



LSC TRANSPORTATION CONSULTANTS, INC.
545 East Pikes Peak Avenue, Suite 210
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Gardens at North Carefree
Noise Impact Study
PUD-18-004
(LSC #174311)
October 15, 2018

Traffic Engineer's Statement

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

Mule Peak Investments LLC

by *Heath A Herber*
Manager

10/16/2018
Date



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October 15, 2018

Mr. Heath Herber
Mule Deer Investments
2727 Glen Arbor Drive
Colorado Springs, CO 80920

RE: Gardens at North Carefree
PUD-18-004
Noise Impact Study
El Paso County, Colorado
LSC #174311

Dear Mr. Herber:

In response to your request, LSC Transportation Consultants, Inc. has completed a detailed analysis of the noise impacts of North Carefree Circle on the proposed Gardens at North Carefree residential development. The site is located south and east of the intersection of North Carefree Circle and Akers Drive in Colorado Springs, Colorado. LSC has completed an evaluation of the noise exposure for submittal to El Paso County in accordance with the Federal Highway Administration (FHWA) requirements.

LSC used the software program Traffic Noise Model Version 2.5—developed by FHWA—to predict the noise levels at 14 locations in the development. The locations are shown in Figure 1. A receiver was placed on each of the lots that are adjacent to North Carefree Circle at a location where the midpoint of the lot meets the toe of the slope towards North Carefree Circle. An additional receiver was then placed ten feet south of the first receiver. Two additional receivers were placed on the west end of the western most lot (Lot 5). An elevation of five feet was assumed for the receivers. A skew cross section of each receiver pair has been attached.

The input data for the noise predictions included traffic volumes, roadway geometry, topographic elevations, and the locations of the receivers. The analysis was completed using the projected 2040 afternoon peak-hour traffic volumes from the *Gardens at North Carefree Traffic Impact Analysis* by LSC dated August 9, 2018.

The results of the noise prediction show that in the year 2040, all locations have predicted noise levels that would not exceed 67 decibels Leq. The noise analysis inputs and outputs are attached.

* * * * *

Please contact me if you have any questions or need further assistance.

