Kolb Road Noise Report

Sabino Canyon to Sunrise

Sound Solutions
Acoustical Engineering

Bill Holliday, PE

Acoustical Consultant

Noise Study Approach

- Assess the existing and planned land uses
- Assess the existing conditions
- Predict the existing and future build scenario for worse case (loudest AM/PM) noise condition using TNM 2.5

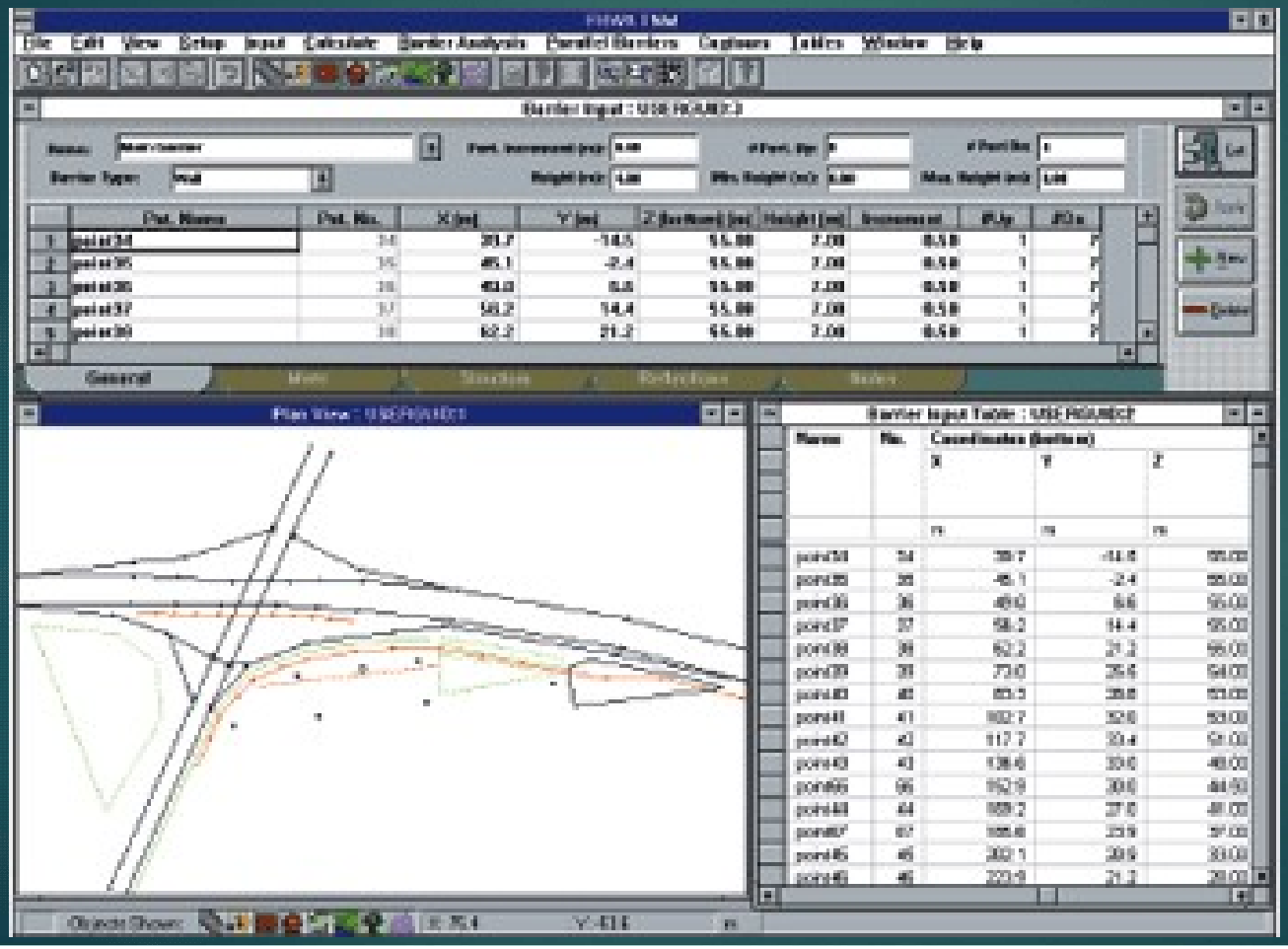
Noise Study Approach

- Verify the noise model by measuring the existing noise levels
- Compare the modeled results with the noise abatement criteria
- If needed, evaluate noise mitigation measures

What we model

- Existing traffic conditions – current street configuration with 2016 traffic volumes.
- Traffic volumes during measurements to verify and calibrate noise model
- Future build condition –proposed road improvements and future projected 2040 traffic volumes.

