11-1-1981

Banfield Light Rail Project: Conceptual Design Information for the City of Portland

Tri-County Metropolitan Transportation District of Oregon

Banfield
Light Rail
Project

CONCEPTUAL DESIGN

REPORT

NOVEMBER 1981

REVISION - 3

12-0109
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BANFIELD LIGHT RAIL PROJECT

Conceptual Design Information for the City of Portland

November, 1981

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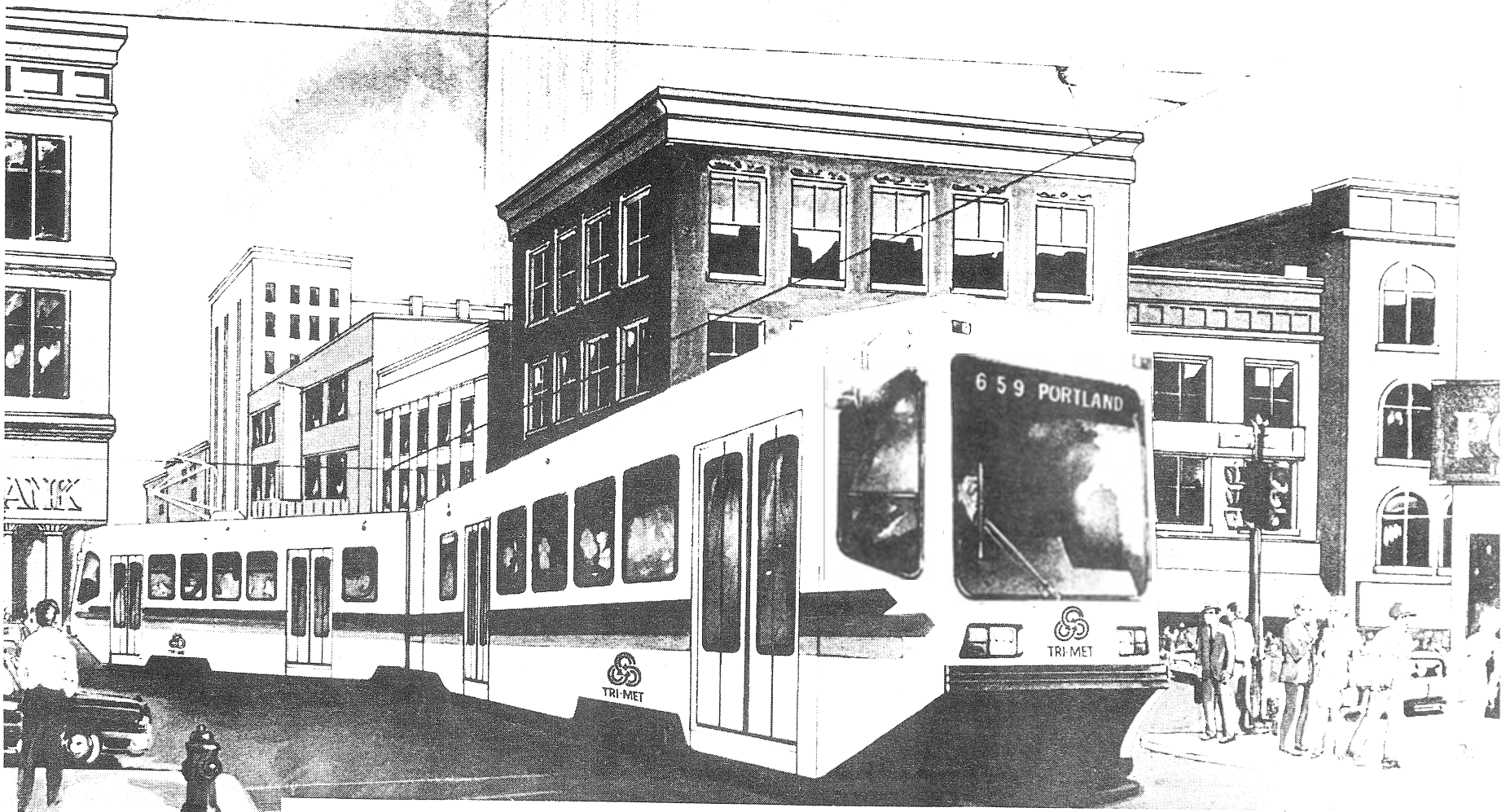

BOMBARDIER BN ARTICULATED LIGHT RAIL VEHICLE

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* Also attached is the Route Map of the entire Project.

1.01 Introduction

This report is a brief descriptive summary of the Banfield Light Rail Project in the City of Portland. Its intent is provision of sufficient information to the Portland City Council for their general approval of the Project.

It is understood that while Tri-Met has prepared an extensive preliminary design, received approval of the project's Final Environmental Impact Statement, and approval of the project's nature by affected jurisdictions, much remains to be done. Final design of the project has begun and Tri-Met wishes to define a process leading to its' construction.

The steps proposed are these:

1. Conceptual Design Approval by the City Council
2. Stage approval by the City's various bureaus at the 40%, 85% and 100% levels of design completion.
3. Final design approval by the City Council

Tri-Met has and will continue to seek the City's involvement at every stage of the project. To assure this it is proposed that an agreement be reached appointing a project coordinator from City staff but paid by Tri-Met. The City's services will also be sought for appropriate portions of the project design such as traffic circulation and control.

Details of this agreement are now under discussion between City and Tri-Met legal staff.

Here then is the Conceptual Design Report. Its content has already received considerable review and revision by the City's Light Rail Advisory Committee and as such reflects the current thinking of both the City and Tri-Met on the project design.

1.02 Costs and Financing

The Banfield Light Rail Project must be constructed within the constraints of a budget that, other than an inflation factor, is fixed. That budget also dictates a design that is primarily functional rather than decorative.

Given those constraints, Tri-Met will attempt to use its funds to produce a design that is acceptable to all concerned through cooperation with the City and private development.

Certain areas, such as the Historic Districts, will need special treatment and budgetary allowances have been made for them.

The figures for the overall Banfield Transitway Project are shown in 1980 dollars as in the original grant application. An annual inflation factor of 12% is added to project figures to meet future inflation costs.

Costs:

Light Rail Portion	$	146.9 million
Freeway Widening		78.6 million
Total	$	225.5 million

Financing:

Interstate Transfer Funds	$	182.3 million
Urban Mass Transportation Administration		8.9 million
Tri-Met		5.0 million
ODOT		11.8 million
State of Oregon Light Rail Construction Fund		17.5 million
Total	$	225.5 million

Dollars allocated to the segments within the City are:

Downtown	$	5.7 million
Steel Bridge		4.7 million
Holladay Street		3.0 million
Banfield Freeway (LRT)		23.2 million

The Multnomah County portion has $24.4 million budgeted and the City of Gresham section has $5.8 million.

Systemwide elements of the LRT project such as the vehicles, track, electrification, signals, maintenance facility, elderly and handicapped lifts, fare collection, etc. total $80.1 million.

A total of $950,000 has been allocated to construction of the fourteen transit stations in downtown Portland.

1.03 The Light Rail System

1.03.1 General

The Light Rail Project is the transit portion of the "Banfield Transitway Project", a comprehensive approach to meeting the transportation needs of the Eastside. The Transitway Project includes both the construction of a 15.1 mile Light Rail system and upgrading of 4.3 miles of the Banfield Freeway. Tri-Met is responsible for the Light Rail Line while the Oregon Department of Transportation oversees widening the freeway. (See Preliminary Project Schedule, Exhibit A, and Project Data Sheet, Exhibit B).

1.03.2 Route

The route is from downtown Portland to downtown Gresham, a distance of 15.1 miles (see Exhibit B). Beginning at S.W. 11th Avenue, the Light Rail route follows Morrison, Yamhill and First Avenues, then crosses the Steel Bridge onto Holladay Street via the exiting connection. From there, the line enters Sullivan Gulch, parallels the Banfield Freeway to Gateway, then moves south along I-205 to East Burnside Street where it continues east. The line will operate in the center of a re-built East Burnside Street to 197th Avenue where it then enters Portland Traction Company right-of-way to the terminus in Gresham.

There will be two types of Light Rail operation in the City of Portland. For the downtown, Steel Bridge and Holladay Street, operation will be in-street and at-grade. In the Banfield Freeway, the Light Rail line will run on an exclusive right-of-way on the north side of the Banfield at the freeway level.

1.03.3 Light Rail Vehicles

Tri-Met will buy 26 articulated Light Rail vehicles from Bombardier Ltd. of Canada. Two vehicles will be coupled together in trains, to carry more people during rush hour. Each 88-foot vehicle can carry up to 166 people for a total of 332 in a two vehicle unit. They will be manually controlled by a Light Rail operator.

1.03.4 Light Rail Operation

By 1990, the Light Rail line is projected to carry 42,500 passengers daily. Light Rail cars will operate every 10 minutes throughout the day and every 20 to 30 minutes in the evenings and on Sundays. During commuter rush hours, Light Rail trains will run every five minutes between downtown Portland and Gateway. Service will begin at 5:00 a.m. weekdays, with the last run at midnight.

Speeds will match the general traffic speed limit: 20 mph in downtown Portland, 25 mph on Holladay Street, 55 mph along the Banfield separated right-of-way, 45 mph along Burnside. Overall average speed, including stop time, will be about 25 mph (compared to 14 mph average speed for Tri-Met buses today). A 15 mile Light Rail trip from Gresham to Portland will take about 40 minutes.

1.03.5 Self-Service Fare Collection

Boarding a light rail vehicle is quick and simple, much more so than the present bus system. Since you need not show your ticket or pay fare to the driver, you enter by any of the four doors, insert your multi-ride ticket in one of the on board validation machines (single ride tickets are validated when issued) take a seat and enjoy the ride!

Transfers aren't needed since your ticket will be valid everywhere for a specified time period. Fare payment will be assured by random checks for validated tickets.

1.03.6 Bus Operations

Most Light Rail stations will connect with a re-designed Eastside bus network. Major bus transfer connections in Portland are planned at the Colisuem and Hollywood Light Rail Station.

Station	Bus Routes	Buses per Peak Hours	Buses Per Off-peak Hours
Coliseum	8	55	30
Union/Grand	2	12	8
Holladay Park	2	12	8
Hollywood	4	31	16
60th Avenue	2	10	6
82nd Avenue	2	12	8

Future Downtown Bus Operations:

The future Eastside grid system will answer the needs of riders whose destination is not downtown and will also serve as a feeder system for Light Rail. However, downtown Portland is, and probably will remain, the principal market for the focus of regional transportation.

