



**LOCAL NON-AUTO
TECHNIQUES TO PROMOTE
CLEAN AIR**

**A Guide for
Public Officials**



Northeastern Illinois Planning Commission





Northeastern Illinois is diverse in its land use and complex in its political structure. It has some of the most productive farms on earth — also one of the world's greatest cities. It contains 3,714 square miles of land and 38 square miles of water. It is home to 7 million people, organized in more than 1,250 units of government.

In 1957, following a decade of rapid urbanization in the Chicago suburban area, the Illinois General Assembly created the Northeastern Illinois Planning Commission (NIPC) to conduct comprehensive planning for the six-county greater Chicago region.

The Commission has three statutory charges: conduct research and collect data for planning; assist local government; and prepare comprehensive plans and policies to guide the development of the counties of Cook, DuPage, Kane, Lake, McHenry and Will.

By necessity, regional planning deals with general development policies not local land use detail. NIPC supports and coordinates county and municipal planning. The Commission has advisory powers only and relies upon voluntary compliance with its plans and policies.



northeastern illinois planning commission

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Public Officials**

\$ 20.50

**Northeastern Illinois Planning Commission
June, 1994**

This document was prepared in cooperation with and financed in part through grants from the U.S. Department of Transportation, Federal Transit Administration, the U.S. Department of Transportation, Federal Highway Administration, and the Illinois Department of Transportation, and in part through voluntary financial support from local governments and the private sector. The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Illinois Department of Transportation or the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

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EXECUTIVE SUMMARY

A. BACKGROUND

The northeastern Illinois region must take specific steps to reduce air emissions by the year 2007 in order to attain national air quality standards. If the region does not comply with federal requirements defined in the Clean Air Act Amendments of 1990, sanctions could be imposed which include the withholding of federal funds for the Illinois transportation program. Complying with these federal requirements will require the cooperative effort of state, regional, county, and municipal governments and agencies.

This report was written to provide public officials and planners with information regarding land use-based Transportation Control Measures (TCMs), many of which require minimal effort and which are relatively inexpensive to implement. The objective of the report is to demonstrate how these TCM strategies can be applied in individual communities and integrated into land use plans, standards or ordinances in order to contribute to the regional effort to improve air quality.

B. BICYCLE PROGRAMS

Bicycle programs can begin with the process of organizing a working group or bicycle advisory committee. This group or committee can assist in developing a bicycle plan or map and establishing bike routes, paths or lanes in a community. To implement a successful bicycle program, consideration should be given to install lockers, racks and other storage in convenient locations, and to provide bicycle storage and access to transit stations. In order to improve the effectiveness of bicycle programs, municipal or county governments can coordinate bicycle programs with those of adjacent communities, and can work with employers to promote programs and marketing campaigns.

C. SIDEWALKS AND WALKWAYS

Creating a "pedestrian friendly" environment, ensuring safety for pedestrians, and creating

connections with transit facilities are important strategies to encourage walking. Municipal and county governments can implement these strategies by developing a pedestrian plan; requiring sidewalk construction in new developments; and repairing, replacing or constructing new sidewalks in developed areas.

D. LAND USE PLANS AND ORDINANCES

Land use plans and ordinances can be used to improve air quality by incorporating strategies to affect travel behavior. Land use management strategies designed to reduce commute distances and encourage non-auto modes of transportation (public transportation, bicycling, and walking) include improving the balance of land for jobs and affordable housing; creating transit "friendly" development; and timing development to correspond with the approval of infrastructure and adequate services. Additional strategies include higher density activity centers (with concentrated employment, housing, retail or office developments at one central location); and dense residential development or redevelopment.

E. CROSS ACCESS EASEMENTS

Cross access easements can be used to encourage connections between adjacent properties and avoid unnecessary travel on major roadways. While these easements are effective in reducing traffic congestion and resulting vehicle emissions, they also preserve the carrying capacity of roadways. Prior to implementing cross access easements, communities should consider internal circulation patterns for vehicles on-site and on adjacent properties; geometric layout and function of existing roadways; and needs of individual property owners and developers.

F. PARKING MANAGEMENT

Parking management can be used to reduce vehicle trips and/or vehicle travel by encouraging carpools and vanpools, decreasing traffic congestion, and increasing the use of transit. Preferential parking

programs can be implemented to reserve the most convenient and attractive parking spaces for high occupancy vehicles (carpools and vanpools). Parking controls and pricing policies are additional parking management strategies to eliminate or limit the use of parking spaces in a particular area.

G. TELECOMMUTING

Telecommuting is a strategy that eliminates or reduces travel between an employee's home and place of work. By allowing employees to work at home or at an alternative location, such as a telecenter or a company's satellite office, employees can reduce work-related vehicle trips. Issues which should be addressed prior to implementing a telecommuting program include identifying which types of jobs are suitable for telecommuting; developing a strategy to select qualified employees; monitoring work productivity; and identifying costs for equipment and other work-related expenses.

H. CONCLUSIONS

Transportation control measures can be developed to enhance a community's current planning process and capital development program. When coordinated appropriately, TCMs can contribute to community goals and improve air quality at a minimal level of effort and financial cost.

Before implementing an individual TCM strategy, municipal or county governments should identify the needs and interests of residents and employers. In order to increase the effectiveness of a TCM strategy, a community may choose to coordinate various TCMs or coordinate with efforts of adjacent communities.

Land use-based TCMs have been identified as a highly applicable strategy in the northeastern Illinois region and the case studies included in this report illustrate the high potential for reducing vehicle emissions. In order to be more effective as a TCM, however, the cooperation of municipal and county governments is needed.

INTRODUCTION

Ambient ozone concentrations in northeastern Illinois have exceeded federal air quality standards since 1979. As a result, we are under a federal mandate to initiate additional programs to improve air quality or face the loss of \$710 million annually in federal transportation funds. According to the Clean Air Act Amendments of 1990, northeastern Illinois is required to reduce ozone-producing emissions by fifteen percent by 1996 and by three percent each year until 2007.

The Clean Air Act Amendments of 1990 also requires the State of Illinois to develop a revised State Implementation Plan. This is a document that "identifies and adopts specific enforceable transportation control strategies and transportation control measures (TCMs) to offset any growth in emissions from growth in vehicle miles travelled or the number of vehicle trips in such area." On November 15, 1993 the northeastern Illinois region submitted to the USEPA documentation of TCMs that will have contributed to a fifteen percent reduction in air emissions between 1990 and 1996.

There are many types of TCMs that can affect air quality, and the Northeastern Illinois Planning Commission (NIPC) is working with the Chicago Area Transportation Study (CATS) and other agencies to identify those TCMs with the highest potential for reducing emissions pollution. Appendix A contains a list of sixteen possible TCMs identified in the 1990 amendments to the Clean Air Act. Specific land use-based TCMs include land use management strategies such as mixed use development, increased densities, or site design modifications; telecommuting; parking management; and pedestrian and bicycle facilities.

This report describes the results of NIPC research on the following TCMs and their potential effects on air quality.

- **Bicycle Plans and Programs**
- **Pedestrian Plans and Programs**
- **Land Use Management**
- **Cross Access Easements**
- **Parking Management**
- **Telecommuting**

Most of these TCMs require minimal capital investments and can be coordinated with existing planning mechanisms.

The purpose of this report is to provide public officials and planners with information on how air quality plans and programs can incorporate land use-based TCMs that are most effective in reducing emissions of ozone precursors (hydrocarbons and nitrogen oxides). Achieving compliance with federal air quality standards will require widespread involvement in these programs, and it can be expected that county and municipal governments will be asked to participate in air quality improvement programs to help the region meet federal requirements.

Finally, this report concludes with a discussion of regional applicability and recommends strategies to effectively implement land use-based TCMs on a regionwide basis.

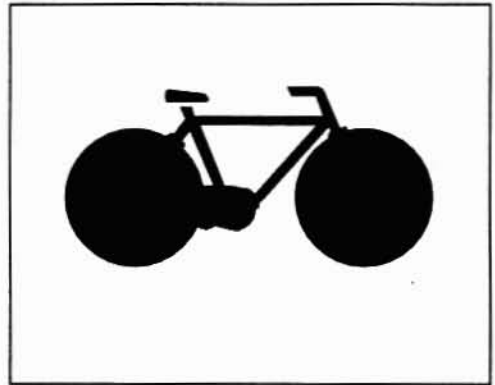
BICYCLE PROGRAMS

A. BACKGROUND

Bicycle transportation is a viable, pollution-free alternative to automobile travel for many kinds of trips, especially those of .5 to 4 miles. According to the 1990 census, there were more than 7,500 bicycle commuters in northeastern Illinois, and available information suggests that others would ride bicycles to work or to commuter rail stations if facilities were more accessible.

Bicycle use as an alternative to auto travel can be encouraged by making it safer and more convenient. Suggested approaches for planning and implementing bicycle programs include:

- *Organize a working group*
- *Develop and evaluate alternatives and prepare a bicycle plan and map (coordinated with subregional and regional plans)*
 - * *Develop goals and objectives*
 - * *Estimate existing bicycle use*
 - * *Inventory existing environment*
- *Implement plans and programs*
 - * *Lockers, racks, and other storage*
 - * *Coordination*
 - * *Integration with transit*
 - * *Employer programs*
 - * *Bicycle safety/education*
 - * *Media and promotion*
- *Establish bike routes or lanes*
- *Monitor and evaluate the implementation of plans and resultant usage*



B. ORGANIZE A WORKING GROUP

The initiative for bicycle planning can come from diverse sources, such as:

Village Board or City Council

Municipal or County Staff

Citizen Bicycle Interest Groups

Although the approval of the village board or city council will be necessary for an official bicycle plan to be developed and adopted, the initiative for undertaking the planning process can come from a variety of sources. For example, a staff member or department may recognize the need for a Bicycle Plan to identify appropriate bike paths or to be eligible for bicycle improvement funding. Alternatively, a bicycle enthusiast or club may urge a city or village to develop a plan.

When the decision has been made to develop the plan, a broad-based working group should be established. Some communities will choose to form a bicycle advisory committee or commission, composed of appropriate staff members (such as planning, engineering, and public safety) and members representing parks and recreation, schools, the business community, and bicyclists or bicycle groups. Interested citizens should be given an opportunity to volunteer, and the group's formation can be announced in local newspapers and/or in a

community newspaper. This type of working group will help to ensure that the plan reflects diverse community concerns.

Alternatively, a bicycle plan can be prepared by professional staff, with community involvement achieved by public hearings and meetings with community groups.

C. PLANS AND MAPS



Bicycle planning cannot take place in isolation and should coordinate land use, recreation, transportation and engineering perspectives, as well as those of the bicycling public. When completed, the plan can be integrated with the street plan or subdivision plan, included as a component of a comprehensive plan, or be presented as a free-standing document.

Ideally, a community bicycle plan will consist of route designations as well as policies on plan implementation. Community route plans should be coordinated with those of adjoining communities and regional plans since route continuity is so important.

A well designed plan should first be based on an agreed upon set of goals and objectives, should include an estimate of existing bicycle use, and should include an inventory of the existing bicycle environment (e.g., routes, parking) and other bicycle-related aspects of the community (e.g., major activity centers, major transportation generators, and review of existing roadways for bicycle use suitability.) It should consist of an interconnected system of bicycle routes, lanes, paths and "greenways" that provide both recreational and alternative transportation opportunities under current conditions and into the future. The bicycle

routes should give priority to connecting major activity centers and all major trip generators.

Early in the planning process, the components of the Plan should be classified and the same terms used consistently throughout the plan. The following classifications are frequently used:

Routes. Streets designated for use by bicycles and marked for such use by signs. Bicyclists share the road with automobiles, usually riding in the right-hand lane adjacent to the curb.