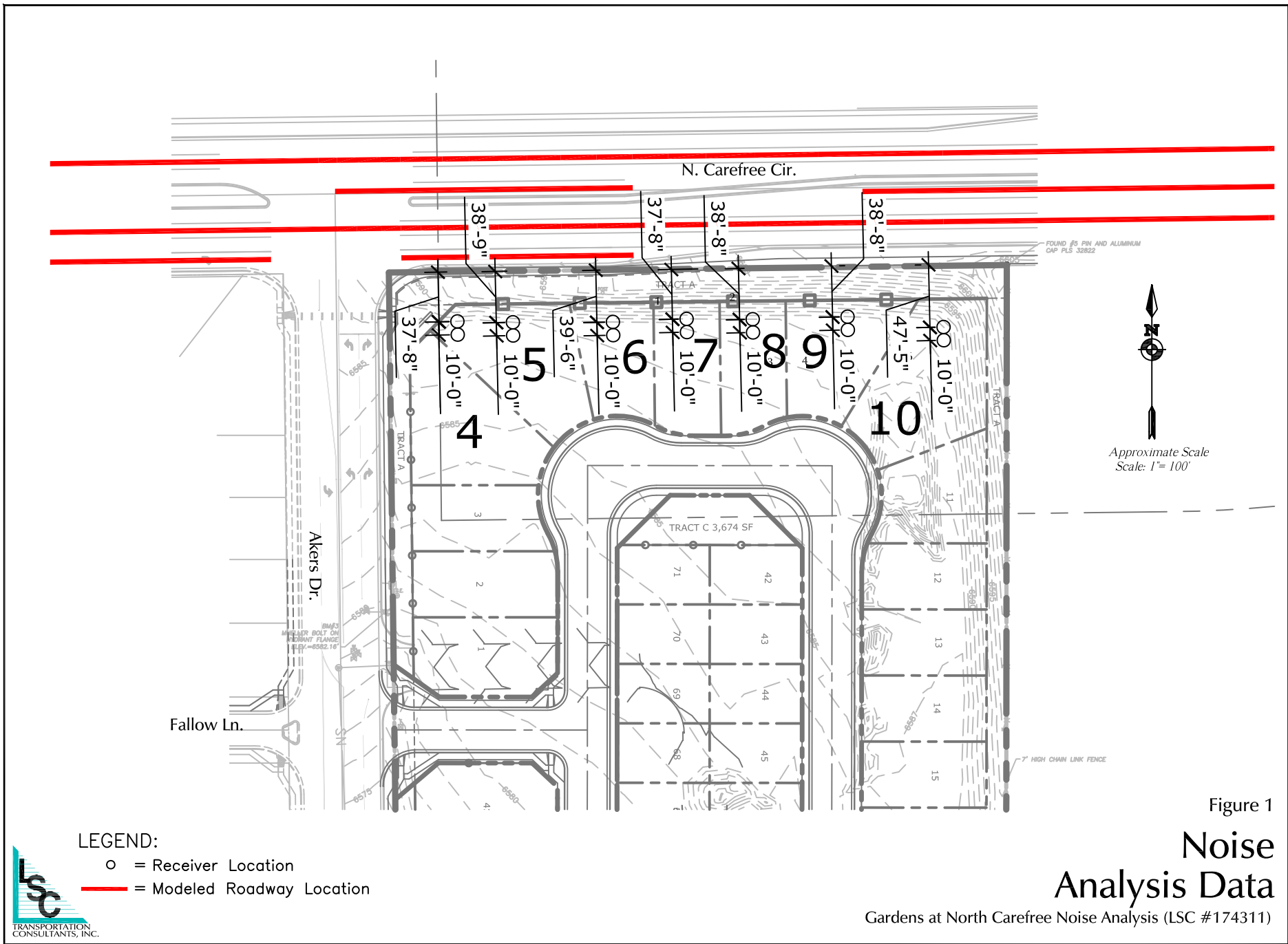
Respectfully submitted,

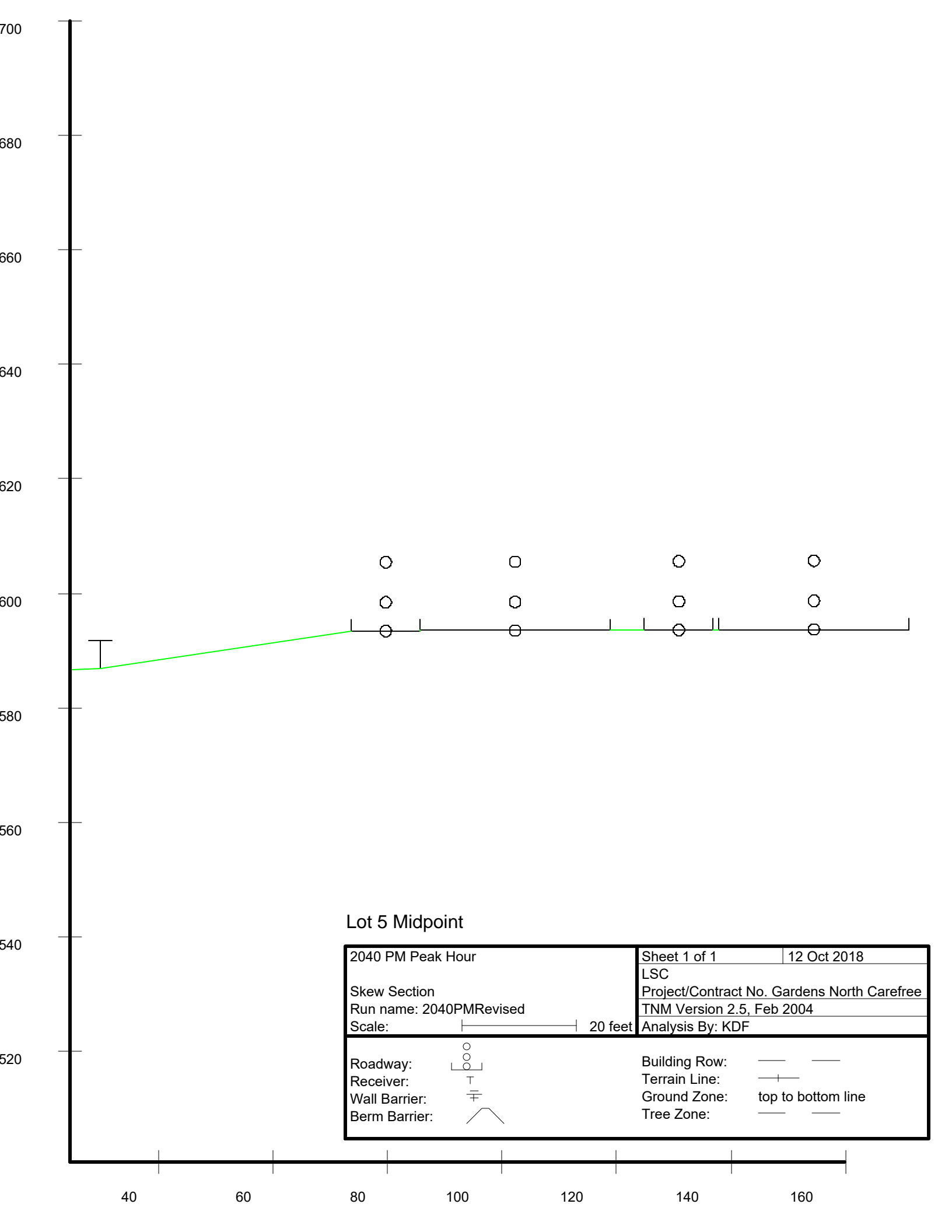
LSC TRANSPORTATION CONSULTANTS, INC.

By: Kirstin D. Ferrin, P.E.
Senior Transportation Engineer









KDF:bjwb

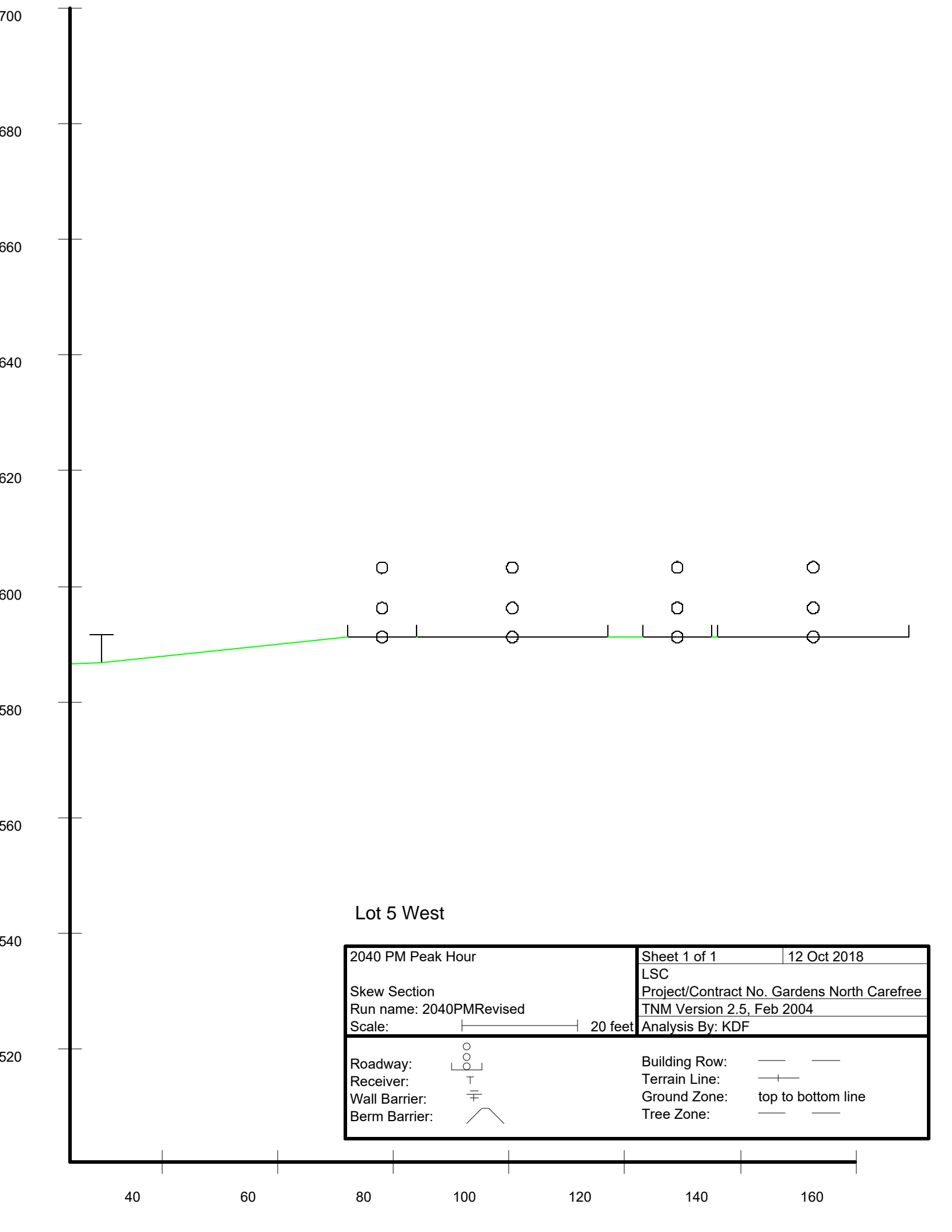
Enclosures: Figure 1
Skew Cross Sections
Noise Analysis Inputs/Outputs













