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CENTER FOR TRANSPORTATION STUDIES

R E S E A R C H R E P O R T

**PERSONAL SAFETY AND TRANSIT:
PATHS, ENVIRONMENTS, STOPS, AND STATIONS**

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CTS 02-05

Personal Safety and Transit: Paths, Environments, Stops, and Stations

Final Report

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**PERSONAL SAFETY
&
TRANSIT:
PATHS, ENVIRONMENTS,
STOPS AND STATIONS**
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Personal Safety and the Transit Environment

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INTRODUCTION

As the Twin Cities Metropolitan Area looks to improve transit choices and seeks to improve existing transit service, the safety of transit users needs to be an issue that is considered carefully as each new service is added, old services changed, and new stops are added. This report is intended to be a resource for informing transit decisions in the Twin Cities Metropolitan Area and in Greater Minnesota. It does not address the safety of the transit vehicle itself; many studies have done that. It focuses on the design of *transit environments* as they impact the personal safety of transit users.

The report looks at site specific physical design issues, that is, transit stop or station design. But it also goes beyond to address the nature of the larger environment in which the transit stop or station is located. Issues of access are also addressed because the character of the pathways leading to and from transit stops are integral parts of the transit environment .

Personal Safety an Important Issue

Personal safety is an important issue in an effective transit system because personal safety greatly impacts use. The real safety of transit users and their perception of their safety are often crucial factors in the decision to use or not to use transit .

The goal of every transit organization is to provide safe transportation to its customers. Much attention is paid to the safe design and operation of the transit vehicle. Vehicles are inspected regularly to ensure safety. Safe operation is stressed through extensive training and careful supervision. Yet, personal safety considerations do not stop with the consideration of the transit vehicle and its operation; nor does it stop with actual safety. Often decisions to ride transit are based on a perception of safety. How safe a person feels when walking to the stop, waiting at the stop, and walking to his/her destination after leaving the transit vehicle are important considerations in making a choice to use or not to use transit.

Scope of the Study

This study addresses personal safety considerations encompassing the environments that the rider encounters while going to the transit stop, boarding the vehicle, and leaving for his destination whether the rider comes on foot, bicycle, car, or in another transit vehicle. The issues of vehicle design are beyond the scope of the study.

Methodology

Using the design principles articulated in *Design for Public Safety. Saint Paul: a Guide for Making a Safer Public Realm*, this study uses the case study methods of the architecture, landscape architecture, and urban design professions. It evaluates existing transit environments and suggests new ones.

INTRODUCTION

Selection of Types: Transit Environments

The study focuses on the physical design issues of transit environments. Transit stops, transit stop environments, the pathways that lead to and from the stop, and the pathway environments were all studied. Traditional bus, light rail, and park and ride facilities, modes of transit that had applicability to the Twin City Metropolitan Area, were all part of the study. Central City, Post World War II Suburbs, and New Urbanism Suburbs, types of communities found in the metro area, were the environments studied.

Organization of the Report

This report is organized so that it can be read from cover to cover or used as a reference. Care has been taken to minimize text. The first chapter presents the personal safety principles. The principles are demonstrated in the following three chapters. Photographs of actual built environments and design drawings of hypothetical or proposed environments show how these principles can be applied or point out things that do not work to support personal safety. The second chapter addresses paths to transit, the third the environments surrounding transit facilities, and the fourth the transit stops and stations themselves.

**CHAPTER I: PERSONAL SAFETY
DESIGN PRINCIPLES**

DESIGN PRINCIPLES: OWNERSHIP

An “owned” environment is safer than one that appears to be abandoned. Often the level of maintenance that a property receives indicates the level of ownership. Well maintained environments appear owned and are less likely to be scenes of crimes because a well cared for urban environment is and feels safer.

Belonging to its surroundings also indicates ownership. Transit stops whose scale, materials, and siting all make it a part of the neighborhood or district are “owned.” Bus stops placed in isolation do not feel owned. Left over spaces next to the pathway to the station can appear to belong to no one making a passerby feel less safe. These “pieces,” especially when they are adjacent to public side walks, can be places where would-be attackers lurk.

When Metro Transit decided to paint its buses white and keep them very clean, it was using the concept of ownership to promote confidence in its customers. Not all signs of ownership are positive, however. Gang graffiti marked environments tag gang territory and intimidate. They are more often scenes of crime than those environments that do not have graffiti.

The lower photograph shows a pathway in the heart of a neighborhood. Because it is unmaintained, it is intimidating even during the day. The upper photograph shows an unowned space near a bus stop.



DESIGN PRINCIPLES: LAND USE/ACTIVITY

Because transit systems are important parts of the public infrastructure that make a community, a well designed public realm should support the transit stop, the environment around the stop, and the pathway to the stop. These public areas should also be supported by the types of land uses contiguous to them. Appropriate land uses and the activities associated with those uses add both to transit use and to personal safety. Deserted areas can be intimidating and dangerous. The presence of people is desired because people provide “eyes on the street” which can deter crime and make others feel safer. Areas of mixed use are preferred because areas of single use can be active, vibrant places at times and deserted, formidable areas during other times of the day and days of the week. Areas of mixed uses have a variety of people coming and going and activity around-the-clock, seven days a week. It is important that the mix of use is compatible, however. Notorious bars are not good neighbors to child care centers or to public libraries.

The sidewalk shown above is example of a public realm that is inadequate pathway to the transit stop. The too-narrow sidewalk is punctuated with obstructions. This is a difficult environment at best; during the winter when snow accumulates; it is impassable. The bus stop shown at the bottom is an island that is not supported by the uses of the land around it. Although it is an important transfer point, it is in the middle of nowhere.



DESIGN PRINCIPLES: VISIBILITY

Transit environments are safer and feel safer if they are visible to users and observers. Crimes against people are usually committed in places that are hidden from the view of others. Victims that are accosted in visible areas are taken to secluded areas.

Sightlines need to be carefully designed in transit environments. Columns, walls, fences, shrubbery, and level changes can all obstruct sightlines, block observers' views, and conceal an attacker.

Lighting levels are crucial in maintaining visibility and safety throughout the day and night in transit environments. Lighting should illuminate the faces of people. Multi sources of light is more resistant to vandalism and provides even illumination that casts fewer intimidating shadows.

Lighting that is too bright in bus shelters can compromise personal safety. Too bright lights create a fish bowl effect. The transit user in the shelter can be easily seen by others, but can not see outside. Maintenance is necessary to maintain visibility. Burned out lights need to be replaced. Trees that have grown to obstruct the illumination need to be trimmed.

Visibility is good in this downtown bus mall, but it needs some maintenance. The bus shelters are transparent and properly lighted at night. There are good sightlines between the stores, the sidewalk, the bus shelters, and the street. The trees are trimmed so that the faces can be observed. However, the trees need to be trimmed to maintain good illumination.



DESIGN PRINCIPLES: MOBILITY

Feeling safe when going to and from a transit stop or waiting for the transit vehicle at a stop is dependent on a sense of mobility. Mobility is the freedom to move to avoid an unsafe or threatening situation. Freedom of movement needs to be designed into the environment so that transit patrons do not feel confined as they walk to the stop and wait there. When transit stops are small, fenced areas, they feel to the users like “people pens.” People feel more comfortable when they are not forced to be too close to the others who are waiting with them. Stops should be spacious so that there is no crowding and that one can move to another part of the stop if one wishes.

Avoiding or minimizing movement predictors and entrapment areas are important considerations when designing transit environments. Movement predictors and entrapment areas are places of potential danger because mobility is restricted in them. When a pathway gives no choice but to enter at one end and leave at the other, such as a tunnel or a bridge, it is a movement predictor. These areas are threatening and dangerous because a would-be assailant can await an intended victim at the exit. Entrapment areas are small, isolated areas where assailants can hide and victims can be confined. Dark nooks along paths are entrapment areas.

The bus shelter in the upper photograph is open ended and has several setting areas. The small space between two buildings in the lower photograph is an entrapment area.



DESIGN PRINCIPLES: READABILITY

We feel safer and are safer if we know where we are, where we are going, and can follow a clear path to get there. Visual cues can make an environment very readable or confusing. Subway stations in Stockholm are designed to be unique environments, each with its own distinct, very recognizable personality. When riding the subway, the signature nature of each station makes it easier to find the right station and avoid mistakes. This environmental design strategy gives the rider a confidence in using the system that makes the rider feel safer.

Clear, assessable signs can give important visual cues in transit environments that make the environment readable. However, the most important readable cues are those parts of the environment that are objects or surfaces. These cues can buffer transit users from potential danger and lead to the stop. Paving surfaces can define a pathway that is easy to follow. Street furniture can be important cuegivers. Bollards can cue where to stand, paving can define a pathway, and potted plants can separate the people area from the area for vehicles.

The top photograph shows a readable transit environment. The paving, the white strip, the maroon signs, the lights with green poles, and the benches define the waiting area for the LRT. The bus shelter, the yellow stripe, the lights with beige poles, and the blue signs define the waiting area for the buses. The trees and waste containers help to define the two separate areas of the environment. In the bottom photograph bus station signs and paving patterns cue people where to stand to wait for the bus. The paving patterns, white strip, and the potted plants delineate where the bus will be.



