

Dexter Street/M-66 Pedestrian Safety Study

City of Ionia

May 2012

2120191

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I. Executive Summary

The planned Grand River Valley Rail Trail non-motorized path will cross Dexter Street/M-66 at the southern approach of the intersection of Dexter Street/M-66 and Adams Street. Dexter Street/M-66 is a four lane curb and gutter cross section with sidewalks on both sides. Data collected for this study indicated that the average daily traffic on Dexter Street/M-66 is 15,499 vehicles per day. The City of Ionia has expressed concerns about the safety of the proposed crossing and has commissioned this study to evaluate the safety of the proposed crossing and possible mitigation options.

Overall site conditions were evaluated in the scope of pedestrian safety. The proposed crossing meets recommended geometric standards for sight distance.

Vehicular traffic flow characteristics and pedestrian crossing performance indicators were evaluated. The availability of sufficient gaps to allow pedestrian crossing was found to be lacking during peak hours. Pedestrian crossing performance indicators were found to be failing.

Existing traffic conditions are not ideal for effective pedestrian crossing. It is recommended that the City investigate some of the mitigation options presented in this report.

II. Site Conditions

The proposed crossing of Dexter Street/M-66 by the Grand River Valley Rail Trail (GRVRT) is located at the intersection of Dexter Street/M-66 and Adams Street. The trail will cross Dexter Street/M-66 at a crosswalk on the southern approach of the intersection. The southern approach to the intersection is a 44 foot wide four lane section with two northbound through lanes, a northbound left turn lane, and one through southbound lane. Concrete

sidewalks are located on both sides of the roadway. Dexter Street/M-66 is signed with a 30 mph speed limit. The area around the proposed crossing is primarily commercial. Dexter Street/M-66 has street lighting on both sides of the roadway.

The roadway geometrics were reviewed to evaluate sight distance at the proposed crossing. As built plans from a 2011 reconstruction of Dexter Street/M-66 were reviewed. The AASHTO Policy on Geometric Design of Highways and Streets, 2011 states that the stopping sight distance for a vehicle traveling 30 mph is 200 feet. Stopping sight distance includes the time a driver takes to perceive and react to a hazard, i.e. a pedestrian, in the roadway. The crossing is located on a tangent in the horizontal alignment and on a slight vertical grade with adequate (200 feet plus) horizontal and vertical sight distance.

Pictures of the proposed crossing site can be found in Appendix B.

III. Methodology

A. Data Collection

Traffic data was collected from Monday April 9, 2012 to Friday April 13, 2012 using a pneumatic tube counter. The counter was placed approximately 100 feet to the south of the intersection of Dexter Street/M-66 and Adams Street. Gap data was derived from the data collected for comparison to the calculated critical pedestrian gap. A full summary of the traffic data can be found in Appendix C.

B. Critical Pedestrian Gap and Level of Service Calculations

The critical pedestrian gap is defined as the minimum time between approaching vehicles in both directions in which a pedestrian would cross a street, including evaluation and consideration time. The critical pedestrian gap was calculated for the proposed crossing using

Highway Capacity Manual (HCM) methods. The critical pedestrian gap was determined to 16 seconds. (Full calculations can be found in Appendix A).

Pedestrian delay, in seconds, was calculated for the top ten vehicle volume hours as derived from the traffic data. Critical pedestrian gap, as defined above is a variable in the calculation of pedestrian delay. (Detailed calculations of pedestrian delay can be found in Appendix A.)

Pedestrian level of service (LOS) is a measurement of effectiveness in pedestrian movements based on the delay in seconds a pedestrian would encounter. Levels of Service range from A to F; A is considered optimal traffic operations and F is considered failing. The pedestrian LOS was calculated to be F in all ten of the peak hour traffic volumes (See Table 2). A LOS of F indicates that the likelihood of risk taking behavior is very high, as shown in Table 1.

Table 1: LOS Criteria for Pedestrian at Unsignalized Intersections

LOS	Average Delay/Pedestrian (s)	Likelihood of Risk Taking Behavior
A	<5	Low
B	≥ 5-10	Moderate
C	> 10-20	
D	> 20-30	
D	> 30-45	High
F	> 45	Very High

Source: Highway Capacity Manual, 2000

Table 2: Pedestrian Level of Service Dexter Street/ M-66 & Adams Street

Date	Time	Vehicles per hour	Pedestrian Delay (s)	Level of Service
4/9/12	4:00 PM – 5:00 PM	1,436	1,246	F
4/9/12	3:00 PM – 4:00 PM	1,392	1,062	F
4/11/12	4:00 PM -5:00 PM	1,390	1,055	F
4/11/12	5:00 PM – 6:00 PM	1,386	1,039	F
4/10/12	6:00 PM – 5:00 PM	1,369	978	F
4/10/12	2:00 PM – 3:00 PM	1,322	826	F
4/10/12	5:00 PM – 6:00 PM	1,310	791	F
4/9/12	5:00 PM – 6:00 PM	1,299	760	F
4/9/12	12:00 PM – 1:00 PM	1,282	716	F
4/11/12	12:00 PM – 1:00 PM	1,279	708	F

C. Critical Pedestrian Gap Availability

Traffic data was analyzed to determine the number of available gaps equal to or exceeding the calculated critical pedestrian gap, of 16 seconds. Guidance on analyzing this data can be derived from the 2011 Michigan Manual of Traffic Control Devices (MMUTCD). Pedestrian related traffic signal warrants include a warrant for pedestrian volumes (Warrant 4) and school pedestrian crossings (Warrant 5). As the proposed trail has not been constructed pedestrian volumes are unavailable. Previous versions of the MMUTCD (2005) included language that stated that the warrant for pedestrian volumes is met when:

“There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied.”

A similar criterion of available gaps is included in Warrant 5 – School Crossing, provided that minimum number of pedestrians per hour is 20. This guidance can be applied in this study to

determine the need for pedestrian crossing treatments by evaluating the available gap data. This guidance is not being used to justify a traffic signal at this intersection; however, it does provide criteria for evaluating available pedestrian gaps. Available pedestrian gaps were found to be far below the 60 per hour recommended by MMTUCD provided that at least 20 pedestrians per hour would cross during the peak hours. Further study once the trail has been constructed is recommended to properly evaluate MMUTCD pedestrian related signal warrants.

Table 3: Available Gaps for Pedestrian Crossing Dexter Street/ M-66 & Adams Street

Date	Time	Vehicles per hour	Available Gaps
4/9/12	4:00 PM – 5:00 PM	1,436	9
4/9/12	3:00 PM – 4:00 PM	1,392	9
4/11/12	4:00 PM -5:00 PM	1,390	9
4/11/12	5:00 PM – 6:00 PM	1,386	1
4/10/12	6:00 PM – 5:00 PM	1,369	6
4/10/12	2:00 PM – 3:00 PM	1,322	10
4/10/12	5:00 PM – 6:00 PM	1,310	9
4/9/12	5:00 PM – 6:00 PM	1,299	7
4/9/12	12:00 PM – 1:00 PM	1,282	4
4/11/12	12:00 PM – 1:00 PM	1,279	6

The table above shows the top ten vehicular volume hours and the available pedestrian gaps in each. The recommended minimum of 60 gaps per hour was found in hours where vehicular volumes were below 630 vehicles per hour. That volume represents only a fraction of peak hour volumes.

When analyzing the available pedestrian gaps it is important to consider actual observed pedestrian behaviors. The analysis detailed above factors in both directions of traffic to

determine the available pedestrian gap. It has been observed in real world applications that pedestrians may adopt a “rolling gap” acceptance to cross. “Rolling gap” refers to a pedestrian evaluating each direction of oncoming traffic individually. The pedestrian will evaluate gaps in the nearside traffic and gaps further up the far side traffic with the expectation that once they have crossed the nearside traffic lanes the far side traffic will have cleared to allow the pedestrian to complete the crossing. This type of behavior is not encompassed in this type of gap analysis.

