APPENDIX

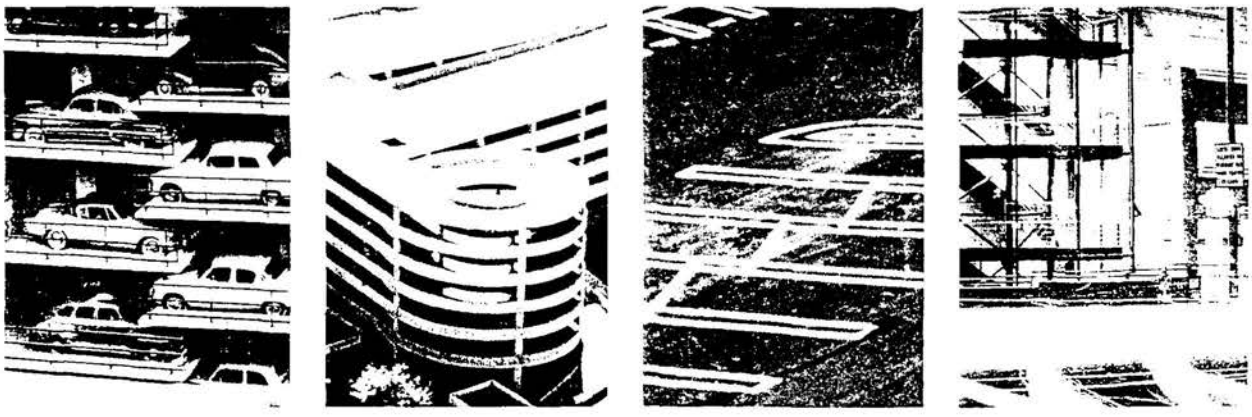
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EXTRACTS FROM PARKING PLANNING REFERENCES AND LOCAL ZONING ORDINANCES

Board of Zoning Adjustment
District of Columbia
CASE NO. 17165
EXHIBIT NO. 24A2

THE DIMENSIONS OF PARKING

Third Edition



ULI–the Urban Land Institute
NPA–the National Parking Association

Chapter 5

PARKING DEMAND

Jean M. Keneipp and Gerald Salzman

The estimation of parking demand is a critical step in the evolution of a development that will attract auto driver trips. Unfortunately, parking demand estimation is complex, misunderstood, and often approached incorrectly. Done properly, demand estimation can be time-consuming and expensive, so the temptation exists to employ shortcuts that yield erroneous results.



The amount of time and resources spent in estimating parking demand should be consistent with the reason for making the estimate. If it is intended to provide only a general idea of how many parkers might use a garage, a broad range is adequate, and the use of a factor from a published table will suffice. On the other hand, if the estimate is to be used to help establish the size of a proposed garage or to support a financial pro forma, the best possible estimate is justified.

Demand estimates may be made for a single land use, such as an office building, or a large mixed-use development, such as a shopping center or a central business district. Sometimes, the demand estimate may include the possible impact of shared parking.

Parking demand is generated by land use, but the demand can be expressed either in terms of total users for the whole project or in terms of total users for a given garage. For example, an office building might generate a peak demand of 600 employee parkers and 75 visitor parkers. A proposed garage to serve the parking needs of the building, however, might have an estimated peak occupancy of only 500 employee and 50 visitor parkers; the other parkers destined to the building may opt to go elsewhere.

The reason that parking demand is difficult to determine accurately is that it can



5-1 Town Square, a mixed-use development in downtown St. Paul, Minnesota. In an estimation of the parking demand for a mixed-use or multiuse development, the opportunities for shared parking should be considered.

be influenced by many conditions. A given land use can attract many person-trips during a 24-hour period. The number and types of trips depend on the size of the land use, its nature, and the characteristics of the persons who will be attracted. If analysts can isolate these variables accurately for representative land uses, they will find it possible to estimate parking demand with accuracy. Such data are rarely developed because of the extensive field surveys and analytical work required.

A common shortcut is to select a parking generation ratio or factor from a published source and to modify it to represent estimated conditions. No simple set of factors can be developed to support an accurate estimate of parking demand. No one factor can be used to estimate the parking demand for a retail establishment located in a suburban area of California, in a small community in the Midwest, or in the heart of an older, large city in the East. Even if a magic factor with a high degree of accuracy could be derived for current conditions, it would become obsolete in a few years as inevitable changes occur in shopping habits, transportation characteristics, policies, and environmental constraints. Further, a table of factors usually does not specify the assumed percentage of transit riders nor the average number of persons per automobile.

