> they congregated there. Including all others within the Territory, the total does not probably exceed 300.
>
> In this, however, are not reckoned the 'Tai-kie-a-pain,' a band said to live apart in the country lying on the western side of the mountains, between the heads of Cathlapootl [Lewis River] and Cowlitz, and which probably did not enter into the former estimate. But little is known of them, and their numbers are undoubtedly small. (Stevens 1855:225)

In this same report, Stevens further added:

> The Tai-tin-a-pam, a band of Klikatats already mentioned, living near the head of the Cowlitz, are probably about seventy-five in number: they are called by their eastern brethren wild or wood Indians.
>
> Until very lately they have not ventured into the settlements, and have even avoided all intercourse with their own race. The river Indians attach to them all kinds of superstitious ideas, including that of stealing and eating children, and of travelling unseen. (Stevens 1855:240)

The Stevens report thus placed the Taidnapam, speakers of a language presumably identical with Klickitat, as living on both the upper Cowlitz as well as in the Lewis River watershed in Clark County. In time the Salishan-speaking Cowlitz and Sahaptian-speaking Taidnapam merged through intermarriage. By the early twentieth century the Cowlitz Tribe elected descendants of both to its council and, for several decades, alternated the chairman's position between Cowlitz and Taidnapam (Cowlitz Indian Tribe 1994).

The Washington Superintendency of Indian Affairs estimated an Indian population of slightly over 500 in the Lower Columbia Valley and southwestern Washington Territory in January, 1854 (Table 3).

Table 3. 1854 Estimate of Indian Population in the Lower Columbia Valley and Southwestern Washington.

Name	Location	No.	Comments
Upper Chinooks, five bands, not including Cascades band	Columbia River, above the Cowlitz	200	Estimate. The upper of these bands are mixed with the Klikatats; the lower with the Cowlitz.
Lower Chinook, Chinook band	Columbia River, below the Cowlitz	66	One of these is intermarried with the Cowlitz; the rest with the Chihalis.
Cowlitz and Upper Chihalis	On Cowlitz River, and the Chihalis above the Satsop	165	The two have become altogether intermarried.
Tai-tin-a pam	Base of the mountains on Cowlitz, etc.	75	Estimate.

Source: Stevens (1855:249).

George Gibbs, drafter of the Stevens report, in the fall of 1853 explored the lower Columbia River (where he settled in 1849 at Astoria) and Willapa Bay. He filed a special account in the *Pacific Railroad Reports* about this reconnaissance (Gibbs 1855b). His extensive travels in Oregon and Washington, service as secretary to the treaty commissions in the Willamette Valley and northwestern California in 1851, and his work with McClellan during the railroad surveys led him to lay out the basic assumptions for Indian policy in Washington Territory. He prefaced his remarks by observing: "The case of the Chinooks and Cowlitz Indians in particular, seems

desperate." Gibbs wrote: "No essential advantage would, it is feared, be obtained by removing them to any one location, for they would not long remain away from their old haunts, and probably the assignment of a few acres of ground for their villages and cemeteries, and the right of fishing at customary points, would effect all that could be done" (Stevens 1855:241). This observation, drafted in September, 1854, became the genesis of the "reserved rights" clauses that Gibbs embedded in the template treaty he created for Governor Stevens. The clauses subsequently appeared in ten ratified Pacific Northwest treaties.

The Stevens report called for agrarian instruction for the Indians on their small reservations, then returned to the matter of fishing:

> The subject of the right of fisheries is one upon which legislation is demanded. It never could have been the intention of Congress that the Indians should be excluded from their ancient fisheries; but, an no condition to this effect was inserted in the donation act, the question has been raised whether persons taking claims, including such fisheries, do not possess the right of monopolizing them. It is therefore desirable that this question should be set at rest by law. (Stevens 1855:248)

William H. Tappan served from May 1, 1854, to 1856 as Indian agent for the "Columbia District," or the "Southern District," in southwestern Washington. This administrative unit extended from the Skookum Chuck River south to the Columbia and from the White Salmon River in the Columbia Gorge to the Pacific Ocean. Its sub-units included The Cascades (1856), Cowlitz Locality (1856), The Dalles (1856–1857), Vancouver (1856), and White Salmon Reservation (1856–1859) (National Archives 1945:xi–xii). Tappan, an artist and engraver, traveled overland in 1849 with his friend George Gibbs. The two civilians accompanied the Mounted Riflemen from Fort Leavenworth to Fort Vancouver. Tappan's reports to Governor Stevens provided brief notes on the Indians living in the vicinity of Vancouver.

On September 30, 1854, after discussing the [Lower] Chinook, Shoalwater Bay, and Cathalamette Indians, Tappan identified the tribes and bands living between the Cowlitz River and the Cascades. He wrote his report at his land claim at the mouth of the Lewis River, at "Cathlapootle, Wash[ington] Terr[itory]:"

> Tai-tin-a-pams The next tribe as we assend the [Columbia] river is the Tai-tin-a-pam a band of which lives upon the Cowlitz river. They were originally from the interior and approached the Columbia as the lands became vacated by the Chinooks. They are an industrious inoffensive people, without their assistance the rapid, shallow river upon which they live would be of but little use to the whites, most of the carrying trade being done by canoes and manned by these indians....
>
> They are fast wasting away and bitterly do they complain of the injustices of the pale faces, who have taken their lands, fenced up their pra[i]ries, plowed up the graves of their fathers, and of their children, and says Kish-kok (a fine old chief) have not given us one blanket to comfort us in our old age....
>
> The largest band of the Tai-tin-a-pam are living in the valley of the Cathlapootle River and are the most interesting Indians in the Southern District. They are not all Tai-tin-a-pam proper for there are some Click-a-tats among them but they are so intermarried that they consider themselves one and the same people. In fact the Tai-tin-a-pams are but a band of the Clickatats which is a large tribe occupying an immense region of country.
>
> They are an active industrious people, excellent hunters and subsist principally upon game, though Salmon and berries make up the variety. There are but a very few

> drunkards among them, and prostitution is of very rare occurrence. Many are quite industrious as farmers, raising potatoes, peas, beans, oats, corn, &c....
>
> This is the only band in this district which I think would be benifitted by agricultural teaching and the expense attending need be but triffeling. If a good plough a strong sett of horse harness and a harrow should belong to the Agency and be loaned to such as desired the use of them, much good would be the result, more land would be cultivated, and they would remain more at home...
>
> It is difficult to ascertain their population as many are always on the move between the gold fields of Oregon–California, and trading expeditions among the northern and eastern Indians of Washington.
>
> In July they numbered 140. I suppose 200 to be their usual amount.
>
> There is also a band who live at the fishery [a location west of the townsite of Vancouver on the north bank of the Columbia identified on the map of R. Covington, 1859] in summer, and on Columbia [Sauvie] island in spring and winter. They are a mixed race, nearly all the tribes are here represented. Among them are two or three of the original occupants of the soil, representatives of the once bold and numerous tribe called the 'Warriors' which headquarters were the town of St. Helens now is and who there established a sort of 'Custom House' leveling and collecting taxes of all who passed wether whites or Indian but 4 or 5 of that great tribe are now alive.
>
> The band spoke of above are not numerous but are a troublesome set: their population is about 30.
>
> La Camas A band of Taitinapams and Clickatat live at La Camass pra[i]rie in the vicinity of Fort Vancouver, unlike those below they are great drunkards, and keep both horses and women to let. They number 78 persons.
>
> The next Band are the Tumwaters or Cascade Indians. They are a band of the Clickatats but claim to have occupied their present position and to have caught Salmon in the rapids of this place from time immemorial. (Tappan 1854a)

Tappan formulated recommendations for consideration in the planned treaty program in western Washington. In the area near Fort Vancouver, he wrote:

> Upon the Cathlapootle they should be allowed to take salmon at all their fisheries now used by them. And as they cultivate the land I would recommend that a tract of land (say one hundred acres) be fenced in a substantial manner and all be allowed to cultivate therein. As they find it so difficult to make good fences I think they would be pleased with such an arrangement and would remove the objection they now have to give up the land which they consider theirs and in some instances have cultivated. (Tappan 1854a)

On December 15, 1854, Agent Tappan submitted additional counsel regarding planned treaties in southwestern Washington:

> Those upon the Cathlapoodle (Ta-tin-a-pams) will I think be willing to go to a reserve in the Chalatchee pra[i]rie, retaining however a right to their fisheries, and to winter their horses in the valley they now occupy. There, I think those of the Cowlitz and about Vancouver could be gathered. The land is unsurpassed by any in the territory, and in the very heart of the vast berry district frequented by all of their tribes. To this Pra[i]rie they have always been particularly attached. (Tappan 1854b)

On January 25, 1855, while at Fort Vancouver, Agent Tappan wrote specifically about the Indians residing at the nearby "Fishery," a site on the west side of the Vancouver townsite:

> Since I have been in this vicinity I have seen the Fishery Indians. They are dispose[d] to sell all but a right to the fisheries and are disposed to make their permanent home in Oregon Territory. The band about this place [Vancouver] will not give their consent to leave the vicinity of this town. I have had many talks with them, but to no purpose. I think however that when their lands are to be paid for, the temptation will be irrisistable and they will be easily disposed of. (Tappan 1855)

Upon completion of the Fort Steilacoom–Fort Vancouver Military Road survey in November, 1855, George Gibbs, the civilian surveyor hired by Lieutenant George H. Derby to mount much of the reconnaissance, settled in at Fort Vancouver to write his notes and prepare a map of the wagon route. His sojourn also gave him ample opportunity to expand his linguistic and ethnographic notes. In December, 1855, he worked with a Klickitat informant named Yáhotowit. Gibbs noted: "Umtuts, or Imtuts' father was Moke-quáh. Umtuts was Taitinapam – his proper country was not Wiltqa, but in the mountains at the foot of St. Helens, on the head of the Cowlitz. His people were always quarreling and he left them." This information thus confirms that the band headed by Umtuts/Umtux, living at the mouth of Lewis River in the 1840s and the 1850s, was identical to the Taidnapam from the upper Cowlitz watershed (Gibbs 1855–1856b).

The informant Yáhotowit further provided information on the Klikitat ethnogeography of the Vancouver vicinity (Gibbs 1855–1856b):

> Wee-kass, the large lake below Fort Vancouver, "Enati-thlalla" its name by the Wakanaseesie Ind[ian]s
>
> Wilt-kwa, the mouth of Lewis' river, where Umtuts' ranch is
>
> Cathlapootl he did not know, said that *pootl* was not Kilkatat
>
> Skitsoothwa seems to be the name of the Columbia river here
>
> Ata-shee-kass or the place of turtles is the name for the *ground*, near the H[udson's] B[ay] Co[mpany]'s fort, as in the overflowed lands there are many of them
>
> Is-ach-lick, the prairie above Switzler's, opposite & a little above Vancouver
>
> Wat-se-ai-as the Mill Creek
>
> Wash-shoo'-hullo the next [creek] above
>
> Wah-kan-a-sissé, the Indian village below Vancouver, nearly opposite the mouth of the Willamette

Gibbs (1855–1856b). also secured information from Yáhotowit on some of the chiefs or headmen who resided in the vicinity of Fort Vancouver during the occupancy of the site by the Hudson's Bay Company:

> Cowlitz chiefs
>
> > Kamah-tchai-ya of Se-úk'hw
> >
> > Se-al-lal-a-quihl of Se-úk'hw
> >
> > Kweetsoks-ha-ho'h former chief of Cowlitz his sons were Wa-nai-ya, dead and How-hóh, still living
> >
> > Kis-koks, another chief, living
> >
> > Moo-leé-kas was formerly chief at Wish-ham on the Cowlitz

Other chiefs

> Kéh-as-nó, commonly called Cáseno was the great Chief of the country round F[or]t Vancouver. He was a Klikatat [corrected by Gibbs's informant below], & had his house at the mouth of Lewis' R[iver] but governed all the Indians around.
>
> Keh-as-nóh, formerly chief of Scappoose. His younger brother was Te-ah-lách both Dead.[1]
>
> Kum-kum-ly & Kah-sa-kah-sa were the two sons of Kum-kumly the great the Com-comly of Washington Irving['s *Astoria*]. The latter was a very quarrelsome bad man
>
> Kwooli or Whaidli, the chief whom [Robert] Newell[2] calls Kwahtli was half Klikatat & half Skin. He had two countries, the Cascades & Skinpam (Skin & Waiyum people both speak the Klikatat)

In a subsequent interview at Fort Vancouver in December, 1855, Yáhotowit provided more information on Cáseno (Figure 8):

> Kéh-as-no's house was always at Scappoose, not at Wiltqua [mouth of Lewis River]. It appears that he was not of Klikatat blood, but became chief over the Klikatats and all the adjacent people. In former times he was always making war. He took the children & made slaves of them. The men he put in his house, *Kahqua guard house.* All his people died with the cold sick. None of his sons are living. Keh-as-no is mentioned by [Gabriel] Franchére [*Relation d'un Voyage a la cote du Nord-Ouest de L'Amerique Septrentrionale* (1820)]. (Gibbs 1855–1856b)

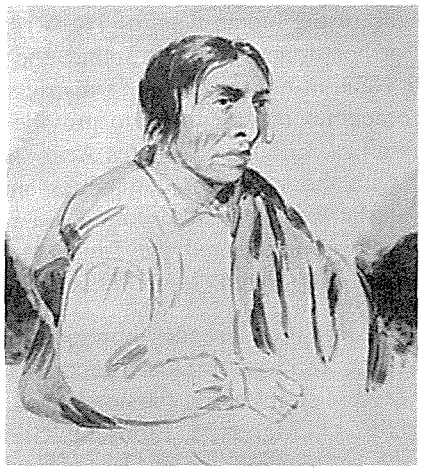

Figure 8. Portrait of Casenov, 1847 (from Vaughan 1971:22).

[1] Gibbs, in a notebook of 1853-1854, compiled during his work on the survey of passes in the Cascade Mountains for the Pacific Railroad surveys, observed: "Ca-se-no the great chief of the Upper Chinooks died in the fall of 1849 at a very advanced age, & having survived nearly all his people. His proper Tribe at Souvie's Island and Scappoose once numbered 4 or 5000. He was Klikatat on the mothers side" (Gibbs 1853-1854).

[2] Gibbs also interviewed Dr. Robert Newell, former fur trapper who lived at Champoeg but was visiting Fort Vancouver. Newell recounted information about the Klickitat incursion into the Willamette Valley subsequent to the decimation of the Chinookans and Kalapuyans in the 1830s (Gibbs 1855-1856b).

On February 23, 1856, John Cain replaced Tappan as Indian agent for southwestern Washington (National Archives 1945:xxxv). Cain established his office in Vancouver. His reports to Governor Stevens were almost devoid of information on the Indians and devoted instead to political events and financial affairs. On October 7, 1856, A. Townsend, agent at White Salmon reported: "I have about 200 Vancouver Indians, 115 Cascades and the others will swell the number I think to near 700." Townsend was in charge of the short-lived White Salmon Reservation in the Columbia Gorge. Townsend's letters confirmed that many of the Klikitats formerly living in the vicinity of the fort or trading there had returned to the Columbia Gorge (Townsend 1856).

By the fall of 1855 Indian relations had deteriorated significantly throughout Washington and Oregon territories. Where the Hudson's Bay Company had worked diligently to maintain peace through fair dealing in trade, patience, and cementing ties with the native communities by intermarriage, the Euroamerican settlers brought prejudice and violence to the region. The Oregon Donation Land Act (1850) set the stage for filing on 2.5 million acres in 7,437 claims in the Pacific Northwest, almost all transactions recorded prior to the ratification of a single treaty of land cession (Johansen 1957:iii–viii). Broken promises in treaty councils, wholesale invasion and trespass on Indian lands, dislocation of fishers, hunters, and gatherers from their traditional places of subsistence, and the calamitous impact of pandemic diseases were causal factors for conflict. The prohibition of sale of weapons and ammunition to Native Americans by the Oregon Territorial Legislature in 1854 and the suppression of traditional practices of fire ecology for the harvest of seeds and control of the landscape were additional matters (Oregon Territorial Legislature 1854:257).

Although the Native American population of the Lower Columbia Valley was reduced by over ninety percent by 1840, tensions swept through the area at the confluence of the Willamette and Columbia rivers with the outbreak of the Indian wars of 1855–1856. Warfare erupted in the late fall of 1855 with the outbreak of hostilities on Puget Sound, the Columbia Plateau, and–as had been the situation in 1852 and 1853–in the gold mining districts of southwestern Oregon. The settlers responded by raising companies of volunteers to provide for defense but also to mount aggression on the native communities. The United States Army headquarters at Fort Vancouver faced a considerable dilemma with the volunteer companies and the mounting of campaigns independent of, and sometimes in the face of, federal policy and action. One of these companies, headed by William Strong of Cathlamet, attacked the Taidnapam Cowlitz at Battle Ground in Clark County in November, 1855, and murdered chief Umtux (Strong 1930:120–121).

Fort Cascades had been established at the Cascades portage near the downstream end of the Columbia Gorge on September 30, 1855, to protect the critical portage for passengers and shipment of Quartermaster Department stores along the north bank of the Columbia River (Derby and Whiting 1855; Townsend 1855). On March 26, 1856, the Klikitats and Upper Chinookans of the Columbia Gorge attacked the settlements at the Cascades portage. They drove the token detachment of soldiers from Fort Cascades and burned the military post. Its destruction suggested to those west of the mountains that they were vulnerable to attack.

On March 28, 1856, Lieutenant Philip Sheridan led a troop detachment into a spirited battle with the Indians at the burned ruins of Fort Cascades. His detachment relieved the troops and civilian refugees at the Fort Rains, the Army blockhouse at the Middle Cascades. The civilian refugees fled the Cascades. With the arrival of additional troops from Fort Dalles, the Army quelled the Indian siege and retook the critical portage (Sheridan 1888:74–83; Weatherford 1961:18–21).

The Indian wars of 1855–1856, while exciting tensions and preparations at Vancouver, were of no immediate consequence to the area, except for the murder of Chief Umtux. Settlers went on

with their affairs. Business quickened with the sale of foodstuffs, weapons, and ammunition to the military companies headed off for Puget Sound, the Rogue River country, or the Columbia Plateau. By June, 1856, peace was largely restored. The volunteers dispersed, congratulating themselves on having fought a good war; the United States Army remained to construct new forts and guard reservations. The Indians, vanquished and driven from their traditional lands, began life confined to reservations.

RESERVATIONS

The treaty with the Confederated Tribes of the Willamette Valley set the stage for the removal of the peoples living between the Columbia River and the head of the Coast Fork of the Willamette to the Grand Ronde Reservation. On June 30, 1857, President James Buchanan created by withdrawal and purchase a reservation at the eastern base of the Coast Range on the South Yamhill River (Kappler 1904a[1]:886). A setting of conifer forests and meadows with boggy, clay soil and frequent rain storms sweeping over a low pass from the Pacific Ocean, the reservation became the holding area and administrative site for the Indians of the western Oregon valleys (including the peoples of the Umpqua and Rogue valleys) and northwestern Oregon (Beckham 2000:102–106).

Prior to official executive order creating the reservation, Superintendent Joel Palmer began removing Indians to the South Yamhill region. Founder of Dayton on the Yamhill River, Palmer selected a site convenient to his office but remote from major settlements. He bought out a half-dozen pioneer land claimants to secure the contiguous tracts he wanted for the reservation. On November 15, 1856, Palmer submitted a detailed census of the "Rogue River Tribe" (13 bands), "Umpqua Tribe" (3 bands), "Calapooia Tribe" (10 bands), and the "Oregon City Indians" (8 bands). The latter were the survivors of the pandemics that swept the lower Willamette and Columbia rivers and probably lived on the Oregon shore of the Columbia River south to the Willamette Falls.

The Oregon Superintendency also submitted a tally of "Oregon City" Indians (Table 4). The bands headed by men named Thomas, William, and John, did not appear in subsequent reports or enumerations at Grand Ronde. Whether they were incorporated into the Clackamas Band of Upper Chinookans, the Kalapuyans of the Willamette Valley, or the Molallans of the Western Cascades is unclear.

None of the subsequent records of the Grand Ronde Reservation documented Clowe-walla, Multnomah, or others peoples formerly identified as living along the Willamette River from the falls at Oregon City to the confluence with the Columbia River. A reservation census of 1867 identified 59 Clackamas and 44 Tumwater (Willamette Falls) Indians at Grand Ronde (Huntington 1868:62). After that, the reservation documentary record fell silent about these people. It is probable that many of them died shortly after removal to Grand Ronde; some were undoubtedly incorporated into the several tribal and band communities on the reservation.[3]

[3] The sacramental registers kept from 1859 to 1898 by Father Adrian Croquet at the mission of St. Michael the Archangel, Grand Ronde, recorded a number of band or tribe affiliations. Traces of Clackamas, Santiam, Molalla, and other peoples are preserved in these records (Munnick and Beckham 1987).

Table 4. Estimate of "Oregon City Indians" Recorded by the Oregon Superintendency.

Name	Men	Women	Boys	Girls	Total	Chief
Thomas Band	27	29	16	15	87	Thomas
William's Band	10	10	6	5	31	William
John's Band	8	8	6	4	26	John
Clackamas Band	21	36	15	13	85	Wa-che-no
Molalla Band	27	43	17	16	103	Quack-e-ty
Louis, Jackson, Charley, Cultus Charley, Mack & [?] Indians	6	0	0	0	6	

Source: Anonymous (1856).

Closure of the Hudson's Bay Company's Fort Vancouver and termination of its "Indian Store" trade removed the impetus for the region's Native Americans to visit Vancouver. Removal and confinement on reservations precluded free movement of tribal peoples to familiar places. Many of the Klikitats were held at the temporary White Swan Reservation prior to removal to the Yakama Reservation. In 1858 the agent moved the Klikitats to Simcoe and, the following year, took over the military post for agency headquarters, the troops departing to assist with the Northwest Boundary Survey of the 49th parallel (Lansdale 1860a:409–413).

In 1860 Agent R. H. Lansdale removed some of the Lewis River Klikitats to the Yakama Reservation. He reported:

> The band named number, as well as can be ascertained in their scattered condition, 100 souls, thirty-seven of whom were transported by steamer from Lewis river to Rockland, Washington Territory. Forty-three have undertaken to remove their horses, their cattle, and themselves, over the Cascade mountains to Yakima reservation, and the remainder the agent has not yet succeeded in inducing to leave willingly their old hunting and fishing lands, though he yet hopes to accomplish so necessary an undertaking, as soon as possible.
>
> These Indians have been badly treated by the whites; driven without compensation from their own lands; their houses burned and otherwise destroyed; the graves of their people inclosed in the white man's fields. They unwillingly consent to remove to please the government agent… (Lansdale 1860b:206)

The Indian and metisse population that resided on the west side of the Hudson's Bay Company fort dispersed to several locations. Some settled at French Prairie in the northern Willamette Valley, a fertile farming district with landings along the river at Butteville and Champoeg. Others removed to the fishing villages at Dahlia, Chinook, and Ilwaco along the north shore of the Columbia in western Wahkiakum and Pacific counties, Washington. Some moved to the Grand Ronde Reservation to join relatives; and others chose remote locations in the foothills of the Cascades on the South Umpqua River (Munnick 1979:xvii–xxi; Beckham 1987:107–08).

The Lewis River Taidnapam, variously also identified as Klikitats and Lewis River Cowlitz, remained in Clark County. Residing in the Cascade foothills, they were ignored by the Washington Superintendency of Indian Affairs and seldom gained notice in agent reports. For example, in June, 1878, Agent R. H. Milroy, based in Olympia, wrote to E. A. Hayt, Commissioner of Indian Affairs about the tribal populations and census enumerations he made in his district. He reported 1,627 Indians from seven tribes in his jurisdiction, but noted:

> I have not yet succeeded in obtaining the census of the Louis River Klikitat band of Indians, residing in Clark & Skamania Counties about 130 miles from this office, over a difficult & expansive rout[e]. Said band numbers somewhere between 70 & 100. So it is safe to say I have written several letters and delayed for some time in hope of obtaining the census of the Louis River Klickitat Bands. (Milroy 1878a)

There is no evidence that Milroy ever obtained a census of the Indians of Lewis River. A search of the letters received from the Washington Superintendency subsequent to 1878 produced no enumeration, though the files contained census records naming heads of household and the numbers of men, women, children, and relatives for the "Cowlitz River Klikitat" and the "Cowlitz Tribe" of the lower Cowlitz River (Milroy 1878b, 1878c).

During the latter part of the nineteenth century the Taidnapam and Lower Cowlitz began operating as a single tribe. They made formal the political relationship in 1918 when they adopted governing documents and elected a single council, predecessor to the present Cowlitz Indian Tribe formally acknowledged by the Department of the Interior in 2001. The Cowlitz secured more than twenty public domain allotments or Indian homesteads in Cowlitz, Lewis, and Clark counties. Some of these properties remain in trust status today. Other Cowlitz participated in the allotment program at Quinault where they obtained an estimated sixteen percent of the allotments (Cowlitz Indian Tribe 1987:31–32; Nicholson 1934).

CONCLUSIONS

Between 1792 and 1830 peaceful and mutually remunerative relationships developed between the Native Americans of the Lower Columbia River and surrounding countryside with the traders who came to the region in quest of furs. Initially Fort Astoria, later Fort George, at the mouth of the river served as the primary trading station. The situation changed when, in 1825, the Hudson's Bay Company moved its headquarters to Vancouver a short distance upstream from the confluence of the Willamette and Columbia rivers. The new site was in the heart of the region occupied by numerous villages of Upper Chinookans. It was a location convenient for trade and drew the Klikitats and Taidnapam from the western Cascades, the Cowlitz from that river system, and the Kalapuyans from the Willamette Valley.

The calamity of pandemic diseases (malaria, smallpox, dysentery, and other maladies) decimated the thriving Native American population in the vicinity of Vancouver. An estimated 15,545 Chinookans and Kalapuyans lived in the region in 1805; by 1840 fewer than ten percent, perhaps 1,932 were alive (Boyd 1999:84). Some, like Chief Casanov, survived, but his family, followers, and power had vanished. The Oregon Treaty (1846) and closing of Hudson's Bay Company operations at Fort Vancouver eliminated the commercial connections between Indians and the fur trade. Vancouver was no longer a Mecca where Native Americans traded at the "Indian Store," camped on the nearby meadows, or resided with their French-Canadian or Pacific Island spouses and families.

Vancouver, however, was a testing place for Euroamerican enterprises. The Hudson's Bay Company tried the resources of the region and found fertile soil, productive agriculture, a promising salmon fishery, timber and waterpower for its sawmill, and, of course, furs. Its employees engaged in the retail trade, export of raw materials, and established a small shipyard. As the HBC interests in the area waned, the U.S. presence waxed with the establishment of the U.S. Army post at Columbia Barracks (later known as Vancouver Barracks) in 1849. In succeeding years the United States Army brought Indian prisoners to Fort Vancouver. Nez Perce,

Northern Paiute, and other Indians–usually men who were deemed enemy combatants–were held in the military prison. Some died and were buried at the fort. In time, those remaining were dispersed to reservations.

Descendants of the aboriginal population of the Lower Columbia River survive today, intermixed with other Native American and Euroamerican populations. The largest descendant communities directly connected with aboriginal residency in the Columbia River Crossing area are the Confederated Tribes of the Grand Ronde Community of Oregon, with tribal office and reservation at Grand Ronde, Oregon, and the Cowlitz Indian Tribe, with tribal office at Longview, Washington.

6. HISTORY

The following overview addresses historical developments which occurred within or immediately adjacent to the project area. The area of focus includes the north shore of the Columbia River at the crossing of the I-5 bridge as well as the south shore and the transit of Hayden Island. The study area thus involves Clark County, Washington, and Multnomah County, Oregon.

BRITISH AND AMERICAN GOVERNMENT EXPLORATION AND SURVEY

In the nineteenth century the shoreline at Vancouver became a port-of-call for exploration and reconnaissance parties as well as for the maritime commercial enterprises of the Hudson's Bay Company. British, American, and French explorers, traveling naturalists, and missionaries visited Fort Vancouver, purchased supplies, and gained information from the officials of the Hudson's Bay Company.

Several of the nineteenth century visitors wrote accounts of the fort and its surroundings, including the "Village" to the west, a site within or immediately adjacent to the future CRC study area. These expeditions generated letters, diaries, formal reports, and, in some instances, collections of natural history and ethnographic objects. These visitor accounts confirm part of the dimension of early Euroamerican activity along the north bank of the Columbia River at or adjacent to the study area. The following visitors are representative of those landing on the north bank of the Columbia at Vancouver.

Lieutenant William Robert Broughton Reconnaissance, 1792

William R. Broughton, Captain of the *Chatham*, sister ship to George Vancouver's *Discovery*, drew the assignment to explore the Columbia River estuary in October, 1792. With a launch and cutter, Broughton left his ship anchored at Point George (Astoria) to ascend the river to the western end of the Columbia Gorge. He named present Hayden Island (dubbed "Image Canoe Island" by Lewis and Clark) as Menzies Island to honor the expedition botanist, Dr. Archibald Menzies. Broughton found no Indian villages in the vicinity of present Vancouver, Washington, but noted the village of the "Friendly Old Chief" on the Oregon shore near the present location of Portland International Airport (Barry 1926:404, 406–407).

Thomas Manby, a crewman who remained on the *Discovery* in the lower estuary, described Broughton's reconnaissance:

> Capt. Broughton expressed a good deal of satisfaction at his Expedition, a great variety of Scenes were met with and good weather prevailed with them the whole time, the Country was in general Woody, and of moderate height, some clear places of a few Acres were seen, a luxurious verdure every where, cloathed them, and many Bears and Deer were seen on the banks of the River.

> Seven extensive Villages were met with, the Indians on first seeing our Boats, came forward in their Canoes, Equip'd for War, almost every Man was provided with War Mat, which they took off, as soon as certain tokens of friendship were given on each side, they were Armed with Clubs, Lances and Bows and Arrows. The report of Fire Arms created great surprise and terror among them, and the effect was shewn to them by shooting many birds, The Indians beg'd of Mr. Broughton to fire, at a War Garment imagining it would not be pierced, of course he satisfied their curiosity, and still more alarmed them, by driving a ball through it when twice doubled, An old Man who appeared of some consequence, kept Company with them few days, and became particularly attached to the Capt, he supplied them with Fish and many other things, as he led the way in his Canoe and had sufficient authority to demand part of the Sport every hunter or fisherman had met with. The River narrowed to a mile about fifty miles up, and where they left off, its breadth was half a Mile, and three fathoms deep, the Water quite fresh and clear, not at all influenced by the tide, but running gently with a continued drain down, Many small Rivers emptied themselves into it, one of which the Captain honor'd with my Name. (Manby 1792)

Lieutenant William A. Slacum Reconnaissance, 1836–1837

In 1836 John Forsyth, Secretary of State in the Jackson administration, ordered William A. Slacum, an officer in the U.S. Navy, to visit the "coast of the United States" and assess the number of Indians, residents, attitudes toward Russia and the United States, and potentials of the region. Slacum's mission was a geopolitical move of the United States to identify potentials harbors and commercial prospects, should the nation expand its territory to the shore of the Pacific Ocean. Slacum traveled to Baja California and to Hawaii where he chartered the Loriot. The vessel entered the Columbia estuary in December, 1836 (Bancroft 1886:100).

Awaiting a pilot to guide the Loriot up the Columbia, Slacum traveled by canoe and landed at Fort Vancouver on January 2, 1837. A week later he departed for the Willamette Valley. He left Oregon in early February. Slacum's reconnaissance eventually included Puget Sound, San Francisco Bay, and San Diego Bay. He described, in particular, the operations of the Hudson's Bay Company and its headquarters at Fort Vancouver. Slacum's account, Report of the Committee on Foreign Affairs, to which was referred a Message from the President of the United States, with a Resolution to the House, in Relation to the Territory of the United States Beyond the Rocky Mountains, was published in 1839 in the Congressional Serial Set (Bancroft 1886:100–101).