Bicycle Lanes. Clearly striped roadway space to be utilized by bicycles.

Bicycle Paths. Facilities built exclusively for bicycles, totally separated from the flow of traffic.

When these plan components have been identified, distinctions should be made between existing routes and future routes. A bicycle map should then be prepared, published and widely circulated as both a promotional and an educational tool.

Finally, a capital improvement program should be prepared in which priorities are established for new bicycle improvements and repairs to existing routes. It is also possible for a community to require developers to assist with financing or constructing these bicycle improvements. When bicycle plans are incorporated as an element of official comprehensive plans, development proposals may be reviewed in relation to the bicycle plan. Land development codes may then require developers to provide bicycle paths or storage facilities in the same manner as they might provide sidewalks, street lighting, or landscaping.

Bicycle planning, like other types of planning, is an ongoing function. New subdivisions will need to be evaluated for compliance with the plan; accidents will need to be monitored to identify problem areas; and conditions on existing routes will need to be upgraded from time-to-time.

A bibliography on bicycle planning is found at the end of this section.

D. IMPLEMENTATION

Lockers, Racks and Other Storage

Bicycle storage facilities are essential to the success of any bicycle program. They should be placed at locations with adequate lighting and high visibility, and access should avoid conflict with automobile traffic and pedestrians.

Bicycle lockers provide the highest level of bicycle security since they are enclosed facilities that totally protect the bicycle from theft, vandalism and weather. Bicycle storage racks are much more common than lockers, and are frequently provided at schools, commuter stations, park-and-ride lots and many other types of community facilities. Communities would be wise to work with transportation agencies to install bicycle parking at existing transit facilities.

In some communities, bicycle parking ordinances have been adopted. Such ordinances frequently require that a percentage of the required parking in new developments be set aside for bicycle parking. Some ordinances further specify the types of bicycle storage facilities to be provided (racks, lockers). For further information, consult the BICYCLE PARKING GUIDE prepared by the Chicagoland Bicycle Federation.

Coordination

To produce the most successful bicycle program possible, coordination within a community and between communities are both needed.

A community bicycle coordinator is usually a government employee who is an advocate for bicycle programming within the community and for the coordination of local programs with those of adjacent communities. Within the community, the coordinator oversees the development and maintenance of the bicycle system and the continued development of new bicycle programs. He/she also coordinates government plans and activities with those of citizens' groups. The coordinator frequently has other responsibilities, but sufficient time should be available for the bicycle program.

Coordination among communities is extremely important. In northeastern Illinois, a great deal of

coordination is provided among municipal governments and citizens' groups by the Chicagoland Bicycle Federation. The Federation has taken an active role in bicycle planning throughout the metropolitan area and has sponsored many media events to promote bicycle use. NIPC's Operation GreenLight Task Force has also served to coordinate regional bicycle issues and concerns (e.g., bicycles on arterial roadways) and specific projects (bicycle access to commuter rail stations). Cooperation and coordination with these larger organizations and with adjacent communities are important elements of the community coordinator.

Integration With Transit

Bicycle commuting is often restricted by long distances, inadequate or unsafe routes and physical barriers. Integration of bicycle use and transit can alleviate some of the problems and contribute to reducing vehicle miles travelled and improving air quality. One approach is to allow bicycles on public transit and to equip buses with bicycle racks. Another common integration approach is to provide bicycle storage facilities at transit stations. If these facilities are safe and secure, bicycle use will probably increase. For example, approximately 89 of the 217 Metra commuter stations in the Chicago metropolitan area have bicycle racks. Of these, 23 stations have at least one of the modern ribbon or loop racks, and the rest have older "schoolyard" racks. Data compiled in 1989 showed good utilization of these racks and a more recent spot-check showed increased usage.

When installing bicycle racks at commuter stations, it is important to provide safe access to the racks and avoid conflict between automobile and bicycle lanes to the maximum extent possible. If possible, place bicycle racks where they are protected from the weather by an overhang or canopy and in well-lit areas for personal security and accident prevention.

Employer Programs

Since the adoption of the Clean Air Act Amendments, there has been an increased emphasis on the employers' role in promoting bicycle

commuting to work. Many employers have participated in events such as the national "bike to work" week and other types of programs to promote bicycle commuting. Some employers have adopted relatively simple incentives, such as providing preferential parking for bicyclists and providing secure bicycle parking facilities. Others have adopted more involved programs, including incentive plans such as reduced hours or flex-time for bicyclists, or have provided shower and clothing locker facilities to encourage employees to bicycle to work.

As employers, municipal and county governments have air quality obligations similar to those of other employers.. They can also help other employers to meet their air quality obligations in many ways, including:

- To the extent possible, ensure that routes to major employment centers are safe for bicyclists.
- Provide safe, appropriately located, bicycle parking in the central business district and at local institutions, such as the library and community center.
- Provide public recognition and awards for companies that achieve a high level of bicycle commuting.

Bicycle Safety/Education

Education programs are essential to ensure a safe and effective bicycle program. Most programs are supported by the public government and may utilize several departments. Traditionally, bicycle safety education is directed at children and primarily consists of teaching the Bicycle Rules of the Road. Many programs are operated through the schools and are often taught by a police officer. However, adult education should not be neglected.

There are several innovative approaches to bicycle education that communities and schools may explore. In Seattle, for example, education is done through local hospitals. Pediatricians emphasize the importance of bicycle safety and the use of helmets. In other places, efforts have been made to simulate on-road bicycle experiences. Other types of programs could include bicycle rodeos and maintenance classes.

Media and Promotion

Many successful bicycle programs include a marketing campaign to make both cyclists & motorists aware of the bicycle program. Promotional campaigns frequently include posters, brochures, radio advertising & special events. Such campaigns and special projects can be carried out by municipal or county governments or by bicycle clubs. Even with the involvement of local bicycle clubs, government participation will be necessary.

E. DEMONSTRATION PROGRAM

Between June and September, 1993 the Northeastern Illinois Planning Commission conducted four bicycle surveys at diverse locations. These included commuter rail stations at Schaumburg and Deerfield, an employer located in Evanston and a survey at the Mercantile Center in Chicago. Results at each of these locations were markedly different, but were quite promising in all cases.

In each of these surveys, a case study approach was used to estimate emissions reductions as a result of bicycle ridership, as opposed to driving. Savings estimates were based on the number of avoided vehicle miles travelled (VMT) and avoided vehicle trips (VT) per rider at each location, provided that the car left at home by the bicycle rider was not used by another household member ("savers"). The avoided VMT and VT were then converted to reductions in pollution emissions by the methodology described in Appendix B.

continued on next page...

DEMONSTRATION PROGRAM, cont.

Results in the two suburban locations were similar, and the response rate was excellent. In both cases, the "savers" represented more than 30 percent of the sample, and the avoided VMT from bicycle ridership was 2,736 in Schaumburg and 1,608 in Deerfield. Emissions reductions are shown at the end of this section.

The Shure Brothers Company is a good example of the potential for encouraging bicycle ridership for the work trip. Shower facilities were installed for employees and bicycle racks were moved to a safer location. As a result, several additional employees bike to work. Of the twelve responses, 50 percent were "savers" and the avoided VMT was 6,828.

Although the response rate from the Mercantile Exchange survey was excellent, only 16 percent of the 49 respondents were "savers" since a large proportion of the riders take public transportation as an alternative to biking. However, there was a reduction of 10,742 VMT per year. Emissions reductions are shown below.

The following table shows annual emissions reductions (in pounds) from bicycle riding which were identified in the four bicycle surveys.

	Hydrocarbons	Nitrogen Oxides
Schaumburg	51.2	15.5
Deerfield	54.4	13.9
Shure Brothers	67.3	27.4
Mercantile Exchange	120.5	44.9
TOTAL	203.4	101.7

F. FURTHER CONSIDERATIONS

Because each community is unique, the political, socio-economic, fiscal and physical characteristics are important in the design of bicycle programs and facilities. For example, planning bicycle routes and route priorities will differ with traffic conditions, availability of a transit station, and location of community facilities. Capital improvement programming for the construction of new bicycle facilities will depend on other community priorities as well as the amount of money available.

Strong leadership is needed to implement bicycle programs, but the costs are small relative to many other types of programs and the air quality benefits are significant.

BICYCLE PLANNING BIBLIOGRAPHY

- American Association of State Highway and Transportation Officials, Guide For Development of New Bicycle Facilities, 1981.
- American Society of Civil Engineers, Bicycle Transportation: A Civil Engineer's Notebook for Bicycle Facilities, 1981.
- Bicycle Institute of America, Bicycling Reference Book, 1990-91 Edition, Washington, D.C. 1991.
- Chicagoland Bicycle Federation, Bicycle Parking Guide, Chicago, IL, 1993.
- DeLeuw, Cather & Co., Safety and Locational Criteria for Bicycle Facilities, FHWA-RD-75-112, February 1976.
- Federal Highway Administration, Technical Guidelines for the Control of Direct Access to Arterial Highways, FHWA-RD-76-86, August 1975.
- Feldman, William, Bicycle Compatible Roadways - Planning and Design Guidelines, New Jersey Department of Transportation, December 1982.
- Jones, Gregory M., On-Road Improvements for Bicycles Implemented in the State of Maryland, Baltimore County Department of Traffic Engineering, 1978.
- Maryland Department of Transportation, Evaluation of Wide Curb Lanes as Shared Lane Bicycle Facilities, 1985.
- Northeastern Illinois Planning Commission, Development Guidelines That Promote Bicycle Use, Operation GreenLight, August 1990.
- Northeastern Illinois Planning Commission, "Promoting Bicycle Commuting", March 1992.
- Northeastern Illinois Planning Commission, "Encouraging Bicycle Use in Northeastern Illinois", 1983.
- Rails to Trails Conservancy, Design and Management Manual for Multi-use Trails, 1993.
- Turner, Daniel S., Fambro, Daniel B., "The Effects of Paved Shoulders on the Accident Rates for Rural Texas Highways," paper presented at Transportation Research Board, 1981.
- U.S. Department of Transportation, Federal Highway Administration, Selecting Roadway Design Treatments to Accommodate Bicyclists, November, 1992.

SIDEWALKS AND WALKWAYS

A. BACKGROUND

Walking is a feasible alternative to driving for many kinds of trips, and there is a 100 percent reduction in air pollution for each trip shifted from driving to walking. The key to attracting walking trips is to create safe, attractive and convenient facilities for people who would like to walk.

Currently, development patterns still favor automobile use, however, and many subdivisions have no sidewalks, so children are often forced to ride school buses for just a few blocks. Recent recognition of the effect of these development patterns on air quality is focusing more attention on the provision of sidewalks and walkways to reduce automobile travel and improve air quality. This can most effectively be accomplished through the development of a pedestrian plan. Municipal governments often combine bicycle and pedestrian planning, but others tend to focus primarily on guidelines for the construction of sidewalks and pedestrian plans.

In addition, there are numerous issues involved in the implementation of pedestrian plans, such as:

- Sidewalk Environment
- Safety/Safety Education
- Connections With Transit

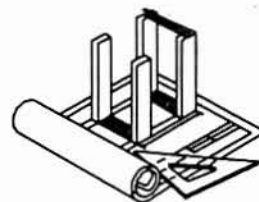
This section defines these issues in greater detail and provides discussion of how municipalities in northeastern Illinois have implemented sidewalks and walkways.

B. PEDESTRIAN/SIDEWALK PLANS

Early in the planning process, it is important to formulate policies to guide pedestrian facility development and redevelopment in built-up areas and standards for new areas. Distinctions should also be made between pedestrian paths within a subdivision which can be linked with sidewalks on collector streets and traditional sidewalks set back from the curb on public streets.