CHAPTER II: PATHS TO TRANSIT

Placing benches and shelters at stops can make the experience of waiting for transit more comfortable, yet the placement of such street furniture can make the pathway past the stop uncomfortable to use. This popular stop would have been better if the bench were not placed on the sidewalk, but next to it, leaving the sidewalk clear for passage. (mobility)

The bump-out at this corner helps ease the congestion at the corner, but the store entrance, street display of merchandise, and waiting for the bus all take place in very close proximity to each other. (activity/landuse,mobility)



PATHS

These bus shelters really crowd the narrow sidewalks. The street signs, lamp posts, and newspaper vending machines also add to the congestion. (mobility, land use)

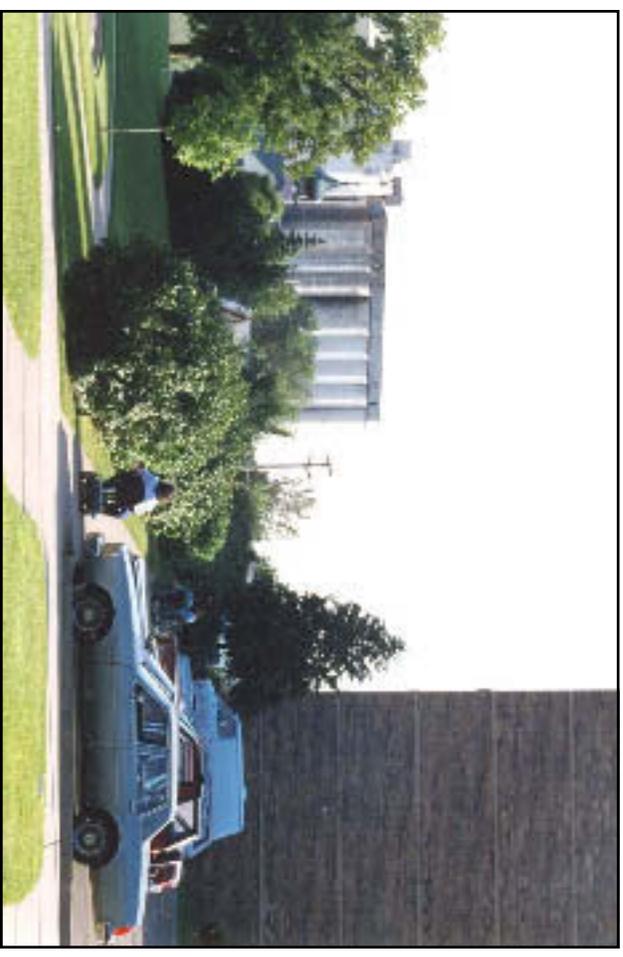


PATHS

Existing environments need to be evaluated before siting a pathway to a transit stop. Certain conditions may make some routes inappropriate. Narrow sidewalks that are cluttered with obstacles, as in the photo to the right, are not suitable. Neither are isolated pedestrian bridges like the one below. (mobility, land use)



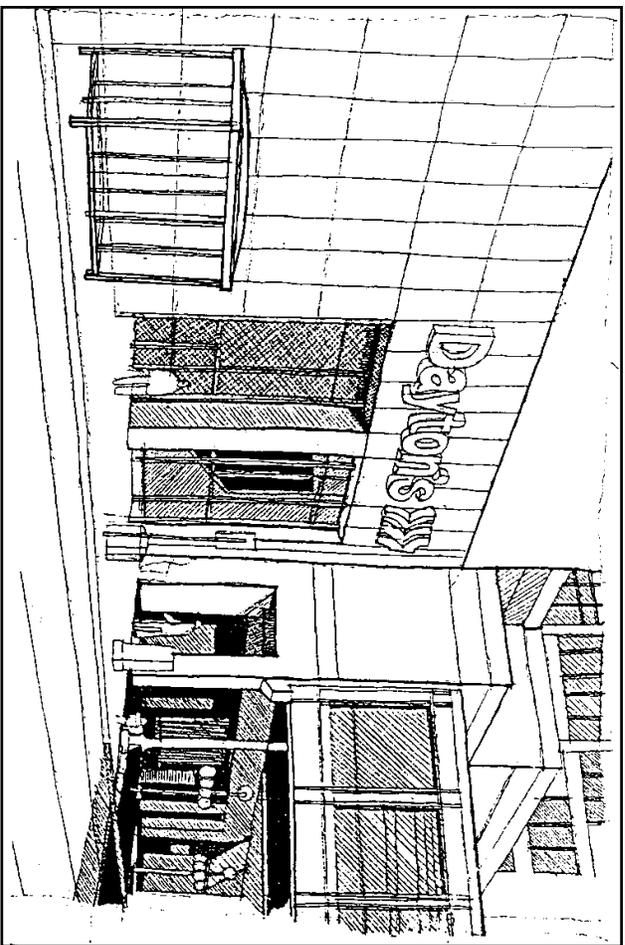
Many efforts have been made to make transit more accessible to those that have physical disabilities. These efforts can be undermined when the path that leads to the transit stop does not feel safe to its users. People with handicaps are particularly vulnerable to attack. This path between an apartment building for people with physical handicaps and the transit stop is isolated, poorly lighted, and lined with bushes that could conceal attackers. Because the front bumpers of cars overhang the sidewalk, the path becomes too narrow for two wheelchairs to pass. (activity/land use, visibility, mobility)



The absence of sidewalks in many residential suburban neighborhoods is a barrier to transit use. Developments should be designed to accommodate transit access. This suburban affordable housing development built by the Roosevelt administration had to use land efficiently in order to keep costs down, yet each street has a sidewalk on one side. (mobility)



Effective strategies for paths that are comfortable to use incorporate all the pedestrian systems that will be used to reach the transit stops. Skyways are important systems in both downtown Saint Paul and Minneapolis. Currently the skyway system is not as integrated with the transit stops as it could be. (activity/landuse)



Suburban and exurban park and ride lots are too often vast, isolated islands of asphalt. This one is not. Sidewalks lead to the bus stop, and a pedestrian path is provided through the lot. (activity/landuse, mobility)



PATHS

The design of this suburban style shopping mall on a busy central city street has made the sidewalk less safe because the buildings are set back from the street. The seasonal fruit market, however, activates the spaces by the bus stop, making it feel safer. (activity/land use, visibility)



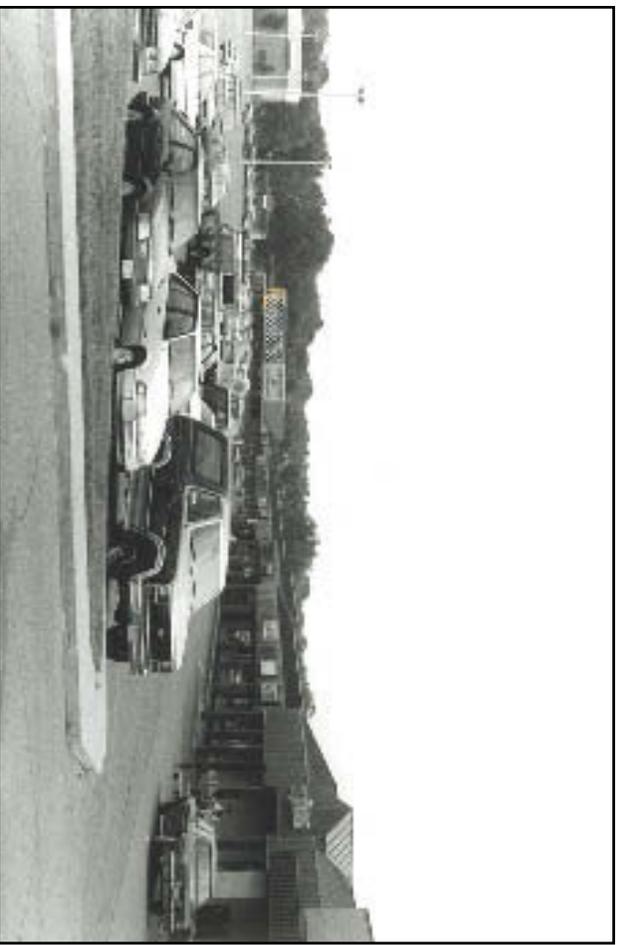
This restaurant does not help make the path to the bus stop safer because the “front door” is not on the front of the building. It is on the side and is oriented to the parking lot, not the street. (activity/land use, visibility)



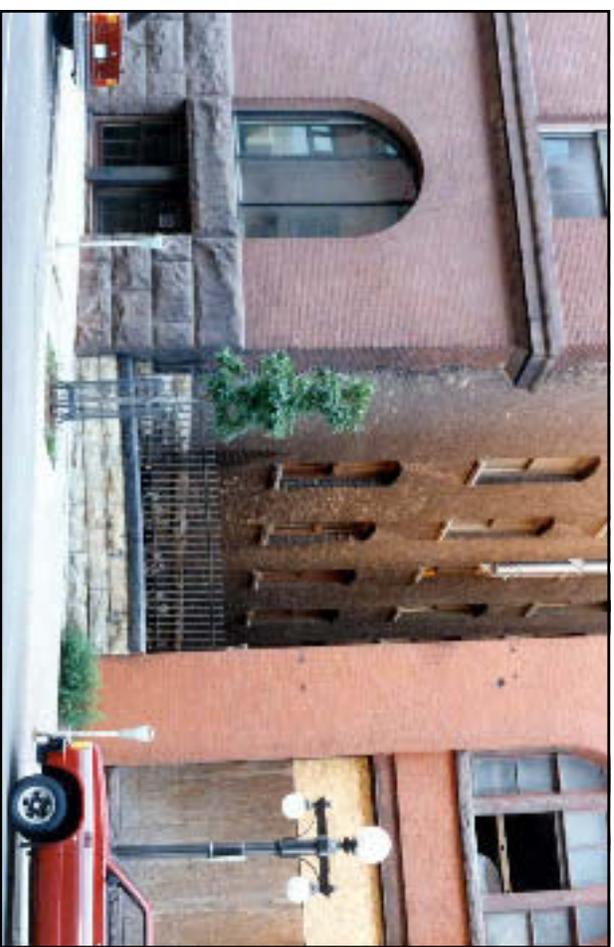
Often parking lots can be places of danger and are to be avoided. This parking lot is a good neighbor that helps to make the path to the transit stop feel safer. Its small size and its design is in character with the design of the street. The lot is well maintained and its fencing does not provide hiding places. (ownership, visibility)



