



Memo: Invergordon Road / Montessori Academy – Traffic Analysis

Date: 12/21/16
TO: Chief Peter Wingert, Paradise Valley Police Department
FROM: Eric Maceyko, P.E., PTOE
Bryan A. Martin, P.E.

INTRODUCTION

The Town of Paradise Valley is evaluating the travel speeds and potential for changes to the existing posted speed limit signing on Invergordon Road within the vicinity of the Montessori Academy. Montessori Academy is a private pre-school and public kindergarten to 8th Grade charter school with an enrollment of more than 200 students.

The school currently experiences a typical morning arrival and afternoon dismissal peak period of traffic generation. The current practice of the Montessori Academy is to place two (2) 15 mph speed limit signs in the center of Invergordon Road, one each in the northbound and southbound directions in advance of the school driveways during the peak arrival and dismissal hours.

EPS Group has been retained to conduct a Traffic Analysis to evaluate current traffic conditions and recommend the appropriate posted speed limit signing.

STUDY AREA

Figure 1 provides a map of the study area. The existing Montessori Academy is located on the west side of Invergordon Road approximately 500 feet north of McDonald Drive. Within the study area, Invergordon Road is a straight, flat undivided north-south roadway consisting of one travel lane in each direction with a posted speed limit of 35 mph. There are also bike lanes in both directions. A continuous sidewalk is only present on the east side of Invergordon Road and no school crossing currently exists.

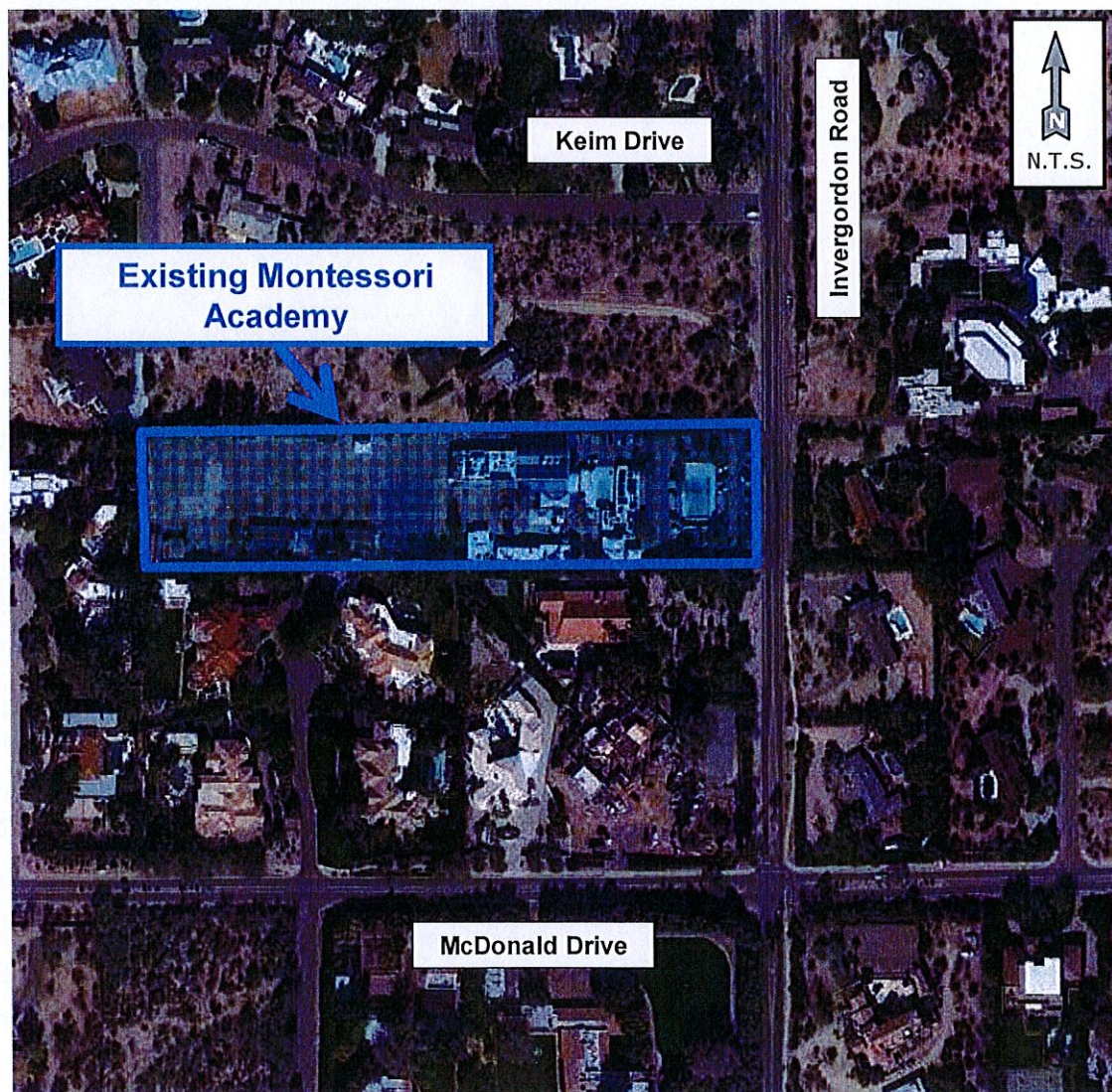


Figure 1: Study Area

The existing Montessori Academy provides access to Invergordon Road via one (1) full access ingress-only driveway to the north and one (1) full access egress-only driveway to the south. The driveways are separated by a distance of approximately 160 feet. No right or left-turn deceleration lanes are present for either access. There is an offset driveway on the east side of Invergordon Road just north of the Montessori Academy ingress-only driveway. This driveway serves the Calvary Church of the Valley property. **Figure 2** provides a close-up view of the current school access on Invergordon Road.

