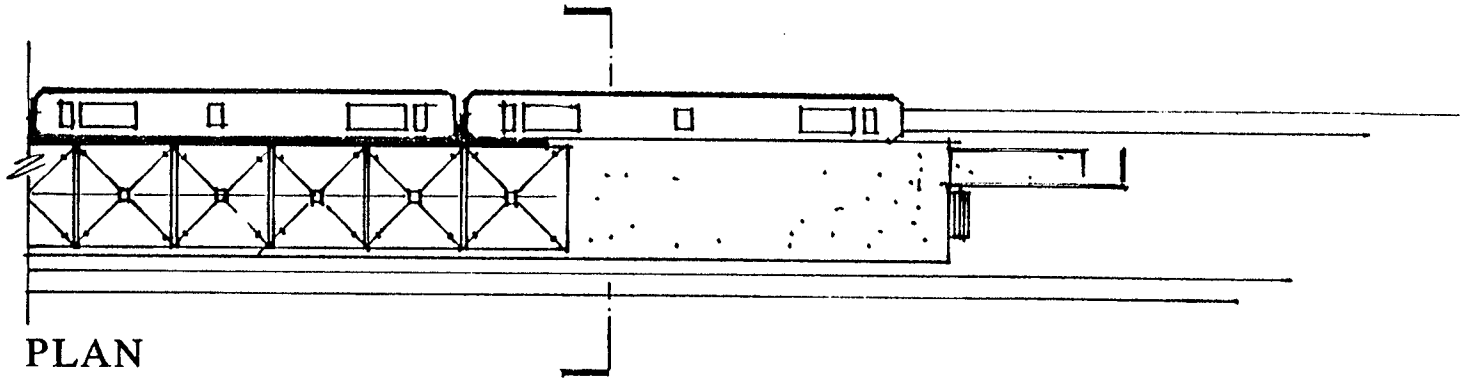
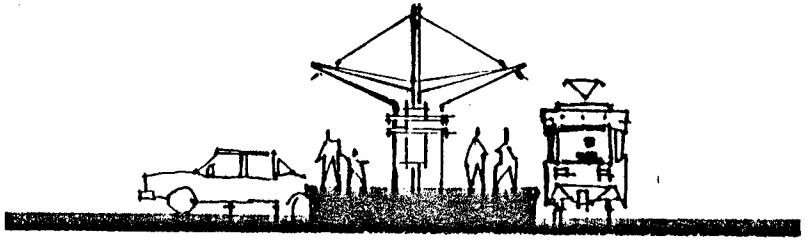


PLAN



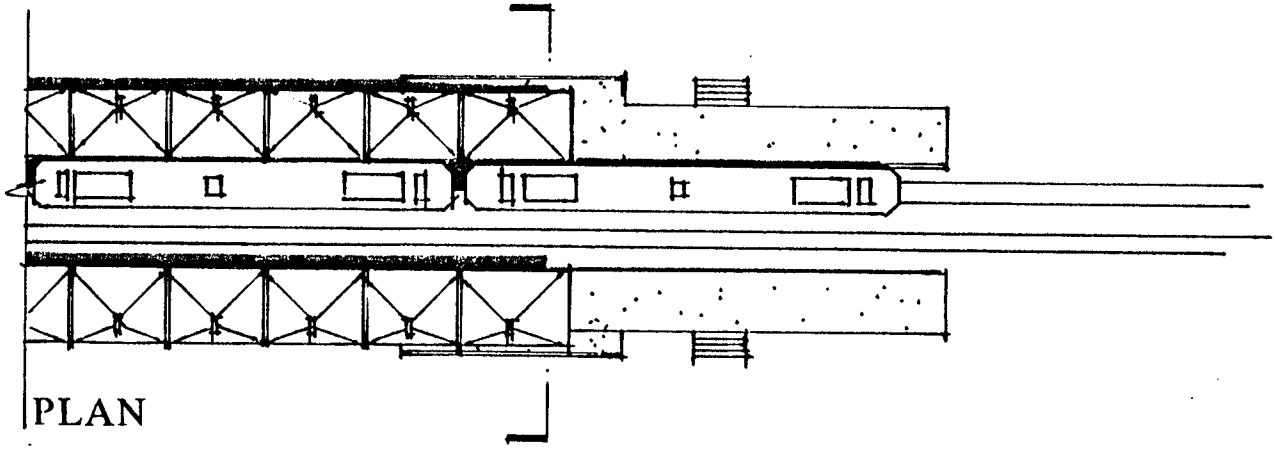
SECTION

Metro Rail Planning Study

Task 2: Station Design Guidelines

GANNETT-DELEUW

At Grade Plan and Section
Center Loading
August, 1990
Figure 2



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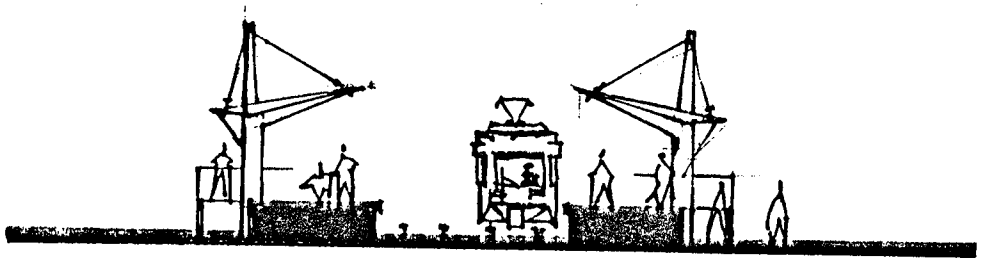

SECTION

Metro Rail Planning Study

Task 2: Station Design Guidelines

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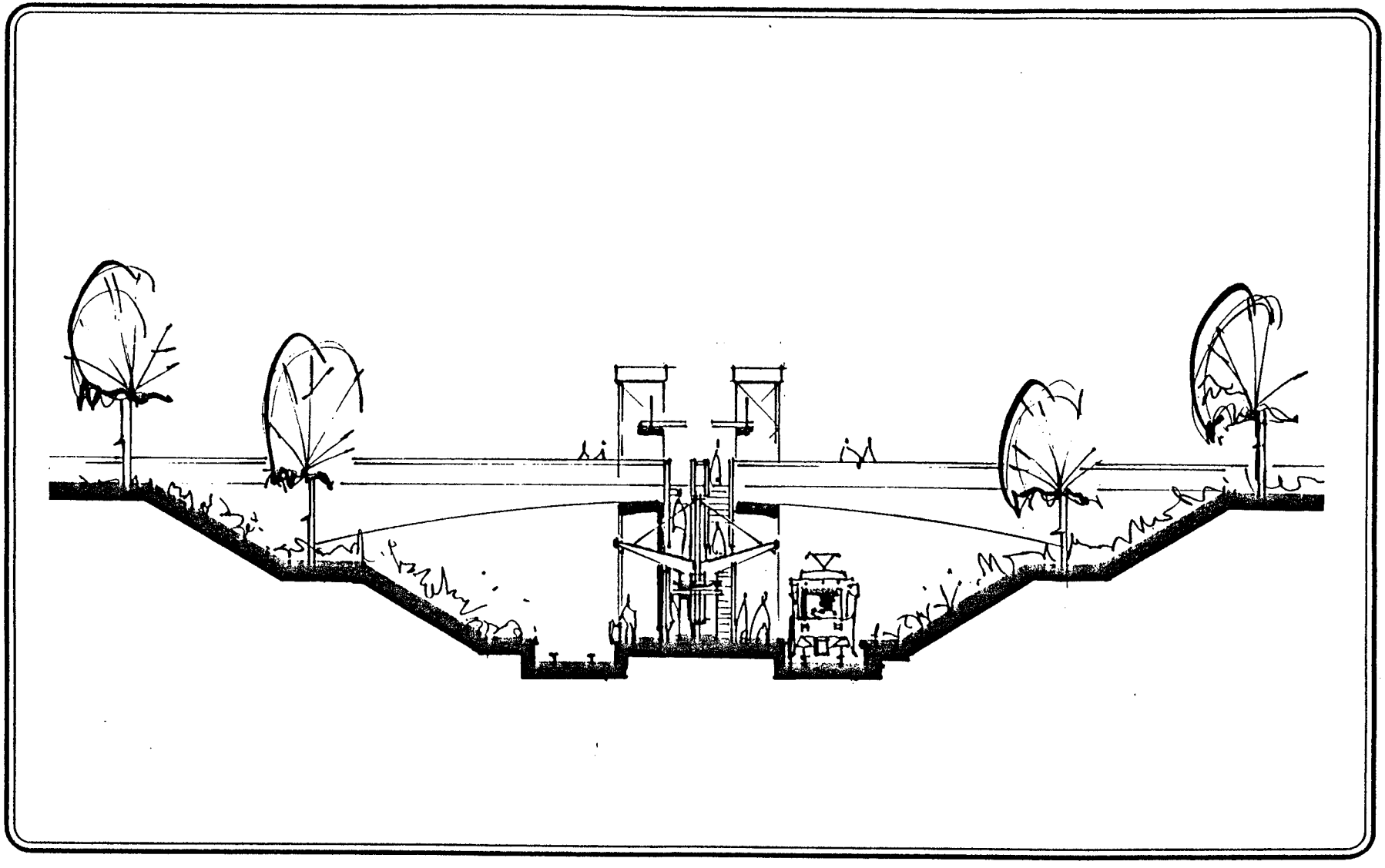
At Grade Plan and Section
Side Loading
August, 1990
Figure 3

