Proposed Thoroughfare Noise Stipulation Study

for

Manatee County Planning Department

prepared by:
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Consultants in Architectural and Environmental Acoustics


RYLAND
HOMES

Manatee County I-75 Corridor Noise Stipulation

Residential development permitted on sites with LDN ≤ 65 dBA

If sound levels on site are > 65 dBA, noise mitigation must be employed to reach the 65 dBA criterion

Mitigation to include barriers or berms to protect both the site and the homes

Living areas, bedrooms, lanais and Florida rooms located away from the noise source

Maximize distance between homes and I-75 to the extent practicable

County Noise Ordinance

Noise Ordinances usually do not apply to transportation noise sources

- Acoustical measurements not required to demonstrate that noise disturbance exists
- Acoustical measurements required to demonstrate maximum permissible sound levels are exceeded
- 55 dBA (day) and 50 dBA (night)
- Sound level limits reduced by 5 dBA for tonal sounds; increased by 10 dBA during day for short duration sounds
- Examples of Exempt Sound Sources:
  - Lawn care
  - Maintenance of trees, hedges, gardens
  - Sweepers
  - Lawn mowers
  - Limb chipping
  - Tree trimming
  - Solid waste and recycling equipment (6:00 am to 6:00 pm)

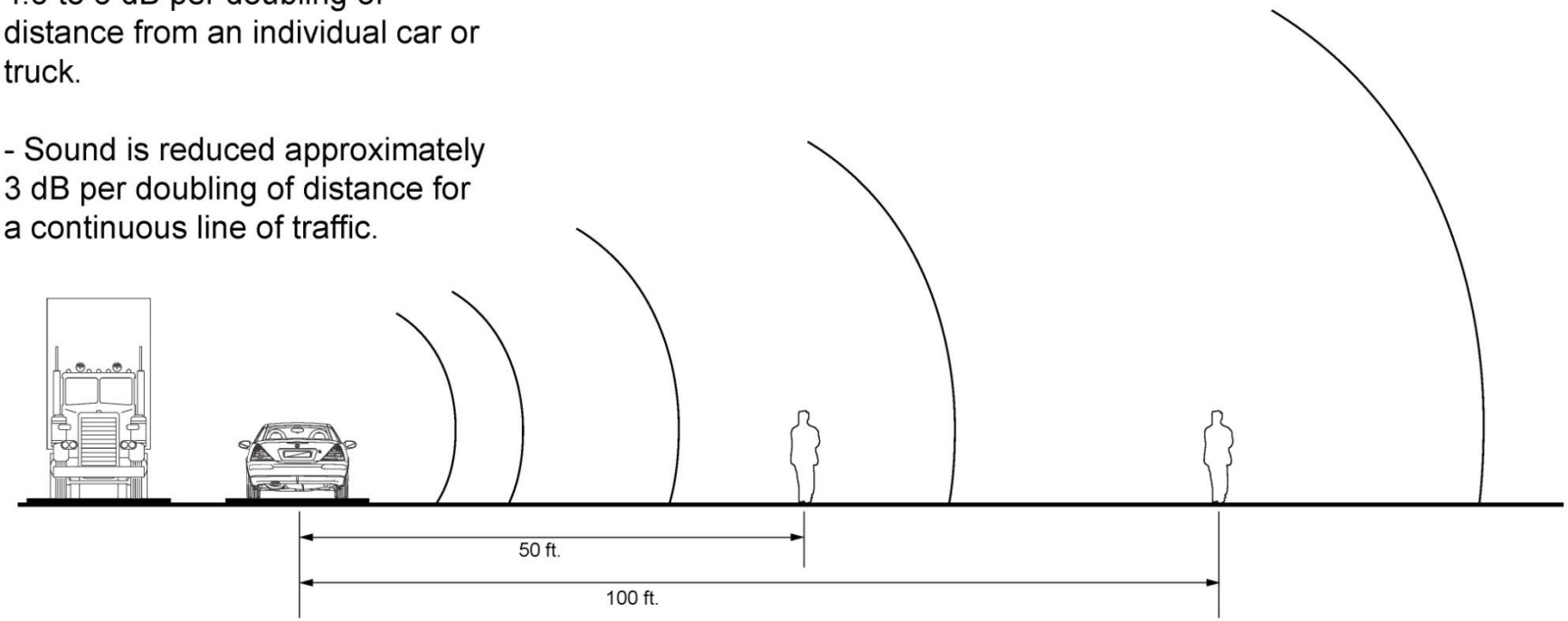
The Day Night Average Sound Level (LDN) is the average sound level taken over a 24 hour time period with a 10 dB penalty added to sounds that occur during night time hours

The Equivalent Continuous Sound Level (Leq) is the continuous or average sound level in a period of time.

Sound Reduction with Distance

- Sound is reduced approximately 4.5 to 6 dB per doubling of distance from an individual car or truck.

- Sound is reduced approximately 3 dB per doubling of distance for a continuous line of traffic.