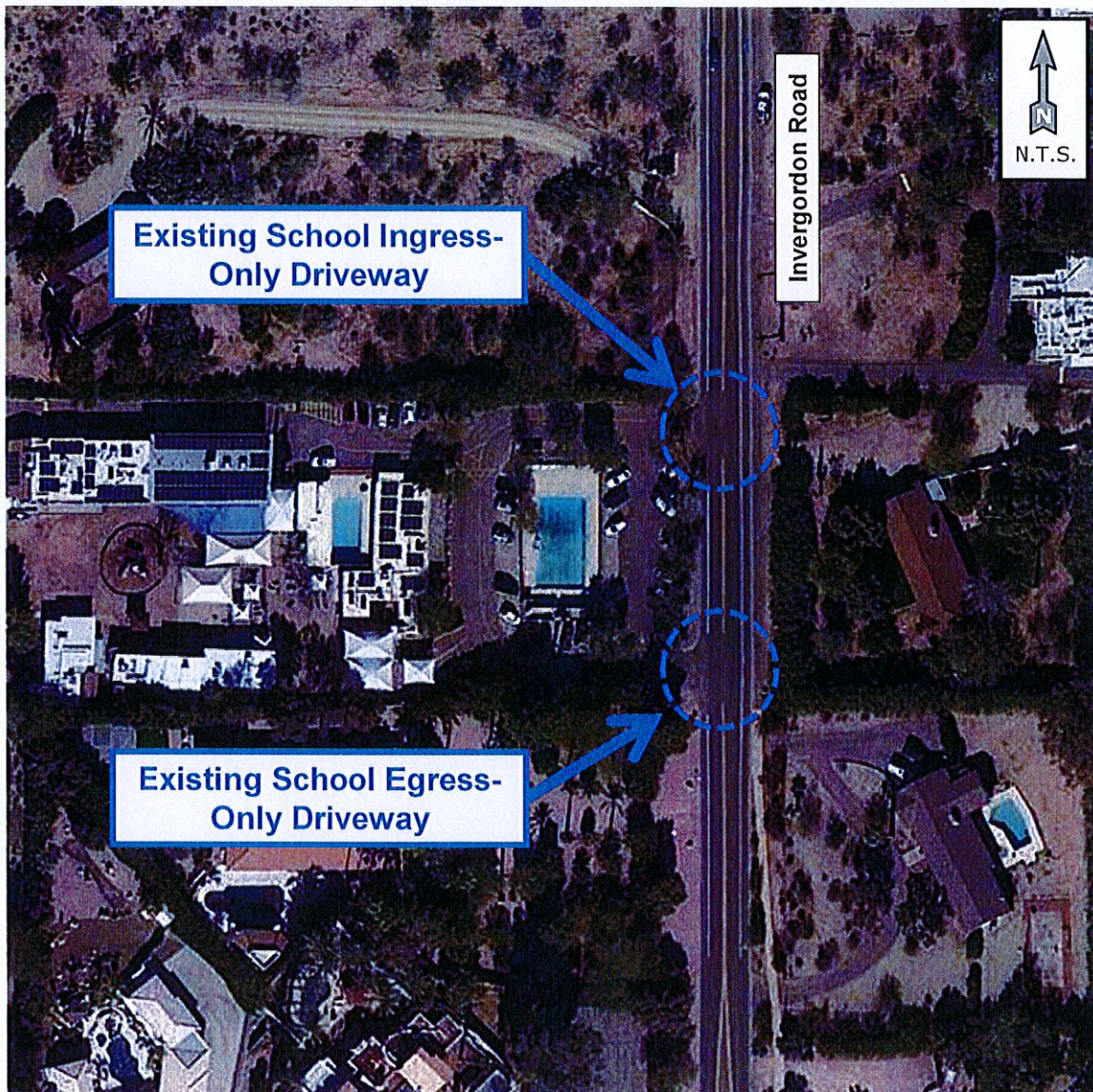


Figure 2: Current School Access

TRAFFIC DATA

Current traffic volume and travel speed data was collected for a 24-hour period on Tuesday, 15 November 2016. The peak hours of traffic on Invergordon Road generally occurred from 8:00 to 9:00 AM and 5:00 to 6:00 PM. The designated school drop-off time is from 8:00 to 8:30 AM, and pick-up times are from 2:50 to 3:15 PM and 3:30 to 3:45. Therefore, peak hour pedestrian counts were also conducted on Tuesday, 15 November 2016 from 7:45 to 8:45 AM, and from 2:45 to 3:45 PM. **Figure 3** depicts the traffic data measurement locations. **Attachment A** provides the traffic count data. **Attachment B** provides the pedestrian count data.

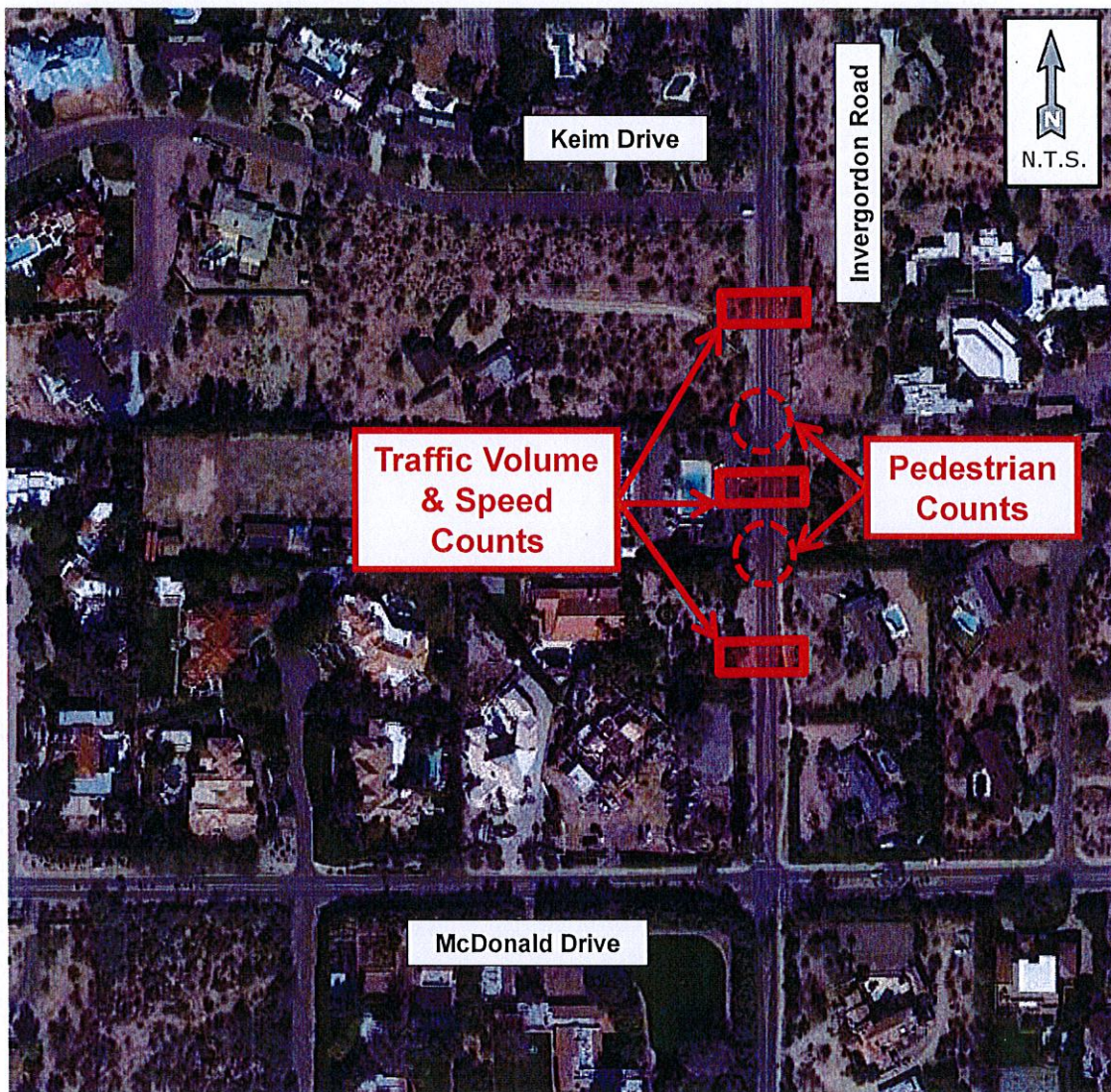


Figure 3: Traffic Data Measurement Locations

The resulting 24-hour, morning peak hour, and evening peak hour traffic volumes for Invergordon Road are summarized in **Table 1**. The morning peak hour of the school coincides with the morning peak hour of Invergordon Road traffic. The evening peak hour of the school occurs earlier than the evening peak hour of Invergordon Road traffic. Therefore, an additional school evening peak hour has been included in the table for use in the traffic analysis.

Table 1: Existing Traffic Volume Results

Time Period	Invergordon Road, South of School	Invergordon Road, Adjacent to School	Invergordon Road, North of School
Day (24 Hours)	6,955	6,720	7,013
AM Peak Hour	578	551	596
PM (School) Peak Hour	476	415	470
PM Peak Hour	695	678	716

The typical maximum capacity of a two-lane undivided roadway such as Invergordon Road is approximately 8,500 vehicles per day per lane. Therefore, the current traffic volumes are at less than 50% of the typical maximum capacity. This level of excess capacity can encourage high travel speeds.

The average travel speed data results are summarized in **Table 2**.

Table 2: Average Travel Speed Results

Time Period	Invergordon Road, South of School	Invergordon Road, Adjacent to School	Invergordon Road, North of School
Day (24 Hours)	31 mph	31 mph	35 mph
AM Peak Hour	21 mph	21 mph	25 mph
PM (School) Peak Hour	25 mph	25 mph	29 mph
PM Peak Hour	33 mph	33 mph	38 mph

Table 3 includes the total percentage of vehicles traveling at speeds greater than the currently posted 35 mph speed limit.