IV. Findings

Of the two pedestrian crossing performance factors evaluated, Level of Service and available gap, neither indicated the existing conditions are conducive to the efficient crossing of pedestrians at the study site. Gaps of sufficient size do exist during the peak hours analyzed, however the frequency of when they occur is low and they may not align with pedestrian arrival at the crossing. The pedestrian delay calculations and the corresponding LOS of F, indicate that the likelihood of pedestrians to engage in risk taking behavior is very high. The longer pedestrians wait to cross a roadway the more likely it is that they may engage in higher risk behaviors to cross.

North of the Dexter Street/M-66 and Adams Street intersection is the signalized Dexter Street/M-66 intersection with Main Street. The signal is equipped with pedestrian signals and push buttons. As the proposed trail crossing is 300 feet south of this signalized intersection, it is unlikely that pedestrians would divert to the north to use the signalized crossing.

It is recommended that mitigation options be investigated for implementation.

V. Pedestrian Crossing Options

The options presented below offer a range of possible actions, ranging from passive systems that are limited to enhancing driver awareness of pedestrians to active systems that require a driver to yield to a crossing pedestrian.

A. Enhanced Signing and Pavement Markings

Existing signing in the proposed crossing area does not include pedestrian warning signs.

Pedestrian warning signs, including flashing warning lights on the signs may be placed upstream of the proposed crossing. Additionally high visibility pavement markings for the crosswalk can be employed. However, it should be noted that some of the benefit of the high visibility crosswalk in daylight hours is lost due to the reduced contrast between the white pavement marking material and the lighter concrete pavement found at this crossing. Other pavement marking materials can be used to increase the contrast. (See Figure 1) These options fall into the passive system category and intended to improve driver awareness.



Figure 1: High Visibility Crosswalk Markings

Source: www.bikepedimages.org, Dan Burden

B. Overhead Flashing Amber Beacons

Another passive system is the installation of overhead flashing amber beacons; they are intended to alert drivers to the presence of pedestrians, but do not have any regulatory power associated with them. It is recommended that if overhead flashing beacons are used then enhanced signing and pavement markings should also be implemented.

C. Pedestrian Actuated Flashing Amber Beacons

Similar to the overhead flashing amber beacons system, is the use of pedestrian actuated flashing amber beacons. The beacons are located either overhead or on pedestals adjacent to the crossing and are activated by a pedestrian push button.



Figure 2: Pedestrian Actuated Flashing Amber Beacons

Source: www.bikepedimages.org, Michael Frederick

D. High Intensity Activated Crosswalk (HAWK)

An active system requiring that drivers stop to allow pedestrian crossing is a High Intensity Activated Crosswalks (HAWK), also referred to as Pedestrian Hybrid Beacons by the MMUTCD (2011). A HAWK system includes the red and yellow portions of a traffic signal that are only activated when a pedestrian calls the function via a push button. The system is dark unless a pedestrian has called the crossing function. The overall system includes stop bars on both vehicle approaches, signing, and the signal.

The MMUTCD (2011) has a specific warrant that compares pedestrians per hour and approaching vehicles per hour that should be satisfied before a HAWK is implemented. As stated in the MMUTCD (2011):

“If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.”

While this study has indicated that the excessive pedestrian delay exists and available gaps are minimal, the number of pedestrians utilizing this crossing is unknown. The number of pedestrians and their intensity during the day are a critical factor to consider prior to the implementation of a HAWK system. It is recommended that further study be undertaken to assess the number of pedestrians using the crossing once it is constructed.

Additionally, HAWKs are recommended to be implemented at least 100 feet from any intersection where the minor streets or driveways are stop or yield controlled. The proposed

crossing is at the south approach of the intersection and does not have the recommended offset from the Adams Street approaches. Approximately 300 feet north of the Dexter Street/M-66 and Adams Street intersection is the signalized Dexter Street/M-66 intersection with Main Street. Evaluation of the possible effects of a HAWK system to the existing traffic signal operations, especially in regard to possible queuing, is recommended before implementation.



Figure 3: High Intensity Activated Crosswalk

Source: www.bikepedimages.org, Mike Cynecki

E. Traffic Signalization and/or Relocation

One option to facilitate pedestrian crossings is the signalization of an intersection, provided that an engineering study finds that the warrants set forth in MMUTCD are met and that the installation of a traffic signal is based on sound engineering judgment. The proposed crossing location would have to be evaluated in the scope of a signal warrant study to see if warrants are met.

One item to consider when recommending a traffic signal is the relative location of existing signals. Approximately 300 feet north of the Dexter Street/M-66 and Adams Street intersection is the signalized intersection Dexter Street/M-66 with Main Street. Traffic signals must be spaced adequately to ensure that they do not interfere with the operations of adjacent signals or are part of a coordinated corridor. If upon further study, it is found that the addition of a traffic signal at the intersection of Dexter Street/M-66 and Adams Street would impact the operations at the intersection of Dexter Street/M-66 and Main Street, one possible solution would be to move the signal south to the Adams Street intersection. Evaluation of the two intersections and traffic simulation is recommended before implementation.

F. Pedestrian Overpass

The proposed crossing is part of the Grand River Valley Rail Trail, the route of which coincides with the former railroad corridor. The proposed trail has been routed north to the intersection of Dexter Street/M-66 and Adams Street to utilize an available parcel for a trailhead. The former railroad corridor crosses Dexter Street/M-66 approximately 210 feet to the south of the Adams Street intersection with Dexter Street (M-66). An option is to route the trail over Dexter Street using the former railroad corridor via a pedestrian overpass bridge. Right of way is available to construct the pedestrian overpass bridge. The use of the overpass structures in urban areas should be considered carefully as pedestrians generally will not alter their path upwards to use the structures. However, in this setting the majority of pedestrian and bike traffic is routed along the proposed Grand River Valley Rail Trail. It is unlikely that existing pedestrian traffic that intends to cross Dexter Street/M-66 at the Adams Street intersection would divert the 200 feet to the south to use the structure.

G. Pedestrian Crossing Options Cost Estimates

General cost estimates for the proposed solutions have been included below.

Option	Estimate
Signing & Pavement Markings	\$3,000
Overhead Flashing Beacons	\$15,000
Pedestrian Actuated Flashing Beacons	\$20,000
HAWK System	\$100,000
Traffic Signal Installation/Relocation	\$100,000
Pedestrian Overpass	\$500,000

VI. Pedestrian Crossing Options Prioritization

The options presented for improving the proposed pedestrian crossing vary greatly in impact and cost. When the number of anticipated pedestrians, the context of the proposed crossing, and the existing traffic characteristics on Dexter Street/M-66 are considered it is recommended that a more active crossing option be considered for implementation. The results of the pedestrian performance factors indicate that there are impediments to the efficient crossing of Dexter Street/M-66 in the existing traffic conditions. The introduction of the proposed trail and more pedestrians will only exaggerate existing deficiencies. More passive options, such as enhanced signing and pavement markings, along with the overhead flashing beacons and pedestrian actuated flashing beacons may not significantly improve the crossing efficiency and safety. It is recommended that those options that include regulatory components that require drivers to yield

to pedestrians, such as the HAWK system or traffic signals, or provide the pedestrian overpass of Dexter Street/M-66 be investigated for further implementation.

Critical Gap Calculation

The critical gap for pedestrian crossings can be calculated using the following formula from the Highway Capacity Manual.

$$t_c = \frac{L}{S_p} + t_s$$

Where

t_c = critical gap for a single pedestrian, (sec)

S_p = average pedestrian walking speed (ft/s)

L = crosswalk length (ft)

t_s = pedestrian start-up time and end clearance time (sec)

The average pedestrian walking speed for this calculation was assumed to be 3.5 feet per second. The Michigan Manual of Uniform Traffic Control Devices advises values ranging from 3.5 feet per second to 4 feet per second. The pedestrian start-up time and end clearance time was assumed to be 3 seconds. Using those values and a crosswalk length of 44 feet a critical gap of 15.57 seconds was calculated which was rounded up to 16 seconds for analysis.

Pedestrian Delay Calculation

Level of service was determined using the following formula to determine pedestrian delay in seconds.

$$d_p = \frac{1}{v} (e^{v \cdot t_G} - v t_G - 1)$$

Where

d_p = average pedestrian delay (s)

t_G = group critical gap (assumed to equal single pedestrian critical gap calculated above)

v = vehicular flow rate (veh/s)

The vehicular flow rate was derived from the traffic data. The peak vehicular flow rate occurred April 11, 2012 from 4:00 pm to 5:00 pm. Pedestrian delay was calculated for the ten largest hours of vehicle volume.

