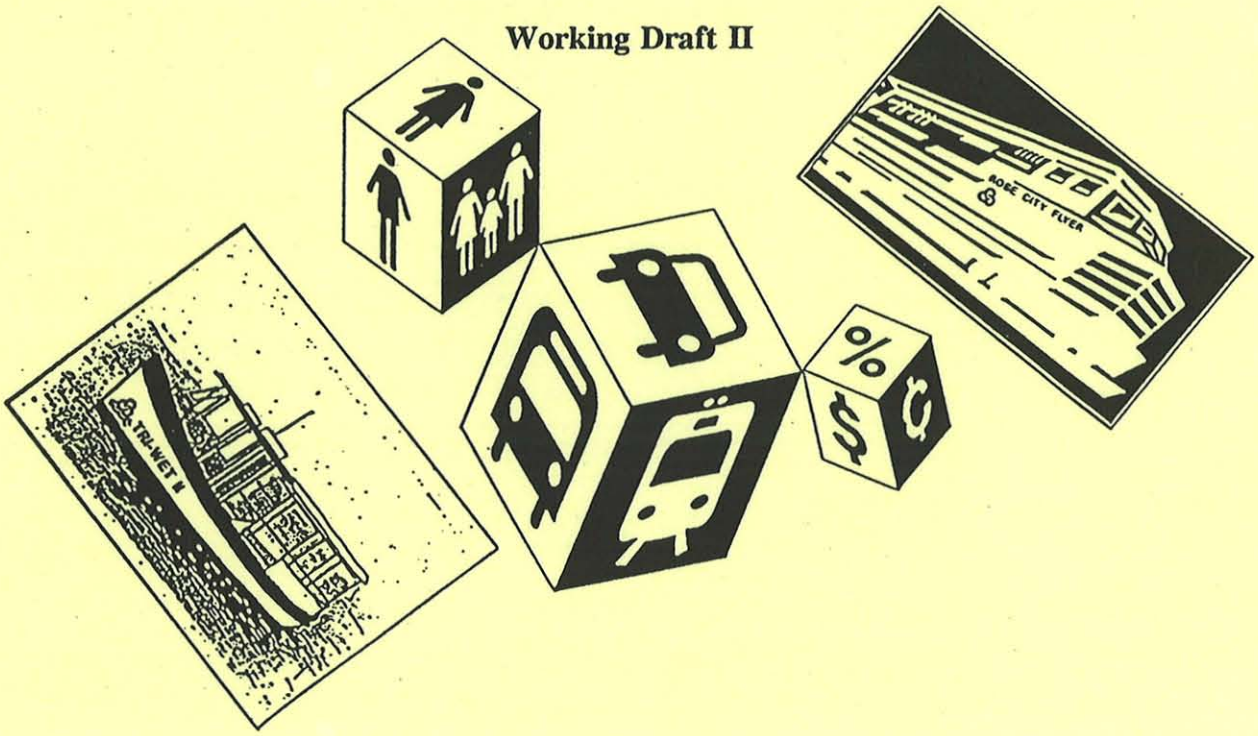
SOUTH/NORTH TRANSIT CORRIDOR STUDY
PRE-ALTERNATIVES ANALYSIS

PHASE II - DEFINITION OF ALTERNATIVE MODES & ALIGNMENTS

Working Draft II



Prepared by Tri-Met, Long Range Planning
For Metro
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I. Alternative Modes

At this conceptual planning stage, a generic definition of transit vehicle technologies is needed from which various alternatives for proving high capacity transit along the Milwaukie and I-5 corridors will be defined. Mode is defined as the means by which travel is accomplished. Alternative modes of travel include walking, auto, bus, rail, etc. Given below is a brief overview on the options examined for this task.

☞ **No Build**, low investments: Evaluates the impacts with not building anything (includes systematic increases in overall service levels from today). Analysis of this alternative helps decision makers determine if there are positive benefits to be derived from HCT development when weighed against its costs. These costs include future traffic congestion, economic development, and the ability of the region to continue to meet its basic transportation needs.

☞ **Transportation System Management (TSM)**, low to moderate investments: Represents actions that improve the operation and coordination of transportation services and facilities to effect the most efficient use of the existing transportation systems. TSM projects are designed to reduce congestion on roadways and freeways via the enhanced utilization of existing capacity.

This option is service-oriented and does not include a fixed guideway. Actions may include:

- bus routes that may be re-configured to coordinated, multi-destinational network serving radial and circumferential trips (Tri-Met status: in place);
- transit centers established to concentrate passengers from "feeders" to "trunk" routes, and to facilitate transfers; may be simple on-street or more elaborate off-street "stations" (Tri-Met status: some of both types in place, more off-street centers planned);
- park-and-ride lots (PAR) in suburbs, to increase transit service area beyond walking distance to a bus stop (Tri-Met status: many in place, more planned); and
- signal bypass lanes and other traffic engineering measures to facilitate bus movements.

☞ **Busway**, moderate to high investments: Busways are roadways or lanes developed in a separate right-of-way and designated for the exclusive use of buses. Separation from traffic congestion and accidents makes possible a high level of transit performance in terms of travel times, reliability, and transit capacity. Components include:

- two lanes (one in each direction), widening to four lanes at stations (of which some may be built as transit centers and/or PAR lots);
- connections required to other streets and highways by exclusive ramps;
- may be used by special busway-only lines as well as regular bus routes; and
- vehicles that cannot be coupled require emphasis on service frequency rather than driver productivity.

☞ **Light Rail Transit (LRT)**, moderate to high investments: LRT is a mode of mass transportation comprised of light rail vehicles which travel on steel tracks and are powered by electricity from overhead wires. Using street level platforms at stations, LRT may run at-grade, above-grade, or in a subway. In a mostly at-grade configuration, LRT offers passenger capacities in the 12,000 to 15,000 passengers per peak hour (ppph); in mostly grade-separated configurations (aerial, depressed cut or subway), LRT can achieve passenger capacities up to 18,000 ppph. Unique features are:

- ability to operate through at-grade crossings and intersections;
- the optional use of street running (with or without separation from general traffic);
- provide manual operation; and
- produce average running speed of 35 mph for a maximum speed of 55 mph.

☞ **Heavy Rail Transit (HR)**, high investments: A type of electric-powered transit system designed to carry large numbers of passengers within fully exclusive right-of-way (ROW). The use of a third rail also warrants high-level platforms at all stations. With its high speed, longer trains, and short headways, HR can achieve passenger capacities up to 100,000 ppph. In contrast to LRT, HR systems have the following features:

- higher capital investment due to full grade-separation;
- a third rail for electric power pick-up because of tunnels;
- average running speed of 50 mph for a maximum speed of 70 mph; and
- potentially greater land use impacts due to the higher ridership attraction.

☞ **Intermediate Capacity Automated Fixed Guideway (AGT)**, moderate to high investments: AGT is a relatively new transit technology. It is meant to deliver medium capacity, high quality service at cost lower than heavy rail. This technology class can offer passenger capacities in the 12,000 to 50,000 ppph range. Unique features are:

- utilize smaller, lighter vehicles, designed to run on very short headways;
- allow for capital cost savings with somewhat smaller guideway structures and stations; and
- lower operating costs by eliminating operators and automating train control and operations.

☞ **Commuter Rail**, moderate investment: Usually runs on existing trackage which may have to be upgraded for passenger train speeds. Traction power is either electric or diesel. The service is characterized by:

- longer trip lengths and station spacing than urban rail transit; this results in somewhat higher average operating speeds;
- double-decker cars;
- operating speeds from 20 to 50 mph with top speeds at 79 mph; and
- seating capacity ranges from 128 seats in single-level cars to as many as 175 in double-deck cars.

☞ **River Transit**, moderate to high investments: Characterized by diesel-powered boats (probably low-wash catamarans) which operate on existing navigable waterways with passenger landings established as stations (of which some may be built as transit centers and/or PAR). Vessels requiring a two-person crew are unlikely to promote either driver productivity or service frequency. Unique features are:

- defined routes which connect a series of landings to serve trips to work and other destinations; and
- ability to minimize damage to adjacent shores from "wake", while achieving speeds of 20 to 30 knots (25 to 35 mph).

II. Alternatives Considered

Six general transportation alternatives will be identified in the Phase II process: No Build, TSM, Busway, LRT, River Transit, and Commuter Rail. These alternatives include several options including various alignment options through the Milwaukie and I-5 corridors. These alignment options are described below and summarized in the following tables. In addition, the TSM and LRT alternatives will include a number of highway improvements that are common to both alternatives.

1. ☞ No Build Alternative

The No Build alternative would include current transit service levels plus customary service increases that would be funded with existing revenue sources through 2010. This study utilizes the Westside Corridor Project Year 2005 No Build alternative, with the Westside 1997 LRT network included as the base network.

The basic components of the No Build alternative includes committed (i.e., funded) highway and transit projects (comprised of systematic bus service increases at 3-5% per year as well as minor peak hour service improvements to the trunk routes) as programmed by Oregon Department of Transportation, Tri-Met, C-Tran, Washington Department of Transportation, and local governments.

Transit Operations

Approximately 110 local and express Tri-Met and C-Tran routes would serve the parts of Portland and Vancouver, WA region as shaded in Figure 1. As currently provided, most of the bus service would remain local in nature. However, the mixed-flow operation on current streets and arterials over time would further deteriorate, likely affecting schedule reliability and coach requirements.

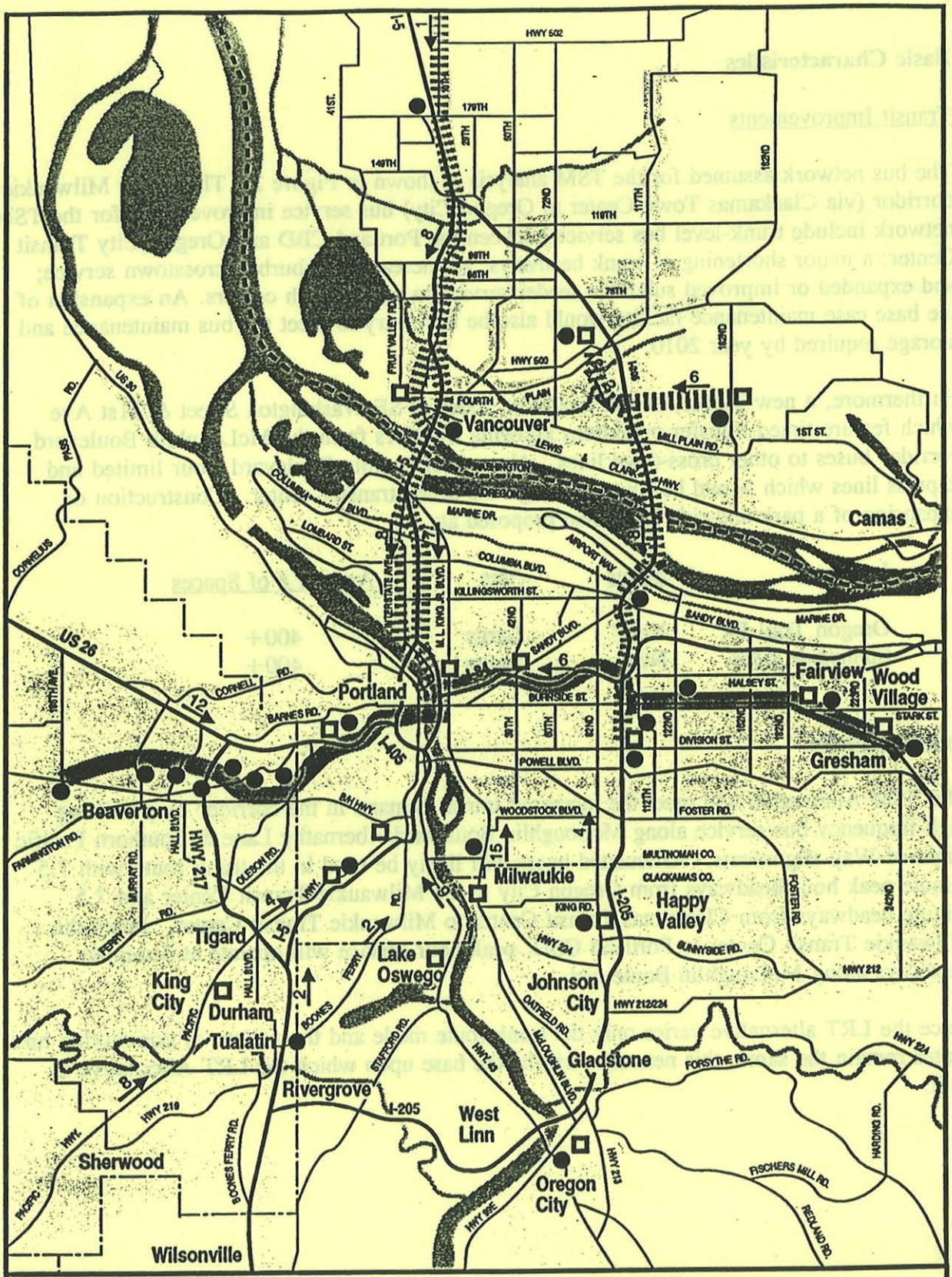
While the Portland Transit Mall would be extended north to N.W. Irving Street, there would be no major expansion in the transit fleet program and associated maintenance facilities under this alternative.