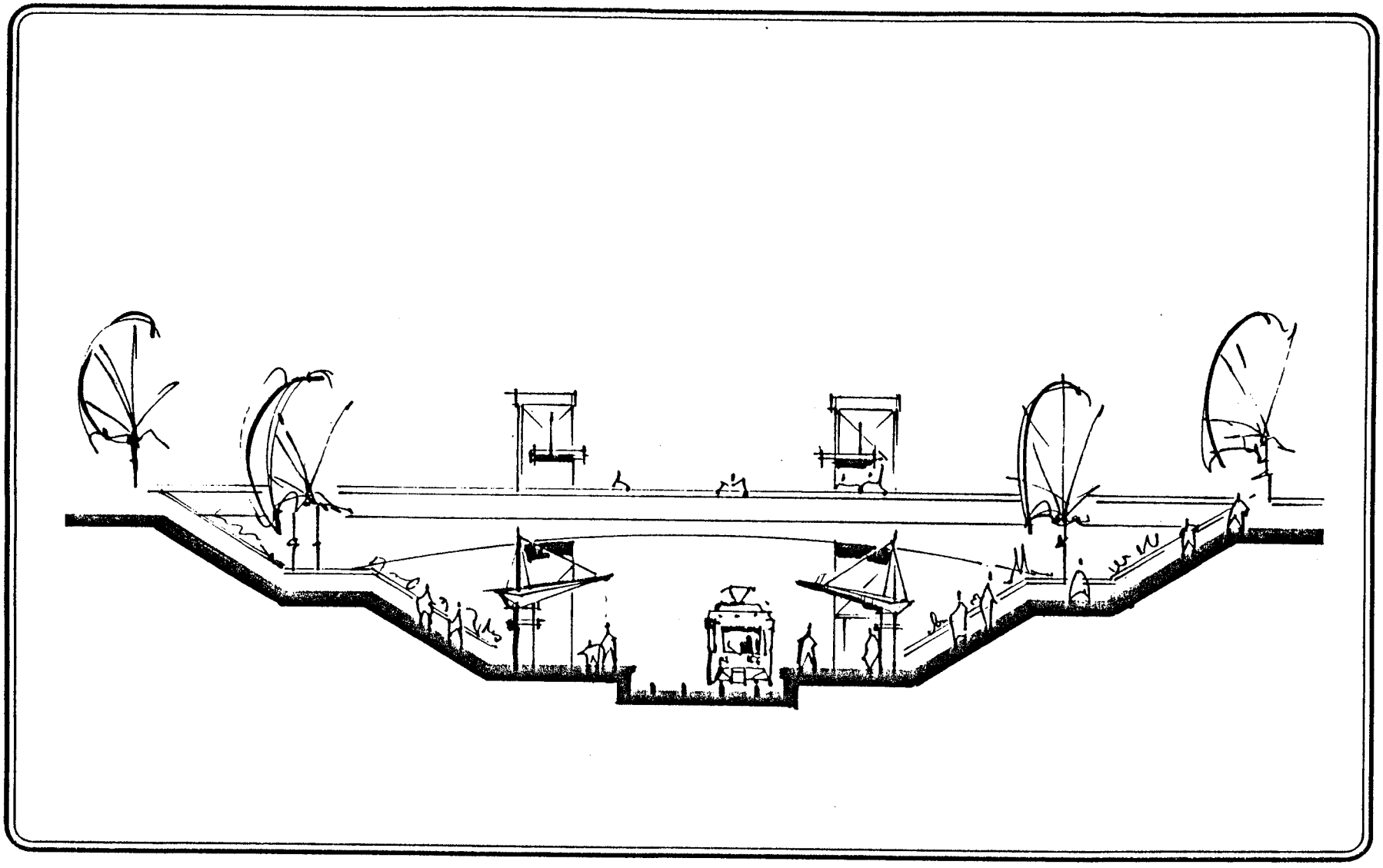


Metro Rail Planning Study

Task 2: Station Design Guidelines

GANNETT-DELEUW

Open Cut
Center Loading
August, 1990
Figure 4

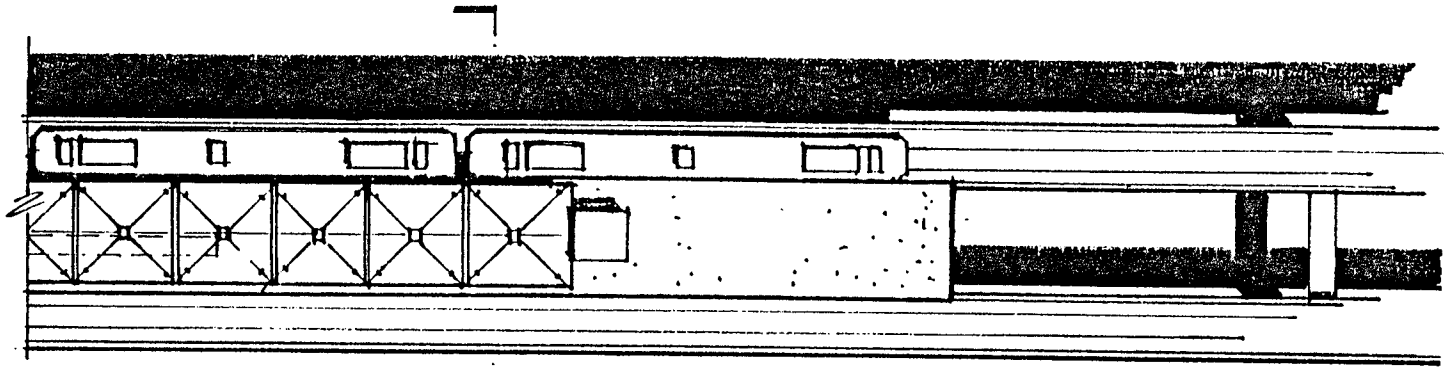


Metro Rail Planning Study

Task 2: Station Design Guidelines

GANNETT-DELEUW

Open Cut
Side Loading
August, 1990
Figure 5



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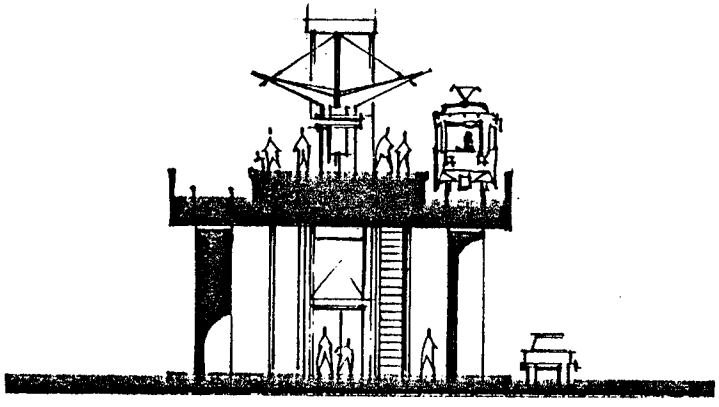

SECTION

Metro Rail Planning Study

Task 2: Station Design Guidelines

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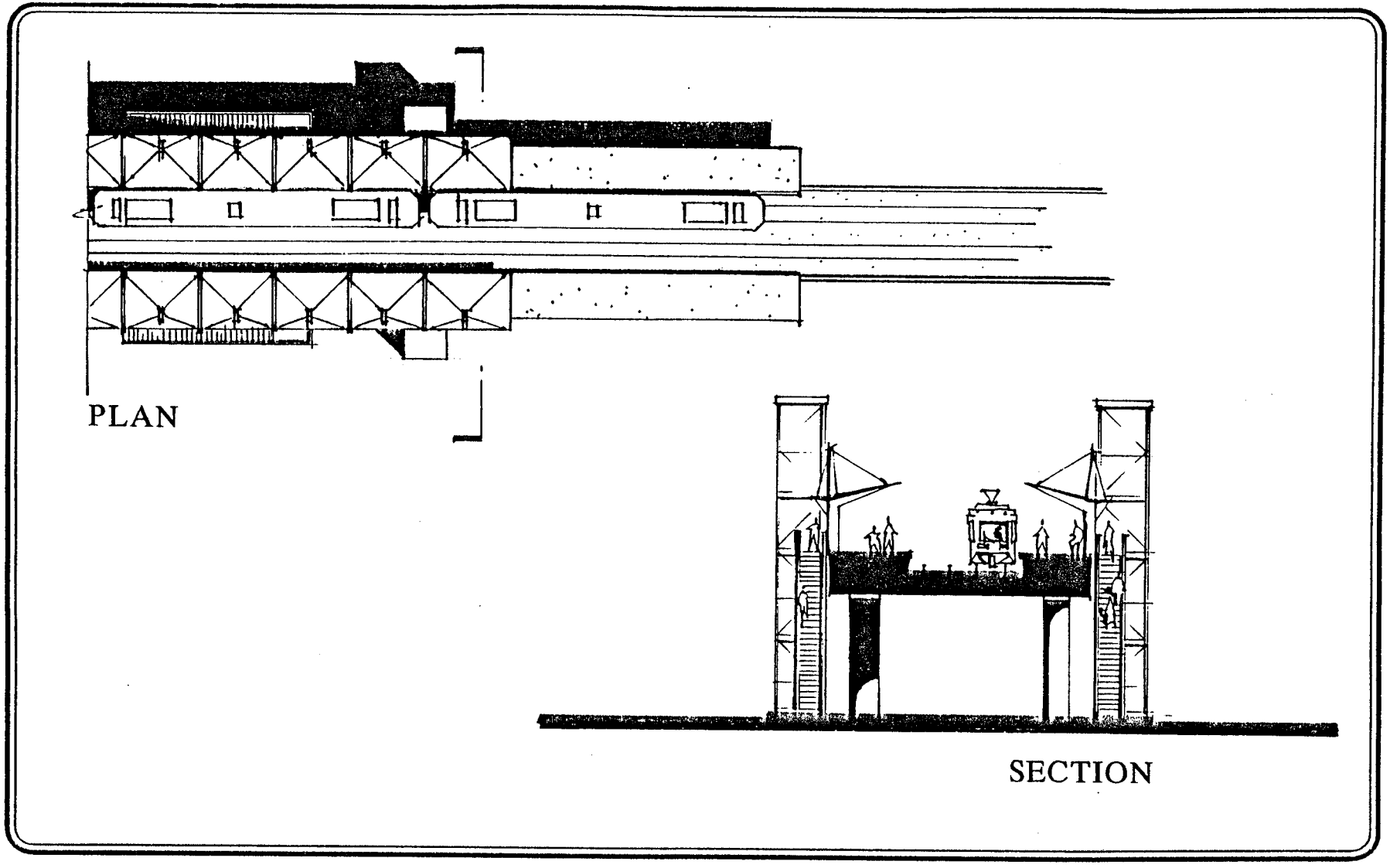
Elevated/Aerial Plan and Section
Center Loading
August, 1990
Figure 6



Metro Rail Planning Study

Elevated/Aerial Plan and Section
Side Loading
August, 1990
Figure 7

Task 2: Station Design Guidelines

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Advantages:

- High profile for a well-designed station.
- Exclusive separate right-of-way; no conflict with other traffic.
- Area under the platform creates use opportunities.
- Patron views

Constraints:

- Possible visual intrusion or obstruction of views for surrounding residents.
- Obstruction of sunlight under platform or where station would create new shadow.
- Safety elements heightened due to elevation.
- Security considerations under platform.

3. **Below Grade/Subway** (Figure 8)

Characteristics:

- Station tends to be longer than minimal platform length in order to handle high passenger volumes.
- Underground environment with guideway funnels extending from platform area.
- Surface street level entrances serve as primary visual elements for station.
- Several sets of vertical circulation elements are required due to volume.

Advantages:

- Exclusive separation from other traffic; except for joint bus operations.
- More so than other types, subways tend to be highly integrative with businesses and urban activities.
- Direct access to retail, office and public spaces through entrances and mezzanine levels.
- Urban design opportunities using entrances as part of open, landscaped "plazas" or "arcades".

Constraints:

- Negative image/reputation of subways as dark, dirty.
- Security and ventilation elements heightened.
- Reduced patron orientation; no sites of city - only tunnel walls.

Variation of Subway: (Figure 9)

A station can be located below grade without being totally underground. A depressed station is possible where natural slopes are further shaped and retained.

C. Parking and Other Intermodal Connections

A primary purpose in mass transit is to make it easier for people to leave their cars at home. Yet encouraging people to change travel patterns and use new travel modes takes time; thus, people's attachment to their cars and related parking issues need to be addressed during the planning and design of rail stations. The preferred access to all stations in the rail system will remain pedestrian.