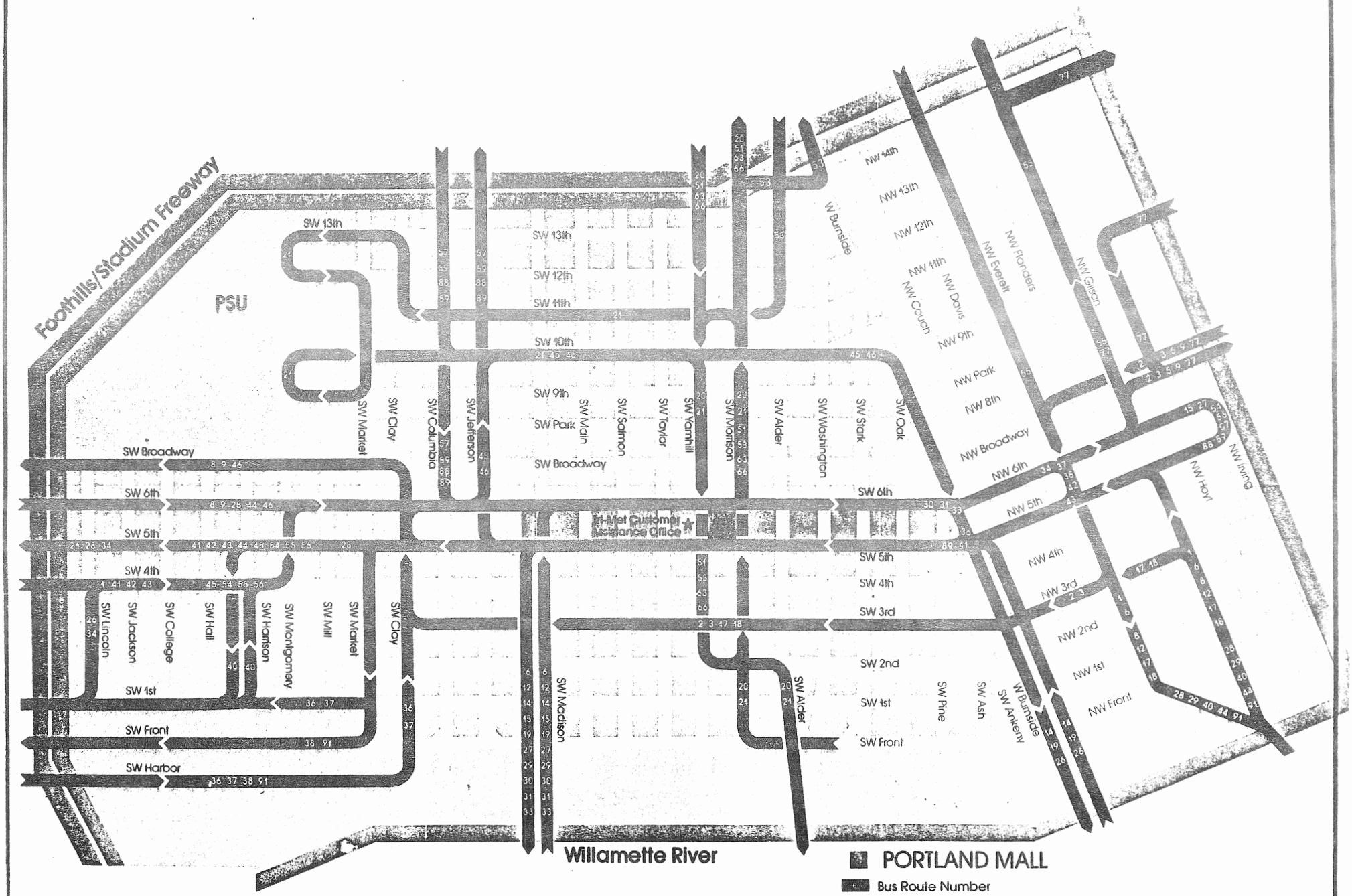
A similar grid is needed in the central business district (CBD) covering the downtown area with easy transportation access, similar to that now enjoyed by those adjacent to the Transit Mall.

Such a system is proposed and the change is shown by the following two illustrations.

The first shows the present CBD routing and the second presents the future system.

Note that with the addition of the Light Rail System the number of routes using Morrison-Yamhill will be reduced; only numbers 21 and 53 would remain. First Avenue would gain bus service with the addition of route 16/41 placing a new southbound line on the grid. The northbound return route would use 2nd Avenue.

Note also, that routes 21 and 53 plus others are targeted for conversion to electrically driven trolley busses.



1980 DOWNTOWN BUS ROUTES

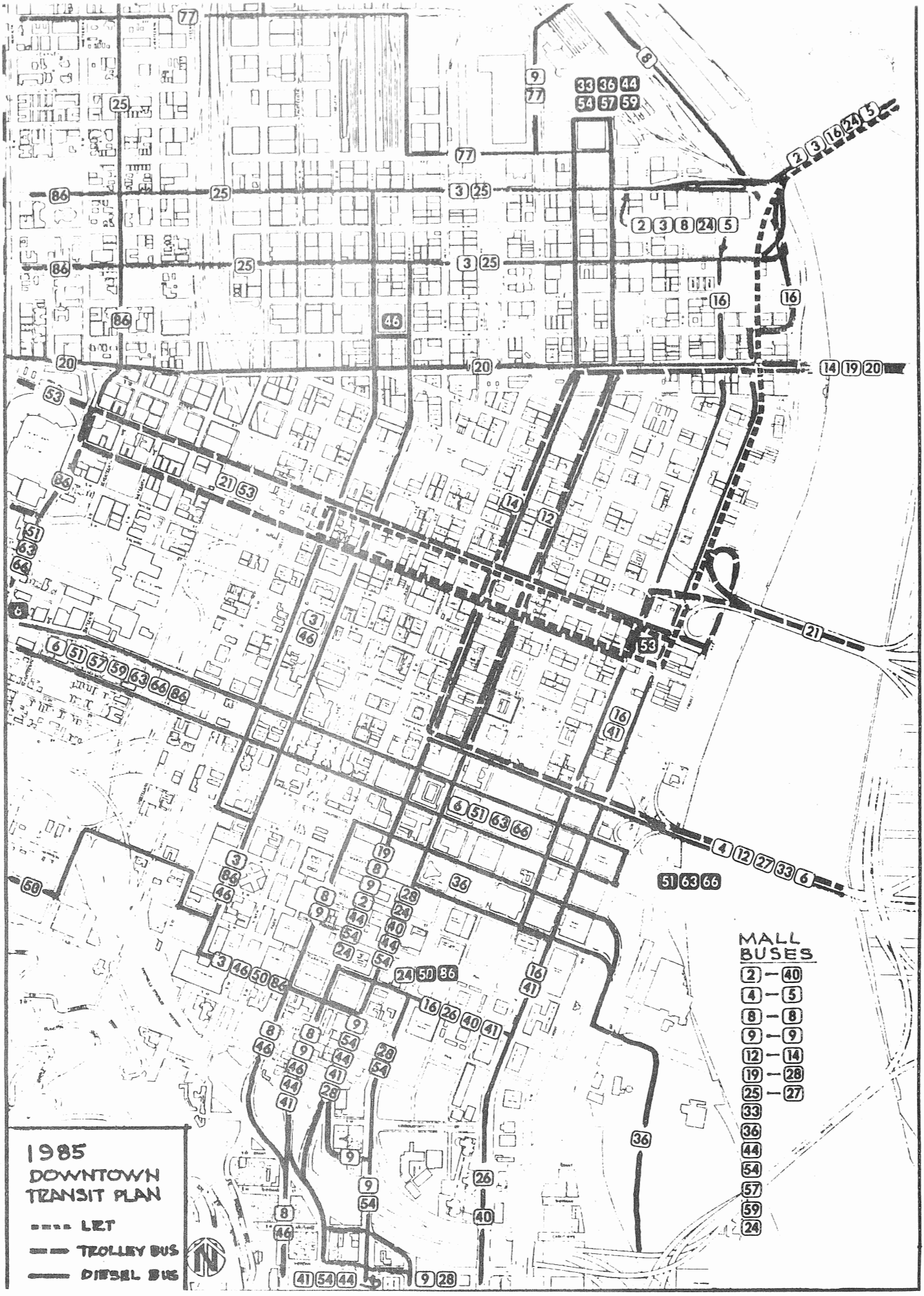
PORTLAND MALL

Bus Route Number

Direction of Travel

Pioneer Courthouse

★ Tri-Met Customer Assistance Office
522 S.W. Yamhill


1985
DOWNTOWN
TRANSIT PLAN
LRT
TROLLEY BUS
DIESEL BUS
N
MALL
BUSES
2 — 40
4 — 5
8 — 8
9 — 9
12 — 14
19 — 28
25 — 27
33
36
44
54
57
59
24

1.03.7 Land Use

The project generally conforms with local land use plans and policies, providing a significantly greater degree of conformance than would occur under the no-build condition. In particular, major goals of (1) improving the flow of goods and services and strengthening the local economy, (2) increasing the viability of the Portland central business district, and enhancing its role as a regional center, and (3) concentrating growth where it can be better served by public transit will be optimized by implementation of the project.

All along the Light Rail alignment positive land use changes are expected. The City's Transit Station Area Planning Program is currently working on detailed land use, transportation and urban design plans within a one-quarter mile radius of each Light Rail station.

1.04 The Downtown Segment

1.04.1 Alignment

Light Rail will run throught the heart of downtown Portland crossing the Yamhill and Skidmore-Old Town Historic Districts. (See Exhibit C).

The Light Rail line starts off-street on the west side of S.W. 11th Avenue, between Morrison and Yamhill streets. This off-street site is presently occupied by a building and parking lot, both of which will be removed. Eastward from S.W. 11th Avenue the Light Rail line occupies a 10 block one-way couplet on Morrison and Yamhill streets. The tracks are to be located in the area between the centerline and curb on the south side of Morrison Street and the north side of Yamhill Street. Light Rail will operate in the same direction as traffic on these streets. Loading and unloading of passengers will be on the left. See typical section, Exhibit D. The trackway will shift to the south side of Yamhill between First and 2nd to allow a greater radius of curvature onto First Avenue. A travel lane will be accommodated adjacent to the track area.

Although originally a contraflow operation was planned on Morrison and Yamhill Streets. This is no longer the case. Light rail vehicles will travel the same direction as adjacent traffic throughout the system.

Both the Yamhill and Morrison single trackways turn north to a two-way double track operation on First Avenue. Continuing north on First the tracks will be situated near the middle of the existing street but offset enough easterly to allow a single intermittent southbound traffic lane. The tracks will pass beneath both the Morrison and Burnside Bridges before beginning an ascent at N.W. Davis Street to cross the Willamette River on the Steel Bridge.

