SWEETWATER ENGINEERING

June 21, 2017

County of San Diego
Department of Planning & Development Services
5510 Overland Avenue, Suite 210
San Diego, CA 92123

Subject: Sight Distance Certification
Project: Nordahl Tentative Map (PDS2015-TM-5602)

Physically, there is a minimum of 641 feet of unobstructed intersectional sight distance in the northerly direction along Nordahl Road from the proposed private road's exit (see the attached Sight Distance Exhibit and Photos). The sight distance exceeds the required Corner Sight Distance requirement of 550 feet based on the road classification design speed of 55 mph per the County Mobility Element as described in Section 6.1.E (Table 5) of the March 2012 County of San Diego Public Road Standards. Therefore, there is adequate sight distances available in the northerly direction. Additionally, the line of sight falls within the existing right-of-way and a clear-space easement is not necessary.

Physically, there is a minimum of 284 feet of unobstructed intersectional sight distance in the southerly direction along Nordahl Road from the proposed private road's exit (see the attached Sight Distance Exhibit and Photos). The existing intersectional sight distance does not meet the required Corner Sight Distance of 550 feet based on the road classification design speed of 55 mph per the County Mobility Element as described in Section 6.1.E (Table 5) of the March 2012 County of San Diego Public Road Standards. However, the Stopping Sight Distance based on a prevailing speed (85th percentile speed) of 32.5 miles-per-hour is 220 feet (see the attached Speed Survey Data and the attached Stopping Sight Distance – AASHTO Calculations on the following pages). Therefore, there is adequate Stopping Sight Distance available in the southerly direction. The line of sight falls within the existing right-of-way and a clear-space easement is not necessary. A *Request for a Design Exception to a Road Standard and/or Modification to Project Conditions* has been submitted for review/approval (copy attached on the following pages) requesting to allow the use of the prevailing 32.5 miles-per-hour speed (85th percentile speed) to calculate the Stopping Sight Distance in place of using the corner sight distance requirement, due to the existing condition of Nordahl Road.

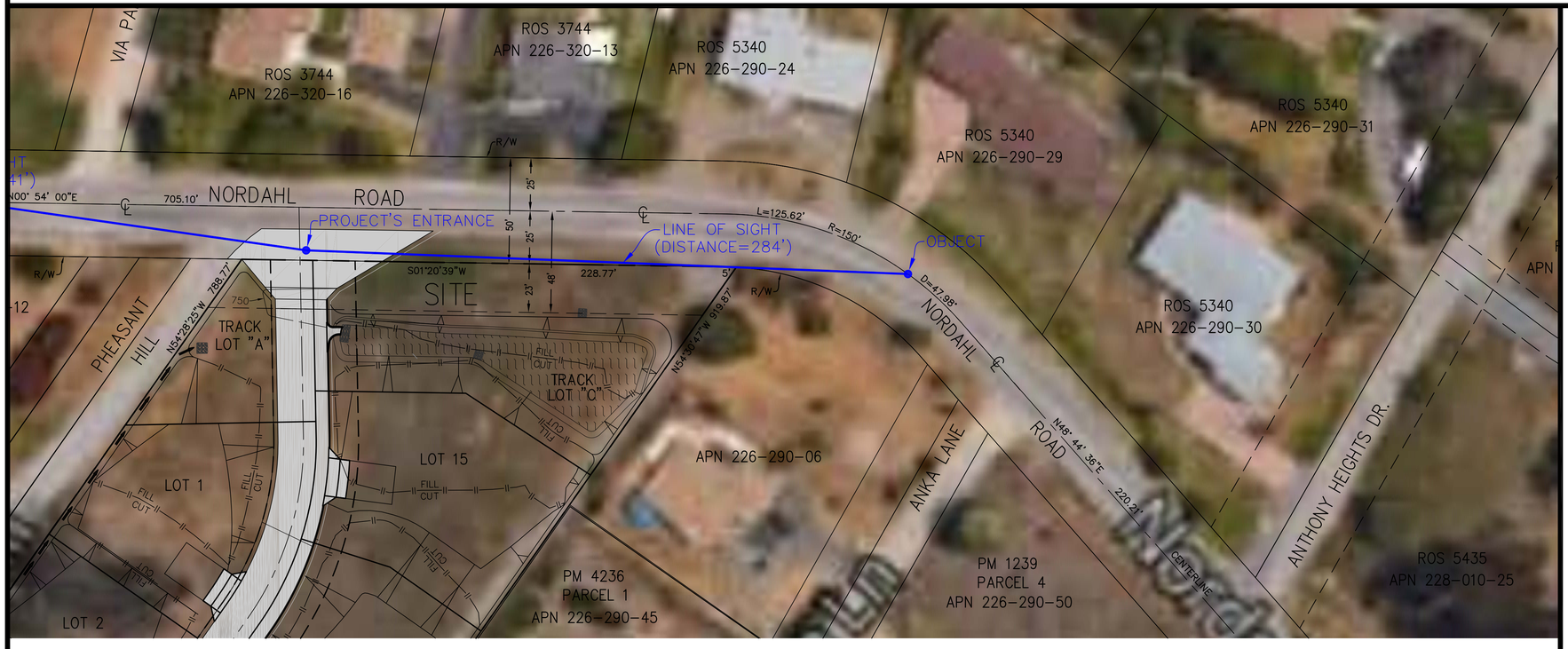
I have exercised responsible charge for the certification as defined in Section 6703 of the Professional Engineers Act of the California Business and Professions Code.