1. Parking and Auto Access

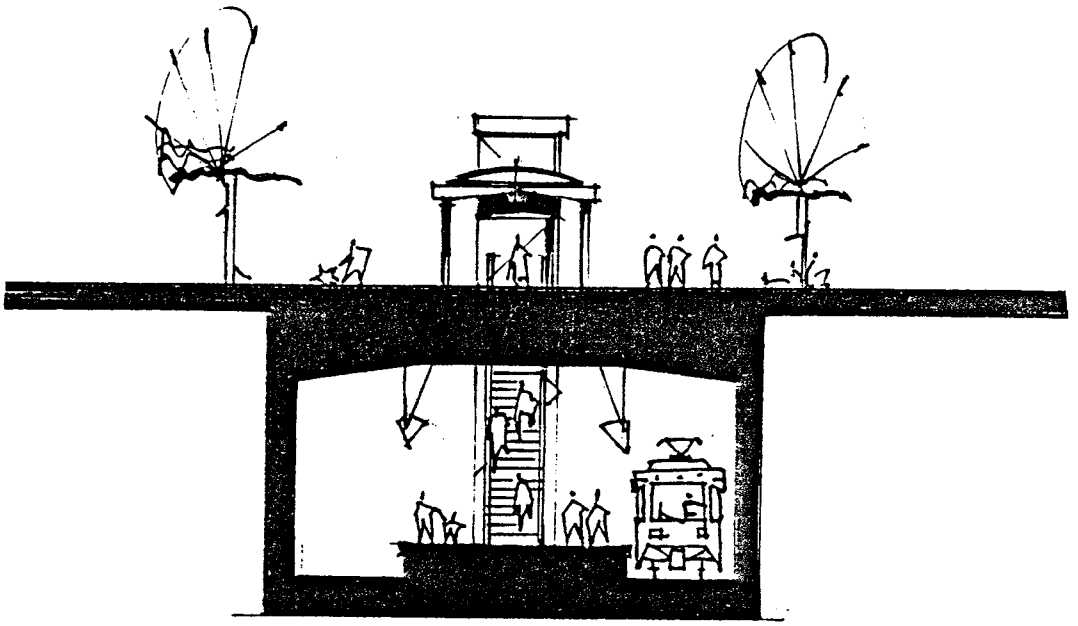
If parking must be accommodated, its impact on transit vehicles and pedestrians must be minimized. Exclusive lane separation from buses and separate entry/exit points away from major pedestrian walkways are usually required.

Size of parking lots is dependent on several factors: whether the parking lot already exist, available acreage to develop or expand areas, type of station in relationship to current and projected passenger volumes, and related land use issues.

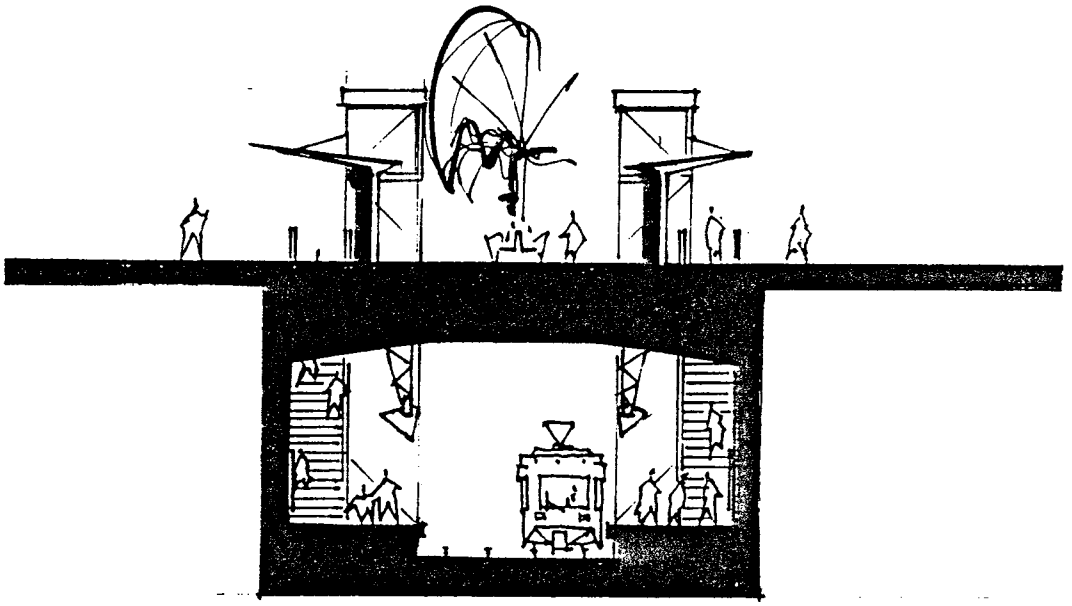
Minimum area requirements for surface parking are summarized below. Structured parking (above and/or below grade) and special design accommodations would require additional square footage.

Park and Ride Lots	100 spaces	40,000 sq ft
	200 spaces	80,000 sq ft
	300 spaces	120,000 sq ft
	400 spaces	160,000 sq ft
	500 spaces	200,000 sq ft
Auto Drop-Off/Kiss and Ride/Taxi		20,000 sq ft
Bus Access/Loading		20,000 sq ft
Misc. Landscape/Buffers		8,000 sq ft

Taxi and auto-drops (kiss and ride) lanes with no or limited short-term parking areas is an alternative strategy that limits use of single occupancy vehicles (SOVs). Designated taxi-waiting areas and passenger loan/unload areas would require approximately 20,000 square feet.



CENTER LOADING



SIDE LOADING

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Subway Sections
Center and Side Loading
August, 1990
Figure 8

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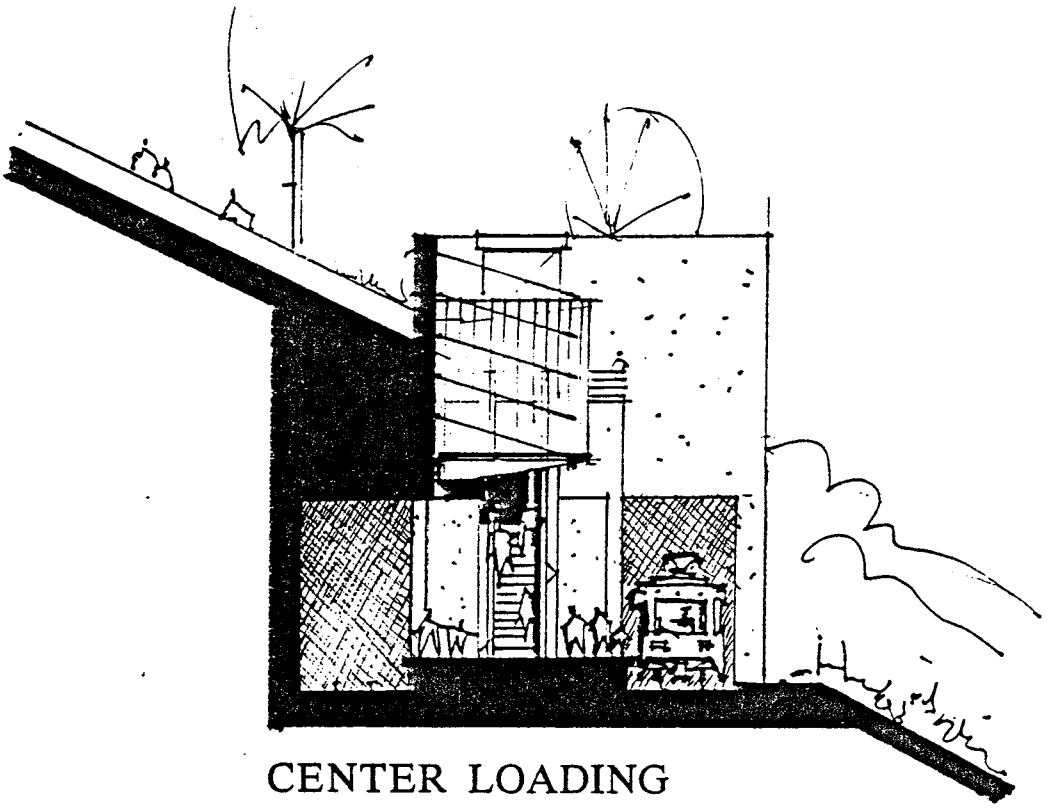