New Developments

Requirements for sidewalk construction in new developments are usually placed in subdivision ordinances. Many communities now require sidewalks on at least one side of the street in all new residential areas, but some require them on both sides. The required sidewalk width is usually a minimum of five feet, with a width of two to five feet between the curb and the walk.



Where new construction is taking place on a single lot, the sidewalk requirements can be more complicated. If there are no existing sidewalks in the area, sidewalk construction on the one lot may be deferred until they are constructed in the larger area. In this case, the property owner may be asked to sign an agreement to pay for a sidewalk when it is constructed in the larger area. If there are sidewalks nearby, the owner is responsible for installing a walk. A development with private roads may be handled differently and, in some cases, sidewalks are required on only one side of the street.

New Sidewalks in Developed Areas

There are many types of government policies regulating this type of sidewalk improvement. In the municipalities consulted, funds for sidewalk construction are included in the capital improvement program. While most municipalities pay the total cost, a few require some matching funds from property owners.

Policies governing site selection for new sidewalks vary. New sidewalk construction in some municipalities concentrates almost exclusively on "safe school" walks. Routes along arterial and collector streets have been given first priority attention. When all of these routes have been covered, sidewalks along neighborhood routes will then be constructed. In addition, some communities have prepared and distributed a walking plan and map for each school which shows the safest routes to school, including safe street crossing locations.

Other municipalities systematically construct new sidewalks in developed areas and focus on "missing links". In some cases, developed areas where sidewalks are missing are prioritized and constructed according to a five-year plan. Variables included in the ranking system include: traffic, location (close to school, Metra station, facilities such as community center, shopping center) and residents' request.

Sidewalk Replacement and Repairs

All of the communities contacted have an annual sidewalk repair program, but there are many differences in the way it is handled. Some municipalities only repair or replace sidewalks in response to complaints by pedestrians or requests by owners, or if city staff identify a walk needing repair when other work is being done in an area.

Other communities have a systematic program for repair and replacement. One municipality inspects and rates sidewalks by condition, so that those most in need are done first. In one place, the village has been divided into six parts. Each year, sidewalks in one part are systematically inspected and repaired or replaced as needed. This system allows workmen to concentrate in one area which is more efficient than doing scattered repairs. The village also keeps a log of complaints. If inspections show a dangerous situation, those repairs are handled as soon as possible.

Funding for sidewalk replacement or repair also differs from place to place. As in sidewalk construction programs, some municipalities pay the full cost of replacement or repair, but others assess property owners for part of the cost.

C. IMPLEMENTATION

Sidewalk Environment

A "pedestrian friendly" environment incorporates as many attractive design features as possible. Parkway trees and plantings at appropriate locations add to the attractiveness of the environment and encourage walking. Well-placed benches, especially near bus stops, are welcomed by many pedestrians.

Safety/Safety Education

Pedestrian safety is a major concern, and design of the sidewalk, crosswalks, and traffic signals should reflect safety standards. In 1987, there were 225 pedestrians killed in pedestrian/motor vehicle collisions and more than 1,850 people suffered disabling injuries in northeastern Illinois.

Crosswalks should be striped and curbs at intersections should be sloped for handicapped access. At intersections with traffic lights, ample time should be allowed on the "walk" cycle for pedestrians to cross safely. For very wide streets, safety islands should be provided for pedestrians who walk slowly.

Safety education programs are often conducted by schools, park districts and senior centers. Model education programs such as WALK ALERT can be tailored to meet individual community needs and coordinated among the various education groups.

Connections With Transit

Connections with transit are essential to promote increased pedestrian activity and maximize air quality benefits. These connections can take the form of new bicycle paths to transit stations, improved access through sidewalk improvements, or provision of shelters at bus stops to encourage people to ride the bus instead of driving.

D. DEMONSTRATION PROGRAM

A demonstration program was recently conducted by the Northeastern Illinois Planning Commission to examine the effect of sidewalk availability on propensity to walk instead of drive, thereby reducing air pollution. The sidewalk where the program was conducted is located in Downers Grove, and connects two residential areas and an industrial park to the Metra commuter station.

A questionnaire, a cover letter and a postage-paid envelope were distributed to 164 persons using the sidewalk for two mornings in August. Responses were received from 39 persons, for a 23.8 percent response rate.

Subjects were asked about their trip distance, mode and destination before the sidewalk was completed and currently. They were also asked about trip purpose and how frequently they use the sidewalk. Most of the subjects use the sidewalk regularly, and 77 percent use the sidewalk to reach the commuter station for the work trip. The average one-way trip was .75 miles (1.5 miles round trip) and 26 percent of the subjects previously drove to the station. On this basis, there would be a saving of 6,050 vehicle miles travelled (VMT) and 8,000 cold starts per year by persons who are now walking instead of driving their automobiles.

Using this information, it is estimated that there would be the following potential emissions reductions per year as a result of changes from driving to walking due to installation of the sidewalk:

Hydrocarbons	364 pounds
Nitrogen oxides	72 pounds

Please refer to Appendix B for a description of the air quality analysis method.

E. FURTHER CONSIDERATIONS

In general, efforts to encourage walking and improve walking conditions have been significantly less than bicycle programs. Yet, there are large numbers of people who drive short distances to transit stations or for errands who might walk under favorable circumstances. As the sidewalk demonstration program shows, some people will shift from driving to walking when a paved walkway is available. Substantial air quality improvements result from the reduction of cold starts.

The State of Florida discovered that the development of a pedestrian plan and the appointment of a coordinator made a dramatic difference in the walking environment and the number of pedestrian fatalities.

SIDEWALK AND WALKWAY BIBLIOGRAPHY

Applied Science Associates, Inc., "Florida Pedestrian System Plan," Florida Department of Transportation, 1989.

National Safety Council, WALK ALERT Pedestrian Safety Program.

Northeastern Illinois Planning Commission, Development Guidelines that Promote Pedestrian Access and Safety, Operation GreenLight Report, August, 1990.

Pedestrian Federation of America News

The Walking Magazine, "America's Ten Best," July/August, 1991.

LAND USE PLANS AND ORDINANCES

A. BACKGROUND

The pattern of land uses in northeastern Illinois is inextricably linked to transportation needs, energy use and air quality. Local governments have the authority to determine the arrangement of land uses within their boundaries through plans and ordinances, and counties plan for unincorporated areas. Land use decisions within each municipality have direct and indirect impacts on air quality. The density and placement of land uses, for example, can affect the feasibility of public transportation. Also, trip distance can be determined by the relationship of residential land uses with community facilities and local jobs.

This chapter will discuss how land use decision-making can have an impact on air quality. Three perspectives are outlined: regional, community, and site design. Air quality benefits can be achieved at all three levels. It is not necessary for all communities to be "urban" neighborhoods. Thus, there are recommendations *** newer, lower density communities, as well as established and mature communities.



The Northeastern Illinois Planning Commission prepares advisory plans on issues that affect the region as a whole, such as land use, transportation and air quality. In June of 1992, NIPC adopted the *Strategic Plan for Land Resource Management* which offers strategies aimed at modifying the trend of decentralization. Recommendations include encouraging compact, contiguous patterns of newly developed and redeveloped land that can support efficient public transportation, bicycling, and walking in order to reduce traffic congestion and air pollution. In addition, the Plan recommends an increased use of vacant lands and older buildings in

mature communities and infill between suburban communities, rather than excessive expansion into agricultural areas. Improving the balance of land for jobs and affordable housing throughout the region is also recommended to give people the option of reducing commute distances.

The adoption of the Clean Air Act Amendments has stimulated a reevaluation of land use decisions and how they impact travel patterns and air polluting emissions. Each jurisdiction can contribute to air pollution reductions through land use planning. Potential land use approaches to air quality improvements discussed in this section include:

- Land Use Management
- Activity Centers, Intense Office Development
- Dense Residential Development

B. LAND USE MANAGEMENT

The term "land use management" has become a generic term used to describe almost any type of land use plan or regulation. Here the phrase describes the organization and timing of land development to achieve a prescribed goal(s). In this case, the goal is reduction of vehicle trips and vehicle miles travelled in order to affect air quality improvement.

Within the context of the air quality improvement goal, the following types of land use management approaches may be considered.

- Balanced development
- Transit "friendly" development
- Development timing

Balanced Development

One regional concern is the relationship between jobs and housing locations. While this is not strictly a local issue, municipal or county governments can help to improve the balance by encouraging appropriate housing that is conveniently located to employment areas. Another concern is the encouragement of new employment in reasonable proximity to housing. By getting workers to live closer to their jobs, a more balanced pattern of development and thus a reduction in work related vehicle miles travelled (VMT) can be achieved.

Transit " Friendly" Development (Site Design)

Design approaches can help development achieve a transit "friendly" status. First, developments need to have an appropriate density to make transit financially feasible. In general, residential densities of seven to fifteen units per acre have been found to be successful to support frequent local bus service depending on surrounding land uses. In addition, inappropriate street design (including street widths and intersection design) can negate any possibility of public transportation in an area. If there is public transportation serving an area, automobile trips and miles can be reduced and air quality improved. Another technique is the placement or orientation of buildings on a particular site. Pace Development Guidelines provide a wealth of good design techniques to make new developments compatible to the provision of bus service.

Development Timing

One approach to encourage contiguous development is the concept of "concurrency." This means that no plan or development can be approved unless adequate services and infrastructure will be provided simultaneously. Supportive ordinances will be needed if concurrency is to succeed, such as ample lot sizes for septic permits. More orderly development processes, that avoid "leap frogging" and the premature development of rural areas, also allows VMT to be contained, thereby producing air quality benefits.

C. ACTIVITY CENTERS

Activity centers are usually concentrations of employment at one location. They vary by size,

and the density is usually higher than that of surrounding areas. They may include housing, which is usually on the periphery in a community application of the concept. The downtown areas of some of the largest cities in northeastern Illinois and some shopping/office centers may be considered activity centers.

Activity centers, in some cases, are similar to "diversified regional centers," a concept described in the NIPC *Strategic Plan for Land Resource Management*. A Diversified Regional Center (DRC) is characterized by a mix of mutually supportive land uses, including substantial percentages of employment, housing and attendant services.

Research has shown that employees working in mixed use centers use their cars less and ride transit more than those working in single purpose centers. In addition, there is an increased participation in carpooling.



D. DEMONSTRATION PROGRAM: OFFICE DEVELOPMENT LOCATION

To identify the effect of the location of office development on vehicle trips and VMT, employee surveys were conducted of two businesses that had moved from suburban locations with adequate free parking to more intensely developed areas without free parking. The surveys were designed to compare travel patterns before and after the move was made.

One firm, the Bank Administration Institute (BAI) moved from Rolling Meadows to the city of Chicago. Questionnaires were distributed to 91 employees, with a return rate of 31 percent. Before the move was made, virtually all of the employees drove to work, but since the move they all take the train. It is estimated that changes in the work trip resulted in the saving of more than 2,800 VMT per week.

The other firm, The Altschul Group, moved from the outskirts of Evanston (Pitner Avenue) to a building in the Evanston Central Business District (CBD). Questionnaires were distributed to the fifty employees with a return rate of 68 percent. This survey included work trips and non-work trips

Most of the Altschul employees drove alone to work both before and after the move. However, nearly fifteen percent changed from driving alone to carpooling/vanpooling or walking. Even with the few mode shifts, there was a slight increase in VMT for the work trip. These employees were also asked about their non-work trips during the day, especially during the lunch hour. The gain in VMT for the work trip was almost off-set by VMT savings for non-work trips, leaving a net increase in VMT of 4.9 miles per week. Because the number of non-work vehicle trips were reduced, there were air quality improvements that resulted from the move.

Annual emissions reductions that resulted from the moves made by the two firms are shown below.