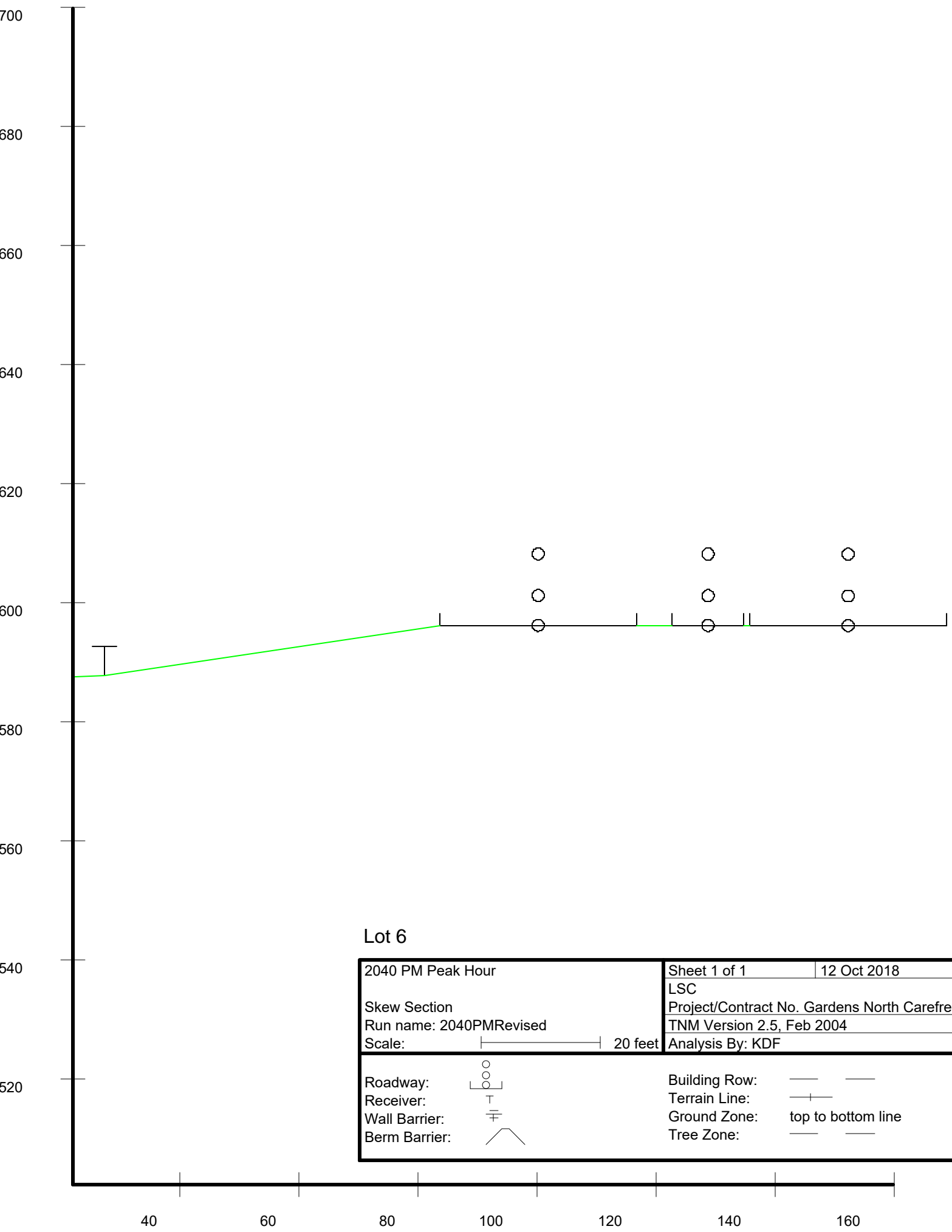
Lot 5 Midpoint

2040 PM Peak Hour		Sheet 1 of 1	12 Oct 2018
Skew Section		LSC	
Run name: 2040PMRevised		Project/Contract No. Gardens North Carefree	
Scale: 		TNM Version 2.5, Feb 2004	
		Analysis By: KDF	
Roadway:		Building Row:	
Receiver:		Terrain Line:	
Wall Barrier:		Ground Zone:	top to bottom line
Berm Barrier:		Tree Zone:	











