

May 19, 2016

Planning Board
Township of Greenwich
Municipal Building
420 Washington Street
Gibbstown, NJ 08027

**Re: Traffic Evaluation
DRP Gibbstown Logistics Center – Phase 1
Warehouse Building 1
Township of Greenwich
Gloucester County, New Jersey
Langan Project No. 130088802**

Dear Board Members:

Langan Engineering & Environmental Services has prepared this traffic evaluation for the DRP Gibbstown Logistics Center – Phase 1 warehouse proposed along the north side of A Line Road. Specifically, this traffic evaluation reviews the traffic-related aspects of the proposed warehouse building including the following items:

- Site trip generation,
- Traffic operations, and
- Access, circulation and parking.

Based on this traffic evaluation, we have concluded the proposed warehouse building will not create any significant impacts on the surrounding road network. Moreover, the proposed site design is in accordance with current standards and will provide adequate access, circulation and parking.

The following sections describe this traffic evaluation.

DEVELOPMENT PROPOSAL

The site is situated on the north side of A Line Road to the west of Repauno Avenue. The site is designated as part of Block 8, Lot 4 and is undeveloped. The applicant proposes to subdivide the site into three lots: 4.05, 4.06 and 4.09. Lot 4.05 will contain Warehouse Building 1, which is proposed to provide 207,396 SF of building area and be served by 200 car parking spaces and 31 trailer parking spaces. Access to Warehouse Building 1 will be provided by two full-access driveways along A Line Road. Lot 4.06 is contemplated to be developed for a warehouse building that will provide approximately 93,800 SF of building area with primary access to Repauno Avenue. The applicant is not seeking site plan approval for proposed Lot 4.06 at this time. Lot 4.09 will encompass A Line Road.

EXISTING CONDITIONS

Repauno Avenue Description

Repauno Avenue is a local road with a general north-south orientation and that provides one lane of travel in each direction. Near the site, the speed limit is assumed to be 25mph and parking is permitted on one side of the road. Land use along this road is predominantly residential.

Langan evaluated traffic operations at the following Repauno Avenue intersections:

- Repauno Avenue and Route 44, and
- Repauno Avenue and Democrat Road.

Existing Traffic Volumes

Langan arranged manual turning movement counts for the study intersections. Specifically, the traffic counts were conducted on Tuesday, October 27, 2015 from 7:00 AM to 9:00 AM and from 2:00 PM to 6:00 PM. The manual turning movement counts indicate distinct peak hours where traffic volumes were the highest during each count period. The morning peak hour occurred from 7:00 AM to 8:00 AM and the evening peak hour occurred from 4:30 PM to 5:30 PM.

Attached are the manual turning movement count sheets along with a traffic volume worksheet that shows the existing peak hour traffic volumes.

TRIP GENERATION AND DISTRIBUTION

Langan used trip generation data contained in Trip Generation, 9th edition, published by the Institute of Transportation Engineers (ITE) to estimate the site trips that will be generated by the proposed warehouse building. For purposes of this evaluation and to be conservative, we estimated trip generation for Warehouse Building 1 (204,120 SF of building area) and the contemplated future warehouse building (94,500 SF of building area) on proposed Lot 4.06.

Table 1 shows the estimated trip generation for the critical weekday morning and evening peak hours. We used ITE warehousing trip rates to estimate trip generation and have assumed that 20% of peak hour trip generation will be trucks.

Table 1 - Trip Generation Estimates

Time Period	Warehouse Building 1 207,396 SF			Warehouse Building 2 93,800 SF		
	Car Trips	Truck Trips	Total Trips	Car Trips	Truck Trips	Total Trips
Weekday Morning Peak Hour						
Enter	78	20	98	50	13	63
Exit	<u>21</u>	<u>5</u>	<u>26</u>	<u>13</u>	<u>4</u>	<u>17</u>
Total	99	25	124	63	17	90
Weekday Evening Peak Hour						
Enter	19	5	24	12	3	15
Exit	<u>57</u>	<u>14</u>	<u>71</u>	<u>34</u>	<u>9</u>	<u>43</u>
Total	76	19	95	46	12	58

We based the distribution and assignment of the car trips on the existing peak hour travel patterns identified from the traffic counts. For the distribution and assignment of the truck trips, we identified the following two routes as the most viable for trucks to travel between the site and Route 295:

- Inbound Trucks – Tomlin Road to Route 44 to Repauno Avenue, and
- Outbound Trucks – Repauno Avenue to Democrat Road.

Trip distribution and site generated trips worksheets are attached.

FUTURE TRAFFIC VOLUMES

We anticipate the proposed warehouse building will be completed by the end of 2017. Therefore, to derive the future 2017 No-Build traffic volumes, we increased the Existing traffic volumes by an annual 1.00% growth rate to account for background traffic growth. That background traffic growth rate is published by the New Jersey Department of Transportation for Gloucester County. We then added the site generated trips to the 2017 No-Build traffic volumes to develop the 2017 Build traffic volumes.

The traffic volume worksheets are attached.

OPERATIONAL ANALYSIS

We conducted a Level of Service (LOS) analysis using the Highway Capacity Software, which is based on methodologies contained in the HCM 2010 Highway Capacity Manual published by the Transportation Research Board. LOS is the term used to denote the operating condition of a road segment or intersection under prevailing conditions and reflects several factors such as number of travel lanes, traffic volume, speed, and motorist delay. LOS designations range from

A to F, with LOS A representing the best operating conditions and LOS F representing poor operating conditions.

LOS designations are reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection. For unsignalized intersections, the analysis considers the operation of all movements that conflict with other movements, such as main-line left turns and traffic exiting a side street.

The HCM defines LOS for signalized intersections as follows:

<u>LOS</u>	<u>Delay Range (sec/veh)</u>
A	<10 sec
B	≥10 and ≤20 sec
C	≥20 and ≤35 sec
D	≥35 and ≤55 sec
E	≥55 and ≤80 sec
F	>80 sec

The HCM defines LOS for unsignalized intersections as follows:

<u>LOS</u>	<u>Delay Range (sec/veh)</u>
A	<10 sec
B	≥10 and ≤15 sec
C	≥15 and ≤25 sec
D	≥25 and ≤35 sec
E	≥35 and ≤50 sec
F	>50 sec

Level of Service Analysis

We conducted a Level of Service analysis of the study intersections. Tables 2 and 3 summarize the Levels of Service for the weekday morning and evening peak hours respectively. As can be seen, there will be no changes to LOS at the study intersections.

