

# Noise Assessment Training

- Noise affects people's ability to:
  - Talk to one another
  - Hear threats around them
  - Enjoy recreational pursuits
  - Learn and concentrate
- Noise causes physical harm
- Noise reduces property value and resale potential

# Noise Assessment Goals

- **Comply with the *Housing Act of 1949* by creating and enforcing a standard for “a decent home in a suitable living environment.”**
- **Comply with the *HUD Act of 1965* mandate “to determine feasible methods of reducing the economic loss and hardships suffered by homeowners...following the construction of airports...”**
- **Comply with *Compatible Land Uses at Federal Airfields* to not promote incompatible land uses within the influence of military and other federal air installations.**

# Objectives

HUD Strategic Framework Objectives Advanced through Noise Assessments:

- **Objective B1:** Expand access to and availability of **decent, affordable rental housing.**
- **Objective B2:** Improve the management accountability and **physical quality** of public and assisted housing.
- **Objective C3:** Foster a suitable living environment in communities by **improving physical conditions and quality of life.**
- **Objective C5:** Address housing conditions that **threaten health.**

These directly pertain to the quality of housing both at the individual and community scales and the quality of life for residents.

# Indoor Standard and Concerns

- 45 Decibels (dBs) Maximum (24CFR51.101(a)(9))
- Major Issues:
  - If Outdoor Noise Level is 65 dBs or Less, Indoor will be 45 dBs or Less with Typical Construction (24CFR51.103(c)(2))
  - Four Management Options:
    - **REDUCE**: Reduce the Noise Emitted from a Sound Generator.  
(HUD has No Authority to Regulate Equipment Manufacturers or Operators)

## *Best Choices*

- **SEPARATE**: Move Building Further from the Sound Generator.
- **MITIGATE PROPERTY**: Construct Noise Barriers Near Property Lines.
- **MITIGATE BUILDING**: Use Sound-Attenuating Building Construction and Materials in the Building Construction.  
(Least Desirable: Subjects Outdoor Areas to Excessive Noise)

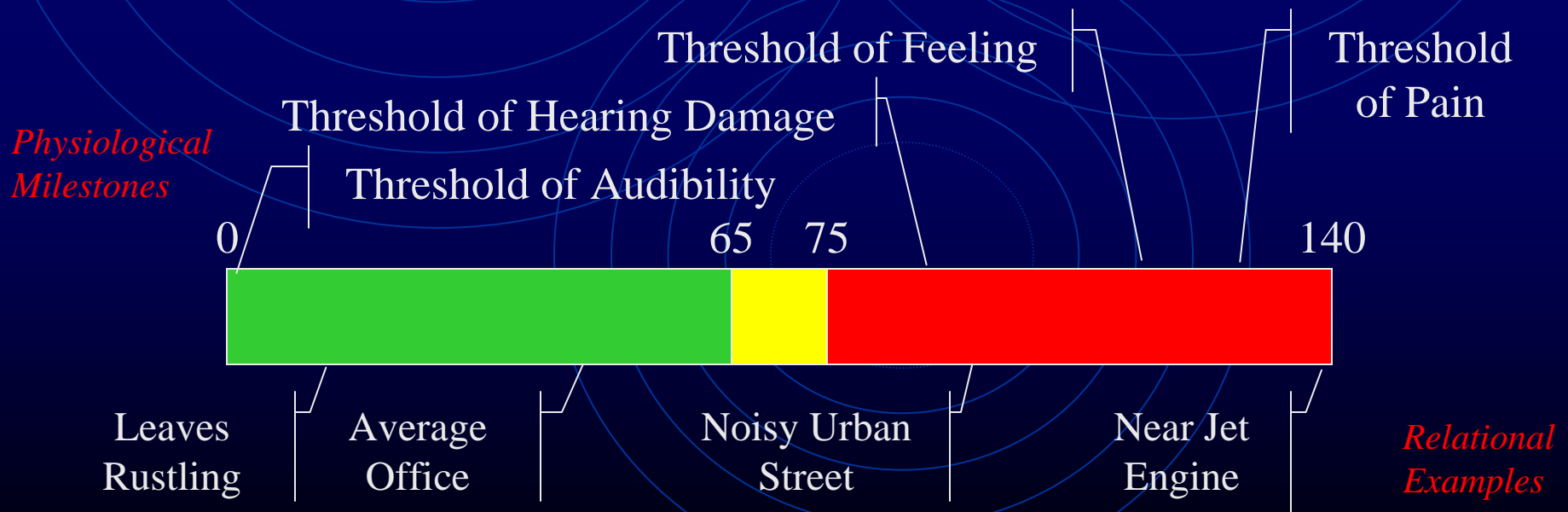
# Outdoor Noise Critical

- Direct, Causal Relationship to Interior Noise Level
- Outdoor Recreation Degraded or Negated
- Community Cohesion Affected (Neighbors Can't Talk over the Fence or have Block Parties)
- **Caution:** Mitigation Measures can Create Urban Design Challenges

# Outdoor Standards

24CFR51.103 (Noise Guidebook pg 50)

- Acceptable Range:  $\leq 65$  dBls
- Normal Unacceptable Range:  $>65$  dBls  $\leq 75$  dBls
- Unacceptable Range:  $>75$  dBls



# Major Noise Generators of Concern

- Airports
- Roadways
- Railroads
- Military and Industrial Facilities

# Assessment Process—How and What

Step 1:  
Understand  
the Project

- Project Name
- Site Location
- Neighboring Uses
- Program
- Military Installations (15 miles)

Step 2:  
Gather Raw  
Data for  
Calculations

- Aircraft**
- Airports within 15 mi.
  - Noise Contours
  - Supersonic Flights?
  - Proj. # Day/Night Ops

- Roads**
- Major Roads within 1000'
  - Distances to Lanes
  - Distance to Stop Sign
  - Road Grade Up and Down
  - Average Speed
  - Proj. 24hr Avg for Cars
  - Proj. 24hr Avg for Trucks
  - Nighttime Fraction

- Railway**
- Railways within 3000'
  - Distance to Tracks
  - Proj. 24hr Diesel Trains
  - Proj. 24hr Electric Trains
  - Nighttime Fraction
  - Avg Cars per Train
  - Avg Speed
  - Welded or Bolted Track
  - Between Whistlestops?