2. ☞ TSM Alternatives with Highway Improvements

The TSM alternatives would include major expansions of bus service, with an emphasis on trunk lines served by feeder lines for more efficient service and on new routes providing increased transit coverage through the Milwaukie and I-5 corridors. Some associated street and highway improvements would be included to allow for improved operations along Milwaukie Blvd, Highway 224, S.E. Harmony Rd, Interstate Ave, and I-5.

a. Milwaukie Corridor TSM Alternative

The TSM Alternative is one of six primary alternatives considered for the Milwaukie corridor, and represents an attempt to meet the transit needs of this corridor without constructing a new guideway facility (i.e. LRT trackway). Bus service is substantially increased, park-and-ride lots are added, and comparatively small physical improvements are made to the local street system and freeway interchanges to achieve improved bus operation at key locations.



= local bus service area
= limited/express bus alignments
= LRT line
2 → = limited/express bus volumes (# buses/a.m. peak hour)
= transit center
= park and ride lot

No Build Alternative

Figure 1

92522 SG

Basic Characteristics

Transit Improvements

The bus network assumed for the TSM analysis is shown in Figure 2. The major Milwaukie corridor (via Clackamas Town Center to Oregon City) bus service improvements for the TSM network include trunk-level bus service between the Portland CBD and Oregon City Transit Center; a major shortening of trunk headways; an increase in suburban crosstown service; and expanded or improved suburban feeder service to new growth centers. An expansion of the base case maintenance facility would also be necessary to meet the bus maintenance and storage required by year 2010.

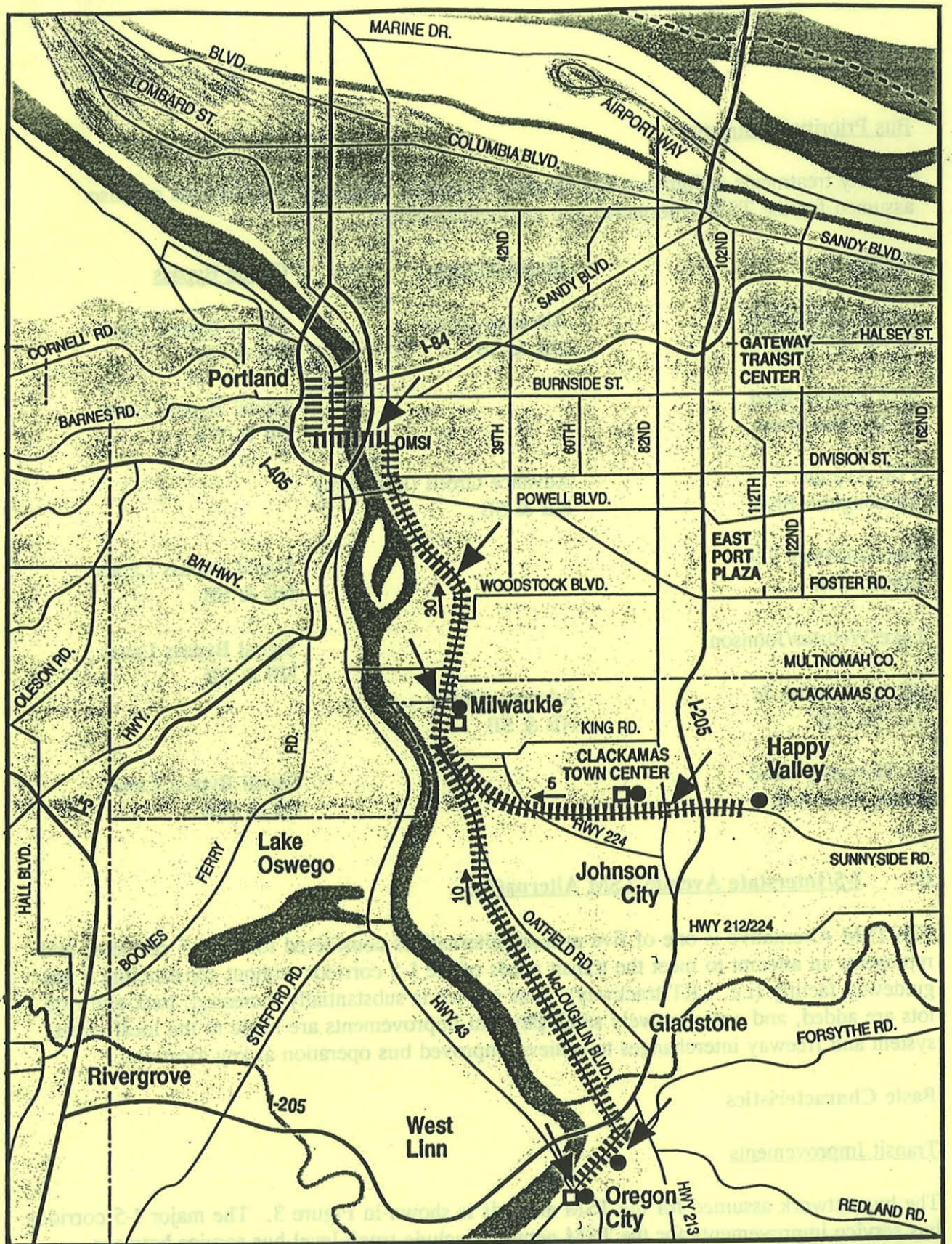
Furthermore, a new Transit Center would be added at SE Washington Street & 21st Ave which feature timed-transfer operations allowing transfers from the McLoughlin Boulevard corridor buses to other cross-town lines. Along McLoughlin Boulevard, four limited and express lines which would be routed through the timed-transfer center. Construction or expansion of a park-and-ride lot is also proposed at:

Location	Status	Size	Approx # of Spaces
Oregon Trail Pk	New	Large	400+
Sunnyside P&R	New	Large	400+

Bus Operations

The TSM Alternative will meet the increased transit demand in the corridor by providing high-frequency bus service along McLoughlin Boulevard/Abernathy Lane & Southern Pacific Right-of-Way alignments. Articulated buses will likely be used in the trunk route with 7.5 minute peak hour headways from Oregon City to the Milwaukie Transit Center and 7.5 minute headways from Clackamas Transit Center to Milwaukie Transit Center. From the Milwaukie Transit Center to Portland CBD, peak hour service will operate at 3 minute headways along McLoughlin Boulevard.

Since the LRT alternative varies only the trunk route mode and the pattern of commuting bus routes remain the same, this network will be the base upon which the LRT Alternative is built.



Milwaukie Corridor TSM Alternative

Figure 2

Bus Priority Treatments

Priority treatments to improve bus operations through congested intersections are also assumed for the TSM Alternative and are detailed below.

Location	Signal Timing	Queue Bypass
McLoughlin Blvd @ Powell Blvd	Advance Green NB & SB	Signal Bypass Lane NB & SB
McLoughlin Blvd @ Tacoma Street		Signal Bypass Lane EB & WB
17th Ave @ McLoughlin Blvd	Advance Green (left Turn) NB & SB	
Harrison/Hwy 224 Intersection		Signal Bypass Lanes NB & SB
Lake/Webster/Johnson		Signal Bypass Lanes NB & SB
SE Washington St @ 21st Ave	Advance Green NB & SB	
SE Harmony Road @ SE 82nd Ave		Signal Bypass Lane EB & WB

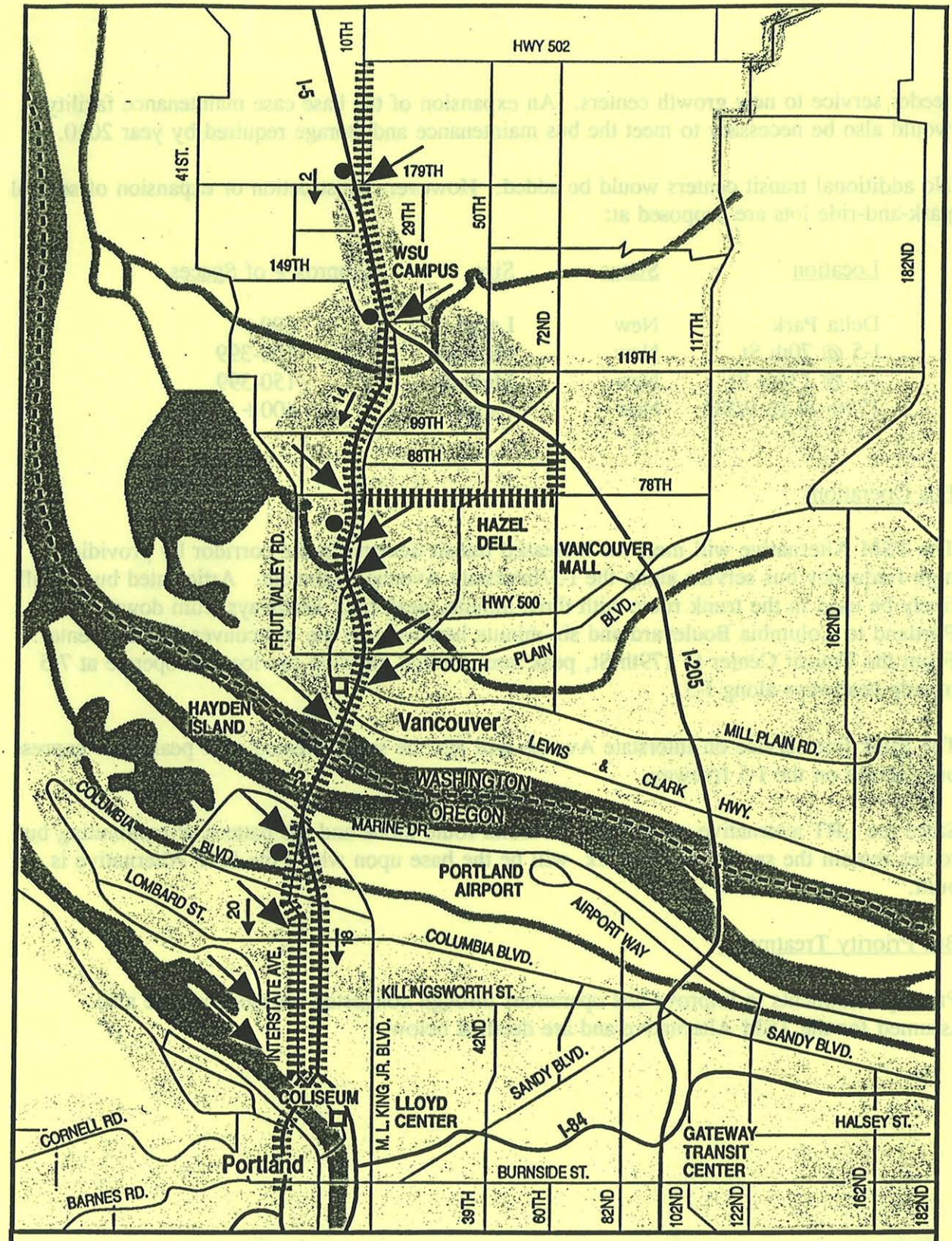
b. I-5/Interstate Avenue TSM Alternative

The TSM Alternative is one of five primary alternatives considered for the I-5 corridor, and represents an attempt to meet the transit needs of the I-5 corridor without constructing a new guideway facility (i.e. LRT trackway). Bus service is substantially increased, park-and-ride lots are added, and comparatively small physical improvements are made to the local street system and freeway interchanges to achieve improved bus operation at key locations.