**Table 2 - Intersection Level of Service Analysis Summary
 Weekday Morning Peak Hour**

Location	2017 No-Build Condition	2017 Build Condition
	LOS*	LOS*
Repauno Avenue/Route 44		
Eastbound	A	A
Westbound	A	A
Northbound	B	B
Southbound	B	B
Repauno Avenue/Democrat Road		
Eastbound	A	A
Southbound	A	A

Based on HCS Software
 * Level of Service

**Table 3 - Intersection Level of Service Analysis Summary
 Weekday Evening Peak Hour**

Location	2017 No-Build Condition	2017 Build Condition
	LOS*	LOS*
Repauno Avenue/Route 44		
Eastbound	A	A
Westbound	A	A
Northbound	B	B
Southbound	B	B
Repauno Avenue/Democrat Road		
Eastbound	A	A
Southbound	A	A

Based on HCS Software
 * Level of Service

Based on the Level of Service analysis, the proposed warehouse will not have a significant impact along the adjacent roads and any changes to area traffic operations will be minor.

SITE PLAN REVIEW

We have reviewed the site plan for the proposed warehouse building. In particular, we focused on access, circulation and parking supply, which the following items address:

- The site plan shows access to the proposed warehouse building will be provided by two full-access driveways along A Line Road. We expect those driveways to function efficiently and facilitate turning into and out of the proposed warehouse building site.
- The proposed passenger car parking provides 9 feet wide and 18 feet deep perpendicular parking spaces served by two-way aisles with a minimum width of 24 feet. The proposed trailer parking provides 12 feet wide and 55 feet deep parking spaces served by a two-way aisle with effectively a minimum width of 50 feet. These parking space dimensions are consistent with current parking design standards.

- The majority of the proposed passenger car parking has been isolated from the truck court and will allow pedestrians to access building entrances without having to walk across truck circulation aisles.
- The proposed trailer parking has been arranged in a uniform pattern opposite a portion of the loading docks, which will provide efficient circulation.
- We anticipate the proposed parking supply will adequately accommodate the parking demands of the proposed warehouse building. A total of 200 parking spaces will serve the proposed warehouse building. Based on the 85th percentile of the ITE warehouse parking demand data, the proposed warehouse building will have a parking demand of approximately 165 vehicles:

Based on our review, we believe convenient access, efficient circulation and adequate parking will be provided for the site.

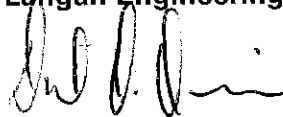
CONCLUSION

The proposed warehouse building will have a minimal traffic impact on the surrounding road network. We expect area traffic operations to remain largely unchanged with the proposed warehouse building in place. Moreover, the site design will provide adequate access, circulation and parking.

Should you have any questions or comments concerning this traffic evaluation, please do not hesitate to contact our office.

Very truly yours,

Langan Engineering and Environmental Services, Inc.



Daniel D. Disario, P.E., PTOE
Principal

TRAFFIC COUNTS

LANGAN

NJ Route 44 & Repauno Avenue
 Manual Turning Movement Count
 Weekday AM and PM Peak Hours
 Tuesday, 27 October 2015

File Name : NJ Route 44 and Repauno Ave AMPM
 Site Code : 00000000
 Start Date : 10/27/2015
 Page No : 1

Groups Printed- Class 1

Start Time	REPAUNO AVENUE Southbound						NJ ROUTE 44 Westbound						REPAUNO AVENUE Northbound						NJ ROUTE 44 Eastbound								
	Left	Thru	Right	Trucks	App. Total		Left	Thru	Right	Trucks	App. Total		Left	Thru	Right	Trucks	App. Total		Left	Thru	Right	Trucks	App. Total		Exclu. Total	Inclu. Total	Int. Total
07:00 AM	1	27	4	5	32		0	7	0	1	7		3	10	3	1	16		5	1	3	1	9		8	64	72
07:15 AM	1	21	2	1	24		1	5	2	0	8		2	17	0	0	19		1	4	4	1	9		2	60	62
07:30 AM	0	20	4	2	24		1	5	3	0	9		3	9	0	1	12		7	5	5	0	17		3	62	65
07:45 AM	1	20	2	0	23		1	4	0	0	5		2	20	0	1	22		4	7	3	2	14		3	64	67
Total	3	88	12	8	103		3	21	5	1	29		10	56	3	3	69		17	17	15	4	49		16	250	266
08:00 AM	1	17	8	1	26		0	3	1	0	4		3	9	1	1	13		7	2	2	0	11		2	54	56
08:15 AM	0	15	3	1	18		0	4	2	0	6		1	17	1	0	19		11	3	2	0	16		1	59	60
08:30 AM	0	13	5	0	18		0	3	1	0	4		0	15	1	0	16		0	1	2	1	3		1	41	42
08:45 AM	1	16	3	0	20		1	1	2	0	4		1	12	0	1	13		3	1	2	0	6		1	43	44
Total	2	61	19	2	82		1	11	6	0	18		5	53	3	2	61		21	7	8	1	36		5	197	202
*** BREAK ***																											
02:00 PM	2	14	2	2	18		1	1	1	0	3		4	15	1	1	20		3	4	2	1	9		4	50	54
02:15 PM	0	13	1	1	14		0	3	1	0	4		2	16	1	0	19		4	4	1	1	9		2	46	48
02:30 PM	1	11	2	0	14		0	2	0	0	2		2	20	1	0	23		4	5	2	0	11		0	50	50
02:45 PM	1	16	3	1	20		1	2	2	0	5		3	22	0	1	25		2	6	2	0	10		2	60	62
Total	4	54	8	4	66		2	8	4	0	14		11	73	3	2	87		13	19	7	2	39		8	206	214
03:00 PM	2	12	5	3	19		0	2	1	0	3		1	18	1	1	20		2	8	2	2	12		6	54	60
03:15 PM	0	18	2	1	20		1	4	0	0	5		2	16	2	2	20		4	11	4	1	19		4	64	68
03:30 PM	2	16	1	1	19		1	3	0	1	4		4	23	0	1	27		5	8	5	0	18		3	68	71
03:45 PM	1	20	4	0	25		1	6	1	0	8		3	25	0	2	28		5	7	2	1	14		3	75	78
Total	5	66	12	5	83		3	15	2	1	20		10	82	3	6	95		16	34	13	4	63		16	261	277
04:00 PM	0	24	3	0	27		2	5	2	0	9		2	20	1	3	23		8	5	3	0	16		3	75	78
04:15 PM	1	16	3	1	20		1	4	0	0	5		2	20	2	3	24		4	6	2	0	12		4	61	65
04:30 PM	1	22	2	2	25		0	4	3	1	7		2	18	2	2	22		3	4	4	2	11		7	65	72
04:45 PM	1	20	4	3	25		1	7	2	0	10		2	15	3	0	20		4	8	3	0	15		3	70	73
Total	3	82	12	6	97		4	20	7	1	31		8	73	8	8	89		19	23	12	2	54		17	271	288
05:00 PM	2	25	6	1	33		1	4	2	0	7		4	23	0	1	27		6	3	6	0	15		2	82	84
05:15 PM	2	21	2	0	25		3	6	0	0	9		3	24	0	0	27		7	4	2	1	13		1	74	75
05:30 PM	2	19	4	1	25		1	2	1	1	4		2	20	2	2	24		4	6	1	1	11		5	64	69
05:45 PM	1	24	4	0	29		1	4	1	1	6		4	15	1	0	20		3	5	2	1	10		2	85	87
Total	7	89	16	2	112		6	16	4	2	26		13	82	3	3	98		20	18	11	3	49		10	285	295
Grand Total	24	440	79	27	543		19	91	28	5	138		57	419	23	24	499		106	118	66	16	290		72	1470	1542
Approach %	4.4	81	14.5		36.9		13.8	65.9	20.3		9.4		11.4	84	4.6		33.9		36.6	40.7	22.8		19.7		4.7	95.3	
Total %	1.6	29.9	5.4				1.3	6.2	1.9				3.9	28.5	1.6				7.2	8	4.5						