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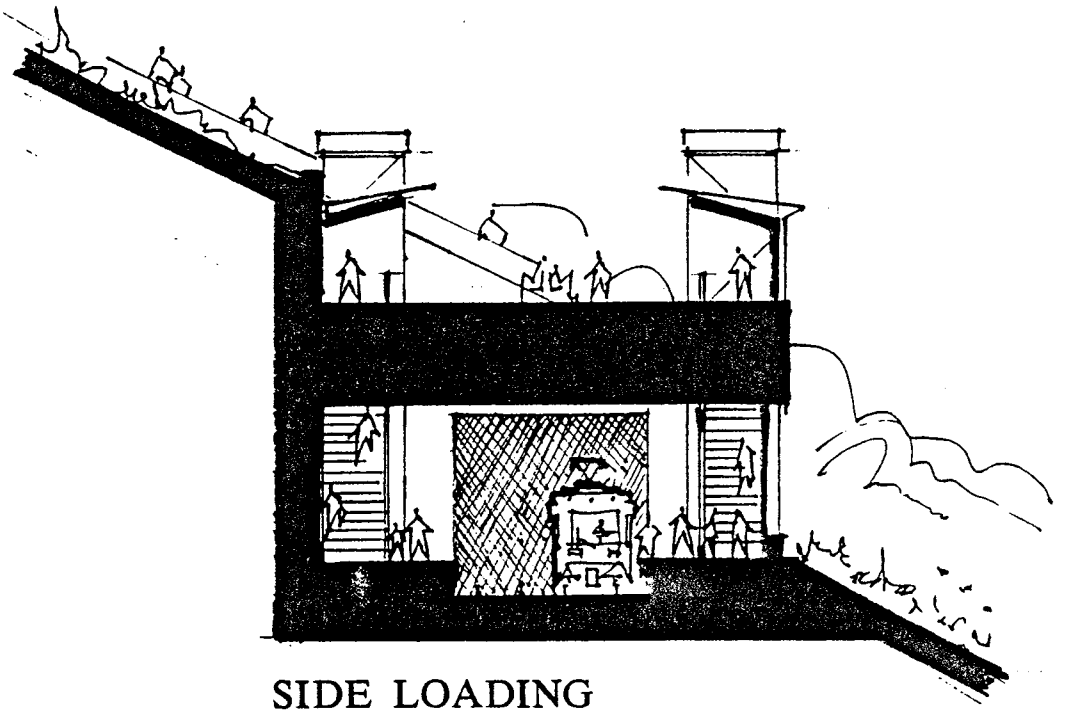

SIDE LOADING

Metro Rail Planning Study

Depressed/Retained Cut Sections
Center and Side Loading

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Figure 9

2. **Bus (local and express)**

Because it is economical and serves a wide public, buses would be the most common (and constant) mode of transit interface with rail. Buses would also provide the primary circulation system outside the station area.

- Bus lanes would be exclusive from all other travel modes
- Joint operations with rail may be an option for some stations, although significant issues regarding handicap access, pedestrian safety and vehicle scheduling will need to be addressed.
- Bus services provide route flexibility that complement the static nature of rail.

3. **Shuttles and People Movers**

These special services can operate in areas characterized by the existence of several medium density districts needing express or direct routes to and from the rail station. Businesses wanting direct linkage with the station, but are located at a distance may employ shuttles or people movers to attract shoppers to their district.

Additional uses include:

- As a means of moving employees, especially for larger employers wishing to reduce employee use of SOVs, reduce rush hour traffic generated by employees, and increase investment in transit system.
- Hotels and convention centers can use shuttles to pick up registered guests as part of their service.
- To reduce traffic generated by special events in the community.

4. **Other Intermodal Transfers**

Because the majority of rail stations are located within activity centers, they are logical places for change of travel mode. Even without boarding rail, passengers can use the station to access and/or transfer to other modes.

A coordinated plan with local/regional transit authority can provide users with options such as:

- carpools
- ride shares
- HOVs
- specialized transit, e.g. senior citizen vans

The flow of people between modes needs to be analyzed and facilitated in the design process in order to provide an efficient system and to generate usage.

V. STATION PROGRAMMING

Following alignment and station site recommendations, different station configurations can be approached prototypically. The physical arrangement of components on the platform, the make-up of the station concourse, the station envelope and its relationship with the surrounding site should be integrated.

With standard elements developed for an identifiable rail transit image, a need for design options was also presented to allow for variability and individuality from station to station. This would be accomplished through a Kit-of-Parts design approach.

A. Primary Design Considerations (major structures)

1. Guideway

Of the rail system's total alignment, the majority would be elevated with only minor segments at or below grade.

Aerial structures may substantially alter the spatial quality of the streetscape or obstruct surrounding views. Keeping in mind that typical aerial structures are usually perceived as out-of- character with urban patterns and forms, careful design of the guideway can minimize these impacts.

- A standard design for guideway elements and support structures should be developed that minimize their scale, obtrusiveness and utilitarian nature with economic and engineering constraints.
  - columnar rather than square supports
  - span length of 82.5 feet
  - two column bents as basic support

- Design opportunities to incorporate guideway into existing streetscape; allow basic design to accommodate different canopies and lighting to reduce scale.

2. Platform

As noted earlier, the standard platform dimensions outlined the nominal width and length required to accommodate a four-car rail train.

Many variations on the basic platform are possible within the basic parameters:

- Variability in width - this can range from a typical transfer center station type with minimal platform/guideway width to that of a major pedestrian park spanning one to two blocks.

- High platforms vs. low platforms - the main concerns to this issue are dwell time and accessibility for the handicapped. Also, joint operations with other transit modes are only possible with low platforms.

- use of a palette of colors and materials for finish up-grades can distinguish one station platform from another; art work with tiles and other finishes can be used on floors, walkways, walls.

3. Station Concourse

The concourse comprises the platform, and other interior elements of the station envelope.

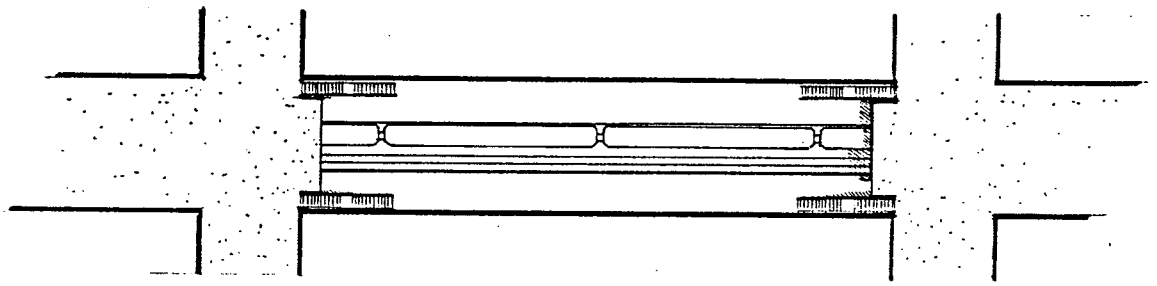
At issue is the evaluation of circulation and access; the design and layout of elements that influence patron flow and direction of patrons' visual continuity throughout the concourse.

