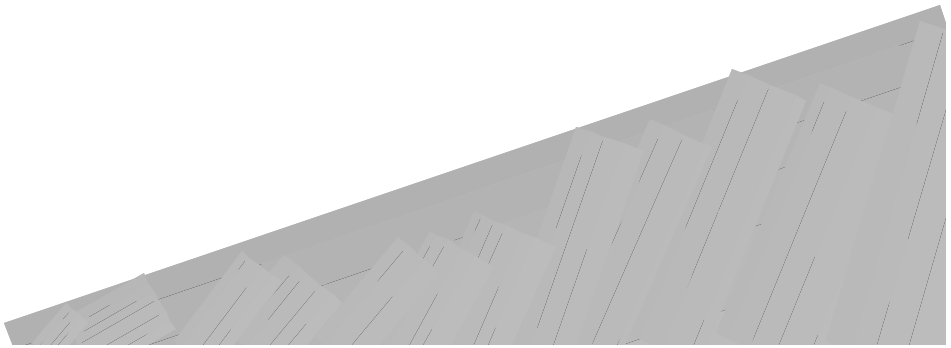
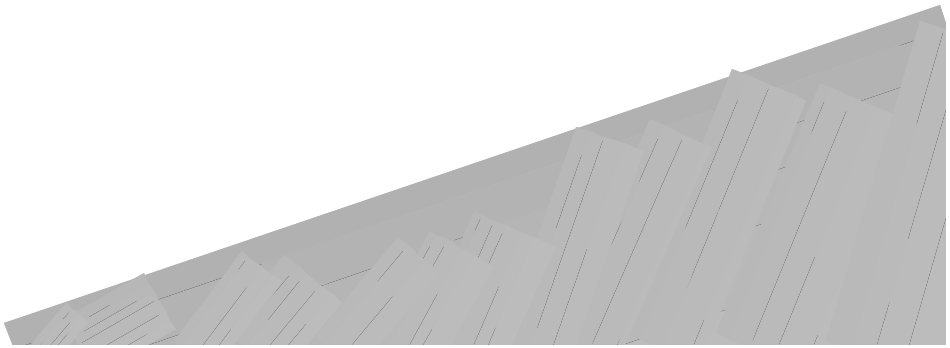
Built Environment



Physical Environment

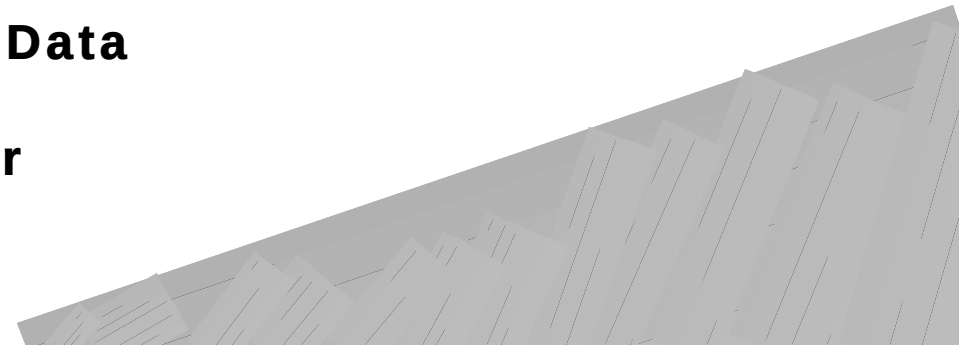
- Traffic/Transportation Systems
- Air
- Noise



Assessing Impacts to Transportation

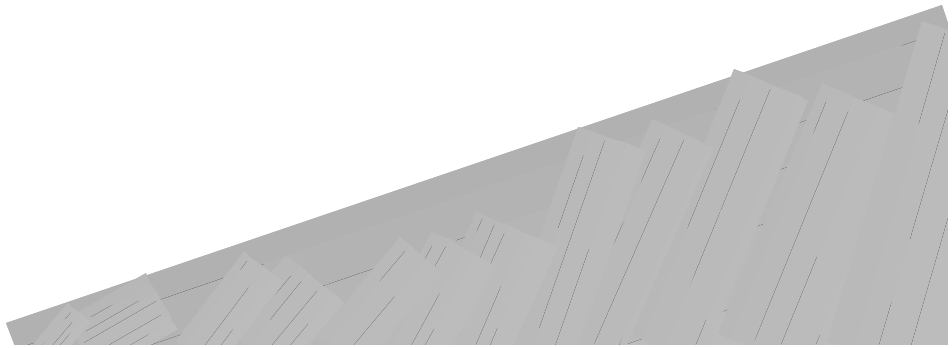
- **Traffic**
- **Transportation System**

- **Identify Source of Potential Impacts**
  - **Changes in Demographics**
  - **Changes in Access**
  - **Direct Changes Due to Project**
  - **Indirect / Attraction Related**
- **Determine Study Area**
  - **Neighboring counties**
  - **Traffic Surveys**
- **Determine Existing Conditions**
  - **State Data**
  - **County / Municipality Data**
  - **Traffic Survey**
  - **Mass Transit Provider**



Transportation (cont.)

