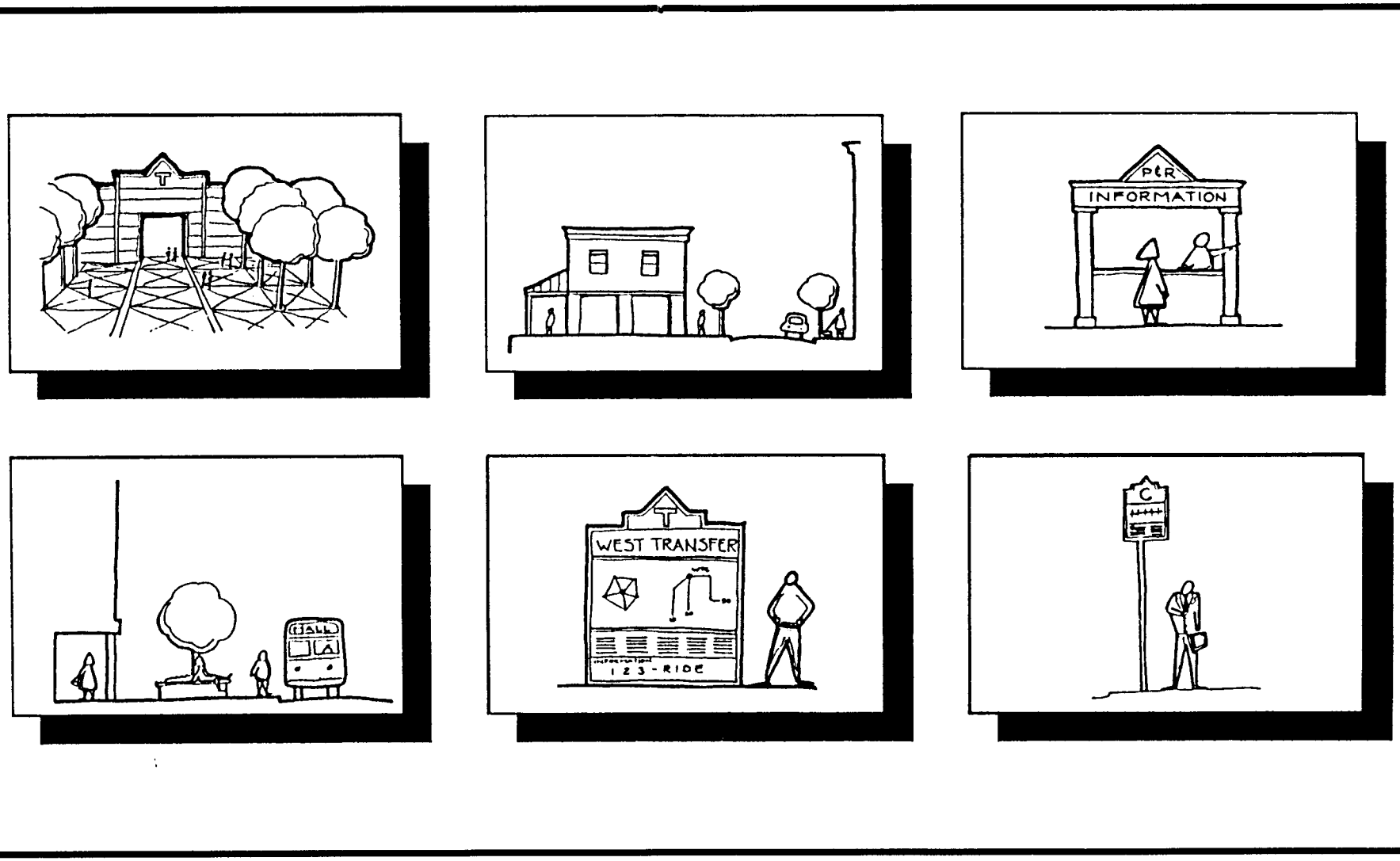
U.S. Department of Transportation

Market Based Transit Facility Design

February 1989



Market Based Transit Facility Design

Final Report
February 1989

Prepared by
Harvey Z. Rabinowitz, Edward A. Beimborn,
Peter S. Lindquist and Donna M. Opper
Center for Urban Transportation Studies
and School of Architecture and Urban Planning
University of Wisconsin–Milwaukee
Milwaukee, Wisconsin 53201

Prepared for
University Research and Training Program
Office of Technical Assistance and Safety
Urban Mass Transportation Administration
Washington, D.C. 20590

Distributed in Cooperation with
Technology Sharing Program
U.S. Department of Transportation
Washington, D.C. 20590

DOT-T-89-12

ABSTRACT:

The purpose of this report is to provide guidelines for the planning and design of transit stations, stops and terminals. These guidelines have been prepared from a market-based point of view. Design elements are suggested that directly relate promoting the success of development activities and transit services. The report discusses general development policies and provides design guidelines for six transit station types through a range of design phases.

Guidelines are given for the planning and design of six station types -- CBD rail stations, neighborhood rail, park and ride stations, transit malls, transfer centers and local stops. These station types are explored through four phases of planning and design -- systems planning, site planning, station design and operations/management. Among the topics discussed for each station type are location, market, connections, access, information, image, user comfort, safety and security, operations and management.

TABLE OF CONTENTS:

TABLE OF CONTENTS:

TABLE OF CONTENTS:

ACKNOWLEDGEMENTS:

This work was done under the sponsorship of an UMTA University Research and Training grant. The opinions expressed are those of the authors and not necessarily those of the project sponsor.

Many people provided useful input into this report, either directly or through viewing the results of their work in the field. This includes transit planners and officials in Washington, Portland, Chicago, San Francisco, San Diego, Miami and other cities. Special thanks to Norm Paulhus and Ron Jensen-Fisher of U.S. DOT and Bob Dumphy of the Urban Land Institute.

Illustrations in the report were initially developed by the report authors and further refined by Harvey Rabinowitz and drawn in final form by Mark Reilly. Word processing was done by Linda Rupp and final assembly by Paul Erhunmwunsee. Sections on Systems Planning were written initially by Peter Lindquist, Site Design was written by Donna Opper, Station Design was written by Harvey Rabinowitz, and Introductory Sections and Operations/Management sections were written by Edward Beimborn. Final editing was done by Professors Rabinowitz and Beimborn.

INTRODUCTION:

OUTLINE

INTRODUCTION
* Report Organization
* Station Types
* Phases of Planning and Design

PRINCIPLES

DEVELOPMENT POLICIES
* Contributions
* Planning
* Competition
* Impresario
* Fiduciary
* Development Corporation
* Agency as Developer

INTRODUCTION:

There has been a significant growth in cooperation between the public and private sectors in transportation projects during the past decade. Public sector budgets have been strained and the potential for innovative private sector real estate development tied to transit has been seen as a way to benefit both public transit and the private sector. In spite of this progress there has been little formal investigation of the role of the private sector as related to public transit projects, to identify the forms of cooperation these partnerships can take, and to provide better guidelines for the incorporation of commercial activity into public transit projects. Much has been written about joint development as a concept and a number of specific project case studies have been documented as successful examples of public-private partnerships in transit. However, little guidance is available on how to specifically design transit projects to generate and maximize the potential for strong market oriented activities at transit stations.

The purpose of this report is to provide planning and design guidance for many types of transit stations, stops and terminals. The underlying philosophy of the guidelines provided in this document is that transit services and facilities should be designed from a market based viewpoint. The market -- people and the activities that transit serves -- is the major determinant of the success of transit and the success of private, commercial activities to be developed jointly with transit. An understanding of the market and how to serve it should manifest itself in station planning and design. Quality design will create use for both transit and developments and be a benefit to both public and private activities.

INTRODUCTION:

This report was developed by a team with engineering, architecture, planning and urban geography backgrounds. Information was compiled from a large number of sources and from site visits to a variety of cities with different types of transit services and varying degrees of success at joint development. Written sources that were consulted include transit related literature, human behavioral analysis, planning literature -- particularly that related to pedestrians and open space, architectural design literature and actual design studies from specific transit systems as well as real estate information. The report provides an exploration of the topic and much still needs to be done to better define the concepts and principles included here. In particular work is needed to relate market size to the potential for success of private, transit related enterprises so that there can be a better fit between transit and private development.

INTRODUCTION:

REPORT ORGANIZATION

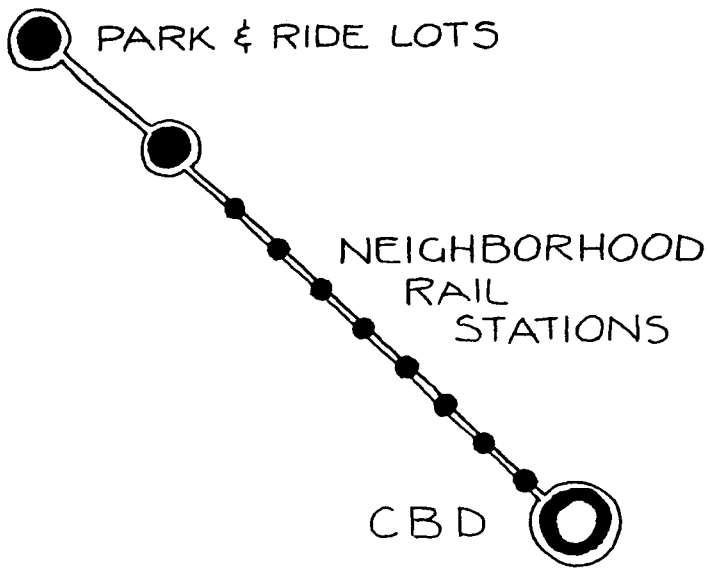
The report begins by providing some basic principles that were used to develop the planning and design guidelines for transit terminals. These principles assume that the market for transit and commercial activities should be the key force in determining transit facility design.

The next section of the report describes the range of policies that a transit agency could adopt to enhance public/private cooperation for public transportation projects. The policies range along a continuum from a reactive approach, where transit agencies have a passive role in joint development, to an active approach where transit agencies take the lead in project activity.

The final and major part of this document is devoted to specific guidelines for transit station planning and design. Six station types for bus and rail transit are looked at for four phases of design -- systems planning, site planning, station design and operations and management. Topics that are discussed for each station type include location, market areas, circulation patterns, image, information systems, user comfort, safety and security.

Key references are provided for many of the guidelines. References include basic sources of detailed specifications; reports of existing or proposed solutions; and, in areas where definitive research is still needed, categorical requirements.

INTRODUCTION:



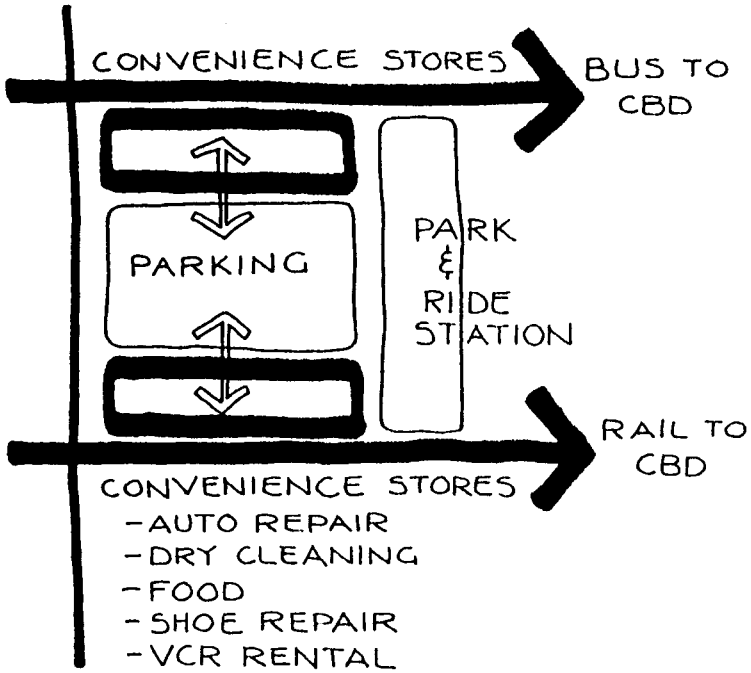
STATION TYPES

Six basic station types were explored in this study -- Central Business District (CBD) rail, neighborhood rail, park and ride, transit mall, transfer center and local stop. These six station types were felt to represent the spectrum of all possible public transit stops which have a potential for joint participation by the public and private sectors. Two of the station types, CBD rail and neighborhood rail, relate only to heavy rail or commuter transit while the other station types could be used by either bus or light rail transit. Park and ride stations can apply to any mode of transit. The stations vary greatly in the size and scope of possible joint development activities. Each station type is described separately for all phases of planning and design. The station types are as follows:

CBD RAIL STATION:

A central business district (CBD) rail station is a high volume facility served by heavy rail or commuter rail transit located at regional high activity centers, such as the center of the city or strong suburban activity center. Daily use may be up to 50,000 persons per day with volumes of 10,000 to 20,000 per day being fairly typical. The station is grade separated, either below ground or above ground. The CBD rail station can be a focal point for a major regional multiple use project, including retail, office, hotel and residential components. Transit is the dominant mode of access for these types of projects. Traditionally these stations were only found in central business districts, however, some outlying heavy rail or commuter transit stations have recently been successful sites for major joint development efforts containing millions of square feet. These outlying developments have begun to function much like CBD rail centers.

INTRODUCTION:



STATION TYPES

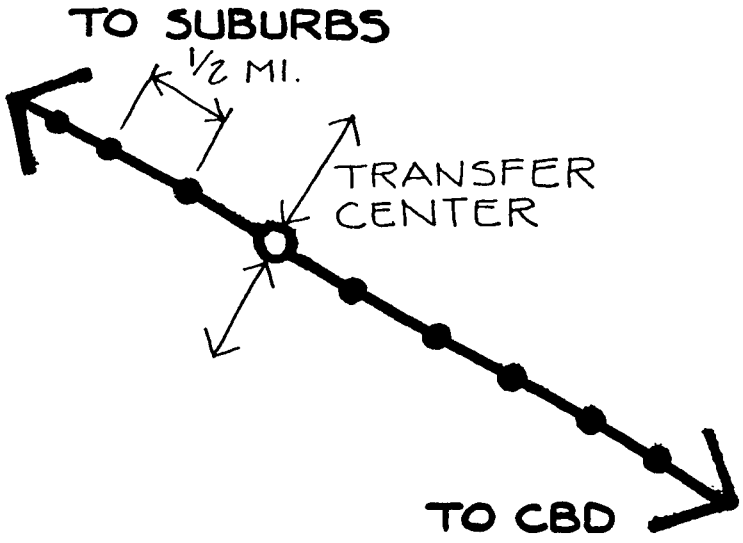
NEIGHBORHOOD RAIL:

A neighborhood rail station serves intermediate points along a heavy rail or commuter rail corridor. Its primary purpose is to provide access to transit at a neighborhood scale. Daily activity may be in the range of 4,000 to 7,000 boardings and alightings per day. Activity near the station relates to the neighborhood as well as to the transit use. Newsstands, snack areas, and flower stands can be integrated into the station while neighborhood shopping areas, banks, high density residential housing, etc. can also be in the immediate vicinity.

PARK AND RIDE:

Park and ride stations are used in conjunction with all transit modes -- heavy rail, light rail, commuter rail, and bus. The park and ride station provides an interface between the automobile and transit. They are normally located in suburban areas and can accommodate up to 1,000 automobiles. Daily usage can be up to 5,000 to 10,000 boardings/alightings per day. Park and ride stations can be combined with transfer centers to provide easy bus-bus or bus-rail as well as transit-auto transfers. Park and ride locations can include transit or auto oriented convenience shopping such as newsstands, snacks, flowers, automatic bank teller machines, auto repair, cleaning, services, etc. More substantial joint projects including office, residential or retail development can also occur if local market conditions warrant.

INTRODUCTION:



STATION TYPES

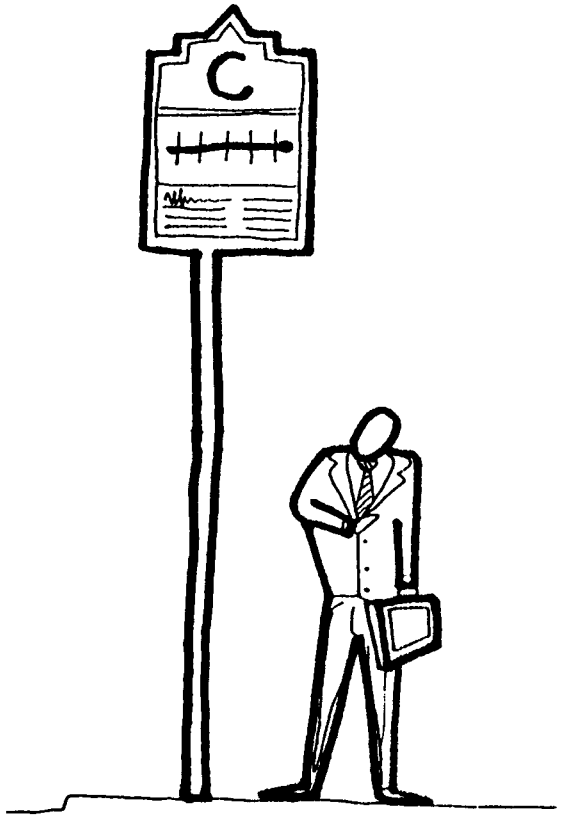
TRANSIT MALL:

A transit mall is a special street set aside for exclusive use of buses and/or light rail vehicles in a city center or other high activity center. Design elements include transit related and urban design components, such as waiting shelters, as well as the substantial use of landscaping and street furniture to support transit, shopping and other civic activities. Transit malls are highly pedestrian oriented and may also be gathering places for a variety of public activities. Transit malls serve a regional market and can be the location of as many as 10,000 trips per day. Development activities relate to adjacent property and include enhanced shopping or office activity as well as transit related retail and services.

TRANSFER CENTER:

The primary purpose of a transfer center is to facilitate easy transfer between transit modes and routes. Transit service at this location is operated on a pulse schedule into the center to provide a timed transfer and minimize waiting time. Transfer centers can be freestanding, apart from any other development, or can be operated in conjunction with other activities such as a suburban shopping center. A Transfer Center often has automobile park and ride activities as well. Daily usage can vary widely, but could reach 3,000 to 5,000 boardings and alightings per day. Transfer centers provide opportunities for transit related developments in the form of convenience shopping, including newsstands, snacks, flowers, teller machines, as well as a project coordinated with a full scale shopping center.

INTRODUCTION:



STATION TYPES

LOCAL STOP:

Local transit stops are low volume access points to bus or light rail lines that service residential areas. Usage is low with a maximum of several hundred persons per day. Local stops generally do not have sufficient demand to support activities that requires staffed services, but can be location for local advertising and coin operated activity such as telephones, newspaper boxes, and vending machines placed in conjunction with shelters.

INTRODUCTION:

PHASES OF PLANNING AND DESIGN

This report looks at six station types through four phases of station planning and design. Issues that need to be dealt with include location, market, connections, access, circulation, information, image, user comfort, safety and security. As a station is planned and designed it will proceed through several distinct stages of development. These are systems planning, site planning, station design and operations/maintenance.

SYSTEMS PLANNING:

Systems planning is the initial phase of planning and design and involves general concerns about routing and the location of new transit services and stations. The size and characteristics of the overall market area of a station is an important concern in location and in the potential success of joint development activities. Connections to other modes of travel is also a key factor in systems planning.

SITE PLANNING:

Once a general location for a station has been determined, a specific location must be found and defined. Site planning involves detailed locational analysis, development of connections to other activities, concern for access to the site, internal circulation, development of an image for the station, and strategies to provide passenger information.

INTRODUCTION:

PHASES OF PLANNING AND DESIGN

STATION DESIGN:

Following site planning, the actual design of station facilities, open areas and structures can take place. Individual stops and stations should be designed to fit into a local context, to provide facilities and services that relate to the station market, to provide for user comfort, and to assure users of their safety and security.

OPERATIONS/MANAGEMENT:

Concern for planning and design of terminals continues after a station is built. Ongoing operations and management is an important activity that includes concern to maintain the appearance of a station, property management, and adapting the station for changing use patterns over time.

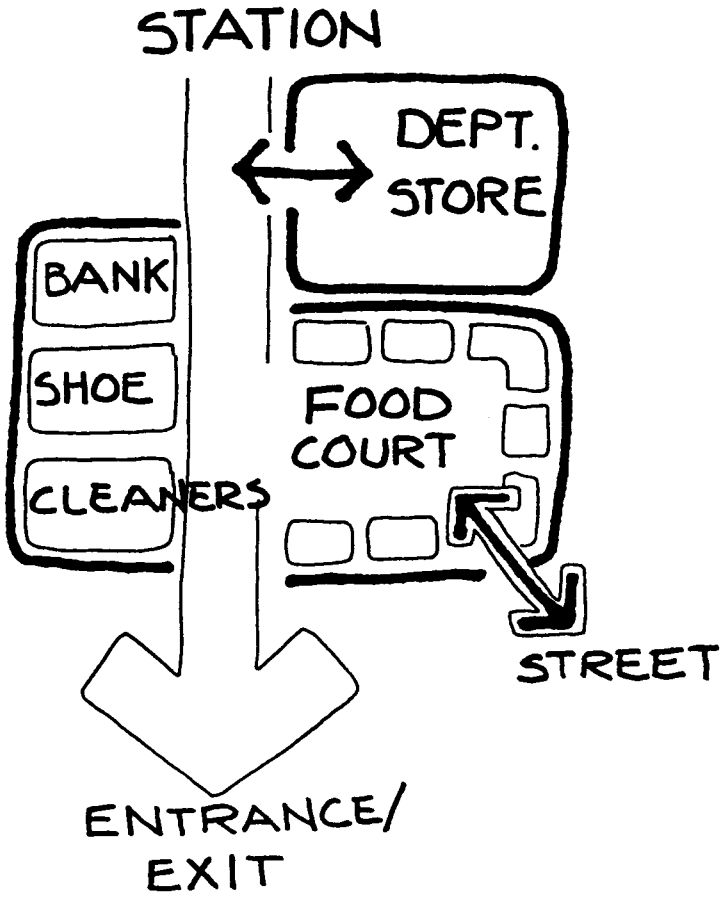
PRINCIPLES

There are several fundamental principles which have guided this work. Basically we have looked at public transit systems and facilities design from a market point of view. How does transit support and serve markets and activities and how can these activities be used to provide more successful transit services? We have attempted to provide design guidelines and recommendations that can lead to a better integration of transit and land use for the mutual benefit of each.

PRINCIPLE NUMBER 1: TRANSIT GENERATES BUSINESS; BUSINESS GENERATES TRANSIT.

There is a symbiotic relationship between public transit and business activity. Transit provides quick, convenient access to commercial enterprises and customers or a market demand for business activities. Business activities and private developments generate trips on transit systems and help to support viable public transportation. It is necessary to understand and take advantage of the nature of this relationship and to be market oriented if there is to be a successful integration of business activity and public transit.

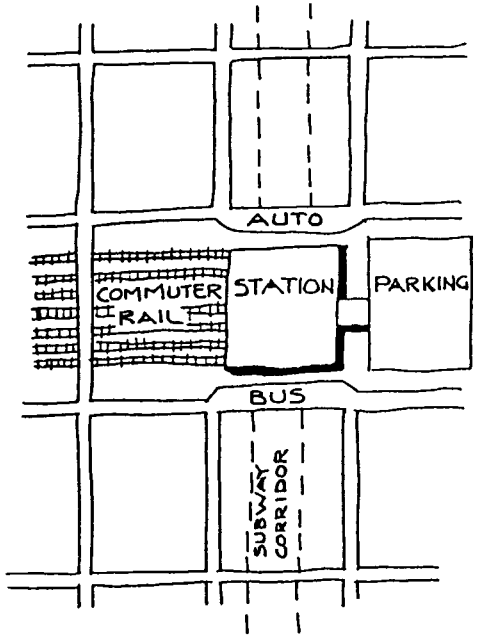
PRINCIPLES

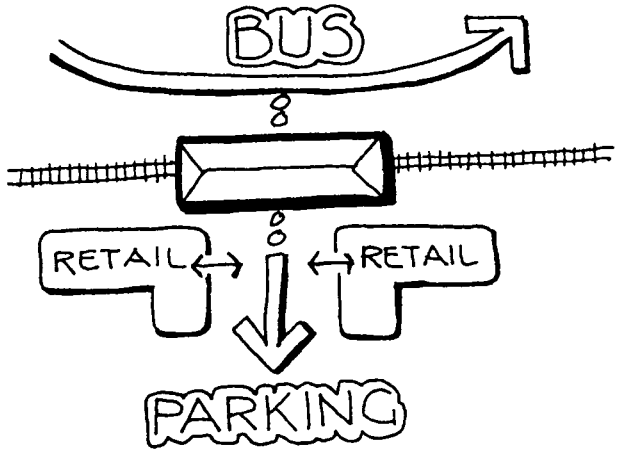


PRINCIPLE NUMBER 2: TRANSIT SHOULD BE AN INTEGRATED PART OF ACTIVITY CENTERS. TRANSIT AND ACTIVITY CENTERS ARE COMPLEMENTARY AND SHOULD BE DESIGNED JOINTLY.

Transit services often fit poorly into major activity centers such as shopping centers, suburban office developments, industrial parks, and even central business districts. It is often awkward to fit transit into existing developments and this generally results in either long walks for transit users or convoluted routing for transit systems. There is a need for an integrated approach to the design of activity centers that actively considers transit. Transit access should be designed into facilities at the initial stages of their planning and design; failing that, transit access should be accommodated into existing development as projects are modified over time.

PRINCIPLES





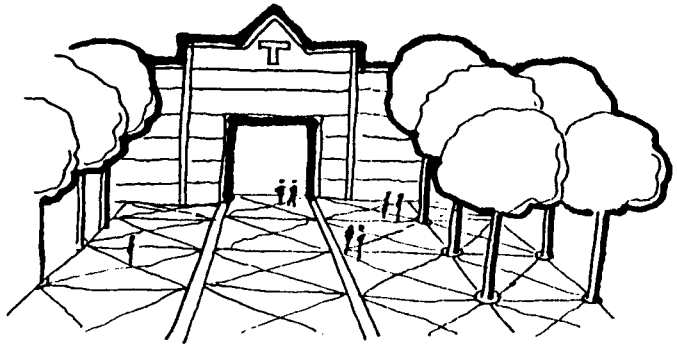
PRINCIPLE NUMBER 3: ACCESS TO ACTIVITY CENTERS SHOULD BE PROVIDED FOR A VARIETY OF MODES. ACTIVITY CENTERS SHOULD BE PLACES WHERE PEOPLE CAN CHANGE TRAVEL MODES.

Travelers should be able to arrive at activity centers by walking, automobile, bus, rail, specialized transit, taxi, or other modes. Activity centers are logical places for change of travel mode. The easy movement of one mode to another should be designed into the center. Change of mode activities focus the flow of users at an activity center and can provide a ready market for commercial activities. The flow of people between modes needs to be carefully analyzed and facilitated in the design process in order to provide a high quality facility and to generate usage.

PRINCIPLE NUMBER 4: TRANSIT FACILITIES SHOULD BE OF THE HIGHEST QUALITY IN ORDER TO COMPETE WITH THE AUTOMOBILE.

Transit is in direct competition with the automobile in seeking to attract patronage and can have advantages in time, cost, convenience, comfort, safety and security relative to the automobile. Even those users who are "captive" to transit have choices in the long run to acquire an automobile, move, change travel patterns or to not travel. Transit facilities should be designed to provide a quality environment that is competitive to the automobile in order to insure long term viability. Failure to do so may have some short term advantages but in the long term will lead to a demise of public transit services and an associated reduction in the quality of the urban environment.

PRINCIPLES



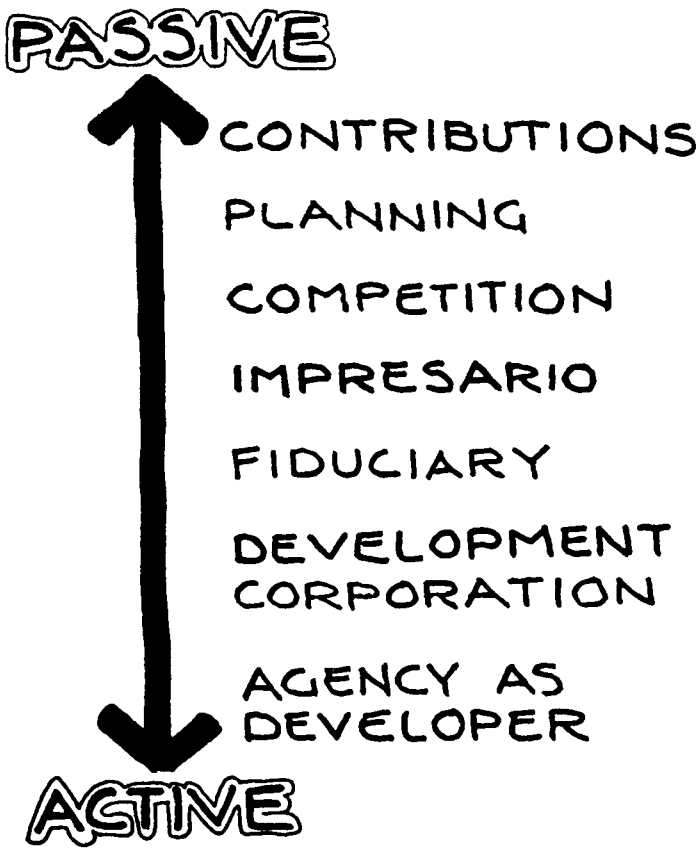
PRINCIPLE NUMBER 5: TRANSIT FACILITIES UNDERGO DYNAMIC CHANGE OVER TIME. THEY NEED TO BE ACTIVELY MANAGED AND DESIGNED FOR CHANGE.

The design and construction of transit facilities is not a one time event; pro-active facilities management is required to maintain facilities in prime condition and to frequently adapt and modify them as new situations develop. This requires a constant effort to modify and expand retail activity, to capture gains in value, and to utilize excess land areas for new projects. In addition, ease of maintenance and adaptability are important factors to consider in the initial design so that a consistent high level of quality can be maintained.

PRINCIPLE NUMBER 6: TRANSIT SHOULD BE USER FRIENDLY; IT SHOULD BE CLEAN, SAFE, ACCESSIBLE, SECURE, INFORMATIVE AND COMFORTABLE.

Transit systems need to overcome traditional negative images. A strong, positive system identity is needed. Facilities design needs to consider passenger safety and security needs as well as comfort; mobility needs of passengers must be accommodated in line with local and/or national policies; positive steps are needed to present an attractive image for the services provided; and information provided for passengers to easily find their way through the system.

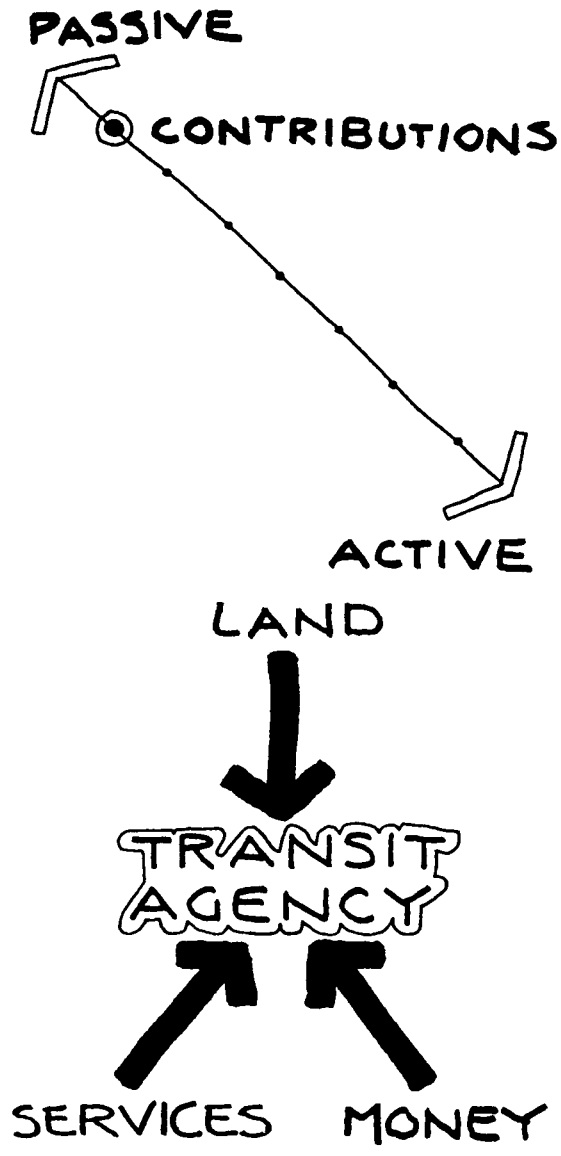
DEVELOPMENT POLICIES:



A wide variety of strategies exist for the enhancement of cooperation between the public and private sectors for public transportation projects. These strategies range along a spectrum which represents different degrees of activism towards private development by public transit agencies. These strategies can be arranged along a continuum. On one end, the transit agency takes an active role in development, for example, to take on the role of a real estate developer, while at the other end, the transit agency is more passive and may only receive contributions from the private sector for projects totally initiated by others. Between these two extremes there are various other options with different degrees of activism. These strategies are not mutually exclusive and the transit agency could adopt or combine parts of each strategy as part of an overall policy. The strategies will be described and discussed beginning at the passive end of the spectrum.

Public/Private Cooperation, p. 22.

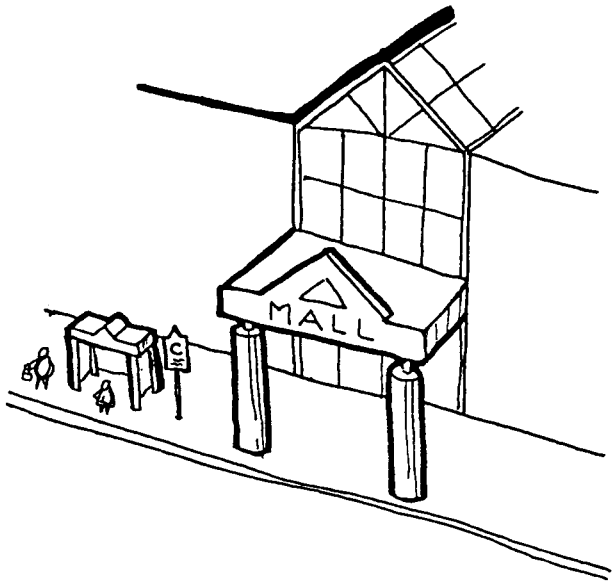
DEVELOPMENT POLICIES: CONTRIBUTIONS



At one end of the continuum, the most passive, a transit agency could accept contributions from the private sector in the form of land, services and/or monetary contributions to create links to a development project. Generally, the private sector approaches the agency with needs that must be met, such as a transit/real estate project connection required for a private development project to be successful. This approach to the transit agency may be made indirectly through the local municipality in which the project is located, or directly to the agency. The transit agency imposes some criteria over the private project and may modify their plans for a better chance of mutual success. At this level, the project can move ahead if the developer is ready to contribute at a high enough level.

The contribution approach has several advantages. It is legal under existing legislation in nearly all states; it provides a way for the transit agency to receive compensation for project components that are clearly related to private development; it provides developers with a means to get the infrastructure improvements they need and are ready, willing and able to pay for; it is simple and can be done relatively quickly; it can provide very high leverage and it is responsive to comprehensive needs. The disadvantage of such an approach is that it is difficult to tie the benefits of a project to a single development. Negotiations may lead to different results at different locations, and it may be hard to use a contribution for some projects and not for others.

DEVELOPMENT POLICIES: CONTRIBUTIONS

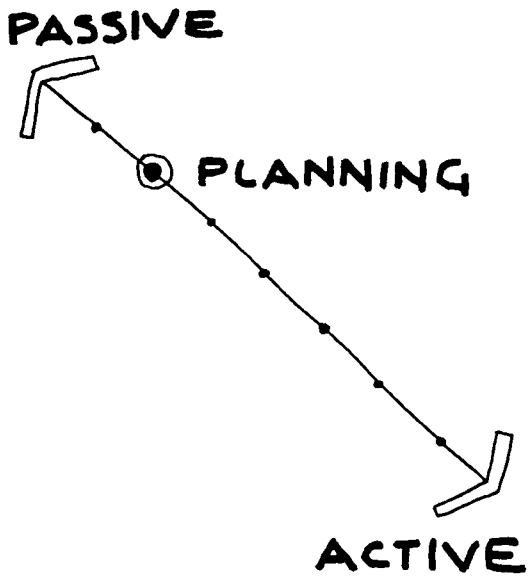


Examples of the contributions strategy include:

* A substantial suburban shopping center contributes land and the costs of a structure for a bus transfer center. The transit system locates their transfer center at the shopping center rather than elsewhere and thus generates additional business for the shopping center and convenience for passengers.

* A downtown department store contributes funds for the construction of an additional station exit for a new subway system at a CBD station. The exit provides direct access to the department store as well as to other local businesses. Standard transit graphics and information are used to integrate this connection with the station as part of the design process.

DEVELOPMENT POLICIES: PLANNING



Under a planning strategy, the transit agency would expand its planning function to try to influence local land use and zoning decisions in order to assure a better environment, a higher quality transportation system, and a sharing of project benefits. Among the tools that might be used by the transit agency in cooperation with local government are expanded access control, zoning and planning requirements. Under this strategy the transit agency, or local government, may require that a land use plan be developed for an area within a specified distance of a transportation improvement, and that zoning changes be made before a project was constructed. This would be done to assure that the value of the transportation investment is not diluted by inadequate local control of land use, traffic flow, function and/or aesthetics. This strategy may or may not have a direct economic benefit like other strategies, but would result in a higher quality transportation system by protecting the transportation investment and the environment as well as assuring that trip generators are integrated with transit facilities.

This approach could be applied consistently across a community. A critical issue of this proposed policy is its effects on local autonomy. What is the role of the transit agency in relation to local government?

DEVELOPMENT POLICIES: PLANNING

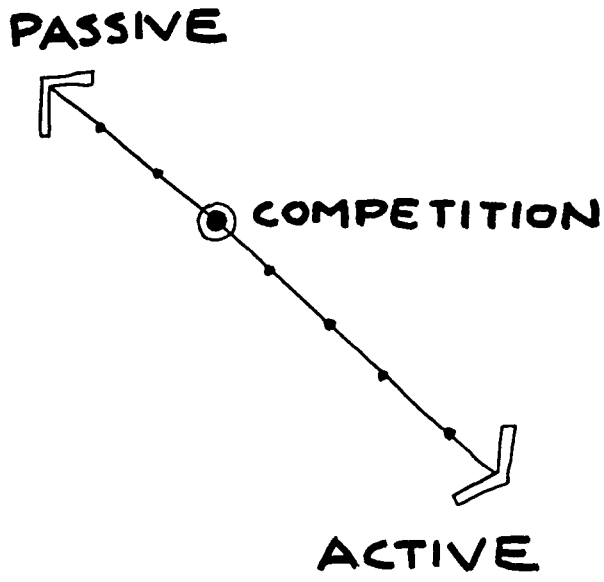
Examples of the land use planning strategy include:

* A major state-funded railroad or bus transit mall in a downtown is contemplated. The transit system asks the city for a land use plan on adjacent blocks to encourage a higher density development, covered arcades and walkways, and retail development.

* A suburban park and ride facility is located in an area that is expected to see rapid growth in suburban retail and office facilities. The transit system is a major participant in the development of a comprehensive plan for the area. Commercial developers are required to locate their building so they relate to local transit routes and to provide loading areas for transit near their buildings.

* A subsidized elderly housing project is proposed for part of the city. The transit agency working in cooperation with the housing agency succeeds in changing the project location so that it can be directly served by transit. Project design includes a protected bus waiting area immediately adjacent to the front entrance of the building.

DEVELOPMENT POLICIES: COMPETITION



This strategy is based upon the "Urban Development Action Grant" (UDAG) selection process used by the federal government to encourage private sector monetary involvement in urban development projects. The UDAG Program was established to help alleviate physical and economic deterioration in distressed cities and urban counties by fostering public/private partnerships to revitalize cities. Monies were granted based on distress, the project's impact and the amount of private sector monies involved. The program used a scoring and ranking system for project selection purposes.

This strategy, as applied to public transportation decisions, would allocate "points" to transportation projects, based upon the ratio of private and local dollars to state or federal funds. This factor would then be considered along with others such as community distress, benefit/cost, etc., to select and prioritize projects for the funding agency. The funding agency would save costs on the project because of the larger non-government share, and be able to leverage existing monies to fund additional projects.

The funds would be applied for jointly by the private sector and the local government. Competition between projects and between localities would lead to a maximum local dollars/public dollars ratio. The non-governmental share could be private and/or public sector contributions.

DEVELOPMENT POLICIES: COMPETITION

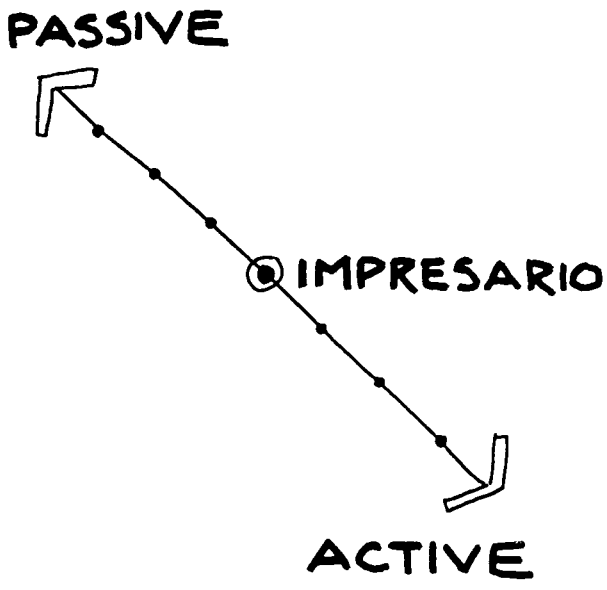
The advantage of this approach is that it would encourage local communities and the private sector to put together public/private development "packages" which maximize the development potential of a transportation project. In addition, the approach would provide incentives, through a competitive process, for localities to increase their share of project costs and thereby provide a greater return on public investment. A potential disadvantage of the approach is that other criteria for project investment such as mobility and congestion could be ignored in the decision process if too much emphasis is placed on the financial aspects. A proper balance between criteria would be necessary and the process should also consider the effects of project size as decisions are made.

Examples of this selection process can include:

* A bus complex is proposed in a major city. Interstate, intrastate, airport buses and local buses will all use this facility. The city will fund a parking garage for 300 cars ($3,000,000), a developer will build a hotel of 150 rooms ($7,000,000) and some retail ($500,000) can be made part of the $2,000,000 terminal. The land ($1,000,000) is being bought and donated by a local development corporation. The match comes to $11,500,000 for a $2,000,000 state project -- a 5.75 to 1 match or leverage factor.

* A transit system is considering the expansion of its service in several areas. Local business associations and developers are willing to support several new projects along one of the proposed lines. This line gets priority over alternative plans because of the higher level of local/private support for the project.

DEVELOPMENT POLICIES: IMPRESARIO



As the transit agency takes a more active role in the development process, the next strategy is one of the "impresario" -- that is, the agency serving as a broker or middleman to promote, generate, market, coordinate and seek financing for public/private projects. The agency orchestrates mechanisms to assist development in the form of Tax Incremental Financing (TIF) districts, loans, tax abatements, grants, infrastructure improvements, etc. The benefits of this program are a better environment, higher tax returns, and potential direct contributions. The transit agency, in cooperation with local government, would assist private developers in putting together project packages utilizing a variety of funding and assistance mechanisms. Funding by the federal or state government, if necessary, would eventually be paid back through loans, tax revenues, direct payments, services and/or land contributions as in the fiduciary strategy.

The advantages of this strategy are that it puts the transit agency more directly in the development process. The transit agency would have a greater degree of control over the end result because of its expanded participation. Some disadvantages are that the agency may not have the development and investment expertise to put together deals that are good for the agency and that some projects may not occur if they become tied up in public debate. In addition, the transit agency may be in competition with local governments which perform a similar role. Such a system, if adopted, would have to have a strong transit agency/local partnership to be effective.

DEVELOPMENT POLICIES: IMPRESARIO

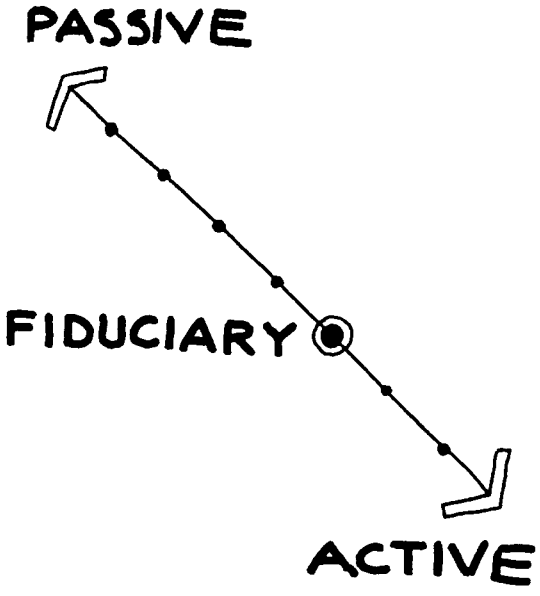
The impresario approach is the most widely used strategy in joint development. This "broker" often finds project financing from a number of sources (foundations, UMTA, EDA, private sector financing, equity), and proposes a mix of uses -- retail, public, office, cultural, housing and transportation -- to generate an integrated and viable project.

Examples of the Impresario strategy:

* The transit agency serves as a major force to bring together the local business community, elected officials, and local government to initiate a station modernization program for a neighborhood rail transit station. The project includes a rehabilitated office building and a new parking structure which is to be built on the site of a vacant building adjacent to the station. The transit agency helps to negotiate an agreement between a local business association and city government for the project. This includes a tax incremental financing district which provides funds for station modernization and the construction of new pedestrian links to the office project.

* A transit system works to attract several large trucking firms and a private charter bus operator to locate their maintenance facilities on excess land adjacent to the bus system's central maintenance depot. Private parts suppliers and fuel vendors are induced to locate in the same area and are able to give discount prices because of the volume of activity in the same location.