1.04.2 Downtown Stations

Station locations on Morrison and Yamhill Streets are proposed between the following points:

10th and 9th
Broadway and 6th
5th and 4th
3rd and 2nd (Morrison Street)
2nd and 1st (Yamhill Street)

1st Avenue Stations are proposed between the following points:

Stark and Oak
Ash and Ankeny (Skidmore Fountain)
Davis and Everett

See artists renderings in Exhibit F through J.

As a result of design investigations, several concerns related to station location and function have been identified. These include the S.W. 11th Avenue Terminal, the 1st Avenue and Yamhill Station, and the Skidmore Fountain Station.

Rather than serve as a station, it is proposed that the 11th Avenue Terminal function only as a turnaround and short term vehicle storage-inspection area. The geometry of tracks on the block between Yamhill and Morrison Street yields a strong argument towards elimination of this site as a station because the sidewalk and vehicle turning characteristics would conflict. The storage-inspection and turnaround functions are still needed, since this is the end of the line. The number and location of tracks on the site, as well as methods of screening the area, are being discussed by City and Tri-Met staff.

Problems with the First Avenue and Yamhill station remain to be resolved. The potential safety problems created by the station's

location on a track curve will be addressed in final design. It will be necessary to eliminate the wayside lift at this station and possibly restrict regular passenger loading to minimize conflict between waiting passengers and the vehicle turning movement.

Similar safety problems exist at the Skidmore Fountain Station, because it too falls on a curve. In addition, the Historic Landmarks Commission suggested that moving the Station should be considered. Consequently, three options are being studied. These include: 1) the Ash and Ankeny site, 2) shifting the station site one block south to between Pine and Ash, and 3) shifting the station site one block north to the area under the Burnside Bridge.

1.04.3 Downtown Station Features

The downtown stations serve as the access point to the system for passengers arriving primarily on foot. Estimates of the patronage at each station are contained in Table 1.

All stations will feature shelters (except Morrison Street), single ride ticket vending machines, telephone, transit information, lighting and full access for the handicapped by wayside lifts (except 1st Avenue and Yamhill). The most heavily used stations will have multi-ride ticket vending machines. Street trees will be provided where appropriate in the various sections of downtown.

Should adjacent property owners or the City wish special designs in front of their building or property, they may be encouraged to participate in the Final Design process with the understanding that they would incur the added cost of special designs.

The Yamhill and Skidmore-Old Town Historic Districts impose their own unique requirements on the Light Rail system from the standpoint of compatibility with the historical nature of the areas and with proposed developments. The integration of Light Rail into the historic districts will be a major concern during Final Design in accordance with the Portland Historic Landmarks Commission agreement. The design of stations in downtown will be coordinated with the design objectives of the Historic Landmarks Commission and Design Committee.

1.04.4 Downtown Traffic Impacts

A design directive of the Light Rail system calls for minimizing auto/Light Rail conflicts and ensuring pedestrian safety. To accomplish this, in the downtown area, operation will be on streets with light auto traffic. This will also serve to minimize the impact on local traffic circulation.

Generally, only emergency vehicles and occassional buses will be allowed in the Light Rail track area, but the remainder of the street may be used by autos.

The Light Rail system will connect with the Transit Mall buses at the four stations located adjacent to the Pioneer Courthouse.

Morrison and Yamhill - General Principles

The following general principles summarize traffic operation on Morrison and Yamhill:

1. The opposite side of the street from the trackway will be divided into a 10 foot travel lane and 8 foot parking strip.

2. The curb line on the north side of Morrison and the south side of Yamhill (opposite the trackway) should not be moved out in bus loading areas.
3. A distinct separator between LRT and auto traffic should be used. This may be a painted rumble strip, low curb or other device.
4. Left turns across the tracks will be prohibited or rigidly controlled.
5. Loading zones will be moved to side streets or restricted to non-critical times.
6. Future curb cuts will generally be prohibited.

Morrison Street - S.W. 1st to 11th Avenue

Morrison Street is designated as a non-auto oriented street intended to serve mainly transit and pedestrian activities. Some shopper pick-up and drop-off occurs by auto, however, and will receive special attention.

A total of 64 parking spaces will be removed from the south side of the street to make way for the one Light Rail track. A single auto/bus lane and a parking strip will be retained on the north side of Morrison and ten minute shopper pick-up zones could be located in the parking strip, where appropriate.

Turning movements onto Morrison can be allowed in most cases, yielding an access pattern similar to that on the present Transit Mall.

All traffic on Morrison, including LRT, can be controlled by the existing signal system. Pre-emption will probably not be necessary. The exisiting computerized progressive traffic flow system can be adapted with minor modifications.

Yamhill Street - S.W. 11th to 1st Avenues

Measures similar to those planned for Morrison Street will also be taken on Yamhill, since its nature is the same. The layout will be a mirror image of Morrison Street with 54 parking spaces removed on the north side for the LRT trackway. A single auto/bus lane with a parking strip will be located on the south side. Traffic control will also be equivalent to that proposed for Morrison Street.

The exisiting sidewalks along the track side of Morrison and Yamhill will be widened to 17 feet, except at stations, where 19' 8" sidewalks will be provided. The method of extending the sidewalks will be determined during Final Design and in close coordination with the City, after the necessary surveys are completed.

Both the Morrison and Yamhill single tracks turn northward onto S.W. First Avenue. There, Light Rail will operate on two tracks on S.W. First Avenue, with a separate lane for local access by trucks and cars where appropriate. The track envelope will be closed to through auto traffic between Morrison and Stark Streets, and between Ash and Couch Streets in station areas where street width is too narrow for an auto lane.

First Avenue - General Principles

The general principles related to traffic operation on S.W. First Avenue are similar to those for Morrison and Yamhill Streets. There are notable exceptions, however, which are outlined below:

1. Station blocks will be closed to all but emergency vehicles and buses.

2. All auto traffic will be banned from beneath the bridges.
3. In general, parking and loading zones will be removed from S.W. First Avenue. Loading zones will be relocated to adjacent streets.

S.W. First Avenue - Yamhill to Everett

The First Avenue designation as a non-auto oriented street is compatible with the intent to use it for LRT. However, there are local traffic circulation issues to be resolved. Plans call for two trackways on First Avenue. In non-station areas this will allow one lane southbound for short distance circulation and continued retail exposure. Existing curb access and truck loading zones will be relocated to adjacent side streets. Left turns will be prohibited to avoid auto/LRV conflicts.

Sidewalks will be extended to the trackways at stations for LRV loading. Accordingly, Tri-Met and the City of Portland have proposed that no auto traffic be allowed in the station areas on S.W. First Avenue. At other locations, one lane can be retained. Any final closures or other restriction will be fully coordinated through the City.

About 123 curbside parking spaces must be removed to gain space for the track and auto lanes. Restricted clearance under the Morrison and Burnside Bridges will mean that auto traffic must be eliminated, but the trackway will be paved for emergency access.

Existing pedestrian routes from the Morrison Bridgehead will be retained.

N.W. First Avenue - Everett to Glisan

The Light Rail vehicles will be on an elevated ramp to the Steel Bridge in this section. A ramp on Everett Street will allow continued auto access across the trackway to the existing Steel Bridge ramp. Access to the Bridge from southbound N.W. Front Avenue will be provided by a new roadway along the east side of the elevated trackway.

Northbound circulation from N.W. Everett to Glisan will be allowed by a single lane on the west side of the elevated trackway.

1.04.5 Downtown Impacts

The projects effect on the following areas must be dealt with:

- Vehicular traffic
- Pedestrian traffic
- Commercial development
- Utilities
- Other transportation modes
- Adjoining properties and land use (access and loading)

Further in the future, the Banfield LRT project must allow for the possible westside LRT extension now being studied. Possible interface points include Glisan Street at the Steel Bridge and the 11th Avenue Terminal. Both areas will be designed so as not to preclude the connection.

1.04.6 Utilities

Utility relocation will be required in the downtown area. This work will be designed in accordance with the applicable criteria and standards established by the utilities and the City. Except for crossings new utilities will not be permitted along the track or within the limits of track pavement.

1.04.7 Business

During Final Design special attention will be given to the design and construction of the trackway and track structure in order to minimize the impact of the LRT during both construction and maintenance operations. Construction activities will be arranged to minimize traffic and other activity disruption. Impacts may include temporary reduced access to some streets for vehicles. Public access to stores will be maintained. Normal dust and noise control techniques will be followed.

Operation of the system will cause relocation of some service vehicle access and changes in parking patterns. The increased flow of pedestrian traffic can improve exposure of business to the buying public.

Particular attention has been and will continue to be directed toward major developments now planned or in progress such as Pioneer Square, the Morrison Street Project, Yamhill Market Place, and Pacific Square. Acceleration of the downtown LRT alignment and grade design will answer the questions implied.

1.04.8 Historic Districts

The Historic Districts, being sensitive to any intrusion, will receive special attention to deal with their unique problem. Every effort will be directed toward integration of the Light Rail project into the historic setting. Mutually acceptable designs will be developed through cooperation with the districts and the City.

1.05 Steel Bridge and Ramps

Choice of the Steel Bridge for the Light Rail crossing of the Willamette River is especially appropriate. The upper deck was designed for and used as a river crossing by the historic Portland Street Car operations.

1.05.1 Alignment

The approach to the Steel Bridge begins with a gradual elevation of N.W. First north of Davis Street. At Everett Street, the LRT enters a new rail-only structure rising to connect with the Bridge at the junction of the Glisan Street and Front Avenue ramps. (See Exhibit D.)

On the Bridge, Light Rail will share use of the center lanes with regular traffic.

At the east end of the Bridge the LRT double trackway will connect to N.E. Holladay Street via the existing ramp.

1.05.2 Traffic

The existing Everett Street ramp connection to the Bridge will be retained by raising Everett sufficiently to cross the LRT ramp at-grade.

Traffic Signals and/or other appropriate control measures will be used on each end of the Bridge at the ramp junctures, to continue safe traffic access.

The shared use of the center Bridge lanes by Light Rail vehicles and regular traffic will provide sufficient capacity for vehicular movement. This shared use capability is the major advantage

of LRT over other forms of rail borne transit. At the east end of the Bridge, westbound Holladay Street traffic will merge into one lane with westbound Light Rail at the underpass structure. The eastbound lane will be Light Rail only.

1.05.3 Impacts

The planned access arrangement retains existing traffic access and sufficient capacity, thus minimizing impact in this section.

1.06 Holladay Street Segment

1.06.1 Alignment

From the Holladay ramp the Light Rail tracks cross to the north side of the street at N.E. Occident Avenue. From that point east, the tracks will be located entirely along the north side of Holladay Street. They will be paved and separated from auto traffic by a narrow median. See typical section, Exhibit E.