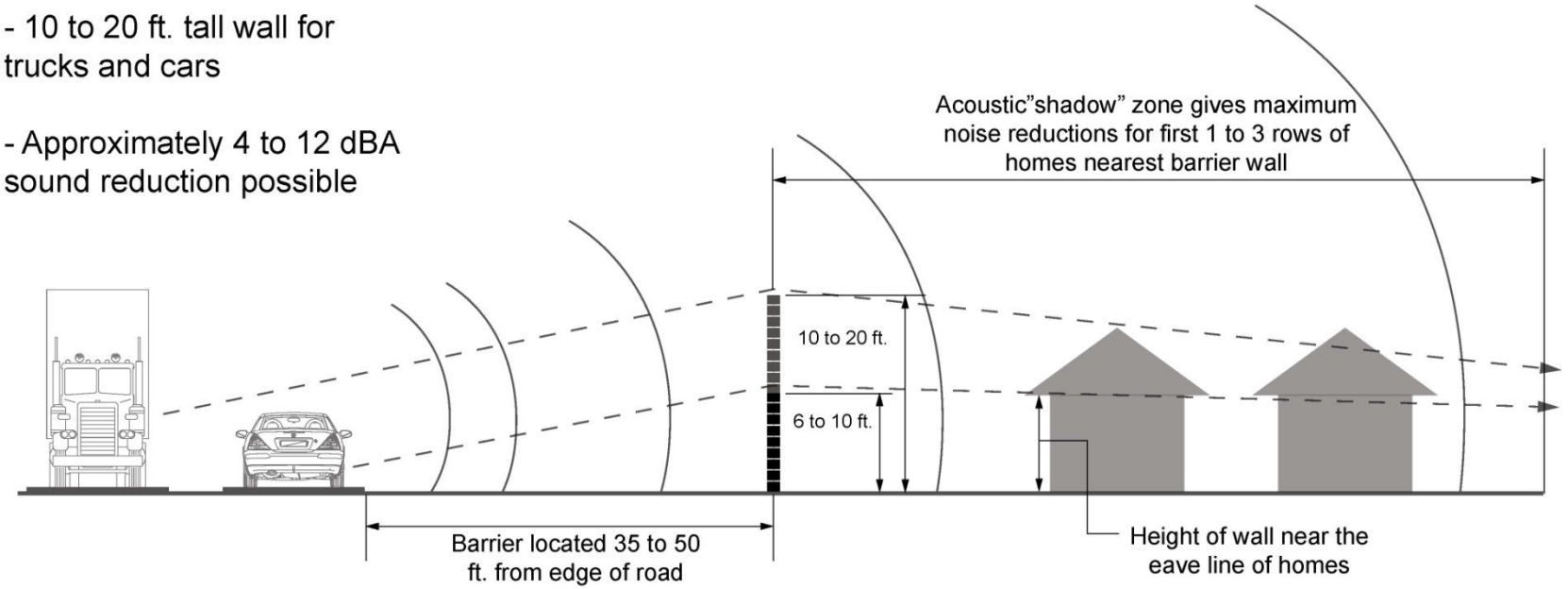


Traffic Barrier Wall

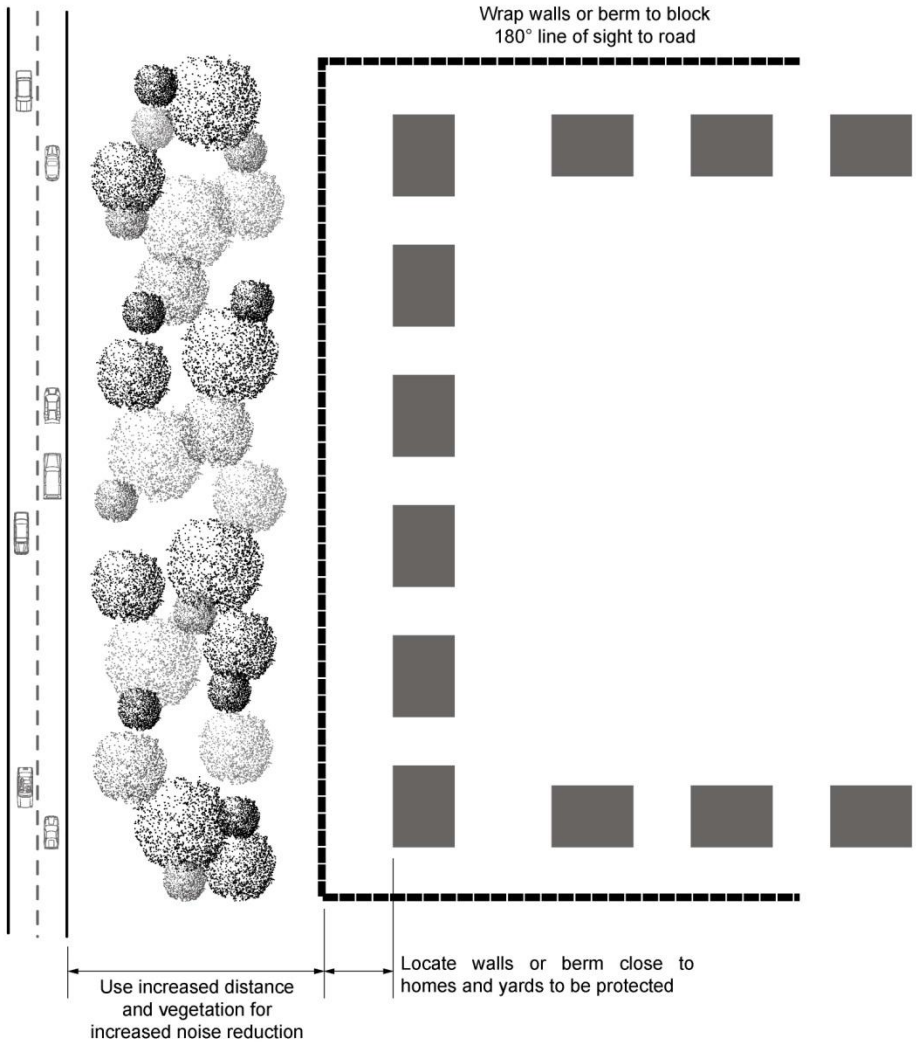
- 6 to 10 ft. tall wall cars

- 10 to 20 ft. tall wall for trucks and cars

- Approximately 4 to 12 dBA sound reduction possible

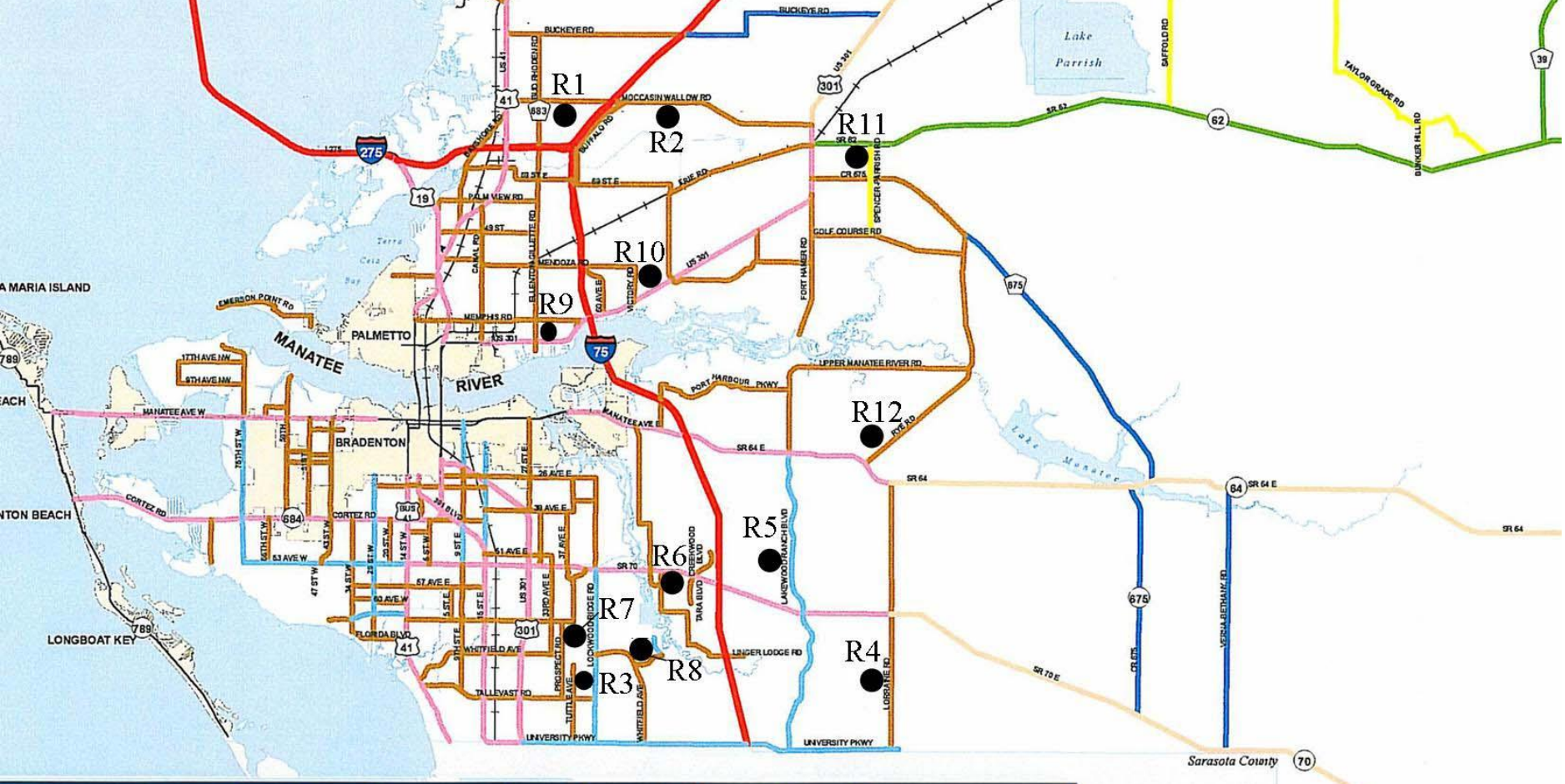


Traffic Barrier Wall Wrapping Sides of Site



METHOD

1. Conduct site visits and project meetings to select measurement sites, develop analysis protocols and obtain traffic counts.
2. Review existing County Noise Stipulation for I-75 corridor as well as various acoustical standards from Federal agencies
3. Take acoustical measurements of traffic noise and ambient sounds at the 12 selected sites
4. Iterative computer models of noise mitigation alternatives
5. Data analysis, recommendations and report



Existing Roadways Functional Classification

Functional Classification

- INTERSTATE/PRINCIPAL ARTERIAL
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- RURAL PRINCIPAL ARTERIAL
- RURAL MINOR ARTERIAL
- RURAL MAJOR COLLECTOR
- RURAL MINOR COLLECTOR
- URBAN COLLECTOR

CITY LIMITS

Map 5 - A

1 inch equals 16,550 feet

0 1 2 4

Miles

GIS

Last data update = July 25, 2005

R1 Moccasin Wallow West
66 dBA LDN
2 lane undivided urban collector
6 lane divided collector

R2 Moccasin Wallow East
63 dBA LDN
2 lane undivided urban collector
6 lane divided collector

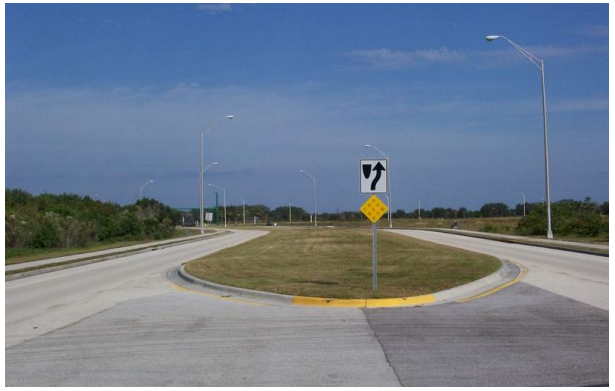
R3 Lockwood Ridge and 70th Drive
72 dBA LDN
4 lane divided minor collector
4 lane divided collector

R4 Lorraine Road/Sienna Loop
65 dBA LDN

4 lane divided urban collector

4 lane divided arterial

R5 Lakewood Ranch North of SR 70
69/62 dBA LDN
2 lane divided minor arterial
6 lane divided principal arterial



R6 SR 70 East of Braden Run
70 dBA LDN
6 lane divided principal arterial
6 lane divided principal arterial

R7 63rd Avenue at Cascades

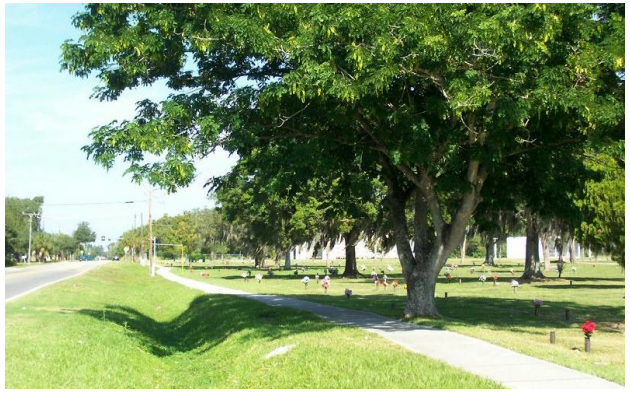
57 dBA LDN

4 lane unclassified divided road

4 lane divided arterial

R8 Honore at Mote Ranch
58 dBA LDN
2 lane divided urban collector
4 lane divided arterial