DEVELOPMENT POLICIES: FIDUCIARY



The next strategy along the spectrum is the transit agency as "fiduciary". In this strategy, the transit agency views itself as a guardian of the public trust in the administration of an investment program. Transit agency holdings would be managed in such a way as to maximize the long-term benefits to the taxpayers and greatest return on agency investment. The rationale behind this approach is that the transit agency can maximize the long term return and promote economic development for its transportation investment, and that it adopts strategies to recover value gains through holding land and/or the capture of property value increases. For instance, the transit agency could purchase and hold land in a land bank to capture value for future development; sell access rights; and provide loans for qualifying private development.

Sale of access rights would involve a charge for access to the transit system for developments above a certain threshold size. Traffic impact fees would be paid by developers to cover the extra costs due to the traffic impact of their project and the need for additional transit services. Payment could be in the form of cash, land, service or developer-constructed local improvements. The fees could be set in proportion to the trip generation (or square footage, etc.) of a development. To some extent the use of Tax Incremental Financing (TIF) to pay for transportation improvements could be viewed as a type of fee system. These types of fees have an advantage in that they are not tied to the timing of a transportation project because they are collected when the development occurs rather than when the transportation project occurs.

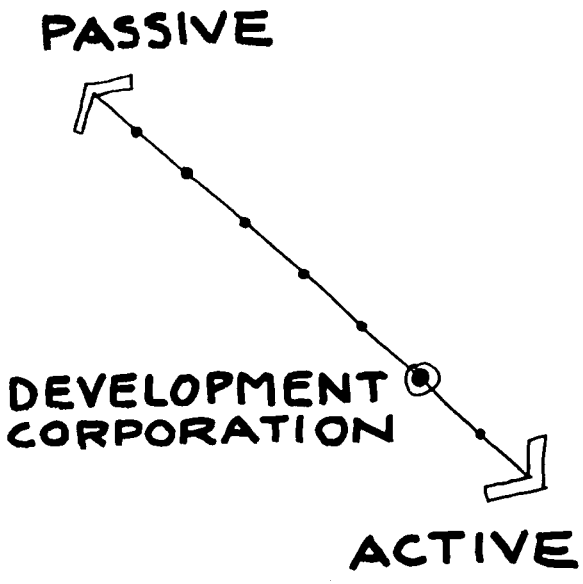
DEVELOPMENT POLICIES: FIDUCIARY

The transit agency would maximize revenues and provide means for the agency to recover gains in value generated by its projects. Policies can be uniform throughout the area, so no one community would have an advantage over another. Such fees can directly place the cost of transportation improvements upon the uses which generate the need for the improvements. Direct access to a transit system has a real value and this approach can provide a mechanism to capture the value. The disadvantages of the approach are that the agency can wind up holding too much land through speculation. The transit agency also may be open to criticism for unfair competition with the private sector. For these reasons, transit agency involvement in land purchases and sales would have to be carefully controlled. Fee systems have a disadvantage in that they impose a fee where none existed in the past and may be viewed as unfair to new projects. In addition they may cause jurisdictional problems with local government, especially for projects which have a major impact, but are not located directly in the affected community.

An example of the Fiduciary strategy:

* During the initial construction period of a light rail line, the transit system acquires vacant property in the vicinity of several of the stations located near the fringe of the central business district. These properties are primarily remnants that were left over after land was taken for the project are parcels with vacant buildings. These properties are leased for parking purposes but are eventually sold to a private developer for an apartment complex. Residents of the apartment complex are heavy users of the light rail line for commuting into the central business district as well as to outlying shopping areas.

DEVELOPMENT POLICIES: DEVELOPMENT CORPORATION



Another active strategy is the establishment of public transportation development corporations. These would be independent government-authorized, but autonomous agencies, whose purpose is to encourage and assist development related to public transportation projects. Projects would be identified by the development corporation; negotiations would be made by the corporation on the basis of market factors, and the benefits would be a better environment and a higher return on investment.

Two types of development corporations are possible: 1) a corridor development corporation could be established which would invest in a particular public transportation corridor, and 2) an area-wide development corporation which would seek private sector development to be tied to public transportation projects throughout the community.

The advantage of a development corporation strategy is that it would be a single purpose agency that would concentrate all of its efforts on facilitating joint development. It would be able to put together projects and serve as a bridge between the public and private sector. The disadvantages of this approach are that it may be applicable only to a limited number of projects, and it would take considerable lead time to become effective. It could be viewed as a competitor to private development, but with a properly defined charter, it could be a positive influence.

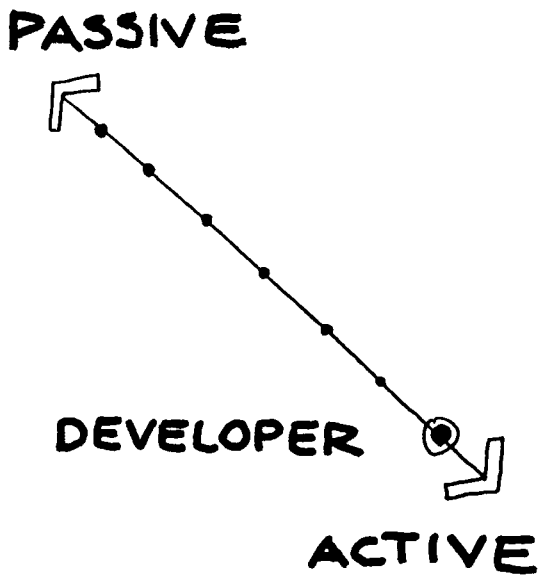
DEVELOPMENT POLICIES: DEVELOPMENT CORPORATION

Examples of the use of transit development corporations include:

* A light rail system is being built in a city. A Corridor Development Corporation is formed. It has acquired an abandoned 200,000 sq. ft. food manufacturing plant and 50 acres on the northwest side of the city, which is adjacent to the right of way and a state highway. A kiss and ride, park and ride lot, and a bus transfer center will be developed. The corporation is marketing the building as either offices or a speciality shopping center and will connect the station to it with a glass-enclosed walkway. EDA, IRB and its own bonds will be used in this undertaking.

* The air rights over the major downtown Station will be developed as a parking (500 cars), office (200,000 square feet), and retail and bus transfer station (20,000 square feet). The rights are provided gratis to the developer in return for station connections to the street, station area within the new buildings, as well as other planning considerations.

DEVELOPMENT POLICIES: AGENCY AS DEVELOPER



The last strategy has the transit agency assuming a wholly entrepreneurial role in becoming a developer in its own right. The transit agency would purchase land, plan, finance, execute and manage projects for profit. Market considerations would determine the investment and the benefits of this strategy would be cash return on investment. The transit agency would be limited to projects which were in the overall public interest.

The advantage of such an approach is that the transit agency both assumes risk as well as receives benefits from its projects. The transit agency would be able to exercise control in order to meet overall goals. The disadvantages are that it may provide unfair competition with the private sector, and that there may be no expertise available to carry it out on a wide scale. Competition between areas could lead to politically acceptable but economically unsound projects. In addition, the extra level of bureaucracy and the requirements for an open process may inhibit projects more than it helps them.

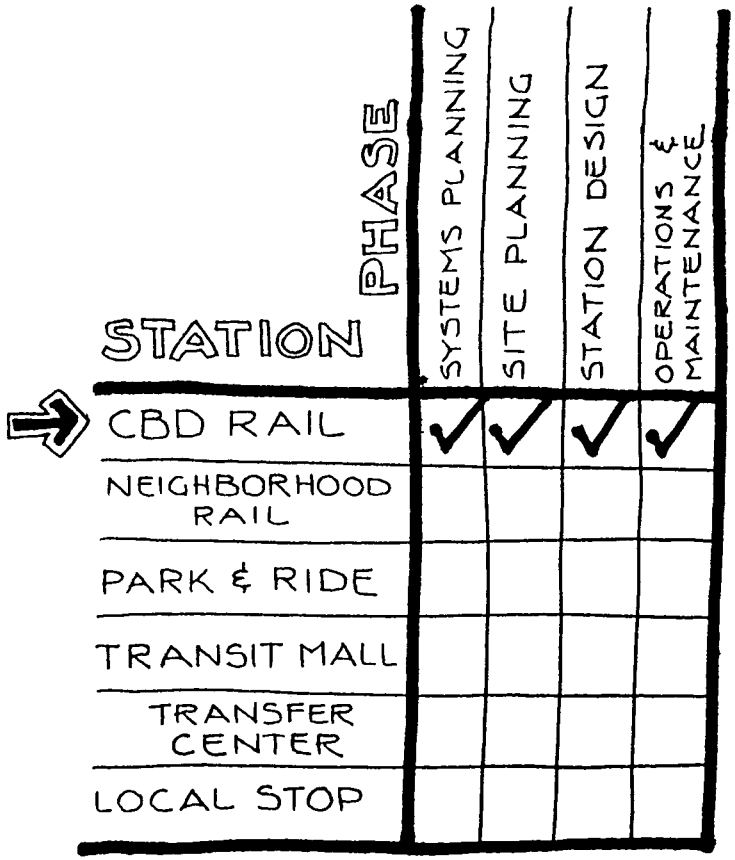
Examples of the Agency as Developer strategy include:

* A transit agency is in need of new office facilities and purchases a tract of land near one of its stations. A new building will be built at the site which will be occupied by the transit system (40% of the space) and by private firms. The building will include retail shops on the first two floors. The transit agency finances the building through bonding and capital grants. The bonds are paid back through rental income at the property.

DEVELOPMENT POLICIES: AGENCY AS DEVELOPER

* A new garage and central maintenance facility is needed by the transit system. A large site is available and a new facility is built. The new garage also is used by the city sanitation department, a private school bus operation and several handicapped vehicle operators for their maintenance. Space is leased out to these other users and a system is developed so that the transit system can do certain maintenance activities for other users. Similarly, the other users do other work for the transit system. A centralized parts depot is used by all agencies that occupy the building.

CBD RAIL:



OUTLINE

ISSUES ADDRESSED IN CBD RAIL PLANNING AND DESIGN:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

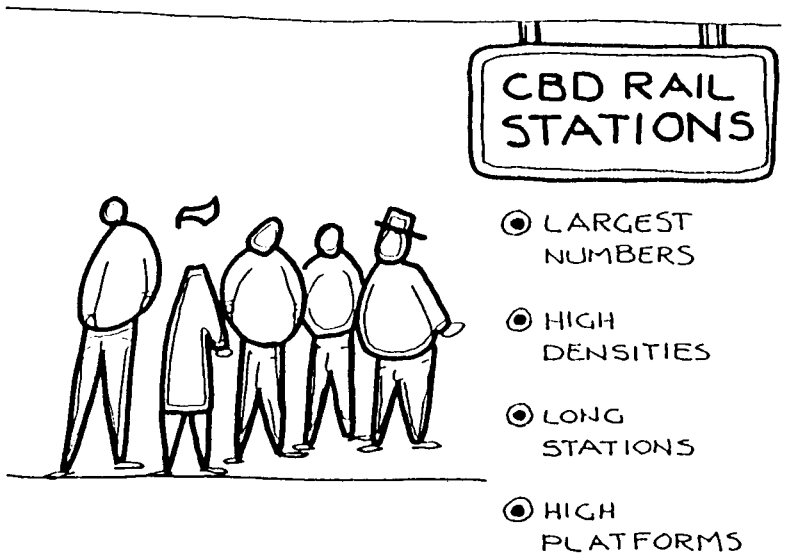
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location
* Market
* Access and circulation
* Information--image

STATION DESIGN
* Context
* Market
* Information--image
* User comfort
* Safety

OPERATIONS/MANAGEMENT

CBD RAIL:



DESCRIPTION

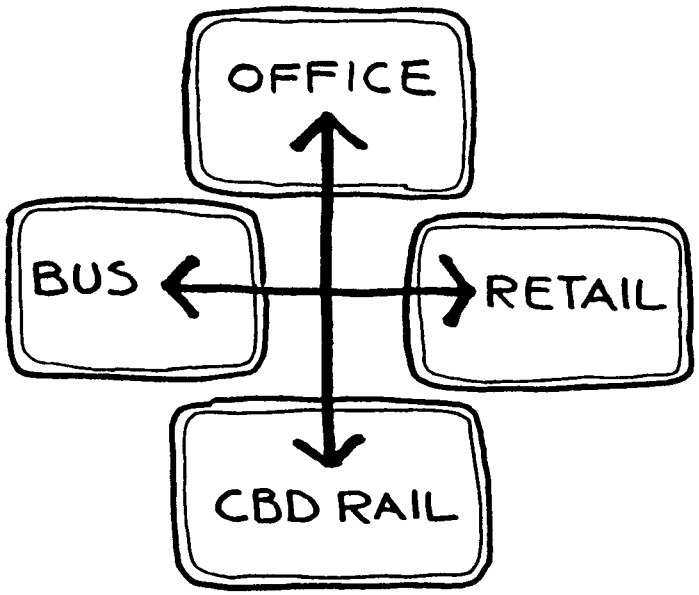
DESCRIPTION:

This is the highest volume facility in any transit system. Rail transit is feasible in urban areas with large, high density downtowns and strong suburban activity centers. About 20,000 boarding/alighting passengers per day will use a CBD rail station and the number can be higher depending on the density of the area, automobile congestion and the number of transfers available. For instance, in some locations stations are used by up to 50,000 persons each day. Downtown densities are quite high and over 100,000 persons may work within a quarter mile of some stations. CBD rail stations are also important transfer points and taxis and buses will invariably connect to these stations.

The very large numbers of persons served, the congestion in CBD locations, the numbers of visitors to downtown locations and the significance of the stations makes image, safety, security and cognition priority items in design.

Activity centers, large dense areas of development in the suburbs, while not the size of downtown locations have problems of generally the same scale.

CBD RAIL:



JOINT DEVELOPMENT OPPORTUNITIES

JOINT DEVELOPMENT OPPORTUNITIES:

CBD rail terminals present significant opportunities for major joint development activities. The large volume of people using the rail station provide a large market for retail activities, office complexes and/or hotels. In a number of cities, major development projects have been implemented in coordination with CBD rail terminals. The results can be mutually beneficial with successful private development supported by transit activity and increased transit system usage related to more intensive land use activity. Cost sharing by the private sector or payment for access rights can be a major source of funding to the transit system.

Demand is very high at CBD/activity center locations and ground level retail area is limited. Second level and underground retail space has been very successful in downtown areas. Additional transit related retail space increases the critical mass of other retail activities and provides an even stronger attraction at CBD rail stop locations.

If possible station locations should be coordinated with strong retail centers and the development of proposed centers. Connections to these centers can be retail oriented. In more severe climates these links, both underground and aboveground, may stretch for a number of blocks and even connect separate CBD rail station locations.

CBD RAIL:

JOINT DEVELOPMENT OPPORTUNITIES

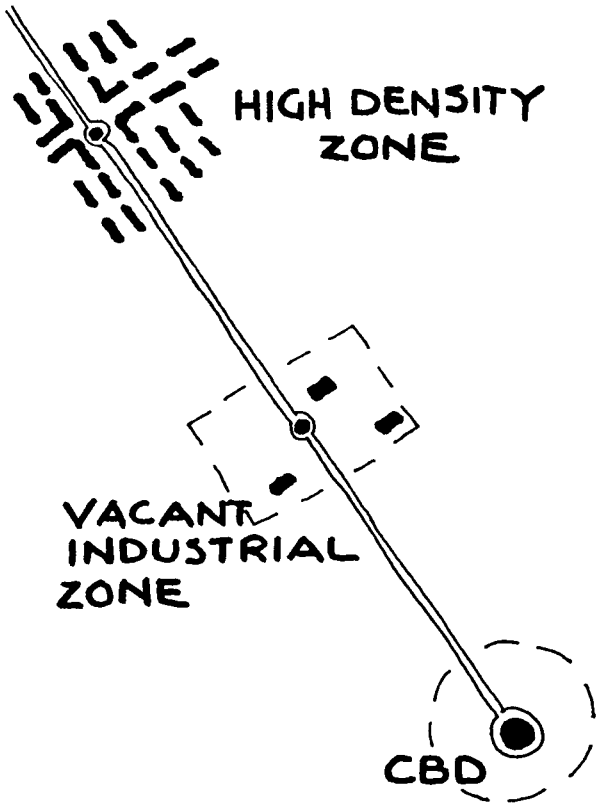
Transit related retail at CBD rail stations is, on the whole, convenience related. The amount of circulation, however, warrants a number of specialized retailers such as a flower shop, newspapers and magazines, candy and snacks. Food vendors and a food court type operation can also succeed in the CBD relying on very heavy lunchtime traffic.

CBD services connected to transit includes gift shops, newsstands, shoe repair, shoe shining, photo processing, cleaners and automated money access machines but also can include more specialized services such as stock brokers, travel agencies, banks and representatives of office building tenants.

Scale: Central Business District or Activity Center. Upwards of 20,000 passengers alone use the CBD rail station on a daily basis. Upwards of 50,000 persons are employed within a quarter mile radius.

Station Capacity: The stations typically have upwards of 20,000 boarding/alighting passengers per day. Three-fourths of this traffic occurs during peak hours. At stations with heavy retail activities this will be more spread out throughout the day.

CBD RAIL:



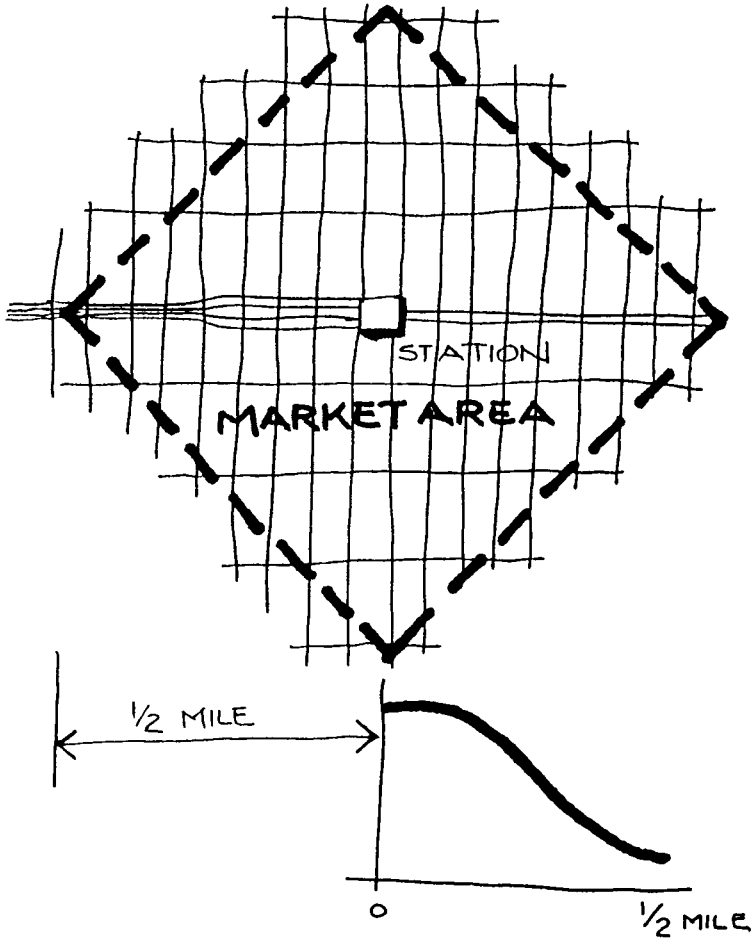
SYSTEMS PLANNING/LOCATION

STATION LOCATION AND URBAN DEVELOPMENT:

The location of CBD rail stations can exert an influence on the level of activity in the immediate vicinity. Several options exist: 1) location at the center of existing activity, or 2) location in under-used areas with high development potential. Station location in an already developed area can serve as a focal point in the renovation of existing activity centers within the immediate vicinity. Transit-related improvements at the station will stimulate additional growth in the immediate vicinity of the station by improving access into the CBD.

An alternative approach is to locate new stations in underdeveloped or vacated areas on the fringe CBD in order to stimulate new growth and development; new development may follow in the form of high density residential, shopping centers and office space. The rail station would be a means to direct new urban development into vacated or underdeveloped areas.

CBD RAIL:



SYSTEMS PLANNING/MARKET

PEDESTRIAN ACCESS WITHIN THE CBD:

The maximum walking access distance has generally been observed to be less than 1/2 mile; thus passenger demand will be significantly influenced by the level of office and retail space available within a half mile walk of the station. As the distribution of passenger demand over distance follows a distance decay function, passenger demand will be strongly influenced by level of activity within the immediate vicinity of the station. For activity centers located further from the station, pedestrian linkages to transit can be facilitated by extending the pedestrian range:

* Introduce open spaces and walkways within blocks to reduce network distances to the station--particularly in the direction of demand generators such as high density office and retail developments.

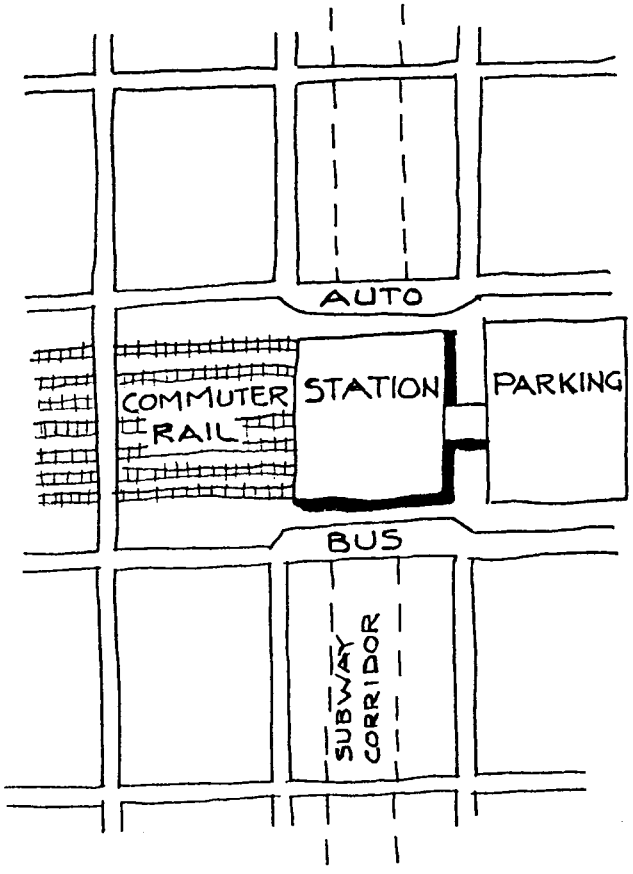
* Introduce mid-block crosswalks and grade-separated walkways over (or under) busy streets.

* Construct enclosed skyways or underground walkways in cities with cold winter climates.

* Alter signalization at intersections to increase pedestrian times traveling in the direction of the station.

Pushkarev and Zupan (1982), Chapter 3; Schoppert and Herald (1978).

CBD RAIL:



SYSTEMS PLANNING/CONNECTIONS

INTERCITY CONNECTIONS:

Connections to intercity or commuter rail service and local airports should also be considered where possible, to extend the service area of the station to intercity networks and to maximize connectivity to other CBD's:

* Provide platforms for intercity trains and provide connections to commuter and local rail service within the station, with clearly-defined pathways between platform areas (this also applies to light rail stops within the station or in the vicinity of the station).

* Where possible, align local rail service (heavy and light rail) for connections from the station to local airports.

* Provide access to regularly-scheduled express bus service from the station to the airport if not provided through some other station or by direct rail service.

CBD RAIL:

SYSTEMS PLANNING/CONNECTIONS

MAXIMIZING CONNECTIONS TO OTHER MODES OF TRAVEL WITHIN THE URBAN AREA:

CBD rail stations can serve as the focal point of large transit systems for a variety of modes. The station can serve as the primary connection between commuter rail service from the suburbs and local rail service in the form of either heavy or light rail service; mobility is thus extended for incoming travelers within the city. Connections should also extend to local and express bus service. Specifically, the CBD rail station should consider the following:

* Provide off-street auto access for parking and for dropping off passengers. Where possible, include parking structures with access to the station and surrounding office buildings and shopping centers.

* Provide platforms for both commuter and heavy rail lines in the station, with clearly-defined pathways between them (this also applies to light rail stops within the station or in the vicinity of the station).

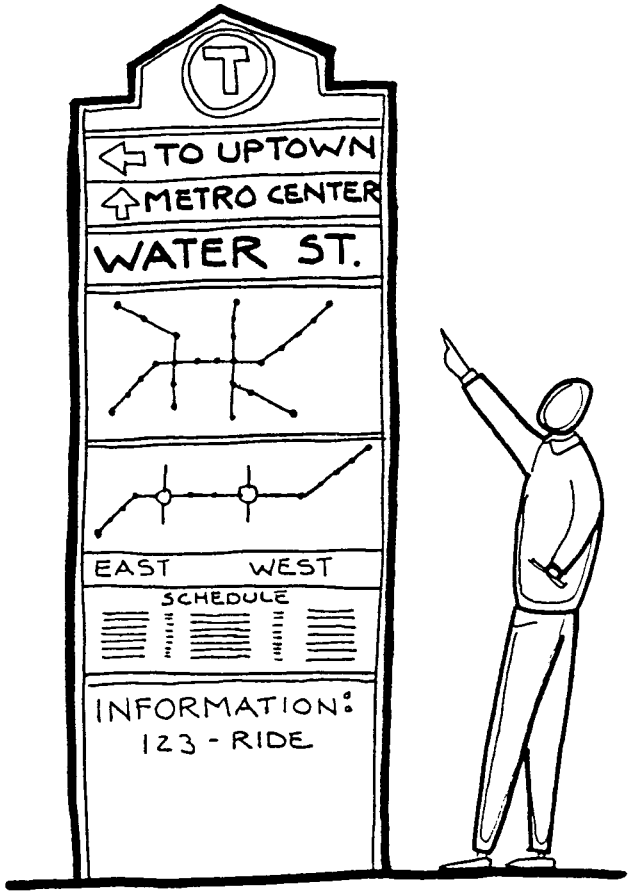
* Align local bus routes within the immediate area to serve the station. Where possible, construct bus bays and passenger loading areas within the station development.

* Provide intermodal transfer passes to increase passenger mobility throughout the system.

* Provide areas for taxicab and specialized handicapped vehicle pick up points around the station.

* Provide additional space for other modes involving unscheduled service (e.g. charter buses, limousine service) to maintain easy access to the station.

CBD RAIL:



SYSTEMS PLANNING/INFORMATION

ROUTE INFORMATION AND SIGNAGE:

CBD rail stations serving as the focal point for a transit system must coordinate service among a variety of modes. Transfers of passengers between routes or modes must be efficient and as simple as possible. Appropriate signage and convenient arrangement of platforms and loading bays is necessary to facilitate the movement of passengers through the station. Efficient movement of passengers between all modes is further enhanced by the following:

* All rail platforms and bus loading areas should be clearly identified with the transit system name and logo, as well as the particular route being served.

* Connections between all transit modes within the station should be facilitated by providing clearly-defined pathways between rail platforms, light rail stops and bus stops. Connections to non-transit modes should also be clearly marked (e.g. parking structures, taxicab stands, charter bus lines).

* Each platform and stop should provide posted maps and schedules for the particular route(s) being served.

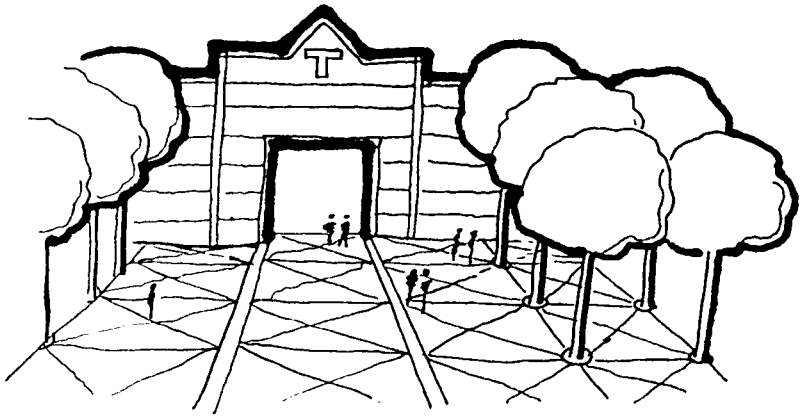
CBD RAIL:

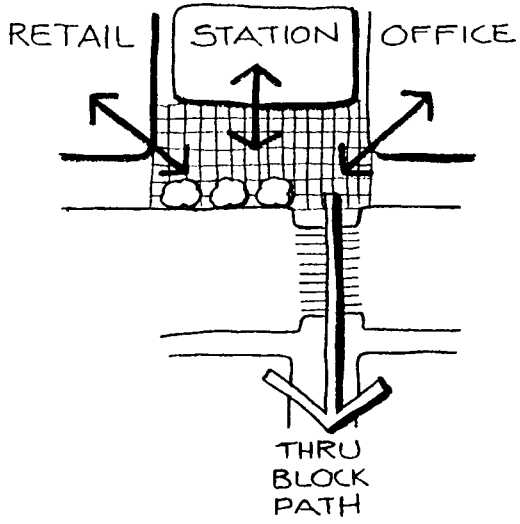
SYSTEMS PLANNING/INFORMATION

* A transit system information desk should be present to provide information on fares, routes, intermodal connections, points of interest that are accessible via transit, and other miscellaneous information. A transit system telephone number should be posted near public telephones at all platforms and transit facilities to further assist passengers.

* For stations with intercity connections, space should be provided for airlines, intercity bus and rail offices and counters to assist intercity passengers. Tourist information desks could also be located in the station for intercity passengers.

CBD RAIL:





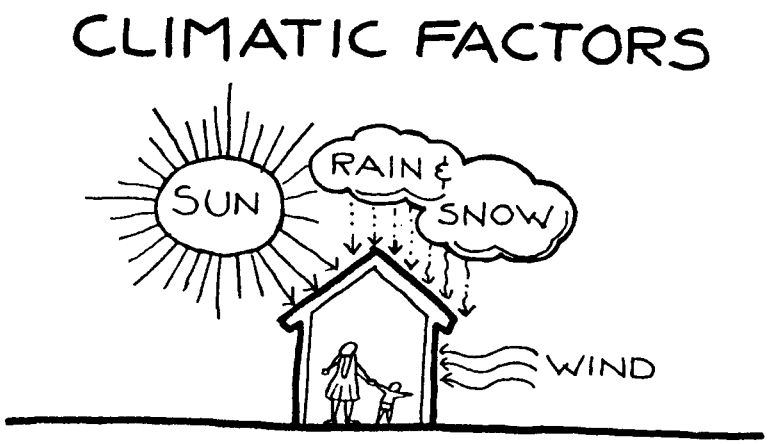
SITE PLANNING/LOCATION

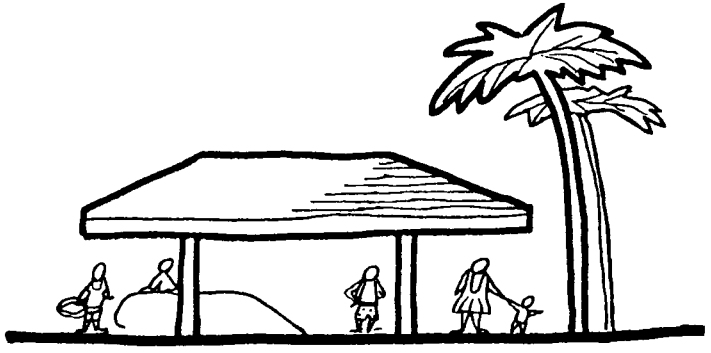
DESIGN IN CONTEXT WITH SURROUNDING NEIGHBORHOOD:

Design of the site should be linked with the district in which it is located. A CBD identity for the system must be provided and an image that is easily recognizable and comfortable as well as convenient to access from the surrounding community is a prime consideration.

* Take into account the means of access, traffic characteristics and flow around site, and layout and location of access streets.
* Design in accordance with topography, demography, surrounding land uses, street axes, existing focal points, land buffering, visual relationships, facades, historic references and landscaping.
* The potential for expansion should also be kept in mind in the initial planning decisions.
* CBD areas are very high density and often have minimal open space. If possible provide high density open space as part of the CBD rail station.
* Provide for less formal vending activities at entry plazas of CBD rail stations. This includes itinerant sellers, kiosks and seasonal pushcarts.

Fruin (1), p. 90; Quinby, pp. 77-79, 85; Murphy, p. 92; Petersen, p. 409; Hayduk, p. 91; Algatt, p. 9; CTA "Suggested Joint Development...," p. 8; CTA "Howard/Paulina Market Study," pp. 10-12; DOT, "Decision Procedures...," p. 6.





SITE PLANNING/LOCATION

CONSIDER ORIENTATION TO CLIMATIC FACTORS AS PART OF SITE DESIGN AND STATION LOCATION:

Site designs need to include amenities which maximize comfort for riders and provide them with shelter in harsher climates as well as pleasant outdoor space in warm weather.

* Sheltered areas should be provided at boarding, alighting, waiting and drop-off areas for buses, taxis and autos.
* Station entries should be located to minimize harsh climatic factors.
* Open-air plazas and skylight exposures should be incorporated in facility design.
* Consider micro-climate impacts such as shadows from adjacent buildings, wind tunnel effects, etc.

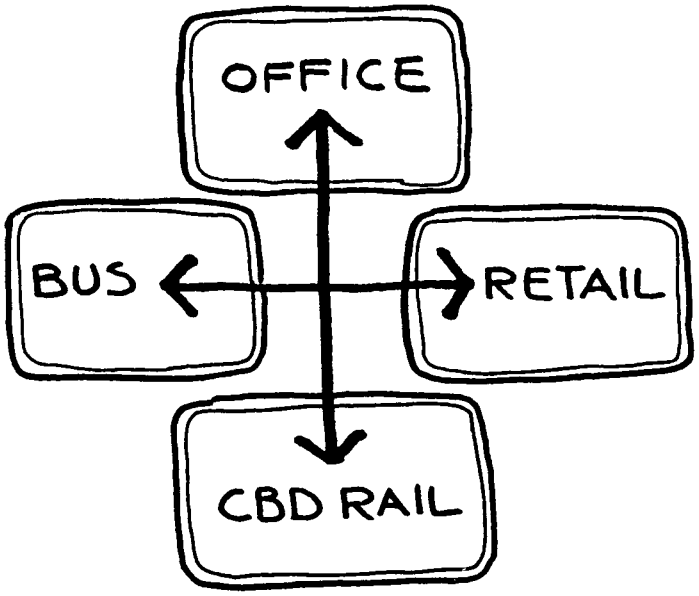
Harvey, p. 110; Misek, pp. 155, 158; Lovely, p. 21; TRB #817, p. 39; "Denver's 16th St. Mall," p. 7.

FLEXIBILITY:

Use patterns of a station and surrounding land use will vary over time. Provide for flexibility, change and ease of remodeling in the location of a station.

* Platform lengths that can be extended if demand warrants.
* Hold development rights on surrounding property and/or excess property for future use.

CBD RAIL:



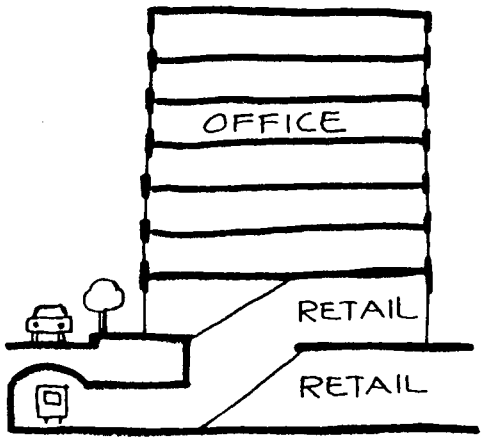
SITE PLANNING/MARKET

PROVIDE OPPORTUNITIES FOR RETAIL ACTIVITIES AT EXTERIOR ENTRIES TO CBD RAIL STATIONS:

The large number of persons using the CBD stations, the high population in the surrounding area and the numbers of visitors to these locations makes CBD station entries a natural location for retail activities. Such activities may be formal and permanent or informal and transient. For instance as many as two dozen separate newspaper racks have been counted at busy CBD stations (Washington, DC); a lunch truck parks outside of CBD station entrances at peak hours (San Francisco, CA) (it has been doing so for over ten years); semipermanent food kiosks are located on a small plaza at a major station (Berkeley, CA); pushcarts selling flowers, hot dogs, ices, roasted chestnuts, etc. occupy locations at various stations; peddlers quickly set up a portable table to sell gloves as the weather turns colder.

* Provide areas at major CBD stations, consistent with sidewalk width and pedestrian circulation to accommodate informal retail activities.
* Provide utilities for vendors.
* Set aside space for pushcarts, newspaper racks, etc. and integrate them into the station design.

CBD RAIL:



SITE PLANNING/ACCESS

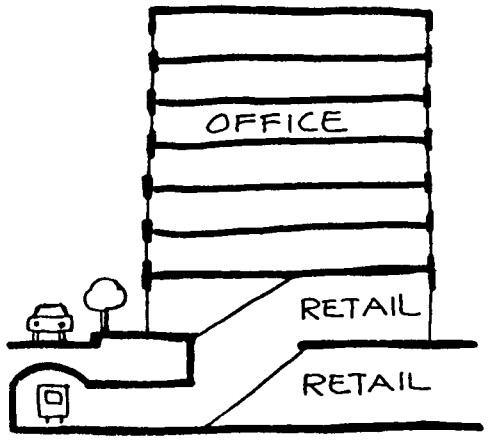
CONVENIENT VEHICLE/PEDESTRIAN ACCESS:

Most passengers in CBD locations walk to the station area. Consideration must be given to the following factors to maximize pedestrian access.

* Locate facility and design circulation patterns to provide quick, safe, uncongested access for pedestrians as well as all modes of transportation.
* Principal pedestrian access should be afforded maximum protection by traffic control devices, located close to expected approach paths.
* Pedestrians may be routed through new building developments or activity areas as soon as these become available.
* Provide appropriate activity along normal pedestrian paths; for example in some areas pedestrians take a shortcut through a hotel lobby. Try to avoid such problems by consideration of paths.

Harvey, p. 109; Petersen, p. 417; Roohr, p. 131; Canadian Transit Handbook, pp. 27-49; TRB #662, p. 25; DOT, "Decision Procedures...," pp. 7-8; DOT, Transit Center.

CBD RAIL:



SITE PLANNING/ACCESS

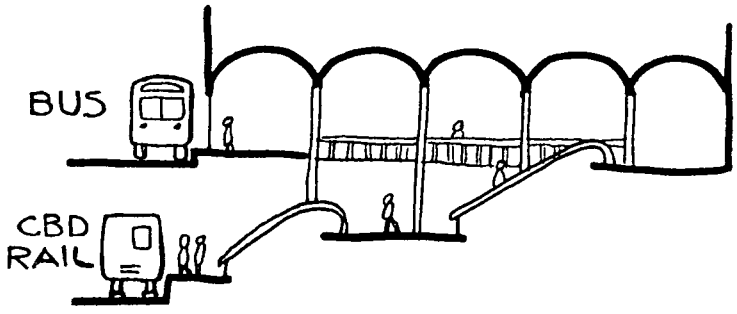
ACCESS TO NEARBY OR ON-SITE RETAIL/PRIVATE DEVELOPMENT:

A major generator of transit ridership are services, products and employment located adjacent to CBD stations. Downtown stations can be effectively connected to large building developments, such as high-density housing, hotels, office complexes, shopping centers, banks, restaurants, etc. which provide services and amenities for the transit passenger.

* On-site vendors in open-air plazas (food and beverage, flower, news and magazines) generate activity which is a key element in successful public places.
* Retail sales and value of land have increased near transit access.

Bosker, p. 51; Hoel, TRB #817, p. 37; Hocking, p. 8; Harvey, p. 103; Kaplan, pp. 4-5; Quinby, p. 84; "Denver's 16th St. Mall," pp. 7-8.

CBD RAIL:



SITE PLANNING/ACCESS

CONVENIENT INTERMODAL CONNECTIONS:

Internal site design should minimize pedestrian travel and give priority to interchanging passengers. The interface of bus and train should be as simple and direct as possible: unobstructed and conflict-free.

Appleyard, pp. 275-276; Hoel, p. 2; Misek, p. 159; Petersen, p. 417; TRB #760, p. 40; DOT, "Transit Center-Based...," pp. 33-35.

SEPARATION OF RAIL/BUS/AUTO:

CBD stations include access to other modes as well as large numbers of vehicles adjacent to station areas. In order to avoid vehicle conflicts and minimize travel time, it is important to separate distinct rights-of-way for each mode of transportation.

* Passenger cars and taxi drop-off areas should not interfere with bus movements into or out of the station area.
* Bus roadways must be wide enough to permit safe operation and turning movements.
* Because of close train headways and high-speed operation, the heavy rail system should be grade-separated.
* Connections between modes should be designed for safe, convenient pedestrian flow.
* Pedestrian flows, safety must be given priority consistent with the necessity to maintain traffic volumes.

Hoel, p. 2; IRT Guidelines and Principles, p. 8; Misek, p. 159; TRB #817, pp. 37-39; TRB #662, p. 25.

CBD RAIL:

SITE PLANNING/ACCESS

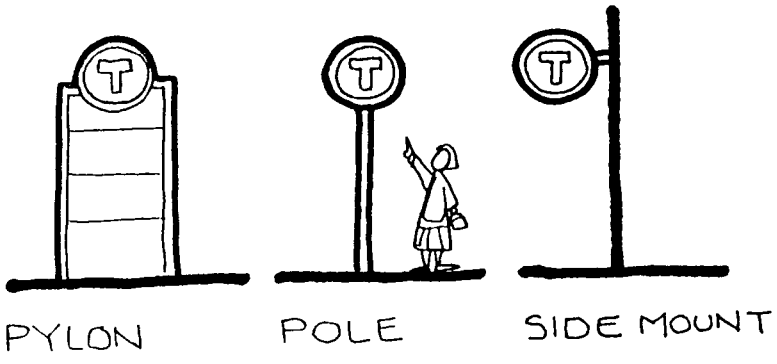
SEPARATION OF PEDESTRIAN/VEHICLE DOMAINS:

Primary consideration should always be given to pedestrians in station areas: their safety and convenience. Due to the large number of riders in CBD areas, provision must be made for distinct, conflict-free pedestrian circulation in the site planning.

* Pedestrian paths and circulation should be separated from vehicle circulation and rights-of-way as much as possible and designed for direct access to and between modes.
* Any crossings should be adequately marked with acceptable forms of barriers including fences, walls and elevation differences.
* Priority in design is always focused on pedestrian flow as opposed to vehicle movement.

Appleyard, pp. 275-276; Petersen, p. 417; IRT Guidelines and Principles, p. 8; TRB #760, p. 37; TRB #817, p. 36.

CBD RAIL STATION:



SITE PLANNING/INFORMATION--IMAGE

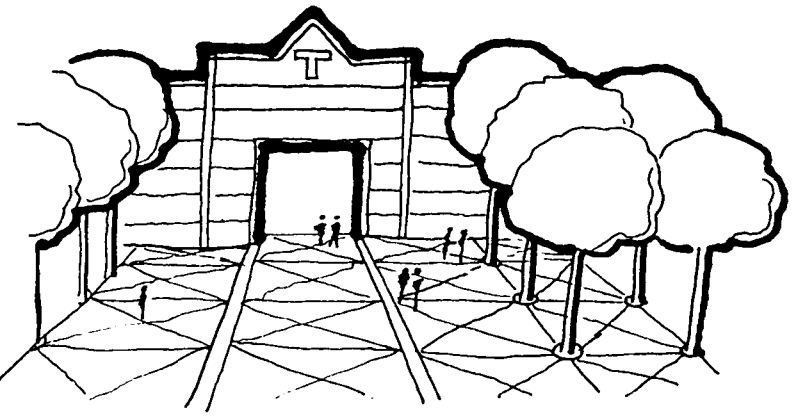
PROPER SIGNAGE:

Signage at CBD rail sites should provide clear, easily understood information for all users, including those who are unfamiliar with the English language.

* Signage should provide directions for access to the station and predominant circulation routes.
* Consistent design of components and materials should be encouraged and standardization of graphics throughout the system is essential.
* Placement is determined by passenger lines of sight and the normal field of human vision.
* Advertising should not be combined with directional signing.
* Signs should be easily recognizable from a distance with identifiable logos, colors and forms.
* Multilingual signs should be used where appropriate.

Fruin (2), pp. 14-16; IRT Guidelines and Principles, p. 46-47; TRB #817, p. 38.

CBD RAIL:



SITE PLANNING/INFORMATION--IMAGE

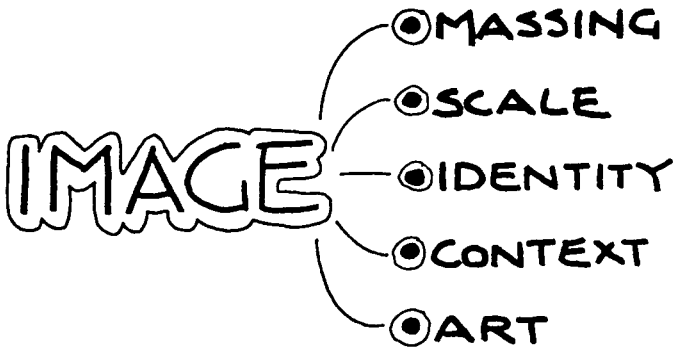
DESIGN FOR OUTDOOR PLAZA/IMAGE/LANDSCAPING:

Many CBD locations can benefit from architectural features on the site. An important factor in successful planning is to provide architectural and landscaping integration within the immediate vicinity of the station. This serves as the first image that the traveler has of the system.

* Funnel commuters through parks and open-air plazas on the site which are encouraged to contain water features and ongoing activities.

Bosker, p. 51; Quinby, p. 84; Kaplan, p. 5; Lovely, p. 17; McClelland, p. 112; TRB #817, p. 36; "Denver's 16th St. Mall," p. 7.

CBD RAIL:



STATION DESIGN/CONTEXT

CONTEXT:

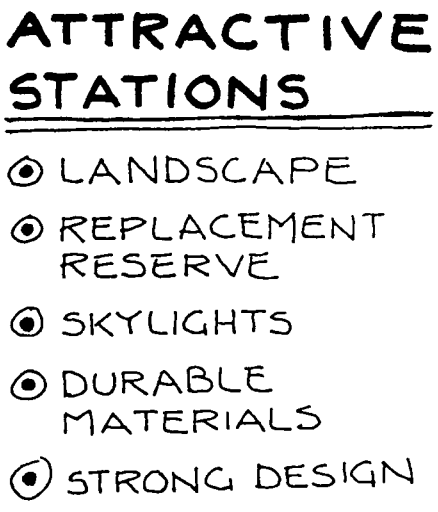
A CBD rail station is the busiest and most complex type of facility in a transit system. This station typically has the highest passenger volumes in the system. It may be a place where a number of radial routes come together and have the highest number of persons unfamiliar with the system. The CBD station is also the most widely known of all stations and becomes an important public "place" which serves the entire city.

