HEINRICH & KLEIN
ASSOCIATES, INC.
TRAFFIC ENGINEERING & PLANNING
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215-793-4177 • FAX 215-793-4179

MEMORANDUM

TO: Len Carey, Vice President - Property
Philadelphia Park Racetrack

FROM: Andreas Heinrich, P.E., P.T.O.E.

DATE: September 1, 2006

RE: Traffic Access Study
Temporary License for 2050-Slots Electronic Gaming Facility
Bensalem Township, Bucks County, PA

In accordance with your request, please accept the results of this Traffic Access Study for the proposed 2050-Slots Electronic Gaming Facility to be constructed within the existing Grandstand at the Philadelphia Park Racetrack located along Street Road (PA Route 132) in Bensalem Township, Bucks County, Pennsylvania. The grandstand is being renovated to accommodate 2050 electronic gaming devices (slot machines). It is proposed to maintain access to the site via the main signalized driveway that intersects Street Road (PA Route 132) at a point directly opposite Tillman Drive South, and secondary driveways that intersect Mechanicsville Road opposite Byberry Road (signalized), and two driveways that intersect Richlieu Road (unsignalized). It is also proposed to extend the adjacent Applebee's Restaurant driveway into the Philadelphia Park site to provide a second signalized access driveway along Street Road (PA Route 132).

The purpose of this Traffic Access Study is to evaluate proposed improvements along Street Road (PA Route 132) to provide additional right turn and left turn entry lanes at the main driveway; and, to evaluate signal timing adjustments at both signalized access locations along Street Road (PA Route 132). This Traffic Access Study relies on the data and assumptions provided in the Traffic Impact Study prepared for Bensalem Township, funded by Philadelphia Park Racetrack, and prepared by Pennoni Associates, Inc. dated October 2004. The Traffic Impact Study presents a detailed analysis of the potential traffic impact for construction of a new 3,000-Slots Electronic Gaming Facility which will include restaurants, bars and nightclubs.

It is anticipated that the new 3,000-Slots Electronic Gaming Facility will be constructed over the next two years or so. The 2050-Slots Electronic Gaming Facility being retro-fitted into the existing grandstand will operate on a temporary basis until the new facility can be completed. The proposed improvements to provide additional turning lanes

and signal timing adjustments along Street Road (PA Route 132) are intended to better accommodate short-term traffic increases associated with the 2050-Slots Electronic Gaming Facility until such time that the new 3,000-Slots Electronic Gaming Facility becomes operational.

It is proposed to widen and re-stripe Street Road (PA Route 132) to provide dual left turn entry lanes, and a channelized free-flow right turn entry lane. Street Road (PA Route 132) currently provides two-through lanes in both directions. At the intersection with the Philadelphia Park driveway opposite Tillman Drive South, Street Road (PA Route 132) also provides a separate left turn lane in both directions and a separate southbound right turn lane to Tillman Drive South. At the intersection with the Applebee's Restaurant driveway, Street Road (PA Route 132) also provides a separate left turn lane in the southbound direction and a separate northbound channelized right turn lane. The posted speed limit along Street Road (PA Route 132) is 45 miles per hour.

The Philadelphia Park driveway currently provides two inbound lanes and two outbound lanes within a cartway width of 48 feet. The outbound lanes are designated as a shared left turn/through lane and a separate right turn lane. It is proposed to widen the driveway to provide a third inbound lane for the free-flow operation of the right turn lane to be constructed along northbound Street Road (PA Route 132).

While no physical improvements are proposed at the intersection of Street Road (PA Route 132) and the Applebee's Restaurant driveway, it is proposed to extend the Applebee's Restaurant driveway approximately 600 feet to provide two additional inbound lanes and two additional outbound lanes to serve Philadelphia Park. The outbound lanes as they intersect Street Road (PA Route 132) are designated as a separate left turn lane and a channelized right turn lane.

Tillman Drive South provides two travel lanes in both directions with a landscaped median separating the two directions of travel. The outbound lanes are designated as a shared left turn/through lane and a separate right turn lane. The posted speed limit along Tillman Drive South is 15 miles per hour.

Traffic traveling through the intersection of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South is regulated by a multi-phased, traffic actuated traffic control signal, with lead left turn phases provided for both approaches of Street Road (PA Route 132). Traffic traveling through the intersection of Street Road (PA Route 132) and the Applebee's Restaurant driveway is regulated by a three-phased, traffic actuated traffic control signal, with a lead left turn phase provided for the southbound approach of Street Road (PA Route 132). Both controllers are interconnected with adjacent signalized intersections along Street Road (PA Route 132) and are programmed to operate on a 120-second cycle during weekday peak periods and a 100-second cycle during off-peak periods.

Existing highway travel demand and traffic patterns at the intersections of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and Street Road (PA Route 132) and the Applebee's Restaurant driveway were determined from

review of Turning Movement Traffic Counts completed in 2004 and presented in the Traffic Impact Study prepared by Pennoni Associates, Inc. The two peak hours evaluated in the Traffic Impact Study include the weekday PM peak hour (4:30 PM to 5:30 PM) and the Saturday PM peak hour (5:00 PM to 6:00 PM). Existing peak hour traffic volumes are summarized in Figure 1.

While traffic volumes provide a measure of activity on the area road system, it is also important to calculate the ability of the road system to adequately accommodate the traffic demand. This involves a comparison of peak hour traffic demand with available roadway or intersection capacity. Intersections are usually the critical points in any road network. At intersections, conflicts occur between through, crossing and turning traffic. It is at intersections where congestion is most likely to occur.

A volume/capacity analysis was completed for existing peak hour traffic conditions at the signalized intersections of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and Street Road (PA Route 132) and the Applebee's Restaurant driveway based upon the peak hour traffic volumes summarized in Figure 1. The volume/capacity analysis was completed in accordance with the standard procedures contained in the "Highway Capacity Manual"[(1)]. By definition, vehicle capacity represents "the maximum number of vehicles that can pass a given point during a specified period under prevailing roadway, traffic and control conditions". The level of functioning of an intersection or a uniform section of lane or roadway can be expressed in terms of levels of service. A level of service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. Such measures include speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

At signalized intersections the factors that affect the various approach capacities include width of approach, number of lanes, signal green time, turning percentages, truck volumes, etc. The relative functioning of an intersection is, therefore, based on the average control delay per vehicle for the various movements within the intersection. While volume/capacity relationships affect the capacity, there are other parameters that affect delay and must also be considered. It is possible under certain conditions to have excessive delays without exceeding roadway capacity. Conversely, a saturated approach may have relatively low vehicular delay under certain conditions. Thus, both capacity and control delay must be considered to evaluate the overall operation of a signalized intersection.

Since operation at capacity is usually unsatisfactory to most drivers, a descriptive mechanism has been developed which relates capacity with the expected traffic delay. This is known as Level of Service (LOS). Level of service for a signalized intersection is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel

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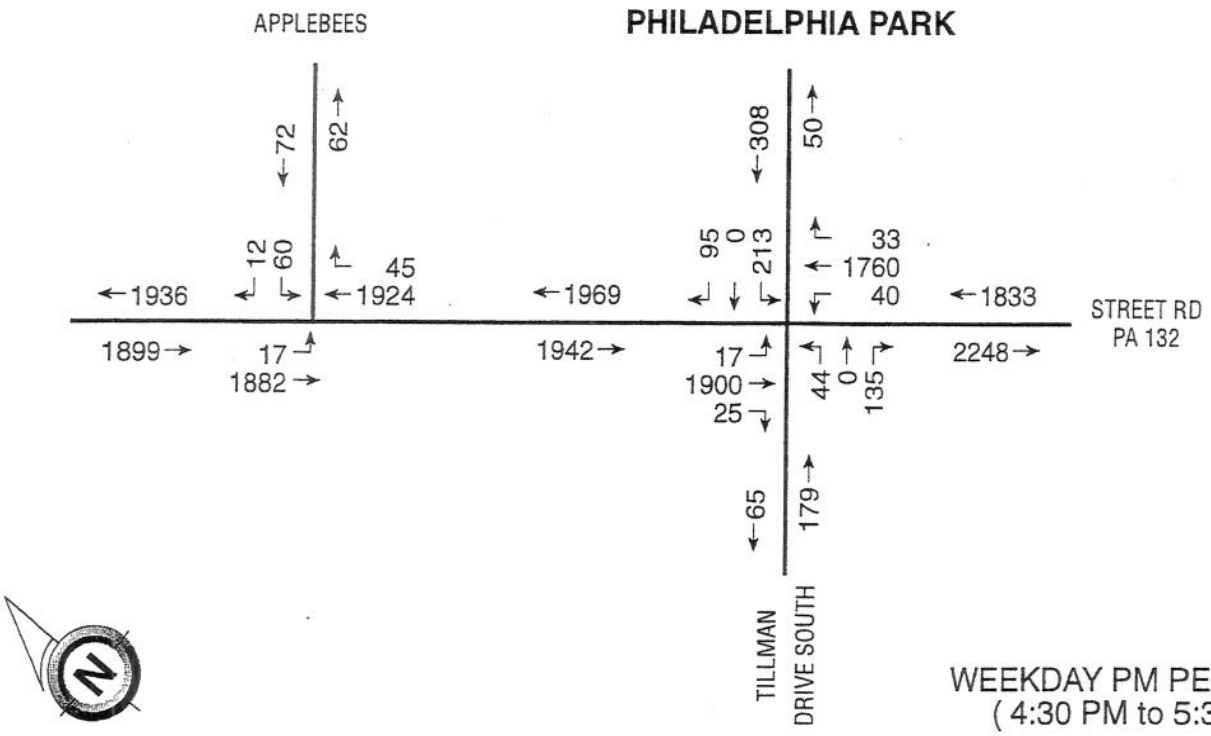
(1) *"Highway Capacity Manual", Transportation Research Board, National Research Council, Washington, D.C., 2000.*



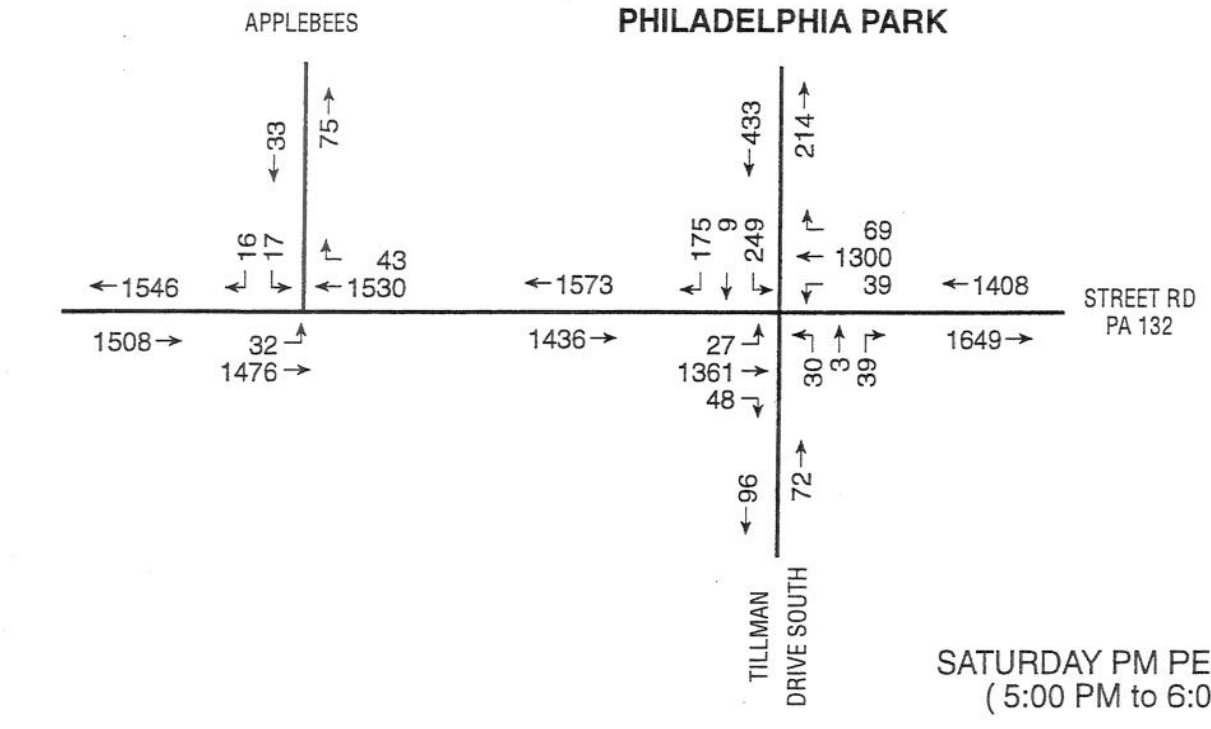


FIGURE 1
EXISTING (2004) PEAK HOUR TRAFFIC

PHILADELPHIA PARK RACETRACK AND CASINO
BENSALEM TOWNSHIP, PA

consumption, and lost travel time. The correlation between levels of service and the stopped delay per vehicle at signalized intersections is provided in Table 1.

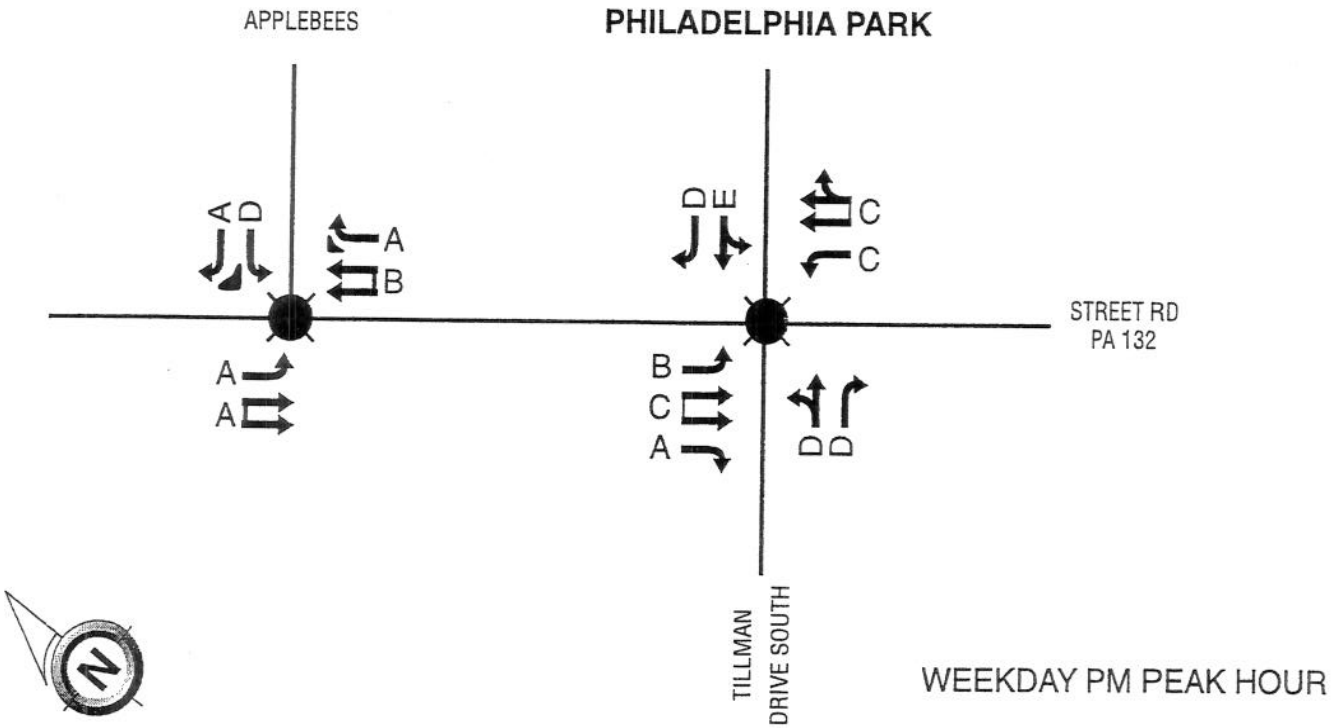
The resultant levels of service calculated from the volume/capacity analysis of existing traffic conditions are summarized in Figure 2. The results of the analysis reveal that peak hour traffic volume at the intersection Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and at the intersection Street Road (PA Route 132) and the Applebee's Restaurant driveway is generally operating at acceptable levels of service, although left turn exiting traffic from the Philadelphia Park driveway is operating at LOS E during both the weekday and Saturday PM peak hours. It should be noted that the results of the analysis have been revised somewhat from the results of the analysis presented in the Traffic Impact Study report in that the left turn factors for traffic exiting from the Philadelphia Park driveway and from Tillman Drive South are adjusted to reflect the fact that there is little or no opposing through traffic on either approach; and, there are two departure lanes along Street Road (PA Route 132) so that left-turning vehicles turn simultaneously with right turning vehicles on the opposing approach. A copy of the volume/capacity analysis worksheets is attached.

As indicated previously, the Philadelphia Park grandstand is being renovated to accommodate 2050 electronic gaming devices (slot machines) temporary to a new 3,000-Slots Electronic Gaming Facility will be constructed over the next two years or so. The temporary facility is expected to be operational before the end of the year, and it is anticipated that the temporary facility will operate at least to the year 2008 when the permanent facility is expected to be completed.

Based on the assumptions for trip generation described in the Traffic Impact Study report, the new 3,000-Slots Electronic Gaming Facility, with associated restaurants, bars and nightclubs, is projected to generate 1,074 trips (558 entering and 516 exiting) during the weekday PM peak hour and 1,431 trips (758 entering and 673 exiting) during the Saturday PM peak hour. For the purpose of this Traffic Access Study, the trip generation for the permanent facility was simply adjusted by factor of 0.683 to reflect the ratio of 2,050 machines in the temporary facility versus 3,000 machines in the future permanent facility. This will result in a projected trip generation for the temporary facility of 734 trips (381 entering and 353 exiting) during the weekday PM peak hour and 978 trips (518 entering and 460 exiting) during the Saturday PM peak hour.

Based on the assumptions for distribution of new trip generation described in the Traffic Impact Study report, the trip generation was assigned to the driveways that serve Philadelphia Park. It is anticipated that approximately 64% of the trip generation will enter and exit via the Street Road (PA Route 132) driveway, approximately 23% of the trip generation will enter and exit via the Richlieu Road driveways, and approximately 13% of the trip generation will enter and exit via the Mechanicsville Road driveway.

The assignment of the projected new trip generation to the intersection of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and to the intersection of Street Road (PA Route 132) and the Applebee's Restaurant driveway is illustrated in Figure 3. As shown, it is anticipated that the main Street Road (PA Route



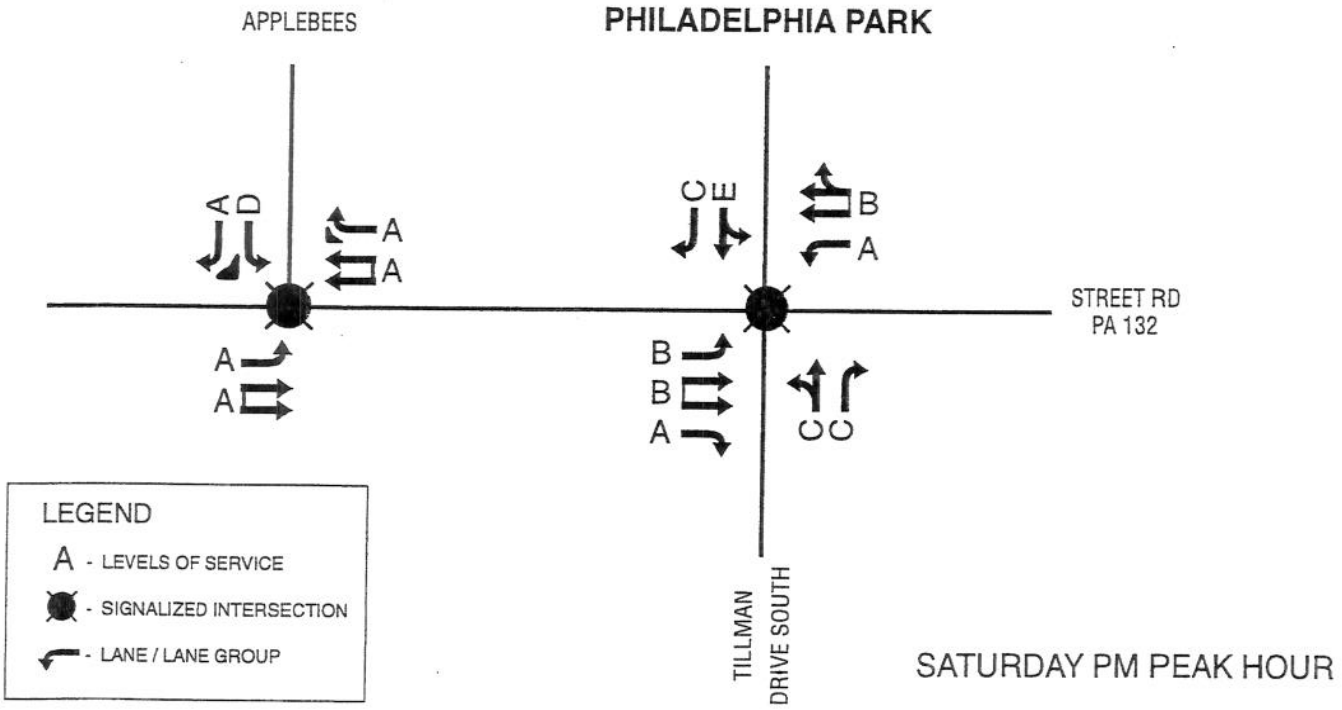
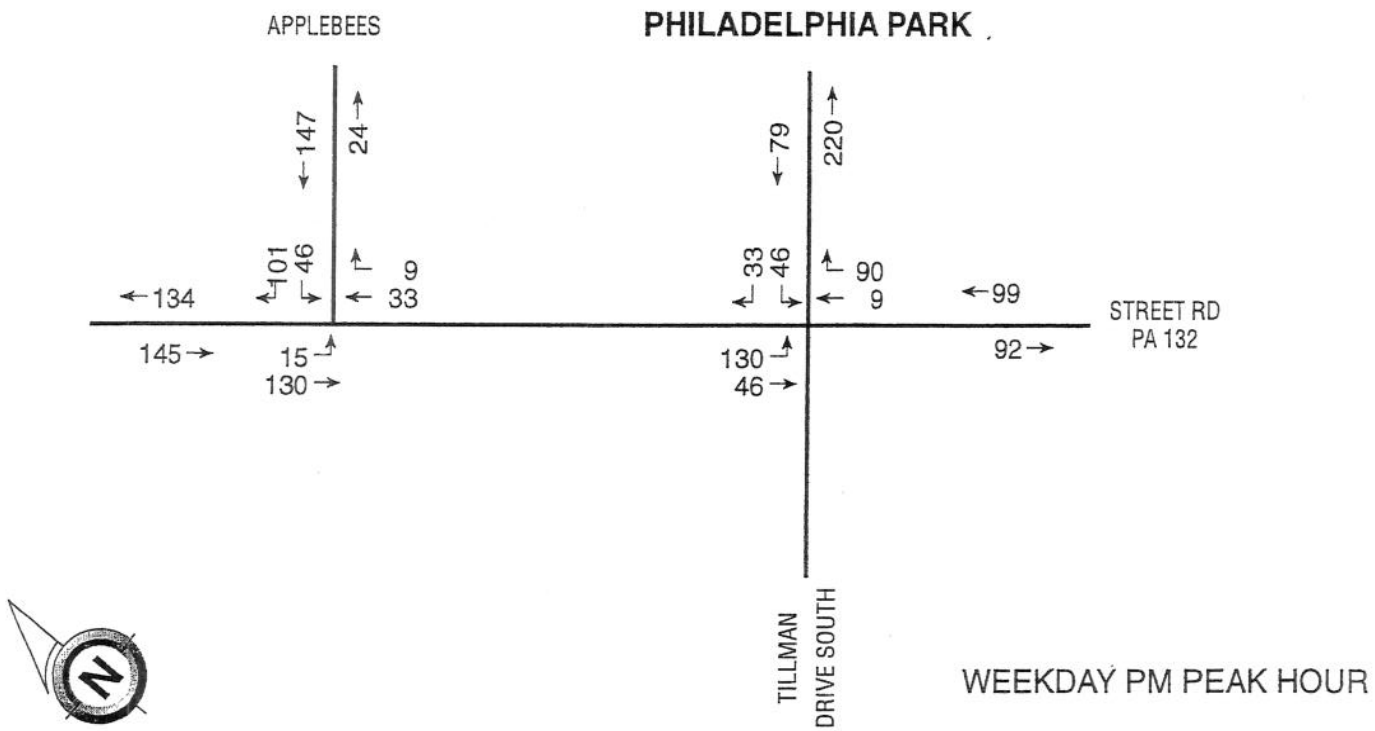


FIGURE 2
EXISTING (2004) PEAK HOUR LEVELS OF SERVICE

PHILADELPHIA PARK RACETRACK AND CASINO
BENSALEM TOWNSHIP, PA



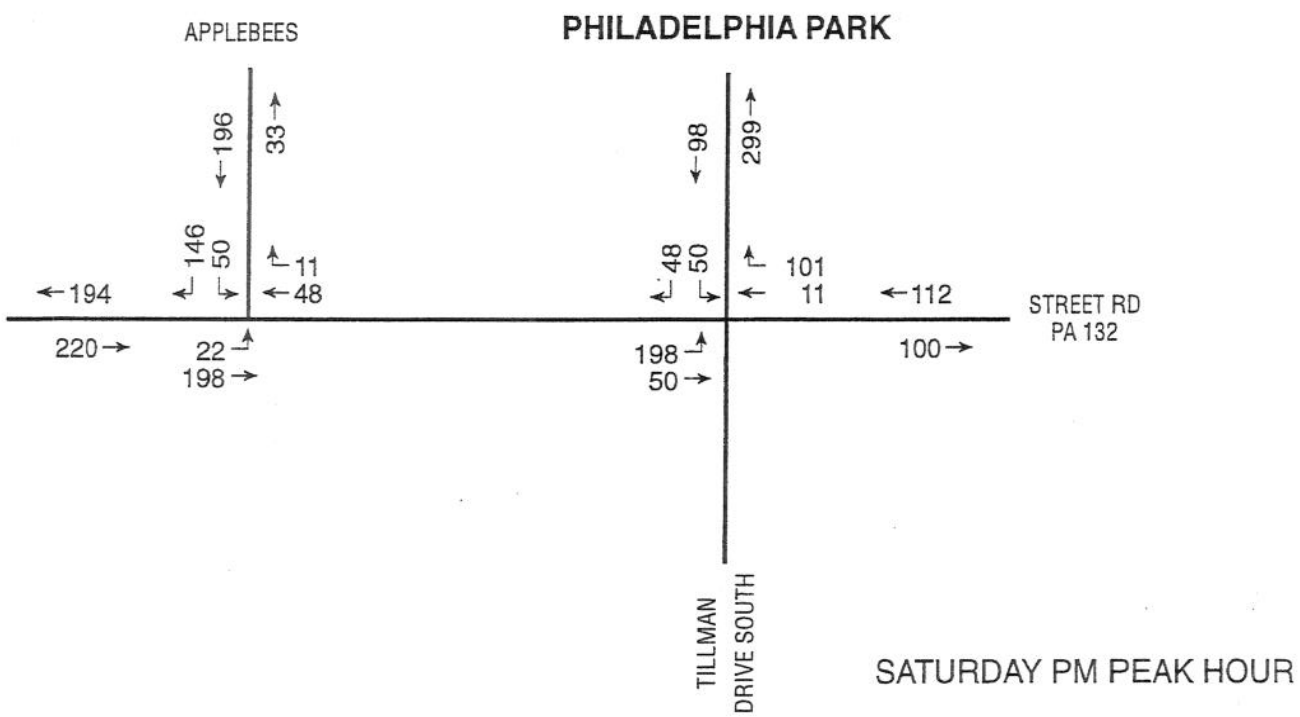


FIGURE 3
NEW DEVELOPMENT GENERATED TRAFFIC
(2050 SLOT MACHINES)

PHILADELPHIA PARK RACETRACK AND CASINO
BENSALEM TOWNSHIP, PA

132) driveway will accommodate 299 new trips (220 entering and 79 exiting) during the weekday PM peak hour and 397 new trips (299 entering and 98 exiting) during the Saturday PM peak hour. It is anticipated that the Applebee's Restaurant driveway will accommodate 171 new trips (24 entering and 147 exiting) during the weekday PM peak hour and 229 new trips (33 entering and 196 exiting) during the Saturday PM peak hour.