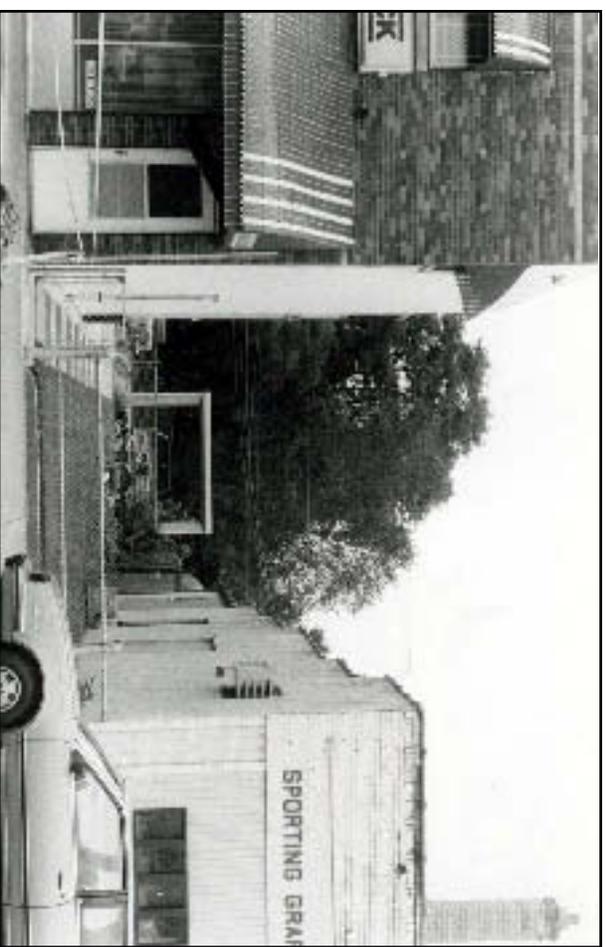
This parking lot is too big, belongs to no one, and is too isolated from “eyes on the street.” These characteristics make it a potential place for criminal activity and intimidating loitering. A path to the transit stop should avoid spaces like this. (ownership, activity/land use)



The gap between these buildings is no longer a potential hiding place because it has been fenced off. This street has such a narrow sidewalk that this strategy is particularly important here. (ownership, mobility)



This space between buildings is occupied and separated from the sidewalk. (ownership, mobility)



PATHS

This space between buildings has been claimed as a social space. It is wide enough to permit passage. The bench is placed back from the sidewalk so it does not block traffic, yet it is close enough for people watching. This space could benefit from the addition of lighting. (ownership, activity/land use, visibility, mobility)



Paths that do not have people places that border them often are avoided because they seem isolated, unfriendly, and scary, even during the day. Paths that are too narrow, like the sidewalk on the right, require users to step out into very fast traffic in order to pass each other. (ownership, activity/land use, mobility)



Passages like this route to the LRT station are to be avoided whenever possible. Narrow, isolated spaces, they are intimidating to cross because there are no places to escape. These spaces need to be well lighted. When transit is built next to a freeway, structures like this are often built so that those across the freeway can reach the station on the other side. (activity/land use, visibility, mobility)



By building new multi-unit housing next to the transportation corridor, transit use is encouraged and more activity is added to the station environment. (activity/land use)



A mugger could hide at the bottom of these steps that lead from the freeway bridge to the LRT station. A victim could be taken to an area behind the stairs. Although the platform appears to be well lighted, the stairs do not. (visibility, mobility)

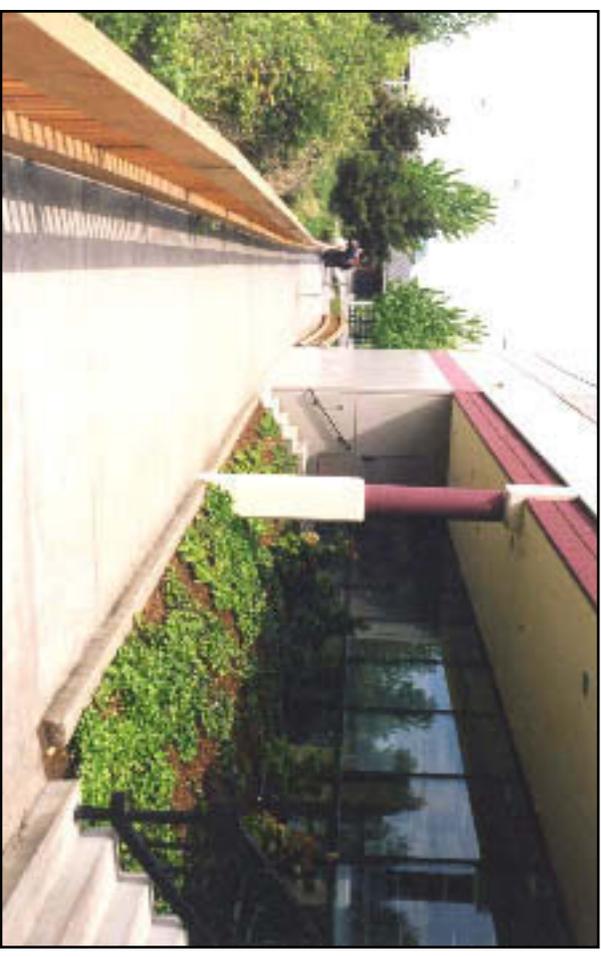


Bushes are adjacent to the bus transfer station and the end of the stairway to the freeway bridge providing potential hiding places for muggers in this isolated setting. (activity/land use, visibility, mobility)



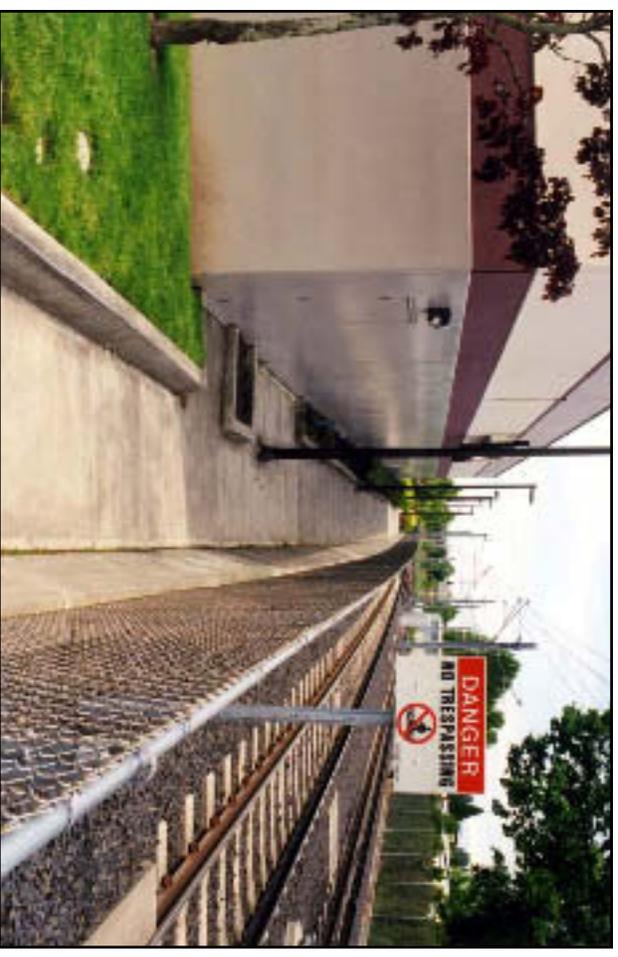
PATHS

This LRT and bus transfer station is isolated from the shopping center it serves. Some of the path to the station has store windows that overlook it. (activity/land use, visibility)



PATHS

This environment behind the shopping center is not a good place for the pedestrian path between the shopping center and the transit station. It is in a “no man’s land” strewn with abandoned shopping carts. Much of the path is very confined as it passes by the back of the center. Its adjacency to the tracks makes it even more intimidating. (ownership, activity/land use, visibility, mobility)



The continuation of this path is also problematic. Although the bridge over the wetland is wide enough to provide an interesting place to stop and watch the wildlife during the day (which adds activity), the bridge area with its bushes can be intimidating at night. Pedestrian-scaled lighting is not provided. The large overhead lights may work for the buses, but they can leave areas adjacent to the path in shadow. (activity/landuse, visibility, mobility)



This pedestrian path to a light rail line is bucolic, but it could be frightening, particularly at night when the lights cast shadows. Its separation from activity could make it intimidating to some at any time. The path width permits the pedestrian an opportunity to walk near the middle, away from the threatening foliage at its edges. Trimming of foliage should be part of the regular maintenance routine in order that the bushes do not become hiding places. (activity/landuse, readability, mobility)



This inner city path is intimidating even in the daytime. (Ownership, Visibility)

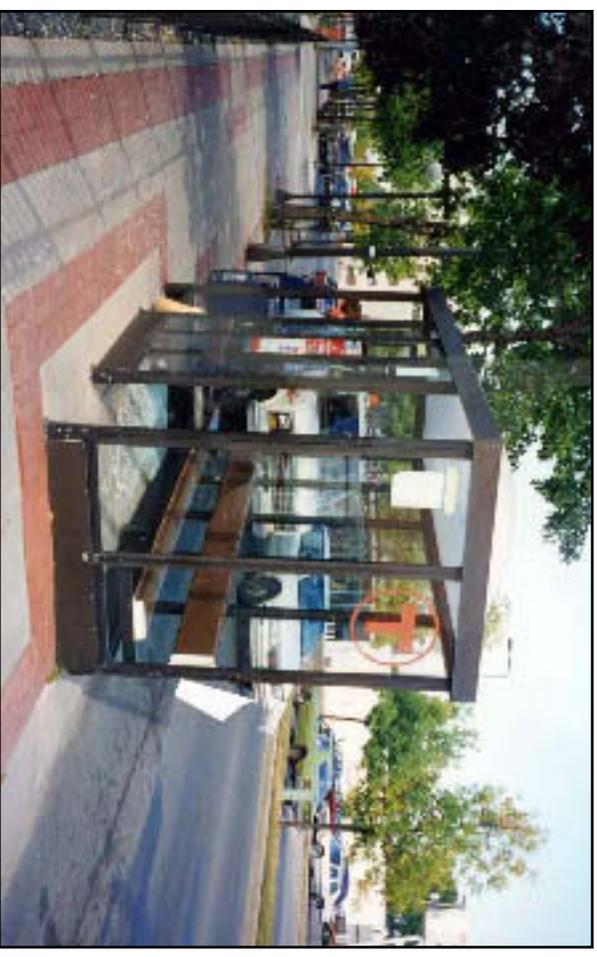
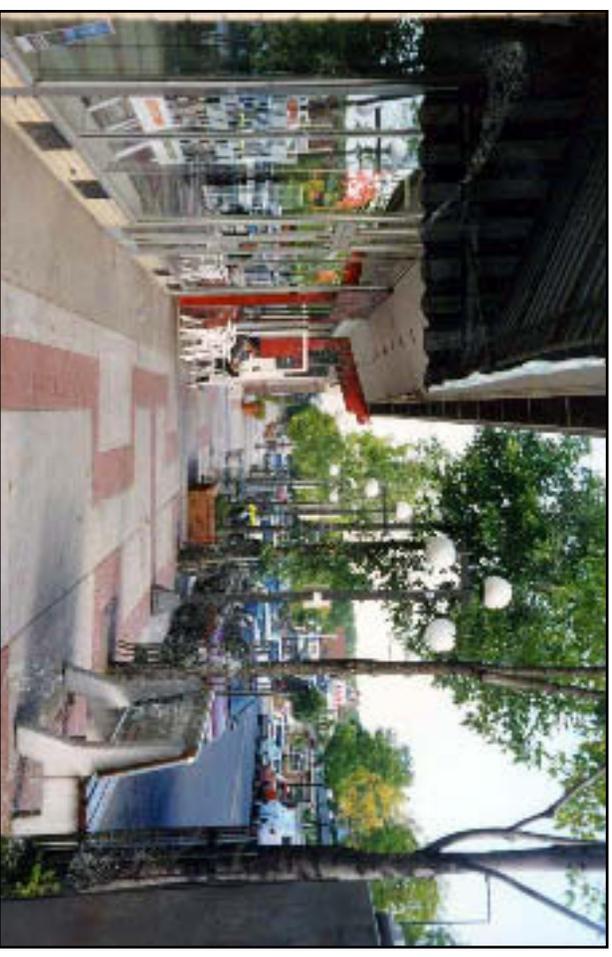