Captain Edward Belcher's Reconnaissance, 1839

In 1835 the British Navy dispatched the *Sulphur* and the *Starling* to the Pacific Ocean to verify existing survey data and collect information of interest to the Admiralty Office. Captain Edward Belcher of the *Sulphur* operated under orders that included the note: "Political circumstances have invested the Columbia River with so much importance that it will be well to devote some time to its bar and channels of approach, as well as its inner anchorages, and shores." Belcher explored the Columbia estuary from 16 July to 12 September 1839. McLoughlin noted: "The *Starling* met with several accidents in this River, and on different occasions lost two rudders which we furnished means to replace" (McKelvey 1991:636; McLoughlin 1943[2]:228; Henry 1984:132–135).

Two accounts document this expedition's work on the Columbia and vicinity of Fort Vancouver: Belcher's (1843) *Narrative of a Voyage Round the World, Performed in Her Majesty's Ship Sulphur, During the Years 1836–1842* and Richard Brinsley Hinds' (1844) T*he Botany of the*

Voyage of H. M. S. Sulphur, Under the Command of Captain Sir Edward Belcher, R.N., C.B., F.R.G.S...During the years 1836–1842. Belcher noted on August 9, 1839: "After being nearly devoured by mosquitoes, we reached Fort Vancouver... as the crow flies, eighty-two miles from Cape Disappointment... As to the appellation of Fort Vancouver, it is clearly a misnomer; no Fort Vancouver exists; it is merely the mercantile post of the Hudson's Bay Company." Belcher assessed the civilian and mission settlements in the Willamette Valley, repaired his ships, and departed in September (McKelvey 1991:644–645, 653).

Belcher's account is representative of the information recorded about the appearance and environs of Fort Vancouver in the 1830s:

> It stands about three hundred yards within the northern edge of the river, is a picketed enclosure three hundred yards square, the pickets being eighteen feet high, composed of roughly split pine logs. No attention to strength has been paid in its construction. It is furnished with three gates, two of which are invariably open by day. The houses of residence, as well as store-houses of the company, are within this enclosure, forming two squares. No guard is observed. The trade store is open during working hours and any increase of number amongst the Indians would not excite uneasiness on the part of the officers.
>
> In the eastern square the main building is occupied by the chief, in which also is the sala or mess-room. In front of the steps of this building are two long twenty-four pounder ship guns and two short, merchant-ship cannonades, twelve or eighteen pounders. On the left, at right angles, are the quarters of other clerks, traders, etc. Those who have married the Canadian half-castes generally live in their quarters or come to the general table when it suits. It is not a little strange in a community so long established, that the women should be almost totally unacquainted with the language of their husbands.
>
> In the rear of the fort is an excellent kitchen garden and orchard, occupying about the same space as the fort, (three hundred yards on its sides) and behind this is a large tract of cultivated land and extensive shore-houses, barns, etc., and abundance of grain in stacks. (Belcher quoted in Alley and Munro-Fraser 1885:25)

Within or immediately adjacent to the CRC project area was the "Village," residence of company engagés, Indian wives, children, and workers from Hawaii and Polynesia. Belcher wrote:

> To the westward are situated, without the palisade, at a distance of a quarter mile, the hospital and houses of the Canadian establishment, forming a complete village. All is apparently defenseless, although when turned out, every man will be found with a well-tried rifle and couteau de chase, or other means of efficient defense; and their partners are efficient helpmates in the literal sense of the phrase. (Belcher quoted in Alley and Munro-Fraser 1885:25)

Lieutenant Charles Wilkes and the U.S. Exploring Expedition, 1841

Dispatched by the Jackson administration, Lieutenant Charles Wilkes headed a multi-faceted naval reconnaissance that was in the field from 1838 to 1842. The five vessels and 350 personnel of the U.S. Exploring Expedition visited South America, rounded Cape Horn, explored the South Pacific and Hawaii, and then in 1841 mounted a reconnaissance of the west coast of North America. The expedition included naturalists, artists–Titian Ramsey Peale, James Drayton, and Alfred Thomas Agate, a mineralogist–James Dwight Dana, botanists–William Dunlop Brackenridge and William Rich, a linguist–Horatio Hale, and others. Several of the expedition members kept diaries and some produced sketch books of places and objects they saw during

their travels (Viola 1985). The manuscript records of the expedition include significant holdings in the National Archives, Washington, D.C., and personal papers at the Beinecke Library, Yale University, New Haven, Connecticut.

The U.S. Exploring Expedition crossed the Columbia Bar, losing the vessel *Peacock* on what later became known as Peacock Spit, and sailed upstream to Fort Vancouver. Wilkes had traveled overland with a party from Puget Sound south to the fort. He dispatched an expedition to travel up the Columbia to Fort Walla Walla and another to travel south through the Willamette Valley and southwestern Oregon to Sutter's Fort in California. A number of members of the Wilkes expedition wrote about their experiences at Vancouver in 1841 (Bancroft 1886:246–249).

Charles Wilkes described his arrival at the Kanaka Village:

> It becoming necessary to make a short portage within a mile of Vancouver, we concluded to walk thither by road. In this march we first entered a wood of large pines, which had an undergrowth of various flowering shrubs. The old stumps in the road were overgrown with the redhoneysuckle, in full blossom. Lupines and other flowers grow even in the roadway.
>
> We came in at the back part of the village, which consists of about fifty comfortable log houses, placed in regular order on each side of the road. They are inhabited by the Company's servants, and were swarming with children, whites, half-breeds, and pure Indians. The fort stands at some distance beyond the village, and to the eye appears like an upright wall of pickets, twenty-five feet high: this encloses the houses, shops, and magazines of the Company. the enclosure contains about four acres, which appear to be under full cultivation. Beyond the fort, large granaries were to be seen... Near by are the rooms for the clerks and visiters [*sic*], with the blacksmiths' and coopers' shops. In the centre stands the Roman1 Catholic chapel, and near by the flag-staff; beyond these again are the stores, magazines of powder, warehouses, and offices. (Wilkes 1845[4]:326–327)

Figure 9. "A Scene on the Columbia River, 1841." Drawing by Henry Eld of the U.S. Exploring and Surveying Expedition of man with musket, Indian woman broiling a salmon, dugout canoe, and Mount Hood in right center background (from Henry 1984:213).

The Wilkes Expedition report, *Narrative of the United States Exploring and Surveying Expedition During the Years 1838, 1839, 1840, 1841, 1842*, included five volumes, an atlas, and fifteen folios of scientific plates as well as extensive manuscript correspondence, diaries, and sketches, some of which subsequently secured publication (Figure 9). Volumes four and five included information the Columbia River, Puget Sound, and Willamette Valley and the reconnaissance through southwestern Oregon to Sutter's Fort on the Sacramento River (Wilkes 1845).

Duflot de Mofras Reconnaissance, 1841

The French government in 1839 dispatched Duflot de Mofras, an attaché at the French embassy in Madrid, to go to Mexico and then mount a reconnaissance of the Pacific Coast northward to Alaska. Ostensibly de Mofras was to assess the potentials for French commerce. His observations were much broader and, in addition to producing an informative map of the Lower Columbia River (Figure 10), de Mofras described harbors, rivers, natural history, and the material culture of the Indian populations (Bancroft 1886:250).

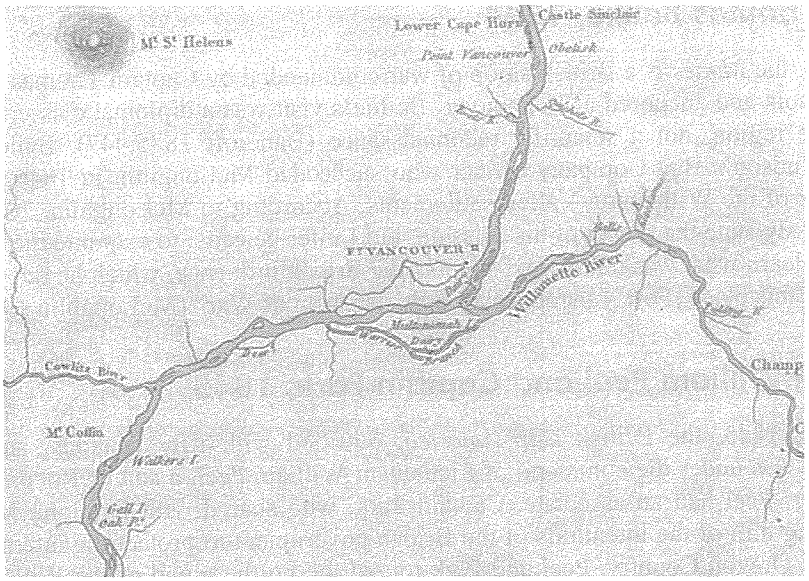

Figure 10. Portion of map of the Lower Columbia River showing features in the vicinity of Vancouver (de Mofras 1937).

De Mofras arrived at Fort Vancouver in the fall of 1841. He noted:

> This [fort] is situated on the north and right bank of the Columbia River, about 30 miles in from its mouth, on a small plain approximately a mile wide that extends for two leagues along the river. The land was a gradual rise, the lower end forming a prairie, while the upper end is crowned by dense forests. The location is extremely picturesque. In front of the fort immense plains covered with verdure are visible stretching off into the distance. In the foreground flow the limpid waters of the river, shaded by great trees. On the southeast towers Mt. Hood, whose eternal snows stand out in striking contrast to the somber tones of the pine forests that rise near by.

> The fort is situated 300 meters back from the river. The palisade that overlooks the south is 240 meters wide and 130 meters deep. The fort has neither moats nor any kind of defense except two antiquated iron cannon that have been spiked, which stand in the center of the quadrangle.
>
> The enclosure contains thirty separate buildings. These include quarters for the governor, the superintendent, and other employés of the Company, together with their families, carpenter, locksmith, and blacksmith shops, forges, storehouses for furs, tanneries, a warehouse for European merchandise, a pharmacy, and a Catholic church that also serves as a school. All of these buildings are constructed of wood, except the powder magazine which is an isolated brick structure.
>
> A large vegetable garden filled with fruit trees adjoins the fort, and every year 600 hectares of ground near by are placed under cultivation. On the shore are situated the sheds and dockyards used by barges and small boats. A few hundred feet beyond the fort cluster the small houses erected for the employés. Near them are a flimsy structure used as a hospital, a few sheds, two sheep pens, a milkhouse, stables, granaries, and a machine for threshing wheat. (de Mofras 1937[2]:98–99)

Captain Thomas Baillie, 1844

In July, 1844, the *Modeste*, a British sloop of war commanded by Captain Thomas Baillie, sailed up the Columbia and anchored at Vancouver. Baillie's visit was a diplomatic assertion of British claims to the region, not a scientific reconnaissance (Bancroft 1886:447). Bailee and James Douglas, a Hudson's Bay Company officer who succeeded McLoughlin in 1846, accompanied him on a tour of the Willamette Valley settlements. According to McLoughlin, "Captain Baillie did not expressly state the object of his Mission, but I infer he came to examine the River, see the Country, and learn what was doing, and support the British influence, which he did greatly by the appearance at this place [Fort Vancouver] of a British Man of War" (McLoughlin 1944:35).

Lieutenant William Peel and Captain Park, 1845

In September, 1845, the British ship *America*, outfitted with fifty cannons, arrived at Fort Vancouver. It was under the command of Lieutenant William Peel, a son of Robert Peel, British prime minister. Peel had an associate, Captain Park, who shared with Dr. John McLoughlin a letter informing him of the intentions of the British government to protect the interests of British citizens in the Oregon Country. Peel and Park toured the northern end of the Willamette Valley (Bancroft 1886:497–498; McLoughlin 1944:146).

Lieutenant Henry Warre and Lieutenant M. Vavasour, 1845

In August, 1845, two British Royal Engineers arrived overland from Canada. While they were ostensibly surveyors examining the Columbia estuary, Warre and Vavasour were assessing the situation in Oregon: the interests of the British and the attitudes and actions of American residents (Bancroft 1886:500). These observers spent several months in the Pacific Northwest, visiting from the Willamette Valley settlements north to Puget Sound.

Henry Warre executed numerous pencil sketches and watercolors. His view of "Fort Vancouver on the Columbia River" looked north. The sketch included several buildings, three outside and the remainder inside the stockade, with towering conifers dominating the horizon behind the fort (Warre 1970:Plate 40).

Lieutenant Neil M. Howison, 1846

Americans elected James K. Polk in 1844 on a political agenda of territorial expansion. A provocateur of the Mexican War, Polk also pressed for resolution of American claims to the Pacific Northwest that led, ultimately, to the Oregon Treaty with Great Britain in 1846. To further these objectives, the Polk administration dispatched Lieutenant Neil M. Howison, U.S. Navy, to Oregon aboard the *Shark*, a vessel of twelve guns. Howison reached Fort Vancouver on July 24. In light of the fact that several vessels containing more than 300 personnel of the U.S. Navy's Surveying and Exploring Expedition had previously toured the region in 1841, Howison's visit was not necessary, except for unstated geopolitical purposes.

Howison's reconnaissance included a tour during the summer of 1846 of the northern Willamette Valley, a visit to Oregon City, and numerous meetings with Provisional Governor George Abernethy. Howison made an assessment of American and British strengths and commitments in the region and, possibly working under covert orders, laid the groundwork for an American seizure of the Pacific Northwest. His Report on Coast, Harbors, etc., of Oregon appeared in the Congressional Serial Set in 1848 (Bancroft 1886:584–590). Howison wrote:

> About twenty-two years ago, leaving a single trader to conduct the trade at Astoria, they [the British] made a new settlement 96 miles up the river, and called it Vancouver. This eligible site is the first prairie land found upon the banks of the river sufficiently elevated to be secure from the summer inundations. (Howison 1848:12)

McClellan Reconnaissance, Pacific Railroad Surveys, 1854

Isaac Ingalls Stevens, governor of Washington Territory, assumed command of the Northern Division, Pacific Railroad Surveys, to explore a feasible route for a railroad from St. Paul, Minnesota, to Puget Sound. To facilitate this far-flung enterprise, Stevens assigned Captain George G. McClellan to mount the examination of the Cascade Range in Washington Territory to identify potential passes for the railroad. Using Fort Vancouver as his supply base and point of departure, McClellan's party assembled at Vancouver in 1854 and explored the Indian trail via the South Fork of the Lewis River to carry out its assignment.

Dr. James Graham Cooper, naturalist for the Western Division surveys, described the landscape from the north shore of the Columbia to the Cathlapootle (Lewis) River in July, 1854:

> The principal trees of this region were in three species of abies, (spruce and fir), one oak, two maples, one dogwood, one ash. The character of the shrubs were two wild roses, three spirens, an elder, and the 'Oregon grape.' Near the streams grew several species of raspberry and the two poplars, and various willows, which were seen on the river banks throughout the country. Two species of huckleberry, a red and a blue fruit kind, were abundant in some parts. Very few plants were in flower in the forest, and but few on the plain, the dry season being accompanied by an almost complete cessation of growth of grass, and then dried up, and round the borders of some was a dense growth of pteris, (fern) reaching above a man's head and almost impassable in places. Most of these prairies are covered by water in wet seasons, which prevents the coniferous trees from growing on them, and assimilates their vegetation to that of the river banks. (Cooper 1855:179)

Figure 11. Section 1859 map showing plat of Vancouver and Fort Vancouver Military Reservation (Wheeler and Dixon 1859, from Hussey 1957: Pl. XXI).

Fort Vancouver–Fort Cascades Military Wagon Road, 1855–1856

The Cascade Portage was key to travel and shipment of supplies to military posts in the interior of the Pacific Northwest. In light of the establishment of Fort Dalles and Fort Walla Walla and proposed additional posts to guard Indian reservations, the U.S. Topographical Engineers surveyed and constructed a wagon road, under direction of Lieutenant George H. Derby, from Fort Vancouver via the north bank of the Columbia River to the U.S. Army Quartermaster's warehouse at Fort Cascades and farther east to the Upper Cascades (Derby 1855).

Fort Vancouver, western terminus of the road, served as headquarters for the Quartermaster Department of the U.S. Army for the Pacific Northwest in the mid-nineteenth century (Figure 11). Annually tons of supplies: food, munitions, weapons, uniforms, harness, wagons, and other materials arrived on the north shore of the Columbia River. The Quartermaster Department logged receipt of these supplies, stored them in warehouses, and, as needed, dispatched them to the military posts in the Department of the Columbia. The Quartermaster warehouses were on the western margin of the military reservation and were situated directly north of the Kanaka Village or servants' quarters of the Hudson's Bay Company post (Wheeler and Dixon 1859).

Fort Vancouver–Fort Steilacoom Military Wagon Road, 1855–1856

Officials of the U.S. Army deemed critical communication between Puget Sound and the Columbia River. Travel proved difficult and problematic at the time of establishment of Fort Vancouver. Finally in the fall of 1855 the U.S. Topographical Engineers gained the assignment to survey and construct a passable wagon road over this route via the watershed of the lower Cowlitz River. Fort Vancouver was the southern point of origin and supply for the parties mounting this survey and construction project. The reconnaissance commenced in October, largely under the direction of civilian surveyor George Gibbs who worked under contract for Lieutenant George H. Derby of the Topographical Engineers. Both surveying and construction of this route were interrupted by the outbreak of troubles with the region's Indians (Gibbs 1855a; 1855–1856a).

CIVILIAN EXPLORATION

Between 1825 and 1850 a variety of civilian naturalists–not financed by any government–visited Fort Vancouver and explored the Pacific Northwest. Because Vancouver was the primary outfitting post and center of Euroamerican civilization, the site served as base camp and point of supply for each of these visitors. A number of them kept diaries and described conditions on the north bank of the Columbia River.

David Douglas, 1825

David Douglas, a botanist employed by the Royal Horticultural Society of London to collect exotic plants in the Pacific Northwest, arrived at the new post, Fort Vancouver, in 1825:

> My residence is on the north bank of the river twelve miles below Point Vancouver (90 from the ocean), the spot where the officer of his squadron discontinued their survey of the river [in 1792]. The place is called Fort Vancouver. In the river opposite my hut lies Menzies Island [Hayden Island], so named by Mr. [William] Broughton in honour of Archibald Menzies, Esq., then his companion on the famous expedition. On my arrival a tent was kindly offered, having no houses yet built, which I occupied for some weeks...
>
> Made a visit [May 2, 1825] to Menzies Island [Hayden Island], in the Columbia river, opposite the Hudson Bay Company's establishment at Point Vancouver, seventy-five miles from Cape Disappointment. The island is low, sandy shores, rich vegetable soil in the middle, frequently inundated when the river is much swollen. (Douglas 1972:34–35)

John Kirk Townsend and Thomas Nuttall, 1834

John Kirk Townsend (1809–1851) traveled overland in 1834 with Nathaniel J. Wyeth's second expedition. Townsend spent nearly two years collecting specimens and writing his observations on the natural history of the Oregon Country. His book, *Narrative of a Journey Across the Rocky Mountains to the Columbia River and A Visit to the Sandwich Islands, Chili, &c., with a Scientific Appendix* (1839), became a classic of early explorations and travels in the Pacific Northwest. Of significant value are the appendices to Townsend's book, enumerating the species he observed and collected in the Pacific Northwest. Little recognized but of interest were Townsend's duplicate bird skins and animal pelts, several of which were used by John James Audubon to illustrate his books on North American natural history. Townsend arrived at Fort Vancouver in mid-September, 1834, and wrote:

> Fort Vancouver is situated on the north bank of the Columbia on a large level plain, about a quarter of a mile from the shore. The space comprised within the stoccade is an oblong square, of about one hundred, by two hundred and fifty feet [yards]. The houses built of logs and frame-work, to the number of ten or twelve, are ranged around in a quadrangular form, the one occupied by the doctor being in the middle. In front, and enclosed on three sides by the buildings, is a large open space, where all the in-door work of the establishment is done. Here the Indians assemble with their multifarious articles of trade, beaver, otter, venison, and various other game, and here, once a week, several scores of Canadians are employed, beating the furs which have been collected, in order to free them from dust and vermin. (Townsend 1839:160–170)

Townsend visited the farm north of the fort and noted that the Hudson's Bay Company had a grist mill, threshing mill, and a water-powered sawmill. He wrote of the employee village (Kanaka Village) west of the stockade:

> On the farm, in the vicinity of the fort, are thirty or forty log huts, which are occupied by the Canadians, and others attached to the establishment. These huts are placed in rows, with broad lanes or streets between them, and the whole looks like a very neat and beautiful village. The most fastidious cleanliness appears to be observed; the women may be seen sweeping the streets and scrubbing the door-sills as regularly as in our own proverbially cleanly city [Philadelphia]. (Townsend 1839:171–172)

Townsend subsequently revised his assessment about the tidiness of the "Village."

Samuel Parker, 1835

Samuel Parker, an American missionary, arrived overland at Fort Vancouver in October, 1835. Parker was scouting the Oregon Country for prospective mission locations for the American Board of Commissioners of Foreign Missions. In his description of the fort, Parker also mentions the adjacent settlement of Kanaka Village:

> Fort Vancouver is situated on the north side of the Columbia river about sixty rods from the shore, upon a prairie of some few hundred acres, surrounded with dense woods. The country around, for a great distance, is generally level and of good soil, covered with heavy forests, excepting some prairies interspersed, and presents a pleasing aspect… The enclosure is strongly stockaded, thirty-seven rods long, and eighteen rods wide, facing the south. There are about one hundred white persons belonging to this establishment, and an Indian population of three hundred in a small compass contiguous. There are eight substantial buildings within the enclosure, and a great number of small ones without, making quite a village appearance. (Parker 1838:140)

Thomas Jefferson Farnham, 1839

Visiting Fort Vancouver in 1839, the American explorer Farnham reported:

> The fort itself is an oblong square two hundred and fifty yards in length, by one hundred and fifty in breadth, enclosed by pickets twenty feet in height. The area within is divided into two courts, around which are arranged thirty-five wooden buildings, used as officers' dwellings, lodging apartment for clerks, storehouses for furs, goods, and grains; and as workshops for carpenters, blacksmiths, coopers, tinners, wheelwrights, &c. One building near the rear gate is occupied as a school-house; and a brick structure as a powder-magazine. The wooden buildings are constructed in the following manner. Posts are raised at convenient intervals, with grooves in the facing sides; in these grooves planks

are inserted horizontally; and the walls are complete. Rafters raised upon plates in the usual way, and covered with boards, form the roofs.

Six hundred yards below the fort, and on the bank of the river, is a village of fifty-three wooden houses, generally constructed like those within the pickets. In these live the Company's servants. Among them is a hospital, in which those who become diseased are humanely treated. At the back, and a little east of the fort, is a barn containing a mammoth threshing machine; and near this are a number of long sheds, used for storing grain in the sheaf. And behold the Vancouver farm, stretching up and down the river (3,000 acres, fenced into beautiful fields) sprinkled with dairy houses, and herdsmen and shepherds' cottages! A busy place. (Farnham 1906:64)

Captain Spaulding, 1841

In 1841 Captain Spaulding of the Lausanne ascended the Columbia and wrote:

> Fort Vancouver is situated on the north side of the Columbia river, about ninety miles from Cape Disappointment, on a beautiful plain about one-fourth of a mile from the river. The stockade forms a quadrangle, and contains about twelve buildings, including warehouses, mechanics' shops, dwelling-houses, &c., in the course of which is the house, &c., occupied by Dr. McLaughlin, chief agent for the Hudson's Bay company, and who has charge of all their affairs in this part of the territory. (Spaulding 1843:56)

James Clyman, 1844

An American fur trapper, James Clyman visited Fort Vancouver in October, 1844. He wrote:

> The great depository of goods and peltries for all the Indian trade west of the main range of the Rocky mountains stands on a gravely plain on the north side of the Columbia River and about five miles above the upper mouth of the Wilhamet and is situated bearly above extreme high water mark.
>
> The Fort itself is a wooden stockade and contains in its inside the companies store all the offices of the company and a complete Quadrangular row of Buildings for servants &c which like the outer works can be closed by port doors at pleasure all in a good State of repair & kept clean and neat. (Clyman 1960:117)

Joel Palmer, 1845

In December, 1845, overland emigrant Joel Palmer traveled down the Willamette River from Oregon City to visit Fort Vancouver. With the advent of Christmas, Palmer found the settlement ready for a holiday as he observed activities that ranged along the north bank of the Columbia River near the fort. He wrote:

> Some were engaged in gambling, some singing, some running horses, many promenading on the river shore, and others on the large green prairie above the fort. H. B. Majesty's ship of war Modesté was lying at anchor about fifty yards from the shore. The sailors also seemed to be enjoying the holydays–many of them were on shore promenading, and casting *sheep's eyes* at the fair native damsels as they strolled from wigwam to hut, and from hut to wigwam, intent upon seeking for themselves the greatest amount of enjoyment... (Palmer 1847:111)

The fort was an imposing establishment for Palmer:

> The fort stands upon the north bank of the Columbia, about six miles above the upper mouth of the Willamette, and about four hundred yards from the shore. The principal buildings are included within a stockade of logs, set up endwise close together, and about twelve feet high; the lower ends of the timbers being sunk about four feet in the ground. A notch is cut out of each log near the top and bottom, into which a girth is fitted, and mortised into a large log at each end, the whole being trenailed to this girth. I judge the area contains about four acres. The first thing that strikes a person forcibly upon entering one of the principal gates upon the south, is the two large cannons, planted one upon either side of the walk leading to the Governor's house, immediately in front of the entrance. Many of the buildings are large and commodious, and fitted up for an extensive business, others are old fashioned looking concerns, and much dilapidated. East of the fort and along the river bank there is a grassy prairie, extending up for about three or four miles; it has been cultivated, but an unusually high freshet in the river washed the fence away, and it has since remained without cultivation. (Palmer 1847:112)

Palmer noted a large farm north of the fort where stood numerous buildings. To the west within or immediately adjacent to the Columbia River Crossing project area he described the settlement of company servants (HBC Village): "Below the fort, and extending from the river for half a mile north, is the village; the inhabitants of which are a mongrel race, consisting of English, French, Canadians, Indians of different nations, and half breeds, all in the employ of the company. The buildings are as various in form, as are the characteristics of their inmates" (Palmer 1847:113).

Paul Kane, 1846

In December, 1846, Paul Kane, a Canadian artist, arrived at Fort Vancouver during an expedition across North America to study and paint the Indians and landscapes. Kane executed several works of art based on his sketches and watercolors in the vicinity of Fort Vancouver. The images included Upper Chinookan lodges and dipnet fishing, portraits of headmen, and views of the eruption of Mount St. Helen. He noted:

> Fort Vancouver, the Indian name of which is Katchutequa, or 'the Plain,' is the largest post in the Hudson's Bay Company dominions, and has usually two chief factors, with eight or ten clerks and 200 voyageurs, residing there. Our society was also enlivened by the addition of the officers of Her Majesty's ship of war the 'Modeste,' which had been on this station for two years, and lay in the river opposite the establishment. The buildings are enclosed by strong pickets about sixteen feet high, with bastions for cannons at the corners. The men, with their Indian wives, live in log huts near the margin of the river, forming a little village–quite a Babel of languages, as the inhabitants are a mixture of English, French, Iroquois, Sandwich Islanders, Crees and Chinooks. (Kane 1925:117)

Arline Anderson Cairns, 1890

Thomas Anderson served as commander of the Fourteenth Infantry at Vancouver Barracks from 1882 to 1894. A veteran of the Civil War, his family arrived at Vancouver in 1890 via Portland. His daughter, Arline Anderson Cairns, wrote vividly about the historical landscape surrounding the fort and the city:

> As our destination was Vancouver Barracks on the Washington side of the Columbia River, we had to take a river boat to complete our journey. Accordingly we boarded the

> old river boat, the 'Lurline' and steamed down the Willamette to its mouth, thence up the Columbia to the town of Vancouver, taking three hours for the trip...
>
> Back of the garrison there still remained a small portion of the forest primeval. The trees attained a height of from two to three hundred feet. On foggy days we could not see half-way to the tree tops. The foot paths wound through dense bracken and flowering shrubs; dogwood made white stars in the dark branches of fir and cedar trees, wild currant made rosy spots here and there, and on the ground, first to appear in spring were the pure, white trillium. (Cairns 1961:32–33)

HISTORICAL ASSESSMENT OF THE "VILLAGE"

John A. Hussey mounted a rigorous exploration of historical, cartographic, and visual information to write an overview of the Hudson's Bay Company's Fort Vancouver. At several points he commented about company structures and activities along the north bank of the Columbia River. Under the heading "General View," Hussey wrote:

> In the immediate neighborhood of the fort, in 1846, were the Catholic church, several large barns and other farm structures, the homes of the lower grades of employees which collectively made up the 'Village,' and a scattering of other structures, large and small. Along the river bank were two large boat sheds, a structure known as the 'Salmon Store,' the hospital, the 'Salt House,' several stables, workshops, and residences. (Hussey 1957:117)

Under the heading "In the village, west and southwest of the fort," Hussey noted:

> De Roche's dwelling, lined and ceiled, 30 x 20 feet
>
> Between about twenty to forty additional dwellings, sheds, out-houses, etc. (Hussey 1957:197)

Hussey's more expansive description under the heading "The Village" began as follows:

> The lesser employees at Fort Vancouver–the tradesmen, artisans, boatmen, laborers, and so forth–for the most part had their homes in what was known as the 'village,' on the plain west and southwest of the stockade. Immediately west and north of the fort was a large cultivated field. Bounding this field on the west, and some six or seven hundred feet from the west stockade wall, was a road which led from the area of the wharf and lagoon to the site of the new Catholic church. Along the west side of this road were lined a number of the village houses, giving the appearance of a street. Another road branched from this one about opposite the northwest corner of the palisade and ran in a westerly direction over the plain. Along this second road, also, about half a dozen houses were ranged with some semblance of regularity. But with these two exceptions it is somewhat difficult to identify the neat 'rows' of huts mentioned by certain visitors to the fort. (Hussey 1957:217)

After presenting accounts of the "Village" by John Kirk Townsend, Hall J. Kelley, Thomas Jefferson Farnham, and Joel Palmer, Hussey continued:

> A good description of the town and its buildings as they stood about the end of the 1840s was given many years later by William F. Crate, the millwright. The village in 1849, he said, was in as good condition as it had been in 1843, 'and in my opinion better.' There were separate streets for French-Canadians, for Kanakas, and for Englishmen and Americans, although most of the employees of the latter two nationalities lived 'scattered

> around,' above and below the fort. Some of the dwellings were built in the Canadian style, of two or four-inch planks; some were built in 'American cottage fashion,' framed and weatherboarded; some were of squared timbers; a 'very few' were of logs; and a number were of edged slabs from the Company's sawmill, the slabs applied with the flat side out.
>
> The houses were generally one story high, but some had one and half stories. A number were ceiled on the inside, and some were even papered. More were plastered with clay. They generally contained two or three rooms, although many had but a single room.
>
> With the decline of the Company's business at Vancouver during the 1850s, the staff of employees was cut, and the number of houses in the village was proportionately diminished. Beginning in 1849, some of the better structures were rented to the Army, chiefly for use as quarters and offices for the Quartermaster Department. By the early 1850s, the village had degenerated into a collection of 'old slab buildings,' generally described collectively as 'Kanaka Town.' (Hussey 1957:218–219)

Hussey also included a description of "The Salmon House" on the north bank of the Columbia River:

> The salmon house, or "fish house" as it was sometimes called, was located at the head of the Company wharf near the bank of the Columbia. It was a large building, measuring 100 x 40 feet, and as might be assumed from its name, was used principally for storing cured salmon. The date of its construction is not known, but in 1849 it was considered an old building. Its roof was then in good condition, but otherwise it was much dilapidated." (Hussey 1957:221)

Hussey reported that the "Village" fell into increasing disrepair in the 1850s and that the military at Fort Vancouver removed a number of the buildings. He wrote:

> Finally, in February, 1860, the military authorities decided to clear the land west and southwest of the fort, embracing a tract of land lying in front of the Quartermaster's office and depot, and stretching from the western boundary of the reservation to a line of stakes commencing at a point about eight yards east of the Catholic church and running from thence in a southerly direction to the river. On March 1, a board of Army officers examined the area and found nine buildings 'claimed' by the Hudson's Bay Company, 'mere shells,' rapidly going to decay and most of them propped up to keep them from falling down. it was decided that these structures–the Salmon House, the 'Johnson House,' and the 'Field House'–were of 'some little value' and should not be destroyed, but the remaining six had to go. Some of the condemned structures were not in the village, a fact which indicates that by March, 1860, the former town had been almost completely obliterated, at least within the boundaries of the military reservation." (Hussey 1957:219–220)

In March, 1860, the army removed the Hudson's Bay Company fences, burned a house used for hay storage, burned the house of William R. Kaulehelehe, better known as Kanaka Billy, who lived in the village from at least 1846, and may have destroyed a few other structures as well. "Johnson House" was moved, but the "Field House" remained standing and, for some time, was occupied by Mrs. Stubbs. Hussey concluded: "Thus, with these exceptions, all traces of the village within the boundaries of the military reservation had disappeared by the end of 1860" (Hussey 1957:220).