Basic Characteristics

Transit Improvements

The bus network assumed for the TSM analysis is shown in Figure 3. The major I-5 corridor bus service improvements for the TSM network include trunk-level bus service between downtown Portland and NE 179th in Clark County, Washington; a major shortening of trunk headways; an increase in suburban crosstown service; and expanded or improved suburban



= local bus service area
= limited/express bus alignments
2 = limited/express bus volumes (# buses/a.m. peak hour)
= transit center
= park and ride lot
= street/highway improvements

I-5/Interstate Ave. TSM Alternative

Figure 3

92522 SG

feeder service to new growth centers. An expansion of the base case maintenance facility would also be necessary to meet the bus maintenance and storage required by year 2010.

No additional transit centers would be added. However, construction or expansion of several park-and-ride lots are proposed at:

Location	Status	Size	Approx # of Spaces
Delta Park	New	Large	400+
I-5 @ 70th St	New	Medium	150-399
I-5 @ 134th St	New	Medium	150-399
179th St @ WSU	New	Large	400+

Bus Operations

The TSM Alternative will meet the increased transit demand in the corridor by providing high-frequency bus service along the I-5/Interstate Avenue alignment. Articulated buses will likely be used in the trunk route with three-minute, peak hour headways from downtown Portland to Columbia Boulevard and six-minute headways to the Vancouver Transit Center. From the Transit Center to 179th St, peak hour limited bus stop service will operate at 7.5 minute headways along I-5.

The trunk line service on Interstate Avenue will also be supplemented with peak-hour express bus service on the I-5 freeway.

Since the LRT alternative varies only the trunk route mode and the pattern of commuting bus routes remain the same, this network will be the base upon which the LRT Alternative is built.

Bus Priority Treatments

Priority treatments to improve bus operations through congested intersections are also assumed for the TSM Alternative and are detailed below.

Location	Signal Timing	Queue Bypass
Northbound & Southbound Freeway on-ramps @ 179th Street @ 134th Street @ 78th Street @ Hazel Dell Road @ 39th Street/SR 500 @ Fourth Plain Road @ Mill Plain Boulevard @ Washington Street @ Union Avenue	Ramp Meters and HOV Bypass Lanes	
W Fourth Plain Blvd @ Main Street	Advance Green NB & SB	Signal Bypass Lane NB & SB
Hwy 99 @ 78th Street Hwy 99 @ 99th Street	Advance Green NB & SB	Signal Bypass Lane NB & SB
Fourth Plain Blvd @ Andresen Road	Advance Green NB & SB	Signal Bypass Lane NB & SB
Interstate Ave @ Going Street @ Beech Ave @ Lombard Street	Advance Green NB & SB	Signal Bypass Lane NB & SB

3. ☞ Busway Alternatives (to be refined in conjunction with the Busway Task Force)

The construction and viability of a busway operation along the Milwaukie and I-5 corridors will also be analyzed. These alternatives represent at attempt to meet the transit needs of the corridors by constructing a new grade-separated exclusive busway facility primarily along the median of Milwaukie Boulevard and I-5 freeway. These alternatives will improve the point-to-point travel times by including access ramps at key locations to improve overall bus operations. Bus service will substantially increase and new PAR lots will also be added.

a. Milwaukie Corridor Busway Alternative

Transit Improvements

The bus network assumed for the busway analysis (which draws upon the Milwaukie TSM alternative) is shown in Figure 4 (as yet to be defined). The major Milwaukie Corridor bus service improvements (for the network include trunk-level limited and express bus service between Downtown Portland to Clackamas Town Center and Oregon City via City of Milwaukie); a major shortening of trunk headways; an increase in suburban crosstown service; and expanded or improved suburban feeder service to new growth centers. An expansion of the base case maintenance facility will also be necessary to meet bus maintenance and storage required by year 2010.

In addition to the new Transit Center at SE Washington Street & 21st Avenue, which feature timed-transfer operation allowing transfers from McLoughlin Boulevard corridor buses to other cross-town lines, construction or expansion of several PAR lots are also proposed at:

Location	Status	Size	Approx # of Spaces
Park Place	New	Medium	150-399
Naef Road	New	Medium	150-399

Busway Operations (to be further refined)

The Milwaukie Corridor Busway Alternative will meet the increase transit demand in the corridor by providing high-frequency bus service along McLoughlin Blvd/Abernathy Road & SP ROW alignments. Table 1 (to be refined) gives the approximate location of the busway stations along this network. This alternative is comprised of ___ miles of barrier-separated, grade-separated median or segregated facility for two-way transit operation.

b. I-5/Interstate Avenue Busway Alternative

(Incorporates BRW work north of Columbia River; Interstate Avenue alignment needs to be further defined)

4. ☞ LRT Alternative with Highway Improvements

A number of alignment options crossing the Portland CBD, various east bank and west bank alignment combinations through Clackamas County, and alignment combinations through Vancouver and Clack County, WA will be identified and analyzed as part of the Phase II analysis. Tables 2 and 3 summarize these options.

Table 1

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TABLE 2
SOUTH CORRIDOR
PRE-AA ENGINEERING MAP INDEX

Map	Line	Map Title	Options
15	Portland	Downtown Portland	* Mall to Hawthorne Bridge * Mall to Moody St.
21	West Bank	North Macadam Riverplace to Johns Landing	* Old SP ROW
22	West Bank	Johns Landing to Sellwood Bridge	* Macadam Median * Old SP ROW with Johns Landing Detour
23	Milwaukie	Sellwood to North Milwaukie	* 17th Ave * Johnson Creek * McLoughlin East
25	Milwaukie	Downtown Milwaukie	* East of SP * West of SP
26	East Bank	Hawthorne Bridge/OMSI	* PTC * ?
27	East Bank	Oaks Bottom PTC McLoughlin to Sellwood Bridge	* Oaks Bottom PTC
28	East Bank	Brooklyn/McLoughlin Holgate Blvd to Bybee Blvd	* McLoughlin East
29	East Bank	Eastmoreland/McLoughlin Bybee Blvd to Hwy 224	* McLoughlin East
31	CTC	Milwaukie Washington St. to Linwood Ave	* Railroad Ave * Hwy 224 * Lake Road
32	CTC	Harmony Hwy 224 to 82nd Ave	* Harmony North * Harmony South
33	CTC	Clackamas Town Center to Kaiser	* CTC/Kaiser North * CTC/Kaiser South
34	I-205 South	Clackamas County 1 Clackamas Town Center to SE Roots Road	* I-205 * SP
35	I-205 South	Clackamas County 2 Clackamas Road to Abernethy Road	* I-205 * SP
41	Oregon City	Oak Grove Kellogg Lake to Oak Grove	* Oak Grove McLoughlin * Oak Grove PTC
43	Oregon City	Jennings Lodge Oak Grove to Jennings Ave	* Oak Grove McLoughlin * Oak Grove PTC
44	Oregon City	Gladstone Jennings to Clackamas River	* Central Gladstone * West Gladstone
45	Oregon City	Oregon City	* SP Option * Canemah Extension

May 6, 1993

TABLE 3
NORTH CORRIDOR
PRE-AA ENGINEERING MAP INDEX

Map	Line	Description	Options
45	Portland	Portland CBD	Mall to Steel Bridge
46	I-5 North	Arena/Fremont Bridge/Emanuel Hospital Steel Bridge to Failing St	* Westside of I-5 * Eastside of I-5 * Stanton yard * City of Portland lot * N. Flint to N. Knott
47	I-5 North/Interstate Ave	Piedmont/Kaiser Hospital Fremont St to Holman St	* N. Interstate Ave * I-5
48	I-5 North/Interstate Ave	Kenton Ainsworth St to Columbia Blvd	* N. Interstate Ave * I-5
49	I-5 North	Delta Park/Expo Center/Jantzen Beach Mall Columbia Blvd to So. Columbia Bridge Crossing	* Pacific Hwy West * I-5
50	I-5 North	Interstate Crossing Columbia River Bridge	* Columbia River Crossing
51	Vancouver	Vancouver CBD No. side of bridge to N. 29th St	* Washington St * Main & Broadway Couplet * I-5 * Ft Vancouver * McLoughlin Blvd
52	Vancouver	North Vancouver N. 27th St to N. 58th St	* Main St * I-5 * Hwy 99
53	I-5 North/Hwy 99	Hazel Dell N. 54th St to N. 94th St	* I-5 * Hwy 99
54	I-5 North/Hwy 99	Salmon Creek N. 88th St to N. 119th St	* I-5 * Hwy 99
55	I-5 North	Clark County N. 114th St to N. 149th St	* I-5 * NE 10th Ave
56	I-5 North	Clark County Fairgrounds N. 149th to N. 179th	* NE 10th Ave
57	E. Vancouver	Ft. Vancouver/Clark College Evergreen Blvd to SR-500	* Ft. Vancouver * W. McLoughlin Blvd * St. Johns Blvd * SR-500 * E 33rd St
58	SR-500	E. Vancouver St. Johns Blvd to NE Andresen	* SR-500 * E. 33rd St
59	SR-500	Vancouver Mall NE Andresen to I-205	* 72nd Ave * SR-500

May 4, 1993

a. Portland CBD Options (refine with CBD PRE-AA work)

As seen by map section 15 of Figure 5, various LRT alignments are identified for the southern portion of the Portland CBD connecting the east and west banks of the Willamette with the Portland Transit Mall.