	Hydrocarbons (Lbs)	Nitrogen Oxides (Lbs)
BAI	1231	1228
Altschul Group	307	66

E. DENSE RESIDENTIAL DEVELOPMENT

Background

In suburban areas, the most prevalent type of residential development is single family, with some townhouses and apartment houses. Most of these

types of development have fairly low densities; that is, less than ten units per acre. By most suburban standards, development with more than ten units per acre can be considered "dense" residential development.

Although dense residential development is associated with reduction of auto travel and air quality improvements, the question is how to achieve desirable densities given current development patterns. Redevelopment at higher densities is often resisted by community residents, but there are a few situations where it can be effected.

For example, one potential application is on the fringe of a commercial area, which is especially palatable if current residences have deteriorated.

Redevelopment at higher densities near transit stations is particularly effective in reducing vehicle travel to the station and may also encourage commuters to take a train to work rather than drive.

F. DEMONSTRATION PROGRAM: DENSE RESIDENTIAL DEVELOPMENT

Based on the hypothesis that denser residential development conveniently located to transit and other facilities has the potential for reducing vehicle miles travelled (VMT) and related emissions, surveys were conducted of residents in two relatively new high rise buildings in such locations. The principal questions addressed in the survey were changes in travel patterns and mode since moving to these buildings for work trips and non-work trips. Based on these results, effects of these changes on air quality were estimated. There were 290 apartments in the two buildings, and 113 responses were received (39 percent).

Work Trip. From the responses, it was estimated that there was a reduction of 17,100 vehicle trips per year and 466,650 VMT per year by employed residents since moving to these buildings.

Estimates of air quality impacts were then calculated for hydrocarbons and nitrogen oxides, the ozone precursors. For both of these pollutants, potential emissions reductions resulting from trip and VMT reductions for each of the vehicle operating phases (cold start, running emissions and hot soak) were calculated. Annual results are shown below.

Hydrocarbons (HC)	2,030 pounds
Nitrogen Oxides (NOx)	1,413 pounds

Non-Work Trip. Responses suggest that non-work trips for shopping, dining out, personal business, and recreation were reduced by 10,600 trips per year. Reductions in the number of VMT were estimated to be 53,800 per year.

Potential emissions reductions were then calculated, and results are shown below.

Hydrocarbons (HC)	604 pounds	Nitrogen Oxides (NOx)	221 pounds
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Total Trips. Potential emissions reductions for both work trips and non-work trips were found to be:

Hydrocarbons (HC)	2,634 pounds
Nitrogen Oxides (NOx)	1,634 pounds

G. FURTHER CONSIDERATIONS

While the land use management concepts described in this part can potentially affect travel behavior and, consequently, air quality, it is important to recognize that implementation of some approaches can take years to effect. For example, the development of a Diversified Regional Center or a major Activity Center is not accomplished quickly. On the other hand, a new, appropriately located dense residential development or intense business development would not take long to complete and the air quality effects would take place quickly.

Since urban development is a dynamic process, there are many opportunities to implement new approaches and improve air quality.

Implementation of approaches described in this part are within the jurisdiction of municipal or county governments. Strong leadership by public officials is needed to affect changes, together with a public education effort to inform constituencies about the issues and benefits. In addition, the coordination of transportation and land use plans across jurisdictional lines is crucial to maximizing the benefits of new approaches.

LAND USE PLANNING BIBLIOGRAPHY

- American Public Transit Association, Building Better Communities: Coordinating Land Use and Transit Planning.
- Calthorpe & Associates, Inc., for Sacramento County Planning and Community Development Department, "Transit Oriented Development Design Guidelines." Draft, September, 1990.
- Cervero, Robert, "America's Suburban Centers: A Study of the Land Use Transportation Link," Urban Mass Transportation Administration, 1988.
- Hooper, Kevin G., JHK Associates, "Travel Characteristics at Large Scale Suburban Activity Centers," National Cooperative Highway Research Program, Report 323, October, 1989.
- Howard/Stein-Hudson Associates, Inc., for Middlesex-Somerset Mercer Regional Council, "The Impact of Various Land Use Strategies on Suburban Mobility," Draft Report, May, 1991.
- Lansing, John B., Robert W. Marins, and Robert B. Zehner, Planned Residential Environments, Institute for Social Research, University of Michigan, 1970.
- Metropolitan Washington Council of Governments, "Transportation Demand Impacts of Alternative Land Use Scenarios," Draft Final Report, May, 1991.
- Northeastern Illinois Planning Commission, Jobs/Housing Balance, May, 1992.
- PACE Suburban Bus Service, Development Guidelines, Arlington Heights, Illinois, December, 1989.
- Puget Sound Council of Governments, Housing Affordability and Relationship to Jobs/ Housing Balance in the Puget Sound Region, 1990.
- Rice Center, "Houston's Major Activity Centers and Worker Travel Behavior," prepared for the Houston-Galveston Area Council, January, 1987.
- U.S. Department of Transportation, A Guide to Land Use and Public Transportation," DOT-T-90-13, December, 1989.

CROSS ACCESS EASEMENTS

A. BACKGROUND

A cross access easement is a type of access management technique which encourages connections between adjacent properties. An example is the neighborhood shopping center, where several adjacent properties are served by an open parking lot area. When there are common access points and sufficient internal circulation, vehicles can travel from one location to another without having to exit onto the roadway and then enter the adjacent driveway. This technique reduces roadway conflicts and eliminates delays from vehicles waiting to cross from one property to the next.

B. CROSS ACCESS

Cross access easements are useful along all types of roadways. They are especially applicable for adjacent properties with small frontage widths and driveway volumes of approximately 500 vehicles per day (1).

Shared driveway access by two or more properties is also desirable when property frontages are short, and may be recommended in conjunction with cross-access easements. Shared driveways are accessible via cross-access easements on private property or are located on joint property lines (2). Consolidating access through a shared driveway is warranted when the average daily traffic is at least 10,000 vehicles per day and highway speeds are greater than 35 miles per hour (1).

C. DEMONSTRATION PROGRAM: COMMERCIAL CROSS ACCESS

SURVEY - COMMONS RETAIL MALL - CONTINENTAL PLAZA, 159TH STREET & HARLEM AVENUE, VILLAGE OF ORLAND PARK

Within the Village of Orland Park there is a cross access easement located between the Commons Retail Mall (159th Street & Harlem Avenue) and the Continental Plaza (157th Street & Harlem Avenue). This cross access permits vehicles to travel a distance of 1660 feet, through the adjoining shopping centers, without having to use Harlem Avenue.

The Clean Air Act Amendments of 1990 classify traffic flow improvements as one of sixteen transportation control measures (TCMs) that can be used to reduce vehicle miles traveled (VMT) and air emissions. This cross access easement in Orland Park was included in the 1992 Transportation Control Measures Committal for the State Implementation Plan as an example of how access management is being used to improve traffic operations in northeastern Illinois.

Staff from the Northeastern Illinois Planning Commission and the Village of Orland Park conducted a traffic survey to measure the reduction in vehicle miles traveled (VMT) and air emissions due to this form of access management. Though this particular survey was designed to measure reduced vehicle miles traveled, the concept of cross access is not limited to motor vehicles and may provide pedestrian and bicycle linkages as well as transit access between adjacent properties.

continued on next page...

C. DEMONSTRATION PROGRAM, cont.

In order to measure the air quality impact of commercial cross access easements, vehicles passing through the cross access easement were counted on April 1, 1993, between the hours of 4:00 - 6:00 p.m. At the same time, vehicles entering and exiting four additional access points to the site were recorded. Within the Continental Plaza, these access points included a driveway at Harlem Avenue; and two driveways (east and west) at 157th Street. Within the Commons Retail Mall, there was one major driveway at 159th Street.

Of a total of 859 vehicles, 73 or 8.5% passed through the cross access between the Commons Retail Mall and the Continental Plaza. Collectively, 2.15 vehicle miles were reduced due to the utilization of the cross access easement. In terms of time savings, vehicles which used the cross access saved an average of 48.9 seconds - as compared to using the major arterials. This is a cumulative time savings of 59.49 minutes when applied to each vehicle that passed through the cross access over the two hour period.

Using this information, it is estimated that the following emission reductions would be provided through this cross access easements over a full year:

Hydrocarbons (HC)	15.624 pounds
Nitrogen Oxides (NOx)	15.594 pounds

Please refer to Appendix B for a description of the air quality analysis method.

D. FURTHER CONSIDERATIONS

The arterial roadway system and the access it provides to economic centers is needed to ensure continued economic growth (4). In northeastern Illinois, municipal and county governments can contribute to efforts to reduce traffic congestion by striving for a balance between land use densities and the provision of transportation capacities.

Implementing a cross access easement is a site design approach to improve traffic flows. It requires counties and municipalities to take on multiple roles, including that of planner and negotiator. Community governments have a significant role in planning for future growth and considering the traffic impacts of proposed developments. Before constructing a cross access easement, thought must be given to the internal circulation and storage space for driveway vehicles

on adjacent properties. Consideration of the geometric layout and function of the existing roadway operation is also needed. Community governments can promote cross access easements during the review of development proposals. In doing so, they can work to balance the needs of individual property owners while working to give priority to the carrying capacity of roadways.

Community governments also have a role as negotiators. Property owners and the private development community are often reluctant to coordinate cross access easements between developments. Reasons for this reluctance include the inability to agree to construction and maintenance costs; competition and a desire for individual identities; complications in attaining development approvals and financing; and issues of liability.

CROSS ACCESS
BIBLIOGRAPHY

Federal Highway Administration, Access Management and Traffic Analysis for Highways, Publication No. FHWA-HI-91-012, 1991. (1)

Institute of Transportation Engineers, Traffic Access and Impact Studies for Site Development, 1989. (2)

Northeastern Illinois Planning Commission and Operation GreenLight: Local Development Policy Task Force, Managing Arterial Access in Northeastern Illinois: A Planning Aid for Local Officials, 1991. (3)

Northeastern Illinois Planning Commission and Operation GreenLight: Local Development Policy Task Force, Access Management Policy, 1990. (4)

PARKING MANAGEMENT

A. BACKGROUND

Parking management is a transportation control measure related to site design that can be considered by governments as a potential approach to improving air quality by encouraging carpooling, decreasing congestion, and increasing the use of transit. All can result in the reduction of vehicle trips and/or vehicle miles travelled (VMT). To accomplish these results, however, municipal and county governments will need parking plans for government owned and operated facilities as well as approaches for enlisting the support of private operators and civic groups.

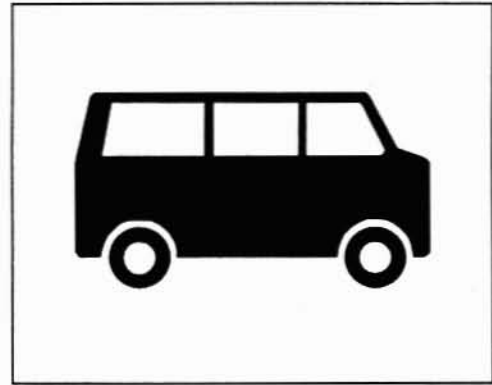
Several types of parking management programs can be considered, including:

- Preferential Parking for High Occupancy Vehicles
- Parking Controls
- Pricing Policies

B. PREFERENTIAL PARKING FOR HIGH OCCUPANCY VEHICLES (HOVs)

Preferential parking programs reserve the most convenient and attractive parking spaces for HOVs and may offer lower parking fees than for single occupant vehicles. The strategy directly encourages the formation of carpools and vanpools, and can be applied in central business districts, in office complexes and elsewhere. It is usually applied where there is a shortage of easily accessible and convenient all day parking and where parking rates are high.

Community governments can initiate preferential parking for HOVs in government-owned facilities, especially those located near employment centers or in their own employee parking facilities. Initial decisions that will need to be made include:



Number of Spaces to Reserve for

Carpools/Vanpools. This question may finally be resolved by trial-and-error, but it may be better to start with a relatively small number of reserved spaces and evaluate results before increasing the number.