Step 3:  
Calculate  
Noise Levels  
by Source

Step 4:  
Combine  
and Assess

Step 5:  
Noise  
Attenuation  
if Needed

Step 6:  
Combine and  
Reassess

- Barrier Design**
- Elev. of Noise Assessment Location or Observer
  - Elev. of Roadway
  - Elev. of Barrier
  - Dist. from Road to Barrier
  - Dist. from Barrier to Observer
  - If Non-continuous, Length of Barrier



# Assessment Process — Where

Step 1:  
Understand  
the Project

Step 2:  
Gather Raw  
Data for  
Calculations

Step 3:  
Calculate  
Noise Levels  
by Source

Step 4:  
Combine  
and Assess

Step 5:  
Noise  
Attenuation  
if Needed

Step 6:  
Combine and  
Reassess

Site Evaluation  
Worksheet A

Aircraft  
Worksheet B

Aircraft  
Worksheet B

Site Evaluation  
Worksheet A

Roads and  
Railways  
Workcharts 5-7

Site Evaluation  
Worksheet A

Roads  
Worksheet C,  
Page 1

Roads  
Worksheet C,  
Page 2  
Workcharts 1&2

Aircraft  
Worksheet B

Railway  
Worksheet D,  
Page 1

Railway  
Worksheet D,  
Page 2  
Workcharts 3&4

Roads  
Worksheet C,  
Page 2

Railway  
Worksheet D,  
Page 2

# Understand the Project

- What is Proposed?
- Where is it Located?
- Who will be Affected?
- What is in the Vicinity?

# Case Study: New Visions Center

The background features three large, overlapping circles arranged in a triangular pattern. Each circle contains several concentric inner rings, creating a target-like or ripple effect. The circles overlap in the center, creating a complex geometric pattern.

# Case Study: New Visions Center

## Step 1: Understand the Project

- Program: Homeless Shelter for Adults with Counseling and Dining Facilities
  - No Outdoor Uses
- Location: Council Bluffs, Iowa
- Noise Sources in the Vicinity:
  - Large Railyard Immediately Behind the Property Used by 3 Different Railroads
  - Two Civilian Airports within 15 Miles
  - Local Arterial Road 400' from Site

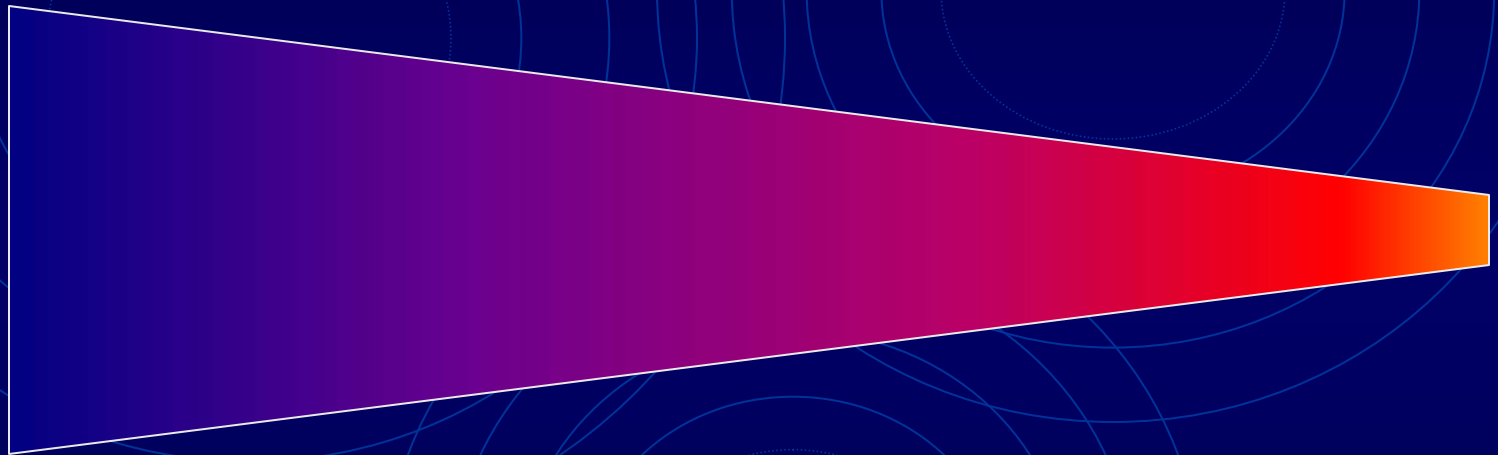
# Step 2: Gather Data

- Talk to the Developer or Sponsor
  - Does She Recognize Noise as a Challenge? (Yes at CB)
  - Are Mixed-Use Buildings Planned for Current Phase or Future Expansions? (Yes at CB. Temporary Lodging, Offices and Counseling)
  - Are there Uses Proposed that are Less Noise-Sensitive (for example Offices or Retail)? (Yes at CB. Offices and Dining)
  - Is the Site Planning Complete or In Progress? (Preliminary Complete at CB. Potential to influence at time of review.)
  - Will Outdoor Use be a Prominent Component of the Development? (No outdoor uses at CB)
    - Are Young Families and First-Time Homebuyers the Target Market?
    - Will Balconies be Installed?
    - Are Patios and Decks to be Built?

