Noise Abatement and Control

24 CFR Part 51, Subpart B and 24 CFR § 58.5(i)(1)

Noise Can Be Detrimental!
Noise affects your ability to:

Talk to one another

Hear threats around them

Enjoy recreational pursuits

Learn and concentrate

Noise Can Do Harm!

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.

History of Noise Regulation

Congress passed the Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978

Implemented for HUD projects through regulation 24 CFR Part 51, Subpart B, Noise Abatement and Control

HUD regulation established standards for maximum interior and exterior noise [24 CFR 51.101(a)(9)]

How Loud is Loud?

Rustling Leaves=10 dB

Whisper=20 dB

Soft Radio Music=40 dB

Range of Speech=48-72 dB

Noisy Urban Street=90 dB

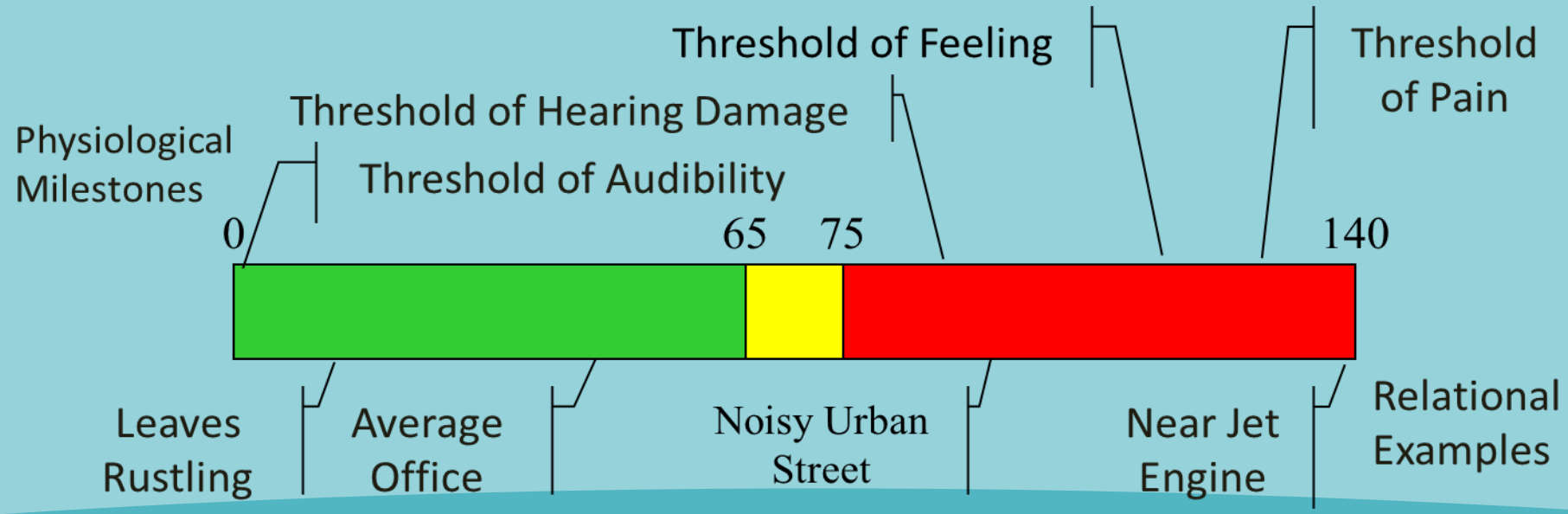
Loud Horn at 10 ft.=100 dB

Noise Standards:
HUD Goal is ≤ 55 dBs Outdoors
Indoor Noise Goal 45 dBs

Acceptable Range: ≤ 65 dBs

Normally Unacceptable Range: > 65 dBs ≤ 75 dBs

Unacceptable Range: > 75 dBs



Impact of Noise

Outdoor Noise Level is 65 dBs or Less

=

Indoor Noise Level will be 45 dBs or Less with Typical Construction (24 CFR 51.103(c)(2))

HUD Noise Standards

New Construction—Prohibit (generally) HUD support for new construction of noise sensitive uses on sites having unacceptable noise exposure [24 CFR 51.101(a)(3)]

Rehabilitation—Encourage, or strongly encourage, noise attenuation features or convert to a land use compatible with high noise levels [24 CFR 51.101(a)(5)]

Land Use—Encourage land use patterns for housing and other noise sensitive urban needs that provide a suitable separation between them and major noise sources [24 CFR 51.100(a)(3)]

Four Options for Too Much Noise

REDUCE: Reduce the Noise Emitted

But no authority to regulate equipment manufacturers, etc.

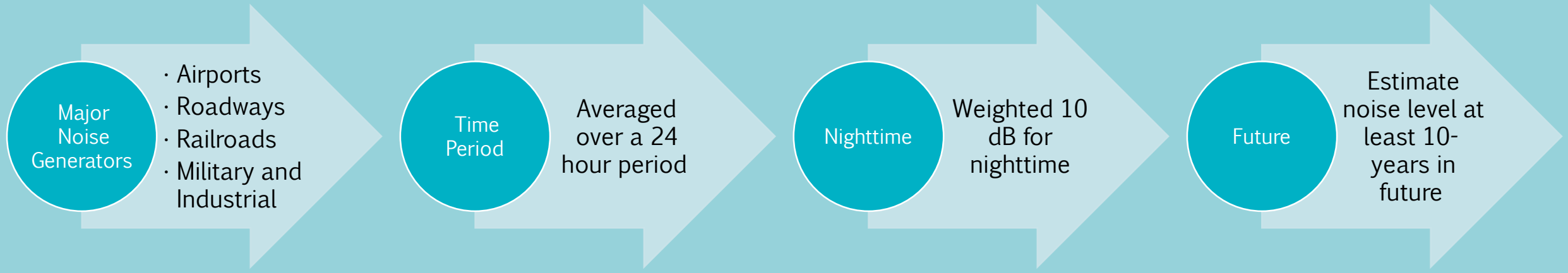
SEPARATE: Move Building Further from the Sound

Protect Outside Noise Sensitive Uses

MITIGATE PROPERTY: Construct Noise Barrier

MITIGATE BUILDING: Use Sound-Attenuating Building Construction and Materials in the Building Construction

How is Noise Evaluated?
HUD uses Day-Night Level (DNL) Noise Descriptor



Evaluating Noise Impacts and Compliance

1. Determine whether project is noise sensitive use
2. Determine whether project is within proximity to major noise source
3. Gather data needed for analysis
4. Calculate noise level
5. Make a finding based on calculated DNL
6. Mitigate/avoid