Table 3: Percentage Excess Speed Results

Time Period	Invergordon Road, South of School	Invergordon Road, Adjacent to School	Invergordon Road, North of School
Day (24 Hours)	24.9%	30.1%	44.2%

The data indicates that Invergordon Road, north of Montessori Academy, currently experiences the highest amount of traffic and highest average speeds. It can also be seen that there is a significant reduction in average speeds at each of the three (3) locations during the morning and school evening peak hours when compared to the overall day and evening peak hour of traffic on Invergordon Road. Additionally, a significant portion of drivers are exceeding the posted speed limit at all three (3) locations.

TRAFFIC ANALYSIS

Arizona State Traffic Law allows local authorities within their respective jurisdictions to determine or change the maximum speed limit on any part of a street or highway based on an engineering and traffic investigation (Arizona Revised Statutes, Section 28-703). **Attachment C** includes a copy of the pertinent excerpts of Arizona Revised Statutes. These studies are to be completed in compliance with the Manual on Uniform Traffic Control Devices (MUTCD, 2009 Edition, Section 2B-13) and the adopted state standards for traffic control devices.

The goal of a posted speed limit is to ensure safety and efficiency by reducing travel speed disparity. When vehicles are traveling at substantially different speeds, driver discomfort and collision potential increase. Driver uncertainty with potential vehicle movement on the same street or intersecting streets and driveways also increases. Mandatory speed limits have greater purposes than limiting the maximum travel speed. They are also intended to accommodate driver travel speed preference to improve efficiency and ensure safety.

The MUTCD lists six factors for consideration in determining speed limits – 85th Percentile Speed, Road Characteristics, Pace Speed, Roadside Development and Environment, Parking Practices and Pedestrian Activity, and Crash Experience. However, other criteria may require a more conservative speed limit established by engineering judgement that supersedes a speed limit based on these statistics alone. The following sections provide an analysis of each factor.

85th Percentile Speed:

The primary consideration provided in the MUTCD for determining the posted speed limit is the 85th percentile speed. This statistic represents the speed at which 85% of the vehicles are traveling at or below and 15% are traveling above. This is the prevailing speed of the vehicles traveling on the segment of roadway. **Table 4** provides the 85th percentile speed for the measured locations.

Table 4: 85th Percentile Speed Results

Time Period	Invergordon Road, South of School	Invergordon Road, Adjacent to School	Invergordon Road, North of School
Day (24 Hours)	38 mph	39 mph	48 mph
AM Peak Hour	35 mph	32 mph	33 mph
PM (School) Peak Hour	36 mph	36 mph	44 mph
PM Peak Hour	38 mph	39 mph	49 mph

As can be seen in **Table 4**, the 85th percentile speeds generally fall within the recommended 5 mph range from the posted speed limit, except on Invergordon Road north of the school. This segment experiences an 85th percentile speed of more than 10 mph from the posted speed limit on average. It can also be seen that there is a significant reduction in 85th percentile speeds at each of the three (3) locations during the morning and school evening peak hours when compared to the overall day and evening peak hour of traffic on Invergordon Road. The difference appears to be more pronounced during the morning peak hour which coincides with a higher ambient volume of traffic on Invergordon Road.

Road Characteristics:

Invergordon Road consists of pavement, curb, gutter, and sidewalk on the east side of the road. All appear in reasonably good condition with clearly visible pavement markings. The alignment of the road is straight with no significant vertical or horizontal alignment. Sight distance also appears adequate with no obvious obstructions or intersection alignment issues. There is landscaping present on both sides of Invergordon Road. The landscaping should be regularly monitored to ensure adequate sight distance is maintained.

Pace Speed:

The 10 mph pace speed is a secondary consideration suggested by the MUTCD. This speed is the 10 mph range of speeds that includes the largest number of vehicles. **Table 5** presents the 10 mph pace speeds at the study locations.

Table 5: Pace Speed Results

Time Period	Invergordon Road, South of School	Invergordon Road, Adjacent to School	Invergordon Road, North of School
Day (24 Hours)	31 - 40 mph	31 - 40 mph	26 - 35 mph

Typically a posted speed limit within the 10 mph pace speed, and close to the 85th percentile speed coincides with the lowest collision rate due to a subsequent reduction in the range of vehicle travel speeds. Therefore, the posted speed limit generally should be within the 10 mph pace speed, unless additional considerations necessitate a lower speed limit. The posted speed limit falls within the 10 mph pace speed at all three (3) locations.

Roadside Development and Environment:

Adjacent land uses consist primarily of low density single-family residences. Some residences have direct access to Invergordon Road and some have indirect access via local collector road intersections. Direct access is present more within the vicinity of the school and McDonald Drive, with indirect access present more to the north of the school.

Invergordon Road provides continuous bike lanes northbound and southbound, and a pedestrian sidewalk on the east side of the road only. There are no marked crosswalks for the school or at any other mid-block location.

Parking Practices and Pedestrian Activity:

There is no dedicated parking on Invergordon Road within the study area. There are no posted parking restrictions, and no parking activity was observed. Onsite parking and circulation areas provided by the school appear adequate.

The pedestrian count data is summarized in **Table 6**.

Table 6: Pedestrian Count Results

Time Period	School Ingress Driveway, North	School Egress Driveway, South
AM Peak Hour	4	3
PM (School) Peak Hour	1	3

As can be seen from **Table 6**, pedestrian activity related to the Montessori Academy is minimal, as is typical of charter schools. Furthermore, it should be noted that of the counts presented in **Table 6**, only two (2) pedestrians were recorded crossing Invergordon Road.

The *Arizona Department of Transportation Traffic Safety for School Areas Guidelines* states the following:

"A School Crossing shall not be installed where the school age pedestrian volume is 10 or fewer."

An official school crossing, as defined by the guidelines, is not recommended based on the low volume of crossing maneuvers.

Crash Experience:

The Paradise Valley Police Department provided historical crash data for Invergordon Road within the vicinity of the Montessori School. Data was collected for the past five years (2012 to 2016) where data was available. The following results were reported:

- Four (4) crashes occurred on Invergordon Road adjacent to the school, and two (2) crashes occurred on Invergordon Road near but not adjacent to the school between 2012 and 2014.
- Three (3) crashes occurred at the Invergordon Road / McDonald Drive intersection between 2015 and 2016.

Evaluation of the crash data does not indicate a significant amount of crashes present during the past five year period.