R9 Ellenton Gillette Road by Cemetery
64 dBA LDN
2 lane undivided busy urban collector
2 lane arterial



R10 US 301 by Colony Cove/Victory Road

73 dBA LDN

6 lane divided principal arterial

6 lane divided principal arterial

R11 SR 62 ½ mile East of US 301
65 dBA LDN
2 lane undivided minor rural arterial
6 lane arterial

R12 Rye Road by Entry to Country Creek
61 dBA LDN
2 lane undivided urban collector
4 lane arterial

Data sorted into 4 groups of sites based on LDN

Data normalized to a 100 ft distance from the edge of the road to the nearest part of a residential property

GROUP 1

LDN 70-74 dBA

Major arterials, 6 lane divided highways
Traffic moving at higher speeds
Large numbers of cars and trucks
US 301

GROUP 2

LDN 65-69 dBA

2 lane rural and 6 lane arterials
High truck counts, high speed travel
SR 70, SR 62 and Moccasin Wallow East

GROUP 3

LDN 60-64 dBA

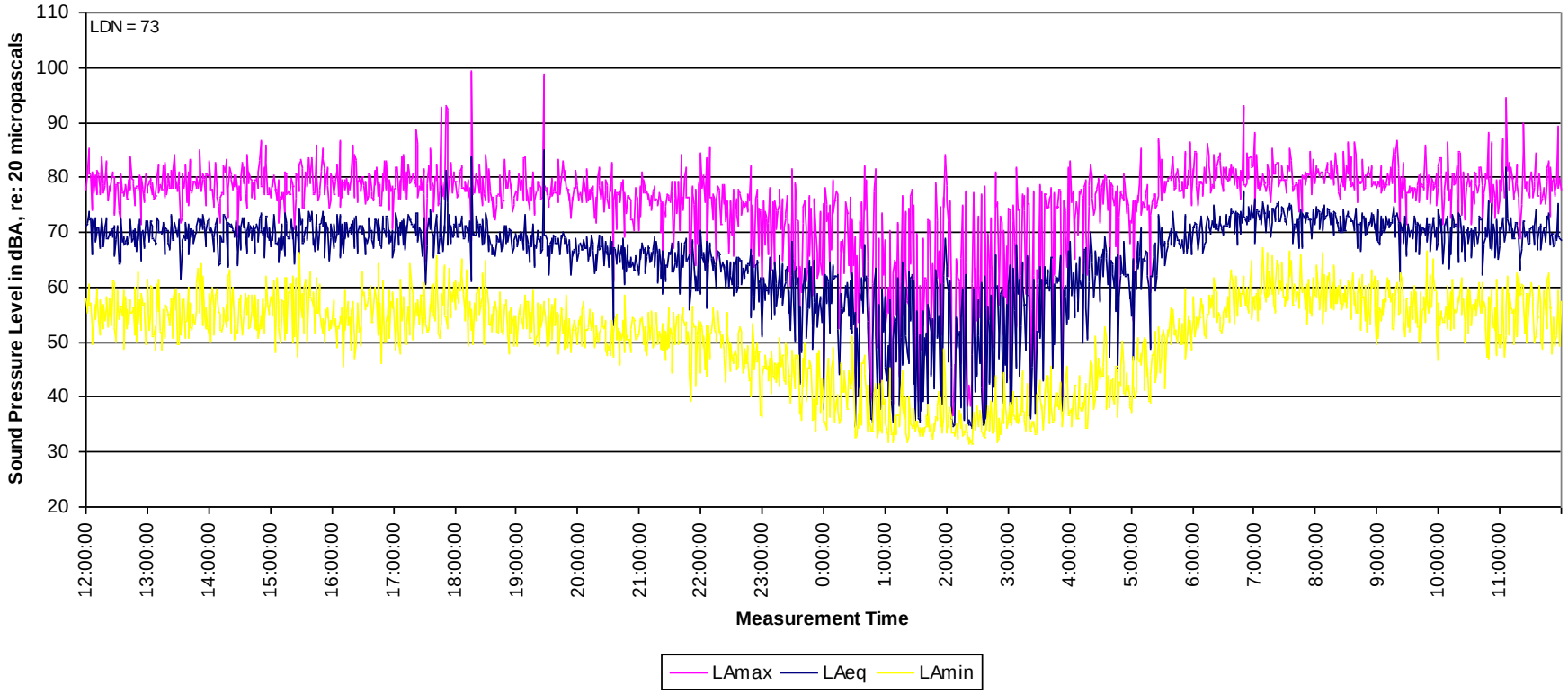
4 lane divided connectors and 2 lane roads
Sub group 1 – primarily auto traffic
Lockwood Ridge, Lorraine Road and Ellenton Gillette Road
Sub group 2 – trucks
Moccasin Wallow West

GROUP 4

LDN 55-59 dBA

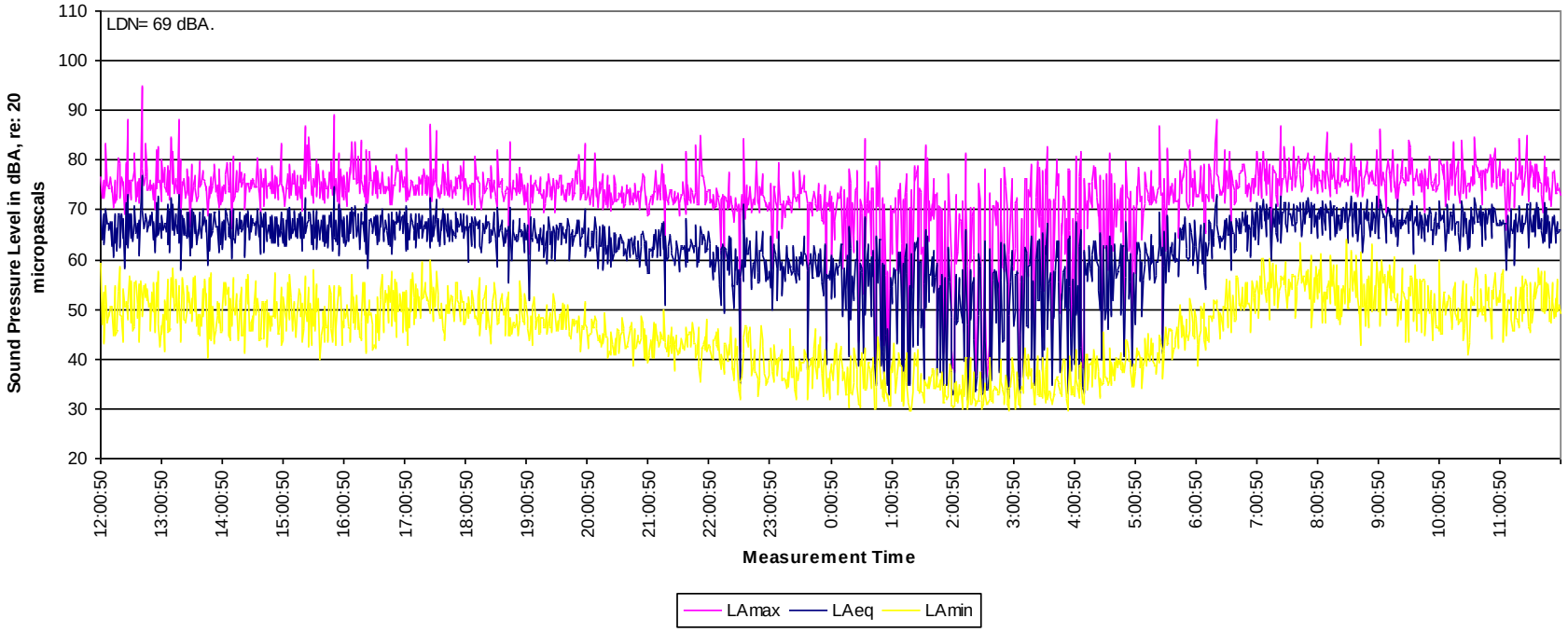
Lightly traveled roads with cars at moderate speeds
63rd Avenue at Cascades, Honore, Rye Road

Manatee County Thoroughfare Noise Stipulation
Location: R10A US-301
January 14, 2008 (Monday) to January 15, 2008 (Tuesday)