Date	Time	Pedestrian Delay (s)	Level of Service
4/9/12	4:00 PM – 5:00 PM	1,436	F
4/9/12	3:00 PM – 4:00 PM	1,392	F
4/11/12	4:00 PM -5:00 PM	1,390	F
4/11/12	5:00 PM – 6:00 PM	1,386	F
4/10/12	6:00 PM – 5:00 PM	1,369	F
4/10/12	2:00 PM – 3:00 PM	1,322	F
4/10/12	5:00 PM – 6:00 PM	1,310	F
4/9/12	5:00 PM – 6:00 PM	1,299	F
4/9/12	12:00 PM – 1:00 PM	1,282	F
4/11/12	12:00 PM – 1:00 PM	1,279	F

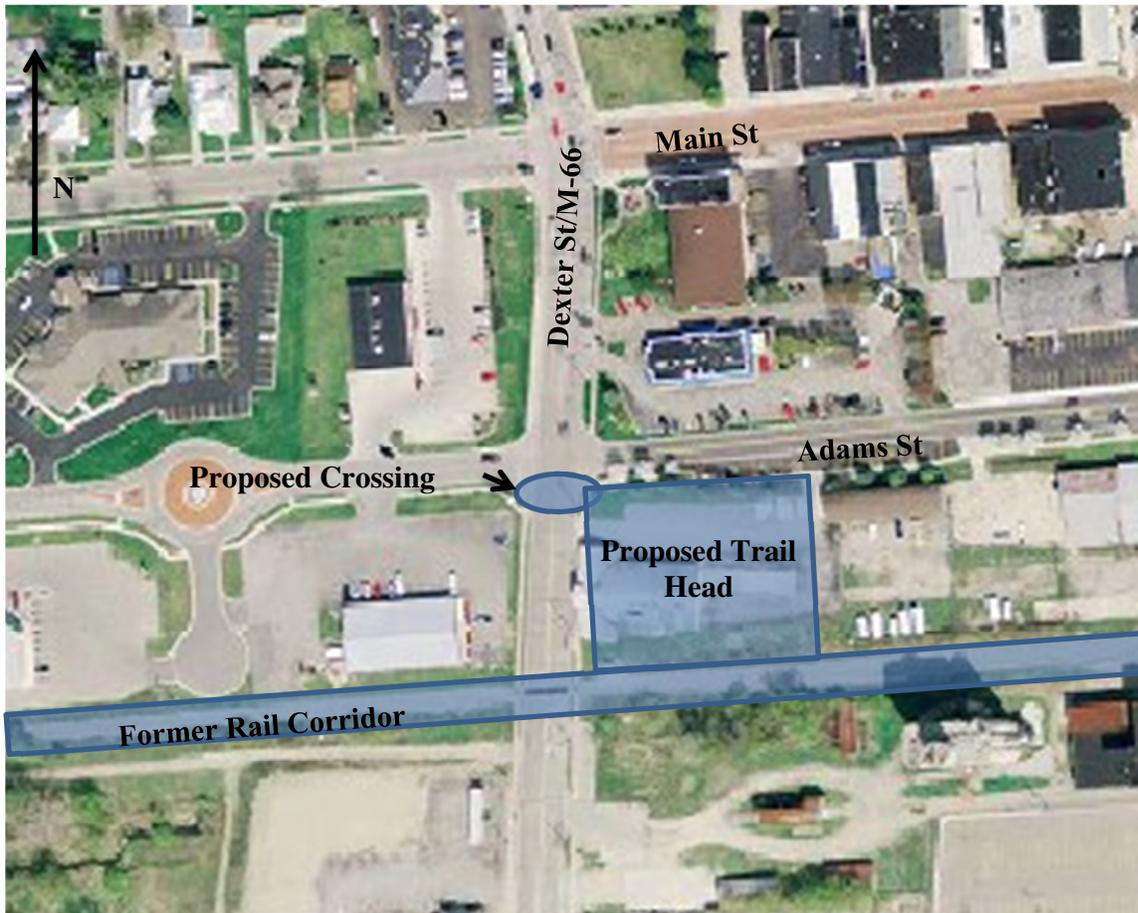


Figure 1: Aerial Site Map of Proposed Crossing



Figure 2: Proposed Crossing – looking north from east side of Dexter St/M-66



Figure 3: Looking south of the proposed crossing from east side of Dexter St/M-66



Figure 4: Proposed Crossing – looking west from Dexter St/M-66



Figure 5: Proposed Crossing – looking east from Dexter St/M-66

Appendix C

Traffic Data

Prein & Newhof

3355 Evergreen Drive NE
Grand Rapids, MI 49525
(616) 364-8491

Site Code:
Station ID:

Volume Data
City of Ionia
Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0° 0.000 South

Start Time	09-Apr-12		Tue		Wed		Thu		Fri		Sat		Sun		Average Day	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	*	324	12	282	18	333	40	154	24	0	*	*	*	*	24	219
12:15	*	303	30	303	22	308	29	150	22	0	*	*	*	*	26	213
12:30	*	308	16	288	20	330	28	159	23	0	*	*	*	*	22	217
12:45	*	347	16	300	22	308	21	166	16	0	*	*	*	*	19	224
01:00	*	316	18	283	20	289	11	154	17	13	*	*	*	*	16	211
01:15	*	294	12	278	16	287	14	172	10	*	*	*	*	*	13	258
01:30	*	332	13	303	11	340	7	160	6	*	*	*	*	*	9	284
01:45	*	308	20	292	9	278	12	166	10	*	*	*	*	*	13	261
02:00	*	339	12	359	12	342	14	176	12	*	*	*	*	*	12	304
02:15	*	294	8	303	18	276	18	154	4	*	*	*	*	*	12	257
02:30	*	326	6	335	16	318	21	195	9	*	*	*	*	*	13	294
02:45	*	294	6	325	14	322	19	202	4	*	*	*	*	*	11	286
03:00	*	338	19	308	12	328	10	169	8	*	*	*	*	*	12	286
03:15	*	316	11	296	14	276	22	176	14	*	*	*	*	*	15	266
03:30	*	368	18	312	18	342	20	182	12	*	*	*	*	*	17	301
03:45	*	370	20	318	19	310	22	167	5	*	*	*	*	*	16	291
04:00	*	350	34	330	39	305	43	167	14	*	*	*	*	*	32	288
04:15	*	357	35	356	39	348	40	174	8	*	*	*	*	*	30	309
04:30	*	377	48	372	47	366	48	199	13	*	*	*	*	*	39	328
04:45	*	352	57	311	51	371	50	200	21	*	*	*	*	*	45	308
05:00	*	347	58	354	72	392	59	216	20	*	*	*	*	*	52	327
05:15	*	326	81	324	85	339	78	196	28	*	*	*	*	*	68	296
05:30	*	321	132	318	138	328	140	172	76	*	*	*	*	*	122	285
05:45	*	305	112	314	123	327	118	169	53	*	*	*	*	*	102	279
06:00	*	276	161	266	174	316	176	154	61	*	*	*	*	*	143	253
06:15	*	266	149	258	147	269	148	184	52	*	*	*	*	*	124	244
06:30	*	242	159	212	174	232	144	170	66	*	*	*	*	*	136	214
06:45	*	204	216	204	218	246	215	124	74	*	*	*	*	*	181	194
07:00	*	206	234	215	232	226	250	154	94	*	*	*	*	*	202	200
07:15	*	168	316	183	333	200	322	137	132	*	*	*	*	*	276	172
07:30	*	173	282	174	281	188	266	149	136	*	*	*	*	*	241	171
07:45	*	180	280	138	271	164	283	130	152	*	*	*	*	*	246	153
08:00	*	206	204	152	192	175	230	140	101	*	*	*	*	*	182	168
08:15	*	144	199	138	197	159	194	114	96	*	*	*	*	*	172	139
08:30	*	128	198	143	244	185	220	108	110	*	*	*	*	*	193	141
08:45	*	136	210	119	247	134	215	77	122	*	*	*	*	*	198	116
09:00	*	138	176	126	238	143	190	99	110	*	*	*	*	*	178	126
09:15	*	118	192	112	216	129	174	78	106	*	*	*	*	*	172	109
09:30	*	104	204	128	224	116	92	94	147	*	*	*	*	*	167	110
09:45	*	86	214	90	229	85	111	68	138	*	*	*	*	*	173	82
10:00	*	130	213	148	241	155	116	47	132	*	*	*	*	*	176	120
10:15	*	60	239	80	244	71	100	64	117	*	*	*	*	*	175	69
10:30	*	52	247	56	289	76	106	38	118	*	*	*	*	*	190	56
10:45	*	50	204	60	249	60	133	48	155	*	*	*	*	*	185	54
11:00	293	60	264	42	240	54	110	49	162	*	*	*	*	*	214	51
11:15	301	48	247	54	270	63	128	34	0	*	*	*	*	*	189	50
11:30	288	50	314	33	327	51	150	38	10	*	*	*	*	*	218	43
11:45	337	34	290	32	302	38	136	46	0	*	*	*	*	*	213	38
Total	1219	11171	6206	10727	6634	11298	5093	6539	2820	13	0	0	0	0	5284	9665
Day Total	12390		16933		17932		11632		2833		0		0		14949	
% Splits	9.8%	90.2%	36.7%	63.3%	37.0%	63.0%	43.8%	56.2%	99.5%	0.5%	0.0%	0.0%	0.0%	0.0%	35.3%	64.7%
Peak	11:00	03:45	11:00	04:15	11:00	04:15	07:00	04:30	10:15	00:15					07:00	04:15
Vol.	1219	1454	1115	1393	1139	1477	1121	811	552	13					965	1272
P.H.F.	0.904	0.964	0.882	0.936	0.855	0.942	0.870	0.939	0.852	0.250					0.874	0.970