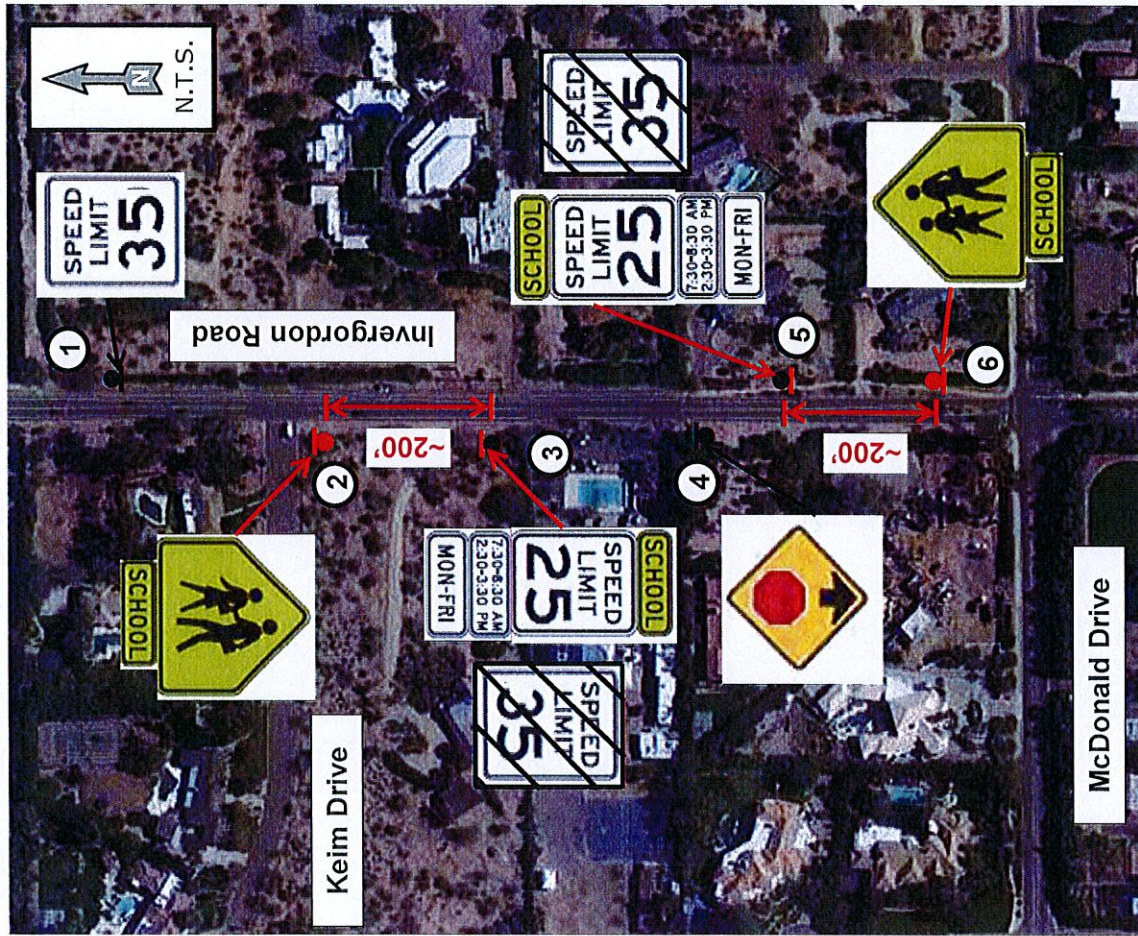
RECOMMENDATIONS

Typically drivers attempt to travel close to the posted speed limit. When drivers believe that a posted speed is unreasonably low, often they will ignore the posted speed limit and travel much faster. Based upon the collected traffic data and analysis, the posted speed limit of 35 mph on Invergordon Road appears appropriate. Reducing the speed limit would increase the gap between the existing travel speeds and the posted speed limit. However, the amount of vehicles in excess of the current posted speed limit does appear to be significant. Therefore, consideration of traffic calming measures to reduce the speeds is recommended.

The current 15 mph speed limit signs placed in the center of Invergordon Road by the Montessori Academy during the peak arrival and dismissal hours do not comply with the current MUTCD standards, nor is this type of sign recommended to be used per ADOT's school safety guidelines. As reflected in the data, the placement of the signs by the school does appear to significantly reduce vehicular speeds within the vicinity of the school during the peak arrival and dismissal hours. The observed impact was greater during the morning peak hour when ambient Invergordon Road traffic volumes were higher.

Therefore, it is recommended to implement enforceable permanent signing enhancements to designate a reduced speed zone in the vicinity of the school during the peak hours. Based on the traffic data, and statutory guidance that adjacent speed limits not have more than a 10 mph difference, a speed reduction to 25 mph is recommended during school peak hours.

Figure 4 provides a schematic diagram of the recommended signing improvements. Optional plaques are shown on the figure that should be considered to provide additional guidance, but are not mandatory. The time periods on the S4-1P plaque can be adjusted as necessary. In addition, flashing light speed display signs can also be considered. Flashing light speed display signs have proven effective in reducing travel speeds. The travel speeds of the lights would flash when vehicles exceed the posted speed limit.



LEGEND

- ① Existing R2-1 (35 MPH) Sign to Remain
- ② New S1-1 (36"x36") and Optional S4-3P (24"x8") Plaque on New Post
- ③ Replace Existing R2-1 (35 MPH) Sign with New S4-3P (24"x8"), New R2-1 (24"x30") and Optional S4-1P (24"x10") and / or Optional S4-6P (24"x10") on Existing Post
- ④ Existing W3-1 Sign to Remain
- ⑤ Replace Existing R2-1 (35 MPH) Sign with New S4-3P (24"x8"), New R2-1 (24"x30") and Optional S4-1P (24"x10") and / or Optional S4-6P (24"x10") on Existing Post
- ⑥ New S1-1 (36"x36") and Optional S4-3P (24"x8") Plaque on New Post

Note: Actual installation locations of new posts to be field adjusted as necessary to provide adequate visibility and clearance. Reuse of existing posts and foundations to be field verified for viability and appropriate mounting height.

Figure 4: Recommended Signing Enhancements

Please contact me at (480) 503-2250, extension 125 if you have any questions or would like to discuss this memorandum.

ATTACHMENTS:

- A. Existing Traffic Counts
- B. Existing Pedestrian Counts
- C. Pertinent Excerpts from Arizona Revised Statutes



Expires: 6/30/2017

ATTACHMENT A
EXISTING TRAFFIC COUNTS

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-001
 Station ID: Tues 11/15/16
 Invergordon Rd. north of Montessori
 Academy (s/o Keim Dr.) 33.5258,-111.9432
 Latitude: 0' 0.000 Undefined

Northbound	0	11	16	21	26	31	36	41	46	51	56	61	66	71	Average	85th
Start Time	10	15	20	25	30	35	40	45	50	55	60	65	70	75	(Mean)	Percent
11/15/16	0	0	0	0	0	0	1	4	3	0	0	0	0	0	9	46
01:00	0	0	0	0	0	0	3	1	0	0	0	0	0	0	4	38
02:00	0	0	0	1	0	0	0	1	0	0	0	0	0	2	31	41
03:00	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	26
04:00	0	0	0	0	0	1	1	3	0	0	0	1	0	0	6	44
05:00	0	0	0	0	0	1	1	7	17	1	0	0	0	0	27	46
06:00	0	0	0	0	0	4	21	22	28	7	3	2	0	0	87	45
07:00	0	1	19	48	42	21	24	28	29	6	2	1	0	0	221	33
08:00	0	3	33	113	68	39	18	22	10	8	2	0	1	0	317	29
09:00	0	0	2	0	4	21	45	61	44	20	11	2	0	0	210	43
10:00	0	0	0	2	2	23	33	64	61	29	6	2	2	0	224	44
11:00	0	0	0	0	12	17	53	60	46	23	8	6	0	0	225	43
12 PM	0	1	1	2	3	13	33	81	64	29	8	2	1	0	238	45
13:00	0	0	1	3	1	16	47	72	61	25	8	0	0	0	234	44
14:00	0	6	23	58	32	15	34	34	38	16	2	1	0	0	259	34
15:00	0	1	6	6	25	47	69	78	60	29	13	4	0	0	338	41
16:00	0	0	2	1	3	27	67	112	106	43	11	5	2	0	379	44
17:00	0	0	0	6	6	24	92	128	108	49	16	1	1	0	431	44
18:00	0	0	0	0	2	4	21	59	61	45	17	2	1	0	212	47
19:00	0	0	0	0	0	1	20	34	35	21	7	1	1	0	120	47
20:00	0	1	2	0	2	4	21	32	35	11	6	1	0	0	115	44
21:00	0	0	0	0	0	1	12	25	20	9	2	1	1	0	71	46
22:00	0	0	0	0	1	3	7	13	9	9	3	1	0	0	46	46
23:00	0	0	0	0	0	0	5	6	3	5	0	0	0	0	19	45
Total	0	13	90	240	203	282	629	947	838	385	125	34	10	0	3796	
Percent	0.0%	0.3%	2.4%	6.3%	5.3%	7.4%	16.6%	24.9%	22.1%	10.1%	3.3%	0.9%	0.3%	0.0%		
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	11:00	10:00	10:00	10:00	09:00	11:00	10:00	08:00	08:00	
Vol.	3	33	113	68	39	53	64	61	61	29	11	6	2	317		
PM Peak	14:00	14:00	14:00	14:00	14:00	15:00	17:00	17:00	17:00	17:00	18:00	16:00	16:00	17:00		
Vol.	6	23	58	32	47	92	128	108	108	49	17	5	2	431		
Total	0	13	90	240	203	282	629	947	838	385	125	34	10	0	3796	
Percent	0.0%	0.3%	2.4%	6.3%	5.3%	7.4%	16.6%	24.9%	22.1%	10.1%	3.3%	0.9%	0.3%	0.0%		