TNM – Traffic Noise Model



Model Inputs

- Vehicle Speeds
- Traffic Volumes
- Vehicle Mix
- Elevations
- Ground type
- Weather Conditions
- Receiver elevations
- Existing barriers

Criteria – consider noise abatement if:

- noise levels reach 66 dBA or higher
- 15 dBA increase between existing and future noise levels

Type of Noise Mitigation

- Change road alignment
- Change road elevation
- Change speeds
- Sound walls

Mitigation

Reasonable and feasible mitigation

- At least 5 dBA reduction achieved at noise sensitive receivers
- Barrier must benefit two or more adjacent receivers
- Cost of the barrier $49,000 or less per benefitted receiver (cost of $35/ft^2)

Reasonable and feasible mitigation

- Majority of property owners approve
- Mitigation is for only the first floor
- Barriers must be less than 24 feet tall
- For undeveloped properties must have building permit issued

Definitions

Sound pressure is expressed on a logarithmic scale in units called decibels (dB)

Hourly L_{eq} is an energy average level

A-weighted scale adjusts the sound level in each frequency band in much the same manner that the human auditory system does

Definitions

Common Outdoor Sounds	Sound Pressure Level (dBA)	Common Indoor Sounds	Subjective Evaluation
Auto horn at 10' Jackhammer at 50'	100	Printing plant	Deafening
Gas lawn mower at 4' Pneumatic drill at 50'	90	Auditorium during applause Food blender at 3'	Very Loud
Concrete mixer at 50' Jet flyover at 5000'	80	Telephone ringing at 8' Vacuum cleaner at 5'	
Large dog barking at 50' Large transformer at 50'	70	Electric shaver at 1'	Loud
Automobile at 55 mph at 150' Urban residential	60	Normal conversation at 3'	
Small town residence	50	Office noise Dishwasher in adjacent room	Moderate
	40	Soft stereo music in residence Library	
Rustling leaves	30	Average bedroom at night Soft whisper at 3'	Faint
Quiet rural nighttime	20	Broadcast and recording studio	
	10	Human breathing	Very Faint
	0	Threshold of hearing (audibility)	

North part of Project

Key

A Measurement Locations

1 Prediction Locations

South part of Project

Key

A Measurement Locations

1 Prediction Locations

Peak- Hour Traffic Volumes

Road	Reference	Existing Volumes (2016)	Future Volumes (2040)
Kolb Road - Northbound	North of Sunrise	385 (299)	434(337)
Kolb Road - Southbound		419(313)	472(352)
Kolb Road - Northbound	Between Territory and Sunrise	582(459)	656(517)
Kolb Road - Southbound		461(616)	475(711)
Kolb Road - Northbound	Between Snyder and Territory	533(441)	601(497)
Kolb Road - Southbound		425(605)	494(656)
Kolb Road - Northbound	Between Sabino Canyon and Snyder	457(495)	515(558)
Kolb Road - Southbound		532(536)	717(676)
Kolb Road - Northbound	South of Sabino Canyon	984(1031)	1109(1162)
Kolb Road - Southbound		1384(1010)	1560(1138)
Sunrise – West of Kolb Road		1649(1423)	1859(1603)
Sunrise – East of Kolb Road		1010(798)	1138(899)
Territory – West of Kolb Road		180(249)	230(404)
Snyder – East of Kolb Road		31(31)	34(43)
Snyder – West of Kolb Road		330(313)	372(353)
Sabino Canyon – East of Kolb Road		1271(957)	1433(1078)

Measurements

- Measurements are made to verify the TNM 2.5 model. (measured levels must be within 1 dBA of predicted noise levels)
- Measurements are made in the right of way, outside of any existing barrier.
- During peak-hour traffic conditions.
- Generally, measurement locations have higher levels than prediction locations because they are significantly closer to the road, and without barrier.
- Residential addresses are used as references, not exact locations.