An example of how parking factors can shift over the years is provided by the factor used to determine space requirements for regional shopping centers. In 1965, the shopping center industry standard was 5.5 parking spaces per 1,000 square feet of gross leasable area (GLA), according to the findings of a 1965 Urban Land Institute study, *Parking Requirements for Shopping Centers*, Technical Bulletin 53. Twelve years later, on the basis of research reported in the May 1977 issue of *Urban Land*, "5.0 parking spaces per 1,000 square feet of gross leasable area would be, in general, a valid national maximum as a basis for current planning for new, existing, and expanding regional shopping centers that have, or will have, a GLA greater than 800,000 square feet." In a 1982 study sponsored by ULI, it was concluded that the current shopping center generation rate is slightly less than 5.0 and even lower for smaller centers. This study, which sets recommended standards to replace the 1965 standards, calls for:

- Four spaces per 1,000 square feet of GLA for centers containing between 25,000 and 400,000 square feet.
- An average of 4.5 spaces per 1,000 square feet for centers containing between 400,000 and 600,000 square feet.
- Five spaces per 1,000 square feet for centers containing more than 600,000 square feet.

These standards are not absolute and require modification based on land use and tenant characteristics of a specific center.

Demand Parameters

Three fundamental characteristics or parameters control the parking demand of a given land use: 1) the nature of the building or development that creates the demand; 2) site-specific factors that may constrain parking demand; and 3) time frame factors.

Basic Demand. The first set of parameters provides the basis for estimating the unrestrained number of person-trips that will be made to the proposed development. The nature of the development or building is defined by:

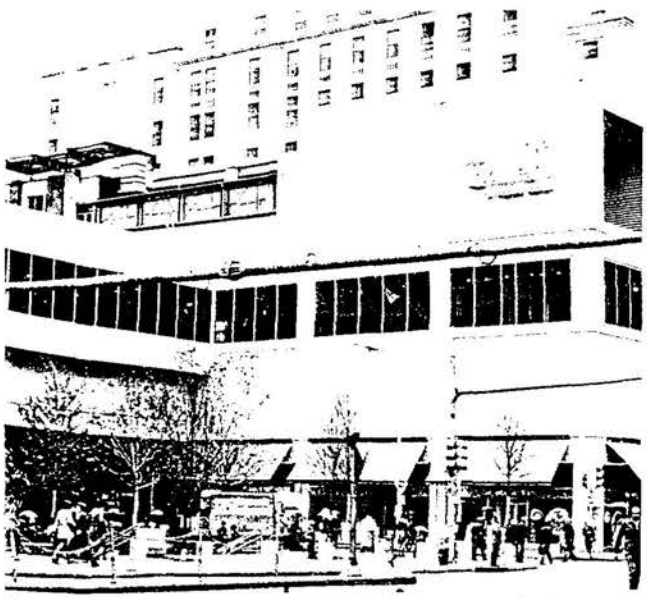
- Type of land use or building use (size, special conditions). Examples: a free-standing general office building of 200,000 square feet in a suburban setting; a 500-room hotel with 5,000 square feet of restaurant space; or a conference facility with a 200-seat capacity.

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- Socioeconomic characteristics of the persons expected to visit the development. Example: a shopping center in a suburb with high levels of car ownership.

Constraining Factors. The basic parking demand of the site, building, or area being evaluated can be modified by the nature of the site itself, of its trade area, or even of the metropolitan area:

- The proportion of trips that are multiple-use. Parking demand at a restaurant many of whose customers work nearby is lower because these patrons will walk to the restaurant, leaving their cars in the work-related parking location.
- Traffic accessibility of the site. A proposed garage location could be more or less convenient to reach from approach streets when compared with nearby competitive parking facilities.
- Parking facility efficiency and attractiveness. If leaving a given garage requires excessive time, that garage may lose patronage if there are better alternatives.
- Cost of parking. Other factors being equal, if a garage charges high fees, its patronage will be lower than if its fees were lower than those of competing facilities.
- Alternative modes. If the parking site is well served by transit and there is an active program to encourage or even subsidize employee transit passes, parking demand will be diminished. Also, an active carpool program can reduce parking demand.



5-2 Parking demand at The Gallery at Market East is influenced by the fact that 70 percent of the patrons arrive at the center by mass transit.