Statistics

10 MPH Pace Speed : 41-50 MPH
 Number in Pace : 1785
 Percent in Pace : 47.0%

Number of Vehicles > 35 MPH : 2968
 Percent of Vehicles > 35 MPH : 78.2%

Mean Speed(Average) : 42 MPH

15th Percentile : 31 MPH
 50th Percentile : 43 MPH
 85th Percentile : 50 MPH
 95th Percentile : 55 MPH

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-001
 Station ID: Tues 11/15/16
 Invergordon Rd. north of Montessori
 Academy (s/o Keim Dr.) 33.5258,-111.9432
 Latitude: 0' 0.000 Undefined

Start Time	0	11	16	21	26	31	36	41	46	51	56	61	66	71	Average (Mean)	85th Percent	
11/15/16	10	15	20	25	30	35	40	45	50	55	60	65	70	71	Total	Percent	
01:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	29	31
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	31	31
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	26
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	29	31
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	31	34
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	30	34
07:00	2	42	56	43	43	41	6	1	0	0	1	0	0	0	127	30	34
08:00	6	52	85	54	55	25	2	0	0	0	0	0	0	0	235	23	32
09:00	0	1	2	25	118	94	13	0	0	0	1	0	0	0	279	21	29
10:00	1	1	2	16	96	70	4	0	0	1	0	0	0	0	254	30	34
11:00	0	0	4	33	111	79	3	0	1	0	0	1	0	0	191	29	34
12 PM	0	0	4	17	93	89	14	0	1	0	0	0	0	0	232	29	34
13:00	0	0	3	15	88	86	13	1	0	1	0	0	0	0	218	30	34
14:00	3	32	59	22	48	41	5	0	0	0	0	1	0	0	207	30	35
15:00	1	0	17	35	77	103	10	1	0	0	0	0	0	0	211	23	32
16:00	0	0	5	13	104	112	9	0	0	0	1	0	0	0	244	29	34
17:00	0	0	3	30	126	116	8	0	0	1	0	1	0	0	285	30	34
18:00	0	0	0	10	81	84	6	0	0	0	0	0	0	0	181	30	34
19:00	0	0	0	6	36	40	3	1	0	0	0	0	0	0	86	30	34
20:00	0	0	0	3	39	25	7	0	0	0	0	0	0	0	74	30	35
21:00	0	0	0	2	28	19	4	0	0	0	0	0	0	0	53	30	34
22:00	0	0	0	3	5	11	2	0	0	0	0	0	0	0	21	31	35
23:00	0	0	0	1	5	11	1	0	0	0	0	0	0	0	18	31	34
Total	13	128	241	343	1232	1127	118	4	2	3	3	3	0	0	3217		
Percent	0.4%	4.0%	7.5%	10.7%	38.3%	35.0%	3.7%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	09:00	09:00	09:00	07:00	11:00	10:00	07:00	11:00	08:00	08:00			
Vol.	6	52	85	54	118	94	13	1	1	1	1	1	279	279			
PM Peak	14:00	14:00	14:00	15:00	17:00	17:00	12:00	13:00	12:00	13:00	16:00	14:00	17:00	17:00			
Vol.	3	32	59	35	126	116	14	1	1	1	1	1	285	285			
Total	13	128	241	343	1232	1127	118	4	2	3	3	3	0	0	3217		
Percent	0.4%	4.0%	7.5%	10.7%	38.3%	35.0%	3.7%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%			

Statistics

10 MPH Pace Speed : 26-35 MPH
 Number in Pace : 2359
 Percent in Pace : 73.3%
 Number of Vehicles > 35 MPH : 133
 Percent of Vehicles > 35 MPH : 4.1%
 Mean Speed(Average) : 28 MPH

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-001
 Station ID: Tues 11/15/16
 Invergordon Rd. north of Montessori
 Academy (s/o Keim Dr.) 33.5258,-111.9432
 Latitude: 0' 0.000 Undefined

Northbound, Southbound		11	16	21	26	31	36	41	46	51	56	61	66	71	71	Average	85th
Start	Time	15	20	25	30	35	40	45	50	55	60	65	70	71	Total	(Mean)	Percent
11/15/16	0	0	0	0	3	2	1	4	3	0	0	1	0	0	14	40	47
01:00	0	0	0	0	0	1	3	1	0	0	0	0	0	0	5	37	38
02:00	0	0	0	1	1	0	1	0	0	0	0	0	0	0	3	31	41
03:00	0	0	1	1	1	1	1	0	0	0	0	0	0	0	5	29	35
04:00	0	0	0	0	4	7	2	3	0	0	0	1	0	0	17	36	41
05:00	0	0	0	1	18	17	2	7	17	1	0	0	0	0	63	37	48
06:00	0	0	1	13	52	59	27	22	28	7	3	2	0	0	214	36	47
07:00	2	43	75	91	85	62	30	29	29	6	3	1	0	0	456	28	40
08:00	6	55	118	167	123	64	20	22	10	8	2	0	1	0	596	25	33
09:00	0	1	4	25	122	115	58	61	44	20	12	2	0	0	464	36	46
10:00	1	1	2	18	98	93	37	64	61	30	6	2	2	0	415	38	49
11:00	0	0	4	33	123	96	56	60	47	23	8	7	0	0	457	36	47
12 PM	0	1	5	19	96	102	47	81	65	29	8	2	1	0	456	38	48
13:00	0	0	4	18	89	102	60	73	61	26	8	0	0	0	441	37	48
14:00	3	38	82	80	80	56	39	34	38	16	2	2	0	0	470	29	44
15:00	1	1	23	41	102	150	79	79	60	29	13	4	0	0	582	36	47
16:00	0	0	7	14	107	139	76	112	106	43	12	5	2	0	623	39	49
17:00	0	0	3	36	132	140	100	128	108	50	16	2	1	0	716	38	49
18:00	0	0	0	10	83	88	27	59	61	45	17	2	1	0	393	39	51
19:00	0	0	0	6	36	41	23	35	35	21	7	1	1	0	206	40	50
20:00	0	1	2	3	41	29	28	32	35	11	6	1	0	0	189	39	49
21:00	0	0	0	2	28	20	16	25	20	9	2	1	1	0	124	39	49
22:00	0	0	0	0	6	14	9	13	9	9	3	1	0	0	67	41	52
23:00	0	0	0	1	5	11	6	6	3	5	0	0	0	0	37	38	49
Total	13	141	331	583	1435	1409	747	951	840	388	128	37	10	0	7013		
Percent	0.2%	2.0%	4.7%	8.3%	20.5%	20.1%	10.7%	13.6%	12.0%	5.5%	1.8%	0.5%	0.1%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	08:00	09:00	09:00	10:00	10:00	10:00	09:00	11:00	10:00	08:00			
Vol.	6	55	118	167	123	115	58	64	61	30	12	7	2	596			
PM Peak	14:00	14:00	14:00	14:00	17:00	15:00	17:00	17:00	17:00	17:00	18:00	16:00	16:00	17:00			
Vol.	3	38	82	80	132	150	100	128	108	50	17	5	2	716			
Total	13	141	331	583	1435	1409	747	951	840	388	128	37	10	0	7013		
Percent	0.2%	2.0%	4.7%	8.3%	20.5%	20.1%	10.7%	13.6%	12.0%	5.5%	1.8%	0.5%	0.1%	0.0%			

Statistics		10 MPH Pace Speed :	26-35 MPH
Number in Pace :	2844	Number in Pace :	2844
Percent in Pace :	40.6%	Percent in Pace :	40.6%
Number of Vehicles > 35 MPH :	3101	Number of Vehicles > 35 MPH :	3101
Percent of Vehicles > 35 MPH :	44.2%	Percent of Vehicles > 35 MPH :	44.2%
Mean Speed(Average) :	35 MPH	Mean Speed(Average) :	35 MPH