LANGAN

NJ Route 44 & Repauno Avenue
 Manual Turning Movement Count
 Weekday AM and PM Peak Hours
 Tuesday, 27 October 2015

File Name : NJ Route 44 and Repauno Ave AMPM
 Site Code : 00000000
 Start Date : 10/27/2015
 Page No : 2

Start Time	REPAUNO AVENUE Southbound				NJ ROUTE 44 Westbound				REPAUNO AVENUE Northbound				NJ ROUTE 44 Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	27	4	32	0	7	0	7	3	10	3	16	5	1	3	9	64
07:15 AM	1	21	2	24	1	5	2	8	2	17	0	19	1	4	4	9	60
07:30 AM	0	20	4	24	1	5	3	9	3	9	0	12	7	5	5	17	62
07:45 AM	1	20	2	23	1	4	0	5	2	20	0	22	4	7	3	14	64
Total Volume	3	88	12	103	3	21	5	29	10	56	3	69	17	17	15	49	250
% App. Total	2.9	85.4	11.7	10.3	72.4	17.2	806	14.5	81.2	4.3	784	34.7	34.7	30.6	750	977	
PHF	.750	.815	.750	.805	.750	.750	.417	.806	.833	.700	.250	.784	.607	.607	.750	.721	.977
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	1	22	2	25	0	4	3	7	2	18	2	22	3	4	4	11	65
04:45 PM	1	20	4	25	1	7	2	10	2	15	3	20	4	8	3	15	70
05:00 PM	2	25	6	33	1	4	2	7	4	23	0	27	6	3	6	15	82
05:15 PM	2	21	2	25	3	6	0	9	3	24	0	27	7	4	2	13	74
Total Volume	6	88	14	108	5	21	7	33	11	80	5	96	20	19	15	54	291
% App. Total	5.6	81.5	13	15.2	63.6	21.2	825	11.5	83.3	5.2	889	37	35.2	27.8	625	900	
PHF	.750	.880	.583	.818	.417	.750	.583	.825	.688	.833	.417	.889	.714	.594	.625	.900	.887

LANGAN

Repauno Avenue & Democrat Road (C.R. 673)
 Manual Turning Movement Count
 Weekday AM and PM Peak Hours
 Tuesday, 27 October 2015

File Name : Repauno Ave and Democrat Rd (C.R. 673) AMPM
 Site Code : 00000000
 Start Date : 10/27/2015
 Page No : 1

Groups Printed- Class 1

Start Time	REPAUNO AVENUE Southbound				DEMOCRAT ROAD (C.R. 673) Westbound				DEMOCRAT ROAD (C.R. 673) Eastbound						
	Left	Right	Trucks	App. Total	Thru	Right	Trucks	App. Total	Left	Thru	Trucks	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	2	1	0	3	3	3	0	6	1	3	0	4	0	13	13
07:15 AM	3	0	1	3	3	5	0	8	0	3	0	3	1	14	15
07:30 AM	5	1	0	6	5	9	1	14	1	5	1	6	2	26	28
07:45 AM	5	1	0	6	3	4	0	7	0	10	0	10	0	23	23
Total	15	3	1	18	14	21	1	35	2	21	1	23	3	76	79
08:00 AM	4	0	0	4	4	3	0	7	1	2	0	3	0	14	14
08:15 AM	3	0	0	3	4	4	0	8	1	7	0	8	0	19	19
08:30 AM	3	0	0	3	2	4	0	6	0	5	0	5	0	14	14
08:45 AM	2	1	0	3	2	4	0	6	1	4	0	5	0	14	14
Total	12	1	0	13	12	15	0	27	3	18	0	21	0	61	61

*** BREAK ***

02:00 PM	5	2	0	7	7	3	0	10	0	5	1	5	1	22	23
02:15 PM	5	0	0	5	5	4	1	9	0	7	1	7	2	21	23
02:30 PM	5	2	0	7	5	2	0	7	0	3	0	3	0	17	17
02:45 PM	7	1	0	8	4	5	2	9	1	6	0	7	2	24	26
Total	22	5	0	27	21	14	3	35	1	21	2	22	5	84	89
03:00 PM	8	2	0	10	8	3	0	11	1	7	1	8	1	29	30
03:15 PM	10	2	0	12	6	5	1	11	1	5	0	6	1	29	30
03:30 PM	6	2	0	8	5	5	0	10	2	5	0	7	0	25	25
03:45 PM	7	1	0	8	7	7	1	14	1	12	1	13	2	35	37
Total	31	7	0	38	26	20	2	46	5	29	2	34	4	118	122
04:00 PM	6	0	1	6	9	6	1	15	0	8	0	8	2	29	31
04:15 PM	8	1	0	9	11	7	1	18	1	7	0	8	1	35	36
04:30 PM	7	0	0	7	10	8	0	18	0	6	0	6	0	31	31
04:45 PM	10	2	1	12	10	8	0	18	0	8	0	8	1	38	39
Total	31	3	2	34	40	29	2	69	1	29	0	30	4	133	137
05:00 PM	5	0	0	5	8	9	0	17	1	10	0	11	0	33	33
05:15 PM	5	1	0	6	5	10	1	15	0	7	1	7	2	28	30
05:30 PM	10	0	0	10	9	5	0	14	1	8	1	9	1	33	34
05:45 PM	7	0	0	7	7	5	2	12	1	5	0	6	2	25	27
Total	27	1	0	28	29	29	3	58	3	30	2	33	5	119	124
Grand Total	138	20	3	158	142	128	11	270	15	148	7	163	21	591	612
Approch %	87.3	12.7	3.4	26.7	52.6	47.4	21.7	45.7	9.2	90.8	2.5	27.6	3.4	96.6	
Total %	23.4	3.4		26.7	24	21.7		45.7	2.5	25		27.6	3.4	96.6	

LANGAN

Repauno Avenue & Democrat Road (C.R. 673)
 Manual Turning Movement Count
 Weekday AM and PM Peak Hours
 Tuesday, 27 October 2015

File Name : Repauno Ave and Democrat Rd (C.R. 673) AMPM
 Site Code : 00000000
 Start Date : 10/27/2015
 Page No : 2