As a final step in projecting traffic at the intersection of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and at the intersection of Street Road (PA Route 132) and at the Applebee's Restaurant driveway existing through traffic along Street Road (PA Route 132) was increased by a factor of 6.0% (1.5% per year for the four year period from 2004 to 2008). Again, the assumption for background traffic growth is consistent with the assumptions described in the Traffic Impact Study report. Future (2008) peak hour traffic volumes are summarized in Figure 4.

As described previously, it is proposed to provide additional right turn and left turn entry lanes along Street Road (PA Route 132) for access to Philadelphia Park. Specifically, through a combination of widening and re-striping, it is proposed to provide a second left turn entry lane 12 feet wide and 200 feet long on the southbound approach of Street Road (PA Route 132); while, realigning the existing left turn lane that is 12 feet wide and 550 feet long. The Philadelphia Park entry lanes will be widened to provide a flared departure area with two entry lanes each 15 feet wide before tapering to 12 foot wide lanes.

It is also proposed to widen northbound Street Road (PA Route 132) to construct a channelized free-flow right turn lane with a deceleration lane 14 feet wide and 200 feet long plus taper. The Philadelphia Park driveway will be further widened to provide a third inbound lane for the free-flow operation of the right turn lane. Finally, these improvements will require modification of the traffic signal operation for the intersection of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South.

Finally, it is proposed to construct an approximate 600 foot long, four-lane extension of the Applebee's Restaurant driveway into the Philadelphia Park parking field.

Based on the improvements described above, a second volume/capacity analysis was completed for the intersection of Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South and for the intersection of Street Road (PA Route 132) and the Applebee's Restaurant driveway. This analysis was based on the projected peak hour traffic volumes summarized in Figure 4. The results of the volume/capacity analysis, expressed in terms of levels of service, are summarized in Figure 5. As shown, the results of the analysis reveal that all movements at the intersection Street Road (PA Route 132) and the Philadelphia Park driveway/Tillman Drive South, and all movements at the intersection Street Road (PA Route 132) and the Applebee's Restaurant driveway will operate at an acceptable LOS D or better during both the weekday and Saturday PM peak hours. It should be noted that Peak Hour Factors (PHF's) for traffic exiting the Philadelphia Park driveway have been adjusted to reflect the higher volume and more consistent traffic flow expected from future casino patrons versus the current racetrack patrons. A copy of the volume/capacity analysis worksheets is attached.

TABLE 1

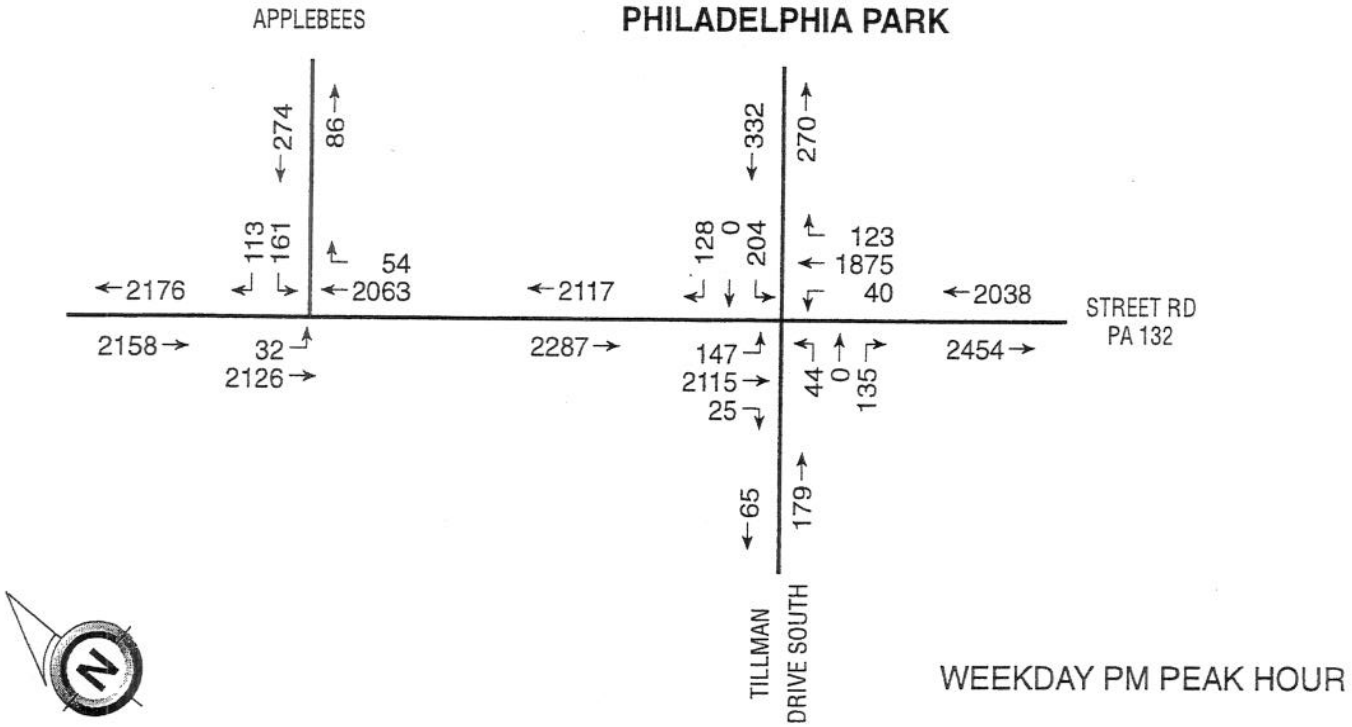
LEVEL OF SERVICE

UNSIGNALIZED INTERSECTIONS

At unsignalized intersections the criteria used to evaluate the quality of flow is the measure of the adequacy of the number of acceptable gaps in the through traffic stream for drivers facing a STOP or YIELD condition. Variables affecting the gaps are the distribution or arrival of vehicles in the through traffic stream, percentage of trucks, grades, and the amount of time it requires to enter the traffic stream from a stop position (critical gap size). The control delay of a critical movement includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

As a result, the following criteria has been established:

Level of Service	Delay Range (sec./veh/)
A	less than 10
B	10 to 15
C	15 to 25
D	25 to 35
E	35 to 50
F	more than 50



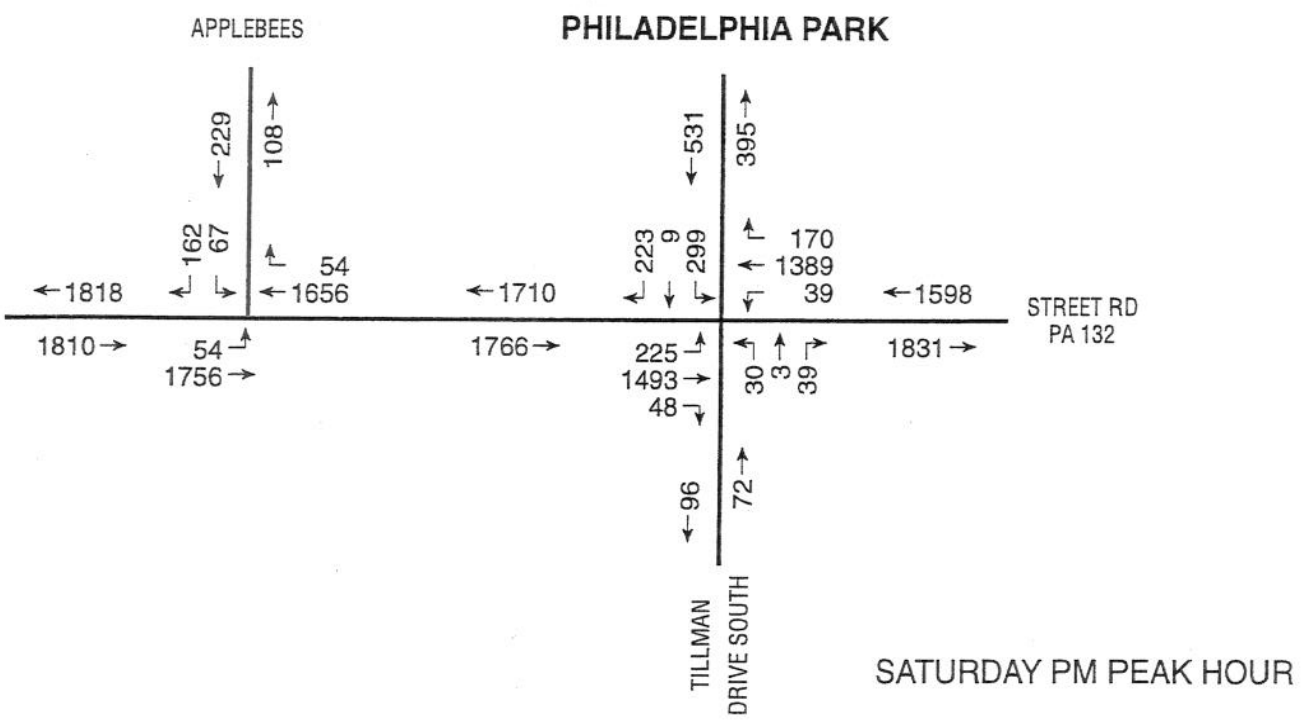
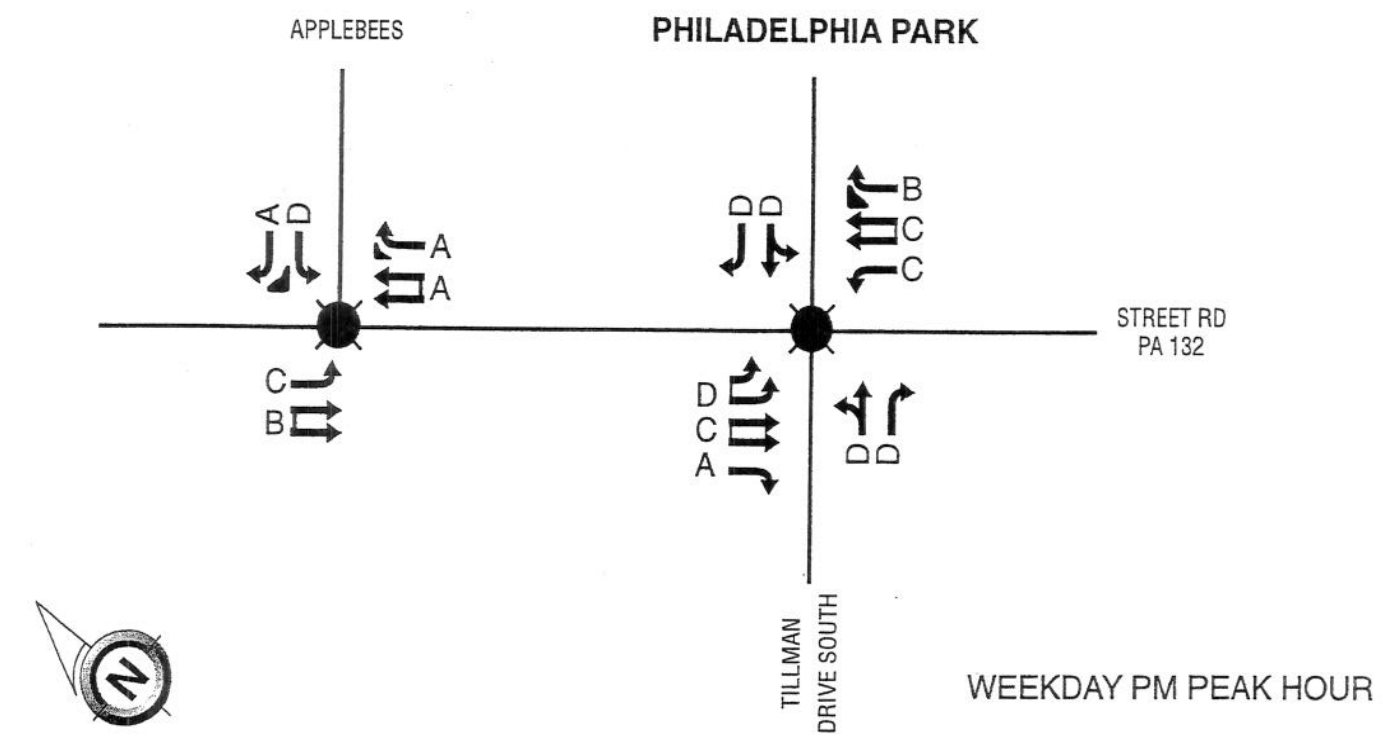


FIGURE 4
PROJECTED (2008) PEAK HOUR TRAFFIC
AFTER DEVELOPMENT

PHILADELPHIA PARK RACETRACK AND CASINO
BENSALEM TOWNSHIP, PA



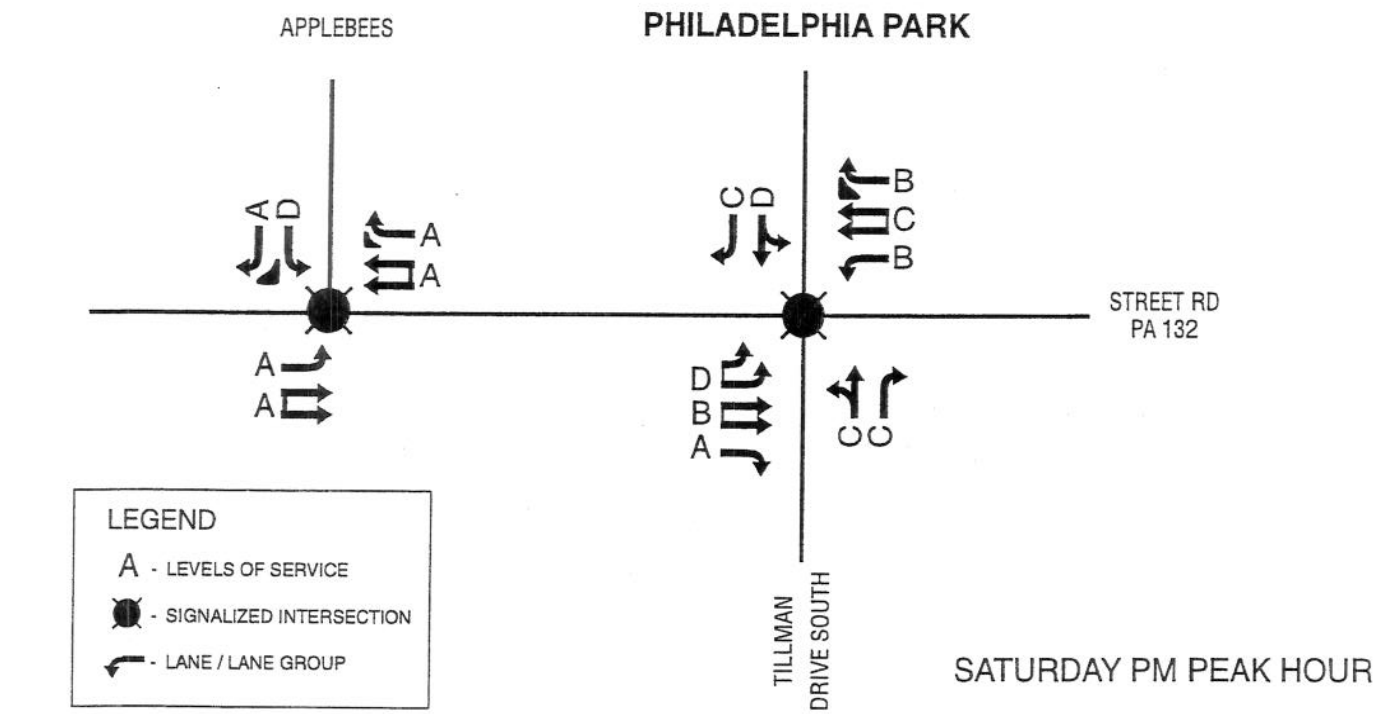


FIGURE 5
PROJECTED (2008) PEAK HOUR LEVELS OF SERVICE
AFTER DEVELOPMENT

PHILADELPHIA PARK RACETRACK AND CASINO
BENSALEM TOWNSHIP, PA

Conclusions

The foregoing Traffic Access Study for the proposed 2050-Slots Electronic Gaming Facility to be developed at Philadelphia Park Racetrack demonstrates that the proposed site access improvements will be adequate to accommodate future peak hour traffic in a safe and efficient manner.

Andreas Heinrich, P.E., P.T.O.E.
Principal

AH:rh

(3.)

Tri-State Traffic Data, Inc.
610-466-1469

Location: Bucks County, PA
Intersection: Street / Race Track
Date: Tuesday, June 10, 2003
Counter: ET / JT

File Name : AF0610-3
Site Code : 00000000
Start Date : 06/10/200
Page No : 1

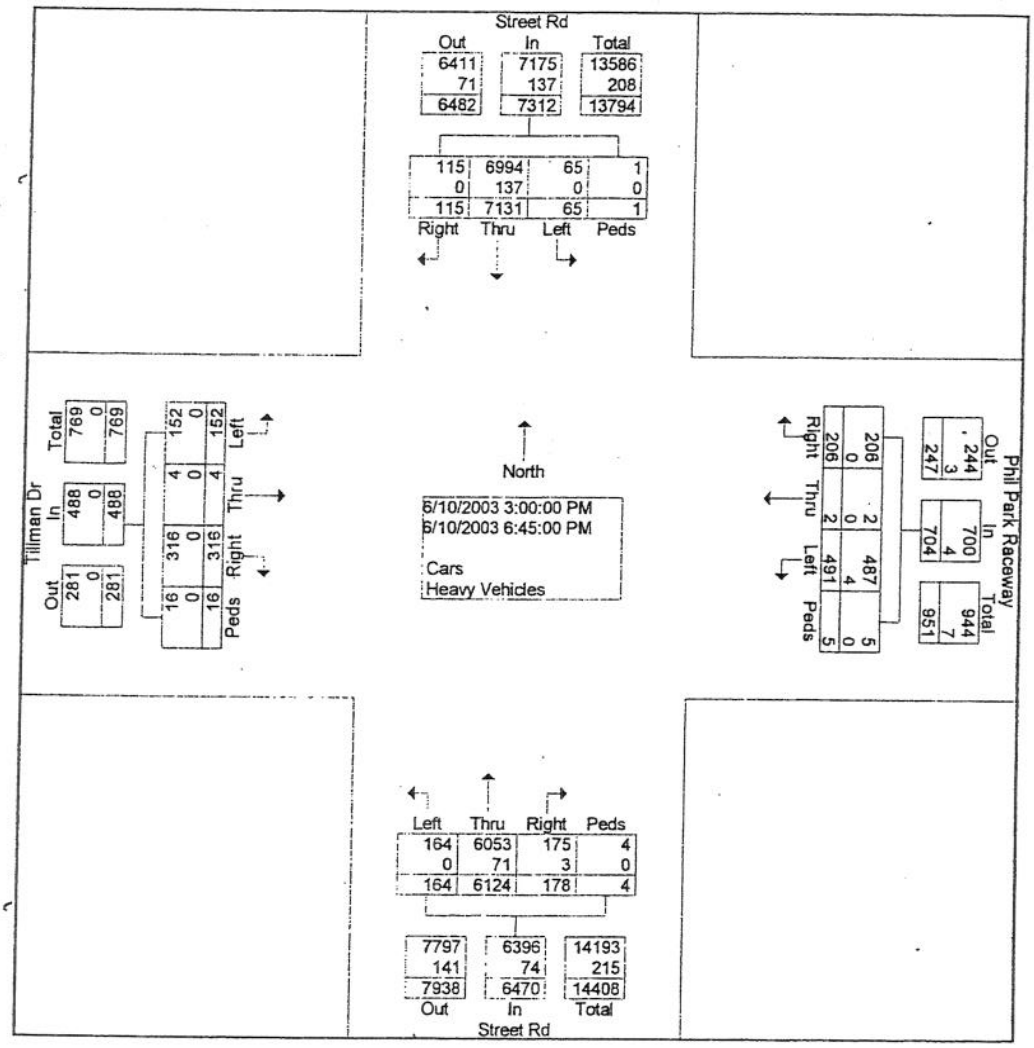
Groups Printed- Cars - Heavy Vehicles

	Street Rd Southbound					Phil Park Raceway Westbound					Street Rd Northbound					Tillman Dr Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	4	354	2	0	360	21	0	12	0	33	3	323	9	0	335	6	0	5	0	11	739
03:15 PM	6	375	5	0	386	27	0	12	1	40	6	363	17	0	386	2	0	5	0	7	819
03:30 PM	2	372	2	1	377	31	0	22	2	55	5	381	14	0	400	6	0	11	4	21	853
03:45 PM	5	436	9	0	450	25	0	13	0	38	13	413	13	1	440	6	0	7	1	14	942
Total	17	1537	18	1	1573	104	0	59	3	166	27	1480	53	1	1561	20	0	28	5	53	3353
04:00 PM	6	451	4	0	461	56	0	23	0	79	11	358	12	0	381	8	1	17	1	27	948
04:15 PM	0	434	6	0	440	21	1	14	1	37	7	385	12	0	404	6	0	10	0	16	897
04:30 PM	6	483	5	0	494	89	0	52	0	141	16	448	7	0	471	10	0	26	1	37	1143
04:45 PM	3	444	5	0	452	47	0	12	0	59	9	449	13	0	471	12	0	30	0	42	1024
Total	15	1812	20	0	1847	213	1	101	1	316	43	1640	44	0	1727	36	1	83	2	122	4012
05:00 PM	1	515	6	0	522	56	0	24	0	80	8	421	7	0	436	11	0	42	1	54	1092
05:15 PM	7	458	9	0	474	21	0	7	0	28	7	442	6	1	456	11	0	37	3	51	1009
05:30 PM	6	534	9	0	549	40	0	7	1	48	15	364	11	1	391	18	0	18	3	39	1027
05:45 PM	4	444	13	0	461	11	0	0	0	11	11	400	6	0	417	6	0	21	0	27	916
Total	18	1951	37	0	2006	128	0	38	1	167	41	1627	30	2	1700	46	0	118	7	171	4044
06:00 PM	3	472	7	0	482	21	0	3	0	24	21	369	12	0	402	19	0	22	0	41	949
06:15 PM	5	509	11	0	525	8	0	2	0	10	10	337	8	0	355	6	1	35	1	43	933
06:30 PM	3	441	14	0	458	11	1	2	0	14	12	318	14	1	345	8	2	13	1	24	841
06:45 PM	4	409	8	0	421	6	0	1	0	7	10	353	17	0	380	17	0	17	0	34	842
Total	15	1831	40	0	1886	46	1	8	0	55	53	1377	51	1	1482	50	3	87	2	142	3565
Grand Total	65	7131	115	1	7312	491	2	206	5	704	164	6124	178	4	6470	152	4	316	16	488	14974
Apprch %	0.9	97.5	1.6	0.0		69.7	0.3	29.3	0.7		2.5	94.7	2.8	0.1		31.1	0.8	64.8	3.3		
Total %	0.4	47.6	0.8	0.0	48.8	3.3	0.0	1.4	0.0	4.7	1.1	40.9	1.2	0.0	43.2	1.0	0.0	2.1	0.1	3.3	