Street furnishings can add much to personal safety. Lighting is particularly important. However, lighting needs to be placed appropriately and be well maintained. The growth of trees and shrubbery may compromise its effectiveness as in this case where tree branches have surrounded the globe, limiting its effective illumination. Bollards can prove needed people-scaled illumination in dark corners and help define a pathway. (visibility, readability)

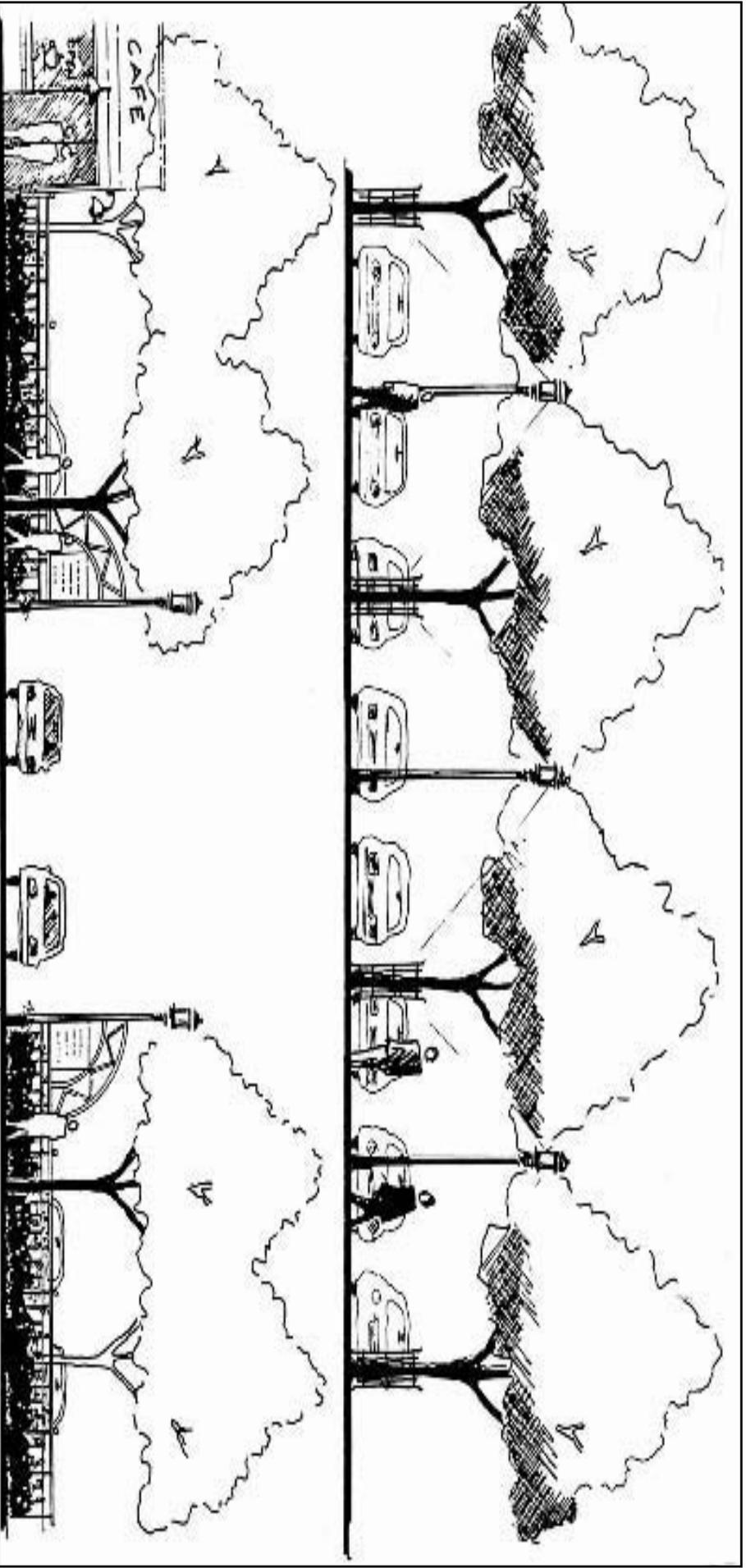
Well maintained pavement is important to safety. Changes in pavement levels can create hazards for the pedestrian especially when these changes collect water that freezes and turns to ice. (ownership)



Careful design of the street edge can increase personal safety. This pedestrian realm is well-layered and very legible. Paving patterns give visual clues that define areas of use. A pedestrian can read what part of the sidewalk is used for the sidewalk cafe, the bus stop, and walking by. The sidewalk is well lighted and maintained. The trees, the lampposts, and the on-street parking protect the pedestrian from the traffic. (readability, ownership, visibility, mobility)



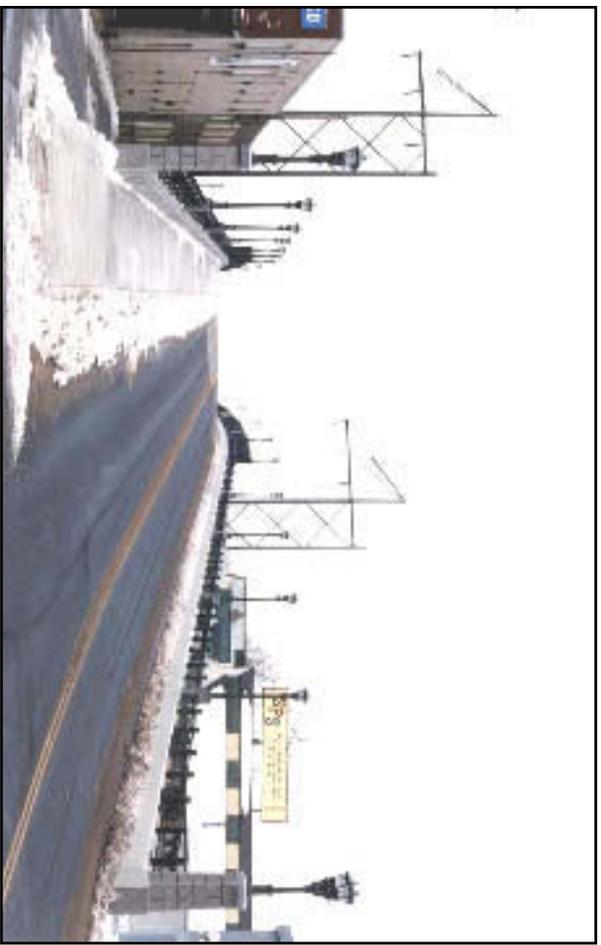
This street has a well defined pedestrian realm as it passes a parking lot. It is well maintained. The trees are trimmed so the sightlines are not blocked, the fence and plants divide the sidewalk from the parking lot, and the lighting calls out the lot entrance. (ownership, visibility, readability, mobility)



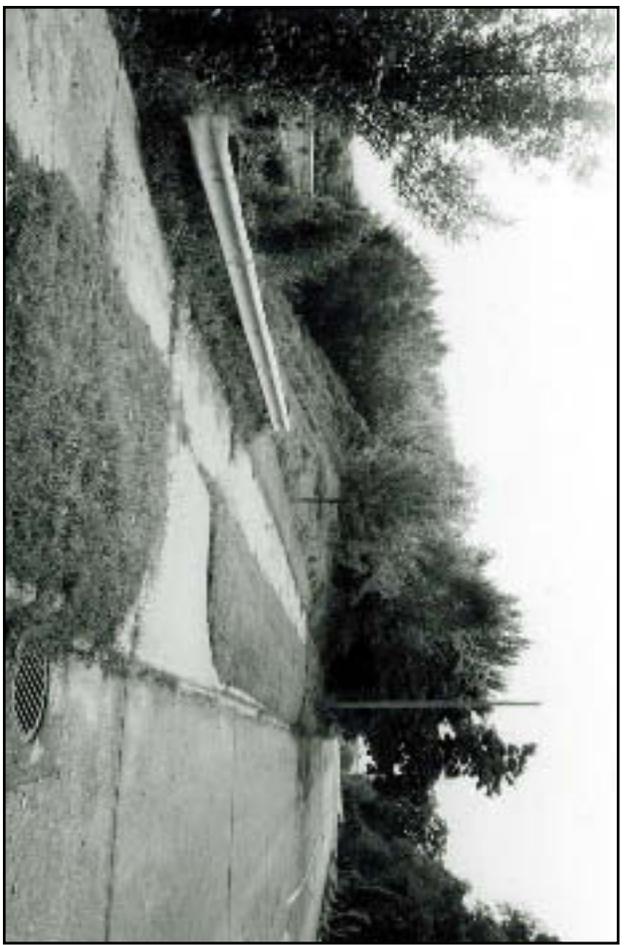
Bridges are of particular concern because they are often weak links in a strong pathway to transit. This bridge is part of no person's land right in the middle of the city. There is nothing urban about it. It has no activity that surrounds or overlooks it. It has a sidewalk, but no pedestrian-scaled lighting. It is clearly an environment for automobiles. (ownership, activity/land use)