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-002
 Station ID: Tues 11/15/16
 Invergordon Rd. btwn. Montessori
 Academy 33.525317,-111.943233
 Latitude: 0' 0.000 Undefined

Northbound	0	11	16	21	26	31	36	41	46	51	56	61	66	71	Total	Average (Mean)	85th Percent
Start Time	10	15	20	25	30	35	40	45	50	55	60	65	70	71	8	33	35
11/15/16	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	28	28
02:00	1	1	0	0	1	0	0	0	0	0	0	0	0	0	3	17	31
03:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	26	26
04:00	0	0	0	1	1	3	1	0	0	0	0	0	0	0	6	31	33
05:00	0	0	0	0	6	18	2	0	0	0	0	0	0	0	26	32	35
06:00	0	0	4	2	32	40	8	1	0	0	0	0	0	0	87	31	35
07:00	0	35	71	36	27	54	5	1	0	0	0	0	1	0	230	23	33
08:00	14	106	112	23	24	30	7	1	0	0	0	0	0	0	317	19	28
09:00	0	0	4	16	63	88	29	0	0	0	0	1	0	0	201	31	35
10:00	0	1	1	15	59	102	30	1	0	0	0	0	1	0	210	32	35
11:00	4	1	13	18	67	92	22	4	0	0	0	0	0	0	221	30	35
12 PM	1	2	4	11	57	122	25	2	0	0	0	0	0	0	224	31	35
13:00	0	0	3	13	58	117	28	1	0	0	0	0	0	0	220	32	35
14:00	11	42	54	21	34	58	14	0	0	0	0	0	0	0	234	23	34
15:00	4	22	48	30	94	118	31	1	1	0	1	0	1	0	351	28	35
16:00	2	5	26	25	84	187	47	3	0	0	0	1	0	0	380	31	35
17:00	0	4	31	23	119	183	50	1	0	1	0	0	0	0	412	30	35
18:00	1	0	1	1	34	112	48	4	0	0	0	0	0	0	201	33	38
19:00	0	0	0	1	26	64	23	1	0	0	0	0	0	0	115	33	37
20:00	0	1	5	2	29	58	11	1	0	0	0	0	0	0	107	31	35
21:00	0	0	1	0	16	39	8	2	0	0	0	0	0	0	66	32	35
22:00	0	0	0	2	12	21	6	0	0	0	0	0	0	0	41	32	35
23:00	0	0	0	0	7	7	3	0	0	0	0	0	0	0	17	32	35
Total	38	220	378	240	854	1521	399	24	1	1	1	2	3	0	3682		
Percent	1.0%	6.0%	10.3%	6.5%	23.2%	41.3%	10.8%	0.7%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%			
AM Peak	08:00	08:00	08:00	07:00	11:00	10:00	10:00	11:00				09:00	07:00		08:00		
Vol.	14	106	112	36	67	102	30	4				1	1		317		
PM Peak	14:00	14:00	14:00	15:00	17:00	16:00	17:00	18:00	15:00	17:00	15:00	16:00	15:00		17:00		
Vol.	11	42	54	30	119	187	50	4	1	1	1	1	1		412		
Total	38	220	378	240	854	1521	399	24	1	1	1	2	3	0	3682		
Percent	1.0%	6.0%	10.3%	6.5%	23.2%	41.3%	10.8%	0.7%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%			

Statistics

10 MPH Pace Speed : 26-35 MPH
 Number in Pace : 2375
 Percent in Pace : 64.5%
 Number of Vehicles > 35 MPH : 431
 Percent of Vehicles > 35 MPH : 11.7%
 Mean Speed(Average) : 29 MPH

15th Percentile : 19 MPH
 50th Percentile : 31 MPH
 85th Percentile : 35 MPH
 95th Percentile : 39 MPH

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-002
 Station ID: Tues 11/15/16
 Invergordon Rd. btwn. Montessori
 Academy 33.525317, -111.943233
 Latitude: 0 0.000 Undefined

Start Time	0	11	16	21	26	31	36	41	46	51	56	61	66	71	71	Total	Average (Mean)	85th Percent
11/15/16	10	15	20	25	30	35	40	45	50	55	60	65	70	71	71	6	35	45
01:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	36	36
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	36	36
03:00	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	36	37
04:00	0	0	0	0	0	1	7	2	1	0	0	0	0	0	0	11	39	41
05:00	0	0	0	0	2	7	17	10	1	0	0	0	0	0	0	37	38	43
06:00	0	0	1	7	7	30	46	25	8	0	0	0	0	0	0	124	37	43
07:00	1	41	57	12	25	27	31	21	5	2	0	1	0	0	0	223	27	40
08:00	0	45	73	27	17	37	19	13	2	0	0	0	1	0	0	234	24	35
09:00	0	0	2	3	27	68	103	34	9	1	0	0	0	0	0	247	36	41
10:00	0	0	0	4	21	63	75	20	3	0	0	0	0	0	0	186	36	40
11:00	1	0	1	4	35	79	84	20	3	0	0	0	0	0	0	227	35	40
12 PM	0	1	1	3	17	59	90	31	9	2	0	0	0	0	0	213	37	42
13:00	0	0	1	7	10	64	78	23	14	2	0	0	0	0	0	199	37	42
14:00	1	29	39	21	2	30	39	18	0	2	0	0	0	0	0	181	27	39
15:00	0	2	5	10	24	53	90	29	3	2	0	0	1	0	0	219	35	41
16:00	0	0	3	6	9	63	97	39	10	0	0	0	0	0	0	227	37	42
17:00	0	0	1	6	25	81	108	42	3	0	0	0	0	0	0	266	36	41
18:00	0	0	0	0	5	57	69	45	6	0	0	0	0	0	0	182	38	43
19:00	0	0	0	1	3	20	40	19	3	1	1	0	0	0	0	88	38	43
20:00	0	0	0	0	0	24	30	9	5	1	0	0	0	0	0	72	37	42
21:00	0	0	0	0	2	18	19	10	4	0	0	0	0	0	0	53	38	43
22:00	0	0	0	1	0	4	8	6	2	0	0	0	0	0	0	21	38	44
23:00	0	0	0	0	1	3	7	4	2	0	0	0	0	0	0	17	39	43
Total	3	119	184	112	235	790	1063	421	94	13	1	1	2	0	0	3038		
Percent	0.1%	3.9%	6.1%	3.7%	7.7%	26.0%	35.0%	13.9%	3.1%	0.4%	0.0%	0.0%	0.1%	0.0%	0.0%			
AM Peak	07:00	08:00	08:00	08:00	11:00	11:00	09:00	09:00	09:00	07:00	07:00	07:00	08:00	08:00	09:00			
Vol.	1	45	73	27	35	79	103	34	9	2	1	1	1	1	247			
PM Peak	14:00	14:00	14:00	14:00	17:00	17:00	17:00	18:00	13:00	12:00	19:00	15:00	15:00	17:00	17:00			
Vol.	1	29	39	21	25	81	108	45	14	2	1	1	1	2	266			
Total	3	119	184	112	235	790	1063	421	94	13	1	1	2	0	0	3038		
Percent	0.1%	3.9%	6.1%	3.7%	7.7%	26.0%	35.0%	13.9%	3.1%	0.4%	0.0%	0.0%	0.1%	0.0%	0.0%			

Statistics	10 MPH Pace Speed :	31-40 MPH
Number in Pace :	1853	
Percent in Pace :	61.0%	
Number of Vehicles > 35 MPH :	1595	
Percent of Vehicles > 35 MPH :	52.5%	
Mean Speed(Average) :	34 MPH	

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-002
 Station ID: Tues 11/15/16
 Invergordon Rd. btwn. Montessori
 Academy 33.525317,-111.943233
 Latitude: 0' 0.000 Undefined