From south to north, one alignment follows the PTC ROW along the east bank of the Willamette, heads west across the Hawthorne Bridge and follows SW Madison and Main street couplet to the Transit Mall along SW 5th and 6th Avenues. The second alignment follows the Old SP ROW (officially designated by the City of Portland as the Willamette Shore ROW) along the west bank of the Willamette and heads west on SW Harrison Street before joining the SW 5th and 6th Avenue couplet through the Transit Mall. The third alignment also utilizes the old SP ROW and heads west along the SW Jefferson and Columbia Street couplet before connecting with SW 5th and 6th Avenues.

b. West Bank Option - Macadam Avenue Alignments

These alignments head south from Portland CBD along the west bank of the Willamette (see map sections 21 & 22) generally along the old SP ROW. For several blocks near Boundary Avenue, the alignment may leave the old SP ROW and swing over to Macadam Avenue in order to avoid disrupting a primarily multi-family residential area. The alignment would cross the river in the vicinity of the Sellwood bridge with a new structure. From here, it would join the Oaks Bottom PTC ROW into the City of Milwaukie utilizing a number of alignment options.

c. East Bank Option - Portland Traction company (PTC) Alignment

This alignment crosses the Hawthorne Bridge from the Portland CBD and follows the PTC ROW along the east bank of the Willamette to the city boundary, then heads east and south to the City of Milwaukie and other points in Clackamas County (see map sections 23 through 45).

d. Southern Pacific (SP)/McLoughlin Alignment

The alignment follows the SW 5th and 6th Avenue couplet through Portland CBD, heads east to OMSI across the Hawthorne Bridge, and follows McLoughlin Boulevard and SE Washington Street to Milwaukie Market Place and other points in Clackamas County (see map sections 26 through 45).

e. I-205 South Option

This alignment follows the Sunnyside Road from Kaiser Medical Center before heading south along the SP ROW or I-205 south to Oregon City (see map sections 34 and 35).

SOUTH CORRIDOR PRE-AA
PROPOSED LRT ALIGNMENT OPTIONS

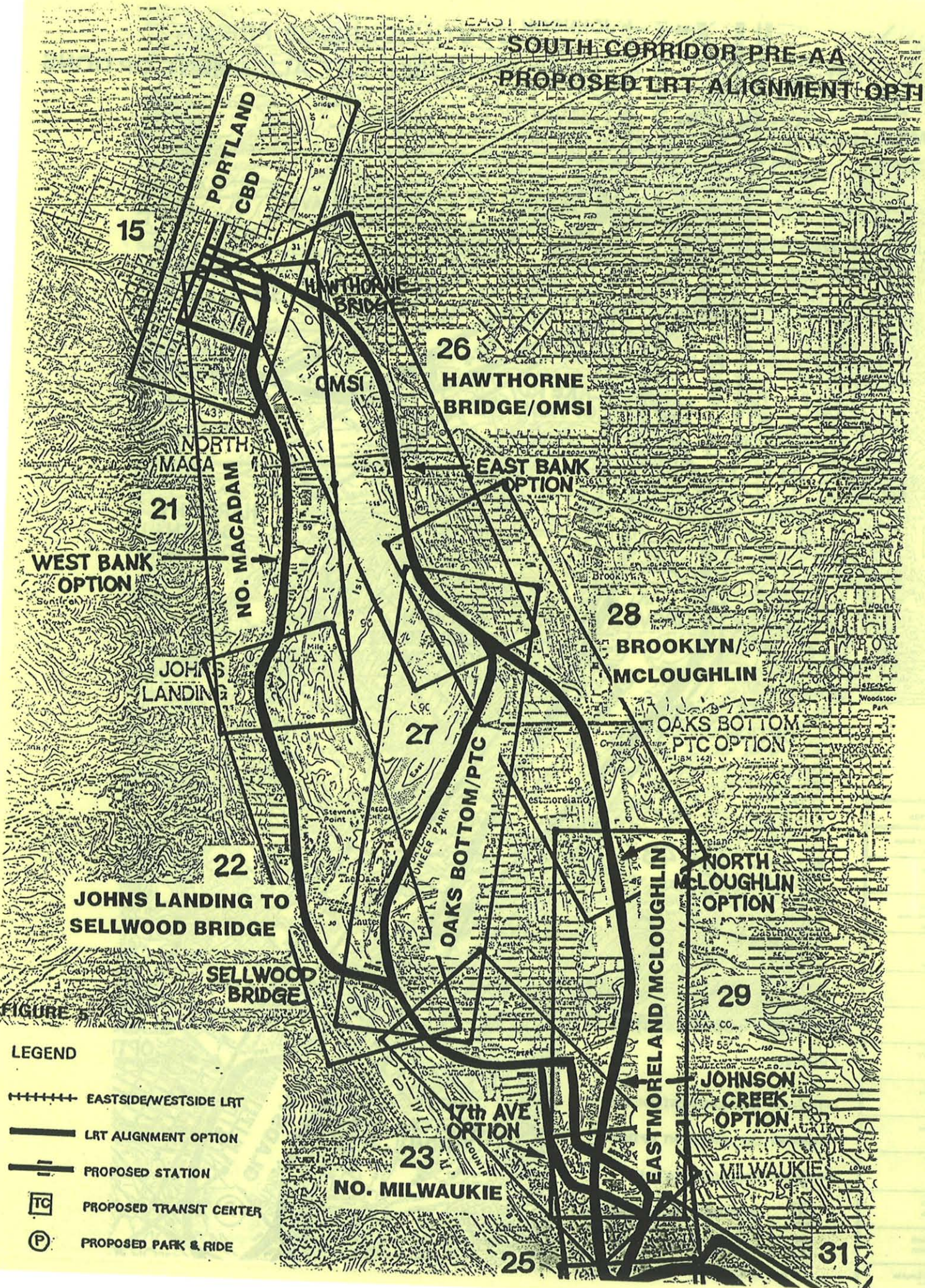


FIGURE 5

LEGEND

- EASTSIDE/WESTSIDE LRT
- LRT ALIGNMENT OPTION
- PROPOSED STATION
- TC PROPOSED TRANSIT CENTER
- (P) PROPOSED PARK & RIDE

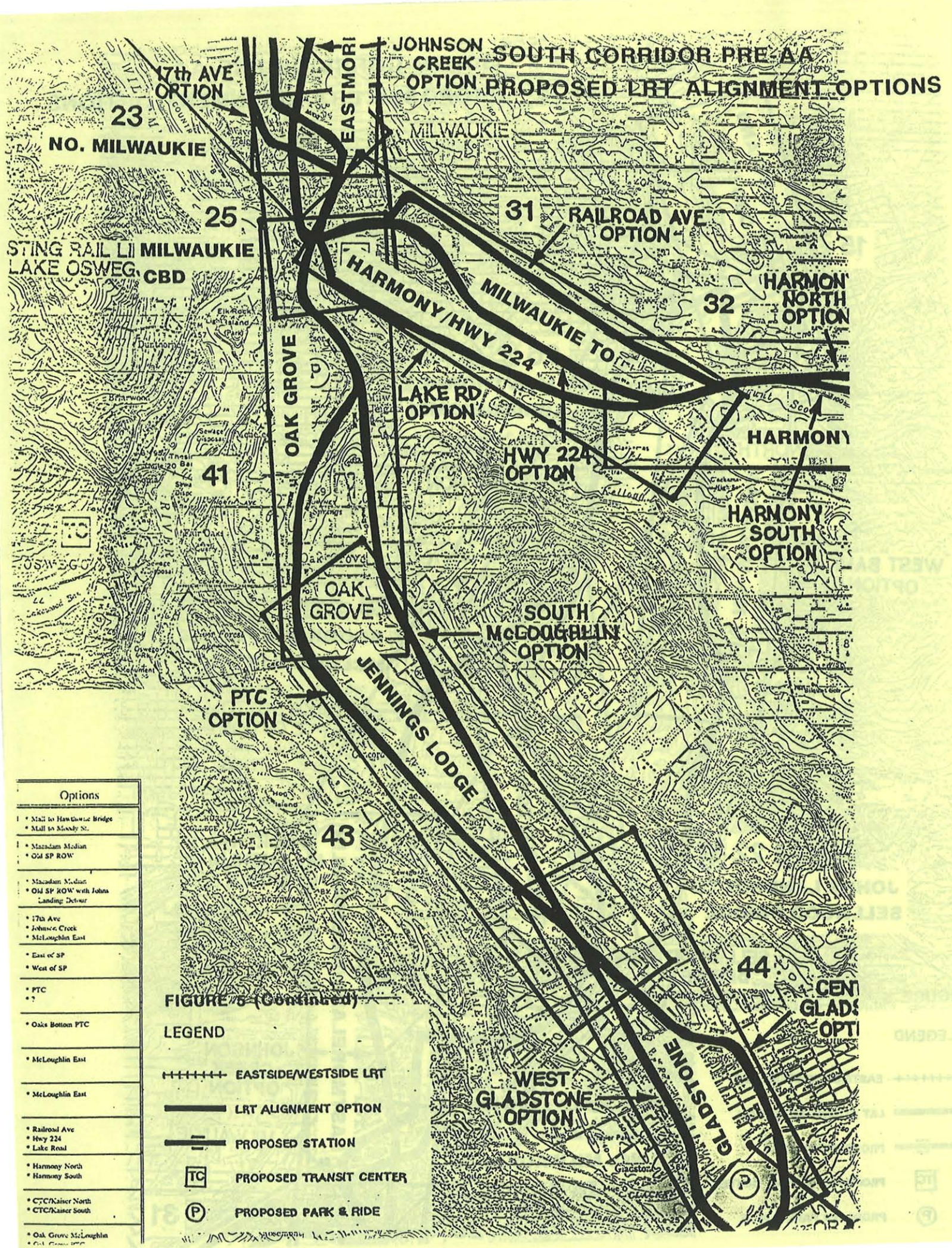
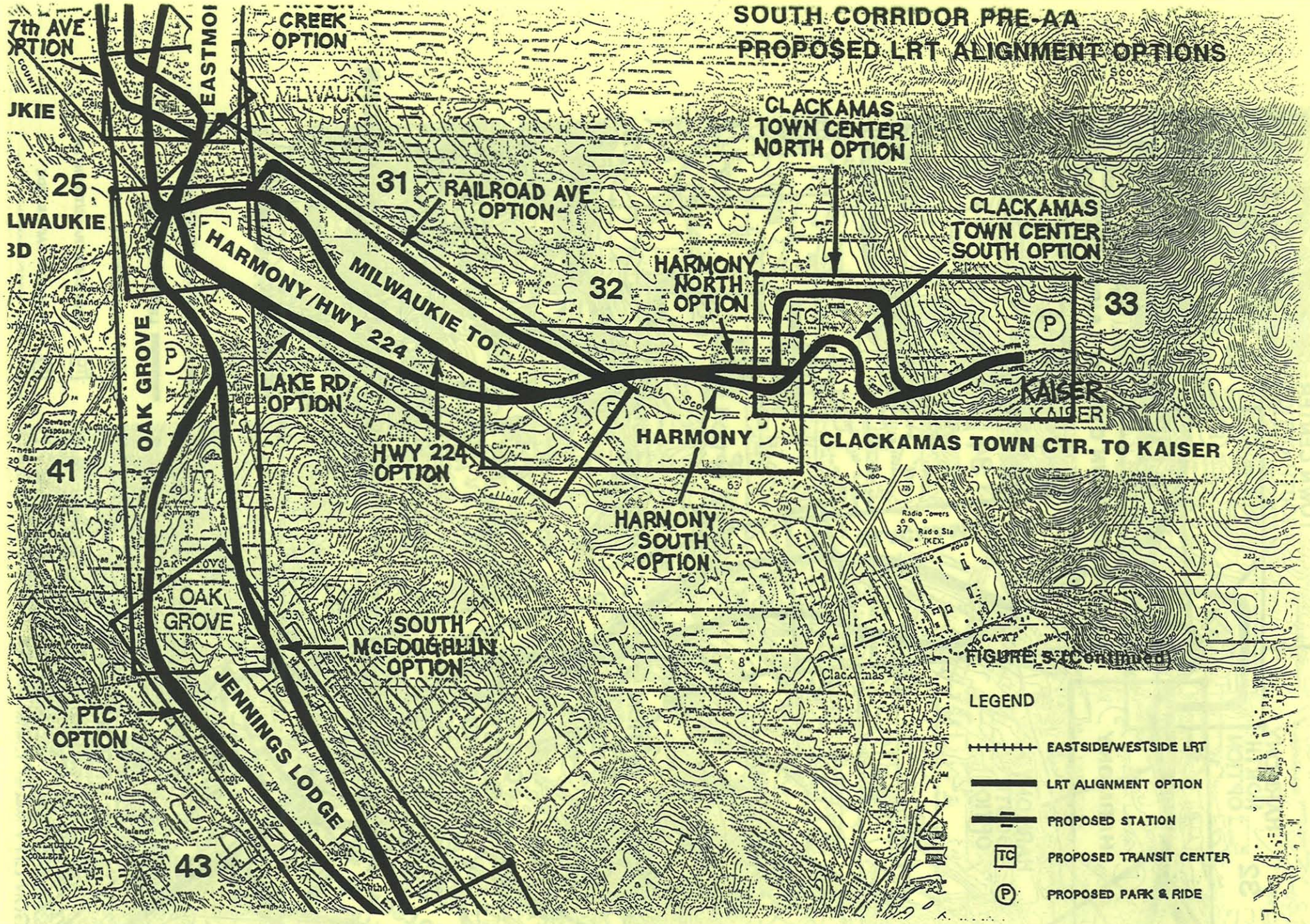