ADT ADT 23,142 AADT 23,142

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
04/09/12	*	*	*	*	*	*	*	*	*	*	*	*	*	*
00:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
00:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
00:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	85	23	12	7	3	6	3	0	0	0	0	1	0	1
11:15	114	24	8	10	5	2	1	1	0	1	1	1	0	0
11:30	132	20	11	10	6	1	2	0	1	0	0	0	0	0
11:45	127	20	7	7	5	4	2	0	0	0	1	0	1	0
Total	458	87	38	34	19	13	8	1	1	1	2	2	1	1

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12 PM	126	27	14	8	4	2	0	1	0	0	0	0	0	0
12:15	115	33	12	6	5	1	1	1	1	0	0	0	0	0
12:30	145	29	6	9	2	1	1	0	0	0	0	0	0	0
12:45	125	32	12	6	4	2	1	1	0	0	0	0	0	0
	511	121	44	29	15	6	3	3	1	0	0	0	0	0
13:00	131	29	11	6	5	2	0	0	0	1	0	0	0	0
13:15	134	20	13	6	2	2	0	2	0	1	0	0	0	0
13:30	167	16	13	5	2	1	0	1	0	0	0	0	1	0
13:45	138	21	14	3	2	3	0	1	1	1	0	0	0	0
	570	86	51	20	11	8	0	4	1	3	0	0	1	0
14:00	130	19	14	1	5	1	2	0	1	0	0	0	0	1
14:15	144	29	10	4	1	0	0	2	0	0	0	0	1	0
14:30	127	18	16	4	5	2	2	1	1	0	0	0	0	0
14:45	145	24	13	3	6	2	1	0	0	0	0	0	0	0
	546	90	53	12	17	5	5	3	2	0	0	0	1	1
15:00	118	21	11	11	7	1	0	1	1	0	0	0	0	0
15:15	149	23	11	4	4	2	0	0	1	0	0	0	0	0
15:30	121	27	11	4	3	2	2	1	1	0	0	0	0	1
15:45	131	19	10	5	6	2	0	0	1	1	1	0	0	0
	519	90	43	24	20	7	2	2	4	1	1	0	0	1
16:00	131	23	11	4	3	2	0	2	1	0	0	1	0	0
16:15	148	18	5	9	1	1	1	1	0	1	0	1	0	0
16:30	163	21	8	6	3	0	0	0	0	0	0	1	0	0
16:45	145	21	11	7	2	1	0	0	0	0	1	0	0	0
	587	83	35	26	9	4	1	3	1	1	1	3	0	0
17:00	150	24	12	7	1	1	1	0	0	0	0	0	1	0
17:15	171	23	10	2	0	2	0	0	1	0	0	0	0	0
17:30	163	20	7	2	3	3	2	0	0	0	1	1	0	0
17:45	166	19	7	3	1	1	2	1	0	2	0	0	0	0
	650	86	36	14	5	7	5	1	1	2	1	1	1	0
18:00	128	22	7	7	4	4	0	0	1	1	0	0	0	0
18:15	142	19	10	3	1	4	3	0	2	0	1	0	0	0
18:30	126	25	9	10	3	1	0	2	0	0	0	1	0	0
18:45	122	24	13	6	4	3	2	0	0	2	1	0	0	0
	518	90	39	26	12	12	5	2	3	3	2	1	0	0
19:00	106	24	14	5	5	4	3	2	0	0	1	0	0	0
19:15	98	25	12	9	10	2	2	0	1	0	0	0	1	0
19:30	85	24	8	7	8	3	4	0	2	0	0	2	1	0
19:45	71	24	12	9	9	6	1	4	0	1	0	0	0	1
	360	97	46	30	32	15	10	6	3	1	1	2	2	1
20:00	56	22	12	8	9	4	1	3	2	1	1	0	1	1
20:15	75	20	11	7	5	5	5	4	2	0	0	0	1	1
20:30	75	13	12	9	6	4	6	0	1	3	1	1	0	1
20:45	72	14	20	9	2	2	1	2	2	1	0	2	1	2
	278	69	55	33	22	15	13	9	7	5	2	3	3	5
21:00	49	14	13	6	5	6	2	2	0	6	2	0	0	2
21:15	32	16	8	8	7	5	3	3	1	0	4	1	1	4
21:30	40	19	9	7	7	6	2	6	2	1	4	1	0	1
21:45	44	14	14	6	7	4	5	1	1	2	2	1	0	3
	165	63	44	27	26	21	12	12	4	9	12	3	1	10
22:00	33	17	10	9	3	3	2	1	4	2	1	4	2	2
22:15	26	8	7	10	4	3	4	4	4	2	0	3	0	5
22:30	24	11	5	2	2	2	2	3	2	1	3	2	2	7
22:45	57	15	13	7	5	2	4	1	2	3	1	0	0	3
	140	51	35	28	14	10	12	9	12	8	5	9	4	17
23:00	14	4	1	6	6	1	0	1	2	1	5	1	0	11
23:15	5	5	3	4	2	4	2	2	3	3	1	4	0	7
23:30	6	6	1	2	2	6	0	3	5	2	2	0	1	9
23:45	8	4	1	4	6	2	2	1	1	4	1	1	1	8
	33	19	6	16	16	13	4	7	11	10	9	6	2	35
Total	4877	945	487	285	199	123	72	61	50	43	34	28	15	70