- Local policy and codes. A city may impose a parking tax in certain locations on certain types of parkers, or it may require that a specified number of spaces be held vacant until 10:00 a.m. to accommodate patron parkers.

Time Frame Factors. This step in the analysis translates daily trip and parking demands into the appropriate formats needed to size a parking facility and estimate its revenues:

- Peak-to-daily relationships. What percentages of day-long parking occur during the daily peak on weekdays and Saturdays? How do the percentages vary by types of parkers—employees, visitors, and so on?
- Periodic factors (daily, monthly, seasonal). Retail parking is at a maximum in December in most places and is usually low in February or July.
- Nonperiodic factors (long-term changes, abrupt changes). There may be a long-term trend upward or downward in the economic activity in the downtown, or a major retail store may leave the CBD.

How the parameters are used in demand estimation is illustrated in Figure 5-3.

Estimating Demand

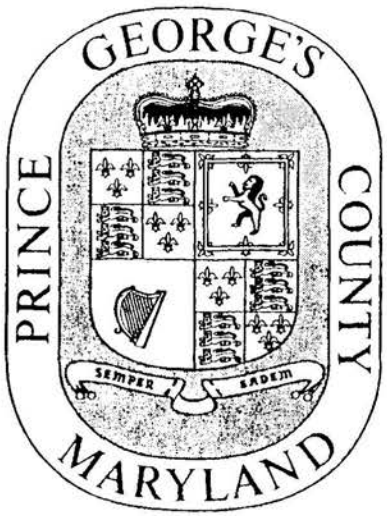
Despite the problems and cautions discussed in this chapter, reliable demand estimates can be prepared if an analyst is willing to take the time. The best approach is to start with reliable factors and calibrate them to reflect local conditions. This approach assumes that the purpose of the demand estimate justifies the work involved. A four-step approach may be outlined as follows:

1) Use the best factors available.
2) Obtain a reliable definition of the land uses that will generate the parking demand.
3) Calibrate and/or adjust the factors to replicate local conditions.
4) Prepare the estimates of parking demand.

First, select factors from a source considered reliable. Try to understand the underlying assumptions, such as the number of persons per car, the percentage of transit users, and the percentages of "captive" patrons or multipurpose trips.

As a guide, Figure 5-4 provides ranges in parking generation for typical situations. The generators include retail, office, medical, industrial, and residential uses. Additional insights into the reasons for variations in parking demand can be found in four Urban Land Institute publications: *Industrial Development Handbook, Shopping Center Development Handbook, Residen-*

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THE

PRINCE GEORGE'S COUNTY

CODE

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SUBTITLE 27. ZONING.

PART 11. OFF-STREET PARKING AND LOADING.

DIVISION 1. GENERAL.

27-549. Applicability.
27-550. Purposes.
27-551. Permitted use of parking lots and loading areas.

DIVISION 2. PARKING FACILITIES.

Subdivision 1. Site Plan.

27-552. General requirements.
27-553. Guidelines for approval.

Subdivision 2. Design Standards.

27-554. Surfacing.
27-555. Location.
27-556. Separation from streets and walks.
27-557. Drainage.
27-558. Parking space sizes. (See Figure 58.)
27-559. Compact car spaces.
27-560. Interior driveway widths. (See Figure 59.)
27-561. Marking.
27-562. Lighting.
27-563. Connection to street.
27-564. Landscaping, screening, and buffering.
27-565. Speed bumps.
27-566. Parking facilities for the physically handicapped.
27-567. Reserved.

Subdivision 3. Minimum Requirements.

27-568. Schedule (number) of spaces required, generally.
27-569. Fractional totals.
27-570. Multiple uses.
27-571. Uses not listed.
27-572. Joint use of parking lot.
27-573. Off-site parking lot.
27-574. Number of spaces required in the M-X-T Zone.

Total Required Parking Spaces in Lot	*Required Minimum Number*
Up to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
Over 1,000	20, plus 1 for each 100 over 1,000

(c) Requirements for handicap parking spaces pertaining to the location, surfaces, curb ramps, and other dimensions shall comply with Sections 4.3, 4.5, 4.6, 4.7 and 4.8 of the American National Standards for buildings and facilities in ANSI A117.1-1986.
(CB-33-1985; CB-149-1987; CB-38-1988; CB-130-1989)

Sec. 27-567. Reserved.

Subdivision 3. Minimum Requirements.

Sec. 27-568. Schedule (number) of spaces required, generally.