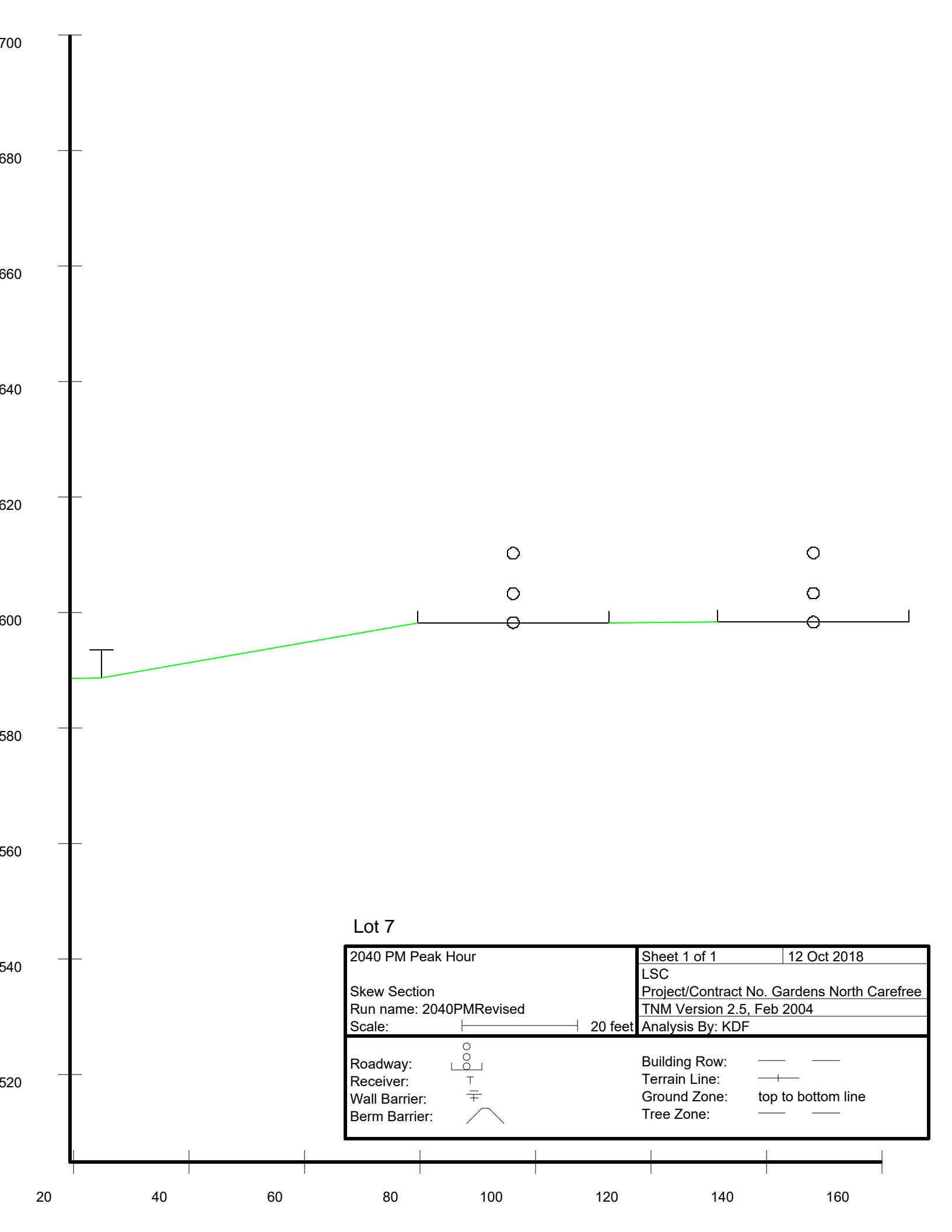
Lot 5 West

2040 PM Peak Hour		Sheet 1 of 1	12 Oct 2018
Skew Section		LSC	
Run name: 2040PMRevised		Project/Contract No. Gardens North Carefree	
Scale: 		TNM Version 2.5, Feb 2004	
		Analysis By: KDF	
Roadway:		Building Row:	
Receiver:		Terrain Line:	
Wall Barrier:		Ground Zone:	top to bottom line
Berm Barrier:		Tree Zone:	











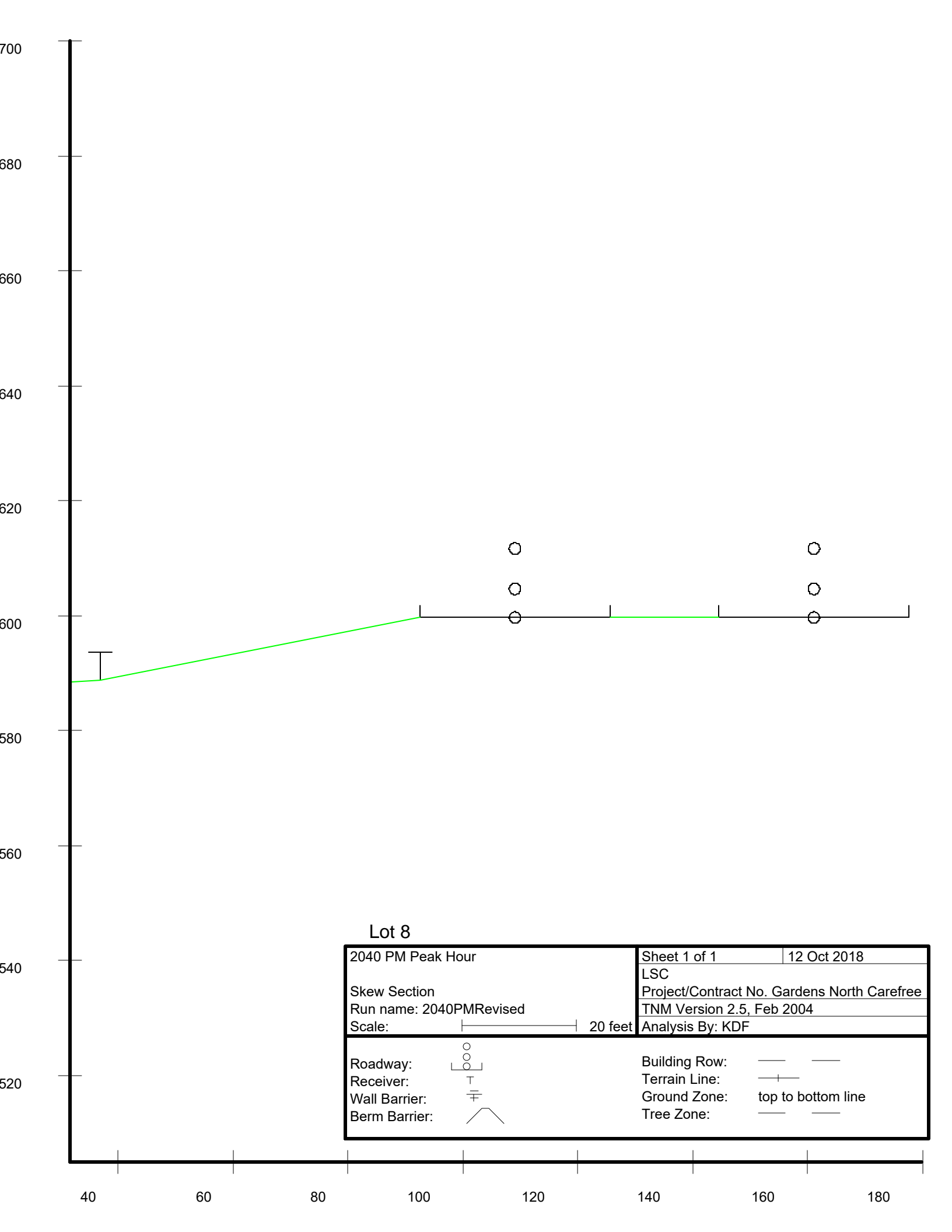
Lot 6

2040 PM Peak Hour		Sheet 1 of 1	12 Oct 2018
Skew Section		LSC	
Run name: 2040PMRevised		Project/Contract No. Gardens North Carefree	
Scale: 		TNM Version 2.5, Feb 2004	
		Analysis By: KDF	
Roadway:		Building Row:	
Receiver:		Terrain Line:	
Wall Barrier:		Ground Zone:	top to bottom line
Berm Barrier:		Tree Zone:	











