

PROPOSED AMENDMENT TO:

**AIR MANAGEMENT REGULATION X:
COMPLEX SOURCE REVIEW**

SECTION I: DEFINITIONS
SECTION II: GENERAL PROVISIONS
SECTION III: AIR QUALITY IMPACT REVIEW

BACKGROUND DOCUMENT

City of Philadelphia
Department of Public Health
Air Management Services
6/15/12

Overview

The City of Philadelphia (City) Department of Public Health, Air Management Services (AMS) is responsible for the prevention, abatement, and control of air pollution in the city and county of Philadelphia. AMS programs are conducted pursuant to Title 3 of the Philadelphia Code, also known as the Air Management Code, the Pennsylvania Air Pollution Control Act, the Federal Clean Air Act, and the respective regulations promulgated thereunder. These programs include activities directed to the prevention and control of air pollution and air pollution nuisances as required to achieve and maintain National Ambient Air Quality Standards (NAAQS), reduction in air toxics emissions, and to provide healthy air quality citywide.

Local regulations pertaining to the control of air pollution, known as Air Management Regulations (AMRs), are promulgated and amended by the Air Pollution Control Board (APCB). See Philadelphia Home Rule Charter § 5-302. AMRs proposed by the APCB must be approved by the Law Department and subsequently filed with the Department of Records where they are available for public inspection for thirty days. See Id. at 8-407(a). Notice of the proposed AMRs must also be published in local newspapers. See Id. at 8-407(b). Public hearings on proposed AMRs are to be held upon written request. Id. Absent a public hearing, a proposed AMR shall become effective at midnight of the thirtieth day after their filing with the Department of Records. See Id. at 8-407(c).

AMS is proposing to amend AMR X: Complex Source Review (AMR X) as follows:

Section I. Definitions: Changes to include an updated definition of *Complex Source* and replacement of *Philadelphia Central Business District (CBD)* with *Philadelphia Metropolitan Center (PMC)*.

Section II. General Provisions: Changes to the review process as applied to certain Complex Sources.

Section III. Air Quality Impact Review: Changes outlining the completion and review of Complex Source Permit Applications, Traffic Impact Studies, and Air Quality Impact Statements.

Background

Originally adopted in 1972, AMR X was written in broad terms to include review of a wide variety of projects covering both indirect and conventional stationary sources. The essential function of AMR X provided AMS with information and access to the decision making process for major construction projects. This would allow AMS to determine whether environmental problems, air pollution in particular, were examined in the design stage rather than after project completion.

In Natural Resources Defense Council, Inc., et al v. EPA, 475 F.2d 968 (D.C. Cir. 1973), the D.C. Circuit Court ordered the United States Environmental Protection Agency (EPA) to disapprove of State Implementation Plans (SIPs) that did “not provide for measures necessary to insure the maintenance of the primary . . . [NAAQS] standard after May 31, 1975.” Natural Resources Defense Council, Inc., et al v. EPA, 475 F.2d 968, 971-972 (D.C. Cir. 1973). EPA subsequently disapproved SIPs to the extent they did not contain provisions to prevent the construction of “complex sources at a location where emissions associated with such source would result in violation of a national standard.” 38 Fed. Reg. 6279 (March 8, 1973). EPA defined complex source as any facility that “has or leads to secondary or adjunctive activity which emits or may emit a pollutant for which there is a national standard.” Id. Amendments to EPA regulations, specifically to Part 51 of 40 CFR Chapter I, were published on June 18, 1973. These amendments required the adoption of state and local regulations to include indirect source review authority, and the submission to EPA of plans for reaching and maintaining air quality goals.

A major amendment to AMR X was prepared in order to comply with the August 15 deadline for revision of the disapproved section of the Pennsylvania SIP. The major aspects of the amendment were the revision of the scope of the regulation to include specific types of indirect source, review procedures, and opportunity for public comment. The revision of AMR X was formalized and adopted by the APCB in May 1974 (see Appendix A and B for additional information).

In March 2009, Sugarhouse Casino sued the City in the Pennsylvania Supreme Court claiming the City failed to meet its obligations pursuant to the Pennsylvania Gambling law, including allegations the City failed to issue certain Philadelphia Code zoning authorizations and various permits and licenses required by the Philadelphia Code. This included an allegation of miss- application or selective enforcement of AMR X. In a collection of findings a Special Master concluded, without evidence, that AMR X could not be enforced on Sugarhouse, in part, because the City had not made guidelines / procedures for submission and review of Air Quality Impact Statements available to the public, as required by AMR X § III.B., and that AMS had not required any other developer to comply with AMR X.

In response, a guideline document for AMR X was adopted by AMS, approved by the APCB on October 18, 2011, and made available to the public. The concerns of the Special Master also prompted a review of AMR X and resulted in the 2012 proposed amendments.

Health and Environmental Effects

In recent years, EPA has adopted stricter NAAQS for some criteria pollutants including NOX and Ozone. Emission of other criteria pollutants, such as PM2.5, continues to affect air quality within the City. AMR X, if amended as proposed, will establish requirements for affected Complex Sources which are expected to reduce ambient levels of NOX (a pre-cursor to Ozone) and PM2.5 Health effects from exposure to criteria pollutants have been documented in

our annual Air Quality Report. The latest version of this document is available on the AMS website: www.phila.gov/health/AirManagement/index.html.

Other State and/or Local Regulations

The following below provides a brief list of other states and local counties that have regulations pertaining to “Complex Sources” or “Indirect Sources”.

New York State, Department of Environmental Conservation

Part 203: Indirect Sources of Air Contamination (<http://www.dec.ny.gov/regs/4292.html>)

- Only applies in New York County, south of 60th Street.
- Uses the term “Indirect Source” – see §203.2 Definitions
- New York City has a City Environmental Quality Review (CEQR) Technical Manual (see http://www.nyc.gov/html/oec/html/ceqr/technical_manual.shtml)
 - Chapter 17 covers air quality (http://www.nyc.gov/html/oec/downloads/pdf/2010_ceqr_tm/2010_ceqr_tm_ch17_air_quality.pdf)

North Carolina, Department of Environmental and Natural Resources

North Carolina Administrative Code Title 15A Subchapter 2D rules .0804 and .0805

(<http://daq.state.nc.us/rules/rules/Sec0800.shtml>)

- Uses the term “Transportation Facility”
- CO only
- Guideline document: http://www.daq.state.nc.us/permits/mets/TF_Guide.pdf

Oregon, Department of Environmental Quality

Oregon Administrative Rules, Chapter 340, Division 254 – Rules for Indirect Sources

(http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_254.html)

- Uses the term “Indirect Source”

California

- San Joaquin Valley, Air Pollution Control District
 - Rule 9510, Indirect Source Review (<http://www.valleyair.org/rules/currntrules/r9510.pdf>)
 - Court ruling validating Rule 9510: (<http://www.natlawreview.com/article/local-air-district-rule-requiring-development-sites-to-reduce-amount-pollutants-emitted-not->)
- Other counties proposing an Indirect Source Rule
 - Bay Area Air Quality Management District (http://hank.baaqmd.gov/pln/ruledev/isr/0300_req_031809.pdf)
 - Imperial County APCD
 - Sacramento Metropolitan Air Quality Management District
 - South Coast Air Quality Management District

Florida, Department of Environmental Protection, Division of Air Resources Management, Mobile Source Section

- “Indirect Source” Guideline document:
www.dep.state.fl.us/air/emission/msc/vehicles/dri_guidancedocGuidelines02.DOC

Proposed Philadelphia Amendments

The proposed amendments contain modifications to Section I, II, and III of AMR X. Changes to each Section are described below.

Section I changes:

- Complex Source definition: The bulleted list in AMR X (1974) has been removed.
- The *Philadelphia CBD* has been replaced with *Philadelphia Metropolitan Center* (PMC). The PMC now includes University City and areas of West Philadelphia.
- Includes new definitions for *Parking Facility* and *Traffic Impact Study*.

Section II changes:

- Revised exemptions for a Complex Source as shown in Section II.A1 and II.A2.

Section III changes:

- All Complex Sources, unless otherwise exempted, now require an AMS Complex Source Permit.
- Changes to review procedures to reflect the requirements adopted in the October 18, 2011 Guideline document. These changes include details pertaining to the Complex Source Permit Application, Air Quality Impact Statements (AQIS), and Traffic Impact Studies (TIS).

Social Impact

The benefits from the regulation go beyond the maintenance of air quality standards. A greater coordination of land use, transportation, and environmental planning is the ultimate benefit.