1.06.2 Stations

Stations will be located at three points on Holladay:

1. Between Occident and N.E. First (Coliseum)
2. Between Union and Grand
3. At Holladay Park (Lloyd Center)

The Coliseum Station will be the focus of heavy special event activity and a major bus transfer point. Normally light Kiss and Ride, pedestrian and heavy bus transfer activity may be expected. It is estimated that bus transfer opportunity will involve three trunk lines and five local lines. From Table 1, it is estimated that LRT will generate 751 passengers during the "weekday PM peak Hour".

1.06.3 Traffic

Light Rail will operate on the north side of Holladay with two adjacent westbound traffic lanes to the south. About 150 curbside parking spaces will be removed. Right turns will be prohibited at N.E. 2nd, 6th, and 11th Avenues. Right turns will be allowed at other signalized intersections but will be pre-empted by the presence of a Light Rail vehicles. A signal will be added at N.E. 3rd and at Occident.

All existing curb access on the north side of Holladay will be closed except for the driveway to the tavern at the corner of Union and Holladay. This driveway access will be exit only and protected by warning signs.

1.06.4 Impacts

Other than some restriction of business access on the north impacts are expected to be minimal.

Individual problems will be resolved as they are identified.

1.07 Banfield Freeway Segment

1.07.1 Alignment

East of N.E. 13th Avenue, the LRT will enter the Banfield Freeway via a new and exclusive Light Rail ramp from Holladay Street. In this segment, the LRT tracks will occupy an exclusive right-of-way located between the Union Pacific Railroad mainline track and the Banfield Freeway. (See Exhibit E.)

The LRT trackway will be approximately at the same level as the freeway with a barrier separating the two.

Since the Union Pacific Railroad on the north is considerably lower in elevation, and close to the Light Rail line, extensive use of retaining walls will be necessary. The Light Rail line follows the Banfield past Portland City Limits at 92nd Avenue.

1.07.2 Banfield Freeway Stations

Stations are to be located at Hollywood (N.E. 42nd), 60th Avenue, and 82nd Avenue. Details of these facilities and their access will be coordinated with the City.

In a June 1979 Resolution, the Council recommended that the Banfield Transitway Project be designed to accommodate a future Light Rail transit station in the vicinity of 67th Avenue. Tri-Met has reviewed the matter critically again, and concluded that the provision of this LRT station is not feasible from the standpoints of engineering, incurred additional cost, and delayed schedule. The problems and consequences are highlighted below:

- The Banfield Freeway alignment, in the vicinity, is on the long tangent section, about 3/4 of a mile long; the LRT trackway is at the minimum clearance from the Union Pacific facility and parallel to it.

- To provide additional space for the station platform, the Banfield Freeway alignment has to be shifted southerly, thus incurring additional right-of-way.

- It is estimated that this undertaking would cost additional $1.8 million to the project, included right-of-way, grading & paving, structures, and engineering.

Stations at Hollywood (N.E. 42nd), 60th and 82nd Avenues will be at freeway level, They will connect with the bridge overpasses by elevators and stairways. Because of the environmental conditions at the freeway level, screens and full covered shelters will be provided.

The Hollywood Station will connect with a bus transfer center in the area between Copeland Lumber and Timber Lanes Bowling Alley. See Exhibit L. The design of the facility is integrated with the City's Hollywood Transportation Project. The 60th and 82nd Avenue Stations will provide bus connections on the adjacent freeway overcrossing structures.

The design of the three Banfield Freeway Segment Station will be consistant and will present a compact unified appearance. The LRT level will provide:

weather protection
elevators and stairs
seating - leaning spaces
trash collection
rider information
water
telephones

At street level bicycle parking facilities will be added to the above amenities.

1.07.3 Traffic

Traffic impacts are minimal since the LRT is completely separated but secondary impacts will be apparent at the Hollywood Station because of the adjacent bus transfer facility. They will be minimized by integration of the service into the community plan.

1.07.4 Impacts

The general separation of this section into a pre-existing transportation corridor will preclude any major impact.

1.08 The Next Steps

The integration of Light Rail with downtown traffic patterns and access will be of major concern. The recommendations developed during the preliminary design phase will be revised as needed through coordination with the City and affected businesses. Particularly important will be seeking satisfactory solutions to business access problems.

Projects developing concurrently with Light Rail such as Pioneer Square, Pacific Square, Morrison Street Project, and the Downtown Pedestrian Study will also need special attention. Coordination with their schedules to avoid duplication of effort will be important.

The method of sidewalk extension and degree of street reconstruction needed are of mutual interest to the City and Tri-Met. Both will be resolved as a prerequisite to final design.

Other specific issues will be identified as the Final Design process continues.

Scheduled events in the immediate future include conceptual design approval by the City Council and their consideration of a City coordination and services agreement.

Downtown design has been advanced and should result in a well-defined LRT alignment and grade by this December (1981). This is necessary to allow adjacent developments, such as Pacific Square and Pioneer Square to complete their designs.

Other significant milestones are presented on Exhibit A contained in the appendix.

EXHIBITS

1995

STATION PASSENGER ACTIVITY

WITHIN CITY OF PORTLAND

Eastbound and Westbound

Weekday PM Peak Hour

Station	Total Boarding and Alighting Riders
Galleria	824
Pioneer Square	2749
4th/5th	1581
Historic	825
Stark/Oak	224
Skidmore	412
Everett/Davis	247
Coliseum	751
Union/Grand	212
Lloyd Center	1060
Hollywood	671
60th Avenue	829
82nd Avenue	1150
Gateway	985

April, 1981

Tri-County Metropolitan Transportation District of Oregon

Management Information and Analysis Department

Metropolitan Service District

Transportation Department

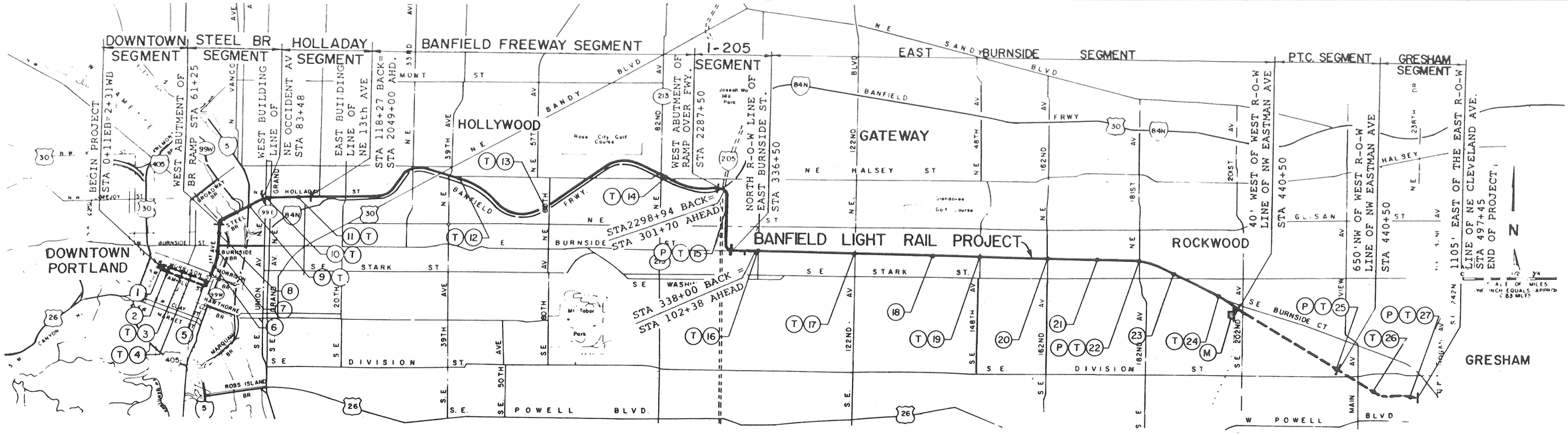
TABLE 1

PRELIMINARY PROJECT SCHEDULE

SCHEDULE

September, 1980	Final federal approval of Banfield Light Rail Project
September, 1980	Final Engineering and Design of Light Rail line begins
September, 1980	Right-of-way purchase started
May, 1981	Land survey of property lines
June, 1981	Light Rail Vehicles selected
September, 1981	Vehicle Contract Awarded
November, 1981	Maintenance Facility groundbreaking
November, 1981	I-205 Light Rail section under construction
January, 1982	Banfield Freeway reconstruction starts by Oregon Department of Transportation
March, 1982	Light Rail construction starts on E. Burnside Street from 199th Avenue to Gateway
January, 1983	Light Rail construction starts on Banfield from Gateway to Lloyd Center
January, 1983	Light Rail construction starts from 199th Avenue and E. Burnside to Gresham Terminal
June, 1983	Light Rail construction starts from Lloyd Center through downtown Portland to 11th Avenue terminal
September, 1983	First Light Rail vehicle arrives in Portland
Mid-1985	Total project completed and Light Rail operates from Gresham to downtown Portland. This date depends on final funding arrangements.

EXHIBIT A



LENGTH

15.1 MILES END TO END
13.0 MILES DOUBLE TRACK
2.1 MILES SINGLE TRACK - 2 WAY

PATRONAGE

42,500 PASSENGERS PER DAY, 1990.
5,128 PEAK HR PEAK DIRECTION PASSENGERS, 1990

VEHICLE

85-88 FT LONG, ARTICULATED DOUBLE-ENDED
75 SEATS (MINIMUM)
75 STANDEES (MINIMUM)

OPERATIONS

55 MPH TOP SPEED
20+MPH AVERAGE SPEED
5-6 MIN PEAK PD FREQUENCY
10-12 MIN NORMAL FREQUENCY
2 CAR TRAINS DURING PEAKS CAPACITY 5128 RIDERS/HR/DIR.
26 CAR FLEET, INCLUDING
3 SPARE CARS
106 LRT SYSTEM EMPLOYEES

IMPLEMENTATION SCHEDULE

1980 START FINAL DESIGN
1981 START CONSTRUCTION
1985 BEGIN OPERATIONS

27 STATIONS

(2) MORRISON PARK WEST
(3) PIONEER SQUARE
(4) 5TH AVENUE
(5) YAMHILL HISTORIC DISTRICT
(6) OAK STREET/STARK STREET
(7) SKIDMORE FOUNTAIN
(8) EVERETT STREET/DAVIS STREET
(9) COLISEUM
(10) UNION AVENUE/GRAND AVENUE
(11) LLOYD CENTER
(12) HOLLYWOOD
(13) 60TH AVENUE
(14) 82ND AVENUE
(15) GATEWAY
(16) 102ND AVENUE
(17) 122ND AVENUE
(19) 148TH AVENUE
(20) 162ND AVENUE
(21) 172ND AVENUE
(22) 181ST AVENUE
(23) 188TH AVENUE
(24) 197TH AVENUE
(25) GRESHAM CITY HALL
(26) GRESHAM CENTRAL
(27) GRESHAM TERMINAL