1. Does the Project Involve Noise Sensitive Uses?

Noise Sensitive Uses are Generally Places where People Sleep

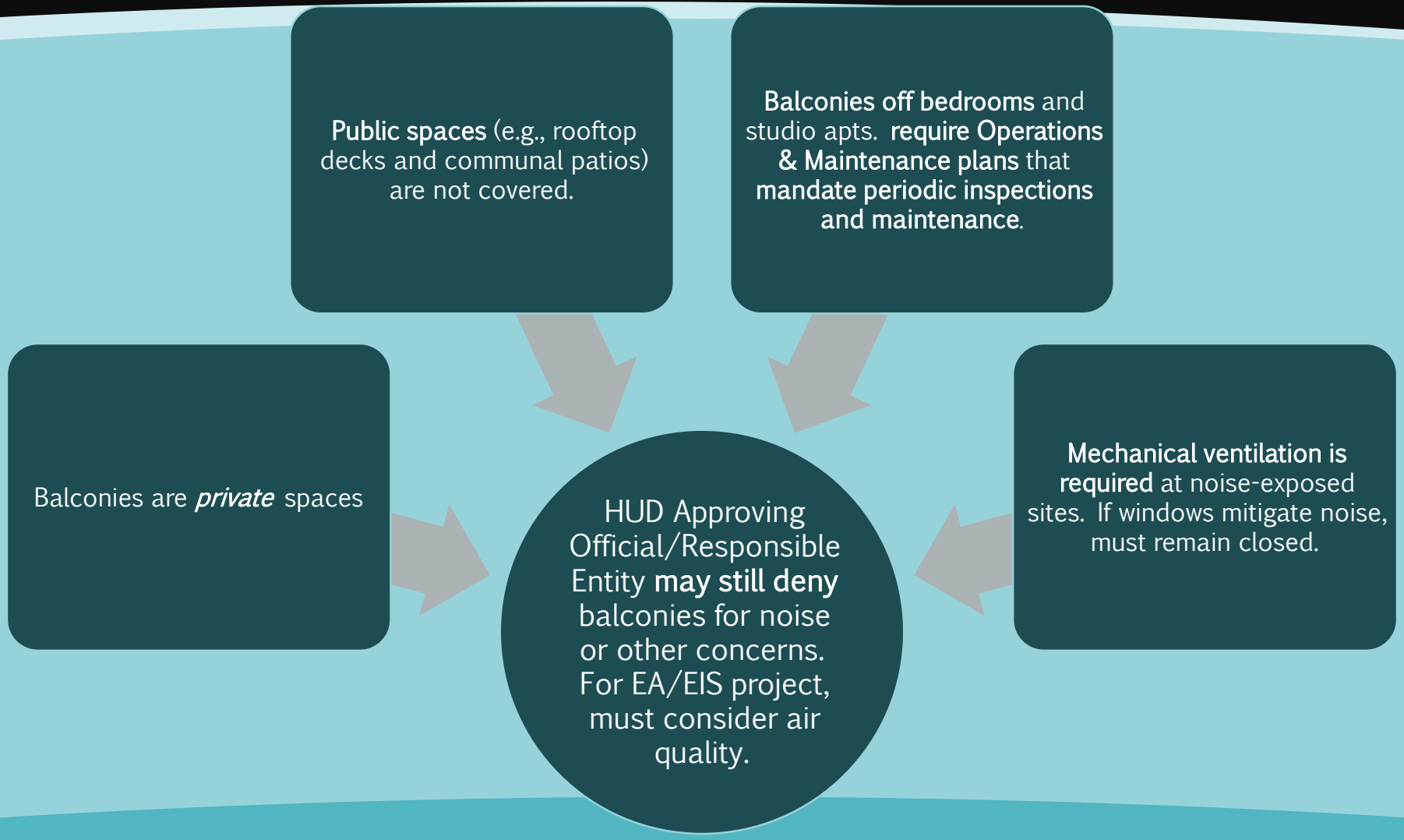
- Residential Structures
- Hospitals
- Nursing Homes

What About a Balcony?

Definition of a Balcony:

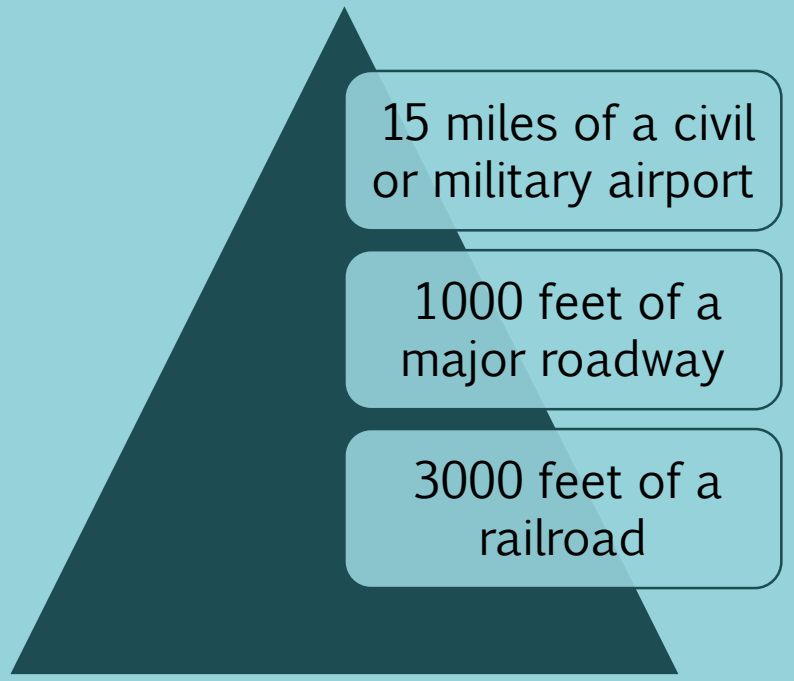
- Private space (i.e., residents can determine if balcony is usable or not)
- Accessible from individual dwelling units
- Not indicative of outdoor, noise sensitive uses
  (e.g., for purpose of EIS waiver under 24 CFR 51.104(b)(2)
- Allowable in any noise zone due to CPD Notice 16-19 “Balcony Notice”

Balcony Notice: Warnings



2. Is the Project in Proximity to a Major Noise Source(s)?

Is the project within:



If not, a noise assessment is **not** required!

3. Gathering Data
Gather Information About the Project and Area

Maps

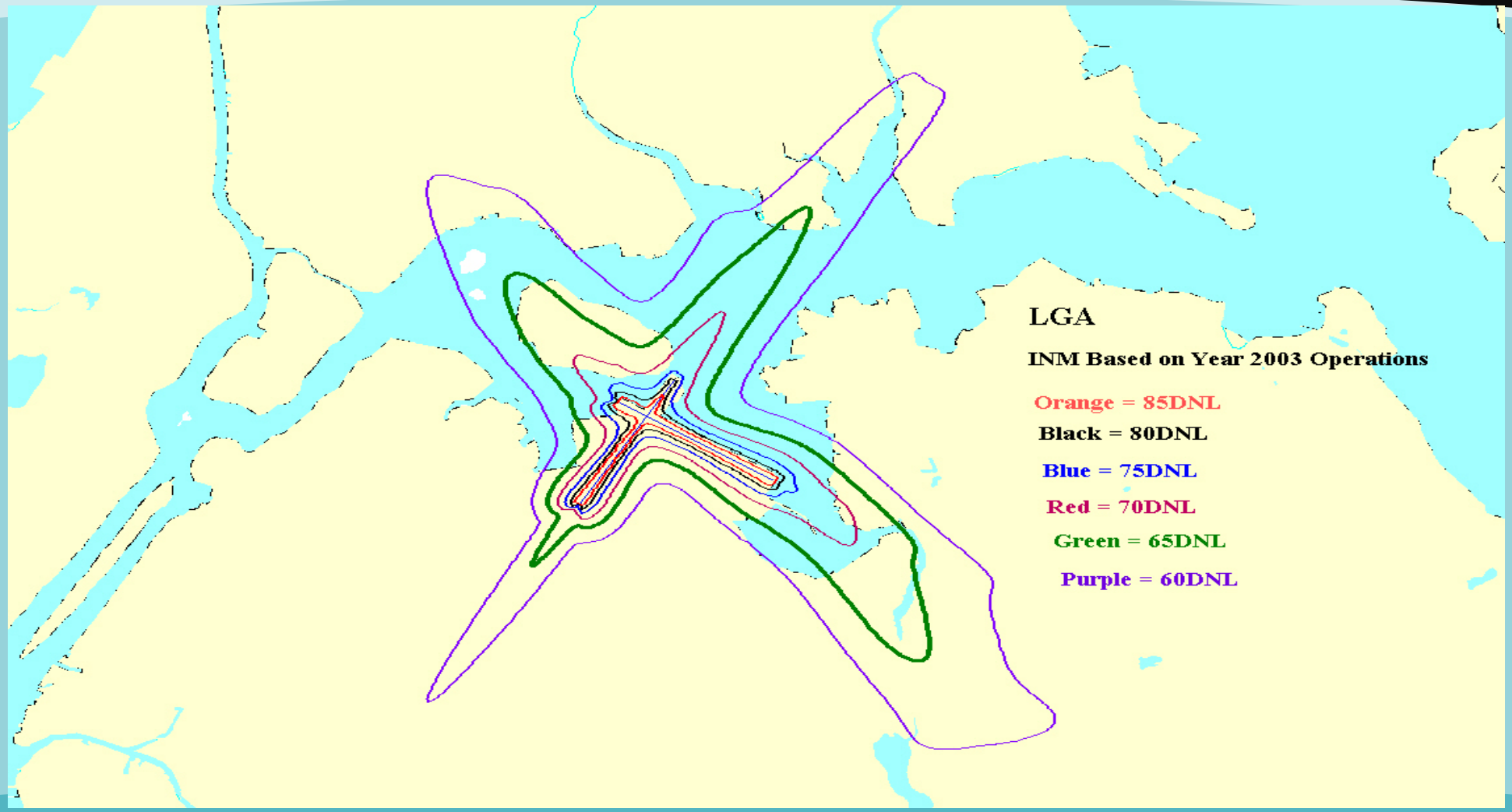
Site plan and vicinity map	Aerial photos (e.g., Google Earth)	Planimetric maps—shows roads, building footprint, railroads, etc.	Topographic map—shows elevation contours