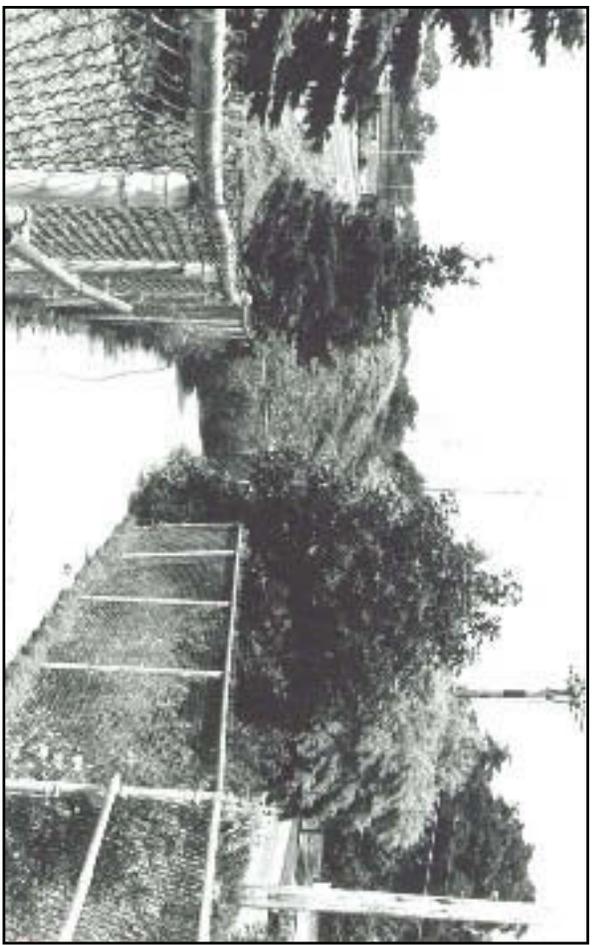
This bridge has some buildings that overlook it. Its sidewalk is lighted with pedestrian-scaled lighting. The railing detail identifies it as a part of the city. Snow has been removed to allow for use. (ownership, activity/land use)



Even this small bridge provides a hazard. It is isolated, the guard rail could provide a hiding place, and it is not lighted. (activity/land use)



This bridge is scary during any time of the day or night. It is isolated, bushes next to it provide a hiding place, it is poorly maintained, and the fencing creates a space from which it is hard to escape. (ownership, activity/land use, visibility, mobility)



Business parks provide special challenges for paths to transit. Often these parks are truck-oriented and suburban in form, even when they are built in the inner city. They are designed as enclaves separate from their neighbors. The buildings have blank walls, or they are set so far back from the street that no “eyes on the street” are provided. When the business park to the right was developed, no pathway from the bus line on the arterial above was provided. Because of this, a special bus that went through the park had to be provided. Often these parks have no sidewalk at all, so it is hard to walk from the transit stop to work. If they do have sidewalks, they are often pedestrian unfriendly. (activity/landuse, visibility, mobility)



PATHS

Paths should read well and be part of their environment
This path is part of an experience. One can shop and
greet neighbors before reaching the bus stop.
(activity/land use)



This path is well marked. Although the transit
stop is separate from the shopping center,
the path to and from it is very clear.
(readability)

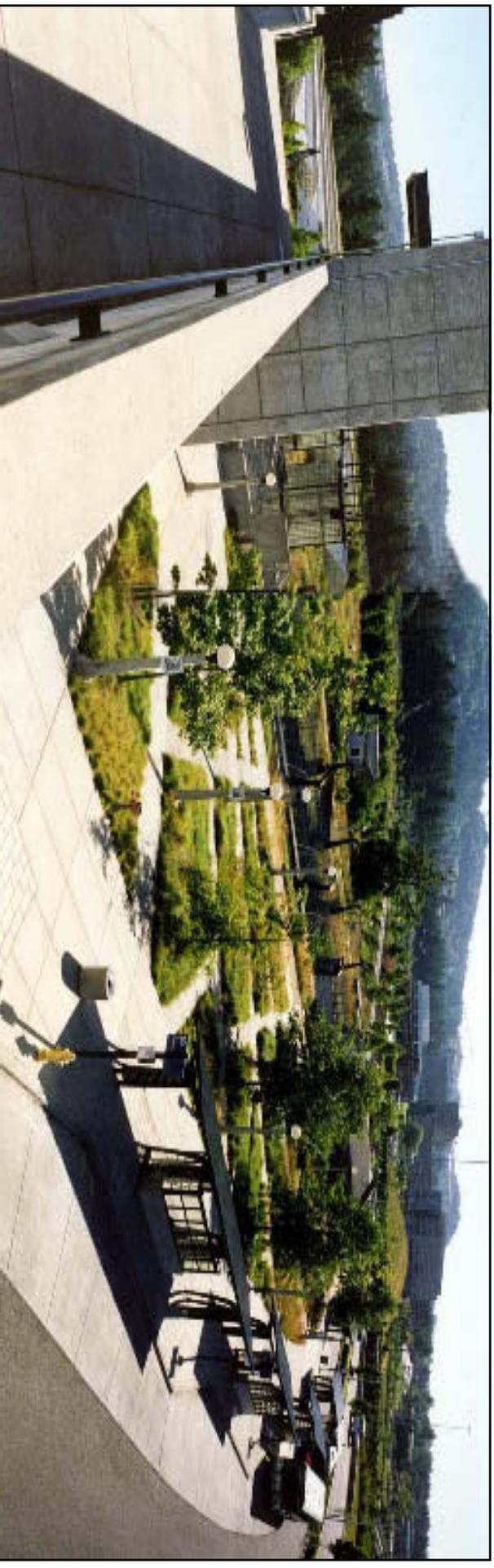
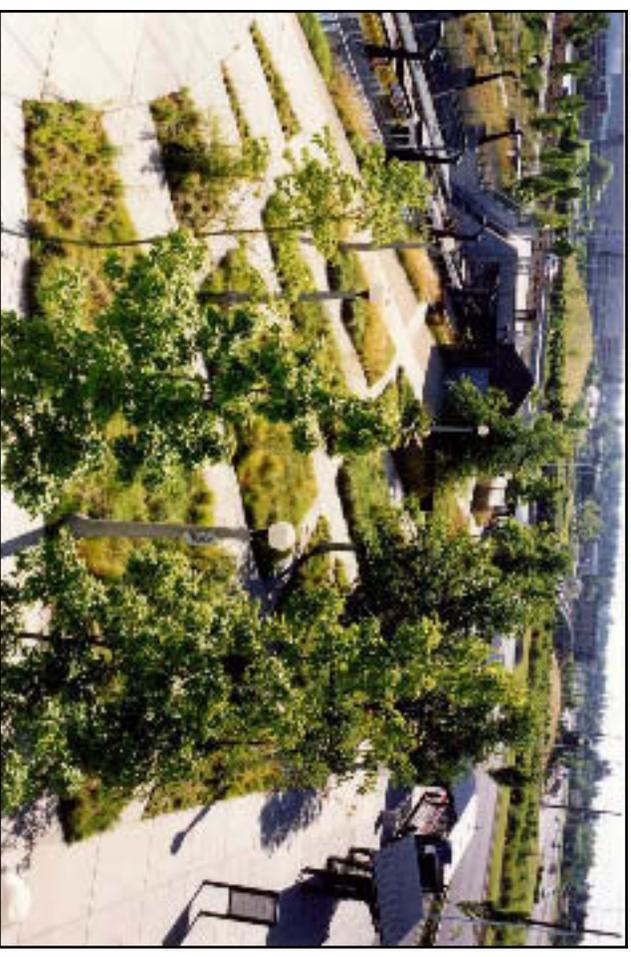


The design of superblock apartment developments, such as this one, does not support transit use even though they often provide the density needed for transit. They are internally focused around shared open space that is for residential use only. They are separated from the public street by a “moat” of parking. No “eyes on the street” are provided by this arrangement. Usually there are no sidewalks for pedestrians, as can be seen in the example on the right. (ownership, visibility, mobility)

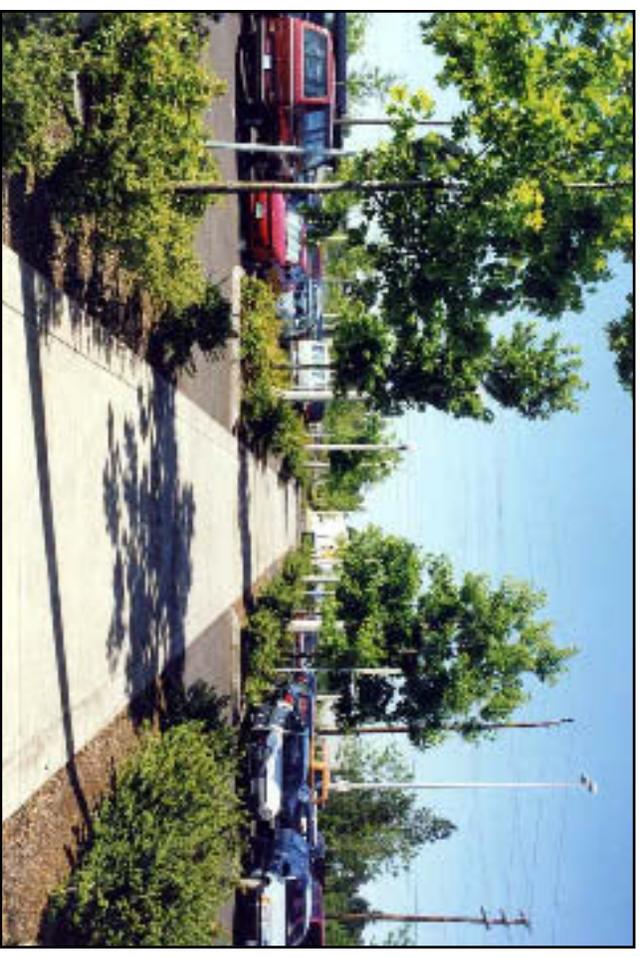
This neighborhood path is supported by the placement of the street, boulevard, street trees, sidewalks, and the housing. The layering from the public realm to the semi-private yard, to private house is very clear. Front doors and front porches provide “eyes on the street.” (activity/land use, visibility, readability)