Start Time	11	16	21	26	31	36	41	46	51	56	61	66	71	Average (Mean)	85th Percent
11/15/16	0	11	16	21	26	31	36	41	46	51	56	61	71	Total	Percent
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	14	34
09:00	0	0	0	0	4	1	0	0	0	0	0	0	0	5	29
10:00	1	1	0	0	1	1	0	0	0	0	0	0	0	4	23
11:00	0	0	0	0	1	2	0	0	0	0	0	0	0	4	34
12:00	0	0	0	1	4	8	2	1	0	0	0	0	0	17	36
13:00	0	0	0	8	25	19	10	1	0	0	0	0	0	63	36
14:00	0	0	5	39	70	54	26	8	0	0	0	0	0	211	34
15:00	1	76	128	48	52	81	22	5	2	0	1	1	0	453	25
16:00	14	151	185	50	41	67	14	2	0	0	1	1	0	551	21
17:00	0	0	6	19	90	156	34	9	1	0	1	0	0	448	34
18:00	0	1	1	19	80	165	105	21	3	0	0	1	0	396	33
19:00	5	1	14	22	102	171	106	24	3	0	0	0	0	448	32
20:00	1	3	5	14	74	181	115	33	9	2	0	0	0	437	34
21:00	0	4	4	20	68	181	106	24	2	0	0	0	0	419	34
22:00	12	71	93	42	36	88	18	0	2	0	0	0	0	415	25
23:00	4	24	53	40	118	171	121	30	4	2	1	0	0	570	31
Total	2	5	29	31	93	250	144	42	10	0	1	0	0	607	33
Percent	0	4	32	29	144	264	43	3	1	0	0	0	0	678	33
AM Peak	1	0	1	1	39	169	117	49	6	0	0	0	0	383	35
PM Peak	0	0	0	2	29	84	20	3	1	1	0	0	0	203	35
Vol.	0	1	5	2	32	82	41	5	1	0	0	0	0	179	34
Total	0	0	1	0	18	57	27	12	4	0	0	0	0	119	35
Percent	0	0	0	3	12	25	14	6	2	0	0	0	0	62	34
AM Peak	0	0	0	0	8	10	4	2	0	0	0	0	0	34	35
PM Peak	41	339	562	352	1089	2311	1462	445	95	14	2	3	5	6720	41
Vol.	0.6%	5.0%	8.4%	5.2%	16.2%	34.4%	21.8%	6.6%	1.4%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%
Total	0.6%	5.0%	8.4%	5.2%	16.2%	34.4%	21.8%	6.6%	1.4%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%
Percent	0.6%	5.0%	8.4%	5.2%	16.2%	34.4%	21.8%	6.6%	1.4%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%

Statistics

10 MPH Pace Speed : 31-40 MPH
 Number in Pace : 3773
 Percent in Pace : 56.1%
 Number of Vehicles > 35 MPH : 2026
 Percent of Vehicles > 35 MPH : 30.1%
 Mean Speed(Average) : 31 MPH

15th Percentile : 21 MPH
 50th Percentile : 33 MPH
 85th Percentile : 39 MPH
 95th Percentile : 43 MPH

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-003
 Station ID: Tues 11/15/16
 Invergordon Rd. south of Montessori
 Academy (n/o McDonald) 33.5249,-111.9432
 Latitude: 0' 0.000 Undefined

Southbound	0	11	16	21	26	31	36	41	46	51	56	61	66	71	Average	85th	
Start Time	10	15	20	25	30	35	40	45	50	55	60	65	70	71	(Mean)	Percent	
11/15/16	0	0	0	1	0	2	2	1	0	0	0	0	0	0	6	34	37
01:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31	31
02:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31	31
03:00	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	32	33
04:00	0	0	0	0	1	4	5	1	0	0	0	0	0	0	11	36	39
05:00	0	0	0	0	3	18	15	1	0	0	0	0	0	0	37	35	39
06:00	0	0	0	6	28	49	36	5	0	0	0	0	0	0	124	33	38
07:00	1	37	57	28	31	40	22	7	0	1	0	1	0	0	225	25	35
08:00	14	58	62	36	29	43	11	2	0	0	0	0	0	0	255	22	32
09:00	0	1	0	3	61	118	60	5	1	0	0	0	0	0	249	33	38
10:00	0	2	0	10	42	97	38	2	1	0	0	0	0	0	192	32	37
11:00	0	7	1	8	72	102	34	2	1	1	0	0	0	0	228	31	36
12 PM	0	1	1	3	43	94	60	10	0	0	0	0	0	0	212	34	39
13:00	1	2	1	6	51	92	37	15	1	0	0	0	0	0	206	33	38
14:00	3	27	54	21	14	55	22	5	0	0	0	1	0	0	202	25	35
15:00	5	4	7	19	43	112	43	3	2	1	0	0	0	0	239	31	37
16:00	2	2	3	5	40	120	57	6	0	1	0	0	0	0	236	33	38
17:00	1	2	3	11	74	121	50	3	0	0	0	0	0	0	265	32	37
18:00	0	0	0	0	31	83	61	6	0	0	0	0	1	0	182	34	39
19:00	0	1	0	1	14	41	25	5	2	0	0	0	0	0	89	34	39
20:00	1	2	1	1	16	32	20	3	1	0	1	0	0	0	78	33	39
21:00	0	0	0	1	11	23	14	4	0	0	0	0	0	0	53	34	39
22:00	0	0	0	1	2	10	5	3	0	0	0	0	0	0	21	35	40
23:00	0	0	0	0	4	5	5	3	0	0	0	0	0	0	17	35	40
Total	28	146	190	161	610	1266	622	92	9	4	1	2	1	0	3132		
Percent	0.9%	4.7%	6.1%	5.1%	19.5%	40.4%	19.9%	2.9%	0.3%	0.1%	0.0%	0.1%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	09:00	09:00	09:00	07:00	09:00	07:00	07:00	07:00	07:00	08:00			
Vol.	14	58	62	36	72	118	60	7	1	1	1	1	1	255			
PM Peak	15:00	14:00	14:00	14:00	17:00	17:00	18:00	13:00	15:00	15:00	20:00	14:00	18:00	17:00			
Vol.	5	27	54	21	74	121	61	15	2	1	1	1	1	265			
Total	28	146	190	161	610	1266	622	92	9	4	1	2	1	0	3132		
Percent	0.9%	4.7%	6.1%	5.1%	19.5%	40.4%	19.9%	2.9%	0.3%	0.1%	0.0%	0.1%	0.0%	0.0%			

Statistics	10 MPH Pace Speed :	31-40 MPH
Number in Pace :	1888	
Percent in Pace :	60.3%	
Number of Vehicles > 35 MPH :	731	
Percent of Vehicles > 35 MPH :	23.3%	
Mean Speed(Average) :	31 MPH	

Field Data Services of Arizona

21636 N. Dietz Dr.
 Maricopa, AZ 85138
 520.316.6745

Site Code: 16-1425-003
 Station ID: Tues 11/15/16
 Invergordon Rd. south of Montessori
 Academy (n/o McDonald) 33.5249,-111.9432
 Latitude: 0' 0.000 Undefined