- Local land use plans (present, future, and proposed)
- Zoning Plans
- Is outdoor use part of the project (balconies, decks, etc.)?
- Visit the site if you can

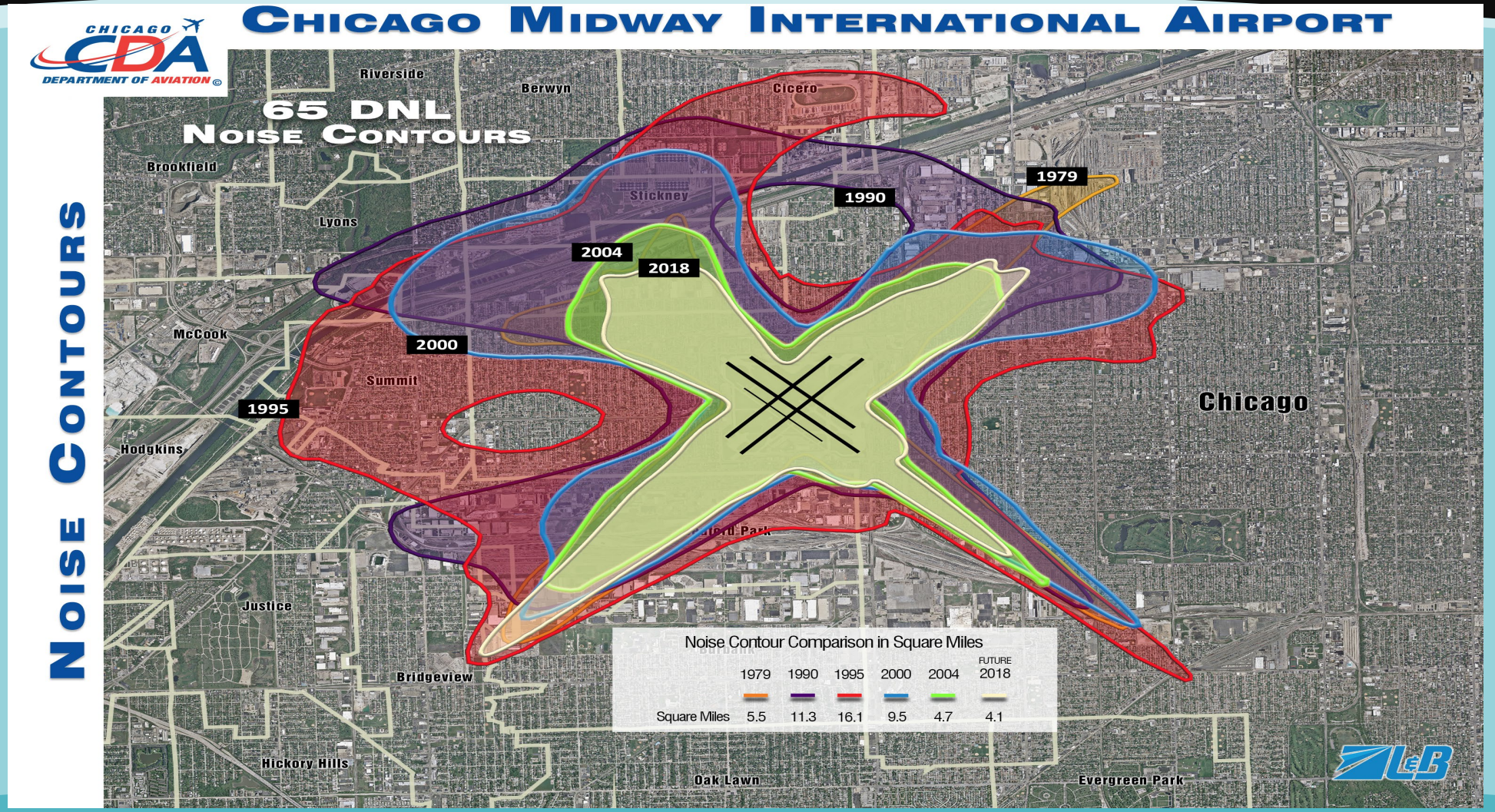
Airport Noise Source Information

- Contact airport manager or Federal Aviation Administration (FAA)
- http://www.airnav.com/airports/
- https://www.faa.gov/airports/environmental/airport_noise/noise_exposure_maps/ (but links not updated)
- Obtain noise contour map **or** data on # flights per day, both daytime and at night
- Most airports have noise plan that includes Noise Contours—Nearly all installations that make noise have a plan for managing it
- For Military Installations, ask for their "Air Installation Compatible Use Zone" Plan—It is intended to be shared with local planners and developers

Example Airport Contour Map



Historical Noise Contours



Roadway Noise Sources

- Contact State DOT, city or county transportation agency, or regional planning agency to obtain:
  - Average Daily Traffic (ADT)
  - Percentage breakdown of automobiles, medium trucks, and heavy trucks
  - Traffic projections needed for minimum of 10 years into the future
  - Percentage nighttime use