FIGURE 5 (Continued)



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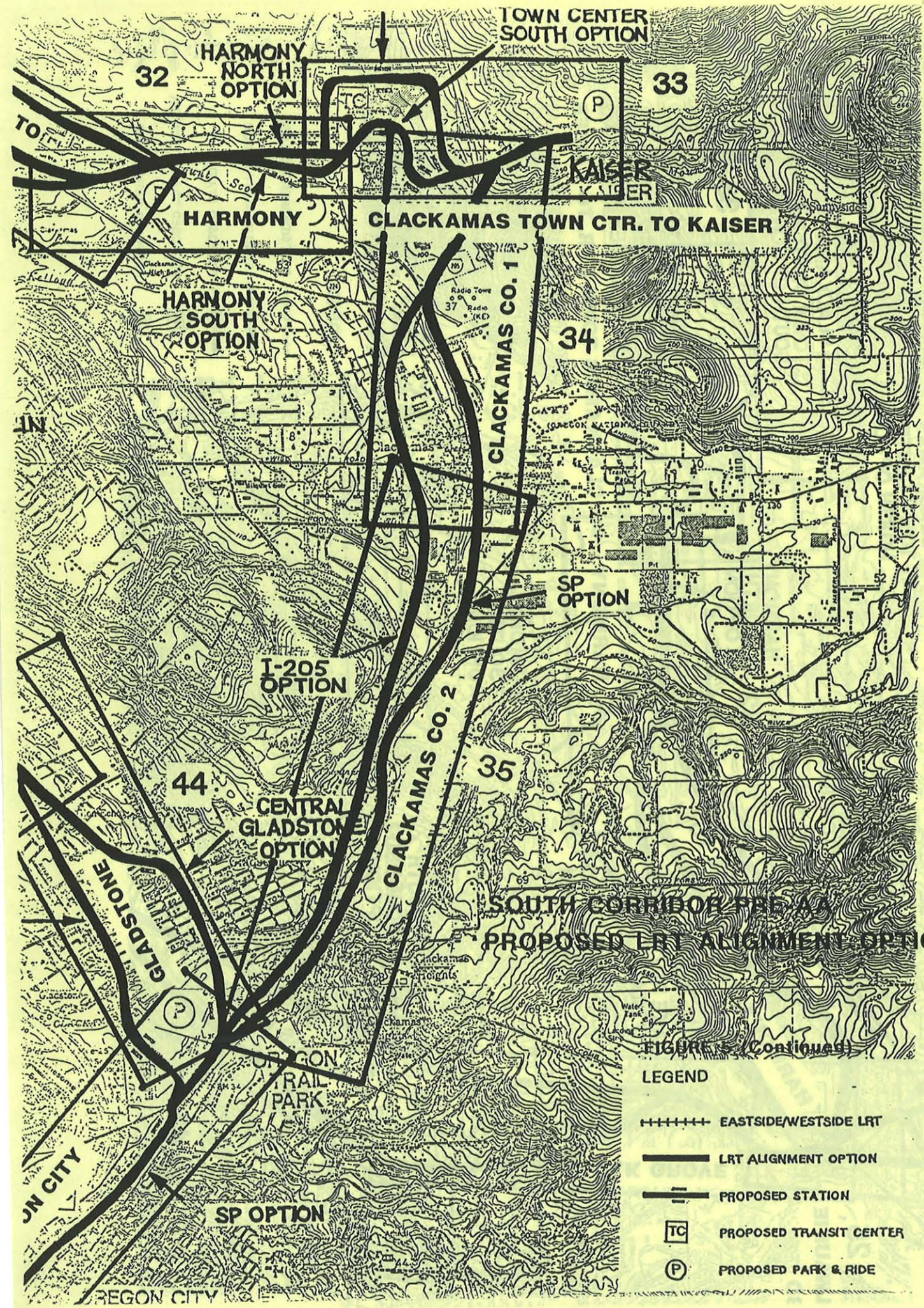

TOWN CENTER SOUTH OPTION
HARMONY NORTH OPTION
32
33
TO
KAISER
HARMONY
CLACKAMAS TOWN CTR. TO KAISER
HARMONY SOUTH OPTION
CLACKAMAS CO. 1
34
SP OPTION
I-205 OPTION
CLACKAMAS CO. 2
35
44
CENTRAL GLADSTONE OPTION
GLADSTONE
OREGON TRAIL PARK
SP OPTION
OREGON CITY
SOUTH CORRIDOR PREFAS
PROPOSED LRT ALIGNMENT OPTIONS
FIGURE 5 (Continued)
LEGEND
EASTSIDE/WESTSIDE LRT
LRT ALIGNMENT OPTION
PROPOSED STATION
TC PROPOSED TRANSIT CENTER
P PROPOSED PARK & RIDE

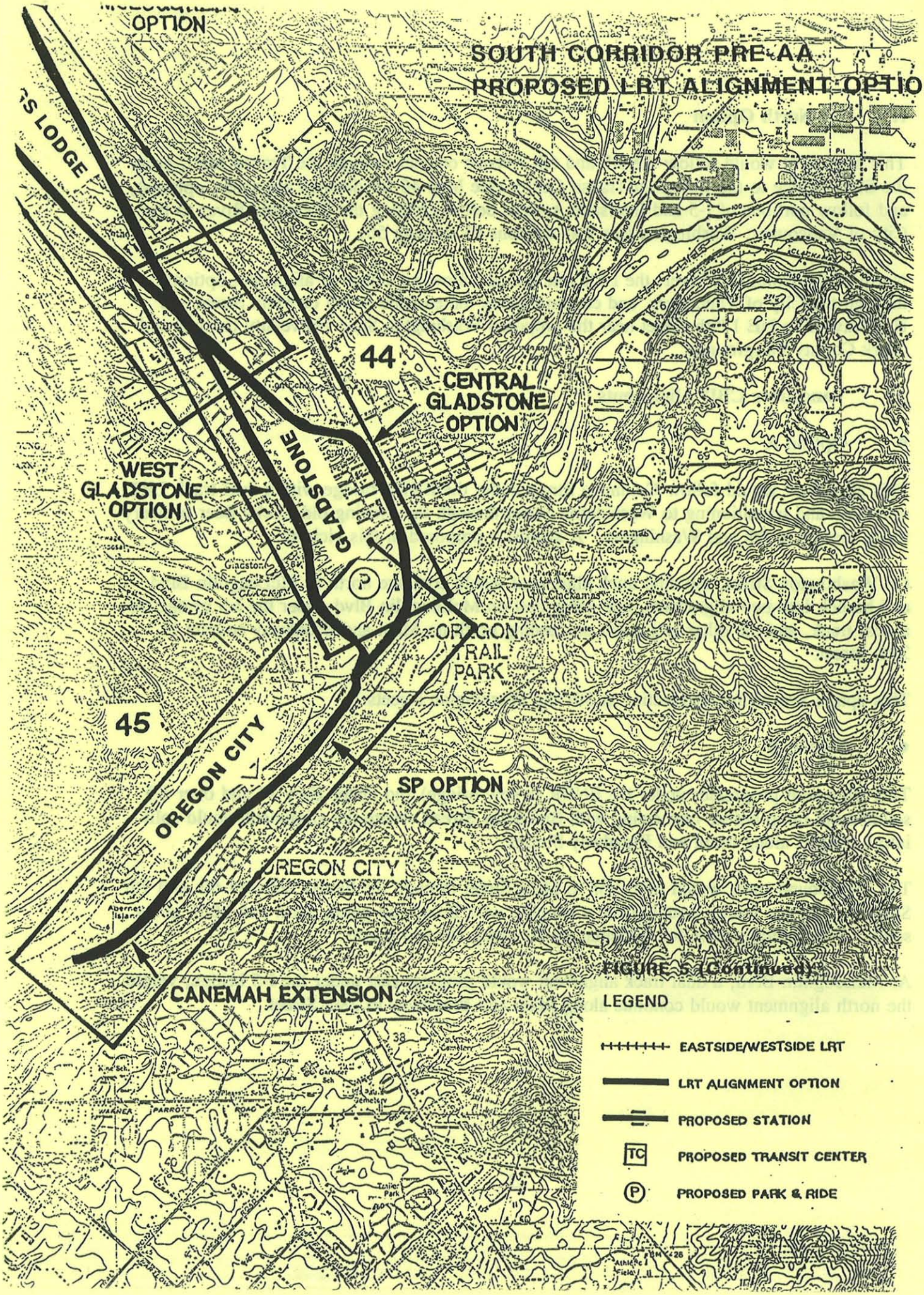


FIGURE 5 (Continued)

f. I-5 North Option

This alignment would follow the 5th and 6th Avenue couplet through the Transit Mall, cross the Steel Bridge to the Coliseum Transit Center (see Map 46 for detailed alignment options), and follow portions of I-5 and Interstate Avenue before crossing the Columbia River to the City of Vancouver, Washington (see map sections 45 through 50).

North of the Columbia River, the LRT line would follow a number of alignment options through the City of Vancouver, and continue along the eastside of I-5 or Main Street and Highway 99 to NE 179th Street near the proposed Washington State University campus and Clark County Fairgrounds.

g. Vancouver CBD Alignments

- **Option A**

This alignment would follow Columbia Street under the BNRR bridge with a dual track LRT operation and transitioning to Washington Street through the existing old Lucky Beer brewery block located at 8th and Washington. A station is proposed in this vicinity.

On Washington Street, the dual track alignment would continue north to McLoughlin Blvd and branch into two alignments, one going east on McLoughlin Blvd under the I-5 bridge on a dual track, and the other alignment proceeding north on Main and Broadway couplet to 28th Street.

This option avoids the intersection at 5th and Washington Streets.

- **Option B**

This alignment progresses under the BNRR (a new bridge) and under Hwy 14 and over I-5 southbound ramp before connecting with Broadway Street, where the alignment would split into a couplet along Main and Broadway Streets.

The southbound track would transition to Main Street through the blocks between 6th and 7th Streets. The two tracks would create a couplet, with Broadway going north and Main going south. This option allows for vehicular traffic along the two streets.