Economic Impact

AMS believes that the TIS and AQIS requirements will not significantly increase the cost to construct or modify an affected Complex Source. Each intersection analyzed pursuant to a TIS costs approximately \$900. AMS estimates that, on average, any required TIS will cost less than \$25,000 to complete. The cost for the AQIS (including modeling) for any one affected Complex Source is estimated to be between \$25,000 and \$75,000. In comparison, the cost to construct or modify a Complex Source, often exceeds \$10,000,000. The published, total construction costs for several recently completed Complex Sources are provided in the table below.

Name / Location of Complex Source	Number of Parking Spaces Included in Complex Source	Total Cost to Construct Complex Source	Total Cost to Construct Complex Source Per Parking Space	Date Completed
Temple University 11 th and Montgomery Ave	1000	\$22.5 million	\$22,500	Anticipated end of 2012
Independence National Historic Park 5 th and Market Sts	650	\$16 million	\$24,600	2001
Thomas Jefferson Hospital 9 th and Chestnut Sts	700	\$35 million	\$50,000	2006
Cira Centre 30 th and Chestnut Sts	1660	\$90 million	\$54,000	2010

** Data provided by City Planning Department (6/4/12)

Environmental Impact

The proposed, AMR X amendments AMR X amendments will prevent hot spots that can lead to exceedances of the NAAQS by requiring developers to address traffic congestion, and to minimize the formation of vehicles queues at exits/entrances, when designing Complex Sources.

APPENDIX

Additional Documents

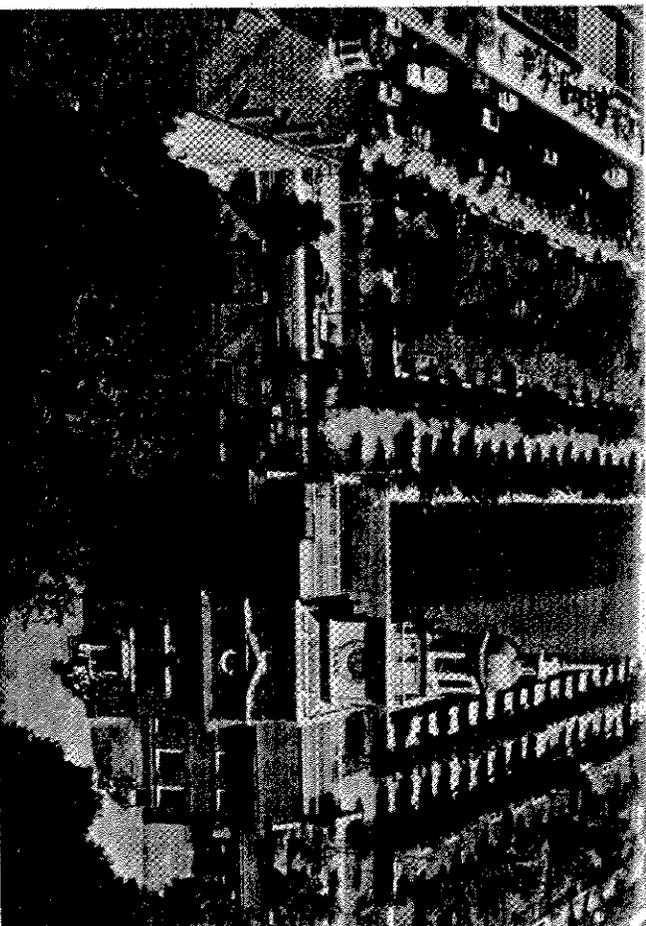


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COMPLEX SOURCE REGULATION IN PHILADELPHIA

William C. Miller



Philadelphia, PA., September 27-October 1, 1976

\$1.00

COMPLEX SOURCE REGULATION IN PHILADELPHIA

By William C. Miller, P.E. *

INTRODUCTION

This preprint has been provided for the purpose of convenient distribution of information at the convention. To defray, in part, the cost of printing, a convention price of \$1.00 to all registrants has been established. The post-convention price, when ordered from ASCE headquarters will be \$1.00 while the supply lasts. For bulk orders (of not less than 200 copies of one preprint) please write for prices.

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The purpose of this paper is to describe the development and implementation of a regulation to control complex sources of air contaminants at the local agency level. Information presented includes a discussion of the legal basis for promulgating a complex source regulation, examples of the types of projects reviewed, and the administrative procedures and guidelines presently in use.

In early 1972 Air Management Services recognized the need for a regulation to control air quality through land use and mobile source restrictions. A regulation of this type was needed to complement stationary source emission regulations. The timing of the adoption of such a regulation in August of 1972 corresponded to a shift in the agency's program goals from implementation of stationary source emission regulations to maintenance of the national ambient air quality standards as specified by the U.S. Environmental Protection Agency.

Regulation X, Construction Review, as originally adopted and the guidelines for submission of impact statements are included in the Appendix of this paper. The revised Regulation X, retitled Complex Source Review, is also included. Reference to these documents will be made throughout the following discussion.

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LEGAL BASIS

The Philadelphia Air Management Code (1969) provides authority for the Air Pollution Control Board to promulgate regulations establishing objectives for air quality. The Board is required to adopt an Air Resources Management Plan covering a ten year period which describes the steps necessary to attain the desired air quality.

Air Management Code section 3-302(2) gives the Board the power to "... promulgate regulations to establish objectives for the quality of community air, ... and limiting, prohibiting, or otherwise controlling emissions to achieve this quality of air. Such regulations may include ... control and limitation of the density of source of emission of air contaminants by ... the restriction of uses of land, new installations, or expansion of existing facilities and operations that will aggravate or create air pollution."

As a component of the Department of Public Health, Air Management Services is responsible for assisting the Air Pollution Control Board in the promulgation of regulations and the enforcement of these regulations upon adoption. Air Management Services submitted the first ten year plan in September of 1970. This plan is revised bi-annually with the third revision due in September, 1976.

REGULATION X (1972)

As originally adopted, Regulation X was written in broad terms to include review of a wide variety of projects covering both indirect and large conventional stationary sources.

The essential function of this Regulation (Appendix A) was to provide Air Management Services with information and access to the decision-making process for major construction projects. This would allow Air Management Services to determine whether environmental problems, air pollution in particular, were examined in the design stage rather than after project completion.

It is the policy of Air Management Services to utilize Regulation X as a means of notifying developers of any potential air pollution problems resulting from a proposed project or facility during the planning stage. The Air Quality Impact Statement and all applicable plans and specifications are reviewed by Air Management Services so that recommendations can be made, where necessary, to achieve compliance with the Air Management Code and Regulations and to maintain the national ambient air quality standards.

The guidelines for the submission of the Air Quality Impact Statement (AQIS) were developed for use by persons required to comply with Regulation X. The guidelines are general in nature and allow for the submission of relevant sections of federally required Environmental Impact Statements where available in lieu of an AQIS. Upon submission of an AQIS and after initial review has been made by Air Management Services additional information will be requested as necessary to complete the evaluation. These guidelines are included in Appendix B. An AQIS was not required for any project, or phase of a project, which had passed the point of awarding construction

contracts prior to the effective date of the Regulation. This decision was made to avoid disruption of those projects where basic design changes might become necessary.

Administrative procedures were established on two levels, within Air Management Services and interagency. Contracts were made with city, regional, and state agencies involved in planning and evaluation of the types of facilities designated in Regulation X in order to publicize the existence and the requirements of this new regulation. The four agencies with which referral and notification procedures were established are the Philadelphia City Planning Commission (PCPC), Philadelphia Department of Licenses and Inspections (L&I), Belaware Valley Regional Planning Commission (DVRPC), and the Pennsylvania Department of Transportation (PennDOT). The arrangement with the two city agencies deals primarily with the planning and construction of commercial and industrial facilities and residential development. Highway and transit related projects and impact statements concerning federally funded projects are referred to Air Management Services through the DVRPC and PennDOT.

The complex source review function is the responsibility of the Engineering Division of Air Management Services. Administrative aspects, such as submission of the AQIS, preparation of responses and project monitoring, are handled by the Source Registration Section of the Engineering Division. Initial statement review is made by an air pollution control engineer to determine completeness of the submission and to verify

calculations, evaluate assumptions, and make recommendations. The AQIS is then reviewed by various staff personnel having expertise in specific areas including transportation, land use planning, and air quality. Upon completion of the review process, the applicant is notified in writing of Air Management Services' findings.

REGULATION X (1974)

In the March 8, 1973 issue of the Federal Register the U.S. Environmental Protection Agency disapproved all state implementation plans for lack of indirect source review regulations. It had been determined that the previously approved new or modified source review procedures were not adequate to insure maintenance of the ambient air quality standards. The final revision to Part 51 of 40 CFR Chapter I was published on June 18, 1973. The new requirements included the amendment or adoption of state and local regulations to include indirect source review authority and the submission to EPA of plans for reaching and maintaining air quality goals.