Treat all trucks as “heavy” if they cannot be split

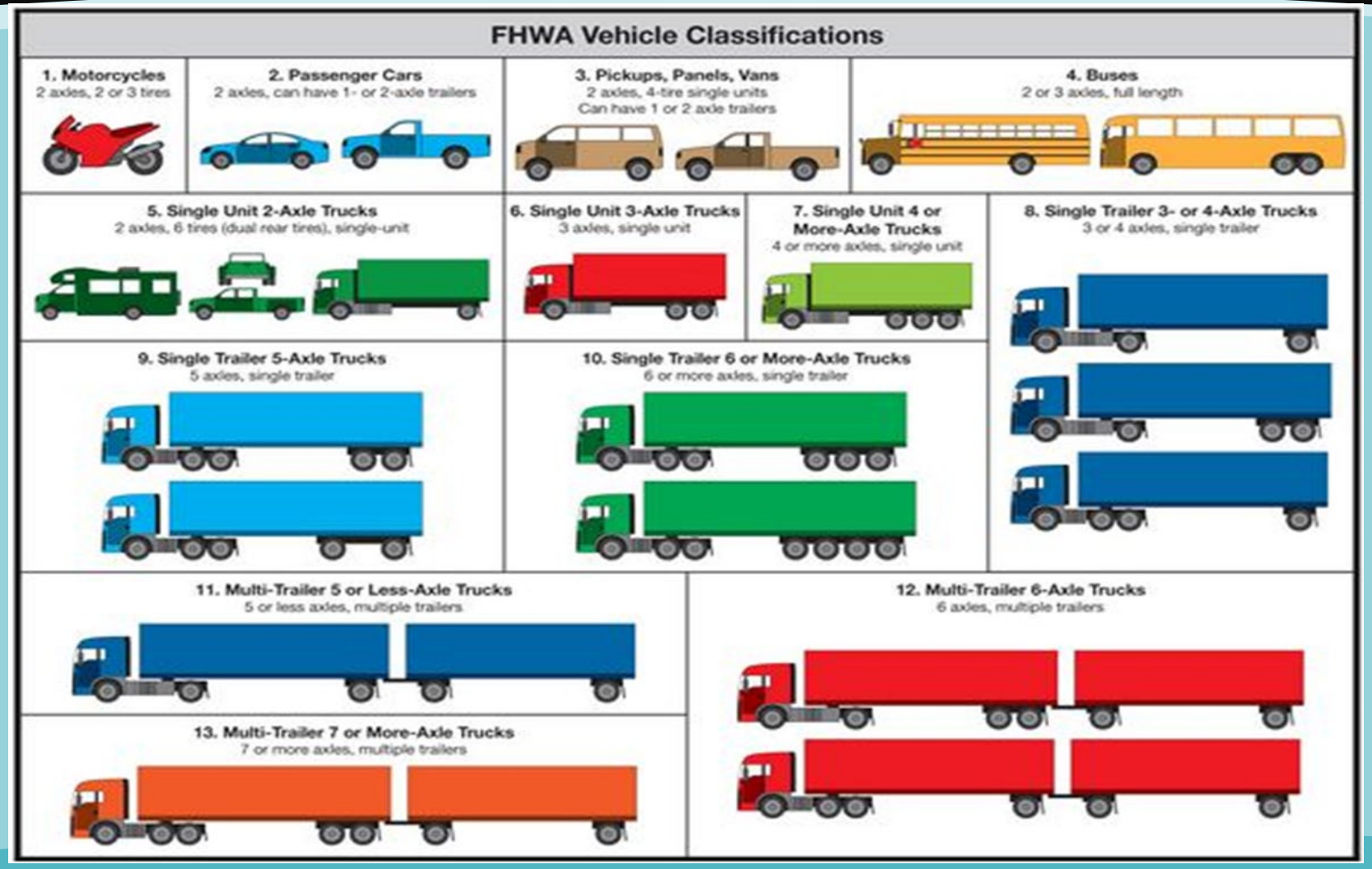
Medium Trucks

- 10,000-26,000 gross vehicle weight
- Includes 2-axle, 6-wheel vehicles (w/ dual tires in rear, aka, “dualies”)

Heavy Trucks

- Above 26,000 gross vehicle weight and 3 or more axles
- Buses with more than 15 seated passengers
- **If not possible to separate trucks that are heavy from those that are not, treat all trucks as “heavy”**

FHWA Vehicle Classifications



Correlating HUD Vehicle Definitions *with* FHWA Vehicle Classifications

HUD Noise Guidebook

- **Autos**

  [FHWA #1,2,3]

- **Medium Trucks**

  [FHWA #5]

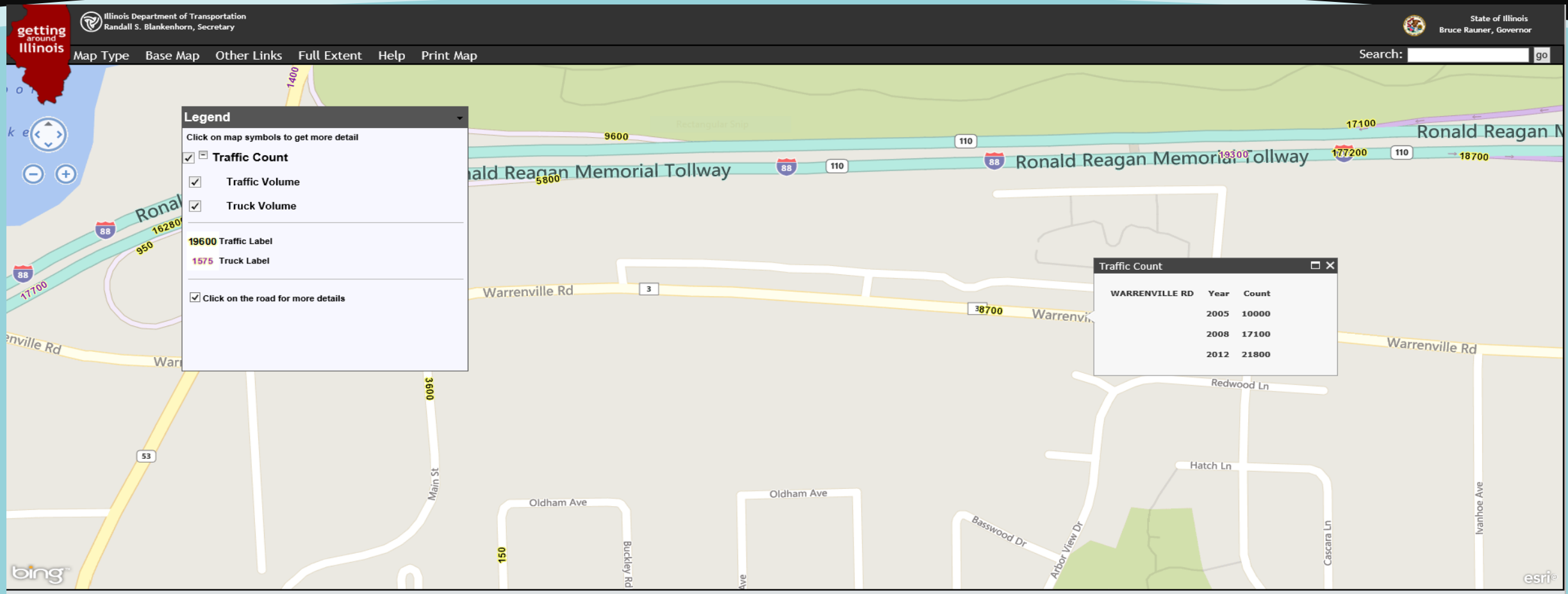
- **Heavy Trucks**

  [FHWA #4, 6-13]

FHWA Vehicle Classes

1. Motorcycles
2. Passenger Cars
3. Pickups (Two-Axle, Four-Tire Single Unit Vehicles)
4. Buses (full-length)
5. Two-Axle, Six-Tire, Single-Unit Trucks
6. Three-Axle, Single-Unit Trucks
7. Four or More Axle, Single-Unit Trucks
8. Four or Fewer Axle Single-Trailer Trucks
9. Five-Axle Single-Trailer Trucks
10. Six or More Axle Single-Trailer Trucks
11. Five or fewer Axle Multi-Trailer Trucks
12. Six-Axle Multi-Trailer Trucks
13. Seven or More Axle Multi-Trailer Trucks

Example Traffic Data



Projecting Traffic

- Most long range transportation planning is done by Metropolitan Planning Organizations (MPOs).
- Transportation Management Agencies (TMAs), Council of Governments (COGs), or regional planning agencies may also perform this function.
- If they do not specify traffic volume, ask for annual growth percentage rate and run it for 10 years.
- In our example, from 2005-2012 traffic increased from 10,000 cars to 21,800 over a 7 year period.
  - That is an annual increase of 16.9%.
  - Using that number, increase annual traffic counts over the ten year period to arrive at an estimate.
  - Professional projections will be much better!

Simple Projection—Warrenville Rd.

Year	Car Count
2012	21,800
2013	25,484
2014	29,791
2015	34,826
2016	40,711
2017	47,591
2018	55,634
2019	65,037
2020	76,028
2021	88,877
2022	103,897