A CBD rail facility is connected to other major facilities. This may be employment centers such as offices, civic functions such as government office centers, sports arenas, museums and libraries, or other transportation centers such as railroad/bus stations or large parking garages.

A CBD rail station is large. Twenty to fifty thousand potential users are located within a quarter mile of the station and twice that many in its one-half mile access zone. The number of links to other modes and routes as well as facilities makes the use of transit more competitive but it also makes planning for its effectiveness a critical task.

The density of downtown development, often without relieving areas or parks, makes the possibility of a downtown transit station which serves a larger function than a transit facility an important consideration.

CBD RAIL:



STATION DESIGN/CONTEXT

THE FACILITY SHOULD BE FUNCTIONAL:

The functional design of the CBD station is the most critical of all its attributes. The very large numbers of persons using these stations at peak hours provides a demand that will stress the station. The feasibility of designing to the highest levels of service at these stations to meet these loads is prohibitive.

A somewhat lower level of standard with high passenger loads will require that functional station planning must be very carefully done.

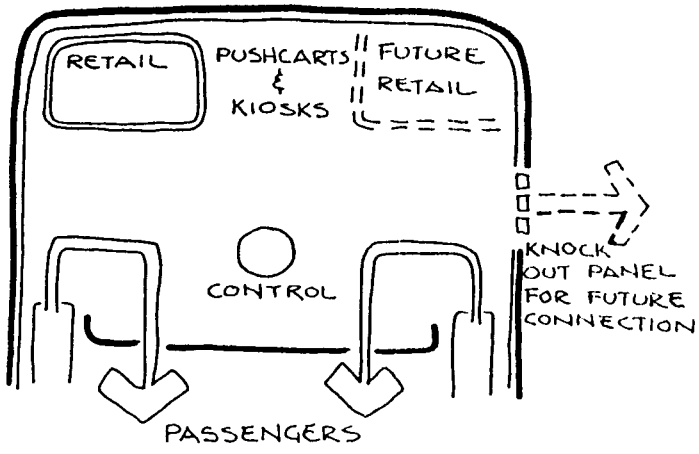
* Platforms and waiting areas should be designed to a high level of service standard in circulation, waiting and queuing.
* Provide access to handicapped persons to all areas.
* Provide necessary functions such as bathrooms and trash receptacles.
* Provide a safe, secure feeling for users through open design and good visibility.

Fruin, "Pedestrian..., p. 3.

THE CBD RAIL STATION SHOULD REMAIN ATTRACTIVE OVER A LONG TIME PERIOD:

* Provide materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle through the use of a replacement reserve fund.
* Use high quality materials and design.
* Provide sufficient areas of landscaping.
* Provide skylights or visual access to outdoors wherever possible.

CBD RAIL:



STATION DESIGN/MARKET

MARKET:

The CBD rail station has the highest potential for market activity in a public transit system. Not only is there a strong market from the transit ridership alone but connections to adjacent development can enhance both transit related and adjacent markets.

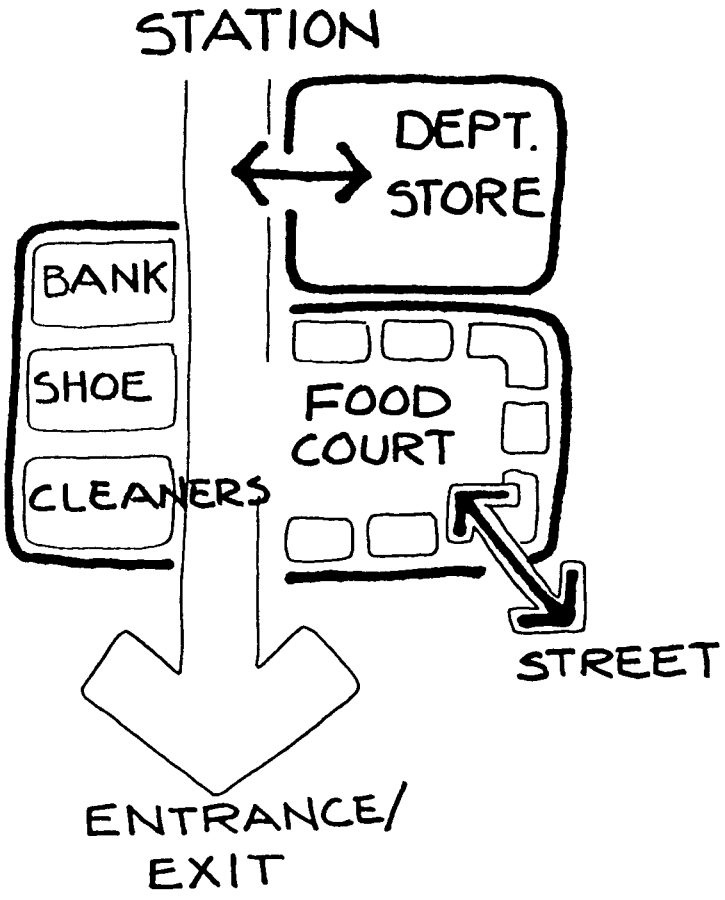
Many thousands of square feet of retail development can be successful but it must be carefully planned to benefit both the stores and users as well as enhancing the transit experience.

ACCOMMODATE GROWTH AND CHANGE IN THE FACILITY OVER THE LONG TERM:

* Provide an "open" plan in the building/concourse area which allows for future modifications.
* Provide for a generous use of space to accommodate future contingencies.
* Provide utilities which have the capacity to supply additional growth and change.
* Ceiling heights should be used which will allow for future changes.
* Reserve areas with knockout panels for future expansion and development.

Lynch, "Good City Form," pp. 171-186.

CBD RAIL:

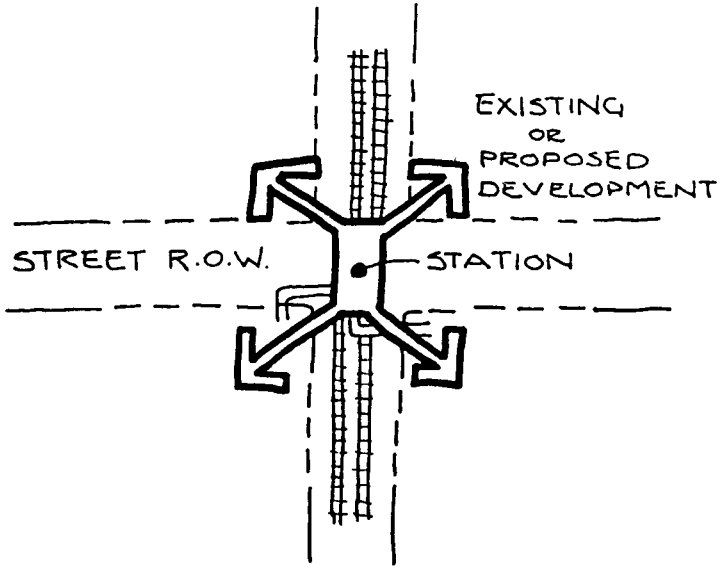


STATION DESIGN/MARKET

THE SUPPLY OF GOODS AND SERVICES SHOULD MATCH THE MARKET DEMAND AT VARIOUS SCALES OF CBD RAIL STATIONS:

* A minimum amount of retail space at a CBD station would be a few thousand feet of space, approximately 1,000-3,000 square feet. The demand is such that separate newspaper/magazine stores, flower shops, shoe repair and cleaners, photo processing, copying, candy and a number of walk around food shops can be successful.
* Tourism-oriented downtown stations may also include souvenir/gift stores as well as traveller oriented storage lockers. A tourist information bureau may also be appropriate at a specific station.
* Stations may have retailers present representing major tenants located nearby. In a financial district, for instance, financial services firms may have a transit "store". Other retail activities may be informational such as major corporations, medical facilities and major metropolitan organizations (e.g., the arts organizations).
* A CBD rail station will include services as well as expanded retail opportunities. These services can include dry cleaning, shoe repair and photo processing. Additional retail opportunities may include VCR tape rental, or expanded food opportunities such as a food court.
* Substantial telephone service should be provided at all CBD rail stations.

CBD RAIL:



STATION DESIGN/MARKET

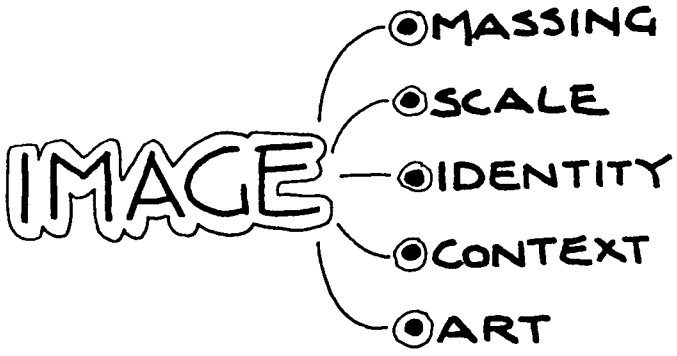
DIRECT LINKS TO OTHER RETAIL/OFFICE FACILITIES SHOULD BE MAXIMIZED IN CBD STATIONS:

A market-based transit system will provide a high degree of convenience for its passengers. The opportunity to directly access large adjacent uses in terms of speed and weather protection makes the transit alternative attractive. Substantial office buildings, for instance, contain thousands of employees and downtown retail facilities may have over 20,000 shoppers on a busy day.

* Station planning should allow the largest number of connections to surrounding projects which are heavy demand generators.
* Station planning should include easily visible and accessible links to adjacent developments.
* Where development has not yet occurred or links not yet made planning for "knockout" panels should occur to allow for future connections.
* Links to adjacent facilities should contain retail facilities.

JHK and Associates, "Development Related Ridership Survey".

CBD RAIL:



STATION DESIGN/INFORMATION

CBD RAIL STATIONS REQUIRE A STRONG IMAGE COMPATIBLE WITH ITS DOWNTOWN CONTEXT:

Though the form of the facility in downtown may not be able to compete with mass and height of downtown buildings the stations should become strong design elements in the downtown.

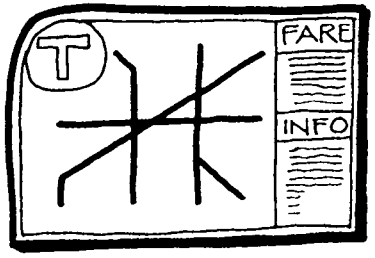
* Provide an image that identifies the facility as one of major civic importance. This includes the massing, form, color and graphics of the facility.
* Provide an image that respects the local context of surrounding buildings and streets.
* Provide for art to be integrated into the transit center design.
* The facility should be identifiable as part of the transit system overall design.

The CBD rail station is both a highly used and intensively used facility. It should be thought of as a long-term investment which, because of the uncertainty of future funding, makes future modifications and expansions uncertain. It should be designed to respond to future contingencies.

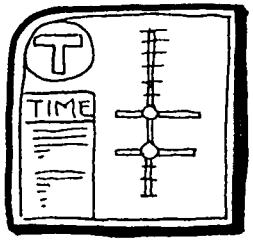
The CBD rail station, as well as the system as a whole, must also be an attractive alternative to the automobile, in the short as well as the long term. This requires a high quality facility as well as one which can grow and change over time.

Lynch, "Good City Form," p. 139; "Image of the City," p. 78.

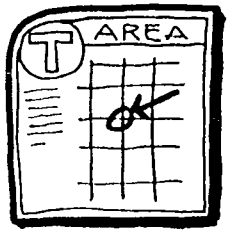
CBD RAIL:



SYSTEM



ROUTE



LOCAL

STATION DESIGN/INFORMATION

PROVIDE ORIENTATION AND SYSTEMS INFORMATION:

A CBD rail station has a level of complexity, in terms of the number of routes and connections, that requires a high degree of explanation. The number of users in such a center is high and some will be unfamiliar with the system.

* Provide overall system routing, fares and local areal information at a central location in the building.
* Provide individual route information -- a schedule and route map -- at individual bus queuing areas.
* Provide an active sign board identifying departure time of buses.
* Provide information services. This may be a dedicated telephone line or electronic information board in low volume centers or a manned booth in heavily used facilities.

Crosby, Fletcher and Forbes, "Sign Systems Manual," Follis and Hammer, "Architectural Signage and Graphics."

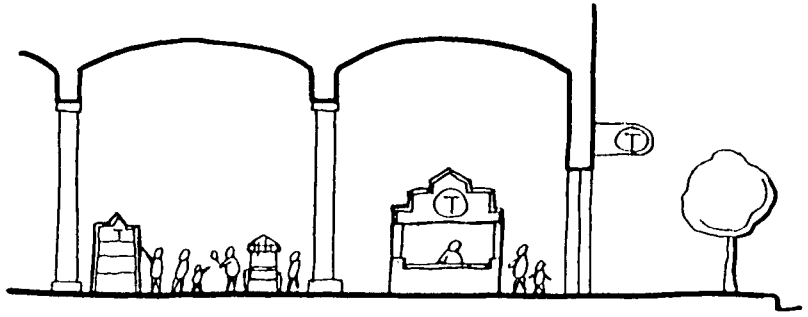
HEAVILY USED TRANSIT FACILITIES ARE AN EXCELLENT LOCATION FOR ADVERTISEMENTS:

Such advertisements also provide information to the public.

* CBD rail stations should provide designated areas to post local events.
* Provide designated areas in which to place advertising.

Rapoport, "Pedestrian Street Use: Culture and Perception."

CBD RAIL:



STATION DESIGN/COMFORT

AN ATTRACTIVE PEDESTRIAN SHOPPING/WAITING ENVIRONMENT SHOULD BE PROVIDED IN THE CBD RAIL STATION:

The downtown station locations becomes the major symbol for the entire transit system because of its very heavy use, its prominent visibility and the number of out-of-town visitors which use it. These stations must be of exemplary design.

* The retail and service stores should be accessible via a defined "concourse" area for the passengers to use. In a joint development project the concourse area may be a substantial area that links a number of buildings.
* Provide "focal points" in station and site planning to help define station facilities and as places to meet. These focal points may also have functions such as clocks, active information boards and active information booths.
* The CBD station requires a larger "scale" which is symbolic of its location and high use. The ceiling height and its design should reflect this character.
* Allowance for expansion of the retail area should be included in plans of the facility. Additional vendors may include sales from peddler's carts as well as kiosks. Utilities for such activities should be built in.
* Station entrances are a traditional place for less formal retail activities, such as pushcarts and itinerant peddlers. The design of station entries should accommodate such uses and provide specific locations, utility connections, etc. to manage such activities.
* Provide adequate seating. The seating should accommodate 5% of the ridership at peak hours. The seating should be high quality, equivalent to airport seating.
* Provide a barrier-free environment.

Passini, "Way Finding in Architecture."

CBD RAIL:

STATION DESIGN/COMFORT

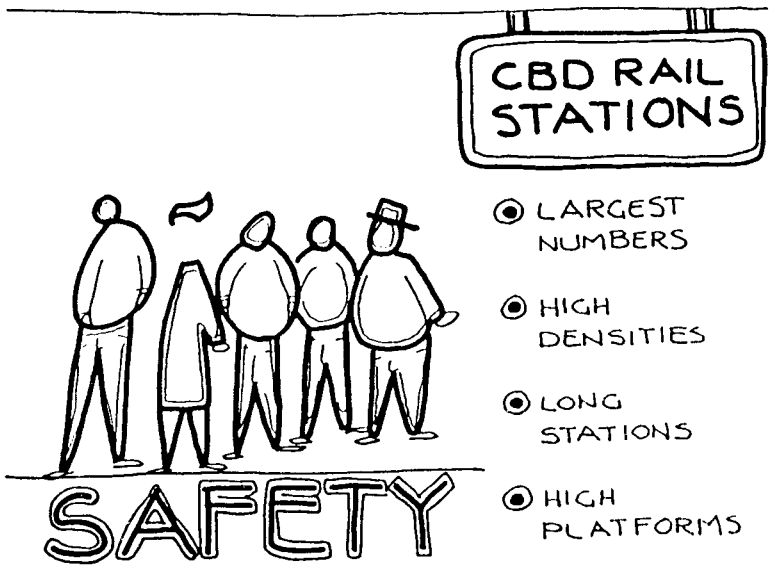
CIRCULATION AND ORIENTATION WITHIN THE CBD RAIL STATION ENVIRONMENT SHOULD BE FACILITATED:

The CBD rail station environment is of moderate size and little complexity and should be easily "legible" to most passengers.

* The center should be designed as one large "place" with visual and circulation access to all platform areas.
* Buses with a high degree of transfers to each other should be located in close proximity.
* Signage at the concourse area and at each bus location should be easily visible.
* Route categories, such as express/local, by direction, etc., should be distinguished by color coding.
* Provide manned information booths in the most heavily travelled CBD rail stations.

Passini, "Wayfinding in Architecture."

CBD RAIL:



STATION DESIGN/SAFETY

THE TRANSIT ENVIRONMENT SHOULD INCORPORATE A HIGH DEGREE OF PASSENGER SAFETY:

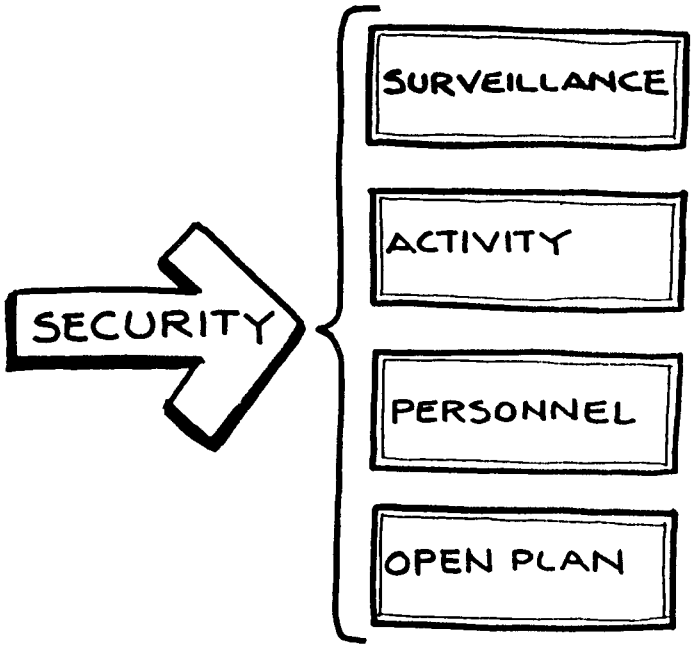
A CBD rail station is a busy environment at peak hours, especially so with a timed transfer system in which many buses arrive at the same time. The number of elderly passengers also dictates safety requirements.

* Provide easily visible and tactile safety strips at edge of bus platforms.
* Provide guardrails and guiderails to control circulation at points of crowding.
* Stop signs, crosswalks and control signals should be appropriately used where pedestrian traffic crosses auto and bus traffic.
* Consider the needs of special user groups, handicapped, children, elderly, etc. Passenger volumes are high at CBD stations and conditions of crowding and crowd flow may cause problems for these groups.

Fruin, "Pedestrian Planning and Design," pp. 72, 79, 84, 96.

CBD RAIL:

STATION DESIGN/SAFETY



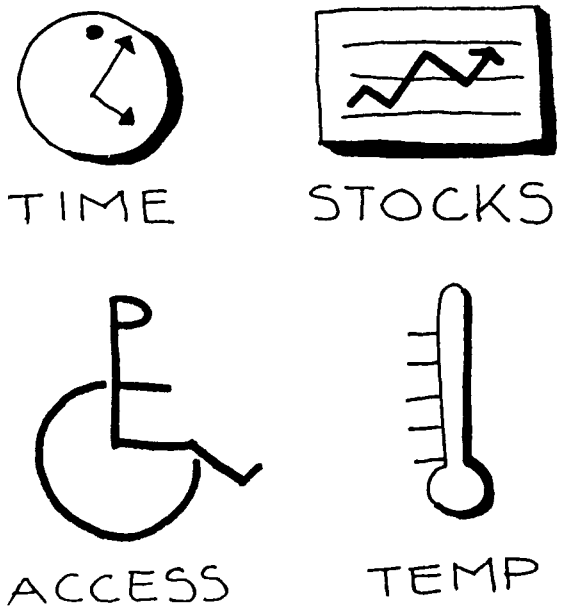
THE CBD RAIL STATION ENVIRONMENT SHOULD MINIMIZE CRIMINAL ACTIVITY AS WELL AS PASSENGERS' ANXIETIES ABOUT SUCH ACTIVITY:

A high proportion of transit riders are elderly persons and women. These groups are often the victims of criminal activity. Increased ridership will result with the perception that the transit system is a safe system.

* Provide a design that facilitates surveillance of CBD rail station facilities. This includes an "open" design, avoidance of hidden areas and high levels of lighting.
* Minimize usable areas and entrances to station at times of minimal travel demand.
* Provide transit personnel at station whenever possible. Provide electronic surveillance at times station is unmanned.
* CBD rail station should be the major pedestrian node for all uses in the development.
* Retail uses, amenities and other activities will increase security by concentrating and increasing the number of users of the facility.

Newman, "Community of Interest," p. 143.

CBD RAIL:



STATION DESIGN/COMFORT

PROVIDE AMENITIES AT CBD RAIL STATIONS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economics of scale.

* Provide amenities appropriate to local ridership at centers. This may be for example stock market quote/news terminals, sports broadcasts, temperature/weather forecasts.
* Transit aides may assist passengers at centers during events that attract many persons unfamiliar with the system.
* Information on local events and information activities may be directly distributed to passengers.

CBD RAIL:

OPERATIONS/MANAGEMENT

FLEXIBILITY OF USE:

The configuration of a transit station and supporting uses should be adaptable to new conditions and usages. Most regional shopping areas are remodeled as often as every five to seven years and the same could apply to transit facilities. Flexibility should be designed into a station so that the transit agency and/or vendors can quickly change their configuration to respond to a changing market.

PROPERTY MANAGEMENT:

Transit systems should hire professional property managers or use agency staff with appropriate expertise to oversee day-to-day operation of concessions, rentals, relations with tenants, maintenance contracts. Ideally, property management should be their sole function and not just part of other duties.

A market oriented property management is needed to seek the highest and best use of the property. Property managers should seek the set of activities that give the greatest return to the agency. The goal is to create value for the tenants, the transit system and the community.

Returns to agency from effective property management include the following:
* Revenues for rental of space
* Economic development within service area
* Improved system aesthetics
* Increased transit ridership
* Better public image

CBD RAIL:

OPERATIONS/MANAGEMENT

LEASES:

Various types of leases are available for commercial property. Leases should be written to provide some degree of control on tenants, but yet provide them with the flexibility to have a viable, successful business. Some of the various types of leases and clauses are:

* Full lease (full service lease) -- includes utilities, security, daily cleaning services, regular schedule of maintenance -- used in office building. Includes allowance for carpet, ceiling, doors, etc.

* Gross lease -- doesn't include cleaning, but does include heat, utilities, includes an allowance for finish of space with tenant paying any extra costs.

* Net lease -- tenants pay heat, electricity. Common for housing, retail.

* Net net lease -- the tenant pays all the above costs and also has to maintain the property.

* Net net net lease (triple net) -- tenant takes care of everything -- utilities, cleaning, maintenance, property taxes. Common for large retail spaces, requires a long term lease.

CBD RAIL:

OPERATIONS/MANAGEMENT

* Percentage rent clause -- standard in shopping leases. The more a tenant makes, the more they pay. There is a base rent plus a percentage of sales over the base, i.e. $10,000 plus 5% of sales over $200,000/year. If sales are $300,000, the rent is $15,000/year. This gives the property owner an incentive to make the shopping areas work; jointly benefits owner and tenants. An open book policy is used, sales records are available to all.

* C.A.M. -- common area maintenance charges -- to take care of open areas, parking lots -- add up all the expenses and divide by square footage. Shopkeeper has to actually build the inside decoration of their area, rental is for an empty cell. Each tenant has to follow aesthetic rules.

* Sanity clause. Tenant has the ability to properly manage the business and provide sanitary conditions for the general public. This is often implicit in the lease, even though some say there is no sanity clause.

CBD RAIL:

OPERATIONS/MANAGEMENT

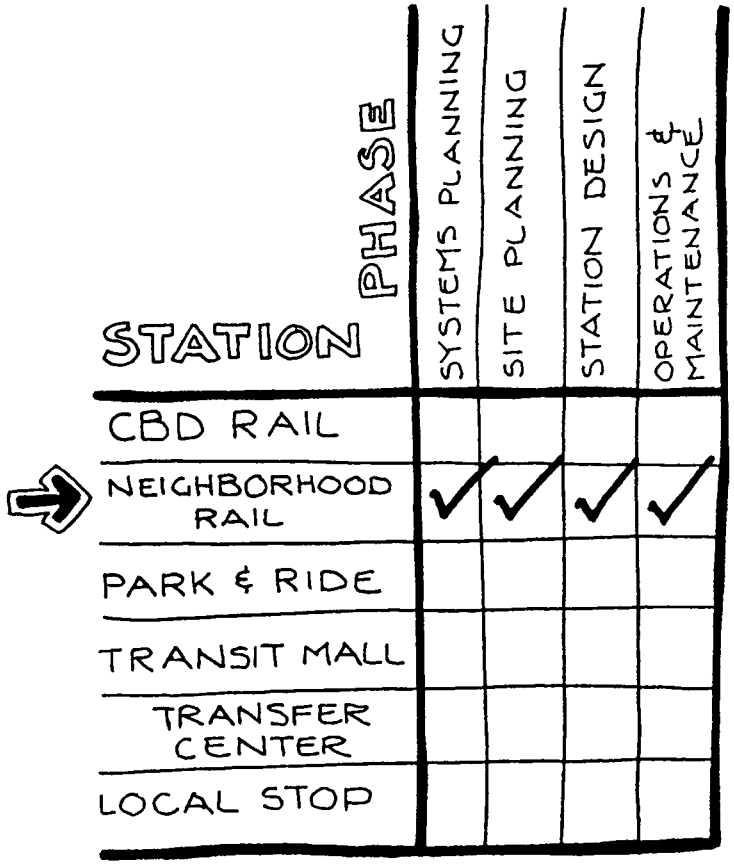
EXPENSES:

It is important to understand the expenses of property leasing. These include the following:

* Vacancy -- loss of income because of empty space, turnover in tenants, 10% is a minimum rate; it is hard to get less than that. Also includes loss of rent, people who pay late or have to be evicted. This can drag out several months -- you can lose 4-6 months rent from tenants whose business fails before their space is really vacant.

* O & M -- operations and maintenance costs -- maintenance and repairs, cleaning, parking lots, equipment repairs, etc. Typical costs (1987) in CBD rail stations may be in the $6 to $10 per square foot range.

NEIGHBORHOOD RAIL:



OUTLINE

CONSIDERATIONS ADDRESSED IN NEIGHBORHOOD RAIL STATION STATION PLANNING AND DESIGN:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

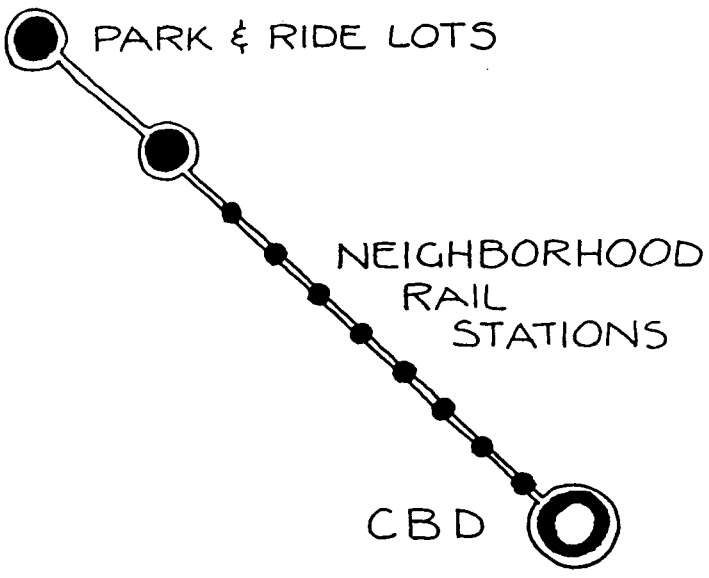
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location
* Market
* Access and circulation
* Information--image

STATION DESIGN
* Context
* Market
* Information--image
* User comfort
* Safety

OPERATIONS/MANAGEMENT

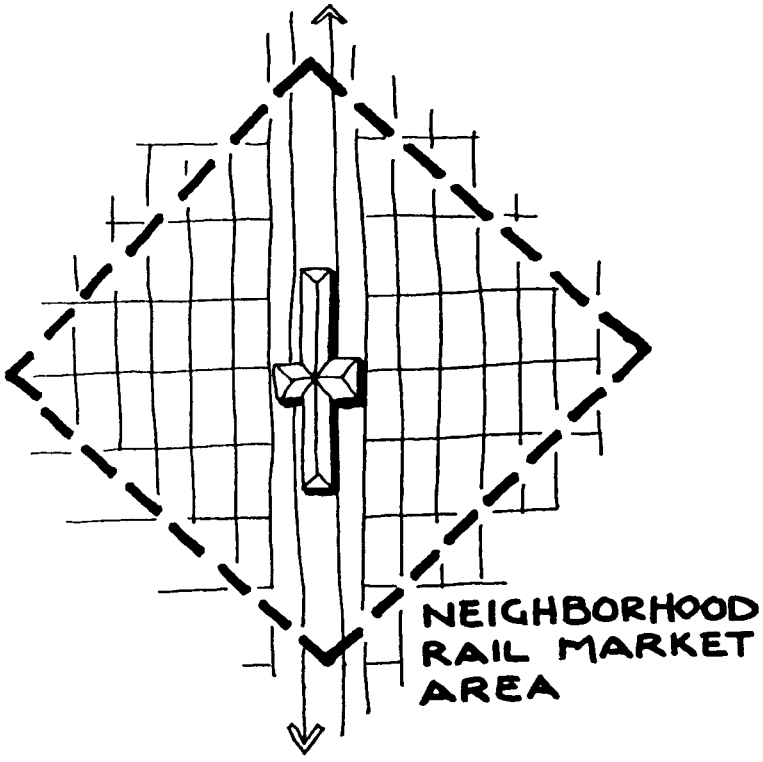
NEIGHBORHOOD RAIL:

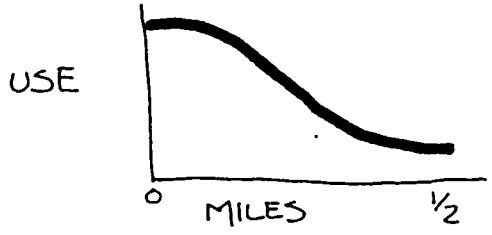


DESCRIPTION

The neighborhood rail station serves intermediate points along a rail corridor. It is neither a CBD location nor a park and ride facility. Its primary purpose is to provide access to transit at the residential neighborhood scale. It is typically located at the intersection of two important connector roads, at a location that often has commercial land uses -- retail and some office space. It is part of the neighborhood "core" or main street. Feeder bus routes, as well as taxis, and some limited parking, may serve this station. Most of its patronage comes from pedestrians living within a half mile of the station.

NEIGHBORHOOD RAIL:





JOINT DEVELOPMENT OPPORTUNITIES

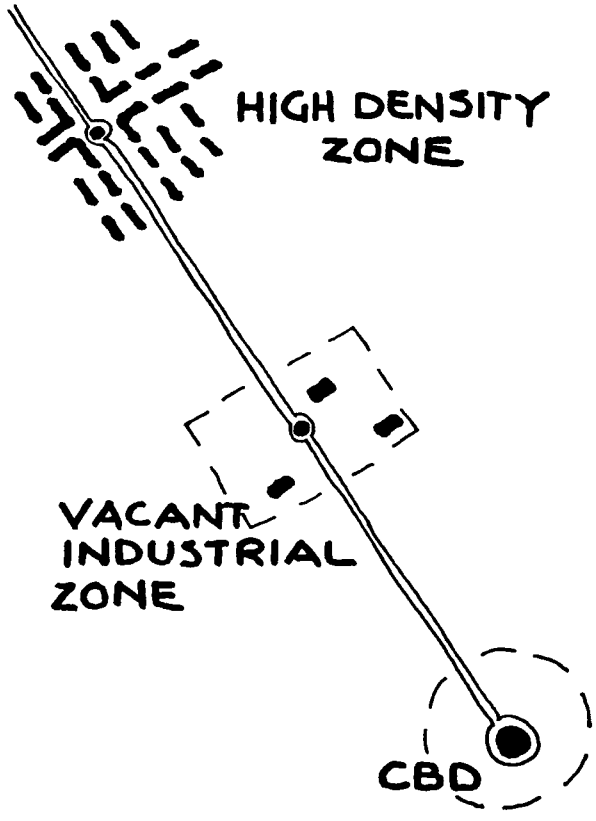
The neighborhood rail station services an immediate area of approximately 5,000 to 15,000 persons, depending on density, and has high rates of patronage -- a few thousand persons may board/alight from the station each day. The transit station contributes substantially to the commerce in the area.

The convenience of neighborhood retail and office uses enhances the attraction of using public transit and the transit in turn strengthens these commercial activities. Convenience uses such as cleaners, flower shops, shoe repair, VCR rental and automated money access, as in many other transit locations, will be successful as individual enterprises. These will be relying on the neighborhood but with a strong contribution due to the station location. Other uses will also have a stronger competitive advantage -- this includes shopping for staples on the trip home, including grocery, drug and liquor stores.

Scale: Typically one-half mile but varies up to one-half miles for lower densities.

Station Capacity: One hundred per stop at peak hours. The station will serve 4,000 to 7,000 boarding/alighting passengers/day.

NEIGHBORHOOD RAIL:



SYSTEMS PLANNING/LOCATION

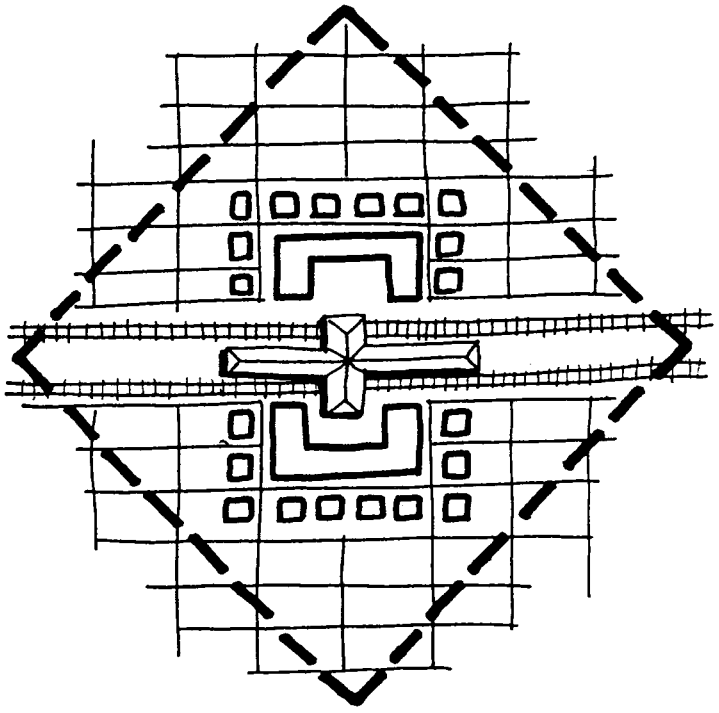
SITE SELECTION OF STATIONS:

If population density were uniform throughout the rail corridor, and the maximum observed walk access distance was 1/2 mile, the optimal station spacing would be at least one station per mile for all neighborhood rail stations. However, few cities match these ideal conditions. Site selection of stations must consider demographic patterns, rail alignments, and the distribution of land uses within the rail corridor.

Location of stations can follow two approaches. First, stations can be located to to serve well-established neighborhoods. Developers should find station sites in neighborhoods having a mix of high residential densities and commercial development within the market area around the proposed station.

An alternative approach is to locate stations in underdeveloped areas in order to stimulate new growth and development; new development may follow in the form of high density residential, shopping centers and office space. Transit service could be integrated with other land uses at the site to maximize access to residences and activity centers within the market area, which in turn could stimulate further development in the surrounding neighborhood. In such a situation the transit system should be actively involved in seeking development projects. Land banking at station sites may be a way to help influence future development projects.

NEIGHBORHOOD RAIL:



HIGH DENSITY RESIDENTIAL/COMMERCIAL

SYSTEMS PLANNING/MARKET

POTENTIAL ACTIVITY CENTERS TO CONSIDER WITH NEIGHBORHOOD RAIL:

In established neighborhoods, a single urban rail station could support a variety of nearby "convenience" establishments frequented local neighborhood residents and by commuters on their way to and from work:

* newsstands;
* dry cleaning;
* convenience stores;
* delicatessens;
* pharmacies;
* access to auto repair; and
* florists.

In order to assure the success of such establishments, initial research must be carried out to determine size of the market in the immediate vicinity. Initial studies must consider the following factors for the population within the market area:

* Population
* Mode split of the population using transit at various walking distances within the market area
* The age and sex distribution of the population
* The proportion of the population employed
* The proportion of the population enrolled in school
* The number of occupied households
* Average income
* Rate of auto ownership

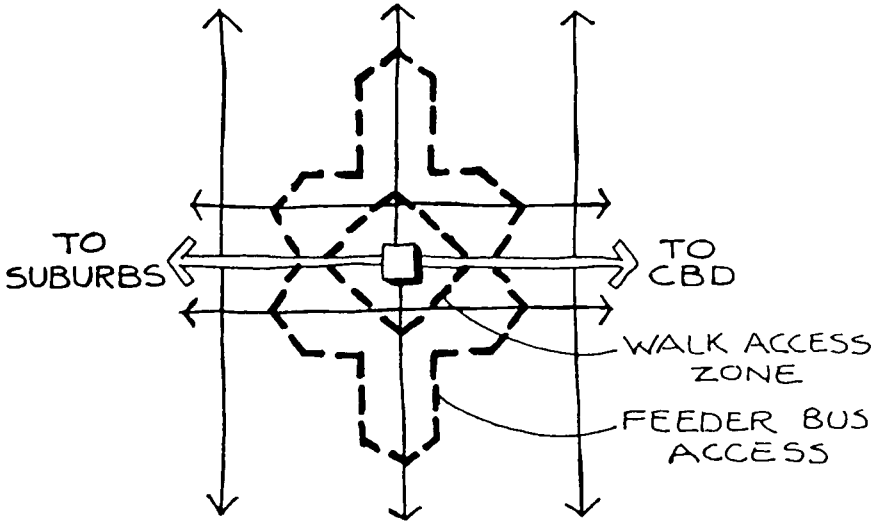
POTENTIAL ACTIVITY CENTERS TO CONSIDER WITH NEIGHBORHOOD RAIL, CONTINUED:

The data needs of each type of establishment will vary according to the type of market it seeks; however these types of demographic data are important in market identification.

Initial studies must also locate any potentially competing retail or service establishments within the market area. If none are present, then new establishments could be built in the immediate vicinity of the station. If competing establishments are present, they may be convinced to move to a new location within the vicinity of the station.

An additional strategy in joint development would be to locate high density residential developments within the immediate vicinity of the station; The principal advantage to residents would be short walking distances to retail and convenience establishments, as well as transit. The principle advantage to developers and entrepreneurs would be more customers within the market area surrounding the station.

NEIGHBORHOOD RAIL: SYSTEMS PLANNING/ACCESS



FEEDER BUS ACCESS:

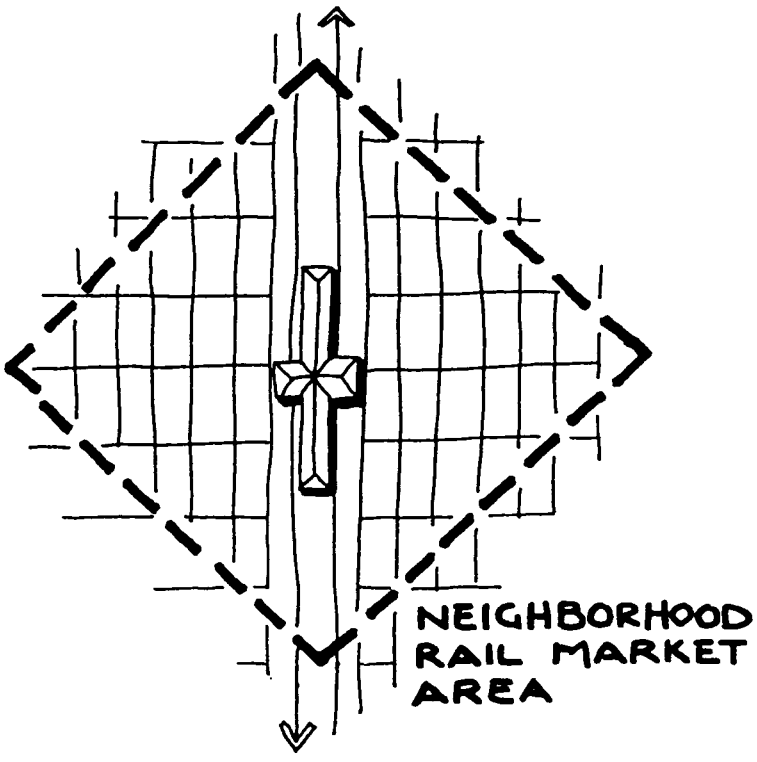
At intermediate distances along rapid transit routes, the market areas for neighborhood rail stations will extend outward from 0.5 miles to as far as 1.5 miles, as feeder bus routes increase in importance. However, the number of potential rail passengers arriving by feeder bus drops significantly because access time is greater in relation to total travel time when compared to other modes of travel. This is particularly true in areas closer to the CBD. However, as distance from the CBD increases, the proportion of total travel time devoted to access diminishes and the market area will expand. In turn, the proportion (or mode split) of rail passengers will increase.

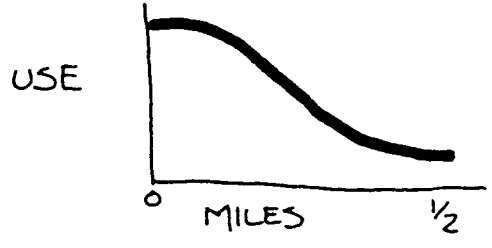
Feeder bus service could be enhanced with the following modifications to the bus system and the station itself:

* realignment of local bus routes to maximize coverage within the market area
* realignment of local bus routes traveling through the market area into the neighborhood rail station to increase the number of feeder routes serving the station
* timed transfer centers at selected neighborhood rail stations
* the introduction of "convenience" establishments at selected neighborhood rail stations to increase the number of intervening opportunities on commuter trips:
  * newsstands
  * dry cleaning
  * convenience stores
  * delicatessens
  * pharmacies
  * access to auto repair

Stringham (1982); Pushkarev and Zupan (1985), Chapters 3 and 4.

NEIGHBORHOOD RAIL:





SYSTEMS PLANNING/ACCESS

WALKING ACCESS:

Pedestrian access distances have generally been observed to be greater than 1/2 mile, but the distribution of passengers choosing to walk to the station decreases rapidly with distance. Activity centers should be placed well within the 1/2 mile limit.

The boundaries of the walk-based market area will reflect the street network due to limited path choices for pedestrians; in grid systems, the market area will be diamond-shaped. The shape and extend of the market area can be altered however, by the following modifications:

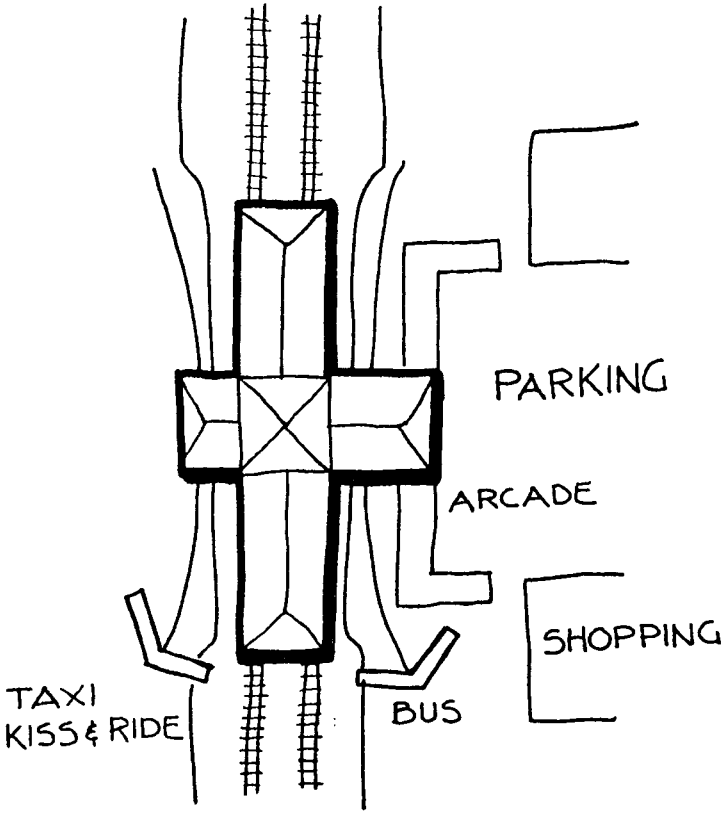
* Introduce mid-block crosswalks and grade-separated walkways over busy streets.

* Alter signalization at intersections to increase pedestrian times traveling in the direction of the station.

* Provide exits at each end of the platform.

Pushkarev and Zupan (1982), Chapter 3; Schoppert and Herald (1978).