(a) In all zones (except the M-X-T Zone), the minimum number of required off-street parking spaces for each type of use shall be as listed in the following schedule. In the schedule, each "employee" means each employee on the largest shift.

TYPE OF USE	*NUMBER OF SPACES*	*UNIT OF MEASUREMENT*
Voluntary fire, ambulance, or rescue station	**1.0**	**Dispatcher or other office personnel**
	+2.0	**Emergency vehicle**
	+1.0	**4 persons legal occupancy in hall or auditorium**
(6) OFFICES:		
Bank, savings and loan association, or other savings or lending institution:		
(A) Automatic teller machine only	**0.0**	**(None)**
(B) Unrestricted	**1.0**	**250 sq. ft. of the first 2,000 sq. ft. of GFA**
(CB-28-1985; CB-38-1988)	**+1.0**	**400 sq. ft. of GFA above the first 2,000 sq. ft.**
Medical practitioners' office/medical clinic:		
(A) In an office building or office building complex	**1.0**	**200 sq. ft. of GFA**
(B) In a one-family dwelling	**1.0**	**100 sq. ft. of GFA**
(C) In a dwelling other than a one-family dwelling	**1.0**	**200 sq. ft. of GFA**
Office building or office building complex (except medical practitioners' offices)	**1.0**	**250 sq. ft. of the first 2,000 sq. ft. of GFA**
(CB-38-1988)	**+1.0**	**400 sq. ft. above the first 2,000 sq. ft. of GFA**
(7) INDUSTRIAL/MANUFACTURING/STORAGE:		
Industrial plant	**2.0**	**1,000 sq. ft. of GFA**
Junk yard or auto salvage yard	**1.0**	**1,000 sq. ft. of gross storage area of the first 10,000 sq. ft.**
(CB-126-1984; CB-133-1984; CB-33-1985)	**+1.0**	**10,000 sq. ft. of gross storage area above the first 10,000 sq. ft.**
Miniwarehouse	**1.0**	**50 units having direct access only from within a building**
	+4.0	**1,000 sq. ft. of GFA of office space**
	+2.0	**Resident manager**
Warehouse unit (except miniwarehouse)	**3.0**	**First 1,500 sq. ft. (or fraction) of GFA**
	+1.0	**Additional 1,500 sq. ft. of GFA, up to 100,000 sq. ft.**
	+0.20	**Additional 1,000 sq. ft. of GFA above the first 100,000 sq. ft.**
Wholesale establishment	**3.0**	**First 1,500 sq. ft. (or fraction of GFA)**
	+1.0	**Additional 1,500 sq. ft. of GFA**

DIVISION 3. LOADING FACILITIES.

Subdivision 1. Site Plan.

Sec. 27-575. General requirements.

(a) Each application for a building or use and occupancy permit (for a use for which off-street loading spaces are required) shall include a drawing (site plan) showing, in addition to other improvements, the proposed layout of the loading area. The drawing shall indicate conformance with the design standards required in Subdivision 2, below, and with the provisions of the Landscape Manual.

(b) No building or use and occupancy permit shall be issued for any use for which a loading area is required, unless the site plan has been approved by the Planning Board (or its designee). (CB-1-1989)

Sec. 27-576. Guidelines for approval.

(a) The following guidelines apply to evaluation of the site plan:

(1) The plan complies with the purposes of this Part and Subtitle, and the General Plan;

(2) All service vehicles parked for the purposes of loading or unloading are removed from streets;

(3) Vehicular and pedestrian traffic on streets is not obstructed; and

(4) The amenities of the site are enhanced by concealing the loading area.

Subdivision 2. Design Standards.

Sec. 27-577. Surfacing.

All loading areas shall be surfaced in such a manner as to be dust-free.

Sec. 27-578. Loading space sizes. (See Figure 62.)

(a) Each loading space shall have the following minimum dimensions (excluding driveways, entrances, and exits):

	Length	*Width*	*Height (if Covered or Obstructed)*
Industrial, wholesale, and storage uses	45 feet	12 feet	12 feet if use served has 3,000 square feet or less GFA; 15 feet if use served has more than 3,000 square feet GFA
All other uses	33 feet	12 feet	12 feet if use served has 3,000 square feet or less GFA; 15 feet if use served has more than 3,000 square feet GFA

(b) Doorway entrances to interior loading spaces shall be at least twelve (12) feet wide and twelve (12) feet high if the use served has 3,000 square feet or less GFA and fifteen (15) feet high if the use served has more than 3,000 square feet GFA.
(CB-69-1987)

Sec. 27-579. Location.