# Noise Sensitivity Continuum

*Least Sensitive*

*Most Sensitive*



*Land Uses*

Industrial

Commercial,  
Office

Retail

Performance  
Venues,  
Recreational

Residential

*Interior Spaces*

Storage,  
Garage

Bath, Utility

Kitchen

Living/Family  
Room

Bedroom,  
Den

# Step 2: Gather Data

- Gather Site and Vicinity Maps
  - Planimetric Maps Show Physical Features (Roads, Buildings, Utilities, Trees, Shorelines, etc.)
  - Topographic Maps Show Elevation Contours and Often Include Physical Features
- Visit Site If Possible

# Step 2: Gather Data

## *New Visions Vicinity Map*

Eppley  
Airfield  
(7.7 Miles)

Local  
Arterial  
Street

Offutt AFB  
(16 Miles)

Council  
Bluffs  
Airport  
(7.3 Miles)

Existing  
Railyard





# Step 2: Gather Data

- Review Local Plans
  - Comprehensive
  - Economic Development
  - Transportation
  - Development
  - Land Use
  - Infrastructure
  - Zoning
- Review Websites for Neighboring Businesses and Other Uses

# Step 2: Gather Data

- Airports
  - Contact Federal Aviation Administration
    - Is the Airport(s) Listed on the National Plan of Integrated Airport Systems (NPIAS)?
    - **At Council Bluffs, Both Eppley Airfield and Council Bluffs Airport are on the NPIAS.**
  - Contact Airport Manager or Noise Office
    - Noise Plan?
    - Noise Contours? (**None available at CB**)
      - Most Airports have a Noise Plan that includes Noise Contours.
      - At Military Installations, Ask for their “Air Installation Compatible Use Zone” Plan.
      - Nearly all Installations that Make Noise have a Plan for Managing it.

# Step 2: Gather Data

- Roadways
  - Contact State Department of Transportation (xDOT) or Local Transportation Agencies (City or County Departments) as Appropriate
    - Traffic Projections (Min. 10 Years into Future) (Only 2004 Data Provided with the original CB Assessment)
    - Percentage Breakdown of Automobiles and Medium and Heavy Trucks (Iowa DOT had already combined Cars and Trucks. No Breakouts Available.)
    - Percentage Nighttime Use (Used 15% Assumption in Worksheet.)
    - Are Projections Coordinated with Local Plans and Known, Future Developments? (This was a Shortfall at Council Bluffs. Very little local planning data available.)

# Step 2: Gather Data

- Railroads
  - Check Federal Railroad Administration's Crossing Inventory Database
    - What Railroads Use Tracks Found? (At CB: Union Pacific, Chicago Central Pacific, and Canadian National)
    - Are there Whistle Stops Near Site? (Yes, but not **Perpendicular** to the Property)
    - Are there At-Grade Road Crossings? (Yes)
    - How Many Trains Per Day? (38)
    - How Many Cars Per Train? (Ranged from 0-100. We used 100.)
    - Diesel or Electric Locomotives and How Many Per Train? (2 Diesel)
    - Welded or Bolted Tracks? (Both)
  - Contact Rail Operators for Noise Data
    - Confirm or Update All FRA Data (All Data came Directly from Railyard Manager or Operators)

# Step 2: Gather Data

- Military and Industrial Facilities
  - Identify Military Installations within 15 Miles (**Offutt AFB is nearby, but too far away to affect.**)
  - Check Cross-Service Locators like:
    - <http://www.globalsecurity.org/military/facility/conus.htm>
    - <http://www.globemaster.de/bases.html>
  - Installation Noise Office?
  - Installation Mission? (**Transport**)
  - Tenant Units?
  - Major Activities? (**Flying Large Jets, but No Fighters**)
  - Hours of Operation?
- Identify Factories, Warehouses, Distribution Centers, etc. within 1 Mile
  - Major Activities (**Only the Railyard and a Store**)
  - Hours of Operation (**A Train Arrives at 3am Every Other Day.**)

# Step 3: Enter the Noise Guidebook Worksheets

- Overview
  - As Discussed, Noise Exposure Calculated for Major Noise Sources Typically Encountered:
    - Aircraft,
    - Vehicles, and
    - Trains (with and without Horn Use)
  - Sound Levels Combined for a Total Environmental Noise to be Expected.
    - Sound Levels are not Mathematically Added.
    - **Table 1** Provides Factors to Add to Sound Levels Based on the Difference Between Two Levels Being Compared.
  - Impact Noises are Handled Separately
    - Sonic Booms
    - Stamping Mills and Other Metal Fabrication
    - Artillery and Explosives Training or Testing

Site Location \_\_\_\_\_

Program \_\_\_\_\_

Project Name \_\_\_\_\_

Locality \_\_\_\_\_

File Number \_\_\_\_\_

Sponsor's Name \_\_\_\_\_ Phone \_\_\_\_\_

Street Address \_\_\_\_\_ City, State \_\_\_\_\_

	Acceptability Category	DNL	Predicted for Operations in Year
1. Roadway Noise	_____	_____	_____
2. Aircraft Noise	_____	_____	_____
3. Railway Noise	_____	_____	_____
Value of DNL for all noise sources: (see page 3 for combination procedure)		_____	

Final Site Evaluation (circle one)

- Acceptable \_\_\_\_\_
- Normally unacceptable \_\_\_\_\_
- Unacceptable \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

# Worksheet A Site Evaluation

Fill Out Top Section  
with Basic Project Data  
to Start Assessment

Individual Findings  
Added After  
Worksheets Completed

Final Determination

List all airports within 15 miles of the site:

1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_

Necessary Information:      Airport 1      Airport 2      Airport 3

1. Are DNL, NEF or CNR contours available? (yes/no) \_\_\_\_\_

2. Any supersonic aircraft operations? (yes/no) \_\_\_\_\_

3. Estimating approximate contours from Figure 3:

a. number of nighttime jet operations \_\_\_\_\_

b. number of daytime jet operations \_\_\_\_\_

c. effective number of operations (10 times a + b) \_\_\_\_\_

d. distance A for 65 dB \_\_\_\_\_

70dB \_\_\_\_\_

75 dB \_\_\_\_\_

e. distance B for 65 dB \_\_\_\_\_

70 dB \_\_\_\_\_

75 dB \_\_\_\_\_

4. Estimating DNL from Table 2:

a. distance from 65 dB contour to flight path, D<sup>1</sup> \_\_\_\_\_

b. distance from NAL to flight path, D<sup>2</sup> \_\_\_\_\_

c. D<sup>2</sup> divided by D<sup>1</sup> \_\_\_\_\_

d. DNL \_\_\_\_\_

5. Operations projected for what year? \_\_\_\_\_  
Impulse Noise from Sonic Booms? (If Yes, Add 8 dBs)

f. Total DNL from all airports \_\_\_\_\_

Signed \_\_\_\_\_ Date \_\_\_\_\_

# Worksheet B Aircraft Noise

(Noise Guidebook pg 52)

List All Airports of Concern

If Contours are available, Locate the Site on the Map and Estimate the Noise Exposure Directly. If not, Fill in the Data Gathered Here and Estimate the Contours

Add Note About Sonic Booms and Explosions



# Loud Impulsive Sounds

- Impulse Noises have Enormous Effect
- Add 8 decibels to the Total if Found (24CFR51.103(b))
- The Criteria: 24CFR51.106(a)(3)
  - Loud (Explosions, Sonic Booms, Artillery Firing, etc.)
  - Unpredictable
- Definition: (24CFR51 Appendix I(3)(i))
  - Definable as a Discreet Event
  - Approximately 1 Second Duration or Less
  - Slow-Averaging Meter Reading At Least 6 Decibels Greater than Ambient Level
  - Fast-Averaging Meter Reading At Least 4 Decibels Greater than Slow-Averaging Meter Reading

List all major roads within 1000 feet of the site:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

Necessary Information	Road 1	Road 2	Road 3	Road 4
-----------------------	--------	--------	--------	--------

- |   |       |       |       |       |
|---|-------|-------|-------|-------|
| 1. Distance in feet from the NAL to the edge of the road                            |       |       |       |       |
| a. nearest lane   | _____ | _____ | _____ | _____ |
| b. farthest lane  | _____ | _____ | _____ | _____ |
| c. average (effective distance)   | _____ | _____ | _____ | _____ |
| 2. Distance to stop sign  | _____ | _____ | _____ | _____ |
| 3. Road gradient in percent   | _____ | _____ | _____ | _____ |
| 4. Average speed in mph   |       |       |       |       |
| a. Automobiles  | _____ | _____ | _____ | _____ |
| b. heavy trucks - uphill  | _____ | _____ | _____ | _____ |
| c. heavy trucks - downhill  | _____ | _____ | _____ | _____ |
| 5. 24 hour average number of automobiles and medium trucks in both directions (ADT) |       |       |       |       |
| a. automobiles  | _____ | _____ | _____ | _____ |
| b. medium trucks  | _____ | _____ | _____ | _____ |
| c. effective ADT (a + (10xb))   | _____ | _____ | _____ | _____ |
| 6. 24 hour average number of heavy trucks   |       |       |       |       |
| a. uphill   | _____ | _____ | _____ | _____ |
| b. downhill   | _____ | _____ | _____ | _____ |
| c. total  | _____ | _____ | _____ | _____ |
| 7. Percentage of nighttime traffic (10 p.m. to 7 a.m.)                              | _____ | _____ | _____ | _____ |
| 8. Traffic projected for what year?   | _____ | _____ | _____ | _____ |

# Worksheet C Roadway Noise

(Noise Guidebook pg 54)

On All Sheets, Use the White Space to Document Data Sources, & Other Pertinent information

Stop Signs within 600'.  
(Lights Don't Count.)

Road Grade: Rise Over Run

Must be Provided by DOT

If Night Use Unknown,  
Use 15%

Adjustments for Automobile Traffic

	9 Stop Table 3	10 Average Speed Table 4	11 Night Time Table 5	12 Auto ADT (line 5c)	13 Adjusted Auto ADT	14 DNL (Worksheet 1)	15 Speaker Evaluation	16 Partial DNL
Road No. 1		X	X	X	-	-	-	-
Road No. 2		X	X	X	-	-	-	-
Road No. 3		X	X	X	-	-	-	-
Road No. 4		X	X	X	-	-	-	-

Adjustments for Heavy Truck Traffic

	17 Graders Table 6	18 Speed Table 7	19 ADT Table 8	20	21	22 Stop and-go Table 8	23 Time Table 5	24 Truck ADT	25 Truck ADT (Worksheet 2)	26 Speaker Evaluation	27 Partial DNL
Uphill Road No. 1	X	X	-		Add	X	X	-	-	-	-
Downhill		X	-								
Uphill Road No. 2	X	X	-		Add	X	X	-	-	-	-
Downhill		X	-								
Uphill Road No. 3	X	X	-		Add	X	X	-	-	-	-
Downhill		X	-								
Uphill Road No. 4	X	X	-		Add	X	X	-	-	-	-
Downhill		X	-								