A major amendment to the existing Regulation X was prepared in order to comply with the August 15th deadline for revision of the affected section of the State Implementation Plan. The major aspects of the amendment are the revision of the scope of the regulation to include specific types of indirect sources, review procedures, and opportunity for public comment. The revision of Regulation X, Complex Source Review, (Appendix C), was formalized and adopted by the Board in May of 1974. An area of considerable debate within Air Management Services

and in the public comment on the proposed regulation was the size of parking facilities which would require an AQS. This question was settled with the criteria in the proposed regulation representing a compromise between the limits suggested by EPA and the facility size requiring evaluation under the State's transportation control strategy.

PROJECT REVIEW

Following are four examples of the types of projects reviewed by Air Management Services:

1. Airport High Speed Line - This project involves the construction of a high speed rail service facility from center city to the Philadelphia International Airport, a route distance of 9.4 miles. The draft Environmental Impact Statement for this project was reviewed. It was concluded that there was no permanent adverse impact on air quality. The creation of this facility would in effect lessen the adverse impact of a parallel highway route presently under development. This rail route will provide an alternative to the use of the Schuylkill (1676) and Delaware (195) Expressways for airport traffic.
2. Center City Commuter Rail Connection - AMS contributed comments to the final Environmental Impact Statement for this project. The two dead-end center city commuter rail terminals would be connected in order to provide continuous service with greater capacity. Although there are no direct adverse effects on air quality from this project the basic question of alternative uses of resources was raised. Comments to UMTA on the final EIS requested a more rigorous study of the air quality effects of this and alternative projects.
3. Eastwick Urban Renewal Area (S.W. Philadelphia) - Due to the residential and commercial nature of this project it was determined that there were no permanent adverse effects on air quality. The major recommendation submitted to HUD was that project planning should include cooperation with the regional transit authority in order to

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provide additional public transportation service. By providing alternatives to automobile dependence any adverse impact of the resulting transportation demand on air quality would be minimized.

4. Red Lion Road - This project involves the widening of an existing east-west arterial in the northeast section of the city. The project area has undergone significant residential and commercial development in the past several years. AMS review of the air quality study submitted by the Pennsylvania Department of Environmental Resources found that the proposed project would exacerbate an existing violation of the carbon monoxide standard. It was recommended that greater consideration be given to improved public transportation as an alternative solution to traffic congestion experienced during peak hours.

CONCLUSIONS

Three basic obstacles must be overcome before a complex source regulation can be effectively implemented and enforced. These are (1) publicizing the existence and requirements of the regulation, (2) coordination of the activities of the various agencies involved, and (3) development of the expertise and techniques necessary to evaluate the impact of complex sources of air contaminants and to prepare detailed "air use" plans at the local agency level.

The first two obstacles are overcome with time and the proper use of available resources and methods. The third, and probably most important, is much more difficult. After adoption of such a regulation the demand for procedures and personnel to perform the required evaluation occurs almost immediately. The actual capabilities necessary become available only after a period of time devoted to recruiting, training or retaining personnel to fill these positions. This process is usually restrained

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by existing budget and personnel limitations in such a manner as to create a significant time lag before the agency attains the level of performance necessary to competently review projects.

Another basic problem is the use of predictive methods in order to obtain valid results for a microscale analysis. This is particularly critical in the analysis of mobile sources (carbon monoxide). Air Management Services uses the EPA publication Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9 - Evaluating Indirect Sources in the analysis of many projects. A description of a small project evaluated using EPA references is found in Appendix D.

Air Management Services is continuing to develop the program necessary to effectively utilize Regulation X as a tool for maintaining air quality. Only the basic essentials of the program have been presented here.

Apart from the mechanics of implementing a complex source review procedure the timing of promulgation and development of realistic goals are of primary concern at Air Management Services. As previously mentioned Air Management Services has taken the position that any project or facility not into a final (construction) phase is immediately subject to the requirements of Regulation X. This apparently inflexible position is tempered by our decision to act in a passive role when reviewing projects which may affect the NAAQS.

Realizing our position in the City's governmental and political structure has lead to a reliance on third-party intervention

in these matters. At best Air Management Services can publish an analysis regarding the effect on NAAQS and allow public opinion and political forces to resolve the question. This is not a capitulation to developers and transportation planners as this agency has a good working relationship with these groups. The technique of "jamboning" has always been a valuable tool at the grassroots level of air pollution control.

The benefits to be derived from the regulation of complex sources go beyond the maintenance of air quality standards. A greater coordination of land use, transportation, housing and environmental planning is the ultimate benefit.

REGULATION X
CONSTRUCTION REVIEW

PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH

AIR POLLUTION CONTROL BOARD

SECTION I. DEFINITIONS

Floor Space—All floor and ground area.

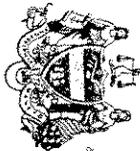
Highway—Route or path used by persons and/or motor vehicles.

Person—Any individual, natural person, syndicate, association, partnerships, firm, corporation, institution, agency, authority, department, bureau, or instrumentality of federal, state, or local government or other entity recognized by law as a subject of rights and duties.

SECTION II. GENERAL

No person shall construct, reconstruct, alter or install any industrial facility or commercial facility having a floor space of 500,000 square feet or more, or any facility of one hundred (100) or more dwelling units, or group of facilities of one hundred (100) or more dwelling units, or any highway which would change traffic flow and/or quantity of traffic on that highway or any other highway, or any mass transit facility before obtaining written approval from the Department for such construction, reconstruction, alteration or installation.

AIR MANAGEMENT REGULATION X



CONSTRUCTION REVIEW

Approved By:

Air Pollution Control Board,	July 18, 1972
Board of Health,	July 18, 1972
Department of Law,	July 21, 1972
Department of Records,	August 20, 1972

SECTION III. ENVIRONMENTAL IMPACT STATEMENT

In order to obtain approval from the Department for those facilities described in Section II of this Regulation, the owner or owners of such proposed facilities shall submit to the Department an environmental air quality impact statement sufficiently detailed to show all actual and potential impacts on the existing air quality at the facility's site, area, neighborhood, and in the region. The statement shall show that employment of maximum technology will be used to reduce or prevent all emissions, and that the facility will be in compliance with the Air Management Code and Regulations. The statement shall include but not be limited to the impact to the air quality from increased automobile, truck and bus traffic, odorous materials, building demolition, combustion effluents and chemical process effluents. The facility shall be approved if it can be shown that it will not cause any detrimental effects to the health and welfare of the citizens of the City of Philadelphia.

SECTION IV. SEVERABILITY

The provisions of these Regulations are severable and if any provision, sentence, clause, section or part thereof shall be held illegal, invalid, unconstitutional or inapplicable to any person or circumstances, such illegality, invalidity, unconstitutionality or inapplicability shall not affect or impair any of the remaining provisions, sentences, clauses, sections or parts of the ordinance or their application to him or to other persons and circumstances. It is hereby declared to be the legislative intent that these regulations would have been adopted if such illegal, invalid or unconstitutional provision, sentence, clause or part had not been included therein, and if the person or circumstances to which the ordinance or any part thereof is inapplicable had not specifically been exempted therefrom.

SECTION V. EFFECTIVE DATE

Except as otherwise provided, this Regulation shall become effective upon adoption.

- AIR QUALITY IMPACT STATEMENT (AQIS) GUIDELINES -

The following guidelines are to be used by persons preparing Air Quality Impact Statements as required by Air Management Regulation X. Complete Section I and either Section II or Section III.

I. GENERAL INFORMATION

- A. The statement shall contain the following basic information.
 - 1. Name and location of proposed facility or project.
 - 2. Name, complete address and telephone of owner.
 - 3. Name, complete address and telephone of the developer, architect, or planner.
- B. Proposed schedule and deadlines
 - 1. Planning and design stages.
 - 2. Anticipated dates of commencement and completion of construction.
- C. The statement shall describe the present character and use of the site and surroundings of the proposed project including the present and proposed zoning classifications.

II. STATIONARY SOURCES

- A. The statement shall include a list of all proposed stationary source equipment and an itemized estimate, in tons per year, of air pollutant emissions including estimates of solid waste generation (tons/day) and proposed disposal method.
- B. The statement shall contain statement of intent with regard to the requirements of the Air Management Code and Regulations in the following categories:
 - 1. Compliance with stationary source and administrative regulations, i.e., Air Management Regulations I, II, III, V, VII, VIII, XI, and any future regulations of this type.
 - 2. The submission of an Emergency Plan as required by Air Management Regulation IV.
 - 3. Compliance with the Parking Facility Ventilation Criteria as published by Air Management Services.
 - 4. Compliance with the Construction and Demolition Criteria as published by Air Management Services.