Sincerely,

Lee C. Whittington, RCE 82332

REGISTERED PROFESSIONAL ENGINEER
LEE C. WHITTINGTON
No. C 82332
STATE OF CALIFORNIA

NORDAHL ROAD - LOOKING IN THE NORTHERLY DIRECTION FROM PRIVATE ROAD'S ENTRANCE/EXIT



NORDAHL ROAD - LOOKING IN THE SOUTHERLY DIRECTION FROM PRIVATE ROAD'S ENTRANCE/EXIT

30' 15' 0 30' 60' 90'

SCALE: 1"= 30'

SIGHT DISTANCE EXHIBIT

REC. ID.: PDS2015-TM-5602

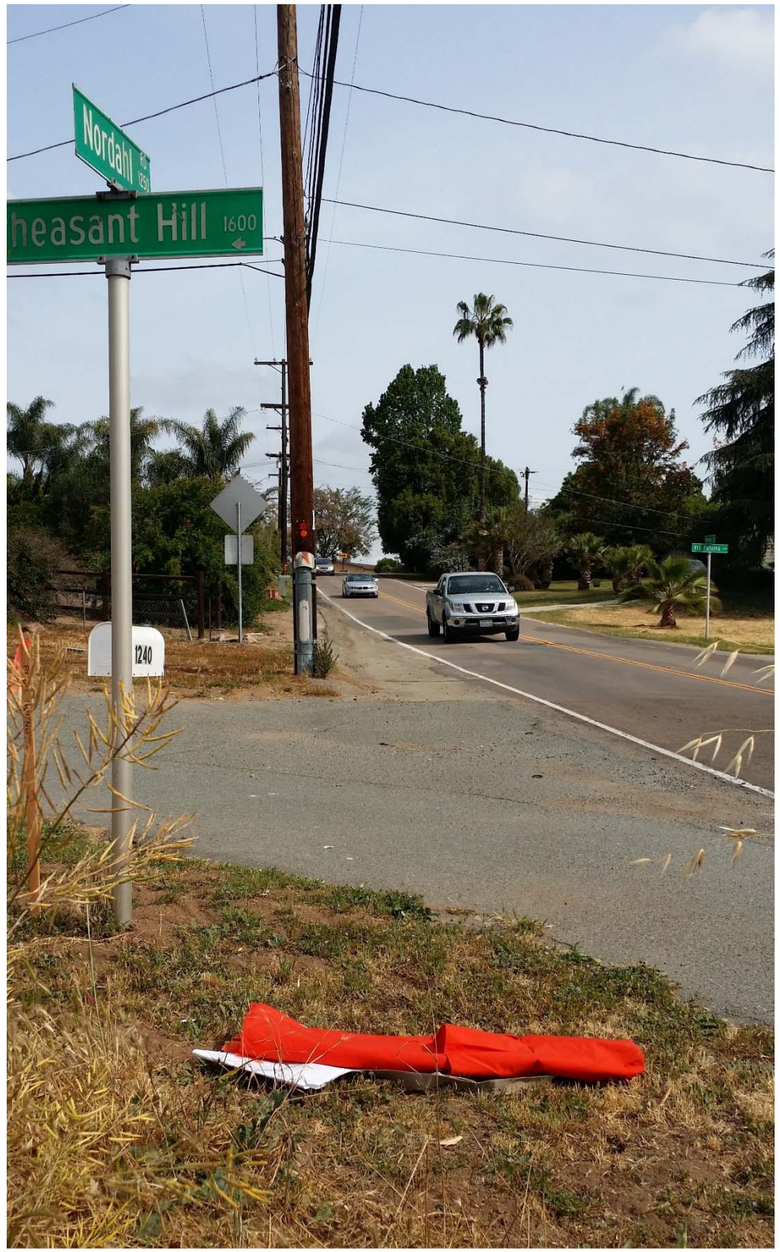
ENV. NO.: PDS2015-ER-15-08-008

SWEETWATER ENGINEERING
Civil Engineering, Land Development Services
8070 Rancho Fanita, Santee, CA 92071
Lee (619) 381-7080, Jose (619) 368-7605

ENGINEER'S NAME: SWEETWATER ENGINEERING
PHONE NUMBER: 619-381-7080, 619-368-7605

DATE: 12-28-16 (ORIGINAL)

PICTURE 1: LOOKING SOUTH TO THE PROJECT ENTRANCE



PICTURE 2: LOOKING NORTH FROM PROJECT ENTRANCE

PICTURE 3: LOOKING SOUTH FROM PROJECT ENTRANCE

PICTURE 4: LOOKING NORTH TO THE PROJECT ENTRANCE

Stopping Sight Distance - AASHTO
Nordahl Tentative Map (PDS2015-TM-5602)
Northbound Direction

Stopping Sight Distance (SSD) Calculations:

$$SSD = DR + DB$$

Where:

DR = Reaction Distance
DB = Braking Distance

Reaction Distance (DR) Calculations:

$$DR = 1.47\ VT$$

Where:

V = 32.5 mph (See Speed Survey on the following pages)
T = 2.5 sec.

Then:

$$DR = 1.47\ (32.5\ mph)(2.5\ sec.)$$
$$DR = 119\ feet$$

Braking Distance (DB) Calculations:

$$DB = V^2 / \{ 30\ [(a / 32.2) + G] \}$$

Where:

V = 32.5 mph (See Speed Survey on the following pages)
a = 11.2 fps
G = 2 %

Then:

$$DB = (32.5\ mph)^2 / \{ 30\ [(11.2 / 32.2) + 0.02] \}$$
$$DB = 101\ feet$$

Stopping Sight Distance (SSD) Calculations:

$$SSD = DR + DB$$
$$= 119 + 101$$
$$= 220\ feet$$

The required Stopping Sight Distance in the Northbound Direction is 220 feet.

Stopping Sight Distance - AASHTO
Nordahl Tentative Map (PDS2015-TM-5602)
Southbound Direction

Stopping Sight Distance (SSD) Calculations:

$$SSD = DR + DB$$

Where:

DR = Reaction Distance
DB = Braking Distance

Reaction Distance (DR) Calculations:

$$DR = 1.47\ VT$$

Where:

V = 38.5 mph (See Speed Survey on the following pages)
T = 2.5 sec.

