SIMPLE METHODS for ESTIMATING HIGHWAY NOISE

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What more do you want?

• Quick preliminary estimator
• Comparative calculator
• Simple screening tool
• Land planning guide
AVAILABLE METHODS

- 1978 FHWA Highway Noise Prediction Model
- 1985 HUD Noise Guidebook
- 1995/2007 FHWA TNM LookUp
DESIRABLE FEATURES

• Simple to use

• Accurate re TNM

• Yields *conservative* results re TNM

• DOES NOT consider noise barriers
Comparison with very simple TNM site model:

- Straight road on flat, barrier-less ground
- Constant traffic conditions per lane
Evaluated Geometry

- Straight 10,000-ft roadway of 200-ft long segments
- 1-, 2-, 3-, 4-, 6-, 8-, and 10-lane configurations
- No median
- Receptors 5-ft-high at distances—50, 75, 100, 150, 200, 250, 300, 400, 500, 600, 800, and 1000 ft
- Flat ground—either Soft (“lawn”) or Hard (“pavement” or “water”)
- “Average” pavement surface
Evaluated Traffic

- Level-of-service (LOS) D traffic, 1800 VPHPL
- 5% medium and 5% heavy trucks
- Uninterrupted, free flow at constant speed
- Speeds—High (70 MPH) and Low (35 MPH)
- For HUD: PHV = 10% ADT, %Nite = 15% ADT
PERFORMANCE re TNM
4-Lanes/Soft Ground/High Speed

![Graph showing performance re TNM for different models: LkUp, FHWA 78, and HUD. The x-axis represents receptor distance relative to CL (in feet), and the y-axis represents error (in dB re TNM prediction).]
PERFORMANCE re TNM
4-Lanes/Soft Ground/Low Speed
TNM LookUp re TNM
Soft Ground/Low Speed
TNM LookUp re TNM
Soft Ground/High Speed
TNM LookUp re TNM
Hard Ground/High Speed
TNM LookUp re TNM
Soft Ground/High Speed/2–6-Lane Roadways
TNM LookUp re TNM
Average for 2–6-Lane Roadways
ALTERNATIVE APPROACH

Hybrid of FHWA procedures:
• 1978 Highway Noise Prediction Model
• 1995 TNM REMELs
FHWA 78/95 re TNM
Average for 2–6-Lane Roadways
FHWA 78/95 re TNM
Soft Ground/High Speed/2–6-Lane Roadways
FHWA 78/95 re TNM
Soft Ground/High Speed

ERROR (dB re TNM Prediction) vs RECEPTOR DISTANCE re CL (ft)

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FHWA 78/95 re TNM
Soft Ground/High Speed/2–6-Lane Average—by Vehicle Type
PERFORMANCE re TNM
Soft Ground/High Speed/2–6-Lane Average

![Graph showing error in dB re TNM prediction against receptor distance in feet.](image-url)
PERFORMANCE re TNM
Average for 2–6-Lane Roadways
CONCLUSIONS

• TNM LookUp most accurate

• TNM LookUp *non-conservative* on soft sites

• FHWA 78/95 moderately conservative except at large distances on soft sites

• HUD similar to FHWA 78/95 at high speed but very conservative at low speed
RECOMMENDATIONS

- *Do not use* current TNM LookUp
- Modify TNM LookUp for roadway width with lane volumes ≤LOS-D
- Use FHWA 78/95 procedure