Tri-State Traffic Data, Inc.
610-466-1469

Location: Bucks County, PA
Intersection: Street / Race Track
Date: Tuesday, June 10, 2003
Counter: ET / JT

File Name : AF0610-3
Site Code : 00000000
Start Date : 06/10/2003
Page No : 2



Tri-State Traffic Data, Inc.
610-466-1469

Location: Bucks County, PA
Intersection: Street / Race Track
Date: Tuesday, June 10, 2003
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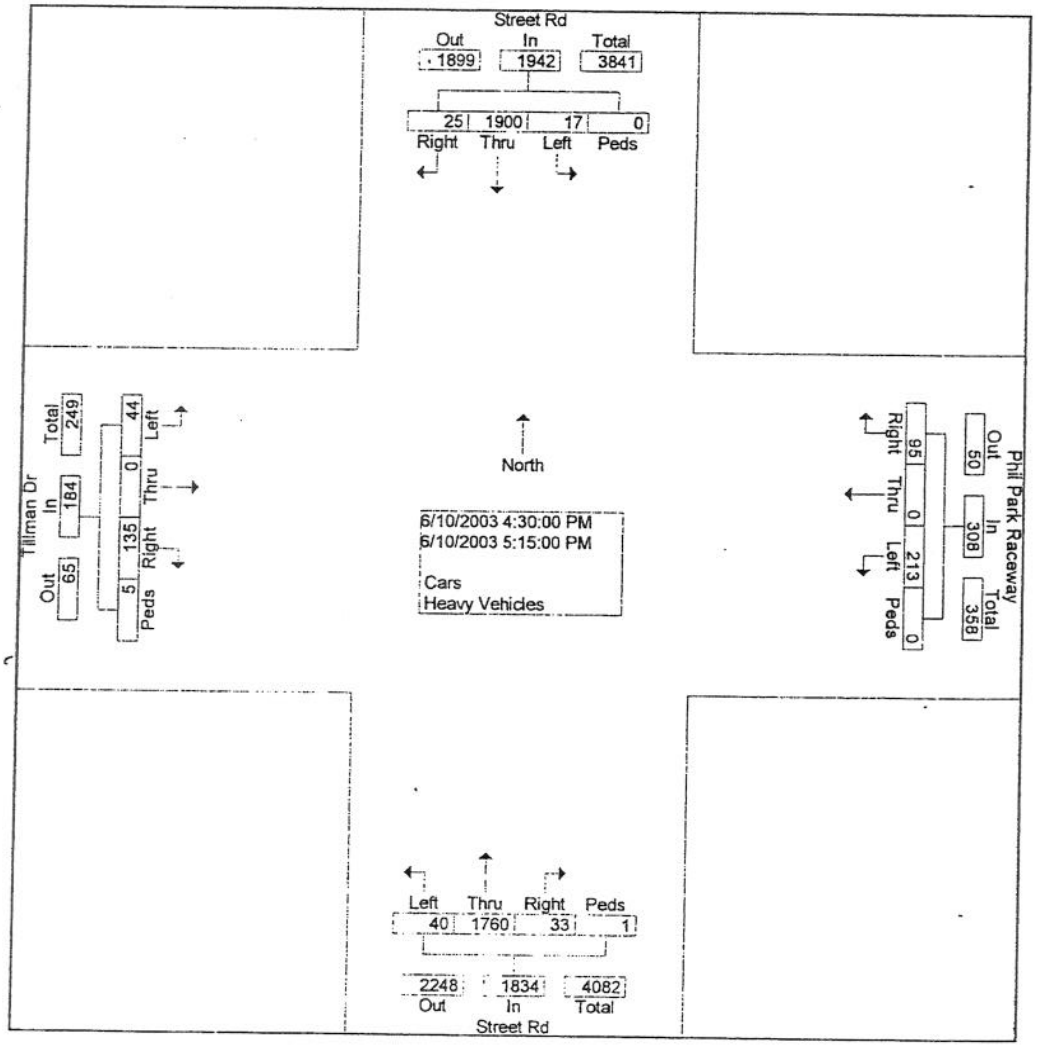
File Name : AF0610-3
Site Code : 00000000
Start Date : 06/10/2003
Page No : 3

	Street Rd Southbound					Phil Park Raceway Westbound					Street Rd Northbound					Tillman Dr Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 06:45 PM - Peak 1 of 1																					
Intersection	04:30 PM																				
Volume	17	1900	25	0	1942	213	0	95	0	308	40	1760	33	1	1834	44	0	135	5	184	4268
Percent	0.9	97.8	1.3	0.0		69.2	0.0	30.8	0.0		2.2	96.0	1.8	0.1		23.9	0.0	73.4	2.7		
04:30 Volume	6	483	5	0	494	89	0	52	0	141	16	448	7	0	471	10	0	26	1	37	1143
Peak Factor																					0.934
High Int.	05:00 PM					04:30 PM					04:30 PM					05:00 PM					
Volume	1	515	6	0	522	89	0	52	0	141	16	448	7	0	471	11	0	42	1	54	
Peak Factor					0.930					0.546					0.973					0.852	



Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd / Phil Race Trac
Date: Saturday, July 19, 2003
Weather: Id

File Name : MS0719-3
Site Code : 00000000
Start Date : 07/19/2003
Page No : 1

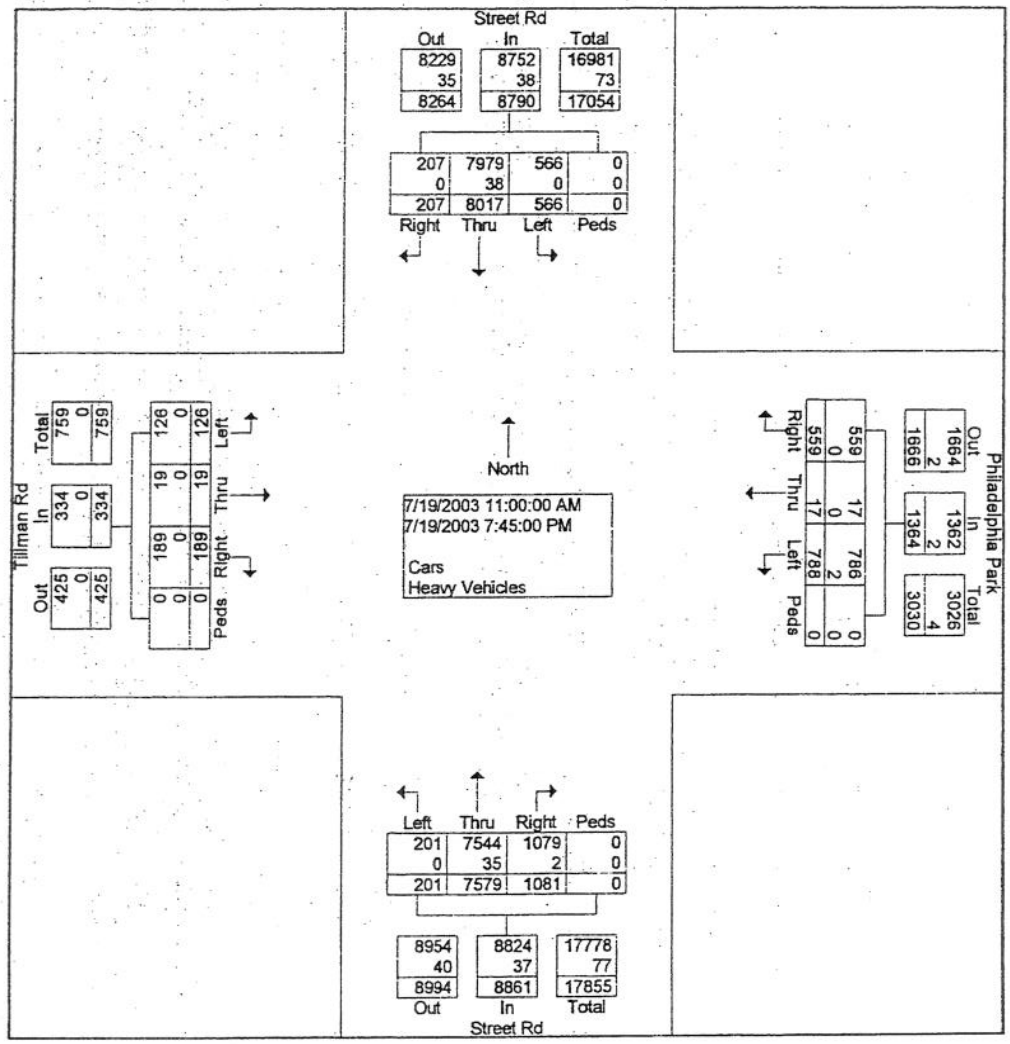
Groups Printed- Cars - Heavy Vehicles

	Street Rd Southbound					Philadelphia Park Westbound					Street Rd Northbound					Tillman Rd Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:00 AM	23	348	3	0	374	24	2	28	0	54	5	278	68	0	351	2	2	2	0	6	785
11:15 AM	46	338	2	0	386	21	0	19	0	40	4	291	61	0	356	2	1	4	0	7	789
11:30 AM	37	367	3	0	407	29	0	19	0	48	5	332	89	0	426	2	2	9	0	13	894
11:45 AM	73	348	1	0	422	22	0	20	0	42	5	347	119	0	471	3	0	6	0	9	944
Total	179	1401	9	0	1589	96	2	86	0	184	19	1248	337	0	1604	9	5	21	0	35	3412
12:00 PM	55	352	7	0	414	28	1	13	0	42	8	344	126	0	478	4	3	5	0	12	946
12:15 PM	46	350	4	0	400	45	1	16	0	62	5	364	85	0	454	8	1	4	0	13	929
12:30 PM	37	368	6	0	411	23	0	23	0	46	5	338	74	0	417	0	1	8	0	9	883
12:45 PM	34	363	5	0	402	21	1	17	0	39	9	335	59	0	403	3	1	9	0	13	857
Total	172	1433	22	0	1627	117	3	69	0	189	27	1381	344	0	1752	15	6	26	0	47	3615
01:00 PM	33	365	4	0	402	33	1	20	0	54	6	320	60	0	386	6	0	11	0	17	859
01:15 PM	33	342	2	0	377	25	0	24	0	49	12	332	47	0	391	3	1	6	0	10	827
01:30 PM	32	357	9	0	398	33	0	19	0	52	5	330	59	0	394	4	1	6	0	11	855
01:45 PM	32	343	7	0	382	24	0	18	0	42	7	336	40	0	383	2	0	6	0	8	815
Total	130	1407	22	0	1559	115	1	81	0	197	30	1318	206	0	1554	15	2	29	0	46	3356
*** BREAK ***																					
05:00 PM	7	361	11	0	379	95	3	59	0	157	9	321	18	0	348	4	0	4	0	8	892
05:15 PM	4	328	13	0	345	52	6	28	0	86	11	304	27	0	342	8	1	11	0	20	793
05:30 PM	8	317	10	0	335	56	0	49	0	105	9	308	6	0	323	8	0	11	0	19	782
05:45 PM	8	355	14	0	377	46	0	39	0	85	10	367	18	0	395	10	2	13	0	25	882
Total	27	1361	48	0	1436	249	9	175	0	433	39	1300	69	0	1408	30	3	39	0	72	3349
06:00 PM	10	311	10	0	331	69	2	51	0	122	3	316	13	0	332	7	1	4	0	12	797
06:15 PM	6	352	9	0	367	30	0	33	0	63	9	311	15	0	335	7	0	11	0	18	783
06:30 PM	6	324	16	0	346	33	0	17	0	50	12	282	15	0	309	5	0	13	0	18	723
06:45 PM	7	297	11	0	315	22	0	17	0	39	16	311	26	0	353	4	1	10	0	15	722
Total	29	1284	46	0	1359	154	2	118	0	274	40	1220	69	0	1329	23	2	38	0	63	3025
07:00 PM	10	294	11	0	315	24	0	15	0	39	16	268	17	0	301	8	0	5	0	13	668
07:15 PM	6	291	12	0	309	7	0	3	0	10	7	295	16	0	318	6	0	15	0	21	658
07:30 PM	3	273	20	0	296	14	0	6	0	20	10	293	14	0	317	14	1	8	0	23	656
07:45 PM	10	273	17	0	300	12	0	6	0	18	13	256	9	0	278	6	0	8	0	14	610
Total	29	1131	60	0	1220	57	0	30	0	87	46	1112	56	0	1214	34	1	36	0	71	2592
Grand Total	566	8017	207	0	8790	788	17	559	0	1364	201	7579	1081	0	8861	126	19	189	0	334	19349
Apprch %	6.4	91.2	2.4	0.0		57.8	1.2	41.0	0.0		2.3	85.5	12.2	0.0		37.7	5.7	56.6	0.0		
Total %	2.9	41.4	1.1	0.0	45.4	4.1	0.1	2.9	0.0	7.0	1.0	39.2	5.6	0.0	45.8	0.7	0.1	1.0	0.0	1.7	

Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd / Phil Race Trac
Date: Saturday, July 19, 2003
Weather: Id

File Name : MS0719-3
Site Code : 00000000
Start Date : 07/19/2003
Page No : 2

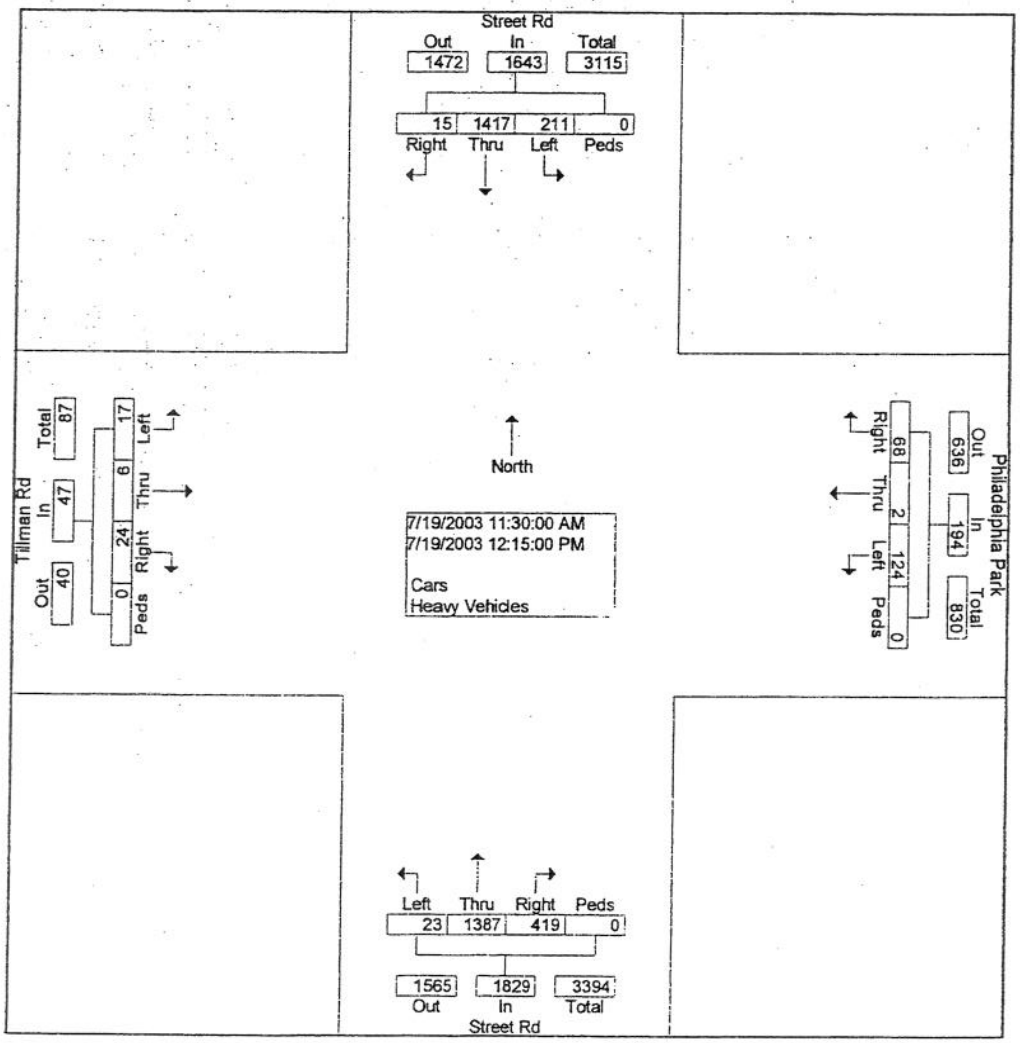


Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd / Phil Race Trac
Date: Saturday, July 19, 2003
Weather: Id

File Name : MS0719-3
Site Code : 00000000
Start Date : 07/19/2003
Page No : 3

	Street Rd Southbound					Philadelphia Park Westbound					Street Rd Northbound					Tillman Rd Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 11:00 AM to 03:30 PM - Peak 1 of 1																					
Intersection	11:30 AM																				
Volume	211	1417	15	0	1643	124	2	68	0	194	23	1387	419	0	1829	17	6	24	0	47	3713
Percent	12.8	86.2	0.9	0.0		63.9	1.0	35.1	0.0		1.3	75.8	22.9	0.0		36.2	12.8	51.1	0.0		
12:00 Volume	55	352	7	0	414	28	1	13	0	42	8	344	126	0	478	4	3	5	0	12	946
Peak Factor																					0.981
High Int.	11:45 AM					12:15 PM					12:00 PM					11:30 AM					
Volume	73	348	1	0	422	45	1	16	0	62	8	344	126	0	478	2	2	9	0	13	
Peak Factor					0.973					0.782					0.957					0.904	

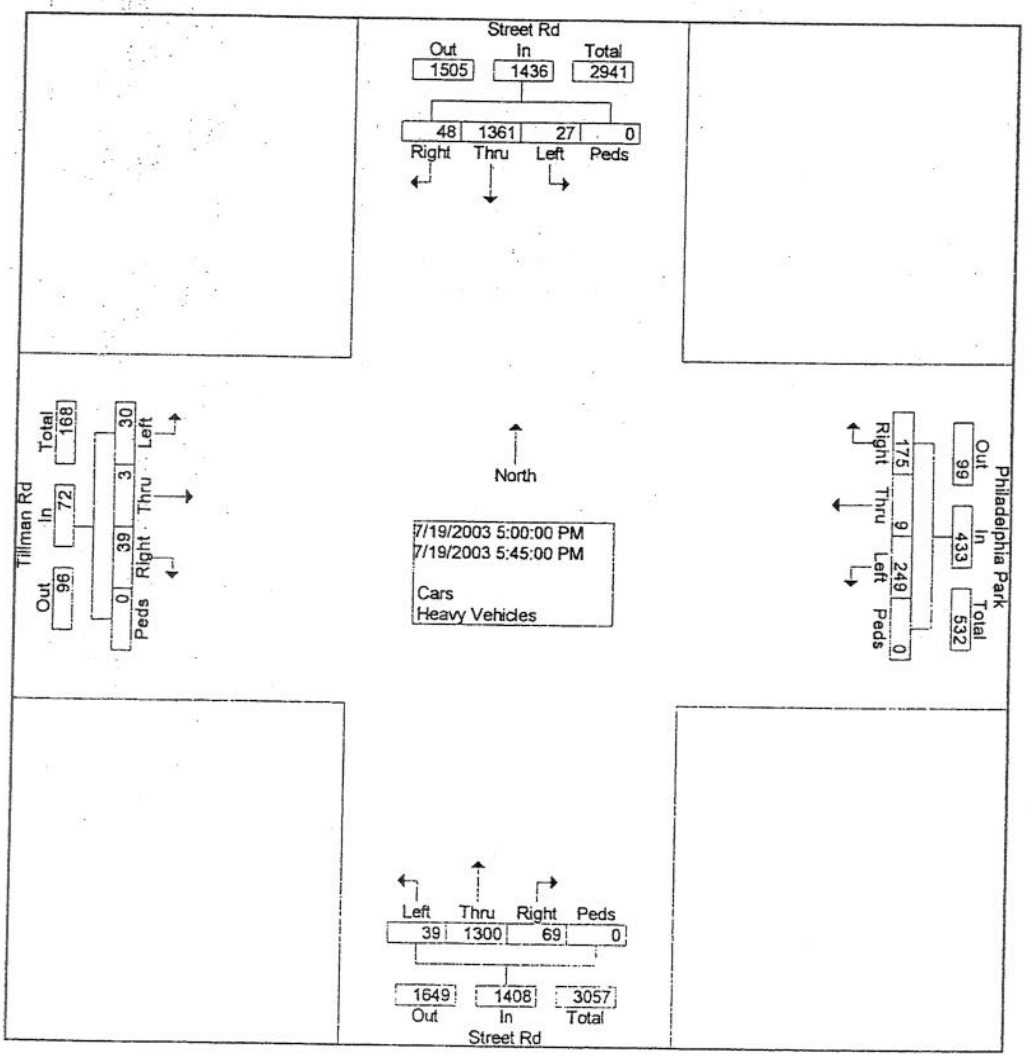


Tri-State Traffic Data, Inc.
610-466-1469

L[illegible]ation: Bensalem Twp., Bucks Co.
In[illegible]section: Street Rd / Phil Race Trac
Date: Saturday, July 19, 2003
Weather: ld

File Name : MS0719-3
Site Code : 00000000
Start Date : 07/19/2003
Page No : 4

	Street Rd Southbound					Philadelphia Park Westbound					Street Rd Northbound					Tillman Rd Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 03:45 PM to 07:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				
Volume	27	1361	48	0	1436	249	9	175	0	433	39	1300	69	0	1408	30	3	39	0	72	3349
Percent	1.9	94.8	3.3	0.0		57.5	2.1	40.4	0.0		2.8	92.3	4.9	0.0		41.7	4.2	54.2	0.0		
05:00 Volume	7	361	11	0	379	95	3	59	0	157	9	321	18	0	348	4	0	4	0	8	892
Peak Factor																					0.939
High Int.	05:00 PM					05:00 PM					05:45 PM					05:45 PM					
Volume	7	361	11	0	379	95	3	59	0	157	10	367	18	0	395	10	2	13	0	25	
Peak Factor					0.947					0.689					0.891					0.720	



Tri-State Traffic Data, Inc.
610-466-1469

(4)

Location: Bucks County, PA
Intersection: Street Rd / Applebees
Date: Tuesday, June 10, 2003
Counter: RZ

File Name : AF0610-4
Site Code : 00000000
Start Date : 06/10/200
Page No : 1

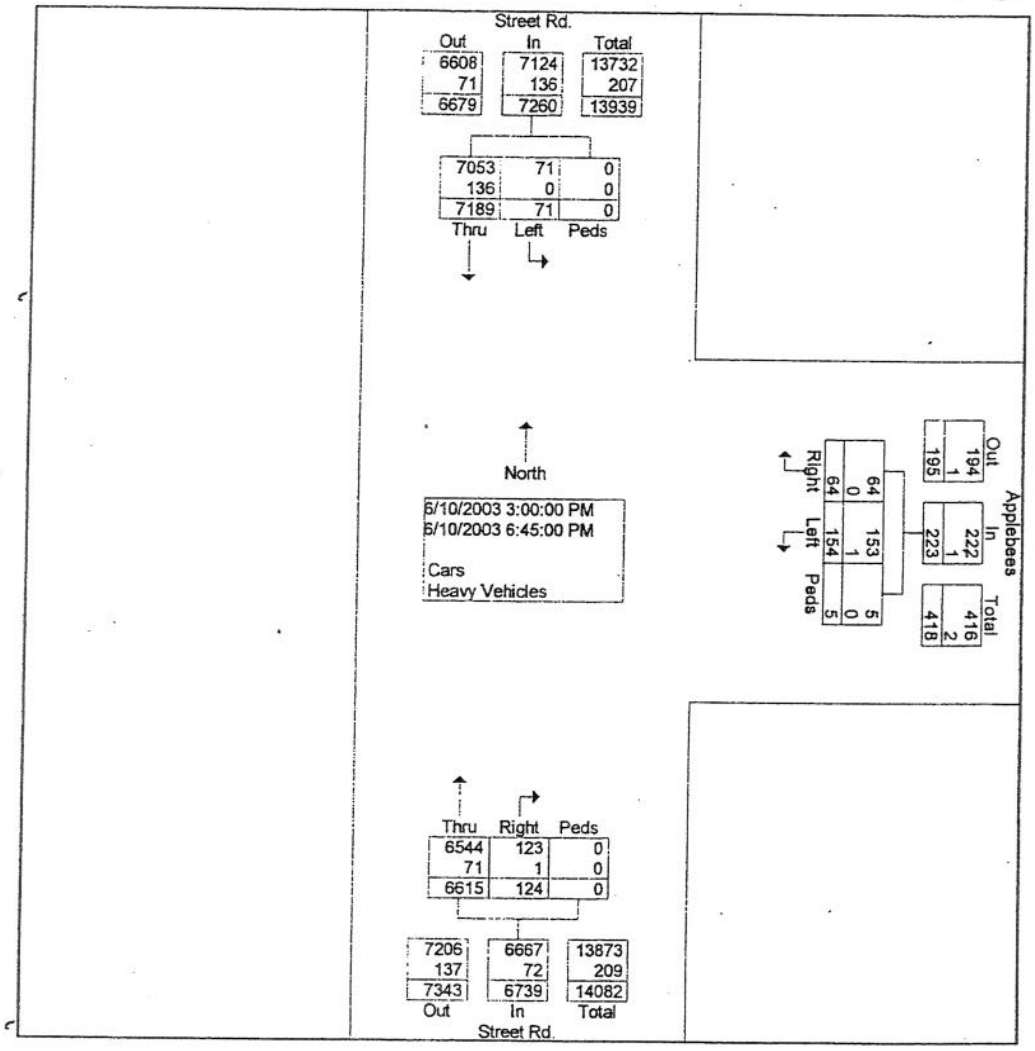
Groups Printed- Cars - Heavy Vehicles

	Street Rd. Southbound					Applebees Westbound					Street Rd. Northbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:00 PM	4	377	0	0	381	7	0	4	0	11	0	359	4	0	363	755
03:15 PM	3	362	0	0	365	4	0	6	1	11	0	396	2	0	398	774
03:30 PM	4	387	0	0	391	2	0	3	0	5	0	419	6	0	425	821
03:45 PM	8	421	0	0	429	3	0	3	1	7	0	436	5	0	441	877
Total	19	1547	0	0	1566	16	0	16	2	34	0	1610	17	0	1627	3227
04:00 PM	1	448	0	0	449	13	0	3	1	17	0	396	8	0	404	870
04:15 PM	2	447	0	0	449	6	0	5	1	12	0	410	8	0	418	879
04:30 PM	5	475	0	0	480	11	0	3	0	14	0	527	13	0	540	1034
04:45 PM	5	452	0	0	457	11	0	0	0	11	0	480	11	0	491	959
Total	13	1822	0	0	1835	41	0	11	2	54	0	1813	40	0	1853	3742
05:00 PM	2	504	0	0	506	22	0	3	0	25	0	453	11	0	464	995
05:15 PM	5	451	0	0	456	16	0	6	0	22	0	464	10	0	474	952
05:30 PM	6	523	0	0	529	19	0	8	1	28	0	405	5	0	410	967
05:45 PM	7	457	0	0	464	9	0	1	0	10	0	416	7	0	423	897
Total	20	1935	0	0	1955	66	0	18	1	85	0	1738	33	0	1771	3811
06:00 PM	9	471	0	0	480	13	0	8	0	21	0	377	15	0	392	893
06:15 PM	3	514	0	0	517	10	0	5	0	15	0	350	10	0	360	892
06:30 PM	2	465	0	0	467	4	0	5	0	9	0	341	5	0	346	822
06:45 PM	5	435	0	0	440	4	0	1	0	5	0	386	4	0	390	835
Total	19	1885	0	0	1904	31	0	19	0	50	0	1454	34	0	1488	3442
Grand Total	71	7189	0	0	7260	154	0	64	5	223	0	6615	124	0	6739	14222
Apprch %	1.0	99.0	0.0	0.0		69.1	0.0	28.7	2.2		0.0	98.2	1.8	0.0		
Total %	0.5	50.5	0.0	0.0	51.0	1.1	0.0	0.5	0.0	1.6	0.0	46.5	0.9	0.0	47.4	

