Cross-County MetroLink Extension
Segment I
Design Standards and Policies
Final Technical Report

Prepared for the
East-West Gateway Coordinating Council

in association with the
Bi-State Development Agency
Missouri Department of Transportation
By Parsons Transportation Group
and Associated Consultants

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Introduction

The purpose of this task is to identify the design standards and policies that are to be followed for the planning and preliminary design activities for the proposed Cross-County MetroLink Segment I Extension.

The Bi-State Development Agency (BSDA) will ultimately be responsible for the preliminary engineering, final design, construction and operation of the planned Cross-County MetroLink Segment I Extension. Bi-State's design criteria for the "St. Clair County Extension" is the most current document available for system and facilities design. This design criteria manual, in preliminary draft form, was issued on June 30, 1998. Another BSDA document entitled "Design Criteria and Standards - Rail Systems" dated December 20, 1996, was also used as a design resource. "This document is also currently under revision."

It is important to keep in context the basic premise that the proposed Cross-County MetroLink Segment I Extension will become part of the MetroLink "System" and as such must assume and be consistent with the established MetroLink (BSDA) Design, Operational Standards and Policies. The consultant team has reviewed the "St. Clair County Extension" Design Criteria Manual and the "Design Criteria and Standards - Rail Systems" documents"and will utilize them" as the basis and principle guidelines for the Cross-County MetroLink Segment I Extension conceptual design.

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Design Criteria and Standards Overview

BSDA's "Facilities Design Criteria Manual" provides the design criteria governing the transit facilities of the MetroLink Light Rail system. The major areas of design contained in this document are;

- Geotechnical - Including cut-and-cover construction, structures, earth support systems, drainage, foundations, retaining walls, earthwork, excavations and underpinning.
- Station Areas - Including platforms, graphic design, canopy requirements, lighting, handicapped accessibility, historic preservation, communications, and building materials.
- Structures and Guideway - Including civil, horizontal and vertical alignment, clearances, drainage, utilities, subgrade, materials, loads and forces, trackwork, geotechnical, signal cable conduit, airport requirements and bridge decks.
- Park-N-Ride Facilities - Including geometrics, pavement design, bus shelters, signage/graphics, lighting, bicycle storage, bus bollards, and drainage.
- Roadway Design - Including paving, traffic signals, signs and striping, and ramps and curb cuts.
- Landscaping - Including criteria for stations/park-n-ride lots, MetroLink system right-of-way, site preparation, and recommended plantings.
- Maintenance Facility - Including design codes, standards, and zoning, vehicle maintenance activities, facility layout, shop facilities, architectural criteria, machinery and equipment.

BSDA's "Design Criteria and Standards - Rail System" furnishes the design criteria for the traction power substations and cable and raceway subsystems (including the overhead catenary system), all track and track components, signals, and communications. All equipment, materials, installation methods and testing shall conform to or exceed the requirements of the following national standards, regulations, and codes:

a. American Concrete Institute (ACI)
b. American National Standards Institute (ANSI)
c. American Railway Engineering and Maintenance-of-Way Association (AREMA)
d. American Society for Testing (ASTM)
e. Building Officials and Code Administrators (BOCA) National Building Code
f. Electronic Industries Association (EIA)
g. Illuminating Engineering Society (IES)
h. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
i. Insulated Cable Engineers Association (ICEA)
j. National Electrical Code (NEC)
k. National Electrical Manufacturers Association (NEMA)
l. National Electrical Safety Code (NESC)
m. National Fire Protection Agency (NFPA)
n. Occupational Safety and Health Administration (OSHA)
o. Underwriters' Laboratory (UL)

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Review and Comments

Both documents, the "Facilities Design Criteria Manual" and the "Design Criteria and Standards - Rail Systems" were reviewed by a Discipline Engineer with an applicable background and expertise for the respective area of engineering design. Some general comments for each discipline area are as follows;

Structural

Structural portions of the manual are very thorough and complete. One exception is the absence of drawing no. 2-4, long-term loading (case 1). Design codes to be used per the manual are appropriate. Tunnel sections and possibly depressed sections may have minimum design clearances to minimize cost. An allowed construction chord segment for wall on curved alignment (possibly 25 feet) may be utilized for stability.

Urban Design

Urban design may be considered the method by which urban pieces are brought to a whole and are enriched. An urban design focus should look at the connectiveness of the individual pieces of the system to each other and to the communities through which the proposed system will cross and interface. Some specific comments with references to the corresponding numerical headings in the "Facilities Design Criteria Manual" are as follows:

3.1.2 Assumptions

(Add) Urban landscaping tends to be more formal, geometric and axial than suburban landscaping. Landscaping in urban areas is more likely used for viewing than for walking, sitting or playing, but it can be used for these activities if it is carefully designed and controlled. Due to the density of foot traffic in urban areas, unrestrained open edges of turf areas may not be desirable. Urban landscaping, in general, cannot be the result of left-over areas in a site plan with grass seed thrown down; open space must be carefully planned and designed; this is more critical than in the suburbs where space is more abundant.