The demographics of the population at Kanaka Village between 1827 and 1843 have been reconstructed by Ron Towner (1984). The adult male population of the Kanaka village was variable, perhaps a reflection of incomplete records but maybe also a function of the coming and going of men in their jobs for the Hudson's Bay Company (Table 5). During this period the

French-Canadians dropped from a high of 117 in 1827–1828 to 44 in 1843, while the Hawaiians increased from 18 in 1827–1828 to 78 in 1843. Other residents included Anglo-Saxons (a low of 6 in 1830–1831 to a high of 28 in 1843), Iroquois (a high of 14 in 1827–1828), and Indians of other Tribes (a high of 25 in 1843).

Table 5. Ethnic Origin of Adult Males at Kanaka Village by Year.

Ethnic Origin	June 1827–June 1828		1830–1831		1837		1838–1839		1842		1843	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hawaiian	18	10	14	14	32	32	35	34	77	38	78	41
French-Canadian	117	61	53	53	30	30	29	28	54	27	44	23
Indians Other than Iroquois	17	9	3	3	4	4	5	4	25	12	25	13
Iroquois	14	7	4	4	4	4	4	4	5	3	7	3
Anglo-Saxon	10	5	6	6	24	24	22	22	27	13	28	15
Unknown	15	8	20	20	5	5	7	7	16	7	9	5
Totals	**191**	**100**	**100**	**100**	**99**	**100**	**103**	**100**	**204**	**100**	**191**	**100**

Source: Towner (1984:Table B-1).

Based primarily on the Hudson's Bay Company employment records and names bespeaking ethnic identity, Towner's study found that between 1827 and 1837 the primary occupations of the residents related to water transportation: seaman, middleman, boute, and boatswain. The employments confirmed that the fort was a primary port for incoming manufactured goods and furs, as well as for shipment of trade items east via the Columbia River. By the later 1830s the population of the village was increasingly dominated by Hawaiians and Anglo-Saxons and occupational callings shifted more to the mercantile trade: blacksmith, carpenter, storekeeper, and schoolmaster (Towner 1984:793–794).

The demography of Kanaka Village confirms two primary features: ethnic diversity, and employments that shifted from transportation to mercantile activity. When adding in the spouses and children connected to this adult male population, the Kanaka Village was a sizable, indeed vital community and integral to the operations of Fort Vancouver.

In addition to John A. Hussey's pioneering study, several more recent studies have addressed the development of the Hudson's Bay Company's Fort Vancouver. Important among these are the two-volume *Cultural Landscape Report, Fort Vancouver National Historic Site* (Taylor 1992; Erigero 1992a), and *Historic Overview and Evaluation of Significant Resources of Fort Vancouver, Vancouver Barracks, Providence Academy, Kaiser Shipyards* (Erigero 1992b). The sacramental work at St. Joseph's Mission, Fort Vancouver, is documented in *Catholic Church Records of the Pacific Northwest: Vancouver, Volumes I & II and Stellamaris Mission* (Munnick and Warner 1972). "St. James Mission, Cathedral and Church: A History of St. James Parish and the Diocese of the 'Square Noses'" (Ransom 1974:391–415) and "The First Cathedral: An Account from an Obscure French Book Written in 1863 by Abbe Rossi" (Hussey 1974:416–420) provide a narrative history of the early development of Catholic labors at Vancouver.

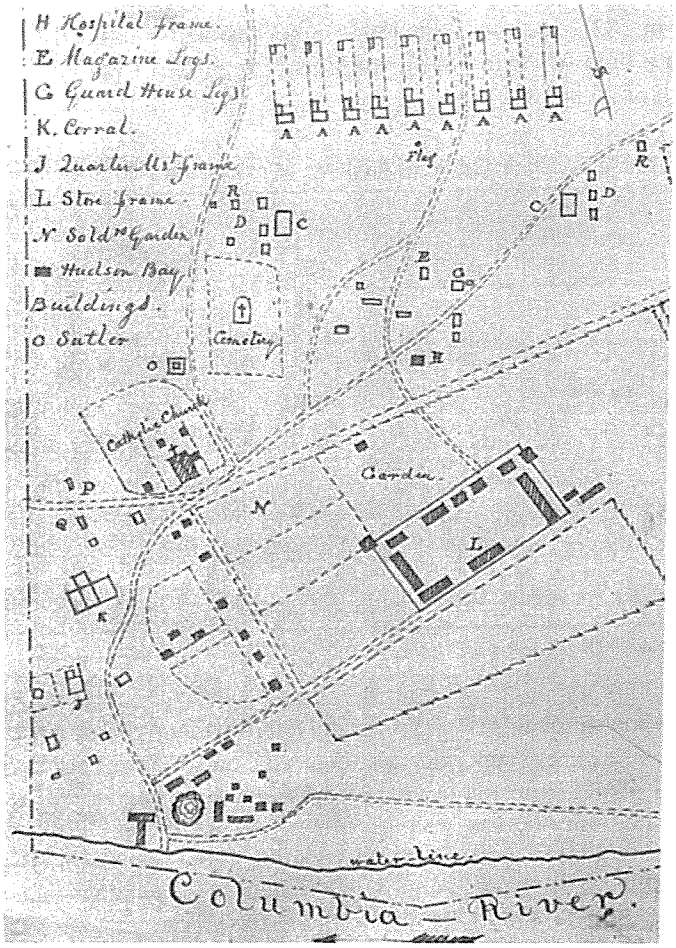

Figure 12. Mansfield's plat of Fort Vancouver Military Post (Frazer 1963).

U.S. ARMY'S FORT VANCOUVER

The Mounted Riflemen, U.S. Army, arrived in Oregon Territory in the fall of 1849. The expedition traveled the Oregon Trail to establish a series of posts to protect emigrants and Indians, respectively, and to assert the presence of the federal government in the American West. Following initial examination of prospects for a western base, Army commanders selected a site immediately adjacent to the Hudson's Bay Company's Fort Vancouver. The site was well chosen at the crossroads of east/west travel through the Columbia Gorge to the estuary and north/south from the Willamette Valley to Puget Sound. The decision, however, was fraught with controversy over competing land claims to the site. The combatants included the Hudson's Bay Company, U.S. Army, Catholic Church, and claimants to lands under the Donation Land Act (1850).

Joseph K. F. Mansfield in 1853–1854 mounted a reconnaissance of the U.S. Army posts in the American West. He visited Fort Vancouver, made a map of the post (Figure 12), and noted:

> *Fort Vancouver* is a beautiful site on the north bank of the Columbia River, in latitude 45° 36' 56" and longitude 122° 4', six miles above the mouth of the Willamette and one

> hundred miles above the mouth of the river, on a reservation of 640 acres, which lays over land claimed, and in part occupied by the Hudson Bay Company, in full view of Mounts Hood and Jefferson... This post is essential and important for a depot for the supply of posts in this quarter up [the] Columbia River and in parts of Washington Territory, but it would have been better located below the mouth of the Willamette, if a suitable site had been found... (Frazer 1963:114–115)

The U.S. Army has occupied Fort Vancouver from 1849 to the present. The development of the post has had no documented impacts on the future site of the Columbia River Crossing except, in the 1850s, removal or relocation of structures in the Hudson's Bay Company's servants' village west of the fort. The Army, in time, destroyed all structures in the village, razed St. Joseph's Catholic Church, and eventually obliterated the fencing and markers in the cemetery that served the residents of Fort Vancouver and the "village." Detailed and highly useful assessments of the U.S. Army presence at Fort during U.S. Army tenure have been written by Donna L. Sinclair (2005a, 2005b, 2005c).

CADASTRAL SURVEY DOCUMENTATION

The Columbia River Crossing project site is located in Township 1 North, Range 1 East, Willamette Meridian. The southwestern corner of the township is located in Oregon; the northern four-fifths of the township is located in Washington. The township's initial survey records are thus split between the two states. All of Hayden Island, identified in the mid-1800s as "Menzies Island" or "Vancouver Island," is south of the primary channel of the Columbia River and lies in Oregon. The following subsections summarize various surveys that also provide a sense of the historic landscape.

Washington Shore

In 1860 Lewis Van Vleet, contract surveyor for the General Land Office, recorded a detailed description of lands along the Columbia River at Vancouver, Washington. Van Vleet was engaged in the subdivision of the township in Washington. By that date the riverbank was already well-developed. Vancouver, an emerging townsite, adjoined the western boundary of the former Hudson's Bay Company post and the U.S. Army's Fort Vancouver (Figure 13).

Van Vleet's field notes create a picture of the lay of the land:

> North on a line between Sections 26 & 27 Var. 21o, 30' E.
>
> 1.70 Fence bears E. & W. and enter H[udson's] B[ay] field
>
> 6.80 Fence bears E. & W. And leave field
>
> 8.50 H[udson's] B[ay] Fort, bears N 85o E.
>
> 11.30 The Governor of H[udson's] B[ay] Company's house bears East 30 lks. Dist.
>
> 12.50 Leave H[udson's] B[ay] Fort bears N. 85o E.
> This Fort is about 1000 chains long the Section line passes through it 3.50 chains from the East end
>
> 17.50 Fence bears N. 5o W. And enter H. B. Field
>
> 20.00 Fence bears N. 85o E. And leave H. B. Field
>
> 20.50 Road bears N. 85o E.

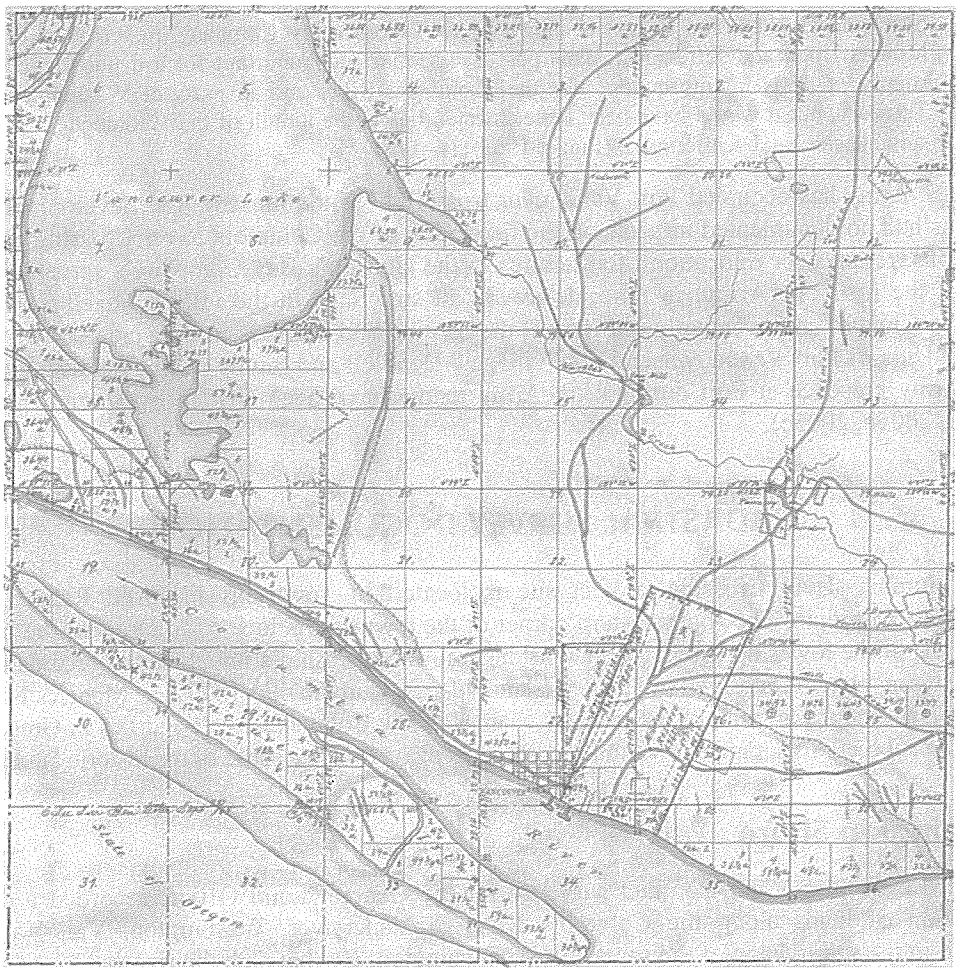

Figure 13. Portion of cadastral survey plat with subdivisions along the Columbia River in Washington, 1861 (Van Vleet 1860b).

21.05 Fence bears E. & W.

23.35 The old Government Hospital bears East 5 lks. dist.

24.35 Fence bears E. & W. And leave yard

25.40 Fence bears E. & W. And enter Garrison grounds.

40.00 Set post for 2/4 section corner from which A white Oak 8 in. Dia. Bears S 67o W 30 lks dist A Fir 40 in dia b ears S. 37o E 125 lks. Dist

42.50 Fence bears S 70o E. & Dr. Barns' house and office bears East 30 lks. dist.

44.80 Fence bears S 70o E. And leave the Garrison Grounds.

46.50 A Fir 30 in. dia.

52.00 Road bears N.E.

52.50 Enter timber bears E. & W.

80.00 Set post for corner to Sections 22, 23, 26 & 27 from which
A Fir 18 in. dia. Bears N. 43o W. 67 lks. dist.
A Fir 12 in. dia bears N 47o E. 80 lks. dist.
A Maple 4 in. dia bears S 15o E. 13 lks. dist.
A Maple 8 in. dia. Bears S. 32o W. 276 lks. dist.

Timber, Fir. Undergrowth Hazel & v. maple. (Van Vleet 1860a:84–85)

In this mile-long transit Van Vleet viewed to the east (on his right) several improvements of the Hudson's Bay Company: a field, fence, the Chief Factor's house, and the fort stockade. North of that he encountered part of the U.S. Army's Fort Vancouver: an old hospital, the garrison grounds (possibly the parade ground), and the house and office of Dr. Barns. As he continued north on this transit, Van Vleet entered the forest, a mix of fir and maple with an undergrowth of hazel and vine maple.

Van Vleet next wrote about his survey that ran west at about twelve blocks north of the Columbia River in Vancouver:

West on a true line between Sections 22 & 27 Var. 20°, 30' E.

2.30 A Fir 80 in. dia.

12.75 Road bears N. & S. And [William G.] Langfords house bears North 200 chs. dist.

36.25 Main street bears N. & S.

39.76 A Fir 18 in. dia.

40.00 Set post for 2/4 Section corner from which
A Fir 30 in. Dia. Bears N. 10 W. 116 lks. Dist.
A Dogwood 10 in dia. Bears S. 43o E 44 lks. Dist

62.50 A Fir 60 in. dia.

80.00 Set a post for corner to Sections 21, 22, 27 & 28 from which A Fir 30 in. Dia. Bears S. 64o E 105 lks. dist....

Land level. Soil 2nd rate. Timber, Fir, Undergrowth, Hazel, Vine Maple and Willow. (Van Vleet 1860a:84–85)

In running this westward line across the northern margin of Section 22, Van Vleet crossed Main Street. He found the land level and lightly timbered. William G. Langford, age 29, was an attorney in practice in Vancouver (Bureau of the Census 1860).

Van Vleet ran the line south between sections 27 and 28, a route almost through the middle of the Amos and Esther Short donation land claim, and wrote:

South on a true line bet. Secs. 27 & 28 Var. 21o E.

3.00 Trail bears E. & W.

7.37 A Fir 80 in. dia.

30.24 A Fir 20 in.

40.00 Set post for 1/4 sec. Cor. From which
A fir 30 in. dia. bears N. 30o W. 92 lks. dist.
A fir 20 in. dia. bears N. 37o E. 97 lks. dist.

54.75 Road bears E. & W.

57.47 Intersect the right bank of the Columbia River and set a post for meander corner to fractional sections 27 & 28 from which...

Land rolling. Soil 2nd rate. Timber, Fir. Undergrowth, Hazel & Willow. (Van Vleet 1860a:111)

Van Vleet also wrote an assessment of the entire township, most of it lying north of the Columbia River. His account is probably the first "word picture" of the setting of present Vancouver, Washington:

General Description

The land in the Township is much above the common average, the uplands are good 2nd rate, timbered with Fir, Cedar, Hemlock, Ash, and Maple, the Columbia bottom is prairie with a deep rich and warm soil, and subject to annual inundations in the moths of June and July. The land in this Township is nearly all claimed by donation claimants, and several preemption claims are now being taken.

The city of Vancouver is situated in section 27 and is a large flourishing & prosperous, commercial town. The United States Military Reservation at Fort Vancouver is situated in Sections 22, 23, 26, 27, 34 & 35. The St. James Catholic Mission claim is in Sections 22, 26, 27, 34 & 35. The claim of the Widow and heirs of Amos W. Short is located in Sections 21, 22, 27 & 28; the claim of the widow and heirs of F. Bier is located in Secs. 21. 22 & 27; the claim of the widow and heirs of Andrew Bolen in Secs. 15, 16, 21 and 22; the Vancouver townsite in Secs. 22 & 27. (Van Vleet 1860a)

Oregon Shore

In 1853 E. Kingsbury, a contract surveyor, began work in the Oregon portion of Township 1 North, Range 1 East, Willamette Meridian. The lands he subdivided included the north shore, a channel of the Columbia River, and Hayden (Vancouver) Island. The line he ran north between Sections 33 and 34 lay west about one-quarter mile from the present route of Interstate 5. Kingsbury wrote:

North Between Secs. 33 & 34

2.90 Intersect Columbia river & Set Meander post from which
an Ash 30 in[ches] dia[meter] bears S[outh] 51½ W[est] 36 l[in]ks a dead Bol[e?]
level 40 chains S[outh] 55½ E 323 ch[ain]s

Land rich alluvial bottoms under cultivation. (Kingsbury 1853:238)

Kingsbury meandered lakes in Sections 31 and 32 as well as the shore of the channel along the slough between the mainland and Hayden Island. At the time of his survey–1853–he noted the presence of settlers in the area:

Section 33: "Mr. Force's field"

Section 32: "Alexander Brown's house" (Kingsbury 1853:234)

Kingsbury created a brief verbal assessment at the completion of his work:

Most of this township lying north of the Columbia river & an island in the river is claimed by the Hudson Bay Co[mpany] & consequently was left unsurveyed. All south of the Columbia river is rich bottom land subject to inundation, except a narrow ridge along the river, there is a little low prairie arround the lakes, along the river is timbered with

> Balm gilead Ash willow &c. with a thick undergrowth of brears seeds vines willows &c. (Kingsbury 1853:236)

In 1860 E. Fitzhenry surveyed Hayden (Vancouver) Island. The island lay wholly in Oregon and included land in seven sections. Fitzhenry ran the section lines on the island and then mounted a meander survey. As of February, 1860, Fitzhenry noted only one settler–W. L. Stabler in Section 19. He commented on the island's level terrain, prairies, first-rate soil, and vegetation–a mix of cottonwoods, ash, willow, and briars (Fitzhenry 1860:502–508).

Gay and Mary Jane Hayden settled on Vancouver Island in 1851. Born in 1819 in Oneida County, New York, Hayden married his wife, Mary Jane, in 1846, in Jefferson County, Wisconsin. They arrived in Oregon in the fall of 1850 and settled their claim, then in Clackamas County, in November, 1851, and remained for five years before relocating to Vancouver Island. The Haydens were the first Euroamerican settlers on the island. They raised cattle and hay, produced eggs and vegetables, and sold cordwood to the soldiers at Fort Vancouver. Annually, however, their farm was flooded by spring freshets. Gay Hayden prospered and, after removing to the Washington shore in October, 1856, became mayor of the town of Vancouver. He died in 1902 and his wife died in 1918 (Van Arsdol 1982:54; Genealogical Forum of Portland, Oregon 1957:53).

At the time of the Hayden residency, Vancouver Island was still used and occupied by local Indians. According to Ted Van Orsdal, author of an article on the family: "Indians still lived in the vicinity, and Mrs. Hayden said her nearest neighbors were a camp of the native Americans on the north bank. Other camps were not far away. Hayden Island was a hunting ground for Chief Tamitus, later killed in the 1855–1856 war with the whites" (Van Orsdal 1982:60).

TITLE CONTEST TO THE VANCOUVER TOWNSITE

Under the lure of possible congressional passage in the 1840s of a Donation Land Act, American settlers trespassed on the lands of the Hudson's Bay Company. Amos M. and Esther Short and their family were squatters on the lands immediately west of the fort and the Kanaka Village, the servants' housing. Short was a desperate, driven man. In the spring, 1850, alleging trespass onto his claim, he murdered two men: Dr. D. Gardner and a Hawaiian. When examined by a grand jury, Short was acquitted, yet he was a blatant trespasser whose land claim conflicted with those of the Hudson's Bay Company, U.S. Army's military reservation, and the Catholic mission at Fort Vancouver. In 1853 the U.S. Army resolved part of the conflict when it reduced the military reservation to one square mile; the Short claim lay west of the Army's claim (Bancroft 1888:90).

Short drowned in January, 1853, on the wreck of the *Vandalia* on the bar of the Columbia. His wife, Esther Short, and his children, however, continued to assert rights to land at Vancouver. Neither of the Shorts had filed timely notification of their land claim under the Donation Land Act of 1850, the law that permitted application for 640 acres for those (such as the Shorts) who had settled their claim prior to enactment of the statute. In May, 1853, the conflict took on new dimension when archbishop Francis N. Blanchet filed a claim of 640 acres for the St. James mission at Vancouver. Esther Short, the widow, belatedly filed her donation claim in October (Bancroft 1888:278–279).

The legal contest for the townsite of Vancouver persisted for years. Part of the complication was the long deferral of resolution of the claims of the Hudson's Bay Company, finally authorized for a settlement during the Civil War by the Hudson's Bay Company Claims Commission. Resolution and token payment to the British company finally occurred in 1869. In 1874 and 1875 Congress

considered private land claims bills on behalf of the St. James Mission. That latter was ultimately resolved in November, 1874, when the General Land Office issued a deed to Abel G. Tripp, mayor of Vancouver, "for the several use and benefit of the inhabitants according to their respective interests." The Catholic Church gained but a minuscule property (Bancroft 1888:280–281).

The complicated legal wrangles in the contest for ownership of the lands on the north bank of the Columbia River were explored in the essay "Land Claims" in Clarke County—Washington Territory—1885 (Alley and Munro-Fraser 1885:97–109). The contest eventually included multiple claimants or their heirs, further complicated by the international dimension of the Hudson's Bay Company claim (confirmed in the Oregon Treaty of 1846), the U.S. Army's military reservation, and the Catholic Church mission claim.

DEVELOPMENT OF THE VANCOUVER WATERFRONT

The north bank of the Columbia River underwent rapid development starting in 1850. Prior to settlement of the Short family, the site of Vancouver was variously claimed by a man named Ermatinger, a Hudson's Bay Company employee; Job McNamee who arrived in 1845; and Henry Willliamson, an emigrant of 1845 who recorded his claim and built a cabin (occupied in 1848 by the Wilson family). Williamson, in 1846, paid his recording fee to the land, put the property under control of his friend Alderman, and returned home to Indiana to marry, only to discover that his would-be wife had died. When he returned in 1847, he found that Amos and Esther Short had "jumped" his claim. Williamson then entered a partnership with William Fellowes and built a cabin at the foot of C Street. Williamson and Fellowes hired Peter Crawford, pioneer settler at Kelso, to survey a townsite in May–June, 1848 (Alley and Munro-Fraser 1885:112).

The Williamson-Fellowes town survey included lands within the future Columbia River Crossing:

> The initial point from which this survey commenced was at the Balm of Gilead [cottonwood] tree that stands at the foot of Main street, where the present city line and that of the Government reservation converge. The tree then was only from fourteen to eighteen inches in diameter. A line was run northward to the rear of 'Kanaka town,' as the eastern boundary of the claim of Henry Williamson, and this being determined as a base, lines parallel and at right angles to it were defined, and blocks two hundred feet square with lots fifty by one hundred feet in dimensions laid out. The area surveyed had for its northern boundary the present Eighth street, with the western ends of the streets running from the claim line terminating at the Columbia river. This tract would about equal one-half of the present occupied portion of West Vancouver. The name of Vancouver City was given to the site, and the plat, which showed five hundred lots in all, although a considerable portion of these was unsurveyed, as well as the field-notes, were duly recorded in the office of the Recorder [Theophilus] McGruder, Oregon City, by Henry Williamson (Alley and Munro-Fraser 1885:112).

The California gold rush consumed the commitments of Williamson and Fellowes. Both departed in 1849 for the diggings in the Sierra foothills and did not return (Alley and Munro-Fraser 1885:112–113).

The donation land claim of Amos and Esther Short in Section 27, Township 1 North, Range 1 West, W.M., overlapped both the U. S. Army military reservation and the St. James Mission claim of the Catholic Church. With the departure of Williamson and Fellowes, Short hired Israel Mitchell to survey a townsite. According to Alley and Munro-Fraser:

> This he did, without disturbing the lines or stakes placed by Mr. [Peter] Crawford, who indeed was engaged to draw the plat, and instructed to leave the numbering of the lots and blocks identical to those on the drawing made by him for Williamson. The second map, however, was never recorded, for the Donation law coming into force forbade the location of claims upon a town site, and therefore all maps were cancelled. To this site was given the name of Columbia City (Alley and Munro-Fraser 1885:113).

Esther Short and her children ultimately prevailed in their title claim to the lands immediately west of the U.S. Army's Fort Vancouver. The genesis of the community was in the village or "Kanaka town" associated with the Hudson's Bay Company post. Alley and Munro-Fraser stated in 1885: "It comprised about thirty houses in all occupied by French-Canadians, Kanakas, and half-breeds, nearly all of them married to Indian women, and the whole in the service of the Company. The precise location of this village was within the Reserve line and east of Batemen street (Alley and Munro-Fraser 1885:111).

At the time of pioneer settlement in the late 1840s, the north bank of the Columbia River was an extensive forest. In their history of Clarke County, Alley and Munro-Fraser (1885:111) noted: "When the first American settlers arrived at Vancouver, where now stands the city was covered with a great forest and dense undergrowth. There was nothing but this timber-clad expanse to the west of what is now Main street."

Settlers constructed several structures to the west of the village or "Kanaka Village" by the early 1850s. Among these were (1) the claim cabin of Henry Williamson; (2) the claim cabin of Amos and Esther Short; (3) the dwelling of George Aiken, a blacksmith; (4) the dwelling of Norman Martin, a carpenter; (5) the dwelling of George Johnston, a cooper; (6) the dwelling of James Johnston, a pilot and master of *the Prince of Wales* [Hudson's Bay Company vessel]; and (7) the dwelling of McPhail, a shepherd (Alley and Munro-Fraser 1885:111–112).

The claim cabins of Williamson and Fellowes and Amos and Esther Short were joined in subsequent years by the burgeoning development of Vancouver along the north bank of the Columbia River. Alley and Munro-Fraser wrote:

> In 1854, however, the first house on Main street was erected, and on the Fourth of July opened as a saloon and a ten-pin alley by Pete Fergusson. The building still stands [in 1885] at the corner of Main and Second streets. At the same time the older portion of the Pacific House was built by Mrs. Esther Short, on the opposite corner, and opened with a grand ball on the same auspicious anniversary, although the building had not been completed. That summer, however, a number of houses were erected, among them being one on the site now occupied by T. W. Padden, which was opened as a store by Mr. Hexter; and another, on the grounds where Mrs. Wise lives, and opened by Sam Marsh, as a saloon. The two storied white house on Main street, directly opposite the Alta House, was constructed in this year by Pat. A'Hern, and is, as it looks, an ancient land-mark. Indeed, the eastern side of Main street thenceforward was quickly occupied by houses, while the population kept on increasing and the brush and 'downed' timber disappeared as the lots were utilized (Alley and Munro-Fraser 1885:113).

Vancouver's development was a function of the adjoining U.S. Army base. Saloons, gambling dens, and house of prostitution were part of the river-front community developing as the seat of government of Clark County. George Gibbs found the situation problematic. In January, 1855, he wrote to Governor Isaac I. Stevens about conditions in Vancouver: "The rum holes at this place are a great curse but as they are licensed, the military authorities cannot break them up. This state of things shows the mischief of restricting military reserves to small tracts of ground" (Gibbs 1855c).

The potentials of the site as a port-of-call were highly important. The waterfront emerged as a landing:

> As early as 1852–53 steamboats were wont to touch at Vancouver and among the first of these were the *Multnomah*, Capt. Hoyt, which called twice a week for the mail on her passage from Astoria; and the *Fashion* and *Belle*, that ran between Portland and the Cascades. In 1854 the *Eagle*, an little iron propeller that had been brought out on the deck of a ship round Cape Horn, was placed on the route between Portland and Vancouver, under command of Captain Woods... (Alley and Munro-Fraser 1885:113).

In 1855 Barker & Stevens moored a wharf-boat on the Vancouver waterfront at the south end of Main Street. Hart & Camp moored another at the foot of B Street. These boats served as docks for import and export of commodities. They were also social places: "These floating wharves were large and flat, entirely surrounded with a wide gunwale to which were attached proper conveniences by which vessels could be tied, while at either end was a saloon and store with a twelve-foot wide passage between." Vancouver became a regular port-of-call for sternwheelers on the Columbia and Willamette rivers. In 1855 the Eagle made daily trips between Vancouver and Portland, succeeded in 1858 by the *Vancouver*, a side-wheeler of eighty-four feet By 1856 investors constructed permanent wharves (Alley and Munro-Fraser 885:113; (Mills 1947:171).

In 1859 R. Covington drew a detailed image of the north of the Columbia River entitled "Map of Fort Vancouver and U.S. Military Post with Town, Environs, Etc." (Figure 14). The map showed approximately thirty structures standing in the Kanaka Village, the Hudson's Bay Company stockade, U.S. Army post and parade grounds, the HBC cemetery, and features to the west of the military reservation including: (1) an unidentified structure in a fenced field; (2) Esther Short's house in an fenced field; (3) an unidentified structure in a fenced field; (4) Abigail Malick's house in a fenced field; (5) two fenced fields near the river; and Chalifoux's house and barn in a fenced field (Covington 1859).

The citizens of Vancouver incorporated the town on January 23, 1857, again on January 29, 1868, and again on October 27, 1881. The town's waterfront drew a variety of investors in the latter half of the nineteenth century:

> The Lucia mills erected on the river bank in the lower edge of the town, are owned by Eugene Semple [in 1885]. They are constructed on the most approved modern principles and have a daily capacity of 20,000 feet of lumber, 20,000 laths and 20,000 shingles. The building is of good proportions and has more than the usual amount of outside finish... (Alley and Munro-Fraser 1885:118–119)

The early history of Vancouver is variously documented and assessed. Important accounts include B. F. Alley and J. P. Munro-Fraser's (1885), *Clarke County—Washington Territory—1885*, and Donna L. Sinclair's thesis, *Contested Visions of Place: People, Power, and Perceptions on the Columbia's North Shore, 1805–1913* (Sinclair 2004). Additional important articles have appeared in numerous issues of *Clark County History,* a publication of the local historical society.

A little known volume, *Far From Home* (Schlissel et al. 1989) provides fascinating insight in the tribulations of a family residing at Vancouver in the mid-nineteenth century. George and Abigail Malick settled in 1848 on the donation land claim adjoining that of the Short family on the west. For seventeen years Abigail wrote letters to a daughter in Illinois. Deaths, insanity, and disappearances dogged the family and, in time, Abigail survived alone on the claim. The letters document both tragedies and everyday life. For example, in 1852, Abigail noted:

Figure 14. Portion of "Map of Fort Vancouver and U.S. Military Post with Town, Environs, Etc., 1859" (Covington 1859, from Hussey 1957:Pl. XXVII).