Whether or Not to Reduce Parking Fees for

Carpools/Vanpools and What to Charge. If HOV parking rates are too low, transit riders may form carpools to save money. In San Francisco, it was found that about two-thirds of the newly formed carpools were former transit riders.

How to Prevent Use of HOV Spaces by Solo

Drivers. There are several ways this can be accomplished, such as issuing permits to facilitate spot-checks. With a permit system, an attendant may issue a one-day permit as vehicles enter the facility, or prepaid monthly permits could be issued.

Planning for HOV parking will also need to consider how to encourage privately-operated parking facilities to initiate preferential parking. Operators of these facilities should be informed about air quality concerns and asked to cooperate. Where persuasion fails, governments may consider adopting an ordinance requiring operators of parking facilities with "x" number of spaces to reserve a given percentage of the spaces for carpools/vanpools.

The design and marketing of HOV parking are additional considerations. Such spaces should be highly visible as well as conveniently located. Their availability should be publicized in advance, and

the government sponsor could also offer to assist in forming carpools.

C. PARKING CONTROLS

The use of parking controls has been suggested as an approach to lessen demand automobile use in a given area (usually a business district), thereby increasing transit use, walking and bicycling. This in turn would reduce vehicle miles of travel and automobile emissions. Parking restrictions also work in tandem to support other traffic mitigation actions such as carpooling. Different strategies might be used for employees or shoppers and for different types of activity centers.

To implement a successful parking management program, it is essential to evaluate parking facilities in relation to adjacent land uses, transit access, and other commute alternatives such as walking, bicycling, and ridesharing. It is also important to be aware of additional parking options (such as residential streets or adjacent properties) to prevent motorists from parking in other locations and minimize the effectiveness of parking controls. Another consideration is to coordinate with the goals of the community and local merchants to respond to concerns that parking controls might be "bad for business" or be in conflict with community interests.

Parking controls can take the form of eliminating public parking spaces or limiting their use. Alternatively, parking controls can be used to limit the number of new parking spaces created.

Limiting Public Parking

In most communities there is a significant amount of on-street public parking in and around the central business district, and probably some public parking lots as well. To some extent, retail and service providers feel that public parking near their businesses is crucial. On the other hand, where the use of a lane or lanes for on-street parking leads to serious congestion, this can also be a detriment to business. If on-street parking is eliminated on congested streets and traffic flow is improved, vehicle emissions would be reduced. Jitney buses and peripheral parking could be used to solve the parking problems. For large commercial areas, off-

street parking lots near, or behind stores, is also an option.

Although not typical of most of northeastern Illinois, an experience in the city of Chicago suggests that it is possible to limit on-street parking in business areas without creating major hardships. During the "Chicago Flood" in the Spring of 1992, many streets in the affected area were closed and traffic became extremely congested on the streets that remained open. As a result, on-street parking was banned on all streets in the Loop, a square mile area with 1,100 parking meters. There were still 21,000 spaces in off-street garages and lots.

The improvement in traffic flow was excellent, and subsequent analysis found that most businesses were not adversely affected. The exception was the small merchants on Wabash Avenue, where some on-street parking was later restored.

Limiting New Parking Spaces

One way to limit the number of new spaces that can be provided is to initiate a parking freeze in a specified area, under which new parking spaces can only be constructed if old spaces have been eliminated. If additional parking is needed, it can be constructed on the periphery of the designated area.

Another approach to limit the number of new parking spaces is to revise the parking requirements in the zoning ordinance. Most zoning ordinances require a designated number of spaces for each type of use in each zoning district. The alternative is to state the parking requirements as a maximum number allowed in the designated area. If desired, parking space allowances can be increased for traffic mitigation actions. These actions can include discounted carpool parking, rideshare promotions and subsidized transit passes.

D. PRICING POLICY

Pricing policies refer to the strategy of increasing parking fees as an approach to discourage driving and encourage the use of transit in order to reduce congestion and air pollution emissions. Municipal governments have the authority to increase parking rates for on-street parking and at public facilities. Higher taxes can be imposed on private parking facilities, which may discourage some drivers by

making parking too expensive. Several factors have been identified that contribute to the success of local pricing policy, including:

- Proportion of parking under public control
- Amount of employer subsidized parking

- Supply of uncontrolled parking available to commuters
- Availability of transit and other alternatives to solo driving

E. DEMONSTRATION PROGRAM: PREFERENTIAL PARKING FOR HIGH OCCUPANCY VEHICLES SURVEY - CTA PARKING LOT, CUMBERLAND AVENUE

In Spring 1992, the CTA park-and-ride lot at Cumberland Avenue was expanded. As part of the expansion, two extra levels were added to the facility which increased capacity to 1500 parking spaces. After May 15, 1992, the main floor of the garage was reserved for carpools and vanpools, providing extra convenience for those drivers. The timing of the construction was designed to alleviate traffic congestion caused by the Kennedy Expressway reconstruction.

To investigate the emissions reduction potential of HOV preferential parking, a survey of carpool/vanpool occupants using the Cumberland Avenue facility was conducted. The survey instrument asked about changes in the respondents' work trip mode and auto trip distance since the facility was opened.

Questionnaires were distributed to about 97 persons and there was a return rate of 21 percent. While this is a small number to base conclusions on, the findings suggest that this is an effective approach to air quality improvements.

Findings

Prior to the opening of the HOV facility, only 28 percent of the respondents rode in carpools (either to work or to commuter parking), but now all must be in carpools to use the facility. In addition, only 61 percent previously used transit for the work trip, compared to 100 percent since the facility opened.

Based on changes in the number of vehicle miles travelled by automobile before using the facility and since the facility opened, it is estimated that an average of nine vehicle miles travelled (VMT) per trip (18 miles round trip) is saved for each carpool formed. This is equal to 81 VMT saved per week for each carpool formed.

From analyses of survey data, estimates were prepared of the number of new carpools formed since the HOV facility was opened, and the resulting reductions in vehicle trips and VMT. These estimates were then used to calculate potential air pollution reductions (hydrocarbons and nitrogen oxides).

Using standard data on automobile emissions, the following emissions reductions were estimated.

Hydrocarbons	608 pounds
Nitrogen Oxides	380 pounds

F. FURTHER CONSIDERATIONS

Although studies have found that parking management can be associated with reductions in automobile use and increases in the use of transit and carpooling, municipal governments have found it difficult to balance parking requirements with other community objectives. It is important to monitor parking demand and supply over time and adjust requirements as needed.

In general, evidence suggests that tight parking supplies and higher prices are associated with higher use of transit and ridesharing. For this reason, it is advisable to keep the supply relatively tight. However, when developing regulations and code requirements, it is advisable to proceed step-by-step and evaluate policies at each step. This probably should include gradually substituting alternative modes of travel for reductions in extra parking.

PARKING MANAGEMENT BIBLIOGRAPHY

- Batt, Kirin and Thomas Higgins, "An Assessment of Travel Demand Approaches at Suburban Activity Centers," UMTA, July 1989.
- Higgins, Thomas J., "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," K.T. Analytics, Inc., paper presented to the Transportation Research Board, Washington, D.C., January 1989.
- Hines, Emery, "Parking Management," July 1982.
- Kunze, R.C. et al, "Impacts of Municipal Parking Fee Increase in Downtown Chicago," Transportation Research Board, Washington, D.C.
- Miller, Gerald and Carol Everett, "Raising Commuter Parking Prices - An Empirical Study," Transportation, Volume 11, 1982.
- Miller, Gerald and Thomas Higgins, "Implementing Parking Pricing Strategies," the Urban Institute, Washington, D.C. 1983.
- Noguchi, Tom, "Promotion of Ridesharing Through Parking Regulations: The Bellevue, Washington Case," paper presented to the Transportation Research Board, Washington, D.C., January 1992.
- Organization for Economic Cooperation and Development, Road Research Group, "Evaluation of Urban Parking Systems," December 1980
- Peat, Marwick, Mitchell and Co., "West University Neighborhood Parking Pricing Demonstration Program in Eugene, Oregon," Final Report, Washington, D.C. July 1985.
- Public Technology Inc., "Flexible Parking Requirements," Washington, D.C., June 1982.
- Shoup, Donald C. and Richard W. Wilson, "Employer-Paid Parking: The Influence of Parking Prices on Travel Demand," 1990
- Smith, Steven and Stuart TenHoor, "Model Parking Code Provisions to Encourage Ridesharing and Transit Use," September 1983.
- U.S. Department of Transportation, "Transit and Parking Public Policy," March 1989.
- Williams, Joni, "Free and Paid Commuter Parking in the Washington Region/Commuter Parking Cost Study," Metropolitan Washington Council of Governments, April 1991.
- Wilson, Richard and Donald Shoup, "The Effect of Employer Paid Parking in Downtown Los Angeles," for the Southern California Association of Governments, May 1990.

TELECOMMUTING

A. BACKGROUND

Telecommuting is an option which allows employees to work at home or at an alternative location, such as a telecenter or a company's satellite office, as a substitute for the usual work place. Telecommuting is not home-based work or home-based business because it must have an element of remote management. Telecommuting may have advantages for both the employee and the employer. The principal employee benefit is avoidance of travel to the office, and the employer can benefit by increased employee productivity. In fact, thirteen of the sixteen employers surveyed by the Urban Transportation Monitor reported that the productivity of telecommuters increased. The others reported that productivity remained the same.

Much of the recent interest and involvement in telecommuting have resulted from requirements of the 1990 Clean Air Act Amendments that apply to areas with severe and extreme ozone non-attainment, including the six-county northeastern Illinois area. In this area, employers with 100 or more employees must comply with the Employee Commute Option Act (ECO) under which they must implement programs to reduce employees' work-related vehicle trips. Telecommuting is one of the approaches that may be used to meet ECO requirements.



B. TELECOMMUTING ISSUES

Issues involved in telecommuting range from the concerns of the individual employee or employer to local and regional impacts.

Employee/Employer Issues

Since participation in a telecommuting program is usually voluntary, most employees have few concerns. Some employees may be concerned about the effect of their absence from the office on their visibility and status, but most are glad to avoid the work trip. Employers, on the other hand, must resolve a number of issues before approving a telecommuting program.

An initial concern of many employers is productivity. Although studies suggest that productivity remains about the same or improves, the concern remains. Related questions are which types of jobs can be handled well at home or at a telecenter, and how to select employees who can be allowed to telecommute. While there are no specific answers to these questions, most employers consider managerial, professional or information jobs to be most suitable. Some clerical jobs are also suitable. The selection of the employees to fill the selected jobs is usually related to personal characteristics such as dependability, length of service, and motivation.

Costs of Initiating Telecommunication Program

The cost of equipment for telecommuters is usually the major cost for employers, even though it is not necessary to provide full office facilities. A national study by The Urban Transportation Monitor indicates that 53 percent of participants in telecommunications programs have personal computers and 40 percent have business phones. Others also have modems and a few have fax machines. Where equipment purchases are involved, it is generally assumed that the employer makes the purchase. Some employees may already own computers, and some may be willing to buy one in order to telecommute.

The cost of telephone service may also be an additional expense for the employer if a business

phone is needed. If the employee can use his or her personal phone for a few business calls, this could be a shared cost.

There are several other miscellaneous costs involved, such as administrative and training costs, which are usually small.

Local and Regional Implications

Although telecommuting is an arrangement between the employee and employer, it involves localities and regions in many ways. The most obvious effect is on transportation and transit. It has been widely assumed and research findings have confirmed that telecommuting generally results in a reduction of vehicle trips (VT) and vehicle miles travelled (VMT), resulting in improved traffic flow and improved air quality. For example, one California study reported a net per person trip reduction of 46 miles for each telecommute occasion, but other studies have reported fewer miles. Additional research will be needed to more accurately quantify these findings.