a. mezzanines

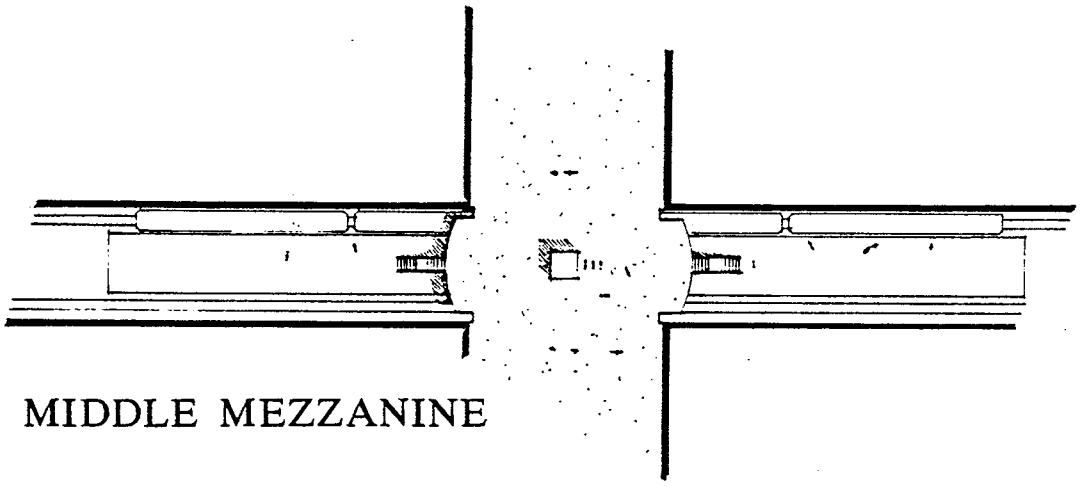
Mezzanines serve as an intermediate platform that helps distribute patron circulation and volume. Not all stations are designed with, nor require, a mezzanine level. Inclusion of mezzanines are highly dependent on numerous design issues, and that use of this level may preclude certain site structures. Some of the advantages of a mezzanine are:

- separates patron flow/que by possibly placing ticket vending on another level.
- provides separate access points to retail by connecting to underground lobbies, floors.
- provides a separate crossover "path" for stations with side-loading platforms.
- a "balcony view" of the loading platform offers strategic placement for security, and gives patrons a sense of orientation.

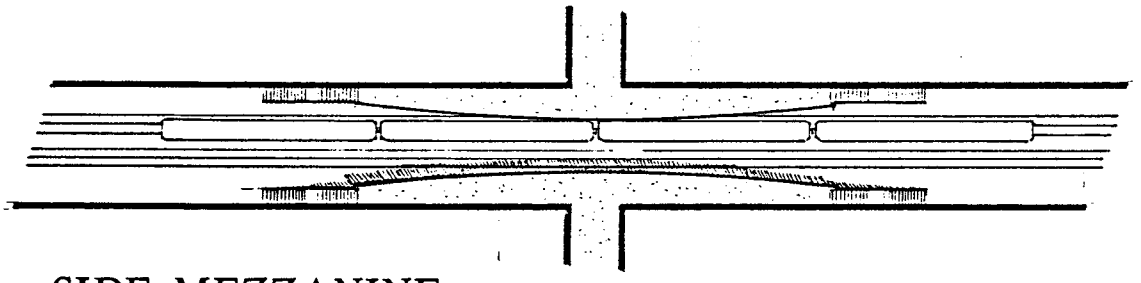
Examples of mezzanine structures are illustrated in Figure 10.



END MEZZANINE



MIDDLE MEZZANINE



SIDE MEZZANINE

Metro Rail Planning Study

Mezzanine Types

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Figure 10

b. stairs, escalators, elevators

Placement of stair/escalator pairs and elevators at logical entry/exit points can help orient patrons to the loading platform. Specific locations of stairs and escalators (including emergency stairwells) may be required for certain platform structures. For example, access to elevators at street level need to be located near passenger vehicle loading zones and handicap parking spaces.

4. Canopy/Roof

Protection from prevailing weather conditions is a priority in the design of shelter elements. The region's extended periods of wind and rain, and occasional snow and intense summer sun, would necessitate a shelter area that may cover 50% or more of the platform footprint.

As a highly visible structure, the canopy/roof is the most important design element of the station. This component may be considered part of the aesthetic continuity that would provide a regional identity to the rail system.

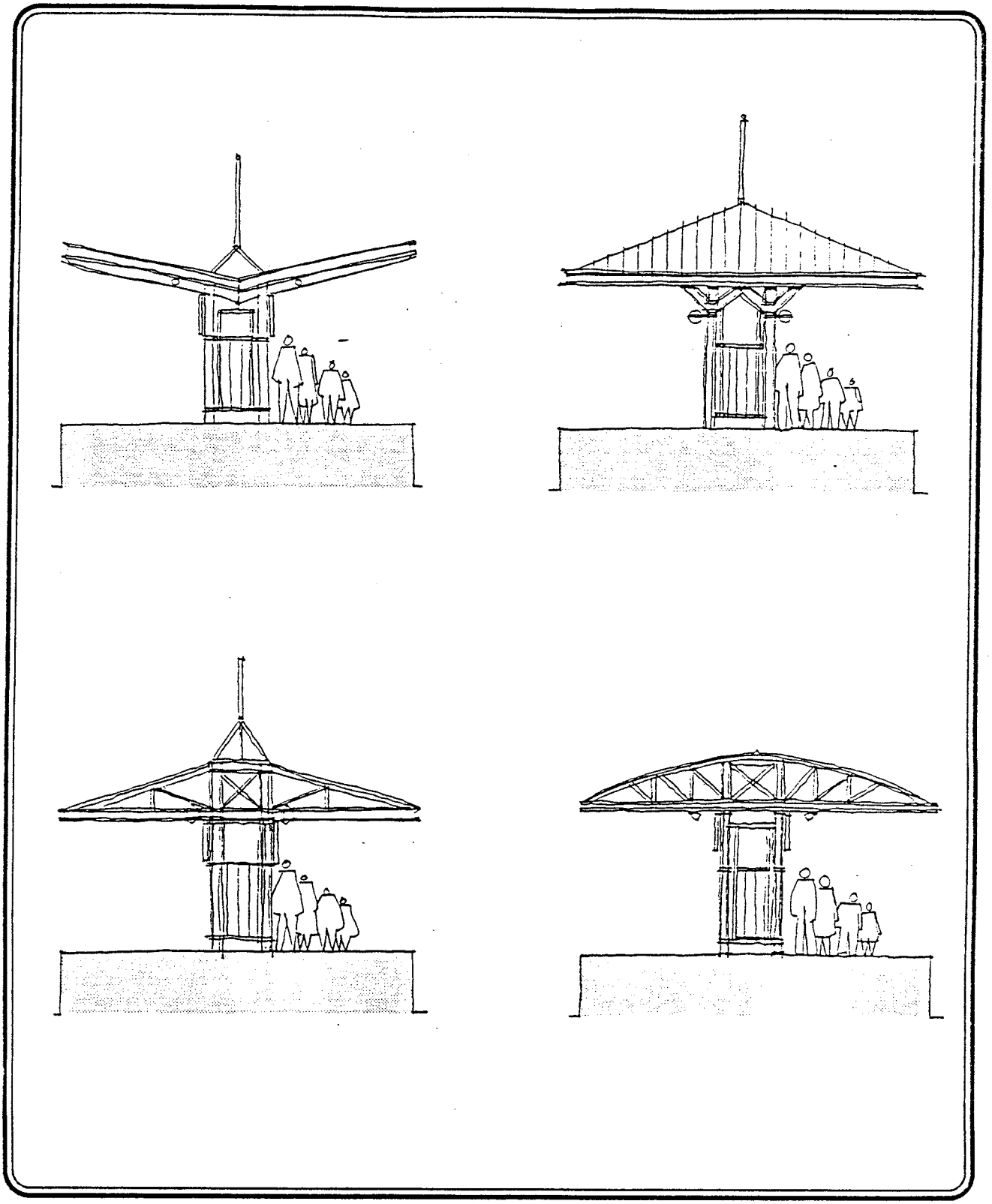
The roof underside should also provide structural capability to address lighting needs for patron security at night and during dark winter days.