> Well We had Rosted Ducks... And Fat Chickens and Rosted pig and Sausages And green Apl pie And Mince pies and Custard pies And Cakes of difrent kindes [and] Inglish goosburyes And Plums Blue And green gages' And Siberian crab Apples And oregon Apples... Likewise Buter And Sturson pikles and Beet pickles And Sauce And Bread and Mashed potatoes and Oister pie And Coffee And Tea to be shore. Now I Must tel you What other preserves that I have. I have peaches And citrons And Sweet Aples, Crab Aples Jelley And Tomatoes And Mince And pairs and Aple Butter. And now I will Tel you of the Rest of my Winter Suplies. I have A plentey of Butter And Milk And a Thousands poundes of Salmon And plentey Cabage And Turnips And A Bout A Hundred and Fiftey Bushel of potatoes And plenty of dried fruits–Aples and Black Buryes the Best that I evr saw. (Schlissel et al. 1989:21)

The Malick letters discuss the impact of the Army post on the community and the diverse population that lived at Vancouver in the nineteenth century. In 1852 Abigail Malick noted: "We have Indians to work for us. Both women and men. There is two here now A beging for work. We have them A Diging potatoes." The Malicks logged their claim and sold cordwood to power steamboats on the rivers (Schlissel et al. 1989:27, 36).

RAILROAD CONNECTIONS

In 1888 investors constructed the Portland and Vancouver Railroad north from Portland. The line led from the Stark Street landing on the east bank of the Willamette River north to Hayden landing on the south bank of the Columbia River. It connected with the steamboat Vancouver for ferry service to the Washington shore. This service significantly diminished steamboat connections between Portland and Vancouver by providing more efficient passenger service (Mills 1947:172). Edwin D. Culp wrote:

> A quarter would take a traveler for two ferry rides and a train trip–one of the best travel bargains of the day. Purchasing a ticket at the foot of Stark Street, one boarded the old Stark Street Ferry on the west side of Portland's Willamette River. Arriving in East Portland, the excursionist climbed aboard the two-car P & V train that was pulled by a wood-burner (this motor car was nothing more than a steam engine disguised to look like a passenger car). 'The Dummy,' as this curiously designed locomotive was dubbed, traveled east to Union Avenue, proceeding north on Union... In those days, the last decade of the nineteenth century, the entire area north of Hayden Island was under water. Nearly half the river was crossed by a long trestle, at the end of which was Hayden Landing. The journey was completed by ferry Vancouver. (Culp 1972:179)

For a time in the late nineteenth century, three street car lines served downtown Vancouver (Freece 1985). In 1889 the Columbia Land & Improvement Company built a line from the ferry landing via Main Street to the north, west, and east boundaries of the city. By May its construction crews completed a route to Vancouver Barracks and were at work on another to Vancouver Heights north of the business district. Service commenced in June with the arrival of two cars from the Pullman Company in Pullman, Illinois. In 1890 the Pacific Street Railway & Real Estate Company (later the Vancouver Railway Company) obtained a franchise to build a second street railroad. This line ran from the ferry landing up Main to Fifth then west to the site of a proposed station. Construction commenced in 1891, but stopped when agreements were made with the Union Pacific Railroad. This street car line was abandoned before completion. In 1892 the Columbia Land & Improvement Company secured a franchise for an electric railway in

Vancouver. The system began operation in August and ran three cars, but it suspended service in 1895. Dismantling of the line commenced in 1897 (Labbe 1980:77–78).

The Spokane, Portland & Seattle Railway Company was founded by James J. Hill of Saint Paul, Minnesota. In 1905, it entered spirited competition against the investments of Edward H. Harriman in the Pacific Northwest. Hill proposed a line down the north bank of the Columbia River to cross the Columbia River at Vancouver and then connect via the Oregon shore with terminal facilities in Astoria, through purchase in 1908 of the Dalles, Portland and Astoria Navigation Company. The project included four viaducts east of Pasco and major bridges spanning the Columbia at Hayden Island (6,468 feet), Oregon Slough, and the Willamette River (1,769 feet). The bridge at Vancouver replaced the railroad ferry that, since 1883, carried cars from Goble, Oregon, to Kalama, Washington (Wood and Wood 1974:25–32).

The Spokane, Portland & Seattle Railway Company, subsequently the Burlington Northern after 1970, built a line along the Vancouver waterfront in 1907–1908. Its construction along the north bank of the Columbia River through the Gorge proved challenging and costly, with twenty-two tunnels and complicated engineering. The line's timetable in February, 1908, announced connections via 221 miles of track from Spokane to Vancouver (Robertson 1995:282–283). The facilities at Vancouver included a double-track atop a levee along the city's waterfront, a railroad yard and shops, and depot (Gaertner 1990:48; Wood and Wood 1974:51).

DEVELOPMENT OF HAYDEN ISLAND

Hayden Island underwent transformation in the second and third decades of the twentieth century from wetlands and agricultural use to transportation corridor and amusement park. During the latter half of the century the island became a multiple use site for residences, boat moorage, shopping center complex, tourist service destination, and transportation corridor. Construction of the Spokane, Portland and Seattle Railroad sparked the island's transformation. The Columbian (Vancouver, WA) noted in December, 1910:

> The purchase of Hayden Island for the purpose of utilizing the miles of waterfront on both sides of the island for factory sites is of the utmost importance to Vancouver. Some if not all of the employees that will be in the industrial plants to be located on the south side of the Columbia should make their homes in this city.
>
> The number will depend to a considerable extent upon the inducement that Vancouver offers, particularly in the matter of transportation across the river. If they can reach homes in this city more quickly than in Portland, and residence property here can be secured at less cost than across the river, the factory hands will naturally come here (Van Orsdal 1982:73–75).

The Hayden Island Development Company headed by L. Y. Keady of Portland began promotion of the island and its potentials. Keady touted the island's location with five miles of harbor frontage for docks and warehouses as well as street railway connections south to Portland. He called the site "Columbia Harbor" (Van Orsdal 1982:75).

As automobile traveling increased, and the Columbia River ferry crossing became severely strained by the increased need to move commerce between Vancouver and Washington, awareness about the need for an interstate bridge increased during the early part of the second decade of the 20th century. Clark County held a special election in June 1913 in which its citizens voted to bond the county to its limits for such a bridge. The contract for the bridge was awarded

on February 27, 1915, and construction commenced that same afternoon. The bridge was completed and opened in 1917, providing the initial unit of the current Interstate Bridge. The bridge was considered an engineering feat, and it significantly expanded north–south transportation connectivity; not only serving the immediate communities of Vancouver and Portland, but also the west coast. It spanned Oregon Slough to reach Hayden Island and then crossed the main Columbia River to Vancouver. The highway drew tens of thousands and travelers (Van Orsdal 1982:75). In 1927 the Hayden Island Amusement Company purchased forty acres on the west side of Highway 99 (now the route of I-5) on Hayden Island from the Portland Electric and Power Company. Within a year the property expanded to 112 acres. William A. Logus and Leo F. Smith, principals in the company, constructed Jantzen Beach Amusement Park on the property. They strategically named the project for Carl C. Jantzen, an investor in the company who gained national stature as manufacturer of trademark "Jantzen swimsuits." Jantzen and John Zehntbauer, avid swimmers, pioneered in 1910 in making elastic stitch fabric for swimwear. The Jantzen Knitting Mills featured Oregon wool and detailed knitting. By the 1920s the company found a world market for its stylish, colored swimming suits (Lockley 1928[3]:843–845; Jantzen Beach SuperCenter 2007).

Jantzen Beach opened in May, 1928, and featured four swimming pools with diving boards and water slides, the Golden Canopy Ballroom for dances, twenty-five acres of picnic grounds, the Big Dipper roller coaster (designed by Carl Phare), a fun-house, and a colossal merry-go-round designed and built by the C. W. Parker Amusement Company of Leavenworth, Kansas. The merry-go-round has seventy-two horses and first operated at Venice, California, from 1921–1927, when it was shipped to Jantzen Beach. The Old Dutch Mill and Fun House with its hall of mirrors, animated ghosts and goblins, and air-jets in the floor, burned in 1959. The park operated for forty years. Investors refurbished the merry-go-round in 1972 as part of the Jantzen Beach Shopping Center, and, in 1995, was spent $500,000 its restoration for the new Jantzen Beach SuperCenter (Jantzen Beach SuperCenter 2007).

In the 1940s Vanport, known as Oregon's "Miracle City," emerged southeast of Hayden Island on the south shore of the Columbia River. For a time, it was the state's second largest town when it housed an estimated 40,000 residents. Henry J. Kaiser, desperate to find residences for his workers, purchased 650 acres on the Columbia floodplain. Constructed to meet the needs of workers in the Kaiser yards in Portland and Vancouver, Vanport received its first residents in December, 1942. By August, 1943, the town had 9,942 housing units in 700 apartment buildings, a police station, three fire stations, a hospital, five recreation halls, a theater, ten ice houses, grocery stores, and six maintenance buildings. In 1946 Vanport College, predecessor of Portland State University, began offering classes to the community's residents (Oregon Historical Society n.d.).

Because of property restrictions based on race, African-Americans found it exceedingly difficult to rent or purchase housing in Portland and Vancouver. Vanport was the answer, a massive public housing project open to all. The Vanport Housing Authority set several restrictions, among them periodic inspections of apartments and a curfew at night for all residents under the age of eighteen. It is estimated that two-fifths of Vanport's residents were African-Americans. The town's population dropped by more than fifty percent with the end of World War II in 1945 and the curtailment of jobs in the three nearby Kaiser shipyards (Skorgaard 2007:88–93).

In spite of assurances from public officials that the dikes would hold against the floodwaters of the Columbia River, they gave way on Sunday afternoon, May 30, 1948. Within a few hours water surged through a break and destroyed the city; fifteen people drowned. Many apartment

buildings broke free of their foundations, floated for blocks, and collapsed. Mud and then mold filled the structures that remained in place. Vanport was no more (Skorgaard 2007:98–105). The remaining structures were razed and, for many years, the site was open space at Delta Park and Portland Meadows Race Track. Within the past two decades new construction has come to the area, now protected by the extensive system of dams on the Columbia and Willamette Rivers.

Hayden Island's north/south transportation corridor has undergone extensive development and change since completion of the first unit of the Interstate Bridge in 1917. Jantzen Beach Amusement Park succumbed to changing tastes and real estate priorities in 1970. Developers razed the amusement park to construct Jantzen Beach Shopping Center with flanking motor hotels on the west and east sides of Interstate 5 (successor to Highway 99). Promoted as "the Mall That Has It All," the shopping center catered to residents of Washington by offering retail goods not subject to Washington sales tax. The mall was reconfigured and upgraded in 1995 (Jantzen Beach SuperCenter 2007).

In 1958 the states of Oregon and Washington increased transportation services over Hayden Island with construction of a second I-5 bridge. The road routing destroyed the eastern part of Jantzen Beach Amusement Park, including the swimming pool complex (PdxHistory.com 2007). Investors constructed two large motor hotels on the north shore of the island. Initially known as the Red Lion Thunderbird, these properties then passed to the Doubletree Corporation and were purchased early in the twenty-first century by an investment group headed by Howard Dietrich, husband of Nancy (Bishop) Dieterich, the owner of Oregon Worsted Company, seller of cloth and related products.

CONCLUSIONS

Both the north shore of the Columbia River and Hayden Island have been the location of extensive development in the past 200 years. No historical record documents aboriginal residency within the immediate area of the existing I-5 bridge. However, several types of historic era development occurred within or immediately adjacent to the present I-5 transportation corridor.

The Kanaka Village, or servants' village, of the Hudson's Bay Company lay west of the stockade and scattered along the north bank of the Columbia River at least as far as the western margin of the subsequent Military Reservation. The village included roads, houses, and sheds for chickens, cows, or other livestock. The community was ethnically complex and included approximately 100 company employees and their spouses and children. Residents included French-Canadians, Indians from the Pacific Northwest, Hawaiians, Polynesians, and Scotch-Irish and British.

The north bank of the Columbia River immediately upstream from the Interstate Bridge was the location from about 1825 to 1850 of the Hudson's Bay Company wharf and Salmon House. After 1849 the United States Army established its wharf in this same area and off-loaded tons of supplies for the Quartermaster Department. Starting in 1850 the Quartermaster Department established its wharf, offices, and warehouses on the west side of the Fort Vancouver Military Reservation. Extensive manuscript records in Washington, D.C. document the importation and shipment of supplies to the region's military posts from this regional supply headquarters. The Quartermaster Department appropriated some structures from the Kanaka Village and razed others when it took over the site.

The Vancouver waterfront included a wharf boat, ferry landing, and wharves from the early 1850s. The waterfront later was altered by construction of the railroad levee, highways, streets,

and commercial buildings. Immediately to the north, residents of Vancouver constructed both commercial and residential structures with a variety of outbuildings such as privies, sheds, chicken houses, and stables. This setting was bisected by construction of the Spokane, Portland, and Seattle Railroad levee in 1907–1908, Pacific Highway 99 in 1917, and by I-5 in 1952. Transportation developments included cutting a route below grade for the highways, building levees for flood protection and the railroad, and other ground-impacting activities.

Jantzen Beach Amusement Park opened in 1928. For several decades Hayden Island remained a mixed-use setting: travel corridor, amusement park, and rural residential with agricultural activities. After World War II the island underwent intense commercial development with boat moorages, house boats, restaurants, hotels, and, in time, replacement of the amusement park with a shopping center.

Over time, dredging and filling along the north and south shores have drastically altered the banks of the Columbia River. The Interstate Bridge, its first unit completed in 1917 as part of the major West Coast highway corridor (Pacific Highway 99) running from Canada to Mexico, transformed both Hayden Island and Vancouver. Engineers built a second bridge structure, doubling capacity, in 1952 when it began service as I-5. Traffic on the route has mounted with the steady growth of Clark and Multnomah counties and surrounding areas. These intensive investments over the past 160 years in transportation, commercial, and residential facilities have had major impacts on the natural and cultural landscape in the I-5 corridor and vicinity.

7. HISTORICAL ARCHAEOLOGY

The CRC project area contains an historical archaeological record associated with Euroamerican settlement that is unmatched anywhere else in the Pacific Northwest (Figure 15). This record begins with archaeological features, deposits, and artifacts from HBC Fort Vancouver established in 1829. Subsurface remains of the extensive multi-cultural settlement of Kanaka Village, where the majority of the HBC employees lived, occur along the southwest side of the fort. In 1849, the U.S. Army established Vancouver Barracks adjacent to the HBC's Fort Vancouver. This post expanded over the years on the north and west sides of the HBC stockade to become one of the most important military installations in the Pacific Northwest during the late nineteenth and early twentieth centuries.

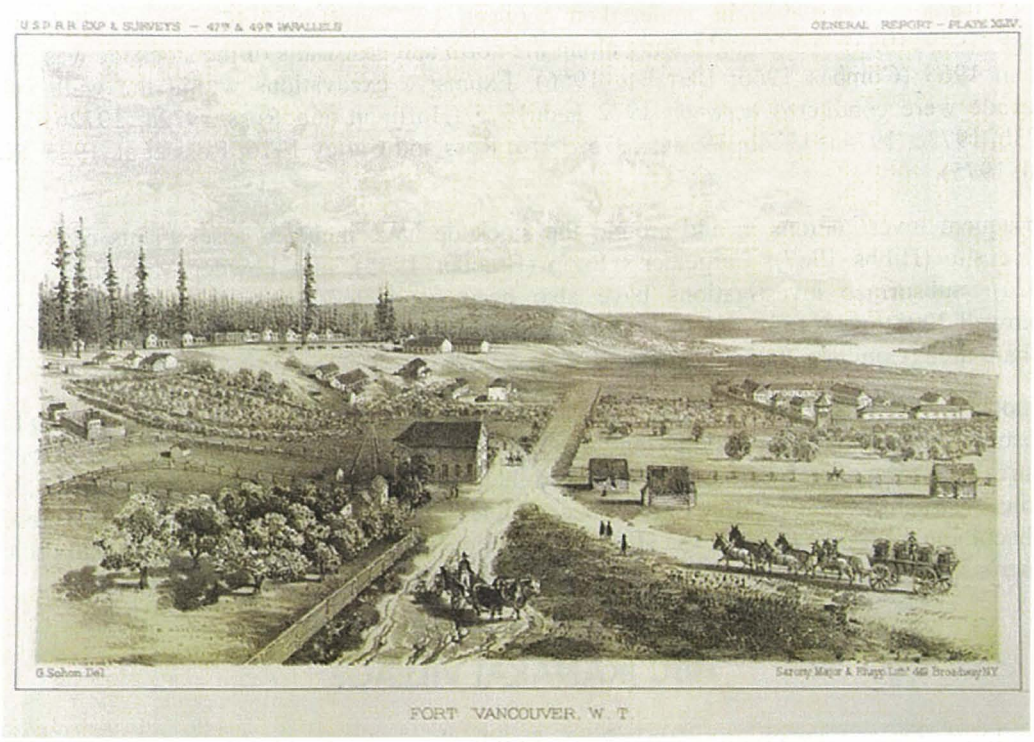

Figure 15. Lithographic print by Gustavus Sohon, ca. 1854, showing locations of HBC stockade (right center), Kanaka Village houses (right foreground), St. James Mission (center), and Vancouver Barracks (left center) (from Thomas and Hibbs 1984, Figure A-8).

The City of Vancouver emerged beginning in the 1850s and 1860s on the north bank of the Columbia River immediately west of the U.S. Military Reserve. The earliest settlement and development in Vancouver occurred in the area that today is immediately west of I-5. Archaeological remains in the city postdate the HBC occupation at Fort Vancouver and relate to

civilian settlement and development coterminous with the U.S. Army occupation at Vancouver Barracks. Although much less intensively investigated in comparison with the area east of I-5, the few studies conducted thus far have shown that historical archaeological investigations in the older portions of the city have great potential for shedding light on the development over time of the urban environment in Vancouver.

HUDSON'S BAY COMPANY FORT VANCOUVER

Fort Vancouver was designated a National Memorial in 1948, a National Historic Site in 1961, and was placed on the National Register of Historic Places in 1966. Under the sponsorship of the National Park Service, archaeological investigations have been conducted in and around the former location of the fort's stockade over more or less the last six decades. A synthesis of this work has never been written, but a summary of fieldwork undertaken through 1991 is available in a useful draft document prepared by Thomas (1992).

The HBC stockade walls and the foundations of some buildings within the stockade were located by archaeological excavations undertaken between 1947 and 1952 (Caywood 1947, 1948a, 1948b, 1949, 1955). Additional testing along the north and east walls of the stockade was carried out in 1966 (Combes 1966; Larrabee 1966). Extensive excavations within the walls of the stockade were conducted between 1972 and 1975 (Hoffman and Ross 1972a, 1972b, 1973a, 1973b, 1973c, 1974a, 1974b, 1974c, 1975, 1976; Ross and Carley 1976; Ross et al. 1975; Steele et al. 1975).

Subsequent investigations in and around the stockade have included assessments of the New Office site (Hibbs 1987), Carpenter's Shop (Brauner 1995), and Powder Magazine (Wilson 2002a). Subsurface investigations have also been conducted for utilities (Thomas 1987a; Cromwell 2005); prior to reconstruction of a well (Wilson 2002b), and in the reconstructed HBC Orchard area (Gembala 2003a; Dorset and Wilson 2006).

As noted by Thomas (1992:57), the HBC Fort Vancouver included a number of agricultural, industrial, and domestic structures and features outside the stockade. These structures and features were described by Hussey (1957), and their locations are shown on historic maps. Most of these structures and features have been subject to only limited archaeological testing. Archaeological investigations at the HBC barns, school houses, root cellars, garden and orchard, cooper's shed/shop, and Lower Mill Road were summarized by Thomas (1992:56–63).

HBC (KANAKA) VILLAGE

The site of this settlement was determined eligible for inclusion in the National Register of Historic Places in 1981. Most conceptions of the village held by archaeologists who later excavated there were framed by Hussey's (1957:216–220) brief history of the site. A more recent, and more detailed, description of the village is provided by Erigero (1992a).

In 1834 the village was described as containing 30 to 40 "log huts." Although an 1848 account described the village as having between 60 and 75 buildings, historical maps do not show this many structures (see Erigero 1992a:155, Figure 10). Beginning in 1849 some of the better structures were rented by the U.S. Army, but during the 1850s most of the remaining buildings

were torn down. With only a few exceptions, "all traces of the village within the boundaries of the military reservation had disappeared by the end of 1860" (Hussey 1957:220).

As early as 1950 Louis Caywood, who was excavating nearby at the HBC stockade, also tested the village area, as he noted that "fragments of [ceramics] were plentiful in the old village area, and a test trench across the old lagoon uncovered sherds as much as three feet below the present surface. Apparently at least two feet of this was fairly recent fill above the old lagoon bottom. Since the excavations in 1950, the lagoon area has been filled and leveled by the Army" (Caywood 1955:51).

Dwellings

The first systematic excavations in the Village were undertaken in 1968 and 1969 by Edward Larrabee and Susan Kardas (Larrabee and Kardas 1968; Kardas 1970, 1971). Exploratory excavations in 1968 mostly involved shallow trenches that, based on an increase in artifacts, located the east side of the village area beginning about 800 meters west of the HBC stockade. Artifacts were found in a layer from about 3 to 6 inches below the surface (Larrabee and Kardas 1968:41). By the 1969 season the excavators were "reasonably sure that evidence of structures would be discernable within 12 inches of the surface" (Kardas 1970:18). The remains of four structures, all interpreted as dwellings or houses, were documented during the two seasons of excavations.

House 1 was a structure that measured roughly 30 feet by 15 feet, from which a total of 962 artifacts were recovered. This structure was represented by

> ...a large concentration of artifacts lying above or pressed into a hard-packed surface, 1" to 2" thick, and containing much charcoal and a higher clay content than the surrounding area. This is assumed to have been the floor of the structure. Its outline was discernable on the west and south side, but was broken on the eastern and northern edges. Both the north and south ends were marked by a heap of burnt rocks and fire pits. About 3 feet to the north and extending eastward of the structure was found the stubs of 3 cedar posts, roughly 5 feet apart, set in rock supports. These probably represent the remains of a fence line running along the north side of the house. (Kardas 1971:275–276)

House 2 lay about 90 feet southeast of House 1. The floor area was "greatly distorted," but what was left of the floor measured 10 feet by 7.5 feet. Most of the artifacts came from a gray clay deposit that filled a rectangular depression lined on at least two sides by cedar planks. Based on its small size, this depression was interpreted as a small shed or root cellar. The only structural debris in the fill inside the plank-lined depressions was broken bricks and rocks, probably from a hearth. A total of 4,157 artifacts were recovered from House 2 (Kardas 1970:24–26; 1971:291–293).

House 3 was represented by bricks, rocks, and charred planks lying on a clay floor of a dwelling situated on the far eastern edge of the village (Kardas 1971:301–306). The clay floor became visible about 2 inches below the sod. The packed layer of clay was about 1 to 2 inches thick. Also numerous on the floor were square nails, ceramic sherds, and pipe stem and bowl fragments. Ceramic and glass sherds from the floor cross-mended with those from a wood-lined pit measuring 35 by 35 inches, situated five feet west of this house. According to Kardas, "the lack of debris above the clay floor indicates that this structure was cleared down to the ground" (1970:45). In addition, "heavy charring of the beams and charcoal fragments" indicated that the

structure had burned (Kardas 1970:45). The dimensions of this house were not estimated. A total of 2,019 artifacts were recovered from House 3 (Kardas 1970:45; 1971:306–313).

House 4 consisted of ash and charred wood, nails, and numerous artifacts situated from 2 to 6 inches below the surface over a roughly rectangular area of about 6½ by 8 feet. According to Kardas (1970:61):

> At the top of the debris was a fine white ash overlying a coarser reddish ash with remnants of burnt planks and wood shingles. Under this debris, which must have been the roof, was a heavy concentration of artifacts. Those in the northern half of the house were almost exclusively ceramic vessels, many of which were restorable. Artifacts in the southern half were primarily metal including a hoe, hatchet, sledge hammer head, gun parts and other tools. Below the ash and artifacts was a thin patchy layer of clay.
>
> At the southeast corner of the house stood a stone hearth. The stones were set above the clay layers and closely fitted together without mortar.

A total of 2,573 artifacts were recovered from House 4 (Kardas 1970:62–64). According to Kardas (1970:62), "the large number of restorable or intact items recovered from this structure suggests that it was still occupied at the time that it burnt down. The undisturbed nature of the debris indicates than no attempt was made to recover anything from the house."

Excavations of additional dwellings at the Village were undertaken between 1974 and 1981 in advance of the reconstruction of the intersection of I-5 and SR 14 (Chance and Chance 1976; Chance et al. 1982; Carley 1982; Thomas and Hibbs 1981, 1984). The reports from these excavations contain information about at least seven different dwellings.

Operation 14 in 1974 involved excavation of a test pit and trench about 100 feet east of the Old Apple Tree. Evidence was found of a late nineteenth century structure, indicated by common cut square nails and window glass; a few items suggested the presence of an earlier HBC structure (Chance and Chance 1976:29–30). Further extensive excavations in Operation 14 in 1981 exposed a dwelling that an examination of historic maps indicates was the home of John Johnson, a cooper at Fort Vancouver. This house was later rented by the U.S. Army in 1849 and was demolished in 1857 (Thomas and Hibbs 1984:111).

The original house was ca. 20 by 13 feet, defined by a compacted silt loam floor and bounded by post features (Thomas and Hibbs 1984:282). The floor conformed to the post hole boundaries except on the north, where it extended ca. 2.5 feet beyond the enclosure. An extra post suggests a door on this side (Thomas and Hibbs 1984:285). A later version of this house, from ca. 1835 to 1846, included a cellar that removed approximately one-third of the original floor, and an 8-ft. addition enclosed by posts constructed on the north side that changed this house from a rectangular structure into an almost square, 21 by 19 foot structure (Thomas and Hibbs 1984:288–289). In the yard of this house, about 30 feet southwest of the southwest corner, was the Old Apple Tree, reputedly the oldest in the Pacific Northwest (Thomas and Hibbs 1984:285–285).

A total of 43,388 historical artifacts were recovered during the 1981 excavations in Operation 14. This represents "the largest collection of Hudson's Bay Company period artifacts heretofore excavated from a Kanaka Village residence, and second only to the Fort Vancouver chief factor's residence (Hoffman and Ross 1973b) as being the largest Hudson's Bay Company domestic assemblage in the Pacific Northwest" (Thomas and Hibbs 1984:152).

Operation 20A involved excavation in 1981 of six 5 by 5 foot units that partially exposed evidence of an HBC period structure that probably corresponds to that labeled "Kanakas" on the 1846 Covington map (Figure 16). This building was in existence by 1845 and was destroyed, probably by burning, by the U.S. Army before 1855 (Thomas and Hibbs 1984:312–324). Evidence of this structure was limited to exposure of posts, stakes, pits, and one possible footing associated with the foundation, and by recovery of 1,003 artifacts. The Operation 20A site was not disturbed by construction of the I-5/SR 14 interchange, and the dwelling at this location is thus available for further investigation (Thomas 1992:46–47).

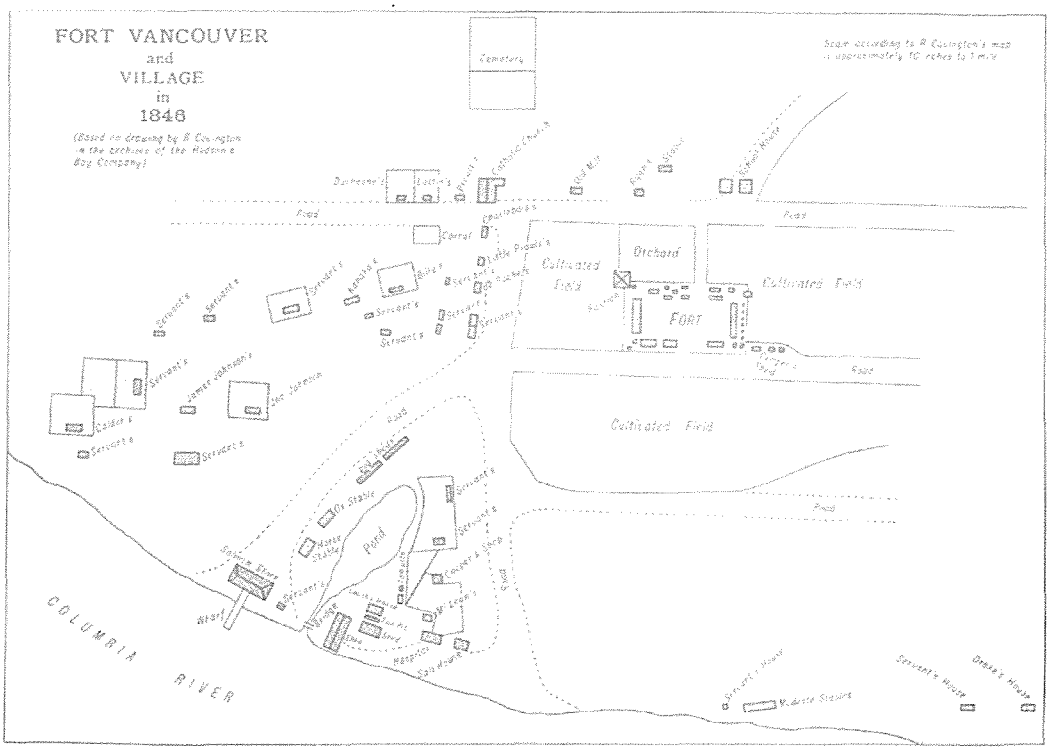

Figure 16. 1846 Map of Fort Vancouver and Village, based on a drawing by R. Covington in the archives of the HBC (from Thomas and Hibbs 1984, Figure A-2).

Operation 27 involved test excavations in 1975 to the east of the pond, and encountered evidence of a structure and artifact scatter "possibly from one of the two servants' houses shown just to the north of the cooper's shop on the Covington map of 1846" (Chance et al. 1982:276). The structure consisted of "a small stockaded enclosure which probably surrounded a small house" (Chance et al. 1982:276). The stockade was composed of "small posts, only two to three inches in diameter" (Chance et al. 1982:276). Nine features were exposed, and 2,343 artifacts were recovered from a component identified as "H.B.C. Servant's House (ca. 1840s)" (Chance et al. 1982:8).

Operations 55, 56, and 57 recovered evidence of HBC dwellings shown on historic maps at the northwest corner of the intersection of a north–south road that separated the village from the Fort Vancouver fields and the Upper Mill Road. Operation 55 exposed posts, stakes, pits, fire areas, and a trench and recovered 2,466 artifacts associated with an unidentified dwelling. Operation 56 exposed posts, stakes, pits, and fire areas and recovered 2,115 artifacts tentatively associated with

the Charlebois house. Operation 57 exposed post holes and pit features and recovered 976 artifacts tentatively associated with Little Proulx's house (Thomas and Hibbs 1984:577–618).

Operation 55 was found to be severely disturbed by construction, but Operation 56 was only moderately affected, and Operation 57 was covered by a protective a layer of fill, so there is some potential for future investigations in the latter areas (Thomas 1992:50–53).

Operation 58 was at the location of a house inhabited by William R. Kaulehelehe, better known as Kanaka Billy, who lived in the village from at least 1846 until his house was destroyed by the U.S. Army in 1860 (Thomas and Hibbs 1984:619–625). Excavation of two 5 by 5 foot test units exposed one stratified trash pit, a second pit, and two square or rectangular post casts and recovered 951 artifacts from this area. The Operation 58 site was not disturbed by construction, and is therefore available for further investigation (Thomas 1992:54).

Pond

Most historic maps of the HBC Fort Vancouver show a pond on the north shore a short distance inland from the river bank. This pond, now buried beneath SR 14, is thought to be "the western end of a flood channel of the Columbia River that passed between the fort and the river" (Chance and Chance 1976:2). One of the most significant discoveries made during investigations in 1974 occurred in Operation 11, where an east–west backhoe trench was excavated across the pond. The trench walls revealed 16 artifact-bearing strata, some separated by six flood deposits, indicating that the pond had been used as a garbage dump.

The principal feature found in these deposits was a layer of decayed planks situated just below the 1862 flood deposit that, based on the presence of wrought iron nails with faceted heads, was interpreted as remnants of an HBC building demolished by the U.S. Army in 1860 (Chance and Chance 1976:27). Below the layer of planks were additional strata of varying thickness that mostly contained HBC materials, although an early Army button with the Infantry "I" was found in one of the lower strata (Stratum 9B). Stratum 10, the lowest stratum, was black organic silty loam that represented the bottom of the pond at the arrival of the HBC in 1825 (Chance and Chance 1976:28).

