



## Strengthening Transportation of Urban – and Suburban Activity Centers

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Presented At the Upper Midwest Planning Conference, American Planning Association, Chicago, Illinois September 1983

Multiple-purpose, high-intensity activity centers represent a longstanding urban phenomenon. Central Business Districts offer the most firmly established and well-known type of urban activity center, but the size, range, and diversity of other types of major centers have increased in the past twenty years. It is not uncommon, in our larger Sunbelt regions, for major office-commercial-residential high-density centers to be planned as integral units, exceeding in total daily population the central business districts of many other medium-sized regions. Institutional campuses (university or government) represent another older and generally mature activity center type.

This report reviews conditions and issues related to larger cores, downtowns and activity centers. Although the paper is based on work done in the early 1980's, most of the material is still valid in terms of descriptions and evaluations of prospects.

While commercial-retail-office activity centers can be found on a continuum of sizes, shapes, and densities, a daily population of about 25,000 has been found to represent a useful minimum size for "major" centers (1, 2, 3). It is these major centers which offer promise for increasing the efficiency with which our urban areas operate, by potentially reducing both the length and number of work and non-work trips which are made each day. As a focus for surrounding residential and related development, such centers also offer potential for greater efficiency in the provision of other urban services. Similar potentials may also exist for major industrial and office centers (without related retail-commercial development), but data on centers of this type are not readily available, and they are not examined here.

The purpose of this paper is to briefly describe the basic characteristics of major activity centers (MACs), focusing on their land-use patterns and external travel characteristics. Because it is felt that strengthening these types of land developments is a worthwhile regional goal – in terms not only of greater efficiency in urban service delivery but also to provide a clearer and more understandable structure for regions – a series of issues associated with such strengthening is identified.

### Land-use Characteristics

MACs represent the most diverse and least documented form of urban development. More than 100 such centers were inventoried in a recent 12-region survey, and nearly 50 analyzed in four regional site visits (1). The wide range of activity center types precludes a precise definition of primary characteristics. Basic population size and density characteristics have been established for 47 site visit centers, falling into several different categories. The small sample of centers in most of these categories, however, led to size and density ranges based largely on interpolation.

### Definitional Problems

A particular problem for analysis lies in the definition of activity center boundaries. Inconsistencies across urban areas were observed, due to the tendency of the "edges" of many centers (central business districts [CBD] and university campuses, for example) to blend in with adjacent land uses. Including or not including these lower-density, mixed-use edges can significantly affect the overall average density for a center.

Because most centers in turn vary widely in total daily population size, the range of associated densities is also fairly large.

Another definitional problem is associated with major commercial activity centers located mainly in suburban areas. In many instances the traditional regional shopping center (RSC) has stimulated adjacent retail, office, and multifamily housing development, so that the entire complex becomes a large major diversified center (MDC). Although 12 such centers could be identified in the survey and seven in the site visits, data on the total area and population of such activity concentrations were usually difficult to find. Consequently, it is quite likely that a number of the remaining RSCs that were identified also exhibit MDC tendencies. Further analysis of the MDC phenomenon is definitely warranted.

### Daytime Population Ranges

The preliminary data gathered on 117 MACs in 12 regions indicate that the great majority (92) of them fall within the 25,000- to 50,000-daytime-population range. Examples of all the different types of MACs are found in this size range. A 50,000- to 100,000-daytime-population range also appears worthy of attention. Here, only 13 examples were uncovered among the survey regions, and seven examples in the four-region site visits. The 13 examples of activity centers in this size category include four CBDs, three MDCs, two older business centers, two universities, one medical center, and one regional shopping center (RSC).

In the largest MAC size category – 100,000 daytime population or greater – the primary example application area is the traditional CBD. Nine of the 13 CBDs analyzed fell in this category, together with two regional airports and one older business district.

### Land-Use Mix

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Table 1 summarizes selected characteristics of 47 major activity centers analyzed during site visits to Los Angeles, Houston, Minneapolis-St. Paul, and Denver.