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
04/10/12	6	8	7	2	3	3	1	2	0	1	1	0	1	11
00:15	7	2	2	0	1	2	0	2	2	1	0	1	1	14
00:30	5	3	1	0	0	1	2	1	1	1	0	1	1	12
00:45	0	1	1	1	0	0	0	1	0	0	0	0	0	10
	18	14	11	3	4	6	3	6	3	3	1	2	3	47
01:00	4	1	1	1	1	1	0	1	0	0	0	1	0	12
01:15	1	0	1	0	0	0	0	0	1	0	0	0	0	11
01:30	0	0	0	0	1	1	0	0	0	1	0	1	0	11
01:45	0	0	0	1	2	0	0	0	0	0	0	0	0	6
	5	1	2	2	4	2	0	1	1	1	0	2	0	40
02:00	0	0	0	1	1	1	0	0	0	0	0	0	0	8
02:15	0	0	1	1	0	0	1	0	0	0	0	0	0	10
02:30	2	0	0	0	0	0	0	0	0	0	0	0	1	11
02:45	1	0	0	1	0	1	1	0	1	0	0	0	1	6
	3	0	1	3	1	2	2	0	1	0	0	0	2	35
03:00	0	0	0	0	1	0	0	0	0	0	0	0	1	4
03:15	0	0	0	1	0	0	0	0	0	0	0	0	0	5
03:30	1	0	0	0	0	1	0	0	0	0	0	1	0	4
03:45	0	0	0	0	0	0	0	2	0	0	0	0	0	7
	1	0	0	1	1	1	0	2	0	0	0	1	1	20
04:00	0	0	0	0	1	0	0	0	0	0	0	1	0	8
04:15	0	0	2	1	0	1	0	0	1	3	0	0	0	11
04:30	1	1	1	1	0	1	1	0	0	1	0	0	0	9
04:45	3	1	1	1	1	1	0	2	0	1	1	0	0	8
	4	2	4	3	2	3	1	2	1	5	1	1	0	36
05:00	4	4	1	2	1	2	4	2	0	1	0	2	0	11
05:15	6	5	4	3	0	2	4	1	4	0	1	1	2	9
05:30	9	1	7	3	1	5	5	4	0	2	1	0	2	9
05:45	9	4	6	8	3	1	4	3	2	1	1	2	2	8
	28	14	18	16	5	10	17	10	6	4	3	5	6	37
06:00	22	12	6	6	5	4	6	3	0	0	2	1	1	6
06:15	43	15	8	6	3	3	2	5	1	2	3	0	1	5
06:30	30	16	5	6	6	7	4	2	1	2	1	0	1	6
06:45	65	11	11	12	10	4	3	0	1	1	0	0	0	4
	160	54	30	30	24	18	15	10	3	5	6	1	3	21
07:00	52	20	9	8	7	5	4	3	1	1	1	1	0	3
07:15	68	20	10	11	2	4	0	2	2	1	2	0	0	4
07:30	88	16	13	8	4	4	1	4	3	0	0	0	0	2
07:45	101	21	12	6	6	4	5	1	1	1	0	0	0	0
	309	77	44	33	19	17	10	10	7	3	3	1	0	9
08:00	132	26	9	4	4	2	0	1	1	0	1	0	0	1
08:15	106	19	17	5	3	4	0	3	2	0	1	0	0	0
08:30	105	22	16	8	4	5	0	2	0	0	0	0	1	0
08:45	67	18	11	7	8	4	1	4	1	0	0	2	0	2
	410	85	53	24	19	15	1	10	4	0	2	2	1	3
09:00	83	17	11	6	3	6	2	2	5	1	0	0	0	2
09:15	78	18	12	4	9	4	3	2	1	1	0	2	0	1
09:30	82	30	14	8	6	3	2	0	2	0	2	1	0	0
09:45	50	19	13	10	6	5	1	1	1	2	2	3	1	1
	293	84	50	28	24	18	8	5	9	4	4	6	1	4
10:00	59	19	14	12	5	7	4	2	1	1	1	0	0	0
10:15	88	29	15	7	6	4	1	1	1	0	0	0	0	2
10:30	89	14	11	7	4	5	2	3	6	0	0	1	0	1
10:45	81	28	9	10	8	1	2	1	0	1	3	1	0	0
	317	90	49	36	23	17	9	7	8	2	4	2	0	3
11:00	93	24	21	8	6	1	0	2	1	1	0	1	0	0
11:15	101	23	9	5	6	5	2	0	2	1	1	0	0	1
11:30	82	24	8	8	3	1	2	3	1	2	0	3	0	1
11:45	96	25	13	8	4	1	3	2	1	1	0	1	0	0
	372	96	51	29	19	8	7	7	5	5	1	5	0	2
Total	1920	517	313	208	145	117	73	70	48	32	25	28	17	257

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12 PM	112	18	9	9	8	2	7	0	0	1	0	0	0	0
12:15	125	25	12	7	2	0	0	0	3	1	0	0	0	1
12:30	134	26	11	5	3	5	0	0	0	1	0	1	0	0
12:45	121	31	9	5	4	3	0	0	1	1	0	0	0	1
	492	100	41	26	17	10	7	0	4	4	0	1	0	2
13:00	124	28	11	2	2	3	2	0	1	1	0	1	0	0
13:15	113	19	14	8	6	2	1	1	2	0	0	0	0	0
13:30	132	27	8	9	2	4	2	1	0	0	0	0	0	0
13:45	108	24	19	6	6	2	3	0	0	0	0	0	0	0
	477	98	52	25	16	11	8	2	3	1	0	1	0	0
14:00	104	23	13	9	5	2	0	1	0	0	1	0	1	0
14:15	126	21	11	8	6	1	1	0	1	0	1	0	0	0
14:30	105	32	15	4	3	3	1	2	0	1	0	0	0	1
14:45	166	25	8	3	2	1	0	0	1	0	0	0	0	0
	501	101	47	24	16	7	2	3	2	1	2	0	1	1
15:00	134	27	16	7	2	0	1	0	0	1	0	0	0	0
15:15	151	16	10	6	2	1	3	2	0	0	0	0	0	0
15:30	128	22	16	4	2	3	1	1	1	0	1	0	0	0
15:45	126	25	14	4	3	1	3	0	1	0	0	1	0	0
	539	90	56	21	9	5	8	3	2	1	1	1	0	0
16:00	123	24	15	8	4	3	1	1	0	0	0	0	0	0
16:15	145	27	11	4	3	0	3	0	1	0	0	0	0	0
16:30	133	25	12	7	3	1	0	1	1	0	0	0	0	0
16:45	135	23	8	4	4	2	3	1	0	0	1	0	0	0
	536	99	46	23	14	6	7	3	2	0	1	0	0	0
17:00	155	28	3	4	3	3	0	0	1	0	0	0	0	0
17:15	137	25	13	3	3	0	0	1	0	1	0	0	0	0
17:30	140	19	17	5	1	2	2	0	1	0	1	0	0	0
17:45	141	20	11	4	2	2	0	2	1	1	0	0	0	0
	573	92	44	16	9	7	2	3	3	2	1	0	0	0
18:00	125	29	8	10	0	2	0	1	0	0	2	0	0	0
18:15	148	25	15	6	5	1	0	0	0	0	0	0	0	0
18:30	127	24	5	5	2	1	4	2	0	3	0	0	0	0
18:45	101	20	17	10	4	1	1	0	1	0	1	1	1	0
	501	98	45	31	11	5	5	3	1	3	3	1	1	0
19:00	113	31	7	5	6	4	1	1	0	1	1	1	0	0
19:15	79	22	20	10	4	6	0	1	0	3	1	0	0	0
19:30	93	15	14	9	8	4	2	0	0	2	0	1	0	1
19:45	86	32	14	12	8	3	2	1	0	1	0	0	0	0
	371	100	55	36	26	17	5	3	0	7	2	2	0	1
20:00	65	21	14	10	3	6	4	3	0	1	0	1	0	2
20:15	67	18	15	9	3	1	5	5	2	0	0	3	0	1
20:30	43	20	8	8	2	5	2	4	1	2	0	0	1	5
20:45	49	19	12	9	10	1	3	3	1	1	2	1	0	2
	224	78	49	36	18	13	14	15	4	4	2	5	1	10
21:00	43	17	12	9	6	8	1	2	4	3	0	0	1	2
21:15	44	15	11	7	7	8	2	5	2	0	0	3	0	2
21:30	46	5	8	12	5	7	1	3	4	1	0	2	0	5
21:45	34	11	14	12	6	2	3	2	1	0	1	3	2	3
	167	48	45	40	24	25	7	12	11	4	1	8	3	12
22:00	34	14	5	7	3	5	1	6	0	3	1	2	0	6
22:15	42	14	8	4	6	7	3	4	1	2	2	0	1	4
22:30	21	10	6	6	5	6	3	2	3	0	2	1	2	7
22:45	63	16	4	6	4	3	4	3	2	3	1	0	1	4
	160	54	23	23	18	21	11	15	6	8	6	3	4	21
23:00	21	11	5	6	2	2	5	4	2	3	2	1	2	5
23:15	6	3	2	3	4	1	2	1	1	4	2	1	0	13
23:30	7	3	5	5	4	3	3	0	2	3	1	3	1	10
23:45	4	4	2	4	0	1	2	1	2	1	2	0	1	14
	38	21	14	18	10	7	12	6	7	11	7	5	4	42
Total	4579	979	517	319	188	134	88	68	45	46	26	27	14	89