STATION FACILITIES

SHELTERS, BENCHES, INFORMATION SERVICES, TELEPHONES, HANDICAP LIFTS (ALL), ELEVATOR ACCESS (BANFIELD), PLATFORMS, (200 FT LONG, 6 INCHES HIGH, 10-20 FT WIDE) CROSS-TOWN BUS TRANSFER, 1530 PARKING SPACES (TOTAL) AT 4 LOCATIONS

TRACTION POWER

750 VDC. SINGLE TROLLEY WIRE DOWNTOWN & HOLLADAY CATENARY ELSEWHERE

SIGNALS, COMMUNICATIONS, AND CROSSINGS

COMBINATION OF LINE-OF-SITE CONTROL, POSTED SIGNALS; TWO-ASPECT, AUTOMATIC TRAIN PROTECTION; TWO-ASPECT POSITION LIGHTS; 62 GRADE CROSSINGS; GRADE CROSSING PORTECTION & HIGHWAY TRAFFIC SIGNAL INTERCONNECTION WITH SOME PREEMPTION, SPACE RADIO COMMUNICATION AMONG LRV OPERATORS, CENTRAL CONTROL, & OTHERS

YARDS AND SHOPS

26 CARS STORAGE, INTEGRATED SERVICE INSPECTION & MAINTENANCE FACILITY

FARE COLLECTION

SELF-SERVICE, PROOF OF PAYMENT

ALIGNMENT

In downtown Portland, light rail will operate in reserved lanes on First Avenue, Morrison and Yamhill Streets, connecting with buses on the Mall at the Pioneer Courthouse. The line will cross the Willamette River in the middle lanes of the Steel Bridge and proceed along Holladay Street to Lloyd Center and bus transfers to other destinations. East of Lloyd Center, the tracks will descend into Sullivan Gulch, where they will be located between the Banfield Freeway and the Union Pacific tracks. Stations along the Banfield will provide access to local neighborhoods, as well as to buses on cross-town routes throughout the East Side. Beyond Gateway, the light rail line will operate along I-205 to East Burnside Street, and in the center of East Burnside Street to 197th Avenue. Burnside Street will be rebuilt with a traffic lane on either side of the light rail tracks. Autos will be able to cross at signals at 97th, 102nd, 108th, 113th, 117th, 122nd, 131st, 139th, 148th, 162nd, 172nd, 181st, 185th, 188th, Stark Street, 197th, and 199th. Curbs, sidewalks, street lights and landscaping will be added along this section of the line. Stations along Burnside will provide access to and from neighborhoods and local businesses and will be designed to blend into the community.

The final portion of the route, east of 199th Avenue, will utilize the existing Portland Traction Company right-of-way to a terminal station in Gresham at 8th and Cleveland.

LEGEND

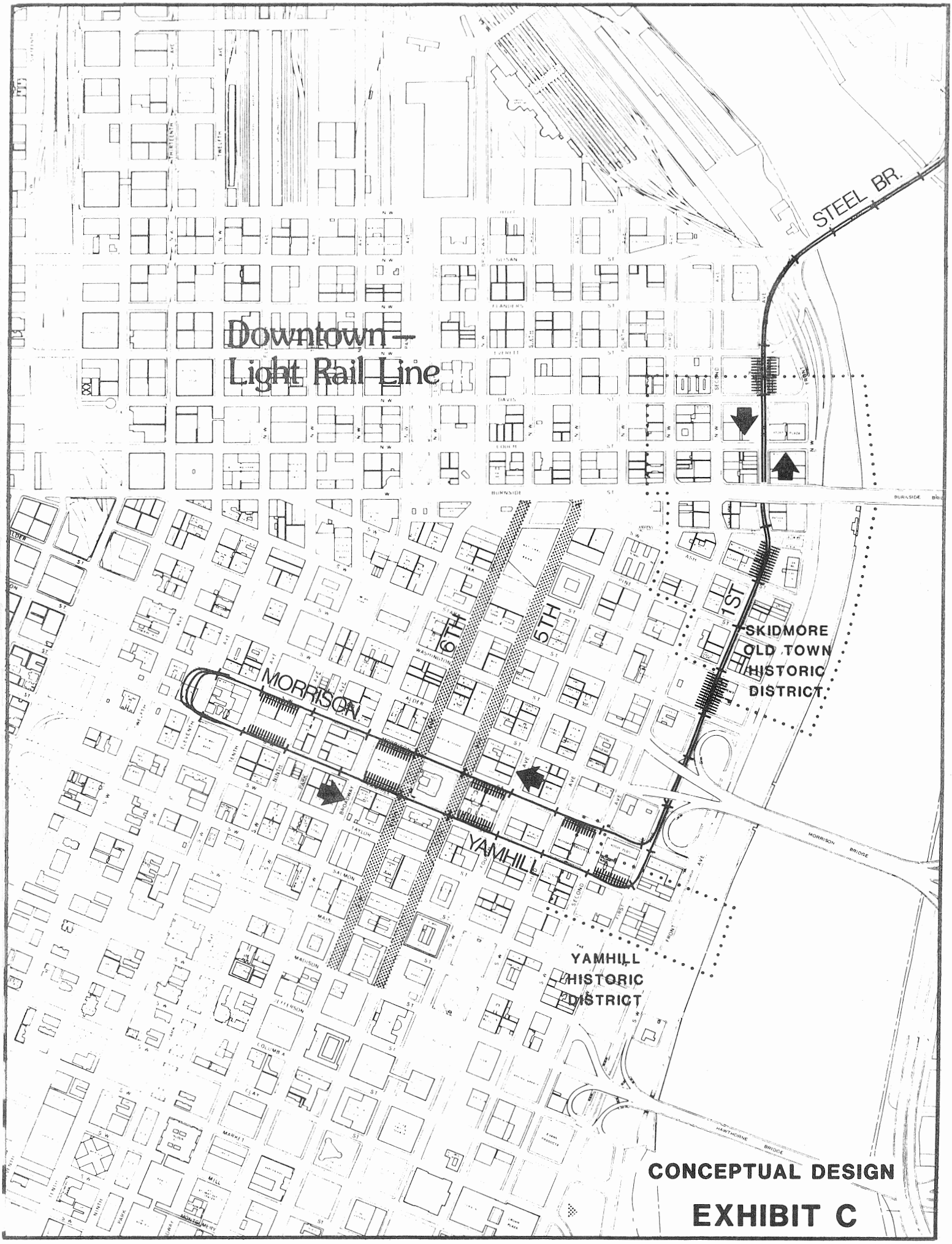
(P) = PARK & RIDE LOT
(T) = BUS TRANSFER
(M) = MAINTENANCE FACILITY & STORAGE YARD
(3) = LRT STATION
- - - = SINGLE TRACK
——— = DOUBLE TRACK