At McLoughlin Blvd, a dual track alignment would progress east under the I-5 bridge, where the north alignment would continue along Main and Broadway to 28th Street.

- **Option C**

This alignment is similar to option B except for its diversion along Main Street. The southbound track would transition over the blocks between 6th and 7th Streets from Main to Washington, where a couplet would be created. The north direction is along Main Street.

This couplet would continue to McLoughlin Blvd where the Washington alignment would join Main Street at 28th Street.

- **Option D**

This alignment is similar to both Options B & C except for a dual track option.

h. SR-500 Option

This alignment progresses east though the City of Vancouver either along Clark College or Fort Vancouver and would connect with SR-500 to its terminus around the vicinity of Vancouver Mall (see map section 57 through 59).

5. ☞ Commuter Rail Alternatives

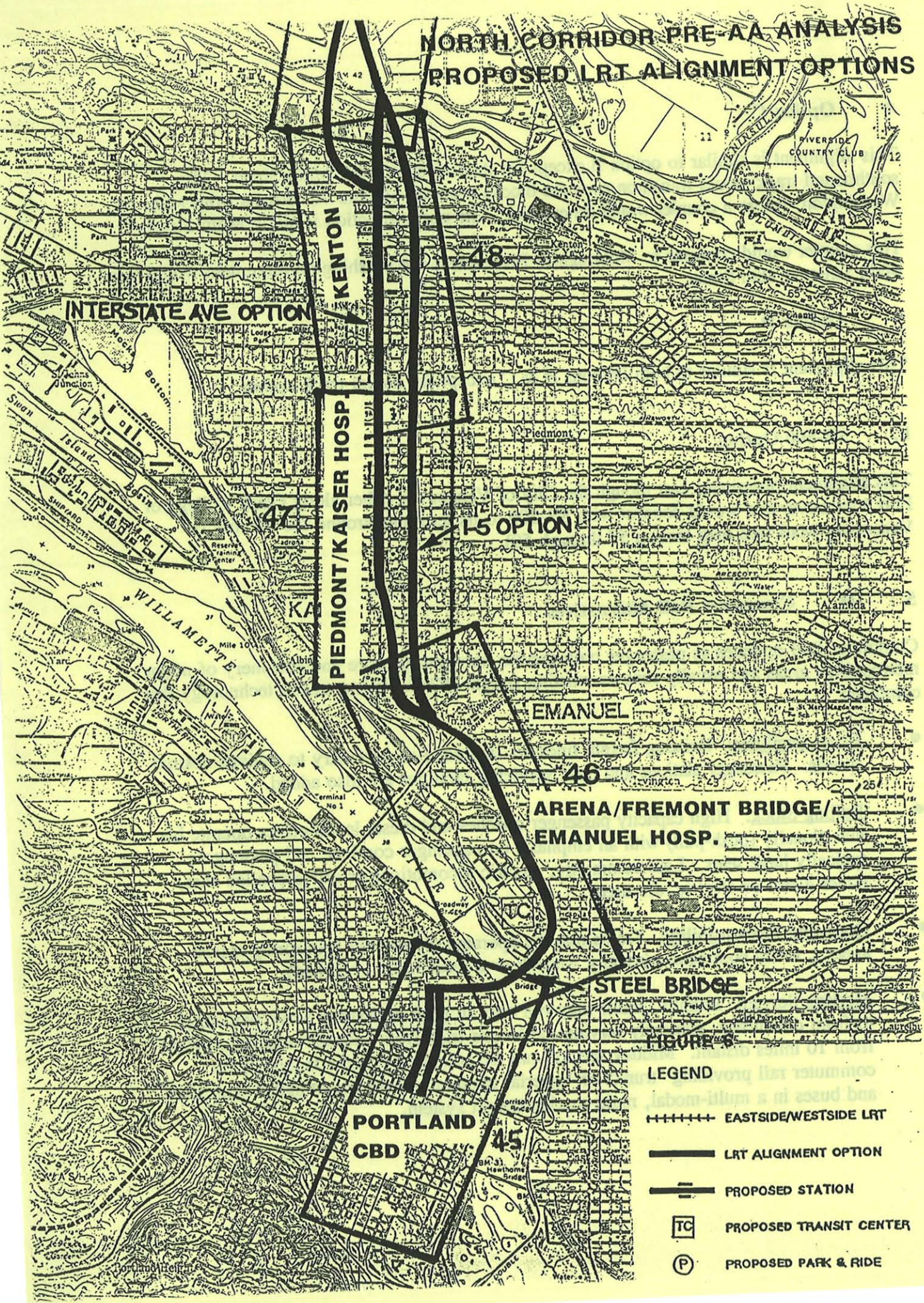
Commuter Rail operates as passenger train service between the core and periphery of major metropolitan areas and usually runs on existing freight ROW. It is a transit technology that combines:

- Fixed Facilities: Existing freight lines are upgraded as necessary to achieve desired speeds. Passenger stations and train servicing facilities are also added.

- Rolling Stock: High capacity passenger coaches and diesel locomotives operate bi-directionally (push-pull) with an emphasis on passenger comfort: all passengers typically have seats. Less commonly, electric locomotives or self-propelled cars, either diesel or electric, are used.

- Operating Responsibility: Trains may be operated directly by sponsoring transit agency, or by contractors (usually Amtrak or a local freight railroad).

- Markets Served: Initially, trains may run only in peak periods to serve work trips to/from downtown, generally serving the longer trips from suburbs ranging outward from 10 miles distant. Midday service may be added as systems mature, with commuter rail providing "trunk" or "arterial express" service coordinated with LRT and buses in a multi-modal, multi-market transit system.


NORTH CORRIDOR PRE-AA ANALYSIS
PROPOSED LRT ALIGNMENT OPTIONS
INTERSTATE AVE OPTION
KENTON
PIEDMONT/KAISER HOSP
I-5 OPTION
48
47
46
45
EMANUEL
ARENA/FREMONT BRIDGE/
EMANUEL HOSP.
STEEL BRIDGE
PORTLAND
CBD
WILLAMETTE
RIVER
FIGURE 8
LEGEND
EASTSIDE/WESTSIDE LRT
LRT ALIGNMENT OPTION
PROPOSED STATION
TC PROPOSED TRANSIT CENTER
P PROPOSED PARK & RIDE

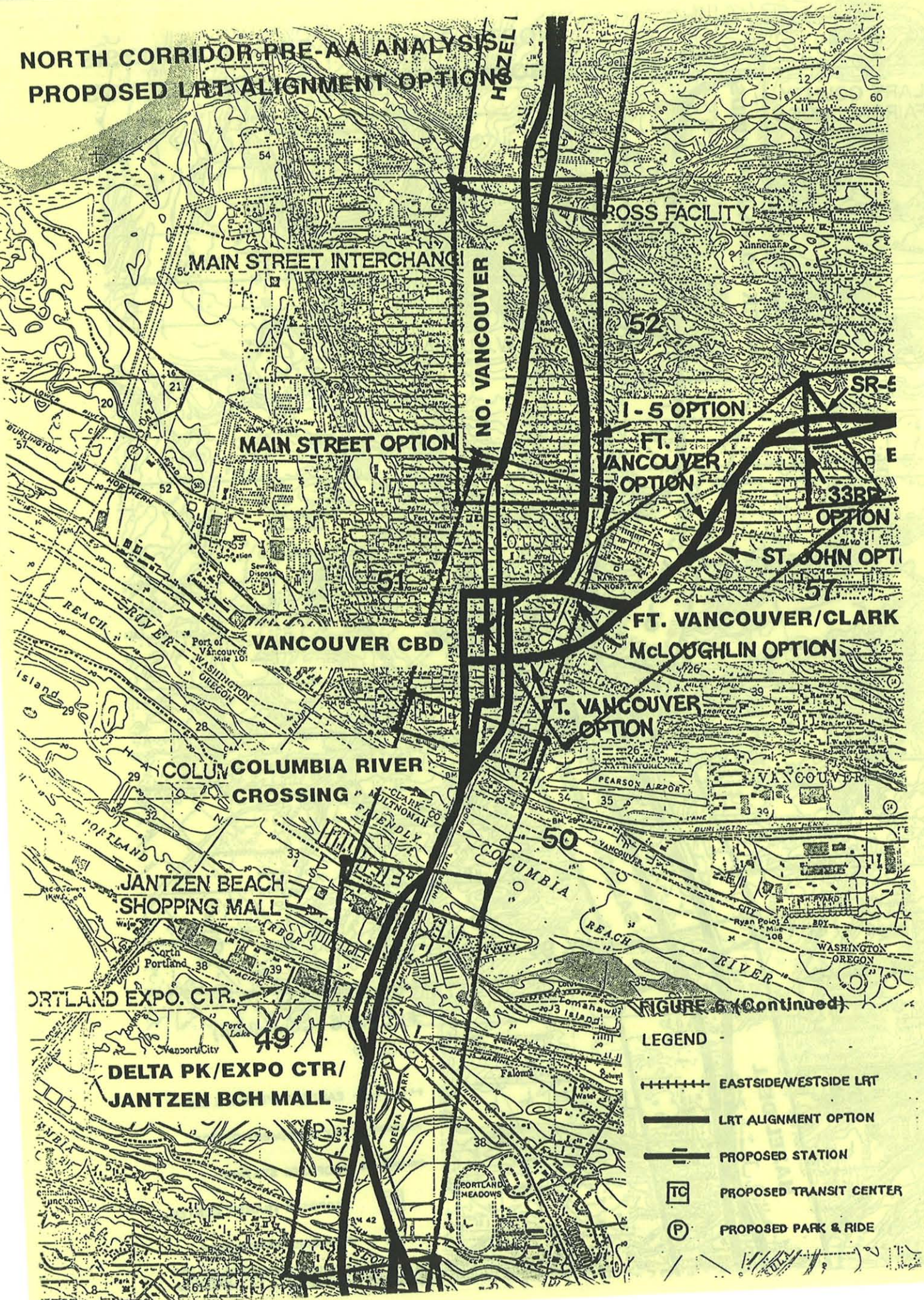


FIGURE 6 (Continued)