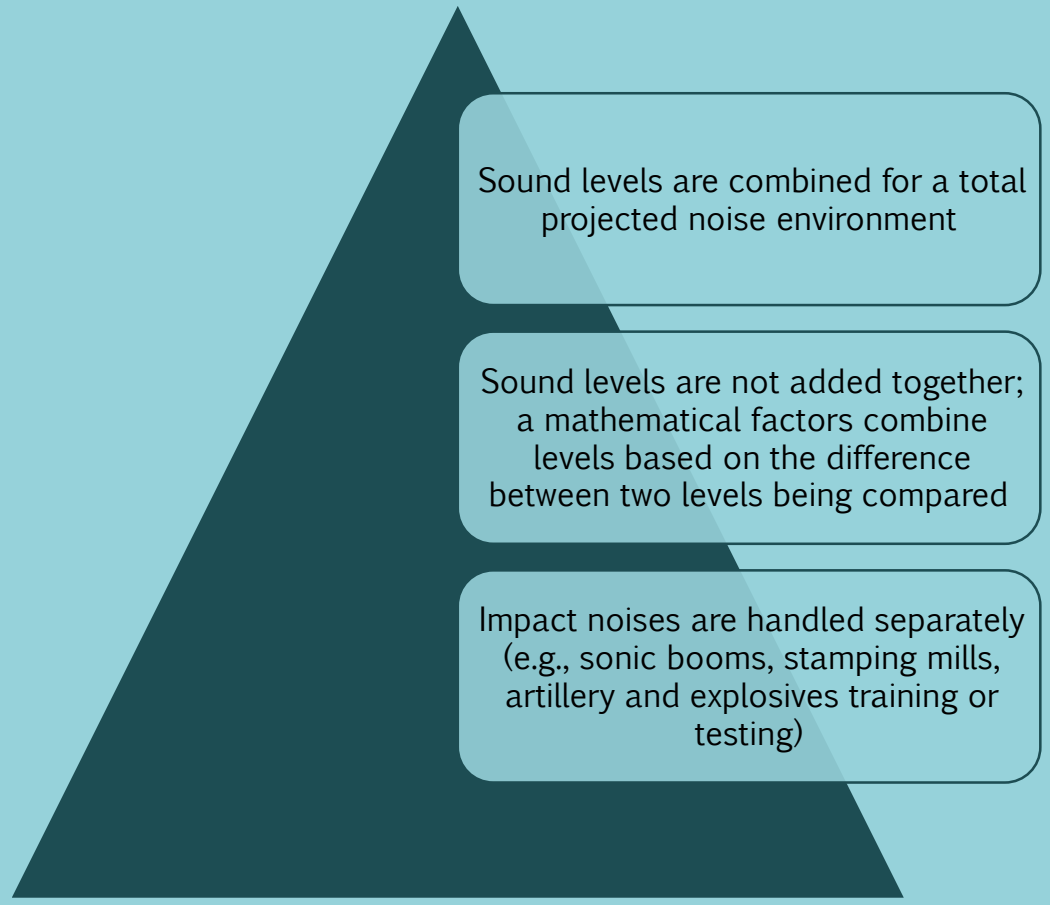
Railroad Noise Sources

- Check Federal Railroad Administration's Crossing Inventory Database: http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/crossing/xingqryloc.aspx
  - What Railroads Use Tracks Found?
  - Are there Whistle Stops near Site?
  - Are there At-Grade Road Crossings?
  - How Many Trains per Day? (% operations 10pm-7am)
  - How Many Cars per Train?
  - Diesel or Electric Engine & How Many per Train?
  - Welded or Bolted Tracks?
- Confirm or Update All Noise Data with Rail Operators

Assumptions When Good Data Can’t Be Found

- **Assumptions are ALLOWABLE when better data is not obtainable**
- **Roadways**
  - Average speed = actual observed speed for cars and trucks, or maximum allowable speed for cars and trucks
  - Night time traffic = 15% of ADT
- **Railroads**
  - 50 cars per diesel train
  - 8 cars per electric train
  - Night time traffic = 15% of ADT

4. Calculate Noise Level



Noise Assessment Location (NAL)

- NAL is located 6.5 feet (2 meters) in front of the facade of the proposed building at the point that is closest to the noise source
- If more than one building, use building nearest to noise source
- May have more than one NAL for a large site or site with more than one major noise source

Measure distance from NAL to centerline of noise source—use scaled site map (Google)

Roadways

- If symmetrical roadways, measure to centerline
- If more than one building, use nearest to noise source
- If unsymmetrical measure to near edge of nearest lane, far edge of farthest lane, average (add and divide by 2)

Railroads

- Measure to center of single track
- Multiple tracks—measure to middle of set
- Non-adjacent tracks—calculate each track as separate source

Enter Data into Online Day/Night Noise Level Calculator Electronic Assessment Tool

- Select Noise Assessment Location—NAL
- Measure distance from NAL to noise source
- Input noise source data into online calculator
- Calculate combined DNL
- Re-calculate DNL accounting for barriers and mitigation, as appropriate

https://www.hudexchange.info/programs/environmental-review/dnl-calculator/

Determine Airport Noise DNL

Airports

- Noise contours can extend far from airport
- If project location is outside of noise contours, then provide map showing location.
  - No further calculation needed

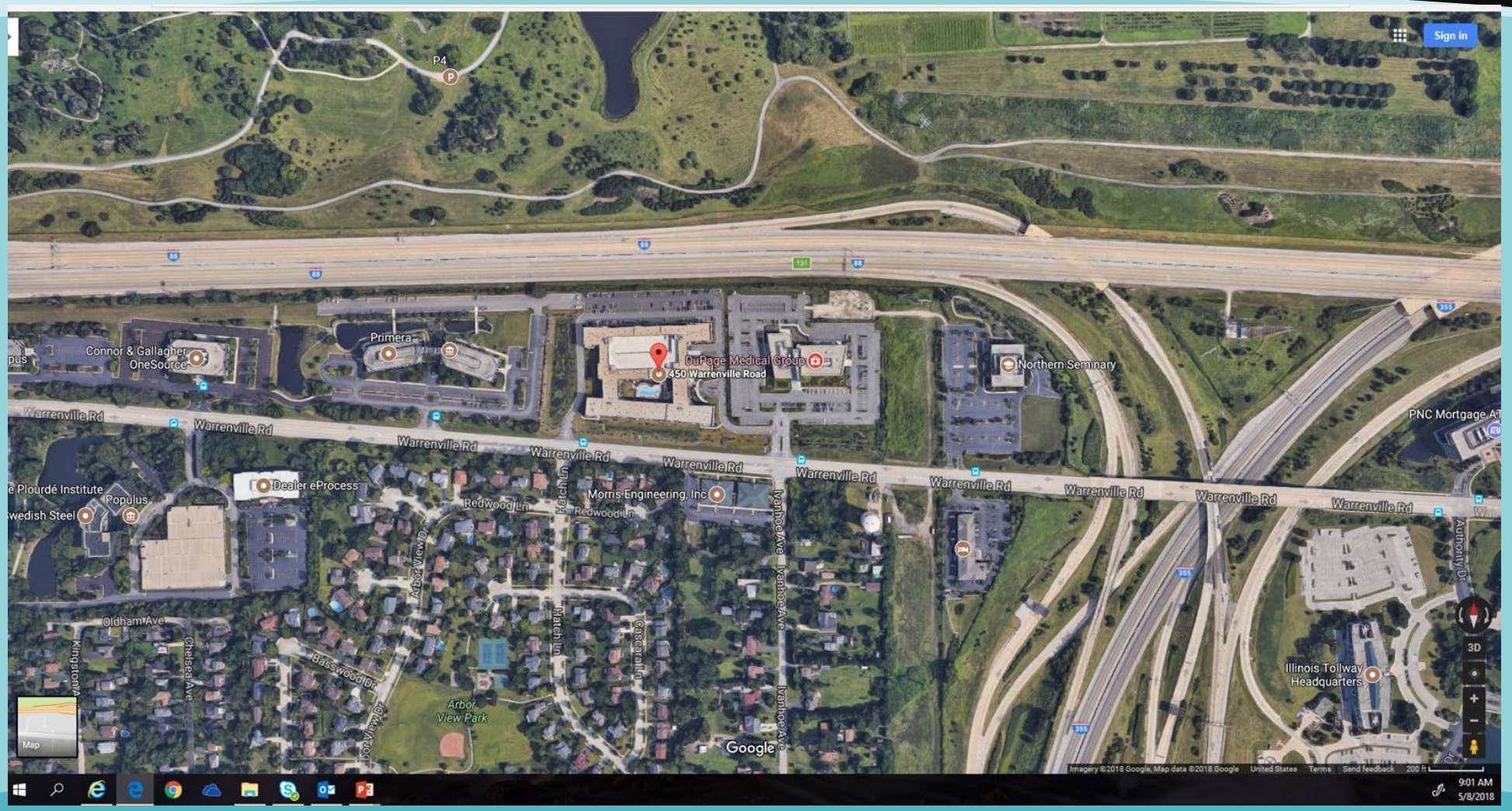
Obtain Road and Railroad Data

- Roadways and Railroads
  - Must extend data out 10 years, minimum
  - Contact planners to obtain basis for increase
    - If not available, can consider linear calculation based on historical data, but may show unrealistic growth if area has developed recently
  - When good data isn't available, use assumptions or look at hiring a professional to perform the study

Loud Impulsive Sounds Have Enormous Effect!

