Noise Abatement Issues

Improving Quality of Life in Chicago
Primary Objective

- Work with the CTA to encourage testing of resilient wheels on trains
  - CTA currently not interested due to cost of wheels and training of employees
  - Assessing community awareness and interest in quieting the “L”
Concentrations

Policy and Social
- Identify interested organizations
- Assess awareness
- Lay foundation for working with CTA

Engineering
- Collect data on wheel
- Perform cost effectiveness analysis
- Explain benefits of wheel to lay person
Engineering of Resilient Wheels
Origin of Noise

Noise generated due to:

- Wheel / Rail Contact Resulting in Friction and Vibration
- Aerodynamic behavior of train

Sound measurements taken & analyzed seek to identify the fundamental frequencies of the noise generated
Evaluating Noise Data

- Peaks are identified as natural frequencies of the wheel where noise amplitude is highest.
Mechanics of Sound Damping

Sound damping techniques include methods by which the vibrational energy of the wheel/rail interface is turned into heat energy.

Several Techniques Include Using:
- Noise Absorbers (Axial & Radial)
- Damping Rings
- Friction Modifiers
- Resilient Wheels
Resilient Wheels

- The term resilient wheel refers to a unique three piece construction consisting of a rubber insert between a metal hub and tire.
- The resilient material (rubber) dampens noise by reducing the resonant noise radiation.
- The resilient material acts as a vibration isolation system that reduces the dynamic forces applied to the rail and reduces vibration transmitted from the wheel/rail interface back to the car body.
Noise Comparison

- Solid Steel Wheel
- Resilient Wheel
Resilient Wheel Example: Penn Machine Bochum 54
Resilient Wheel: Bochum 54

The Bochum 54 is a resilient or rubber cushioned wheel, containing rubber blocks pre-stressed in the radial direction throughout its circumference.

- 20 to 25 individual rubber blocks
- Wheel disc
- Wheel tire
• Bochum 54 wheel design is unique in that it uses high quality rubber blocks and not a solid rubber insert
Bochum 54 Qualities

- Very effective at reducing noise squeal on a curved track
- Bochum 54 reduces sound most effectively at levels above 500 Hz by reducing the amount of airborne noise from wheel/rail vibration (Ground borne vibration much lower than 500 Hz)
- Bochum tire averages 40% longer tire life than solid steel wheels
- Only tire replacement is necessary as opposed to the entirety of solid wheels

Data taken from U.S Department of Transportation Report No: UMTA-MA 06-0099-80-1 Dec. 1979
Quality of Life Model

- Factors that contribute to the goodness and meaning of life, as well as people’s happiness
- Quality of life studies promote means for people, within their environment to live in ways that are best for them
- Quality lives: lives that are meaningful and enjoyed
- Enjoyment: the experience of satisfaction or the possession or achievement of some characteristic
Quality of Life

The degree to which a person enjoys the important possibilities of his or her life through the interaction of personal and environmental factors.
Conceptual Framework
Decision-Making Opportunities

- People need to be highly satisfied with the possibilities of their lives, given their surrounding environment.
- Sometimes people may be unaware that a better quality of life is possible.
Quality of Life Concerning the CTA

- Chicago Public Transit infringing upon quality of life of the city’s citizens
  - Physical being: physical health
  - Community and social belonging: neighborhood involvement and recreational programs
  - Leisure Becoming: activities that promote relaxation and stress reduction
Community Groups

- People coming together for a specific cause

- In this case, individuals and previously established interest groups would come together to work with the CTA to improve quality of life within Chicago

- Other groups in Chicago are concerned about noise; for example, the building of Midway airport and the expansion of O’Hare
The Business Aspect
The Initial Steps

- CTA lines around the loop can be valuable.
- Along wells, Wabash, Van Buren, and Lake, however, detrimental.
- Can be seen by the depressing and dark look. Can this be caused by the noise?
- First began contact by going from building to building along Wabash Ave., seeking out managerial firms that had a stake in the development along these corridors.
Making Contact in the Business Community

- Contacted managerial firms, as well as the Chicago Chamber of Commerce
- Most described the noise as unavoidable and had no solutions
- Forced to install and replace storm windows, which repel noise better than conventional windows
- This places burdens on businesses.
Finding Some Information

L. J. Sheridan & Co

Buildings are ‘C’ level, meaning they command a price between $17 and $21 per square foot.

Other buildings in the loop are ‘B’ level, $29 and $34 per square foot.

‘A’ level, downtown command up to $40 and more per square foot.
Onward and Upward

- Disparity in price due to environment surrounding Wabash Ave

- Convince businesses that there is a solution to the noise in the loop
Getting Out Into the Community
Building a Relationship

Step One: Researching
- Searching newspaper articles
- Internet research
- Calling phone numbers found

Step Two: Contacting
- Telephone contact
- Setting up appointments
- Presenting information
- Discussing and answering questions
Contacts

Metro Seniors in Action

- Involved with CTA to make transit accessible for seniors
  - Seeking to increase members quality of life
- Attended sub-committee meeting of transportation
  - Invited to share further information
Contacts, cont’d

- Neighborhood Capital Budget Group
  - Seek to pursue “public good”
    - Campaign for Better Transit
  - Creating a discussion group of engineers and community activists for educational purposes
Further Interested Parties

- Chicago Area Transportation
- Harold Washington College
- Merchant’s Association
- Chicago Police Department
- South Commons Condo Association
- Cosmopolitan Chamber of Commerce
- Roosevelt University
- De La Salle High School
Future IPRO

- Continue to contact community groups and assess concern related to “L” noise
- Inform the CTA of results
- Work with CTA to explore options of improving quality of life