- Identify Standard
  - Level of Service
- Impact Prediction
  - Traffic Generation Tables
  - Traffic Flow Modeling
  - Highway Capacity Manual - ADT
- Assess Significance of Impacts
  - LOS
  - Lost of Parking
- Mitigation
  - Scheduling
  - Van/Car Pools

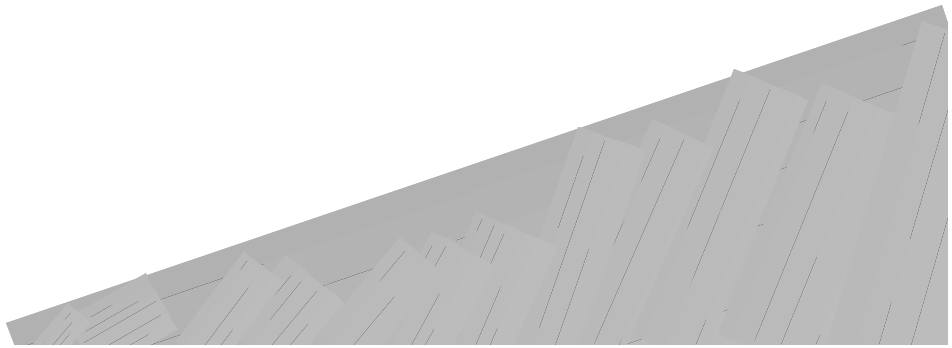


Level of Service

- **Level of Service A**
  - **Free flow, with low volumes and high speeds.**
- **Level of Service B**
  - **Stable flow, operating speeds beginning to be restricted somewhat by traffic conditions. Reasonable ability to select speed and lane of operation.**
- **Level of Service C**
  - **Mostly stable flow, speeds and maneuverability are more closely constricted by the higher volumes.**
- **Level of Service D**
  - **Approaches unstable flow, tolerable operating speeds. Driving speed is considerably affected by changes in operating conditions.**

Level of Service (continued)

- Level of Service
  - Operating speeds are lower than in Level D, with volume at or near the capacity of the highway.
- Level of Service F
  - Forced or breakdown flow. Stop and go patterns and waves set up in traffic stream. Highly unstable and unpredictable.



Level of Service “A”

Level of Service “B”

Level of Service “C”

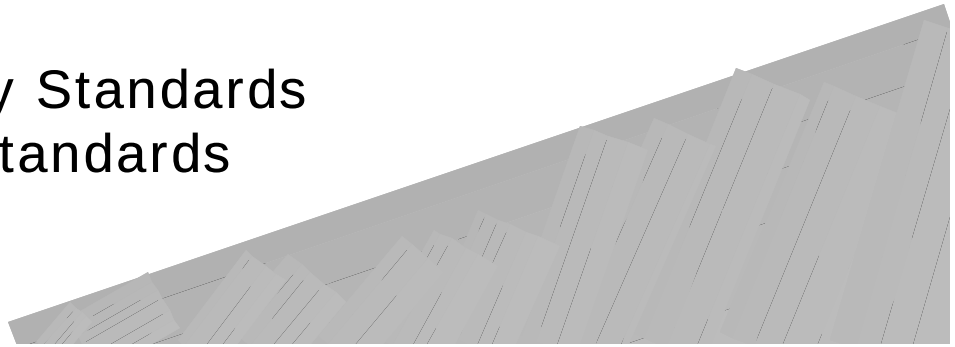
Level of Service “D”

Level of Service “E”

Level of Service “F”

Assessing Impacts to Air Quality

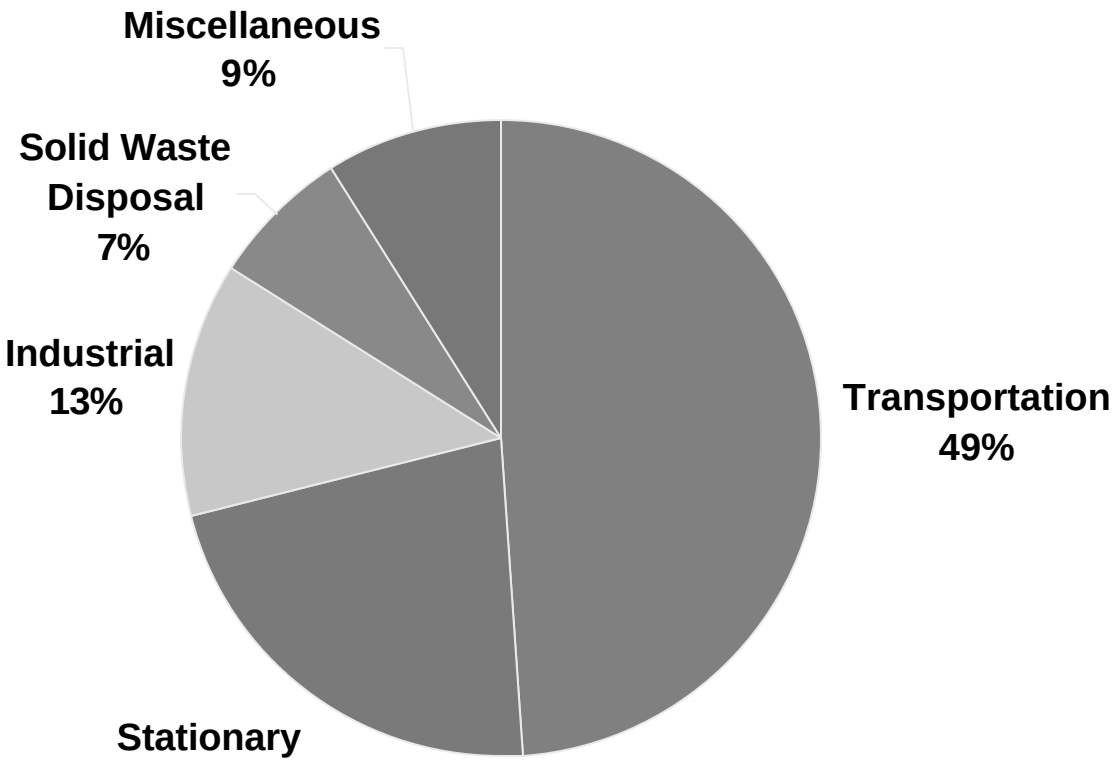
- Identify Source of Potential Impacts
  - Transportation
  - Stationary - Fuel Combustion
  - Industrial Processes
  - Solid Waste Disposal (Burning/Dust)
- Determine Study Area
  - Local to Regional
- Determine Existing Conditions
  - EPA/State Monitoring Program
  - Meteorological Data (Airports/Weather Stations)
  - Emission Factors (AP-42 USEPA)
  - Field Testing - rarely
- Identify Standard
  - National Ambient Air Quality Standards
  - State Ambient Air Quality Standards
  - New Source Limitations