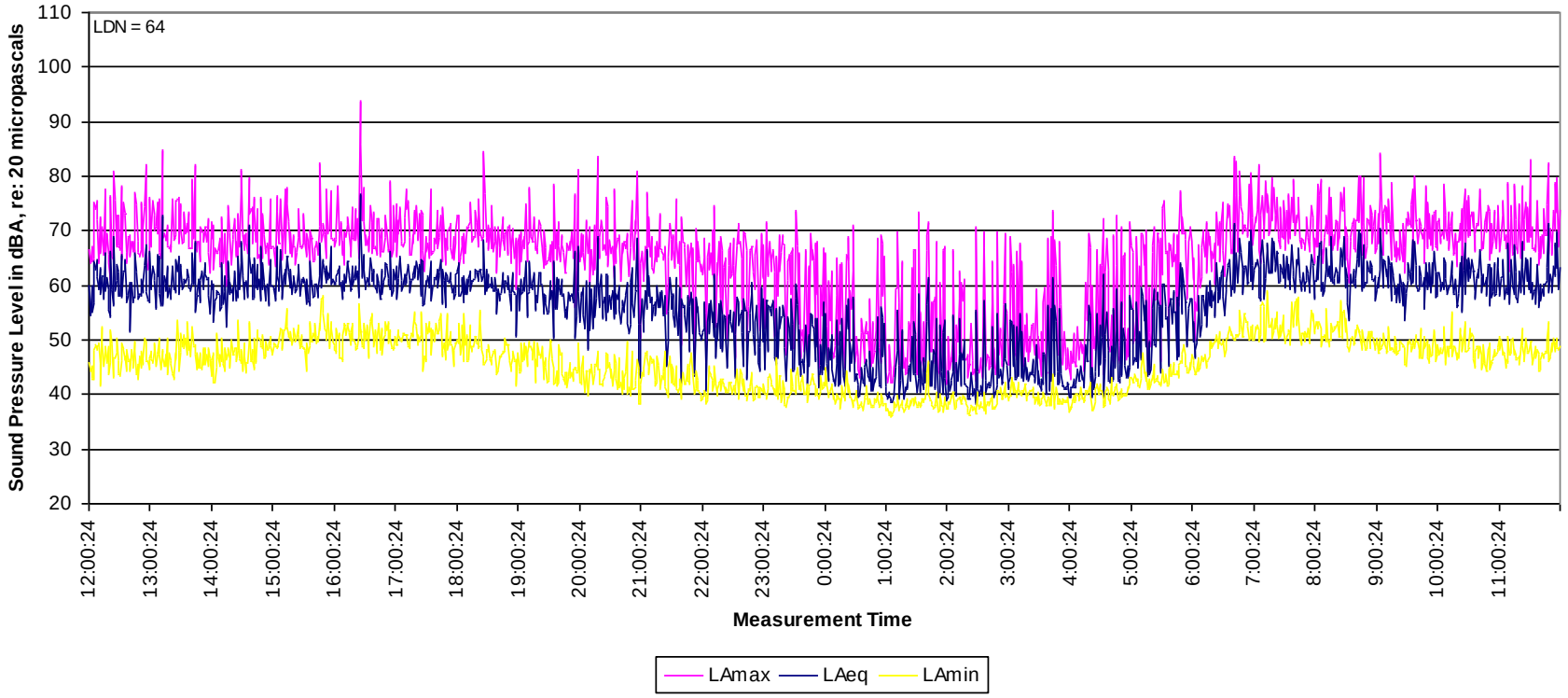
LDN 73 dBA

Manatee County Thoroughfare Noise Stipulation
Location: R6 SR-70 at Braden Woods
November 19, 2007 (Monday) to November 20, 2007 (Tuesday)



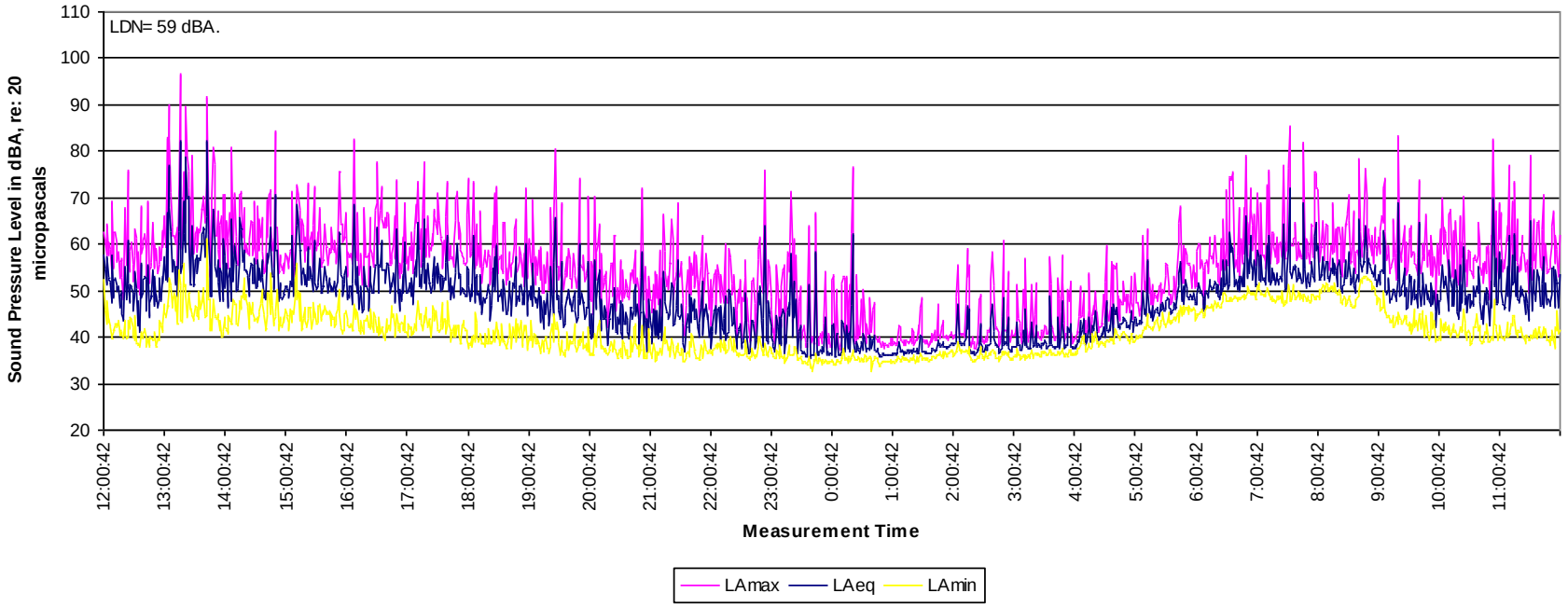
LDN 69 dBA

Manatee County Thoroughfare Noise Stipulation
Location: R9 Ellenton Gillette Road
November 27, 2007 (Tuesday) to November 28, 2008 (Wednesday)



LDN 64 dBA

Manatee County Thoroughfare Noise Stipulation
Location: R8 Honore at Mote Ranch
December 5, 2007 (Wednesday) to December 6, 2007 (Thursday)



LDN 59 dBA

COMPUTER MODELS

Computer model based on HUD *Noise Assessment Guidelines* developed for each site and calibrated with field data (1-2 dB generally agreement between field measured average LDN's and calculated)

Computer models account for traffic only sounds. They do not include construction in the vicinity, insects, air conditioners at homes, birds, wind and other non-traffic sources.

Traffic data used in the models were obtained from monitoring of current traffic flows at each site for 48 hours each by the County

Iterative models developed for each site to determine sound reduction achieved by various noise mitigation strategies