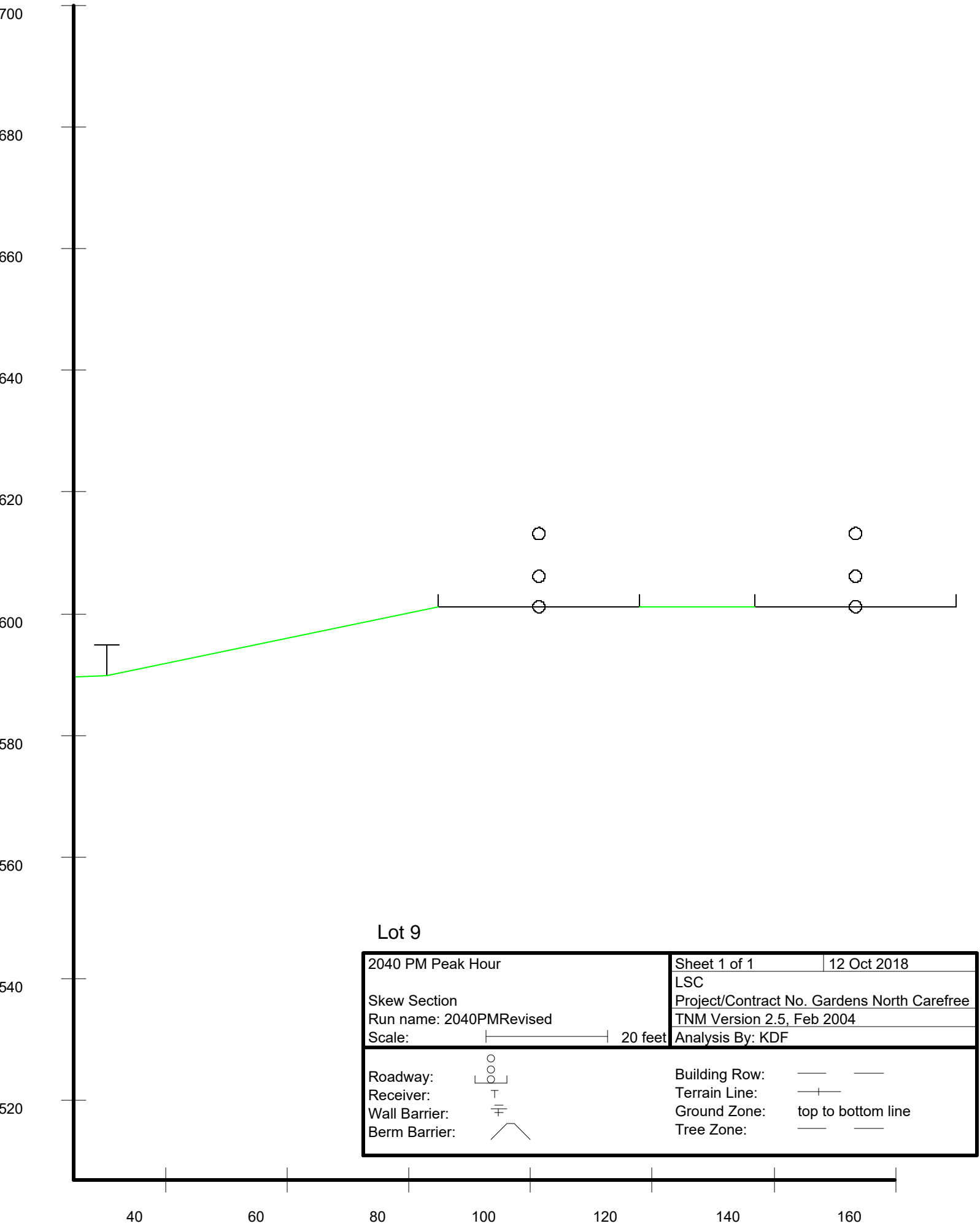
Lot 7

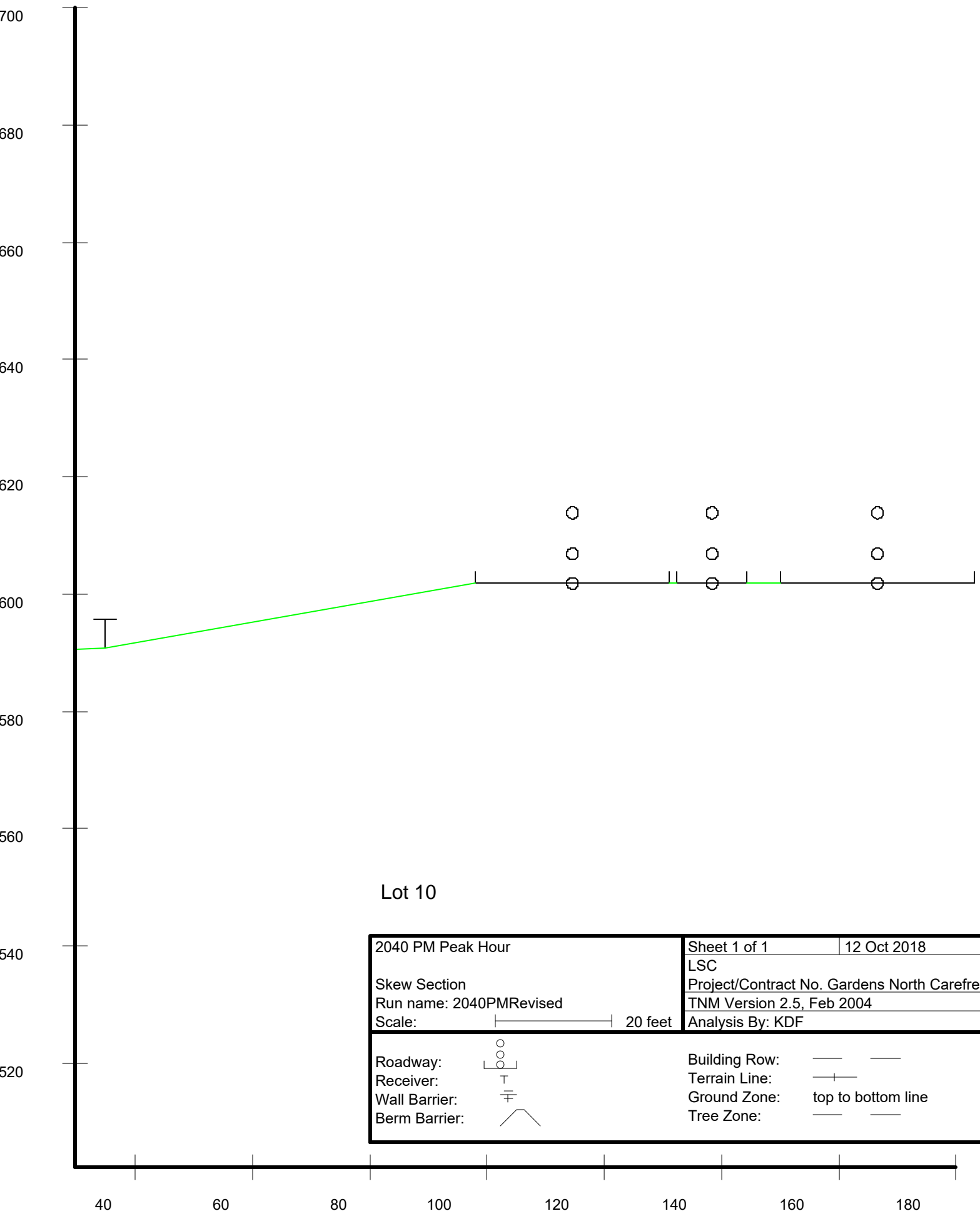
2040 PM Peak Hour		Sheet 1 of 1	12 Oct 2018
Skew Section		LSC	
Run name: 2040PMRevised		Project/Contract No. Gardens North Carefree	
Scale: 		TNM Version 2.5, Feb 2004	
		Analysis By: KDF	
Roadway: 	Building Row: 		
Receiver: 	Terrain Line: 		
Wall Barrier: 	Ground Zone: top to bottom line		
Berm Barrier: 	Tree Zone: 		