- C. The transportation related aspects of the proposed project of facility shall be described in the following categories:
 1. Location and schedules of existing and/or proposed mass transit facilities, particularly new or revised bus routes.
 2. The effect of the proposed project or facility on local automobile traffic patterns including an estimate of the impact on local air quality.
 3. Location and capacity of proposed off-street parking facilities including entrance and exit locations and provisions for truck deliveries and scheduling.
- D. Assumptions should be stated and justified. Adequate information and references should be included to enable Air Management Services to verify any calculations.

III. HIGHWAY/MASS TRANSIT

- A. The statement shall contain a description of the proposed route of the project, number of vehicles or persons using the facility, and the effect of the proposed route or facility on existing routes or facilities (schedules, volume, etc.).
- B. The statement shall contain an estimate of the effect on local air quality of the proposed project or facility.
- C. If required for the proposed project, the submission of that portion of the Federal Environmental Impact Statement dealing with air quality will meet the requirements of this Section.
- D. Assumptions should be stated and justified. Adequate information and references should be included to enable Air Management Services to verify any calculations.

Air Quality Impact Statements are to be submitted to:

Air Management Services
 Source Registration-AQIS
 801 Arch Street
 Philadelphia, Pennsylvania 19107

PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH
AIR POLLUTION CONTROL BOARD



Air Management Regulation X

COMPLEX SOURCE REVIEW

Approved By:

AIR POLLUTION CONTROL BOARD, March 12, 1974
 BOARD OF HEALTH, March 20, 1974
 DEPARTMENT OF LAW, April 2, 1974
 DEPARTMENT OF RECORDS, May 4, 1974

REGULATION X

COMPLEX SOURCE REVIEW

SECTION I—DEFINITIONS

Complex Source—A facility, building, structure or installation, or combination thereof, that has or leads to secondary or adjunctive activity which emits or may emit a pollutant for which there is a national ambient air quality standard. These sources include, but are not limited to:

1. Shopping Centers;
2. Sports complexes;
3. Drive-in theaters;
4. Parking lots and garages;
5. Residential, commercial, industrial, and institutional developments;
6. Amusement parks and recreational areas;
7. Highway and transportation facilities;
8. Sewer, water, power, and gas lines, and
9. Other such facilities which will result in increased emissions from motor vehicles or stationary sources.

National Ambient Air Quality Standards—Those primary and secondary ambient air quality standards which are promulgated by the Administrator of the United States Environmental Protection Agency.

Person—Any individual, natural person, syndicate, association, partnership, firm, corporation, institution, agency, authority, department, bureau or instrumentality of federal, state or local government or other entity recognized by law as a subject of rights and duties.

Philadelphia CBD—The area within the City of Philadelphia bounded by, but not including, Vine Street, South Street, the Schuylkill River, and the Delaware River.

SECTION II—GENERAL PROVISIONS

A. No person shall construct, reconstruct, alter or install any complex source, except as provided in Section II B, before obtaining written approval from the Department for such construction, reconstruction, alteration or installation.

B. The requirements of Section II A, shall not apply to the following complex sources:

1. Commercial or industrial facilities with gross leasable area or floor space less than 500,000 square feet;
2. New or modified parking facilities within the Philadelphia CBD with total capacity of less than 250 motor vehicles and new or modified parking facilities outside of the CBD with total capacity of less than 500 motor vehicles;
3. Facilities of less than one hundred (100) dwelling units or groups of facilities of less than one hundred dwelling units;
4. Such other complex sources as the Department determines to have negligible air quality impact.

C. Nothing contained in this Section shall be taken to excuse or relieve any person from complying with any applicable provision of the Air Management Code or any regulation adopted thereunder.

SECTION III—AIR QUALITY IMPACT REVIEW

A. Request for Approval

Request for approval to construct, reconstruct, alter or install any complex source shall be made to the Department by the person responsible for such source and shall include submission of an air quality impact statement sufficiently detailed to show all actual and potential impacts on the existing air quality resulting directly, or indirectly, from the facility at the site, and in the area, neighborhood and region.

B. Review Procedures

1. The Department shall establish procedures and guidelines for use in the preparation, submission and review of air quality impact statements and shall prescribe the information to be supplied in order to determine the effect of the complex source on air quality.
2. Information to be given in the statement shall include, but not be limited to, the following:
 - a. Location and general description of the proposed facility or project.
 - b. Information on the nature, design, construction and operation of the facility.
 - c. Information on the transportation related aspects of the project including mass transit, traffic patterns and parking facilities.

d. The nature and amounts of air contaminants to be emitted directly from the facility or emitted by associated mobile sources.

Any additional information, evidence or documentation that the Department may require shall be furnished upon request.

3. The Department shall make available for public inspection information submitted by the person responsible for the proposed project or facility, as well as the Department's analysis of the effect on air quality and proposed approval or disapproval, and provide a period of at least thirty (30) days after prominent advertisement for the submittal of public comment.

C. Conditions of Approval

1. Approval to construct, reconstruct, alter or install any complex source shall be granted only upon demonstration to the satisfaction of the Department that such source will not violate any provision of the Air Management Code or Regulations of the Air Pollution Control Board or prevent or interfere with the attainment or maintenance of any national ambient air quality standard in the neighborhood, area or region.

2. Such approval shall not exempt any person from prosecution for violation of the Air Management Code, Regulations of the Air Pollution Control Board or any applicable laws of the Commonwealth of Pennsylvania or the United States Government.

SECTION IV--SEVERABILITY

The provisions of these Regulations are severable and if any provision, sentence, clause, section or part thereof shall be held illegal, invalid, unconstitutional or inapplicable to any person or circumstances, such illegality, invalidity, unconstitutionality or inapplicability shall not affect or impair any of the remaining provisions, sentences, clauses, sections or parts of the ordinance or their application to him or to other persons and circumstances. It is hereby declared to be the legislative intent that these Regulations would have been adopted if such illegal, invalid or unconstitutional provision, sentence, clause or part had not been included therein, and if the person or circumstances to which the ordinance or any part thereof is inapplicable had not specifically been exempted therefrom.

SECTION V--EFFECTIVE DATE

Except as otherwise provided, this Regulation shall become effective upon adoption.

JUNE 1976

1. INTRODUCTION

This analysis has been performed by AMS in order to determine the impact of the New Market Parking Garage, 2nd & Lombard Streets on air quality in the immediate vicinity of the garage.

The analysis was done with the aid of "Guidelines for Air Quality Maintenance Planning and Analysis" published by the U.S. EPA Office of Air Quality Planning and Standards.

The methodology presented in these documents is intended as a conservative screening technique to identify situations in which a potential problem may exist. If it is shown that there may be a problem a more complete analysis would be necessary, and possibly design and/or operation changes required before approval. AMS policy in the event of detection of such a problem is to require that the developer take those steps considered reasonable to minimize the impact of the facility. These would include such steps as redesign of entrance/exit configuration, flashing "PULL" sign during certain period, etc.

Indirect source analyses will be done on two levels:

- 1) A preliminary evaluation using graphs provided in the EPA documents.
- If a problem is indicated by step (1), then:
- 2) A more detailed evaluation of emissions, and a computer model of resulting A.Q. will be made.

II. PARKING PROFILE

Capacity 346 vehicles with approximately 20% (70 cars) leased monthly.

<u>Time Period</u>	<u>Parked</u>	<u>In</u>	<u>Out</u>
12 Mid.-9 AM	20% (leased)	-	-
9 AM-12 Noon	30%	30%	20% (all of previous period parked)
12 Noon-2 PM	60%	50%	20% (2/3 of previous period parked)
2 - 5	50%	30%	40% (2/3 " " ")
5 - 8	100%	75%	25% (1/4 " " ")
8 - 12 Mid.	85%	65%	80% (3/4 " " ")

Peak use occurs between 5 PM and 12 Midnight with approximately 20% of capacity entering and 15% of capacity leaving each hour. The usage estimates were developed from the "Parked" projections supplied by the project developers. More reliable estimates might be obtained by performing a traffic count and survey of an existing facility of similar design, operation and character of usage. A study of that nature would be indicated where either the proposed new facility's size or planned commuter use pattern would suggest a high peak hour activity.