NEIGHBORHOOD RAIL:



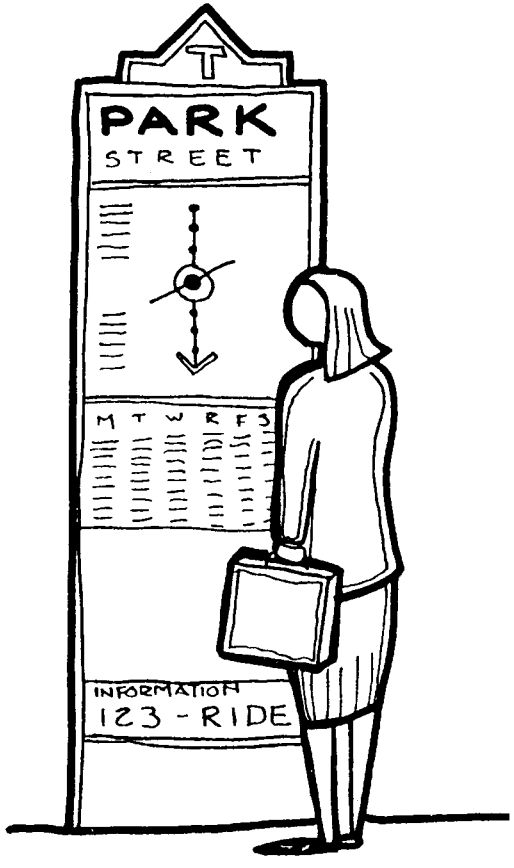
SYSTEMS PLANNING/CONNECTIONS

MAXIMIZE CONNECTIONS TO OTHER MODES OF TRAVEL:

Space around the station should be allocated to provide connections with other modes of travel:

* Kiss-and-ride zones to provide auto access to the station
* Taxicab stands
* Limited off-street parking where possible.
* Bus loading areas for feeder buses and connections to local transit.
* Areas for access to station by specialized transit users, handicapped, etc.

NEIGHBORHOOD RAIL:



SYSTEMS PLANNING/INFORMATION-IMAGE

ROUTE INFORMATION AND SIGNAGE:

* The exterior of all stations should be clearly identified from the street with signs identifying the particular transit station along with the transit system name and logo. Architectural form should be generally consistent with other stations to identify it with the transit system.

* Signs identifying the transit station should be clearly visible from trains on each platform or stop

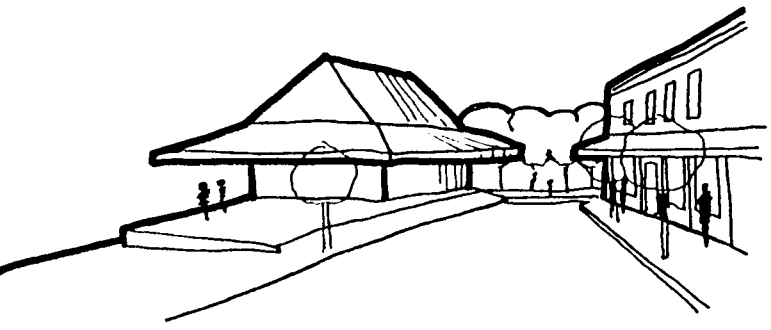
* Each platform should contain maps and schedules of the rail route serving the station detailing points of interest along the route. Maps and schedules should also be provided for feeder bus routes serving the station

* Street maps of the surrounding neighborhood should also be posted to identify important points of interest.

* Public telephones should be available at the station with the transit system telephone number clearly posted for additional passenger assistance.

* In particularly busy stations, information booths could provide additional transit system information.

NEIGHBORHOOD RAIL:



SITE PLANNING/LOCATION

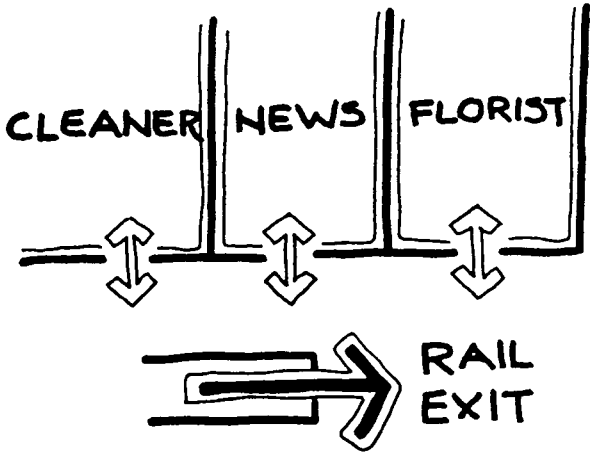
SITE DESIGN IN CONTEXT WITH SURROUNDING NEIGHBORHOOD:

The planning and design of transit stations should be intimately linked with the neighborhoods in which they are located. This enables potential users to identify with the system and feel comfortable entering the station area.

* Respect the street axes, topography, visual relationships. historic references and short cuts near the station.
* Provide landscaping consistent with the surroundings.
* Design with a potential for expansion.
* Take into account the traffic characteristics of access, predominant approach directions of buses, land buffering, etc.

Murphy, p. 92; Quinby, pp. 77-79; Petersen, p. 409; CTA "Suggested Joint Development...," p. 8; DOT, "Decision Procedures in Transit...," pp. 7-8.

NEIGHBORHOOD RAIL:



SITE PLANNING/LOCATION

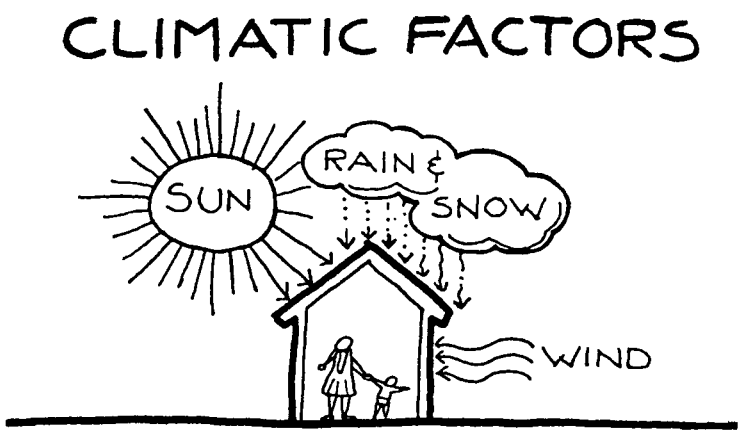
ON-SITE RETAIL AND ACCESS TO NEARBY DEVELOPMENT:

Transit patronage is aided by having the convenience of services and products available in or near the station. Many riders combine transit trips with shopping and service visits.

* Retail on site can include food vendors, newspaper kiosks and vending machines.
* Retail, offices and banks are considered good developments near a station site.
* All should be located so they do not interfere with transit patron movements.
* Safe, convenient access should also be provided to nearby high-density housing.

Hoel, p. 37; IRT Guidelines and Principles, p. 5; Byrne, p. 11.

NEIGHBORHOOD RAIL:



SITE PLANNING/LOCATION

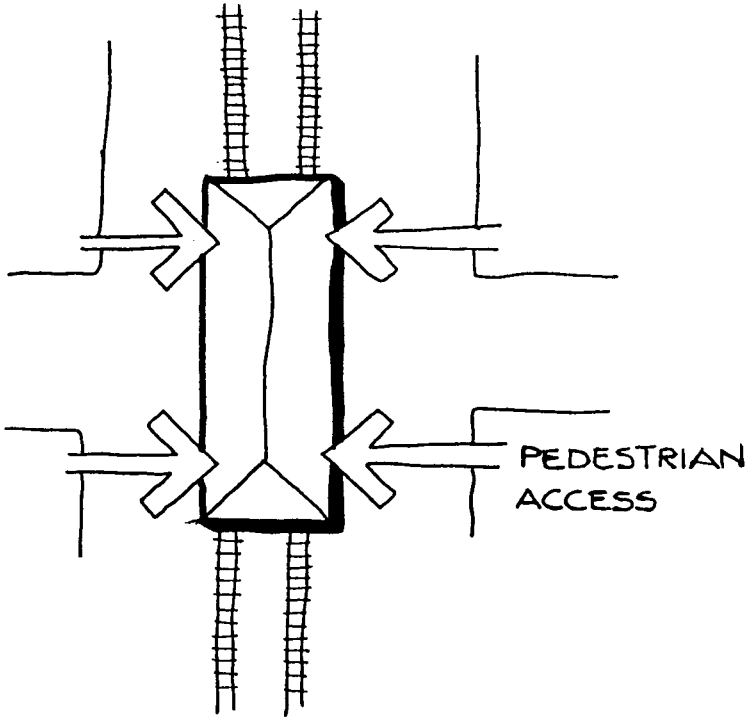
ORIENTATION TO CLIMATIC FACTORS:

To maximize the degree of comfort for riders, design should take into consideration the climate and weather patterns at each site.

* Stations and shelters should be designed and constructed to protect passengers from adverse weather conditions.
* Windbreaks should be provided on all platforms exposed to the elements and boarding, alighting and waiting areas as well as entranceways should be covered and protected.
* Prevailing winds should be considered at each specific site.
* The angle of the sun's rays and shadow patterns during each season and the course of the day should be considered.
* Design should provide advantages for warm weather conditions.

Harvey, p. 110; Lovely, p. 21; Fruin (1), p. 99; Misek, pp. 155, 159.

NEIGHBORHOOD RAIL:



SITE PLANNING/ACCESS

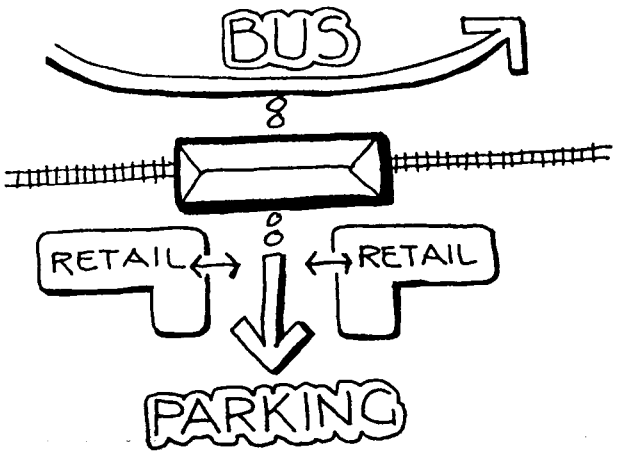
PROVIDE FOR SAFE, CONVENIENT PEDESTRIAN ACCESS AND MOVEMENT:

Because of the large number of patrons who walk to neighborhood stations, pedestrian access is a prime consideration in site design. It is also important to access the station area with private development near the site.

* Pedestrian access points should be close to the expected approach paths and on-street bus stops.
* Access should be afforded maximum protection by traffic control devices.
* Some stations may be designed with two entrances, one at each end, to improve service.
* Once in the station area the paths should be as direct as possible to the fare collection areas with a minimum of obstructions and conflicts with any vehicular traffic.
* Because of close train headways and high-speed operation,the entire rapid transit system should be grade-separated with barriers used such as fences and walls.

Appleyard, p. 275; Petersen, pp. 407, 417; Canadian Transit Handbook, p. 27; IRT Guidelines and Principles, pp. 8,14; TRB #760, p. 40.

NEIGHBORHOOD RAIL:



SITE PLANNING/ACCESS

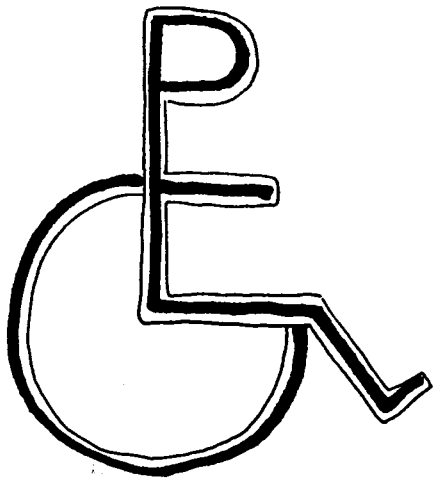
BUS/AUTO ACCESS POINTS/CONNECTIONS:

A primary factor in the selection of a site is its accessibility to local auto and bus travel as many rail passengers to downtown areas transfer from autos and buses.

* Connections should be simple with interchange direct and short.
* Access can be enhanced by using priority traffic management techniques making it easier to enter and exit from the station area.
* Sufficient space on some sites must be furnished for any feeder buses (turning radii, parking, etc.) and drop-off areas.

Hoel, p. 2; Misek, p. 152; DOT, "Encouraging Public...," p. 35; DOT, "Transit Center-Based Transit Systems...," pp. 35-39; DOT, "Decision Procedures in Transit Station Design," p. 6; TRB #817, p. 37.

NEIGHBORHOOD RAIL:



SITE PLANNING/ACCESS

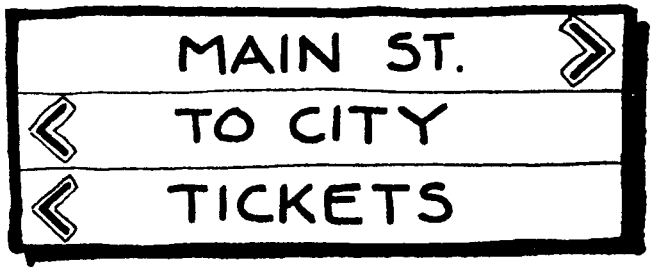
HANDICAPPED ACCESS:

All handicapped persons need access to the station area. Preferably this should not merely adhere to minimum standards but should be designed for comfort and pleasure.

* All public walks should be at least 48" wide with a gradient of not more than 5%.
* They should be constructed as continuing common surfaces not interrupted by steps.
* At least one exit and entrance must be usable by wheelchair patrons.
* Special features should include hand rails, platform edge strips, telephones and ramp designs.

Hayduk, p. 93; IRT Guidelines and Principles, pp. 53-54.

NEIGHBORHOOD RAIL:



SITE PLANNING/INFORMATION--IMAGE

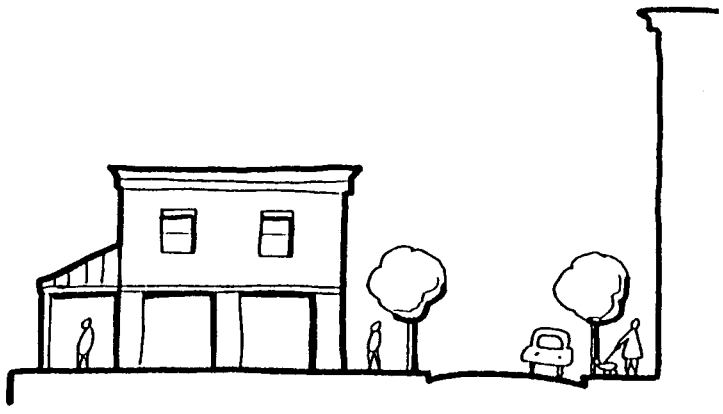
PROPER SIGNAGE:

The primary purpose of site signage is to provide clear, concise information to passengers for access to the station and bus/auto drop-off areas as well as the main circulation routes.

* Consistent modular design of components and materials is encouraged -- standardization of graphics throughout the system is essential.
* Advertising should be avoided at critical decision-making points.
* Placement is determined by passenger lines of sight.
* All signs should be designed for the total population of users.

Fruin (2), pp. 15-16; IRT Guidelines and Principles, pp. 46-47; TRB #817, p. 38; Crosby, Fletcher and Forbes, "Sign Systems Manual;" Follis and Hammer, "Architectural Signage...".

NEIGHBORHOOD RAIL:



STATION DESIGN/CONTEXT

CONTEXT:

A neighborhood rail station is often the generating force behind the creation of a neighborhood activity "node". The rail station, typically located at the meeting of two arterials, is part of a small neighborhood shopping district. The transit and retail activities are both located to maximize access from the surrounding area.

Sometimes, due to economic considerations, rail stations at the neighborhood scale are above ground. Thus these stations, because of the structures required and the length of the trains, are important "landmarks" in a community. Furthermore bus and taxi connections increase the transportation impact at these stops.

On the other hand, outside of the limited commercial area the scale of the neighborhood is likely to be small and almost wholly residential -- considerations that should affect the design of the rail structure and the station.

NEIGHBORHOOD RAIL:

GROWTH & CHANGE

- BUDGET NOW FOR FUTURE GROWTH/CHANGE
- PROVIDE ADDITIONAL CAPACITY
- PLAN FOR PHASED REPLACEMENT
- DESIGN GENEROUSLY

STATION DESIGN/CONTEXT

THE FACILITY SHOULD BE FUNCTIONAL:

Though passenger loads are relatively low at the neighborhood rail station compared to other rail stations issues of capacity, safety, security and comfort must be considered in their design.

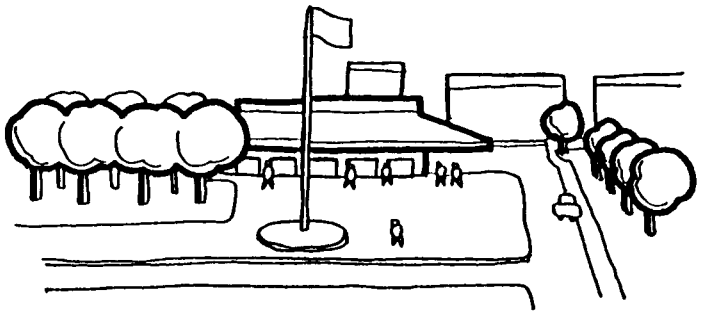
* Passenger shelters, platforms and waiting areas should be designed to a high level of service standard in circulation, waiting and queuing.
* Provide access to handicapped persons to all areas.
* The design of sheltered areas should consider the local climate. Though the station itself is long the sheltered area can be limited to the length of two or three cars.
* Provide necessary functions such as bathrooms if appropriate and trash receptacles.

Fruin, "Pedestrian Planning and Design."

ACCOMMODATE GROWTH AND CHANGE IN THE FACILITY OVER THE LONG TERM:

* Provide for a generous use of space to accommodate future contingencies.
* Provide utilities which have the capacity to supply additional growth and change.
* Ceiling heights should be used which will allow for future changes.
* Provide materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle.
* Use high quality materials and design.

NEIGHBORHOOD RAIL: STATION DESIGN/MARKET

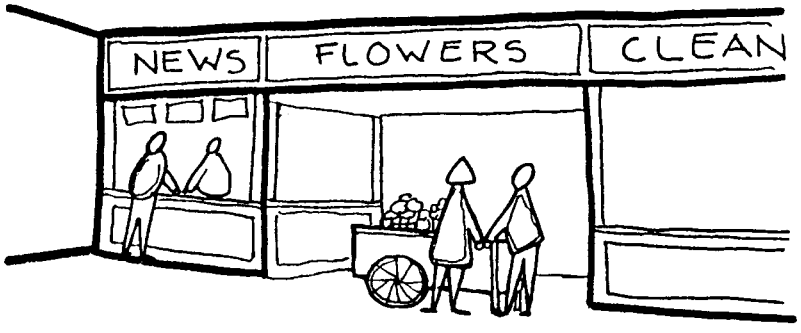


THE NEIGHBORHOOD RAIL STATION SHOULD ENHANCE THE LOCAL COMMUNITY:

The station and its surroundings are among the largest structures in the local neighborhood as well as representing a large public investment. The cost of the rail functional infrastructure itself is very high -- the cost of design quality at the station level is minuscule by comparison but can have a strong positive effect on the community it serves.

* The station, with its continual use can be designed as a focal civic building in the community which would include appropriate plazas and outdoor areas, landscaping, community information, etc.
* Allowance for expansion of the retail area should be included in plans of the facility. Additional vendors may include sales from peddlers' carts as well as kiosks. Utilities for such activities should be built in.
* Use materials and design compatible with the local community.

NEIGHBORHOOD RAIL: STATION DESIGN/MARKET



THE SUPPLY OF GOODS AND SERVICES SHOULD MATCH THE MARKET DEMAND AT THE NEIGHBORHOOD RAIL STATIONS:

* Retail activities can include convenience stores selling newspapers and magazines, snacks, flowers, shoe repair, banking machines, dry cleaners, and VCR rentals.
* In addition local shops such as supermarkets, drugstores, liquor, and eating places will also be strengthened by transit users.
* Though usually located outside of the station, retail activities may be located within the station depending on the strength of the existing shopping area and the anticipated passenger volume. If retail activities are located within the station they should be easily accessible by shoppers and passersby.
* Provide telephone service for transit passengers.
* There can be a substantial amount of advertising at the local rail station and would include public service advertising and advertising limited to neighborhood events and retailers in designated areas. Other advertising will be limited to areas designated for that purpose.

NEIGHBORHOOD RAIL: STATION DESIGN/INFORMATION–IMAGE

NEIGHBORHOOD RAIL STATIONS REQUIRE A STRONG IMAGE COMPATIBLE WITH ITS RESIDENTIAL CONTEXT:

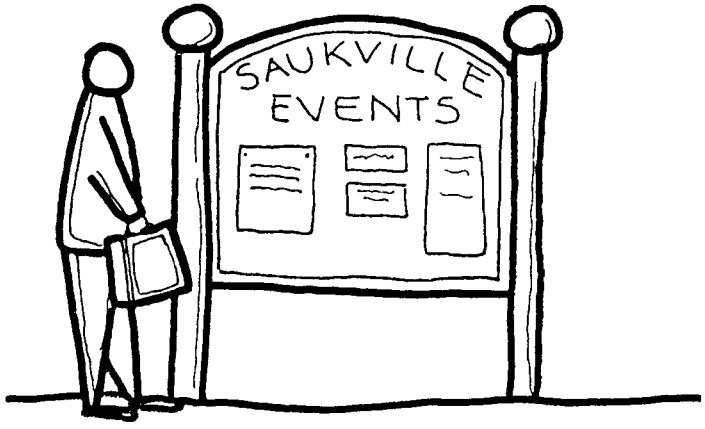
* Provide an image that is compatible with the area that the station serves. This includes the massing, height, form, materials and details of the station.
* Provide an image that is understandable to the local community.
* Landscaping is an important design feature at the local community level.
* The facility should be identifiable as part of the transit system overall design.

HEAVILY USED TRANSIT FACILITIES ARE AN EXCELLENT LOCATION FOR ADVERTISEMENTS:

Such advertisements also provide information to the public.

* Neighborhood rail stations should provide designated areas to post local events.
* Provide designated areas in which to place advertising.

NEIGHBORHOOD RAIL:



STATION DESIGN/COMFORT

THE NEIGHBORHOOD RAIL STATION SHOULD BE AN ATTRACTIVE AND COMFORTABLE ENVIRONMENT:

To attract and keep ridership the transit environment must provide a level of comfort for its users. The neighborhood rail station will not require many facilities.

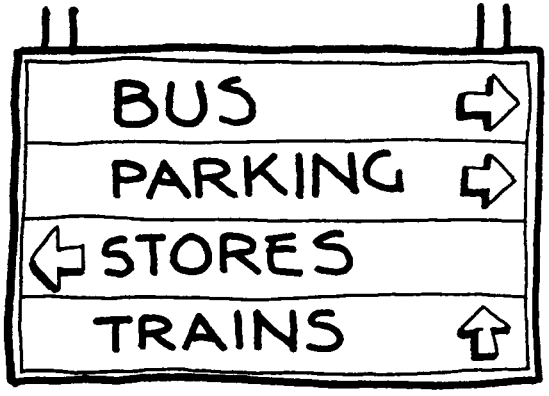
* Provide adequate seating. The seating should accommodate 5% of the ridership at peak hours. The seating should be high quality, equivalent to airport seating.
* Provide bathroom facilities if appropriate. Public bathrooms can be a source of trouble if not carefully designed and controlled by transit personnel.
* Provide a barrier-free environment.

PROVIDE AMENITIES AT NEIGHBORHOOD RAIL STATIONS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economies of scale.

* Provide amenities appropriate to local ridership at centers. This may be for example stock market quote/news terminals, sports broadcasts, temperature/weather forecasts.
* Transit aides may assist passengers at centers during events that attract many persons unfamiliar with the system.
* Information on local events and information activities may be directly distributed to passengers.

NEIGHBORHOOD RAIL:



STATION DESIGN/COMFORT

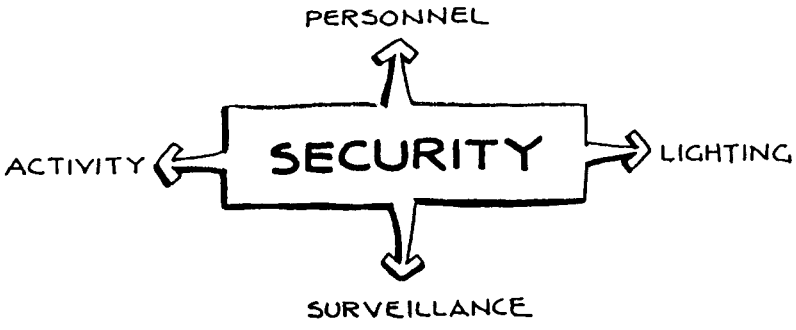
CIRCULATION AND ORIENTATION WITHIN THE NEIGHBORHOOD RAIL STATION ENVIRONMENT SHOULD BE FACILITATED:

The neighborhood rail station environment is of moderate size and little complexity and should be easily "legible" to most passengers.

* The center should be designed as one large "place" with visual and circulation access to all platform areas.
* Signage at the concourse area and at each bus location should be easily visible.
* Route categories, such as express/local, by direction, etc., should be distinguished by color coding.
* Provide manned information booths in the most heavily travelled neighborhood rail stations.

Passini, "Wayfinding in Architecture."

NEIGHBORHOOD RAIL: STATION DESIGN/SAFETY



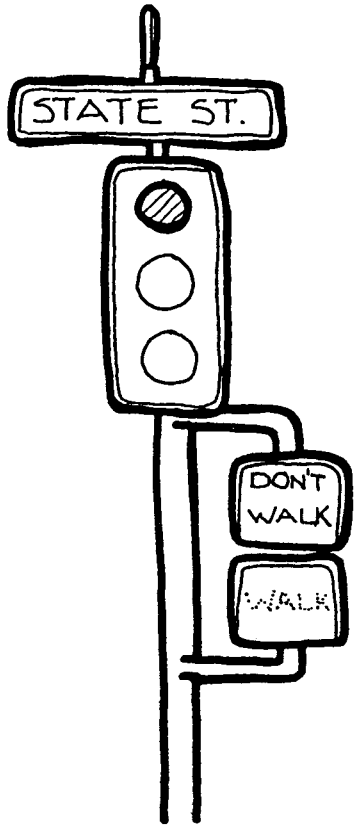
THE NEIGHBORHOOD RAIL STATION ENVIRONMENT SHOULD MINIMIZE CRIMINAL ACTIVITY AS WELL AS PASSENGERS' ANXIETIES ABOUT SUCH ACTIVITY:

A high proportion of transit riders are elderly persons and women. These groups are often the victims of criminal activity. Increased ridership will result with the perception that the transit system is a safe system.

* Provide a design that facilitates surveillance of neighborhood rail station facilities. This includes an "open" design, avoidance of hidden areas and high levels of lighting.
* Minimize usable areas and entrances to station at times of minimal travel demand.
* Provide transit personnel at station whenever possible. Provide electronic surveillance at times station is unmanned.
* CBD rail station should be the major pedestrian node for all uses in the development.
* Retail and other activities will increase security through the use of "eyes on the street".

Newman, "Community of Interest," p. 143.

NEIGHBORHOOD RAIL:



STATION DESIGN/SAFETY

THE TRANSIT ENVIRONMENT SHOULD INCORPORATE A HIGH DEGREE OF PASSENGER SAFETY:

A neighborhood rail station is a busy environment at peak hours, especially so with a timed transfer system in which many buses arrive at the same time. The number of elderly passengers also dictates safety requirements.

* Provide easily visible and tactile safety strips at edge of bus platforms.
* Provide guardrails and guiderails to control circulation at points of crowding.
* Stop signs, crosswalks and control signals should be appropriately used where pedestrian traffic crosses auto and bus traffic.

NEIGHBORHOOD RAIL:

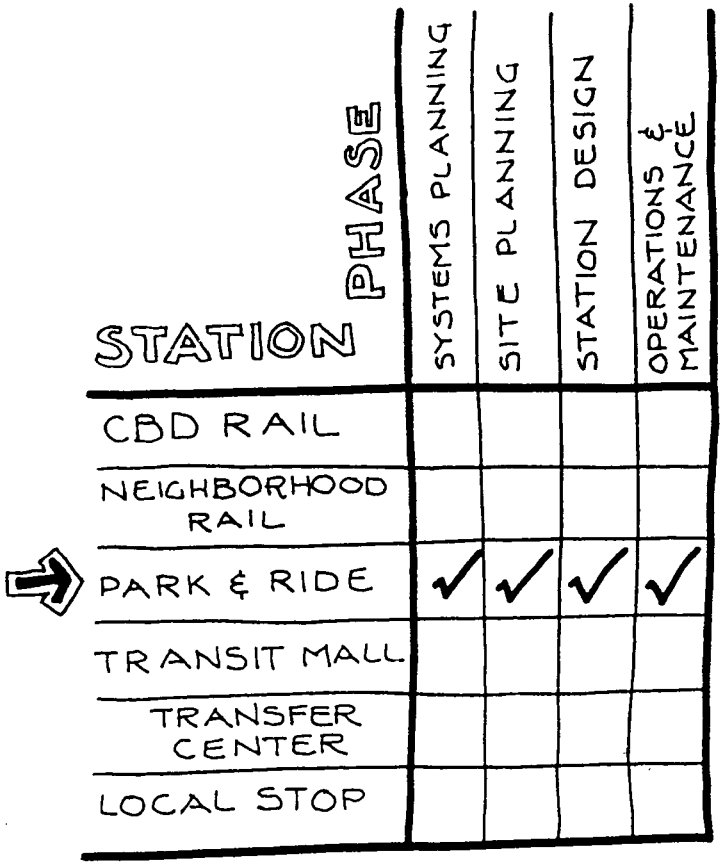
OPERATIONS/MANAGEMENT

Many of the principles related to CBD rail stations also apply to intermediate rail stations. There is a need for an ongoing property management group to oversee station operation and the activities of tenants using transit property.

Regular operation and maintenance activities include the following:

* Station cleaning and trash pick-up.
* Servicing of vending machines and equipment.
* Removal of graffiti.
* Replacement of advertising.
* Updating of posted maps and schedules.

PARK AND RIDE:



STATION / PHASE	SYSTEMS PLANNING	SITE PLANNING	STATION DESIGN	OPERATIONS & MAINTENANCE
CBD RAIL				
NEIGHBORHOOD RAIL				
PARK & RIDE	✓	✓	✓	✓
TRANSIT MALL				
TRANSFER CENTER				
LOCAL STOP				

OUTLINE

CONSIDERATIONS ADDRESSED IN PARK AND RIDE STATION PLANNING:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

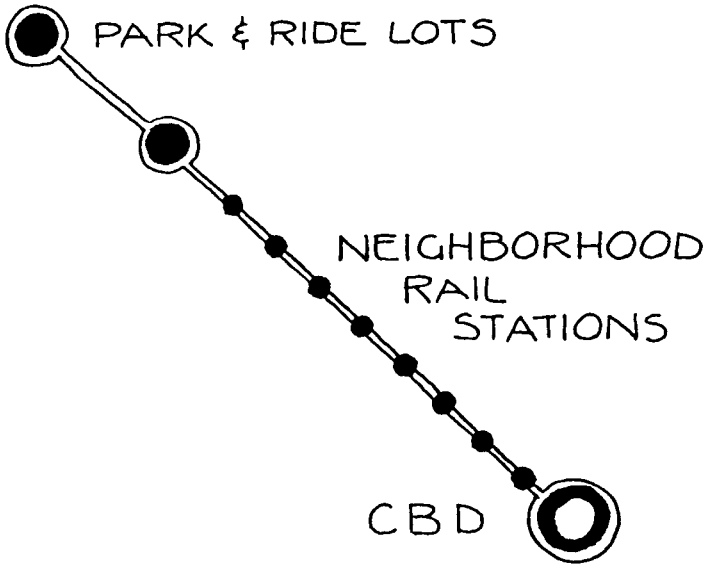
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location/context
* Market
* Access and circulation
* Comfort
* Information--image

STATION DESIGN
* Context
* Market
* Information--image
* User comfort

OPERATIONS/MANAGEMENT

PARK AND RIDE:

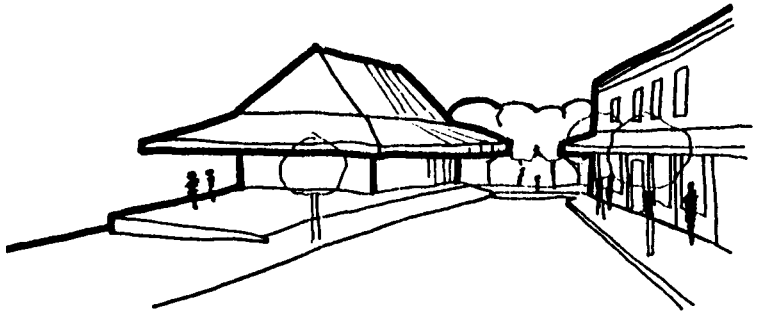


DESCRIPTION

A park and ride facility is a major transit node in suburban areas of a metropolitan area. Densities are lower in these areas and the automobile is the dominant transportation mode, though some bus service may be available in selected locations. A park and ride station can be bus or rail oriented. Park and ride stations have traditionally been located in or near suburban town centers or near shopping centers. Park and ride stations can also be used as transfer centers as described elsewhere.

Today's park and ride developments are located at sites where heavily used traffic arteries and/or rail stations converge. They serve an area that may be three to six miles distant from the facility. Developments near park and ride facilities may consist of very large numbers of parking spaces -- some have over 1,000 spaces -- and may also have some bus and taxi service. Sites for park and ride facilities will be large, a few acres would be a minimum site, and vary depending on local circumstances.

PARK AND RIDE:



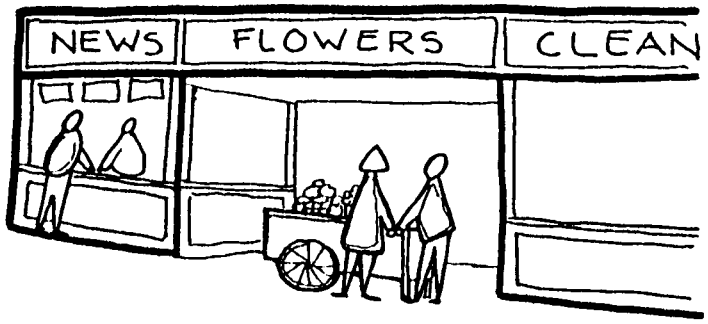
JOINT DEVELOPMENT OPPORTUNITIES

Adjacent development to park and ride facilities can vary greatly in size from convenience goods and services to a substantial, mixed use facility which may have retail, office and hotel components that share use of the parking structure. A park and ride facility can have approximately 1,000 boarding/alighting passengers each day or more which provides a base market. Combined with good access from adjacent streets a larger facility can be successful.

Access to freeways and heavily trafficked arteries, the amount of parking, a larger site, as well as the rail component provides an important joint development opportunity for this location. The confluence of these factors makes this a valuable site for quite intensive development and a "destination" facility, consisting of substantial amounts of square footage, can be successful. An office/retail development would attract additional persons beyond the park and ride transit users and more substantial retail activities will be feasible. This would consist of typical convenience retailers, those oriented towards office uses as well as a destination shopping center. Residential and hotel development may also be a use in destination type park and ride facilities.

Joint development at park and ride facilities is particularly attractive because considerable added value is provided by the transit connection. This newly created valuable land is less expensive and easier to acquire and develop than more urbanized land.

PARK-AND-RIDE:



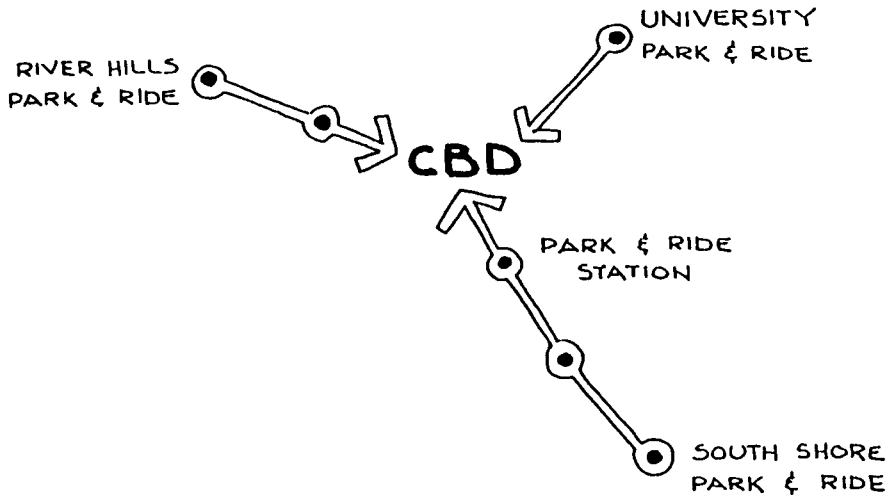
JOINT DEVELOPMENT OPPORTUNITIES

POTENTIAL ACTIVITY CENTERS TO CONSIDER IN JOINT DEVELOPMENT WITH PARK-AND-RIDE:

Joint development strategies can follow two approaches: 1) park and ride facilities can be located at existing activity centers (e.g. shopping centers), as with transfer centers; 2) park and ride facilities can be constructed in conjunction with other facilities at an underdeveloped or vacant site. In the latter case, a single park and ride facility could be included in projects consisting of a variety of "convenience" establishments frequented by commuters on their way to and from work. Such an establishment would draw its market from the transit users as well as from the local neighborhood. For example, a convenience store could offer transit users access to dry cleaning, shoe repair or auto repair services while passengers were at work during the day. Some possible activities may include:

* Dry cleaning
* Convenience stores
* Delicatessens
* Pharmacies
* Access to auto repair
* Florists
* Video rental
* Newstands
* Snacks, fast food
* Locate governmental functions as part of an overall joint development which includes a park and ride facility.

PARK AND RIDE:

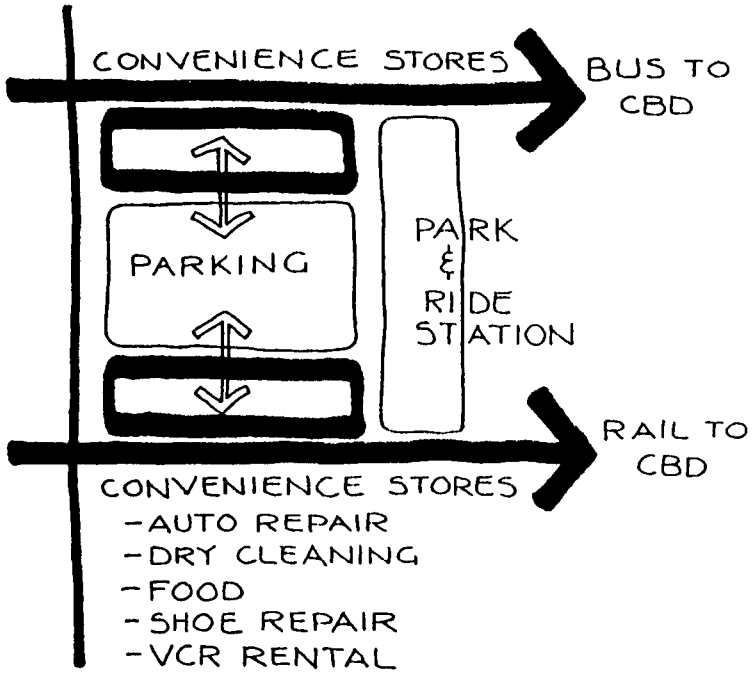


JOINT DEVELOPMENT OPPORTUNITIES

Scale: A park and ride facility can serve an entire sector of a metropolitan area. There may be three to a half dozen such facilities in the metropolitan area. It can draw passengers from three to six miles away.

Station Capacity: A park and ride facility would generate up to 5,000 to 10,000 boarding/alighting passengers per day. Two thirds would be at peak hours. If combined with a large joint development these numbers could be substantially higher depending on the size of the development and its use.

PARK AND RIDE:



SYSTEMS PLANNING/LOCATION

LOCATE PARK AND RIDE FACILITIES TO MAXIMIZE POTENTIAL FOR JOINT DEVELOPMENT:

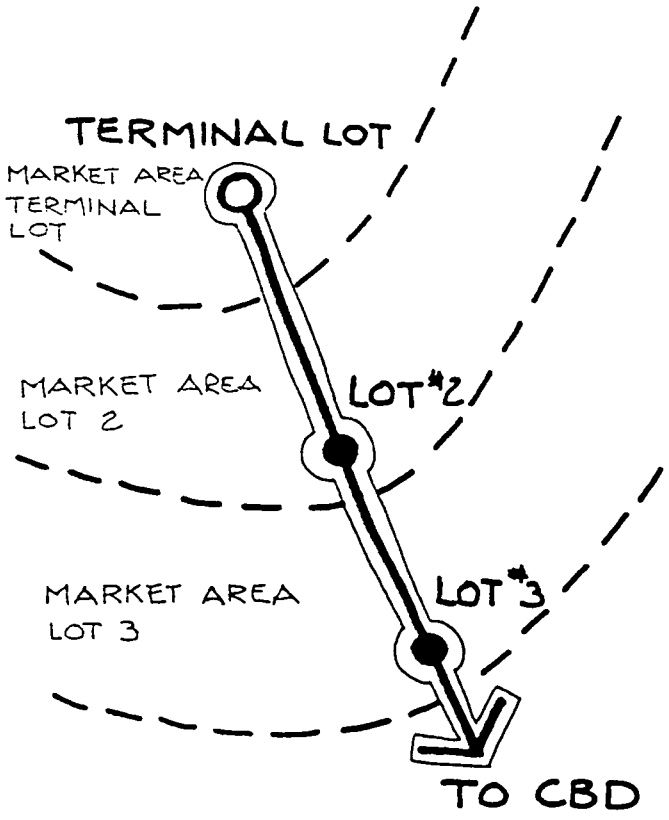
When park and ride facilities are planned in conjunction with retail, civic, office and industrial facilities, efficiency and convenience is provided to both users of these facilities as well as the tenants of the projects.

The potential labor pool at such transit-served centers is increased as well as the potential high quality planning due to the critical mass and integration of uses.

Existing shopping centers, either traditional older centers or more recent mixed use developments, should be reinforced by adding transit facilities

* Park and ride sites should have direct access to heavily trafficked arteries carrying 20,000 cars per day.
* Acres of parking, five to ten acres or more, are required just for parking at this type of facility.
* Structured parking may be required for very large facilities or where adequate amounts of land are difficult to acquire.
* Locate park and ride facility close to locus of market area.

PARK-AND-RIDE:



SYSTEMS PLANNING/MARKET AREA

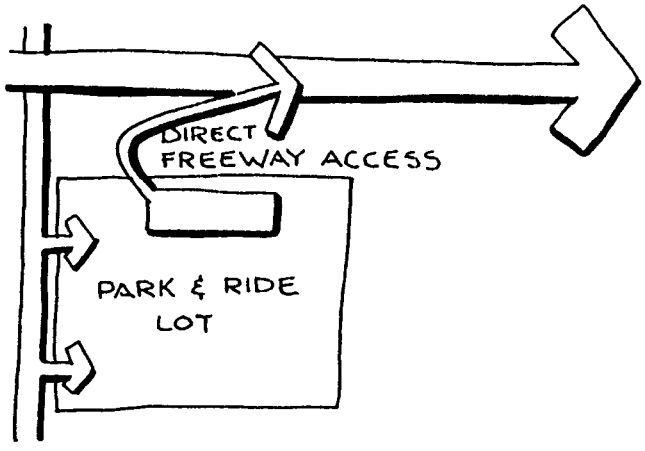
EXTENT OF THE MARKET AREA:

Studies have shown that the average driving access distances for express bus generally ranges from 3-6 miles, depending upon distance from the CBD. Auto-based access for rapid transit has been shown to vary with the distance of the station from the CBD; median access distances range from 2.5 miles at 10 miles from the CBD to 5.0 miles at a distance of 40 miles from the CBD.

Average driving distances will be greater for park-and-ride facilities at the route terminus than at those located along the route. At intermediate stations, the market area for park-and-ride facilities is larger in the direction away from the CBD (or other terminal node) because passengers are reluctant to "backtrack" to the facility.

Stringham (1982); Mather (1983); Gilbert (1981); Pushkarev and Zupan (1982), Chapter 3.

PARK-AND-RIDE:

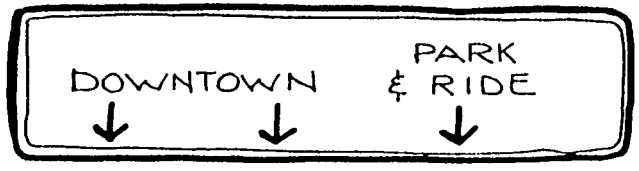


SYSTEMS PLANNING/CONNECTIONS

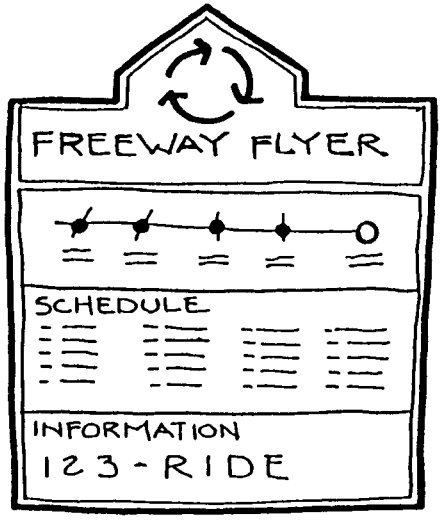
ACCESS TO MAJOR ARTERIALS:

For all transit modes, proximity to major arterials and freeways is critical in providing convenient access for passengers arriving by auto. However, park and ride facilities should avoid locations near heavily congested arterials. Where express bus routes are concerned, park and ride facilities should be located close to major arterials or freeways to promote greater efficiency and speed in travel for rapid transit. High occupancy vehicle lanes and exclusive use of ramps also can be used to increase efficiency in travel.

PARK-AND-RIDE:



LOCATION SIGN



STATION SIGN

SYSTEMS PLANNING/INFORMATION

ROUTE INFORMATION AND SIGNAGE:

The park and ride facility should be clearly marked and adequate signage should be placed on all adjacent streets and highways to direct passengers arriving by auto. The transit system logo should be clearly displayed on all signs associated with the facility. Detailed information including system maps and accompanying schedules should be available at the facility. For further passenger assistance, public telephones should also be provided at the facility with the system telephone number clearly posted nearby.