The intent is to design a standard structural module for all canopy/roof elements that can be augmented through several variations. Whether it is through a canopy or other major structures, stations should be recognized as part of the rail system but they need not look identical.

Canopy styles and extent of coverage should be integrated with the level of service and passenger volume. Several canopy/roof variations are illustrated in Figure 11.

B. Secondary Design Considerations (site/environment context)

As a station is conceptualized, impacts on the surrounding area are inevitable. Form and character of the immediate community are shaped during this process. The section discusses some of the secondary design considerations as planning proceeds from major structures to the relationship between structure and the environment. These are described below in no particular order of importance.



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Canopy Types

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Figure 11

1. **Parking area requirements**

   Is auto access needed or even desired? What type of auto access would be appropriate to rider characteristics? How much parking can be accommodated? Where? Would location allow connection to existing bus routes, other travel modes? How are emergency vehicles accommodated?

2. **Landscaping**

   Beside shrubbery, trees are the most predominant part of the landscape. Their selection may be crucial to design integration with its surroundings.

   - tree shapes that are congruous with existing trees and/or design style
   - deciduous or evergreen
   - hardiness and suitability

3. **Ancillary structures**

   These structures lend support to the functioning of the station and are only used by transit personnel for operations and maintenance. They may include security booths, utility rooms, operator restrooms, mechanical rooms, vent and fan shafts, communications rooms, and power substations. Main considerations for design are:

   - location without interfering with circulation pattern
   - low or no patron visibility
   - structural compatibility with rest of station

4. **Air and Noise**

   Localized air pollution and noise impacts can influence station design. It is expected that portions of the proposed system would require sound attenuation Most affected would be residential areas and where stations are adjacent to commercial buildings. Use of noise and vibration control buffers will need to be considered.

5. **Public Art**

   The basic goals of station artwork are to provide stations with visual interest and local identity through community artists. Artwork can be integrated with functional elements or free standing. In either case, artists need to be a part of the design team to establish related criteria such as placement, maintenance, durability, mechanics, materials and color.

C. Detailed Design Considerations

A palette of materials and colors for individual station design that is compatible with system design principles is the preferred strategy. These design elements can be purely functional, purely aesthetical, or a combination of both.

Examples of items to consider during detailed design may include:

1. Paving materials and other finishes

There is wide variability ranging from granite and brick, to concrete. Choice should be based on cost, aethetics, maintenance and budget constraints.

2. Lighting styles

Often subject to municipal policy, lighting systems are crucial for evening/nighttime use of the station. Considerations are many:

- security
- type of standard (ornamental, modern, traditional)
- height levels
- intensity
- source (high-pressure sodium, low-pressure sodium, incandescent)
- cost of energy

3. Interior/exterior furniture

The major criterion is durability, followed closely by aesthetics. These include the various amenities that tend to be placed in proximity to furniture, e.g. trash receptacles.

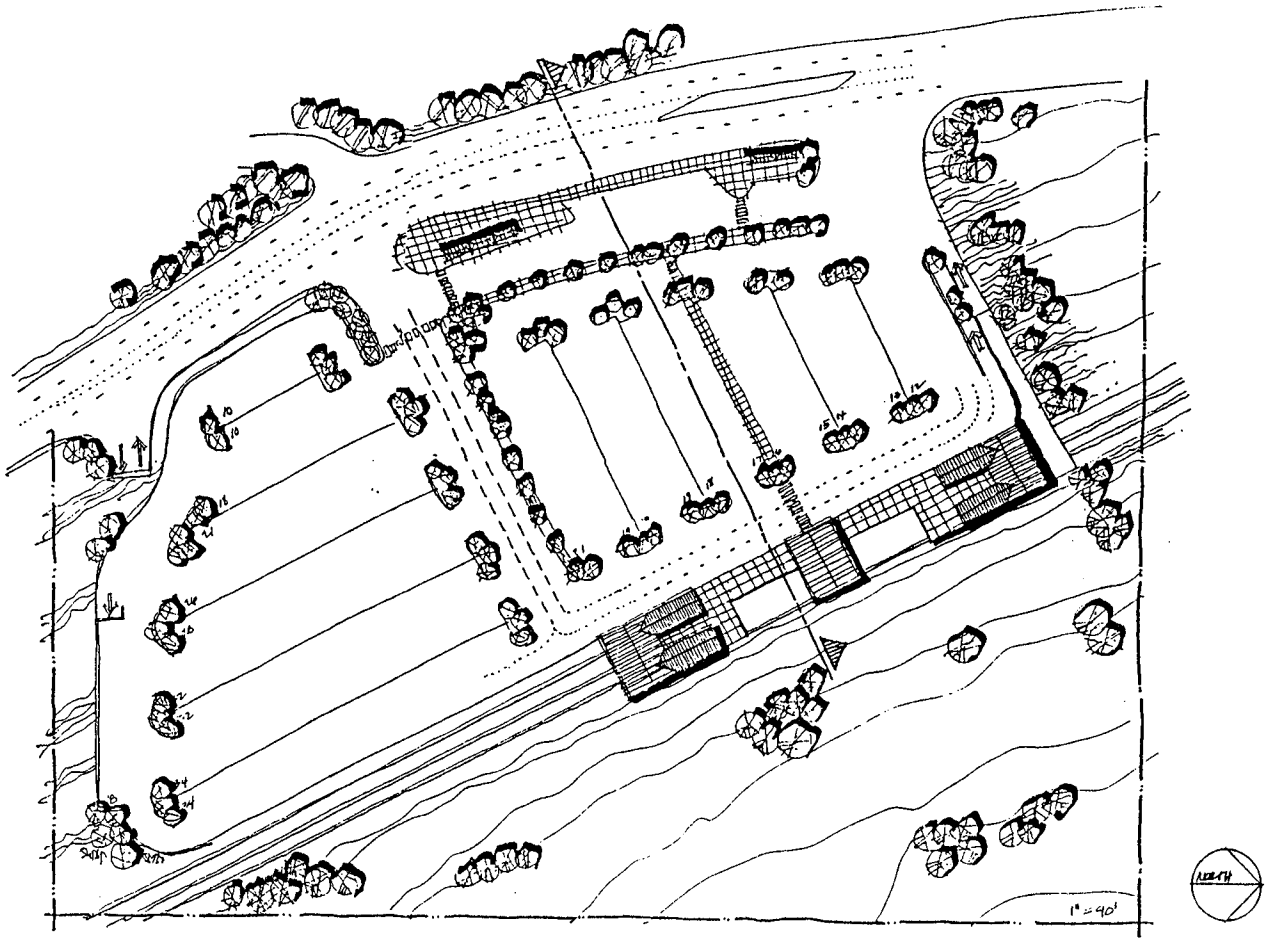
The more blending of art into function as a design element, the more unique the station design becomes. Through a series of public involvement and a coordinated process with local amateur and professional artists, community investment and commitment to the station, and to the rail system, is engendered.

It should be noted that at this juncture, operational, electrical (power) and mechanical systems are not included in this report.

D. Station/Site Concepts

The illustrations in Figures 12, 13 and 14 show a conceptual rail station (typical park-and-ride).