In a June 7, 1976 letter the applicant and the representative of the owner of the New Market Parking Garage stated the following concerning the parking use pattern:

1. The percentage of capacity projected for commuter use is less than 10%. The policy of the garage operator will be to discourage any long term parking.

2. The rate structure will reflect this policy. There will be no daily rate. The rate for the first hour will probably be approximately \$1.00, and 75¢ for each hour thereafter.

III. SCREENING ANALYSIS

Volume 9 of EPA's "Guidelines for Air Quality Maintenance Planning and Analysis" presents a methodology for estimating peak CO concentrations associated with identified traffic design and operating variables of an indirect source. These estimates are then compared with the appropriate ambient air quality standards for carbon monoxide. If the results indicate there may be difficulty in meeting the standards for carbon monoxide, this is not necessarily grounds for denial of an EPA permit for operation of the source. The methodology is a conservative screening technique to identify situations in which a potential problem may exist. If a problem is indicated, the options for redesign of the facility and reapplication of the methodology or a more complete analysis would be considered. Since the screening technique is intended to be conservative, it may be used as a basis for concluding that the sources design and operating characteristics are sufficient to avoid localized violation of the CO standards.

According to EPA, the rationale for this method is that monitoring observations in the vicinity of indirect sources have indicated that the highest concentrations of CO occur near exit/entrance gates, at nearby intersection approaches or in the vicinity of access roads. Therefore, the air quality impact analysis for indirect sources focuses on relationships between air quality and traffic design and operating parameters at exit/entrance gates, at nearby intersection approaches and on access roads.

With the major concern focused on the garage's contribution to ambient street level concentrations of carbon monoxide, the peak hourly volume of the entrance lane is selected for use in the analysis. The period 5 to 8 PM shows the highest hourly average entering volume of 75/3 = 25% of capacity or 87 VPH.

Curves are given on pages 18 to 27 of the referenced "Guidelines" which can be used to determine carbon monoxide concentrations at various distances from traffic lanes within an indirect source using volume capacity ratios and vehicle usage rates. From Air Management Services observations, a single automatically controlled entrance lane has a capacity of approximately 8 VPM (480 VPH).

The peak hourly use factor has been estimated at 87 VPH occurring between 5 and 8 PM. The V/C ratio is 0.18.

From the graphs, the impact of traffic in the entrance lane on one hour CO concentrations at a receptor located five meters away is one part per million with concentrations decreasing from five to fifty meters. The exit lane has an estimated capacity of 240 VPH with a 5 to 8 PM hourly use factor of 29 VPH. The V/C ratio is 0.12. The resultant CO contribution of exit lane traffic is less than 1 PPM for all receptor distances.

Intersections in the area were not included in this analysis because the indirect source's activity is negligible compared to traffic volumes on nearby streets.

IV. CONCLUSIONS

For the low demand-capacity ratios analyzed, congestion is minimized and the problem posed by queues of vehicles forming at exits/entrances to the parking garage is minimal.

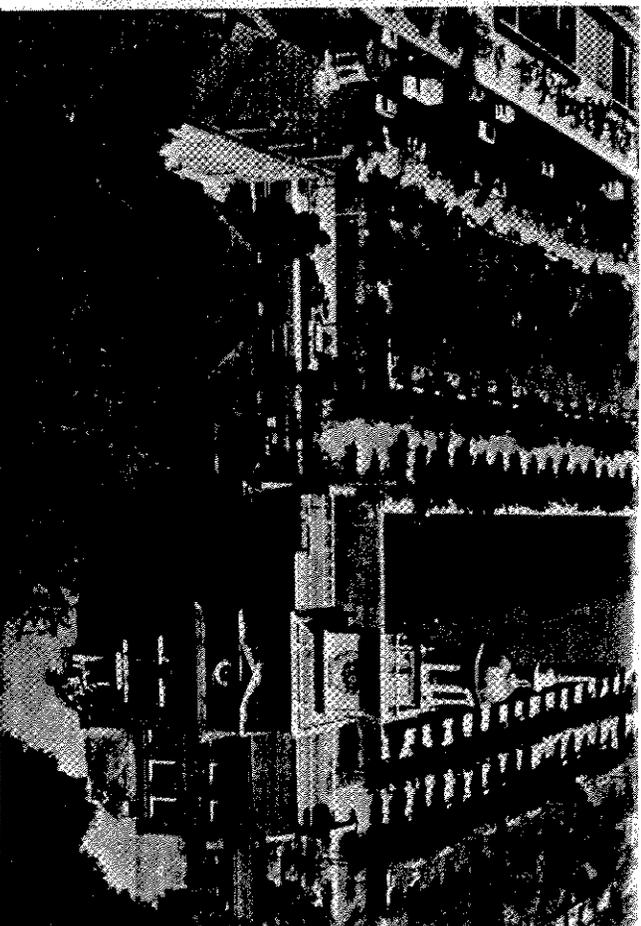


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IMPACT OF OFFICE SPACE AND PARKING DISTRIBUTION ON COMMUTER MODAL CHOICE

Joseph J. McCourt & William C. Miller



Philadelphia, PA., September 27-October 1, 1976

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THE IMPACT OF OFFICE SPACE AND PARKING DISTRIBUTION
ON COMPUTER MODAL CHOICE

By Joseph J. McCourt and William C. Miller, P.E.*

INTRODUCTION

This preprint has been provided for the purpose of convenient distribution of information at the convention. To defray, in part, the cost of printing, a convention price of \$1.00 to all registrants has been established. The post-convention price, when ordered from ASCE headquarters will be \$1.00 while the supply lasts. For bulk orders (of not less than 200 copies of one preprint) please write for prices.

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The modal choice of Philadelphia central business district (CBD) commuters is usually in a short run equilibrium state which is a function of several variables including parking fees, parking convenience, walking time, public transit cost, and waiting time. When a force such as a mass transit strike or an acute gasoline shortage upsets this equilibrium, we see dramatic changes in commuter modal choice, followed by a slow swing back to the original mode. This phenomenon was evidenced during and after the recent energy crisis when public transit ridership rose during the shortage and gradually returned to its pre-crisis point several months after the gasoline shortage eased. The opposite is happening today after the SEPTA strike with ridership down from pre-strike levels. In this case ridership is increasing as strike-diverted commuters rediscover the "best" way to get to work.

Another type of force can upset commuter mode choice equilibrium, but its effect is much less reversible. A large new parking facility in the CBD will result in some commuters finding it easier to drive to work. A change in the location of office space will change the relative attractiveness of modes.

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Similarly, new public transit and highway capacity will have upsetting effects on the modal choice equilibrium. It is this second type of force to which this report is addressed.

FINDINGS

This report shows that recent changes in office space distribution have resulted in the biasing of CBD commuter modal choice in favor of the automobile. This trend will continue in the future and be accelerated by proposed future highway improvements. Unless mass transit is made substantially more attractive and driving substantially less attractive, the result will be higher traffic volumes, congestion, and air pollution in the Philadelphia CBD during peak rush hours.

PART I. PARKING TRENDS IN THE CBD

Parking facilities can be divided into those spaces under city control and those under private control. Table A gives a breakdown of parking capacity in the Philadelphia CBD for 1969. Since this paper addresses the impact of parking supply on commuter modal choice, only the public parking capacity will be discussed in detail. Private capacity and concentration of control will be discussed later in this report.

Parking data for the CBD was compiled by the Philadelphia City Planning Commission (PCPC) for the years 1969 and 1973. A schematic representation of the CBD is shown in Figure 1. PCPC derived their data from Department of Licenses and Inspections (L&I) billing records of public parking facilities. In cases where apartment house garages had spaces licensed as public but available to tenants only, estimates of the number of spaces available to the general public were made by the garage operators. These spaces were considered public, while the rest of the spaces in each facility were considered private and not included.