1. Increasing distance

2. Adding densely planted tree buffers

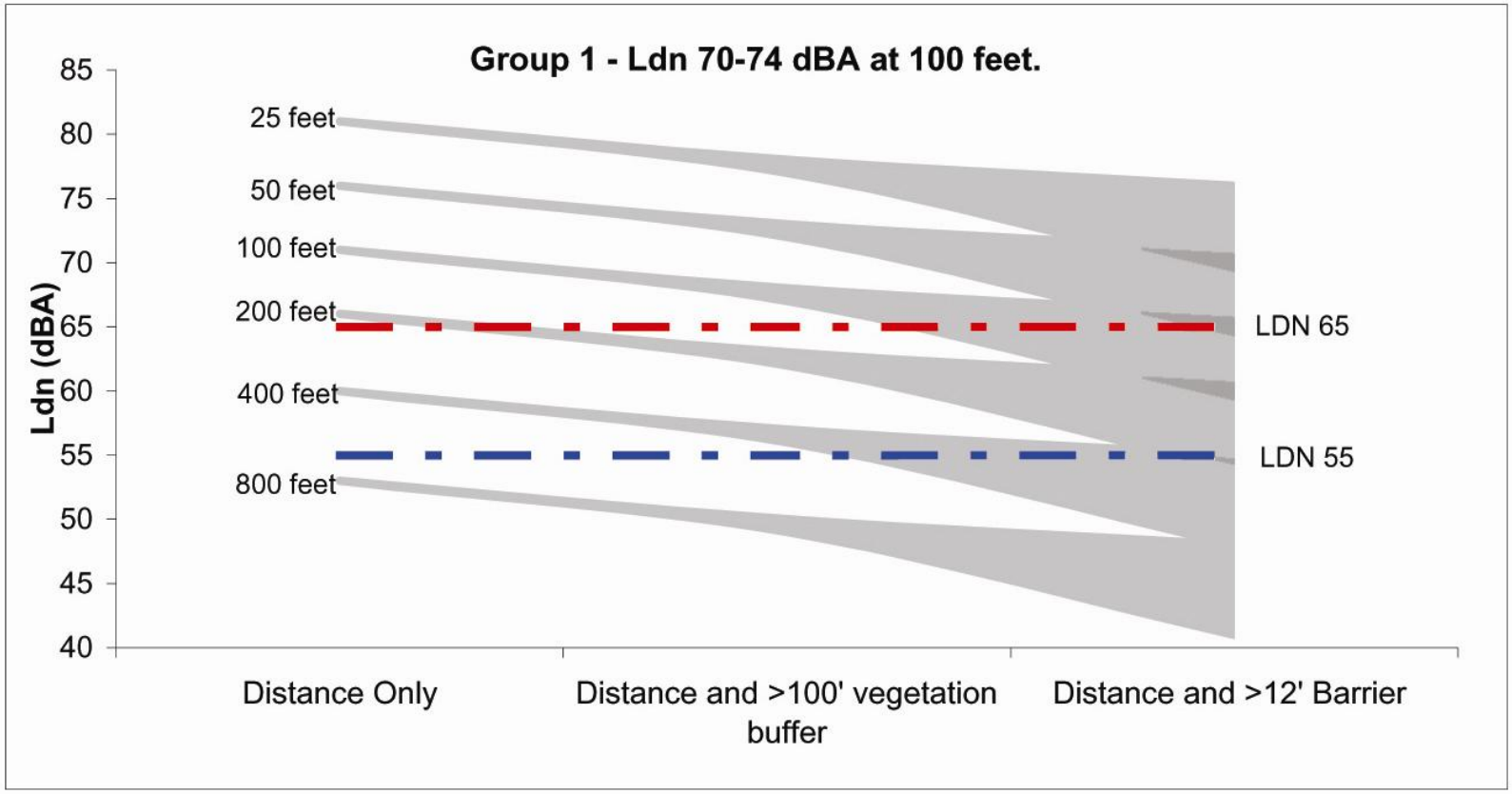
3. Constructing walls, berms and berm/wall combinations of various heights

4. Alternative planning strategies

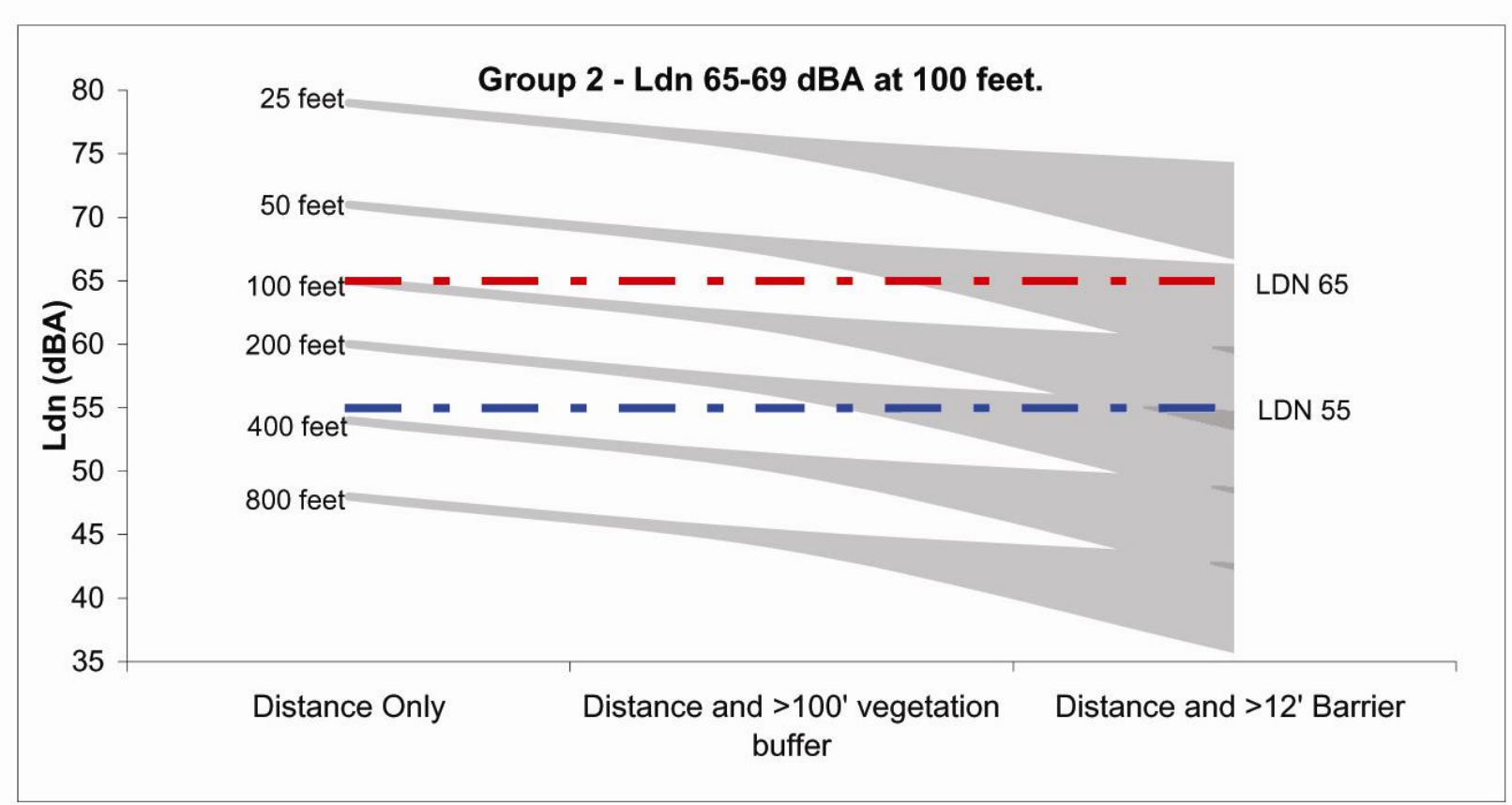
WHO, US EPA and HUD generally recommend 55 dBA as the maximum exterior sound level for residential communities

FICUN, HUD and other federal agencies generally recommend outside noise levels in residential areas of 55 dBA LDN
However, they allow residential construction in areas with sound levels up to 65 dBA LDN when economic, social and other specific needs of a community justify using lands with higher sound levels

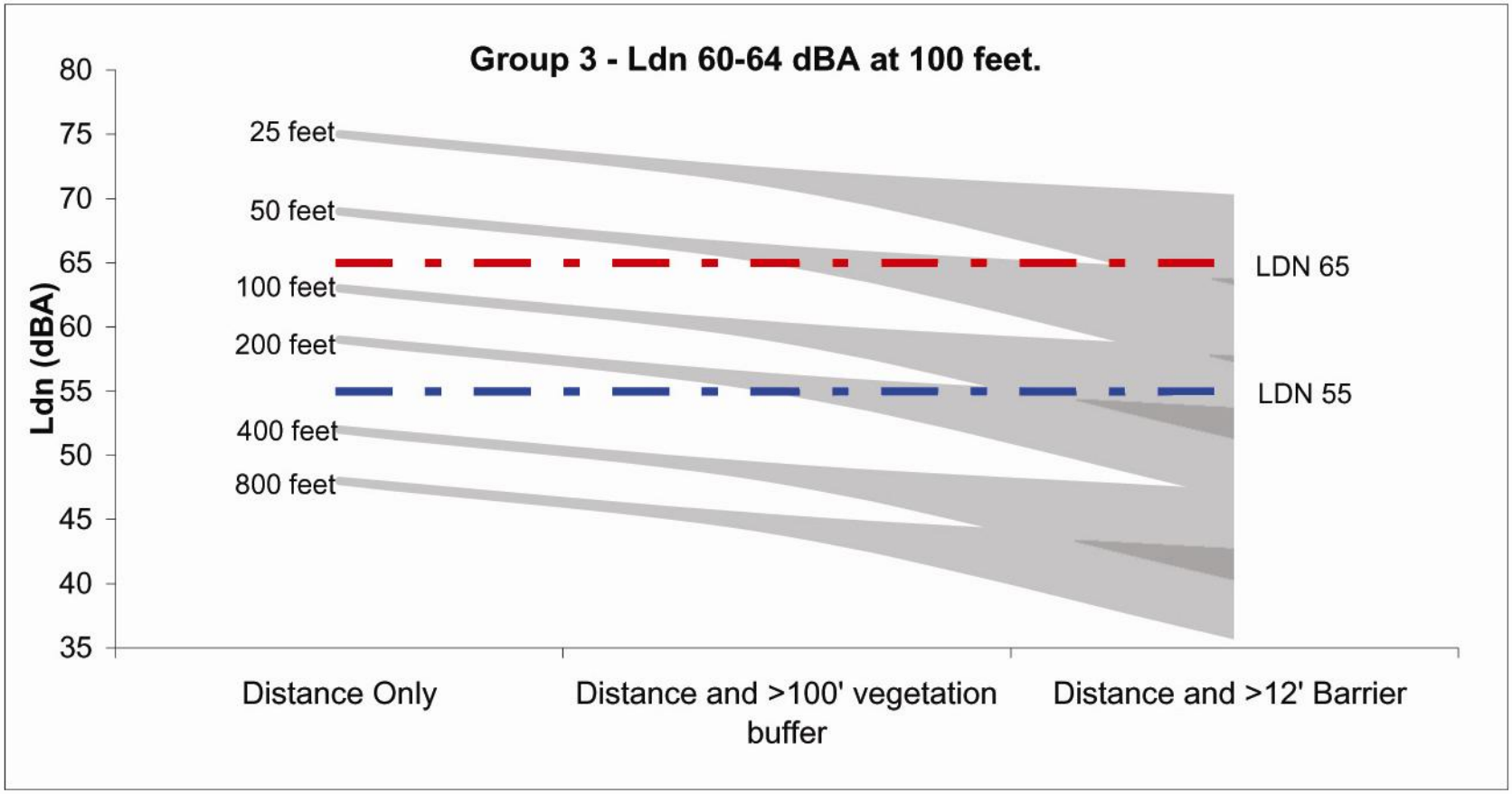
All Federal agencies recommend 45 dBA LDN as maximum allowable interior sound level