Several other transportation questions have been raised about telecommuting. There have been questions about the possibility that telecommuters will increase their non-work travel as a result of driving less for work. One older study found that non-work travel increases by a small percentage of the VMT saved from telecommuting. However, several recent studies found no increase in non-work travel and some found that such trips were actually reduced.

Communities can encourage telecommuting by reviewing their zoning ordinances to see if there are unnecessary obstacles to employees working at home (telecommuting). While most suburban communities allow the type of working at home associated with telecommuting (computer and/or telephone work), some municipalities prohibit any type of home work. Work involving equipment that might lead to electronic interference in the vicinity would not be allowed by right in most places, nor would home business that generate traffic in a residential area. Municipalities concerned about such issues can frame their ordinances with appropriate safeguards.

Research identifies many potential regional benefits from telecommuting. In general, reductions in vehicle trips and vehicle miles travelled will contribute to improved air quality. Further, they can contribute to reduced traffic congestion, but the extent of the impact depends on the time of day and route.

The largest unanswered regional question is the impact of telecommuting on regional land use. There has been considerable speculation on whether or not telecommuting will promote sprawl. It has been postulated that employees who telecommute may choose residential locations further from their jobs than they would otherwise. It should be pointed out that people move for many reasons - costs, amenities, housing type preference & transportation. Thus, the possibility of telecommuting is only one of the factors involved in the residential location decision, and research has yet to confirm that it is a significant factor.

C. DEMONSTRATION PROGRAM

In March 1993, the Northeastern Illinois Planning Commission conducted a survey of employees in northeastern Illinois who now telecommute (work at home) one or more days a week. The primary purpose of the survey was to investigate the impact of telecommuting on vehicle miles travelled (VMT) and vehicle trips (VT) and, consequently, on air quality. Approximately 260 questionnaires were distributed by five businesses to their telecommuting employees. A total of 39 completed questionnaires were returned, for a response rate of 12.7 percent.

continued on next page...

DEMONSTRATION PROGRAM, cont.

Responses to the survey show more than half of the employees who telecommute do computer-related or customer service work and the others include professions such as engineering, management and accounting. All but one of the employees have computers at home, and most also have printers and modems.

Of the persons who responded to the survey, 95 percent (37 persons) drive to work alone. Most of the trips are from suburb to suburb (33 respondents) and the balance are from Chicago to suburb or Chicago to Chicago.

The number of days the respondents telecommute range from one to five per week. For the 39 respondents, the weekly average number of telecommute days was 2.4. Since telecommuting five days a week is unusual, the average number of telecommute days was recalculated, omitting respondents who telecommute five days a week. On this basis, the results showed an average of 1.7 telecommute days a week. Therefore, survey findings are presented as a range in which calculations based on the whole sample (including those who telecommute five days a week) will represent the high end, and calculations based on a subset of the sample will represent the low end.

A case study approach was used to estimate the potential saving in VMT as a result of telecommuting, based on the number of avoided work trip miles and the number of telecommute days per person. The miles driven by another household member on telecommute days were deducted from the VMT saved. A similar approach was used to estimate avoided vehicle trips (VT) for cold start and hot soaks calculations. These results are shown below.

	High Estimate	Low Estimate
Avoided VMT Per Week	2,350 miles 60.3/person	1,444 miles 50/person
Avoided VT Per Week	152 trips 4.6/person	102 trips 3.4/person

Estimates of the potential pollution reduction were calculated for hydrocarbons (HC) and nitrogen oxides (NOx), the ozone precursors, based on avoided VMT and VT per person per year, as shown below.

	High Estimate	Low Estimate
Hydrocarbons	19.003 pounds	13.059 pounds
Nitrogen Oxides	10.349 pounds	8.429 pounds

To visualize the potential impact of telecommuting, it may be useful to consider the air quality impact of 100 telecommuters. Estimates of the pollution reduction of hydrocarbons and nitrogen oxides per year are shown below.

	High Estimate	Low Estimate
Hydrocarbons	1,900 pounds	1,481 pounds
Nitrogen Oxides	1,035 pounds	843 pounds

D. FURTHER CONSIDERATIONS

Results of many previous studies and the NIPC telecommuting survey have demonstrated the significant potential of telecommuting as a tool in improving air quality and achieving the Clean Air Act mandate to reduce emissions.

Employers, including municipal employers, who must meet Employee Commute Option requirements could benefit from such a program and contribute to regional air quality improvements at the same time. Further, the cooperation of municipal and county governments is of special importance in implementing telecommuting programs because of their land use controls. With the growth of telecommuting, it may be an appropriate time for community governments to re-evaluate their zoning ordinances with regard to the many different types of work-at-home situations.

TELECOMMUTING BIBLIOGRAPHY

- JALA Associates, Inc., California Telecommuting Pilot Project Final Report, Department of General Services, State of California. June 1990.
- Kitamura, Ryuichi, Jack M. Nilles, Patrick Conroy, and David M. Fleming. "Telecommuting as a Transportation Planning Measure: Initial Results of California Planning Measure." Transportation Research Record 1285. 1990.
- K.T. Analytics, Inc., TDM Status Report, Telecommuting. U.S. Dept. of Transportation, Federal Transit Administration. August 1992.
- Mokhtarian, Patricia L., Srikanth, Sampath and Somitra Saxana. The Effectiveness of Telecommuting as a Transportation Control Measure. Institute of Transportation Studies, UC-Davis. August 1991.
- Mokhtarian, Patricia L., Telecommuting and Travel: State of the Practice, State of the Art. Institute of Transportation Studies, University of California, Davis, CA. December 1991.
- Nilles, Jack M. "Telecommuting and Urban Sprawl: Mitigator or Incitor?" Transportation, Vol. 18(4), 1991
- Nilles, Jack M., "Traffic Reduction by Telecommuting: A Status Review and Selected Bibliography," Transportation Research A, Vol. 22A (4), 1988.
- Salomon, I. and Joseph L. Schofer, "Forecasting Telecommunications-Travel Interactions: The Traffic Manager's Perspective," Transportation Research A, Volume 22A, No. 4, 1988.
- U.S. EPA, Office of Air and Radiation, "Work Schedule Changes: Telecommuting," Transportation Control Measure Information Documents. Cambridge Systematics Inc., Cambridge, Mass. March 1992.
- U.S. Department of Transportation, "Transportation Implications of Telecommuting," 1992.

CONCLUSIONS AND DISCUSSION

A. BACKGROUND

The 1990 Clean Air Act Amendments (CAAA) require northeastern Illinois to develop plans and programs to reduce ozone emissions by fifteen percent each year until 2007. Since mobile sources have typically accounted for nearly 50 percent of total emissions, northeastern Illinois is required to develop and implement transportation control measures (TCMs) and other approaches to improve air quality.

Transportation control measures are strategies and measures designed to reduce driving or enhance traffic flows to reduce harmful emissions. The Northeastern Illinois Planning Commission (NIPC) and the Chicago Area Transportation Study (CATS) are working together to develop approaches to implementing various TCMs. This report has described potential strategies for implementing five land use based TCMs. A list containing a wider variety of TCM strategies is located in Appendix A.

The CAAA also require Illinois to develop a State Implementation Plan (SIP) describing steps the State will take to implement TCMs and other measures. TCMs selected for the SIP must meet the goals and requirements of the CAAA, mitigate congestion and mobile source emissions and be consistent with federal and state planning and regulations. Further, for a TCM to be included in the SIP, it must meet the test of acceptability and applicability. Acceptability is defined by the general public and municipal response to an approach and their agreement on the implementability of the TCM. The applicability of a TCM in northeastern Illinois is determined by evaluating whether or not the TCM is feasible in northeastern Illinois.

B. CONCLUSIONS

This report has described several land use based transportation control measures and the results of NIPC demonstration programs which included:

- Bicycle plans and programs
- Pedestrian plans and programs
- Land use management

- Cross access management
- Parking management
- Telecommuting

These demonstration programs were designed to examine the effects of each program on vehicle miles travelled, cold starts, and potential emissions reductions as a result of the TCMs. Below is a summary of results of each demonstration program. Due to large differences in the types of programs and numbers of respondents, comparability among the program results could not be established. With the possible exception of parking management and cross access, the other land use based TCMs appear to show high potential for emissions reductions.

Walking or Biking

In the four bicycle survey conducted (Schaumburg, Deerfield, Shure Brothers, and the Mercantile Exchange), the emissions reductions included a total of 203 pounds of hydrocarbons and 101 pounds of nitrogen oxides per year. For the walking survey conducted in Downers Grove, a total of 364 pound of hydrocarbons and 72 pounds of nitrogen oxides were identified as potential emissions reductions per year. The air quality benefits of walking or biking are among the highest of all TCMs, but these options are not widely utilized. The effectiveness of walking or biking is frequently underestimated because of the belief that it would not apply to commuting, especially in the winter months. However, since ozone problems are highest in the summer, a walk or bike-to-work program could be effective.

Land Use

In evaluating the potential effects that activity centers and dense residential development can have on travel patterns, employees in two office developments and residents in two high-rise buildings were surveyed. Estimated emissions reductions that resulted when two employers relocated to office developments in mixed use activity centers were between 307 and 1231 pounds

of hydrocarbons and between 66 and 1228 pounds of nitrogen oxides for work trips. Non-work trips for shopping, dining out, personal business and recreation were also made with fewer emissions. Potential emissions reductions identified for non-work travel were approximately 604 pounds of hydrocarbons and 221 pounds of nitrogen oxides.

The coordination of land use and transportation alternatives has been found to be very effective as a planning strategy. However, it will be difficult to overcome the present emphasis on the automobile. One of the most important factors in land use coordination is the need for a better geographic match between employment and housing. This will require changes in comprehensive plans and zoning ordinances.

Cross Access

The commercial cross access easement evaluated in the Village of Orland Park contributed to reducing vehicle miles travelled and time savings per vehicle. The emission reductions estimated for a full year are approximately 15 pounds of hydrocarbons and 15 pounds of nitrogen oxides. Though the emissions reduced by an individual cross access easement appear low, this type of site design improvement has an increased potential when applied to multiple locations. Prior to implementing cross access easements, the following issues should be considered: internal circulation patterns for vehicles on-site and on adjacent properties; geometric layout and function of existing roadways; and needs of individual property owners and developers.

Parking Restrictions

Estimated emissions reductions for the CTA park-and-ride lot at Cumberland Avenue are approximately 608 pounds of hydrocarbons and 380 pounds of nitrogen oxides per year. While parking restrictions have been found to reduce the amount of traffic, successful programs involve a number of other strategies. In addition, there are often institutional barriers, such as the possible refusal of banks to grant loans if they believe parking is inadequate.

Telecommuting

Many employers in northeastern Illinois have adopted telecommuting programs through which

employees work at home or at a telecommute center part of the time, which eliminates or reduces work trips. Results of pilot programs investigated by NIPC have shown significant savings in vehicle miles travelled. The potential emissions reduction calculated for each person participating in a telecommuting program are between 13 to 19 pounds of hydrocarbons and between 8 and 10 pounds of nitrogen oxides each year.

C. DISCUSSION OF REGIONAL APPLICABILITY AND ACCEPTABILITY

Complying with the mandates of the federal Clean Air Act Amendments will require the cooperative effort of state, regional, county, and municipal governments and agencies. The objective of the report is to demonstrate how these TCM strategies can be applied in individual communities and integrated into land use plans, standards or ordinances in order to contribute to the regional effort to improve air quality. Transportation control measures can be developed to enhance a community's current planning process and capital development program. When coordinated appropriately, TCMs can contribute to community goals and improve air quality at a minimal level of effort and financial cost.