Measurements

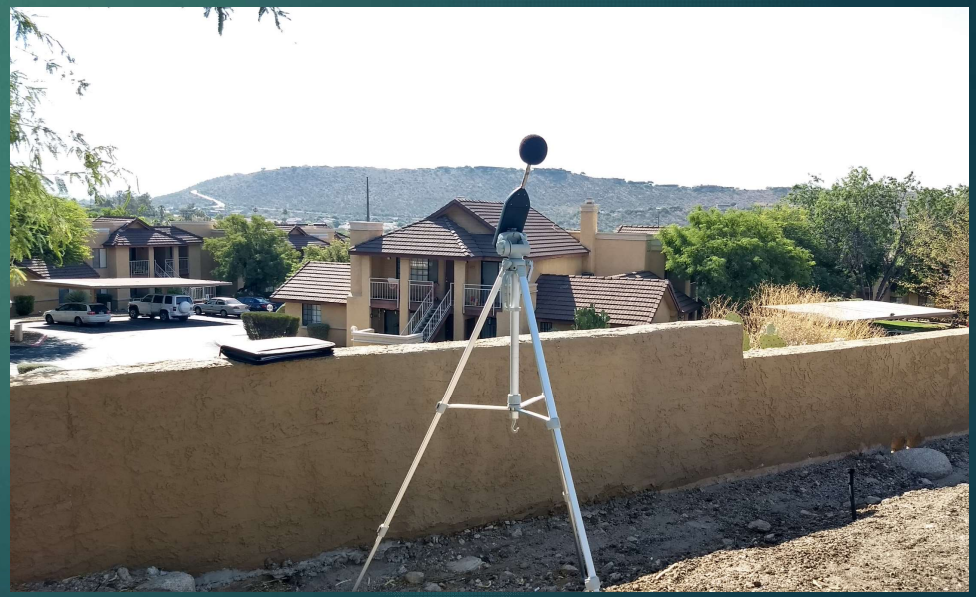
Site ID	Location Description	Measured Noise Level (Leq)	Predicted Noise Level
A	7050 E Sunrise Rd	66	66
B	5281 N Rocky Ridge Pl	55	55
C	7255 E Snyder Rd	68	69
D	4700 N Kolb Rd	69	68
E	7161 E Painted Quail Circle	63*	63
F	7271 E Gambel Circle	66	65