Tri-State Traffic Data, Inc.
610-466-1469

Location: Bucks County, PA
Intersection: Street Rd / Applebees
Date: Tuesday, June 10, 2003
Counter: RZ

File Name : AF0610-4
Site Code : 00000000
Start Date : 06/10/2003
Page No : 2

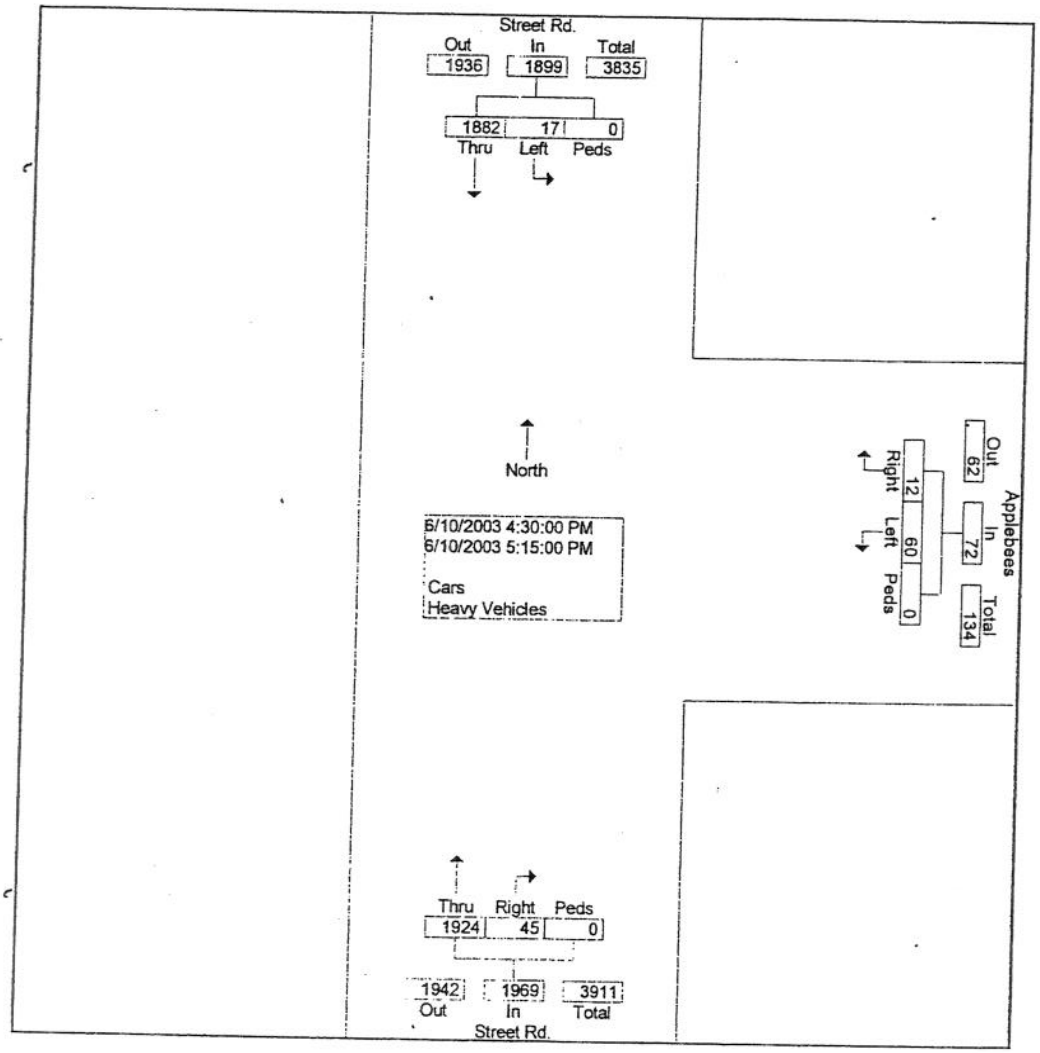


Tri-State Traffic Data, Inc.
610-466-1469

Location: Bucks County, PA
Intersection: Street Rd / Applebees
Date: Tuesday, June 10, 2003
Counter: RZ

File Name : AF0610-4
Site Code : 00000000
Start Date : 06/10/2003
Page No : 3

	Street Rd. Southbound					Applebees Westbound					Street Rd. Northbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 03:00 PM to 06:45 PM - Peak 1 of 1																
Intersection	04:30 PM															
Volume	17	1882	0	0	1899	60	0	12	0	72	0	1924	45	0	1969	3940
Percent	0.9	99.1	0.0	0.0		83.3	0.0	16.7	0.0		0.0	97.7	2.3	0.0		
04:30 Volume	5	475	0	0	480	11	0	3	0	14	0	527	13	0	540	1034
Peak Factor																0.953
High Int.	05:00 PM					05:00 PM					04:30 PM					
Volume	2	504	0	0	506	22	0	3	0	25	0	527	13	0	540	
Peak Factor					0.938					0.720					0.912	



Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd @ Applebees Drvw
Date: Saturday, July 19, 2003
Weather: wc

File Name : MS0719-4
Site Code : 00000000
Start Date : 07/19/2003
Page No : 1

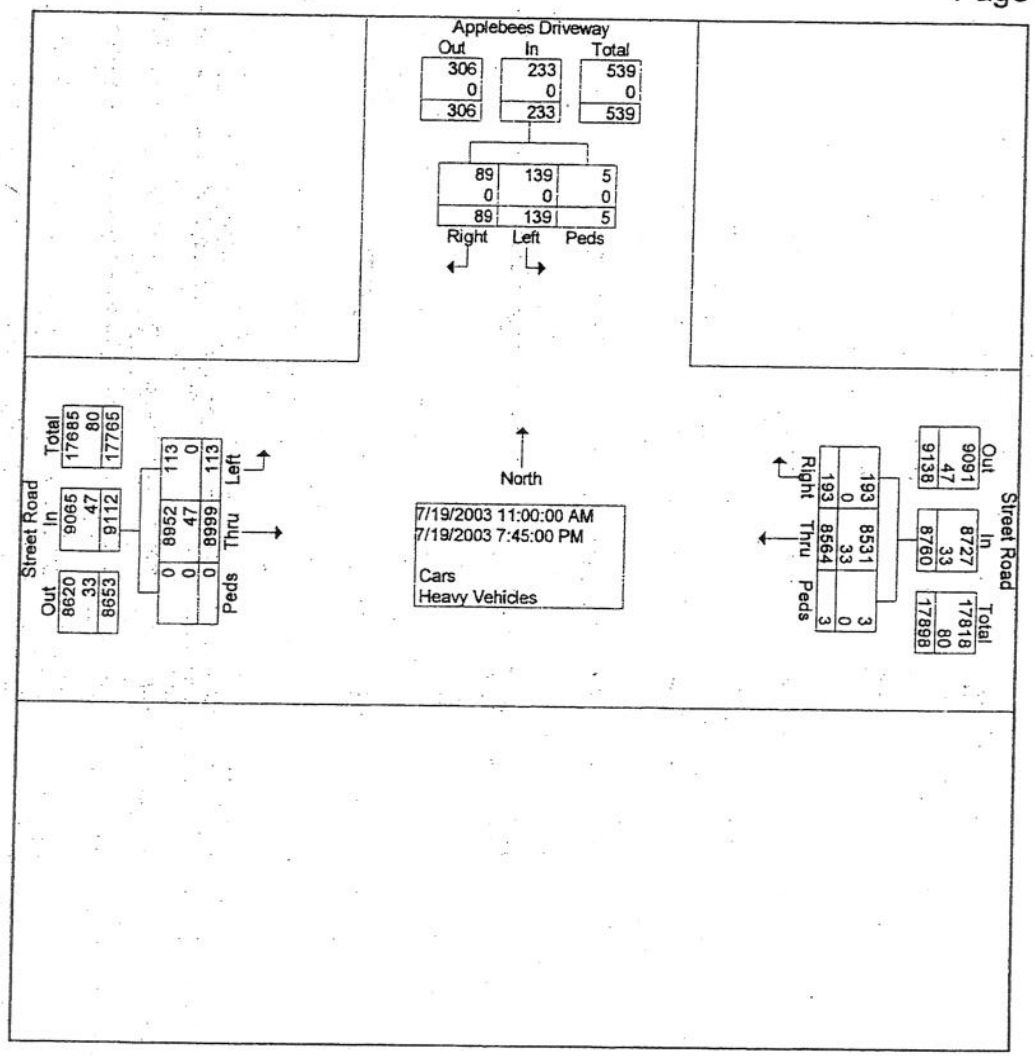
Groups Printed- Cars - Heavy Vehicles

	Applebees Driveway Southbound					Street Road Westbound					Street Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:00 AM	2	0	0	0	2	0	300	4	0	304	3	361	0	0	364	670
11:15 AM	4	0	0	1	5	0	306	7	0	313	0	389	0	0	389	707
11:30 AM	5	0	4	0	9	0	363	4	0	367	6	408	0	0	414	790
11:45 AM	3	0	3	0	6	0	373	9	0	382	5	414	0	0	419	807
Total	14	0	7	1	22	0	1342	24	0	1366	14	1572	0	0	1586	2974
12:00 PM	17	0	5	1	23	0	390	5	0	395	5	424	0	0	429	847
12:15 PM	5	0	3	0	8	0	394	3	0	397	2	425	0	0	427	832
12:30 PM	1	0	2	0	3	0	392	5	0	397	4	433	0	0	437	837
12:45 PM	7	0	3	0	10	0	369	10	0	379	2	393	0	0	395	784
Total	30	0	13	1	44	0	1545	23	0	1568	13	1675	0	0	1688	3300
01:00 PM	5	0	2	0	7	0	328	3	0	331	2	416	0	0	418	756
01:15 PM	1	0	3	0	4	0	383	3	0	386	2	392	0	0	394	784
01:30 PM	6	0	0	1	7	0	384	5	1	390	5	400	0	0	405	802
01:45 PM	7	0	2	0	9	0	360	7	0	367	3	387	0	0	390	766
Total	19	0	7	1	27	0	1455	18	1	1474	12	1595	0	0	1607	3108
*** BREAK ***																
05:00 PM	5	0	2	0	7	0	401	10	0	411	7	384	0	0	391	809
05:15 PM	3	0	4	1	8	0	347	8	1	356	10	367	0	0	377	741
05:30 PM	4	0	6	0	10	0	371	8	0	379	7	334	0	0	341	730
05:45 PM	5	0	4	0	9	0	411	17	0	428	8	391	0	0	399	836
Total	17	0	16	1	34	0	1530	43	1	1574	32	1476	0	0	1508	3116
06:00 PM	11	0	1	0	12	0	395	12	0	407	3	334	0	0	337	756
06:15 PM	6	0	5	0	11	0	363	12	0	375	4	384	0	0	388	774
06:30 PM	4	0	3	1	8	0	333	7	1	341	10	355	0	0	365	714
06:45 PM	8	0	10	0	18	0	353	20	0	373	1	322	0	0	323	714
Total	29	0	19	1	49	0	1444	51	1	1496	18	1395	0	0	1413	2958
07:00 PM	8	0	3	0	11	0	308	6	0	314	2	319	0	0	321	646
07:15 PM	8	0	12	0	20	0	342	8	0	350	6	331	0	0	337	707
07:30 PM	4	0	6	0	10	0	322	13	0	335	12	328	0	0	340	685
07:45 PM	10	0	6	0	16	0	276	7	0	283	4	308	0	0	312	611
Total	30	0	27	0	57	0	1248	34	0	1282	24	1286	0	0	1310	2649
Grand Total	139	0	89	5	233	0	8564	193	3	8760	113	8999	0	0	9112	18105
Apprch %	59.7	0.0	38.2	2.1		0.0	97.8	2.2	0.0		1.2	98.8	0.0	0.0		
Total %	0.8	0.0	0.5	0.0	1.3	0.0	47.3	1.1	0.0	48.4	0.6	49.7	0.0	0.0	50.3	

Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd @ Applebees Drvw
Date: Saturday, July 19, 2003
Weather: wc

File Name : MS0719-4
Site Code : 00000000
Start Date : 07/19/2003
Page No : 2

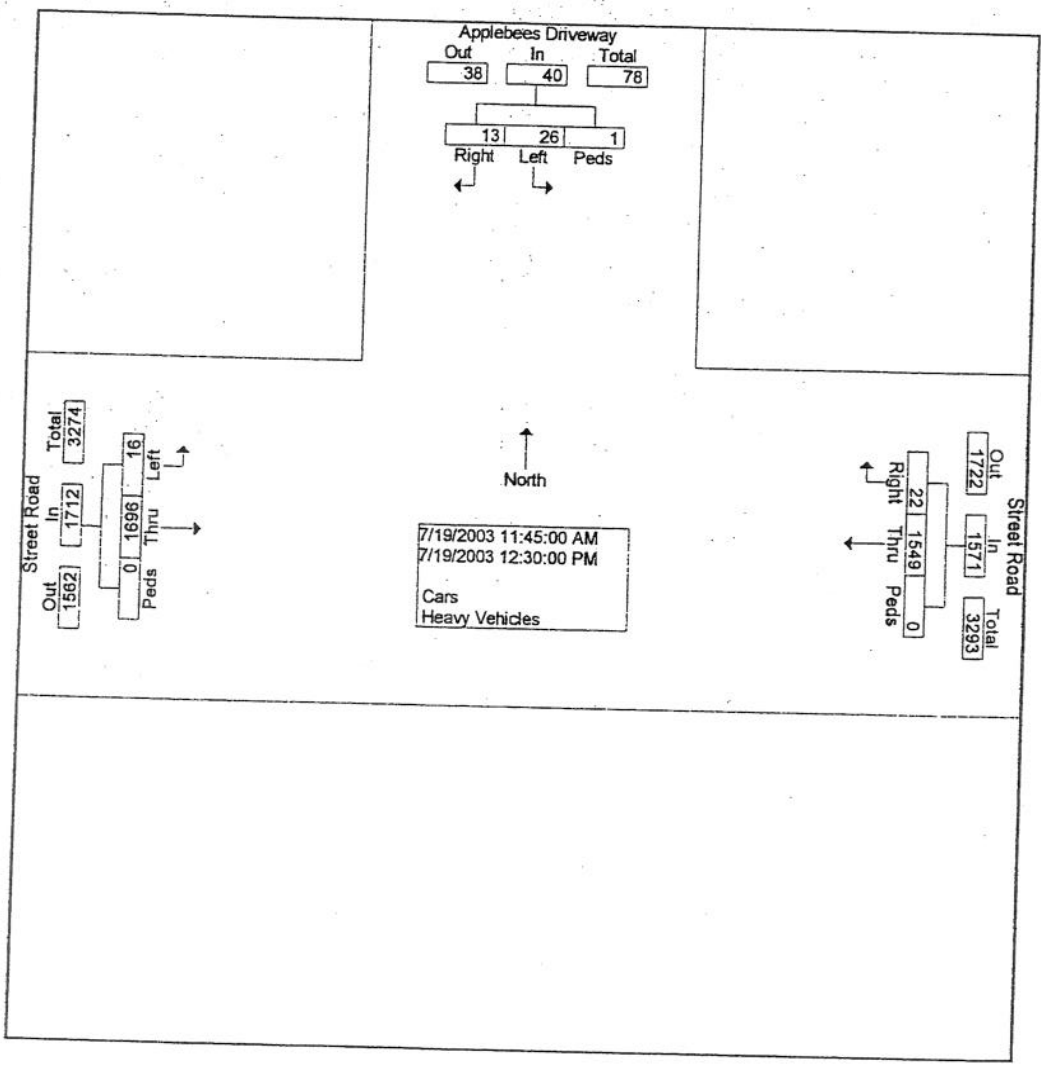


Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd @ Applebees Drvw
Date: Saturday, July 19, 2003
Weather: wc

File Name : MS0719-4
Site Code : 00000000
Start Date : 07/19/200
Page No : 3

	Applebees Driveway Southbound					Street Road Westbound					Street Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 11:00 AM to 03:30 PM - Peak 1 of 1																
Intersection	11:45 AM															
Volume	26	0	13	1	40	0	1549	22	0	1571	16	1696	0	0	1712	3323
Percent	65.0	0.0	32.5	2.5		0.0	98.6	1.4	0.0		0.9	99.1	0.0	0.0		
12:00 Volume	17	0	5	1	23	0	390	5	0	395	5	424	0	0	429	847
Peak Factor																0.981
High Int.	12:00 PM					12:15 PM					12:30 PM					
Volume	17	0	5	1	23	0	394	3	0	397	4	433	0	0	437	
Peak Factor					0.435					0.989					0.979	

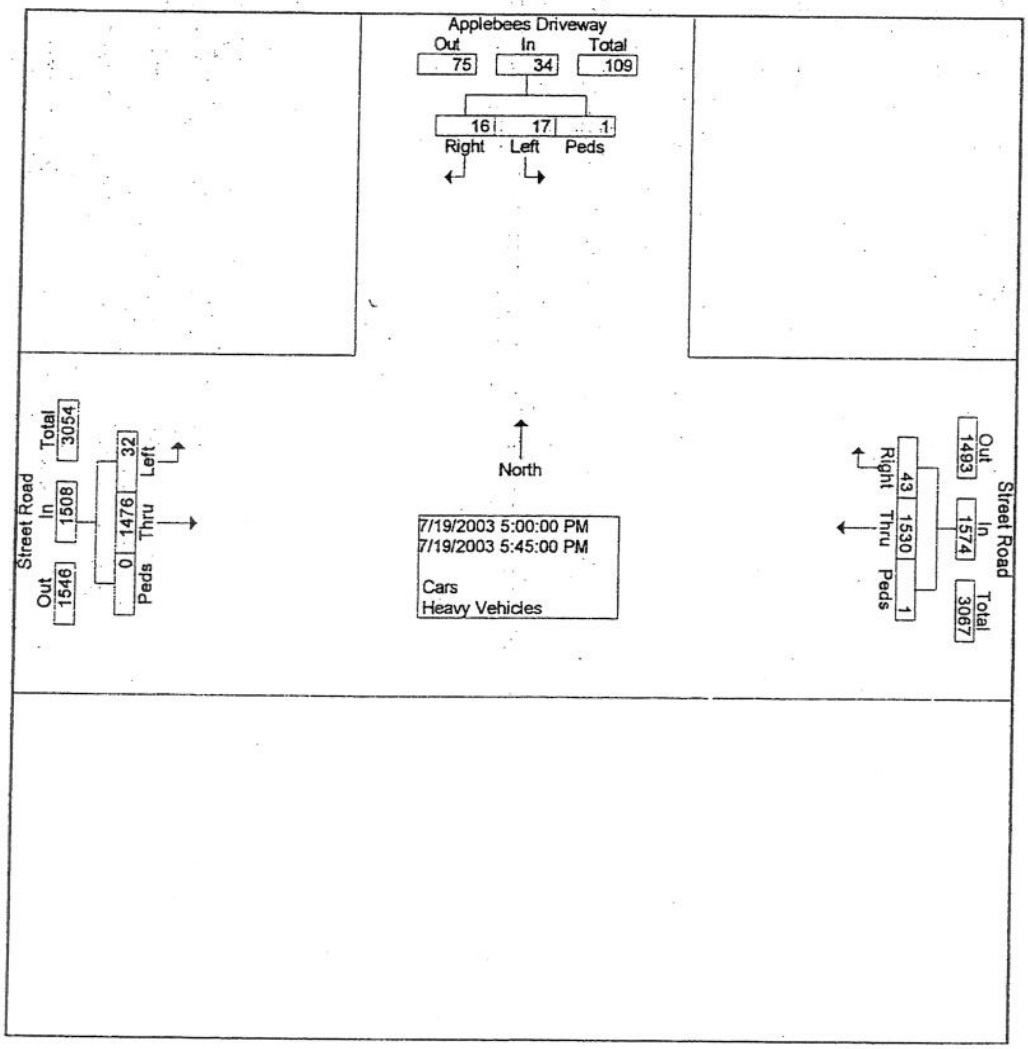


Tri-State Traffic Data, Inc.
610-466-1469

Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd @ Applebees Drvw
Date: Saturday, July 19, 2003
Weather: wc

File Name : MS0719-4
Site Code : 00000000
Start Date : 07/19/2003
Page No : 4

	Applebees Driveway Southbound					Street Road Westbound					Street Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 03:45 PM to 07:45 PM - Peak 1 of 1																
Intersection 05:00 PM																
Volume	17	0	16	1	34	0	1530	43	1	1574	32	1476	0	0	1508	3116
Percent	50.0	0.0	47.1	2.9		0.0	97.2	2.7	0.1		2.1	97.9	0.0	0.0		
05:45 Volume	5	0	4	0	9	0	411	17	0	428	8	391	0	0	399	836
Peak Factor																0.932
High Int.	05:30 PM					05:45 PM					05:45 PM					
Volume	4	0	6	0	10	0	411	17	0	428	8	391	0	0	399	
Peak Factor					0.850					0.919					0.945	



Tri-State Traffic Data, Inc.
610-466-1469

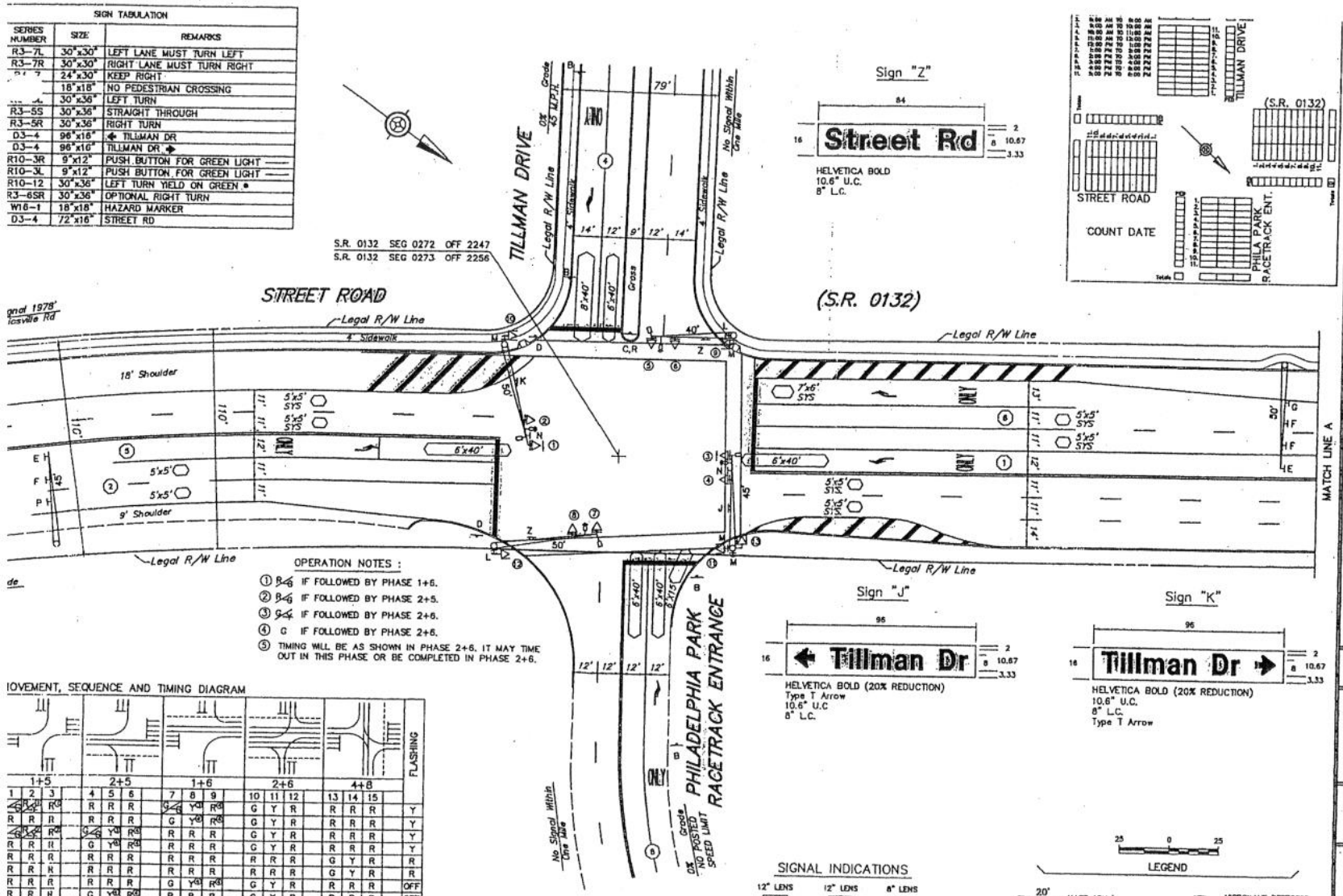
Location: Bensalem Twp., Bucks Co.
Intersection: Street Rd @ Applebees Drvw
Date: Saturday, July 19, 2003
Weather: wc