Combined Automobile & Heavy Truck DNL

Road No. 1	Road No. 2	Road No. 3	Road No. 4	Total DNL for All Roads
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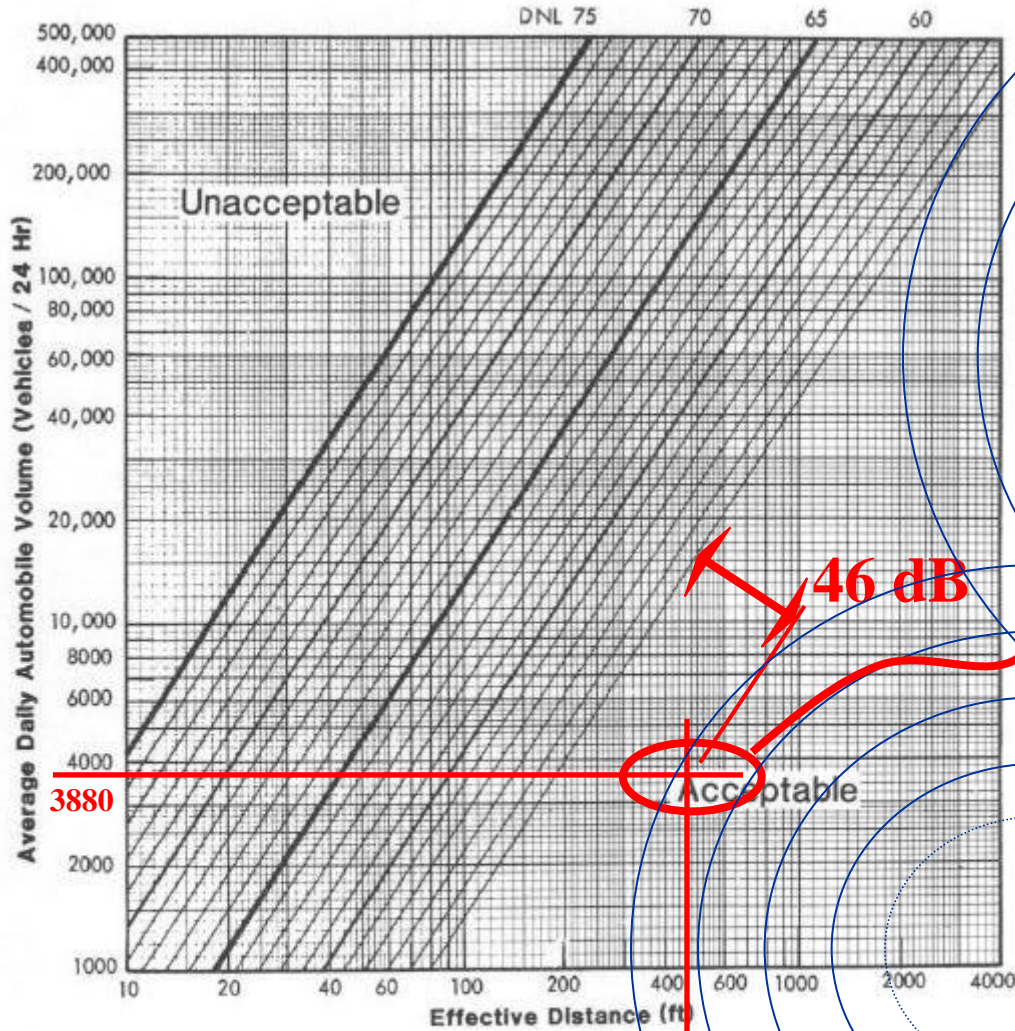
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# Worksheet C Roadway Noise

Calculation Inputs are the Previous Data Collection Worksheet, the Tables in the Narrative, or the Attached Workcharts as Noted.

Noise Levels are Not Added Mathematically. Table 1 Gives Factors Based on Difference of 2 Levels to Add to the Larger Value.

Workchart 1  
Autos (55 mph)



# Workchart 1 Roadway Noise (Automobiles)

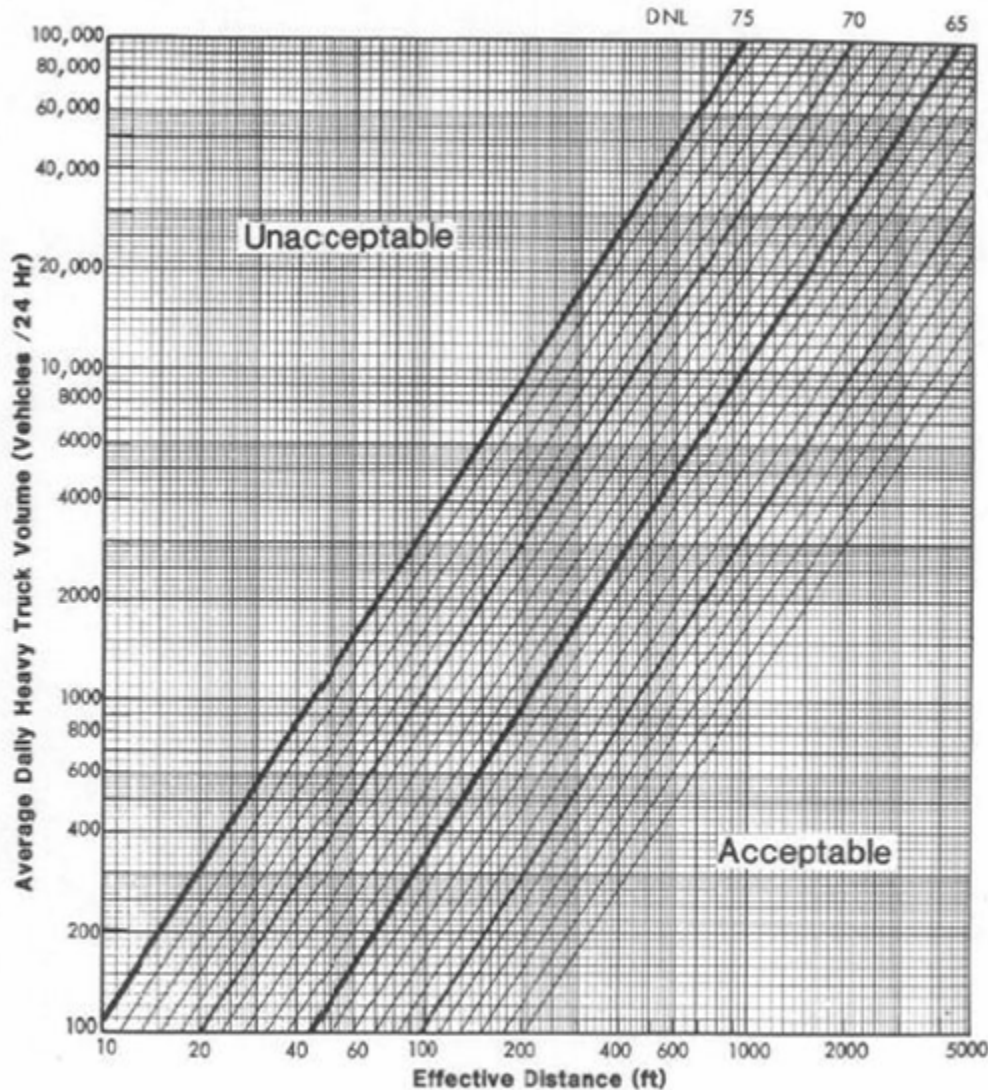
Using the Council Bluffs  
Example:

The Avg. Effective  
Distance from the Road  
to the NAL = 460'

Adjusted Annual Daily  
Traffic = 3880 Vehicles

**DNL = 46 dBs**

Workchart 2  
Heavy Trucks (55 mph)



# Workchart 2 Roadway Noise (Heavy Trucks)

Use the same as  
Workchart 1 Except  
Using the Truck Data.

Adjustments for Automobile Traffic

	9 Stop and-go Table 3	10 Average Speed Table 4	11 Night- Time Table 5	12 Auto ADT (line 5c)	13 Adjusted Auto ADT	14 DNL (Workchart 1)	15 Barrier Attenuation	16 Partial DNL
Road No. 1		X	X	X	-	-	-	-
Road No. 2		X	X	X	-	-	-	-
Road No. 3		X	X	X	-	-	-	-
Road No. 4		X	X	X	-	-	-	-

Adjustments for Heavy Truck Traffic

	17 Gradient Table 6	18 Average Speed Table 7	19 Truck ADT 2	20	21	22 Stop and-go Table 8	23 Night- Time Table 5	24 Adjusted Truck ADT	25 DNL (Work- chart 2)	26 Barrier Attrn.	27 Partial DNL
Uphill	X	X	-	-	-	-	-	-	-	-	-
Road No. 1				Add	X	X	-	-	-	-	-
Downhill		X	-	-	-	-	-	-	-	-	-
Uphill	X	X	-	-	-	-	-	-	-	-	-
Road No. 2				Add	X	X	-	-	-	-	-
Downhill		X	-	-	-	-	-	-	-	-	-
Uphill	X	X	-	-	-	-	-	-	-	-	-
Road No. 3				Add	X	X	-	-	-	-	-
Downhill		X	-	-	-	-	-	-	-	-	-
Uphill	X	X	-	-	-	-	-	-	-	-	-
Road No. 4				Add	X	X	-	-	-	-	-
Downhill		X	-	-	-	-	-	-	-	-	-

Combined Automobile & Heavy Truck DNL

Road No. 1	Road No. 2	Road No. 3	Road No. 4	Total DNL for Roads
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Signature \_\_\_\_\_ Date \_\_\_\_\_

# Worksheet C Roadway Noise (Council Bluffs)

For Council Bluffs, there is Only One Road and One Traffic Count.

46 dBs from Workchart 1 is the Total Roadway Noise

Adjustments for Automobile Traffic

	9 Stop and-go Table 3	10 Average Speed Table 4	11 Night- Time Table 5	12 Auto ADT (line 5c)	13 Adjusted Auto ADT	14 DNL (Worksheet 1)	15 Barrier Attenuation	16 Partial DNL
Road No. 1		X	X	X	=			
Road No. 2		X	X	X	=			
Road No. 3		X	X	X	=			
Road No. 4			X	X	=			

Adjustments for Heavy Truck Traffic

	17 Gradient Table 6	18 Average Speed Table 7	19 Truck ADT 2	20	21	22 Stop and-go Table 8	23 Night- Time Table 5	24 Adjusted Truck ADT	25 DNL (Work- chart 2)	26 Barrier Attrn.	27 Partial DNL
Uphill	X	X	=								
Road No. 1				Add		X	X	=			
Downhill		X	=								
Uphill	X	X	=								
Road No. 2				Add		X	X	=			
Downhill		X	=								
Uphill	X	X	=								
Road No. 3				Add		X	X	=			
Downhill		X	=								
Uphill	X	X	=								
Road No. 4				Add		X	X	=			
Downhill		X	=								

Combine Automobile Heavy Truck DNL.

Road No. 1	Road No. 2	Road No. 3	Road No. 4	Total DNL for Roads

Signature \_\_\_\_\_ Date \_\_\_\_\_

# Worksheet C Roadway Noise (Typical Application)

Record Automobile Findings  
from Multiple Roads

Then Calculate the Truck  
Noise for the Same Roads

Combine Cars and Trucks  
for Each Road

Finally, Combine All  
Noise into Total for Roads

List All railways within 3000 feet of the site:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

Necessary Information:

Railway No. 1    Railway No. 2    Railway No. 3

- 1. Distance in feet from the NAL to the railway track: \_\_\_\_\_
- 2. Number of trains in 24 hours:
  - a. diesel \_\_\_\_\_
  - b. electrified \_\_\_\_\_
- 3. Fraction of operations occurring at night (10 p.m. – 7 a.m.): \_\_\_\_\_
- 4. Number of diesel locomotives per train: \_\_\_\_\_
- 5. Number of rail cars per train:
  - a. diesel trains \_\_\_\_\_
  - b. electrified trains \_\_\_\_\_
- 6. Average train speed: \_\_\_\_\_
- 7. Is track wet, icy, or coated? \_\_\_\_\_
- 8. Are whistles or horns required for grade crossings? \_\_\_\_\_

# Worksheet D1 Railway Noise

(Noise Guidebook pg 62)

Applies to All Railroads within 3000' of the Property Line

Include the Locomotive in Number of Cars in an Electrified Train

Horns are Required at Nearly All Crossings. Should be Rephrased: "Is Site Opposite a Section of Track Between Whistlestops?"