Group 1 - Ldn 70-74 dBA at 100 feet.
Ldn (dBA)
85
80
75
70
65
60
55
50
45
40
25 feet
50 feet
100 feet
200 feet
400 feet
800 feet
LDN 65
LDN 55
Distance Only
Distance and >100' vegetation buffer
Distance and >12' Barrier

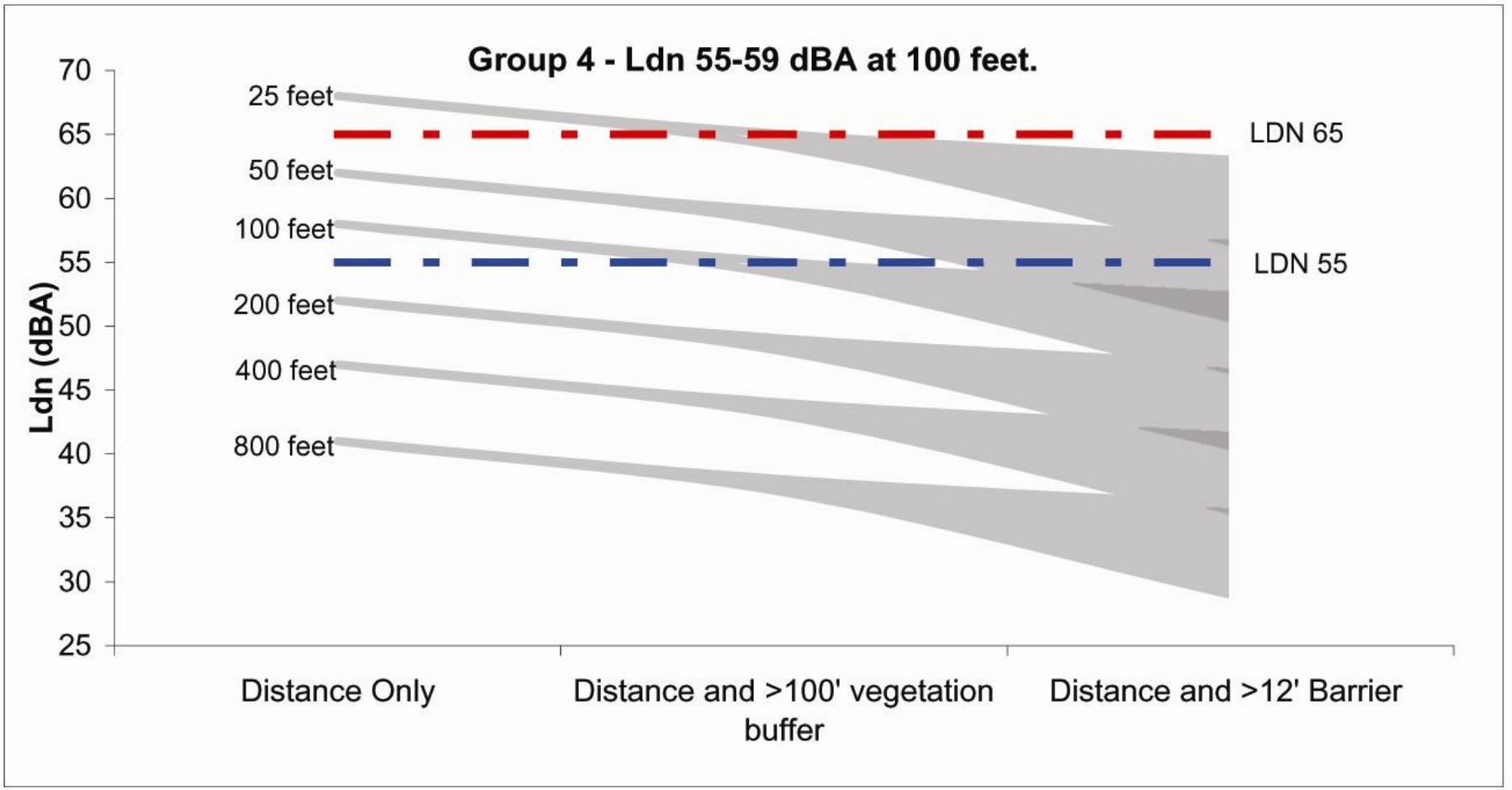
Group-Distance	LDN (dBA)	Distance only	Dense Vegetative Buffer	Wall, berm or berm/wall combination
Group 1 LDN 70-74 dBA at 100 ft				
25 ft	80-82	Exceed	Exceed	Special acoustical design required
50 ft	75-76	Exceed	Exceed	Special acoustical design required
100 ft	71-70	Exceed	Exceed	15-20' + meets 65 dBA
200 ft	66-63	Exceed	Meets 65 dBA with 100' buffer	12-16' meets 55 dBA
400 ft	62-57	Meets 65	Exceeds 55 dBA with 100' buffer	12-18' meets 55dBA
800 ft	57-49	Meets 65	Meets 55 dBA with 100' buffer	NA


Group 2 - Ldn 65-69 dBA at 100 feet.
Ldn (dBA)
80
75
70
65
60
55
50
45
40
35
25 feet
50 feet
100 feet
200 feet
400 feet
800 feet
LDN 65
LDN 55
Distance Only
Distance and >100' vegetation buffer
Distance and >12' Barrier

Group-Distance	LDN (dBA)	Distance only	Dense Vegetative Buffer	Wall, berm or berm/wall combination
Group 2 - LDN 65-69 dBA at 100 ft				
25 ft	78-79	Exceed	Exceed	Special acoustical design required
50 ft	69-72	Exceed	Exceed	12-20' + meets 65 dBA
100 ft	64-66	Barely Meets 65 dBA	Meets 65 dBA with 100' buffer	16 - 20' meets 55 dBA
200	60	Meets 65 dBA	Almost meets 55 dBA with 100' buffer	12-16' meets 55dBA
400 ft	53-55	Meets 55 dBA	Meets 55 dBA	N/A
800 ft	45-51	Meets 55 dBA	N/A	N/A


Group 3 - Ldn 60-64 dBA at 100 feet.
Ldn (dBA)
80
75
70
65
60
55
50
45
40
35
25 feet
50 feet
100 feet
200 feet
400 feet
800 feet
LDN 65
LDN 55
Distance Only
Distance and >100' vegetation buffer
Distance and >12' Barrier

Group-Distance	LDN (dBA)	Distance only	Dense Vegetative Buffer	Wall, berm or berm/wall combination
Group 3 - LDN 60-64 dBA at 100 ft				
25 ft	70-79	Exceed	Exceed	16-20' + meets 65dBA
50 ft	66-72	Exceed	Exceed	12-20' +meets 65 dBA
100 ft	60-66	Meets 65 dBA	Meets 65 dBA with 100' buffer	12-18' meets 55 dBA
200 ft	57-60	Meets 65 dBA	Meets 55 dBA with 100' buffer	6-12' meets 55 dBA
400 ft	51-53	Meets 55 dBA	N/A	NA
800 ft	47-49	Meets 55 dBA	N/A	NA


Group 4 - Ldn 55-59 dBA at 100 feet.
Ldn (dBA)
70
65
60
55
50
45
40
35
30
25
25 feet
50 feet
100 feet
200 feet
400 feet
800 feet
LDN 65
LDN 55
Distance Only
Distance and >100' vegetation buffer
Distance and >12' Barrier

Group-Distance	LDN (dBA)	Distance only	Dense Vegetative Buffer	Wall, berm or berm/wall combination
Group 4 - LDN 55-59 dBA at 100 ft				
25 ft	65-69	Exceeds	Almost Meets 65 dBA with 100' buffer	10-14' meets 55 dBA
50 ft	60-63	Meets 65 dBA	Meets 65 dBA with 100' buffer	8-12' meets 55 dBA
100 ft	56-59	Meets 65 dBA	Meets 55 dBA with 100' buffer	6-12' meets 55 dBA
200 ft	50-54	Meets 55 dBA	N/A	NA
400 ft	43-50	Meets 55 dBA	N/A	NA
800 ft	37-45	Meets 55 dBA	N/A	NA