PARK-AND RIDE:

SITE PLANNING/LOCATION

LOCATION BASED ON ACCESSIBILITY/DEMAND/SITE RESTRICTIONS:

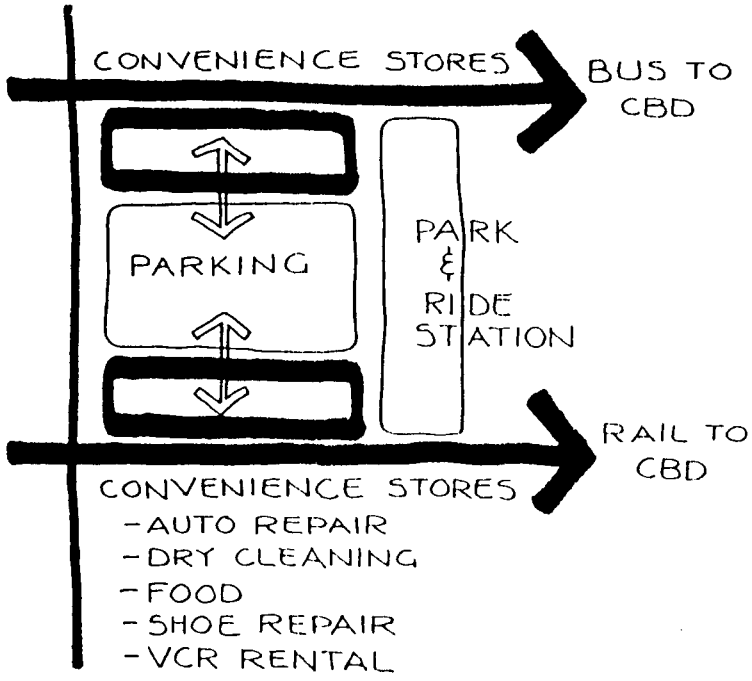
Park-and-ride stations depend on large numbers of passengers arriving and departing by auto. They should be located where ridership potential and access to the site is excellent.

Factors involved in the selection of a site for a park-and-ride station include:

* ridership potential
* accessibility to major corridor or expressway
* accessibility to local walk, auto or bus travel
* compatibility with surrounding land use
* current use of site
* size of site
* potential for site expansion
* cost of construction
* joint development opportunities

DOT, "Decision Procedures in Transit Station Design," pp. 7-8.

PARK-AND-RIDE:



SITE PLANNING/MARKET

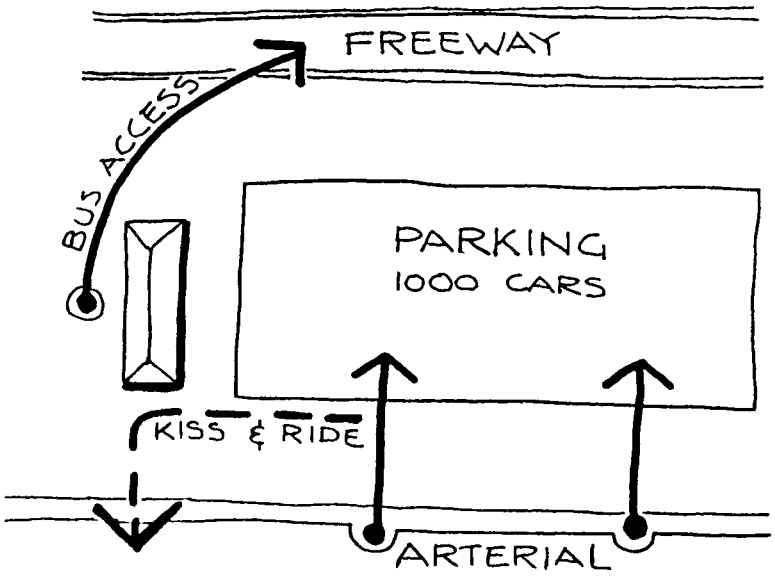
CONCESSIONS:

Private retail development constructed jointly on or near park-and-ride sites provide services and amenities which draw potential transit patrons. In turn, the transit system generates a market for these services and thus both benefit.

* Concessions should be located so they are conveniently located for transit users and not to interfere with pedestrian movements.
* On-site retail may include compact shopping malls, public cafeterias, newspaper stands, retail drugstores, office space, bookstores, tobacco shops, etc.
* Joint development can take advantage of policies benefitting both private and transit organizations. A park and ride site may have significant private development. The transit center/retail facilities can form the node of such a large joint development project.
* In-station retail may be flower kiosks, video outlets, snack bars, shoeshine shops, etc.

Murphy, pp. 349-355; "Boston Holds New 'T' Party," p. 122; IRT Guidelines and Principles, p. 50.

PARK-AND-RIDE:



SITE PLANNING/ACCESS

CONVENIENT AUTO ACCESS TO STATION AREA:

Due to the large volume of autos entering and leaving the site, a primary design objective must be to provide convenient and safe access to the station area. Auto access points should minimize conflicts of station-destined traffic with other highway traffic and can be improved by:

* minimizing problems associated with traffic congestion.
* developing special transit-only freeway on- or off-ramps.
* using transit priority traffic management techniques.
* devising route patterns that minimize left-hand turns.

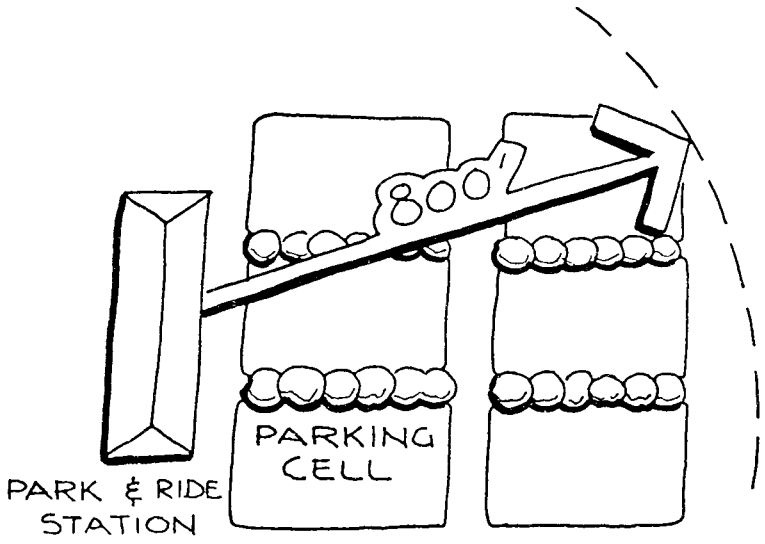
All facilities with more than 300 spaces should have at least two points of ingress/egress. Facilities of 1000-1500 spaces should have access to two or more adjacent streets in order to disperse peak volumes.

DOT, "Transit Station Renovation...," p. 144; DOT, "Transit Center-Based...," pp. 33-36; Petersen, pp. 414-415.

The ideal location of a park and ride facility is at a center of other activity with easy access to shopping and other amenities. There is a need to minimize bus/auto conflicts and to be consistent with objectives of transit operations and other activities.

Serramonte Transit Center Study, pp. 9-1 to 9-11.

PARK-AND-RIDE:



SITE PLANNING/ACCESS

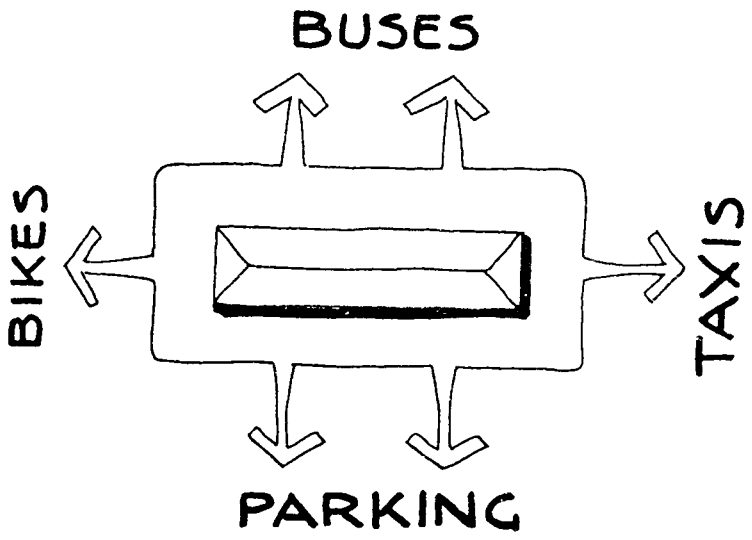
ADEQUATE PARKING:

Because most passengers arrive and depart by auto, parking is a major consideration in site design.

* Parking should be designed so that maximum walking distances be kept under 800 feet.
* Lots should not generally exceed 1500-2000 spaces at any single station and large lots should be broken into smaller "cells" no larger than 1.5 acres.
* Stalls should be laid out at right angles for maximum utilization of space and simplified two-way aisle operation.
* At least one entrance and one exit lane should be provided for every 300 stalls.
* Generally an area of 300-450 square feet per space has been allowed but may go higher (450-475 square feet per auto).
* Bicycle racks or storage space should be provided adjacent to pedestrian entrances.

Hoel, p. 2; Petersen, pp. 414-415; TRB, "Transit Terminal Facilities," p. 2; DOT, "Transit Station Renovation...," p. 144; Harvey, p. 118.

PARK-AND-RIDE:



SITE PLANNING/ACCESS

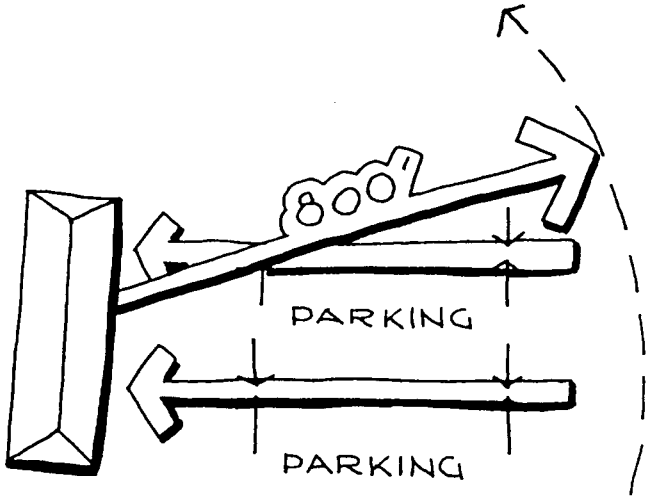
DISTINCT CIRCULATION AND SEPARATION OF FUNCTIONS:

In addition to large numbers of autos using the staion area, bus and taxi traffic is also present. Separate circulation routes and areas for specific functions must be provided and be clearly distinguishable.

* Passenger car movements should be separated from bus movements.
* Taxi and kiss-and-ride areas should be kept distinct from parking areas. Waiting space for 10-15% of the total number of spaces should be provided for kiss-and-ride users.
* Internal vehicular circulation should be largely self-regulating with a minimum of control devices and designed so traffic which gets in the wrong lane can recover within the station area. Also allow for drop-off immediately adjacent to the station entrance.
* Pedestrian paths should flow predominantly in one direction and should be as direct as possible with a minimum of pedestrian-vehicle conflicts.
* Commercial spaces should be located so activity generated does not interfere with transportation functions or the fare collection area.

Misek, p. 160; Petersen, pp. 407-417; Traffic Engineering, Dec. 1970.

PARK-AND-RIDE:



SITE PLANNING/ACCESS

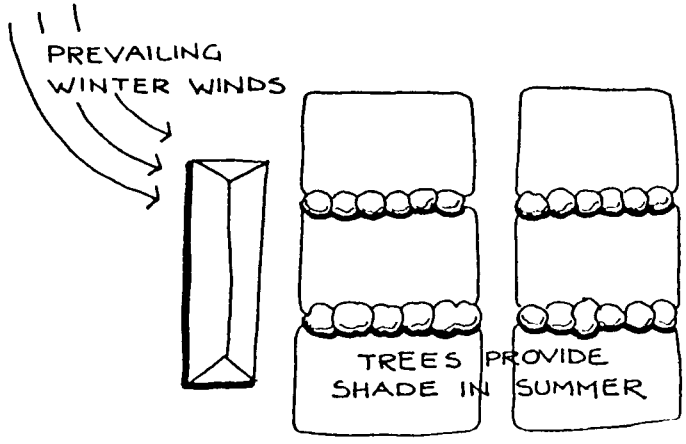
EFFICIENT PEDESTRIAN MOVEMENT:

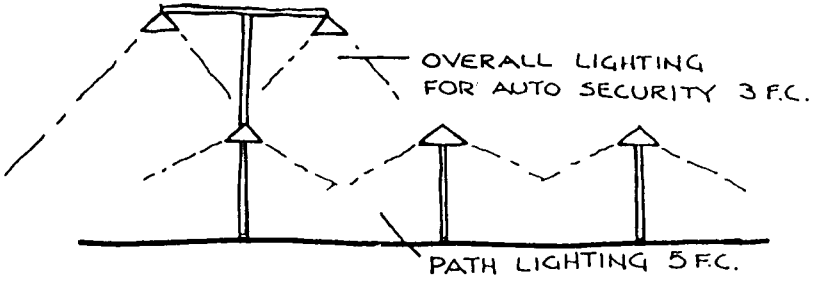
Due to relatively large volumes of passengers and destinations, it is necessary to provide safe, conflict-free pedestrian circulation paths.

* Paths should be as direct as possible with walking distances between parking stalls and fare collection not exceeding 800 feet.
* Distance normally accepted as "walk refusal distance" is one-quarter mile.
* Pedestrian crossings should be defined by a 12' wide change in paving texture or painted yellow warning stripes.
* Grade-separated crossings should <u>not</u> be used except in crossing vehicular rights-of-way with over 5000 vehicles per peak hour.
* Access from surrounding community should be encouraged by providing a direct route and paved walkways separate from parking areas.

Petersen, p. 415; DOT, "Transit Center-Based Transit System...," p. 35; DOT, "Transit Station Renovation...," p. 146.

PARK-AND-RIDE:





SITE PLANNING/COMFORT

ORIENTATION TO CLIMATIC FACTORS:

In order to maximize the degree of comfort for riders, site design should respond to the climate and weather patterns in any specific region.

* Proper site grading and landscaping can ameliorate harsh climatic conditions.

Misek, p. 155; Petersen, p. 414; Fruin (1), pp. 98-99.

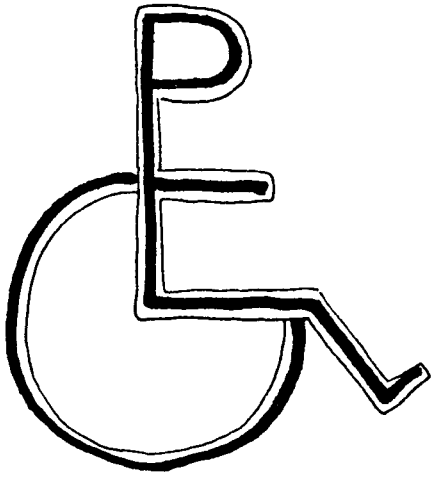
LIGHTING:

Because there may be times when private spaces need to be closed off from transit areas or times of low use of the system, security is a high priority.

* Architectural configurations can assist police and public surveillance by providing direct lines of sight.
* Provide minimum lighting levels.
* Minimum lighting levels are:
  * Self-parking areas: 2 fc
  * Pedestrian walkways: 3 fc
  * Kiss-and-ride areas: 5 fc
  * Entrance/exit roadways: 2 fc

Fruin (1), pp. 98-99; IRT Guidelines and Principles, p. 22.

PARK-AND-RIDE:



SITE PLANNING/COMFORT

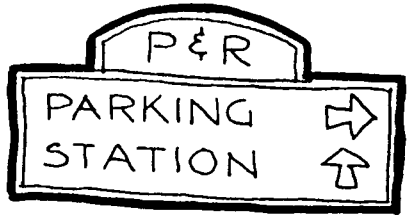
HANDICAPPED ACCESS:

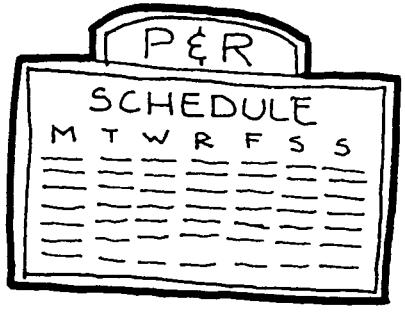
Because of special needs, design for handicapped access should be taken into consideration early in the design process.

* Public walks should be at least 48" wide with a continuing common surface (no steps) and a gradient no larger than 5%.
* At least one exit and entrance to the station should be usable by individuals in wheelchairs.
* A minimum of two parking spaces (12' x 20') should be provided at each station or one space for every 150 parking spaces. They should be as close to the station as possible and properly signed and striped.

IRT Guidelines and Principles, pp. 53-55; DOT, "Transit Station Renovation...," pp. 144-145.

PARK-AND-RIDE:





SITE PLANNING/INFORMATION

PROPER SIGNAGE:

Signage should provide clear, concise information which is easily understood by all users. It should also provide an identity for the system which is easily recognizable to potential users.

* Repeat color codes, symbols, sign shapes.
* Make message brief, positive and decisive and place in passenger lines of sight within the normal field of human vision.
* Signs directing motorists must be coordinated with appropriate federal and state highway standards.
* Illuminated signs should be provided at station entrances.

Fruin (2), pp. 17,19; IRT Guidelines and Principles, pp. 46-47.

PARK AND RIDE:

CONTEXTUAL FACTORS

- **HEAVY USE**
  - "CIVIC DESIGN"
  - MARKET OPPORTUNITIES
  - COMMUNITY FOCUS
- **MIXED USE**
  - FUNCTIONAL COMPATIBILITY
  - VEHICLE / TRANSPORT / USER MARKET CIRCULATION

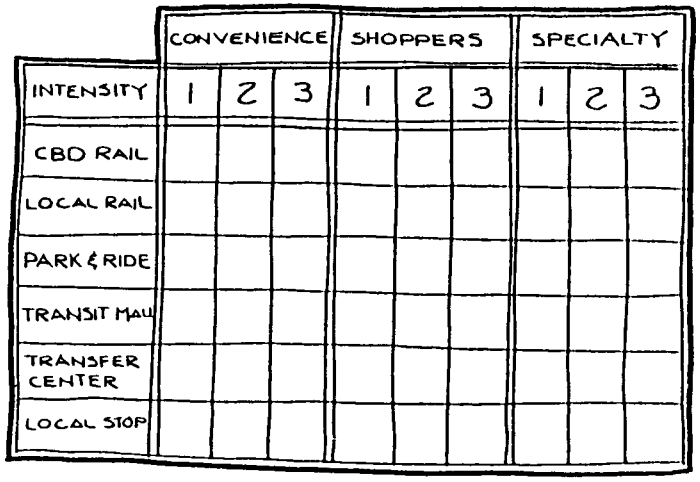
STATION DESIGN/CONTEXT

A park and ride facility is an important public location in the suburban parts of a metropolitan area. Low density suburban areas with dispersed facilities are not conducive to meaningful public centers; in fact shopping centers are the major areas of public congregation engendering continuing debate whether these privately owned centers are indeed de facto "public" gathering places.

The park and ride facility therefore is one of the few highly frequented locations in the low density suburb. It is used more frequently and by more persons than most public buildings. A park and ride facility is not only a neighborhood facility -- its service area of three to six miles can be a large community of an entire sector of a metropolitan area.

A stand-alone park and ride center is of an importance which belies its moderate size. The needs for multiple bus bays and/or rail access, vehicle access, waiting and automobile parking, besides joint development buildings which may form part of the center, makes this a significant undertaking.

PARK AND RIDE:



	CONVENIENCE			SHOPPERS			SPECIALTY		
INTENSITY	1	2	3	1	2	3	1	2	3
CBD RAIL									
LOCAL RAIL									
PARK & RIDE									
TRANSIT MALL									
TRANSFER CENTER									
LOCAL STOP									

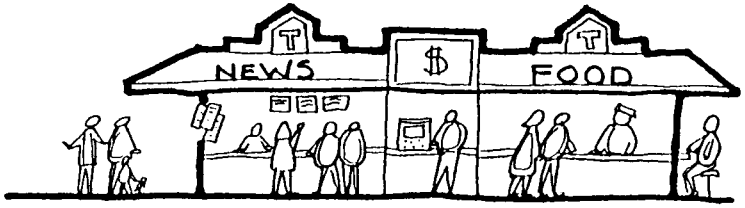
STATION DESIGN/MARKET

A park and ride facility may be located in an existing, medium scale or larger, commercial area but is as likely to be located as the nucleus of, or part of, a developing area where more parking is available.

* A park and ride station with a larger ridership will include some limited services as well as expanded retail opportunities directly related to transit use. These services will include cleaning, shoe repair and photo processing and additional retail may include VCR tape rental, expanded food opportunities -- coffee, doughnuts, cookies and flowers.
* An auto service station is naturally associated with a park and ride facility. This would provide normal gas station functions as well as convenient repair services while the owner is at work.
* If a park and ride is located in conjunction with a major mall, the retail services at the mall can gain market from transit use and direct transit related retail may be less. Careful consideration should be made of the specific location of the park and ride facility and the mix of retail activities located near it.
* As part of a joint development project the park and ride station could have up to a few thousand square feet of retail area. Eating places become feasible, as well as business services such as stationers, copy shops and express mail; and a small lunch-oriented food stores. Some stores which may have carried a few types of products at the smaller scale facilities may now be a number of specialized retailers.
* Telephone service should be provided at all park and ride stations.
* Taxi service and specialized vehicle service should be accommodated. A dedicated phone to the local cab or specialized service should be present and waiting zones should be included.

Serramonte Transit Center Study, pp. 8-1 to 32.

PARK AND RIDE:



STATION DESIGN/COMFORT

THE FACILITY SHOULD BE FUNCTIONAL:

* Passenger platforms and waiting areas should be designed to a high level of service standard in circulation, waiting and queuing.
* Provide access to handicapped persons to all areas.
* The design of sheltered areas should consider the local climate.
* Provide necessary functions such as bathrooms, drinking fountains and trash receptacles.

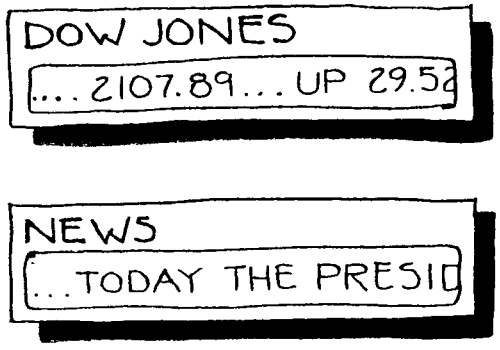
Fruin, "Pedestrian...".

AN ATTRACTIVE AND COMFORTABLE PEDESTRIAN SHOPPING/WAITING ENVIRONMENT SHOULD BE PROVIDED IN THE PARK AND RIDE FACILITY:

To attract and keep ridership the transit environment must provide a level of comfort for its users. The transit center, with most passengers using timed transfers, will not require many facilities.

* Provide adequate seating. The seating should accommodate 10% of the ridership at peak hours. The seating should be high quality, durable and easy to maintain.
* Provide bathroom facilities, perhaps in conjunction with associated commercial activity. These can be of minimal size and controlled by transit personnel.
* Provide a barrier-free environment.
* The retail and service concerns should be accessible via a protected "concourse" area for the passengers to use while shopping and waiting. In a joint development project or heavily used park and ride station the concourse may be a substantial area that links a number of buildings.
* Allowance for expansion of the retail area should be included in plans of the facility. Additional vendors may include sales from peddlers' carts as well as kiosks. Utilities for such activities should be built in.

PARK AND RIDE:



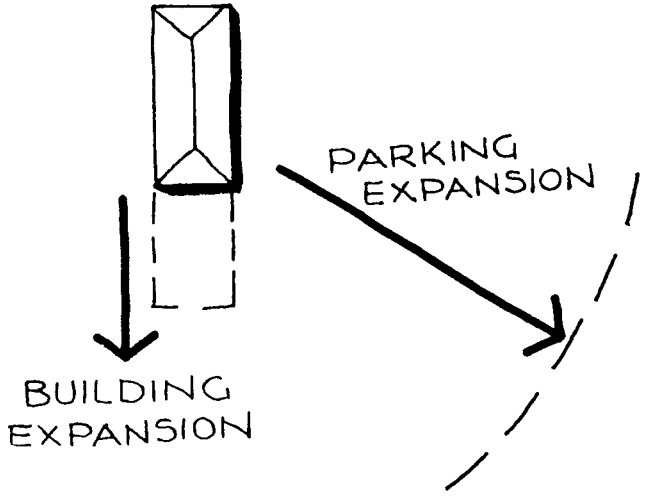
STATION DESIGN/COMFORT

PROVIDE AMENITIES AT PARK AND RIDE STATIONS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economies of scale.

* Provide amenities appropriate to local ridership at centers. This may be for example stock market quote/news terminals, sports broadcasts, temperature/weather forecasts.
* Transit aides may assist passengers at centers during events that attract many persons unfamiliar with the system.
* Provide information on local events and information activities.
* Provide appropriate architectural amenities such as fountains, skylights, and landscaping.

PARK AND RIDE:



STATION DESIGN/COMFORT

ACCOMMODATE GROWTH AND CHANGE IN THE FACILITY OVER THE LONG TERM:

* Provide an "open" plan in the building/concourse area which allows for future modifications.
* Provide for a generous use of space to accommodate future contingencies.
* Provide utilities which have the capacity to supply additional growth and change.
* Ceiling heights should be used which will allow for future changes.

Lynch, "Good City Form," pp. 171-186.

THE PARK AND RIDE STATION SHOULD REMAIN ATTRACTIVE OVER TIME:

* Provide materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle.
* Use a replacement reserve account to fund future improvements.
* Use high quality materials and design.
* Provide sufficient areas of landscaping.

PARK AND RIDE:

STATION DESIGN/INFORMATION

PROVIDE ORIENTATION AND SYSTEMS INFORMATION:

A park and ride station has a relatively low level of complexity. However the number of users in such a center is high and some users will be unfamiliar with the system.

* Provide overall system routing, fares and local areal information at a central location in the building.
* Provide individual route information -- a schedule and route map -- within the station and every 100 feet on platforms.
* Provide an active sign board identifying departure time of trains.
* Provide manned information services at all park and ride stations.
* Where appropriate provide multilingual signs.

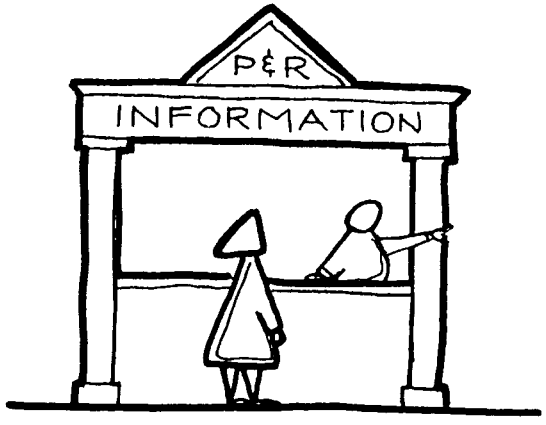
Crosby, Fletcher and Forbes, "Sign Systems Manual;" Follis and Hammer, "Architectural Signage and Graphics."

HEAVILY USED TRANSIT FACILITIES ARE AN EXCELLENT LOCATION FOR ADVERTISEMENTS:

Such advertisements also provide information to the public.

* Park and ride stations should provide designated areas to post local events at central locations.
* Provide designated areas in which to place advertising.

PARK AND RIDE:



STATION DESIGN/COMFORT

CIRCULATION AND ORIENTATION WITHIN THE PARK AND RIDE STATION ENVIRONMENT SHOULD BE FACILITATED:

The park and ride station environment is of moderate size and little complexity and should be easily "legible" to most passengers.

* The center should be designed as one large "place" with visual and circulation access to all platform areas.
* Route categories, such as express/local, by direction, etc. should be distinguished by color coding.
* Provide manned information/ticket booths in park and ride stations.
* Clearly identify direction of travel on station platform.

Passini, "Wayfinding in Architecture."

PARK AND RIDE:

STATION DESIGN/SAFETY

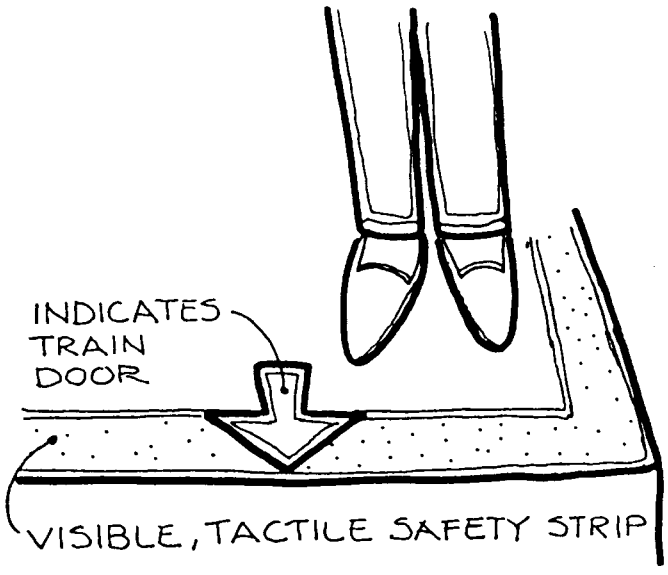
THE PARK AND RIDE STATION ENVIRONMENT SHOULD MINIMIZE CRIMINAL ACTIVITY AS WELL AS PASSENGERS' ANXIETIES ABOUT SUCH ACTIVITY:

A high proportion of transit riders are elderly persons and women. These groups are often the victims of criminal activity. Increased ridership will result with the perception that the transit system is a safe system.

* Provide a design that facilitates surveillance of the park and ride station facilities. This includes an "open" design, avoidance of hidden areas and high levels of lighting.
* Minimize usable areas and entrances to station at times of minimal travel demand.
* Provide transit personnel at station during hours of operation. If station is unmanned at times provide electronic surveillance and/or roving security personnel.
* The park and ride station should be the major pedestrian node for all uses in the development.
* Retail and other activities will increase security through the use of "eyes on the street".

Newman, "Community of Interest," p. 143.

PARK AND RIDE:



STATION DESIGN/SAFETY

THE TRANSIT ENVIRONMENT SHOULD INCORPORATE A HIGH DEGREE OF PASSENGER SAFETY:

A park and ride station is a busy environment at peak hours. The number of elderly passengers and the speed, size and control of vehicles also dictates stringent safety requirements.

* Provide easily visible and tactile safety strips at edge of platforms.
* Provide clear location of queuing areas at stopping areas.
* Provide guardrails and guiderails to control circulation at points of crowding.
* Stop signs, crosswalks and control signals should be appropriately used where pedestrian traffic crosses auto and bus traffic.

PARK AND RIDE:

OPERATIONS/MANAGEMENT

FACILITIES MAINTENANCE:

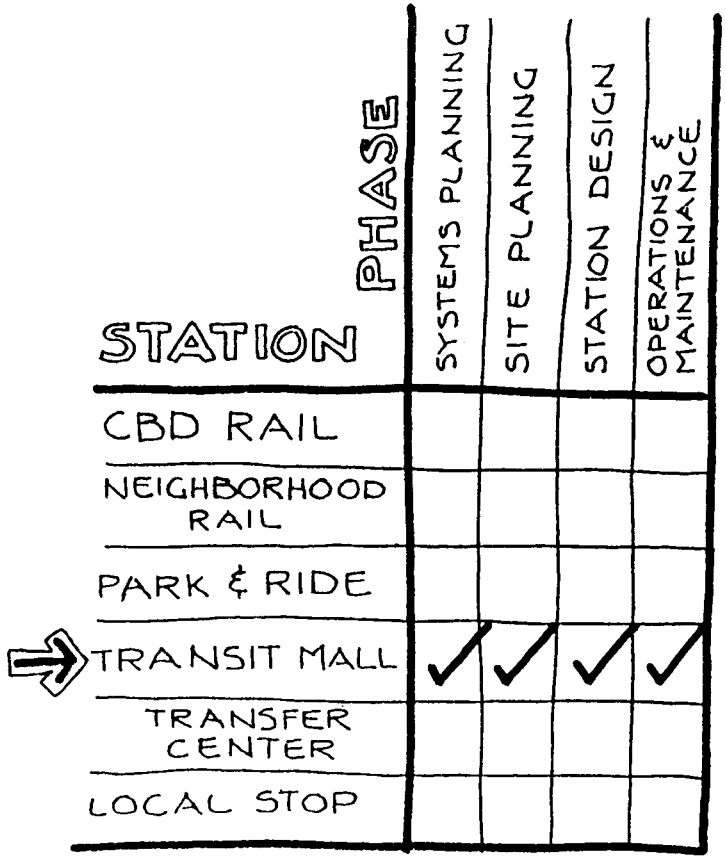
A park and ride facility will require various types of ongoing maintenance including the following:

* Snow removal.
* Pavement patching.
* Sign maintenance.
* Landscaping and mowing of grass.
* Updating of transit route and schedule information.
* Servicing of vending machines and equipment.
* Removal of abandoned vehicles.

INCOME/EXPENSES:

Some transit systems may choose to charge for parking at their stations. Parking rates depend upon supply/demand conditions as well as system policy. Parking rates can vary by location in the lot (i.e. walking distance to transit vehicles), time of day (peak versus off-peak rates), duration, and type of vehicle/user. Funds can be collected through monthly or weekly passes, parking meters or parking attended gate operation. In each case it will take an effort to collect funds and to maintain equipment.

TRANSIT MALL:



OUTLINE

CONSIDERATIONS ADDRESSED IN TRANSIT MALL PLANNING AND DESIGN:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

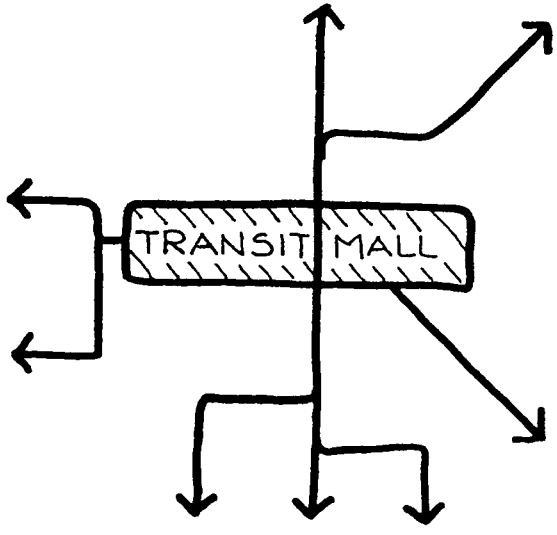
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location
* Market
* Access and circulation
* Information--image

STATION DESIGN
* Context
* Market
* Information--image
* User Comfort
* Safety

OPERATIONS/MANAGEMENT

TRANSIT MALL:



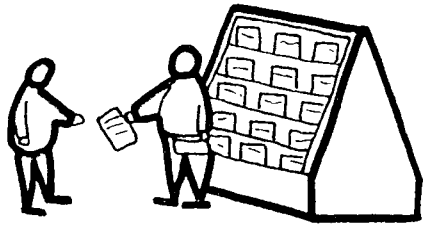
DESCRIPTION

The transit mall is one of the most important transit "nodes" in the metropolitan area. As many as 10,000 persons may be working within one block of any stop on the transit mall. Only the CBD rail station with its very large volumes and downtown location competes with the transit mall in terms of volume and perceived importance. The transit mall, however, can have much more impact on the physical quality of the city because of its size and its presence at ground level.

The transit mall site is one of the most highly accessible places in the metropolitan area. A transit mall may have five to twelve or more bus and/or light rail transit routes converging on it. These routes are coordinated in time or pulsed, to minimize time delays in transferring between routes. The transit mall not only includes those transferring within the same mode but also those changing travel modes -- for instance from a bus to commuter rail. A minimum of a few thousand persons will be directly using the transit mall at peak hours.

A transit mall is based on a large activity center in or near the center of a CBD area or in a large suburban activity center. These locations are large, fairly dense developments, containing millions of square feet, located in suburban areas. In some cases suburban activity centers are larger developments than the traditional CBD center.

TRANSIT MALL:



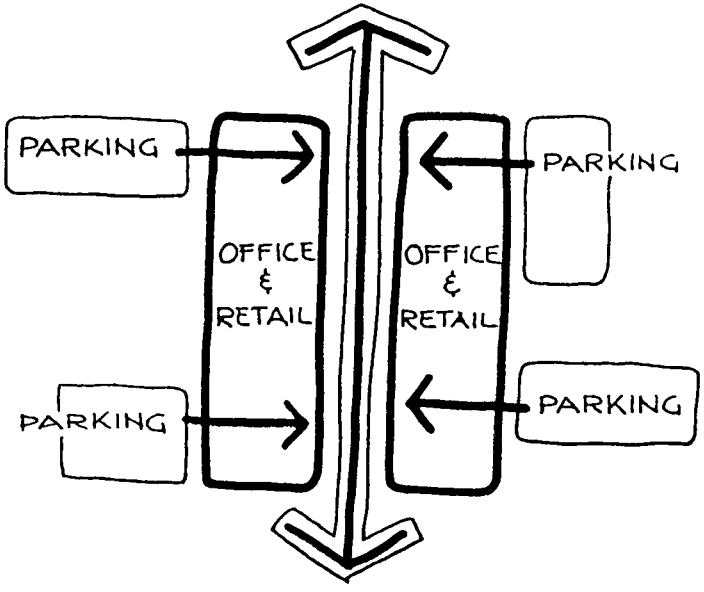
JOINT DEVELOPMENT OPPORTUNITIES:

Depending on the scale of the transit mall, there is a wide range of activities that can be incorporated. Demand is usually high in downtown locations for a full range of goods -- from convenience and impulse items to shoppers' goods. A transit mall will attract additional demand to these locations.

Access to the transit mall is excellent -- it is one of the most accessible sites in the metropolitan area. Substantial office and retail uses are viable because of the easy access by a number of modes. Well located transit malls may also work with industrial or business parks. Other high demand generators may also be coordinated with the location and design of a mall. For example sports arenas may have a capacity of fifteen to fifty thousand persons and public transit is an important factor in accessing these facilities. Institutions, such as colleges, have substantial numbers of students, many of whom need access by public transit. Transit malls integrated into proposed or existing developments are also advantageous in terms of efficiencies and market for both the project and the users.

Transit malls create a strong potential for retailing and services. Access is quick and convenient from a variety of bus routes. Well-designed transit malls will also provide safe, convenient walkways for potential shoppers to visit a variety of retail establishments, ranging from department stores to specialty shops to restaurants and theaters as well as public buildings such as museums, libraries, etc.. Existing stores can use mall seating as outdoor eating areas, creating vitality on the mall. Other on-mall activities can include pushcarts, kiosks and semipermanent structures selling a variety of merchandise.

TRANSIT MALL:



JOINT DEVELOPMENT OPPORTUNITIES:

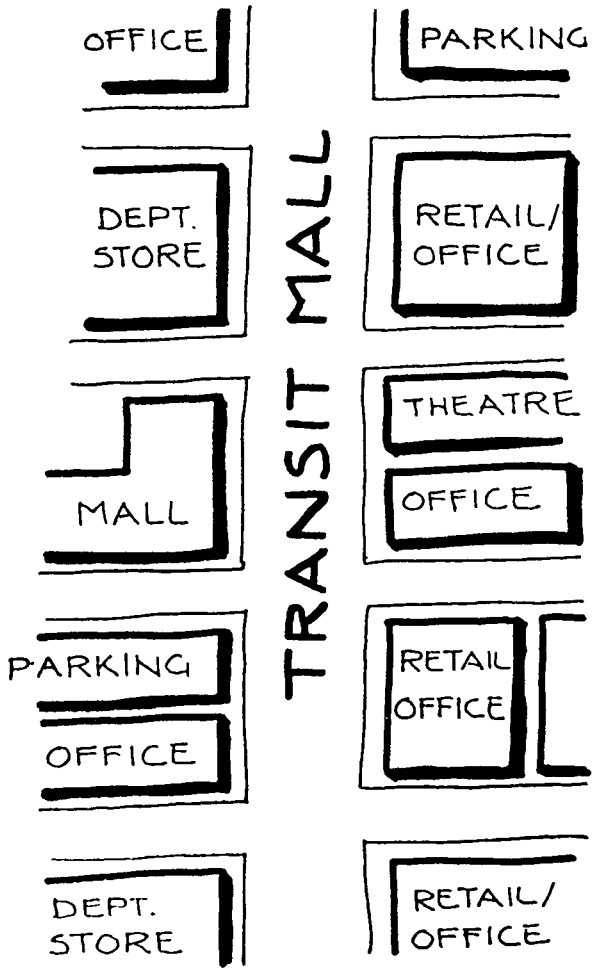
Transit malls, because of the high density areas surrounding them as well as the heavy volume of passengers, can support substantial amounts of retail activity. A variety of convenience goods and services are possible at this scale including snacks, newspapers and magazines, flowers, and food. Combined with destination uses, such as retail or offices, the amount of goods and services can substantially increase.

One major concern among retailers along proposed transit malls however, is loss of business due to restricted automobile access. One way to overcome this problem is to provide convenient, off-street parking at regular intervals along the mall. Customers may then access retail establishments from the mall. Customers may also use shuttle services or other forms of mass transit to reach other parts of the CBD without additional driving.

Scale: Regional level. Typically there may be a single transit mall in a metropolitan area. However in larger metropolitan areas with a multi-nucleated pattern of development secondary transit malls may be feasible.

Station Capacity: A minimum of two to three thousand passengers is served during each peak hour.

TRANSIT MALL:



SYSTEMS PLANNING/LOCATION

LOCATION OF TRANSIT MALL:

Site selection of transit malls can follow two approaches. First, transit malls can be developed to serve existing activity centers in the immediate vicinity. Transit malls can provide greater access for work and shopping trips into the CBD, particularly if parking costs and auto travel times are high. Existing malls can also provide a focus for renovation and redevelopment of activity centers within the CBD.

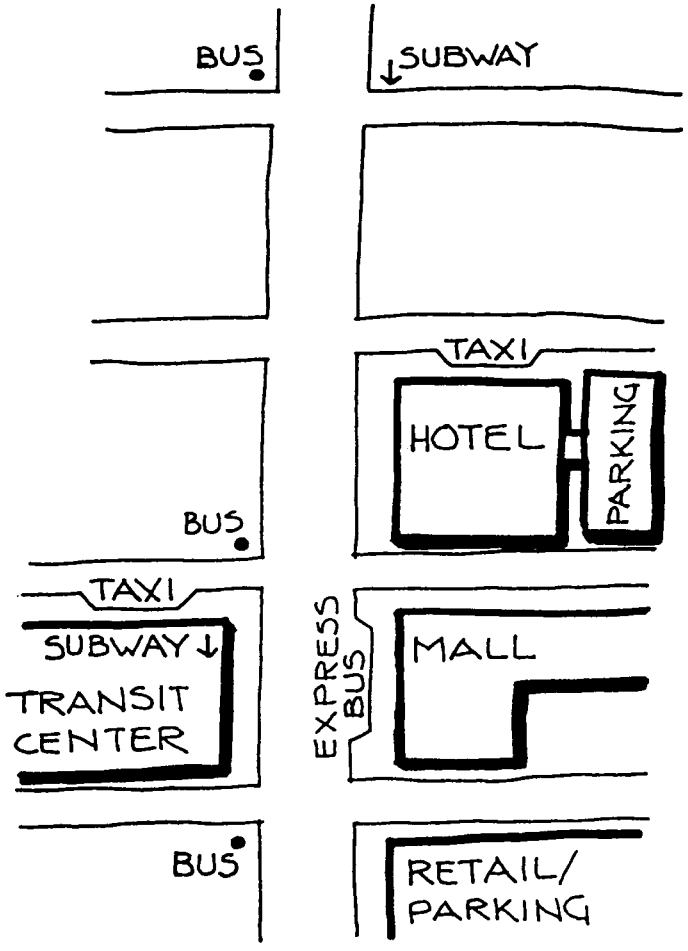
An alternative approach is to locate new transit malls in underdeveloped or vacated areas on the fringe of the CBD in order to stimulate new growth and development; new development may follow in the form of high density residential, retail and office land uses. The transit mall would be a means to redirect urban development into vacated or underdeveloped areas.

Where physical constraints are concerned, site selection of transit malls should consider the following:

* Locate transit mall well within 1/4 mile maximum walking distance of existing or proposed major trip generators.

* Select sites away from congested arterials, as the mall should be closed to general traffic.

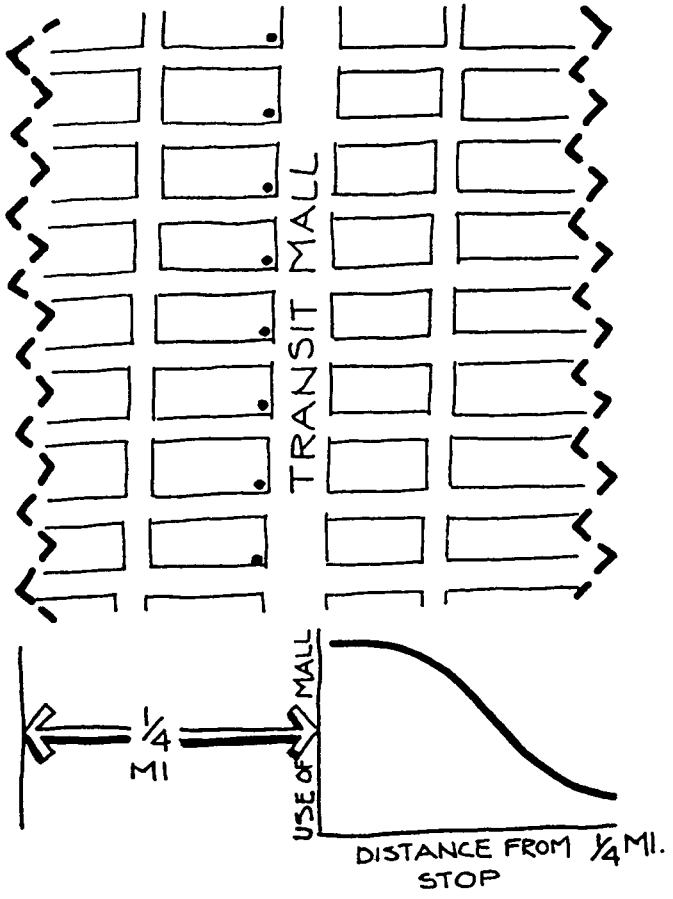
TRANSIT MALL:



SYSTEMS PLANNING/LOCATION

* Provide easy access to buildings by automobiles and trucks from other streets.
* Locate malls on extended street segments with a minimum of turning conflicts and cross traffic.
* Locate malls on streets that are sufficiently wide to support loading areas, shelters, loading bays and layover areas.