Additional sampling of the artifact-bearing strata in the pond was undertaken in four other operations. Operation 13 in the northern portion of the pond produced a better stratigraphic record of the flood deposits, as it was observed that "as one moves north in the pond, the flood deposits are better represented. The flood silts seem to have 'stuck' better in the shallow shelf of the northern part of the pond but were flushed out from the more southerly portions" (Chance and Chance 1976:29). Operation 24, more centrally located on the north side of the pond, contained abundant Army material and two moderately productive HBC strata, but the stratigraphy was more lens-like and could not be easily correlated with the layers in Operation 11.

Operation 21, on the south side of SR 14, revealed highly stratified deposits containing artifacts associated with the U.S. Army occupation. The excavations were stopped by the water table, with the lowest stratum reached dated by headstamps on cartridges to no earlier than 1884 (Chance and Chance 1976:33). Operation 22, also on the south side of SR 14, extended down to the HBC layer and original pond bottom without reaching the water table. However, this operation "was characterized by a notable lack of stratigraphy," as "floods had either not registered here or their deposits had been flushed away" (Chance and Chance 1976:35).

In 1975 additional sampling was undertaken in the northern portion of the pond north of SR 14. Operation 26 was a large excavation adjacent to the north side of the east–west trench excavated

in Operation 11. According to Chance and others (1982:6–7): "Here we augmented the sample from the H.B.C. strata (the 9 Series) and took a small sample from the former pond bottom – Stratum 10. Our samples from the Army strata, the Stratum 6 Series and the Stratum 7 Series, were a considerable improvement over the previous year." Operation 11 from 1974 was also enlarged on the south side of the east–west trench "to expose more of the mass of timbers found in Stratum 9Gr which had been thrown into the pond in ca. 1859–1860, apparently during the dismantling of Kanaka village by the Army" (Chance et al. 1982:7). An additional flood deposit, attributed to the flood of 1859, was documented in the wall profile from this excavation. Although not specifically identified in the text, this enlargement of Operation 11 to the south probably corresponds to the work Chance et al. (1982:8, Table 1) referred to as Operation 28.

In 1977 Operation 28, consisting of three test units aligned in an east–west transect, was excavated across the pond to further investigate the stratigraphy, and especially to document the flood deposits (Carley 1982:5). Two flood deposits, most likely from floods in 1887 and 1894, were found in each unit, with the majority of cultural material recovered from between them. Only U.S. Army materials were found in these test units; artifacts attributable to earlier HBC occupation were absent (Carley 1982:27–30). According to Carley (1982:30), "this suggests that this part of the pond may have been used for activities other than trash disposal during HBC occupation. If boat building and repairing were taking place nearby, the pond may have been kept clear of debris for some function related to this activity."

Riverside Complex

The term "riverside complex" has been used to refer to evidence of HBC occupation and activity south of the Village and close to the river bank (Chance et al. 1982; Carley 1982). As shown on the 1846 Covington map (Figure 16), the structures within the Riverside Complex included a hospital, cooper's shop, salt house, McLean's and Smith's residences, several servant's quarters, horse and ox stables, pig sheds, and Salmon Store with a wharf projecting into the river (Erigero 1992a:262–266).

Archaeological investigation in the Riverside Complex began in 1974 when test excavations in Operation 19 between SR 14 and the railroad berm encountered HBC artifacts in association with a gray clay floor similar to the floors found in dwellings at the Village. The artifacts "suggested a residential area of Company servants and some industrial or maintenance activity comprised of boat and ship repair or construction and blacksmithing" (Chance and Chance 1976:31).

Further excavations in Operation 19 in 1975 resulted in discovery of a previously undocumented stockade associated with the HBC occupation. Two corners and part of three walls of a stockade trench were exposed, extending 100 feet east–west and 75 feet north–south (Chance et al. 1982:7, 258–264). Subsequent research by Caroline Carley (1982:23) identified an account by Lieutenant George Emmons of the U.S. Navy, attached to the United States Exploring Expedition under Charles Wilkes, referring to "a hospital near the riverbank, also stockaded, a cooper's shop, boat house and several other out buildings about the premises" (Emmons 1841).

Returning in 1977 to further investigate the stockade, Carley conducted additional excavations in Operation 19 and uncovered medicine bottles and other evidence of medical activities within its boundaries. In a study of nineteenth century medicine at Fort Vancouver, Carley established that the hospital was built in the early 1830s when the number of intermittent fever victims became too great to be handled by the small dispensary in Fort Vancouver (Carley 1982:35–36). After discussing reasons why a stockade might be desirable around the hospital, Carley suggested that

when large numbers of HBC personnel became sick and medical supplies ran low, a situation developed in which infected Indians seeking help were "turned away from the Fort without medical aid" (1979:63).

Two attempts to relocate the wharf associated with the HBC Salmon Store have been made by underwater surveys in the Columbia River. The first attempt was made in 1987 by a representative from the National Park Service's Submerged Cultural Resources Unit who "examined an area directly off the bank from Who-Song and Larry's Restaurant" where a local diver had found HBC artifacts (Lenihan 1987:4). This location is within about 600 feet of the I-5 bridge. It was concluded that "if this indeed was the location of the historic wharf it was probably covered by heavy fill from twentieth century use" (Lenihan 1987:5). No "architectural features that could be related to the HBC wharf" were observed, and it was suggested that the HBC artifacts found by the local diver "were more outlying clusters or isolated finds rather than something that could be related to a major primary deposition from historic use" (Lenihan 1987:5).

The second attempt to locate the wharf associated with the HBC Salmon Store was made in 1988 and 1989 by Alison Stenger (1989). As noted by Stenger, historical maps (e.g., Covington 1846) placed the wharf in an area later used for the U.S. Army's Quartermaster Depot, but historical paintings show the wharf "quite a bit farther to the east" (Stenger 1989: not paginated). An underwater survey in 1988 located a mix of historical artifacts from the HBC and Quartermaster Depot recorded as the Quartermaster East Site (45CL400), and a cluster of stone net-sinkers and net weights identified as prehistoric in age recorded as the Benoit Site (45CL401). In 1989 the survey continued to the east, upstream in the river, where archaeological remains interpreted as evidence of the wharf were located "nearly 350 yards from its 19th century cartographic placement" (Stenger 1989). These remains included a small cluster of HBC era ceramic and glass bottle fragments, as well as a metal wood-working tool found underwater, and "an elongated stack of large rock" exposed at low tide (Stenger 1989). Based on this evidence, it was considered "highly probable" that the location of the HBC wharf was found (Stenger 1989).

ST. JAMES MISSION

The St. James Church and the associated rectory, constructed in 1845–1846, were located on the north side of Upper Mill Road (today's East Fifth Street), and west of a north–south-oriented road that separated the Village from a cultivated field and orchard adjacent to the HBC stockade. They were the first buildings constructed in a five-acre mission complex that by 1874 included 28 structures. The boundaries of the Catholic mission were challenged by the HBC and U.S. Army, and in 1887 the commander of Vancouver Barracks took possession of the facilities. The history of the St. James Mission has been compiled by Hussey (1957:208–213), Thomas (1984), Thomas and Hibbs (1984:697–698), and Erigero (1992a:125–126). The limited archaeological excavations undertaken at the site were summarized by Thomas (1992:55–56).

Archaeological excavations at the former site of the St. James Mission were limited to backhoe test trenches in 1980 and construction monitoring in 1981 that mostly exposed features and artifacts from the late nineteenth and early twentieth century U.S. Army occupation (Thomas and Hibbs 1984:698–699). A noteworthy exception was the discovery of a pig burial found in an area that correlates with a "pig sty" shown on an 1872 map. In 1991 the areas examined were "occupied by two relocated U.S. Army duplex residences" (Thomas 1992:56). Thomas (1992:56) added that "the cartographic study of the mission site compiled by Thomas (1984) locates mission

building sites on the Federal Highway Administration property that may be preserved despite twentieth century ground disturbances."

During archival research in support of historical archaeological investigations in the West Barracks area, evidence of a previously unrecorded cemetery associated with the St. James Mission came to light (Cromwell and Gembala 2003). A "burial ground" is shown on the east-central boundary of the claim on an 1866 map of the St. James Mission buildings by Father J. B. Blanchet. This map has not been previously included in cartographic studies of HBC Fort Vancouver. Records suggest that burials from this early cemetery were moved to the current St. James Catholic Cemetery located on 29th Street in Vancouver.

VANCOUVER BARRACKS

In response to conflicts resulting from encroachment by American miners and settlers on Native American lands, U.S. Army troops were detailed to the Pacific Northwest in 1849. A military base was established north and west of the HBC stockade at Fort Vancouver. Known as Columbia Barracks or Vancouver Barracks, this post became the headquarters and base of supply for the military offensive mounted by the U.S. Army against hostile Native Americans, especially during the conflicts of 1855 and 1856. Vancouver Barracks later played a significant role in the mobilization of troops during the Civil War, the Spanish-American War, and World War I.

Today, Vancouver Barracks (45CL162H) consists of a complex of historic buildings that occupies 55 acres to the north and west of the reconstructed HBC stockade. Vancouver Barracks was determined eligible for inclusion in the National Register of Historic Places as an Historic District in 1979. Part of this complex known as Officers Row was listed as an Historic District on the National Register of Historic Places in 1974.

The most complete review of the long history of the U.S. Army post at Vancouver Barracks was prepared by Erigero (1992a). Of the many maps of Vancouver Barracks, the 1874 map by 2nd Lieutenant F. K. Ward has proven the most reliable for identifying features on the U.S. Military Reserve (Figure 17). Archaeological investigations at Vancouver Barracks through 1991 were summarized by Thomas (1992:62–81), who identified 24 separate operations (test excavation areas) as primarily associated with the U.S. Army occupation.

Quartermaster Depot

By far the most noteworthy investigations at Vancouver Barracks were in Operation 20, where test excavations in 1974 located the Quartermaster's House erected around 1851 by Rufus Ingalls, the first Quartermaster at what was then called Columbia Barracks. This residence was occupied until it was razed in 1937. In addition to the excavation of numerous features constructed of brick, the 1974 investigations included excavation of a privy and recovery of artifacts spanning the interval from the 1850s into the twentieth century (Chance and Chance 1976:32–33).

Further excavations in Operation 20 in 1975 uncovered a well-defined brick foundation, two privies, a fireplace, an assortment of drains and water pipes, and other fixtures associated with the residence. The excavated portion proved to be the north wing of the L-shaped house. The main section of the house was initially thought to have been "scraped away and covered by a six inch thick concrete hardstand prior to World War II" (Chance et al. 1982:9). Further excavations in 1981 exposed features associated with the main house, basement, the southeast corner of the

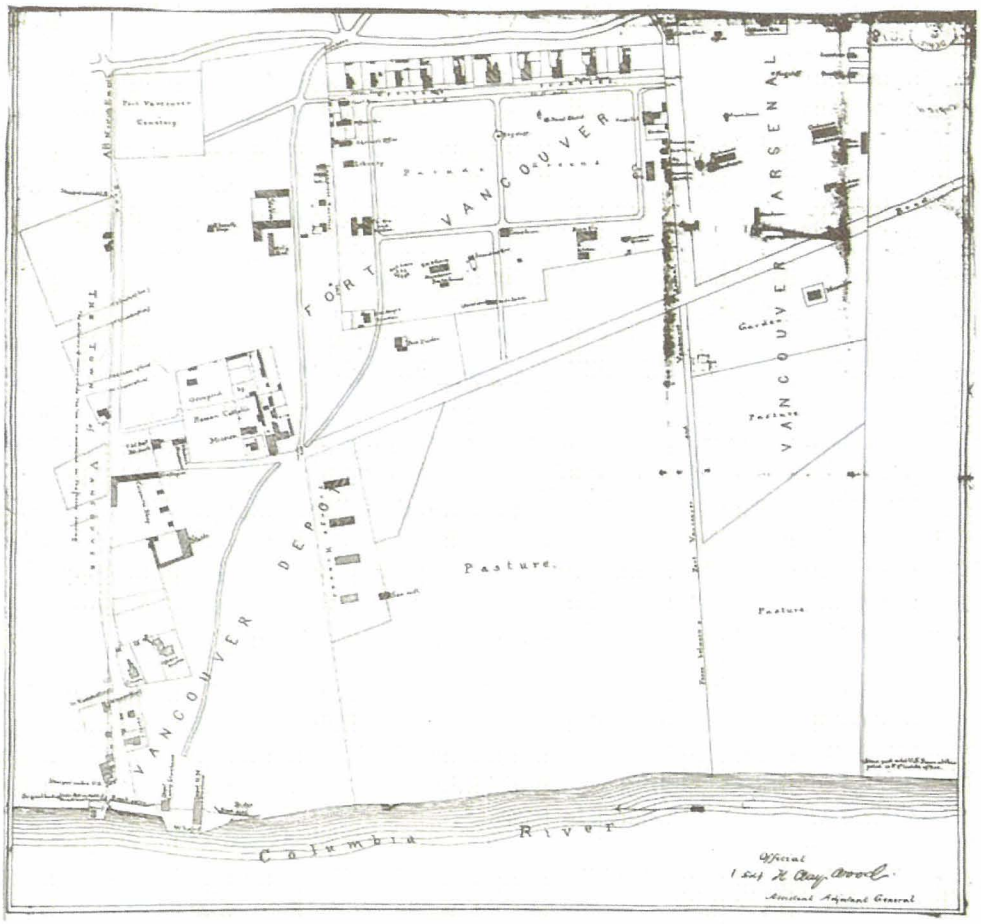

Figure 17. 1874 map of the U.S. Military Reserve at Fort Vancouver, Washington Territory by 2nd Lieutenant F. K. Ward (from Thomas and Hibbs 1984, Figure A-15).

north wing, and the yard (Thomas and Hibbs 1984:330–351). The Ingalls House remains the most thoroughly investigated residential building from the U.S. Army occupation at Vancouver Barracks.

Officers Row, Parade Ground, Garrison, and Cemetery

The northern portion of Vancouver Barracks (45CL162H) includes Officers Row, the Parade Ground, and the part of the garrison north of East Fifth Street between West Reserve Street (now covered by I-5) and East Reserve Street. Archaeological investigations through 1991 in this portion of Vancouver Barracks were summarized by Thomas (1992:81–86). Thirteen separate projects were undertaken, most of which involved monitoring of relatively small-scale construction such as excavations for utilities, sidewalk construction, and paving of road and parking areas (e.g., Thomas 1986, 1987a, 1987b, 1987c, 1988a, 1988b, 1988c).

One of the most productive of these small-scale projects occurred along Officers Row, where excavations for a waterline on the east side of Building No. 7 exposed part of a cellar under a

kitchen/washhouse dating from 1850 to 1865. Test excavations revealed that the fill within the cellar included nine strata from which over 6,500 artifacts were recovered. Aside from the portion disturbed by water line construction, this cellar remains intact and available for further investigation (Thomas 1992:81–82). The pattern of small-scale investigations in the Officers Row vicinity has continued with numerous survey and monitoring project in recent years (e.g., Rader 1999; Wilson 1999a, 2000a, 2000b, 2004; McIlrath 2002; Gembala 2003b, 2003c; Cheung et al. 2006).

In advance of proposed construction of a new residential structure in the East Barracks area, archaeological testing was carried out in 1986 on the site of a former "Company Quarters" on the southeast side of the junction of Alvord and McClelland roads. The Company Quarters stood at this location from 1880 to 1885, and was later replaced by an "Infantry Barracks" built in 1885 and possibly standing as late as 1942. The excavations exposed an intact section of brick footing at the southwest corner of the barracks below a dense layer of rubble from the building's demolition. Test excavations also confirmed the location of a privy constructed in 1887 to the west of the barracks, and the possible location of an earlier privy on the east side of the barracks also was identified (Minor and Beckham 1987).

In 2002 the first comprehensive historical archaeological study of the Parade Ground was completed in advance of construction of a new irrigation system (Langford and Wilson 2002). The eastern and western ends of the Parade Ground were found to contain artifacts from the earliest years of the post, beginning with the Army's arrival and initial construction activities in 1849–1850. This study was followed by monitoring during installation of the Parade Ground irrigation system (Gembala 2002) and monitoring during installation of a fiber optic line across the Parade Ground (Cromwell 2006a).

In recent years a number of historical archaeological investigations have been conducted in the West Barracks area, between Evergreen Boulevard on the north and East Fifth Street on the south. Small-scale testing in advance of utility trench excavations was undertaken in 1996 and monitoring during installation of a water line was carried out in 1999 at the O. O. Howard House (Thomas 1996; Wilson 1999b). Monitoring also was conducted in 2002 during renovation of the City Police Station on the west side of the O. O. Howard House (Wilson 2002c).

In 2003 the first comprehensive historical archaeological study was undertaken of the West Barracks area between McCelland Road on the north and the Western Federal Lands Highway Department facilities property on the south (Cromwell and Gembala 2003). Significant archaeological resources were found more or less throughout the area, including the remains of several 1880s infantry barracks in the north, a mid-nineteenth century sutler's store in the middle, and a portion of the St. James Catholic Mission and early twentieth century U.S. Army quarters in the south. In comparison, survey and testing in the adjacent Western Federal Lands Highway Department facilities to the south typically encountered deep deposits of mid-twentieth century fill and a general lack of intact cultural deposits (Cromwell 2006b).

The HBC established a cemetery as early as 1833 on the hillside northwest of the stockade at Fort Vancouver. With establishment of the St. James Mission in 1838, this cemetery was apparently enlarged to include burials presided over by Catholic priests (Erigero 1992a:119–120; also see Cromwell and Gembala 2003). Historical maps and illustrations consistently show that the HBC–St. James Mission cemetery was located on the hillside northeast of the Catholic Church (Thomas and Hibbs 1984: App. A). The Catholic Church records contain information on 208 burials in this cemetery representing individuals from a wide range of ethnic groups (Thomas and Freidenburg 1998:App. B).

In the years following the arrival of the U.S. Army in 1849, the fences and headboards began to be removed by the soldiers for fuel, and "the graveyard became gradually almost obliterated" (Erigero 1992a:232). The Army later constructed a fence through the area, with part of the cemetery falling inside the parade ground and the rest outside. The cemetery was still in existence when the HBC departed in 1860. In 1866 an inspector from the Quartermaster Department recommended that the graves be removed to the post cemetery (Erigero 1992a:292). It is not known if, or to what extent, this action was carried out, but the discovery of burials during construction in the former cemetery area was reported in newspaper articles from 1885 and 1993 (Thomas and Freidenburg 1998:5).

The U.S. Army established a cemetery at Vancouver Barracks around 1855, as first indicated on an 1855 topographic map of the Vancouver area, where it was shown to have been situated along the western reservation boundary to the west of, and in line with, the officers' quarters comprising Officers Row (Thomas and Hibbs 1984:A-10). Curiously, the cemetery is placed a considerable distance north of this location on two maps prepared in 1859 (Thomas and Hibbs 1984:A-12, A-13), but appears in its first position at the west end of Officers Row in maps prepared in 1871 and 1874 (Thomas and Hibbs 1984:A-14, A-15). The cemetery does not appear on maps dating 1886 and later. An 1866 account describes this cemetery as occupying about four acres enclosed by a rail fence and containing about 20 graves (Thomas and Freidenburg 1998:6). Additional evidence suggests that at one time over 300 individuals were interred in the original Post Cemetery (Cromwell 2008; Crouch 2000) which included Officers, enlisted men and civilians. It is not clear how many were relocated to the Post cemetery on Fourth Plain Boulevard.

In 1883, the Army contracted to remove the human remains from this cemetery to a new one at its current location north of Fourth Plain Boulevard. This action was probably undertaken in conjunction with the westward expansion of the officers' quarters along Officers Row (Thomas and Freidenburg 1998:6). However, as noted by Thomas and Freidenburg (1998:6), "there is reason to believe that not all of the bodies were exhumed and removed." There are uncorroborated reports of human remains being unearthed during construction of I-5, and linear depressions that appear to be graves were observed, but not explored, during monitoring of construction excavations in the area (Thomas 1988b:29).

CITY OF VANCOUVER

In contrast to the long history of archaeological research at Fort Vancouver, little historical archaeology has been conducted in the City of Vancouver. Concern about historical archaeological resources in the city threatened by reconstruction of the I-5/SR 14 interchange in 1974 and 1975 was expressed by Chance and others (1982:4), who commented on the limits of their project area:

> It also needs to be emphasized that our excavations were confined to the limits of the right-of-way as marked in 1974 and 1975, and that we were strongly discouraged from conducting tests within the existing interchange. Our limited tests for building "R" of the Quartermaster Depot, a structure we believed had been erected in the 1870s, were somewhat beyond the scope of our mandate. There was thus no prospect of doing serious work on the early portions of the town and port of Vancouver which lay within the interchange as it was in 1974 and 1975.

As recently as the late 1990s, some archaeologists believed that later urban development would have destroyed any significant archaeological remains associated with the early settlement and

development in the city (Freidenburg 1998). This notion was soundly contradicted by the results of archaeological monitoring and data recovery excavations in 2000 in advance of construction of the West Coast Bank building on portions of Blocks 24 and 25 immediately west of I-5 and the VNHR (Minor 2006).

Construction of underground parking and foundations for the bank building required a deep pit excavation 11 feet below surface within a 12,600 square foot area. Archaeological monitoring and follow-up investigations during excavation of the deep pit resulted in the documentation of eight cultural features, including cellars under two buildings (one earthen-walled and the other rock-lined), two dry wells, a wood-lined chute, a trash pit, concrete footings, and a concrete wall. A total of 1,910 artifacts was recovered. Of these, 1,222 artifacts, or 64 percent of the collection, were recovered from contexts directly associated with buildings identified on Sanborn insurance maps.

The artifacts recovered reflect the material culture of the inhabitants of Vancouver during the last half of the nineteenth century and early decades of the twentieth century. Most of the people living on Blocks 24 and 25 presumably were of Euroamerican ancestry. An addition to the population occurred by 1928, when Chinese operated a laundry out of the building on the northeast corner of Block 24. The archaeological remains on Blocks 24 and 25 span the interval of time when the area between the U.S. military reserve on the east and the commercial district along Main Street to the west underwent a transition from residential to commercial use.

Historical archaeological investigations have recently been conducted at several other locations west of the I-5 corridor in the oldest portion of Vancouver. The Vancouver Convention Center Site (45CL582) was the subject of data recovery excavations in 2004 (Wilt et al. 2004). Testing was conducted nearby at the Columbian Newspaper's Downtown Campus Site (45CL646) in 2005 (Roulette and White 2005; Roulette et al. 2006). Both sites contained features and artifacts associated with early residences; these projects were conducted so recently that final reports are not yet available.

The Broadway Saloon Site (45CL583) consists of a single shaft feature containing nineteenth century artifacts exposed during construction in 2004. This feature appeared to be associated with a one-story outbuilding on the lot in 1888 but gone by 1892 (Roulette 2004). Site 45CL687 consists of three archaeological features exposed in test trenches excavated in 2006 in the City of Vancouver's proposed Fourth Street realignment project area. One of these features contained glass bottles and other remains associated with the Vancouver Bottling Works and the later Wineberg Bottling Works.

While not every parcel contains significant archaeological resources (e.g., Kent and Reese 2000), recent historical archaeological investigations demonstrate the potential for encountering archaeological remains associated with early residences, businesses, and industries in this portion of Vancouver (Wilt and Roulette 2006). Based on the results of these projects, there is every reason to believe that abundant and well preserved archaeological remains are present beneath the older portions of the City of Vancouver.

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APPENDIX 1A-I:

GEOLOGY AND GEOMORPHOLOGY

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In this reconnaissance study of the morphostratigraphy of the project vicinity, selected existing data have been compiled and interpreted to establish natural and anthropomorphically influenced deposition/erosion dynamics during the last 12,000 years within the APE. The geologic deposits and landforms are evaluated with respect to potential development and preservation of archaeological resources in the APE.

The data compiled for this report include 10 historic charts dating from 1841 to 2006; 10 historical photographs (dating from 1914 to 2006); 14 historical vertical airphotos and satellite images (dating from 1935 to 2006); and 122 geotechnical borehole logs (dating from 1954 to 2006). Based on present geomorphological conditions near the APE, the following depositional settings, elevations, and deposit proxies have been established: channel axes –30 to –10 ft elevation (sand and/or gravel), channel margin –5 to +5 ft elevation (sand > mud, no roots), floodplain 0 to +20 ft elevation (mud > sand, roots, peat, soil profiles). Based on reported historic and geologically dated events in the Lower Columbia River Valley, the following stratigraphic intervals have been established for the CRC APE: historic fill (<150 yr BP), late Holocene (150–7,000 yr BP), early Holocene (7,000–12,000 yr BP), and Pleistocene or older (>12,000 yr BP).

Eighty borehole logs were selected to establish stratigraphic cross-sections of age and deposit settings in the APE. Key stratigraphic units include: (1) fill debris; (2) latest Holocene flood deposits (below 35 ft elev.); (3) Mazama ash at 7,000 yr BP; (4) onset of earliest Holocene submergence (above –230 ft elev.); (5) latest Pleistocene rhythmites (12,000 yr BP); and (6) late Pleistocene, or older, gravels (>12,000 yr BP).

Historic fill in the boreholes ranges from 0 to 30 ft in thickness. Late Holocene deposits in the Lower Columbia River Valley, between Vancouver and Columbia Slough, extend down to about –50 ft elevation. Early Holocene deposits under the modern Columbia River channel and Hayden Island reach –230 ft elev. Late Pleistocene gravels mantle the upland valley terraces in Vancouver and near Columbia Boulevard in North Portland. In Vancouver, Pleistocene rhythmites mantle the Pleistocene gravels, where the rhythmites have not been excavated. Only the Holocene deposits in the submerged river valley, and preserved topsoils on the Pleistocene rhythmites, include strata that are younger than 12,000 yr BP.

Early historic positions of river shorelines, slough shorelines, and floodplain geomorphic features are established from early navigation charts (1841) and vertical aerial photographs (1936). A shoreline change comparison (1841 to 2006) shows a slight widening and lengthening of Hayden Island, demonstrating high, natural preservation potential for river shorelines and adjacent floodplains associated with that island. The shoreline change map also indicates stability, and

associated high preservation potential, of the Oregon Slough shorelines in the project vicinity between 1841 and 2006.

The 1936 airphoto mosaic delineates floodplain features between Oregon Slough and Columbia Slough that existed in the APE prior to flood control and urbanization in the mid-1900s. Features mapped for potential archaeological resource locations include abandoned pond and drainage channel shorelines, elevated channel levees, and adjacent floodplains with 200-foot setbacks. The present I-5 corridor and interchanges cross at least five early-historic to latest-prehistoric floodplain-channel and levee settings between Oregon Slough and Columbia Slough.

Based on the data obtained in this study, the northern (Vancouver) section of the APE appears to have little potential for pre-European contact archaeological resources below the bottom layers of Holocene soils. Where that prehistoric topsoil has been excavated, only Pleistocene deposits (> 12,000 yr BP) should occur below artificial fill. The central section of the APE (modern Columbia River channel) will also have little potential for preservation of archaeological resources due to active channel erosion processes.

In comparison, the southern section of the APE, including Hayden Island and south to Columbia Slough, should have high potential for the preservation of archaeological sites. A broad floodplain with overflow chutes, drainage channels, sloughs, and ponds has developed over thousands of years in that area. Continuous floodplain deposition, with no major channel erosion, has likely assured very high preservation potential of floodplain deposits and any hosted archaeological resources to depths of 50 feet subsurface. The presence of Mazama ash at this depth in Delta Park indicates that the main channel axis (thalweg) did not migrate south of Oregon Slough since the ash was deposited, so there is likely 7,000 years of semicontinuous sedimentation and preservation in this area of the south shore floodplain.

VERTICAL ELEVATION DATUM CONVERSIONS

Several datum conversions are used in this analysis of existing subsurface conditions. The older borehole data (1960–1980s) are surveyed to the NGVD 1929 datum. The CRC project datum is NGVD88. The conversion from NGVD29 to NGVD88 is taken to be 3.47 feet (Table 1). Other datums used in the project area include the Columbia River datum (COE CR datum–close to NGVD29 datum) and the MLLW datum (NOAA MLLW datum–about a foot lower than NGVD29 datum). The diurnal tidal range at Vancouver is 1.8 feet (NOAA 2001).

HISTORIC CHANNEL DEPTHS

An early historic chart drafted in 1841 by the Wilkes Expedition shows the main channel of the Columbia River between Vancouver and Hayden Island (Figure 1). This is the earliest bathymetric and shoreline map obtained for the CRC APE in this study (Wilkes 1845). The original text of the Wilkes Expedition report was examined at the Oregon Historical Society to establish the surveying accuracy for this 1:6,000 scale chart. The shoreline and control points for the sounding lines were surveyed by two sets of three vessels each, positioned on opposite sides of the channel. Using cannon fire to time positioning measurements, each vessel surveyed the other five vessels and common shoreline points to establish triangulations from known baselines.

Table 1. Elevation Datum Conversion Table

Known Datum to Wanted Datum		
City of Portland	–1.375	USC & GS 1947
City of Portland	–1.375	ODOT ORE ST HWY TRANS
City of Portland	–1.375	NGVD 29 (Approx)
City of Portland	–1.375	NGVD 27 (Approx)
City of Portland	+2.10	NAVD 88 (Approx)
City of Portland	–2.92	Weather Bureau Gauge Morrison Bridge
City of Portland	–3.22	US Engineers Gauge Stark Street
City of Portland	–3.22	US Engineers Gauge Vancouver

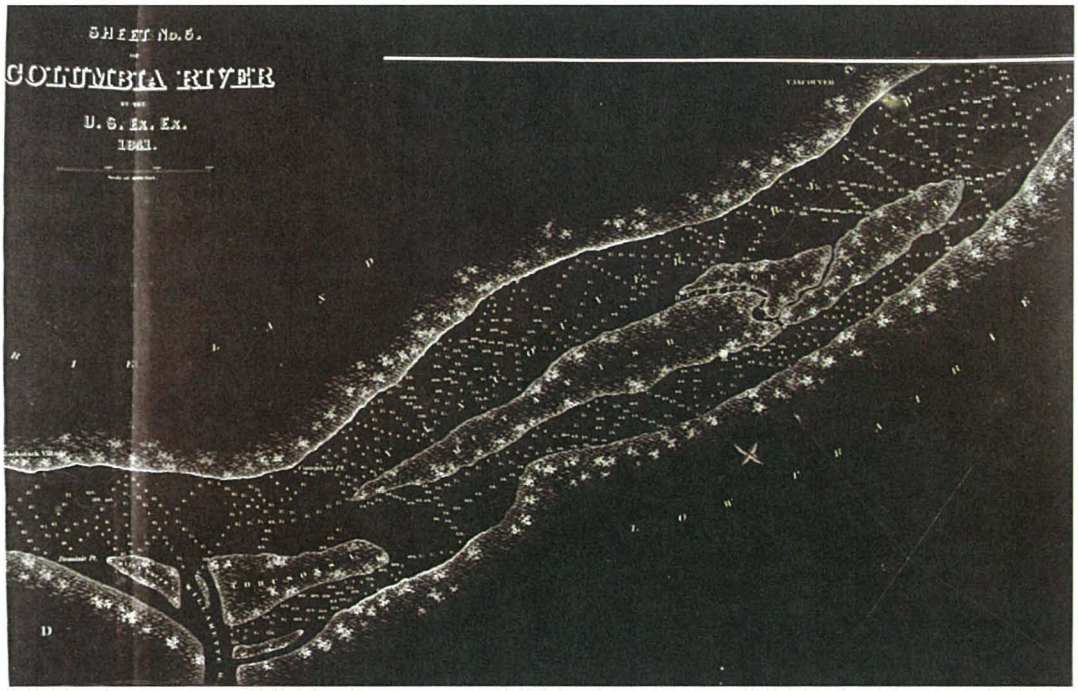

Figure 1. Wilkes Expedition chart (1841, Sheet 5) of the CRC project area, from the Willamette River confluence (lower left) to Fort Vancouver (upper right) (from Wilkes 1845).

Sightings were made with 18 inch azimuth circles mounted on 3–5 foot long sighting scopes. Such instrumentation should provide better than 10 minute arc accuracy, which should yield better than 3 m error over 1 km distance. Within the Vancouver Channel area, the shoreline positions are assumed to be within 10 m relative accuracy. Sounding was performed along lines flagged on either side of the channel. Measurements over shallow shoals are provided to the nearest foot. Measurements over deeper channels are provided to the nearest half fathom (one fathom is approximately six feet in depth).