Recommendations

1. Noise stipulation for secondary roads should consider *future* location, status and traffic counts

2. Using a goal of 55 dBA LDN for exterior areas would be consistent with WHO, EPA and other agency recommendations

3. County could consider raising this level to 65 dBA LDN if economic, social or other goals supercede the sonic environment of the community as many Federal agencies do

4. Homes built in areas with higher LDN's than allowed should have noise mitigation required for outdoor areas of the site and for the building envelope to reach 45 dBA maximum LDN inside

5. Second floor balconies and outdoor living areas or building facades built where elevation changes put them above or below the roadway will require special consideration

Noise mitigation strategies to include:

1. Increased distance from the road
2. Dense vegetative buffers – 100 ft depth gives 3-4 dBA sound reduction
3. 6-12 ft tall walls, berms or berm/wall combinations for car noise
4. 12-20+ walls, berms or berm/wall combinations for car and truck noise
5. Develop alternative mitigation strategies

6. In urban areas consider requiring interior sound levels to be ≤ 45 dBA LDN

Alternative approaches

a. Locate open space, drainage retention and other natural areas between homes and the roads to increase distance

b. Develop commercial, retail, office, hotel and other less critical and uses and the associated parking between homes and busy roads to increase distance and serve as barriers to road noise

c. Develop long range plans for alternative transportation modalities to reduce the need to expand roadways

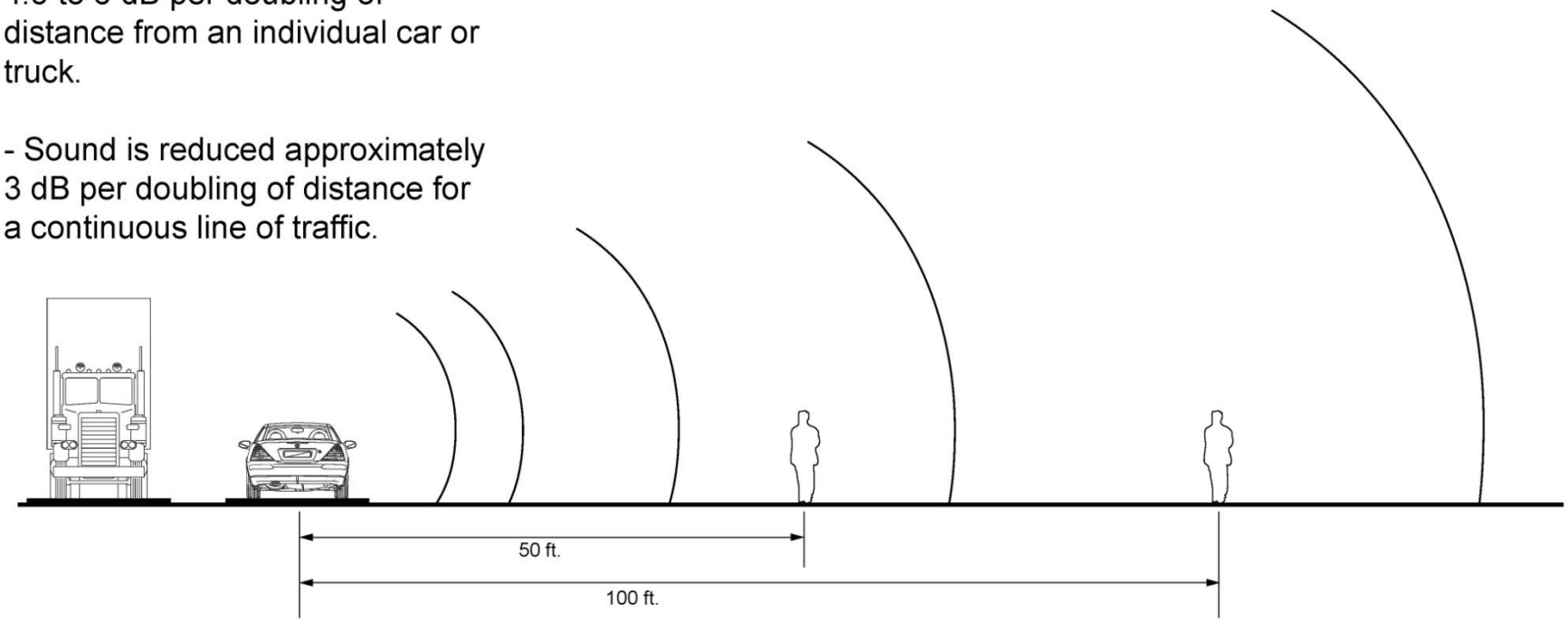
d. Develop alternative zoning strategies to provide mixed use centers, live/work/shop/school communities to reduce future needs for road way expansion

e. Develop incentives for renewal of downtown and close-in suburban infill projects to attract development

Sound Reduction with Distance

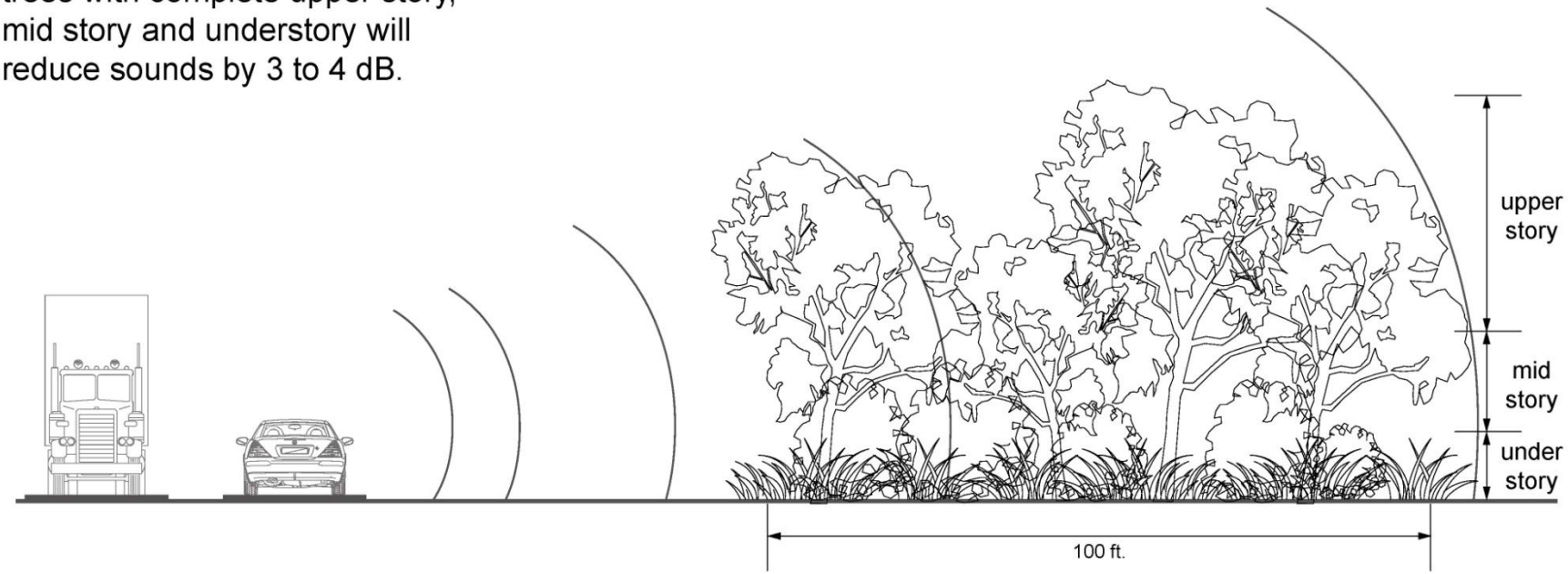
- Sound is reduced approximately 4.5 to 6 dB per doubling of distance from an individual car or truck.

- Sound is reduced approximately 3 dB per doubling of distance for a continuous line of traffic.



Vegetated Barrier

- A 100 ft. depth of densely planted trees with complete upper story, mid story and understory will reduce sounds by 3 to 4 dB.