- Definition found at 24 CFR Part 51, Appendix I(3)(i)
- Discreet Event
- Approx. 1 Second Duration or Less
- Slow Averaging Meter Reading at Least 6 dB greater than Ambient Level
- Fast Averaging Meter Reading at Least 4 dB Greater than Slow Averaging Meter Reading
- Add 8 dB to the Total if Found per 24 CFR 51.103(b)

Example Noise Assessment
450 Warrenville Rd, Lisle, IL

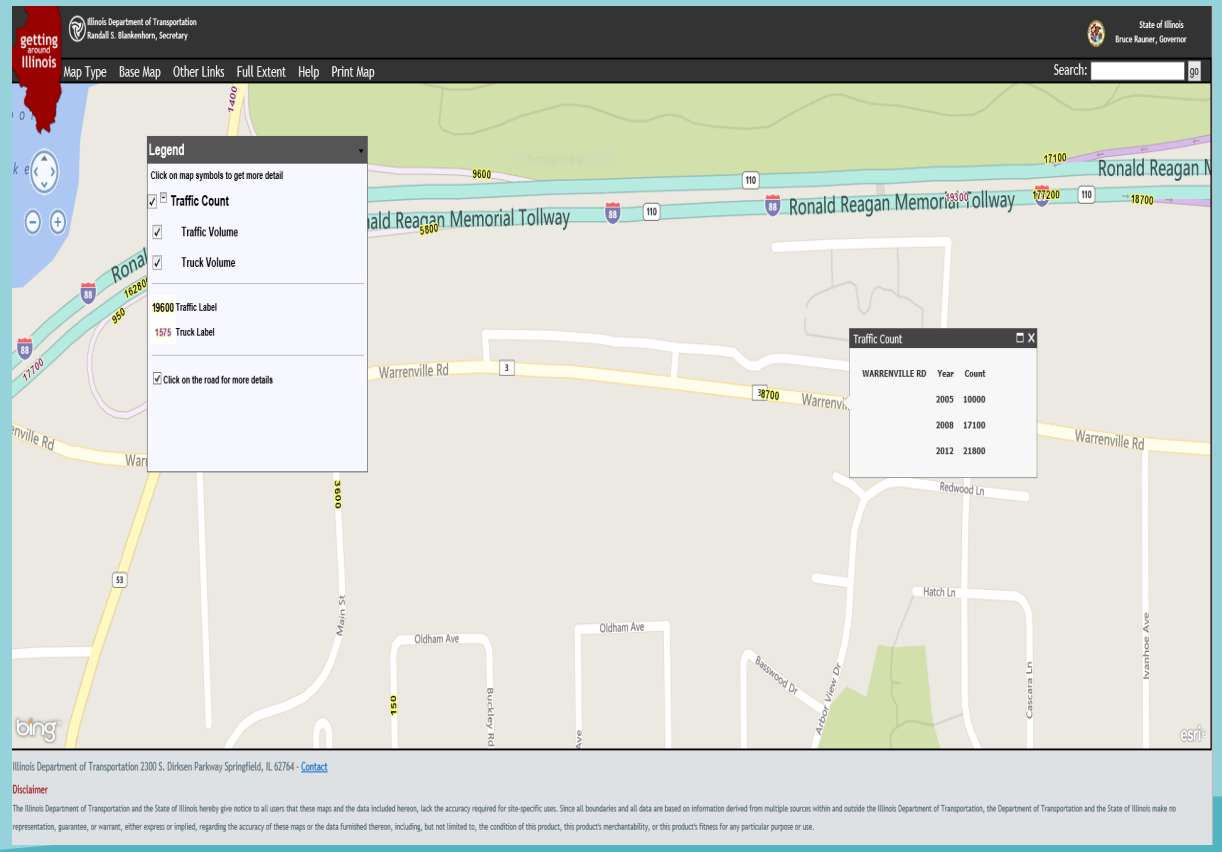


Roadway Data

- I-88 is 240 ft. from building
  - Illinois DOT ADT is 177,200; trucks at 19,300.
  - Negative growth (0.4%) per year
- I-355 is 1,770 ft. from building
  - Do not need to include
- Warrenville Rd. is 110 ft from building
  - Illinois DOT: 21,800 ADT in 2012 but map now says 8,700. Shows considerable growth but newest data 2012. No trucks.
  - DuPage County study from 2015 at Main and Warrenville (nearby) found ADT of 14,000. Shows no traffic growth between 2003 and 2016.