File Name : MS0719-4
Site Code : 00000000
Start Date : 07/19/2003
Page No : 1

Groups Printed- Heavy Vehicles

	Applebees Driveway Southbound					Street Road Westbound					Street Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:00 AM	0	0	0	0	0	0	2	0	0	2	0	4	0	0	4	6
11:15 AM	0	0	0	0	0	0	3	0	0	3	0	6	0	0	6	9
11:30 AM	0	0	0	0	0	0	1	0	0	1	0	3	0	0	3	4
11:45 AM	0	0	0	0	0	0	2	0	0	2	0	3	0	0	3	5
Total	0	0	0	0	0	0	8	0	0	8	0	16	0	0	16	24
12:00 PM	0	0	0	0	0	0	4	0	0	4	0	3	0	0	3	7
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
12:30 PM	0	0	0	0	0	0	3	0	0	3	0	3	0	0	3	6
12:45 PM	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	4
Total	0	0	0	0	0	0	10	0	0	10	0	9	0	0	9	19
01:00 PM	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	4
01:15 PM	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	6
01:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:45 PM	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	4
Total	0	0	0	0	0	0	10	0	0	10	0	5	0	0	5	15
*** BREAK ***																
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
05:30 PM	0	0	0	0	0	0	1	0	0	1	0	3	0	0	3	4
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Total	0	0	0	0	0	0	1	0	0	1	0	8	0	0	8	9
06:00 PM	0	0	0	0	0	0	2	0	0	2	0	3	0	0	3	5
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
BREAK ***															***	
06:45 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
Total	0	0	0	0	0	0	3	0	0	3	0	5	0	0	5	8
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
BREAK ***															***	
07:30 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	0	1	0	0	1	0	4	0	0	4	5
Grand Total	0	0	0	0	0	0	33	0	0	33	0	47	0	0	47	80
Apprch %	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	41.2	0.0	0.0	41.2	0.0	58.8	0.0	0.0	58.8	

SIGN TABULATION		
SERIES NUMBER	SIZE	REMARKS
R3-7L	30"x30"	LEFT LANE MUST TURN LEFT
R3-7R	30"x30"	RIGHT LANE MUST TURN RIGHT
[illegible]	24"x30"	KEEP RIGHT
[illegible]	18"x18"	NO PEDESTRIAN CROSSING
[illegible]	30"x36"	LEFT TURN
R3-5S	30"x36"	STRAIGHT THROUGH
R3-5R	30"x36"	RIGHT TURN
D3-4	96"x16"	← TILLMAN DR
D3-4	96"x16"	TILLMAN DR →
R10-3R	9"x12"	PUSH BUTTON FOR GREEN LIGHT
R10-3L	9"x12"	PUSH BUTTON FOR GREEN LIGHT
R10-12	30"x36"	LEFT TURN YIELD ON GREEN •
R3-6SR	30"x36"	OPTIONAL RIGHT TURN
W16-1	18"x18"	HAZARD MARKER
D3-4	72"x16"	STREET RD



OPERATION NOTES :

① B-G IF FOLLOWED BY PHASE 1+6.
② B-G IF FOLLOWED BY PHASE 2+5.
③ G-Y IF FOLLOWED BY PHASE 2+6.
④ G IF FOLLOWED BY PHASE 2+6.
⑤ TIMING WILL BE AS SHOWN IN PHASE 2+6. IT MAY TIME OUT IN THIS PHASE OR BE COMPLETED IN PHASE 2+6.

Sign "Z"

HELVETICA BOLD
10.6" U.C.
8" L.C.

Sign "J"

HELVETICA BOLD (20% REDUCTION)
Type T Arrow
10.6" U.C
8" L.C.

Sign "K"

HELVETICA BOLD (20% REDUCTION)
10.6" U.C.
8" L.C.
Type T Arrow

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

1+5			2+5			1+6			2+6			4+8			FLASHING
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
R	R	R	R	R	R	G-B	Y-B	R-B	G	Y	R	R	R	R	Y
R	R	R	R	R	R	G	Y-B	R-B	G	Y	R	R	R	R	Y
R	R	R	G	Y-B	R-B	R	R	R	G	Y	R	R	R	R	Y
R	R	R	G	Y-B	R-B	R	R	R	G	Y	R	R	R	R	Y
R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R
R	R	R	R	R	R	G	Y-B	R-B	G	Y	R	R	R	R	OFF
R	R	R	G	Y-B	R-B	R	R	R	G	Y	R	R	R	R	OFF
R	R	R	G	Y-B	R-B	R	R	R	G	Y	R	R	R	R	OFF

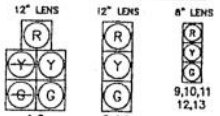
4	2			4	2		4	2		4	2		4	2	
			3			3						3			
			3			3						3			
			7			7			44			21			
			7			7			74			23			
			⑤			⑤			27			21			
			NL			NL			MoR			NL			

TRIAN ACTUATION ONLY

TRAFFIC SIGNAL SYSTEM NOTE:

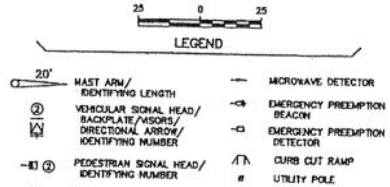
• REFER TO SYSTEM PERMIT # 10005 FOR PROGRAM TIMES AND WEEKLY PROGRAM CHART.

SIGNAL INDICATIONS



SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 10,11,13
SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS 9,12

LEGEND



GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 187, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE DECEMBER 19, 1996.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE DORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-7800 SERIES.

CLOSED LOOP SYSTEM PERMIT # 10005

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: BUCKS
MUNICIPALITY: BENSALEM TOWNSHIP
INTERSECTION: STREET ROAD (S.R. 0132) AND TILLMAN DRIVE SOUTH/PHILADELPHIA PARK

REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

RECOMMENDED:
Paul M. Lutz 03/30/01
DATE
Louis R. Belmonte 04/04/01
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES. REVIS.	DATE	REVIS.	DATE	RECOM.	DATE
1	Added Emergency Pre-Emption/ Push Buttons	PAI	10/11/00				
2							
3							
4							
5							
6							
7							
8							

EMERGENCY PRE-EMPTION PHASING
MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2			6			4			8		
INTERVAL	16	17	18	19	20	21	22	23	24	25	26	27
1	R	R	R	G	Y	R	R	R	R	R	R	R
2	R	R	R	G	Y	R	R	R	R	R	R	R
3	G	Y	R	R	R	R	R	R	R	R	R	R
4	G	Y	R	R	R	R	R	R	R	R	R	R
5,6	R	R	R	R	R	R	R	R	R	G	Y	R
7,8	R	R	R	R	R	R	G	Y	R	R	R	R
11,12,13	R	R	R	R	R	R	R	R	R	R	R	R
D TIME	*	4	2	*	4	2	*	4	2	*	4	2

FOR DURATION OF PRE-EMPTION

IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

SIGNAL TO INDICATE G WHEN RETURNING TO NORMAL OPERATION.
SIGNAL TO INDICATE G/A WHEN RETURNING TO NORMAL OPERATION.

RGENCY PRE-EMPTION NOTES:

TROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE TBOUND AND WESTBOUND APPROACHES OF STREET ROAD (S.R. 0132) AND NORTHBOUND APPROACH OF TILLMAN DRIVE AND SOUTHBOUND APPROACH HILADELPHIA PARK RACETRACK ENTRANCE, WITH A FLASHING FAIL SAFE R EACH DIRECTION OF OPERATION.

GENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE RSECTION FOR THE APPROPRIATE APPROACH.

SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE GREEN INDICATIONS IMMEDIATELY, FOLLOWED BY THE COMPLETE YELLOW AND CLEARANCE INTERVALS ACCORDINGLY, FOLLOWED BY THE GREEN INTERVAL THE PRE-EMPTED PHASE.

E SIGNALS ARE IN EITHER YELLOW OR RED CLEARANCE, THE CLEARANCE SHALL BE COMPLETED BEFORE THE GREEN INTERVAL OF THE PRE-EMPTION E OCCURS.

E SIGNALS ARE FLASHING WHEN ACTIVATED BY AN EMERGENCY VEHICLE ALL LS SHALL REMAIN FLASHING.

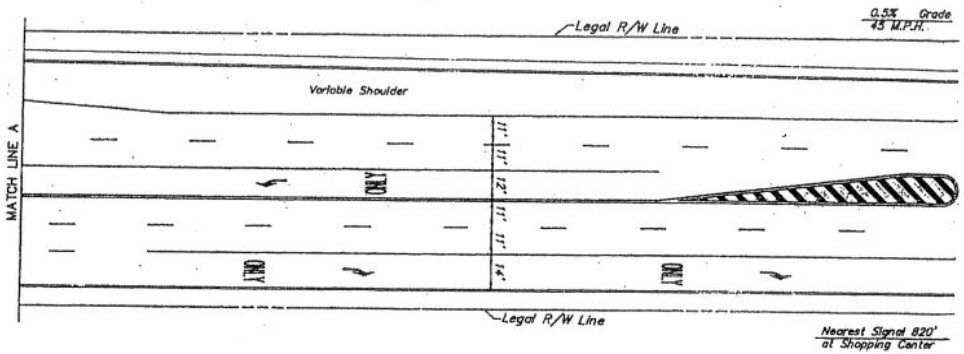
COMPLETION OF PRE-EMPTION PHASE 2, 4, 6 OR 8, IN RETURNING TO AL OPERATION PHASE 2+6 INTERVAL 10 SHALL FOLLOW.

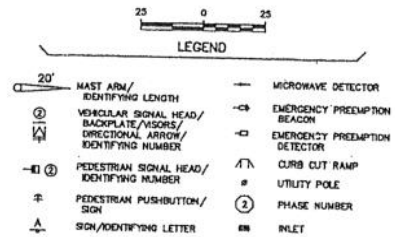
DITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE NAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT EMPTION PHASE.

ERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, EMPTION SHALL BE A "FIRST COME, FIRST SERVED" OPERATION.

FIELD LOCATIONS OF THE PRE-EMPTION DETECTORS MAY DIFFER FROM THE TIONS DEPICTED ON THE CONDITION DIAGRAM, AS THE DETECTORS MAY NEED RELOCATED AND/OR ADJUSTED TO PROVIDE ACCEPTABLE OPERATION AS ED APPROPRIATE BY DEPARTMENT PERSONNEL.

E SIGNAL HAS BEEN ACTUATED BY A PEDESTRIAN PUSH BUTTON, AND THE L IS PRE-EMPTED, THE PEDESTRIAN TIME SHAL BE SPLIT BETWEEN PED (MAN)" AND PED "CLEAR (HAND)". THIS INTERVAL SHALL TIME OUT FOLLOWED HE APPROPRIATE SELECTIVE CLEARANCES, BEFORE GOING INTO EMERGENCY EMPTION PHASE.





CLOSED LOOP SYSTEM PERMIT # I0005

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: BUCKS

MUNICIPALITY: BENSALEM TOWNSHIP

INTERSECTION: STREET ROAD (S.R. 0132) AND TILLMAN DRIVE SOUTH/PHILADELPHIA PARK

REVIEWED:

DATE

MUNICIPAL OFFICIAL DATE

RECOMMENDED:

Paul M. Lutz 03/30/01
DATE

Louis R. Belmonte 04/04/01
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./ REVW.	DATE	REVR.	DATE	RECOM.	DATE
1	Added Emergency Pre-Emption/ Push Buttons	PAI	04/01/01				
2							
3							
4							
5							
6							
7							
8							

SHEET 3 OF 3 | PERMIT # 61-1917

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	13	12	11	14	12	12	14	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1796	3404	1660	1796	3427			1805	1723		1805	1615
Flt Permitted	0.05	1.00	1.00	0.05	1.00			0.95	1.00		0.95	1.00
Satd. Flow (perm)	100	3404	1660	97	3427			1805	1723		1805	1615
Volume (vph)	17	1900	25	40	1760	33	44	0	135	213	0	95
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.85	0.85	0.85	0.55	0.55	0.55
Adj. Flow (vph)	18	2043	27	41	1814	34	52	0	159	387	0	173
RTOR Reduction (vph)	0	0	9	0	1	0	0	0	42	0	0	48
Lane Group Flow (vph)	18	2043	18	41	1847	0	0	52	117	0	387	125
Heavy Vehicles (%)	0%	2%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	73.8	72.6	72.6	77.8	74.6			26.2	26.2		26.2	26.2
Effective Green, g (s)	79.8	75.6	75.6	83.8	77.6			29.2	29.2		29.2	29.2
Actuated g/C Ratio	0.66	0.63	0.63	0.70	0.65			0.24	0.24		0.24	0.24
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	126	2145	1046	156	2216			439	419		439	393
v/s Ratio Prot	0.01	c0.60		c0.01	0.54							
v/s Ratio Perm	0.09		0.02	0.17				0.03	0.09		0.21	0.11
v/c Ratio	0.14	0.95	0.02	0.26	0.83			0.12	0.28		0.88	0.32
Uniform Delay, d1	15.8	20.5	8.3	24.4	16.2			35.4	36.9		43.7	37.2
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	11.1	0.0	0.9	3.9			0.1	0.4		18.3	0.5
Delay (s)	16.4	31.6	8.3	25.3	20.1			35.5	37.2		62.1	37.7
Level of Service	B	C	A	C	C			D	D		E	D
Approach Delay (s)		31.2			20.2			36.8			54.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

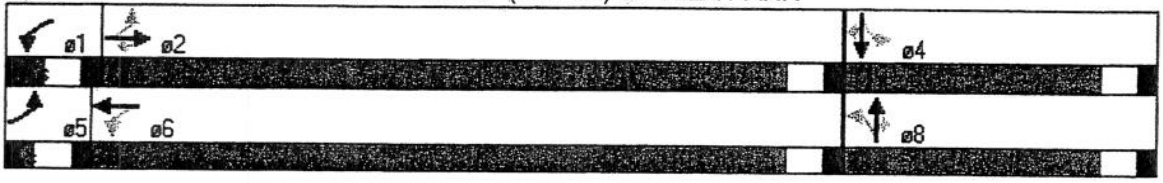
c Critical Lane Group

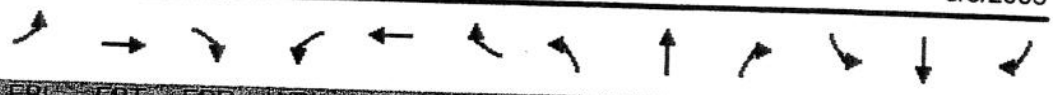
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	81.7	76.9	76.9	84.0	81.2		29.2	29.2		29.2	29.2	
Actuated g/C Ratio	0.68	0.64	0.64	0.70	0.68		0.24	0.24		0.24	0.24	
v/c Ratio	0.11	0.94	0.03	0.24	0.80		0.12	0.35		0.88	0.39	
Uniform Delay, d1	5.3	20.5	0.9	5.3	16.2		35.3	24.0		43.7	23.3	
Control Delay	7.0	30.3	3.8	8.8	18.1		35.8	26.1		62.9	26.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.0	30.3	3.8	8.8	18.1		35.8	26.1		62.9	26.0	
LOS	A	C	A	A	B		D	C		E	C	
Approach Delay		29.8			17.9		28.5			51.5		
Approach LOS		C			B		C			D		
Queue Length 50th (ft)	4	747	1	9	439		31	65		287	68	
Queue Length 95th (ft)	11	#980	12	20	694		61	117		218	60	
Internal Link Dist (ft)		1670			1670		1070			1020		
Turn Bay Length (ft)	800		275	200								
Base Capacity (vph)	161	2180	1072	173	2320		451	472		451	452	
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	72	0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.94	0.03	0.24	0.80		0.12	0.34		0.86	0.38	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 27.5 Intersection LOS: C
Intersection Capacity Utilization 82.7% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: STREET ROAD (PA 132) & PHILA PARK





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	13	12	11	14	12	12	14	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		0.95	1.00
Satd. Flow (prot)	1796	3472	1660	1796	3446			1817	1723		1813	1615
Flt Permitted	0.09	1.00	1.00	0.11	1.00			0.90	1.00		0.90	1.00
Satd. Flow (perm)	179	3472	1660	206	3446			1710	1723		1710	1615
Volume (vph)	27	1361	48	39	1300	69	30	3	39	249	9	175
Peak-hour factor, PHF	0.94	0.94	0.94	0.89	0.89	0.89	0.72	0.72	0.72	0.69	0.69	0.69
Adj. Flow (vph)	29	1448	51	44	1461	78	42	4	54	361	13	254
RTOR Reduction (vph)	0	0	19	0	4	0	0	0	41	0	0	62
Lane Group Flow (vph)	29	1448	32	44	1535	0	0	46	13	0	374	192
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	60.4	59.2	59.2	61.6	59.8			21.0	21.0		21.0	21.0
Effective Green, g (s)	66.4	62.2	62.2	67.6	62.8			24.0	24.0		24.0	24.0
Actuated g/C Ratio	0.66	0.62	0.62	0.68	0.63			0.24	0.24		0.24	0.24
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	187	2160	1033	216	2164			410	414		410	388
v/s Ratio Prot	0.01	0.42		c0.01	c0.45							
v/s Ratio Perm	0.10		0.03	0.13				0.03	0.03		c0.22	0.16
v/c Ratio	0.16	0.67	0.03	0.20	0.71			0.11	0.03		0.91	0.50
Uniform Delay, d1	9.7	12.3	7.3	9.1	12.5			29.7	29.1		37.0	32.8
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	1.7	0.1	0.5	2.0			0.1	0.0		24.2	1.0
Delay (s)	10.1	13.9	7.3	9.5	14.5			29.8	29.1		61.2	33.8
Level of Service	B	B	A	A	B			C	C		E	C
Approach Delay (s)		13.6			14.3			29.4			50.1	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

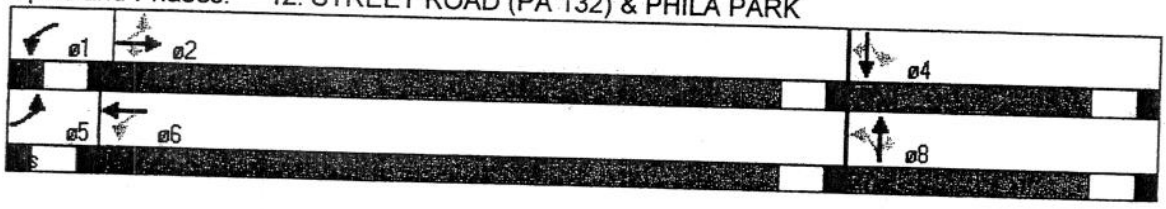
c Critical Lane Group

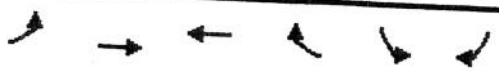
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	C-Max		Min	Min	Min	Min	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	67.6	64.6	64.6	68.8	65.2		24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.68	0.65	0.65	0.69	0.65		0.24	0.24		0.24	0.24	
v/c Ratio	0.14	0.65	0.05	0.19	0.68		0.11	0.12		0.91	0.57	
Uniform Delay, d1	4.6	12.2	0.0	4.6	12.4		29.7	0.0		36.9	22.2	
Control Delay	6.3	13.1	2.4	6.5	13.5		30.7	9.2		65.4	28.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.3	13.1	2.4	6.5	13.5		30.7	9.2		65.4	28.0	
LOS	A	B	A	A	B		C	A		E	C	
Approach Delay		12.6			13.3		19.1			50.3		
Approach LOS		B			B		B			D		
Queue Length 50th (ft)	5	300	0	8	323		23	0		233	96	
Queue Length 95th (ft)	13	375	14	17	396		41	18		246	116	
Internal Link Dist (ft)		1670			1670		1070			1020		
Turn Bay Length (ft)	800		275	200								
Base Capacity (vph)	200	2243	1090	232	2249		410	455		410	449	
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	0.14	0.65	0.05	0.19	0.68		0.11	0.12		0.91	0.57	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 65.7% ICU Level of Service C
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 12: STREET ROAD (PA 132) & PHILA PARK





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	14	15	16
Grade (%)		-1%	1%		0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1814	3438	3438	1714	1986	1830
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	102	3438	3438	1714	1986	1830
Volume (vph)	17	1882	1924	45	60	12
Peak-hour factor, PHF	0.94	0.94	0.91	0.91	0.72	0.72
Adj. Flow (vph)	18	2002	2114	49	83	17
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	18	2002	2114	49	83	17
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	pm+pt			Free		Free
Protected Phases	1	6	2		8	
Permitted Phases	6			Free		Free
Actuated Green, G (s)	100.1	100.1	91.7	120.0	8.9	120.0
Effective Green, g (s)	103.1	103.1	94.7	120.0	10.9	120.0
Actuated g/C Ratio	0.86	0.86	0.79	1.00	0.09	1.00
Clearance Time (s)	6.0	6.0	6.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	165	2954	2713	1714	180	1830
v/s Ratio Prot	0.00	c0.58	c0.61		c0.04	
v/s Ratio Perm	0.09			0.03		0.01
v/c Ratio	0.11	0.68	0.78	0.03	0.46	0.01
Uniform Delay, d1	9.0	2.8	6.9	0.0	51.8	0.0
Progression Factor	1.00	1.00	1.33	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.3	1.6	0.0	1.9	0.0
Delay (s)	9.3	4.1	10.8	0.0	53.6	0.0
Level of Service	A	A	B	A	D	A
Approach Delay (s)		4.2	10.6		44.5	
Approach LOS		A	B		D	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

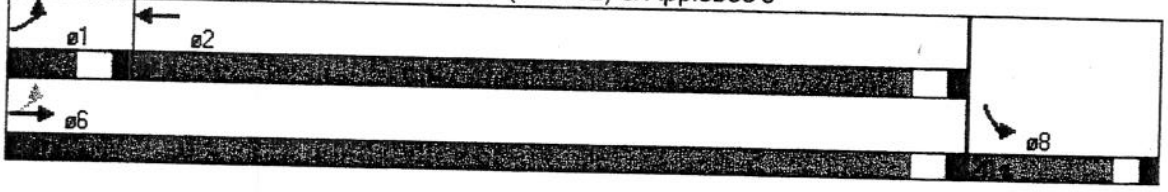
c Critical Lane Group

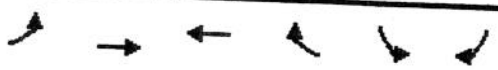
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Time Before Reduce (s)	0.0	0.0	0.0		0.0	
Time To Reduce (s)	0.0	0.0	0.0		0.0	
Recall Mode	None	C-Min	C-Min		None	
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	104.1	104.7	99.9	120.0	12.1	120.0
Actuated g/C Ratio	0.87	0.87	0.83	1.00	0.10	1.00
v/c Ratio	0.09	0.67	0.74	0.03	0.41	0.01
Uniform Delay, d1	1.2	2.8	6.9	0.0	51.7	0.0
Control Delay	2.5	4.7	11.3	0.0	52.5	0.0
Queue Delay	0.0	0.1	1.2	0.0	0.0	0.0
Total Delay	2.5	4.8	12.4	0.0	52.5	0.0
LOS	A	A	B	A	D	A
Approach Delay		4.8	12.2		43.6	
Approach LOS		A	B		D	
Queue Length 50th (ft)	2	214	638	0	61	0
Queue Length 95th (ft)	6	343	968	m0	86	0
Internal Link Dist (ft)		1740	740		1020	
Turn Bay Length (ft)	200			300		
Base Capacity (vph)	220	2999	2863	1714	281	1830
Starvation Cap Reductn	0	0	476	0	0	0
Spillback Cap Reductn	0	200	0	0	0	0
Storage Cap Reductn	2	0	0	0	0	0
Reduced v/c Ratio	0.08	0.72	0.89	0.03	0.30	0.01

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 44 (37%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 9.4 Intersection LOS: A
Intersection Capacity Utilization 63.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: STREET ROAD (PA 132) & Applebee's