Table B shows the amount of change by facility and the total net change. However, the actual change in parking spaces was much greater than shown in the table. Many new lots were not included in the 1973 data since temporary lots don't appear on L&I billing transcripts. Since 1969 there has been much demolition in the CBD, and cleared sites are often leased out by the Philadelphia Redevelopment Authority for temporary

TABLE A*
PARKING FACILITIES IN THE PHILADELPHIA CBD

City Control (direct or indirect)	
A. Philadelphia Parking Authority	3,875
B. Metered street spaces	1,774
C. Unmetered legal curbside spaces	2,350
D. Illegal parking	unknown
Private Control	
A. Private lots and garages	5,510
B. Public lots and garages	24,251
TOTAL SPACES	37,560

*Sources of data - Philadelphia City Planning Commission
- Philadelphia Parking Authority

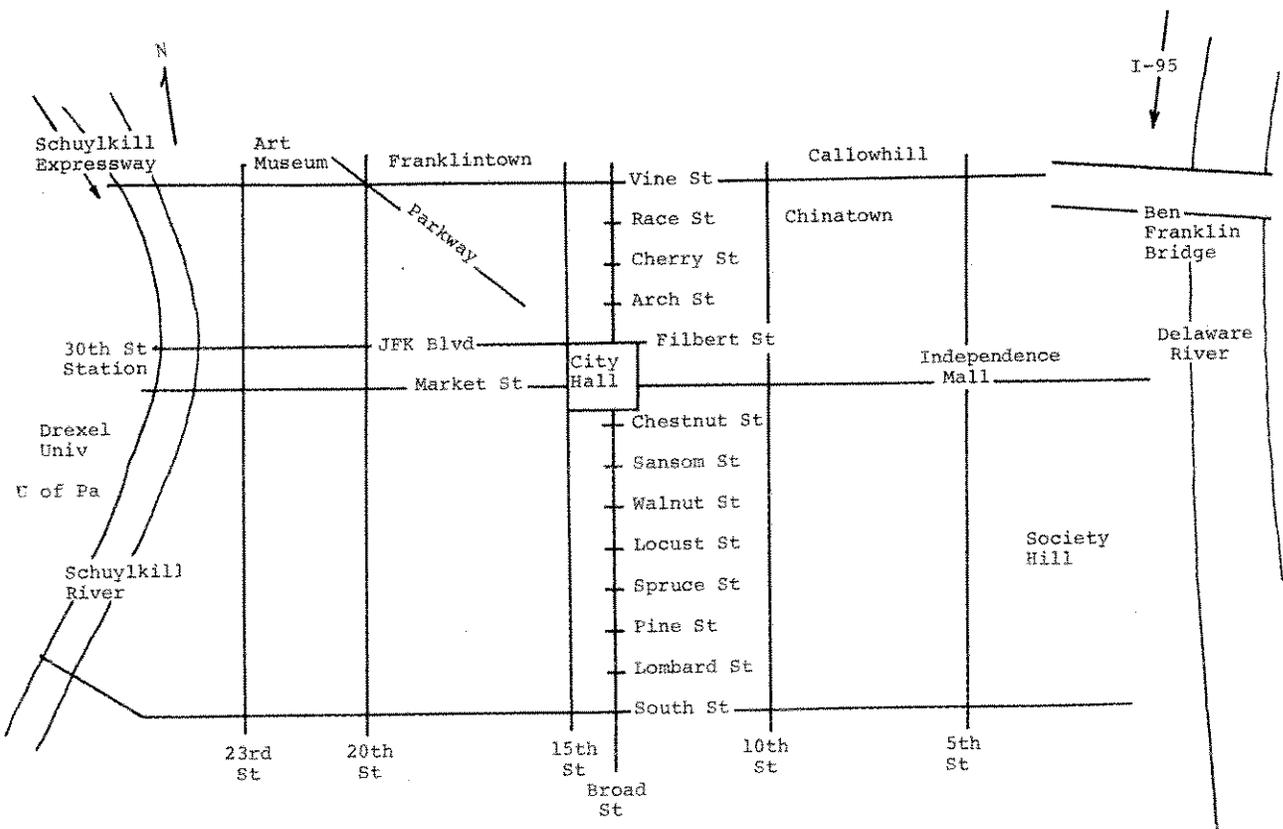


Figure 1. PHILADELPHIA CENTRAL BUSINESS DISTRICT (CBD)

CHANGES IN PUBLIC PARKING SPACES FROM 1969 TO 1973

TABLE B

<u>Location</u>	<u>Change</u>
18 & Parkway	+ 94
23 & Arch	+160
19 & Market	+ 35
20 & Market	- 55
5 & Market	- 56
4 & Market	- 47
22 & Chestnut	-570
21 & Chestnut	+200
18 & Market	+180
17 & Chestnut	- 56
5 & Market	- 28
22 & Walnut	- 10
19 & Walnut	- 50
16 & Locust	+ 35
5 & Locust	- 44
24 & Locust	- 9
21 & Spruce	+ 30
15 & Locust	+400
13 & Spruce	- 60
6 & Locust	- 88
Net Change	+ 61

parking lots on a monthly basis. It also seems that many new facilities owned by institutions are being called private yet rent space to the general public. University of Pennsylvania for example has its parking facilities listed as private yet sells "permits" on a daily basis.

It is difficult to determine just where the parking supply increase occurred. Many temporary lots have sprung up along Vine Street near Chinatown, and in the Independence Mall area where there has been substantial demolition.

Since these sites are fairly scattered it would be difficult to determine a definite trend. An examination of current LAT billing transcripts doesn't show any dramatic increases in parking capacity from 1973.

Since commuter modal choice is being investigated, only fees charged for all day parking have been considered. It should be noted, however, that in all cases observed, short term users pay higher hourly rates than all day users. Current data was collected during a number of field trips in an attempt to determine representative rates for most areas of the CBD. Table C gives the location and all day rates for over 60 representative parking facilities.

The Walnut, Chestnut, Sansom Street area near the core of the CBD (i.e. within a few blocks of City Hall) is the most expensive in the city. This is because of the large short-term parking demand in that area. Large lots near the Schuylkill River are cheap because they are located far away from most office buildings. As one walks east from the River,

TABLE C
ALL DAY PARKING RATES

Location	Type*	All Day Fee
20 & Walnut	L	2.50
18 & Walnut	G	3.25
17 & Sansom	G	3.00
16 & Sansom	G	3.00
14 & Sansom	G	3.00
21 Bet Arch & JFK	L	1.30
21 Bet JFK & Market	L	1.50
21 & Ranstead	G	1.70
21 & Chestnut	G	1.75
15 & Delancey	L	1.75
15 & Spruce	L	2.25
23 & Walnut	L	1.25
24 & Sansom	L	1.25
22 & Walnut	L	1.50
23 & Arch	L	1.00
23 & Arch	L	1.00
21 & Arch	L	1.35
20 & Arch	L	1.40
19 & Race	L	1.40
16 & Race	L	1.80
16 & Parkway	G	1.80
18 & Arch	L	2.10
21 & JFK	L	1.90
20 & JFK	L	2.25
18 & JFK	G	2.50
17 & Market	G	2.25
18 & Market	G	2.25
18 & Market	L	2.50
19 & Ludlow	G	2.00
19 & Ludlow	G	2.00
22 & Walnut	L	1.50
17 & Pine	L	2.40
15 & Locust	G	3.00
15 & Locust	L	2.50
Broad & Spruce	L	2.50
13 & Locust	G	2.75
13 & Locust	L	2.75
Broad & Arch	L	2.20
12 & Cherry	L	1.30
11 & Race	G	1.25
10 & Race	G	1.40
9 & Arch	L	5.00

TABLE C. (continued)

Location	Type*	All Day Fee
Broad & Race	L	2.25
Juniper & Cherry	L	2.00
11 & Race	L	1.25
9 & Race	L	1.30
13 & Race	L	1.60
13 & Race	L	1.60
Sansom & Juniper	L	1.75
12 & Walnut	G	2.75
10 & Walnut	L	4.80
9 & Walnut	L	2.00
8 & Walnut	L	2.00
6 & Chestnut	L	2.25
7 & Market	L	2.00
7 & Cherry	L	2.10
8 & Arch	L	1.50
Race & Juniper	G	2.50
Juniper & Arch	L	2.15
Juniper & Arch	L	2.40
15 & JFK	L	2.25
6 & Arch	G	3.00
6 & Arch	G	2.75

* L - Parking Lot
G - Parking Garage

the price of all day parking goes up as the concentration of office space increases, and the walking distance for the commuter from lot to office decreases. The same phenomenon is observed approaching City Hall from any direction except the east. This is probably because of the existence of a secondary CBD core about 6 blocks east of City Hall.

The way in which parking facility owners price and allocate capacity is determined by location and type of facility. The facility's location with respect to offices and stores apparently determines the demand the owner sees for his spaces. The size and type of facility influences demand to a lesser degree.

Large enclosed parking garages offer protection from the elements, but present congestion problems when peak hour commuters queue up to the few entrances or exits. Facilities using attendants offer convenience but also have congestion problems. Parking lots don't have great queuing problems as their exit to capacity ratios are relatively large.

The relative advantages and disadvantages of parking garages for commuters seem to cancel each other. An example of this is an attendant parking garage which charges \$2.25 for all day parking while an open lot directly across the street charges \$2.40.

A simple economic model can be used to explain parking rates and space allocation to commuters and short-term users. Public parking lots are very effective price discriminators.