These paths radiate from the LRT station to individual bus stations. They are easy to read and have pedestrian scaled lights, but some trees obscure the lights. The areas between the paths have been planted. Plants chosen in such settings should be easy to maintain in order to give the area a well-maintained appearance. (readability, visibility, ownership)



This path from a park and ride lot to the transit station reads well as it moves through the lot. It is wide, well lighted and the trees are trimmed up to permit the recognition of faces. (readability, visibility, mobility)



PATHS

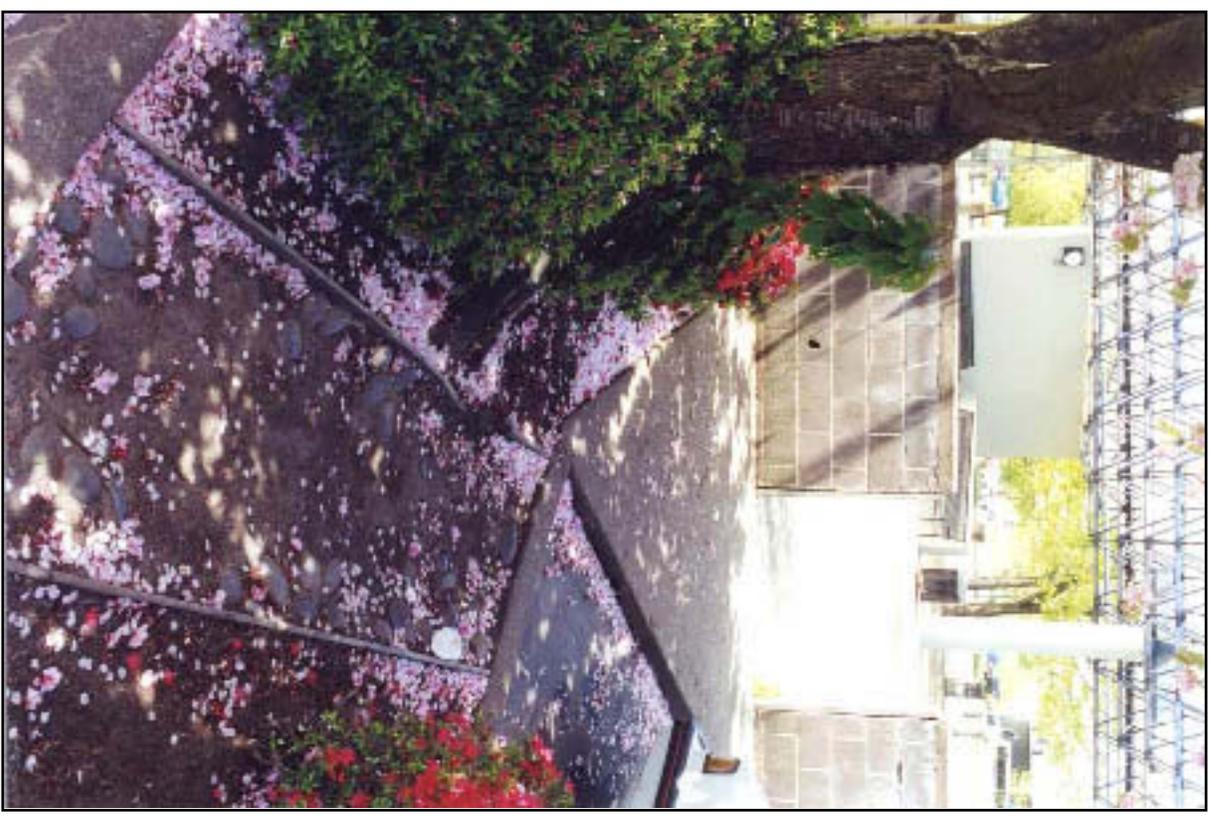
These crosswalks that lead from the LRT station are well marked, well lighted, and accessible to those in wheelchairs. (readability, mobility)



The gates by the station in the lower photograph help protect the transit users from the train. (readability)



This path through a wall at a transit station is problematic. The surface is uneven and the wall provides a dark hiding place for a would-be assailant. (visibility, mobility)

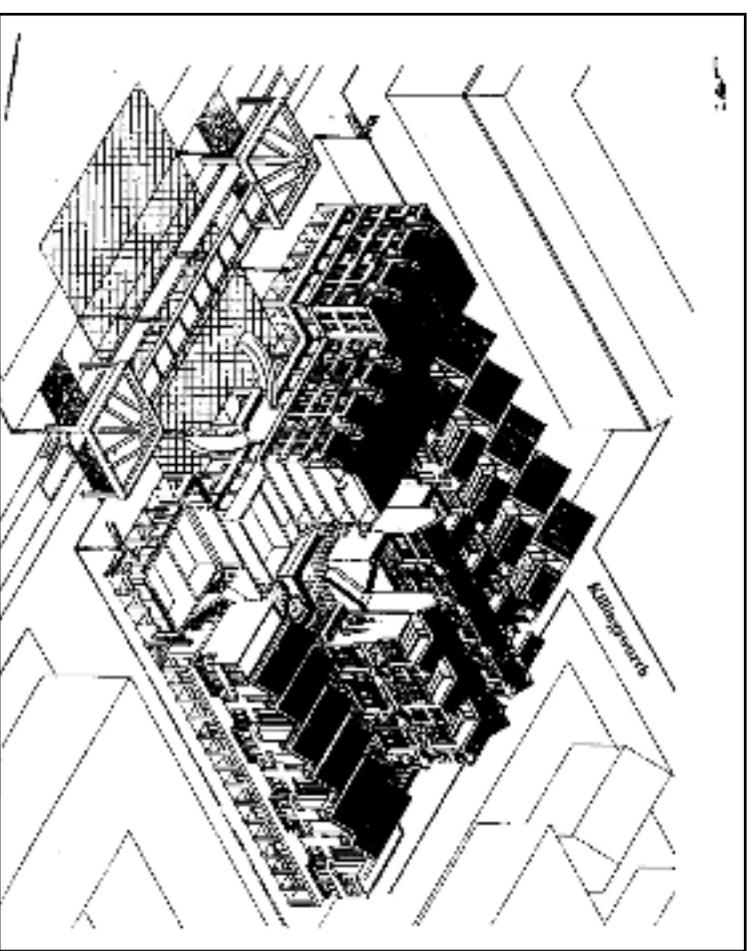


Crossing busy arterials to reach the transit stop is a problem, but an island between lanes of traffic helps. The bases of the lamp posts and the bollards on this small island help protect the pedestrian and provide illumination. Wider islands are preferred. (activity/land use, visibility, mobility)

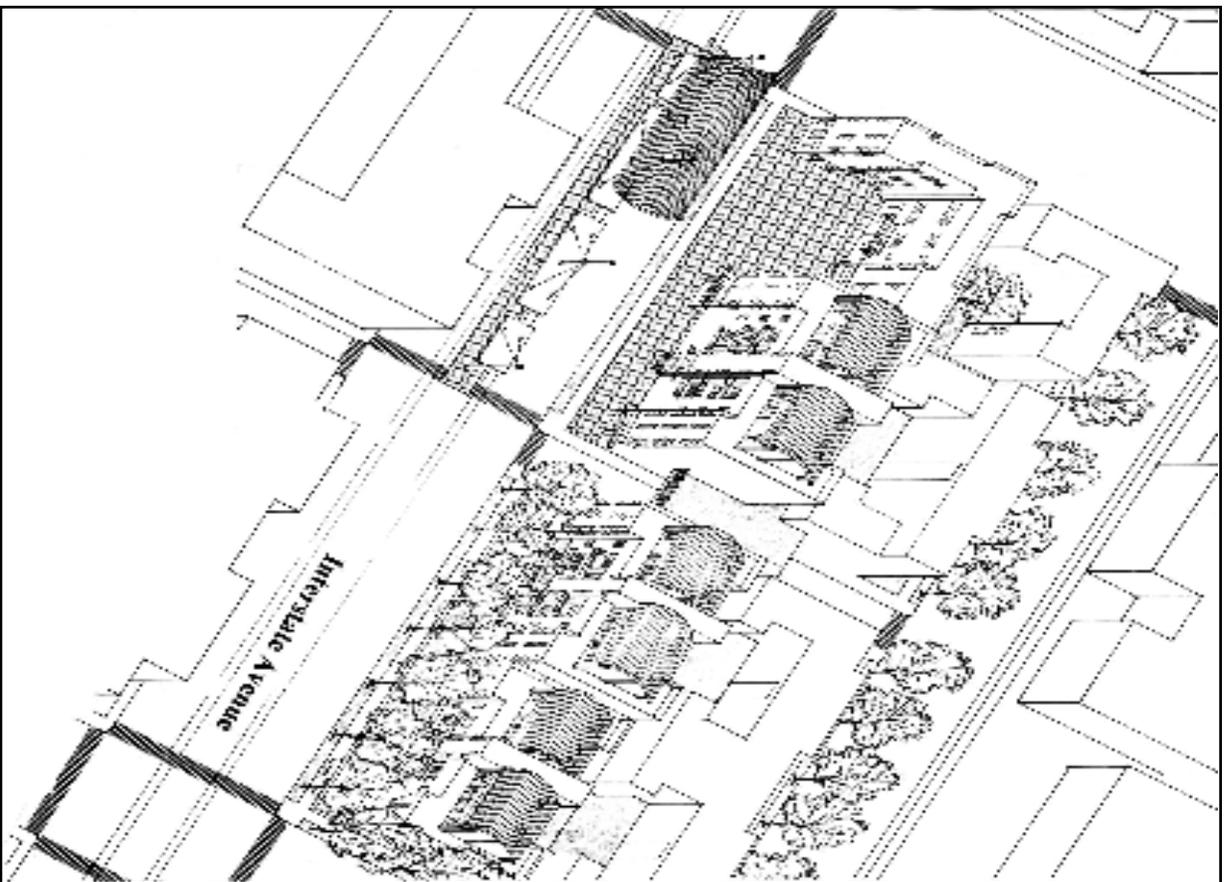


CHAPTER III: TRANSIT ENVIRONMENTS

Transit environments are very important to transit users. The quality of these areas around stations and stops contribute to their use or discourage their use. The design of the most effective transit environments responds to all of the personal safety principles: ownership, activity/land use, visibility, mobility, and readability. This infill development is a good example. It responds to the historic character of the block around the transit station. The street level commercial with residential above provide round the clock activity and “eyes on the street.” The clearly defined path to the station is well lighted. The paving patterns, street trees, building massing and siting all work together to make an environment reads well to the user. (ownership, activity/land use, visibility, readability, mobility)



