Determining "Loudest Hour" For Noise Analysis

The following page is an excerpt from a Federal Highway Administration document entitled "Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA", March 2010 (Section 2.6.1).

The results of travel demand forecasts are used as inputs to noise analyses routinely conducted as part of the NEPA process. The procedures used to identify and estimate noise impacts are found in 23 CFR Part 772, the FHWA regulations for the evaluation and mitigation of traffic noise in the planning and design of Federal funded highway projects. This regulation establishes:

1. Methodologies for conducting a traffic noise analysis, and

2. Guidelines and requirements for the consideration of noise abatement measures.

In preparing traffic projections for NEPA documents, it is important to understand certain requirements of the FHWA regulations with respect to traffic volume estimation and modeling:

- *Noise levels are established for the existing condition and a no-build and build scenario in the design year. The "design year" is "[t]he future year used to estimate the probable traffic volume for which a highway is designed" and is usually consistent with the design year established for other impact analyses in the EIS process.*
- *Noise impacts are measured during the one-hour period where the worst-case noise levels are expected to occur. This may or may not be the peak hour of traffic. That is, higher traffic volumes can lead to higher congestion and lower operating speeds. Since higher speeds lead to higher noise emissions from motor vehicles, the worst-case noise levels may occur in hours with lower volumes and higher speeds. In addition, vehicle mix may also change hourly. On many highways, the percentage of heavy trucks is reduced during peak hour. Since heavy trucks have greater sound emissions than passenger cars, vehicle mix is an important component in determining the peak hour of noise impact. It may be necessary to conduct screening runs on several hours to determine which combination of traffic volume, speed, and vehicle mix yields the greatest impact. It may be the case that the peak hour of noise impact changes as the result of the proposed project. For example, the introduction of a multimodal facility like a freight terminal could introduce a large volume of heavy trucks during off-peak hours. In this case, a different analysis hour could be evaluated for the no-build and build alternative scenarios.*

If the hour to be modeled is not included as a direct output of the travel demand forecasting model, then adjustments can be considered based on factors developed for similar types of roads. For example, if a transportation model is used to develop annual average daily traffic (AADT), then adjustment factors based on automatic traffic recorders (ATRs) could be used to estimate time-of-day hourly volumes and vehicle mix. The methodology for adjustments of model volumes used in the noise analysis should be consistent with that used in other sections of the EIS, and should be documented.

Example traffic breakdown sheet

HOURLY TRAFFIC BREAKDOWNS

Location: **TH 100, No. of TH 55 (Vehicle Classification Site #7726)**

Beg. Hour	Hourly % of ADT	Hourly Direct. Distrib.		% of Hourly ADT that are Trucks (HCADT)	Truck Splits	
		SB	NB		Single Units	Semi's
0:00	.063 %	33 %	67 %	2.13 %	50 %	50 %
1:00	.49 %	28 %	72 %	7.55 %	25 %	75 %
2:00	.32 %	40 %	60 %	9.72 %	29 %	71 %
3:00	.36 %	54 %	46 %	9.64 %	25 %	75 %
4:00	.68 %	71 %	29 %	6.00 %	25 %	75 %
5:00	2.37 %	77 %	23 %	3.94 %	44 %	56 %
6:00	6.44 %	71 %	29 %	1.78 %	57 %	43 %
7:00	8.78 %	65 %	35 %	1.65 %	63 %	37 %
8:00	6.93 %	66 %	34 %	2.30 %	59 %	41 %
9:00	4.90 %	57 %	43 %	4.25 %	65 %	35 %
10:00	4.15 %	53 %	47 %	5.02 %	72 %	28 %
11:00	4.58 %	50 %	50 %	3.85 %	73 %	27 %
12:00	4.48 %	49 %	51 %	2.96 %	77 %	23 %
13:00	5.32 %	49 %	51 %	3.68 %	71 %	29 %
14:00	6.05 %	48 %	52 %	2.59 %	59 %	41 %
15:00	7.42 %	42 %	58 %	1.99 %	62 %	38 %
16:00	7.71 %	42 %	58 %	2.45 %	49 %	51 %
17:00	7.90 %	42 %	58 %	1.79 %	61 %	39 %
18:00	6.21 %	45 %	55 %	2.13 %	60 %	40 %
19:00	4.11 %	42 %	58 %	2.16 %	69 %	31 %
20:00	3.57 %	43 %	57 %	1.94 %	75 %	25 %
21:00	3.26 %	45 %	55 %	2.21 %	67 %	33 %
22:00	2.13 %	42 %	58 %	2.70 %	45 %	55 %
23:00	1.23 %	33 %	67 %	5.38 %	25 %	75 %

Note:

ADT = Average Daily Traffic
HCADT = Heavy Commercial Average Daily Traffic

Example Write-up for Loudest Traffic Noise Hour

Traffic Noise Analysis

Worst Hourly Traffic Noise Analysis

In general, higher traffic volumes, vehicle speeds, and numbers of heavy trucks increases the loudness of highway traffic noise. The worst hourly traffic noise impact typically occurs when traffic is flowing more freely and when heavy truck volumes are the greatest. For determining the worst-case traffic noise hour, traffic noise levels for three time periods were modeled at six representative receptor locations along the project corridor under existing conditions, taking into account the appropriate vehicle mix (i.e., cars, medium trucks, heavy trucks), seasonal traffic variations where appropriate, and directional split in traffic volume (i.e., northbound versus southbound).

The Leq level for each of the three modeled time periods are summarized in the Table below, along with the daytime monitored noise levels at each of the six representative receptor locations. Based on this analysis, it was determined that the time period from 9:00 AM to 10:00 AM represents the worst-case traffic noise hour.

TABLE "X"
EXAMPLE WORST HOURLY TRAFFIC NOISE SUMMARY

Receptor ID	Monitored Level (dBA)	Modeled Level (dBA) by Time Period		
		9:00-10:00 AM	3:00-4:00 PM	PM Peak Hour
	Leq	Leq	Leq	Leq
35	63.0	64.9	64.1	62.2
46	63.0	63.3	62.6	61.0
52	**70.3**	**69.6**	**68.8**	**67.2**
57	57.5	59.9	59.1	57.1
66	60.0	63.9	63.7	61.9
78	**70.5**	**72.1**	**71.2**	**69.9**

Bold numbers are approach or exceed Federal noise abatement criteria B (NAC B). NAC B is the appropriate category for all of the receptors in this sample scenario.