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
04/11/12	9	4	6	4	1	3	1	0	1	2	0	3	2	11
00:15	4	2	2	1	2	0	1	1	0	1	1	1	0	14
00:30	4	4	0	0	1	0	1	2	1	0	1	1	1	6
00:45	1	0	0	0	0	0	0	4	1	1	0	0	2	8
	18	10	8	5	4	3	3	7	3	4	2	5	5	39
01:00	3	1	1	1	1	0	1	0	0	0	0	0	1	13
01:15	0	0	0	2	2	0	0	1	0	0	0	1	0	12
01:30	1	0	0	1	0	0	0	0	1	1	0	0	0	7
01:45	0	3	0	1	0	0	0	1	0	1	0	0	0	10
	4	4	1	5	3	0	1	2	1	2	0	1	1	42
02:00	0	0	0	0	0	0	1	3	0	0	0	0	0	9
02:15	0	0	0	0	0	1	0	1	0	0	0	0	0	6
02:30	0	0	0	1	0	0	0	0	0	0	0	0	0	7
02:45	2	2	1	0	0	0	0	1	0	0	0	1	0	9
	2	2	1	1	0	1	1	5	0	0	0	1	0	31
03:00	1	1	0	0	2	0	1	1	0	0	0	0	0	8
03:15	0	1	1	0	1	1	0	1	1	0	0	0	1	6
03:30	0	0	0	1	0	1	0	0	0	0	0	0	0	9
03:45	0	0	0	0	0	0	0	0	1	0	0	0	0	8
	1	2	1	1	3	2	1	2	2	0	0	0	1	31
04:00	0	0	0	0	0	1	0	0	0	0	1	0	1	10
04:15	1	1	1	1	0	0	1	0	0	0	0	0	1	10
04:30	1	0	2	0	0	0	1	0	1	0	1	0	1	9
04:45	1	2	1	1	4	0	1	1	0	0	0	1	0	12
	3	3	4	2	4	1	3	1	1	0	2	1	3	41
05:00	5	3	4	1	2	2	3	1	1	0	1	0	0	12
05:15	1	5	2	3	2	4	1	0	3	3	2	3	0	9
05:30	5	7	4	4	2	3	1	2	1	1	4	2	1	10
05:45	12	8	6	2	1	6	3	4	1	1	1	1	1	11
	23	23	16	10	7	15	8	7	6	5	8	6	2	42
06:00	18	10	9	2	2	5	4	1	5	2	2	2	1	7
06:15	41	16	4	7	7	5	5	1	3	3	3	0	1	2
06:30	25	16	12	7	4	6	4	4	4	1	1	0	1	4
06:45	62	14	10	10	6	6	4	3	1	1	0	2	1	1
	146	56	35	26	19	22	17	9	13	7	6	4	4	14
07:00	42	14	13	7	6	6	3	3	3	2	1	2	0	1
07:15	66	18	8	5	6	6	3	0	2	3	0	1	1	4
07:30	86	16	16	5	5	7	4	4	0	1	0	0	0	1
07:45	87	25	16	7	6	2	2	0	1	0	1	1	1	0
	281	73	53	24	23	21	12	7	6	6	2	4	2	6
08:00	149	22	11	4	6	2	0	0	0	0	0	1	0	0
08:15	114	22	14	9	3	3	2	2	0	0	0	0	0	0
08:30	107	17	13	8	4	1	2	0	3	1	2	0	0	0
08:45	80	16	15	10	6	1	2	0	2	1	1	2	1	1
	450	77	53	31	19	7	6	2	5	2	3	3	1	1
09:00	83	18	10	7	4	7	1	3	4	1	1	1	0	0
09:15	104	22	12	11	2	4	3	1	1	2	1	0	0	0
09:30	89	28	15	9	4	5	3	1	0	0	0	1	0	0
09:45	109	18	9	5	5	3	1	4	0	2	0	2	0	0
	385	86	46	32	15	19	8	9	5	5	2	4	0	0
10:00	76	20	18	4	9	3	2	2	2	1	2	0	0	0
10:15	91	25	16	8	2	5	2	1	1	2	1	0	0	0
10:30	86	17	21	9	2	2	2	2	1	2	1	1	0	0
10:45	98	21	10	8	4	3	1	0	2	1	1	1	0	1
	351	83	65	29	17	13	7	5	6	6	5	2	0	1
11:00	98	20	11	10	7	4	1	2	3	0	0	0	0	0
11:15	106	22	11	12	4	1	1	0	0	0	1	1	0	0
11:30	106	23	14	7	4	6	1	1	0	1	1	0	0	0
11:45	91	17	12	8	6	6	2	2	2	1	0	0	0	0
	401	82	48	37	21	17	5	5	5	2	2	1	0	0
Total	2065	501	331	203	135	121	72	61	53	39	32	32	19	248

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 999
12 PM	115	30	18	4	7	1	1	0	1	0	0	0	0	0
12:15	126	28	10	7	7	1	0	1	0	0	0	0	0	0
12:30	142	21	12	5	0	1	2	0	0	0	1	1	0	1
12:45	141	23	14	4	4	2	1	1	0	0	0	0	0	0
	524	102	54	20	18	5	4	2	1	0	1	1	0	1
13:00	132	28	10	5	3	2	1	0	1	0	0	0	0	0
13:15	120	21	13	5	3	3	2	1	1	0	1	0	0	0
13:30	138	26	18	2	3	2	2	0	0	0	0	0	0	0
13:45	105	17	16	8	5	1	1	2	1	2	0	0	0	0
	495	92	57	20	14	8	6	3	3	2	1	0	0	0
14:00	118	26	11	14	2	3	2	0	0	0	0	0	0	0
14:15	153	19	8	6	5	0	1	0	1	1	0	0	0	0
14:30	113	23	10	12	5	2	0	1	1	1	0	0	0	0
14:45	134	29	12	4	5	0	1	0	0	0	0	1	0	0
	518	97	41	36	17	5	4	1	2	2	0	1	0	0
15:00	104	28	16	8	4	1	2	0	0	0	1	1	0	0
15:15	152	17	11	5	0	3	3	0	0	1	1	0	0	0
15:30	138	16	13	5	3	2	2	1	0	1	0	0	0	0
15:45	145	17	10	8	1	1	0	0	2	0	0	0	0	1
	539	78	50	26	8	7	7	1	2	2	2	1	0	1
16:00	106	24	18	9	2	0	0	0	0	2	1	0	0	1
16:15	139	25	7	7	1	1	2	0	1	0	0	1	0	0
16:30	141	13	8	6	6	3	3	0	0	0	0	0	0	1
16:45	135	22	13	9	1	2	1	0	1	0	0	1	0	0
	521	84	46	31	10	6	6	0	2	2	1	2	0	2
17:00	148	21	12	4	2	3	3	0	0	0	0	0	0	0
17:15	163	24	6	6	2	1	0	0	0	0	0	0	0	0
17:30	158	17	9	5	2	1	0	0	1	0	0	0	0	0
17:45	154	21	11	5	3	1	0	0	0	0	0	0	0	0
	623	83	38	20	9	6	3	0	1	0	0	0	0	0
18:00	146	20	7	4	3	0	2	3	0	0	1	0	0	0
18:15	129	26	6	7	1	2	2	3	1	0	0	0	0	0
18:30	140	20	9	6	5	1	2	0	0	0	0	0	0	0
18:45	131	22	11	7	3	1	3	2	0	1	0	0	0	0
	546	88	33	24	12	4	9	8	1	1	1	0	0	0
19:00	106	21	12	8	2	6	4	0	0	2	0	0	0	0
19:15	90	24	12	9	2	6	1	2	1	0	1	1	0	1
19:30	100	25	12	10	4	5	3	2	0	1	0	0	0	0
19:45	83	21	4	8	8	2	3	1	3	1	1	1	1	0
	379	91	40	35	16	19	11	5	4	4	2	2	1	1
20:00	72	19	12	9	12	2	5	1	1	1	0	0	0	1
20:15	59	22	15	13	3	6	2	4	1	3	0	0	0	0
20:30	69	22	6	8	8	6	3	4	0	0	2	1	2	0
20:45	66	15	13	9	6	1	3	5	1	1	3	1	0	2
	266	78	46	39	29	15	13	14	3	5	5	2	2	3
21:00	61	18	17	4	5	1	5	2	1	3	2	1	1	1
21:15	74	27	13	10	4	4	2	1	1	2	1	1	1	0
21:30	35	13	16	5	9	2	5	1	3	1	2	2	2	1
21:45	43	13	13	9	7	1	5	3	2	0	3	0	0	4
	213	71	59	28	25	8	17	7	7	6	8	4	4	6
22:00	36	14	10	7	7	4	4	1	2	4	2	0	1	4
22:15	32	14	8	7	9	4	3	1	6	0	1	0	1	5
22:30	23	7	2	3	6	6	3	3	3	3	1	1	1	4
22:45	69	18	14	5	3	2	2	1	1	1	0	0	3	5
	160	53	34	22	25	16	12	6	12	8	5	1	6	18
23:00	17	8	1	2	2	3	3	1	1	3	0	3	2	10
23:15	20	4	3	5	5	3	3	0	5	3	2	0	1	9
23:30	8	5	9	2	4	6	3	0	4	2	2	1	0	9
23:45	12	6	2	1	2	0	5	2	2	1	0	1	2	12
	57	23	15	10	13	12	14	3	12	9	4	5	5	40
Total	4841	940	513	311	196	111	106	50	50	41	30	19	18	72