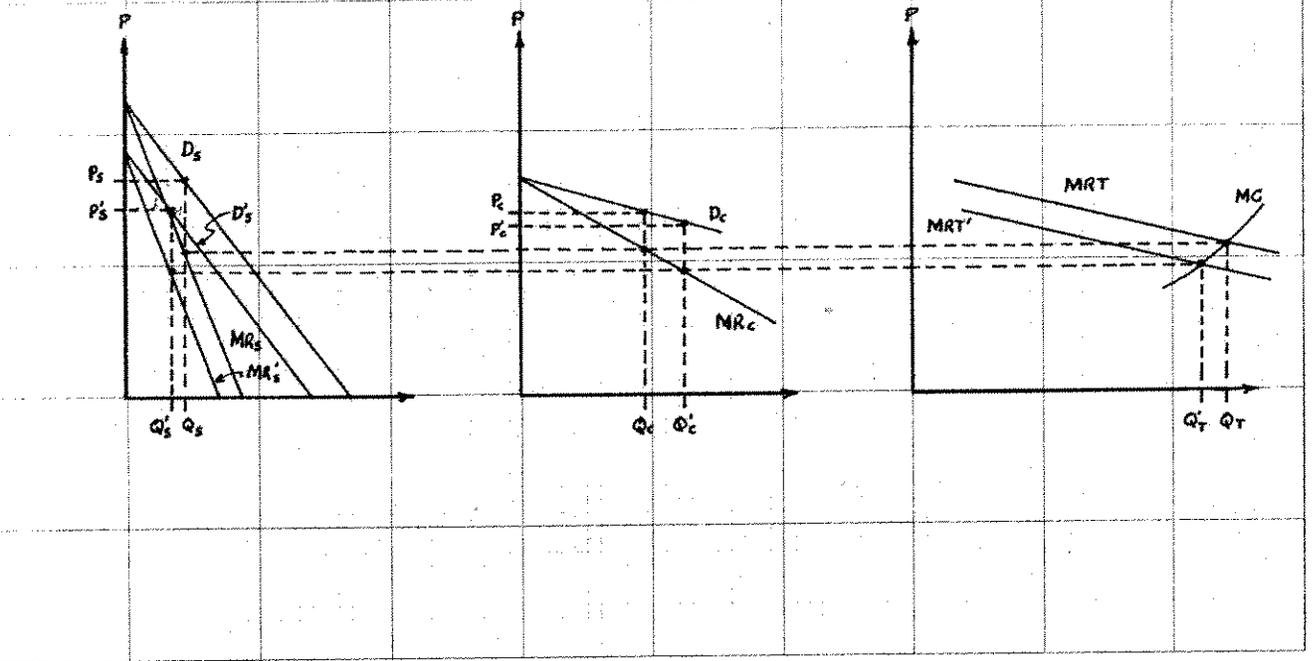
They satisfy the criteria for price discrimination in that

they can identify and segregate consumers with different elasticities of demand, and the nature of their service makes arbitrage impossible. All day users have a higher elasticity of demand than short term users. Persons who drive into the CBD for shopping trips, medical appointments and office visits are not likely to compare prices or walk an extra block to save ten or twenty cents. Regular commuters, however, have plenty of opportunity and incentive to compare prices. The everyday expense of parking means more to a commuter than to the irregular short term user.

When price discriminating firms maximize profits, they charge higher rates to the customers with lower elasticities. This explains why short term users pay more per unit time than commuters. The parking lot owner attempts to price and allocate his capacity in such a way as to maximize profits. His "rule of thumb" pricing and allocating techniques may come close to price and quantity decisions reached by marginal cost pricing.

The method by which a price discriminator maximizes profits is shown in Figure 2. D_s represents short-term parking demand, MRS is its associated marginal revenue curve. DC is the commuter parking demand and MRC its associated marginal revenue. The profit maximizing prices and quantities can be determined by summing the Marginal Revenue curves (MRC) and imposing the parking lot owners' marginal cost (MC) curve. The intersection point of the MC & MRC_t is used to determine price and space allocation to the short-term parker and commuter. Note that

Figure 2. PRICE AND ALLOCATION DECISIONS OF PRICE DISCRIMINATORS



12

since the elasticity of commuter demand is greater than that for short-term parkers, the price for the latter is higher, and the number of spaces allocated is less.

A number of assumptions are made in applying this model. Demand curves facing a particular facility are assumed to be downward sloping, as in fact they are. If the price were increased, there would be a loss of some customers to neighboring facilities, but not all. Demand curves are also assumed to be straight lines. In reality the demand curves would not intersect the price axes where shown but would curve upward since some people would pay any cost to use a particular convenient lot. The parking facility's cost function is assumed to be smooth. In reality, total cost would look like a step function since incremental costs come in large chunks in the form of attendants salaries. This would make the marginal cost function look different. Another problem is that complications arise when $Q_t > Q$ maximum; that is the owner would like to allocate more spaces than he has. In this situation the owner will allocate space and charge as he would if MC intersected MR_t at Q maximum because this would still result in the highest profit. The assumption of profit maximization may be violated because of bad management. Supply and demand may change in an area so that all day parking rates are comparatively cheap. An operator may then be content to let his lot fill up early with commuters and play cards for most of the day while higher paying shoppers are looking for spaces. Similarly, if all day parking rates are overpriced and short-term rates underpriced

the owner may be paying high attendant salaries while he has unused capacity in dead portions of his lot. Keeping the assumptions and complications in mind, the model is probably good enough to explain the following observations.

A long time owner of a parking lot near 20th and Market Streets told me that before the stores in the area were torn down to make way for the new office buildings, a higher percentage of his business was from short-term parkers than it is today. We can look at these two separately in Figure 2. When shopping demand shifts down to D_s' , MRS shifts to MRS' , MR shifts down and the profit maximizing pricing and allocation scheme results in $P_s' < P_s$, $Q_s' < Q_s$, $Q_c' > Q_c$, $P_c' < P_c$. Therefore as stores move out of an area parking rates tend to drop, more spaces are allocated to commuters and leys to shoppers. Although parking rates in the 20th and Market St. area have not changed in recent years, they have gone down with respect to most consumer prices because of inflation. A similar scheme will show that as office space in an area increases, D_c shifts upward resulting in $Q_s'' < Q_s$, $P_s'' > P_s$, $Q_c'' > Q_c$, $P_c'' > P_c$. When these two changes, i.e. less short-term demand and greater all day demand, occur simultaneously, the direction of price changes will depend on the relative magnitudes of the demand shifts. What can be seen clearly however is that for each shift in demand, the spaces allocated to commuters goes up, and those to short-term users goes down. Retail sales in Philadelphia decreased through the 1960's levelling off by the late 60's in dollar sales (1) (so they

were therefore still declining). During the same period, office space in the CBD was growing rapidly. Both trends undoubtedly caused parking facility owners to devote more capacity to commuters than they had previously. This effect would be pronounced in areas such as 20th and Market, Market Street East, and Independence Mall where stores are being torn down and offices built at a fast rate. The effect of this on commuter modal split will be discussed in Part IV of this report.

Concentration of ownership has important implications for control of the parking supply. L & I billing records have been used in determining the concentration of control in 1973. The degree of control of parking lots is shown in Table D. A similar analysis for parking garages could also be done.

In the latest L & I billing list, it was observed that concentration has increased slightly as one new owner appeared with 5 lots and about 400 spaces, and a former 4 lot owner appeared with 12 more or about 500 more spaces. Six other owners appeared with one or two additional lots.

The significance of control will be discussed in Part IV of this report.

TABLE D
CONCENTRATION OF PARKINGLOT OWNERSHIP IN THE PHILADELPHIA CBD
1973

Owners controlling	Total Number Of Spaces	% Spaces	% Lots
1 Lot - 60	3086	37	69
2 Lots- 10	1168	14	11
3 Lots- 10	1638	20	11
4 Lots- 3	706	8	3
5 Lots- 0	0	0	0
6 Lots- 2	627	8	2
7 Lots- 0	0	0	0
8 Lots- 1	502	6	1
9 Lots- 0	0	0	0
10 Lots- 0	0	0	0
11 Lots- 0	0	0	0
12 Lots- 0	0	0	0
13 Lots- 1	640	8	1
	8367		

PART II. OFFICE SPACE TRENDS IN THE CBD

Before 1960 office space in the CBD was highly concentrated within a few blocks of City Hall. During the 1960's there was an office building construction boom which persists even now. Tables E and F give the name, location opening date and size of each building added since 1967 and office space either under construction or planned. Some of the data is incomplete and some buildings have not been included, but the trend is obvious. A CBD sprawl has occurred and the magnitude is not trivial. The total amount of office space in the CBD in 1970 was 20.6 million square feet (2). Buildings such as the William Green Federal Building (450,000 ft.²) at 6th and Arch, Philadelphia Electric Company Building (414,000 ft.²) at 23rd and Market Street and 2000 Market Street (700,000 ft.²) represent sizable commuter attractors to the fringes of the CBD. As can be seen in Table E, there will be substantially more office space in the CBD fringe in the near future. Note that the Federal Court House alone is about 5% of 1970 total CBD office space. The implications of this sprawl will be discussed in Part IV of this paper.