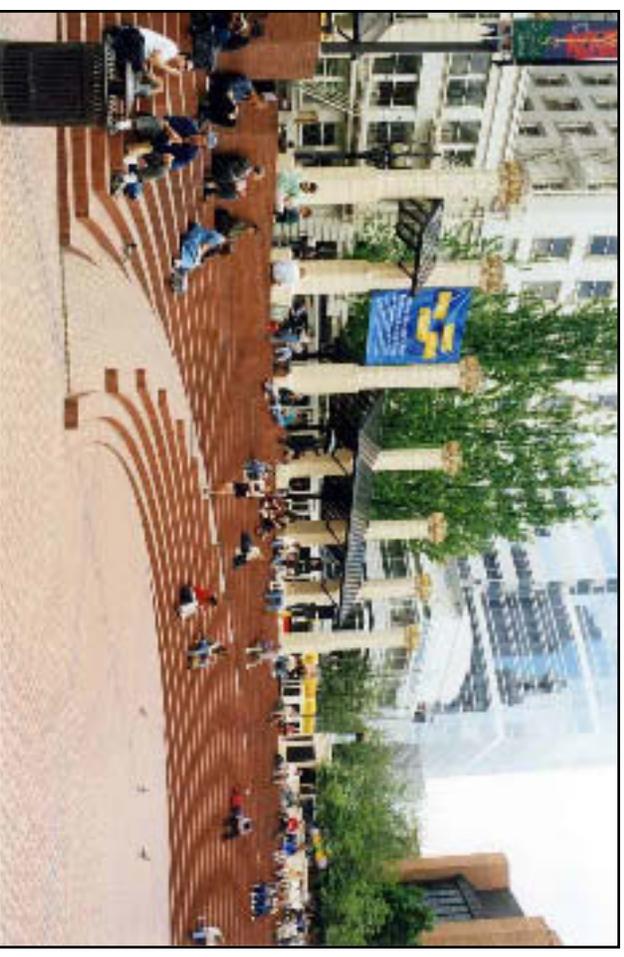
The mixed use development at this LRT station provides activity around the clock. The residential block on the right is placed to at a sight distance from the station. It is buffered from the line by tress that are trimmed to maintain sightlines. The crosswalks are clearly marked. The commercial/residential block across from the station is well sited. The stores, the public plaza for gathering, and the residential units above provide activity and “eyes on the station” and transit riders. This station environments integrated into the community and has been designed as a destination. (ownership, activity/land use, visibility, readability, mobility)



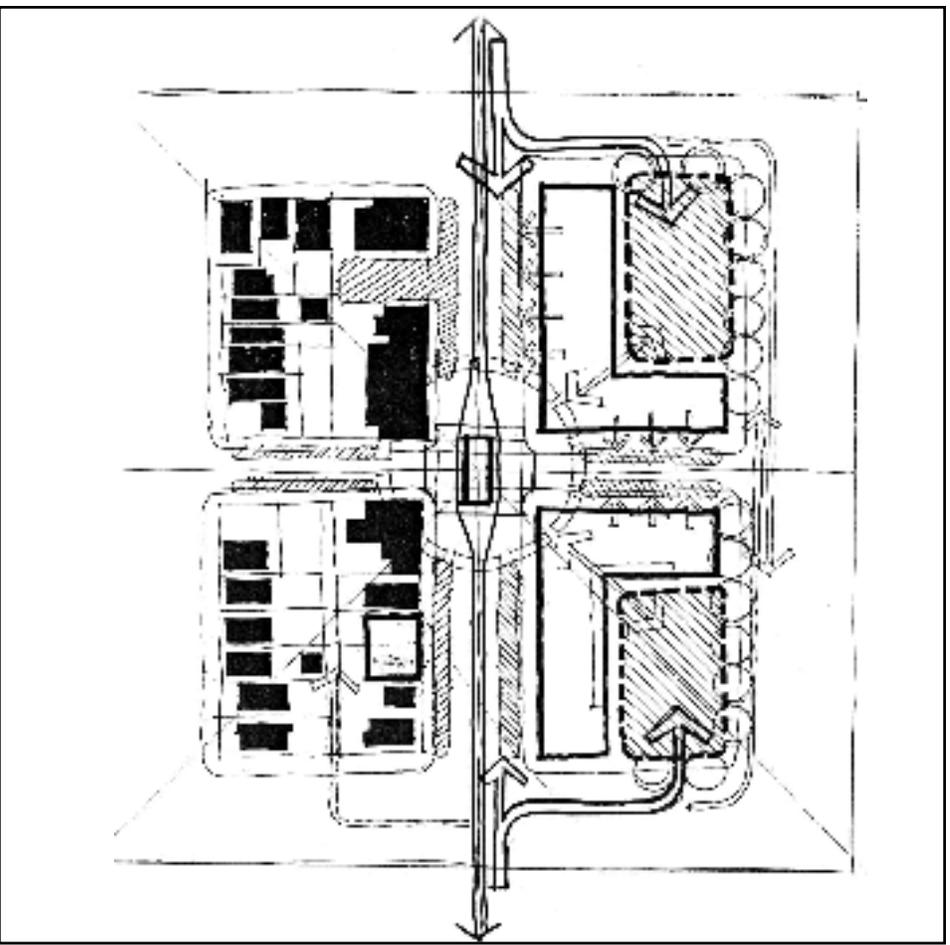
TRANSIT ENVIRONMENTS

Transit stations adjacent to public gathering spaces should be large to avoid crowding and to permit easy access. This one next to the major gathering space in downtown Portland has wide sidewalks and good sightlines. It is easy to access from the plaza. (mobility, visibility, activity/land use)

This is another view of the station which shows how it relates to the public plaza. (activity/land use)



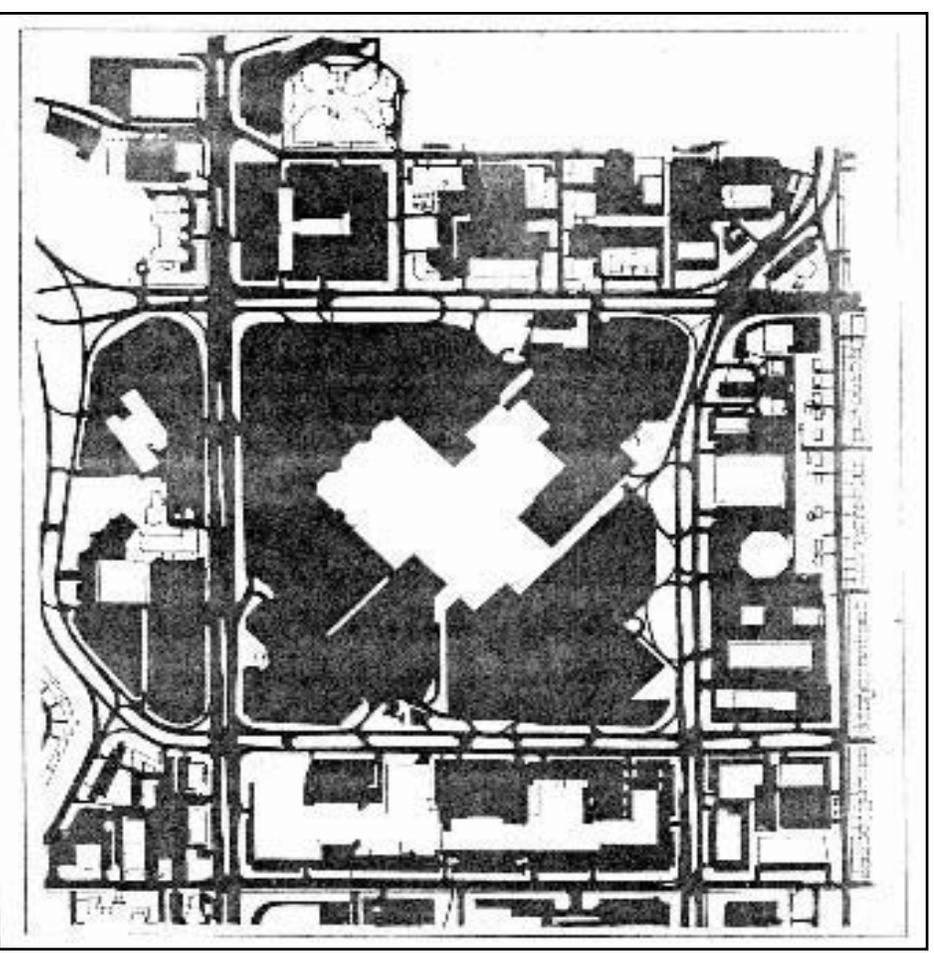
This a diagram of a neighborhood LRT station environment that supports and enhances safe transit use, existing neighborhood businesses, and neighborhood living. The station is placed at an intersection to discourage through neighborhood traffic. Cross walks are well marked. Wide sidewalks are provided. Mixed use buildings of neighborhood commercial with apartments above are placed in L-shaped configurations at the corners to provide activity and “eyes on the street” to both the transit street and the neighborhood street that intersects it. Parking is located on the street and in lots at the rear of the mixed use buildings. Pedestrian access from the parking lots is provided by a small concourse through the buildings. The housing across the street from the parking is buffered by trees. (ownership, activity/land use, readability, mobility, visibility)



This figure/ground drawing of a large shopping center shows what is often wrong with transit environments at suburban shopping centers. The white areas are buildings, the black parking lots and streets. This center was originally built as an enclosed shopping environment to be reached by car. Shoppers parked in one of the large surface parking lots and entered the center through one of the large entries. These centers were usually designed as enclaves separate from their surrounding environments. This one is even surrounded by earth beams to emphasize the separation. Over time these centers spawn adjacent development. Other retail areas are built often in a “hen and chicks pattern” with the original large center being the “hen” and the additional retail being the “chicks.” Movie theaters are added. Offices and multi family residential follow.