Northbound_Southbound	0	11	16	21	26	31	36	41	46	51	56	61	66	71	Average (Mean)	85th Percent	
Start Time	10	15	20	25	30	35	40	45	50	55	60	65	70	71	Total	Percent	
11/15/16	0	0	0	1	0	6	6	1	0	0	0	0	0	0	14	35	39
01:00	0	0	0	0	3	2	0	0	0	0	0	0	0	0	5	29	31
02:00	0	0	1	0	0	2	0	0	0	0	0	0	0	0	3	26	32
03:00	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	32	33
04:00	0	0	0	1	1	8	5	2	0	0	0	0	0	0	17	35	39
05:00	0	0	0	0	9	32	22	1	0	0	0	0	0	0	64	34	38
06:00	0	0	0	6	60	83	56	6	0	1	0	0	0	0	212	33	38
07:00	2	72	110	66	57	95	49	10	0	1	0	1	0	0	463	25	35
08:00	20	142	166	93	55	78	20	4	0	0	0	0	0	0	578	21	31
09:00	0	1	0	13	106	224	100	15	1	0	0	0	0	0	460	33	38
10:00	0	2	0	17	94	195	95	12	2	0	0	0	0	0	417	33	38
11:00	1	7	2	20	123	209	82	10	4	1	0	0	0	0	459	32	37
12 PM	0	2	2	14	78	208	122	17	1	0	0	0	0	0	444	33	38
13:00	1	2	1	18	89	203	109	21	2	0	0	0	0	0	446	33	38
14:00	5	72	108	60	46	113	61	9	0	1	0	1	0	0	476	25	36
15:00	5	13	12	46	120	235	116	10	3	1	0	1	0	0	562	31	37
16:00	5	2	4	14	104	305	160	22	1	1	0	0	0	0	618	33	38
17:00	1	2	5	20	156	329	162	20	0	0	0	0	0	0	695	33	38
18:00	0	0	0	4	50	182	138	20	2	0	0	0	1	0	397	35	39
19:00	0	1	0	2	26	103	66	10	2	0	0	0	0	0	210	34	39
20:00	1	2	1	2	35	83	53	5	2	0	1	0	0	0	185	33	38
21:00	0	0	0	1	18	63	35	8	0	0	0	0	0	0	125	34	39
22:00	0	0	0	3	7	31	21	4	0	0	0	0	0	0	66	34	39
23:00	0	0	0	0	7	14	10	4	0	0	0	0	0	0	35	35	40
Total	41	320	412	401	1244	2807	1488	211	20	6	1	3	1	0	6955		
Percent	0.6%	4.6%	5.9%	5.8%	17.9%	40.4%	21.4%	3.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	09:00	09:00	09:00	09:00	11:00	06:00	07:00	07:00	07:00	07:00	08:00		
Vol.	20	142	166	93	123	224	100	15	4	1	1	1	1	1	578		
PM Peak	14:00	14:00	14:00	14:00	17:00	17:00	17:00	16:00	15:00	14:00	20:00	14:00	18:00	18:00	17:00		
Vol.	5	72	108	60	156	329	162	22	3	1	1	1	1	1	695		
Total	41	320	412	401	1244	2807	1488	211	20	6	1	3	1	0	6955		
Percent	0.6%	4.6%	5.9%	5.8%	17.9%	40.4%	21.4%	3.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%			

Statistics

10 MPH Pace Speed : 31-40 MPH
 Number in Pace : 4295
 Percent in Pace : 61.8%
 Number of Vehicles > 35 MPH : 1730
 Percent of Vehicles > 35 MPH : 24.9%
 Mean Speed(Average) : 31 MPH

15th Percentile : 24 MPH
 50th Percentile : 32 MPH
 85th Percentile : 38 MPH
 95th Percentile : 40 MPH

ATTACHMENT B
EXISTING PEDESTRIAN COUNTS





FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

Pedestrian & Bicycle Study

N-S STREET: Invergordon Rd.

Date: 11/15/16

City: Paradise Valley

E-W STREET: Montessori South Dwy

Day: TUESDAY

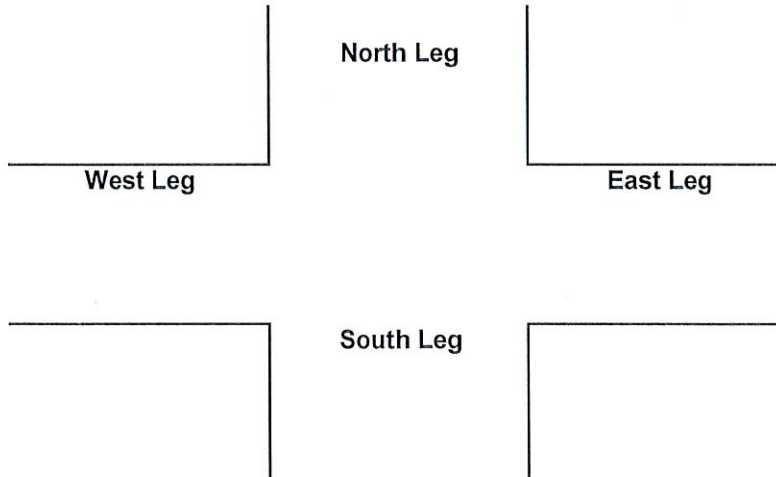
Project #: 16-1425-002

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
7:45 AM	0	0	0	1
8:00 AM	0	0	0	2
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
TOTAL	0	0	0	3

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	1
8:30 AM	0	0	0	0
TOTAL	0	0	0	1

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
2:45 PM	0	0	0	1
3:00 PM	2	0	0	0
3:15 PM	0	0	0	0
3:30 PM	0	0	0	0
TOTAL	2	0	0	1

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
2:45 PM	0	0	0	0
3:00 PM	0	0	0	0
3:15 PM	0	0	0	0
3:30 PM	0	0	0	0
TOTAL	0	0	0	0





FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



Pedestrian & Bicycle Study

N-S STREET: Invergordon Rd.

Date: 11/15/16

City: Paradise Valley

E-W STREET: Montessori North Dwy.

Day: TUESDAY

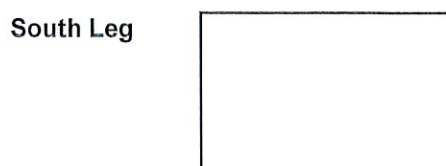
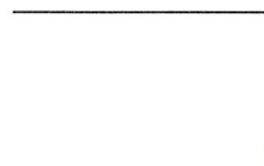
Project #: 16-1425-001

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
7:45 AM	0	0	0	2
8:00 AM	0	0	0	2
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
TOTAL	0	0	0	4

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	1
8:30 AM	0	0	0	0
TOTAL	0	0	0	1

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
2:45 PM	0	0	0	1
3:00 PM	0	0	0	0
3:15 PM	0	0	0	0
3:30 PM	0	0	0	0
TOTAL	0	0	0	1

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
2:45 PM	0	0	0	0
3:00 PM	0	0	0	0
3:15 PM	0	0	0	0
3:30 PM	0	0	0	0
TOTAL	0	0	0	0



ATTACHMENT C
PERTINENT EXCERPTS FROM ARIZONA REVISED STATUTES

ARS TITLE PAGE	NEXT DOCUMENT	PREVIOUS DOCUMENT
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28-703. Alteration of speed limits by local authority

A. If a local authority determines on the basis of an engineering and traffic investigation that the maximum speed permitted under this article is greater or less than is reasonable or safe under the conditions found to exist on any part of a street or highway in its jurisdiction, the local authority may determine and declare a reasonable and safe maximum speed limit at the location and, based on the investigation, may:

1. Decrease the limit at intersections.
2. Increase the limit within any business or residence district to not more than sixty-five miles per hour.
3. Decrease the limit outside any business or residence district.
4. Increase or decrease the limit on streets that are adjacent to or otherwise surrounding school grounds or public parks.

B. A local authority shall determine by an engineering and traffic investigation the proper maximum speed for all arterial streets in its jurisdiction and shall declare a reasonable and safe maximum limit on the arterial streets in its jurisdiction that may be more or less than the maximum speed permitted under this article for a business or residence district.

C. A local authority may decrease the limit to not less than fifteen miles per hour on an unpaved street or road within any district in its jurisdiction if the local authority determines that the limit is necessary to achieve or maintain national ambient air quality standards.

D. An altered limit established as provided for in this section is effective at all times, or during hours of darkness, or at other times as may be determined if appropriate signs giving notice of the altered limit are erected on the street or highway.

E. The alteration of maximum speed limits on state highways or extensions of state highways in a municipality by a local authority is not effective until the director approves the alteration.

F. A local authority shall not make more than six alterations per mile along a street or highway pursuant to this section, except for reduced limits at intersections. The difference between adjacent limits shall not be more than ten miles per hour except for school crossings.