TABLE E

OFFICE BUILDINGS PLANNED OR UNDER CONSTRUCTION IN MARCH, 1975*

Building	Location	Anticipated Opening	Square Feet
1. Federal Court House	6 & Market	1975	1,400,000
2. 4th & Market	4 & Market	1976	125,000
3. One Independence Mall	7 & Chestnut	1977	900,000
4. Federal Reserve Bank	7 & Arch	1975	900,000
5. Penns Landing	Front & Market	1976	300,000
6. Franklin Town	Art Museum Area	1976	1,000,000
7. Franklin Town	Remainder	1980	2,500,000
8. United Engineers	17 & Chestnut	1975	600,000
9. Market Street East	8-11th & Market	1977-91	8,205,000
10. Callowhill Area	N.E. of CBD	1976	-----

*Philadelphia City Planning Commission

TABLE F

OFFICE BUILDINGS OPENED BETWEEN 1969 AND MARCH, 1975 *

Building	Location	Date Opened	Square Feet
1. Mutual Benefit Life	1845 Walnut	1969	280,000
2. Philadelphia Electric	23 & Market	1970	415,600
3. Pennwalt	17 & Cherry	1970	540,000
4. Fidelity Mutual Life	15 & So. Penn. Sq.	1973	689,800
5. I.B.M.	-----	---	---
6. 1500 Walnut St. Add.	1500 Walnut	--	268,000
7. Stock Exchange Bldg.	17 & Sansom	--	216,000
8. Center Square	1500 Market	1974	2,000,000
9. Archdiocese Office	17 & Vine	1970	112,000
10. 1234 Market St.	1234 Market	1975	600,000
11. P.N.B.	5 & Market	1973	500,000
12. 2000 Market St.	2000 Market	1973	700,000
13. Hallmark Corp.	1818 Market	1975	900,000
14. I.N.A. Addition	17 & Arch	1974	600,000
15. William Green Bldg.	6 & Arch	1973	450,000
16. K.Y.W.	4 & Arch	1971	---
17. Liberty Mutual Ins. Co.	Ind. Mall Area	1973	---
18. I.V.B.	17 & Arch	1973	1,000,000

* Philadelphia City Planning Commission

PART III. COMPUTER ACCESS TO THE CBD

The Philadelphia CBD is well served by public transportation and highways. The core of the CBD is much better served by public transit than the fringe areas. The regional commuter rail systems have stations at Reading Terminal (12th & Market), 30th Street, and Suburban Station. The Market Street Subway has no stations between 30th and 15th streets, although transfers can be made to the Market Street Subway at 8th Street. In general, as one goes away from City Hall, public transportation convenience decreases.

The fringes of the CBD are very well served by the highway system. The Schuylkill Expressway, I-95, the Parkway, Ben Franklin Bridge, and local streets give commuters easy access to the fringe. Close to the core CBD, highway service degrades as congestion increases.

Mass transit coverage of the CBD will be improved with the proposed Center City Commuter Rail Tunnel which will provide more terminals for regional rail commuters.

Additional Highway coverage of the CBD fringe will be provided with the completion of I-95 and the proposed Vine Street Expressway.

PART IV. IMPLICATIONS

Most CBD office workers either use public transit or drive to work. Many have public transit alternatives and most can drive. The decision to drive or take public transit is based on the costs of each alternative.

The total cost of driving to work is based on:

- 1 - Car operating costs
- 2 - Tolls
- 3 - Travel Time
- 4 - Parking Costs:
 - a. Fee
 - b. Queuing times
 - c. Lot to office walking distance

The total cost of taking mass transit is based on:

- 1 - Home to station distance
- 2 - Time waiting
- 3 - Attractiveness of facilities
- 4 - Fare
- 5 - Time riding
- 6 - Station to office distance

This section will discuss what happens to these costs and thus commuter choice as a result of in office space distribution.

Prior to 1960, most office space was concentrated around City Hall. All day parking rates were expensive in this core because of high shopper and commuter demand and limited supply. A "cheap ring" developed around this core to serve drivers who were willing to walk a few extra blocks to save some money and

time in congestion. Price decreased as distance from the high office concentration increased and people became less enthusiastic about the exercise.

Today, prices are high where demand is high because of convenient location, but now the "cheap ring" has expanded a great deal. More and more offices have moved to the fringe and taken their potential parking demand with them. Marginal land responds to this demand and suddenly vacant lots and demolition sites turn into parking lots. Existing parking facilities operate at a higher occupancy rate. Since an existing vacant lot incurs fixed costs anyway (taxes), the owner will use it for parking as soon as he can just cover his variable costs, i.e. an attendant.

By 1980, this cheap ring will be extending with the future openings of more offices in Independence Mall, Franklin Town, and the Callowhill area.

The effect of this phenomenon on commuter modal choice can be seen by what happened when the Federal Government opened the William Green Building at 6th and Arch in late 1973. Before the current building boom, it was the Federal Government's policy to locate offices as close to City Hall as possible (3). During late 1973, as many as 3,000 federal workers were moved to the William Green Building from federal offices close to City Hall. This move undoubtedly had an impact on commuter modal choice. Modal choice for office workers in Two Penn Center, 15th and Market, was determined by a survey in February, 1970 (4) and is shown in Table G: If the same percentages

TABLE G
OFFICE WORKERS

Mode	Two Penn Center	3,000 Displaced Federal Employees
Auto	13.5%	405
Bus	14.9%	447
Subway	32.9%	985
Street Car	2.9%	87
Railroad	30.9%	926
Walk	4.9%	147

hold for federal workers located in the core CBD the 3000 workers moved would make modal choices as shown in the second column of table G. In the new location, the 405 who drove will probably still drive since public transit is not more attractive at Independence Mall, and driving is not less attractive. These people will leave their spaces in the core CBD making the effective supply there larger.

For former public transit riders, those who took the Reading Railroad are not significantly further away from the terminal, but those who took the Penn Central are quite a distance from Suburban Station. Public transit is much less convenient for these people while parking rates are less, parking lots are closer and there is less traffic congestion. Similar situations will happen when office space moves in any direction from the core CBD. Public transit becomes less attractive, because the core is the best served area and driving becomes more attractive because the core is the most expensive in terms of parking fees and congestion.

CONCLUSION

Since public transit is strongly focused at the core of the CBD, many areas in the fringe can be reached only if transfers are made. As it exists today transferring is unattractive to the time conscious commuter. The transfer system can certainly be improved, but whether it can overcome the enormous edge the automobile has because of cheap convenient parking is doubtful. Driving disincentives will probably have to coincide with public transit improvements.

The fact that tremendous peak hour congestion exists now shows that commuters are being diverted by driving disincentives already. Once I-95 and the Vine Street Expressway provide additional capacity to the CBD, more commuters will drive until the congestion diverts them again.

Control of the parking supply could be used to introduce a more rational disincentive. The City could try to influence the situation through the rate structure of the 3,875 off-street parking spaces it controls. This would not be very successful because the large number of small parking lots would try to accommodate displaced commuters and marginal land would blossom into parking lots in response to increased demand. A City wide rate increase would be difficult to administer and enforce because of the large numbers of small lots who would probably be willing to shade prices to commuters instead of having idle ground. The most effective step the City could take would be to make it much more difficult for new parking facilities (public and private) to come into

existence by changing zoning or licensing policies.

Commuter parking space allocation in existing parking facilities could be reduced by strict enforcement of existing parking restrictions. If short-term users were discouraged from illegal parking, the demand for short-term parking would shift upward and profit maximizing parking facilities would raise the price and decrease the number of spaces allocated to commuters. This would have the added benefit of reducing congestion in the CBD and improving the service of busses and trolleys.

Recent office space construction has biased commuter modal choice in favor of the automobile. Unless steps are taken, this trend will accelerate as more office buildings open in the CBD fringe, and highway access to the fringe improves. The result will be increased traffic congestion and air pollution during peak rush hours. Improving existing core CBD focused public transit will probably not be enough to offset this imbalance.

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