Lot 8

2040 PM Peak Hour	Sheet 1 of 1	12 Oct 2018
Skew Section	LSC	
Run name: 2040PMRevised	Project/Contract No. Gardens North Carefree	
Scale: 	TNM Version 2.5, Feb 2004	
	Analysis By: KDF	
Roadway: 	Building Row: 	
Receiver: 	Terrain Line: 	
Wall Barrier: 	Ground Zone: top to bottom line	
Berm Barrier: 	Tree Zone: 	





Lot 10

2040 PM Peak Hour		Sheet 1 of 1	12 Oct 2018
Skew Section		LSC	
Run name: 2040PMRevised		Project/Contract No. Gardens North Carefree	
Scale: 		TNM Version 2.5, Feb 2004	
		Analysis By: KDF	
Roadway:		Building Row:	
Receiver:		Terrain Line:	
Wall Barrier:		Ground Zone:	top to bottom line
Berm Barrier:		Tree Zone:	

RESULTS: SOUND LEVELS

Gardens North Carefree

LSC									12 October 2018				
KDF									TNM 2.5				
									Calculated with TNM 2.5				
RESULTS: SOUND LEVELS													
PROJECT/CONTRACT:	Gardens North Carefree												
RUN:	2040 PM Peak Hour												
BARRIER DESIGN:	INPUT HEIGHTS												
ATMOSPHERICS:	68 deg F, 50% RH												
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.													
Receiver													
Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n	Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB			dBA	dB	dB	dB
Lot 5 West Toe	1	1	0.0	66.5	67	66.5	10	----		66.5	0.0	8	-8.0
Lot 5 West 10' S/O Toe	2	1	0.0	65.5	67	65.5	10	----		65.5	0.0	8	-8.0
Lot 5 Midpoint Toe	3	1	0.0	64.6	67	64.6	10	----		64.6	0.0	8	-8.0
Lot 5 Midpoint 10' S/O Toe	5	1	0.0	63.9	67	63.9	10	----		63.9	0.0	8	-8.0
Lot 6 Toe	7	1	0.0	63.7	67	63.7	10	----		63.7	0.0	8	-8.0
Lot 6 10' S/O Toe	8	1	0.0	63.1	67	63.1	10	----		63.1	0.0	8	-8.0
Lot 7 Toe	10	1	0.0	63.6	67	63.6	10	----		63.6	0.0	8	-8.0
Lot 7 10' S/O Toe	11	1	0.0	62.9	67	62.9	10	----		62.9	0.0	8	-8.0
Lot 8 Toe	12	1	0.0	63.3	67	63.3	10	----		63.3	0.0	8	-8.0
Lot 8 10' S/O Toe	13	1	0.0	62.5	67	62.5	10	----		62.5	0.0	8	-8.0
Lot 9 Toe	14	1	0.0	63.3	67	63.3	10	----		63.3	0.0	8	-8.0
Lot 9 10' S/O Toe	15	1	0.0	62.7	67	62.7	10	----		62.7	0.0	8	-8.0
Lot 10 Toe	16	1	0.0	63.0	67	63.0	10	----		63.0	0.0	8	-8.0
Lot 10 10' S/O Toe	17	1	0.0	62.4	67	62.4	10	----		62.4	0.0	8	-8.0
Dwelling Units		# DUs	Noise Reduction										
			Min	Avg	Max								
			dB	dB	dB								
All Selected		14	0.0	0.0	0.0								
All Impacted		0	0.0	0.0	0.0								
All that meet NR Goal		0	0.0	0.0	0.0								

INPUT: TRAFFIC FOR LAeq1h Volumes

Gardens North Carefree

LSC		12 October 2018										
KDF		TNM 2.5										
INPUT: TRAFFIC FOR LAeq1h Volumes												
PROJECT/CONTRACT:		Gardens North Carefree										
RUN:		2040 PM Peak Hour										
Roadway	Points											
Name	Name	No.	Segment		MTrucks		HTrucks		Buses		Motorcycles	
			Autos		V	S	V	S	V	S	V	S
			V	S	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
EB North Carefree W/O Akers	point1	1	1535	35	48	35	32	35	0	0	0	0
	point43	43	1401	35	44	35	30	35	0	0	0	0
	point2	2										
WB North Carefree W/O Akers	point3	3	1338	35	42	35	28	35	0	0	0	0
	point4	4										
EB North Carefree E/O Akers	point5	5	1401	35	44	35	30	35	0	0	0	0
	point7	7	1401	35	44	35	30	35	0	0	0	0
	point8	8	1401	35	44	35	30	35	0	0	0	0
	point9	9	1401	35	44	35	30	35	0	0	0	0
	point10	10	1401	35	44	35	30	35	0	0	0	0
	point11	11	1401	35	44	35	30	35	0	0	0	0
	point12	12	1401	35	44	35	30	35	0	0	0	0
	point13	13	1401	35	44	35	30	35	0	0	0	0
	point14	14	1401	35	44	35	30	35	0	0	0	0
	point15	15	1401	35	44	35	30	35	0	0	0	0
	point16	16	1571	35	50	35	33	35	0	0	0	0
	point17	17	1571	35	50	35	33	35	0	0	0	0
	point18	18	1571	35	50	35	33	35	0	0	0	0
	point19	19	1571	35	50	35	33	35	0	0	0	0
	point20	20	1571	35	50	35	33	35	0	0	0	0
	point21	21	1571	35	50	35	33	35	0	0	0	0
	point22	22	1411	35	45	35	30	35	0	0	0	0
	point23	23	1411	35	45	35	30	35	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