Centers are ranked by daily population size. Note that a consistent pattern for population densities is not apparent, and that they range considerably for each center type. Airport terminal areas are included for reference purposes, though not analyzed further. Four examples of government centers were found to be incorporated within CBDs.

Where data were available, a distinction was made between retail and office gross leasable area (GLA). Note that three MDCs – City Post Oak and Greenway Plaza in Houston and Century City in Los Angeles – are primarily high-rise office centers with some supporting retail land uses. These centers include a considerable supply of parking space. CBDs, of course, traditionally contain major office concentrations, as do many older business centers (for example, the Wilshire District and Hollywood in Los Angeles).

### **Physical Form**

Associated with these MAC types are two geographic form variations: multiple-node and focused. Further field studies in the four regions visited indicated that the great majority of major activity centers are multi-node in nature. Only MDCs and RSCs with a heavy concentration of office and retail facilities at their core can be classed as focused. Only two of the seven MDCs visited (Greenway Plaza in Houston and Century City in Los Angeles) were focused in this manner. Most RSCs also display this development pattern.

### **Land-Use Patterns**

Several important baseline land use characteristics for prototype activity centers, drawn from real-world examples in the four-site visit regions, are summarized in Table 2. Total employment ranges from a low of 8,000 for the multicenter, medium-sized MDC to 150,000 for the large CBD. Total retail and office floor area, shown in Table 2, influences the number of internal shopping, business, and related trips that are made, as does the total number of households. Long-term and short-term parking spaces influence the internal travel characteristics of both workers, shoppers, and visitors as they arrive at the activity center from external locations and search for parking (with parking costs also a variable) that is near their ultimate destination.

### **Daytime Population Densities**

Practically all the major activity centers inventories have areas of less than one mile. Most regional shopping centers have areas of less than one-sixth mile (100 acres), although this usually does not include any adjacent commercial-office areas that increase the functional size and scale of such centers. Land area data also do not reflect any tendency for linear patterns of development, which can often lead to activity centers axes of one mile or more in length. Thus, these relatively small geographic areas lead to daytime population densities of, generally, 100,000 to 400,000 persons/mile. These high densities reflect both employment and daily shoppers,

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visitors, travelers, local residents, and students; not all of the last group are present at any one time, but they do represent a significant portion of total internal circulation travel demand.

### Summary of MAC Types

Seven major MAC types can be distinguished (Table 2). Three types involve MDCs, two involve CBDs, and two involve institutional campuses (medical, university, governmental). All but one are associated with multiple-node or multiple-center geographic development patterns, with perhaps four to eight or more major concentrations of trip ends within an overall center. The exception is the type of MDC that exhibits one or two major high-density office concentrations at its core. This focused form of activity center still displays additional retail, office, hotel and multi-family residential areas around the core.

CBD and MDC activity centers are distinguished primarily by size. For analysis purposes, a large CBD with a baseline daily population of 300,000 is distinguished from a medium-sized CBD with a population of 140,000. MDC baseline daily populations are 100,000 (large, lower density than large CBD), 50,000 (medium-size, focused), and 35,000 (medium-size, multiple-center, lower density than medium-sized CBD). Associated densities merit additional study but have been primarily set at a minimum of 100,000 persons (arriving trip-ends)/mile, ranging as high as 750,000 persons/mile for large CBDs.

The two types of institutional campus vary primarily by land use intensity. Both are set at baseline daily populations of 35,000. High-density campuses (generally large high-rise medical or governmental complexes) with baseline densities of 100,000 persons/mile are then distinguished from moderate-density campuses (primarily large universities) with baseline densities set at 50,000 persons/mile. Density ranges are again preliminarily set on a judgmental basis.

### Transportation Characteristics

Access To and From Major Activity Centers, Except for CBDs, the overwhelming modal choice for gaining access to MACs involves the private automobile. Transit and walk trips represent a very small proportion – usually less than five percent – of the total trips that travel to and from non-CBD MACs. For CBDs, the proportion of work trips that arrive and leave by transit may range from 20 to 40 percent for medium-sized CBDs, and up to 50-75 percent (or more) for large CBDs. In general, for all MACs, a smaller proportion of non-work trips (shopping, personal business, etc.) than work trips travel to MACs by transit, due to poorer off-peak transit service levels and generally greater reliance on the automobile for such variable travel activities.