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
04/12/12	7	5	1	2	6	5	4	2	3	1	1	3	1	10
00:15	4	5	4	2	2	4	1	2	2	1	1	1	0	12
00:30	4	3	1	1	1	2	3	1	1	2	1	0	2	11
00:45	7	1	0	3	3	0	0	0	3	4	1	2	0	11
	22	14	6	8	12	11	8	5	9	8	4	6	3	44
01:00	4	3	2	0	0	0	1	0	0	1	1	2	0	11
01:15	3	1	0	4	0	1	0	0	1	2	0	0	1	7
01:30	0	1	0	0	0	0	1	0	1	0	0	1	0	12
01:45	0	1	0	0	1	0	0	0	0	0	0	0	0	6
	7	6	2	4	1	1	2	0	2	3	1	3	1	36
02:00	1	0	0	0	0	0	0	0	1	0	0	0	1	8
02:15	0	0	0	2	0	0	0	0	0	0	0	0	0	6
02:30	1	0	0	0	1	0	0	0	0	0	0	0	0	8
02:45	0	0	0	0	0	1	0	0	0	0	0	0	0	12
	2	0	0	2	1	1	0	0	1	0	0	0	1	34
03:00	0	1	0	0	1	1	1	1	0	0	1	0	1	10
03:15	2	0	2	0	2	0	0	1	0	0	0	0	0	9
03:30	1	0	1	1	0	0	1	1	0	2	0	0	0	9
03:45	0	1	0	0	0	0	0	0	0	0	0	0	1	7
	3	2	3	1	3	1	2	3	0	2	1	0	2	35
04:00	0	1	0	0	1	2	0	0	1	0	1	0	0	14
04:15	3	0	1	0	1	0	1	1	0	1	0	0	0	9
04:30	2	0	3	2	1	0	0	0	0	0	2	1	1	10
04:45	4	3	1	5	1	3	3	0	0	0	1	0	1	9
	9	4	5	7	4	5	4	1	1	1	4	1	2	42
05:00	6	2	3	4	2	3	1	0	2	0	1	2	0	11
05:15	3	3	0	1	2	3	5	2	3	1	0	2	0	9
05:30	8	2	7	4	1	2	1	3	3	0	3	1	1	11
05:45	15	6	3	3	1	5	1	0	4	2	0	1	2	12
	32	13	13	12	6	13	8	5	12	3	4	6	3	43
06:00	13	11	5	5	2	3	5	2	2	4	1	1	1	8
06:15	40	16	12	10	2	3	5	4	2	2	2	0	0	4
06:30	34	12	11	3	12	3	2	1	0	4	2	0	0	6
06:45	77	13	9	6	4	3	4	2	2	2	1	1	3	1
	164	52	37	24	20	12	16	9	6	12	6	2	4	19
07:00	48	11	12	5	7	5	6	1	4	1	0	2	2	1
07:15	48	13	8	5	5	7	3	2	3	3	2	0	1	3
07:30	101	20	18	6	7	8	1	1	0	0	0	1	0	0
07:45	103	26	8	9	6	6	1	2	1	1	0	0	0	0
	300	70	46	25	25	26	11	6	8	5	2	3	3	4
08:00	128	24	9	5	4	3	2	1	0	0	1	0	0	0
08:15	94	15	15	10	7	2	1	0	3	1	0	0	0	1
08:30	116	22	9	9	4	5	0	2	1	1	1	0	0	0
08:45	96	21	7	5	9	5	0	3	1	1	0	0	1	2
	434	82	40	29	24	15	3	6	5	3	2	0	1	3
09:00	82	19	8	8	7	2	4	3	3	1	0	0	0	2
09:15	88	21	14	13	5	2	1	4	0	0	1	0	0	1
09:30	76	21	14	7	7	3	0	3	2	1	1	0	1	1
09:45	74	12	14	4	6	5	4	1	4	2	1	0	0	1
	320	73	50	32	25	12	9	11	9	4	3	0	1	5
10:00	60	15	6	6	0	4	7	5	0	1	3	1	0	3
10:15	31	13	7	4	1	3	3	1	1	2	1	0	2	9
10:30	29	12	11	1	3	4	3	3	1	1	4	0	0	8
10:45	38	10	6	3	2	4	1	2	2	4	2	1	0	8
	158	50	30	14	6	15	14	11	4	8	10	2	2	28
11:00	23	12	7	5	3	1	3	4	1	2	0	0	3	9
11:15	33	11	4	4	4	4	2	4	3	1	1	1	1	7
11:30	44	11	3	4	4	3	2	1	3	0	2	1	2	7
11:45	39	10	8	4	3	0	6	0	0	0	1	0	3	10
	139	44	22	17	14	8	13	9	7	3	4	2	9	33
Total	1590	410	254	175	141	120	90	66	64	52	41	25	32	326