Start Time	REPAUNO AVENUE Southbound			DEMOCRAT ROAD (C.R. 673) Westbound			DEMOCRAT ROAD (C.R. 673) Eastbound			
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	2	1	3	3	3	6	1	3	4	13
07:15 AM	3	0	3	3	5	8	0	3	3	14
07:30 AM	5	1	6	5	9	14	1	5	6	26
07:45 AM	5	1	6	3	4	7	0	10	10	23
Total Volume	15	3	18	14	21	35	2	21	23	76
% App. Total	83.3	16.7	.750	40	60	.625	8.7	91.3	.575	.731
PHF	.750	.750	.750	.700	.583	.625	.500	.525	.575	.731
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	7	0	7	10	8	18	0	6	6	31
04:45 PM	10	2	12	10	8	18	0	8	8	38
05:00 PM	5	0	5	8	9	17	1	10	11	33
05:15 PM	5	1	6	5	10	15	0	7	7	28
Total Volume	27	3	30	33	35	68	1	31	32	130
% App. Total	90	10	.625	48.5	51.5	.944	3.1	96.9	.727	.855
PHF	.675	.375	.625	.825	.875	.944	.250	.775	.727	.855

TRAFFIC VOLUME WORKSHEETS

LANGAN



12(14) ←
 00(00) ↓
 3(6) ↙

↑ 5(7)
 ← 21(21)
 ↓ 3(5)

ROUTE 44

(20) 17 ↗
 (19) 17 →
 (15) 15 ↘

(11) 10 ↖
 (80) 56 ↑
 (5) 3 ↗

REPAUND AVE.

↑ 3(3)
 ↓ 15(27)
 (1) 2 ↗
 (31) 21 →

↑ 21(35)
 ← 14(33)

DEMOCRAT RD.

LEGEND

- UNDIVIDED ROAD
- ← AM (PM)

2015 EXISTING PEAK HOUR
TRAFFIC VOLUMES

BY DDD DATE 5/16

PROJ. NO. 130088802

CKD. DATE

SHEET OF



↙ 12(14)
 ↘ 90(90)
 ↙ 3(6)

↗ 5(7)
 ← 21(21)
 ↘ 3(5)

ROUTE 44

(20) 17 ↘
 (19) 17 ↘
 (15) 15 ↘

(11) 10 ↘
 (82) 57 →
 (5) 3 ↘

REPAUND AVE.

↘ 3(3)
 ↘ 15(28)
 (1) 2 ↘
 (32) 21 ↘

↗ 21(36)
 ← 14(34)

DEMOCRAT RD.

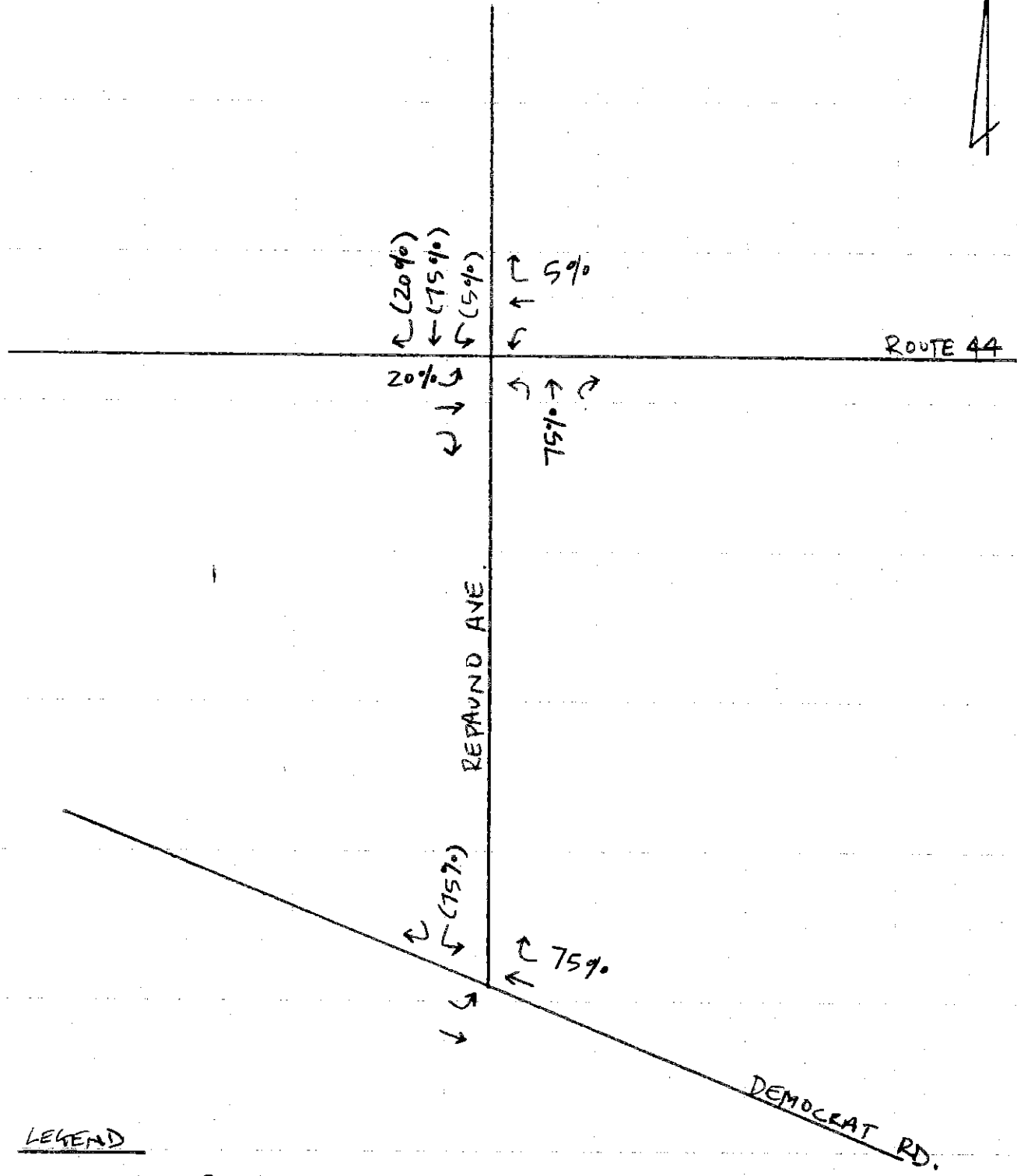
LEGEND

- UNDIVIDED ROAD
- ← AM (PM)

2017 NO-BUILD PEAK HOUR
TRAFFIC VOLUMES

BY DDD DATE 5/16
 CKD. _____ DATE _____

PROJ. NO. 130008802
 SHEET _____ OF _____



LEGEND

- UNDIVIDED ROAD
- ← AM (PM) ENTER (EXIT)

TRIP DISTRIBUTION

CARS

BY DDD DATE 5/16

PROJ. NO. 130088802

CKD _____ DATE _____

SHEET _____ OF _____



← 6 (18)
 ← 26 (68)
 ← 2 (5)
 (6) 26 →
 →
 →
 (23) 96 →
 →
 →

ROUTE 44

REPAUND AVE.