Then:

$$DR = 1.47\ (38.5\ mph)(2.5\ sec.)$$
$$DR = 141\ feet$$

Braking Distance (DB) Calculations:

$$DB = V^2 / \{ 30\ [(a / 32.2) + G] \}$$

Where:

V = 38.5 mph (See Speed Survey on the following pages)
a = 11.2 fps
G = 2 %

Then:

$$DB = (32.5\ mph)^2 / \{ 30\ [(11.2 / 32.2) + 0.02] \}$$
$$DB = 142\ feet$$

Stopping Sight Distance (SSD) Calculations:

$$SSD = DR + DB$$
$$= 141 + 142$$
$$= 283\ feet$$

The required Stopping Sight Distance in the Northbound Direction is 283 feet.

Traffic Survey
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road

DIRECTION(S):	SOUTHBOUND		
DATA COLLECTED ON:	6/4/2015		
BEGINNING AT:	3:50		
POSTED SPEED LIMIT:	25 MPH		
REPORT DATE:	6/5/2015		
50TH PERCENTILE SPEED:	34.5	MPH	(See below for calculations)
85TH PERCENTILE SPEED:	38.5	MPH	(See below for calculations)
10-MPH PACE SPEED:	31 THROUGH 40		
PERCENT IN PACE SPEED:	86.3	%	
PERCENT OVER PACE SPEED:	7.3	%	
PERCENT UNDER PACE SPEED:	6.4	%	
RANGE OF SPEEDS:	24 TO 50	MPH	
SPEEDS OBSERVED:	342	VEHICLES	(See next page for vehicle counts)
AVERAGE SPEED:	35.9	MPH	

Calculations:

85th Percetile:

Step 1:	342 x 85% =	0	vehicles	
Step 2:	290.7 + 0.5 =	0.5	vehicles	
Step 3:	291.2 is between 268 and 300			
Step 4:	x =	38	mph	(for 268 vehicles)
	xx =	39	mph	(for 300 vehicles)

Step 5:

85th percentile = (1-d)x + dxx
85th percentile = (1 - 0.5) 38 + (0.5) 39
85th percentile = 38.5 mph

50th Percetile:

Step 1:	342 x 50% =	171	vehicles	
Step 2:	145.6 + 0.5 =	171.5	vehicles	
Step 3:	146.1 is between 109 and 151			
Step 4:	x =	34	mph	(for 109 vehicles)
	xx =	35	mph	(for 151 vehicles)

Step 5:

50th percentile = (1-d)x + dxx
50th percentile = (1 - 0.5) 38 + (0.5) x 39
50th percentile = 34.5 mph

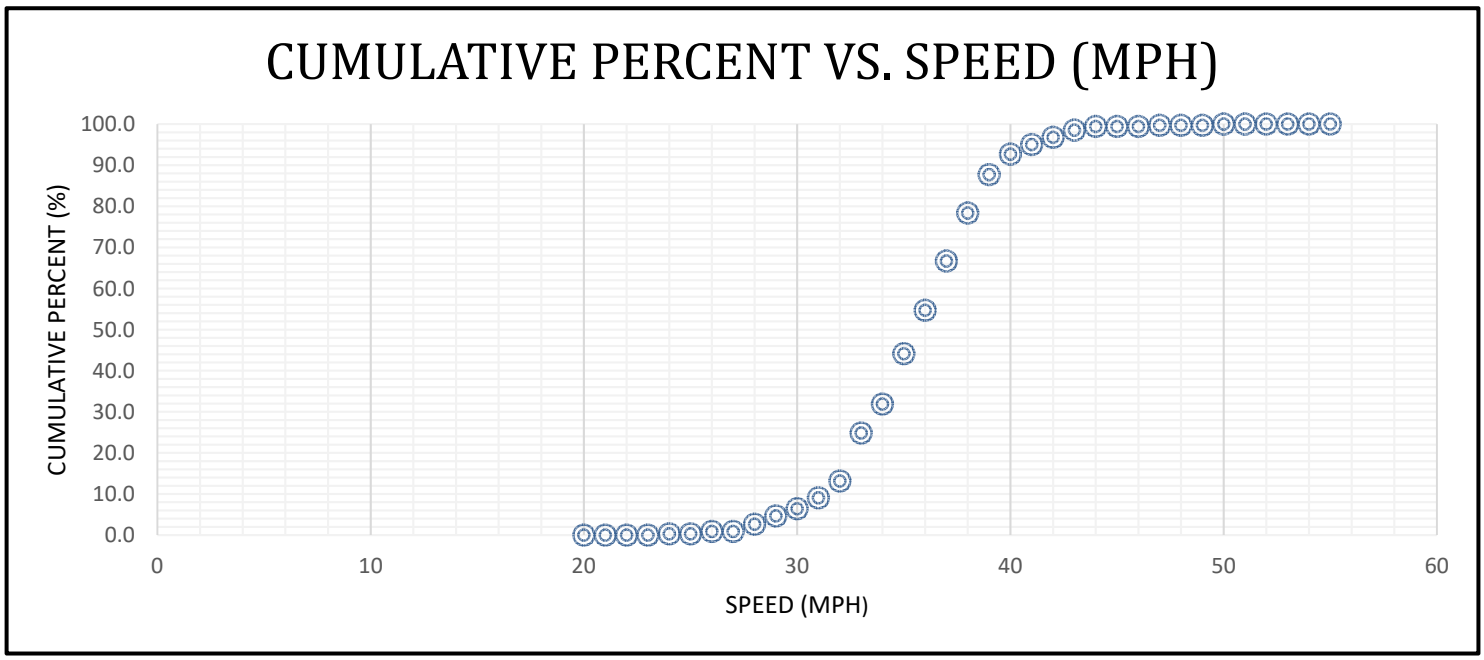
Traffic Survey
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road