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12 PM	41	13	7	7	1	4	0	4	3	2	1	0	1	6
12:15	53	24	6	8	4	2	2	2	0	1	1	0	2	5
12:30	48	23	9	3	2	0	1	1	0	5	2	1	0	7
12:45	60	14	14	5	2	2	4	3	2	2	0	1	0	5
	202	74	36	23	9	8	7	10	5	10	4	2	3	23
13:00	59	14	6	10	5	2	1	2	3	2	1	0	2	4
13:15	56	19	9	9	3	0	3	3	5	0	1	2	1	3
13:30	57	21	6	9	3	4	2	3	1	1	2	0	0	5
13:45	46	18	8	9	1	2	4	2	1	0	0	1	3	6
	218	72	29	37	12	8	10	10	10	3	4	3	6	18
14:00	66	24	9	3	4	3	3	1	1	2	1	2	2	2
14:15	60	15	10	9	2	3	4	1	0	0	3	4	1	3
14:30	49	15	7	8	5	1	5	1	2	5	3	1	2	0
14:45	61	19	10	5	5	6	3	3	2	1	2	2	1	0
	236	73	36	25	16	13	15	6	5	8	9	9	6	5
15:00	58	17	8	7	2	3	1	4	0	0	1	3	3	4
15:15	75	21	10	8	3	3	2	0	0	2	1	1	1	3
15:30	77	20	10	1	5	6	2	1	0	1	3	0	3	1
15:45	63	19	6	3	7	4	1	4	2	0	2	0	2	3
	273	77	34	19	17	16	6	9	2	3	7	4	9	11
16:00	75	12	9	3	5	2	1	0	2	0	1	2	0	7
16:15	67	17	9	4	2	3	3	0	4	1	1	1	0	5
16:30	69	13	9	2	3	3	1	4	0	1	1	0	2	7
16:45	58	20	9	7	3	2	0	2	1	4	1	4	1	2
	269	62	36	16	13	10	5	6	7	6	4	7	3	21
17:00	70	12	4	2	3	5	2	2	3	1	1	2	1	4
17:15	76	22	15	2	3	3	5	1	0	1	0	0	2	3
17:30	68	19	6	7	3	3	0	1	0	0	0	0	0	10
17:45	67	16	12	6	5	2	2	2	2	3	1	1	1	2
	281	69	37	17	14	13	9	6	5	5	2	3	4	19
18:00	67	15	13	7	3	1	0	2	4	1	1	4	0	3
18:15	57	20	4	8	3	1	4	3	1	0	1	1	0	6
18:30	55	11	8	2	1	1	5	7	2	2	1	2	2	2
18:45	54	14	5	4	3	2	3	2	1	3	1	0	0	8
	233	60	30	21	10	5	12	14	8	6	4	7	2	19
19:00	73	15	11	5	4	4	5	3	0	2	1	2	1	2
19:15	41	11	13	10	2	3	2	1	1	1	2	1	0	5
19:30	41	10	8	5	4	2	3	0	2	1	3	1	1	7
19:45	47	17	8	5	2	1	0	2	2	1	1	0	1	9
	202	53	40	25	12	10	10	6	5	5	7	4	3	23
20:00	43	16	6	7	4	2	1	6	0	1	2	1	1	6
20:15	41	8	9	4	6	5	6	2	2	3	0	1	1	3
20:30	36	13	8	4	6	4	4	3	5	2	1	0	1	5
20:45	45	17	10	7	4	4	4	1	0	4	1	0	2	4
	165	54	33	22	20	15	15	12	7	10	4	2	5	18
21:00	27	13	7	8	6	5	1	4	2	2	3	4	1	2
21:15	34	11	6	5	5	3	3	3	4	0	1	1	0	6
21:30	21	14	6	4	4	2	2	0	1	2	1	1	0	12
21:45	27	9	5	7	2	0	2	4	2	0	3	0	2	9
	109	47	24	24	17	10	8	11	9	4	8	6	3	29
22:00	28	6	1	4	5	4	1	2	3	0	1	1	1	11
22:15	31	8	6	4	3	5	0	1	4	2	1	2	0	9
22:30	13	6	4	4	4	1	1	2	3	0	1	0	1	13
22:45	5	4	3	0	1	3	3	0	2	1	1	0	0	9
	77	24	14	12	13	13	5	5	12	3	4	3	2	42
23:00	8	6	8	0	5	3	2	1	1	1	2	0	0	12
23:15	5	0	2	1	2	1	1	1	0	0	0	0	2	13
23:30	9	3	3	2	2	1	0	0	0	0	0	0	0	14
23:45	2	3	2	1	2	1	2	1	3	2	0	3	1	12
	24	12	15	4	11	6	5	3	4	3	2	3	3	51
Total	2289	677	364	245	164	127	107	98	79	66	59	53	49	279

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
04/13/12	4	1	2	1	1	0	0	3	0	1	0	0	1	13
00:15	3	2	0	0	3	1	1	1	1	2	2	1	0	11
00:30	6	1	0	1	1	0	0	0	0	0	0	0	0	14
00:45	1	1	1	0	0	0	0	1	0	0	0	0	0	11
	14	5	3	2	5	1	1	5	1	3	2	1	1	49
01:00	2	1	0	2	1	1	0	0	1	0	1	0	0	9
01:15	1	0	1	0	1	0	1	0	0	0	0	0	0	9
01:30	1	0	0	1	0	0	0	0	0	0	1	0	0	8
01:45	1	1	0	0	0	0	1	0	0	0	0	0	0	8
	5	2	1	3	2	1	2	0	1	0	2	0	0	34
02:00	0	0	0	0	0	0	0	0	1	0	0	0	0	6
02:15	1	0	0	0	0	0	0	0	0	0	0	0	0	6
02:30	0	0	0	1	0	0	0	0	0	0	0	0	1	5
02:45	0	0	1	1	0	0	0	1	0	0	0	0	1	7
	1	0	1	2	0	0	0	1	1	0	0	0	2	24
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	3
03:15	0	0	0	0	1	0	0	0	0	0	0	0	0	4
03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	4
03:45	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	0	0	0	0	1	0	0	0	0	0	0	0	0	16
04:00	0	0	0	1	0	1	0	0	1	1	0	0	0	8
04:15	0	0	0	0	1	0	0	0	0	0	0	0	0	8
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:45	0	0	0	0	0	0	0	1	0	0	0	0	1	8
	0	0	0	1	1	1	0	1	1	1	0	0	1	28
05:00	0	0	0	0	0	0	0	0	0	1	0	0	0	6
05:15	0	0	1	0	0	0	1	0	1	1	0	0	0	7
05:30	1	0	2	0	0	0	0	0	0	0	0	0	1	8
05:45	0	0	0	1	1	0	0	0	2	0	1	0	0	7
	1	0	3	1	1	0	1	0	3	2	1	0	1	28
06:00	3	3	1	2	1	1	0	2	0	1	0	1	0	14
06:15	11	4	4	3	6	0	2	0	2	3	0	0	1	13
06:30	9	3	0	4	1	1	2	1	0	2	0	2	1	9
06:45	5	2	2	3	3	4	4	2	1	2	3	1	1	8
	28	12	7	12	11	6	8	5	3	8	3	4	3	44
07:00	5	7	1	0	1	2	2	0	1	0	4	3	0	11
07:15	10	5	3	3	2	3	1	3	1	3	0	0	0	11
07:30	17	1	6	5	0	3	1	5	0	1	1	1	0	12
07:45	24	6	4	4	4	0	3	0	7	1	1	0	0	9
	56	19	14	12	7	8	7	8	9	5	6	4	0	43
08:00	49	8	6	0	5	2	3	3	0	1	6	1	0	8
08:15	38	14	15	5	2	3	5	5	0	2	1	0	0	6
08:30	45	15	9	5	2	1	2	1	2	0	1	2	3	7
08:45	29	11	5	7	2	1	3	4	3	2	1	1	3	6
	161	48	35	17	11	7	13	13	5	5	9	4	6	27
09:00	16	7	4	6	2	1	3	1	4	2	2	0	1	8
09:15	37	11	3	5	5	2	4	0	0	3	0	0	0	10
09:30	33	12	5	6	1	5	2	0	3	2	2	0	0	8
09:45	17	7	2	3	7	1	5	2	3	3	1	2	0	9
	103	37	14	20	15	9	14	3	10	10	5	2	1	35
10:00	26	10	7	3	4	2	3	3	0	1	2	3	1	8
10:15	40	8	10	7	6	6	0	2	2	1	0	1	0	6
10:30	42	15	7	5	3	1	2	2	1	1	0	1	2	8
10:45	39	12	11	2	3	6	3	0	1	2	2	0	1	8
	147	45	35	17	16	15	8	7	4	5	4	5	4	30
11:00	45	12	7	1	8	0	2	2	1	2	2	1	2	8
11:15	27	7	7	2	5	1	3	1	3	2	3	3	0	6
11:30	42	12	8	2	2	2	5	1	1	1	3	1	1	7
11:45	38	10	11	5	6	3	0	4	3	2	2	0	0	2
	152	41	33	10	21	6	10	8	8	7	10	5	3	23
Total	668	209	146	97	91	54	64	51	46	46	42	25	22	381

Gap Data
 City of Ionia
 Dexter Street/M-66 Pedestrian Safety Study

Latitude: 0' 0.000 South

Combined

Start Time	1	5	7	9	11	13	15	17	19	21	23	25	27	29
	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	1	0	1	0	0	0	0	1	0	0	2	1
12:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	0	1	1	0	1	0	0	0	0	1	0	0	2	1
13:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:15	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:30	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:45	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	0	1	1	0	1	0	0	0	0	1	0	0	2	1
Grand Total	23287	5266	2964	1877	1279	920	680	526	436	367	291	239	189	1724