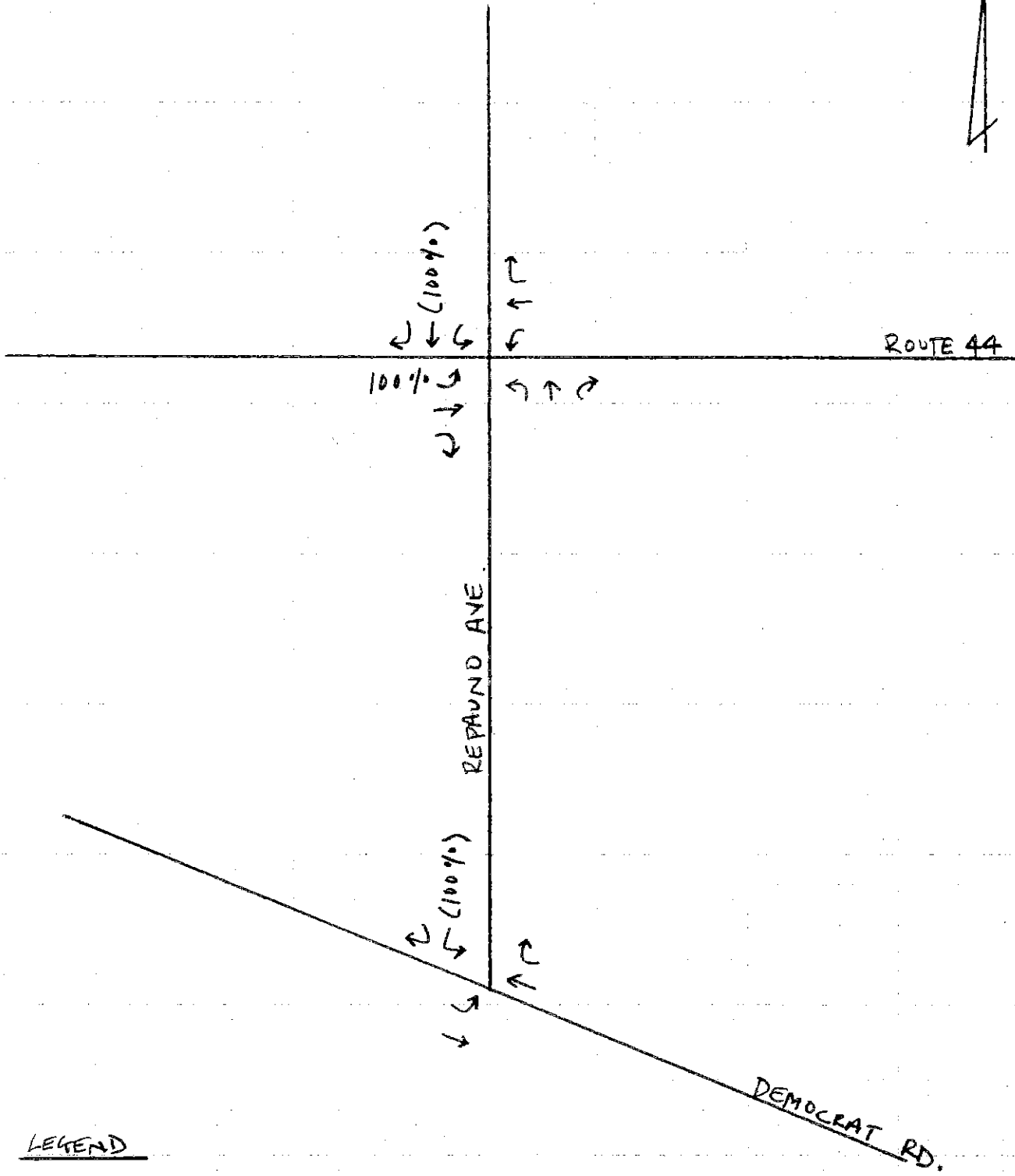
→ 26 (68)
 →
 →
 → 96 (23)
 →

DEMOCRAT RD.

LEGEND

- UNDIVIDED ROAD
- ← AM (PM)