In 1841, the Columbia River channel ranged from 2–9 fathoms and the channel thalweg averaged 4–5 fathoms or 24–30 feet depth in the CRC vicinity. Oregon Slough was an important secondary channel in 1841, reaching 20 ft depth at the time of surveying. The Columbia Slough was apparently too small to have been recorded in the 1841 chart. At the time of the Wilkes Expedition the longitudinal bar complex, separating the Columbia River from Oregon Slough, was divided into three islands, called McTavish Island (west), Joe Island (central) and Barclay Island (east). The longitudinal bar lengthened and consolidated after 1841 to yield the Hayden and Tomahawk Islands mapped in 1933 (see COE charts below).

A US Army Corps of Engineers archive chart from 1933 provides another record of main channel axis thalweg depths prior to tributary dam impoundment and major diking in the CRC vicinity (Figure 2). Thalweg depths range from 15–22 feet, but rarely exceed 20 feet below the Columbia River datum (CRD), about mean sea level (MSL). In this report an average, natural channel depth for the main channel of the Columbia River is assumed to be about 20 feet below seasonal low water, or the Columbia River datum near MSL.

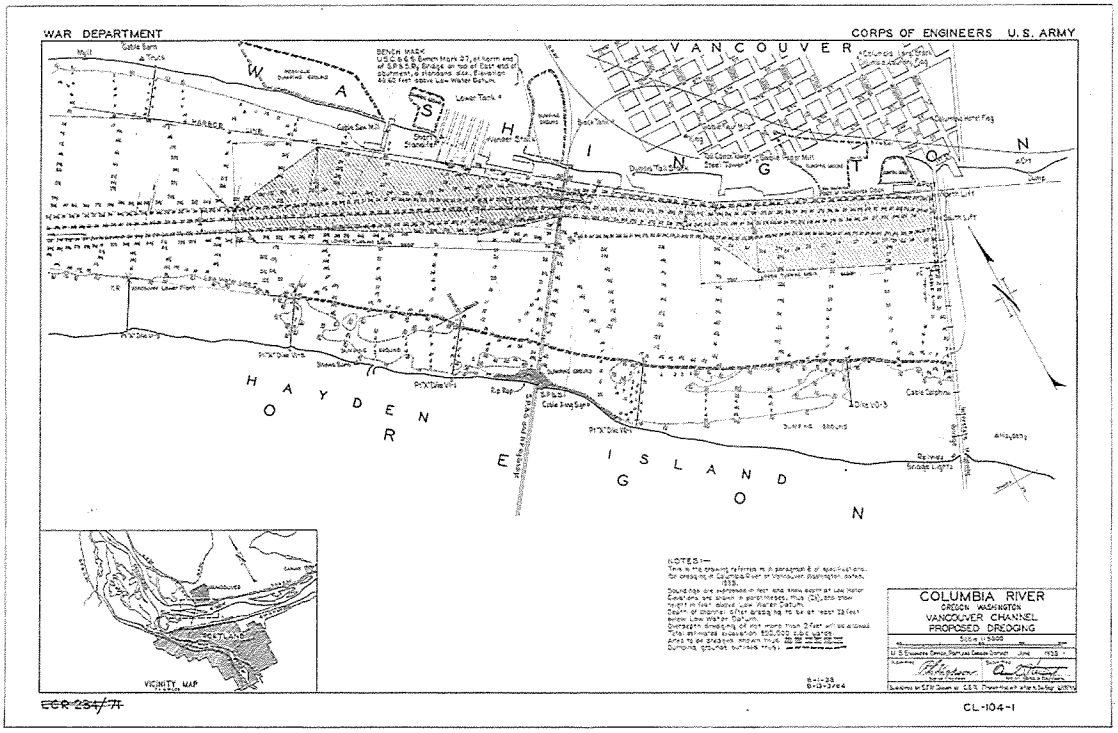

Figure 2. COE Bathymetric Chart (1933) of Columbia River main channel between Hayden Island and Vancouver in the CRC project area.

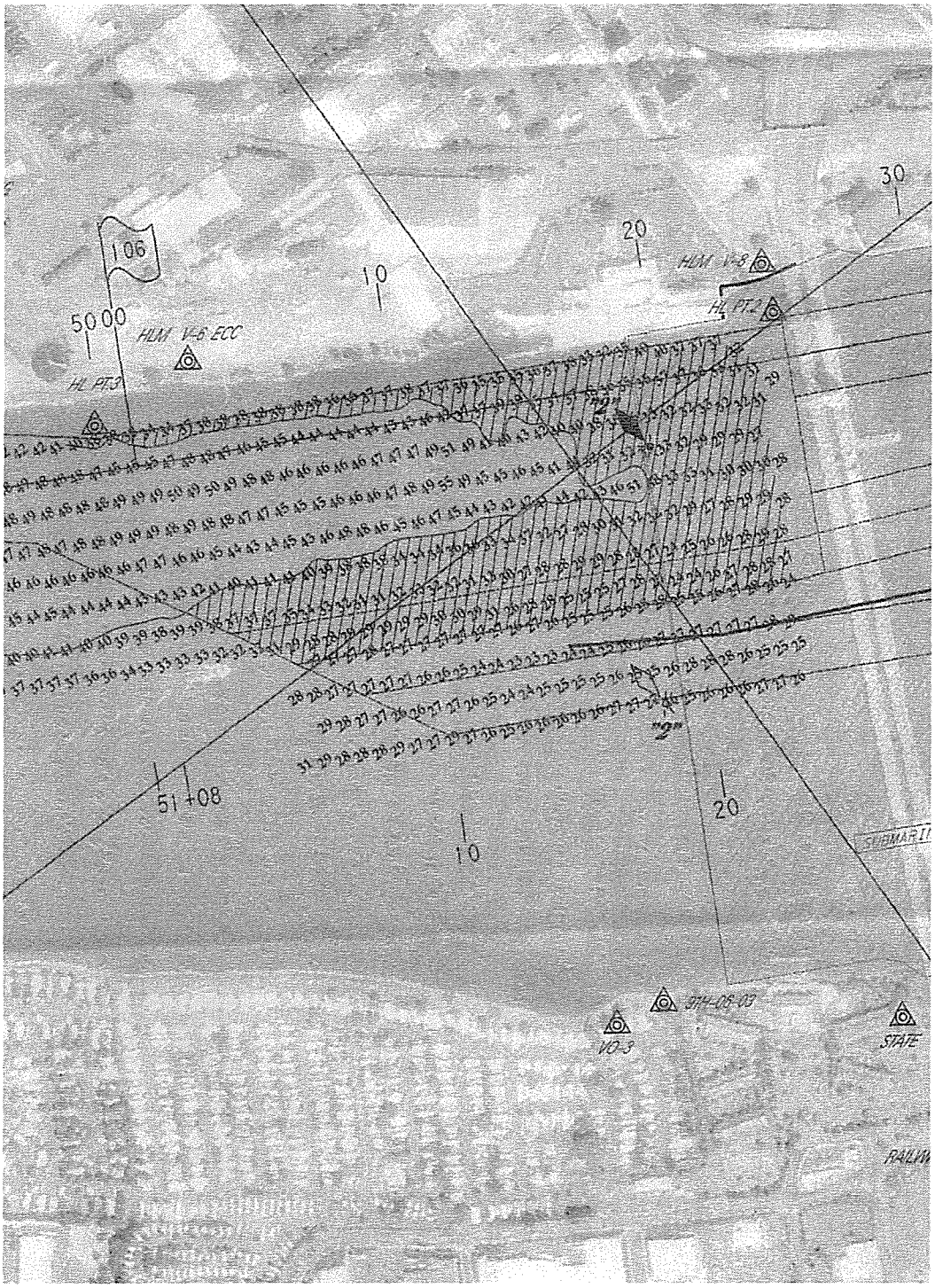

Figure 3. Modern COE Bathymetric Chart (2006) showing maintenance dredging depths in the Columbia River main channel west of I-5 between Hayden Island and Vancouver.

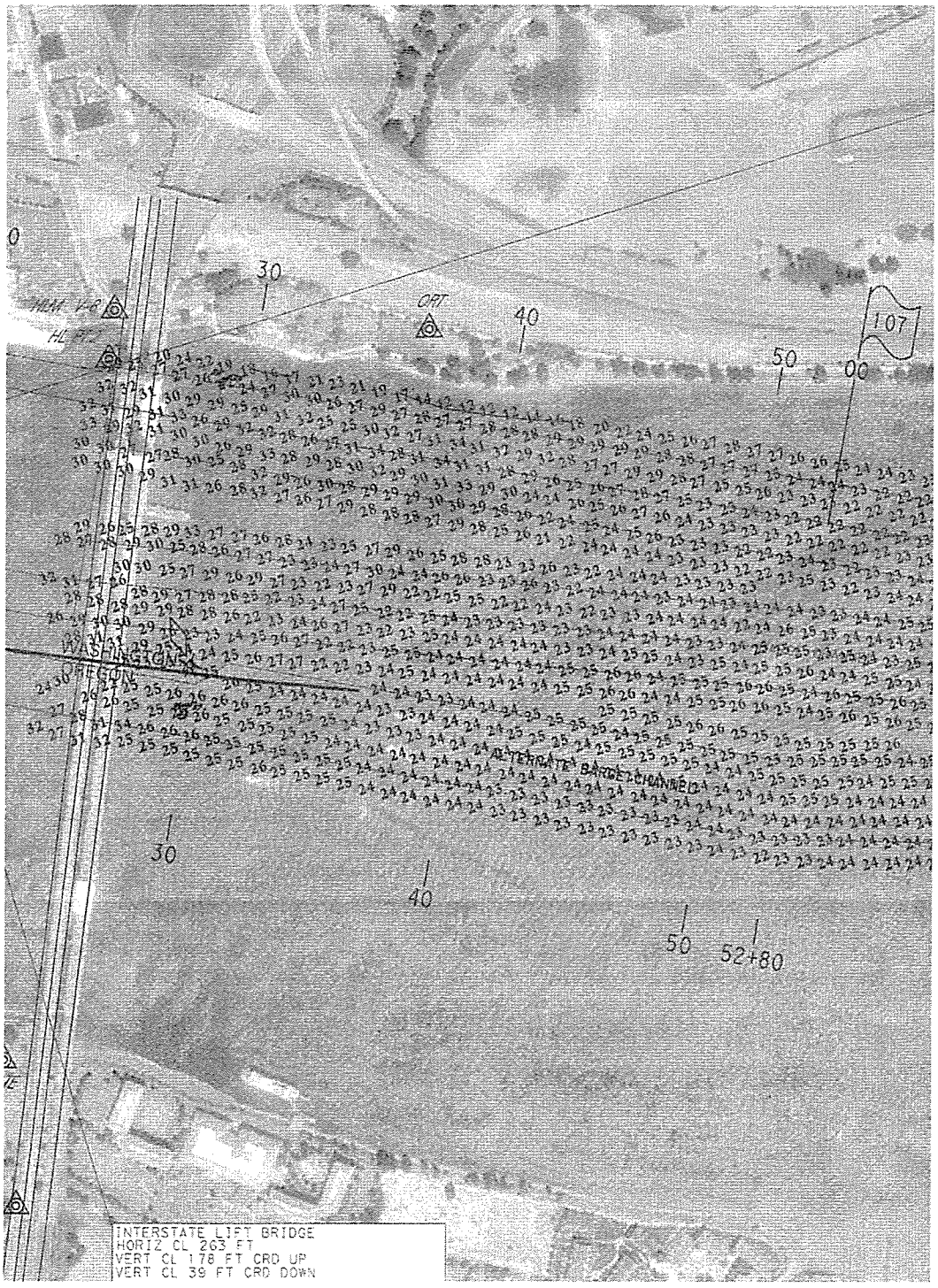

Figure 4. Modern COE Bathymetric Chart (2006) showing maintenance dredging depths in the Columbia River main channel east of I-5 between Hayden Island and Vancouver.

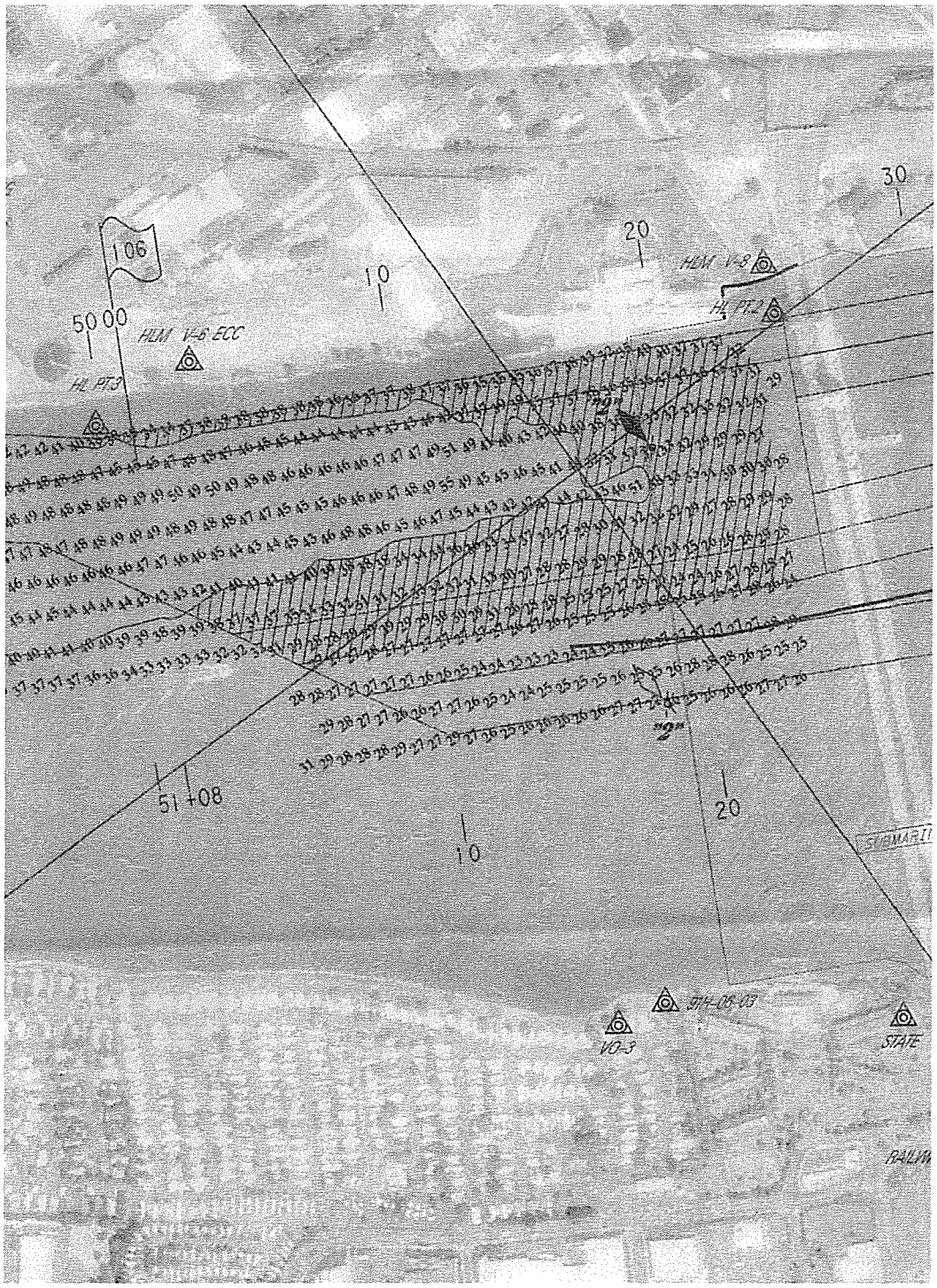

Figure 3. Modern COE Bathymetric Chart (2006) showing maintenance dredging depths in the Columbia River main channel west of I-5 between Hayden Island and Vancouver.

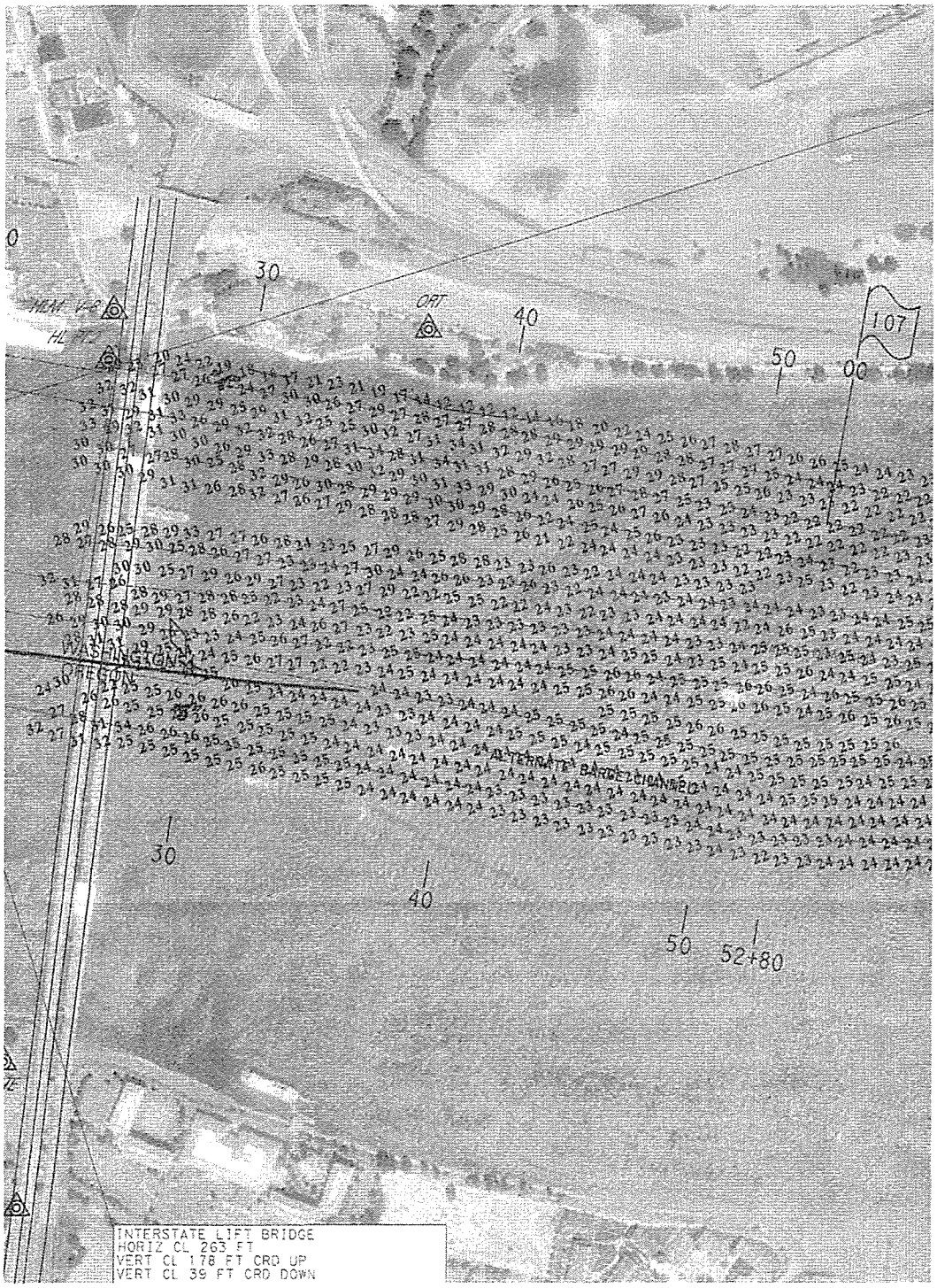

Figure 4. Modern COE Bathymetric Chart (2006) showing maintenance dredging depths in the Columbia River main channel east of I-5 between Hayden Island and Vancouver.

Figure 5. Ground photo of 1948 flood deposits at Vanport in the CRC vicinity (Oregon Historical Society Photograph).

As shown on a modern bathymetric chart (COE 2006), the dredged turning basin of the Port of Vancouver in the Columbia River between Hayden Island and Vancouver is maintained by dredging to about –40 feet MLLW (Figures 3 and 4). The channel above the I-5 bridge crossing is maintained to –27 ft CRD for barge traffic.

HISTORIC FLOOD ELEVATIONS AND MODERN FLOODPLAIN HEIGHTS

The 1948 flood height in the North Portland area (Figure 5) was measured at +32.8 feet NGVD29 (Gates 1994). The flood of 1894 is reported to have had a slightly higher elevation. These floods are considered, for the purposes of this study, to represent 100-year flood events. These ~100-yr floods of the Columbia River represent natural maximum floods during late-Holocene time prior to tributary impoundments. For this study, the elevations of latest-Holocene flood silts are assumed to reach not more than 35 feet NGVD29.

Elevations bounded by Columbia Slough to the south and the present Columbia River channel to the north range from 0 to 30 ft NGVD29 (Figure 6 and 7). The mapped 30 ft NGVD29 elevations are associated with artificial fill at channel bank dikes, roadways, and elevated parking lots. By comparison, the 20 ft contour encompasses some broader areas not associated with dikes and artificial structures on Hayden Island and East Delta Park. Approximately 50 percent of the Hayden Island surface area adjacent to the CRC APE reaches 20 ft NGVD29. Less than 10 percent of the Delta Park–Vanport surface areas reach 20 ft NGVD29. West of the CRC APE (3–5 km distance), Smith and Bybee Lakes fall below the 10 ft elevation contour. Perennial vegetation occurs at +5 ft NGVD29, and woodlands occur at +10 ft NGVD.

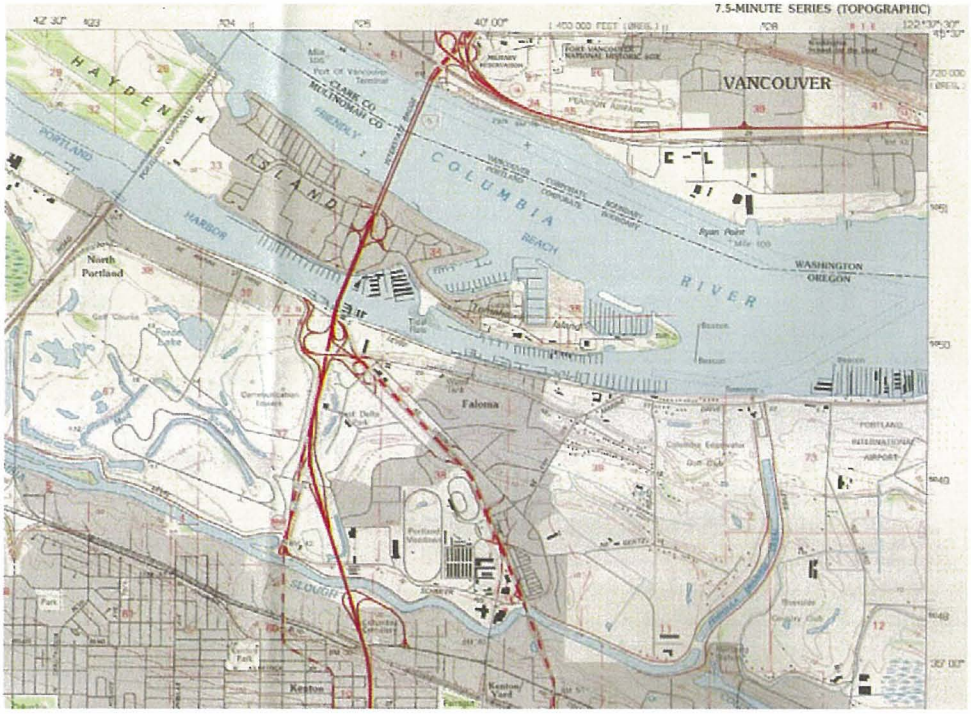

Figure 6. USGS Portland 7.5' quadrangle (1990) of CRC vicinity east to PDX airport.

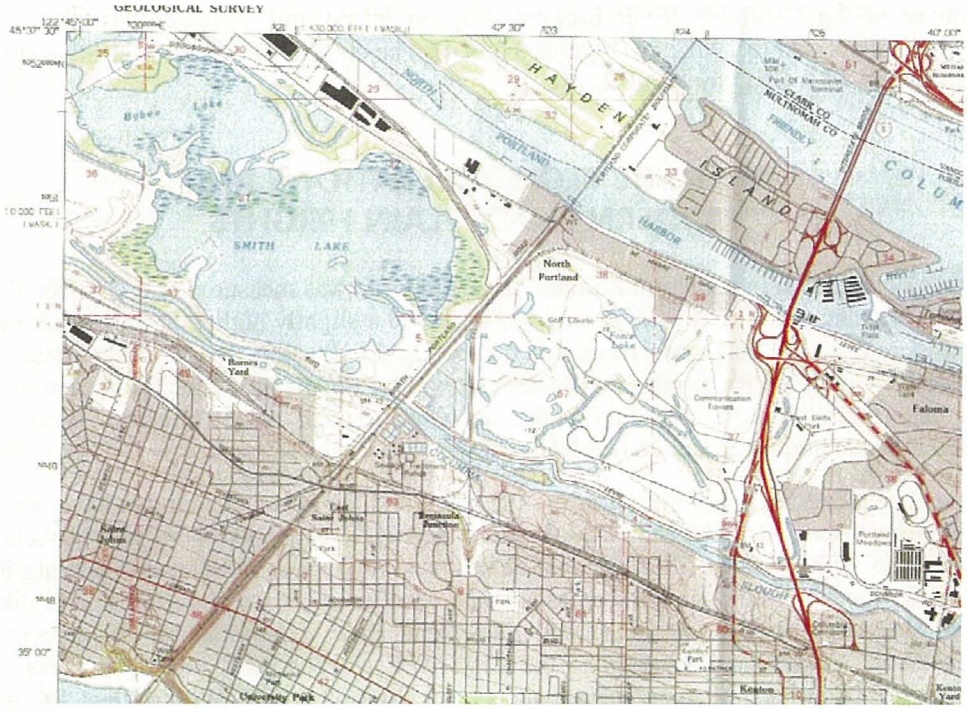

Figure 7. USGS Portland 7.5' quadrangle (1990) of CRC vicinity west to Smith and Bybee Lakes.

In this study, the 20 foot elevation contour (NGVD29) is used as the maximum elevation of significant, seasonal floodplain deposition in latest-prehistoric time. Floodplain elevations less than 20 ft NGVD29 represent areas of limited flood deposition due to young age and/or distance from the Columbia River channel. The floodplain elevation reflects relative stability (age) and proximity to sediment supply from the main Columbia River channel.

LATE PLEISTOCENE GLACIAL FLOOD DEPOSITS

Cemented, weathered, and/or substantially consolidated, gravel-bearing, naturally-stratified deposits above the Holocene flood heights of 35 feet NGVD29 are assumed, for the purposes of this study, to represent Pliocene–Pleistocene deposits (Figure 8). These deposits are referred to as either Troutdale (cemented) or Pleistocene (uncemented) fluvial gravels (Trimble 1963; Beeson and Tolan 1993). The upper member of the Troutdale formation, including sand, cobbles, and boulders, ranges from about 5 million to 2 million years in age.

The younger Pleistocene gravel deposits could range from 2 million years in age to the last ice age, e.g., the late Wisconsin 75,000 to 10,000 yr BP. The younger Pleistocene gravels occur well above the present grade of the Columbia River, indicating changing base levels in late-Pleistocene time (Figure 9).

CATACLYSMIC GLACIAL LAKE FLOOD DEPOSITS

Uncemented, unaltered, minimally consolidated, naturally stratified, sand and silt deposits at elevations higher than the historic flood heights or latest Holocene floods ~35 ft NGVD29 are assumed to represent cataclysmic flood deposits from glacial Lake Missoula and/or periglacial loess (Gates 1994). These flood deposits were produced by multiple glacial dam bursts, resulting in numerous sequences of fining-up beds called rhythmites. These deposits were locally remobilized to form interbeds of loess (Lentz 1983). For the purposes of this study, the cataclysmic rhythmites and loess are lumped together as latest-Pleistocene periglacial deposits.

The youngest glacial flood deposits from Lake Missoula that inundated the Lower Columbia River and Willamette valleys are dated to about 12,000 radiocarbon years BP (Benito and O'Connor 2003). These catastrophic flood deposits reach ~350 feet above MSL in the Willamette Valley. The upland terraces adjacent to the north and south sides of the Columbia River valley in the project vicinity are covered by the glacial flood rhythmites (Beeson et al. 1991). Drop stones ranging from pebbles to boulders melted out of glacial ice rafts and are occasionally interbedded with the cataclysmic sand and silt rhythmites. Waning cataclysmic floods and/or smaller floods likely eroded the debris out of the Lower Columbia River Valley after 12,000 years BP, carrying the remobilized sediments downriver (see Columbia River Valley sea level curve in Figure 10).

MAZAMA ASH

Several eruptions in early Holocene time (7–12,000 years BP) could have produced tephra layers in the Lower Columbia River Valley. For example, the Mt St Helens J tephra is dated between 8,300 ± 300 and 11,700 ± 230 yr BP. There are four separate tephras from Glacier Peak dated

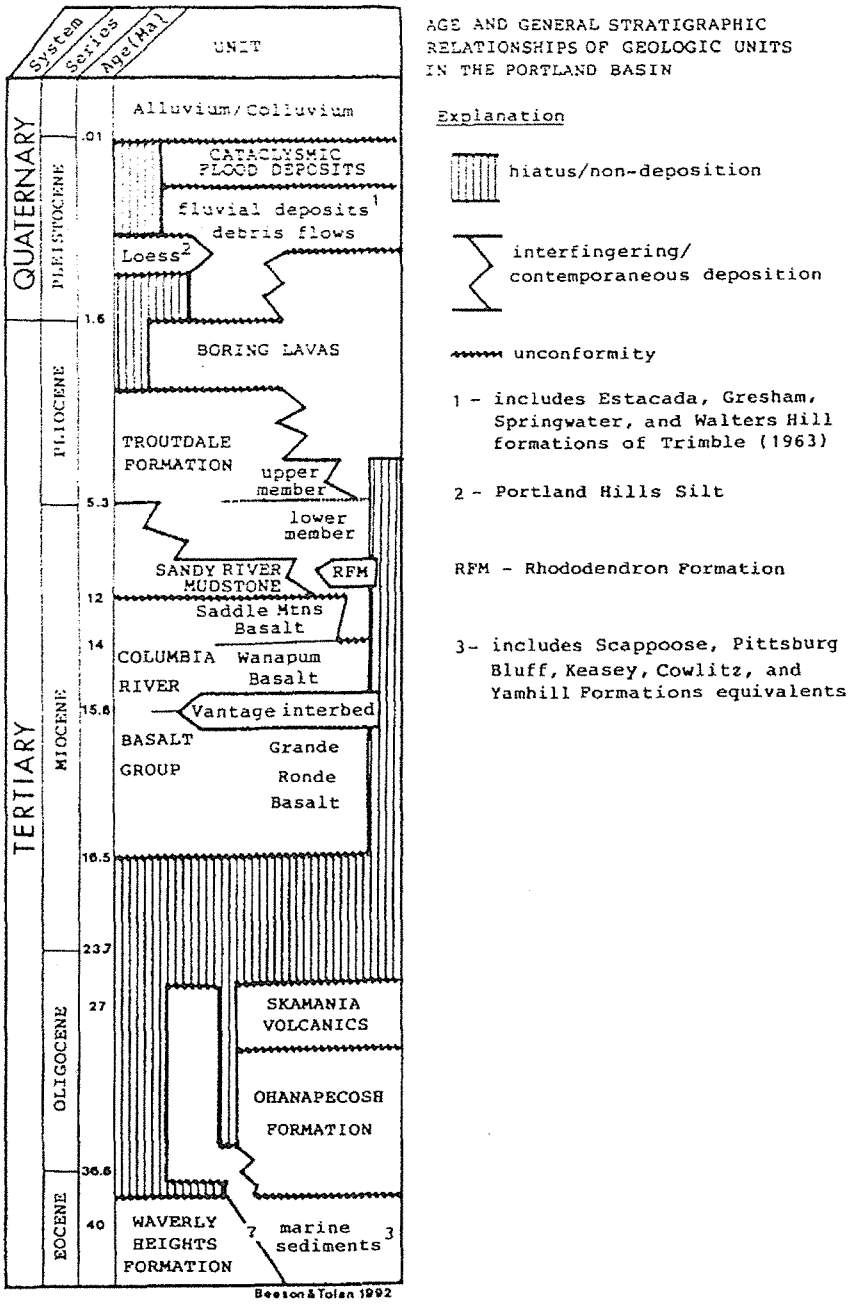

Figure 8. Summarized stratigraphy of the Portland Basin (from Beeson and Tolan 1993).