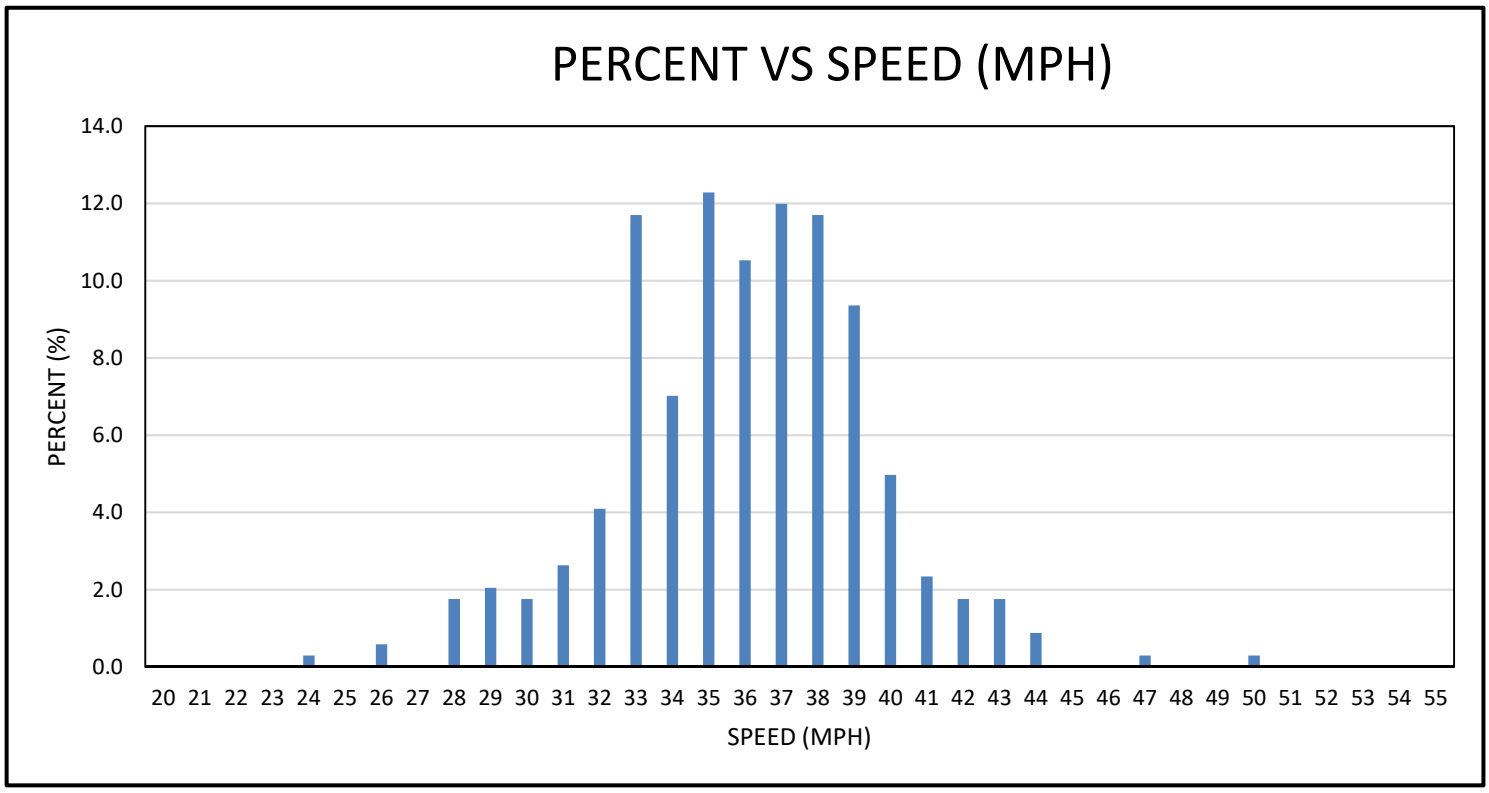
DIRECTION(S)…….. SOUTHBOUND

SPEED (MPH)	NUMBER OF VEHICLES	COMULATIVE NUMBER	PERCENTAGE (%)	COM PCT. (%)	AVG. SPEED (MPH)	10-MPH PACE SPEED	
20	0	0	0.0	0.0	0	20-29	16
21	0	0	0.0	0.0	0	21-30	22
22	0	0	0.0	0.0	0	22-31	31
23	0	0	0.0	0.0	24	23-32	45
24	1	1	0.3	0.3	0	24-33	85
25	0	1	0.0	0.3	52	25-34	108
26	2	3	0.6	0.9	0	26-35	150
27	0	3	0.0	0.9	168	27-36	184
28	6	9	1.8	2.6	203	28-37	225
29	7	16	2.0	4.7	180	29-38	259
30	6	22	1.8	6.4	279	30-39	284
31	9	31	2.6	9.1	448	31-40	295
32	14	45	4.1	13.2	1320	32-41	294
33	40	85	11.7	24.9	816	33-42	286
34	24	109	7.0	31.9	1470	34-43	252
35	42	151	12.3	44.2	1296	35-44	231
36	36	187	10.5	54.7	1517	36-45	189
37	41	228	12.0	66.7	1520	37-46	153
38	40	268	11.7	78.4	1248	38-47	113
39	32	300	9.4	87.7	680	39-48	73
40	17	317	5.0	92.7	328	40-49	41
41	8	325	2.3	95.0	252	41-50	25
42	6	331	1.8	96.8	258		
43	6	337	1.8	98.5	132		
44	3	340	0.9	99.4	0		
45	0	340	0.0	99.4	0		
46	0	340	0.0	99.4	47		
47	1	341	0.3	99.7	0		
48	0	341	0.0	99.7	0		
49	0	341	0.0	99.7	50		
50	1	342	0.3	100.0	0		
51	0	342	0.0	100.0	0		
52	0	342	0.0	100.0	0		
53	0	342	0.0	100.0	0		
54	0	342	0.0	100.0	0		
55	0	342	0.0	100.0	0		

Traffic Survey
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road

DIRECTION: SOUTHBOUND





Traffic Studies
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road (Nordahl Tentative Map)