SITE GENERATED TRAFFIC CARS	BY DDD DATE 5/16	PROJ. NO. 130088802
	CKD. DATE	SHEET OF



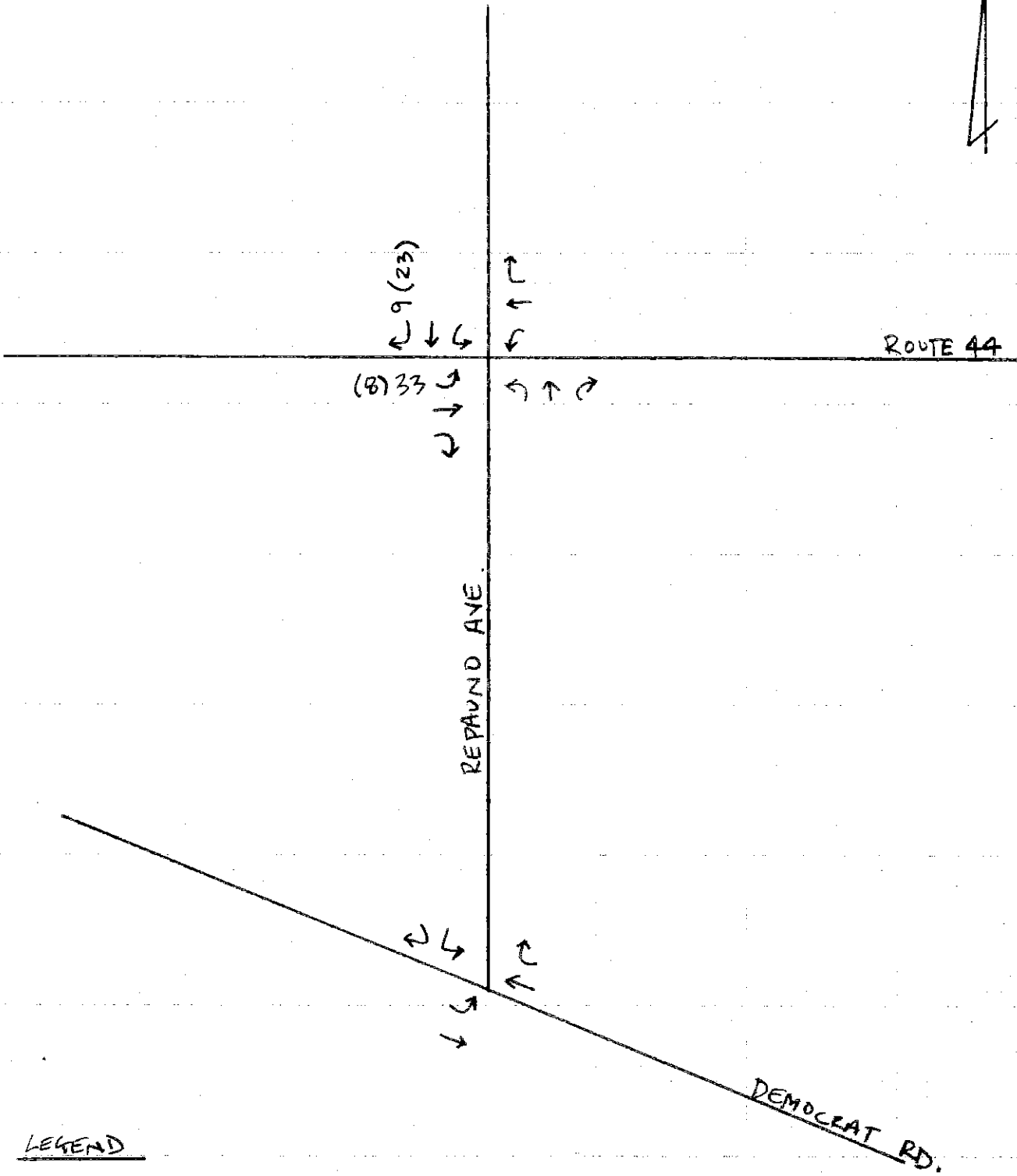
LEGEND

- UNDIVIDED ROAD
- ← AM (PM) ENTER (EXIT)

TRIP DISTRIBUTION
TRUCKS

BY DDD DATE 5/16
CKD. _____ DATE _____

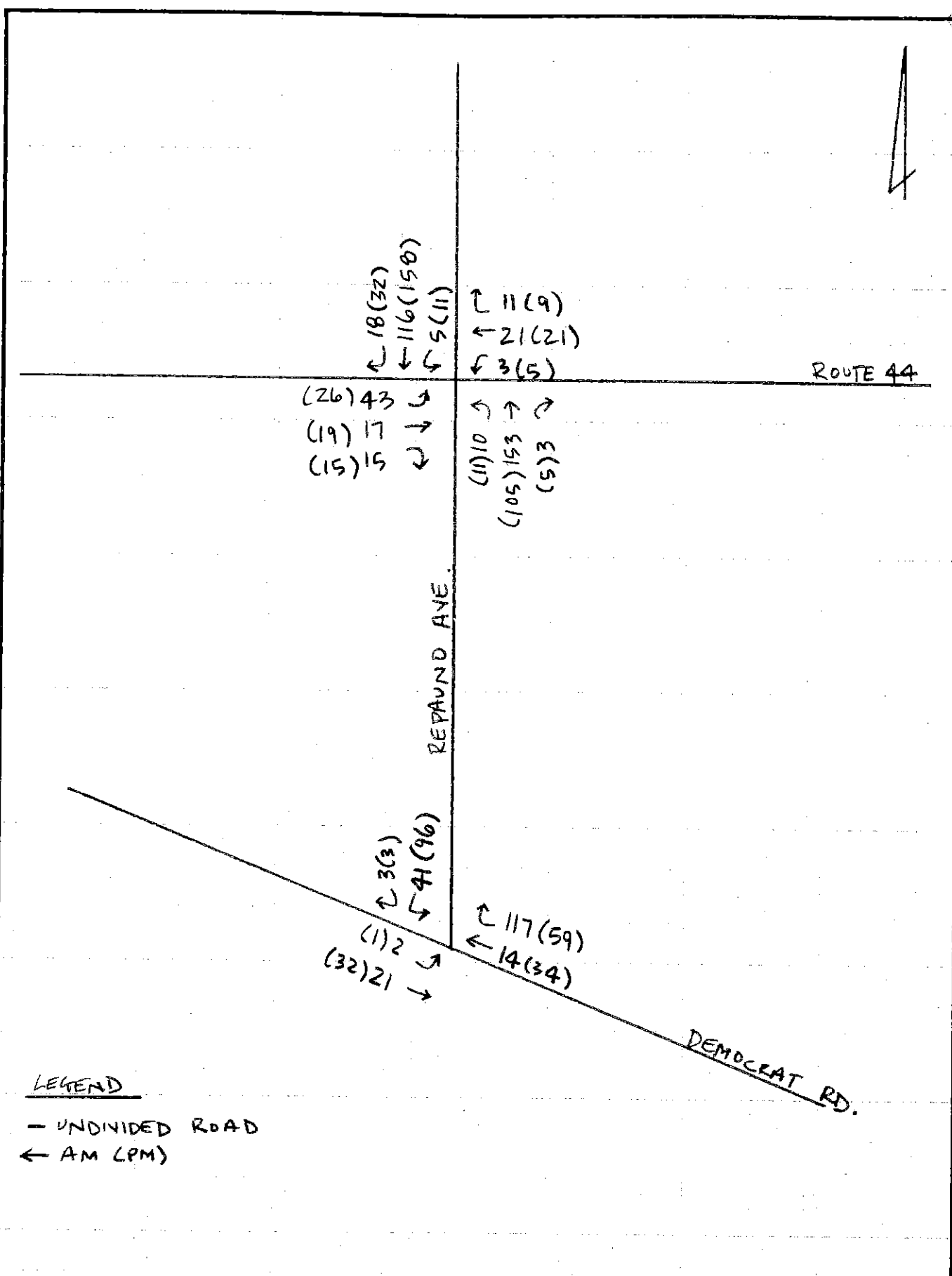
PROJ. NO. 13008802
SHEET _____ OF _____



LEGEND

- UNDIVIDED ROAD
- ← AM (PM)

SITE GENERATED TRAFFIC	BY DDD DATE 5/16	PROJ. NO. 130088802
TRUCKS	CKD. _____ DATE _____	SHEET _____ OF _____



LEGEND

- UNDIVIDED ROAD
- ← AM (PM)

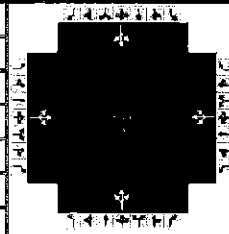
2017 BUILD PEAK HOUR TRAFFIC VOLUMES	BY DDD	DATE 5/16	PROJ. NO. 130088802
	CKD.	DATE	SHEET _____ OF _____

**LEVELS OF SERVICE
ANALYSIS PRINTOUTS**

LANGAN

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Langan			Duration, h	0.25
Analyst	KAMP	Analysis Date	11/2/2015	Area Type	Other
Jurisdiction		Time Period	AM No-Build	PHF	0.98
Urban Street		Analysis Year	2017	Analysis Period	1 > 7:00
Intersection	NJ 44 & Repauno Ave		File Name	NJ44&RepaunoAve AM No-Build.xus	
Project Description	130088802 - Greenwich				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	17	17	15	3	21	5	10	57	3	3	90	12

Signal Information														
Cycle, s	46.3	Reference Phase	2	Green	28.0	6.3	0.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	5.0	3.0	0.0	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