MACs in Major Travel Corridors. Travel to and from MACs is accumulated in major travel corridors according to the network geometry of existing highway and transit systems, and the particular configuration of MACs in relation to one another as they have evolved over time. In the 12-region survey, it was found that the average number of activity centers per major travel corridor was 1.75 (average radial corridor length of 17.2 miles), or a spacing of 9.8 miles. Because work trips in the 12 cities generally averaged about 8-10 miles in length – including work trips traveling to each of the MAC types, as well as to other industrial and office employment centers – most such trips pass by other MACs on their way to the work location. This tends to increase the capacity

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requirements for transportation facilities serving any one MAC, and seriously complicates the volume-capacity analysis of transportation requirements for that single center.

MACs Serving Major Sub-Regions. An average non-work trip length of 2.5-4.0 miles, on the other hand, is more consistent with activity center spacing in corridors and with the geography of regional sub-areas focused on MACs. Still, these average trip lengths fall at the outer limit of corridor spacing and service area radii, indicating that a good proportion, perhaps approaching 50 percent, of all non-work trips accessing any MAC come from beyond its basic service area. In fact, data from the Twin Cities region indicate that 32 percent of the non-work trips accessing any major activity center come from beyond its individual service area. For work trips, this figure increases to 45 percent (4,5). Data from Orange County, California show that the average distance traveled by bus transit passengers to ten different centers was 5.3 miles (6).

It has consequently been suggested that transit centers which facilitate service to MACs (and also allow feeder to radial route transfers) be located at MACs (and somewhat smaller centers) which are 4-8 miles apart (7). Local feeder bus routes emanating from these centers should correspondingly be 2-4 miles in length. These local routes should: (a) operate as a feeder system; (b) provide local service within a subregion; and (c) distribute transferring riders within a subregion. They would consequently provide service for trips leaving, entering, and lying entirely within the subregion.

## **Alternate Urban Forms**

It has also been argued that the regional configuration of MACs can influence travel behavior over regional highway and transit systems (5). Alternative urban forms have been analyzed in a long-term sense from this point of view. Under these alternative forms (multiple centers, satellite cities, radial corridors, etc.), it is assumed that, in the long run, families will adjust their residential or job locations so that they might live closer to work and other desired activities in order to reduce the time and distance required for typical daily travel. In particular, for the polycentric urban form, it has been hypothesized that average trip lengths for work and non work purposes would be reduced to more closely correspond to MAC spacing and service area radii.

## **The Polynucleated City**

In one recent study of abstract urban forms, it was found that the polynucleated city would require substantially less travel than two other urban forms examined – concentric ring city and one-sided city (8). Computerized land use allocation models were utilized in conjunction with more standardized Urban Transportation Planning System (UTPS) travel demand models to estimate travel requirements. So-called "basic" employment was allocated external to the land-use model, with "service" employment (the primary employment located in non-CBD major activity centers) allocated as a function of basic employment. For the polynucleated city, three outlying centers, each containing about 16 percent of total employment, with the remaining 50 percent in the CBD, were hypothesized. It was found that average trip lengths for the polynucleated form were 30 percent shorter than for the concentric city, and 23 percent shorter than for the one-sided city.

### Transit Service to Non-CBD MACs

Efficient transit service in the lower-density residential areas that surround non-CBD MACs is notoriously difficult to provide (7). Because of this difficulty, transit mode shares for work and non-work trips for these outlying subregional areas are usually quite small. Even under the polycentric urban form, where outlying centers take on the size and form of major diversified centers, the study cited above achieved a work trip mode split for outlying centers of less than nine percent – substantially higher than that achieved today but still relatively low (8). Mode shares would be even less for non-work off-peak travel purposes.