The CATS Council of Mayors has commissioned a project to determine levels of acceptance of TCMs in the northeastern Illinois region. The purpose of the Council of Mayors project is to help the general public and elected officials reach agreement on appropriate TCM strategies to be included in the SIP. The TCMs considered as part of this study include (1) Ridesharing, (2) Vanpooling, (3) Flexible Work Hours, (4) Telecommuting, (5) Walking or Bicycling, (6) Parking Fees, (7) Traffic Flow Improvements, (8) Improved Public Transit, (9) High Occupancy Vehicle Lanes, (10) Congesting Pricing, (11) Parking Restrictions, (12) Driving Restrictions, (13) Regional Motor Fuel Tax Increase, and (14) Coordination of Land Use.

A series of workshops and a citizen survey have been completed to discuss issues and concerns regarding these TCMs. A final report will also be prepared which summarizes the survey results and workshop discussions regarding the applicability and acceptability of each of the TCMs.

In addition to the Council of Mayors project, staff of the Northeastern Illinois Planning Commission are surveying municipal and county governments in order to produce a regional inventory of land use-based TCMs. This inventory will serve to measure the number of land use-based TCMs that have been implemented or that are planned or programmed within the next several years. The objective of this effort is to evaluate the effectiveness of these strategies and monitor air quality impacts during future years.

APPENDIX A

TRANSPORTATION CONTROL MEASURE (TCM)

TYPOLGY

Source: Transportation Control Measure Information Documents; Prepared for the U.S. Environmental Protection Agency, Office of Mobile Sources, by Cambridge Systematics, Inc. - 1992.

- I. Trip Reduction Ordinances
 - A. Special Use Permits
 - B. Negotiated Agreements
 - C. Trip Reduction Goals
 - D. Mandated Ridesharing and Activity Programs
 - E. Transportation Management Funds and Districts
 - F. Requirements for Adequate Public Facilities
 - G. Conditions of Approval for New Construction
 - H. Applicability
 - 1. New Development versus Existing Employers
 - 2. Variation by Employment Size
 - 3. Phase-In-Provisions

- II. Employer-Based Transportation Management Programs
 - A. On-site Employer Transportation Coordinator
 - B. Transit/Rideshare Services
 - 1. Provide HOV Shuttle Services Between Company Facilities
 - 2. Centralized Vanpool/Carpool Matching Service
 - 3. Rideshare/Transit Marketing/Information Programs
 - 4. Designated Transportation Coordinator
 - 5. HOV Priority Parking
 - 6. Vanpool/Subscription Bus Financing
 - 7. Subscription Buses or Buspooling
 - 8. Midday and Park-and-Ride Shuttles
 - 9. Guaranteed Ride Home
 - C. Bicycle and Walking
 - D. Employee Financial Incentives
 - 1. Subsidize Transit Use
 - 2. Transportation Allowances
 - 3. Eliminate Employee Parking Subsidies
 - 4. Charge for Drive-Alone Parking

- III. Work Schedule Changes
 - A. Telecommuting
 - 1. Home
 - 2. Satellite Work Center
 - 3. Neighborhood Work Center
 - B. Flextime
 - 1. Daily Start/End Time
 - 2. Number of Hours Worked
 - a. Per Day
 - b. Per Week
 - c. Per Pay Period

- IV. Area-wide Rideshare Incentives
 - A. Areawide Commute Management Organizations (Third Party Brokerage)
 - 1. Carpool Matching Programs
 - 2. Vanpool Programs
 - 3. Shared Ride Taxi
 - 4. Guaranteed Ride Home
 - B. Transportation Management Associations (TMAs)
 - 1. Operation of Ridesharing and Other Transportation Management Programs
 - 2. Education
 - 3. Informational Materials
 - 4. Advocacy
 - 5. Transportation Service Coordinators
 - 6. Employee Surveys
 - 7. Organization
 - a. Independent, Non-Profit Corporations
 - b. Existing Business Organizations
 - C. Tax Incentives and Subsidy Programs
 - 1. State/Local Tax Exemptions for Vanpool or Transit Subsidies
 - 2. Exemption of Ridesharing Vehicles from "Common Carrier" Status
 - 3. Safety Regulations for Vanpools, Buspools, Subscription Buses
 - 4. Insurance Coverage
 - 5. Liability Responsibility
 - 6. Accelerated Depreciation Allowance for Employer-Provided Vanpools and Bicycle Facilities
 - 7. State/Local Gas Tax Exemptions for Provision of Vanpool Benefits

- V. Improved Public Transit
 - A. System/Service Expansion
 - 1. Fixed Guideway Transit
 - 2. Fixed Route and Express Bus Service
 - 3. Circumferential and Local Bus Service
 - 4. Paratransit Programs
 - B. System/Service Operational Improvements
 - 1. Feeder Bus Service
 - 2. Express Bus Service
 - 3. Bus Route and Schedule Modifications
 - 4. Improved Transfers
 - 5. Schedule Coordination
 - 6. Bus Traffic Signal Preemption
 - 7. Road Operational Changes
 - 8. Operations Monitoring
 - 9. Maintenance Improvements
 - 10. Park/Ride Service
 - 11. Subscription bus Service
 - C. Demand/Market Strategies
 - 1. Employer Offered Incentives
 - 2. Marketing and Information Programs
 - 3. Peak/Off-peak Transit Fares
 - 4. Simplified Fare Collection
 - 5. Reduced Fares
 - 6. Monthly Passes
 - 7. Uniticket Programs
 - 8. Passenger Amenities
 - 9. Joint Development Activities

- VI. High Occupancy Vehicle Lanes
 - A. Freeways
 - 1. Exclusive, in a separate right of way
 - 2. Barrier or buffer-separated
 - 3. Concurrent-flow (no physical separation)
 - 4. Contra-flow
 - 5. Queue bypass
 - B. Arterials
 - 1. Concurrent-flow
 - 2. Contra-flow
 - 3. Median
 - 4. Bus Street
 - 5. Bus Tunnel
 - C. Entrance Ramp Priority
 - D. Parking Facilities
 - E. Applicability
 - 1. Buses
 - 2. Carpools
 - a. 2+ occupants
 - b. 3+ occupants
 - 3. Vanpools
 - 4. Other
 - 5. Time Periods
 - a. Peak Periods
 - b. Entire Day

- VII. Traffic Flow Improvements
 - A. Traffic Signalization
 - 1. Local Intersection Signal Improvements
 - 2. Interconnected Arterial Signal System
 - 3. Area Signal System
 - 4. Equipment or Software Updating
 - 5. Eliminate Unnecessary Signals and Stop Signs
 - B. Traffic Operations
 - 1. Intersection and Roadway Widening
 - 2. One-Way Streets
 - 3. Turn Lane Installation
 - 4. Turning Movement and Lane Use Restrictions
 - 5. Reversible Lane System
 - 6. Strengthen Curb Cut Controls
 - C. Enforcement and Management
 - 1. New Freeway Lane Using Shoulders or Reduced Lane Widths
 - 2. Incident Management Systems
 - 3. Freeway Diversion and Advisory Signing
 - 4. Ramp Metering
 - 5. Surveillance and Control
 - 6. Enforcement
 - D. Intelligent Vehicle and Highway Systems (IVHS)

- VIII. Parking Management
 - A. Preferential Parking for High Occupancy Vehicles
 - 1. Garages and Lots
 - 2. Metered Spaces

- B. Public Sector Parking Pricing
 - 1. Alter Rates
 - 2. Long vs. Short Term Parking
 - 3. Impose New Prices
 - 4. Tax the Provision of Free Private Parking
 - C. Parking Requirements in Zoning Codes
 - 1. Revise Maximum and Minimum Requirements
 - 2. Allow Reductions in Minimum Requirements for Traffic Mitigation Actions
 - D. On-Street Parking Controls
 - 1. Curb parking Restrictions
 - 2. Residential Parking Controls
 - 3. Peak Hour Parking Ban and Enforcement
 - 4. Reduced Legal Parking Spaces in High Congestion Areas
 - 5. Increase Meter Fees
 - 6. Increased Enforcement and Towing
 - E. Commercial Vehicles
 - 1. On-Street Loading Zones
 - 2. Off-Street Loading Areas
 - 3. Peak Hour On-Street Loading Prohibition
 - F. Control of Parking Supply
 - 1. Limit Construction of New Parking Facilities in Areas Served by Mass Transit
 - 2. Limit Number of On and Off-Street Parking Spaces in Designated Areas
 - 3. Use of Zoning and Parking Regulations to Limit Capacity
- IX. Park-and-Ride/Fringe Parking
- A. Construct New/Enlarged Dedicated Facilities on Public Property
 - B. Use of Direct Ramps to Connect Park-and-Ride Lot with Freeway System
 - C. Locate Personal Business Support Services at Park-and-Ride Lots including Day-Care Centers, Financial Services, Convenience Stores, and Dry Cleaners
 - D. Joint Use of Theater, Shopping Center, Church, Stadium Parking Facilities, as Available
 - E. Parking at all Major Transit Stations
 - F. Locate Fringe Parking to Serve Major Highway Facilities/Interchanges Near Central Business District
 - G. Provide Transit/Shuttle Services to Park and Ridge/Fringe Parking
 - H. Priority Parking for HOV's at Major Parking Facilities
 - I. Provide Bicycle Lockers/Storage at Parking Facilities
- X. Bicycle and Pedestrian Programs
- A. Bicycle Facilities
 - 1. Bicycle Routes, Lanes, and Paths
 - 2. Bicycle Plans and Maps
 - 3. Bicycle Coordinators
 - 4. Lockers, Racks, and Other Storage Facilities
 - 5. Shower and Clothing Lockers
 - 6. Integration with Transit
 - 7. Ordinances
 - 8. Education
 - 9. Media and Promotion
 - B. Pedestrian Facilities and Programs
 - 1. Sidewalks and Walkways
 - 2. Safe Facilities
 - a. Crosswalks
 - b. Walk Signals
 - c. Median Strips

- d. Speed Ramps
- e. Lighting
- f. Clear Sight Lines
- 3. Sidewalk Environment/Furniture
 - a. Benches
 - b. Street Level Shops
 - c. Amenities
- 4. Connections with Transit
- 5. Education

XI. Special Events

- A. Remote Parking with Shuttle Service
- B. Public Transportation
- C. Highway Improvements
- D. Signage, Communication and Public Education/Information
- E. Traffic Flow Improvements
- F. Parking Management
- G. Pedestrian Access/Circulation
- H. Public and Private Coordination Committee
- I. Operations Response Teams
- J. Alternate Travel Schedules
- K. Rescheduling of Truck Travel

XII. Vehicle Use Limitations/Restrictions

- A. Route Diversion
 - 1. Auto Restricted Zones
 - 2. Pedestrian Malls
 - 3. Traffic Controls
- B. No-Drive Days
 - 1. Voluntary
 - 2. Required (e.g. License Plate)
- C. Control of Truck Movements
 - 1. Designated Truck Routes
 - 2. Truck Management Strategies
 - a. Sign Placement
 - b. Variable Message Signs
 - c. Speed Restrictions
 - d. Additional Lanes
 - e. Lane Restrictions
 - f. Mobile Safety Inspection Teams
 - 3. Scheduling of Shipping/Receiving
 - 4. Peak Period Truck Bans on Freeways or Major Arterials
 - 5. Freight and Delivery Consolidation

XIII. Accelerated Retirement of Vehicles

- A. Vehicle Eligibility
- B. Dollar Value of Payment
- C. Program Duration
 - 1. Length of Buy-Back Period
 - 2. One Time Program
 - 3. Sequential Program
- D. Limitations on Number of Vehicles Bought
 - 1. None
 - 2. Maximum Number

- E. Retirement vs. Tune Up
 - F. Administration
 - 1. Public Sector
 - 2. Private Sector
 - 3. Use of Credits in Emissions Banking and Trading
- XIV. Activity Centers
- A. Design Guidelines/Regulations
 - 1. Transit
 - 2. Carpooling and Vanpooling
 - 3. Pedestrian
 - 4. Bicycling
 - B. Parking Regulations and Standards
 - C. Mixed Use Development Ordinances and Zones
 - D. Site Plan Review Ordinances
- XV. Extended Vehicle Idling
- A. Controls on Drive-Through Facilities
 - 1. New Facilities
 - 2. Existing Facilities
 - B. Limitations on Idling of Heavy-Duty Vehicles
 - 1. Trucks
 - 2. Buses
 - 3. Locomotives and Other Mobile Sources
 - C. Vehicle Modifications
- XVI. Extreme Low-Temperature Cold Starts
- A. Vehicle Modifications
 - 1. Block Heaters
 - 2. Intake Manifold Heaters
 - 3. Monolithic Catalysts
 - 4. Start or Warm-up Catalysts
 - 5. Multipoint Fuel Injection Systems
 - B. Parking Facility Electrical Outlets
 - 1. Public Facilities
 - 2. Private Employers
 - C. Transit Use Incentives
 - D. No-Drive Days
 - E. Vehicle Fleet Operations

APPENDIX B

EXPLANATION OF AIR QUALITY ANALYSES

Because hydrocarbons and nitrogen oxides are ozone precursors, estimates of air quality impacts must be calculated for each of these pollutants. Emissions of these pollutants differ with the vehicle phase of operation: the cold start mode, the hot stabilized mode (running emissions) and the hot soak evaporative mode. The following estimates of air quality impacts were calculated for each of these modes.