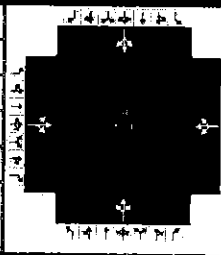
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		35.0		35.0		11.3		11.3
Change Period, (Y+Rc), s		7.0		7.0		5.0		5.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (gs), s		2.6		2.3		3.6		4.7
Green Extension Time (ge), s		0.1		0.1		0.3		0.3
Phase Call Probability		1.00		1.00		0.90		0.90
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	50			30			71			107		
Adjusted Saturation Flow Rate (s), veh/h/ln	1518			1757			1755			1716		
Queue Service Time (gs), s	0.0			0.0			0.0			0.0		
Cycle Queue Clearance Time (gc), s	0.6			0.3			1.6			2.7		
Green Ratio (g/C)	0.60			0.60			0.14			0.14		
Capacity (c), veh/h	1023			1148			328			313		
Volume-to-Capacity Ratio (X)	0.049			0.026			0.218			0.342		
Available Capacity (ca), veh/h	1475			1671			1200			1186		
Back of Queue (Q), veh/ln (95 th percentile)	0.2			0.1			1.1			1.7		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00			0.00			0.00		
Uniform Delay (d1), s/veh	3.7			3.7			18.0			18.4		
Incremental Delay (d2), s/veh	0.0			0.0			0.1			0.2		
Initial Queue Delay (d3), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	3.7			3.7			18.1			18.7		
Level of Service (LOS)	A			A			B			B		
Approach Delay, s/veh / LOS	3.7	A		3.7	A		18.1	B		18.7	B	
Intersection Delay, s/veh / LOS	13.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.0	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.6	A	0.5	A	0.6	A	0.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.25		
Analyst	DDD	Analysis Date	11/2/2015	Area Type	Other		
Jurisdiction		Time Period	AM Build	PHF	0.98		
Urban Street		Analysis Year	2017	Analysis Period	1> 7:00		
Intersection	NJ 44 & Repauno Ave			File Name	NJ44&RepaunoAve AM Build.xus		
Project Description	130088802 - Greenwich						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	43	17	15	3	21	11	10	153	3	5	116	18

Signal Information				Signal Timing (s)										
Cycle, s	47.1	Reference Phase	2	Green	28.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	5.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On											

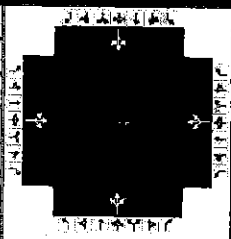
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		35.0		35.0		12.1		12.1
Change Period, (Y+Rc), s		7.0		7.0		5.0		5.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (gs), s		2.9		2.4		6.7		5.7
Green Extension Time (ge), s		0.2		0.2		0.5		0.5
Phase Call Probability		1.00		1.00		0.98		0.98
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	77			36			169			142		
Adjusted Saturation Flow Rate (s), veh/h/ln	1459			1723			1609			1678		
Queue Service Time (gs), s	0.0			0.0			1.0			0.0		
Cycle Queue Clearance Time (gc), s	0.9			0.4			4.7			3.7		
Green Ratio (g/C)	0.59			0.59			0.15			0.15		
Capacity (c), veh/h	988			1108			323			331		
Volume-to-Capacity Ratio (X)	0.077			0.032			0.525			0.428		
Available Capacity (ca), veh/h	1417			1613			1095			1139		
Back of Queue (Q), veh/ln (95th percentile)	0.3			0.1			2.8			2.3		
Queue Storage Ratio (RQ) (95th percentile)	0.00			0.00			0.00			0.00		
Uniform Delay (d1), s/veh	4.0			3.9			19.0			18.6		
Incremental Delay (d2), s/veh	0.0			0.0			0.5			0.3		
Initial Queue Delay (d3), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	4.1			3.9			19.5			18.9		
Level of Service (LOS)	A			A			B			B		
Approach Delay, s/veh / LOS	4.1	A		3.9	A		19.5	B		18.9	B	
Intersection Delay, s/veh / LOS	15.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.0	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.6	A	0.5	A	0.8	A	0.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.25		
Analyst	KAMP		Analysis Date	11/2/2015		Area Type	Other
Jurisdiction			Time Period	PM No-Build		PHF	0.89
Urban Street			Analysis Year	2017		Analysis Period	1 > 7:00
Intersection	NJ 44 & Repauno Ave			File Name	NJ44&RepaunoAve PM No-Build.xus		
Project Description	130088802 - Greenwich						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	19	15	5	21	7	11	82	5	6	90	14

Signal Information														
Cycle, s	46.7	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	28.0	6.7	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	3.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

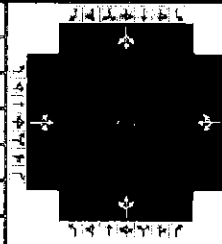
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		35.0		35.0		11.7		11.7
Change Period, (Y+R _c), s		7.0		7.0		5.0		5.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (g _s), s		2.7		2.4		4.6		5.0
Green Extension Time (g _e), s		0.2		0.2		0.4		0.4
Phase Call Probability		1.00		1.00		0.95		0.95
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	61			37			110			124		
Adjusted Saturation Flow Rate (s), veh/h/ln	1539			1719			1779			1733		
Queue Service Time (g _s), s	0.0			0.0			0.0			0.0		
Cycle Queue Clearance Time (g _c), s	0.7			0.4			2.6			3.0		
Green Ratio (g/C)	0.60			0.60			0.14			0.14		
Capacity (c), veh/h	1029			1120			340			329		
Volume-to-Capacity Ratio (X)	0.059			0.033			0.324			0.376		
Available Capacity (c _a), veh/h	1484			1626			1209			1185		
Back of Queue (Q), veh/ln (95 th percentile)	0.2			0.1			1.7			2.0		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00			0.00			0.00		
Uniform Delay (d ₁), s/veh	3.9			3.8			18.2			18.4		
Incremental Delay (d ₂), s/veh	0.0			0.0			0.2			0.3		
Initial Queue Delay (d ₃), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	3.9			3.8			18.4			18.7		
Level of Service (LOS)	A			A			B			B		
Approach Delay, s/veh / LOS	3.9	A		3.8	A		18.4	B		18.7	B	
Intersection Delay, s/veh / LOS	14.2						B					

Multimodal Results	EB		WB		NB		SB	
	Pedestrian LOS Score / LOS	2.0	B	2.0	B	2.1	B	2.1
Bicycle LOS Score / LOS	0.6	A	0.5	A	0.7	A	0.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Langan			Duration, h	0.25		
Analyst	DDD	Analysis Date	11/2/2015	Area Type	Other		
Jurisdiction		Time Period	PM Build	PHF	0.89		
Urban Street		Analysis Year	2017	Analysis Period	1 > 7:00		
Intersection	NJ 44 & Repauno Ave		File Name	NJ44&RepaunoAve PM Build.xus			
Project Description	130088802 - Greenwich						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	26	19	15	5	21	9	11	105	5	11	158	32