TRANSIT MALL:



SYSTEMS PLANNING/MARKET

EXTENT OF MARKET AREA AROUND TRANSIT MALL

Research has shown that bus passengers will generally not walk more than 1/4 mile to or from a bus stop, and the average walking distance is considerably less than 1/4 mile. Therefore, the mall should be placed well within the 1/4 mile walking distance from any desired activity center. Moreover, individual stops along the mall should be spaced sufficiently close to minimize average walking distances to desired activity centers.

As with other bus-related facilities, it cannot be assumed that the outer boundary of the market area for individual stops will be will be uniform at the limits of the maximum walking distance, as passengers must follow paths along the street network. However, with sufficiently close stop spacing, the effects of network access on the shape of the market area are minimized. In addition, the shape and extent of the service area can also be modified by increasing the pedestrian range:

* Introduce open spaces and walkways between streets to reduce network distances to the mall -- particularly in the direction of high density office and retail developments.

* Introduce mid-block crosswalks and/or grade-separated walkways over busy streets.

TRANSIT MALL:

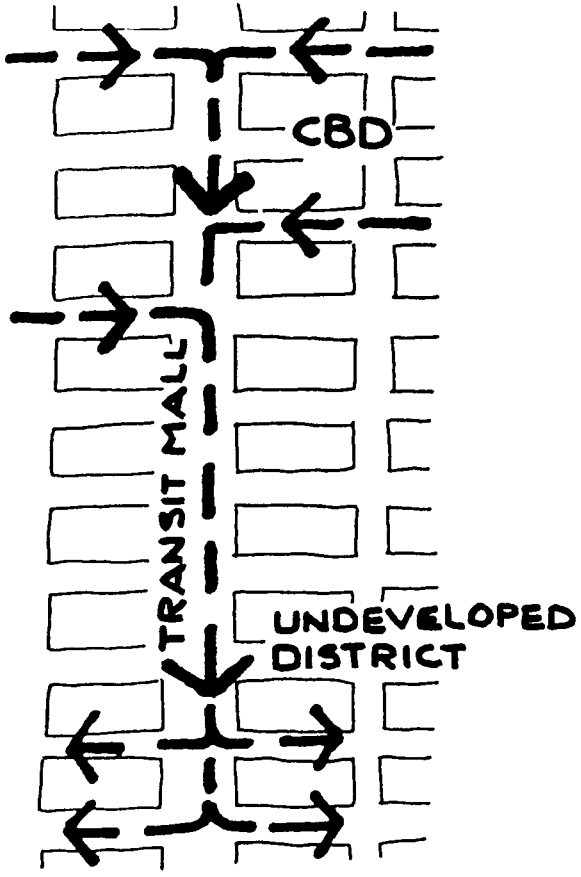
SYSTEMS PLANNING/MARKET

* Construct enclosed skyways or underground walkways in cities with cold winter climates.

* Alter signalization at intersections to increase pedestrian times traveling in the direction of the station.

Canadian Transit Handbook (1985), Chapters 4 and 27; Schoppert and Herald (1978).

TRANSIT MALL:



SYSTEMS PLANNING/CONNECTIONS

ROUTE ALIGNMENT:

* All bus routes serving the CBD should be rerouted through the transit mall.

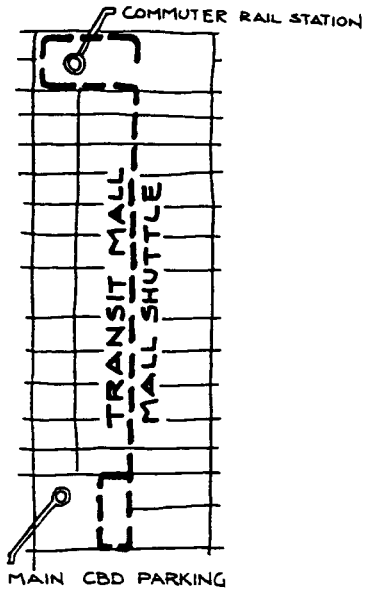
* Where possible, routes in CBD areas should stop at every block (300 ft.) to facilitate transfers between routes and to maximize pedestrian range to the mall from activity centers. If there are a large number of routes, it may be necessary to use a skip-stop arrangement.

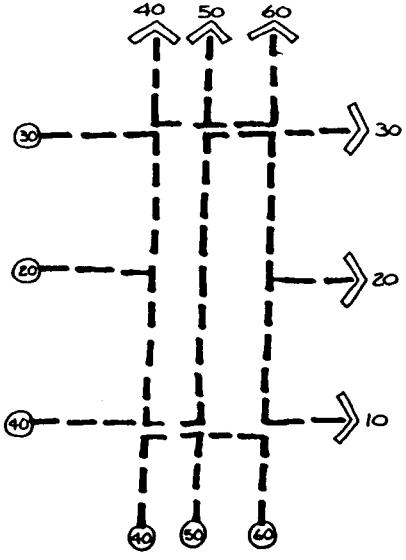
* Buses should maintain timed transfer whenever possible at designated stops on the mall.

* Where possible, buses should enter and exit the transit mall on arterials that are relatively free of congestion.

Canadian Transit Handbook (1985), Chapters 11 and 27; Schneider, et al. (1980); Vuchic, et al. (1981).

TRANSIT MALL:





SYSTEMS PLANNING/CONNECTIONS

MAXIMIZE INTERMODAL CONNECTIONS:

Transit malls can comprise one component of an integrated urban transit system consisting of a variety of modes. Consideration should be given to maximizing connections to as many alternative modes as possible:

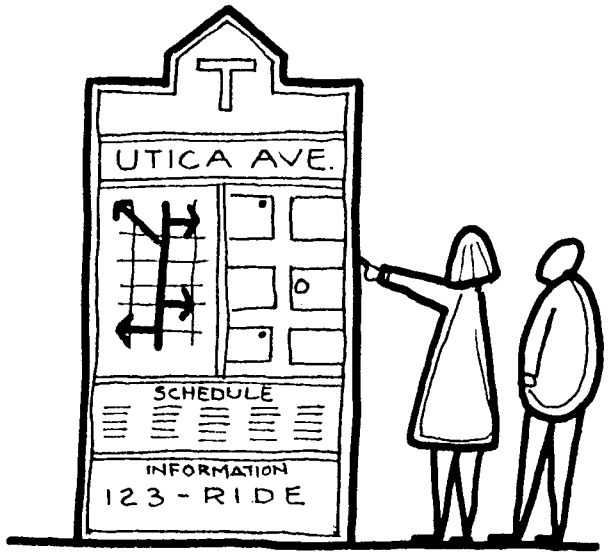
* Provide for taxicab loading/unloading on the mall. Also provide space for specialized vehicles for the handicapped and privately operated shuttle services (e.g. airport limousine, etc.).
* Provide access to heavy rail (e.g. stairways to subway or elevated rail platforms), or to intersecting light rail lines. Signs should be clearly posted to direct passengers to these alternative modes.
* Provide access to shuttle bus services and people movers in the downtown area.
* Provide access to skyways and underground walkways to office and retail activity centers, and to parking structures.

ADDITIONAL SHUTTLE BUS SERVICE:

In larger CBD areas, downtown shuttle services or free fare zones can transfer passengers to activity centers located beyond the maximum walking distance. These frequent shuttle services can also provide convenient opportunities for travel along extended malls for passengers at reduced fares or at no cost. Expenses of such services can be subsidized through contributions of special districts or through cross subsidy from other transit operations.

Pushkarev and Zupan (1982), Chapter 3.

TRANSIT MALL:



SYSTEMS PLANNING/INFORMATION

ROUTE INFORMATION AND SIGNAGE:

* The transit mall should have its own strong identity within the CBD. Signs should direct passengers to the mall from all major activity centers within the immediate vicinity of the mall.

* The mall itself should be identified at all major points with signs bearing the transit system name and logo.

* Shelters should be constructed at all major stops in the mall with consistent architectural form to identify the mall with the transit system. Each shelter should contain maps showing all routes served by the stop. Schedules should accompany all maps. The transit system telephone number should be posted next to public telephones at each shelter for further passenger assistance.

* Street maps of the CBD showing major areas of interest and activity centers within the immediate vicinity should be posted at major stops. Points of interest along bus routes served by the stop should also be displayed on transit system maps.

Canadian Transit Handbook (1985), Chapters 11 and 27; Schneider, et al. (1980); Vuchic, et al. (1981).

TRANSIT MALL:

SITE PLANNING/LOCATION

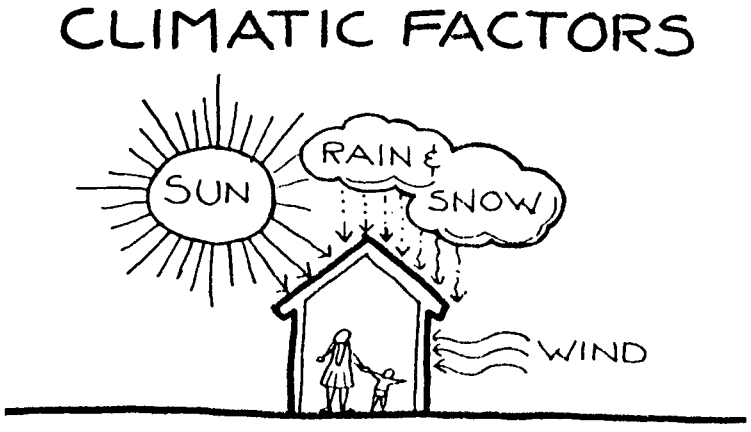
LOCATE STOPS TO PROVIDE CONVENIENT ACCESS TO ADJOINING RETAIL AND OFFICE SPACE:

In downtown sites with heavy pedestrian traffic there is a demand for convenient access to shopping, restaurants, hotels, office space, banking, etc. The design of transit malls can provide such connections along the circulation paths of transit users.

* Design access routes so people may combine a number of activities in one visit.
* Encourage a mixed-use environment in the initial planning stages.
* Allow for site expansion to incorporate more development in the future.

Kaplan, p. 5; Lovely, p. 21; "Denver's 16th St. Mall," pp. 7-9.

TRANSIT MALL:



SITE PLANNING/LOCATION

LOCATE TRANSIT SHELTERS TO AMELIORATE HARSH CLIMATIC EFFECTS:

Transit malls are places of strolling, shopping and people-watching as well as heavily used transit areas. Many areas for sitting and relaxing should be provided as well as circulation paths which take advantage of good weather. Site designs need to include elements that insure a degree of comfort for riders and provide them with shelter from wind, rain and uncomfortable sunlight.

* Provide shelters in specific waiting areas.
* Offer amenities designed for comfort and pleasure such as skylit mall areas, open-air plazas as entrances to buildings and spacious circulation paths.
* Design to take advantage of pleasant weather as well as extending its use during uncomfortable seasons.

Lovely, p. 21; McClelland, p. 112; "Denver's 16th St. Mall," p. 7.

TRANSIT MALL:

SITE PLANNING/LOCATION

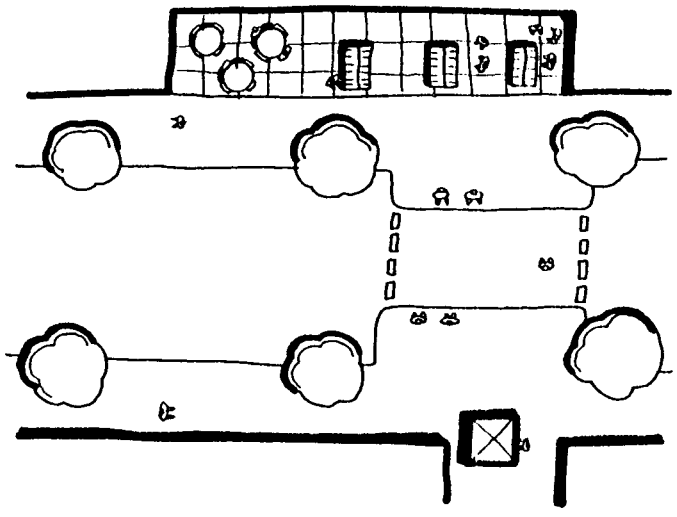
SITE DESIGN IN CONTEXT WITH SURROUNDING NEIGHBORHOOD:

Transit malls should be designed to not only enhance the attractiveness of the system, but also to relate to the neighborhood and cityscape in which they are located. This provides an identity that creates a positive image as well as increasing the use of the facilities. Factors to consider are:

* means of access
* traffic characteristics
* character of the design
* style and materials of surrounding buildings
* lighting
* circulation
* landscape design

Bosker, p. 51; Kaplan, p. 5; Lovely, pp. 20-21; Quinby, p. 79; "Denver's 16th St. Mall," p. 7.

TRANSIT MALL:



SITE PLANNING/MARKET

DEVELOPMENT OF RETAIL ON SITE:

Great numbers of people and activities are cited as factors in popular and successful public spaces. The number of transit passengers using the mall as well as the large population within a short walking distance make the feasibility of large amounts of retail and public activity quite good. Several means of attaining this activity on transit malls are for site designs to make provisions for:

* nearby food and beverages
* flower vendors
* newspaper and magazine vendors
* Pushcarts, street vendors
* Special events such as art fairs, concerts, etc.
* staged or spontaneous entertainment
* banking services
* information kiosks
* theatre ticket sales booths

These should be located as to not interfere with transit service access or predominant pedestrian circulation flows.

Kaplan, pp. 4-5; McClelland, p. 112; "Denver's 16th St. Mall," p. 7.

TRANSIT MALL:

SITE PLANNING/ACCESS

SEPARATION OF PEDESTRIAN/BUS/AUTO/TRUCK DOMAINS:

In order to reduce trip time by increasing the efficiency of the movement of vehicles and to provide safety for all users, pedestrian, bus and auto traffic be kept as distinct and separate as possible in CBD areas.

* Markings, pavings and signs are to be used to indicate which type is allowed in any area and to designate crossings.
* Most malls should be closed to auto traffic which is to be rerouted to parallel streets.
* If complete closure is not possible throughout the mall, individual blocks can be closed to private auto traffic to prevent through movement.

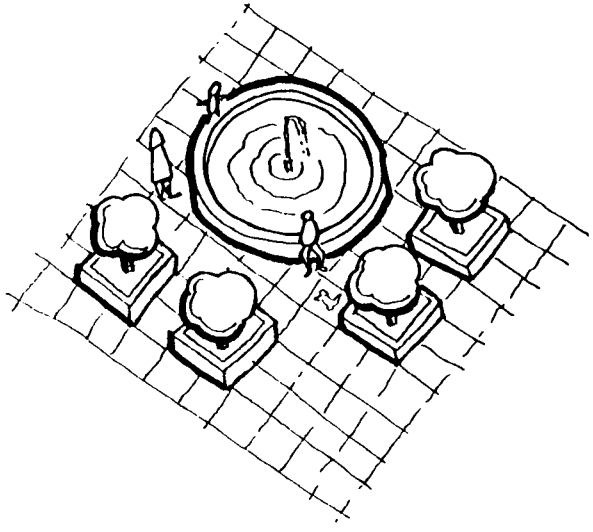
Lovely, pp. 20-21; Petersen, p. 417; "Transit Around the Country," p. 117.

PROVIDE FOR ACCESS FOR EMERGENCIES AND FOR NECESSARY DELIVERIES:

Provisions should be made for access for fire equipment, ambulances, police vehicles, etc. during emergencies.

Truck deliveries to buildings should be done from other streets unless it is absolutely necessary for them to use the mall street. Delivery times may be restricted to early morning or evening hours.

TRANSIT MALL:



SITE PLANNING/INFORMATION--IMAGE

LANDSCAPING:

Landscaping adds attractiveness to the mall area as well as acting as circulation indicators and buffers. This can add to efficiency and the well-being of potential users.

* Use plants and trees which will add character to the urban setting.
* Encourage water features and plantings indigenous to the area and climate.
* Provide small areas of privacy as well as larger central gathering spaces.
* Maintain open sight lines and visibility in order to avoid cover for criminal activity and to provide a feeling of security.

Lovely, pp. 20-21; Kaplan, pp. 4-5.

TRANSIT MALL:

SITE PLANNING/INFORMATION--IMAGE

PROPER SIGNAGE:

Downtown sites have the largest proportion of passengers unfamiliar with the entire system. Transit patrons need clear, concise information in order to make quick decisions and avoid getting lost or missing scheduled stops. Signs also provide directions to demand generators as well as advertising products and services.

Information needed on site:
* station and stop identification
* route map and schedule display
* system maps, directories, "You-are-here" displays
* passenger assistance telephones
* "active" displays of arrivals/departures
* aids to handicapped persons

Sign placement should be determined by passenger lines of sight and normal fields of vision. Guidelines include:
* brevity
* repetition of color, symbols and shapes
* clear terminology
* advertising and directional signing kept separate

Fruin (2), pp. 9-10; Lovely, p. 21.

TRANSIT MALL:

SITE PLANNING/INFORMATION--IMAGE

SECURITY:

Because there will be very little activity at times on the mall, it is important that all users feel secure on the site at all times.

* Features and structures should be designed in order to provide direct lines of sight for public and police surveillance.
* Appropriately high levels of lighting should be provided for all areas during evening and night use.

Fruin (1), pp. 98-99; Lovely, p. 21.

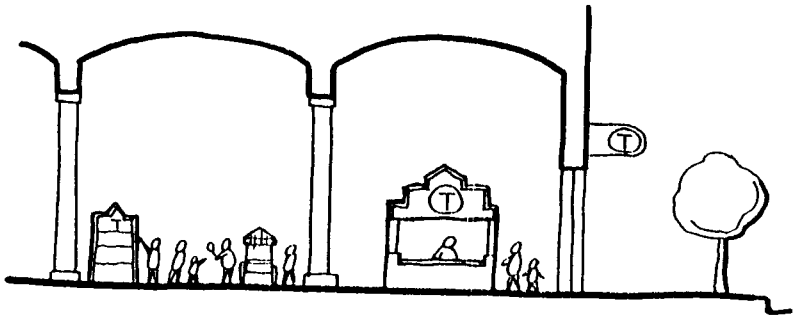
HANDICAPPED ACCESS:

Sites are required to be accessible to all handicapped persons. Designing for handicapped access should not merely adhere to minimum standards but should be designed for comfort and pleasure.

* All walks should be at least 48" wide and have a continuing common surface with a gradient not greater than 5%.
* Adjacent retail, office and public buildings and platforms as well as waiting areas for public transit should also provide access for wheelchair patrons.

IRT Guidelines and Principles, p. 53.

TRANSIT MALL:



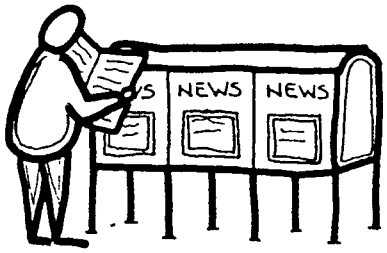
STATION DESIGN/CONTEXT

CONTEXT:

A transit mall is a most important location in the metropolitan area. It is used by many persons using transit; however its major use is that of an urban amenity for the great numbers of persons working in the market it serves -- a landmark street in the city which is designed for shoppers, strollers and for enjoyment by the public. It is a street that attracts persons from the larger CBD area.

A transit mall is a few blocks long (two to four blocks minimum) in a downtown area in order to accommodate the multiple bus stops, and taxicab access required. Depending on the local situation, such as street width, a transit mall may also contain automobile access and parking.

TRANSIT MALL:



STATION DESIGN/MARKET

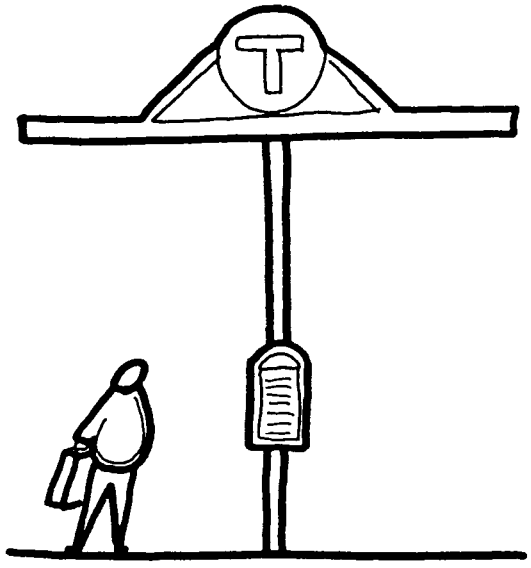
THE SUPPLY OF GOODS AND SERVICES SHOULD MATCH THE MARKET DEMAND AT VARIOUS SCALES OF TRANSIT MALLS:

A transit mall provides a major opportunity for a response to market demand. Retail facilities on the transit mall can be the strongest aggregation of any transit facility.

* The center should provide a few thousand square feet of retail area oriented towards traditional transit related selling activities -- newspapers and magazines, tobacco and candies, and some walk around food products such as ice cream, soda, pretzels and hot dogs.
* A mall should also include services such as cleaning, shoe repair and photo processing, VCR tape rental, expanded food opportunities -- coffee, doughnuts, cookies and flowers.
* Eating places are strong tenants on transit malls because of the high daytime populations. During good weather eating places can open onto the mall and seating can be located outdoors.
* Business services such as stationers, copy shops and express mail should also be located on the mall as well as a variety of shoppers' goods, i.e., men's and women's clothing, etc.
* A significant amount of telephone service should be provided at all transit malls.

Francis, "The Making of Democratic Streets."

TRANSIT MALL:



STATION DESIGN/INFORMATION–IMAGE

ACCOMMODATE CHANGING ACTIVITIES IN THE TRANSIT MALL OVER THE LONG TERM:

* Provide large open areas which can allow for a variety of activities.
* Provide for a generous use of space to accommodate future contingencies.
* Provide utilities outlets at strategic locations which have the capacity to supply additional activities.

TRANSIT MALLS REQUIRE A STRONG IMAGE COMPATIBLE WITH ITS CBD CONTEXT:

* Provide a strong consistent image for the mall through the use of materials and forms that identifies the facility as one of major civic importance. This includes the scale of elements in the centers, the use of landscaping, graphics and other elements of the urban landscape.
* Provide an image that respects the local context, if applicable.
* Provide for art to be integrated into the transit mall design.
* The facility should be identifiable as part of the overall design of the transit system.

TRANSIT MALL:

STATION DESIGN/INFORMATION–IMAGE

PROVIDE ORIENTATION AND SYSTEMS INFORMATION:

A transit mall has a level of complexity, in terms of the number of routes and connections, that requires a high degree of explanation. The number of users in such a center is high and the transit mall, because of the number of out-of-town visitors and users from other areas of the city, will have the highest proportion of users who will be unfamiliar with the system.

* Provide overall system routing, fares and local area information at each shelter area.
* Provide individual route information -- a schedule and route map -- at individual bus queuing areas.
* Provide an active sign board identifying departure time of buses.
* Provide information services. A manned booth should be open at all normal business hours as well as during peak travel times.

Crosby, Fletcher and Forbes, "Sign Systems Manual;" Follis and Hammer, "Architectural Signage and Graphics."

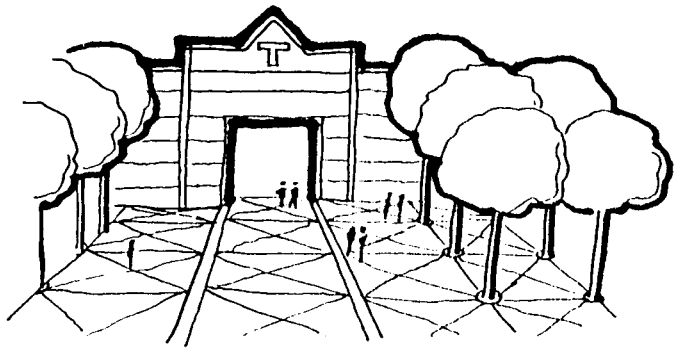
HEAVILY USED TRANSIT FACILITIES ARE AN EXCELLENT LOCATION FOR ADVERTISEMENTS:

Such advertisements also provide information to the public.

* Transit malls should provide designated areas to post local events.
* Provide designated areas in which to place advertising.

Rapoport, "Pedestrian Street Use: Culture and Perception."

TRANSIT MALL:



STATION DESIGN/COMFORT

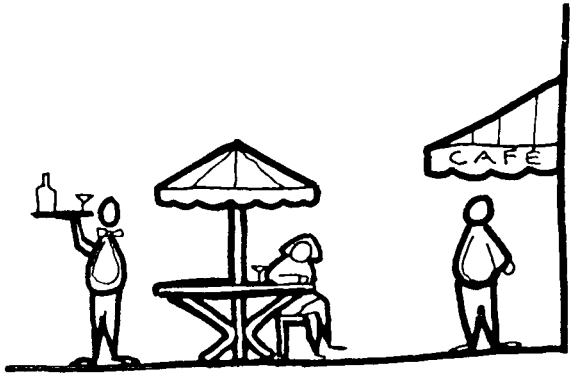
AN ATTRACTIVE PEDESTRIAN ENVIRONMENT SHOULD BE PROVIDED IN THE TRANSIT MALL:

An attractive environment provides benefits in many areas -- the dense CBD area is enhanced with an area which provides a relief and vitality from the mass of buildings and this creates a stronger image for the city; an area which attracts pedestrians attracts additional pedestrians; retailers benefit; a more secure environment, through more persons being present, develops and the transit alternative is made more attractive.

* Noon time lunch hours on the mall can be a pleasant experience and generate mall activity; provide areas for outdoor seating, sale of street food, etc. to enhance this activity.
* Special events, ethnic celebrations, outdoor music and festivals are natural activities for malls. Provide appropriate areas for community events and gatherings.
* The mall area should be designed to accommodate the number of persons generated by transit related as well as retail activities during peak hours.
* Trees should be regularly planed on the mall. This can extend the use of the mall by providing shade in the summers and protection in the transitional seasons as well as beautifying the area.
* "Stage" areas, transit information booths as well as other specific activity centers should be developed.
* Areas for itinerant vendors, pushcarts, outdoor dining, etc. should be provided.
* Retail and service concerns should be accessible via sufficient seating should be provided.

Greenberg; Miles and Hinshaw; Harrison in Vernel Moudon, "Public Streets for Public Use."

TRANSIT MALL:



STATION DESIGN/COMFORT

THE TRANSPORTATION CENTER SHOULD BE AN ATTRACTIVE AND COMFORTABLE ENVIRONMENT:

To attract and keep ridership the transit environment must provide a level of comfort for its users. The transit center, with large numbers of passengers using transfers, will not require many facilities.

* Provide adequate seating. The seating should accommodate 10% of the ridership at peak hours. The seating should be high quality.
* Provide a barrier-free environment.

PROVIDE AMENITIES AT TRANSIT MALLS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economies of scale. Local merchants can cooperate to help finance some of these amenities.

* Provide retailing amenities such as unique stores, outdoor cafe areas, evening sales and retailers appropriate to local ridership at centers.
* Transit aides may assist passengers at centers during events that attract many persons unfamiliar with the system.
* Information on local events and information activities may be directly distributed to passengers.

Miles and Hinshaw, "Bellevues' New Approach...".

TRANSIT MALL:

STATION DESIGN/COMFORT

THE TRANSIT MALL SHOULD REMAIN ATTRACTIVE OVER A LONG TIME PERIOD:

* Use materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle.
* Use high quality materials and design.
* Provide sufficient areas of landscaping.

THE FACILITY SHOULD BE FUNCTIONAL:

* Passenger shelters, platforms and waiting areas should be designed to a high level of service standard in circulation, waiting and queuing.
* Provide access to handicapped persons to all areas.
* The design of sheltered areas should consider microclimatic effects.
* Provide necessary functions such as bathrooms and trash receptacles.

Bryan and Stuebing, "Natural Light...".

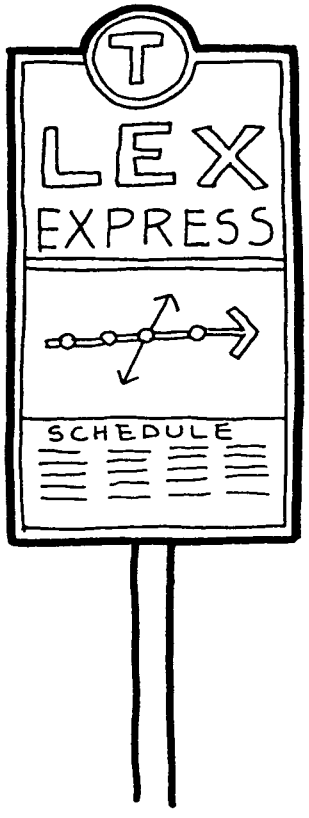
TRANSIT MALL:

STATION DESIGN/COMFORT

THE FACILITY SHOULD BE DESIGNED FOR ALL WEATHER CONDITIONS:

* Provision for snow storage and/or removal should be made. A balance is often needed between the needs of snow and ice control and the physical layout of street furniture and mall elements.
* Proper drainage is essential. Mall areas should drain quickly to enable a quick resumption of activity following storms.
* Wind paths should be considered. Avoid "wind tunnels"; areas where air flows lead to excessive wind conditions.

TRANSIT MALL:



STATION DESIGN/COMFORT

CIRCULATION AND ORIENTATION WITHIN THE TRANSIT MALL ENVIRONMENT SHOULD BE FACILITATED:

The transit mall environment is a complex environment with many routes and options for users. The design of the mall should aid passengers in understanding the transit choices to be made and the location of these options.

* All route boarding locations should be easily visible, and well marked by code and by named route or destination.
* Buses with a high degree of transfers to each other should be located in close proximity.
* Signage at the concourse area and at each bus location should be easily visible.
* Route categories, such as express/local, by direction, etc., should be distinguished by color coding.
* Provide manned information booths in the most heavily travelled transit malls.

Passini, "Wayfinding in Architecture."

TRANSIT MALL:

STATION DESIGN/SAFETY

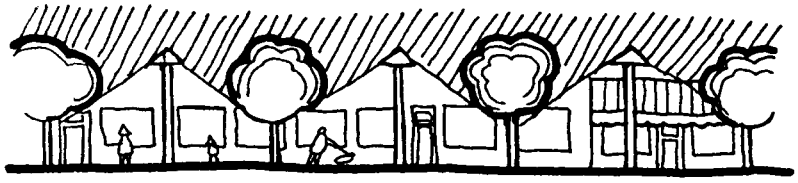
THE TRANSIT ENVIRONMENT SHOULD INCORPORATE A HIGH DEGREE OF PASSENGER SAFETY:

A transit mall is a busy environment at peak hours, especially so with a timed transfer system in which many buses arrive at the same time. The number of elderly passengers also dictates safety requirements.

* Provide easily visible and tactile safety strips at edge of loading areas.
* Provide guardrails and guiderails to control circulation at points of crowding.
* Stop signs, crosswalks and control signals should be appropriately used where pedestrian traffic crosses auto and bus traffic.

Fruin, "Pedestrian...".

TRANSIT MALL:



STATION DESIGN/SAFETY

THE TRANSIT MALL ENVIRONMENT SHOULD MINIMIZE CRIMINAL ACTIVITY AS WELL AS PASSENGERS' ANXIETIES ABOUT SUCH ACTIVITY:

A high proportion of transit riders are elderly persons and women. In addition there will be the largest number of out-of-town visitors in this location. These groups are often the victims of criminal activity. Increased ridership will result with the perception that the transit system is a safe system.

* Provide a design that facilitates surveillance of transit mall facilities. This includes an "open" design, avoidance of hidden areas and high levels of lighting.
* Provide security personnel at the mall during all hours that transit operates. The cost may be shared with the retailers and owners of property on the mall.
* Retail and other activities will increase security through the use of "eyes on the street".

Newman, "Community of Interest," p. 143.

TRANSIT MALL:

OPERATIONS/MANAGEMENT

DOWNTOWN MANAGEMENT DISTRICT:

A transit mall can be operated as part of a downtown management district. Such a district can provide "a coordinated public and private approach to influence and control the downtown (or suburban activity center) environment in order to make it an attractive secure place in which people will want to work, shop, enjoy themselves and live" (Denver). The idea behind the concept is to provide a centralized management of an activity center to deal with conflicting agendas of various organizations, lack of coordination between retailers and the need for a common identity.

Such a district can be supported by membership dues, earmarked tax revenues, contributions, public funding, earned income and special assessments. Pooled funds from a variety of sources can be more efficiently used than if they were handled separately by individual businesses or agencies. Districts can also provide employment for the hard-to-employ, through their activities.

Activities of a public space management district could include the following:

* Public space management (security, maintenance, landscaping, special events programming, correction of design flaws, graffiti control, waste pickup, cleaning of street furniture, etc.)

TRANSIT MALL:

OPERATIONS/MANAGEMENT

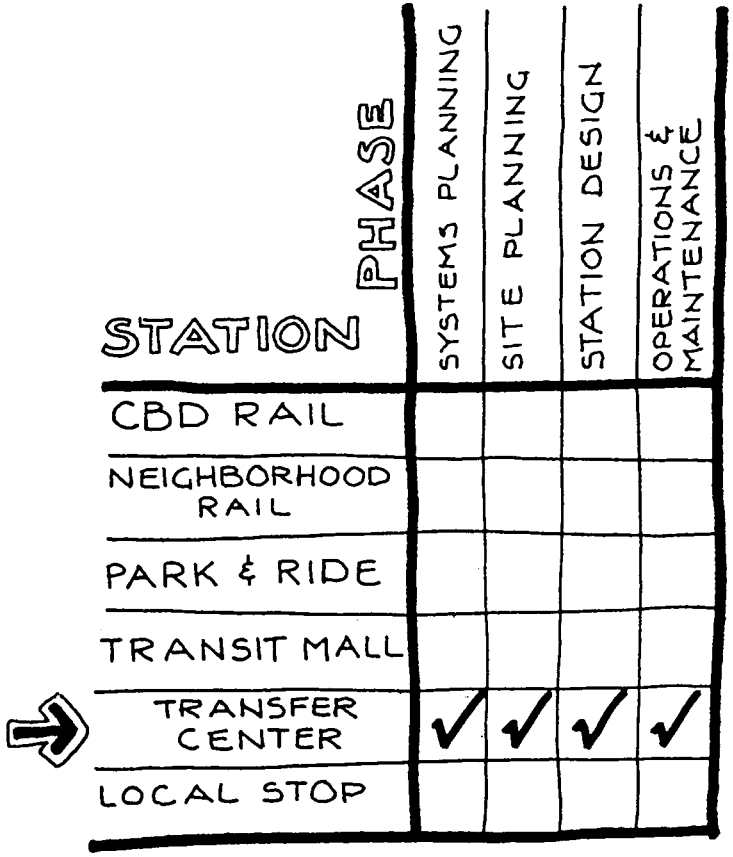
* Retail management (coordination of operating hours, leasing of public spaces for private businesses, temporary exhibits and shops, push cart regulation/leasing, street banners, theater ticket sales, promotions).
* Transportation management (parking regulation, maintenance of transit schedule/route information, ticket sales, information booths).

Fletcher, Urban Land, pp. 12-15.

TEMPORARY USE/SPECIAL EVENTS:

A transit mall can be an urban gathering place for special events and temporary uses. These could include festivals and street fairs (i.e. noon time concerts, art fairs, ethnic food festivals, flea markets, open air displays of civic information, etc.) as well as seasonal or part time operations (food pushcarts, flower vending, street musicians, etc.). Active use of the transit mall generates community spirit as well as usage of the transit system. Such activity can be actively sought by local businesses or civic associations or coordinated through a downtown management district.

TRANSFER CENTER:



OUTLINE

CONSIDERATIONS ADDRESSED IN TRANSFER CENTER STATION PLANNING AND DESIGN:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

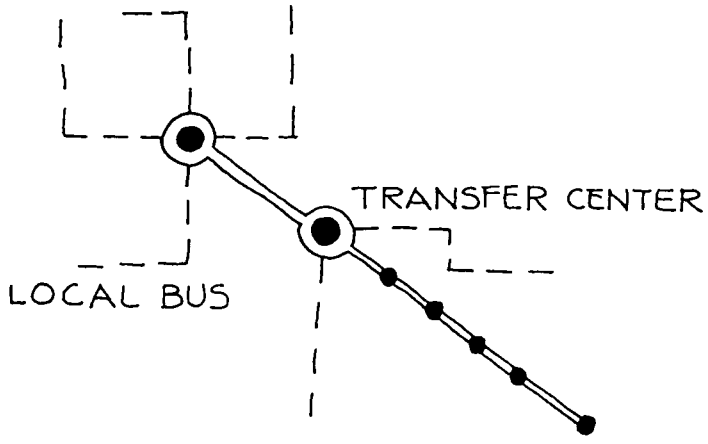
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location
* Market
* Access station and circulation
* Information--image

STATION DESIGN
* Context
* Market
* Information Advertising--image
* User comfort

OPERATIONS/MANAGEMENT

TRANSFER CENTER



DESCRIPTION:

The transfer center is -- outside of the CBD activity centers -- can be an important transit "nodes" in the metropolitan area. The transit center site is one of the most highly accessible in the metropolitan area -- it may even have better access, in terms of all transit modes, including automobile, than any other part of the metropolitan area. A transfer center has five to twelve transit routes which meet at the center and provide an opportunity to easily transfer between vehicles. Some of these routes may be express lines which transfer to local transit. These routes are coordinated, or pulsed, to minimize time delays between routes. The transfer center not only includes those transferring within the same mode but also those changing travel modes. A minimum of a few hundred persons will be directly using the transfer center at peak hours.

A transfer center site is typically in a suburban or edge of city location -- some five to ten miles from the CBD. There is often sufficient acreage to allow access and circulation to a number of travel modes but also a substantial amount of parking.

TRANSFER CENTER

JOINT DEVELOPMENT OPPORTUNITIES

Depending on the scale of the transfer center, there is a wide range of activities that can respond to demand at this level. Access to the transfer center is excellent, it is one of the most easily accessible sites in the metropolitan area. Substantial office and retail uses are viable because of the easy access by a number of modes. Well located transfer centers may also work with industrial or business parks. Transfer centers integrated into proposed or existing developments are also advantageous in terms of efficiencies and market for both the project and the users.

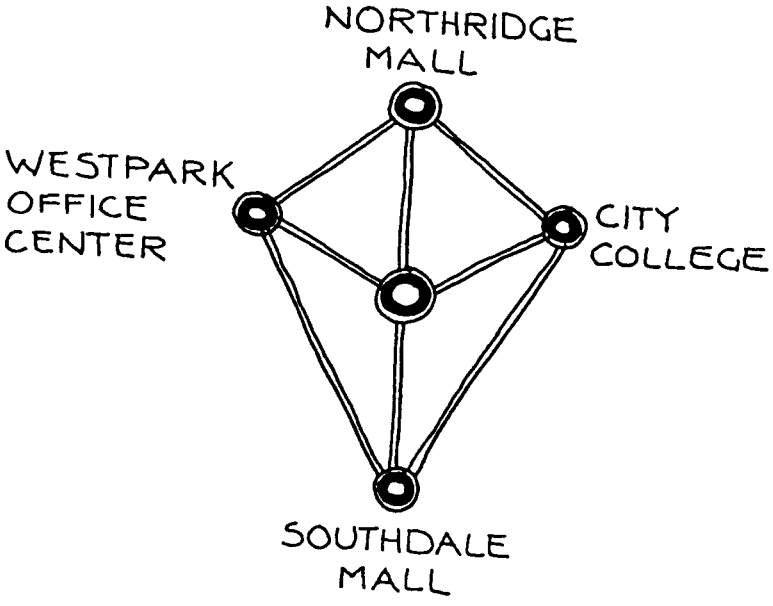
Transfer centers have a high enough demand that retail activities are capable of support solely from the transferring passengers. A variety of convenience goods and services are possible at this scale including snacks, newspapers and magazines, flowers, and food. Combined with destination uses, such as retail or offices, the amount of goods and services can substantially increase.

An airport is an excellent example of a transfer with a variety of retailers and services available. It is a brobdingnagian example of the potential of a well designed center at the local transit scale.

Scale: Regional level. There may be three to a half dozen such transfer centers at the metropolitan scale. Each may serve a major sector of the city.

Station Capacity: A minimum of five hundred passengers is served during each peak hour.

TRANSFER CENTER:



SYSTEMS PLANNING/LOCATION

TRANSFER CENTER LOCATIONS:

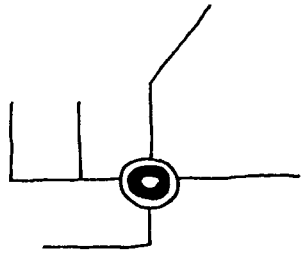
Optimal locations for transfer centers include major shopping centers, universities, medical centers and similar facilities which independently generate a high degree of activity. Transfer centers could also be free standing locations independent of other land uses. Activity centers should be self supporting, well-known by the public and easy to locate. Activity centers should already have high transit demand, and must be able to support several bus routes.

Transfer centers can also form the nucleus of substantial new developments. Their access to major arterials as well as public transport creates substantial value in terms of development potential.

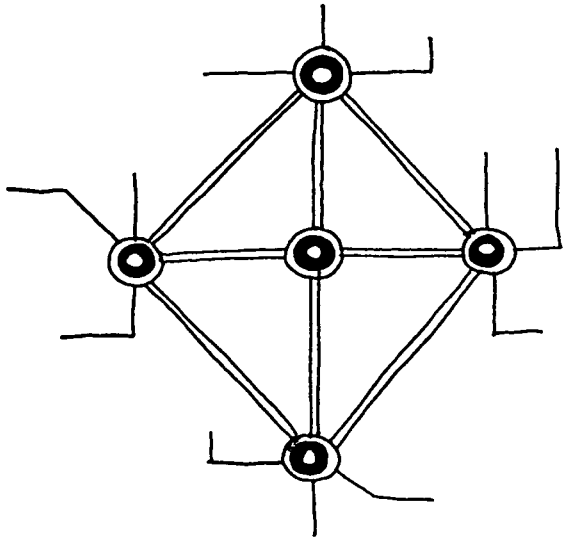
Where express routes are concerned, transit centers should also be located near major arterials or freeways to promote greater efficiency and speed in travel between centers and the CBD. However, transfer centers should avoid locations near heavily congested arterials.

Schneider, et al. (1980), Section II; Vuchic, et al. (1981), Section 6.

TRANSFER CENTER:



SMALL SYSTEM
ONE TRANSFER CENTER



LARGE SYSTEM
MULTIPLE TRANSFER CENTERS

SYSTEMS PLANNING/LOCATION

ROUTE CLASSIFICATION:

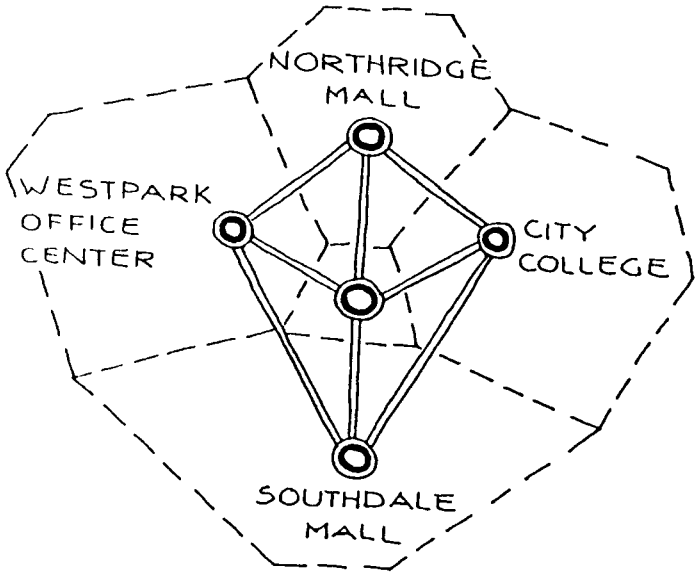
Two types of routes generally serve transfer centers: local routes and express routes. Local routes serve the area immediately surrounding the transfer center for the purpose of transporting passengers to and from the transfer center. Such services would extend radially out of the center and operate on a pulse schedule to meet express services.

Express routes transport passengers to and from other transfer centers or into the CBD with no stops between centers, except at points of high demand such as park-and-ride facilities along routes between transit centers.

Transfer centers can also be served by shared ride taxi services in lower density areas or at off-peak times to provide demand responsive transportation service.

Schneider, et al. (1980), Section II; Vuchic, et al. (1981), Sections 4 and 5.

TRANSFER CENTER:



SYSTEMS PLANNING/MARKET

POPULATION AND LAND USE CHARACTERISTICS:

Residential population in the service area should range between 25,000 and 100,000 persons. Transfer centers can effectively serve medium density areas on the urban fringe, with population densities ranging from 1,000 to 10,000 people per square mile. Each service area should ideally support a range of activities: employment, health care facilities, schools and recreation. Local routes should maximize connectivity between these activities within the service area and with the transfer center.

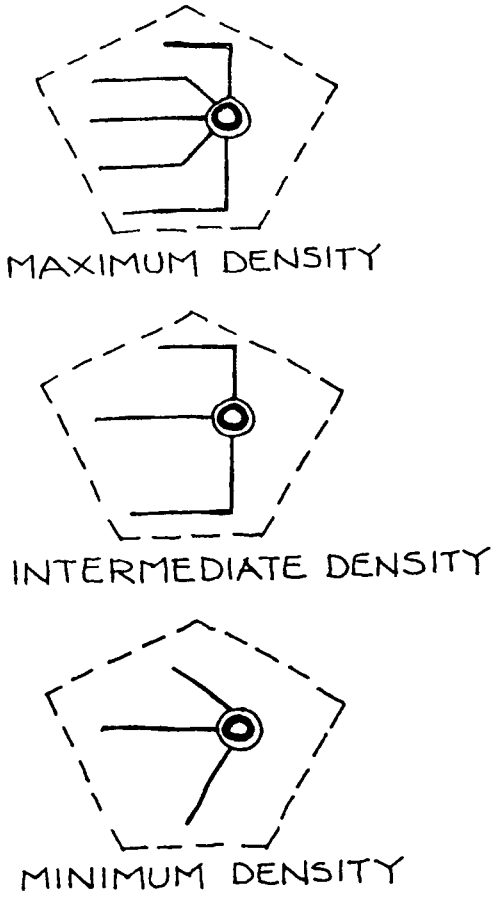
Schneider, et al. (1980); Newman, Bebendorf and McNalley (1983), Chapter 3.