Cold Start Mode

Both hydrocarbon and nitrogen oxide emissions during the cold start mode differ with temperatures. The following table shows the grams per trip emissions used for four different temperatures.

Degrees	Emissions	
	HC	NOx
20	37.37	3.20
40	19.92	3.12
60	10.30	3.05
75	5.85	3.02

A review of weather data for the Chicago area indicates that each of these degree periods prevails for about three months or about one-fourth of the year.

Unless there are seasonal variations, the total number of trips saved per year is divided by four (to represent the four weather periods). The number of trips per season is then multiplied by the HC and NOx grams per trip. HC emissions and NOx emissions are totalled, which equals the number of grams per pollutant emitted per year.

EXAMPLE: 6,750 TRIPS SAVED PER YEAR.
(1637.5 PER 1/4 YR)

Degrees	Trips	Emissions	
		HC	NOx
20	1687.5	63062	5400
40	1687.5	33615	5265
60	1687.5	17381	5147
75	1687.5	9872	5096
Total	6750		
		HC Grams	123930
		NOx Grams	20908

The number of grams is divided by 1000 to calculate the number of kilograms, then the number of kilograms is multiplied by 2.2046 to calculate the number of pounds.

HC = 123.93 kilograms = 273.2 pounds
NOx = 20.9 kilograms = 46 pounds

Hot Soak Mode

During the hot soak mode, hydrocarbon emissions (grams per trip) vary by temperature as shown on the following page.

Total Emissions Reduction

The total emissions reductions are the sum of reductions from:

Cold Starts
Hot Soaks
Running Emissions

Degrees	HC Emissions
20	.61
40	.97
60	1.26
75	1.40

The number of trip ends (hot soak periods) is the same as the number of cold starts, and the method of calculation is also the same.

Running Emissions

As in the case of the cold start and hot soak modes, running emissions vary by temperature as shown on the next page by grams per mile. This data is based on a running speed of 25 miles per hour.

Degrees	<u>Emissions</u>	
	HC	NOx
20	1.53	1.51
40	1.32	1.32
60	1.17	1.16
75	1.03	1.05

The method for calculating emissions reductions is the same as that used to calculate cold start emissions reductions, except it is based on the number of miles saved (reduced). In this case, the total number of miles(VMT) reduced per year is divided by four.

APPENDIX C

APPENDIX C

GLOSSARY OF TERMS

Access Management - A process whereby public agencies and private developers negotiate the number, type, and location of access points along a roadway in order to provide a balance between maintaining high standards for traffic capacity and providing necessary access to abutting development.

Activity Center - A center of activity developed with higher density or concentration of employment, housing, retail or offices at one central location.

Affected Area - The area in Illinois designated as a severe nonattainment area for ozone under the Clean Air Act amendments of 1990. The affected area encompasses the counties of Cook, DuPage, Kane, Lake, McHenry and Will counties and the townships of Aux Sable and Gooselake in Grundy County and Oswego township in Kendall County.

Balanced Development - A strategy to reverse imbalances in the metropolitan area caused by continuing decentralization. Three specific types of balance include: (1) the balance between public and private investment; (2) the balance between the location of new jobs and the location of affordable housing; and (3) the balance between agricultural protection and demands for extending the region's developed area.

Chicago Area Transportation Study (CATS) - The metropolitan planning organization for the affected area; also the regional ridesharing agency.

Clean Air Act of 1990 - The federal Clean Air Act as amended by Public Law 101-549 (42 U.S.C. sec. 7401 et seq.) and as subsequently amended or supplemented.

Cold Start - Air emissions resulting from vehicle ignition - after engine has been inoperative or "cold".

Cross Access Easement - An easement between two or more adjacent parcels which permits cross access

of vehicles (as well as pedestrians and bicycles in some cases).

Diversified Regional Center - A large-scale concentrated area of mixed land uses, including employment and housing, which is planned in order to support a diversified internal transportation system as well as regional linkages. DRCs are intended to promote economic development, reduce suburban sprawl, mitigate regional traffic congestion and air pollution, improve job-housing imbalances, and increase cultural opportunities.

Demand Management Technique - Methods used by employers, transportation management associations, and public agencies to modify travel behavior and reduce trips.

Employee Commute Options (ECO) Program - A program mandated in Section 182 (d) (1) (B) of the Clean Air Act amendments of 1990 requiring employers of 100 or more employees in severe and extreme ozone nonattainment areas to reduce work related vehicle trips and miles traveled by employees.

High Occupancy Vehicle (HOV) - A vehicle containing two or more - but less than 15 passengers.

Hot Soak - Air emissions resulting after a vehicle has been running and the engine turned off.

NIPC Operation GreenLight Task Force - The Local Development Policy Task Force (renamed Land Use - Transportation Task Force in May of 1994) was created to investigate land development issues related to traffic congestion. Areas of emphasis include pedestrian and bicycle access; access control guidelines; regional centers, jobs/housing balance; and right-of-way protection. The Operation GreenLight program was initiated by the Illinois Department of Transportation to reduce traffic congestion through specific highway, public transit, and land use actions in northeastern Illinois.

Northeastern Illinois Planning Commission (NIPC) - The comprehensive planning commission for the six-county greater-Chicago region. NIPC has three statutory charges: conduct research and collect data for planning; assist local government; and prepare comprehensive plans and policies to guide the development of the counties of Cook, DuPage, Kane, Lake, McHenry and Will.

Ozone - Ozone (O₃) is a colorless gas formed by photochemical reactions involving air pollutants (HC-Hydrocarbons and NO_x-Nitrogen Oxides) and sunlight. Though stratospheric ozone (formed naturally) helps filter infrared rays of sunlight and protect the environment from harmful effects of the sun, atmospheric ozone and its related "photochemical oxidants" contain a number of compounds which are harmful to living organisms and materials.

Parking Management - A strategy to control, regulate or restrict the availability of parking spaces. Specific parking management techniques include giving priority to high occupancy vehicles, limiting the number of parking spaces for vehicles carrying only one person, restricting parking during peak hours, and charging parking fees.

"Pedestrian Friendly" Development - Development which is constructed to be easily accessible by pedestrians. Elements of "pedestrian friendly" design include a mixture of land uses (such as residential, commercial and office) which are functionally integrated in the same building, site, or development complex; interconnected sidewalks and walkway systems; buildings that are oriented toward a sidewalk or street; building setbacks that minimize walking distances; and amenities such as benches, awnings, bus shelters, lighting, and landscaping - which are designed to improve pedestrian safety and accessibility while making walking a more attractive travel option.

Preferential Parking - Parking spaces which have been designated for high occupancy vehicles, such as carpools and vanpools.

Satellite Office - An office established by a company or organization which is located within close proximity to employees' places of residence. The office is the exclusive property of the company which owns the equipment and rights to the occupied space.

Single Occupant Vehicle (SOV) - A vehicle containing only the driver.

State Implementation Plan (SIP) - Illinois program demonstrating how the northeastern Illinois region will reach attainment of the National Ambient Air Quality Standards. The plan is prepared by the Illinois Environmental Protection Agency and submitted to United States Environmental Protection Agency for approval.

Strategic Plan for Land Resource Management: A component of an evolving comprehensive plan for land resource management in northeastern Illinois. Adopted by the Northeastern Illinois Planning Commission in June 1992, the Strategic Plan offers selected strategies to improve the stewardship of environmental resources and to achieve a more balanced development pattern.

Strategic Regional Arterial (SRA) - A network of major arterial roadways designated in the *CATS/NIPC 2010 Transportation Development Plan* and currently being studied by IDOT for its ability to carry increased traffic as an alternative to additional expressway construction.

Telecenter - An office located within close proximity to an employee's home. The telecenter may include shared office space which is rented to any number of businesses.

"Transit Friendly" Development - Development that incorporates site design features to (1) accommodate the access of transit vehicles to a development, and (2) provide safe and efficient routes from buildings to transit stops and minimize walking distances. Features include adequate driveway widths and roadway design, bus turnarounds, park-n-ride lots, bus shelters, connective walkway systems (on-site and to surrounding locations), bicycle storage facilities and routes linked to transit facilities, lighting, route identification signs and schedule information. Clustered or high density centers of development at transit stations or along transit corridors are land use approaches to enhance transit service.

Transportation Control Measures (TCMs): Air quality oriented strategies and measures designed to increase ridesharing, public transit, bicycling, walking, and to improve the efficiency of land use and transportation facilities and services.

2010 Transportation Development Plan - A long range regional transportation plan which provides a vision of the region's future transportation system, identifies regional goals and objectives, and directs transportation investments based on forecasted growth. The Plan must be consistent with the region's development policies and must reduce vehicle emissions to conform with federal requirements of the CAAA and ISTEA. A revised TSD Plan for the year 2010 was recommended for approval by NIPC in September 1993, and approved by the CATS Policy Committee in October 1993. A *2020 Transportation System Development Plan* is expected to be completed by the end of 1995.

Vehicle Miles Traveled (VMT) - A measure of travel which is the product of traffic volume (average weekday volume) and the length of roadways in miles. At the regional level, VMT is monitored and forecasted by the Chicago Area Transportation Study as part of the long range planning process. VMT is also estimated by the Illinois Department of Transportation. Together, these estimates of vehicle miles of travel are used with speed estimates to calculate air emissions for the northeastern Illinois region.

Worksite - A building or group of buildings located within the affected area that is in physical contact or separated only by a roadway or right-of-way and that is owned, operated or leased by the same employer or by employers under common control.

ACKNOWLEDGEMENTS

This report is a product of the Land Use/Transportation Task Force, one of six groups established by the CATS Work Program Committee as part of a region-wide congestion mitigation program called Operation GreenLight. The Task Force, staffed by the Northeastern Illinois Planning Commission, was established to investigate land use issues as they contribute to and help solve traffic congestion. Operation GreenLight is an open process involving local officials, transportation agencies, and private sector groups who come together to develop specific plans and programs to reduce congestion. Operation GreenLight is intended to include both early action efforts as well as longer range capital improvements as found in the 2010 Transportation Plan.

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Special thanks is also extended to the following individuals for their assistance with data collection for this report.

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