(Add) Fencing in urban areas as with other building and site elements is more formal; refined and permanent in nature. Use decorative steel fencing in lieu of chainlink. Consider use of low concrete/masonry walls used along or in conjunction with decorative steel fencing.

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3.2 Graphics

(Add) a. Graphics in urban areas, particularly downtown, should be designed in response to existing urban signage. Urban graphics signage is characterized by sophisticated and refined fabrication and presentation.

b. Graphics in urban areas will be viewed by a proportionally greater number of people who are walking and not in vehicles.

c. Graphics in urban areas tends to be mounted more often directly on buildings with permission of the building owner or as part of the building landscape rather than as separate elements on freestanding posts or pedestals.

Note: New signage system criteria development is underway. The revised graphics/signage criteria has not yet been incorporated into the Design Criteria Manual.

3.3 Canopies

(Add) It is anticipated that platforms/station stops in urban areas may be part of existing buildings or may be built as if they are part of the buildings lining a street. MetroLink canopies in urban street facades should respond to existing urban building canopies as well as match the typical characteristics of the MetroLink System canopies as a whole. Canopies, as well as providing cover from weather, indicate rail system entrance/exit provide opportunity for signage and can reflect character of the local urban neighborhood.

3.4.1 Local Materials

(Add) Wherever possible use locally available materials, materials which are a "signature" for a given urban area, or materials which are characteristic of a particular urban neighborhood.

3.4.2 Wall Materials

Acceptable

(Add) "natural cut stone"

"stainless steel panels"

Base Materials

(Add) "natural cut stone"

3.7 Historic Preservation Criteria

Consider looking at Washington University Campus planning from the turn-of-century. Were there provisions in these old plans for light rail alignment and stops? City of St. Louis also has heritage and urban design criteria. These should also be considered.

Consider looking at historic alignment and station design of the old St. Louis trolley system, particularly as it operated along Forest Park Parkway and into Clayton along Pershing Avenue. (Line ran at least partially through Clayton CBD along Central in north/south direction.)

5.1.4 Parking Structures

The use of surface parking lots in urban areas is to be discouraged. The essence of urbanity is density and streetscape, neither of which is achieved by surface lots.

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Though parking garages are more expensive to build than lots, the garage may be part of a larger building complex which may act as bus shelters, transit platform canopies, provide for ticket and communication offices, including restrooms and maintenance spaces. In an even more ambitious scheme, such structures may include rental space for restaurants, magazine and newspaper stands and other businesses which benefit from the concentration of transit users.

5.2.4

(Add) In urban areas, the use of asphalt pavement except for vehicular drives and at-grade parking is not appropriate.

In addition to the use of concrete for walks, consider the use of granite curbs and pavers or other hard and permanent materials.

5.5 Lighting

(Add) High pressure sodium lighting, unless it is well color-controlled, should not be used. Better color and foot-candle illumination is achieved from metal-hallide lighting. Sodium lighting distorts certain colors and can create confusion after dark when people are returning to their cars.

7.1 Landscaping - General

(Add) Urban transit stations will probably use trees and other landscaping elements in an entirely different manner than in the suburbs.

Plantings are more likely to be smaller in scale and more likely to be contained in planters, urns or within fenced areas.

Urban parking structures will likely not have trees but entrances and exits may be enhanced with focal plantings.

Limit use of unrestricted or undefined grass areas which may become worn or trampled. This requires thought regarding likely pedestrian paths; select grasses which are hardier and can tolerate less moisture.

7.2.2

(Add) In urban areas, structurally-retained slopes with flat planted areas are more in keeping with urban character than the use of mulch or planted slopes. Retaining walls act to create more useable space, more clearly define space, sometimes provide seating and are more building-like and are therefore more urban in character, although they may be more costly to construct.

Facilities and Shops

As written, Chapter 8 provides guidelines for an ideal LRV maintenance facility, but it does not specifically address the current and planned operational experiences and limitations of MetroLink's Ewing Street and St. Clair Shops. The chapter could be expanded to address current MetroLink vehicle overhaul philosophy and needs, in addition to covering cleaning, inspection, and running repair.

The Phase I shop at Ewing Street was designed to be approximately 3 vehicles long. Current MetroLink operating practice is to maintain coupled train sets of two vehicles each. This limits the usefulness of all inspection and repair positions. In addition, the wheel truing machine is located in one of the through tracks and limits the usefulness of this track when vehicles are having wheels machined. In light of the operational experiences in Ewing shop, the Phase II shop at St. Clair Avenue was designed to be approximately 4 vehicles long to be able to accommodate two train sets.

It is possible that the Cross-County MetroLink Segment I Extension's equipment maintenance requirements may be absorbed into one of the existing shops or require an additional facility. Future MetroLink expansion beyond Segment I will require construction of a shop facility near the west/north/south end of the new segments.