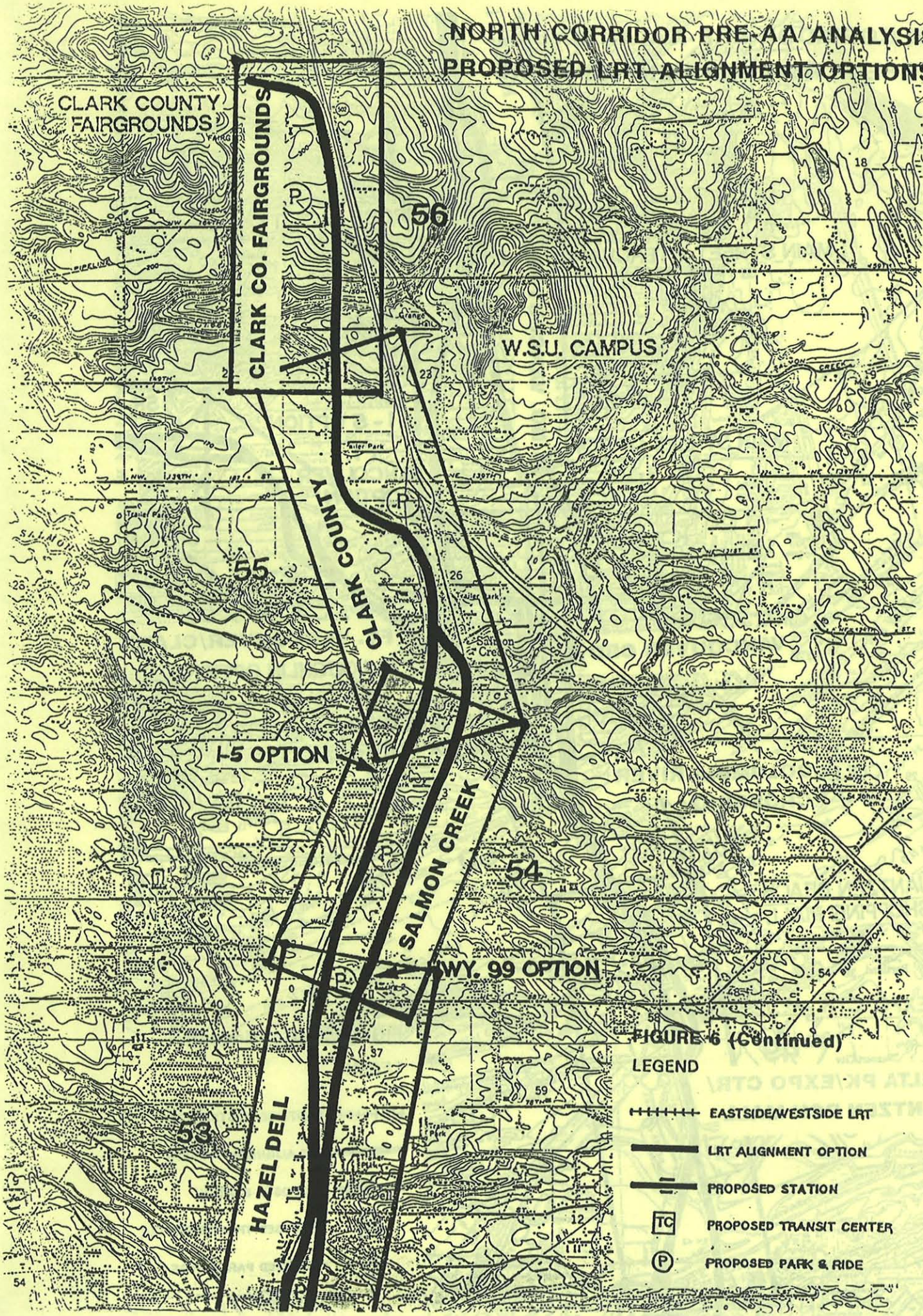


FIGURE 6 (Continued)

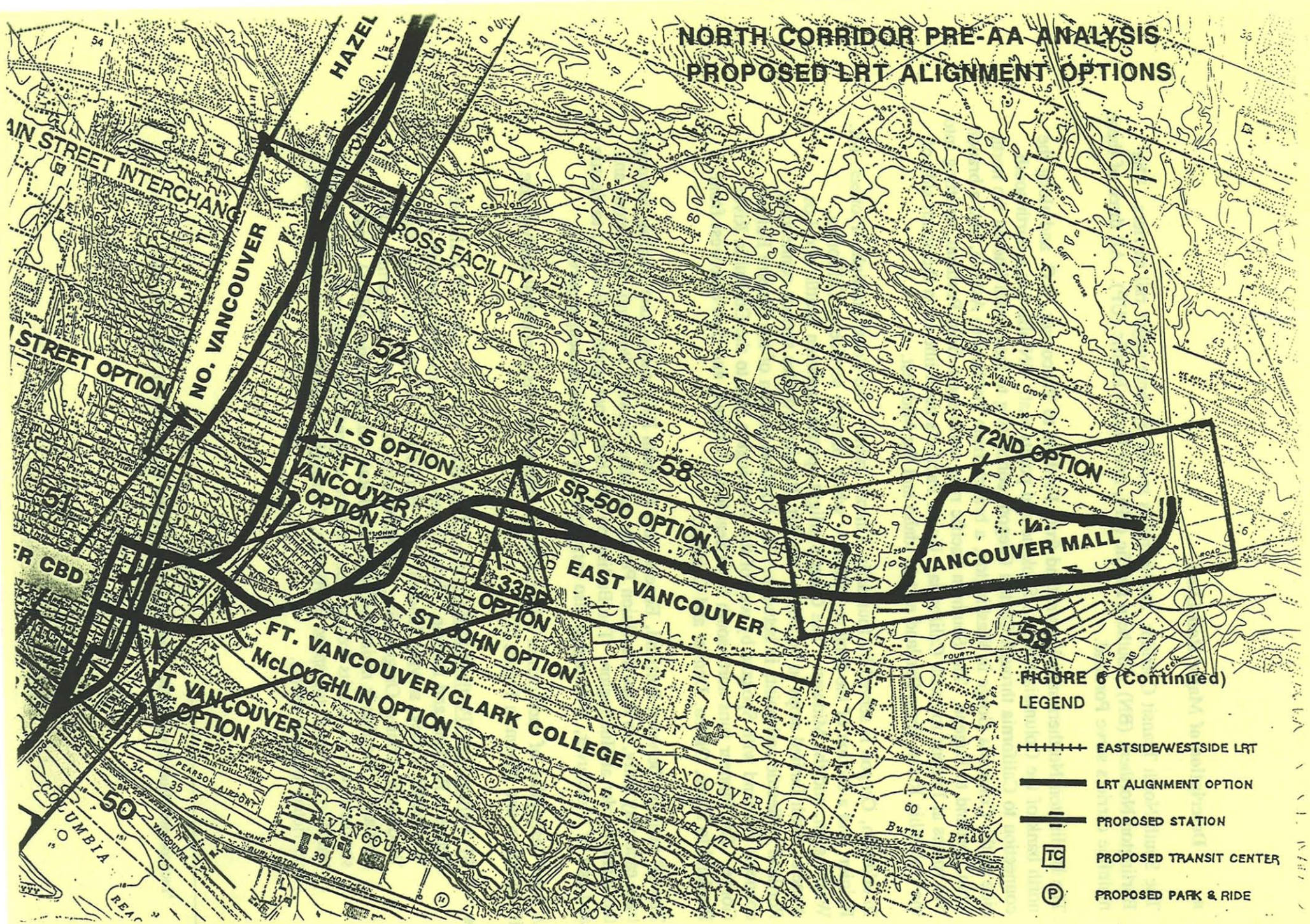


FIGURE 6 (Continued)

a. Description of Major Rail Lines

The South/North Transit Corridor Study area is served by three major rail carriers. The Burlington Northern (BN), Southern Pacific (SP), and Union Pacific (UP). All three of these mainline carriers serve Portland.

The Burlington Northern mainlines extend from Portland to Vancouver, B.C. and along the north bank of the Columbia River to Spokane and points east. BN also has a north-south connection to California through Central Oregon, connecting to their main line on the north side of the Columbia Gorge in Washington, a branch from Portland to Astoria, and a branch from Portland to Eugene. The Southern Pacific runs north-south from Portland, splitting into two routes at Eugene to reach California. Union Pacific's main line is on the south side of the Columbia River, from Portland east to Idaho and the Midwest.

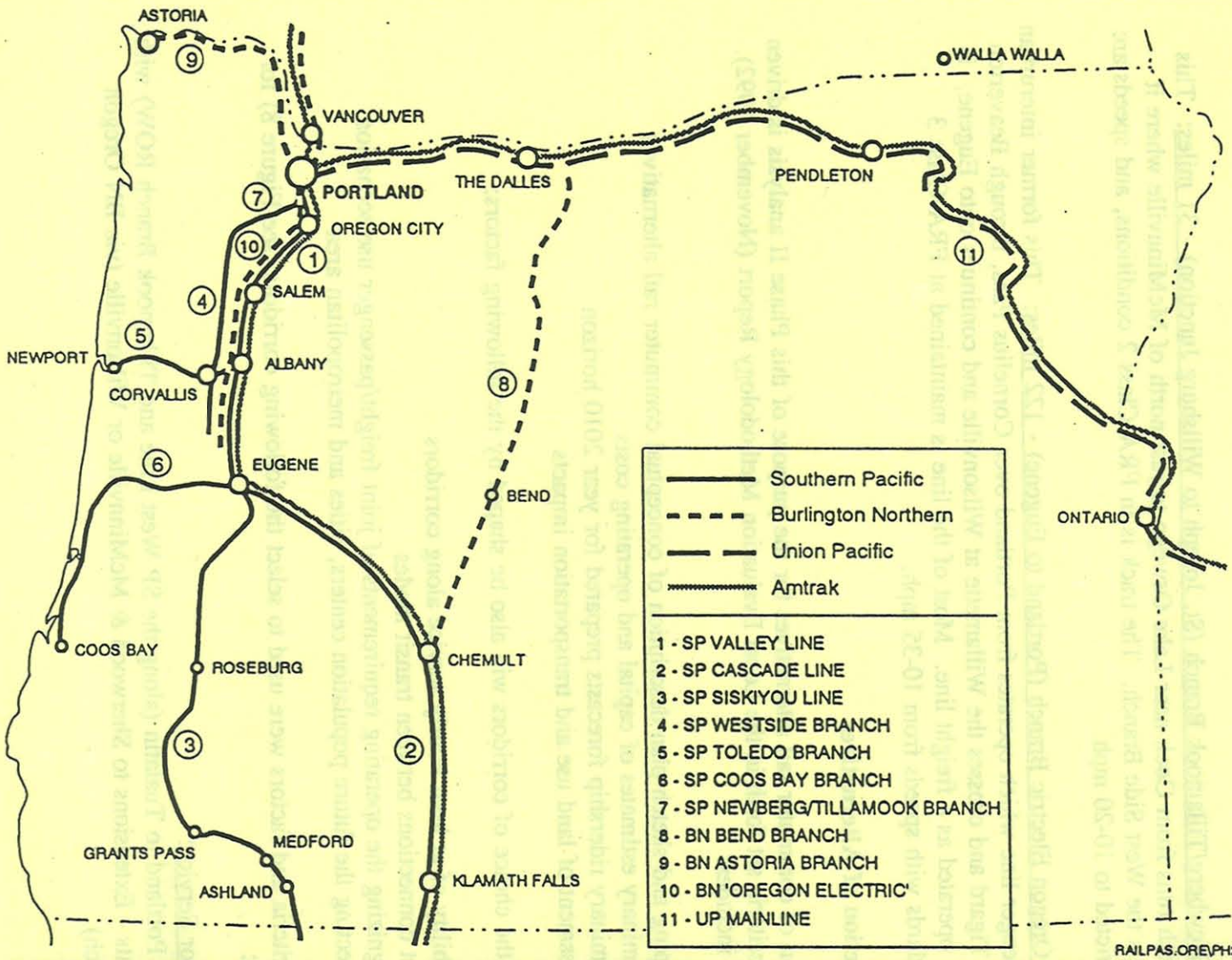
In addition, Oregon is served by four daily Amtrak trains -- the Coast Starlight, Pioneer, Mt. Rainier, and a section of the Empire Builder -- which provide service to California, Washington, and the Midwest. The Coast Starlight operates between Seattle and Los Angeles, with limited stops in between. The Mt. Rainier provides service connecting Portland to Seattle and points in between. The Portland section of the Empire Builder connects Portland with Spokane by way of the Washington side to the Columbia River Gorge. The Pioneer runs north-south from Seattle to Portland, and then east-west from Portland to Boise, Ogden, Denver and Chicago.

The SP mainline between Portland, Eugene, and Klamath Falls carries one Amtrak passenger train each way daily, as does the Union Pacific mainline between Portland, Pendleton, and the Idaho border at Huntington. The Burlington Northern lines north of Portland to Seattle and east of Vancouver, Washington also carry intercity Amtrak passenger service.