Figure 9. Uncemented Pleistocene gravel deposits in the CRC vicinity. View is from Lombard Street to the south. Very large foresets represent channel bars aggraded well above the present Columbia River base level (photo courtesy of Oregon Historical Society).

from approximately 11,200 and 13,000 yr BP (Sarna-Wojcicki et al. 1983). Tephras from these eruptions have not been reported in deposits in the CRC vicinity.

The catastrophic eruption of Mt Mazama at about 7,000 yr BP (Bacon 1983) produced abundant unconsolidated tephra in the eastern tributary basins of the Columbia River, and some tributaries of the Willamette River. These tributaries supplied fine-grained ash to the Lower Columbia River and Willamette River near its confluence with the Columbia River, forming a discrete key horizon of less than one foot to 35 feet in thickness (Gates 1994). The layer is identified by anomalous high standard penetration test (SPT) blow counts relative to hosting floodplain deposits, by its uniform fine silt size, and by its anomalous tan to light gray color (Ken Robbins, personal communication, 1992).

An isopach map for the Mazama tephra layer in the project vicinity has been prepared by Ken Robbins, a geologist with extensive experience in mapping the distribution of Mazama ash in the Lower Columbia Valley (Robbins 1992). This map shows the ash to vary from less than 2 feet to as much as 10 feet in thickness (Figure 11). Corresponding borehole depths (proprietary industry data) indicate an average elevation of the ash layer at about –50 feet MSL in the Delta Park area. Gates (1994) used calibrated elevations to place the ash layer at –49 to –56 feet NGVD29 in the Vanport locality, –52 to –54 feet NGVD29 at the North Marine Drive locality, –50 to –56 feet NGVD29 in West Delta Park, and –51 feet in East Delta Park.

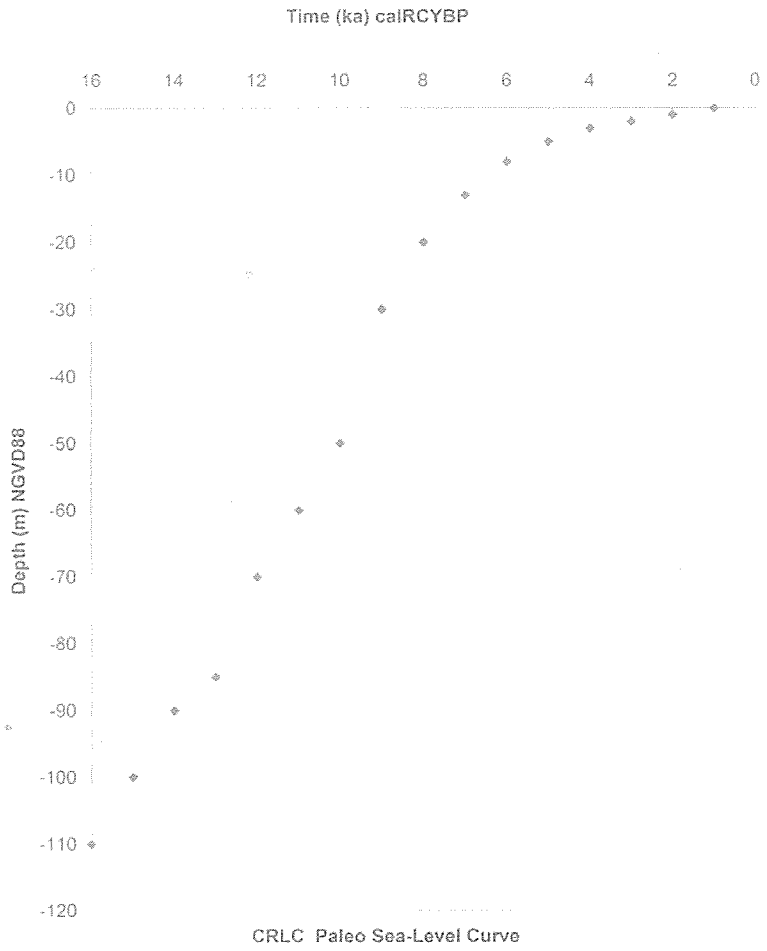

Figure 10. Paleo-sea level curve for the Lower Columbia River Valley (from Peterson et al. 2007).

The Mazama tephra layer, when identified, establishes a key stratigraphic horizon in mid-Holocene time (7,000 yr BP). This was a critical time of declining rate of sea level rise (globally) and declining tide level rise (Columbia River tidal basin) as shown in the Columbia River tide level curve (see Figure 10). The declining rate of tide level rise resulted in decreasing accommodation space for river sediment, more sediment bypassing through the river, and possibly changing stability of some floodplains.

The Mazama ash is used as a key time line in this report to break the Holocene fill into later-Holocene (post-Mazama) and earlier-Holocene (pre-Mazama) time. Where the ash layer is missing or unidentified in boreholes it is assumed that the Mazama time line occurs at –50 feet (paleo-sea level at 7,000 yr BP) in the Delta Park–Vanport areas. Channel erosion (–20 ft depth) and floodplain deposition (+20 ft height) add ±20 ft uncertainty to this arbitrary depth estimate.
No Mazama ash layers are reported from Oregon Slough or Hayden Island. This observation may reflect the sampling system used for investigations in this area and does not mean that such ash layers do not exist in this area, or that layers were deposited and subsequently washed away.

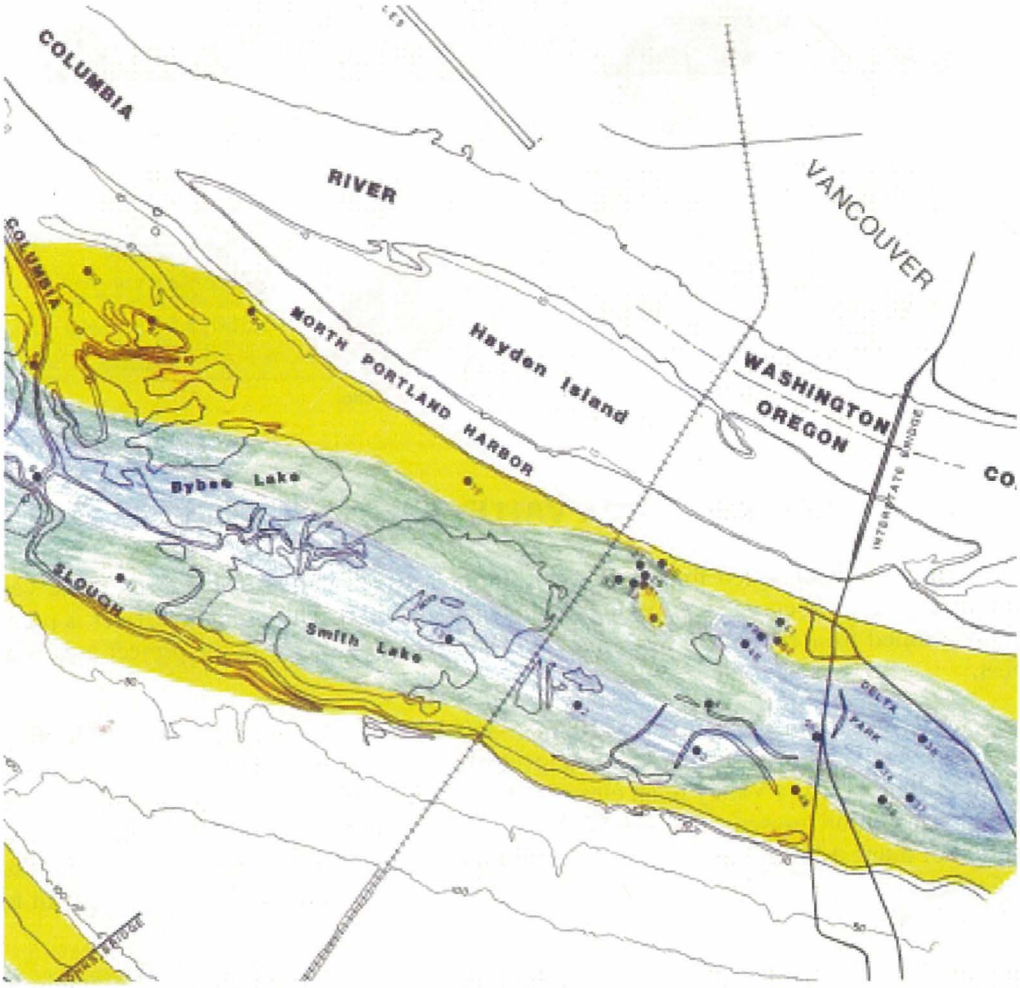

Figure 11. Mazama ash isopach map for CRC vicinity. Yellow is less than 2 ft thick, green is 2–4 ft thick, and blue is 4–10 ft thick (Ken Robbins, unpublished industry borehole data, personal communication 1992; data summarized in Gates 1994).

One recent borehole in the main channel (CRC-RC-003) does record an anomalous ash layer (e.g., lenses of ash) at 53 ft NGVD88 that is consistent with the Mazama ash deposit depths in the Delta Park area.

LATER HOLOCENE TEPHRAS AND LAHARS

Several volcanic tephra or lahar (volcanic debris flow) producing events could have yielded key beds in the Lower Columbia River Valley (Table 2). Three of these Late Holocene events have left distinct deposits in the Sandy River Delta area upstream of the project area (Gates 1994; Peterson and Madin 1997; Rapp 2005).

Table 2. Late Holocene Tephra Producing Events

Source Area	Ash Layer	Lahar	Age yr BP
Mt St Helens	1980 Eruption		27
Mt Hood*		Old Maid	200
Mt St Helens*	WE, WN		500
Mt Hood*		Timberline	1800
Mt Newberry			1,150–1,300
Mt St Helens	P		2,580–2,930 ± 250
Mt St Helens	Ye-Yn		3,350–3,510 ± 240
Mt Mazama*	O		6,700–7,000

* Identified in deposits upriver of the CRC APE (e.g., Sandy River Delta)
Sources: Sarna-Wojcicki et al. (1983); Rapp (2005)

COLUMBIA RIVER VALLEY SEA LEVEL CURVE

A sea level curve is provided for the Lower Columbia River Valley in Figure 10. The vertical datum for the sea level curve is NGVD88 (Peterson et al. 2007). The Columbia River is presently tidally controlled from the mouth to Bonneville Dam. The tidal range in the project area is about 1.8 feet.

As sea level rose from a depth of –110 m (–360 ft) since 16,000 years ago, the ancestral Columbia River Valley was submerged. Sea level would have extended upslope (landward) in the ancestral Columbia River Valley to an elevation of –70 m (–230 feet) relative to modern sea level at 12,000 years before present. The –230 ft depth (–70 m) corresponds to the maximum 12,000 yr BP period of interest for archaeological site formation and preservation established for the project area. Coincidentally, the –230 ft NGVD88 is close to the maximum depth of Holocene fill in the project vicinity.

At the time of Mazama ash deposition (7,000 yr BP), sea level in the Lower Columbia River Valley would have reached –12.5 m (–41 ft) NGVD88. The greater depth of ash strata in the Delta Park and Vanport localities of the project area (about –50 ft NGVD88) implies that the ash was deposited in shallow channels or flats of about 10 ft depth. The 50 ft elevation is used for the early-to-late Holocene transition, where the ash layer is absent in the APE. The declining rate of sea level rise after 7,000 yr BP resulted in sea level approaching its present elevation by several thousand years ago. Sea level, and corresponding river level, in the project area has risen only 3 m in the last three thousand years, e.g., about 1 mm yr^{-1} rate of sea level rise.

River floods of 20 feet above seasonal low river level at 3,000 years ago would have reached +10 ft NGVD29. Therefore, floodplain deposits at elevations of +15 to +20 ft NGVD29 in the project vicinity are expected to be less than a few thousand years old. Floodplains of less than +10 ft elevation should have filled in well over a thousand years ago. Floodplains of 0 to +5 ft NGVD29 in the project vicinity are presumed, for the purposes of this report, to have developed very recently from either channel migration or avulsion.

RELATIVE DATING OF QUATERNARY DEPOSITS

The relative ages of the Quaternary deposits summarized above are used to establish timelines or target horizons that could be recognized in boreholes, auger cores, or trench walls in the APE. The target units are listed from youngest, modern fill, to oldest, Sandy River Mudstone (Table 3). In their borehole log notes, drilling inspectors identify modern fill based on anomalous coarse fragments of gravel, brick, asphalt, and concrete, as well as on disturbed, oxidized soils.

Table 3. Target Stratigraphic Horizons in CRC Project Area Deposits

Age (Youngest to Oldest)	Stratigraphic Horizon
<75 yr BP	Modern Fill
<150 yr BP	Historic
<300 yr BP	Latest Prehistoric soil (no Bw soil horizon), Old Maid Lahar
<400 yr BP	Mt St Helens Set W
<1,800 yr BP	Timberline Lahar
<7,000 yr BP	Later Holocene Submergence* or Mazama Ash
<12,000 yr BP	Early Holocene Submergence**
>12,000 yr BP	Pleistocene Glacial Flood Silt/Sand, Uncemented
>1.5 mil yr BP	Pliocene Cemented, Weathered, Gravel, Troutdale
	Pliocene–Miocene Sandy River Mudstone

* –40 ft NGVD 29
** –230 ft NGVD 29

Unfortunately, no radiocarbon dates are available from any of the boreholes in the immediate vicinity of the APE. Mazama ash is recorded from some industry boreholes in the Delta Park area of the project area (see Borehole Compilation below). The Timberline lahar is established upriver at the I-205 bridge crossing (Rapp 2005). The Old Maid lahar is established in the Sandy River Delta, upriver of the I-205 bridge (Rapp 2005).

A flood following breaching of the Bonneville Landslide Dam across the Columbia River at present-day Bonneville Dam has been asserted to have had catastrophic effects on native peoples downstream and to represent a "major chronological marker throughout the Lower Columbia Valley" (Pettigrew 1981:121). Originally radiocarbon dated to around AD 1250, more recent attempts at determining the date of the landslide place this event between AD 1415 and AD 1455 (O'Connor 2004:420fn).

A close examination of cut banks in the Sandy River delta by Peterson and Madin (1997) did not yield any evidence of a catastrophic flood in the exposed continuous sections extending from the present surface down to a tephra layer, thought to be the Mt St Helens SetW horizon at 400–500 years BP. Two charcoal-based radiocarbon dates of 250 ± 70 and 410 ± 70 uncalibrated RCYBP bracket the section observed by Peterson and Madin (1997). More recent work in the Sandy River Delta (Rapp 2005) also failed to identify any evidence of anomalous flooding associated with breaching of the prehistoric Bonneville Landslide dam.

For this study, the Holocene deposits were arbitrarily divided into later Holocene (after 7,000 yr BP) and earlier Holocene (prior to 7,000 yr BP) based on presence of the Mazama ash layer (Table 3). Where the ash layer is not reported in borehole records we use elevation proxies from the Sea Level Curve (Figure 10) to establish post-Mazama deposits above – 20 ft NGVD29 and pre-Mazama deposits below –60 ft NGVD29. These elevations occur ± 20 ft from the 40 ft elevation predicted for the 7,000 yr BP paleo-tidal level in the submerged Columbia River system. For purposes of stratigraphic cross-section drafting, 50 ft NGVD29 is used as a conservative elevation for the early-to-late Holocene transition in the APE.

The relative ages of the deposits serve as a proxy for archaeological site formation in early historic time, latest Holocene, mid-Holocene, and early Holocene time. No archaeological site preservation in the Lower Columbia River Valley is expected from deposits that predate the 12,000 yr BP cataclysmic floods. However, intact topsoils on top of the Pleistocene deposits from the valley sides could host archaeological sites from that time. The intact topsoils of the Pleistocene deposits represent targets for archaeological site identification. In contrast, the Holocene deposits in the submerged Lower Columbia River Valley are capable of hosting archaeological sites below the topsoil. Due to river-valley submergence, the middle and early Holocene deposits in the CRC APE are deeply buried (see Cross-Sections below).

Unfortunately, the absence of radiocarbon dates from any intervals in the APE precludes further refinement of deposit stratigraphy, landscape evolution, or ages of potential archaeological site formation in subsurface sediments (see Suggested Additional Work below).

HOLOCENE DEPOSITIONAL ENVIRONMENTS IN THE CRC APE

For the purposes of this study, key depositional environments or settings in the APE are related to sediment composition and stratigraphic sequence. Specific settings are established from facies distribution and stratigraphic sequence, following Walters Law of Lateral Facies and Vertical Sequences. The depositional environments are floodplain, channel margin, shallow channel, and channel axes (thalweg). Shoaling-up sequences are expected in order of shallowing environments, e.g., floodplain over channel margin over channel axes. Erosional lag and basal gravel over pre-Holocene contact are considered to be "in-channel" deposits, but are not restricted to specific depth intervals.

The depositional settings listed above roughly correspond to different river levels as established from most recent, natural, borehole sediments and corresponding elevations (Table 4). NOAA (2001) charts show modern, undredged, channel scour to maximum depths –30 ft NGVD29 in the CRC vicinity at RM 106–107. COE (2006) shows a maximum depth of –50 ft CRD at RM 108. Vegetated floodplain (+5 ft NGVD29) and forested floodplain (+10 ft NGVD29) are established from USGS topographic maps.

The shallower (higher) depositional settings have a higher probability of archaeological site formation and, most importantly, of site preservation potential. Archaeological sites should not be expected in the channel axes. Lateral migrations of river channels are likely to erode archaeological sites from shallow channel or channel margin environments, though remobilized artifacts might be found (their original depositional context lost). Floodplains, and particularly stable floodplains, have the greatest potential for occupation and for preservation of archaeological sites (Minor et al. 1994; see Cross-Section Settings below).

Table 4. Holocene Depositional Environments

Depositional Setting	Composition Lithofacies	Elevation (NGVD29)
Floodplain	soil profile in silt/sand	+10 to 20 ft
Floodplain	peaty mud/sand	+5 to 15 ft
Channel levee/back-levee	mud>sand	+0 to +10 feet
Shallow channel/levee	sand>mud	–5 to +5 ft
Channel axes	sand	–20 to –5 ft
Deep channel thalweg	sand>gravel	–30 to –10 ft
Erosional lag	>sand	
Basal contact gravel	gravel>cobble	

BOREHOLE COMPILATIONS

Geotechnical testing by borehole drilling provides useful constraints on identifying units with potential for hosting archaeological sites. Unlike water well drilling, the core tops of geotechnical borings are surveyed for position and elevation. The drilling depths are accurately measured. Soil types are recorded in a systematic manner using the Unified Soils Classification System. Dominant and minor grain size fractions and their relative distribution about the mean (grading) are recorded for the sample intervals. In addition, SPT blow counts and soil structure are recorded.

The borehole logs do not record other important information such as soil profile development, rooted zones, middens, hearth charcoal, fire-cracked rock, or small artifacts. The discontinuous sampling strategy, e.g., 6-inch disturbed samples, collected at intervals every 5 feet or 10 feet downcore, can miss thin cultural horizons, artifacts, ash layers, peat layers, and paleosols that would be observed in continuous auger coring or trenching

The geotechnical borehole logs used in this study (122 in number) were obtained for bridges and other structures requiring substantial foundation design. There is no regular spacing or alignment of the borehole sites relative to depositional settings or deposit age. For this report, the focus is on boreholes completed for the Washington Department of Transportation (WSDOT) and Oregon Department of Transportation (ODOT). Many of the highway department boreholes, and some other agency boreholes, have been re-located by the project team.

Additional industry boreholes in the project area utilized in this study occur in areas not tested by the public agencies or include records of ash layers at depth. Most of the early Department of Transportation boreholes in the Columbia River Valley (1950–1980) did not penetrate to the pre-Holocene contact, e.g., flood gravels or the Troutdale formation in the Columbia River Valley. The deeper industry boreholes reported here did reach basal gravels or the Troutdale formation. The industry borehole data is proprietary, but has been summarized by Gates (1994) (Figure 12). Gates provides the borehole locations in UTM coordinates (NAD83). Elevation of the industry boreholes is given relative to NGVD29.

The borehole sites utilized for this study are located in project map sections 3.1 to 3.10 (Figure 13). Oregon borehole locations are shown in map sections 3.1–3.7; Washington borehole locations are shown in map sections 3.7–3.10 (Figure 14).

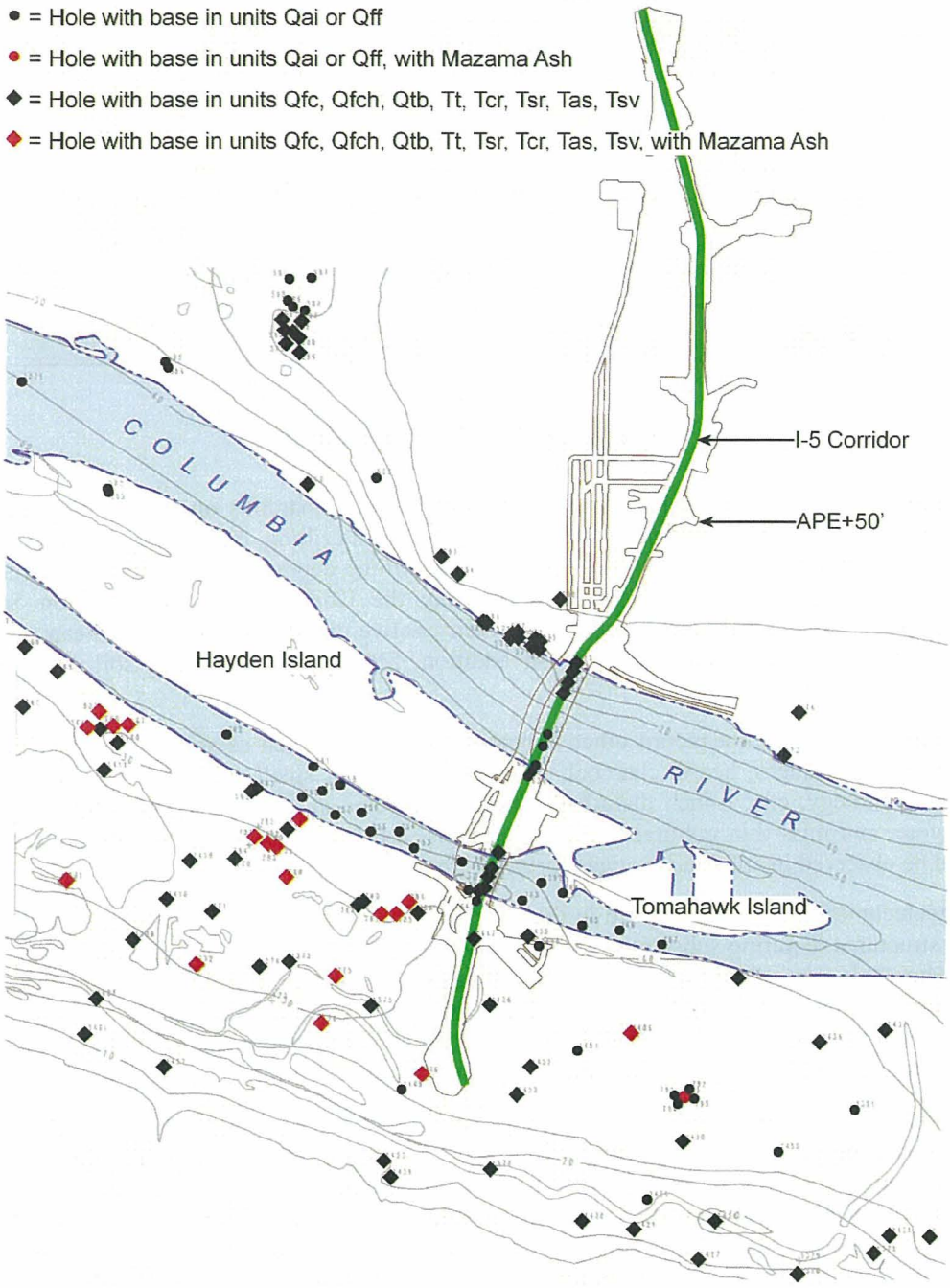

Figure 12. Industry and DOGAMI boreholes compiled by Gates (1994). The site map segment is from the Delta Park area of North Portland, in the I-5 corridor between Oregon Slough (top of map) and Columbia Slough (bottom of map), on the south side of the Columbia River. Black symbols represent boreholes that penetrated to pre-Holocene contacts. Red symbols are boreholes that record the Mazama ash layer, and that penetrated to pre-Holocene contacts. Those data are generally not available from earlier ODOT borehole records.

Figure 13. Project map sections listed by number, 3.1 (south) to 3.10 (north).

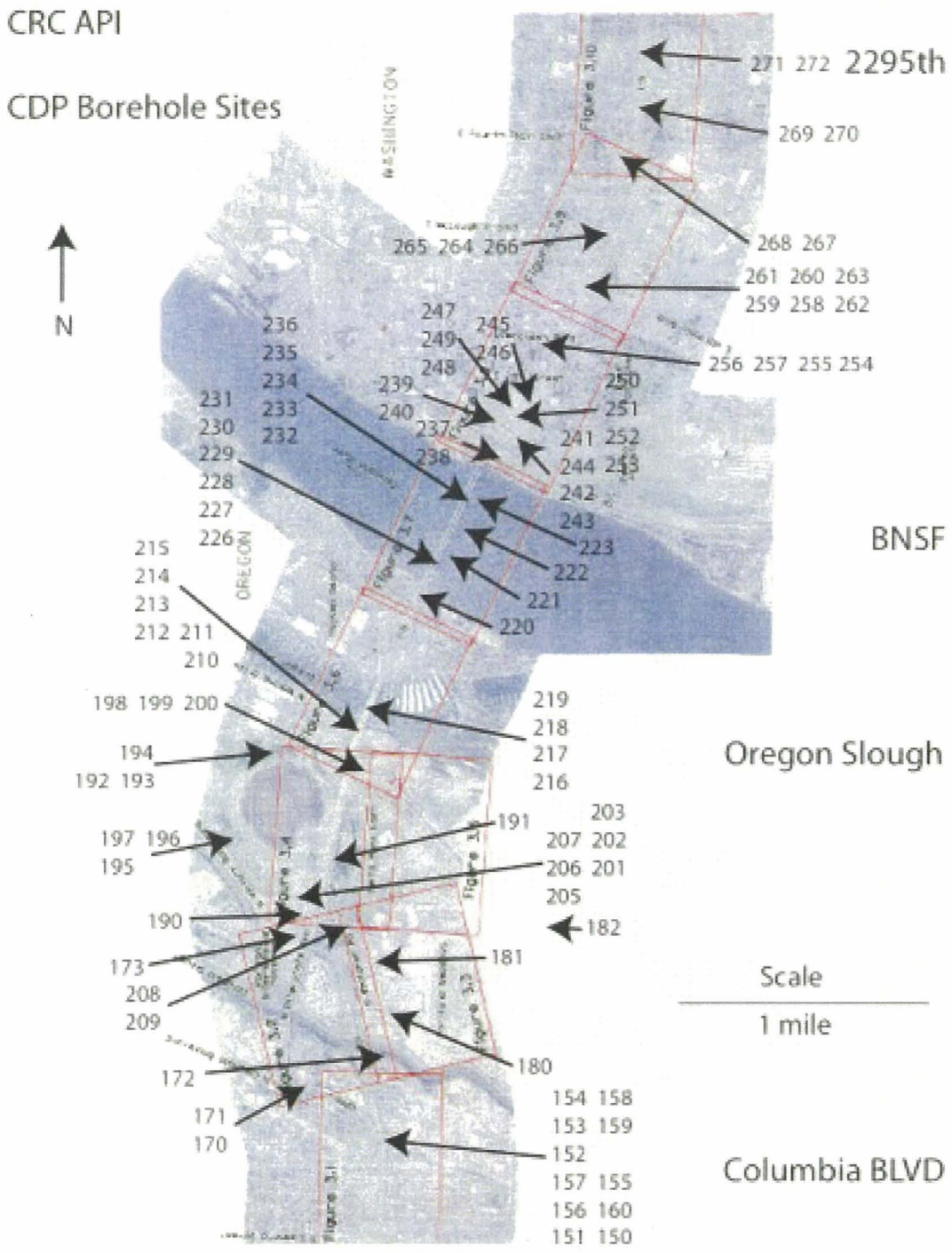

Figure 14. Compiled borehole sites in the CRC APE.

COLUMBIA RIVER CROSSING APE CROSS-SECTION AGES

The borehole logs contain limited proxy data on estimated deposit age (Table 3) relative to depth or elevation. The age intervals are estimated from (1) driller's notes on artificial fill (borehole top) or basal gravel (borehole bottom); (2) paleo-tidal level at 12,000 yr BP (–230 ft NGVD29); (3) Mazama ash at 7,000 yr BP; (4) paleo-tide level curve estimated at 7,000 yr BP (–50 ft NGVD29); and (5) elevation of deposits above the reach of late-Holocene Columbia River flooding (+35 ft NGVD29). The ages of the borehole strata are shown in Figures 15, 16, and 17.

As shown in Figure 12, artificial fill is reported to extend below the red markers in corresponding boreholes. Many of the earlier borehole logs (particularly from the 1950s through the 1970s) lack any mention of fill. Late Holocene (0–7,000 yr BP) deposits extend below the orange line in the Cross-section Ages exhibits. Early Holocene (7–12,000 yr BP) deposits extend below the green line. Pleistocene (last ice age) deposits extend below the blue line. Yellow markers are reports of Mazama ash (7,000 yr BP) from the boreholes.

The Holocene fill in the central Columbia River valley reaches –260 ft elevation. Deeper water wells in the area indicate that Sandy River formation mudstone exists below the Troutdale formation cemented gravels that form the floor of the deepest part of the ancestral Columbia River valley. The color scheme used in Figure 15 through 17 to show the stratigraphic age sections ranges from youngest (warm colors) to oldest (cool colors). The inversion of colors on the flanks of the ancestral Columbia River valley results from a transition of Holocene submergence in the valley axis to draping of Pleistocene flood deposits on the valley sides.

Pleistocene and older deposits cover all of the Vancouver section of the APE. Intact topsoils (where they still exist in the project area), but not underlying parent Pleistocene deposits, could contain archaeological resources. The Pleistocene deposits predate the 12,000 yr BP termination of cataclysmic floods in the Columbia River Valley.

COLUMBIA RIVER CROSSING APE CROSS-SECTION SETTINGS

The borehole logs are evaluated for proxy data on depositional settings (Table 4). For the purposes of this study, the depositional settings are grouped into six categories: (1) active channel, (2) floodplain, (3) channel margin, (4) channel axes, (5) Pleistocene rhythmites, and (6) Pleistocene gravels. The relations between these depositional settings and their relative elevation and position along the project corridor are shown in Figures 18, 19, and 20.

Near the southern boundary of the APE the Pleistocene flood rhythmites overlie older Pleistocene gravels on the valley terraces. At Columbia Boulevard near Delta Park, the Holocene fill deposits transition with increasing depth and increasing distance north from dominantly floodplain to mixed floodplain and channel margin deposits. This part of the APE was not influenced by the main Columbia River channel in late Holocene time.

The central section if the APE between Oregon Slough and Vancouver is dominated by lithologic proxy data for channel axes deposition. The main channel(s) of the Columbia River have influenced the central section, at least episodically, for the entire period of Columbia River valley filling (12,000 yr BP to the present).