Banfield Light Rail Project

PROJECT DATA SHEET

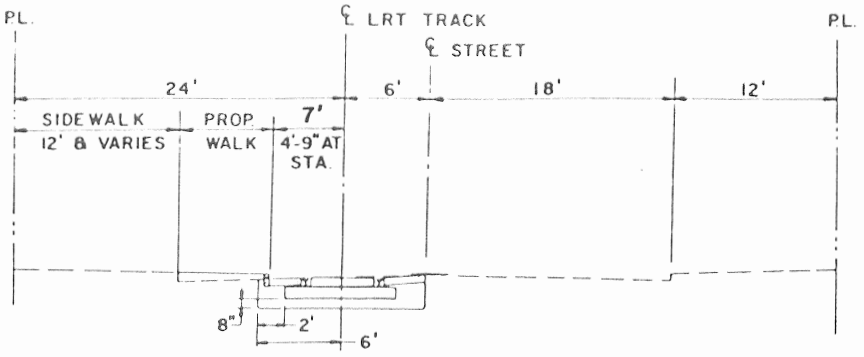
CONCEPTUAL DESIGN

EXHIBIT B

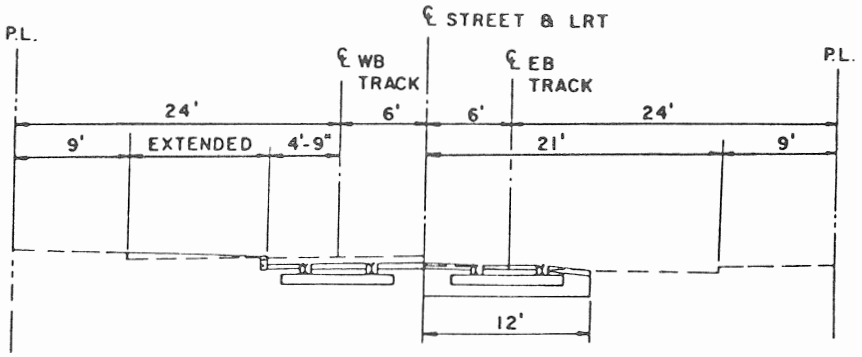


CONCEPTUAL DESIGN

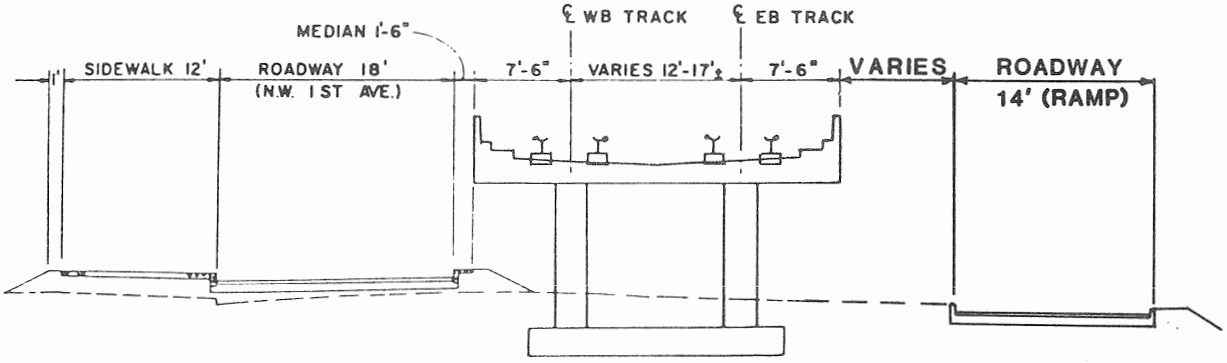
EXHIBIT C



S.W. YAMHILL ST. - EB
S.W. MORRISON - OPPOSITE - WB



S.W. FIRST AVE. TO MORRISON BRIDGE
UNDERPASS STA. 31+97 TO 37+08

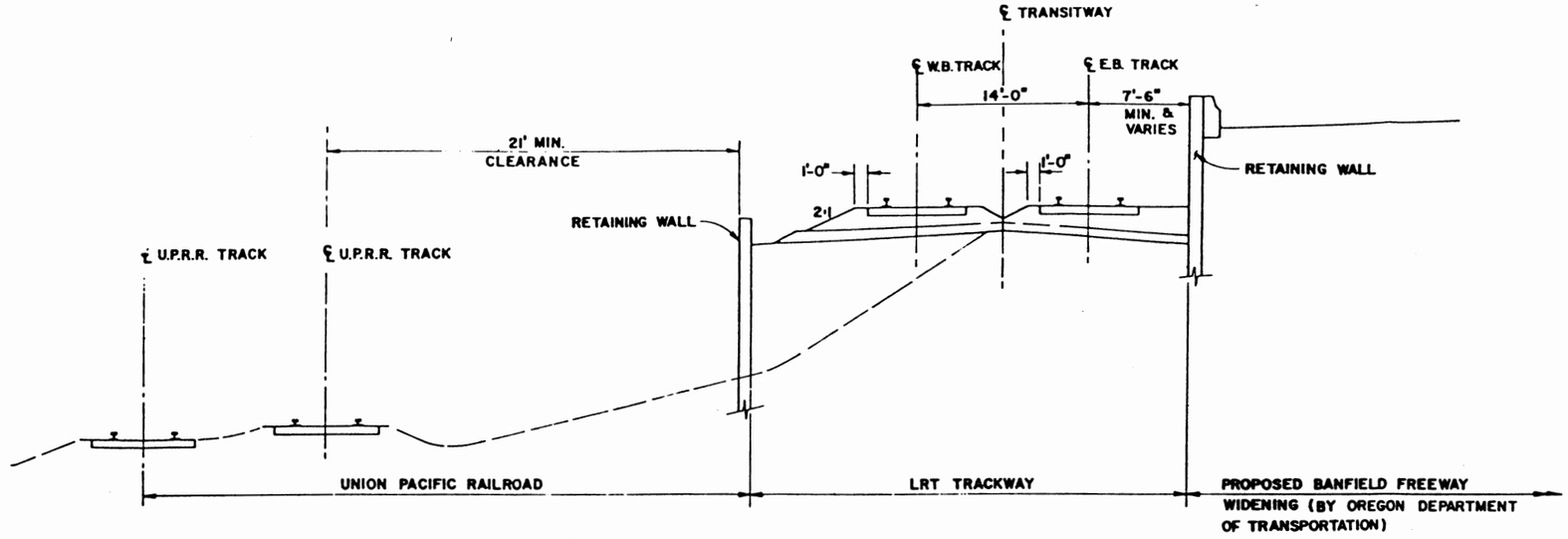


AERIAL STRUCTURE TRACK SECTION
WEST APPROACH - STA. 61+26 TO 64+85±

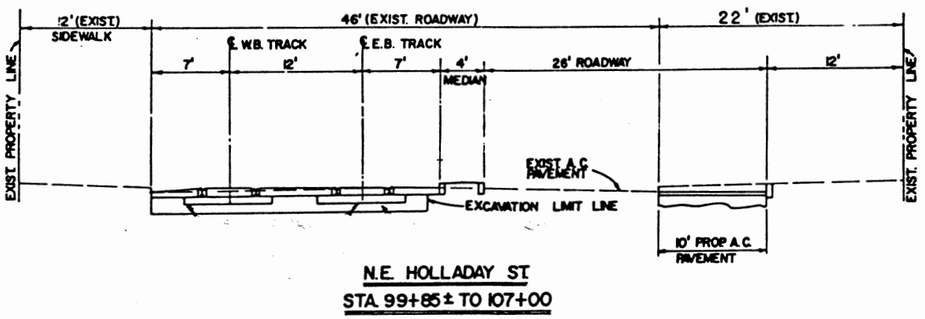
TYPICAL SECTIONS - DOWNTOWN & STEEL BRIDGE SEGMENTS

CONCEPTUAL DESIGN

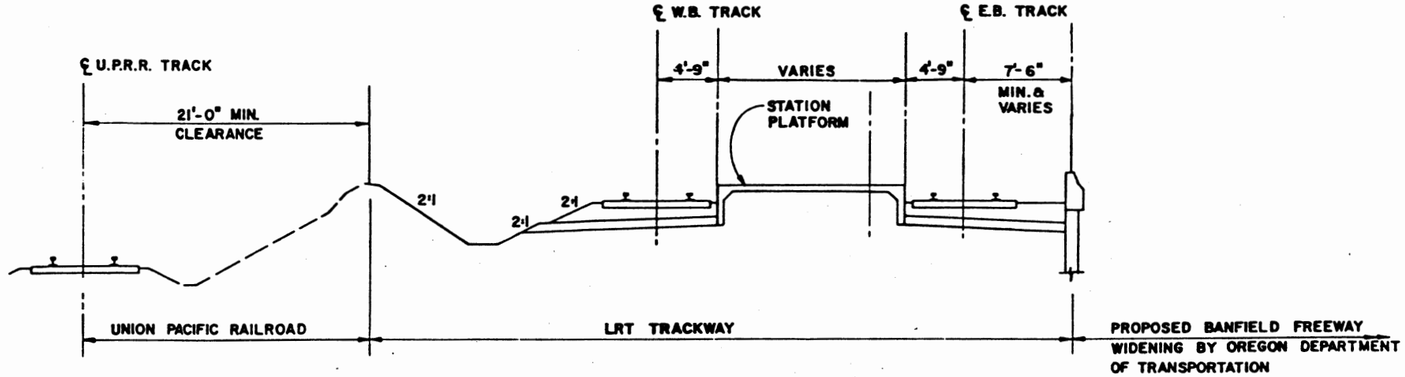
EXHIBIT D



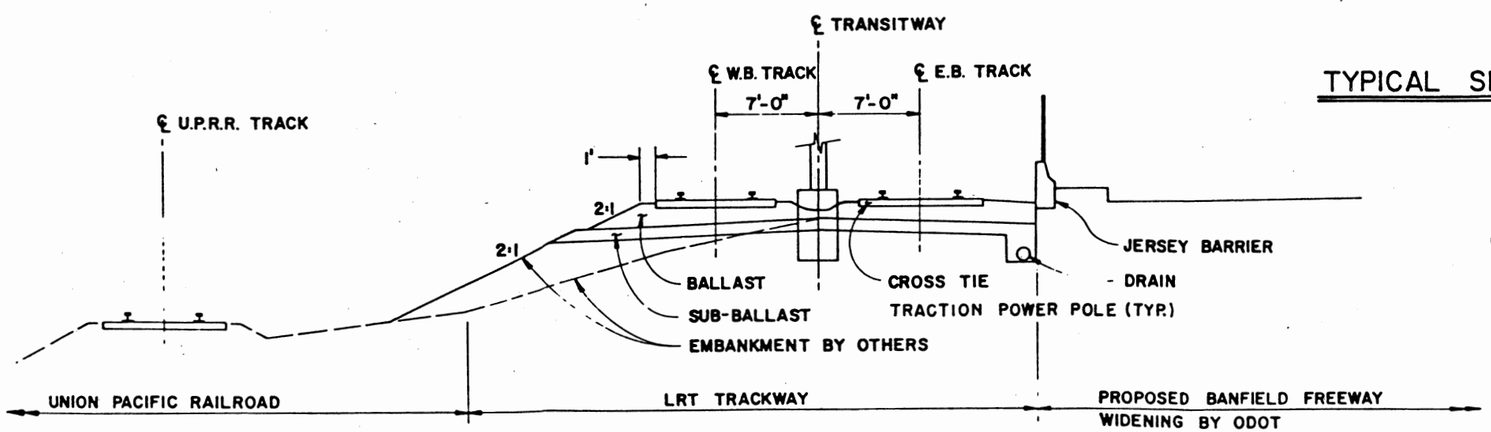
TYPICAL SECTION BANFIELD SEGMENT (WALLS)