Adjustments for Diesel Locomotives

	9 No. of Locomotives	10 Average Speed Table 9	11 Horns (enter 10)	12 Night- time Table 5	13 No. of Trains (line 2a)	14 Adj. No. of Ops.	15 DNL Workchart 3	16 Barrier Attrn.	17 Partial DNL
Railway No. 1	X		X	X					
Railway No. 2	X		X	X					
Railway No. 3	X		X	X					

Adjustments for Railway Cars or Rapid Transit Trains

	18 Number of Cars	19 Average Speed Table 10	20 Bolted Rails (enter 4)	21 Night- time Table 5	22 No. of Trains (Line 2a or 2b)	23 Adj. No. of Ops.	24 DNL Work- chart 4	25 Barrier Attrn.	26 Partial DNL
Railway No. 1	X		X	X					
Railway No. 2	X		X	X					
Railway No. 3	X		X	X					

Combined Locomotive and Railway Car DNL

Railway No. 1 \_\_\_\_\_ Railway No. 2 \_\_\_\_\_ Railway No. 3 \_\_\_\_\_ Total DNL for all Railways \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

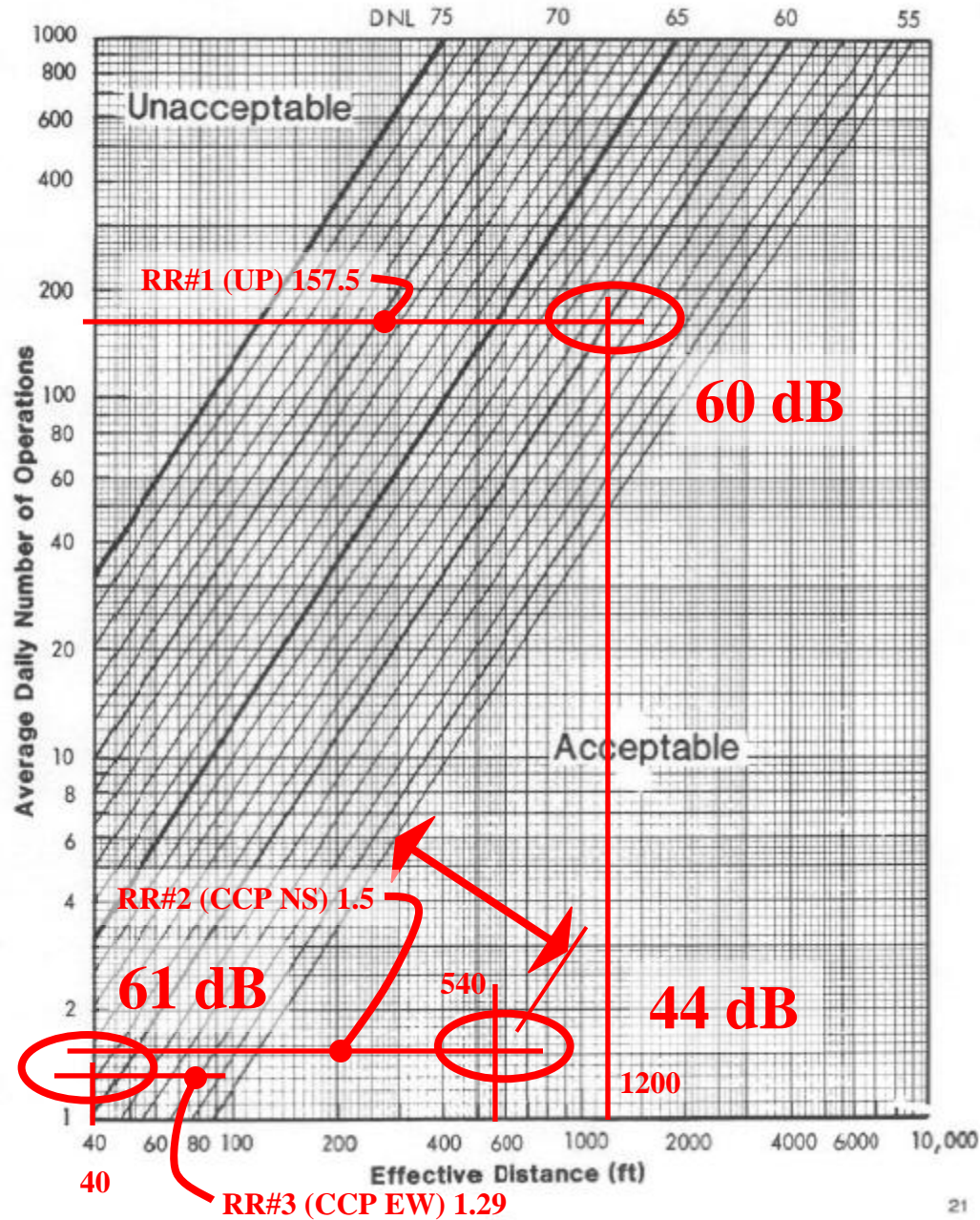
# Worksheet D2 Railway Noise

Based on 2 Locomotives

If No Horns, Use 1

Same as Roads, Data Comes  
from Raw Input, Tables, and  
Charts

If Welded Rails, Use 1



# Workchart 3 Railway Noise

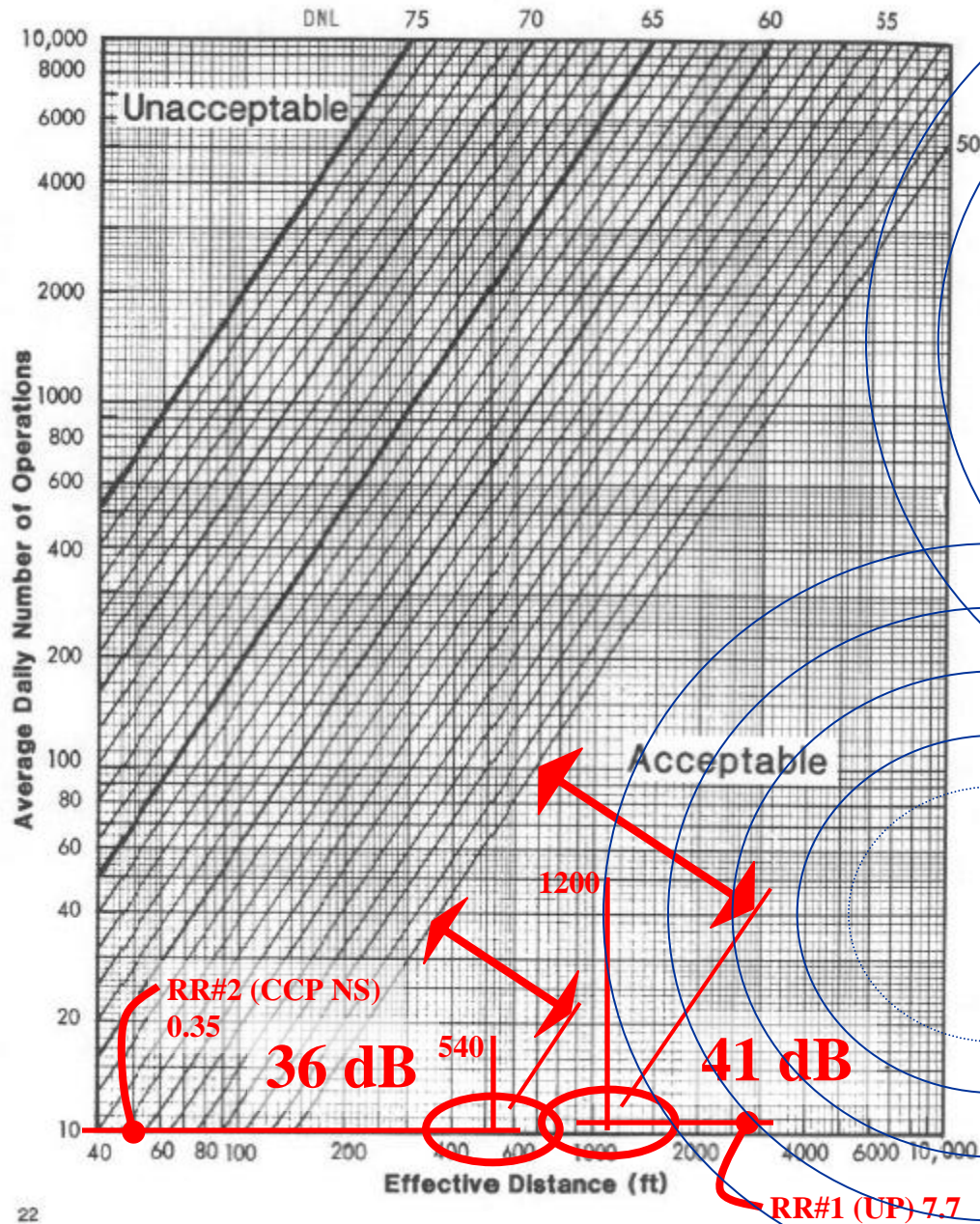
Plot Each Railroad on the Chart and Find the Noise Level

**RR#1 DNL = 60 dB**

**RR#2 DNL = 44 dB**

**RR#3 DNL = 61 dB**

Workchart 4  