Air Quality (cont.)

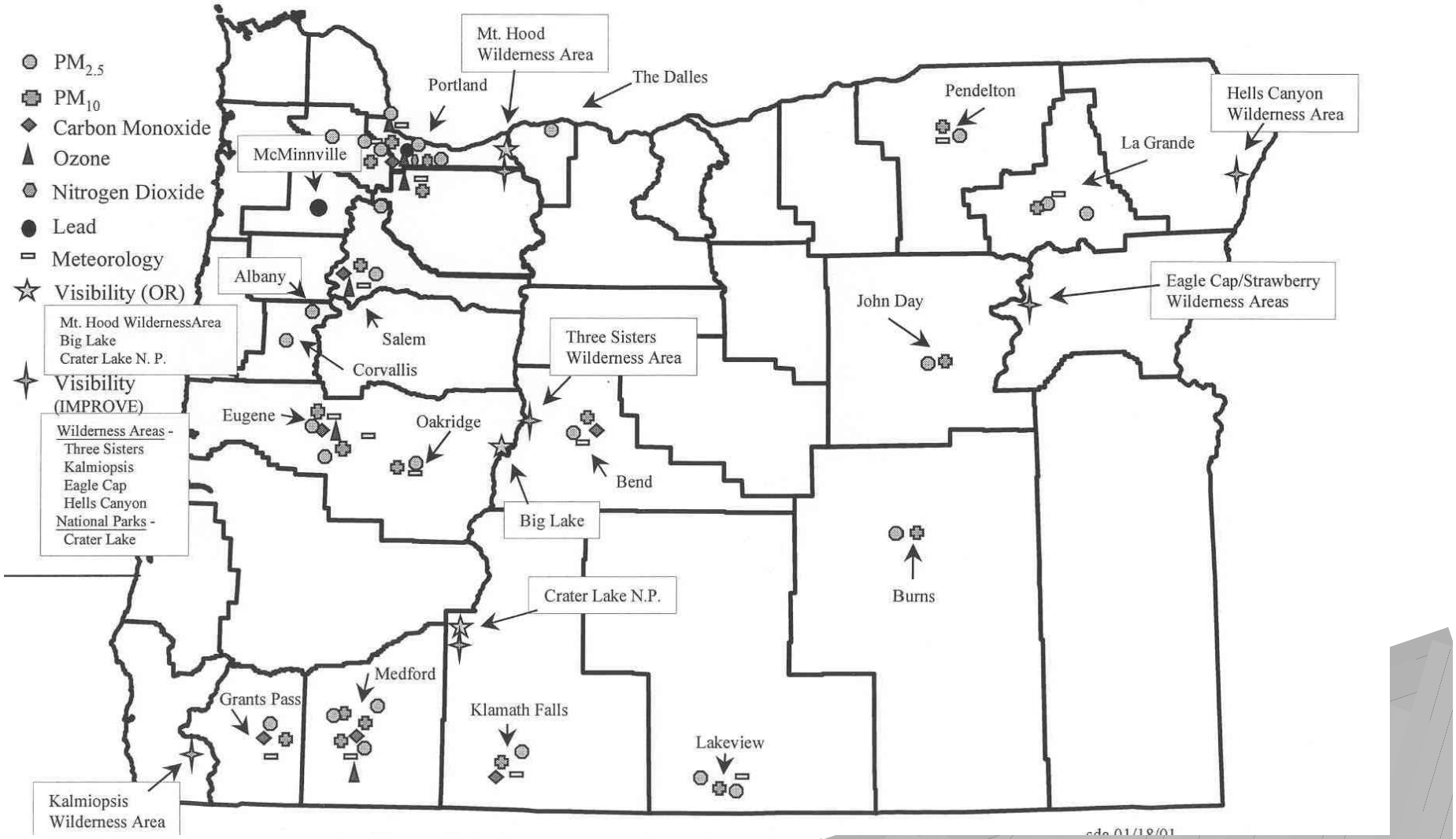
- **Impact Prediction**
  - **Emission Factors**
  - **Dispersion Modeling**
- **Assess Significance of Impacts**
  - **Depends on Attainment Status**
  - **Federal/State Standards**
  - **Sensitive Receptors**
- **Mitigation**
  - **Limit Burning**
  - **Limit Wind Erosion**
  - **Treat Unpaved Roads**
  - **Fugitive Dust Control**
  - **Reduce Emissions from Mobile Sources**
  - **Air Pollution Control of Point Sources**