N.E. HOLLADAY ST
STA. 99+85± TO 107+00



TYPICAL SECTION BANFIELD SEGMENT STATION

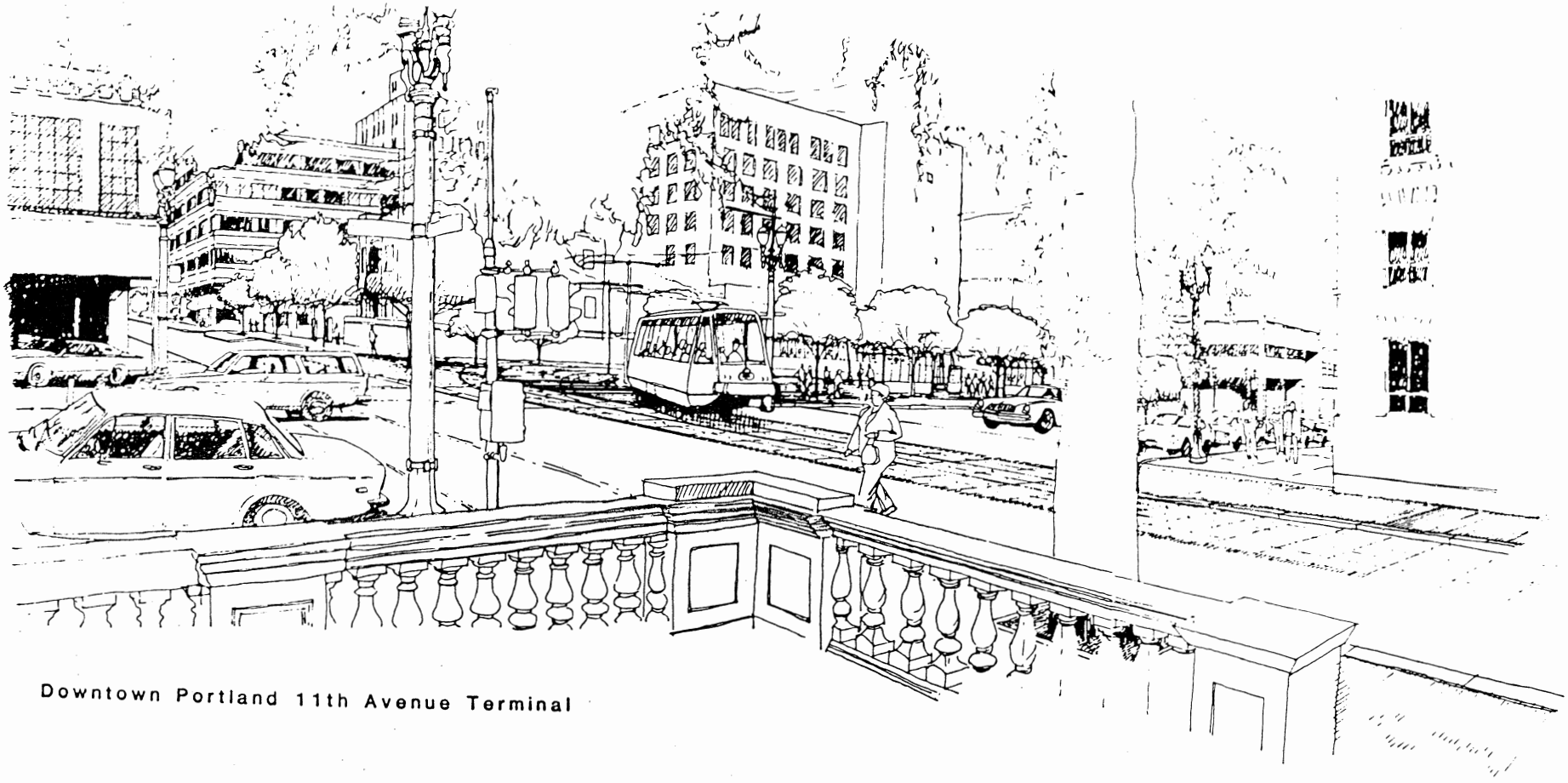


SECTION - EMBANKMENT AREAS

TYPICAL SECTIONS - HOLLADAY STREET & BANFIELD SEGMENTS

CONCEPTUAL DESIGN

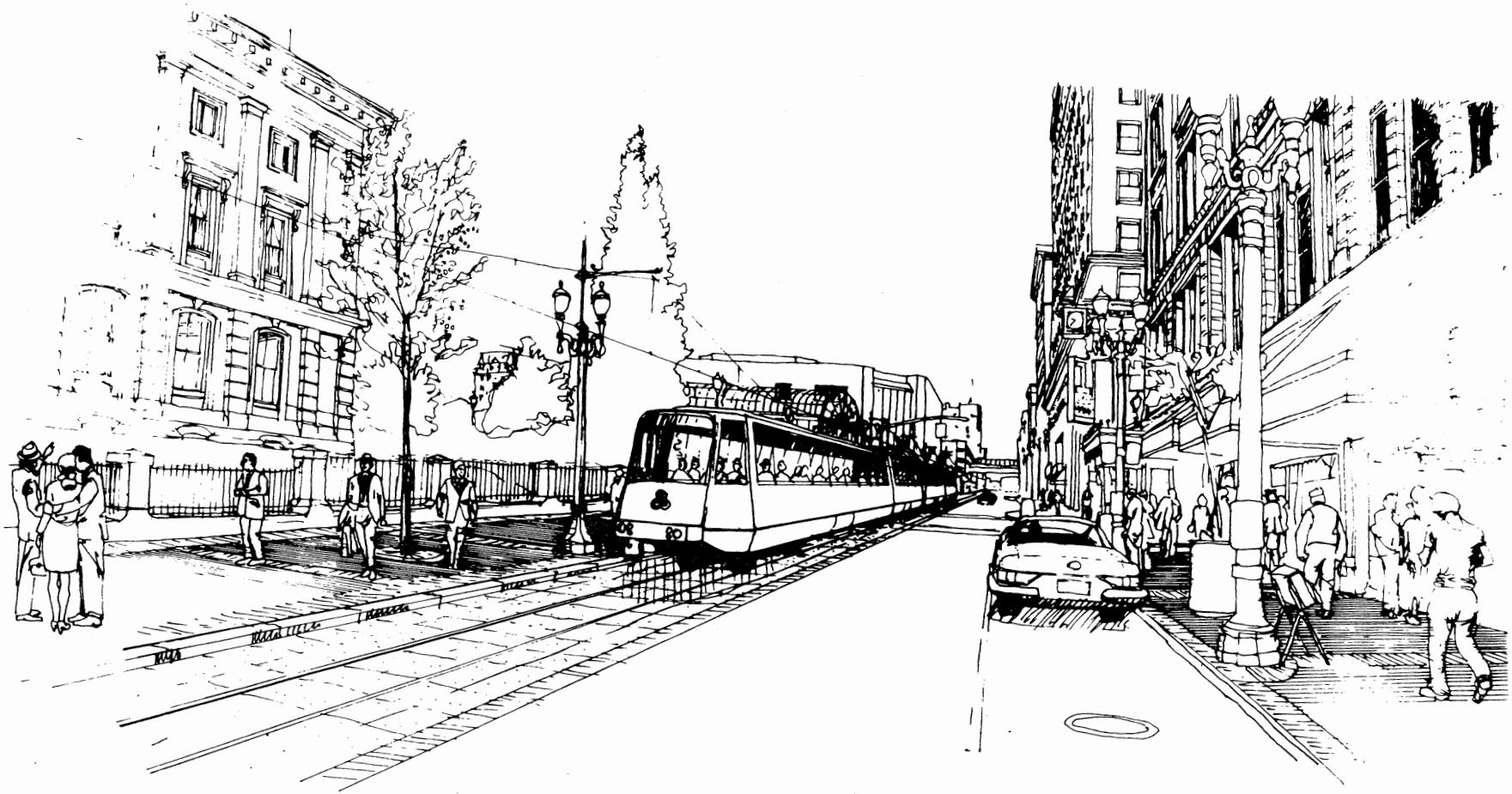
EXHIBIT E



Downtown Portland 11th Avenue Terminal

CONCEPTUAL DESIGN

EXHIBIT F



Westbound on Morrison past Pioneer Courthouse

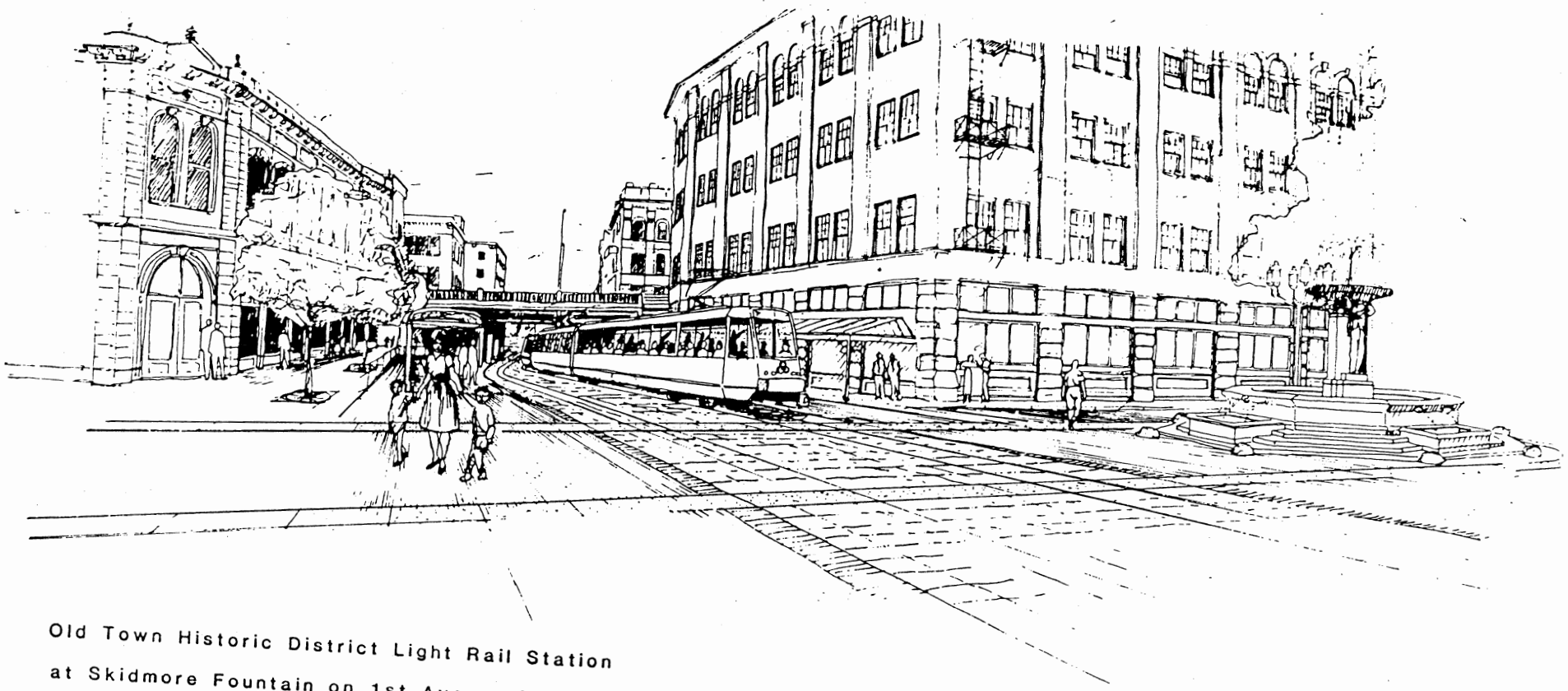
CONCEPTUAL DESIGN

EXHIBIT G

Light Rail stop at 1st Avenue and Yamhill Street in downtown Portland

CONCEPTUAL DESIGN

EXHIBIT H



Old Town Historic District Light Rail Station
at Skidmore Fountain on 1st Avenue in downtown Portland

CONCEPTUAL DESIGN

EXHIBIT I

S.W. Stark St.

S.W. Oak St.

S.W. First Ave.