SERVICE AREAS FOR TRANSIT CENTERS:

The limits of service areas generally should not exceed distances which incorporate a 30-60 minute cycle time for local feeder buses. For transfer centers located in regional shopping centers, service areas could coincide with the market area of the mall: 4-5 miles or a 15 minute driving time to the mall. Transfer centers located on the urban fringe may combine park-and-ride facilities to attract passengers from a wider area.

Schneider, et al. (1980), Section II.

TRANSFER CENTER:



SYSTEMS PLANNING/CONNECTIONS

NUMBER OF LOCAL ROUTES TO SERVE TRANSFER CENTERS:

Generally six to twelve routes serve a center but conditions will vary among transfer centers. The number of routes serving a transfer center is a function of the population density, the distribution of activities, and the passenger demand for transit in the surrounding service area. However, route alignment and scheduling problems increase with the number of local routes in the service area; thus coordination of timed transfers is more difficult as the number of routes increase.

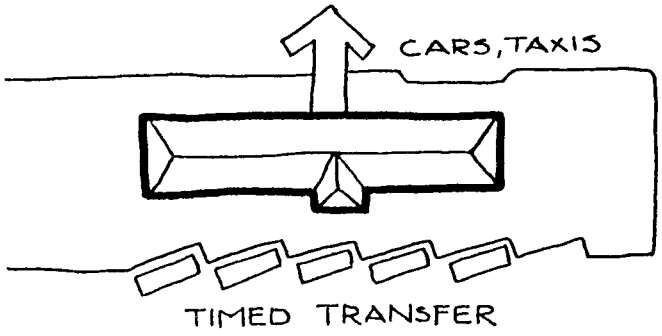
Vuchic, et al. (1981), Section 4.

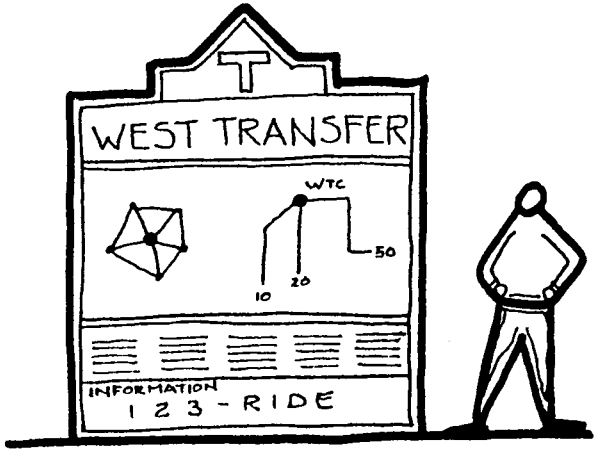
TIMED TRANSFER:

Local feeder routes can be aligned and scheduled to enable buses on all routes to meet at the transfer center at the same time. Express bus service should also be coordinated to coincide with local feeder service. A variety of services can be coordinated at a transfer center -- express-local-taxi-specialized transit. The greater the level of transit activity, the better the potential for joint development activity.

Vuchic, et al. (1981); Newman, Bebendorf & McNalley (1983), Section 2.

TRANSFER CENTER:





SYSTEMS PLANNING/INFORMATION--IMAGE

IMAGE

The design of the transfer center facility should be easily identifiable both as a "foreground" building and as part of the metropolitan area's transit system. The facility will be significant in the community -- it is located in high activity location and will independently generate traffic. The centers also serve an extensive market in their service areas. The use of a standard transit system logo, color and the form and materials of transit facilities should be imageable and memorable to the public.

ROUTE AND TRANSFER INFORMATION:

Detailed information including system maps (for express routes and locations of transfer centers), local route maps (for information concerning local routes within the immediate service area), and accompanying schedules should be available at the transfer center. Public telephones should also be available at the transfer center with the transit system telephone number clearly displayed for further passenger assistance. Maps and schedules for the system and specific routes should also be available on individual vehicles.

Vuchic, et al. (1981), pp. 93-101; Newman, Bebendorf and McNalley (1983), Chapter 3.

TRANSFER CENTER:

SITE PLANNING/LOCATION

INCREASE THE CONSIDERATION OF TRANSIT IN COMMERCIAL DEVELOPMENT DECISIONS:

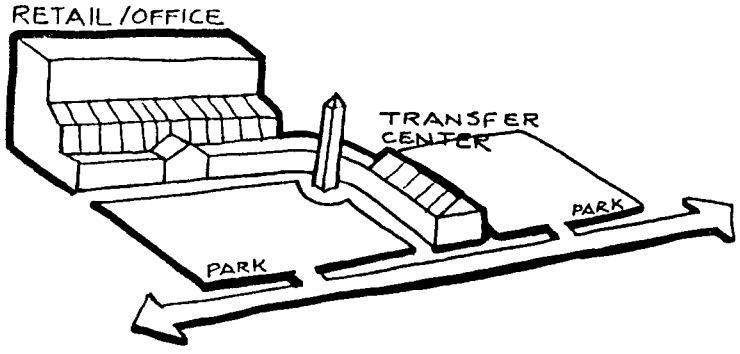
Although transit access is often considered to be a low-priority factor in the location decision of most developers, it will become increasingly important as traffic congestion increases and conditions to mitigate traffic are levied on new developments, or if energy costs increase.

When a new development is located within an existing activity center, the cost of providing public facilities and service to that development will be lower than if it is located in an undeveloped area. For this reason, transit systems should encourage most commercial and industrial development to locate in existing urban activity centers, where public facilities and services are already in place or needed improvements can be provided cost-effectively.

Clustering of activities also results in a concentration of trip ends. When a recreation complex, health unit, public library and senior citizens' center, for example, are all situated adjacent to a shopping mall, the transit routes that serve the shopping mall also allow people to travel to the other activity centers without transferring

Seattle Metro, "Encouraging Public Transportation Through Land Use Actions," p. 33.

TRANSFER CENTER:



SITE PLANNING/LOCATION

PROXIMITY TO GENERATOR:

Transfer facilities should be located at activity centers that generate their own traffic or planned in conjunction with or for such potential high activity centers. This benefits both transit and private development by increasing the number of customers for each.

* Developments may be commercial or retail shopping centers, high-density housing, branch banks, restaurants, employment complexes, universities or medical centers.
* By creating a public plaza on the site, commuters can be funneled past some of these services, but direct pedestrian access should always be provided from the station to the major nearby facilities.
* Each of these types of locations can be viewed as a joint development opportunity that provides a larger market for the development and increased trip making for the transit system.

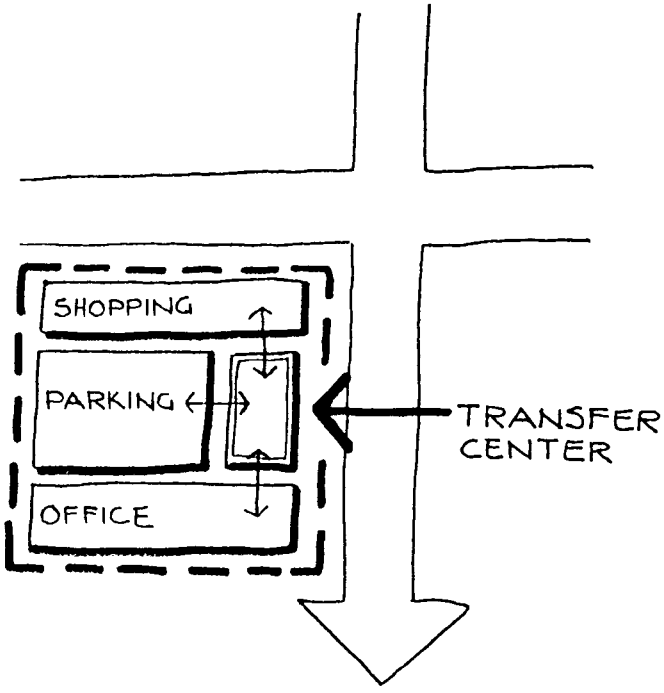
Hoel, p. 37, TRB 817; Hocking, p. 8; Lovely, p. 17; Canadian Transit Handbook, p. 27; Quinby, p. 84; Taylor-Harris, p. 40, TRB 760; DOT, "Encouraging Public Transit...", p. 35; Serramonte Transit Study Center, sec. 8.

FUTURE GROWTH:

Transit needs as well as long-term joint development activities should be accommodated:

* Purchase land in excess of immediate transfer station needs.
* Plan for phased expansion of transfer center.

TRANSFER CENTER:



SITE PLANNING/LOCATION

SITE DESIGN IN CONTEXT WITH IMMEDIATE SURROUNDINGS:

Design of a transfer center should be linked with the neighborhoods in which it is located. This enables potential users to identify with the system and feel comfortable entering station areas.

* Take into account the means of access to and from the station and the traffic characteristics of access.
* Respect the street axes and views, topography and surrounding development and land uses.
* Make aesthetic contributions to the community.
* Design for future development and possible buffers for noise control.

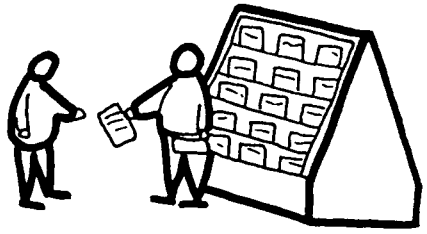
Anderson, p. 4; Fruin (1), pp. 90, 92; Murphy, p. 92; Quinby, pp. 77-79; Petersen, p. 409; Canadian Transit Handbook, pp. 27-49.

ORIENTATION TO CLIMATIC FACTORS:

Consideration for the welfare and protection of each potential patron should be taken into account early in the site planning design. The transfer station should be located on site to minimize harsh climatic effects on the patrons in terms of specific conditions of regional climate and site microclimate.

Harvey, p. 110; Misek, pp. 155, 158; Murphy, p. 349; McClelland, p. 112; Fruin (1), p. 99; IRT Guidelines and Principles, p. 9.

TRANSFER CENTER:



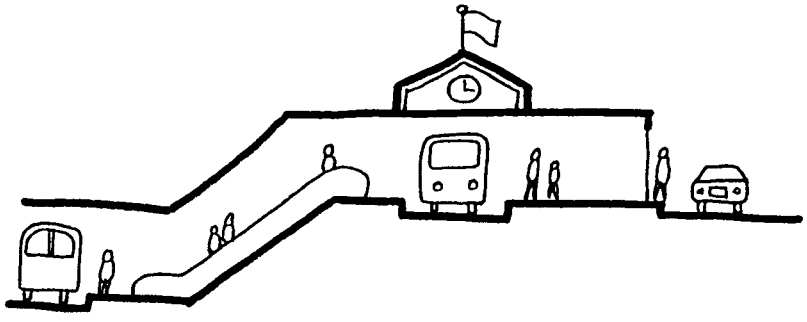
SITE PLANNING/MARKET

Retail and services on the site provide conveniences and a sense of activity that attract people to the area, many of which may become regular users of the system.

* Food vendors, flower vendors, newspaper kiosks, etc. can be located on the site.
* All concessions should be placed so they do not interfere with transit patron movements.

IRT Guidelines and Principles, p. 50.

TRANSFER CENTER:



SITE PLANNING/ACCESS AND CIRCULATION

SEPARATION OF RAIL/BUS/AUTO MOVEMENTS:

Due to the number of passengers, different modes of transportation and passenger destinations on the site, vehicle rights-of-way should be kept as well-defined and conflict-free as possible.

* Each mode of transportation should be provided with its own distinct right-of-way.
* Bus movement should remain separate from parking areas and automobile movement.
* For buses there should also exist a lane for defective or pull-in buses in each turnaround.

IRT Guidelines and Principles, p. 8; Misek, p. 160; Hoel, p. 2; Petersen, p. 417.

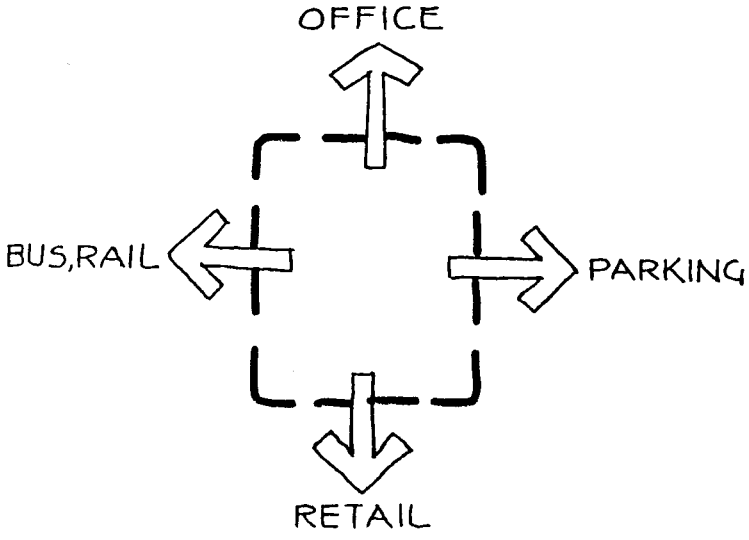
PARKING AVAILABILITY:

Convenience for patrons makes transit attractive to many who may otherwise choose other transportation options. Therefore, sufficient parking for automobiles should be provided at each station dependent on auto-ridership potential are. It may be desirable to combine a transfer center with a park and ride facility.

* Large lots should be broken into smaller cells with the maximum walking distance from any space to the fare collection area kept under 800 feet.
* Bicycle and motorcycle parking should also be located on the site preferably near pedestrian entrances to the station.

Harvey, p. 118; Roohr, p. 131; "Denver's 16th St. Mall," p. 9; "Boston Holds New 'T' Party," p. 122; DOT, "Transit Station Renovation...," p. 144.

TRANSFER CENTER:



SITE PLANNING/ACCESS AND CIRCULATION

SEPARATION OF PEDESTRIAN/VEHICLE DOMAINS:

The relatively large number of passengers in the station area moving in many different directions in order to make vehicle connections need protection and conflict-free circulation.

* Pedestrian paths should be as direct as possible to destinations while reducing conflicts with vehicular traffic to a minimum.
* At crossings there should be adequate warnings of interruptions, texture changes in walking surfaces and high levels of illumination.
* Grade-separated pedestrian crossings may be needed when crossing vehicular rights-of-way with over 5000 vehicles per peak hour.

Petersen, pp. 407,417; Appleyard, p. 275; DOT, "Transit Station Renovation...", p. 146; IRT Guidelines and Principles..., p. 8.

TRANSFER CENTER:

SITE PLANNING/ACCESS AND CIRCULATION

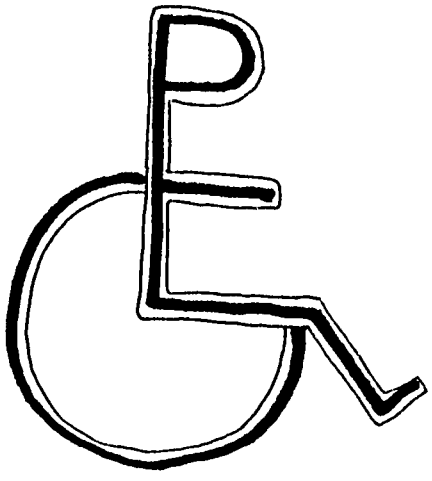
AMPLE ROOM FOR MANEUVERING BUSES/ACCESS:

Bus roadways must be wide enough to permit safe operation and permit turning movement with ease thus decreasing total trip time for each passenger.

* All turning movements should be based on a turning radius of full size vehicles.
* Roadways in loading bays should be no less than 12 feet in width and preferably each should be separated by a waiting island.
* Off-street bus bays may be of two types, either parallel or sawtooth, with the total number of spaces required equivalent to peak hour bus volume divided by 12.
* When there are large volumes of transit vehicles, it is desirable that facilities be located off-street at least 200 feet from street intersections.
* Buses should not use the same point for loading and unloading. Where possible, each major line should have its own berth.

Misek, p. 159; Petersen, p. 412; Harvey, pp. 104, 105, 110; DOT, "Transit Station Renovation...", p. 147.

TRANSFER CENTER:



SITE PLANNING/ACCESS AND CIRCULATION

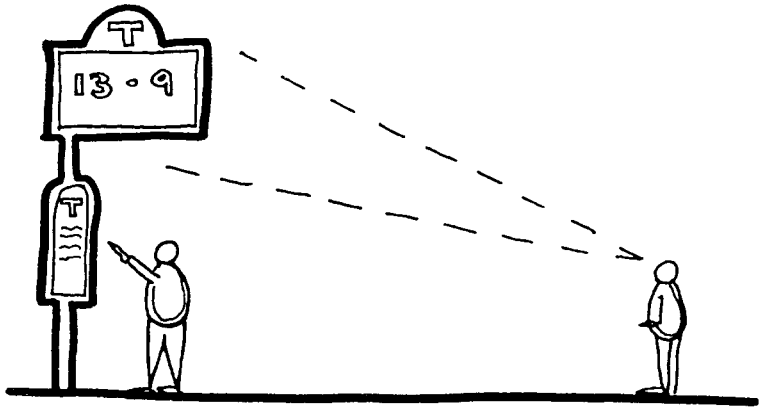
HANDICAPPED ACCESS:

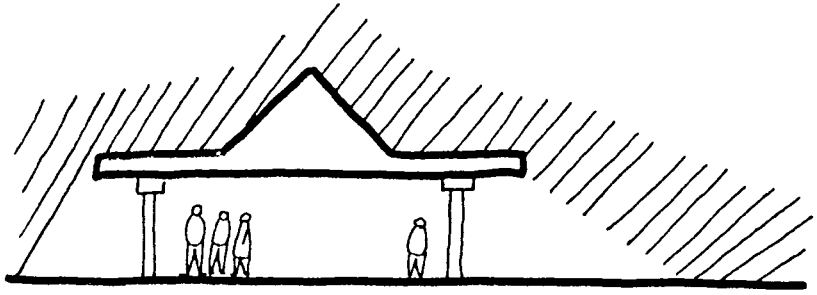
Stations need to be accessible for all handicapped persons. Preferably these amenities should not merely adhere to minimum standards but should be designed for comfort and pleasure.

* All public walks should be at least 48 inches wide and continuous and should have a gradient of not greater than 5%.
* Parking lots should have handicapped spaces (12 feet wide) that are accessible and located close to station entrances.
* Wheelchair access should be provided at at least one access point to the station.
* Amenities should include hand rails, platform edge strips, telephones, stairs and ramps to accommodate the handicapped.

Hayduk, p. 93; IRT Guidelines and Principles, pp. 53-54.

TRANSFER CENTER:





SITE PLANNING/INFORMATION AND IMAGE

PROPER SIGNAGE:

Information needs to be easily read and understood by all potential transit users. Signage on the site should provide clear, concise directions for access to the station and for circulation in and out of parking, drop-off, and transit areas.

* Provide some type of identity for the system -- using consistent colors, logos and lettering.
* Placement of signs should be determined by passenger lines of sight and the normal field of human vision.
* Information should be brief, decisive, consistent in design; advertising and directional signing kept separate.

Fruin (2), pp. 14-16; IRT Guidelines and Principles, pp. 46-47.

SECURITY:

Because there will be times with very little activity as well as peak hours of use of the system, it is important that all users feel secure on the site.

* Sufficient lighting on the site for use at all hours should be provided.
* Architectural features and design can minimize dark areas and help in public and police surveillance.
* If an adjacent mall or activity center has its own security system, it may be possible to integrate its security measures with those of the transit center; for example, a consolidated set of cameras.

Fruin (1), pp. 98-99; IRT Guidelines and Principles, p. 22.

TRANSFER CENTER:

STATION DESIGN/CONTEXT

CONTEXT:

A transfer center is an important public building in the metropolitan area. While it does not have the ceremonial or legislative aspects of some public buildings, or the importance of trips taken from other transportation facilities, it is used more frequently by more persons than most public or transportation buildings. A transfer center is not a neighborhood facility -- its service area is the larger community of an entire sector of the city.

A transfer center is also not small. The needs for multiple bus bays, vehicle access, waiting and automobile parking, besides joint development buildings which may form part of the center, makes this a significant undertaking.

A transfer center may be located in an existing, medium scale or larger, commercial area or be located as the nucleus of, or part of, a developing area.

TRANSFER CENTER:

STATION DESIGN/CONTEXT

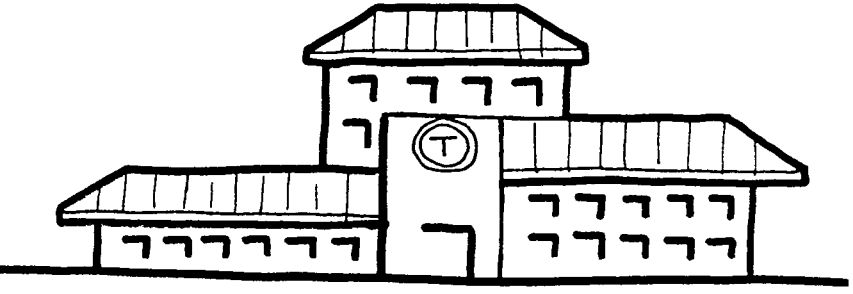
THE FACILITY SHOULD BE FUNCTIONAL:

* Passenger shelters, platforms and waiting areas should be designed to a high level of service standard in circulation, waiting and queuing.
* Provide access to handicapped persons to all areas.
* The design of sheltered areas should consider the local climate.
* Provide necessary functions such as bathrooms and trash receptacles.

THE TRANSFER STATION SHOULD REMAIN ATTRACTIVE OVER A LONG TIME PERIOD:

* Provide materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle.
* Use high quality materials and design.
* Provide sufficient areas of landscaping.

TRANSFER CENTER:



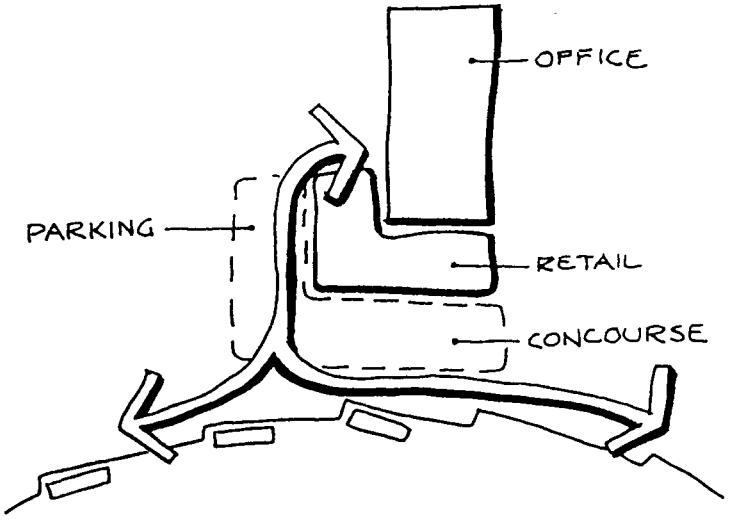
STATION DESIGN/CONTEXT

TRANSFER CENTERS REQUIRE A STRONG IMAGE COMPATIBLE WITH ITS GENERAL CONTEXT:

* Provide an image that identifies the facility as one of major civic importance. This includes the massing, form, color and graphics of the facility.
* Provide an image that respects the local context, if applicable.
* Provide for art to be integrated into the transit center design.
* The facility should be identifiable as part of the transit system overall design.

Lynch, "Good City Form," p. 139; "The Image of the City," p. 78.

TRANSFER CENTER:



STATION DESIGN/MARKET

THE SUPPLY OF GOODS AND SERVICES SHOULD MATCH THE MARKET DEMAND AT VARIOUS SCALES OF TRANSFER CENTERS:

A transfer center provides an important opportunity for a response to market demand at two scales -- serving the market generated by the transfer center alone and for a larger project which includes some joint development.

* At the lower scale a transfer center might provide 500 to 2,000 square feet of retail area oriented towards traditional transit related convenience goods and services -- newspapers and magazines, tobacco and candies, and some walk around food products such as ice cream, soda, pretzels and hot dogs. Passengers have short waits due to well timed transfers.
* A larger transit-based center will include some limited services as well as expanded retail opportunities. These services will include cleaning, shoe repair and photo processing and additional retail may include VCR tape rental, expanded food opportunities -- coffee, doughnuts, cookies and flowers.
* As part of a joint development project the center could have a few thousand square feet of retail area. Eating places become feasible, as well as business services such as stationers, copy shops and express mail; and a small lunch-oriented food store. Stores, which may have carried numerous products at the smaller scale facilities, may now be represented by a number of specialized retailers.
* Telephone service should be provided at all transfer centers.

TRANSFER CENTER:

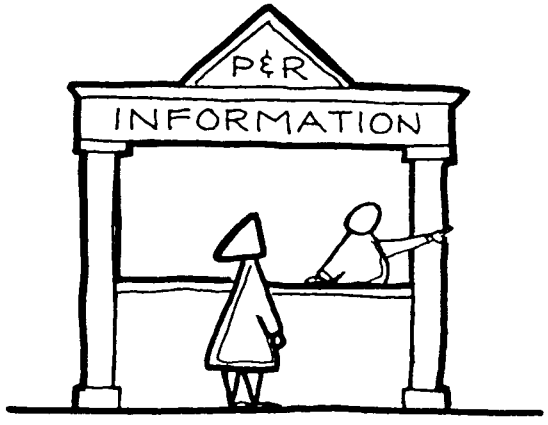
STATION DESIGN/MARKET

ACCOMMODATE GROWTH AND CHANGE IN THE FACILITY OVER THE LONG TERM:

* Provide an "open" plan in the building/concourse area which allows for future modifications.
* Provide for a generous use of space to accommodate future contingencies and/or for future sale for other developmental activities.
* Provide utilities which have the capacity to supply additional growth and change.
* Ceiling heights should be used which will allow for future changes.

Lynch, "Good City Form," pp. 171-186.

TRANSFER CENTER:



STATION DESIGN/COMFORT

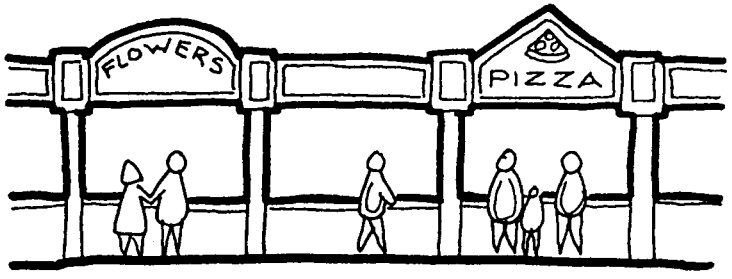
CIRCULATION AND ORIENTATION WITHIN THE TRANSFER CENTER ENVIRONMENT SHOULD BE FACILITATED:

The CBD rail station environment is of moderate size and little complexity and should be easily understandable to most passengers.

* The center should be designed as one large "place" with visual and circulation access to all platform areas.
* Buses with a high degree of transfers to each other should be located in close proximity.
* Signage at the concourse area and at each bus location should be easily visible.
* Route categories, such as express/local, by direction, etc., should be distinguished by color coding.
* Provide manned information booths in the most heavily used transfer centers. Provide easy access to telephone information elsewhere.

Passini, "Wayfinding...".

TRANSFER CENTER:



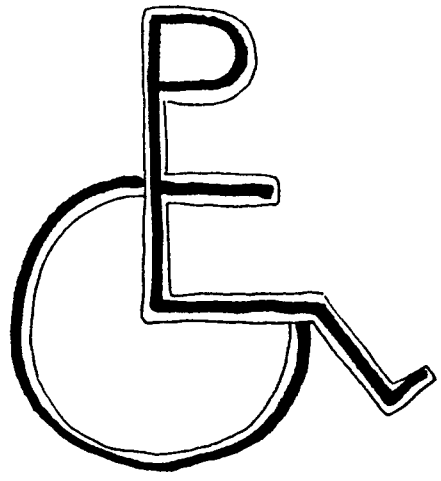
STATION DESIGN/COMFORT

AN ATTRACTIVE PEDESTRIAN SHOPPING/WAITING ENVIRONMENT SHOULD BE PROVIDED IN THE TRANSFER STATION:

To attract and keep ridership the transit service must provide a level of comfort for its users. The transit center, with most passengers using timed transfers, will not require many facilities.

* The retail and service concerns should be accessible via a protected "concourse" area for the passengers to use while shopping and waiting. In a joint development project or heavily used transfer center the concourse area may be a substantial area that links a number of buildings.
* Allowance for expansion of the retail area should be included in plans of the facility. Additional vendors may include sales from peddlers' carts as well as kiosks. Utilities for such activities should be built in.
* Provide adequate seating. The seating should accommodate 5% of the ridership at peak hours. The seating should be high quality, equivalent to airport seating.
* Provide bathroom facilities. These can be of minimal size and controlled by transit personnel.
* Provide a barrier-free environment.

TRANSFER CENTER:



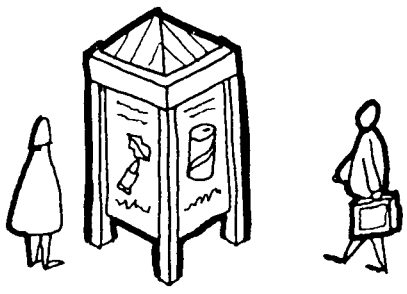
STATION DESIGN/COMFORT

PROVIDE AMENITIES AT TRANSFER CENTERS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economies of scale. Such elements are comparable to those used in transit malls, rail stations, etc. and include the following:

* Provide amenities appropriate to local ridership at centers. This may be for example stock market quote/news terminals, sports broadcasts, temperature/weather forecasts.
* Transit aides may assist passengers at centers during events that attract many persons unfamiliar with the system.
* Information on local events and information activities may be directly distributed to passengers.

TRANSFER CENTER:



STATION DESIGN/INFORMATION–IMAGE

PROVIDE ORIENTATION AND SYSTEMS INFORMATION:

A transfer center has a level of complexity, in terms of the number of routes and connections, that requires a high degree of explanation. The number of users in such a center is high and some will be unfamiliar with the system.

* Provide overall system routing, fares and local areal information at a central location in the building.
* Provide individual route information -- a schedule and route map -- at individual bus queuing areas.
* Provide an active sign board identifying departure time of buses.
* Provide information services. This may be a dedicated telephone line or electronic information board in low volume centers or a manned booth in heavily used facilities.

Crosby, Fletcher and Forbes, "Sign Systems Manual;" Follis and Hammer, "Architectural Signage and Graphics."

HEAVILY USED TRANSIT FACILITIES ARE AN EXCELLENT LOCATION FOR ADVERTISEMENTS:

Such advertisements also provide information to the public.

* Transfer centers should provide designated areas to post local events.
* Provide designated areas in which to place advertising.

TRANSFER CENTER:

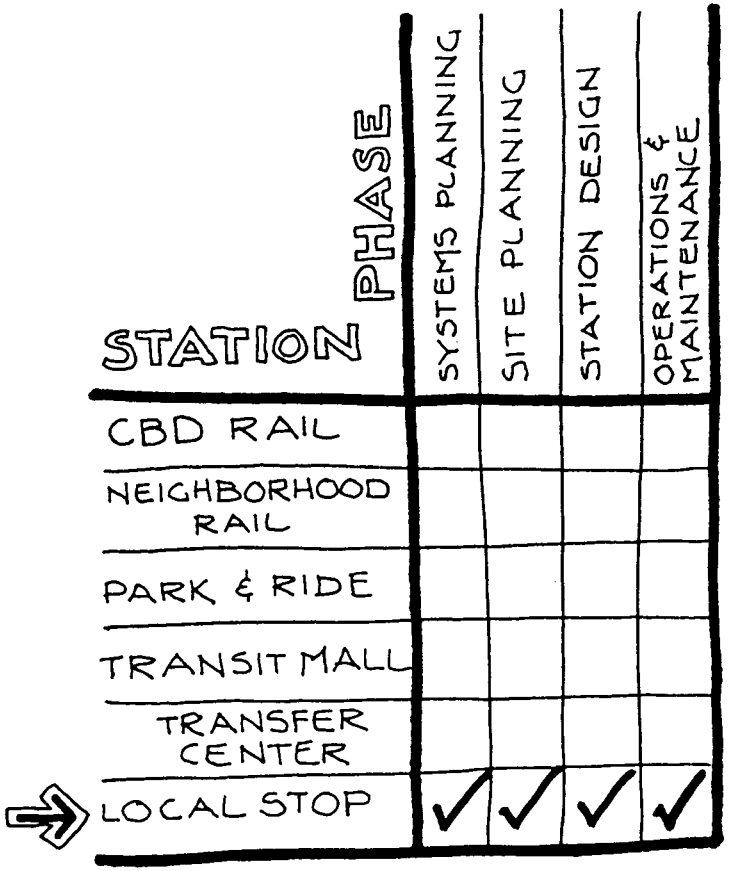
OPERATIONS/MANAGEMENT

FACILITY MAINTENANCE:

Maintenance of transfer centers depends on the type of location. When located at a shopping center or at a trip generator, the responsibility for maintenance and operations is shared between the property owner and the transit system. Generally the shopping center owner would be responsible for street and parking area maintenance while the transit system will care for shelters, benches and route information kept at the site.

If the center is a transit system property, then the responsibilities of the transit system are broader, much like that at a park and ride location. The transit system would have responsibility for street maintenance, snow removal, landscaping, and servicing of equipment as well as maintenance of shelters and route information.

LOCAL STOP:



OUTLINE

CONSIDERATIONS ADDRESSED IN LOCAL STOP PLANNING AND DESIGN:

DESCRIPTION

JOINT DEVELOPMENT OPPORTUNITIES

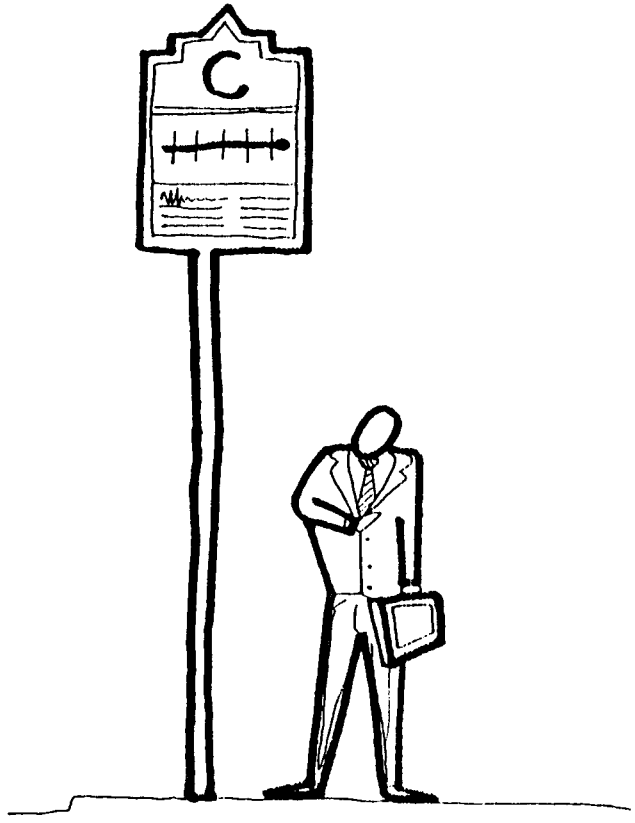
SYSTEMS PLANNING
* Location
* Market
* Connections
* Information--image

SITE PLANNING
* Location/context
* Market
* Access and circulation
* Information--image

STATION DESIGN
* Context
* Market
* Information--image
* Comfort
* Safety

OPERATIONS AND MANAGEMENT

LOCAL STOP:



DESCRIPTION:

The local stop is a low volume access point provided by public transit. The local stop is on a bus or light rail line which serves a residential neighborhood. Local stops are spaced two to five blocks or one-eighth to one-quarter mile apart. The size of the actual transit shelter at this level is minimal -- perhaps twenty to thirty square feet. Mode connections at local stops are minimal. A local stop provides service to an approximately one-quarter mile surrounding area and to upwards of 3,000 persons, depending on the density of the neighborhood. Transfer corners, on more highly travelled streets, will have more passengers.

Transit service will operate at low headways at peak hours and up to thirty to sixty minute headways throughout the day. Passenger volume is low.

LOCAL STOP:

JOINT DEVELOPMENT OPPORTUNITIES:

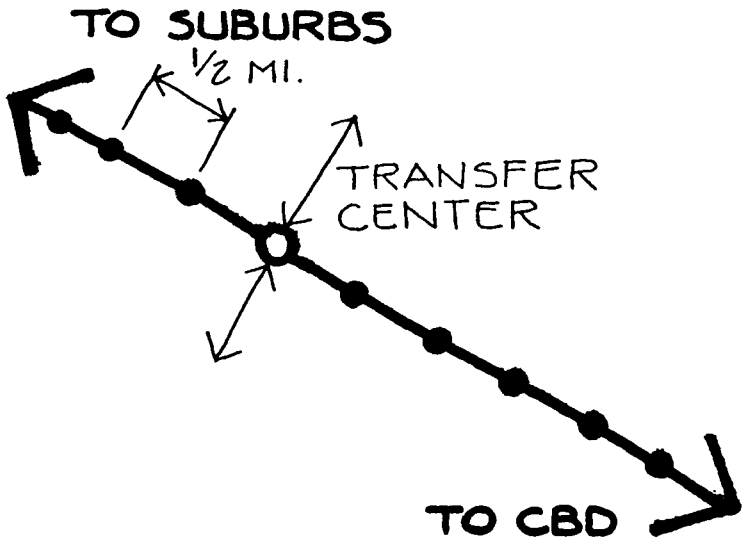
Passenger volume is low and connections to other modes is minimal. There may be some existing local retailers in the area which find marginally increased demand from transit riders and may be able to add convenience goods and services to their stores.

New retail activities cannot be justified at local stops based on transit volume alone. However the development of stores which serve the neighborhood demand will have additional sales from transit ridership. If no retail is present then only newspaper boxes or public telephones may be appropriate at this level.

Scale: Local stops serve a neighborhood of 3,000 persons and higher. However, boarding/alighting passengers at this stop are low.

Station Capacity: Ten per stop at peak hours. Approximately fifty to one hundred passengers will use the stop each day.

LOCAL STOP:



SYSTEMS PLANNING/LOCATION

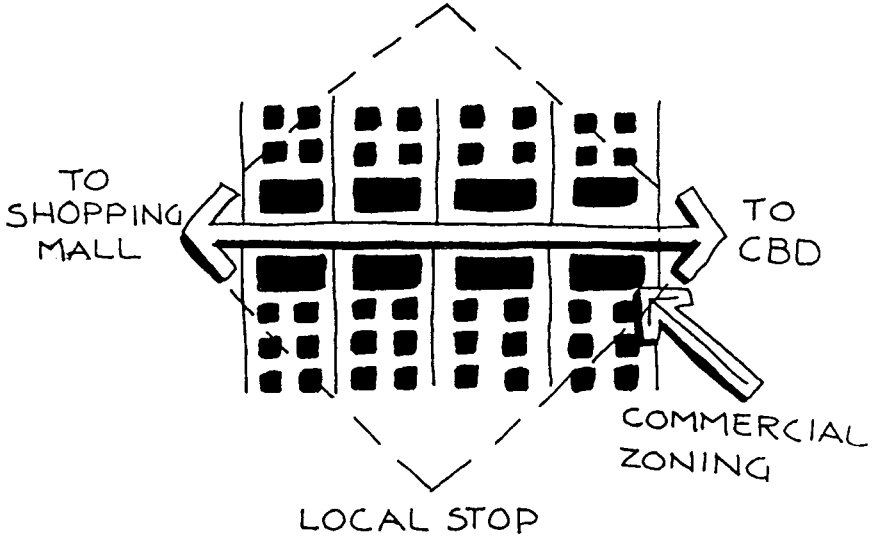
STOP SPACING:

Stop spacing will vary among routes according to the density of passengers within the market area. In CBD areas, passenger densities are high due to concentration of office and shopping activity centers; in these cases, stop spacing may be as close as one stop per block (300 feet) In contrast, stop spacing may be as far as one stop every four blocks (1/2 mile) in outlying areas composed of relatively low density housing. As a result, stop spacing is generally a result of land use, arrangement of the street network and transit system policy. These factors vary among cities as well as within cities.

* Locate stops in close proximity to facilities or buildings, try to minimize walking distance.
* Consider the needs of disadvantaged users -- physically or mentally handicapped.

Canadian Transit Handbook (1985), Chapter 11.

LOCAL STOP:



SYSTEMS PLANNING/LOCATION

ROUTE ALIGNMENT:

Local bus routes should be limited to arterials where possible, in order to reduce conflicts with residences on local streets, and to maximize contact with office, retail and commercial establishments on arterials. Each route terminus should be located within the immediate vicinity of a major trip generator (e.g. shopping center, major employment center, etc.). When possible, routes should connect major generators at intermediate points along the route; route alignment however, should not deviate extensively from a direct path to meet this objective.

Canadian Transit Handbook (1985), Chapters 11 and 27.

LOCAL STOP:

SYSTEMS PLANNING/LOCATION

CONSIDERATIONS IN ROUTE LOCATION:

In locating local transit routes, the following factors should be considered:

* Integration with rest of network: other competing services, transfer opportunities, similar parallel routes.

* Simplicity and clarity: directness, imageability, reasonable location.

* Marketing factors: attraction to choice riders, relate to travel needs of target groups, alternative to parking congestion, serve established travel patterns of existing users.

* Rider access: kiss-n-ride, park-n-ride, walk-n-ride.

* Safety considerations: pedestrian, rider.

* Highway geometry: continuity, width, volume/capacity, traffic control, intersection problems.

* Utilization of special facilities: bus on freeways, good stop locations, transit centers, major trip generators, weather protected areas.

* Political considerations.

LOCAL STOP:

SYSTEMS PLANNING/LOCATION

ACTIVELY SEEK TO HAVE TRANSIT NEEDS BE CONSIDERED IN THE LAND USE DESIGN PROCESS:

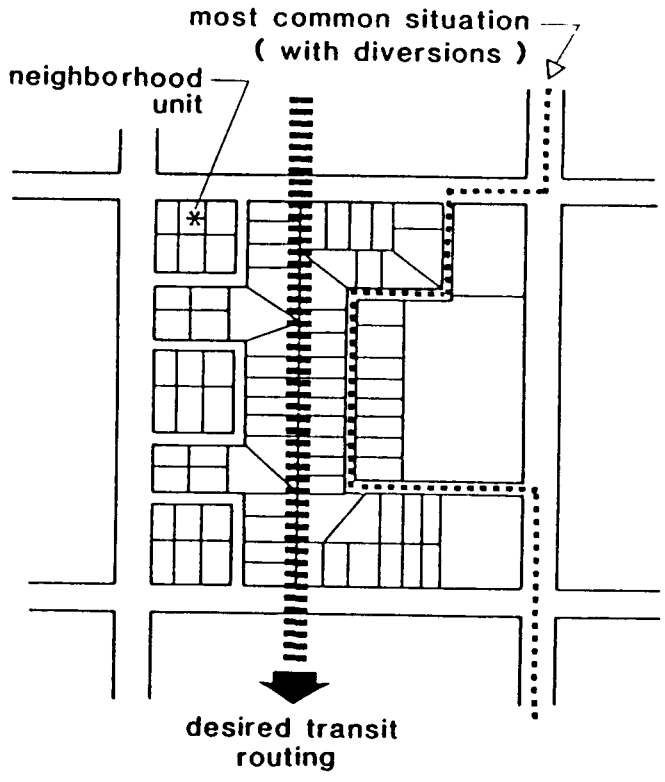
The incorporation of transit route planning early in the land use design process will, in most cases, ensure that walking distances to transit are kept to acceptable levels. Community planning and road system design should also provide for the incremental extension of transit routes without the need to restructure or substantially revise existing service.

The following guidelines may be useful in planning a street network which can be efficiently served by public transit:

* Design arterials and transit service in advance of development, to connect clusters.
* Encourage neighborhood and service area designs that minimize street lengths and the percentage of area devoted to streets.
* Apply suitable roadway geometries to accommodate bus turning maneuvers.
* Ensure that streets identified for possible transit usage be structurally capable of supporting the weight of transit vehicles.
* Sidewalks should be provided on at least one side of the street carrying transit. Sidewalks and an attractive pedestrian environment are particularly necessary on collector and arterial roads.
* Bicycle access to transit centers, park-and-ride lots, freeway flyer stops, and other major bus stops should be encouraged by local jurisdictions. Wide curb lanes (13 feet minimum) or striped bike lanes should be considered for major streets leading to transit facilities.

Seattle Metro Transit, "Encouraging Public Transportation Through Effective Land Use Actions," p. 41.

LOCAL STOP:



SYSTEMS PLANNING/LOCATION

STREET LAYOUT:

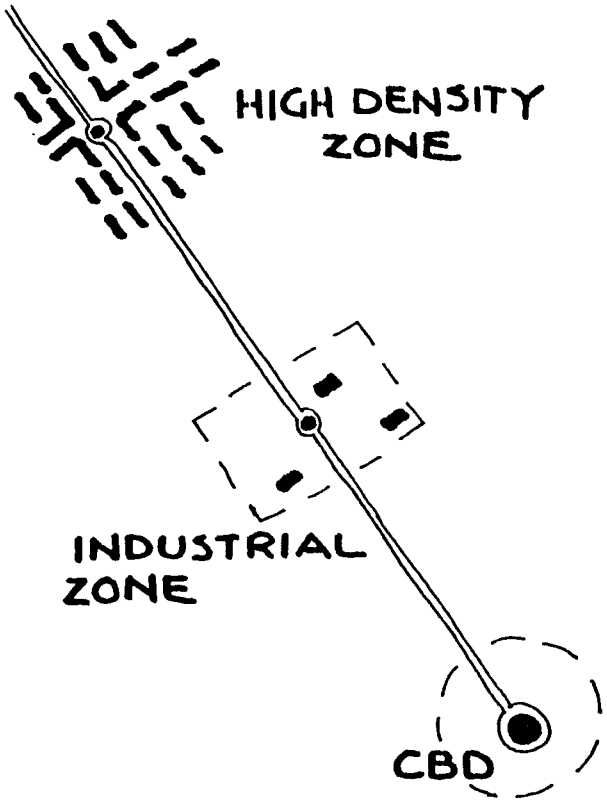
Local streets' layout will have a major effect on the ability to provide transit service. Well designed collector streets should be used which permit operation of transit routes through neighborhoods.

Curvilinear and discontinuous streets (cul-de-sacs) typical of suburban residential areas may restrict the routing of buses and make it difficult for transit to provide service within easy walking distance of most residents. A simple connection of the central collector street through the entire neighborhood would permit direct transit services to operate within a few hundred feet of all residents.