Sources of Air Pollutants



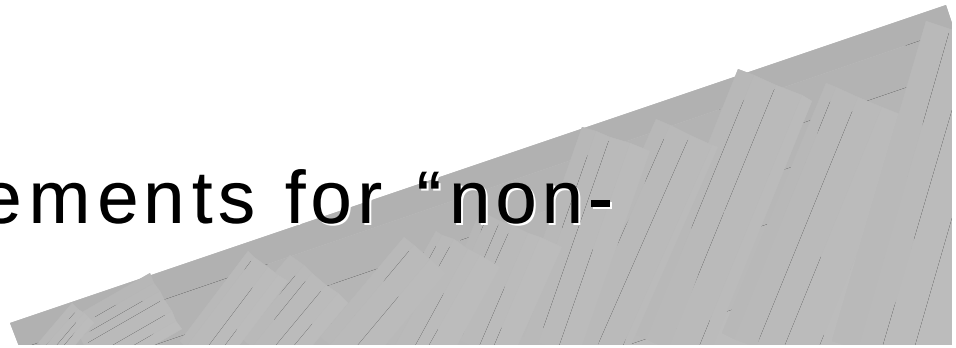
Air Pollution

Air Monitoring -- Oregon



Clean Air Act

- 1970
  - EPA establishes National Ambient Air Quality Standards (NAAQS) for Criteria Pollutants
- 1990
  - Established “non-attainment” criteria
    - Ozone
    - Particulate Matter
    - Carbon Monoxide
  - Established requirements for “non-attainment” areas

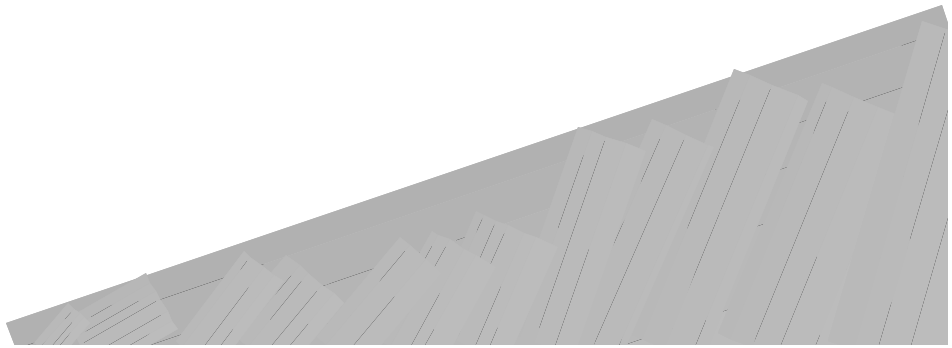


Criteria Air Pollutants

Pollutant	**Source**	**Standard**
Sulfur Dioxide	Burning Fossil Fuel	0.03 ppm/annual 35 ppm/1 hr
Nitrogen Oxides	Burning Fossil Fuel	0.053 ppm annual
Carbon Monoxide	Motor vehicles	9 ppm/8 hr 35 ppm/1 hr
Ozone	NOx + VOCs	0.08 ppm/8 hr
Particulate Matter	Industrial, burning wood	PM2.5 15µg/m^3 ann, 65µg/m^3 24 hr
Lead	Paint, smelters	1.5µg/m^3 3month

Computer Based Dispersion Models

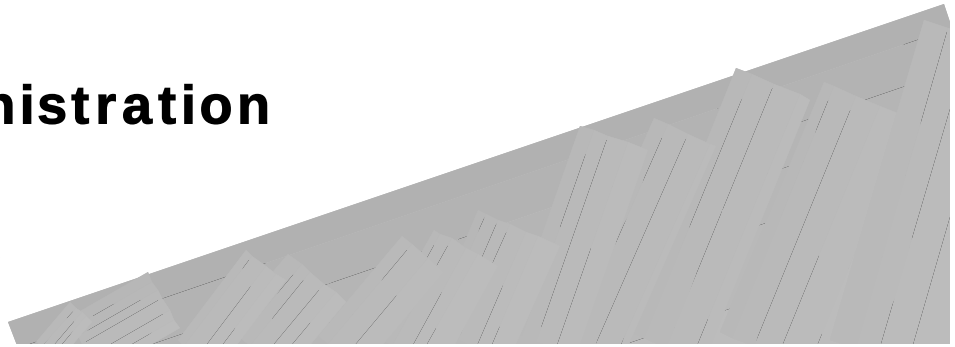
- Transportation
  - CALINE
  - HIWAY
- Industrial Sources
  - Industrial Source Complex – long-term
  - Fugitive Dust Model