Find Best Data

Illinois DOT

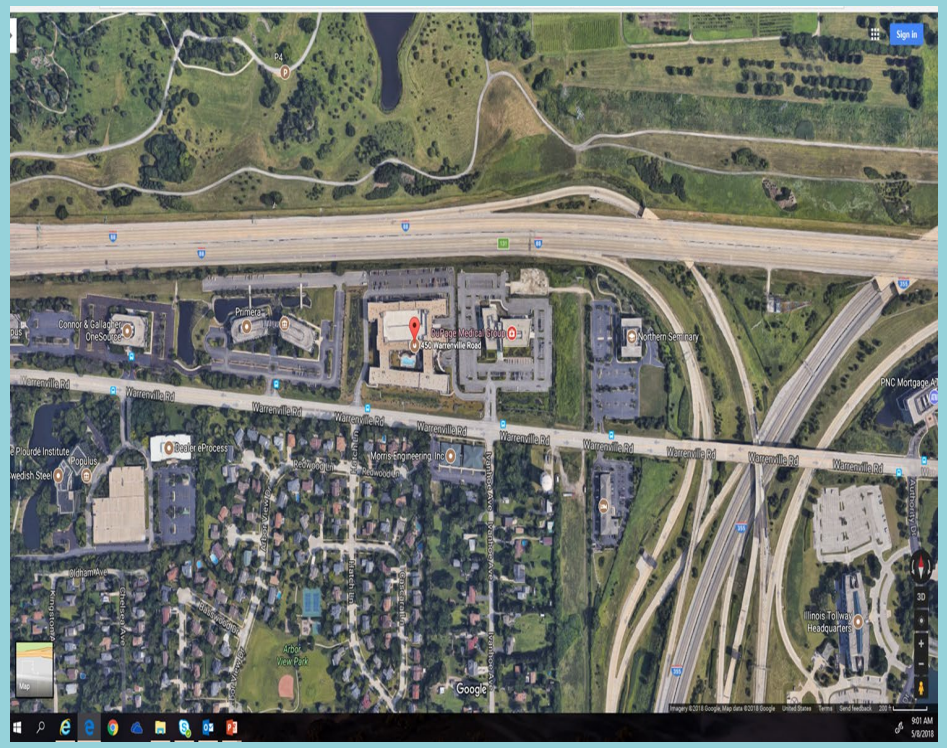


DuPage County Website

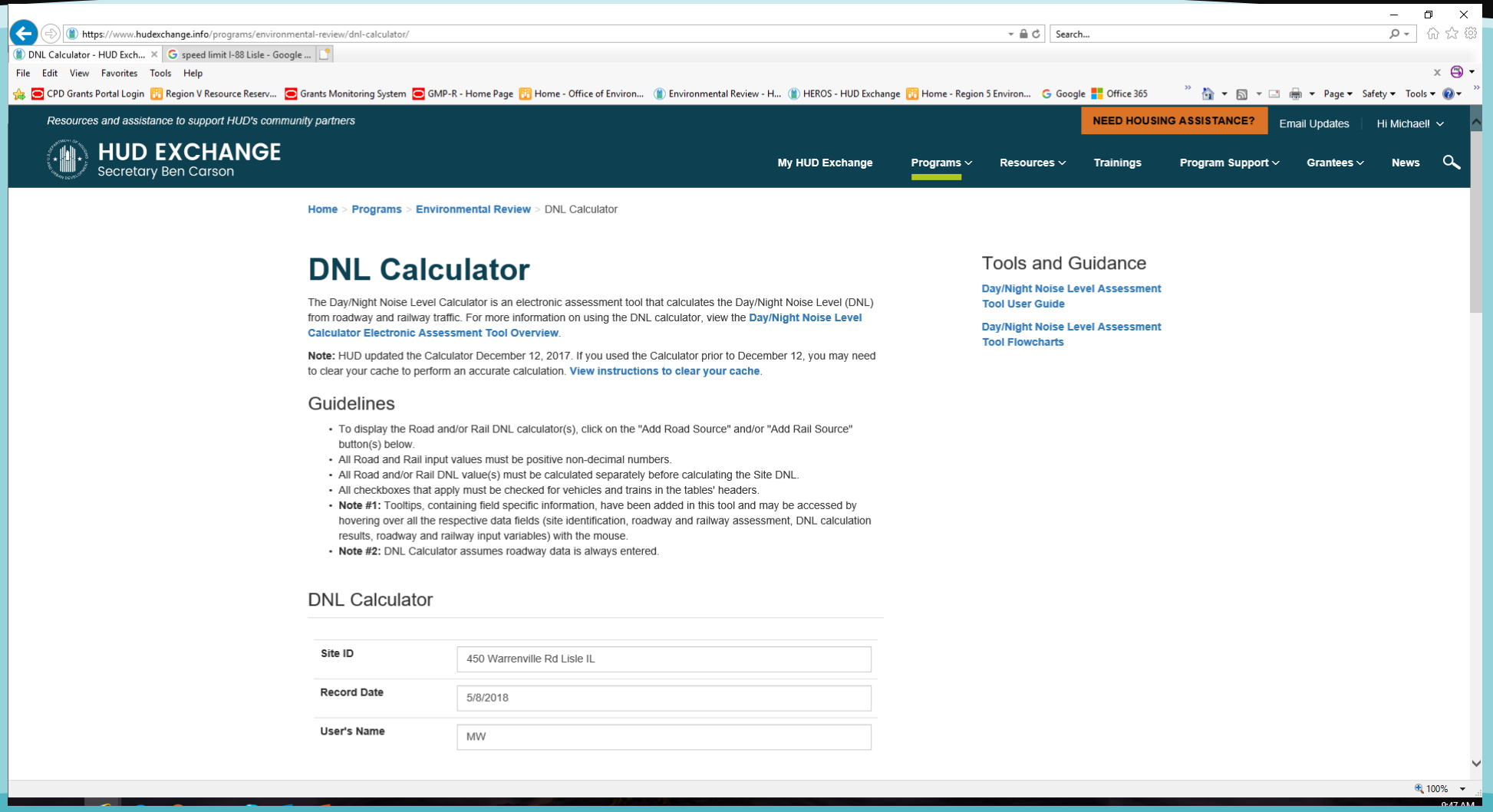
Railway and Airport

Airport—NA

Railway—NA



DNL Calculator



DNL-Roadways

Road # 1 Name:	Warrenville Rd		
Road #1			
Vehicle Type	**Cars** ☑	**Medium Trucks** ☐	**Heavy Trucks** ☐
Effective Distance	110		
Distance to Stop Sign			
Average Speed	45		
Average Daily Trips (ADT)	14000		
Night Fraction of ADT	15		
Road Gradient (%)			
Vehicle DNL	62.8153		
Calculate Road #1 DNL	62.8153	Reset	

Road # 2 Name:	I-88		
Road #2			
Vehicle Type	**Cars** ☑	**Medium Trucks** ☐	**Heavy Trucks** ☑
Effective Distance	240		240
Distance to Stop Sign			
Average Speed	55		45
Average Daily Trips (ADT)	177200		19300
Night Fraction of ADT	15		15
Road Gradient (%)			0
Vehicle DNL	70.4994		75.9631
Calculate Road #2 DNL	77.0704	Reset	

DNL-Total

Vehicle DNL	70.4994		75.9631
Calculate Road #2 DNL	77.0704	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	0
Loud Impulse Sounds?	○Yes ◉No
Combined DNL for all Road and Rail sources	**77.2576**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

5. RE Makes a Finding Based on DNL

- Here, project has DNL total of 77 dB.
  - Unacceptable range is >75 dB
  - Reject the project, seek alternative, or do an EIS.
- If project between 65 dB and 75 dB, look at mitigation or attenuation.
- If ≤ 65 dB, approve without mitigation or attenuation.

6. Mitigate/Avoid

- HUD support for new construction of new noise sensitive uses is prohibited generally for project with unacceptable noise exposure and discouraged for projects with normally unacceptable noise exposure. 24 CFR 51.101(3)
- HUD encourages noise mitigation for modernization projects in the normally unacceptable noise zone. 24 CFR 51.101(5)
- For substantial rehab located in the normally unacceptable and unacceptable zones, RE should actively seek to have project incorporate noise attenuation features.
- HUD strongly encourages conversion of noise exposes sites to land uses compatible with high noise levels

Noise Mitigation and Attenuation

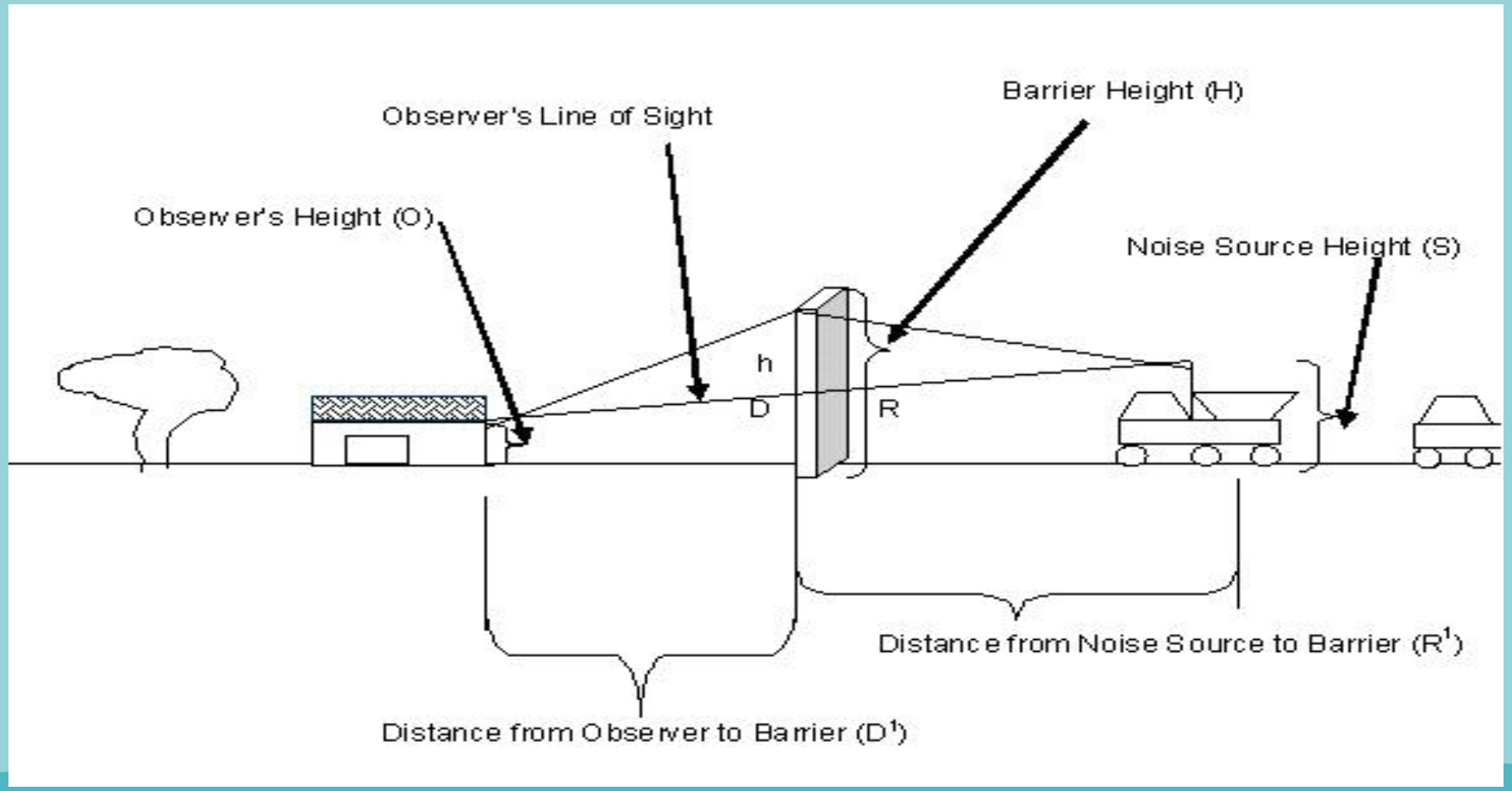
- Three Options for Attenuating Noise:
  - Site Design
  - Barriers or Berms
  - Structural Design and Acoustical Construction
- Two Options for Mitigating Noise
  - Options for Exterior Mitigation
  - Options for Interior Mitigation