Trash
Handicapped lift
Newspapers
Shelter
Bench
Trash
Ticket vending
Information
Bench
Shelter
Trash
Telephone

Inbound Train

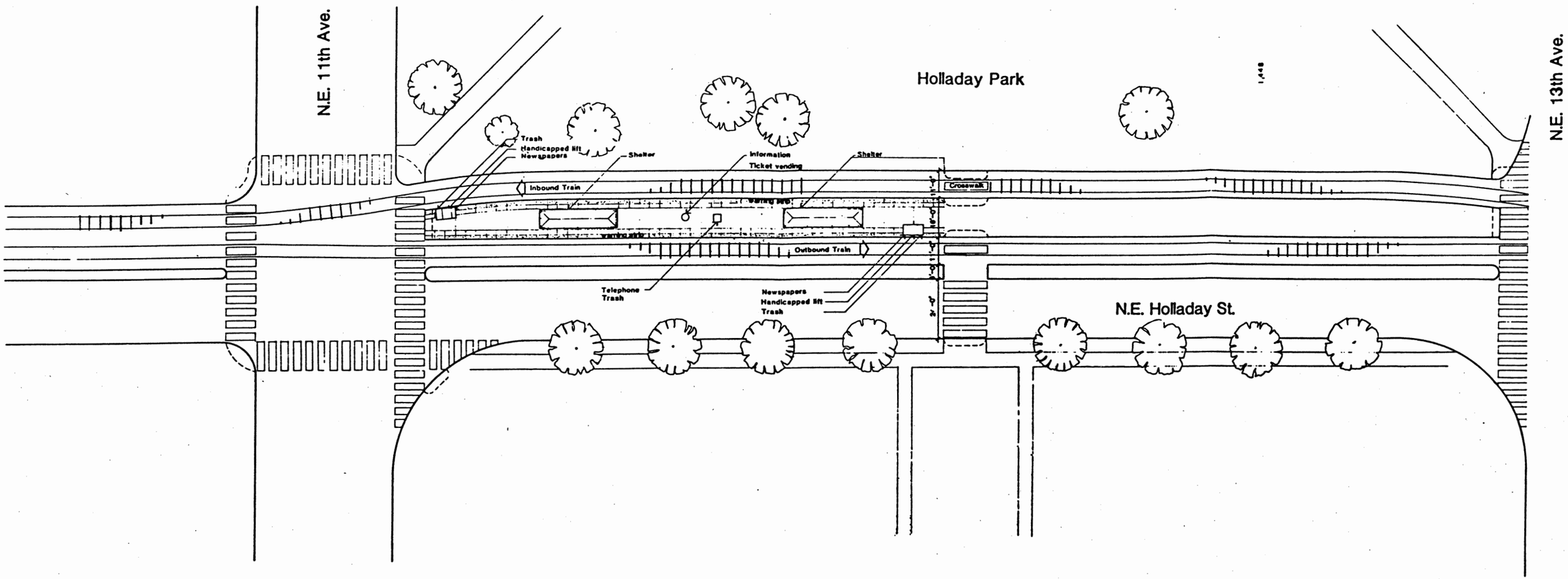
Outbound Train

Telephone
Trash
Shelter
Bench
Information
Ticket vending
Trash
Bench
Shelter
Newspapers
Handicapped lift
Trash

OAK STREET STATION PLAN

CONCEPTUAL DESIGN

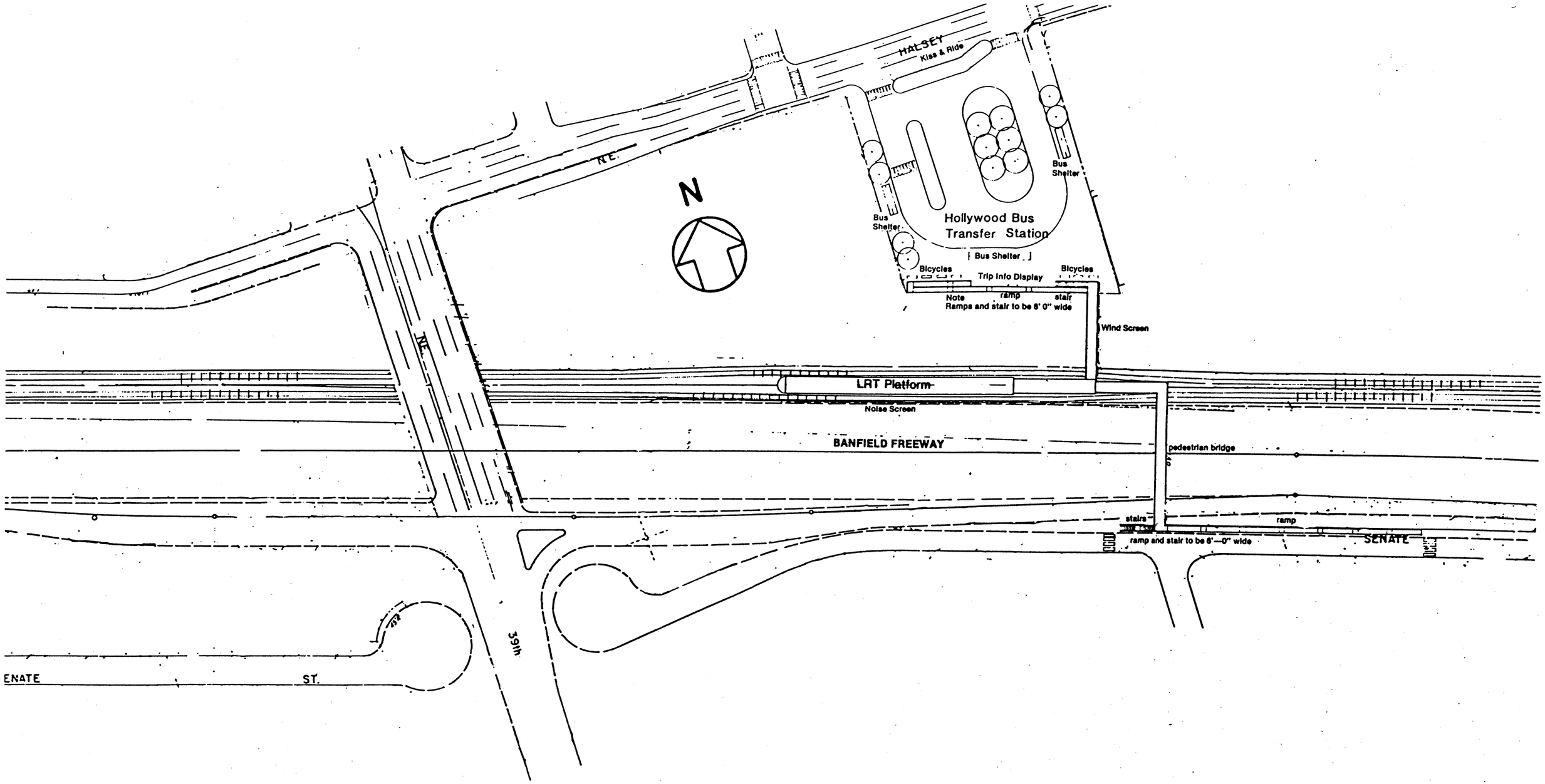
EXHIBIT J



LLOYD CENTER STATION PLAN

CONCEPTUAL DESIGN

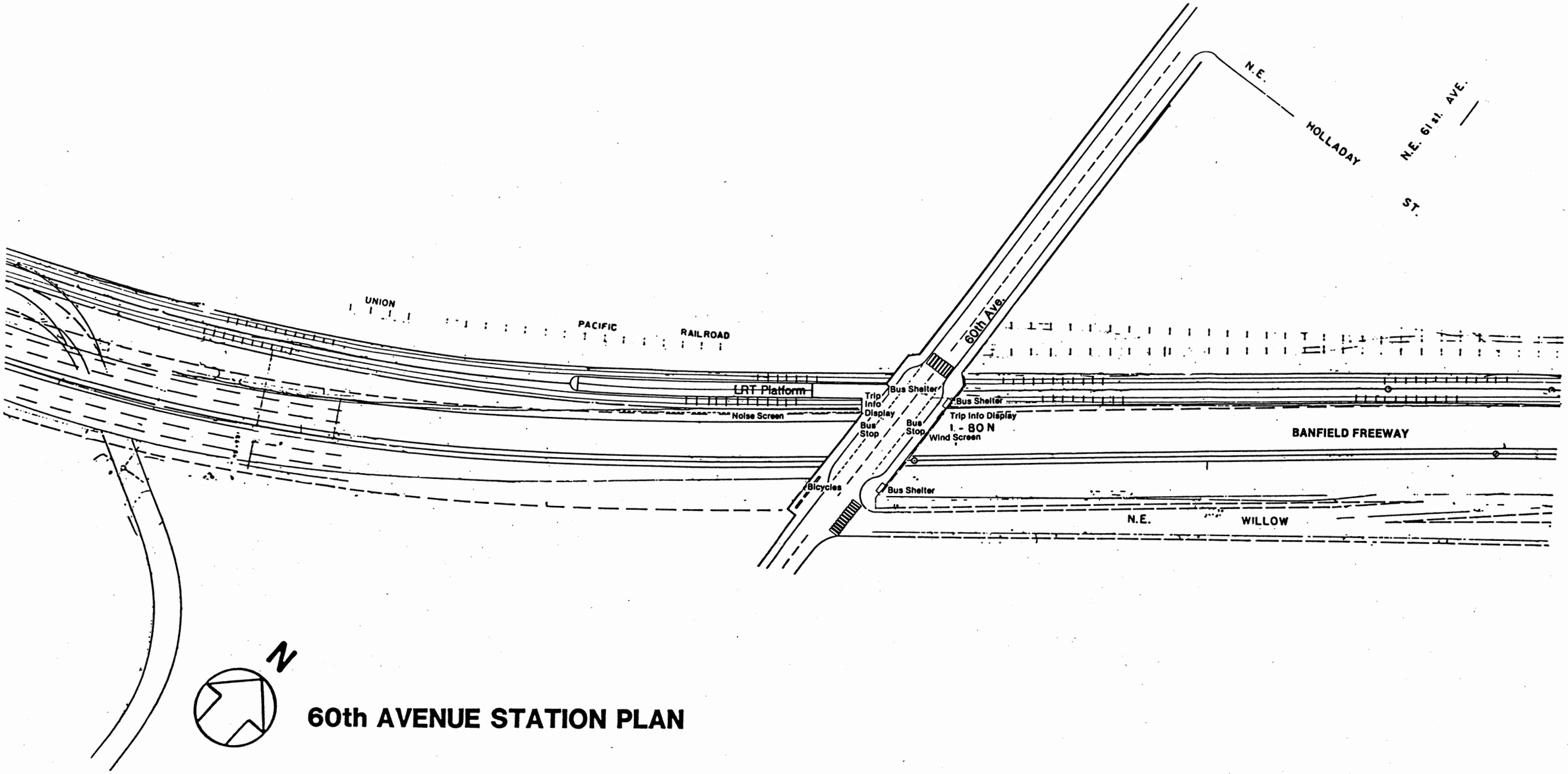
EXHIBIT K



HOLLYWOOD STATION PLAN

CONCEPTUAL DESIGN

EXHIBIT L



60th AVENUE STATION PLAN

CONCEPTUAL DESIGN

EXHIBIT M

Kiss & Ride

UNION PACIFIC RAILROAD

Bicycle Rack

Windscreen

Bus Shelter

Trip Info. Display

LRT Platform

Noise Screen

BANFIELD FREEWAY

I 80N

Bus Stop

Windscreen

Bus Shelter

Bus Stop

Landscape Barrier

Bus Shelter

ST.

82ND.

Kiss & Ride

WASCO

N.E.

N.E. 80TH.

N.E.

ST.

KAMAS

81ST.

N

CONCEPTUAL DESIGN

82nd AVENUE STATION PLAN

EXHIBIT N