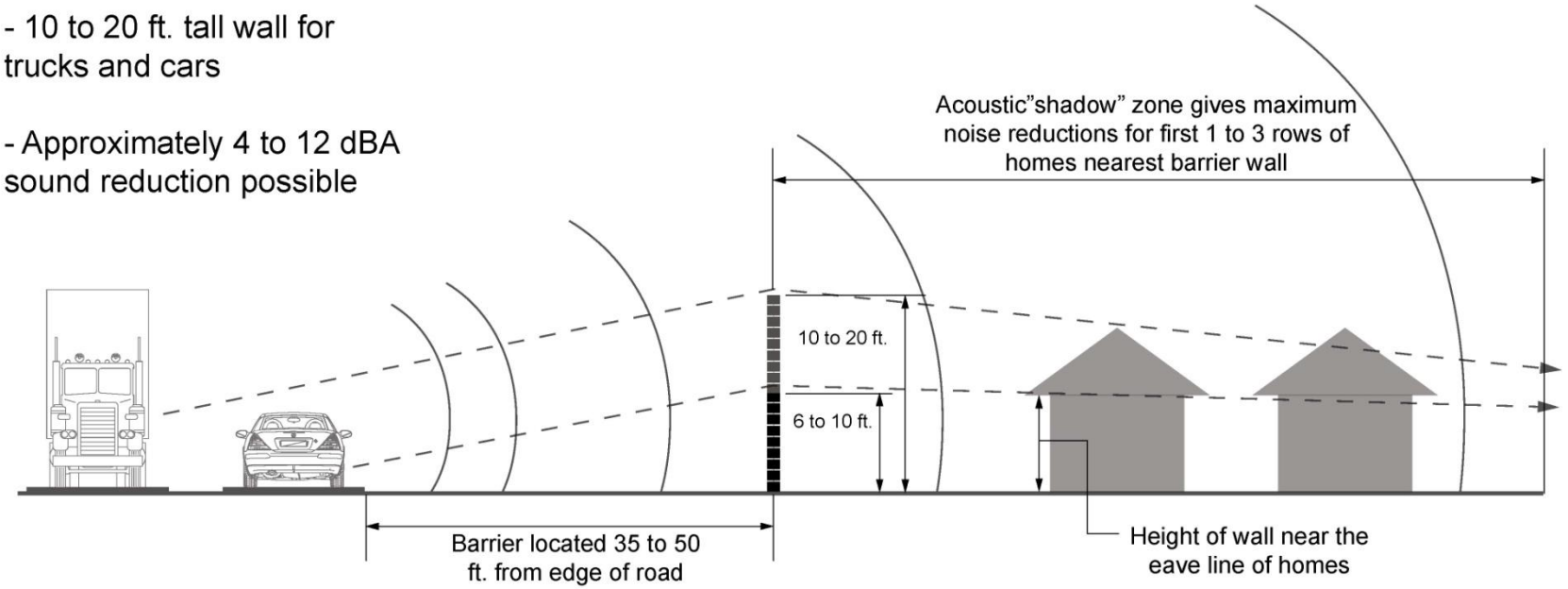


Traffic Barrier Wall

- 6 to 10 ft. tall wall cars

- 10 to 20 ft. tall wall for trucks and cars

- Approximately 4 to 12 dBA sound reduction possible

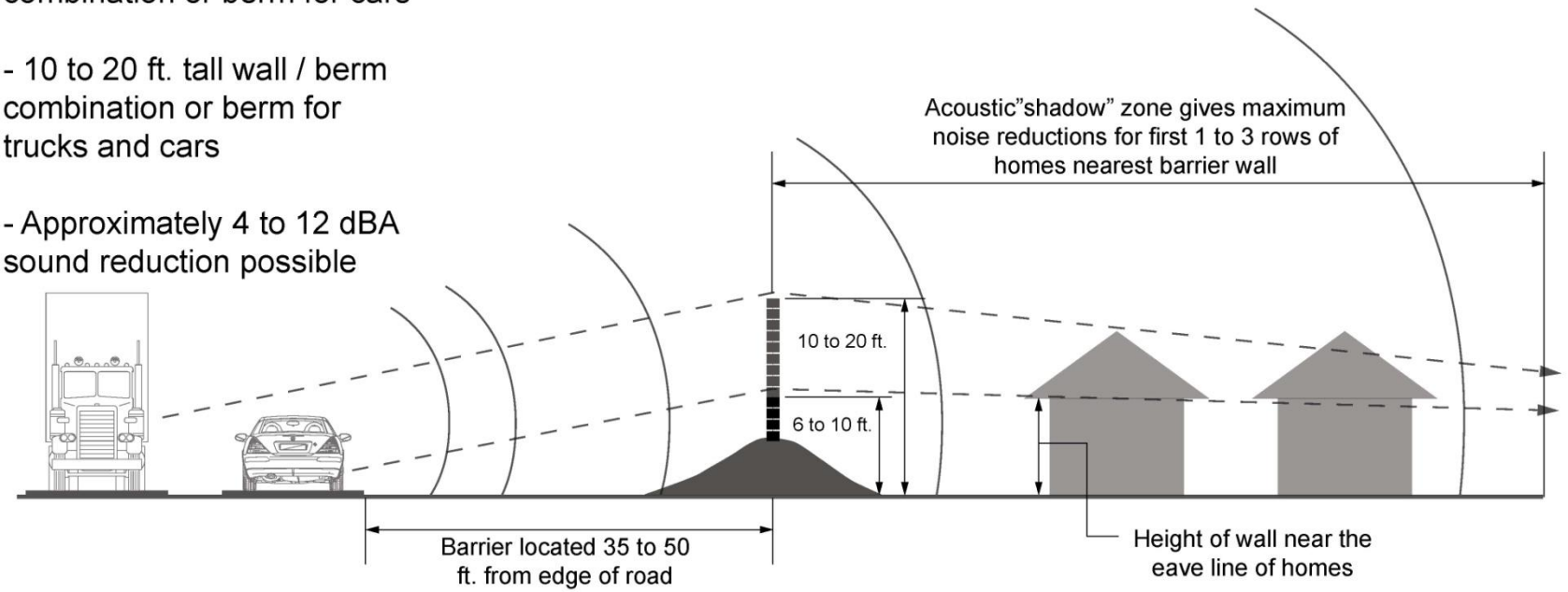


Traffic Barrier Wall / Berm

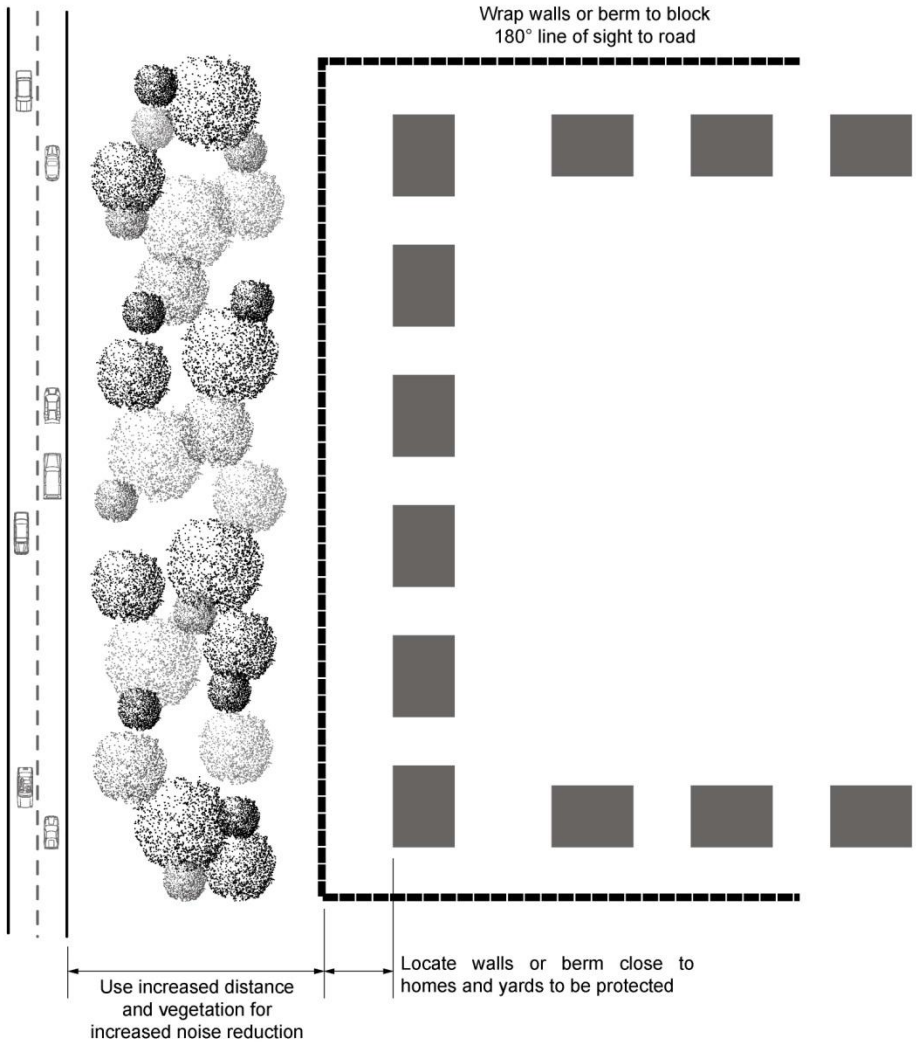
- 6 to 10 ft. tall wall / berm combination or berm for cars

- 10 to 20 ft. tall wall / berm combination or berm for trucks and cars

- Approximately 4 to 12 dBA sound reduction possible



Traffic Barrier Wall Wrapping Sides of Site



QUIET COMMUNITIES

Meet standards

Plan for and design community soundscape

Provide for a better tomorrow

. . . "Always the wish that you find patience enough in yourself to endure, and simplicity enough to believe, that you may acquire more and more confidence in that which is difficult, and in your solitude among others" . . .

Rainier Maria Rilke *Letters to a Young Poet* 1954