A brief description of each carrier's lines that are relevant to this conceptual analysis are listed below and shown in Figure 7[1]:

- SP Valley Line (Portland to Eugene) - 124 miles: This line is the SP mainline between Portland and Eugene. From Eugene, the line runs north through the Willamette Valley, serving Junction City, Harrisburg, Albany, Jefferson, Salem, Woodburn, Canby, Oregon City, and Milwaukie on its way to the terminus at Portland. The line is maintained to Federal Rail Administration (FRA) Class 4 standards which permits freight trains to have a speed limit of 60 mph and passenger trains to operate at top speed of 70 mph. Through some communities, train speed is restricted to lower levels.

[1]Incorporated from Oregon Rail Passenger Policy and Plan Report, ODOT, August 3, 1992.



WSA

EXISTING MAJOR RAIL LINES AND SERVICES

SOUTH/NORTH TRANSIT CORRIDOR STUDY

FIGURE 7

Source: Oregon Rail Policy and Plan Report, ODOT.

- SP West Side Branch (Monroe to Hillsboro) - 93 miles: The west side branch serves the western side of the Willamette Valley from Monroe north through Corvalis, Independence and McMinnville to St. Joseph. Authorized speed is 40 mph, with extensive segments limited to 20 mph and short segments of 10 mph.

- SP Newberg/Tillamook Branch (St. Joseph to Willsburg Junction) - 31 miles: This branch runs from Cook near Lake Oswego to just north of McMinnville where it meets the West Side Branch. The track is in FRA Class 2 conditions, and speeds are restricted to 10-20 mph.

- BN Oregon Electric Branch (Portland to Eugene) - 122 miles: This former interurban passenger line which operates from Portland over Cornelius Pass, through Beaverton and Tigard and crosses the Willamette at Wilsonville and continues onto Eugene, is now operated as a freight line. Most of the line is maintained at FRA Class 3 standards with speeds from 10-35 mph.

b. Selection of Alternatives

The selection of commuter rail alternatives for the purpose of this Phase II analysis is driven by a set of criteria set forth in the Local Evaluation Methodology Report (November 1992). The criteria includes:

- Mapping and sketch plan description of conceptual commuter rail alternatives
- Preliminary estimates of capital and operating costs
- Preliminary ridership forecasts prepared for year 2010 horizon
- Assessment of land use and transportation impacts

In addition, the choice of corridors will also be shaped by the following factors:

- Capability of at least hourly service along corridors
- Direct connections between transit modes
- Recognizing the operating requirements of joint freight/passenger use scenarios
- Connecting the future population centers, cities and metropolitan area

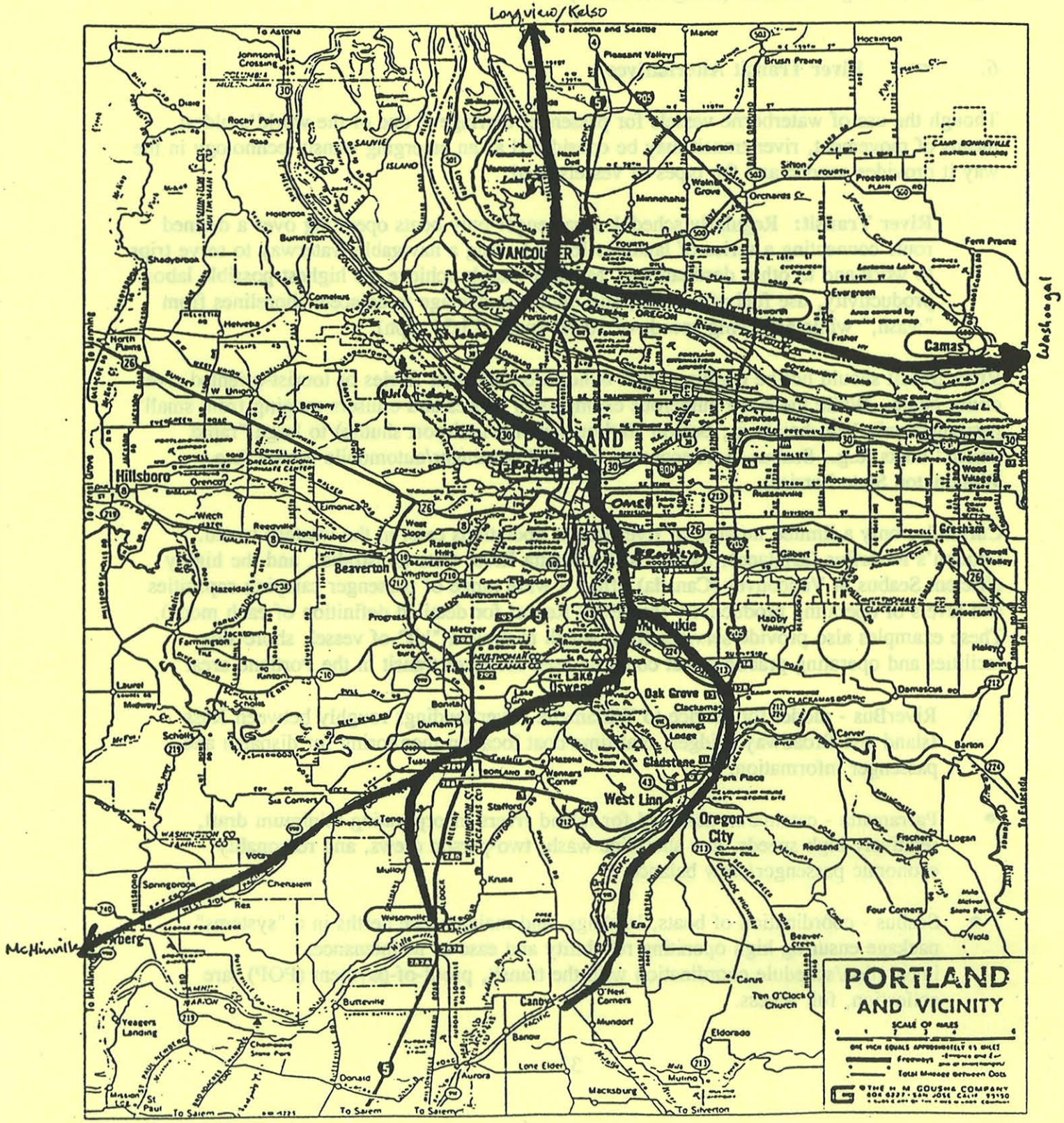
The above criteria and factors were used to select the following corridors (see Figure 8) for further study:

South Corridor Service:
Main Line - Portland to Tualatin (along the SP West Line and Tillamook Branch ROW) with Alt Alignments - Extensions to Sherwood & McMinnville or Wilsonville (via BN Oregon Electric Branch)

FIGURE 8

South/North Transit Corridor Study

COMMUTER RAIL - CONCEPTUAL ALIGNMENTS



North Corridor Service:

Main Line - Portland to Camas/Washougal (along BN ROW)
Alt. Alignments - Portland to Barberton District (along Chelatchie Prairie & BN ROW)
Portland to Longview/Kelso (along BN ROW)

6. ☞ River Transit Alternatives

Though the use of waterborne vessels for passenger carriage is one of the world's oldest means of movement, river transit may be considered as an emerging transit technology in the way it provides service and the types of vessels used:

> **River Transit:** Regularly scheduled passenger-only boats operating over a defined route connecting a series of landings located along a navigable waterway to serve trips to work and to other destinations. Modern vessels achieve the highest possible labor productivity, use fuel efficiently, and minimize damage to adjacent shorelines from "wash," while achieving speeds of 20-30 knots (25-35 mph).

River transit should not be confused with either cross-channel ferries or tourist-oriented river cruise boats. While there are numerous examples of ferries and cruisers ranging from small passenger-only launches (e.g., Boston Harbor downtown-airport shuttle) to large "rapid transit" boats (e.g., Seabus in Vancouver, BC) and passenger/automobile ferries (e.g., Washington State Ferries).

Currently, only a limited number of river transit operations exist in the western world. London's RiverBus (England), Sydney's Parramatta River Cats (Australia), and the highly efficient Seabus in Vancouver (Canada) offers a wide range of passenger carrying capacities and levels of operating productivity (see FOG Report for detailed definition of each mode). These examples also provide services from which to draw a "kit" of vessel, shore-side facilities and operating practices that could be used for river transit in the Portland area:

- RiverBus - model for service to Willamette River landings roughly between Ross Island and Broadway bridges; real time boat location monitoring for dispatch and passenger information.

- Parramatta - catamaran designed for inland rivers incorporating minimum draft, relatively high speeds, low shoreline wash, two-person crews, and reasonably economic passenger/crew balance.

- Seabus - coordination of boats, landings, and maintenance berths in a "systems" package ensuring high operating reliability and ease of maintenance, integration/schedule coordination with the transit, proof-of-payment (POP) fare collection, full access.

River transit in Portland should meet criteria similar to Sydney's Parramatta River service: limited vessel draft, relatively high speeds, low wash of adjacent shorelines, two-person crews (master and deck attendant), and sufficient passenger capacity to achieve a level of operating efficiency at least equal to buses. In addition, the vessels must be accessible to passengers with disabilities, and any permanent service should be coordinated with other transit services.

Reliability and availability equal to that achieved by Seabus is also necessary for river transit to become an accepted element of Portland's total public transit system. Achieving this goal will require resolution of several inherent constraints that could impede the regularity of operations: weather conditions (fog, wind, ice), visibility at night and in poor weather, floating debris (the US Army Corps of Engineers maintains the Willamette channel upriver only to the Ross Island bridge), bridge clearance, conflicts with commercial vessel movements (about 1,000 ship and 10,000 tug movements a year at St. Johns), conflicts with recreational boaters (who do not always adhere to the "rules of the road"), noise, water depth (channels and landings), landing site availability and connections with other transit services.

a. Description of River Transit Corridors

The Columbia and the Willamette Rivers traverse the North/South Transit Corridor Study area. River transit may use any natural waterway determined to be navigable. Thus, the Columbia River along its entire length through metropolitan Portland and the Willamette River, north of the Ross Island Bridge (maintained by the U.S. Army Corps of Engineers), meet this standard.

While its channel is not maintained by the Corps, the Willamette south of the Ross Island Bridge is also generally considered to be a navigable waterway. This may not be a problem for the shallow draft, low-wash catamarans described herein; however, there may be trade-offs between river transit speed restrictions and some dredging and/or blasting to reduce channel circuity due to shoals (e.g. the area around Elk Rock). More detailed study of any particular river transit service option will be necessary to confirm that this is or is not the case.

b. Selection of Alternatives

The selection of river transit alternatives for the purpose of this study is driven by a set of criteria set forth in the Local Evaluation Methodology Report (November 1992). The criteria includes:

- Mapping and sketch plan description of conceptual alternatives
- Preliminary estimates of capital and operating costs
- Preliminary ridership forecasts prepared for year 2010 horizon
- Assessment of land use and transportation impacts

In addition, the choice of corridors will also be shaped by the following factors:

- Capability of at least hourly service along corridors
- Direct connections between transit modes (potential for P&R lot access problems)
- Recognizing the operating requirements of mixed river uses (i.e. recreational and fishing boats, commercial vessel movements)
- Connecting the future population and activity centers, cities, and metropolitan areas adjacent to the river

The above criteria and factors were used to select the following alignments (see Figure 9) for further study:

South Corridor: Portland to Oregon City

North Corridor: Portland to Vancouver, WA with short line to St. Johns

FIGURE 9

South/North Transit Corridor Study

RIVER TRANSIT - CONCEPTUAL ALIGNMENTS