Gardens North Carefree

	point6	6										
WB North Carefree E/O Akers	point24	24	1293	35	41	35	27	35	0	0	0	0
	point26	26	1293	35	41	35	27	35	0	0	0	0
	point27	27	1293	35	41	35	27	35	0	0	0	0
	point28	28	1293	35	41	35	27	35	0	0	0	0
	point29	29	1293	35	41	35	27	35	0	0	0	0
	point30	30	1293	35	41	35	27	35	0	0	0	0
	point31	31	1293	35	41	35	27	35	0	0	0	0
	point32	32	1187	35	38	35	25	35	0	0	0	0
	point33	33	1187	35	38	35	25	35	0	0	0	0
	point34	34	1187	35	38	35	25	35	0	0	0	0
	point35	35	1187	35	38	35	25	35	0	0	0	0
	point36	36	1187	35	38	35	25	35	0	0	0	0
	point37	37	1187	35	38	35	25	35	0	0	0	0
	point38	38	1187	35	38	35	25	35	0	0	0	0
	point39	39	1187	35	38	35	25	35	0	0	0	0
	point40	40	1187	35	38	35	25	35	0	0	0	0
	point41	41	1187	35	38	35	25	35	0	0	0	0
	point42	42	1187	35	38	35	25	35	0	0	0	0
	point25	25										
EB RT	point44	44	133	35	4	35	3	35	0	0	0	0
	point45	45										
WB LT	point46	46	106	35	4	35	1	35	0	0	0	0
	point56	56	106	35	4	35	1	35	0	0	0	0
	point57	57	106	35	4	35	1	35	0	0	0	0
	point58	58	106	35	4	35	1	35	0	0	0	0
	point59	59	106	35	4	35	1	35	0	0	0	0
	point60	60	106	35	4	35	1	35	0	0	0	0
	point61	61	106	35	4	35	1	35	0	0	0	0
	point62	62	106	35	4	35	1	35	0	0	0	0
	point63	63	106	35	4	35	1	35	0	0	0	0
	point64	64	106	35	4	35	1	35	0	0	0	0
	point65	65	106	35	4	35	1	35	0	0	0	0
	point47	47										
Antelope Ridge EB LT	point66	66	160	35	5	35	3	35	0	0	0	0
	point68	68	160	35	5	35	3	35	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes**Gardens North Carefree**

	point69	69	160	35	5	35	3	35	0	0	0	0
	point67	67										
EB Accel	point70	70	170	35	5	35	4	35	0	0	0	0
	point72	72	170	35	5	35	4	35	0	0	0	0
	point73	73	170	35	5	35	4	35	0	0	0	0
	point74	74	170	35	5	35	4	35	0	0	0	0
	point75	75	170	35	5	35	4	35	0	0	0	0
	point76	76	170	35	5	35	4	35	0	0	0	0
	point77	77	170	35	5	35	4	35	0	0	0	0
	point71	71										

INPUT: ROADWAYS

Gardens North Carefree

LSC	12 October 2018									
KDF	TNM 2.5									
INPUT: ROADWAYS										
PROJECT/CONTRACT:	Gardens North Carefree									
RUN:	2040 PM Peak Hour									

Review 1: Provide a narrative explaining why a "grouped" modeling was used instead of a lane by lane modeling.

Review 2: Please include your response as a paragraph in the body of the study.

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points			Coordinates (pavement)			Flow Control			Segment	
Name	Width	Name	No.	X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?	
	ft			ft	ft	ft		mph	%			
EB North Carefree W/O Akers	33.0	point1	1	2,537.6	6,395.8	6,546.00				Average		
		point43	43	2,949.8	6,400.8	6,561.00				Average		
		point2	2	3,188.4	6,403.7	6,586.00						
WB North Carefree W/O Akers	33.0	point3	3	3,186.0	6,455.7	6,546.00				Average		
		point4	4	2,537.0	6,447.8	6,586.00						
EB North Carefree E/O Akers	33.0	point5	5	3,200.7	6,403.9	6,586.00				Average		
		point7	7	3,214.9	6,404.0	6,587.00				Average		
		point8	8	3,233.6	6,404.3	6,588.00				Average		
		point9	9	3,248.4	6,404.4	6,589.00				Average		
		point10	10	3,263.4	6,404.6	6,590.00				Average		
		point11	11	3,280.3	6,404.8	6,591.00				Average		
		point12	12	3,300.4	6,405.1	6,592.00				Average		
		point13	13	3,322.2	6,405.3	6,593.00				Average		
		point14	14	3,344.5	6,405.6	6,594.00				Average		
		point15	15	3,369.8	6,405.9	6,595.00				Average		
		point16	16	3,396.9	6,406.2	6,596.00				Average		
		point17	17	3,424.1	6,406.6	6,597.00				Average		
		point18	18	3,451.3	6,406.9	6,598.00				Average		
		point19	19	3,479.8	6,407.3	6,599.00				Average		
point20	20	3,517.0	6,407.7	6,600.00				Average				
point21	21	3,564.9	6,408.3	6,601.00				Average				
point22	22	3,658.8	6,409.4	6,602.00				Average				
point23	23	3,905.1	6,412.4	6,600.00				Average				
point6	6	3,973.6	6,413.2	6,598.00								
WB North Carefree E/O Akers	33.0	point24	24	3,982.3	6,465.9	6,598.00	Signal	0.00	50	Average		