Signal Information				Signal Timing (s)										
Cycle, s	49.0	Reference Phase	2	Green	28.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	5.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On											

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		35.0		35.0		14.0		14.0
Change Period, (Y+R _c), s		7.0		7.0		5.0		5.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (g _s), s		2.8		2.5		5.3		8.4
Green Extension Time (g _e), s		0.2		0.2		0.6		0.6
Phase Call Probability		1.00		1.00		0.99		0.99
Max Out Probability		0.00		0.00		0.00		0.00

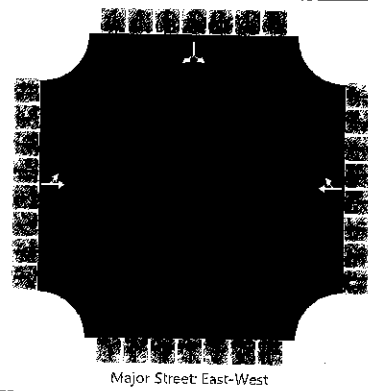
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	67			39			136			226		
Adjusted Saturation Flow Rate (s), veh/h/ln	1528			1711			1722			1630		
Queue Service Time (g _s), s	0.0			0.0			0.0			1.6		
Cycle Queue Clearance Time (g _c), s	0.8			0.5			3.3			6.4		
Green Ratio (g/C)	0.57			0.57			0.18			0.18		
Capacity (c), veh/h	979			1062			395			376		
Volume-to-Capacity Ratio (X)	0.069			0.037			0.344			0.601		
Available Capacity (c _a), veh/h	1410			1543			1114			1067		
Back of Queue (Q), veh/ln (95 th percentile)	0.3			0.2			2.2			3.9		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00			0.00			0.00		
Uniform Delay (d ₁), s/veh	4.7			4.6			17.7			18.9		
Incremental Delay (d ₂), s/veh	0.0			0.0			0.2			0.6		
Initial Queue Delay (d ₃), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	4.7			4.6			17.9			19.5		
Level of Service (LOS)	A			A			B			B		
Approach Delay, s/veh / LOS	4.7	A		4.6	A		17.9	B		19.5	B	
Intersection Delay, s/veh / LOS	15.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.0	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.6	A	0.6	A	0.7	A	0.9	A

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	KAMP	Intersection	Democrat Rd & Repauno Ave
Agency/Co.	Langan	Jurisdiction	
Date Performed	11/2/2015	East/West Street	Democrat Road
Analysis Year	2017	North/South Street	Repauno Avenue
Time Analyzed	AM No Build	Peak Hour Factor	0.73
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	130088802 - Greenwich		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR								LR
Volume (veh/h)		2	21				14	21						15		3
Percent Heavy Vehicles		4												6		6
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

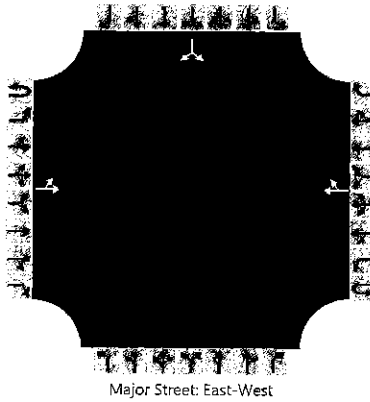
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		32														25	
Capacity		1544														941	
v/c Ratio		0.02														0.03	
95% Queue Length		0.0														0.1	
Control Delay (s/veh)		7.3														8.9	
Level of Service (LOS)		A														A	
Approach Delay (s/veh)		0.7												8.9			
Approach LOS		A												A			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DDD	Intersection	Democrat Rd & Repauno Ave
Agency/Co.	Langan	Jurisdiction	
Date Performed	5/19/2016	East/West Street	Democrat Road
Analysis Year	2017	North/South Street	Repauno Avenue
Time Analyzed	AM Build	Peak Hour Factor	0.73
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	130088802 - Greenwich		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume (veh/h)		2	21				14	117						41		3
Percent Heavy Vehicles		4												18		6
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

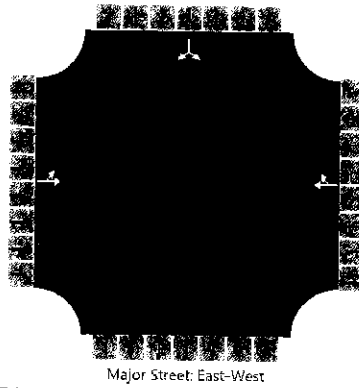
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		32														60
Capacity		1383														829
v/c Ratio		0.02														0.07
95% Queue Length		0.0														0.2
Control Delay (s/veh)		7.6														9.7
Level of Service (LOS)		A														A
Approach Delay (s/veh)	0.7												9.7			
Approach LOS	A												A			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	KAMP	Intersection	Democrat Rd & Repauno Ave
Agency/Co.	Langan	Jurisdiction	
Date Performed	11/2/2015	East/West Street	Democrat Road
Analysis Year	2017	North/South Street	Repauno Avenue
Time Analyzed	PM No Build	Peak Hour Factor	0.86
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	130088802 - Greenwich		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	0	0		0	0	0	
Configuration	LT				TR				LR							
Volume (veh/h)		1	32				34	36						28		3
Percent Heavy Vehicles		3												3		3
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

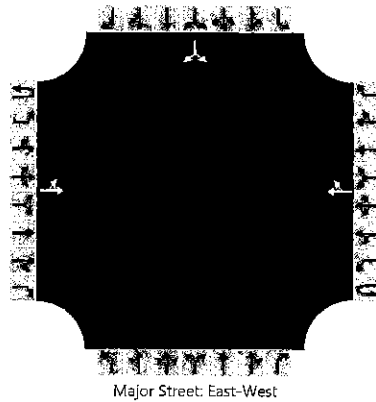
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		38														36
Capacity		1507														903
v/c Ratio		0.03														0.04
95% Queue Length		0.0														0.1
Control Delay (s/veh)		7.4														9.2
Level of Service (LOS)		A														A
Approach Delay (s/veh)	0.2												9.2			
Approach LOS	A												A			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DDD	Intersection	Democrat Rd & Repauno Ave
Agency/Co.	Langan	Jurisdiction	
Date Performed	5/19/2016	East/West Street	Democrat Road
Analysis Year	2017	North/South Street	Repauno Avenue
Time Analyzed	PM Build	Peak Hour Factor	0.86
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	130088802 - Greenwich		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT					TR								LR	
Volume (veh/h)		1	32				34	59						96		3
Percent Heavy Vehicles		3												19		3
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		38														115	
Capacity		1473														846	
v/c Ratio		0.03														0.14	
95% Queue Length		-0.0														0.5	
Control Delay (s/veh)		7.4														9.9	
Level of Service (LOS)		A														A	
Approach Delay (s/veh)		0.2												9.9			
Approach LOS		A												A			