- Plan
- Section
- Perspective



Metro Rail Planning Study

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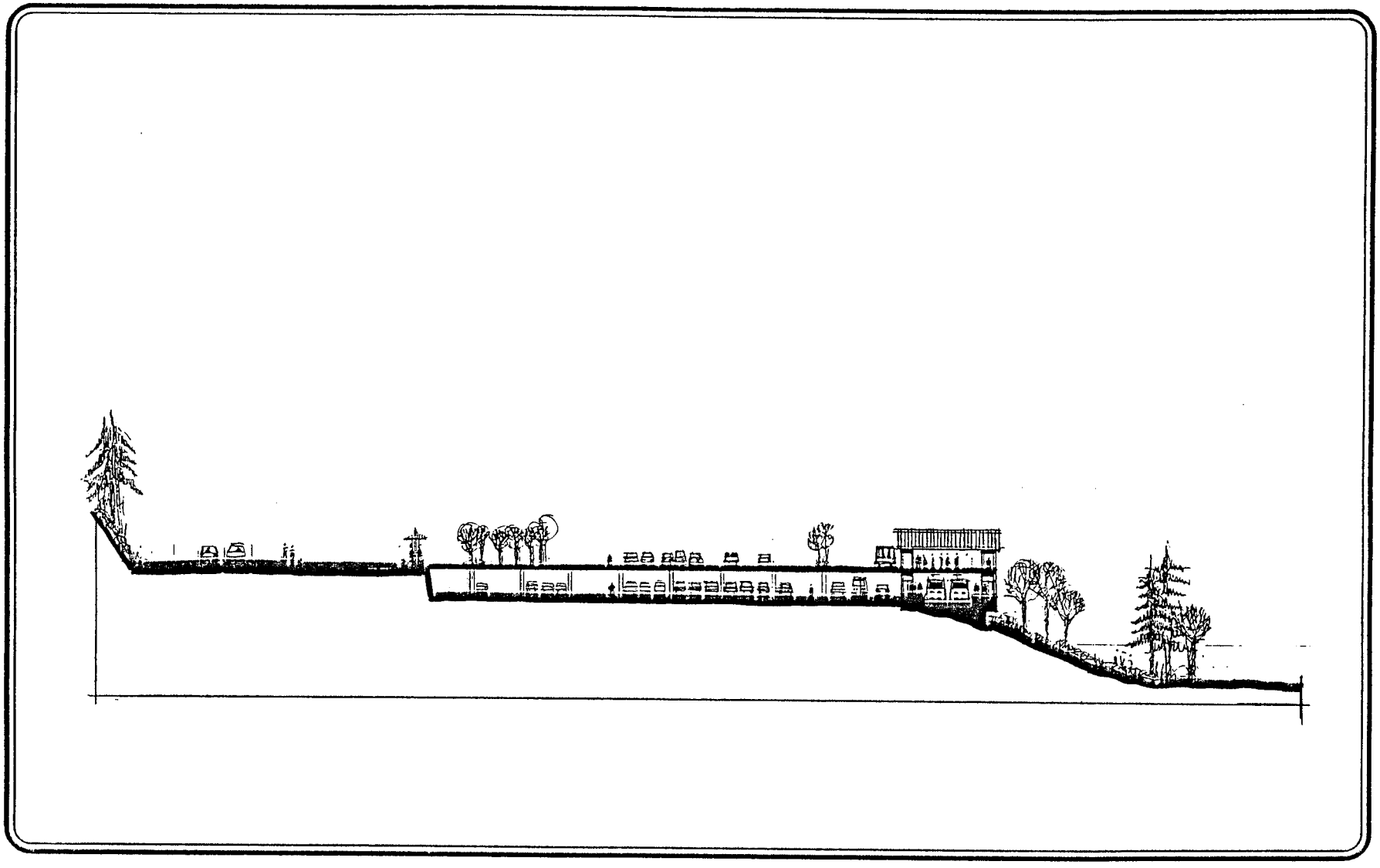
Station Concept
Plan
August, 1990
Figure 12



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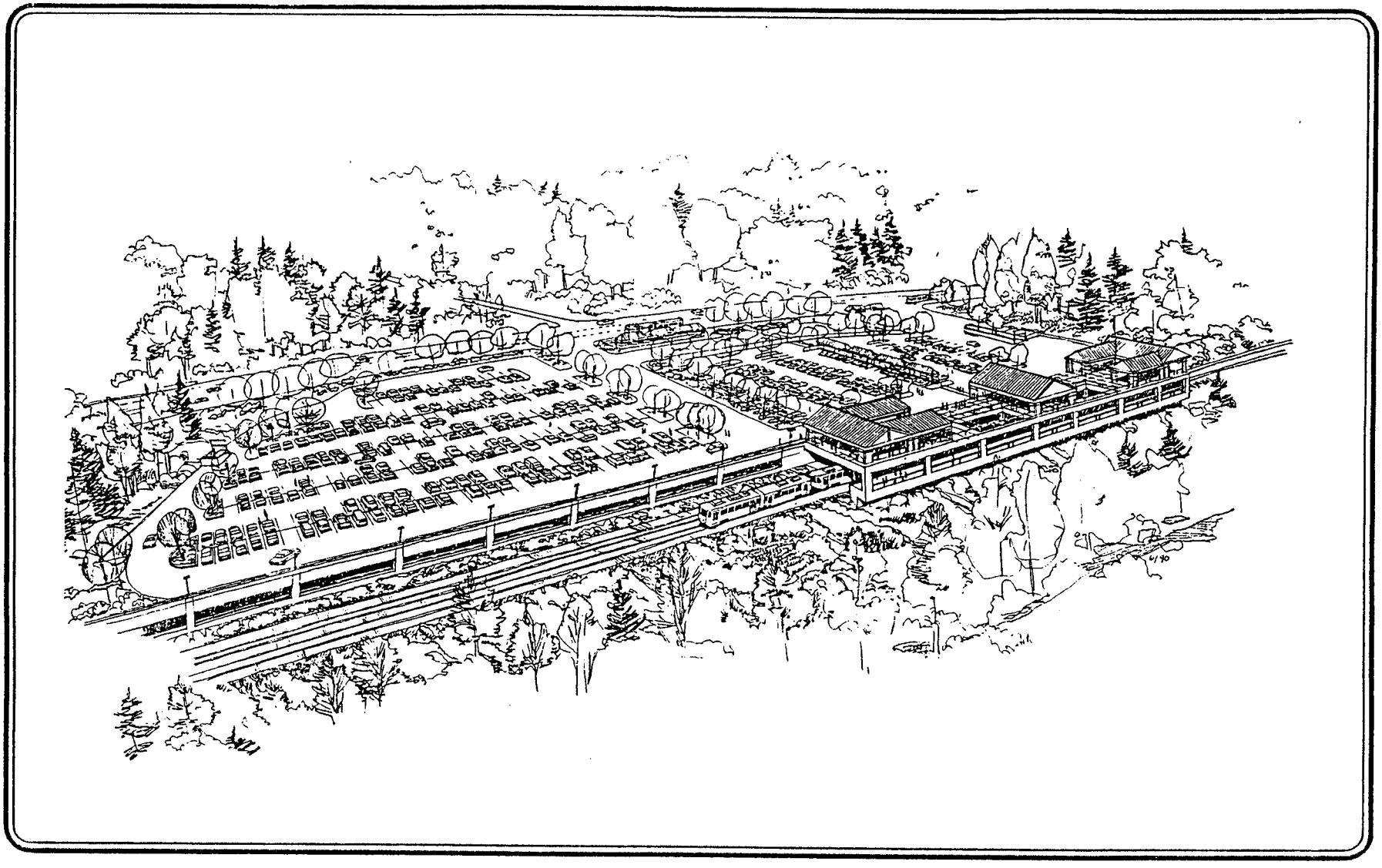
Station Concept
Section
August, 1990
Figure 13



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Station Concept
Perspective
August, 1990
Figure 14