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	14	15	16
Grade (%)		-1%	1%		0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1814	3472	3472	1714	1986	1830
Flt Permitted	0.11	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	214	3472	3472	1714	1986	1830
Volume (vph)	32	1476	1530	43	17	16
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.85	0.85
Adj. Flow (vph)	34	1554	1663	47	20	19
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	34	1554	1663	47	20	19
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt			Free		Free
Protected Phases	1	6	2		8	
Permitted Phases	6			Free		Free
Actuated Green, G (s)	86.0	86.0	76.5	100.0	3.0	100.0
Effective Green, g (s)	89.0	89.0	79.5	100.0	5.0	100.0
Actuated g/C Ratio	0.89	0.89	0.80	1.00	0.05	1.00
Clearance Time (s)	6.0	6.0	6.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	294	3090	2760	1714	99	1830
v/s Ratio Prot	0.01	c0.45	c0.48		c0.01	
v/s Ratio Perm	0.10			0.03		0.01
v/c Ratio	0.12	0.50	0.60	0.03	0.20	0.01
Uniform Delay, d1	2.8	1.1	4.0	0.0	45.6	0.0
Progression Factor	1.00	1.00	0.42	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.6	0.7	0.0	1.0	0.0
Delay (s)	2.9	1.7	2.4	0.0	46.6	0.0
Level of Service	A	A	A	A	D	A
Approach Delay (s)		1.7	2.4		23.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM Average Control Delay	2.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

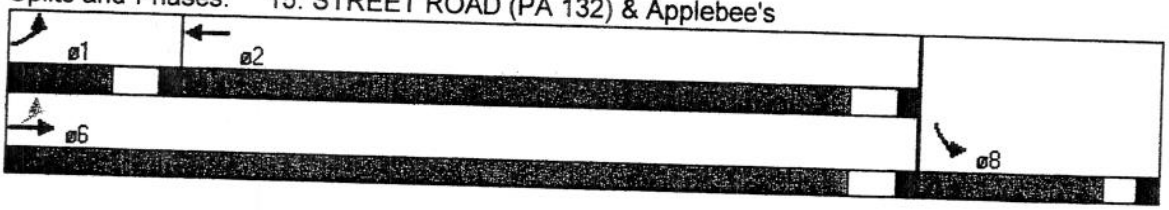
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Time Before Reduce (s)	0.0	0.0	0.0		0.0	
Time To Reduce (s)	0.0	0.0	0.0		0.0	
Recall Mode	None	C-Min	C-Min		None	
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	92.0	93.8	86.1	100.0	8.4	100.0
Actuated g/C Ratio	0.92	0.94	0.86	1.00	0.08	1.00
v/c Ratio	0.13	0.48	0.56	0.03	0.12	0.01
Uniform Delay, d1	0.6	1.1	4.0	0.0	45.5	0.0
Control Delay	1.6	1.6	2.3	0.0	42.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.6	1.6	2.3	0.0	42.3	0.0
LOS	A	A	A	A	D	A
Approach Delay		1.6	2.3		21.7	
Approach LOS		A	A		C	
Queue Length 50th (ft)	1	0	71	0	12	0
Queue Length 95th (ft)	6	129	100	m0	32	0
Internal Link Dist (ft)		2230	740		1020	
Turn Bay Length (ft)	200			300		
Base Capacity (vph)	312	3257	2989	1714	357	1830
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	1	0	0	0	0	0
Reduced v/c Ratio	0.11	0.48	0.56	0.03	0.06	0.01

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 28 (28%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 2.2 Intersection LOS: A
Intersection Capacity Utilization 52.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: STREET ROAD (PA 132) & Applebee's



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	12	12	14	12	12	14	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	3484	3522	1660	1796	3556	1664		1805	1723		1805	1615
Flt Permitted	0.95	1.00	1.00	0.06	1.00	1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	3484	3522	1660	104	3556	1664		1805	1723		1805	1615
Volume (vph)	147	2115	25	40	1875	123	44	0	135	204	0	128
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.85	0.85	0.85	0.70	0.70	0.70
Adj. Flow (vph)	158	2274	27	41	1933	127	52	0	159	291	0	183
RTOR Reduction (vph)	0	0	7	0	0	50	0	0	77	0	0	80
Lane Group Flow (vph)	158	2274	20	41	1933	77	0	52	82	0	291	103
Heavy Vehicles (%)	0%	2%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2	6		6	8		8	4		4
Actuated Green, G (s)	10.4	75.0	75.0	74.2	69.4	69.4		22.2	22.2		22.2	22.2
Effective Green, g (s)	13.4	78.0	78.0	80.2	72.4	72.4		25.2	25.2		25.2	25.2
Actuated g/C Ratio	0.11	0.65	0.65	0.67	0.60	0.60		0.21	0.21		0.21	0.21
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	389	2289	1079	179	2145	1004		379	362		379	339
v/s Ratio Prot	c0.05	c0.65		0.01	0.54							
v/s Ratio Perm			0.02	0.14		0.08		0.03	0.09		0.16	0.11
v/c Ratio	0.41	0.99	0.02	0.23	0.90	0.08		0.14	0.23		0.77	0.30
Uniform Delay, d1	49.6	20.7	7.4	28.6	20.7	9.9		38.6	39.3		44.6	40.0
Progression Factor	1.05	0.77	0.96	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	12.5	0.0	0.7	6.7	0.1		0.2	0.3		9.0	0.5
Delay (s)	52.5	28.5	7.2	29.3	27.3	10.0		38.7	39.6		53.7	40.5
Level of Service	D	C	A	C	C	B		D	D		D	D
Approach Delay (s)		29.8			26.3			39.4			48.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

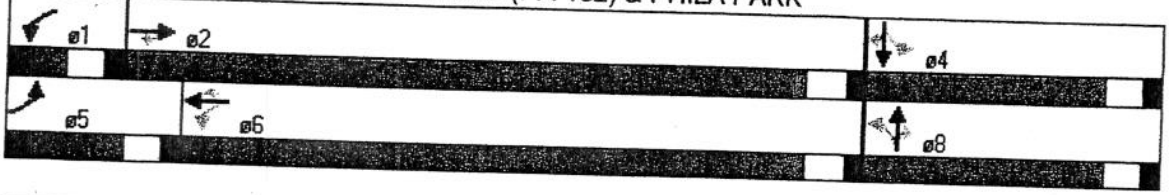
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	13.4	79.2	79.2	81.3	72.4	72.4		25.2	25.2		25.2	25.2
Actuated g/C Ratio	0.11	0.66	0.66	0.68	0.60	0.60		0.21	0.21		0.21	0.21
v/c Ratio	0.41	0.98	0.02	0.20	0.90	0.12		0.14	0.36		0.77	0.44
Uniform Delay, d1	49.6	20.7	1.6	4.6	20.7	0.0		38.6	14.9		44.6	17.7
Control Delay	53.2	27.3	4.2	8.0	28.9	2.3		37.9	17.9		53.5	20.7
Queue Delay	0.0	27.4	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	53.2	54.7	4.2	8.0	28.9	2.3		37.9	17.9		53.5	20.7
LOS	D	D	A	A	C	A		D	B		D	C
Approach Delay		54.0			26.9			22.8			40.8	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	62	~1004	1	8	680	0		32	38		209	52
Queue Length 95th (ft)	m77	#1140	m3	18	#923	27		63	88		225	73
Internal Link Dist (ft)		740			1670			1070			720	
Turn Bay Length (ft)	500		275	200		600						
Base Capacity (vph)	436	2323	1102	203	2144	1054		421	477		421	454
Starvation Cap Reductn	0	192	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	8		0	0		0	0
Reduced v/c Ratio	0.36	1.07	0.02	0.20	0.90	0.12		0.12	0.33		0.69	0.40

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 40.7 Intersection LOS: D
Intersection Capacity Utilization 88.1% ICU Level of Service E
Analysis Period (min) 15

* User Entered Value
~ 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: 12: STREET ROAD (PA 132) & PHILA PARK



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	14	15	16
Grade (%)		-1%	1%		0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1814	3438	3438	1714	1986	1830
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	87	3438	3438	1714	1986	1830
Volume (vph)	32	2126	2063	54	161	113
Peak-hour factor, PHF	0.94	0.94	0.91	0.91	0.72	0.72
Adj. Flow (vph)	34	2262	2267	59	224	157
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	34	2262	2267	59	224	157
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	pm+pt			Free		Free
Protected Phases	1	6	2		8	
Permitted Phases	6			Free		Free
Actuated Green, G (s)	91.7	91.7	81.9	120.0	17.3	120.0
Effective Green, g (s)	94.7	94.7	84.9	120.0	19.3	120.0
Actuated g/C Ratio	0.79	0.79	0.71	1.00	0.16	1.00
Clearance Time (s)	6.0	6.0	6.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	167	2713	2432	1714	319	1830
v/s Ratio Prot	0.01	c0.66	c0.66		c0.11	
v/s Ratio Perm	0.15			0.03		0.09
v/c Ratio	0.20	0.83	0.93	0.03	0.70	0.09
Uniform Delay, d1	24.4	7.8	15.1	0.0	47.6	0.0
Progression Factor	1.00	1.00	0.25	1.00	1.00	1.00
Incremental Delay, d2	0.6	3.2	5.2	0.0	6.8	0.1
Delay (s)	25.0	11.0	8.9	0.0	54.5	0.1
Level of Service	C	B	A	A	D	A
Approach Delay (s)		11.2	8.6		32.1	
Approach LOS		B	A		C	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

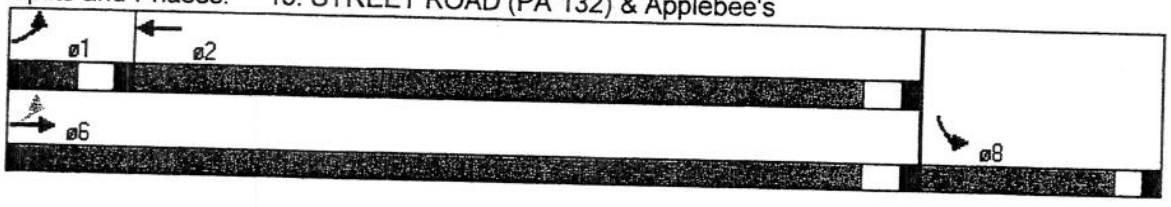
c Critical Lane Group

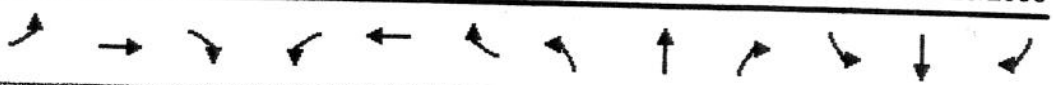
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Time Before Reduce (s)	0.0	0.0	0.0		0.0	
Time To Reduce (s)	0.0	0.0	0.0		0.0	
Recall Mode	None	C-Min	C-Min		None	
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	94.7	94.7	87.3	120.0	19.3	120.0
Actuated g/C Ratio	0.79	0.79	0.73	1.00	0.16	1.00
v/c Ratio	0.17	0.83	0.91	0.03	0.70	0.09
Uniform Delay, d1	2.7	7.8	15.1	0.0	47.6	0.0
Control Delay	4.8	12.1	9.5	0.0	55.0	0.1
Queue Delay	0.0	0.0	1.7	0.0	0.0	0.0
Total Delay	4.8	12.1	11.3	0.0	55.0	0.1
LOS	A	B	B	A	D	A
Approach Delay		12.0	11.0		32.4	
Approach LOS		B	B		C	
Queue Length 50th (ft)	5	495	61	0	164	0
Queue Length 95th (ft)	12	661	#1110	m0	190	0
Internal Link Dist (ft)		2150	740		1027	
Turn Bay Length (ft)	200			200		
Base Capacity (vph)	218	2713	2500	1714	364	1830
Starvation Cap Reductn	0	0	116	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	2	0	0	0	0	0
Reduced v/c Ratio	0.16	0.83	0.95	0.03	0.62	0.09

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 13.1 Intersection LOS: B
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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: STREET ROAD (PA 132) & Applebee's





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	12	12	14	12	12	14	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.95	1.00
Satd. Flow (prot)	3484	3592	1660	1796	3592	1714		1817	1723		1812	1615
Flt Permitted	0.95	1.00	1.00	0.08	1.00	1.00		0.90	1.00		0.90	1.00
Satd. Flow (perm)	3484	3592	1660	148	3592	1714		1710	1723		1710	1615
Volume (vph)	225	1493	48	39	1389	170	30	3	39	299	9	223
Peak-hour factor, PHF	0.94	0.94	0.94	0.89	0.89	0.89	0.72	0.72	0.72	0.80	0.80	0.80
Adj. Flow (vph)	239	1588	51	44	1561	191	42	4	54	374	11	279
RTOR Reduction (vph)	0	0	23	0	0	93	0	0	40	0	0	112
Lane Group Flow (vph)	239	1588	28	44	1561	98	0	46	14	0	385	167
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2	6		6	8		8	4		4
Actuated Green, G (s)	8.5	53.7	53.7	53.2	49.2	49.2		24.3	24.3		24.3	24.3
Effective Green, g (s)	10.5	55.7	55.7	57.2	51.2	51.2		26.3	26.3		26.3	26.3
Actuated g/C Ratio	0.10	0.56	0.56	0.57	0.51	0.51		0.26	0.26		0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	366	2001	925	184	1839	878		450	453		450	425
v/s Ratio Prot	c0.07	0.44		0.01	c0.43							
v/s Ratio Perm			0.03	0.12		0.11		0.03	0.03		c0.23	0.17
v/c Ratio	0.65	0.79	0.03	0.24	0.85	0.11		0.10	0.03		0.86	0.39
Uniform Delay, d1	43.0	17.6	10.0	14.5	21.1	12.6		27.9	27.4		35.0	30.3
Progression Factor	0.96	0.85	0.98	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	3.3	2.7	0.0	0.7	5.1	0.3		0.1	0.0		14.7	0.6
Delay (s)	44.7	17.6	9.8	15.2	26.2	12.9		28.0	27.4		49.7	30.9
Level of Service	D	B	A	B	C	B		C	C		D	C
Approach Delay (s)		20.9			24.5			27.7			41.8	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

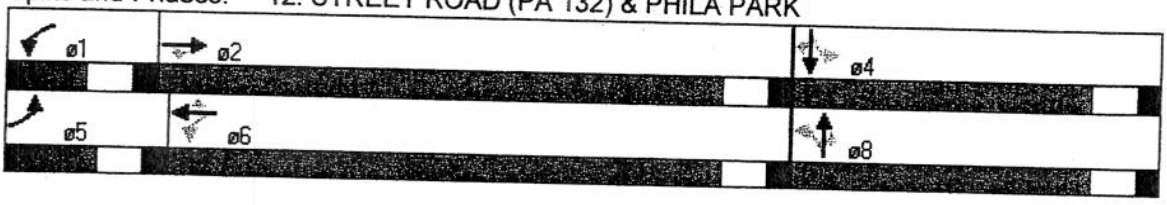
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	Min	Min	Min	Min	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	10.5	58.1	58.1	59.5	51.2	51.2		26.3	26.3		26.3	26.3
Actuated g/C Ratio	0.11	0.58	0.58	0.60	0.51	0.51		0.26	0.26		0.26	0.26
v/c Ratio	0.65	0.76	0.05	0.19	0.85	0.20		0.10	0.11		0.86	0.52
Uniform Delay, d1	43.0	17.6	0.0	6.5	21.1	0.0		27.9	0.0		35.0	13.5
Control Delay	49.0	17.6	3.6	8.7	27.1	2.5		27.6	8.2		48.9	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	49.0	17.6	3.6	8.7	27.1	2.5		27.6	8.2		48.9	16.8
LOS	D	B	A	A	C	A		C	A		D	B
Approach Delay		21.2			24.1			17.1			35.4	
Approach LOS		C			C			B			D	
Queue Length 50th (ft)	78	331	0	9	444	0		22	0		228	63
Queue Length 95th (ft)	#120	351	m9	21	540	32		39	17		291	111
Internal Link Dist (ft)		740			1670			1070			720	
Turn Bay Length (ft)	500		275	200		600						
Base Capacity (vph)	366	2086	986	239	1839	971		479	521		479	562
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	6	0	0	15		0	0		0	0
Reduced v/c Ratio	0.65	0.76	0.05	0.18	0.85	0.20		0.10	0.10		0.80	0.50

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 76 (76%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 24.4 Intersection LOS: C
Intersection Capacity Utilization 78.5% ICU Level of Service D
Analysis Period (min) 15

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: STREET ROAD (PA 132) & PHILA PARK



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	14	15	16
Grade (%)		-1%	1%		0%	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1814	3472	3472	1714	1986	1830
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	147	3472	3472	1714	1986	1830
Volume (vph)	54	1756	1656	54	67	162
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.85	0.85
Adj. Flow (vph)	57	1848	1800	59	79	191
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	57	1848	1800	59	79	191
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt			Free		Free
Protected Phases	1	6	2		8	
Permitted Phases	6			Free		Free
Actuated Green, G (s)	81.0	81.0	70.0	100.0	8.0	100.0
Effective Green, g (s)	84.0	84.0	73.0	100.0	10.0	100.0
Actuated g/C Ratio	0.84	0.84	0.73	1.00	0.10	1.00
Clearance Time (s)	6.0	6.0	6.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	257	2916	2535	1714	199	1830
v/s Ratio Prot	0.02	c0.53	c0.52		c0.04	
v/s Ratio Perm	0.17			0.03		0.10
v/c Ratio	0.22	0.63	0.71	0.03	0.40	0.10
Uniform Delay, d1	7.2	2.7	7.6	0.0	42.2	0.0
Progression Factor	1.00	1.00	0.44	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.1	1.0	0.0	1.3	0.1
Delay (s)	7.6	3.8	4.4	0.0	43.5	0.1
Level of Service	A	A	A	A	D	A
Approach Delay (s)		3.9	4.2		12.8	
Approach LOS		A	A		B	

Intersection Summary			
HCM Average Control Delay	4.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

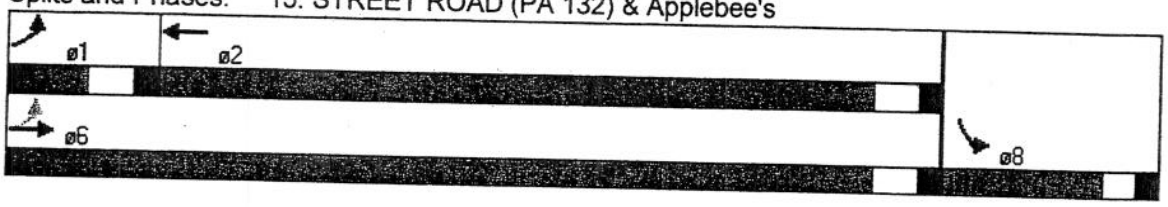
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Time Before Reduce (s)	0.0	0.0	0.0		0.0	
Time To Reduce (s)	0.0	0.0	0.0		0.0	
Recall Mode	None	C-Min	C-Min		None	
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	85.0	85.6	75.8	100.0	11.2	100.0
Actuated g/C Ratio	0.85	0.86	0.76	1.00	0.11	1.00
v/c Ratio	0.23	0.62	0.68	0.03	0.36	0.10
Uniform Delay, d1	1.3	2.7	7.6	0.0	42.2	0.0
Control Delay	4.0	4.3	4.8	0.0	42.3	0.1
Queue Delay	0.0	0.0	0.7	0.0	0.0	0.0
Total Delay	4.0	4.3	5.5	0.0	42.3	0.1
LOS	A	A	A	A	D	A
Approach Delay		4.3	5.3		12.5	
Approach LOS		A	A		B	
Queue Length 50th (ft)	5	162	20	0	47	0
Queue Length 95th (ft)	16	264	645	m0	84	0
Internal Link Dist (ft)		2150	740		1027	
Turn Bay Length (ft)	200			200		
Base Capacity (vph)	266	2971	2632	1714	318	1830
Starvation Cap Reductn	0	0	441	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	3	0	0	0	0	0
Reduced v/c Ratio	0.22	0.62	0.82	0.03	0.25	0.10

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 96 (96%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 5.3 Intersection LOS: A
Intersection Capacity Utilization 58.9% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: STREET ROAD (PA 132) & Applebee's



mentioned previously. The Saturday midday peak hour rate was obtained using Table 2 from the Box and Bunte article which provides an hourly breakdown of the daily traffic percentages.

The combination of literature research and field observations resulted in the following trip generation rate estimates:

- **0.358** trips per gaming position during the **weekday evening** peak hour (52% entering and 48% exiting); and
- **0.477** trips per gaming position during the **Saturday evening** peak hour (53% entering and 47% exiting)
- **0.252** trips per gaming position during the **Saturday midday** peak hour (52% entering and 48% exiting)

Additional information on the trip generation research, data from the local observations, and the ITE article are provided in **APPENDIX F.**

Based on the above stated rates, the proposed Philadelphia Park development is anticipated to generate the following peak hour trips:

- 1,074 trips during the weekday evening peak hour (558 entering and 516 exiting);
- 1,431 trips during the Saturday evening peak hour (758 entering and 673 exiting); and
- 756 trips during the Saturday midday peak hour (476 entering and 280 exiting).

In order to determine the total daily traffic expected to be developed by the site, peak hour/daily traffic ratios were applied to the entering and exiting traffic for both the proposed electronic gaming facility traffic, and the existing horse track traffic. For the proposed facility, the ratios were taken from the Box and Bunte ITE article, while the daily traffic rates for the existing traffic were estimated using ITE Trip Generation. The results of the daily traffic estimates are as follows:

- 19,000 daily trips for an average weekday (4,450 existing and 14,550 proposed)
- 30,000 daily trips for a Saturday (10,150 existing and 19,850 proposed)

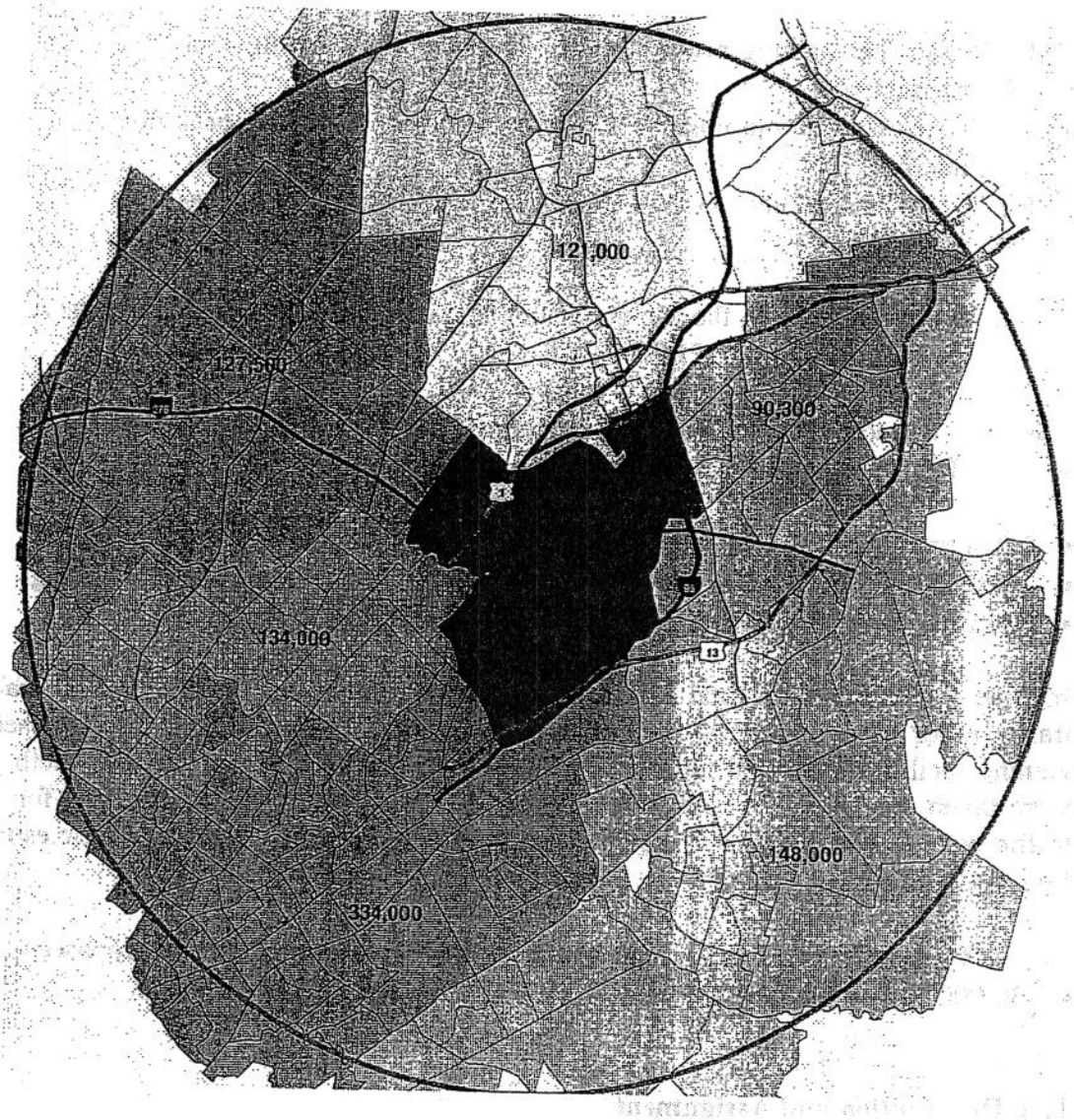
Trip Distribution and Assignment

With the proposed facility's close proximity to several major highways, a separation of local trips and regional trips was established to accurately estimate the distribution of the proposed traffic. The results of the analysis indicate that approximately 85% of the new trips generated by the site will be regional trips that will access the site and the surrounding local roadway network via a major highway or arterial. The distribution of the regional and local traffic is outlined below:

1. Regional Distribution

In order to estimate the regional distribution of new trips to and from the proposed gaming facility, a gravity model, with an exponentially distributed impedance function was developed.