When it is remembered that the polycentric urban form, and other urban forms, were analyzed in a hypothetical or pure sense, and that in reality the relationship of such centers to surrounding residential areas would be less structured, the likelihood of work trip mode splits achieving a level of nine percent becomes less. In general, the dispersed travel requirements of MACs, with a single center serving a market area typically of 75-150 miles, indicate that the provision of effective transit service levels offers major challenges.

Progress is possible, however, as indicated by the fact that daily mode split to 10 major centers in Orange County now falls at 3.4 percent. This is higher than the system-wide modal split of the Orange County Transit District (OCTD). OCTD has in turn organized its route system in a grid arterial pattern with one-mile spacing, focusing on major activity centers (6).

### Issues in the Strengthening of Major Activity Centers

#### Land-use

- Achieving Balance Between CBD Economic Health and the Continued Growth of Key Suburban Activity Centers. In growing regions, as well as in stable or declining ones, the CBD represents the single largest investment in high-density urban infrastructure and land development. The current economic renaissance and office building boom in many CBDs across the country is evidence of the critical role which they play in the region overall. Balance between CBD health and greater emphasis on suburban activity centers, to focus development patterns in outlying sub-areas, represents a major challenge.
- Encouraging continuing development at preferred activity center locations. In general, many regional Councils of Governments have found that those activity center sites which make the most sense in terms of regional accessibility and service to surrounding neighborhoods are not necessarily the sites which currently have, or are likely to have, developer attention. The normal competitive nature of the urban land market suggests that a host of other factors regarding land availability, price, capability of parcel assembly, etc., influence developer activity, apart from locational and service area factors. Land use controls available to encourage (or discourage) activity center growth nodes are much needed.
- Assuring safe and attractive pedestrian environments. The suburban shopping mall (enclosed or open), and the CBD pedestrian mall (with or without exclusive transit lanes)

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represent examples of sensitive treatment of pedestrian environments. These examples seek to minimize conflict between pedestrians and the automobile, and to provide varied shopping-recreational, human interaction, and even cultural opportunities, as well as pleasing visual and aesthetic environments. When major activity centers outgrow the bounds of the central shopping mall or transit street, however, pedestrian/vehicle conflicts again are found. In all too many suburban activity centers, problems in crossing huge parking lots on foot to reach related office-commercial development at the outer fringes of the center are often severe.

- Redeveloping Older Regional Centers. During the '80s, a growing number of regional centers originally developed 20 to 30 years ago may require varying degrees of rehabilitation and facelifting. Depending on the extent to which peripheral land uses have also increased in intensity, significant redevelopment may also be needed (for example, adding a new department store, building parking structures, enclosing an open air mall, adding high rise office towers). Such redevelopment should occur within an overall site plan for the entire activity center.

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- Providing Adequate Transit Access to Major Suburban Activity Centers. All too often the regional transit system is radial in nature, focusing on the Central Business District. Regional service to any one outlying center is thereby usually poor, and limited to that corridor within which the center is located. Access from other corridors first requires a transfer downtown, usually at considerable inconvenience. Adequate cross-town transit service, incorporated with timed-transfer and transit center concepts, are among the suggestions for improving transit access to outlying centers (7). Increased local neighborhood bus service, including paratransit services, can also improve transit access within the service area of any one activity center.
- Ensuring sufficient street and peak traffic flows. Though traffic engineering and parking management concepts for planning automobile access to and circulation within major activity centers have become well established over the years (9), they nevertheless require major attention in ensuring the continued functional integrity of centers. Connections to nearby freeway interchanges, signalization and turning movements in association with major arterial streets, and the choice between surface parking and parking structure, as activity centers grow, are all a part of the need to update overall circulation plans.
- Accommodating Internal Circulation Needs. For large CBDs and major diversified centers, circulation between the core development and peripheral office, hotel, and commercial uses may present problems. Walking distances may be excessive, pedestrian environments through parking lots unappealing, and significant demand for convenient pedestrian connections between office, hotel, commercial, and retail uses may exist (for shopping, luncheon, personal business, and related trips). Super block pedestrian concepts – possibly supplemented by internal circulator/distributor transit modes (streetcar, minibus, automated guideway transit) – may be appropriate.

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