DIRECTION(S):	NORTHBOUND		
DATA COLLECTED ON:	6/4/2015		
BEGINNING AT:	3:50		
POSTED SPEED LIMIT:	25 MPH		
REPORT DATE:	6/5/2015		
50TH PERCENTILE SPEED:	29.5	MPH	(See below for calculations)
85TH PERCENTILE SPEED:	32.5	MPH	(See below for calculations)
10-MPH PACE SPEED:	26 THROUGH 35		
PERCENT IN PACE SPEED:	88	%	
PERCENT OVER PACE SPEED:	6	%	
PERCENT UNDER PACE SPEED:	6	%	
RANGE OF SPEEDS:	22 TO 58	MPH	
SPEEDS OBSERVED:	422	VEHICLES	(See next page for vehicle counts)
AVERAGE SPEED:	30.1	MPH	

Calculations:

85th Percetile:

Step 1:	422 x 85% =	358.7	vehicles	
Step 2:	358.7 + 0.5 =	359.2	vehicles	
Step 3:	359.2 is between 336 and 364			
Step 4:	x =	32	mph	(for 336 vehicles)
	xx =	33	mph	(for 364 vehicles)

Step 5:

85th percentile = (1-d)x + dxx
85th percentile = (1 - 0.5) 32 + (0.5) x 33
85th percentile = 32.5 mph

50th Percetile:

Step 1:	422 x 50% =	211	vehicles	
Step 2:	211 + 0.5 =	211.5	vehicles	
Step 3:	211.5 is between 189 and 239			
Step 4:	x =	29	mph	(for 189 vehicles)
	xx =	30	mph	(for 239 vehicles)

Step 5:

50th percentile = (1-d)x + dxx
50th percentile = (1 - 0.5) 29 + (0.5) x 30
50th percentile = 29.5 mph

Traffic Studies
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road (Nordahl Tentative Map)

DIRECTION(S)…….. NORTHBOUND

SPEED (MPH)	NUMBER OF VEHICLES	COMULATIVE NUMBER	PERCENTAGE (%)	COM PCT. (%)	AVG. SPEED (MPH)
<20	0	0	0.0	0.0	0
21	0	0	0.0	0.0	0
22	1	1	0.2	0.2	22
23	2	3	0.5	0.7	46
24	11	14	2.6	3.3	264
25	10	24	2.4	5.7	250
26	33	57	7.8	13.5	858
27	36	93	8.5	22.0	972
28	43	136	10.2	32.2	1204
29	53	189	12.6	44.8	1537
30	50	239	11.8	56.6	1500
31	46	285	10.9	67.5	1426
32	51	336	12.1	79.6	1632
33	28	364	6.6	86.3	924
34	23	387	5.5	91.7	782
35	10	397	2.4	94.1	350
36	11	408	2.6	96.7	396
37	5	413	1.2	97.9	185
38	2	415	0.5	98.3	76
39	3	418	0.7	99.1	117
40	3	421	0.7	99.8	120
41	0	421	0.0	99.8	0
42	0	421	0.0	99.8	0
43	0	421	0.0	99.8	0
44	0	421	0.0	99.8	0
45	0	421	0.0	99.8	0
46	0	421	0.0	99.8	0
47	0	421	0.0	99.8	0
48	0	421	0.0	99.8	0
49	0	421	0.0	99.8	0
50	0	421	0.0	99.8	0
51	0	421	0.0	99.8	0
52	0	421	0.0	99.8	0
53	0	421	0.0	99.8	0
54	0	421	0.0	99.8	0
55	0	421	0.0	99.8	0
56	0	421	0.0	99.8	0
57	0	421	0.0	99.8	0
58	1	422	0.2	100.0	58

10-MPH PACE SPEED	
20-29	189
21-30	239
22-31	285
23-32	335
24-33	361
25-34	373
26-35	373
27-36	351
28-37	320
29-38	279
30-39	229
31-40	182
32-41	136
33-42	85
34-43	57
35-44	34
36-45	24
37-46	13
38-47	8
39-48	6
40-49	3
41-50	0
42-51	0
43-52	0
44-53	0
45-54	0
46-55	0
47-56	0
48-57	0
49-58	1

Traffic Studies
Nordahl Tentative Map (PDS2015-TM-5602)
Intersection of Nordahl Road and Private Road (Nordahl Tentative Map)

DIRECTION: NORTHBOUND