INPUT: ROADWAYS

Gardens North Carefree

		point26	26	3,904.5	6,464.7	6,600.00				Average	
		point27	27	3,658.2	6,461.4	6,602.00				Average	
		point28	28	3,564.2	6,460.3	6,601.00				Average	
		point29	29	3,516.3	6,459.7	6,600.00				Average	
		point30	30	3,479.1	6,459.2	6,599.00				Average	
		point31	31	3,450.6	6,458.9	6,598.00				Average	
		point32	32	3,423.5	6,458.6	6,597.00				Average	
		point33	33	3,396.3	6,458.2	6,596.00				Average	
		point34	34	3,369.1	6,457.9	6,595.00				Average	
		point35	35	3,343.9	6,457.6	6,594.00				Average	
		point36	36	3,321.6	6,457.3	6,593.00				Average	
		point37	37	3,299.8	6,457.1	6,592.00				Average	
		point38	38	3,279.7	6,456.8	6,591.00				Average	
		point39	39	3,262.7	6,456.6	6,590.00				Average	
		point40	40	3,247.8	6,456.4	6,589.00				Average	
		point41	41	3,233.0	6,456.3	6,588.00				Average	
		point42	42	3,214.3	6,456.0	6,587.00				Average	
		point25	25	3,200.1	6,455.9	6,586.00					
EB RT	12.0	point44	44	2,950.1	6,378.3	6,561.00				Average	
		point45	45	3,150.1	6,380.8	6,586.00					
WB LT	12.0	point46	46	3,423.8	6,435.1	6,597.00				Average	
		point56	56	3,396.6	6,434.7	6,596.00				Average	
		point57	57	3,369.4	6,434.4	6,595.00				Average	
		point58	58	3,344.2	6,434.1	6,594.00				Average	
		point59	59	3,321.9	6,433.8	6,593.00				Average	
		point60	60	3,300.1	6,433.6	6,592.00				Average	
		point61	61	3,280.0	6,433.3	6,591.00				Average	
		point62	62	3,263.0	6,433.1	6,590.00				Average	
		point63	63	3,248.1	6,432.9	6,589.00				Average	
		point64	64	3,233.3	6,432.8	6,588.00				Average	
		point65	65	3,214.6	6,432.5	6,587.00				Average	
		point47	47	3,198.5	6,432.3	6,586.00					
Antelope Ridge EB LT	12.0	point66	66	3,597.5	6,432.2	6,601.50				Average	
		point68	68	3,658.5	6,433.2	6,602.00				Average	
		point69	69	3,918.8	6,436.1	6,600.00				Average	
		point67	67	3,986.0	6,436.9	6,598.00					
EB Accel	12.0	point70	70	3,248.7	6,381.9	6,589.00				Average	
		point72	72	3,263.6	6,382.1	6,590.00				Average	
		point73	73	3,280.6	6,382.3	6,591.00				Average	

INPUT: ROADWAYS**Gardens North Carefree**

		point74	74	3,300.7	6,382.6	6,592.00				Average	
		point75	75	3,322.5	6,382.8	6,593.00				Average	
		point76	76	3,344.8	6,383.1	6,594.00				Average	
		point77	77	3,370.0	6,383.4	6,595.00				Average	
		point71	71	3,397.2	6,383.7	6,596.00					

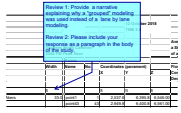
INPUT: RECEIVERS

Gardens North Carefree

LSC							12 October 2018				
KDF							TNM 2.5				
INPUT: RECEIVERS											
PROJECT/CONTRACT:		Gardens North Carefree									
RUN:		2040 PM Peak Hour									
Receiver											
Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Lot 5 West Toe	1	1	3,291.1	6,333.9	6,587.00	4.92	0.00	67	10.0	8.0	Y
Lot 5 West 10' S/O Toe	2	1	3,291.3	6,323.9	6,586.75	4.92	0.00	67	10.0	8.0	Y
Lot 5 Midpoint Toe	3	1	3,333.0	6,333.3	6,587.00	4.92	0.00	67	10.0	8.0	Y
Lot 5 Midpoint 10' S/O Toe	5	1	3,333.3	6,323.3	6,586.60	4.92	0.00	67	10.0	8.0	Y
Lot 6 Toe	7	1	3,408.8	6,333.5	6,588.00	4.92	0.00	67	10.0	8.0	Y
Lot 6 10' S/O Toe	8	1	3,409.0	6,323.5	6,587.50	4.92	0.00	67	10.0	8.0	Y
Lot 7 Toe	10	1	3,464.5	6,335.8	6,589.00	4.92	0.00	67	10.0	8.0	Y
Lot 7 10' S/O Toe	11	1	3,464.7	6,325.8	6,588.75	4.92	0.00	67	10.0	8.0	Y
Lot 8 Toe	12	1	3,514.5	6,335.5	6,589.00	4.92	0.00	67	10.0	8.0	Y
Lot 8 10' S/O Toe	13	1	3,514.7	6,325.5	6,588.50	4.92	0.00	67	10.0	8.0	Y
Lot 9 Toe	14	1	3,586.2	6,337.5	6,590.00	4.92	0.00	67	10.0	8.0	Y
Lot 9 10' S/O Toe	15	1	3,586.5	6,327.5	6,589.60	4.92	0.00	67	10.0	8.0	Y
Lot 10 Toe	16	1	3,658.9	6,329.6	6,591.00	4.92	0.00	67	10.0	8.0	Y
Lot 10 10' S/O Toe	17	1	3,659.1	6,319.6	6,590.50	4.92	0.00	67	10.0	8.0	Y

Markup Summary

Daniel Torres (1)



Subject: Callout
Page Label: 16
Author: Daniel Torres
Date: 11/8/2018 5:33:30 PM
Color: ■

Review 1: Provide a narrative explaining why a "grouped" modeling was used instead of a lane by lane modeling.

Review 2: Please include your response as a paragraph in the body of the study.

Kirstin (7)

Lot
6

Subject: Typewritten Text
Page Label: 7
Author: Kirstin
Date: 10/12/2018 11:44:44 AM
Color: ■

Lot 6

Lot
7

Subject: Typewritten Text
Page Label: 8
Author: Kirstin
Date: 10/12/2018 11:45:41 AM
Color: ■

Lot 7

Lot
8

Subject: Typewritten Text
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Author: Kirstin
Date: 10/12/2018 11:50:19 AM
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Lot 8

Lot
9

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Date: 10/12/2018 12:13:24 PM
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Lot 9

Lot 5
West

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Date: 10/12/2018 12:19:03 PM
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Lot 5 West

Lot 5
Midpoint
2040 PM Peak Hour

Subject: Typewritten Text
Page Label: 5
Author: Kirstin
Date: 10/12/2018 12:20:01 PM
Color: ■

Lot 5 Midpoint

Lot
10

Subject: Typewritten Text
Page Label: 11
Author: Kirstin
Date: 10/12/2018 12:22:09 PM
Color: ■

Lot 10