Air Pollution Mitigation

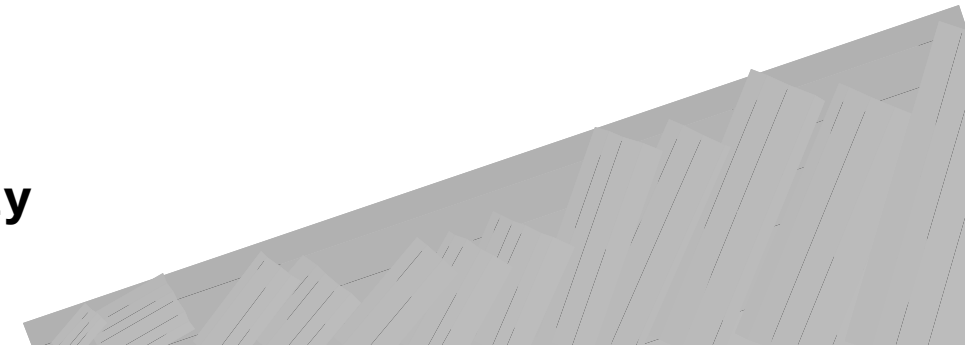
Assessing Impacts to Noise Levels

- **Identify Source of Potential Impacts**
  - **Transportation (Highways/Airports)**
  - **Stationary/Industrial Processes**
  - **Construction**
  - **Military Exercises**
- **Determine Study Area**
  - **Using within 1 mile of Activity**
  - **Air Traffic Patterns**
- **Determine Existing Conditions**
  - **Field Testing**
- **Identify Standard**
  - **Federal Highway Administration**
  - **EPA, DOT, HUD Goals**
  - **Local Noise Ordinances**



Noise (cont.)

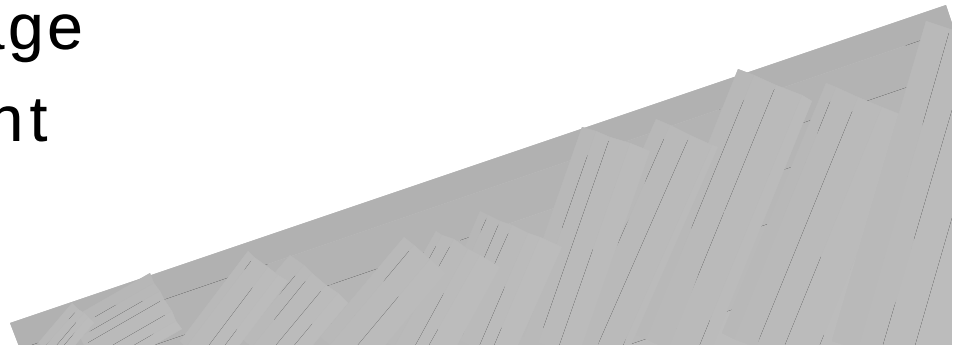
- **Impact Prediction**
  - **Construction Activity - Noise Ranges**
  - **Geometric Attenuation**
    - **Point Source - level decreases by 6 dBA for doubling of distance**
    - **Line Source - level decreases by 3 dBA for doubling of distance**
  - **Mathematical Modeling**
    - **Aircraft - INM**
    - **Helicopter - HNM**
    - **Motorized Vehicles - STAMINA**
- **Assess Significance of Impacts**
  - **Federal/Local Standards/Guidelines**
  - **Sensitive Receptors**
  - **3 dBA increase Detectable**
- **Mitigation**
  - **Limit Time of Activities**
  - **Noise Barriers**
  - **Depress Grade of Highway**
  - **Building Designs**
  - **Flight Patterns**