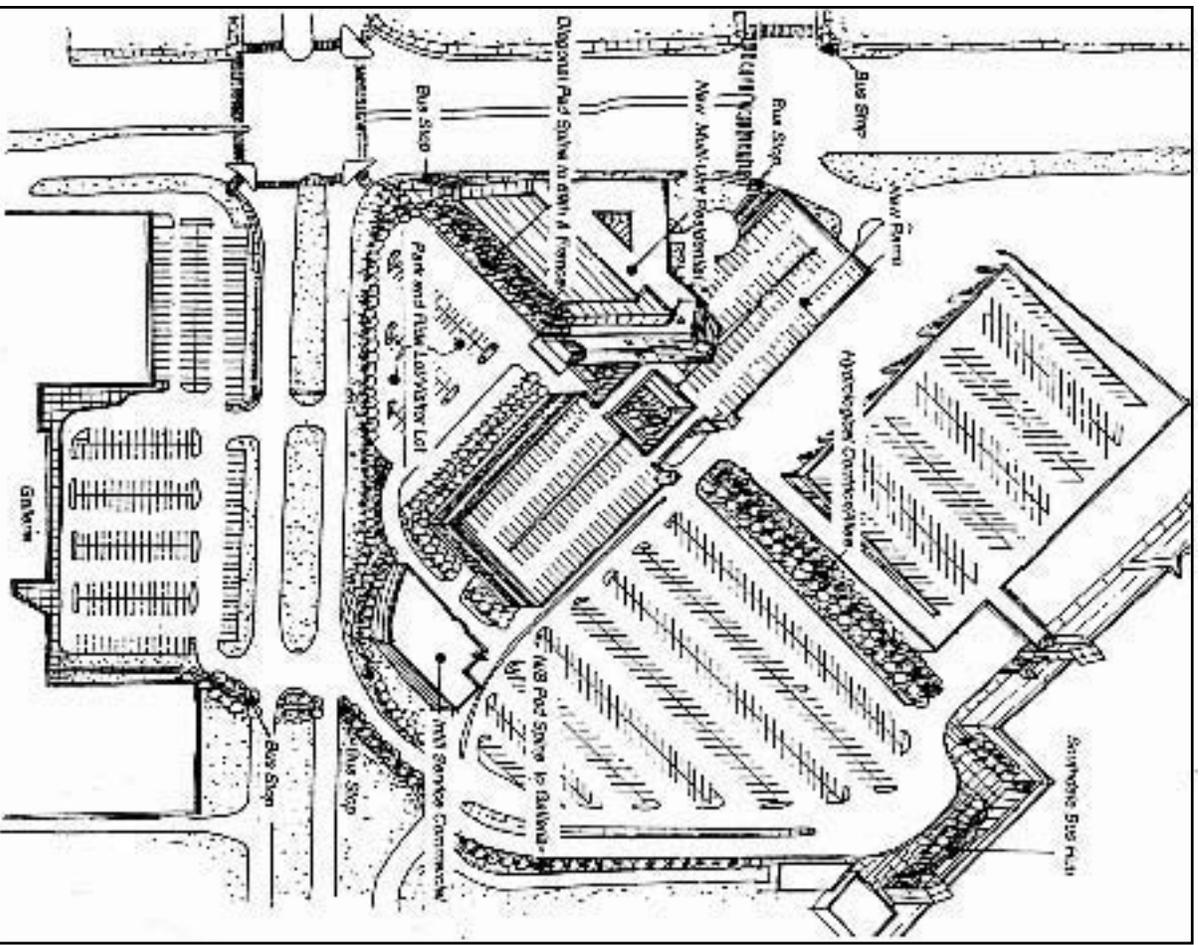
A pedestrian system associated with these developments is usually non existent or very inadequate because of the privatized and accreted nature of the circulation systems associated with these environments. This car oriented environment does not accommodate transit well because it is difficult to move from place to place without a car. Eventually it becomes difficult to go from place to place in the precinct in a car because of the increased traffic generated by the dependency on the car.

Safe, user friendly transit service to these accreted environments is dependent on the establishment of vehicular circulation systems, building patterns, and pedestrian paths that work together to provide access to cars, transit vehicles and people on foot. A single transit stop can not serve these large environments, they are too diffuse.

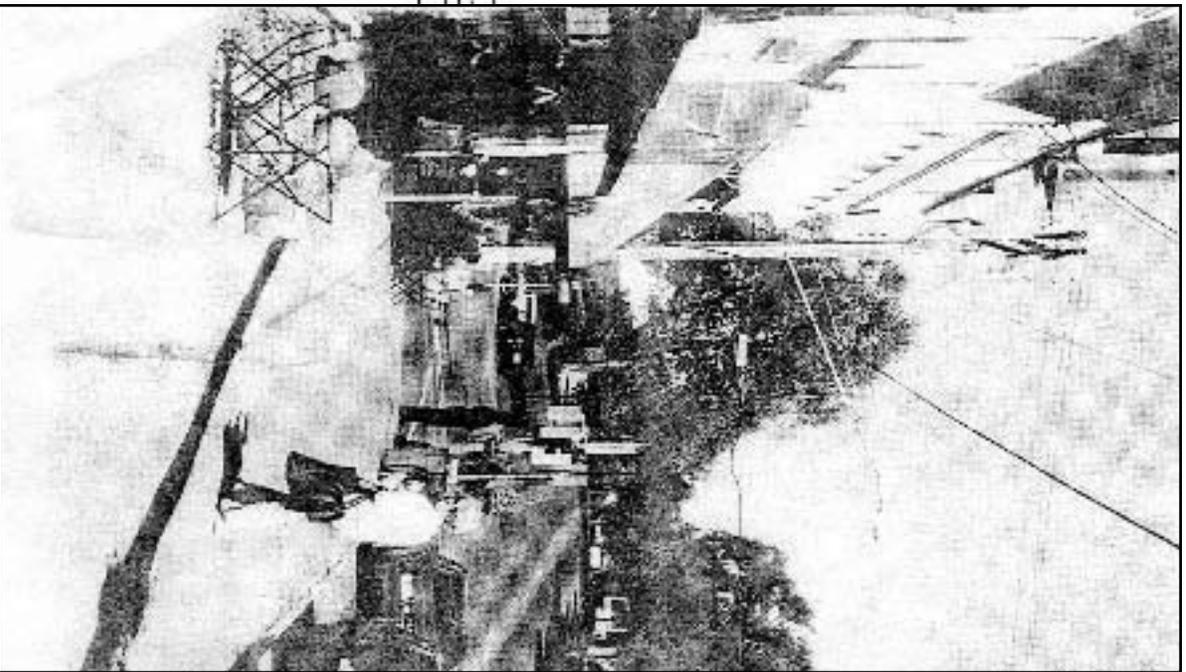
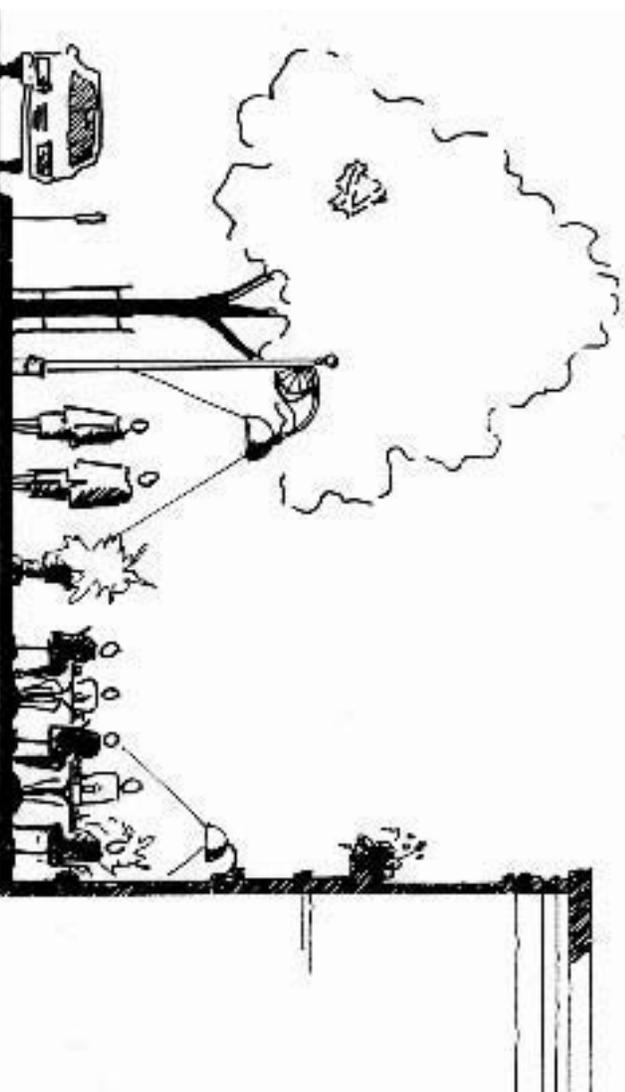


Multiple stops/stations are needed. Equally important are clear, easy to follow, well lighted pedestrian paths from transit stops and stations to a number of destinations. These paths need to be an integral part of the design of these environments, not after thoughts. They need to be placed in areas of activity. (activity/land use, mobility, ownership, readability)

This drawing shows an example of how the shopping center shown on the previous page could start to be retrofitted to make a more transit friendly environment by densifying the development and creating clear pedestrian paths. A parking lot could be retrofitted with residential and commercial buildings while at the same time creating a pedestrian connection to the large enclosed shopping center.(activity/land use,mobility,readability)



Commercial buildings that support the pedestrian environment edge go a long way to making a transit environment that is people friendly. In the drawing below the restaurant has windows that over look the street and an outdoor seating area that activates the street. Ample room is provided for pedestrians to pass and the semi-private space of the sidewalk seating area is clearly set off from the public sidewalk. Pedestrians are protected from the street traffic by the definition of the public pedestrian realm. Trees, lighting, on street parking, and ample space are provided. The lighting is pedestrian-scaled. In the photo at the right the neighborhood commercial environment accommodates display of merchandise on the street, an outdoor restaurant seating, and a bus stop while leaving room for people to pass comfortably on the sidewalk. (ownership, activity land/use, readability, mobility, and visibility)



TRANSIT ENVIRONMENTS

Public buildings should help support the transit use by providing activity and “eyes on the street.” Unfortunately both this neighborhood post office and this fire station fall short. Although they are sited near the sidewalk, both present blank walls to the street. (activity/land use, visibility)