(a) Except as otherwise provided in this Subtitle, a surface loading area may be located in any yard.

(b) No portion of an exterior loading space, and no vehicular entrances to any loading space (including driveways and doorways), shall be located within fifty (50) feet of any Residential Zone (or land proposed to be used for residential purposes on an approved Basic Plan for a Comprehensive Design Zone, approved Official Plan for an R-P-C Zone, or any approved Conceptual or Detailed Site Plan). (See Figure 63.)

(c) In any Industrial Zone, where a lot has frontage on more than one (1) street, loading shall be permitted in only one (1) yard adjoining a street.
(CB-33-1985; CB-38-1988)

Sec. 27-580. Screening.

Screening of loading areas shall be provided pursuant to the provisions of the Landscape Manual.
(CB-62-1990)

Sec. 27-581. Connection to street.

Every loading space shall be connected to a street by means of a driveway. The driveway shall be at least twenty-two (22) feet wide, exclusive of curb returns and gutters. In the case of a corner lot, no such driveway shall be located less than twenty (20) feet from the existing or proposed ultimate point of curvature of the curb or the edge of the pavement of an uncurbed section of the street, whichever forms the greater distance to the point of curvature of the fillet of the driveway apron. (See Figure 60, Part 2.)

Subdivision 3. Minimum Requirements.

Sec. 27-582. Schedule (number) of spaces required, generally.

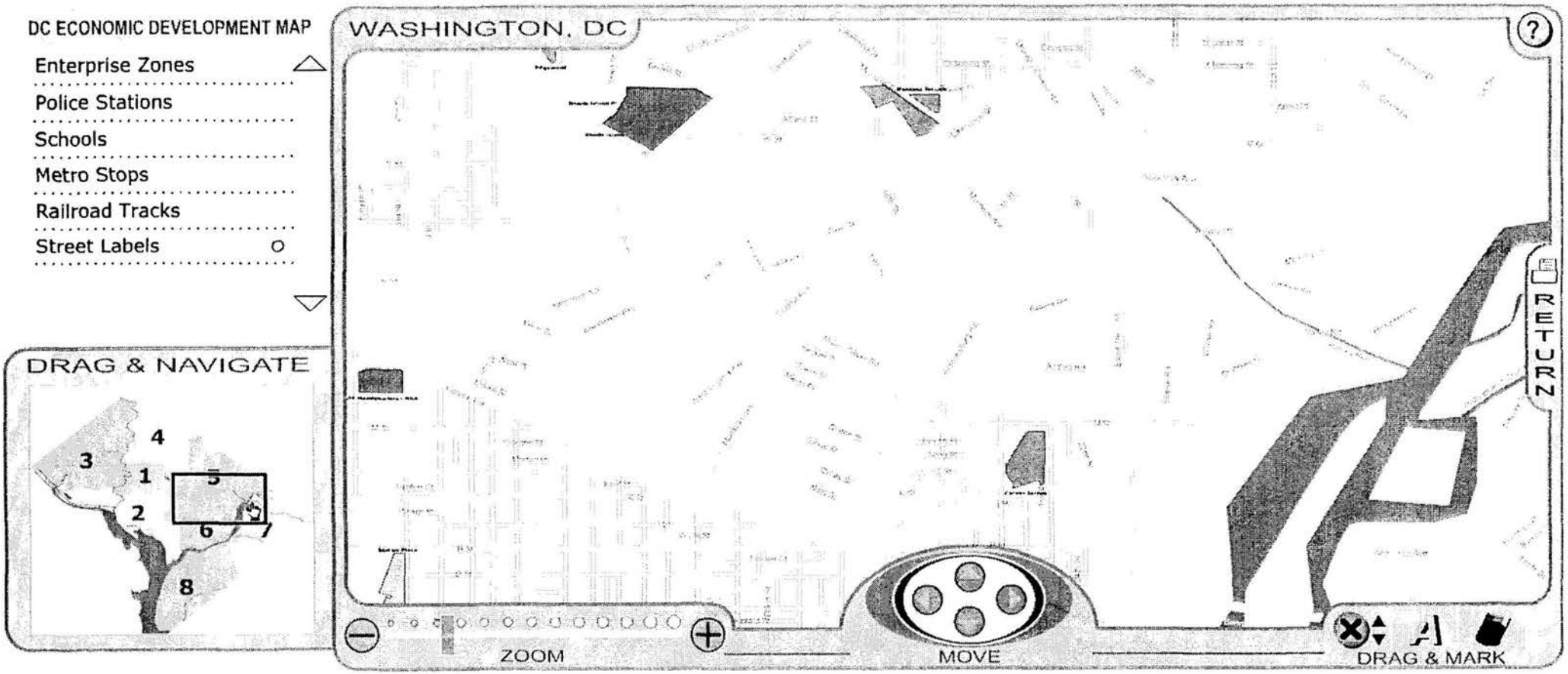
(a) In all zones (except the M-X-T Zone), the minimum number of required off-street loading spaces for each type of use shall be as listed in the following schedule:

TYPE OF USE	*NUMBER OF SPACES*	*UNIT OF MEASUREMENT*
Hospital or other institution	**None**	**Less than 10,000 sq. ft. of GFA**
	1.0	**10,000 to 100,000 sq. ft. of GFA**
	+1.0	**Each additional 100,000 sq. ft. of GFA (or fraction)**
Hotel or motel	**None**	**Less than 10,000 sq. ft. of GFA**
	1.0	**10,000 to 100,000 sq. ft. of GFA**
	+1.0	**Each additional 100,000 sq. ft. of GFA (or fraction)**
Industry or manufacturing	**None**	**Less than 2,000 sq. ft. of GFA**
	1.0	**2,000 to 25,000 sq. ft. of GFA**
	+1.0	**Each additional 40,000 sq. ft. GFA (or fraction)**
Multifamily dwelling	**None**	**Less than 100 dwelling units**
	1.0	**100 to 300 dwelling units**
	+1.0	**Each additional 200 dwelling units (or fraction)**
Office building or office building complex (including banks) (CB-38-1988)	**None**	**Less than 10,000 sq. ft. of GFA**
	1.0	**10,000 to 100,000 sq. ft. of GFA**
	+1.0	**Each additional 100,000 sq. ft. of GFA (or fraction)**
Retail sales and service (per store)	**None**	**Less than 2,000 sq. ft. of GFA**
	1.0	**2,000 to 10,000 sq. ft. of GFA**
	+1.0	**10,000 to 100,000 sq. ft. of GFA**
	+1.0	**Each additional 100,000 sq. ft. of GFA (or fraction)**
Shopping Centers (integrated shopping centers, malls, and plazas) having at least 25,000 sq. ft. of GLA	**3.0**	**Less than 100,000 sq. ft. of GLA**
	+1.0	**Each additional 100,000 sq. ft. of GLA (or fraction)**
Theater, auditorium, bowling, or other recreational establishment	**None**	**Less than 10,000 sq. ft. of GFA**
	1.0	**10,000 to 100,000 sq. ft. of GFA**
	+1.0	**Each additional 100,000 sq. ft. of GFA (or fraction)**
Undertaking establishment or funeral parlor (CB-38-1988)	**None**	**Less than 3,000 sq. ft. of GFA**
	1.0	**3,000 to 5,000 sq. ft. of GFA (or fraction)**
	+1.0	**Each additional 10,000 sq. ft. of GFA (or fraction)**
Wholesale or warehouse unit (except miniwarehousing) (CB-32-1988)	**None**	**Less than 1,500 sq. ft. of GFA**
	1.0	**1,500 to 10,000 sq. ft. of GFA**
	+1.0	**Each additional 40,000 sq. ft. of GFA (or fraction)**

TYPE OF USE	*NUMBER OF SPACES*	*UNIT OF MEASUREMENT*
Miniwarehouses, per building[1]	**2.0**	**Up to 10,000 sq. ft. of GFA**
(CB-32-1988; CB-108-1988)	**+1.0**	**Each additional 40,000 sq. ft. of GFA (or fraction)**

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1 For miniwarehouse units having direct access to areas outside the building, there shall be provided driveways and areas between buildings for vehicular access, loading, and unloading. Sufficient width shall be provided to permit a moving vehicle to safely and efficiently pass a vehicle parked adjacent to an individual miniwarehouse unit. In no case shall a width of more than twenty-five (25) feet be required. (CB-32-1988; CB-38-1988; CB-108-1988)


DC ECONOMIC DEVELOPMENT MAP
Enterprise Zones
Police Stations
Schools
Metro Stops
Railroad Tracks
Street Labels
DRAG & NAVIGATE
1
2
3
4
5
6
7
8
WASHINGTON, DC
?
RETURN
ZOOM
MOVE
DRAG & MARK