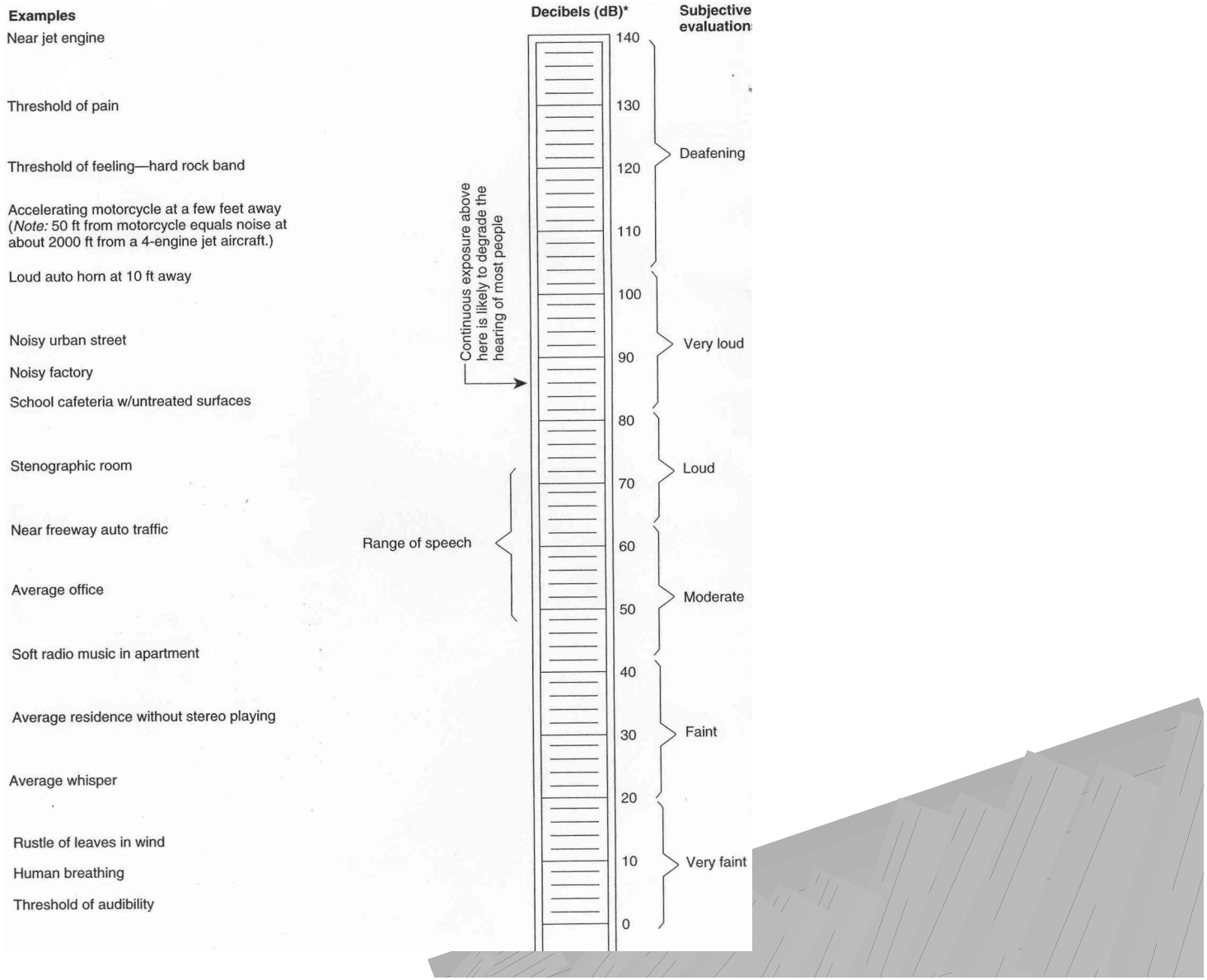
Noise Basics

- Define: unwanted sound
- Measured: microbars of sound pressure
- Human hearing: logarithmic
- Sound-pressure level (SPL)

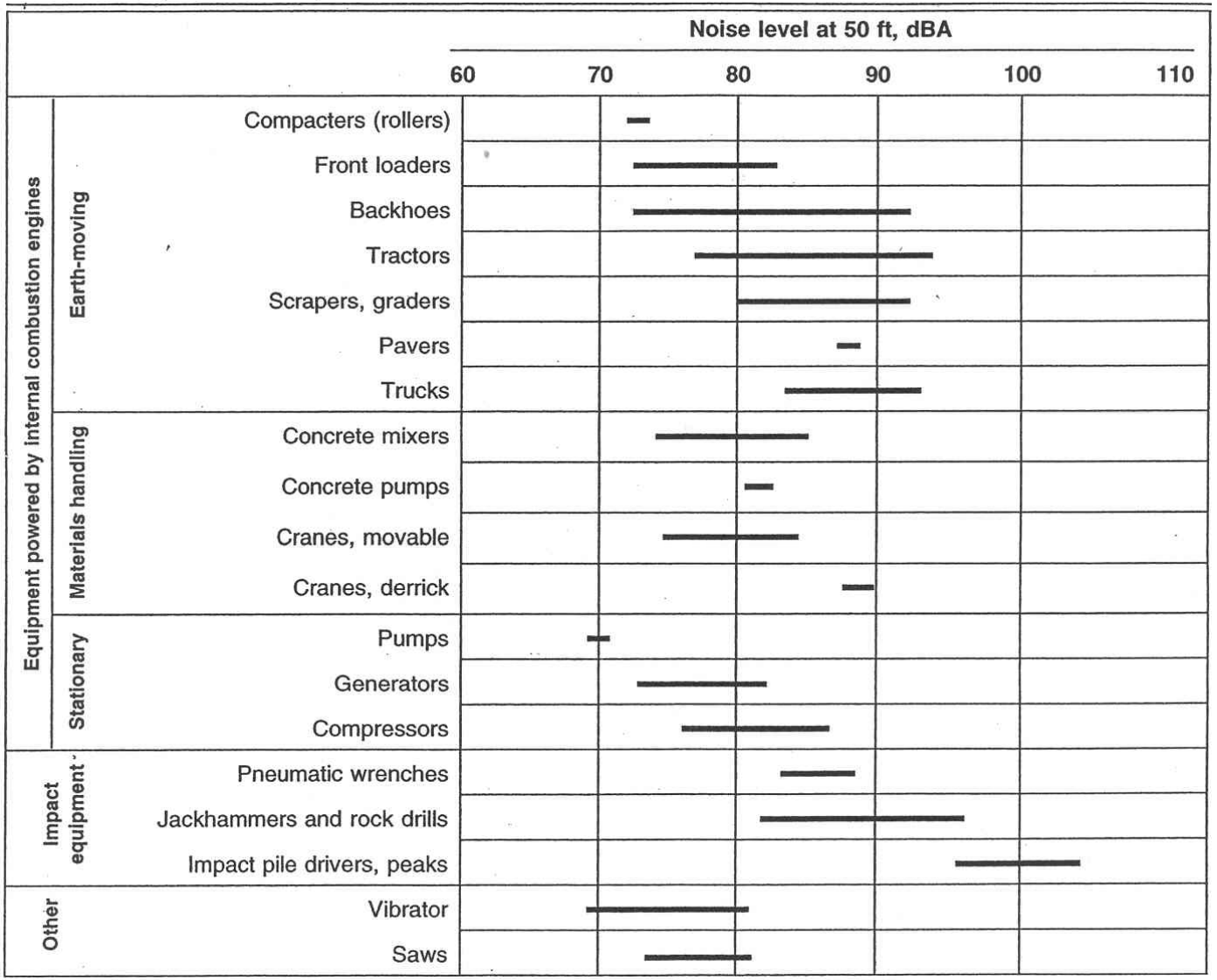
  $SPL = 20\log_{10}(P/P_o)$
- "A-weighted" frequencies
- Average Sound Levels
  - L_{dn} – Day/night Average
  - L_{eq} – Energy equivalent