Total population, adjusted for potential casino trip-makers within a 10-mile radius of the project site was used to represent weighted trip attraction. The population is allocated to seven major zones, composed out of individual census tracts based on the proximity to a regional expressway (I-95, US-1, US-13, PA Turnpike, and Street Road). Specific zones and casino populations are shown in the image below.



Traffic analysis zones in 10-mile radius

Adjustment of Total Population to Casino Trip Makers

The total population was adjusted to potential casino trip-makers based on a survey performed by American Gaming Association about a profile of a typical American gambler [1]. Distribution by casino visitor's age was taken as an adjustment factor.

Gravity Model Set-Up

The gravity model $T_{ij} = P_i \frac{A_j F_{ij} K_{ij}}{\sum_j A_j F_{ij} K_{ij}}$ produces T number of trips between any zone i and

Philadelphia park (zone j), adjusted by the following factors:

- F_{ij} is a friction coefficient, which accounts for an impedance (travel time, distance). The impedance function was used where distance is the least responsive, yet still decreases the number of trips to Philadelphia Park with increasing distance.
- K_{ij} is a socioeconomic coefficient expressing a non-gravity relationship between zones i and j. Trips are adjusted by K_{ij} for three zones: local traffic, US-1 N traffic and PA Turnpike traffic. This adjustment factor takes into account the expectation of traffic from areas which are outside of the 10-mile radius and therefore non-reflected in the unadjusted gravity model. It also provides impedance to local traffic to prevent an overestimation of how much traffic will be generated locally.

Final regional distribution is shown in Tables 3 and 4.

TABLE 1
PHILADELPHIA PARK
POPULATION DEMOGRAPHICS- POPULATION BY AGE

	Total 2000 Population	21-35	36-50	51-65	66 >
LOCAL	75,479	21,314	12,092	12,438	8,008
RT. 13 NORTH	90,331	23,018	14,767	12,557	12,084
I-95 SOUTH	333,782	87,815	47,354	46,649	55,316
RT. 1 NORTH	121,016	27,590	23,318	20,183	12,409
RT. 1 SOUTH	134,660	29,846	19,769	23,067	29,711
PA TURNPIKE/ STREET ROAD	127,543	29,376	20,245	21,630	20,785
NEW JERSEY	148,693	36,359	23,872	24,411	19,528
SUM:	1,031,504				

TABLE 2
PHILADELPHIA PARK
GRAVITY MODEL

	Estimated Casino Population:	Approx. Distance To Site [km]:	F_{ij}	K_{ij}	$A_jK_{ij}F_{ij}$	T_{ij}	Distrib.:
LOCAL	14,245	2.4	0.3817	0.55	2,990.85	310	16%
RT. 13 NORTH	16,476	9.5	0.0840	1.00	1,384.70	144	7%
I-95 SOUTH	62,722	12	0.0650	1.00	4,076.83	423	21%
RT. 1 NORTH	22,132	11.1	0.0708	1.90	2,978.01	309	15%
RT. 1 SOUTH	27,346	7.8	0.1044	1.00	2,854.87	296	15%
PA TURNPIKE/ STREET ROAD	24,506	10	0.0794	1.70	3,309.21	343	17%
NEW JERSEY	27,654	12.7	0.0611	1.00	1,688.76	175	9%
Total	**195,081**						
c = 1.1					19,283.23	2000	
					$\Sigma_j[A_jK_{ij}F_{ij}]$	$\Sigma_j[T_{ij}]$	

2. Local Distribution

The local distribution was based on existing traffic volumes, reduced by regional traffic along Street Rd. The reduction applies to both I-95 and US-1 traffic. The traffic to and from I-95 and US-1 was reduced proportionately to the approach volumes, as it enters or exits Street Rd. This reduction allows for the local traffic to be distributed along local roadways.

Sources:

1. "Profile of an American Gambler." Harrah's Survey. American Gaming Association, Washington, D.C., 2003.

It was estimated that the traffic generated by the Philadelphia Park gaming device facility will be **85% regional** and **15% local**. Local traffic was distributed to the local roadway network utilizing existing traffic patterns, while regional traffic was allocated with the use of a gravity model which yielded the following distribution:

To/From North:	Lincoln Highway (Route 1)	15%
	Bristol Pike (Route 13)	7%
To/From South:	Interstate 95	22%
	Lincoln Highway (Route 1)	15%
To/From East:	Interstate 276	9%
To/From West:	Interstate 276	11%
	Street Road (SR 0132)	6% +
Total Regional Traffic		**85%**

FIGURES 14, 15, 16, 17, 18 & 19 provide illustrations of the distribution of project traffic and the assignment of project trips to the study intersections and site accesses.

As previously noted, the distribution of the regional traffic will take into account the completion of the Rockhill Drive extension/connector road that is currently in construction as part of the YDC redevelopment project. The connector road will provide an optional route to Route 1. The roadway is estimated to attract approximately 8% of the regional Route 1 traffic.

PHILADELPHIA PARK
TRAFFIC IMPACT STUDY

APPENDIX F

TRIP GENERATION AND DISTRIBUTION DATA

Gaming Casino Traffic

THE AUTHORS SUMMARIZE RESULTS FROM TRAFFIC VOLUME STUDIES OF TWO GAMING CASINOS—THE CASINO ST. CHARLES AND THE CASINO QUEEN.

BY PAUL C. BOX AND WILLIAM BUNTE

GAMING CASINOS GENERATE significant volumes of traffic—especially during the evening peak hour. Two studies of existing operations were made in the St. Louis, Mo., USA, metropolitan area, including hourly vehicular volumes and daily variations. Also, the projections from an economic report for a proposed casino were utilized to provide multiplication factors for traffic counted in any given month, to that expected during the peak summer months.

Gaming casinos have three general types of positions—individual, such as slots and video poker; table, such as blackjack and poker; and audience, such as Keno or racing. For riverboat type facilities, a land-side staging area is used. Other customary services include bar and restaurant.

The Casino St. Charles is located in the metropolitan area, west of the Missouri River. It is reported to have about 2,500 gaming positions, about 80 percent of which are slots or video poker machines.

In January 1995, counts of entering and leaving traffic were taken across weekdays, Saturday and Sunday.[1] For the peak hours, the counts were converted into rates of flow in and out of the facility per gaming position and were expanded to the summer peak conditions (see Table 1). The highest weekday traffic occurs on Friday, while the absolute peak hour occurs on Saturday evening.

From the counts, it also was possible to calculate the hourly variation by the days of the week during which counts

Table 1. Casino St. Charles peak hour rates of vehicular traffic per gaming position

Day	Hour	Rate*
Friday, Peak Peak		
IN	13:00 to 14:00	0.25
OUT	16:00 to 17:00	0.25
Saturday, Peak Peak		
IN	13:00 to 14:00	0.25
OUT	20:00 to 21:00	0.29
Sunday, Peak Peak		
IN	13:00 to 14:00	0.21
OUT	16:00 to 17:00	0.21

*Expanded to summer peaks.
Source: Ref. 1

0.48

0.54

0.64

were taken. These data are given in Table 2. It should be noted that the facility is quite busy from 09:00 through 22:00 hours. Unlike residential, office or industrial developments, gaming casinos have no significant AM peak hour loading.

A second study was taken at the Casino Queen, a land-based facility on the north side of the Mississippi River in East St. Louis, Ill., USA. Table 3 gives the rates of flow in the PM peak hour per gaming position for customer traffic and separately for employee/service vehicles. The counts have been expanded to peak summer month activity. Only one truck entered or left the casino during the PM peak, which was from 16:30 to 17:30. This is a much smaller facility than the Casino St. Charles, with only 1,200 gaming positions. About 80 percent are slots or video poker. Furthermore, this casino is only open 22 hours per day (09:00 through 07:00). Pickup/dropoff traffic also was observed at the Casino Queen, and amounted to about 10 vehicles during the PM peak. Data on various characteristics of the casinos, such as floor area and employees, are given in Table 4.

The peak gaming months are reported as May, July and August. These may be considered as the "design" condition. The percent of average months and the monthly variation in expected casino traffic, provided in the form of a multiplier for counts taken in a given month to those projected during the peak months, is given in Table 5. For example, a February count would be expanded by 30 percent (1.3 times the count) to reach peak month volumes. The data are taken from an economic study,[3] prepared in connection with a gaming facility zoning application to St. Louis County.

Additional studies of casino traffic are warranted because of widely varying characteristics. For example, the St. Louis casinos had similar rates of peak flow per gaming position. However, the St. Charles facility continued to experience significant flow and had a weekday peak just after the PM peak, while the Casino Queen traffic dropped abruptly at the end of the rush hour. The count was discontinued at this point, because

Hour Ending	Percent of Daily Vehicular Traffic					
	IN			OUT		
	Weekday*	Sat.	Sun.	Weekday*	Sat.	Sun.
20	6.2	6.5	5.9	5.5	6.2	4.3
21	5.3	6.1	5.0	5.7	6.1	4.3
22	4.7	5.7	5.4	6.3	6.0	4.6
23	4.0	4.6	5.2	6.1	6.4	5.6

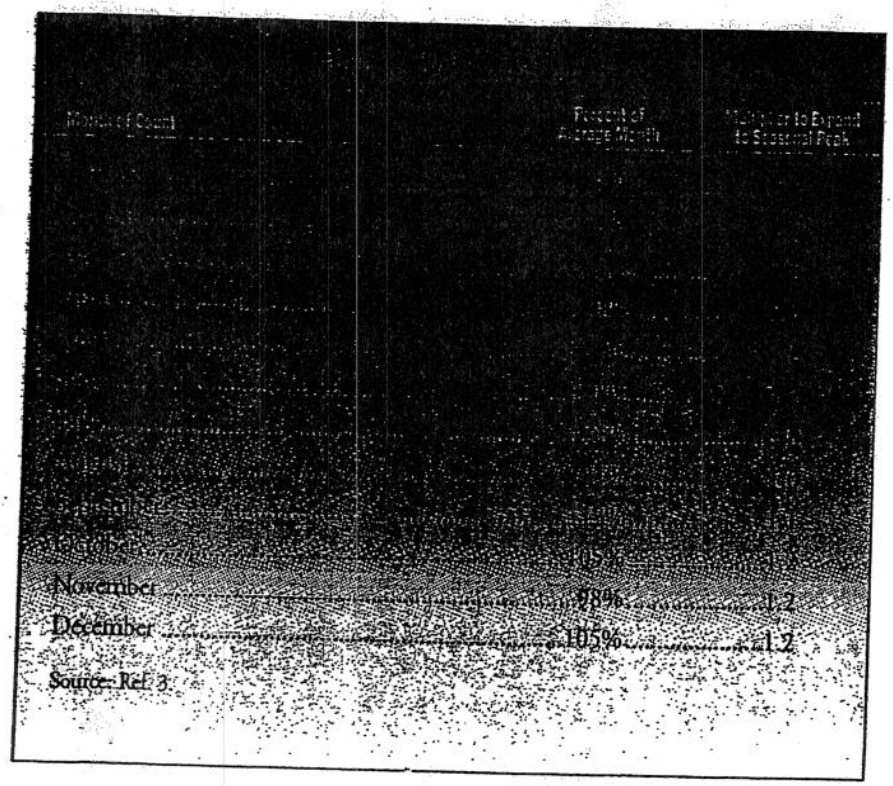
*Average Monday AM, Thursday PM plus Friday.
Source: Ref. 1.

Type of Traffic	Rate per Gaming Position*	
	IN	OUT

Source: Ref. 2.

	St. Charles	Casino Queen

*Conversion: One square foot = 0.093 square meter.



the scope of study was intended to analyze only the PM street peak hour generation.

The two sites studied have provided useful information on hourly and monthly variation. These data should guide studies of other sites. Separate counts of customer and employee vehicular traffic, plus trucks, should be taken on busy weekdays and perhaps on a Saturday evening, if a street capacity problem is likely. At some locations, large numbers of patrons may arrive by bus, which relates to geometric design of driveways.

Other studies of gaming facilities needed include parking generation, which represents a major factor. The development of gaming on Native American tribal lands is often away from or at the fringe of metropolitan areas. Traffic and parking characteristics of these facilities may differ from those

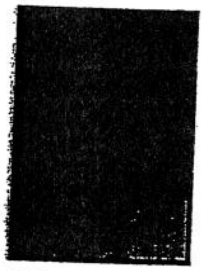
within a metropolitan area. Busing may represent a more significant factor—especially relative to parking layout. ■

References

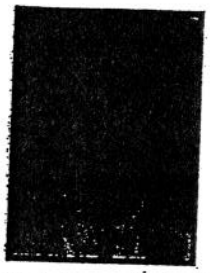
1. *Traffic Impact Study for the Ultimate Development of St. Charles Riverfront Station,* Final Report. Crawford, Bunte, Brammeier, August 1995, unpublished.

2. *Study of Casino Queen.* Paul C. Box and Associates Inc., November 1996, unpublished.

3. *Horseshoe Gaming, St. Louis County Project.* Economics Research Associates, as presented to County Plan Commission about September 1996, unpublished.



PAUL C. BOX, *P.E., has about 17 years of experience working for cities and some 33 years of experience as a traffic consultant. He has more than 100 publications in the traffic engineering field, has lectured extensively and has chaired a number of ITE Standard Practice technical committees. He is a Fellow and Life Member of ITE.*



WILLIAM F. BUNTE, *P.E., received his bachelor's and master's degrees in civil engineering from the University of Illinois. During the past 32 years he has provided traffic and transportation engineering consulting services for a variety of private and public clients. He currently is a partner in the firm of Crawford, Bunte, Brammeier. He is a Fellow of ITE.*

Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

Counter: 2779
Counted By: AW
Weather: COLD
Other: Trip Generation

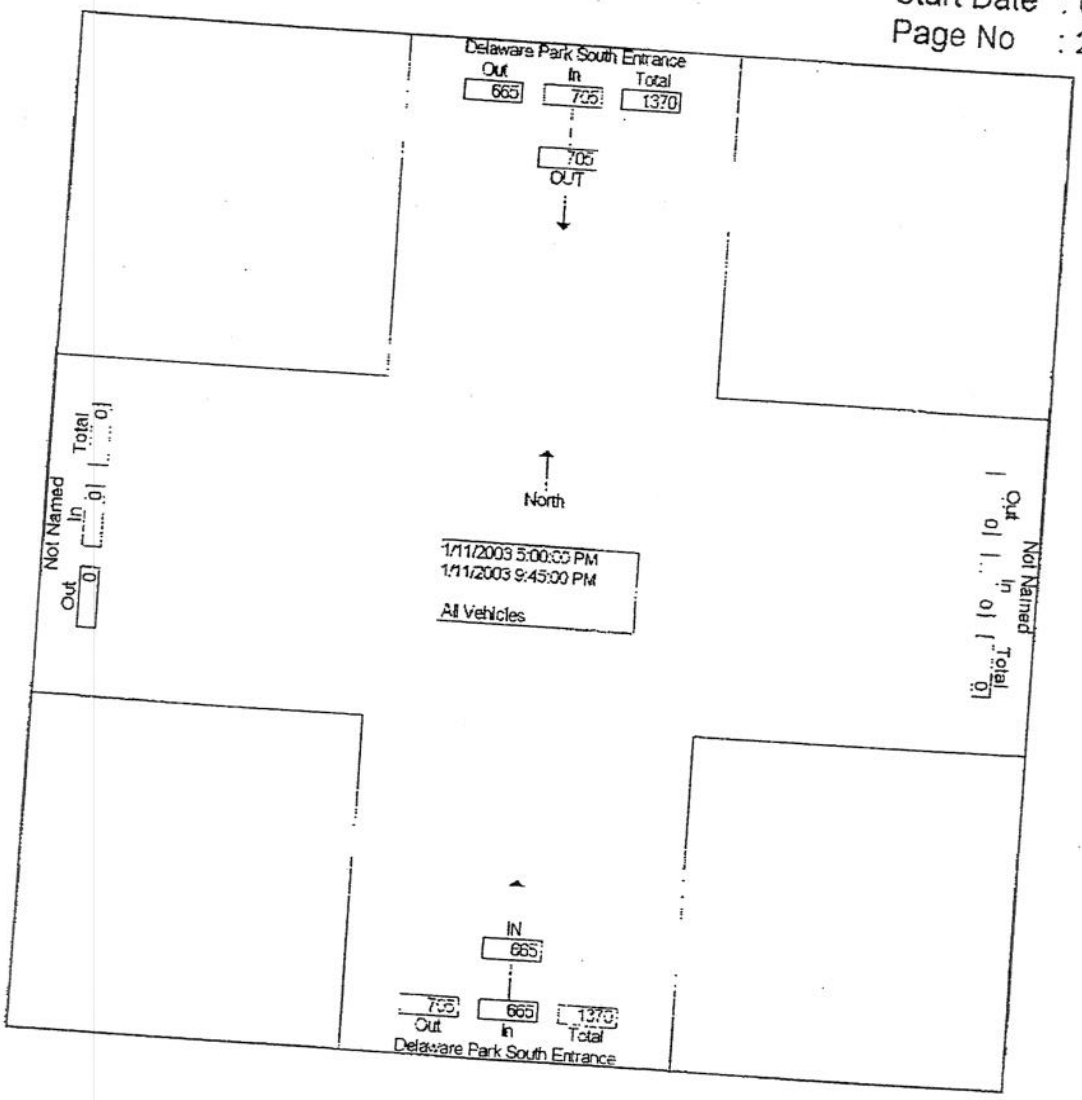
File Name : South Entrance
Site Code : 00000022
Start Date : 01/11/2003
Page No : 1

Groups Printed- All Vehicles

	Delaware Park South Entrance From North		Delaware Park South Entrance From South		
Start Time	OUT	App. Total	IN	App. Total	Int. Total
Factor	1.0		1.0		
05:00 PM	48	48	49	49	97
05:15 PM	63	63	28	28	91
05:30 PM	33	33	53	53	86
05:45 PM	45	45	42	42	87
Total	189	189	172	172	361
06:00 PM	43	43	45	45	88
06:15 PM	54	54	49	49	103
06:30 PM	39	39	34	34	73
06:45 PM	52	52	31	31	83
Total	188	188	159	159	347
07:00 PM	38	38	31	31	69
07:15 PM	45	45	41	41	86
07:30 PM	36	36	40	40	76
07:45 PM	34	34	27	27	61
Total	153	153	139	139	292
08:00 PM	29	29	32	32	61
08:15 PM	14	14	24	24	38
08:30 PM	28	28	15	15	43
08:45 PM	18	18	34	34	52
Total	89	89	105	105	194
09:00 PM	24	24	27	27	51
09:15 PM	12	12	18	18	30
09:30 PM	29	29	24	24	53
09:45 PM	21	21	21	21	42
Total	86	86	90	90	176
Grand Total	705	705	665	665	1370
Apprch %	100.0		100.0		
Total %	51.5	51.5	48.5	48.5	

Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

File Name : South Entrance
Site Code : 00000022
Start Date : 01/11/2003



Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

Counter: 2778
Counted By: SF
Weather: COLD
Other: Trip Generation

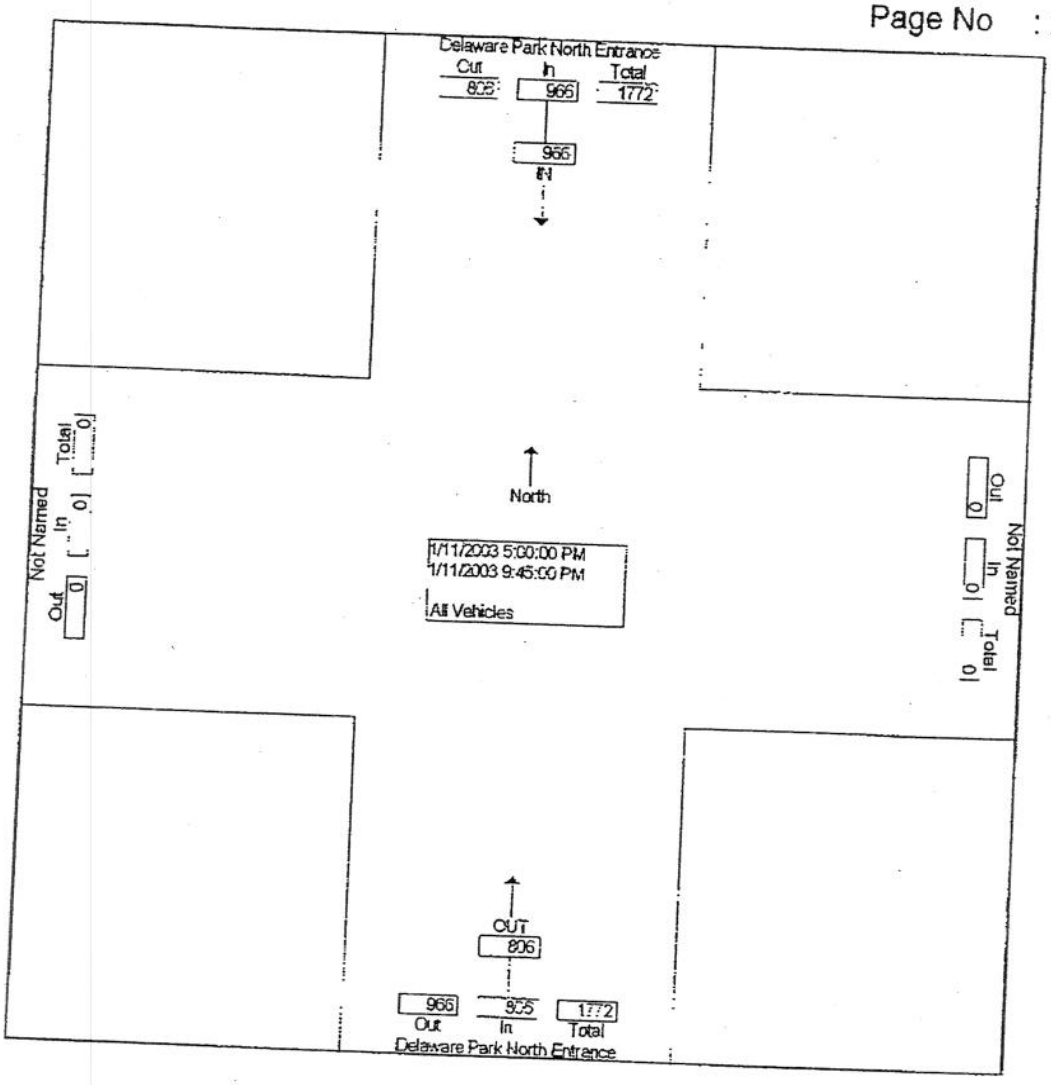
File Name : North Entrance
Site Code : 00000001
Start Date : 01/11/2003
Page No : 1

Groups Printed- All Vehicles

	Delaware Park North Entrance From North		Delaware Park North Entrance From South		
Start Time	IN	App. Total	OUT	App. Total	Int. Total
Factor	1.0		1.0		
05:00 PM	78	78	40	40	118
05:15 PM	69	69	46	46	115
05:30 PM	52	52	46	46	98
05:45 PM	71	71	49	49	120
Total	270	270	181	181	451
06:00 PM	54	54	50	50	104
06:15 PM	59	59	43	43	102
06:30 PM	40	40	42	42	82
06:45 PM	36	36	36	36	72
Total	189	189	171	171	360
07:00 PM	45	45	47	47	92
07:15 PM	42	42	42	42	84
07:30 PM	33	33	31	31	64
07:45 PM	41	41	43	43	84
Total	161	161	163	163	324
08:00 PM	35	35	31	31	66
08:15 PM	45	45	38	38	83
08:30 PM	43	43	42	42	85
08:45 PM	43	43	38	38	81
Total	166	166	149	149	315
09:00 PM	31	31	36	36	67
09:15 PM	50	50	45	45	95
09:30 PM	55	55	28	28	83
09:45 PM	44	44	33	33	77
Total	180	180	142	142	322
Grand Total	966	966	806	806	1772
Apprch %	100.0		100.0		
Total %	54.5	54.5	45.5	45.5	

Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

File Name : North Entrance
Site Code : 00000001
Start Date : 01/11/2003



Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

Counter: 05
Counted By: CRA
Weather: COLd
Other: Trip Generation

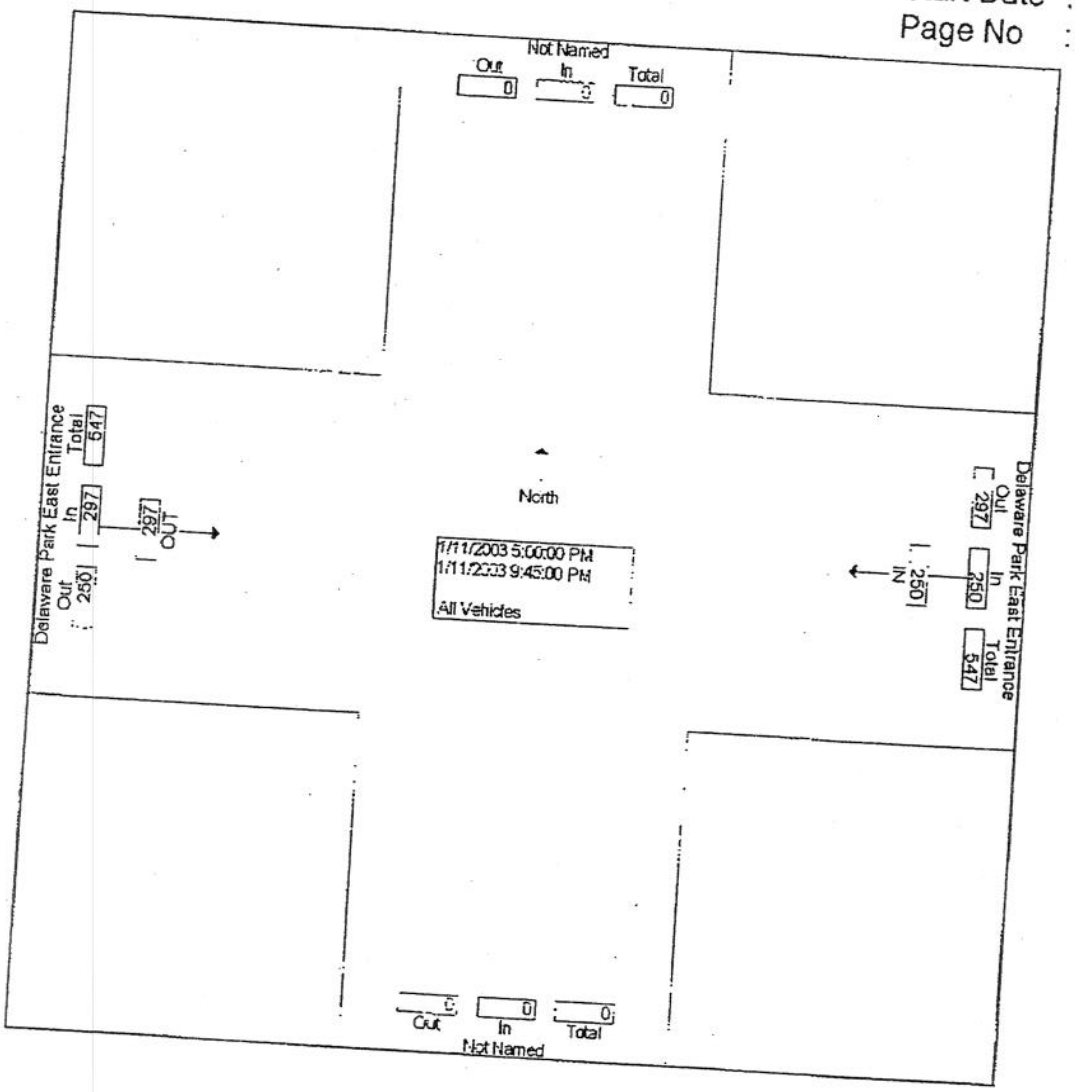
File Name : East Entrance
Site Code : 00000055
Start Date : 01/11/2003
Page No : 1

Groups Printed- All Vehicles

	Delaware Park East Entrance From East		Delaware Park East Entrance From West		
Start Time	IN	App. Total	OUT	App. Total	Int. Total
Factor	1.0		1.0		
05:00 PM	1	1	6	6	7
05:15 PM	11	11	22	22	33
05:30 PM	14	14	23	23	37
05:45 PM	31	31	23	23	54
Total	57	57	74	74	131
06:00 PM	13	13	21	21	34
06:15 PM	21	21	20	20	41
06:30 PM	13	13	11	11	24
06:45 PM	18	18	28	28	46
Total	65	65	80	80	145
07:00 PM	10	10	23	23	33
07:15 PM	12	12	11	11	23
07:30 PM	13	13	6	6	19
07:45 PM	11	11	12	12	23
Total	46	46	52	52	98
08:00 PM	8	8	8	8	16
08:15 PM	11	11	6	6	17
08:30 PM	6	6	26	26	32
08:45 PM	20	20	10	10	30
Total	45	45	50	50	95
09:00 PM	10	10	7	7	17
09:15 PM	9	9	12	12	21
09:30 PM	8	8	10	10	18
09:45 PM	10	10	12	12	22
Total	37	37	41	41	78
Grand Total	250	250	297	297	547
Apprch %	100.0		100.0		
Total %	45.7	45.7	54.3	54.3	

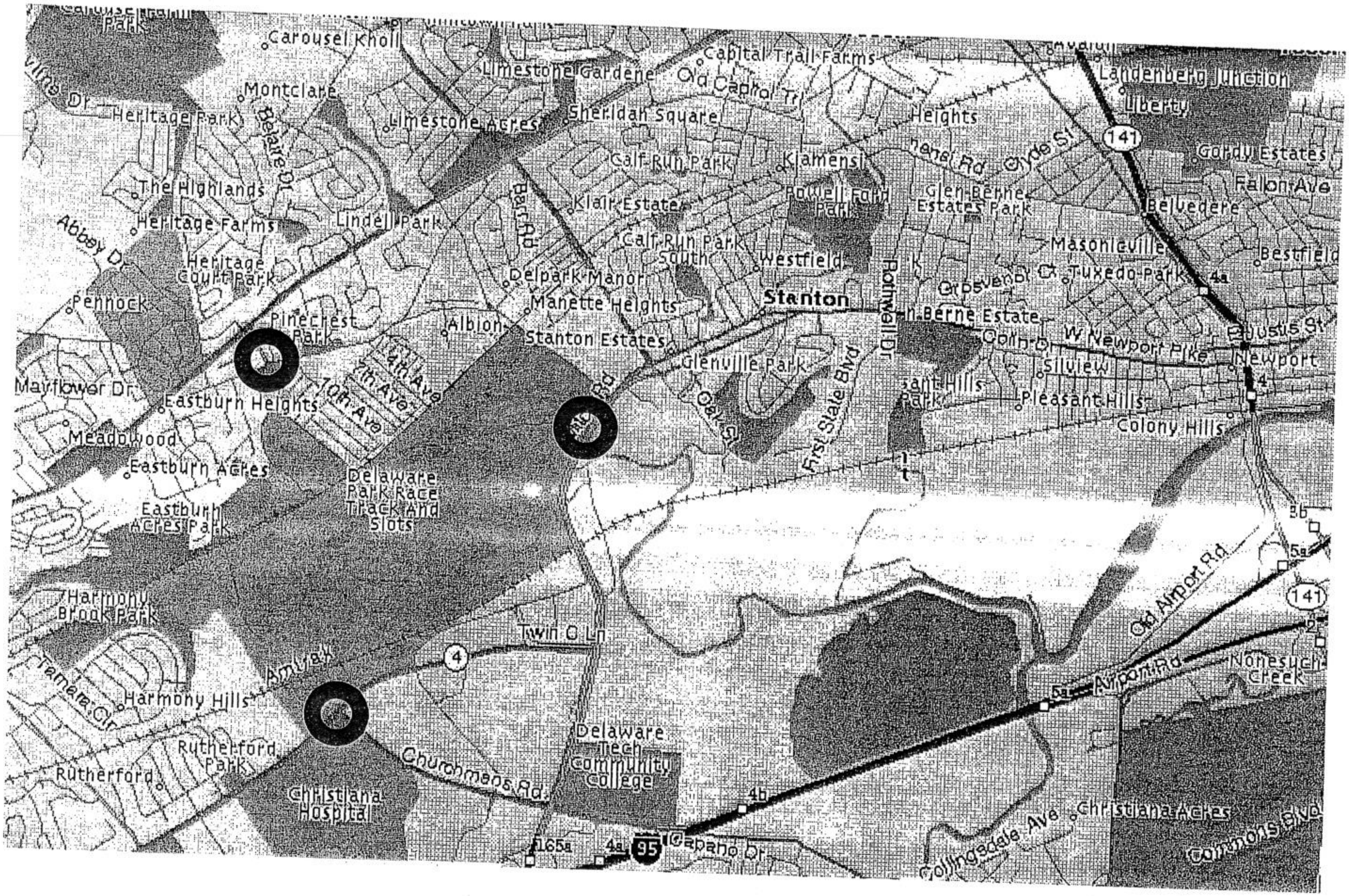
Pennoni Associates, Inc.
950 Clifton Ave.
Clifton, NJ, 07013
973-365-0510

File Name : East Entrance
Site Code : 00000055
Start Date : 01/11/2003



START TIME	ENTERING S	E	N	TOTAL	HOURLY	START TIME	EXITING S	E	N	TOTAL	HOURLY	
17:00	49	1	78	128	499	17:00	48	6	40	94	444	943
17:15	28	11	69	108	483	17:15	63	22	46	131	464	947
17:30	53	14	52	119	504	17:30	33	25	46	102	450	954
17:45	42	31	71	144	472	17:45	45	23	49	117	440	912
18:00	45	13	54	112	413	18:00	43	21	50	114	439	852
18:15	49	21	59	129	387	18:15	54	20	43	117	433	820
18:30	34	13	40	87	353	18:30	39	11	42	92	414	767
18:45	31	18	36	85	352	18:45	52	28	36	116	395	747
19:00	31	10	45	86	346	19:00	38	23	47	108	368	714
19:15	41	12	42	95	335	19:15	45	11	42	98	328	663
19:30	40	13	33	86	320	19:30	36	6	31	73	288	608
19:45	27	11	41	79	298	19:45	34	12	43	89	311	609
20:00	32	8	35	75	316	20:00	29	8	31	68	288	604
20:15	24	11	45	80	309	20:15	14	6	38	58	287	596
20:30	15	6	43	64	306	20:30	28	26	42	96	298	604
20:45	34	20	43	97	329	20:45	18	10	38	66	269	598
21:00	27	10	31	68	307	21:00	24	7	36	67	269	576
21:15	18	9	50	77		21:15	12	12	45	69		
21:30	24	8	55	87		21:30	29	10	28	67		
21:45	21	10	44	75		21:45	21	12	33	66		
				MAX	504					MAX	464	954

Entering = 504 53%
Exiting = 450 47%



Carousel Knoll
Montclare
Heritage Park
Belaire Dr
Limestone Gardens
Limestone Acres
Capital Trail Farms
Old Capitol Trl
Sheridan Square
Heights
Landenberg Junction
Liberty
141
Gordy Estates
Fallon Ave
Belvedere
Bestfield
The Highlands
Heritage Farms
Abbey Dr
Heritage Court Park
Pennock
Lindell Park
Barr Rd
Calf Run Park
Kiamensi
Klair Estates
Powell Ford Park
Glen Berne Estates Park
Clyde St
Calf Run Park South
Westfield
Masonleville
Tuxedo Park
Delpark Manor
Manette Heights
Stanton
Rothwell Dr
Berne Estate
W Newport Pike
Justis St
Newport
Pinecrest Park
Albion
Stanton Estates
Glenville Park
Silview
Pleasant Hills
Colony Hills
Mayflower Dr
Eastburn Heights
4th Ave
7th Ave
10th Ave
Meadowood
Eastburn Acres
Oak St
First State Blvd
Delaware Park Race Track And Slots
Eastburn Acres Park
Old Airport Rd
Harmony Brook Park
Twin C Ln
Tamara Cir
Harmony Hills
Amtrak
4
Airport Rd
Nonesuch Creek
Rutherford Park
Rutherford
Churchmans Rd
Delaware Tech Community College
Christiana Hospital
Christiana Acres
Collingsdale Ave
Commons Blvd
95
Capano Dr

PHILADELPHIA PARK TRIP GENERATION AND DISTRIBUTION

Trip Generation

The standard reference generally utilized to estimate traffic generated by new developments is a publication entitled Trip Generation by the Institute of Transportation Engineers. However, Trip Generation does not include a significant amount of data for gaming uses. The data it does include, does not match up well with the proposed Philadelphia Park development. Therefore, additional research was conducted to identify other sources of trip data.

An article titled "Gaming Casino Traffic", published in the ITE Journal, March 1998, by Paul C. Box and William Bunte, provides trip generation rates and an analysis of the daily fluctuation in generated traffic for two gaming casino facilities. While the article establishes trip generation rates per gaming position for the study sites, the rates could not be reasonably applied to the Philadelphia Park site, because the sites included in the article contain table an audience type gaming positions (blackjack, poker, Keno).

In order to develop an estimate of the future traffic for the proposed gaming device facility, driveway count information from similar facilities was utilized. Traffic counts from the following facilities were analyzed:

- Freehold National, New Jersey
- Delaware Park, Delaware
- Dover Downs, Delaware

Out of the three sites, the trip generation rates regressed from Delaware Park Saturday evening driveway vehicle counts appear to be most suitable to be applied to Philadelphia Park. This is primarily because the driveway traffic counts at this facility were conducted when the live horse racing facility was closed and therefore the trips attracted by the gaming device facility were singled out. Additionally, the Delaware Park site is compatible with the proposed Philadelphia Park development, in that it includes a similar number and type of supporting patron services within the gaming device facility.

In order to develop trip generation rates for the weekday evening peak hour, the regressed Saturday evening rate was adjusted based on ratios provided in the Box and Bunte article mentioned previously. The Saturday midday peak hour rate was obtained using Table 2 from the Box and Bunte article which provides an hourly breakdown of the daily traffic percentages.

The combination of literature research and field observations resulted in the following trip generation rate estimates:

- **0.358** trips per gaming position during the **weekday evening** peak hour (52% entering and 48% exiting); and
- **0.477** trips per gaming position during the **Saturday evening** peak hour (53% entering and 47% exiting)
- **0.252** trips per gaming position during the **Saturday midday** peak hour (52% entering and 48% exiting)

Based on the above stated rates, the proposed Philadelphia Park development is anticipated to generate of the following peak hour trips:

- 1,074 trips during the weekday evening peak hour (558 entering and 516 exiting);
- 1,431 trips during the Saturday evening peak hour (758 entering and 673 exiting); and
- 756 trips during the Saturday midday peak hour (476 entering and 280 exiting).

In order to determine the total daily traffic expected to be developed by the site, peak hour/daily traffic ratios were applied to the entering and exiting traffic for both the proposed electronic gaming facility traffic, and the existing horse track traffic. For the proposed facility, the ratios were taken from the Box and Bunte ITE article, while the daily traffic rates for the existing traffic were estimated using ITE Trip Generation. The results of the daily traffic estimates are as follows:

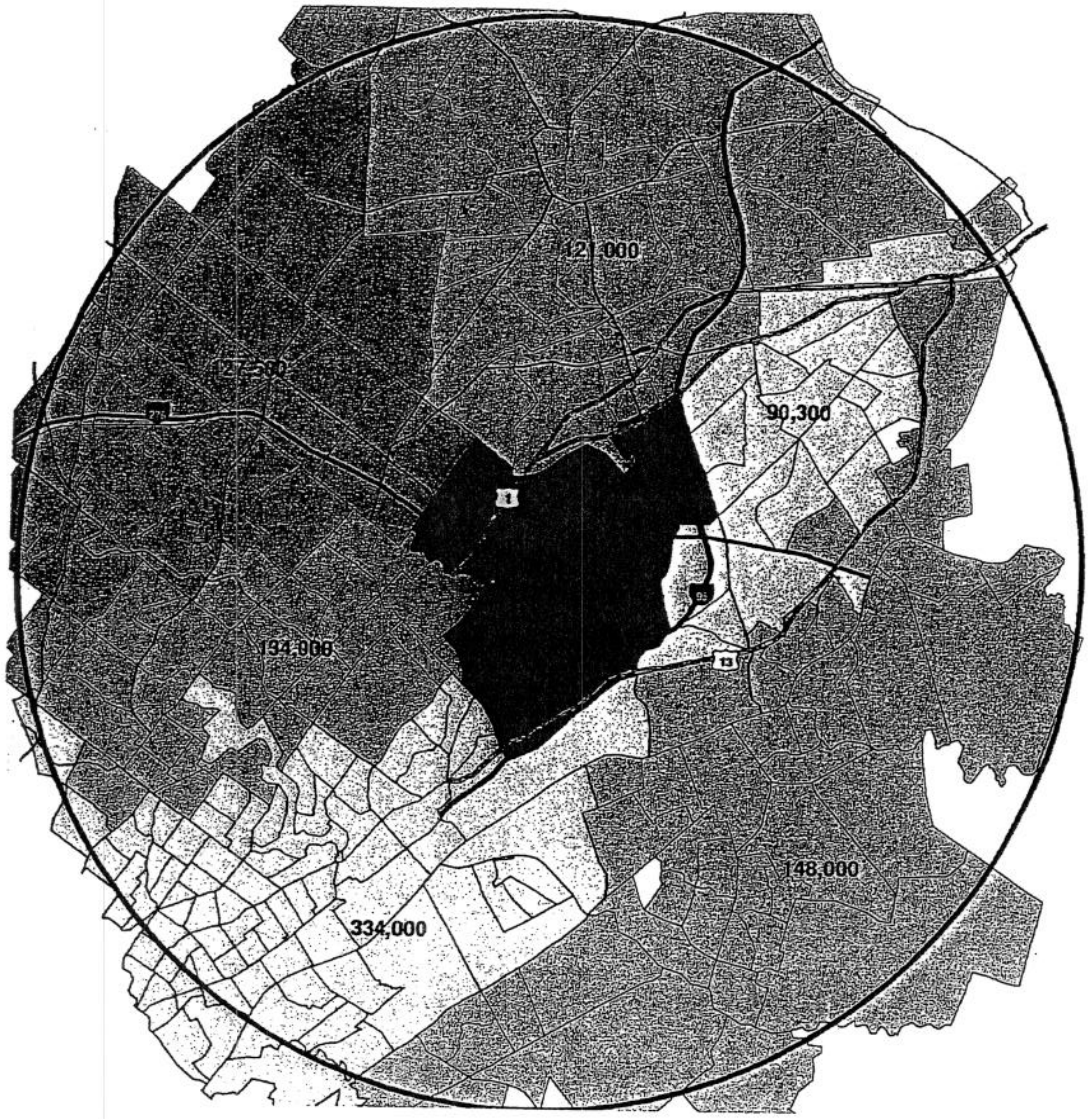
- 19,000 daily trips for an average weekday (4,450 existing and 14,550 proposed)
- 30,000 daily trips for a Saturday (10,150 existing and 19,850 proposed)

Trip Distribution and Assignment

With the proposed facilities close proximity to several major highways, a separation of local trips versus regional was established to accurately estimate the distribution of the proposed traffic. The results of the analysis indicate that approximately 85% of the new trips generated by the site will be regional trips that will access the site and the surrounding local roadway network via a major highway or arterial. The distribution of the regional and local traffic is outlined below:

1. Regional Distribution

In order to estimate the regional distribution of new trips to and from the proposed gaming facility, a gravity model, with an exponentially distributed impedance function was developed. Total population, adjusted for potential casino trip-makers within a 10-mile radius of the project site was used to represent weighted trip attraction. The population is allocated to seven major zones, composed out of individual census tracts based on the proximity to a regional expressway (I-95, US-1, US-13, PA Turnpike, and Street Road). The study assumes an all-or-nothing trip assignment of Philadelphia park trips to major regional roadways from these zones. Specific zones and casino populations are shown in the image below.



Traffic analysis zones in 10-mile radius

Adjustment of Total Population to Casino Trip Makers

The total population was adjusted to potential casino trip-makers based on a survey performed by American Gaming Association about a profile of a typical American gambler [1]. Distribution by casino visitor's age was taken as an adjustment factor.

Gravity Model Set-Up

The gravity model $T_{ij} = P_i \frac{A_j F_{ij} K_{ij}}{\sum_j A_j F_{ij} K_{ij}}$ produces T number of trips between any zone i and Philadelphia park (zone j), adjusted by the following factors:

- F_{ij} is a friction coefficient, which accounts for an impedance (travel time, distance). The impedance function was used where distance is the least responsive, yet still decreases the number of trips to Philadelphia Park with increasing distance.
- K_{ij} is a socioeconomic coefficient expressing a non-gravity relationship between zones i and j. Trips are adjusted by K_{ij} for three zones: local traffic, US-1 N traffic and PA Turnpike traffic. This adjustment factor takes into account the expectation of traffic from areas which are outside of the 10-mile radius and therefore non-reflected in the unadjusted gravity model. It also provides impedance to local traffic to prevent an overestimation of how much traffic will be generated locally.

Final regional distribution is shown in Tables 1 and 2.

TABLE 1
PHILADELPHIA PARK
POPULATION DEMOGRAPHICS- POPULATION BY AGE

	Total 2000 Population	21-35	36-50	51-65	66 >
LOCAL	75,479	21,314	12,092	12,438	8,008
RT. 13 NORTH	90,331	23,018	14,767	12,557	12,084
I-95 SOUTH	333,782	87,815	47,354	46,649	55,316
RT. 1 NORTH	121,016	27,590	23,318	20,183	12,409
RT. 1 SOUTH	134,660	29,846	19,769	23,067	29,711
PA TURNPIKE/ STREET ROAD	127,543	29,376	20,245	21,630	20,785
NEW JERSEY	148,693	36,359	23,872	24,411	19,528
SUM:	1,031,504				

TABLE 2
PHILADELPHIA PARK
GRAVITY MODEL

	Estimated Casino Population:	Approx. Distance To Site [km]:	F_{ij}	K_{ij}	$A_iK_{ij}F_{ij}$	T_{ij}	Distribution
LOCAL	14,245	2.4	0.3817	0.55	2,990.85	310	16%
RT. 13 NORTH	16,476	9.5	0.0840	1.00	1,384.70	144	7%
I-95 SOUTH	62,722	12	0.0650	1.00	4,076.83	423	22%
RT. 1 NORTH	22,132	11.1	0.0708	1.90	2,978.01	309	15%
RT. 1 SOUTH	27,346	7.8	0.1044	1.00	2,854.87	296	15%
PA TURNPIKE/ STREET ROAD	24,506	10	0.0794	1.70	3,309.21	343	17%
NEW JERSEY	27,654	12.7	0.0611	1.00	1,688.76	175	9%
Total	**195,081**				19,283.23	2000	
c = 1.1					$\Sigma_i[A_iK_{ij}F_{ij}]$	$\Sigma_i[T_{ij}]$	

2. Local Distribution

The local distribution was based on existing traffic volumes, reduced by regional traffic along Street Rd. The reduction applies to both I-95 and US-1 traffic. The traffic to and from I-95 and US-1 was reduced proportionately to the approach volumes, as it enters or exits Street Rd. This reduction allows for the local traffic to be distributed along local roadways.

Sources:

1. "Profile of an American Gambler." Harrah's Survey. American Gaming Association, Washington, D.C., 2003.

It was estimated that the traffic generated by the Philadelphia Park gaming device facility will be **85% regional** and **15% local**. Local traffic was distributed to the local roadway network utilizing existing traffic patterns, while regional traffic was allocated with the use of a gravity model which yielded the following distribution:

To/From North:	Lincoln Highway (Route 1)	15%
	Bristol Pike (Route 13)	7%
To/From South:	Interstate 95	22%
	Lincoln Highway (Route 1)	15%
To/From East:	Interstate 276	9%
To/From West:	Interstate 276	11%
	Street Road (SR 0132)	6% +
Total Regional Traffic		**85%**

SUMMARY AND CONCLUSIONS

Philadelphia Park proposes to construct an electronic gaming device facility at their existing mixed venue entertainment complex which includes a horse racing facility (consisting of grandstands and box seating); restaurants, sports bars, lounges and simulcasting theaters. The proposed gaming device facility will be comprised of restaurants, bars, nightclubs, and 3000 electronic gaming units.

Based on literature research and data from existing gambling facilities, the proposed addition of 3000 gaming units to the existing Philadelphia Park site is anticipated to generate a total of:

- 1,074 trips during the weekday evening peak hour (558 entering and 516 exiting);
- 1,431 trips during the Saturday evening peak hour (758 entering and 673 exiting); and
- 756 trips during the Saturday evening peak hour (476 entering and 280 exiting).

Utilizing peak/daily traffic rates for the proposed gaming facility traffic and the existing racetrack traffic yields the following daily traffic estimates for the entire site:

- 19,000 daily trips for an average weekday (4,450 existing and 14,550 proposed)
- 30,000 daily trips for a Saturday (10,150 existing and 19,850 proposed)

It was estimated that the traffic generated by the Philadelphia Park gaming device facility will be **85% regional** and **15% local**. The local traffic was distributed to the roadway network utilizing existing traffic patterns while the regional traffic was allocated to the roadway network through the use of a gravity model which yielded the following distribution:

To/From North:	Lincoln Highway (Route 1)	15%
	Bristol Pike (Route 13)	7%
To/From South:	Interstate 95	22%
	Lincoln Highway (Route 1)	15%
To/From East:	Interstate 276	9%
To/From West:	Interstate 276	11%
	Street Road (SR 0132)	6% +
Total Regional Traffic		**85%**

The projected development traffic was added to traffic from other planned area developments and analyzed under build year 2005 and design year 2015 conditions. For both the build year and design year, area roadway improvements that are either in construction or planned for future construction were included in the analysis period

which corresponds to their anticipated completion date. Based on the analysis, the following roadway and traffic signal improvements are recommended as part of this project to mitigate the impact of the development traffic:

- An additional through lane should be provided for both the eastbound and westbound directions of Street Road from east of Mechanicsville Road to west of Richlieu Road.
- At the Street Road Philadelphia Park Access, dual southbound left turn lanes out of the site should be provided. With this modification, the northbound (Tillman Drive) and southbound (Philadelphia Park) approaches must operate under split phasing.
- A right turn lane should be provided for the southbound approach of Richlieu Road at Street Road.
- One public access should be provided to Richlieu Road. This access point should be signalized with auxiliary turn lanes into and out of the site, and should be interconnected with fiber optic cable to the adjacent intersections along Richlieu Road at Street Road and Rockhill Drive.
- Left turn lanes should be provided for all approaches at the Mechanicsville site access location.
- Timing modifications should be provided for all signalized intersections within the study area. Event timing plans for the Street Road corridor must be developed and implemented with the corridor's traffic responsive operation.
- Data collection should be completed after the development is open to determine the effectiveness of the recommended improvements and to optimize the area signal timings based on the actual distribution of the project traffic.

With the implementation of the above referenced improvements, and with close coordination with planned area roadway improvements, the traffic to be generated by the proposed Philadelphia Park electronic gaming device facility can be successfully accommodated within the local roadway network.