Railroads - Cars and Rapid Transit



# Workchart 4 Railway Noise

The other Railway Workchart is for Cars and Rapid Transit (Electrified Trains)

**RR#1 DNL = 41 dB**

**RR#2 DNL = 36 dB**

**RR#3 DNL = 0 dB**  
(No Cars, No Noise)

Adjustments for Diesel Locomotives

	9 No. of Locomotives 2	10 Average Speed Table 9	11 Horns (enter 10)	12 Night- time Table 5	13 No. of Trains (line 2a)	14 Adj. No. of Oprs.	15 DNL Workchart 3	16 Barrier Attn.	17 Partial DNL
Railway No. 1	X	X	X	X	-	-	-	-	
Railway No. 2	X	X	X	X	-	-	-	-	
Railway No. 3	X	X	X	X	-	-	-	-	

Adjustments for Railway Cars or Rapid Transit Trains

	18 Number of cars 5a	19 Average Speed Table 10	20 Bolted Rails (enter 4)	21 Night- time Table 5	22 No. of Trains (Line 2a or 2b)	23 Adj. No. of Oprs.	24 DNL Work- chart 4	25 Barrier Attn.	26 Partial DNL
Railway No. 1	X	X	X	X	-	-	-	-	
Railway No. 2	X	X	X	X	-	-	-	-	
Railway No. 3	X	X	X	X	-	-	-	-	

Combine Locomotive and Railway Car Data

Railway No. 1	Railway No. 2	Railway No. 3	Total DNL for all Railways

# Worksheet D2 Railway Noise

Input from Workchart 3

Input from Workchart 4

Finally, Combine All into  
Total for Railways

# Time for a Break

- Next Topics:
  - Step 4: Combine Findings and Assess
  - Step 5: Noise Attenuation
  - Step 6: Reassessment