A grid system with a regular hierarchy of local, collector, and arterial streets, or a pie-shaped configuration with arterials and collector streets radiating out from the center of the city provide easy access to property. Radial street networks which focus on a group of passenger destinations such as a shopping/recreation center give this center more direct accessibility potential than a grid network does.

Seattle Metro, p. 44.

LOCAL STOP:



SYSTEMS PLANNING/LOCATION

ROUTE LOCATION GUIDELINES:

* A route should, if possible, begin and end at traffic generators.

* Routes should attempt to touch as many traffic generators as possible.

* Buses should, if possible, enter a traffic generator such as a shopping center, apartment complex, or an industrial plant.

* Routes should be of linear configuration -- providing direct two-way service between all points on the route.

* Where transit rider origin-destination linkages exist between one sector of the city to another, through routes should be developed.

* Loop and reverse routing -- being circuitous and inconvenient to the riders -- should be avoided.

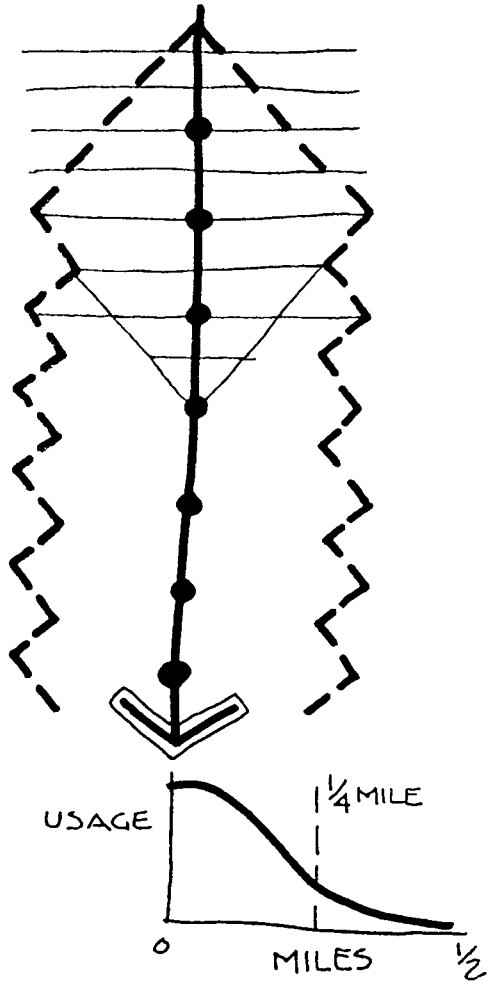
* Unless patronage demands require, placing of several routes on one street should be avoided (generally, it is better to run four routes on four streets than four routes on one street).

* A corollary to the above guideline is that routes should be spaced no closer together than the average acceptable walking distance to a bus stop in a given service area. (In most instances, this is a 1/2 mile spacing or a maximum walking distance of 1/4 mile.)

* The traffic and operational characteristics of potential transit route streets must be carefully considered.

* Transit routes should be considered as flexible and should be reviewed and evaluated periodically.

LOCAL STOP:



SYSTEMS PLANNING/MARKET

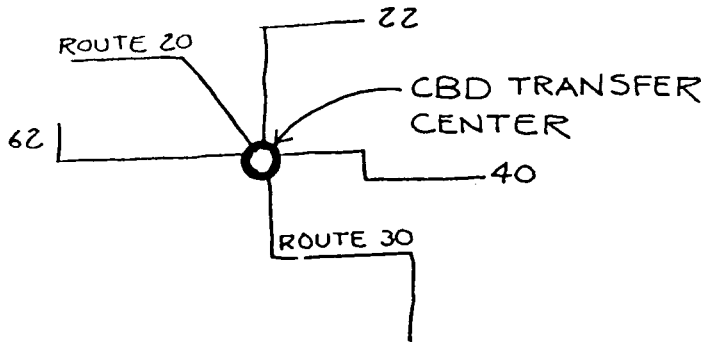
EXTENT OF MARKET AREA AROUND STOPS:

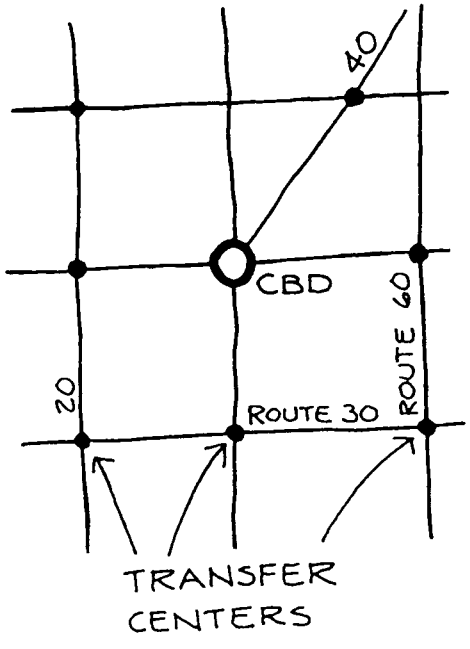
Transit planners generally assume that bus passengers will not walk more than 1/4 mile to board a bus on either end of a trip. Studies have shown that some passengers will walk a greater distance, but the overwhelming majority of passengers will board buses from distances significantly shorter than 1/4 mile. Therefore, local stops should be placed well within 1/4 mile of any desired activity center, assuming a uniform density of riders over distance.

It cannot be assumed that the outer boundary of the market area will be circular following the radius set by the maximum walking distance. Instead, the limits of the market area must follow paths along the street network. On grid-based street networks, the market area will be diamond shaped; on other networks, the limits of the market area will be irregular in shape. Planners must therefore seek locations for local stops within 1/4 mile along the street network from desired activity centers. The shape and extent of the service area can be altered however, by introducing walkways and open spaces between the stop and the service area, and by strategic placement of stops relative to activity centers.

Canadian Transit Handbook (1985), Chapters 4 and 27; Petersen (1968); Lam and Morrall (1982).

LOCAL STOP:





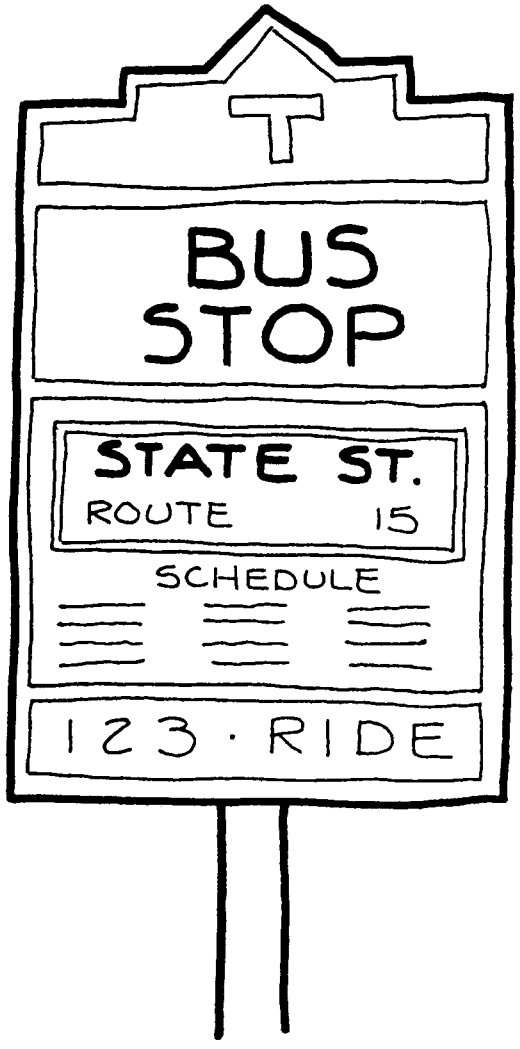
SYSTEMS PLANNING/CONNECTIONS

TRANSFERS/CONNECTIONS:

In smaller radial networks, routes tend to converge in a single area, generally the CBD. On most radial systems, routes will meet at a transfer center or transit mall in the CBD. In contrast, larger systems will not have every route converging at a central point. Instead, these networks contain "crosstown" routes to collect passengers who will transfer to other routes converging into the CBD or elsewhere in the network. Transfer corners emerge where these individual routes exchange passengers. In many cases, timed transfers are not possible because of increased complexity of the network. Potential markets exist for low threshold, "convenience" establishments at transfer corners serving high-volume routes consisting of passengers who must wait for buses while transferring.

Canadian Transit Handbook (1985), Chapter 10.

LOCAL STOP:



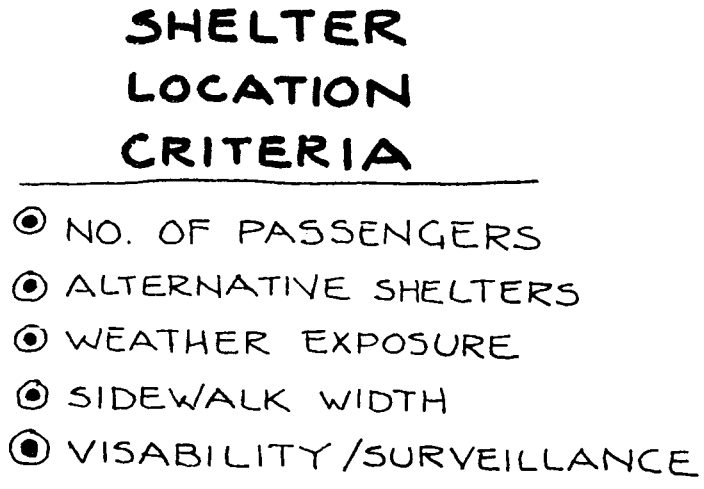
SYSTEMS PLANNING/INFORMATION

ROUTE INFORMATION AND SIGNAGE:

Local bus stops should be clearly identified with signs bearing the transit system name and logo, the route(s) served by the stop, important stops along the route, and the transit system telephone number for information. For bus stops with shelters, route maps and schedules should be clearly posted where possible.

Vuchic, et al. (1985), pp. 94-95; Canadian Transit Handbook (1985), Chapter 11.

LOCAL STOP:



SITE PLANNING/LOCATION

SHELTER LOCATIONS BASED ON DEMAND/SITE RESTRICTIONS:

The primary purpose of a bus shelter is to protect transit passengers from inclement weather. Because it isn't feasible to provide them at all stops, shelters are generally placed at corners with more concentrated ridership.

Factors involved in shelter locations are:
* number of passengers using stop
* average waiting time
* availability of alternate shelters
* degree of exposure to elements
* adequate sidewalk width for placement
* proximity to suitable lighting
* clear visibility/absence of obstructions
* neighborhood security

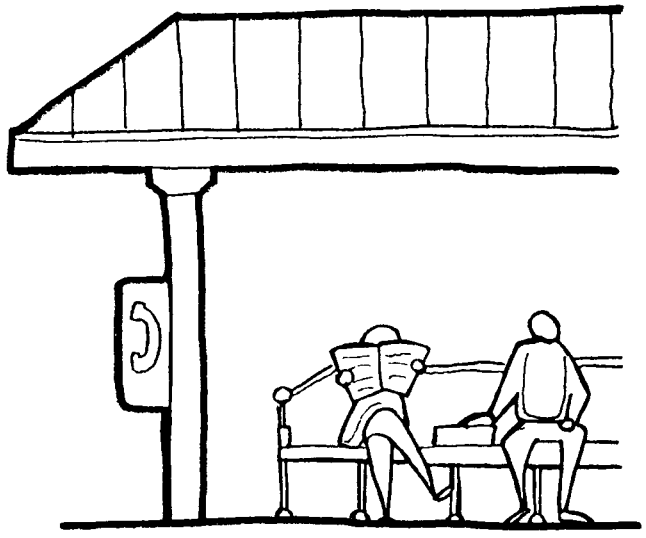
Canadian Transit Handbook, pp. 11-12; Misek, pp. 155, 158.

ORIENTATION TO CLIMATIC FACTORS:

In order to maximize the comfort for riders, the design of shelters should consider the climate and weather patterns in any specific region. All shelters should be located, oriented and designed to provide protection from wind, rain, snow and direct uncomfortable sunlight.

Canadian Transit Handbook, pp. 11-12; Fruin (1), p. 99.

LOCAL STOP:



SITE PLANNING/MARKET/ACCESS

MARKET FOR GOODS AND SERVICES:

Local stops typically generate a low passenger volume. At many stops only minimal concessions are possible or feasible on the site. However, some local stops will be located at local retail areas. Transit volume will marginally increase sales at these locations, particularly from traditional transit purchases such as newspapers and snacks.

* Newspaper boxes may be located at selected stops.
* Telephones may be located at shelters.
* Stops at transfer corners may also provide benefits for nearby drug or convenience stores.

CONVENIENCE FOR PASSENGERS:

Shelters should be located and designed for the convenience of each user.

* Place trash receptacles near structure.
* Provide adequate, comfortable seating in or near the shelter.
* Design for easy access from the main approach paths.

Canadian Transit Handbook, pp. 11-12; McClelland, p. 5; Murphy, p. 351; Fruin (1), p. 100.

LOCAL STOP:

SITE PLANNING/INFORMATION

IDENTITY:

The local bus shelter is the first image many passengers have of the system as well as being an important piece of "street furniture" at the neighborhood scale. Therefore it is important to make it positive and recognizable.

* Provide colors, logos and forms which produce a sense of identity for the system itself.
* Use materials and images that are compatible with the surrounding community.
* Locate shelters so they can be seen and identified from a distance.

Anderson, p. 4; Fruin (2), p. 16.

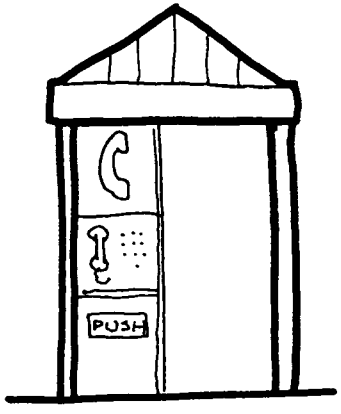
PROPER SIGNAGE:

Signs identifying the stop and route should be designed to provide clear understanding for all users including those unfamiliar with the English language in appropriate neighborhoods.

* Maintain consistency throughout the system -- logos, color, lettering.
* Place information in direct lines of sight.
* Construct signage of low-maintenance materials.

Fruin (1), pp. 98-99; Fruin (2), p. 15.

LOCAL STOP:



STATION DESIGN/CONTEXT

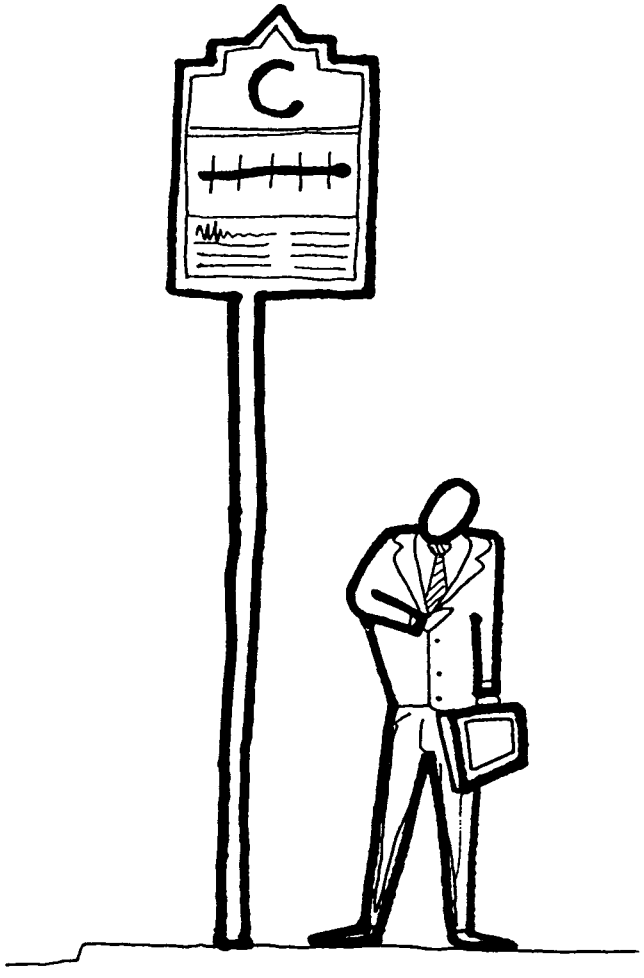
A local stop is typically located on a collector street or minor arterial. The stop is surrounded by residences and occasionally a small shopping area. These stops are low volume -- few passengers are at any one local stop even at peak hours.

LOCAL STOP STATIONS SHOULD BE COMPATIBLE WITH THEIR RESIDENTIAL CONTEXT:

The local stop must fit into and enhance the neighborhood.

* The shelter must be compatible with the area that the station serves. Consider elements such as roof slopes, height, materials and details.
* Provide an image that is understandable and acceptable to the local community.
* Landscaping is an important design feature at the local community level.
* The facility should be identifiable as part of the transit system overall design.

LOCAL STOP:

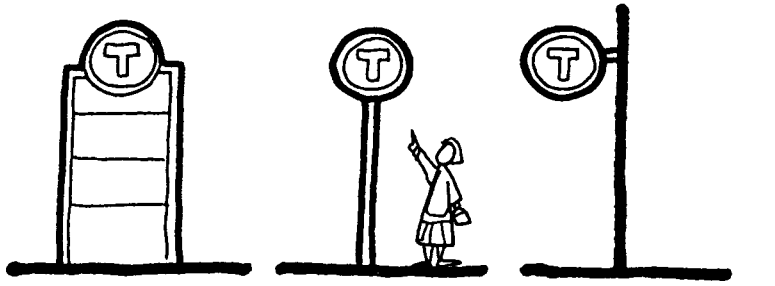


STATION DESIGN/MARKET

THE SUPPLY OF GOODS AND SERVICES SHOULD MATCH THE MARKET DEMAND AT THE LOCAL STOP STATIONS:

* A newspaper box could be located at many local stops, especially those with shelters.
* Some local stops will have adjacent retail facilities. Additional demand will be generated by transit passengers. Newspapers, magazines and snacks may be provided in addition to the normal goods offered.
* Telephone service can be provided at many local stops, especially those with shelters.

LOCAL STOP:



STATION DESIGN/INFORMATION

PROVIDE ORIENTATION AND SYSTEMS INFORMATION:

Most local stop station passengers are familiar with the local area and system. A minimum amount of information is required.

* The local stop should be visible from one block away.
* Provide bus route, fares and schedule information.

Crosby, Fletcher and Forbes, "Sign Systems Manual;" Follis and Hammer, "Architectural Signage and Graphics."

BUS SHELTERS MAY CONTAIN SOME ADVERTISING:

Such advertisements also provide information to the public.

* Local stops should provide designated areas to post local events.
* Provide a limited area in which to place advertising.
* Adopt standards so that advertising is compatible with surrounding areas. For example, it may be permitted in commercial areas only.

LOCAL STOP:

STATION DESIGN/COMFORT

THE LOCAL STOP STATION SHOULD REMAIN ATTRACTIVE OVER A LONG TIME PERIOD:

* Provide materials that are highly durable.
* Plan for the phased replacement of materials and systems over the building's life cycle.
* Use high quality materials and design.
* Provide sufficient areas of landscaping.

THE LOCAL STOP SHOULD BE AN ATTRACTIVE AND COMFORTABLE ENVIRONMENT:

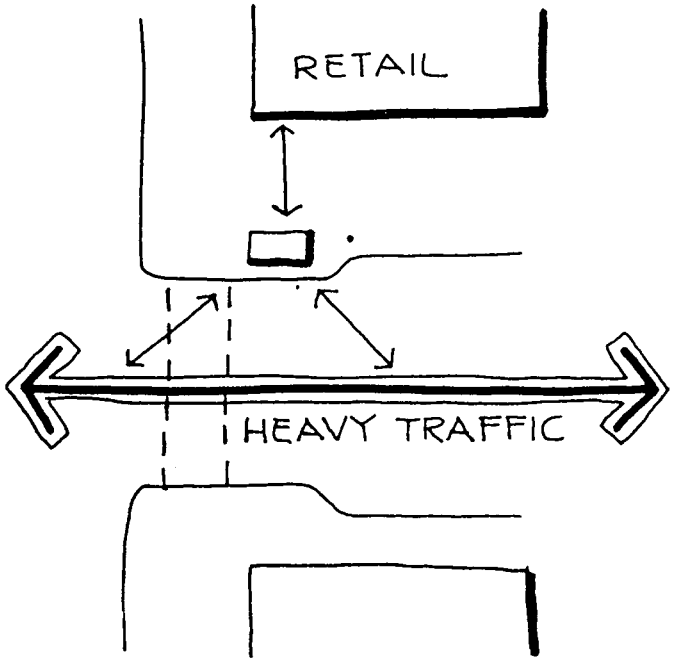
* Provide adequate seating. The seating should accommodate 30% of the ridership at peak hours. The seating should be high quality.
* Provide a barrier-free environment.

PROVIDE AMENITIES AT LOCAL STOP STATIONS:

To be competitive with private transportation the transit system should provide a degree of amenity affordable through the economies of scale.

* Provide an area for information on local events at passenger shelters.

LOCAL STOP:



STATION DESIGN/SAFETY

THE TRANSIT ENVIRONMENT SHOULD INCORPORATE A HIGH DEGREE OF PASSENGER SAFETY:

A local stop is a low volume facility with little demand.

* Provide easily visible safety strips at edge of boarding area.
* Stop signs, crosswalks and control signals should be appropriately used where pedestrian traffic crosses auto and bus traffic.
* Waiting areas should be properly drained to remain clear of water, mud, snow and ice.

THE LOCAL STOP STATION ENVIRONMENT SHOULD MINIMIZE CRIMINAL ACTIVITY AS WELL AS PASSENGERS' ANXIETIES ABOUT SUCH ACTIVITY:

A high proportion of transit riders are elderly persons and women. These groups are often the victims of criminal activity. Increased ridership will result with the perception that the transit system is a safe system.

* Provide a design that facilitates surveillance of local stop station facilities. This includes an "open" design, avoidance of hidden areas and high levels of lighting. This will limit the potential area of advertising.
* Provide electronic surveillance at local stops in high crime areas. Work in cooperation with local police to provide additional surveillance in these areas.
* Local stop stations should be located in areas with frequent automobile and pedestrian traffic.
* Retail and other activities will increase security through the use of "eyes on the street".

Newman, "Community of Interest," p. 193.

LOCAL STOP:

OPERATIONS/MANAGEMENT

REGULAR MAINTENANCE:

General maintenance of bus stops and shelters should be done on a regular basis. Bus shelters deteriorate to a poor condition that detracts from the neighborhood and gives a poor image to the transit system. Glass or plastic panels in shelters should be replaced if it becomes scratched or discolored and schedule/route information should be updated regularly. Graffiti and broken glass should be cleaned or replaced immediately to prevent further damage. Graffiti resistant materials should be used as necessary.

Vending machines, newspaper boxes, public telephones all can be placed in conjunction with local bus stops. The transit system should require a minimum level of maintenance. The transit system should be able to order their removal if poorly maintained.

Advertising may be placed at local stops, shelters or benches if in accordance with transit system policy. Performance standards and/or aesthetic standards may be necessary in the advertising contract in order to maintain a good transit system image.

REFERENCES:

OUTLINE

SOURCES BY TOPIC:

* Signage
* Urban space design
* Joint Development
* Standards, handicapped, etc.
* Parking/bus maneuvering
* Factors in site selection
* Channelization
* Transit malls
* Context/identity
* Access
* Climate

ANNOTATED BIBLIOGRAPHY

ADDITIONAL REFERENCES

REFERENCES:

SOURCES BY TOPIC

1) SIGNAGE:

a. Passini -- Wayfinding in Architecture
b. Crosby, etc. -- A Sign Systems Manual
c. Follis -- Architectural Signing and Graphics
d. Fruin -- Passenger Information Systems for Transit Transfer Facilities
e. IRT Guidelines and Principles for Design of Rapid Transit Facilities

2) URBAN SPACE DESIGN:

a. Kaplan/Diaz -- "Celebrating Urban Gathering Places"
b. Anderson -- On Streets
c. Fruin -- Pedestrian Planning and Design

3) JOINT DEVELOPMENT:

a. CTA booklet -- "Suggested Joint Development Policy and Procedures"
b. Algatt -- "One Reading Center"
c. Byrne -- "Rail Station Improvements and Development Opportunities -- A Look at the Northeast Corridor"
d. Calthorpe -- "Pedestrian Pockets"
e. Sedway Cooke -- "Joint Development"
f. "Denver's 16th St. Mall"
g. Lovely -- "Public Transit and Downtown Development"
h. Murphy -- "Bus Interface at a Regional Shopping Center"
i. CTA booklet -- "Value Capture and Joint Development"
j. "Transit-Linked Development: A Case Study of Atlanta's MARTA System" (DOT booklet)
k. Bosker -- "Portland as an Urban Theme Park"

REFERENCES:

SOURCES BY TOPIC

4) STANDARDS, HANDICAPPED INFO, ETC.:

a. Canadian Transit Handbook
b. IRT "Guidelines and Principles for the Design of Rapid Transit Facilities"
c. BART Manual of Architectural Standards
d. DOT "Transit Station Renovation: A Case Study of Planning and Design Procedures" (p. 144 on)
e. Petersen -- "Planning and Design of Mode Transfer Facilities"
f. Hayduk -- "Transit Station Planning and Design: Workshop Report"

5) PARKING/BUS MANEUVERING:

a. Petersen -- "Design of Mode Transfer Facilities"
b. DOT booklet -- "Encouraging Public Transportation through Effective Land Use Actions"
c. Misek -- "Station Planning and Design: Where to Start"

6) FACTORS IN SITE SELECTION:

a. CTA booklet -- "Howard/Paulina Market Study"
b. Petersen -- "Planning and Design of Mode Transfer Facilities"
c. Quinby -- "Transit Station Planning and Design Methodology"
d. DOT booklet -- "Decision Procedures in Transit Station Design"
e. Canadian Transit Handbook
f. TRB booklet #662

REFERENCES:

SOURCES BY TOPIC

g. Hoel -- "Transit Station Planning and Design: State of the Art"
h. DOT booklet -- "Decision Procedures in Transit Station Design"
i. Seattle Metro -- "Encouraging Public Transportation Through Effective Land Use Actions"
j. BC Transit -- "Guidelines for Public Transit in Small Communities"

7) CHANNELIZATION -- pedestrian, vehicle:

a. IRT "Guidelines and Principles for Design of Rapid Transit Facilities"
b. Petersen -- "Planning and Design of Mode Transfer Facilities"
c. Murphy -- "Bus Interface and a Regional Shopping Center"
d. Appleyard -- "BART Stations: Environmental Assessment Methods"
e. Canadian Transit Handbook
f. TRB booklet #817
g. "Transit Work Around the Country"

8) TRANSIT MALLS:

a. "Denver's 16th St. Mall"
b. Lovely -- "Public Transit and Downtown Development"
c. Bosker -- "Portland as an Urban Theme Park"
d. Liskamm -- "Serramonte Transit Center Study"

REFERENCES:

SOURCES BY TOPIC

9) CONTEXT/IDENTITY:

a. Fruin -- "Passenger Information Systems for Transit Transfer Facilities"
b. Algatt -- "One Reading Center"
c. CTA booklet -- "Suggested Joint Development Policies and Procedures"
d. Murphy -- "The Providence Connection"
e. Hayduk -- "Transit Station Planning and Design: Workshop Report"
f. Quinby -- "Transit Station Planning and Design Methodology"
g. DOT booklet -- "Decision Procedures in Transit Station Design"
h. CTA booklet -- "Howard/Paulina Market Study"
i. Petersen -- "Planning and Design of Mode Transfer Facilities"
j. TRB booklet 662
k. Lynch -- "The Image of the City"
l. Fruin -- "Pedestrian Planning and Design"

10) ACCESS:

a. Harvey -- "Some Aspects of Rapid Transit Station Design"
b. Roohr -- "Design of Pedestrian Facilities for Washington Metro"
c. Misek -- "Station Planning and Design: Where to Start"
d. DOT booklet -- "Transit Center-Based Transit Systems"
e. Petersen -- "Planning and Design of Mode Transfer Facilities"
f. Quinby -- "Transit Station Planning and Design Methodology"
g. DOT booklet -- "Decision Procedures in Transit Station Design"

REFERENCES:

SOURCES BY TOPIC

11) CLIMATIC ORIENTATION:

a. Lovely -- "Public Transit and Downtown Development"
b. Harvey -- "Some Aspects of Rapid Transit Facilities Design"
c. Misek -- "Station Planning and Design: Whhere to Start"
d. "Denver's 16th St. Mall"
e. Fruin -- "Environmental Factors in Passenger Terminal Design"

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Algatt, Jeffrey R. and Ann Lenney, "One Reading Center, Philadelphia: Playing the High-Risk Development Game," Urban Land, January 1985, pp. 8-10. Describes joint development in downtown Philadelphia (Reading Co. and Toombs Development Co.) combining an office tower and retail space with a rail station tying together all of the region's major commuter lines. Includes information on the design of the structure, two-stage financing, project costs, rental performance and the center's contributions to its surroundings (Market Street East).

Bosker, Gideon and Lena Lencek, "Portland as an Urban Theme Park," Architecture, November 1987. Emphasizes contributions made by a new $214-million, 15-mile light rail system (MAX) to revitalize downtown Portland. Describes intentions of architects and planners to design the city as an "urban theme park" and illustrates a number of new projects (i.e. the Performing Arts Center and Pioneer Courthouse Square) which use materials and features to promote interaction, intimacy and festiveness.

British Columbia Urban Transit Authority, "Guidelines for Public Transit in Small Communities," 844 Courtney Street, Victoria, B.C. V8W-2P3. Provides guidelines for planning, route location and land use policies related to transit. Specific suggestions for subdivision and shopping center design are included.

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Calthorpe, Peter and Mark Mack, "Pedestrian Pockets: New Strategies for Suburban Growth," Northern California Real Estate Journal, February 1988. Proposes a new model of suburban growth: a balanced, mixed-use area including housing, back offices, retail, day care, recreation and open space located within a quarter-mile walking radius of a light rail station. The system is designed to form a long-range growth network linking nodes of higher density housing with commercial destinations and replacing 50% of households' typical auto trips with walking and light-rail journeys. Includes an example in an area north of San Francisco.

"Carousel Snack Bars Prove that Good Locations are No Accident," Shopping Center World, May 1984, pp. 196-198. Aspects used in locating Carousel Snack Bars in malls and shopping centers. Describes the process and people involved in all stages from development feasibility through design and construction. Includes considerations for various mall guidelines and tenants.

Fruin, John J., Passenger Information Systems for Transit Transfer Facilities, Transportation Research Board, Washington, DC: 1985. Discusses the importance and design considerations of clearly-understood transit passenger information systems. Defines the four major categories of a system as: 1) visual information; 2) oral information; 3) distributed material; and 4) automatic interactive systems. Also deals with the issues of planning, management, the differing needs of each station or stop and areas where further research is still needed.

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Hocking, Richard J. and Rick Kuner, "Improving Pedestrian Access to Train Platforms at Grand Central Terminal," Transportation Research Record, No. 614, 1976, pp. 6-13. This paper is a study of the needs and proposals for northern access facilities at New York's Grand Central Terminal. The article includes study issues and surveys used, proposals of possible facilities and their limitations, design considerations, future conditions and impacts on the present station.

Hoel, Lester A., and Ervin S. Roszner, "Planning and Design of Intermodal Transit Facilities," Transportation Research Record, No. 614, 1976, pp. 1-5. This paper discusses a transit facility design process with emphasis on parameters and standards (stairways, ramps, escalators, platforms, parking, etc.), design of the station environment (lighting, fire control, acoustics, graphics, security, commercial activities, handicapped access) and design methodology.

Lam, William and John Morrall, "Bus Passenger Walking Distances and Waiting Times: A Summer-Winter Comparison," Transportation Quarterly, Vol. 36, No. 3, July 1982, pp. 407-421. This paper compared walking distances of bus riders between summer and winter in the City of Calgary, Alberta. Maximum walking distances generally agreed with the conventional service area radius of one quarter mile for local bus service (the 75th percentile distance found in the study). Results also indicated that rates of bus ridership and walking distances were higher in winter than in summer.

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Liskamm, W.H. and R. Conradt, Serramonte Transit Center Study, Urban Mass Transit Administration, Doc. DOT-I-83-45, U.S. Department of Transportation, 1983. Provides a case study of the location of transfer center at a major shopping center south of San Francisco. Includes an analysis of specific locations within the center, design factors, financing and application to other centers.

McCutchen, Wilmot R., "Five Decisions in Transit Station Design," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 95-99. This article proposes a close client-consultant relationship as the basis for the satisfactory resolution of five important decisions in transit station design. These are defined as: 1) basic station design; 2) people-moving requirements; 3) the proper provision of amenities and environmental quality features; 4) the incorporation and design of facilities such as parking, drop-off areas, bus circulation and landscaping; and 5) the best amount of community involvement in professional problem-solving.

Newman, Oscar, Community of Interest, Anchor Books/Doubleday, Garden City, N.Y., 1981. Though emphasizing housing site design the principles advocated -- territoriality, transition spaces, the use of amenities, the role of streets, zones of influence -- are all applicable to station designs.

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Seattle Metro Transit, "Encouraging Public Transportation Through Effective Land Use Actions," May 1987, reprinted by Technology Sharing Program, U.S. Department of Transportation. This report provides an excellent discussion of practical land use actions which can benefit transit services. Included are parking management actions, land use planning, site locational considerations and means to gain input into decision making.

Schneider, J.B., Planning and Designing a Transit Center-Based Transit System, University of Washington, U.S. Department of Transportation, Washington, DC: 1980. Describes the considerations in planning and designing center-based transit systems including the process of selecting the number and location of centers, boundaries, travel pattern analyses and alternative routes. Also discusses an evaluation of this system concept (its strengths and weaknesses) and provides general design guidelines plus illustrations and plans of case studies in Seattle, Portland, Orange County, Denver, Vancouver, Edmonton and Hannover, West Germany.

Schoppert, David W. and William S. Herald, "Pedestrian Range as Related to Transit Stations and Their Immediate Surroundings," Transportation Engineering, March 1978, pp. 13-15. This paper describes a generalized relationship between the rate of transit ridership and walking distance from rapid transit stations. Some general trends are also cited for real estate values within proximity to transit stations. Techniques for increasing the pedestrian range to transit are also provided.

REFERENCES:

ANNOTATED BIBLIOGRAPHY

Seneviratne, Prianka N., "Acceptable Walking Distances in Central Areas," Journal of Transportation Engineering, Vol. 111, No. 4, July 1985, pp. 365-376. This paper examines a method to calculate maximum walking distances to transit by plotting the rates of ridership over distance for various trip purposes. The critical distance is the point at which the rate of ridership shows the greatest change. Walking distances obtained with this technique were lower than those generally used by transit planners.

Stringham, M.G.P., "Travel Behavior Associated with Land Uses Adjacent to Rapid Transit Stations," ITE Journal, April 1982, pp. 16-18. This paper focuses primarily on pedestrian and "feeder bus" ranges for rapid transit. The paper found that pedestrian ranges in two Canadian cities extended to 2000 feet from the station; beyond 2000 feet, local bus service provided the principal means of access to 3000 feet from the station and beyond. The author notes that this provides up to 1200 acres of land for joint development.

REFERENCES:

ADDITIONAL REFERENCES

Alexander, Christopher, A New Theory of Urban Design, Oxford University Press, New York: 1987.

Altman, Irwin, Joachim F. Wohlwill and Peter B. Everett, Transportation and Behavior, Volume 5, Plenum Press, New York.

Anderson, Stanford, On Streets, MIT Press, Cambridge, MA: 1986.

Appleyard, Donald and H.E. Abell, Jr., "BART Stations: Environmental Assessment Methods," EDRA Journal, No. 5, pp. 273-283.

"Boston Holds New 'T' Party," Modern Railroads, September 1971, pp. 119-122.

Bryan, Harvey and Susan Stuebing, "Natural Light and the Urban Environment," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Byrne, Robert M. and Elizabeth D. Baker, "Rail Station Improvements and Development Opportunities: A Look at the Northeast Corridor," Urban Land, September 1981, pp. 5-13.

Charles River Associates, Transit Operator Guidelines for Transfer Policy Design, Rep. UMTA-MA-06-0049-80-12, Urban Mass Transit Administration, U.S. Department of Transportation, 1980.

Charles River Associates, State of the Art of Current Practices for Transit Transfers, Rep. UMTA-MA-06-0049-80-3, Urban Mass Transit Administration, U.S. Department of Transportation, 1981.

REFERENCES:

ADDITIONAL REFERENCES

Cooke, Sedway and Associates, "Joint Development," Urban Land, July 1984, pp. 16-20.

Crosby, Fletcher and Forbes, A Sign Systems Manual, Studio Vista, London: 1970.

"Denver's 16th Street Mall: Tabor Center ties Together a Mixed-Use District," Urban Land, May 1985, pp. 7-9.

Desor, J., "Toward a Psychological Theory of Crowding," Journal of Personality and Social Psychology, No. 21, 1972, pp. 79-83.

Droege, John A., Passenger Terminals and Trains, McGraw-Hill, New York: 1916.

"Encouraging Public Transportation Through Effective Land Use Actions," Municipality of Metropolitan Seattle, DOT, 1987.

Fletcher, Nancy, "Showcasing Downtown Management: Denver and Hartford," Urban Land, April 1987, pp. 12-15.

Follis, John and Dave Hammer, Architectural Signing and Graphics, Whitney Library of Design, New York: 1979.

Francis, Mark, "The Making of Democratic Streets," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Freedman, Jonathan L., Crowding and Behavior, W.H. Freeman and Co., San Francisco: 1975.

Fruin, John J., "Environmental Factors in Passenger Terminal Design," Transportation Engineering Journal, Vol. 98, No. TE1, February 1972, pp. 89-101.

REFERENCES:

ADDITIONAL REFERENCES

Fruin, John. J., Pedestrian Planning and Design, Metropolitan Association of Urban Designers and Environmental Planners, Inc., New York: 1971.

Fruin, John J., "Service and Capacity of People Mover Systems," Transportation Engineering Journal, ASCE, Vol. 99, No. TE3, August 1973, pp. 489-497.

Greenberg, Kenneth, "Toronto: Streets Revived," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Griffiths, John R., Lester A. Hoel and M.J. Demetsky, Transit Station Renovation: A Case Study of Planning and Design Procedures, University of Virginia, U.S. Department of Transportation, Washington DC: June 1979.

Guidelines and Principles for Design of Rapid Transit Facilities, Institute for Rapid Transit, Washington, DC: 1973.

Harrison, Michael, "Promoting the Urban Experience in Portland, Oregon," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Harvey, J.T., "Some Aspects of Rapid Transit Station Design," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 100-118.

Hayduk, William, "Transit Station Planning and Design: Workshop Report," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 91-94.

Hill, Michael, "Pedestrians, Priorities and Spatial Games," EDRA Journal, Vol. 8, pp. 126-136.

REFERENCES:

ADDITIONAL REFERENCES

Hoel, Lester A. and Ervin S. Roszner, Transit Station Planning and Design: State of the Art, Transportation Research Institute, Carnegie-Mellon University, Pittsburgh: 1976.

Holland, Harry, Traveller's Architecture, George S. Harrap and Co. Ltd., London: 1971.

JHK and Associates, "Final Report for the Development Related Ridership Survey" (prepared for Washington Metropolitan Area Transit Authority), March, 1987.

Kaplan/McLaughlin/Diaz, "Celebrating Urban Gathering Places," Urban Land, May 1985.

Lloyd, David and Donald Insall, Railway Station Architecture, David and Charles, London: 1978.

Lovely, Mary E., "Public Transit and Downtown Development," Urban Land, November 1979, pp. 14-22.

Luyanda, Felipe and Jose F. Lluch, Evaluation of the Impact of a Publico Terminal Facility on Urban Transportation, University of Puerto Rico, U.S. Department of Transportation, Washington, DC: March 1984.

Lynch, Kevin, Good City Form, MIT Press, Cambridge, Mass., 1981.

Lynch, Kevin, The Image of the City, MIT Press, Cambridge, Mass., 1960.

Magnenat-Thalmann, Nadia, "An Individual Information System for Visualizing the Bus and Subway Network," Transportation Planning and Technology, 1982, Vol. 7, pp. 275-279.

REFERENCES:

ADDITIONAL REFERENCES

Manual of Architectural Standards, BART, June 1965.

Marathon (Wis.) County Planning Commission, Downtown Transit Center, City of Wausau, Wisconsin: A Mass Transit Planning and Demonstration Project, 1977.

"A Market Survey and Planning Study for the Revitalization of the Howard/Paulina Area of Chicago, Illinois," Trkla, Pettigrew, Allen & Payne, Inc. & Nicholas C Jannotta and Associates, Ltd., Chicago, 1986.

McCants, Douglas M., Larry G. Richards and Michael J. Demetsky, Decision Procedures in Transit Station Design, University of Virginia, U.S. Department of Transportation, Washington, DC: May 1981.

McClelland, Lou and Nathan Auslander, "Determinants of Perceived Crowding and Pleasantness in Public Settings," EDRA Journal, No. 7, pp. 108-114.

Metropolitan Washington Council of Governments, Metrorail Station Area Planning: A Metrorail Before-and-After Study Report, Doc. DOT-I-83-50, Urban Mass Transit Administration, U.S. Department of Transportation, 1983.

Miles, Don C. and Mark L. Hinshaw, "Bellevue's New Approach," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Misek, F.J., Station Planning and Design: Where to Start," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 150-161.

Moudon, Anne Vernez, Public Streets for Public Use, Van Nostrand Reinhold Co., New York: 1987.

REFERENCES:

ADDITIONAL REFERENCES

Murphy, Jim, "The Providence Connection," Progressive Architecture, March 1987, pp. 92-95.

Murphy, Richard A. and William H.W. Doyle, "Bus Interface at a Regional Shopping Center," San Diego Transit Corporation, Design Construction and Rehab of Public Transportation Facilities, ASCE, pp. 343-355.

"New Act in Minneapolis: Transit Station Opens for Long Run," Urban Land, July 1987, pp. 30-31.

Newman, D.A., M. Bebendorf and J. McNally, Timed Transfer: An Evaluation of its Structure, Performance and Cost, Rep. UMTA-MA-06-0049-83-6, Urban Mass Transit Administration, U.S. Department of Transportation, 1983.

"N.E. Train Project," Architectural Record, July 1979, pp. 120-121.

"North/Cicero Retail Development," Alan/Jupiter, Inc., 1988.

Notter, George M., "The Architect as Developer: Union Station in New London."

Page, John A., Meryl A. Mandell, Michael J. Demetsky and Lester A. Hoel, Catalog of Transit Station Impact Case Studies, University of Virginia, U.S. Department of Transportation, Washington, DC: August 1983.

Passini, Romedi, Wayfinding in Architecture, Van Nostrand Reinhold, New York: 1984.

"Petersen, Steven G., "Walking Distances to Bus Stops in Washington, D.C. Residential Areas," Traffic Engineering, December 1968, pp. 28-34.

REFERENCES:

ADDITIONAL REFERENCES

Petersen, S.J. and R.H. Braswell, "Planning and Design Guidelines for Mode Transfer Facilities," Traffic Quarterly, Vol. 26, No. 3, July 1972, pp. 405-423.

Pisarski, Alan E., "Commuting Patterns and Trends in America," Urban Land, October 1987, pp. 32-33.

"Planning and Design of Rapid Transit Facilities," Transportation Research Record 662, Washington, DC: 1978.

Porter, Douglas R., "The Future Doesn't Work," Transportation Research News, Washington, DC: November-December 1987.

Pushkarev, B. and J.M. Zupan, Urban Space for Pedestrians, MIT Press, Cambridge, MA: 1975.

Pushkarev, B., and J.M. Zupan, Urban Rail in America, Indiana University Press, Bloomington, IN: 1982.

Quinby, Henry D., "Transit Station Planning and Design Methodology," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 77-90.

"Rapid Transit: Subway," Architectural Record, July 1979, pp. 122-125.

"Rail Transit and Terminals," Transportation Research Record 817, Washington, DC: 1981.

"Rail Transit Planning and Rail Stations," Transportation Research Record 760, Washington, DC: 1980.

REFERENCES:

ADDITIONAL REFERENCES

Rapoport, Amos, "Pedestrian Street Use: Culture and Perception," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

Recycling Historic Railroad Stations: A Technical Supplement to the Citizen's Manual, U.S. Department of Transportation, Washington, DC: 1978.

Roohr, Albert J., "Design of Pedestrian Facilities for the Washington Metro," Transportation Facilities Workshop, ASCE, Washington, DC: 1975, pp. 125-149.

San Diego Association of Governments, San Diego Trolley: The First Three Years, Doc. DOT-I-85-10. Urban Mass Transit Administration, U.S. Department of Transportation, 1984.

Schneider, J.B., Transit and the Polycentric City, Doc. DOT-I-81-33, Urban Mass Transit Administration, U.S. Department of Transportation, 1981.

"Station Center," Kohn Pedersen Fox Associates, Progressive Architecture, January 1987.

Steller, Joseph D. Jr., "Preservationists as Developers," Urban Land, October 1980, pp. 18-20.

"Suggested Joint Development Policy and Procedures," Chicago Transit Authority Development, Chicago.

Transit-Linked Development: A Case Study of Atlanta's MARTA System, U.S. Department of Transportation, Washington, DC: January 1985.

"Transit Work Around the Country," Architectural Record, July 1979, pp. 116-119.

REFERENCES:

ADDITIONAL REFERENCES

Untermann, Richard K., "Changing Design Standards for Streets and Roads," in Public Streets for Public Use, Anne Vernez Moudon, ed., Van Nostrand Reinhold, 1987.

"Value Capture and Joint Development: Potential for CTA Properties," Northeastern Illinois Planning Commission, Chicago Transit Authority, 1986.

Virkler, Mark R., Michael J. Demetsky and Lester A. Hoel, Transit Station Design: Case Studies of a Planning and Design Method, University of Virginia, U.S. Department of Transportation, Washington DC: February 1980.

Vuchic, V., R. Clarke and A. Molinero, Timed Transfer System Planning, Design and Operation, Doc. DOT-I-83-28, Urban Mass Transit Administration, U.S. Department of Transportation, 1981.

Winkel, Gary H. and D. Geoffrey Hayward, Some Major Causes of Congestion in Subway Stations, 1971.