Resources

- General: https://www.hudexchange.info/programs/environmental-review/noise-abatement-and-control/
- Barrier Performance Module: https://www.hudexchange.info/programs/environmental-review/bpm-calculator/
- HUD Noise Guidebook: https://www.hudexchange.info/resource/313/hud-noise-guidebook/
- Sound Transmission Classification Assessment Tool (STraCAT): https://www.hudexchange.info/stracat/

Noise Mitigation—Barrier Performance Module

Allows reviewer to incorporate natural/manmade sound barrier into site DNL



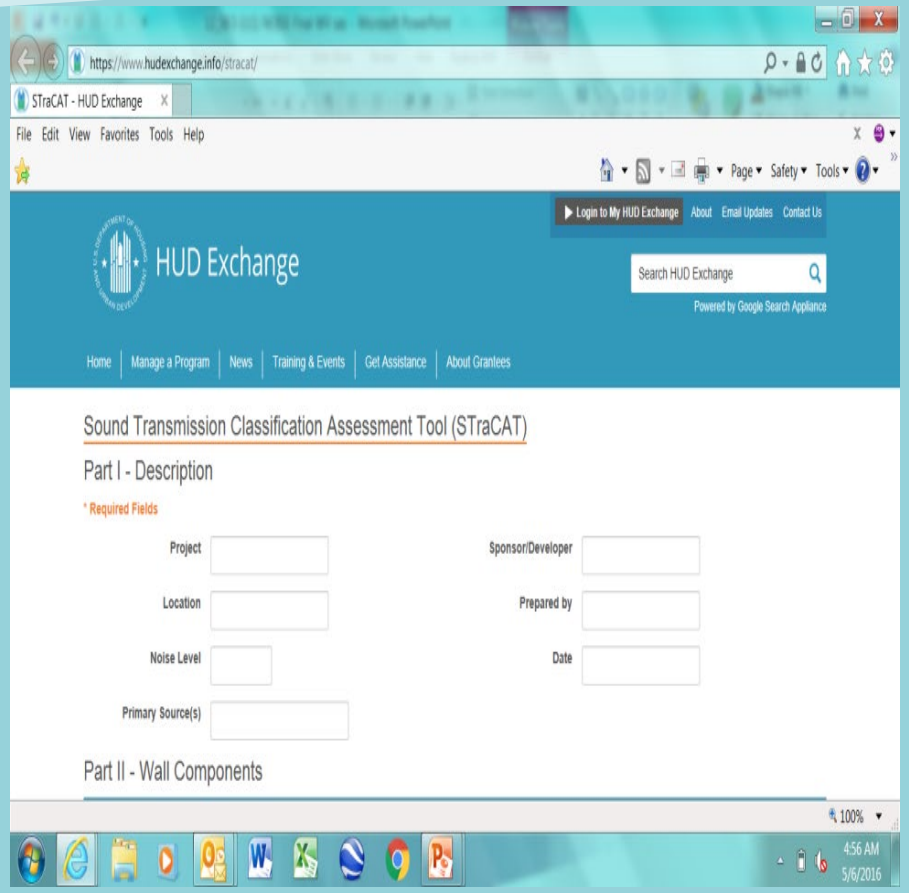
Noise Mitigation, if Needed

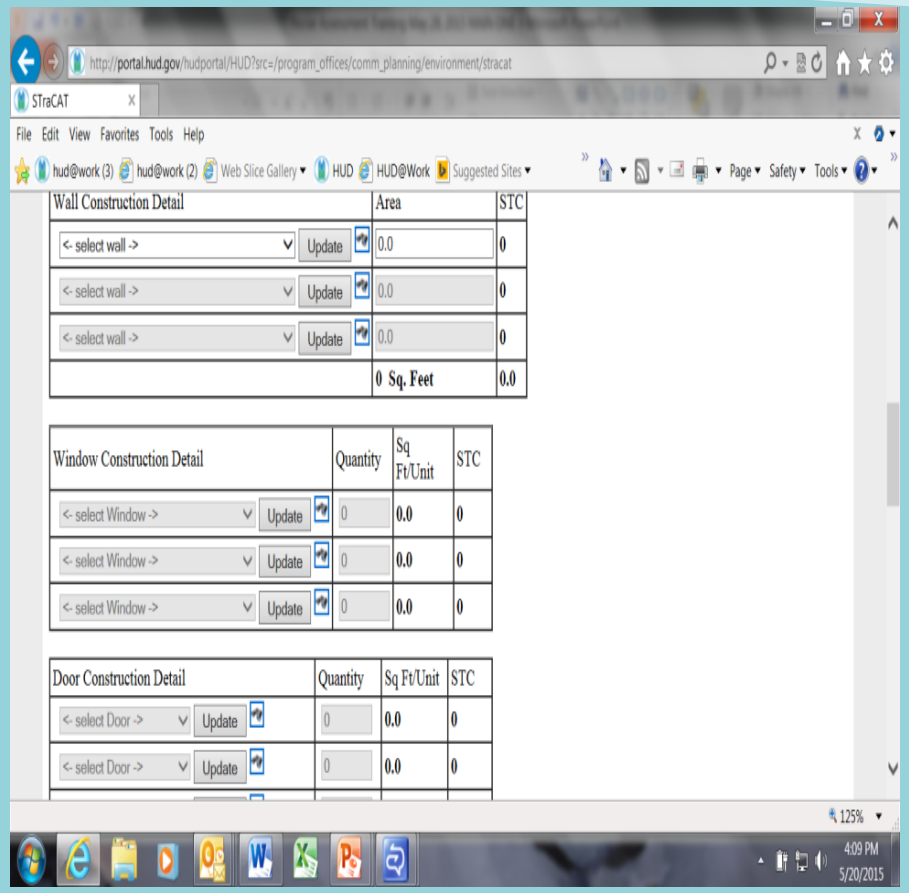
- Distance
- Noise-compatible land uses as buffers
- Buildings as Shields
- Building Orientation

Noise Mitigation--STraCAT

- Provide project info and noise levels from the DNL for our site.
- After completing the DNL fill in the top of the page then find your values in the bottom.
- Wall construction is limited but is better than the window and door construction detail.
- For wall you need to provide an area value for each type of material. Window/Door choose number of windows or doors.
- On the bottom of the page will provide you with a Printable Page that you can keep for your ERR to go along with DNL.

Noise Mitigation—STraCAT





Noise Mitigation—Notes on Barriers

- Moving a barrier closer to the source creates better attenuation. The larger the diffraction angle means better attenuation.
- Make the barrier higher near the receiver (the housing).
- At a minimum, barriers must break the line-of-sight between noise sources and receivers.
- Nosie traveling around and through a barrier reduces its effectiveness.

Compliance and Documentation

Document whether proposed action is:

- noise sensitive land use, *and*
- within 1,000 feet of a major roadway, 3,000 feet of railroad, or 15 miles of an airport (all three)

If within those distances, document site is: ***Acceptable*** (at or below 65 dB) per attached Noise Analysis

- **OR**

If ***Normally Unacceptable***, document specific mitigation (site design, noise barrier, acoustical construction, etc.) sufficient to make it Acceptable

- **OR**

If ***Unacceptable***, document that alternative site has been selected or project is preparing Environmental Impact Statement

- Noise attenuation conditions **must** *(if required)* be included in Environmental Review as a Project Condition

Questions???