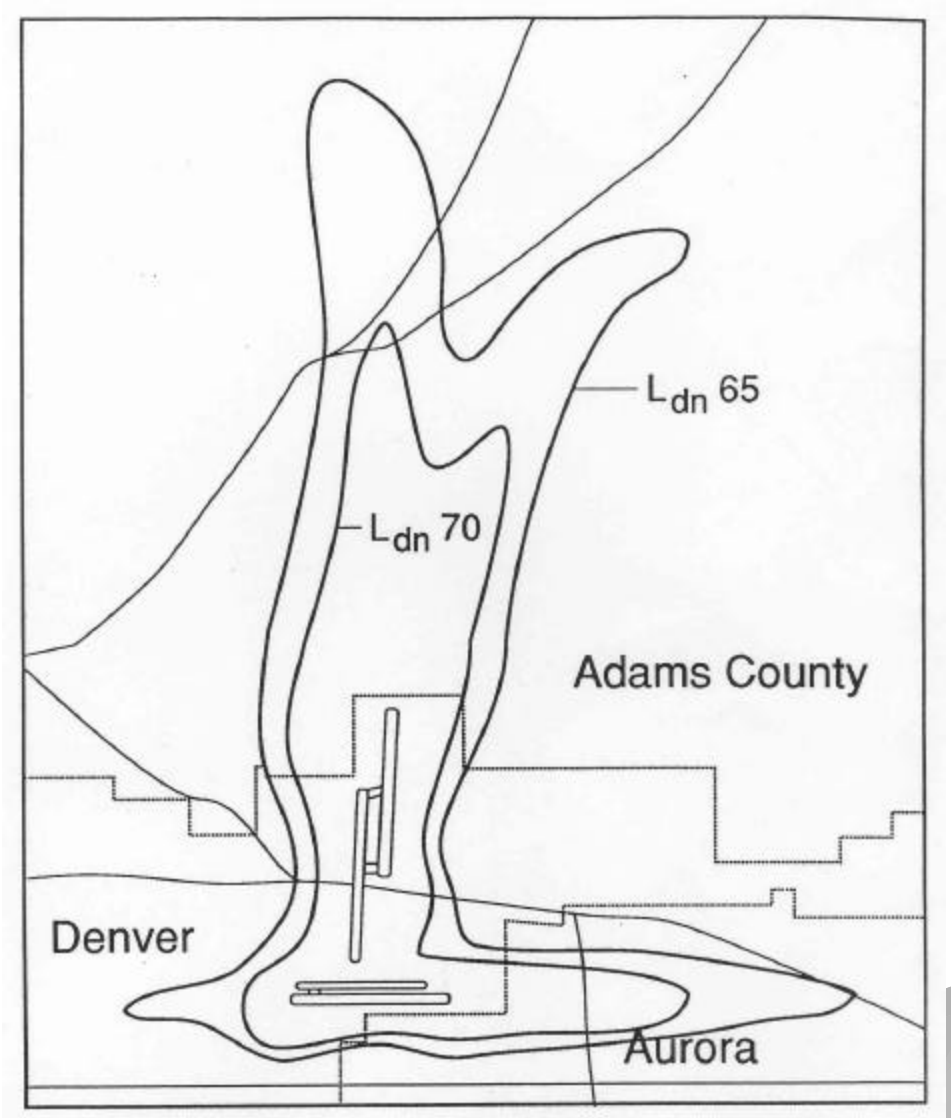
Common Sound Levels



Construction Noise Ranges

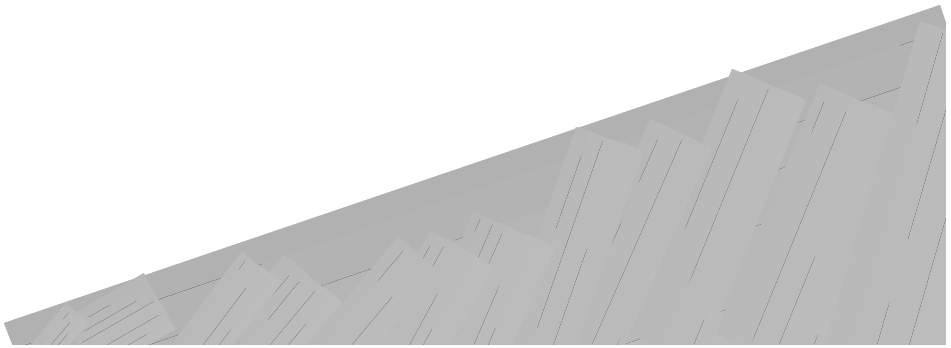


Aircraft Model Output

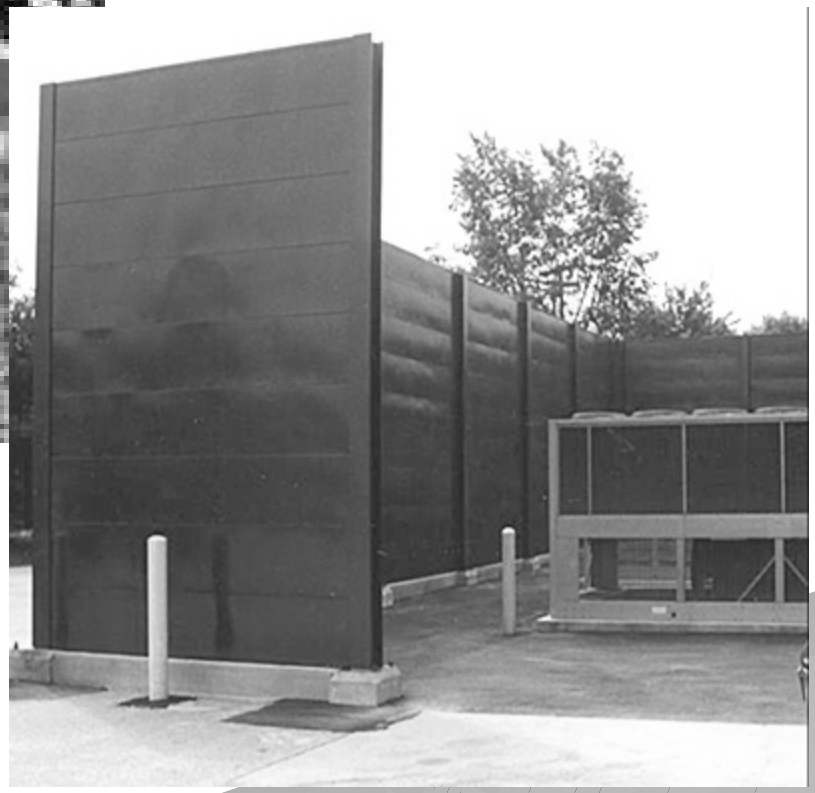


Highway Model

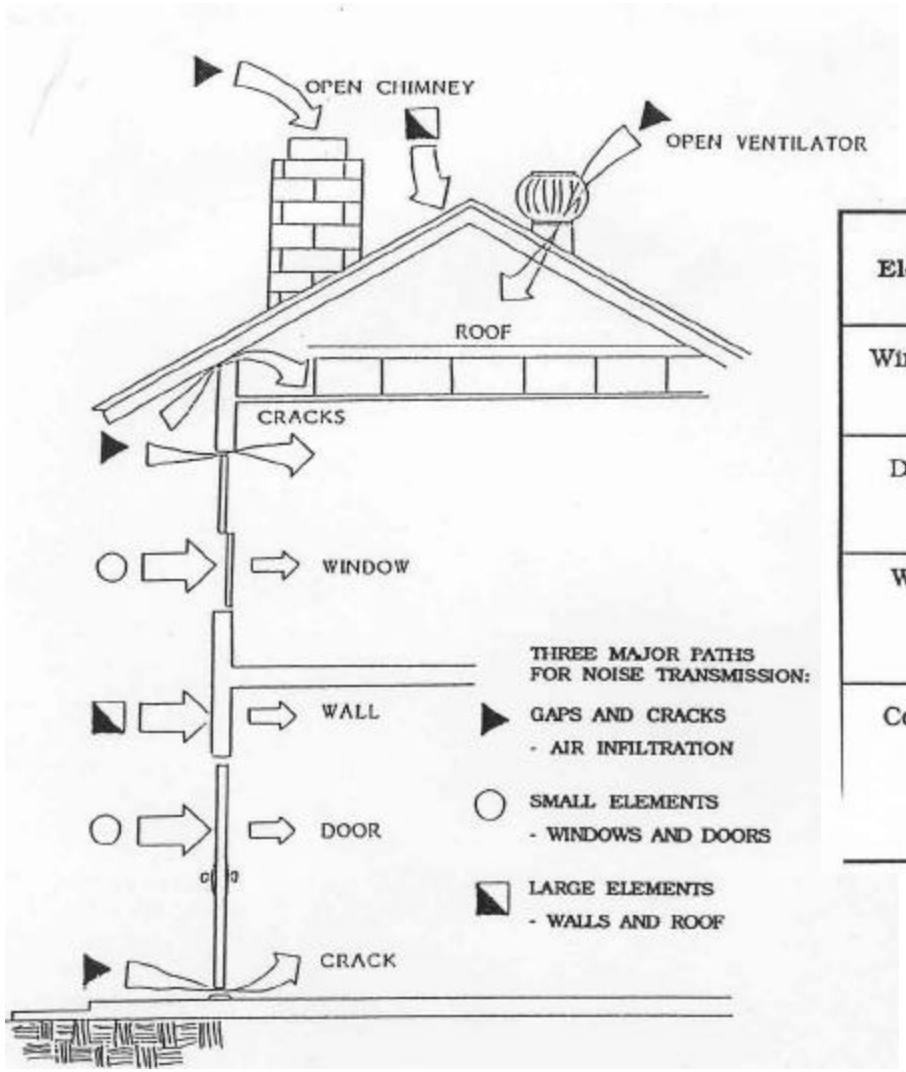
- STAMINA
  - Coordinates of highway
  - Coordinates of receptors
  - Traffic Data
    - Volume
    - Vehicle Mix
    - Speed
  - Ground Cover
  - Buildings



Noise Barriers



Noise Paths & Mitigation



Element	0–5 dB Noise Isolation Improvement	5–10 dB Noise Isolation Improvement	10–20 dB Noise Isolation Improvement
Windows	Seal cracks. Caulking.	Replace with STC 35 acoustic windows.	Replace with STC 40-45 acoustic windows.
Doors	Weatherstrip. Add storm doors.	Replace with STC 35 acoustic doors. Add storm doors.	Replace with STC 40 acoustic doors. Add storm doors.
Walls	Increase mass of interior surfaces.	Increase mass or resilient mounting of interior surfaces.	Resilient or furred-out mounting of new interior surfaces.
Ceiling	Add fiberglass insulation to attic space.	Increase mass of interior surfaces. Add fiberglass insulation to attic spaces.	Resilient mounting of new interior surfaces.