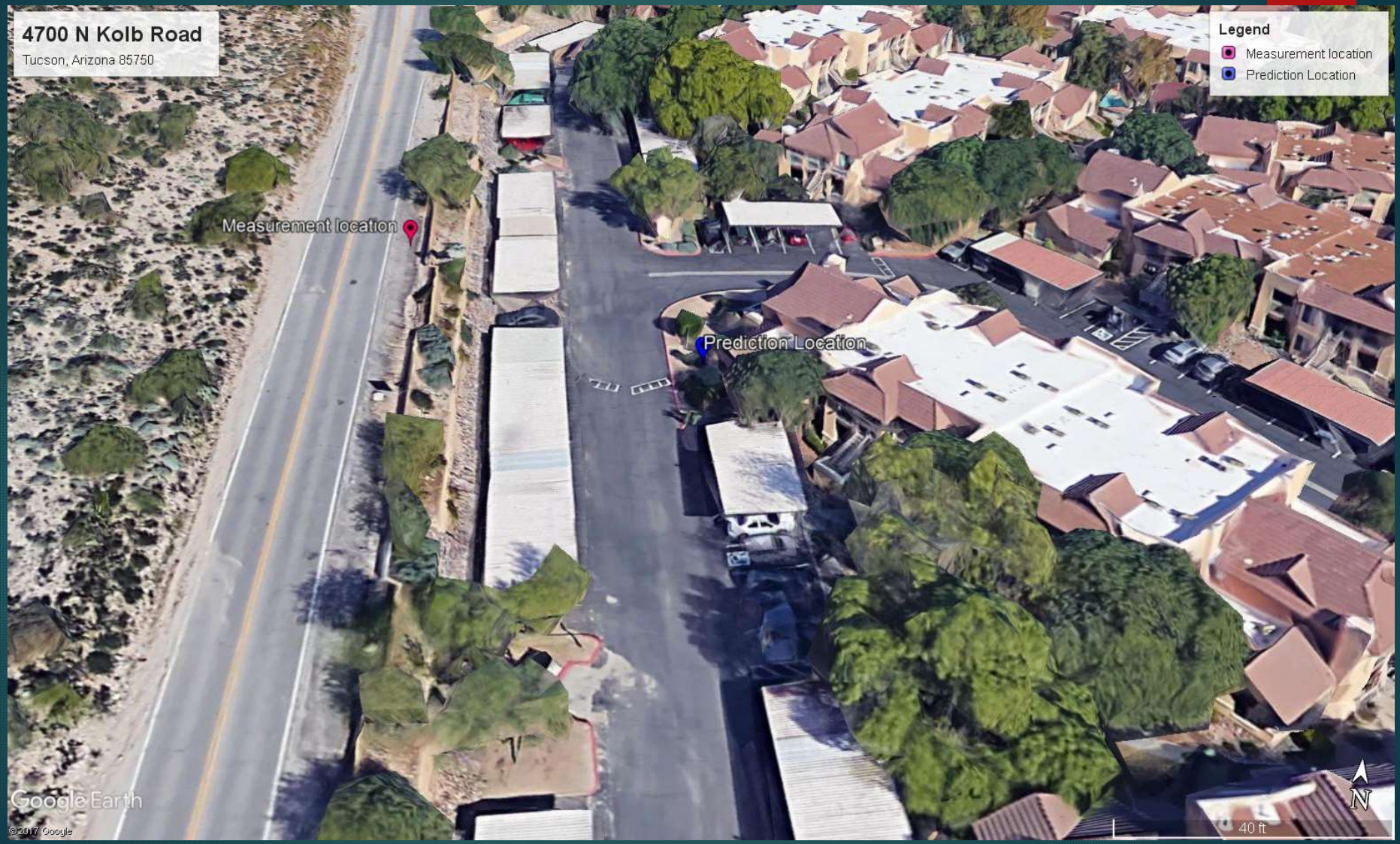
* Estimated traffic noise – cicadas increased the overall measured level at this location

Example Measurement Location

4700 N Kolb Rd. Tucson, AZ 85750

32°17'34.6"N 110°50'20.7"W




4700 N Kolb Road
Tucson, Arizona 85750
Legend
Measurement location
Prediction Location
Measurement location
Prediction Location
Google Earth
©2017 Google
40 ft
N

Predictions

- Predicted noise levels take into account:
  - Vehicle Speeds
  - Traffic Volumes
  - Vehicle Mix
  - Elevations
  - Ground type
  - Receiver elevations
  - Existing barriers

Predictions

Receiver ID	Receiver Location	Predicted Before Project (2016) Hourly Leq (dBA) AM / PM	Future (2040) Hourly Leq (dBA) AM / PM	Noise Limit (dBA)
1	7050 E Sunrise Rd	62 / 62	62 / 62	66
2	5348 N Gate Ridge Rd	53 / 53	53 / 54	66
3	5281 N Rocky Ridge Pl	50 / 50	51 / 51	66
4	5100 N Kolb Rd	61 / 60	61 / 61	66
5	5041 N Kolb Rd	63 / 63	63 / 64	66
6	7255 E Snyder Rd	51 / 51	51 / 51	66
7	4700 N Kolb Rd	50 / 50	51 / 51	66
8	Quail Canyon Two	46 / 46	47 / 47	66
9	7171 E Quail Run Dr	59 / 59	60 / 60	66
10	7161 E Painted Quail Circle	59 / 59	60 / 60	66
11	7223 E Inca Dove Dr	62 / 63	63 / 63	66
12	7271 E Gambel Circle	52 / 52	53 / 53	66
13	7261 E Cripple Creek Dr	55 / 55	56 / 56	66
14	7282 E Clayridge Rd	54 / 54	55 / 55	66
15	4200 N Ventana Dr	60 / 60	60 / 60	66

Summary of Noise Study

- The noise study found that there are no locations along the project that exceed the noise limit criteria.
- No additional noise mitigation is required.

Questions?