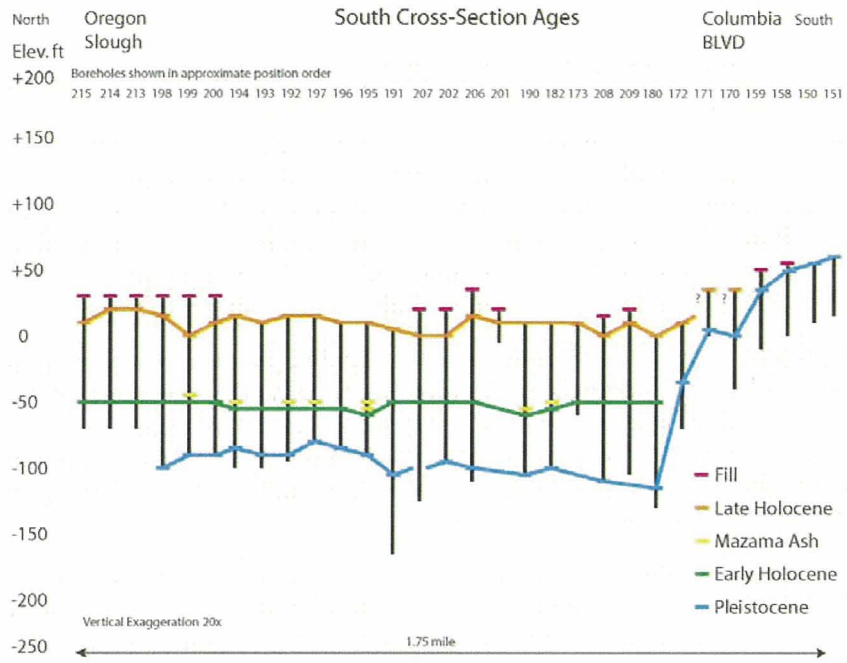

Figure 15. Stratigraphic cross-section (south section) of borehole interval ages plotted against elevation from Columbia Blvd. to Oregon Slough (see Figure 16 for borehole positions).

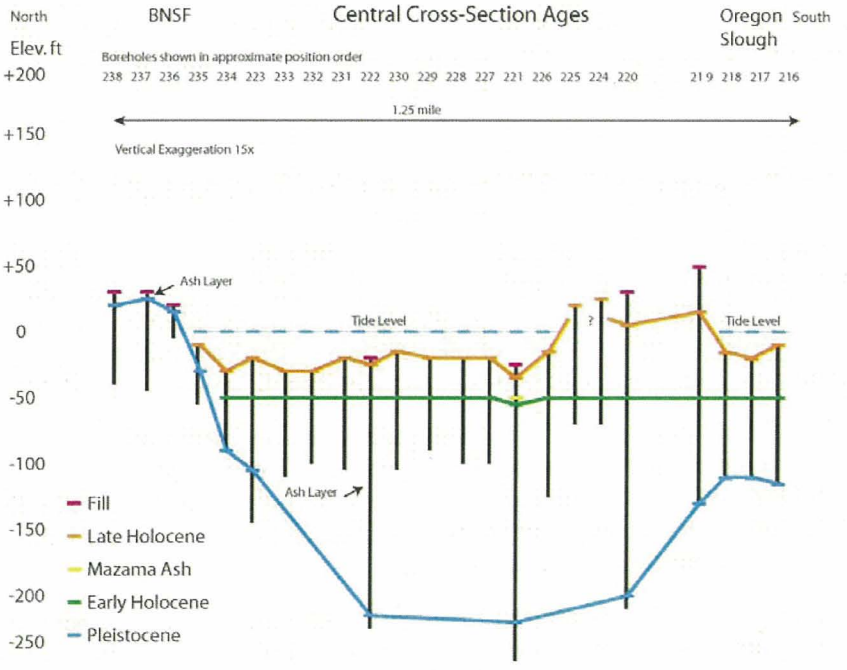

Figure 16. Stratigraphic cross-section (central section) of borehole interval ages plotted against elevation from Oregon Slough to BNSF rail line in south Vancouver (see Figure 16 for borehole positions).

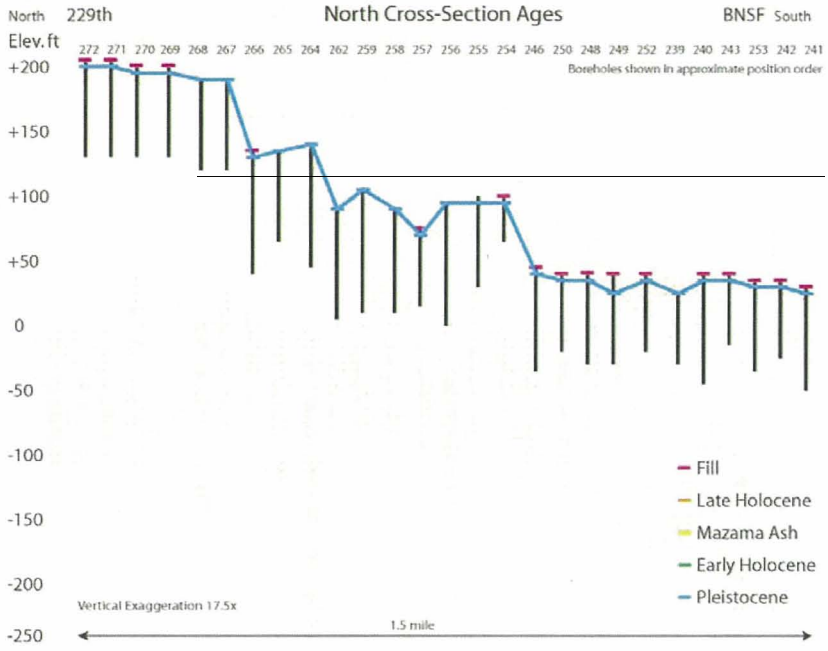

Figure 17. Stratigraphic cross-section (north section) of borehole interval ages plotted against elevation from BNSF rail line to the 229th cross street in north Vancouver (see Figure 16 for borehole positions).

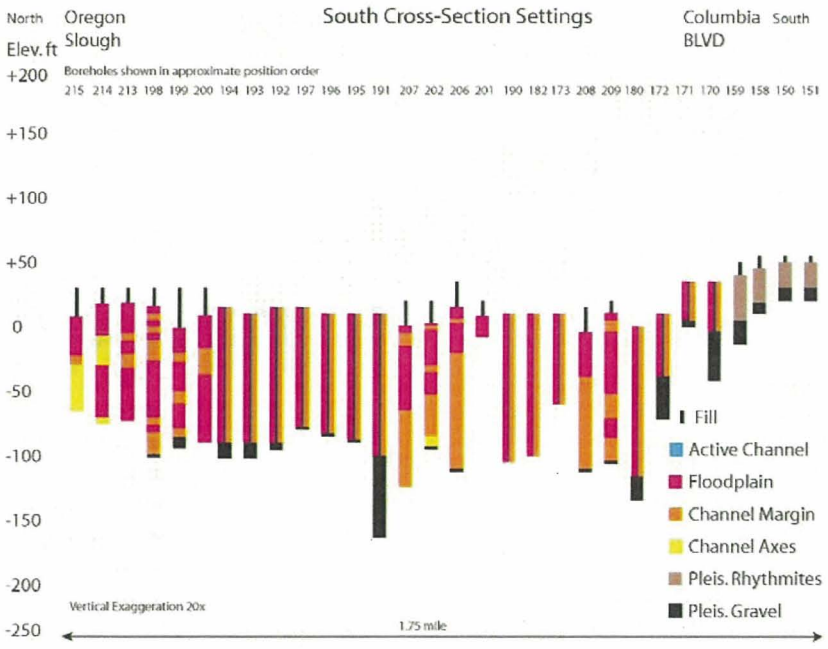

Figure 18. Stratigraphic cross-section (south section) of borehole depositional settings plotted against elevation from Columbia Blvd. to Oregon Slough (see Figure 16 for borehole positions). Borehole extensions above colored deposit settings represent fill. Bimodal colored settings are undifferentiated in logs.

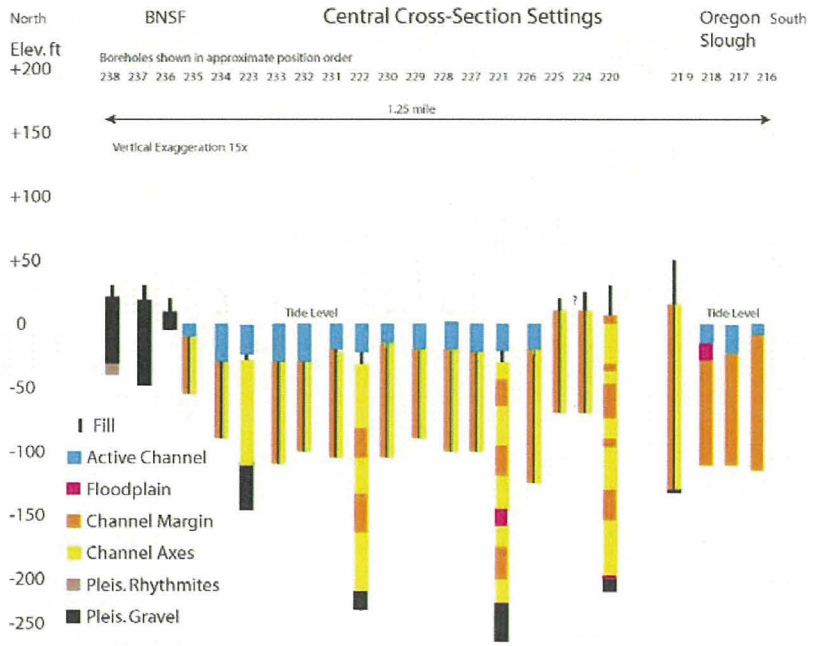

Figure 19. Stratigraphic cross-section (central section) of borehole depositional settings plotted against elevation from Oregon Slough to BNSF in south Vancouver (see Figure 16 for borehole positions). Borehole extensions above colored deposit settings represent fill. Bimodal colored settings are undifferentiated in logs.

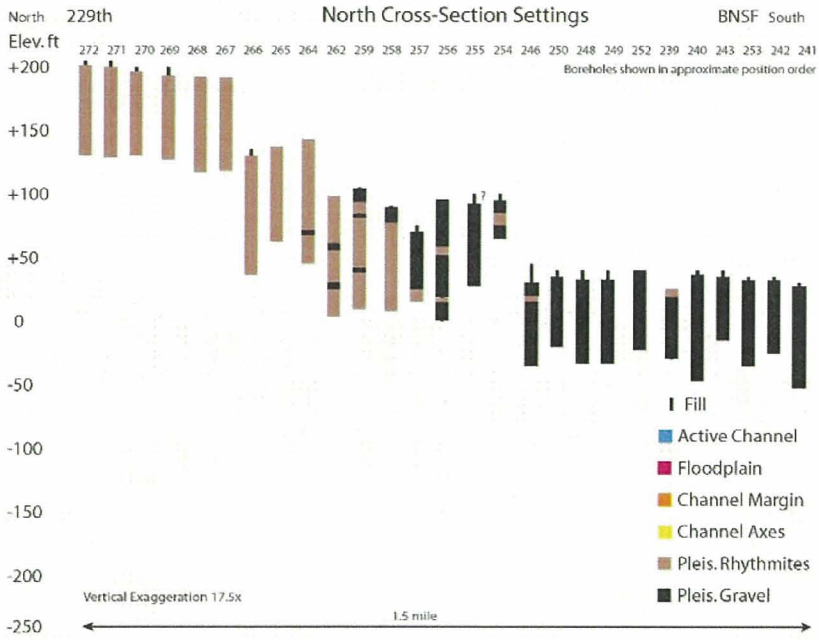

Figure 20. Stratigraphic cross-section (north section) of borehole depositional settings plotted against elevation from BNSF to 229th cross street in north Vancouver (see Figure 16 for borehole positions). Borehole extensions above colored deposit settings represent fill.

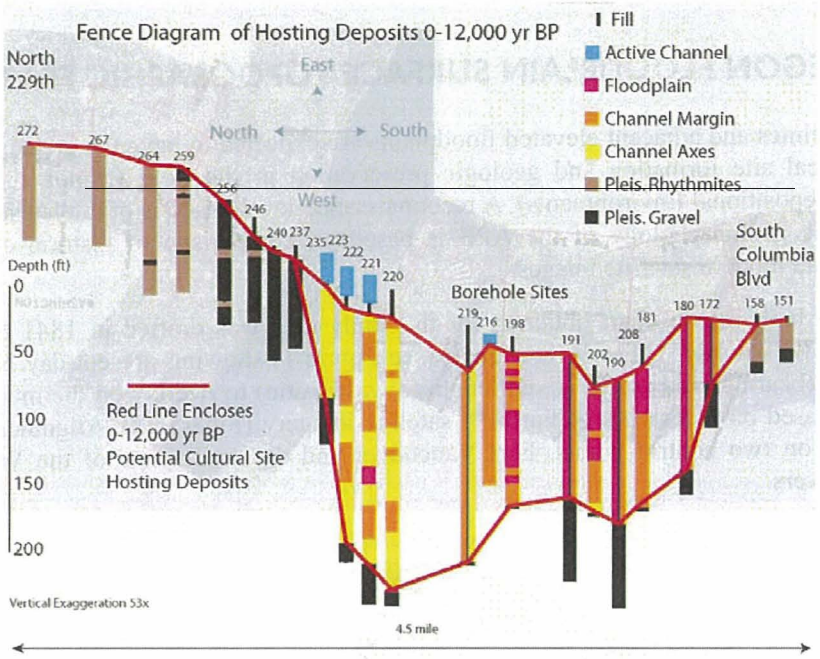

Figure 21. Fence diagram of Holocene fill and latest Pleistocene topsoils that could host archaeological resources (0–12,000 yr BP) in the CRC APE. Borehole positions are plotted on the CRC base map (underlay). Borehole depths are taken downcore from each borehole surface. Borehole extensions above colored deposit settings represent fill. Bimodal colored settings are undifferentiated in logs.

The north section contains only Pleistocene deposits. Flood silts and sands (Pleistocene rhythmites) overlie and extend well east of the Pleistocene gravels in the Vancouver area. The gravels might predate the cataclysmic floods. They appear to represent much higher base-level grades, e.g., riverbed elevations, of the ancestral Columbia River. The lack of cementation and/or very high blow counts in these gravels indicates that they post-date Troutdale Formation deposits. Missing Pleistocene rhythmites from the borehole tops in South Vancouver area (near the BNSF rail line) probably reflect deep roadway excavation into the Pleistocene deposits in the immediate vicinity of I-5. Intact rhythmite deposits might exist on the east and west flanks of the excavated roadway.

COLUMBIA RIVER CROSSING APE STRATIGRAPHIC FENCE DIAGRAM

Both the summarized deposit age and depositional setting data are combined in a stratigraphic fence diagram for the APE (Figure 21). The fence diagram data are taken from the most representative and complete borehole sites in the APE. As previously discussed, the floodplains are thought to have the greatest potential for archaeological site formation and preservation from channel erosion. Furthermore, only Holocene fill deposits (0–12,000 yr BP) and intact topsoils developed on the Pleistocene rhythmites are expected to contain significant archaeological remains. These deposits are bounded by red lines in the fence diagram.

OREGON FLOODPLAIN SURFACE TOPOGRAPHIC FEATURES

Stable shorelines and adjacent elevated floodplains are expected to have the greatest potential for archaeological site formation and geologic preservation in the APE (Minor et al. 1994; see Holocene Depositional Environments). A reconnaissance-level analysis of the latest-prehistoric to early-historic geomorphology of the APE is based on comparison of historic charts, historic airphotos, and modern satellite images.

The earliest bathymetric chart obtained for the study area was drafted in 1841 by the Wilkes expedition (Wilkes 1845). The Wilkes chart (see Figure 1) showing present-day North Portland was rotated (bearing) and scaled (fixed length to width ratio) to overlay on the modern shoreline geometry, based on recent GoogleEarth ™ satellite imagery (Figure 22). Alignment and scaling were based on two control points, Fort Vancouver and the confluence of the Willamette and Columbia rivers.

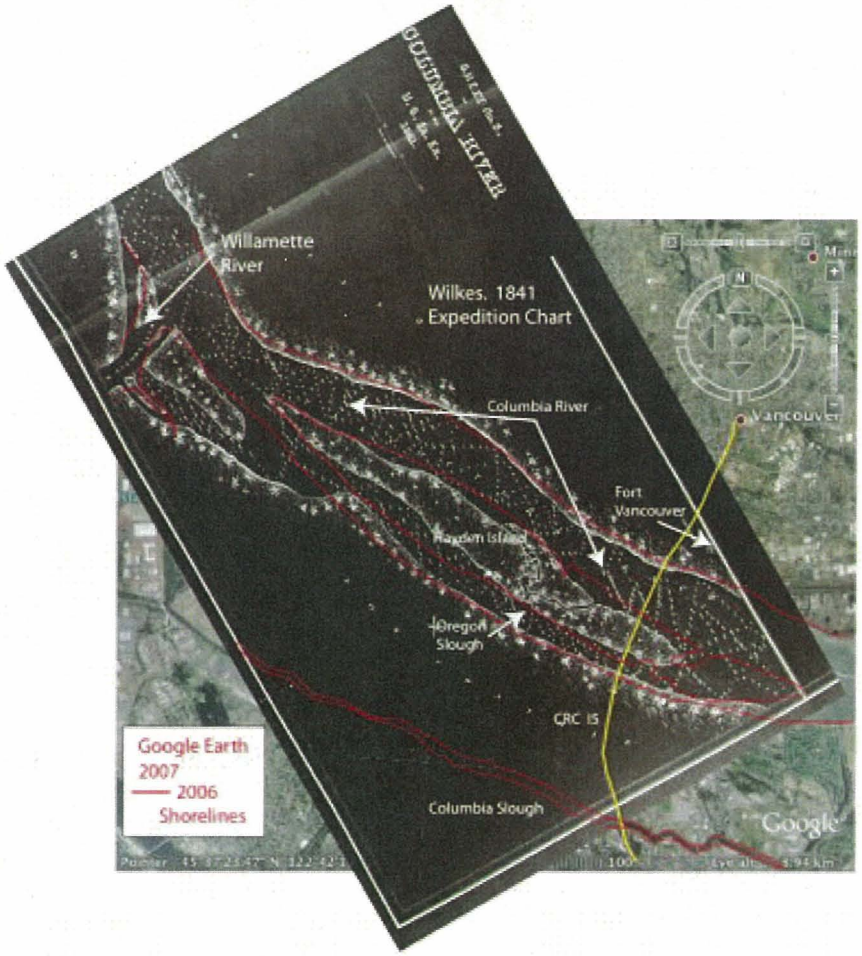

Figure 22. 1841 Wilkes Expedition survey chart overlay on current (GoogleEarth™) satellite image of the Columbia River from the Willamette River confluence to Fort Vancouver (from Wilkes 1845).

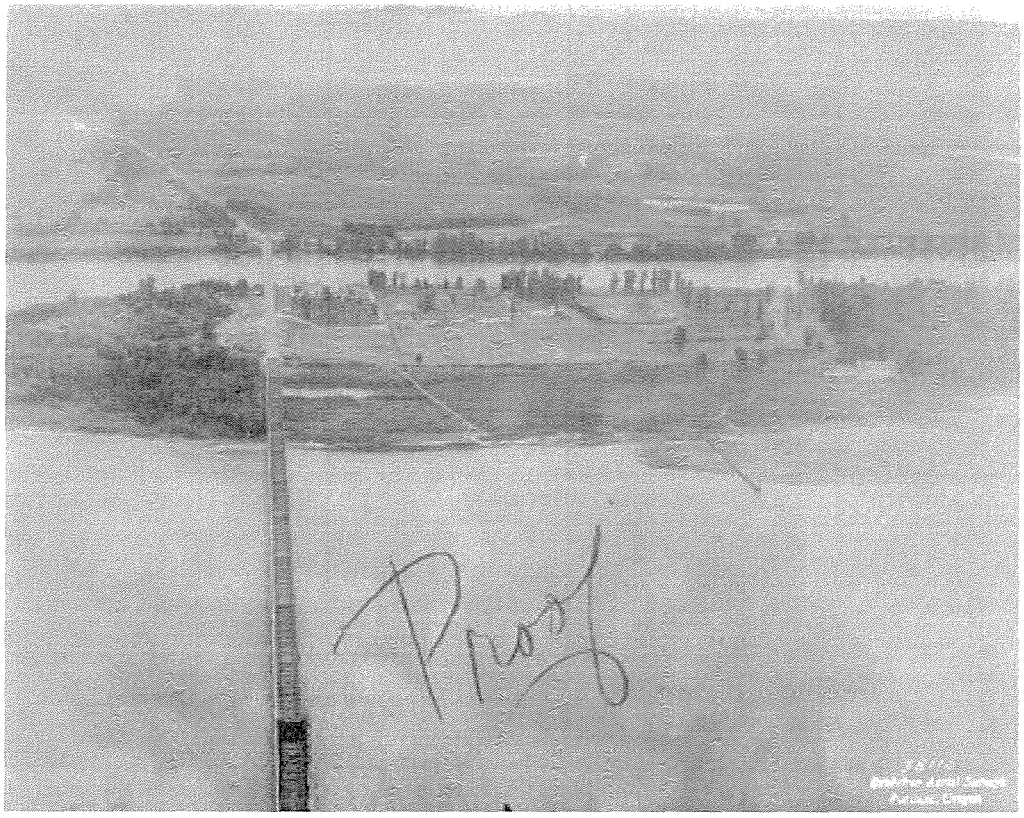

Figure 23. Oblique air photo of Pacific Highway bridge (now I-5 bridge) and Hayden Island (view to the south), circa 1938. The eastern end of the island (photo left) has been deforested and put into pasture. A small inlet (water body and vegetation) is apparent on the northern side of Hayden Island (foreground). An accreting shoal is apparent just downstream (photo right) of the bridge on the north bank of Hayden Island. Oregon Slough and Delta Park floodplains are in the background (Oregon Historical Society photograph).

An analysis of north Columbia River bank fit from Fort Vancouver to the Willamette River confluence between the Wilkes Chart (1841) and the present-day (2006) shoreline yields a length-normalized mean error of less than five percent. By comparison, the shorelines of Hayden Island and the northwestern portion of Oregon Slough show significantly greater change between the 1841 chart and the present-day. Hayden Island has generally widened and lengthened upriver by adjoining to a younger longitudinal bar (Tomahawk Island) that grew from a south bank promontory. There is little to no apparent change in shoreline position of the southeastern Oregon Slough shorelines between the 1841 chart and the present-day.

The preliminary analysis of historic shoreline change suggests high-preservation potential (notwithstanding modern disturbances) for earliest-historical archaeological sites (1840–1900) on the banks of Hayden Island and Oregon Slough. Small, net shoreline accretion likely buried and preserved the earliest historic shorelines in the APE. Evidence of an accreting shoal located just downstream, e.g., northwest, of the Hayden Island north bank at the existing I-5 bridge is evident in a historic airphoto from 1938 (Figure 23).

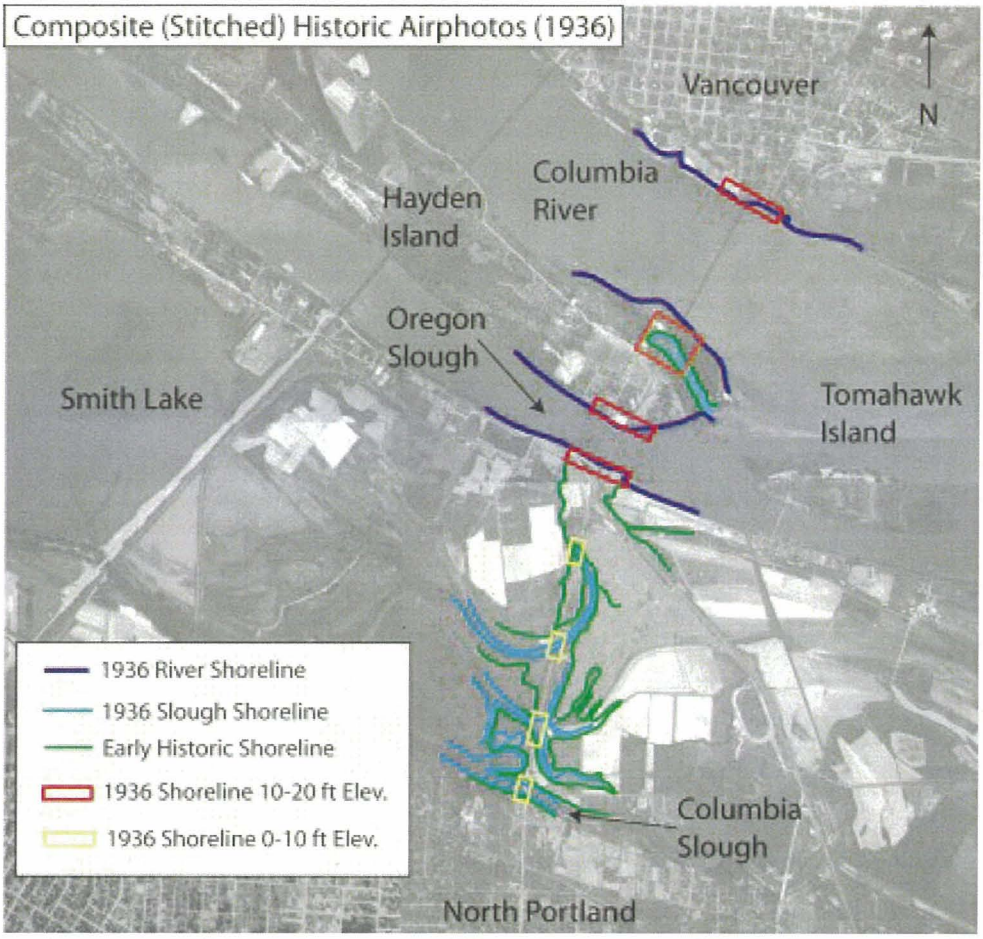

Figure 24. Composite image from 1936 aerial photos with interpreted shorelines (colored lines) and adjacent 200-foot setbacks (colored boxes).

The earliest vertical airphoto coverage for the project area obtained for this study is from 1936. Overlapping airphoto images, totaling six in number, were stitched together to form a non-rectified airphoto mosaic shown in Figure 24. The airphotos were used to establish the 1936 shorelines in the APE. The shorelines include those of the Columbia River and Oregon Slough, which were adjacent to major waterways, trade routes, and eventually ship lanes. Additional shorelines include those of runoff sloughs, abandoned flood chutes, and cutoff lakes of the Delta Park and Vanport floodplains.

In addition to the 1936 shorelines that bounded low, river-stage water bodies, older shorelines, termed earliest-historic shorelines, are outlined in Figure 24. The early-historic shorelines are identified based on vegetated levees apparent in the high-resolution airphotos. Due to high-preservation potential in the protected floodplains, these older shorelines, possibly extending to the latest-prehistoric in age, are likely to represent potential locations for archaeological sites.

For this study, a 200-foot setback is used to highlight the 1936 shorelines, the early-historic shorelines, and adjacent elevated floodplains, shown by boxes in Figure 24. The boxed shoreline and levee sites are differentiated by elevation corresponding to inter-annual flooding (10–20 ft

elevation) and annual flooding (0–10 ft elevation). Annual seasonal flooding of the Delta Park area left large bodies of standing water throughout winter and spring months (Figure 25). Dikes and floodgates constructed throughout the early 1900s along with subsequent runoff impoundment in 128 dams on the Columbia River system, reduced flooding, eventually permitting the urban development that dominates the landscape there today.

Figure 25. Oblique air photo of Oregon Slough, view to east, circa 1924. Hayden Island is still forested, but shorelines along the North Portland docks are diked and developed. Standing water is evident in Smith Lake, and both West and East Delta Park areas. The Delta Park low-flood plains experienced routine seasonal flooding until encircling dikes were constructed in the mid-1900s (Oregon Historical Society photograph).

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BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF ENDORSING THE I-5 TRANSPORTATION AND TRADE STUDY RECOMMENDATIONS	)))	RESOLUTION NO. 02-3237A Introduced by Councilor Rod Monroe

WHEREAS, I-5 is the only continuous Interstate on the West Coast; and

WHEREAS, I-5, between Portland, Oregon and Vancouver, Washington experiences some of the Portland region's worst congestion; and

WHEREAS, at the Columbia River I-5 provides a key economic connection to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and much of the Portland/Vancouver region's industrial land; and

WHEREAS, the transportation facilities in the I-5 corridor in the vicinity of the Columbia River provide important connections to and from national and international markets for businesses throughout Oregon; and

WHEREAS, in the Portland/Vancouver area, I-5 provides one of two crossings of the Columbia River for cars, trucks and transit vehicles; and

WHEREAS, doing nothing in the I-5 corridor between Portland and Vancouver will result in unpredictable delays and congestion throughout the day, which cannot be tolerated without an adverse impact on the Portland/Vancouver region's economy and quality of life; and

WHEREAS, the Oregon and Washington Departments of Transportation jointly conducted a public planning process to develop a strategic plan for the I-5 Corridor between the Fremont Bridge in Oregon and the I-205 interchange in Washington; and

WHEREAS, the development of the I-5 Corridor Strategic Plan was guided by a bi-state Task Force representing a wide range of interests; and

WHEREAS, a thorough process of public outreach and involvement was conducted to seek public input in the development of the I-5 Corridor Strategic Plan; and

WHEREAS, recommendations of the I-5 Transportation and Trade Partnership Task Force for a I-5 Corridor Strategic Plan have statewide significance; now therefore; now therefore

BE IT RESOLVED,

1. That the Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council endorse the Portland/Vancouver I-5 Transportation and Trade Partnership's "Final Strategic Plan" (June 2002) including the following improvements for the Interstate-5 corridor, as recommended by the I-5 Transportation and Trade Partnership Task Force at their June 18, 2002 meeting:

    - Three through-lanes in each direction on I-5, between I-405 in Portland and I-205 in Clark County including southbound through Delta Park including designation of one of the three through-lanes as an High Occupancy Vehicle (HOV) lane as feasible.

- A phased light rail loop in Clark County in the vicinity of the I-5, SR500/4th Plain and I-205 corridors

- An additional span or a replacement bridge for the I-5 crossing of the Columbia River, with up to 2 additional lanes in each direction for merging plus 2 light rail tracks

- Interchange improvements and additional auxiliary and/or arterial lanes where needed between SR500 in Vancouver and Columbia Boulevard in Portland. These include a full interchange at Columbia Boulevard

- Capacity improvements for freight rail that will improve freight and intercity passenger rail services

- Bi-state coordination of land use and management of our transportation system to reduce demand on the freeway and to protect the corridor investments

- Involving communities along the corridor to ensure that the final project outcomes are equitable and committing to establish a fund for community enhancements

- Develop additional transportation demand and system strategies to encourage more efficient use of the transportation system

2. That the bridge influence area (BIA) improvements be identified as illustrative projects for the purposes of federal review and certification, and therefore included in interim air quality analyses completed prior to the next scheduled RTP update;

3. That Metro staff be directed to incorporate these recommendations into the next update of the Regional Transportation Plan (RTP), scheduled to occur in 2003-04;

4. That I-5 Transportation and Trade Partnership Task Force recommendations for further study of the NW Highway 30 to I-5 connections be incorporated into the North Willamette Crossing Study provisions of Section 6.7 of the RTP, and that this study be elevated to a Type 2 refinement plan as part of the next RTP update.

ADOPTED by the Metro Council this 14th day of November, 2002

Carl Hosticka, Presiding Officer

Approved as to Form:

Daniel B. Cooper, General Counsel

BEFORE THE METRO COUNCIL

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WHEREAS, the transportation facilities in the I-5 corridor in the vicinity of the Columbia River provide important connections to and from national and international markets for businesses throughout Oregon; and

WHEREAS, in the Portland/Vancouver area, I-5 provides one of two crossings of the Columbia River for cars, trucks and transit vehicles; and

WHEREAS, doing nothing in the I-5 corridor between Portland and Vancouver will result in unpredictable delays and congestion throughout the day, which cannot be tolerated without an adverse impact on the Portland/Vancouver region's economy and quality of life; and

WHEREAS, the Oregon and Washington Departments of Transportation jointly conducted a public planning process to develop a strategic plan for the I-5 Corridor between the ~~I-84 interchange~~ Fremont Bridge in Oregon and the I-205 interchange in Washington; and

WHEREAS, the development of the I-5 Corridor Strategic Plan was guided by a bi-state Task Force representing a wide range of interests; and

WHEREAS, a thorough process of public outreach and involvement was conducted to seek public input in the development of the I-5 Corridor Strategic Plan; and

WHEREAS, recommendations of the I-5 Transportation and Trade Partnership Task Force for a I-5 Corridor Strategic Plan have statewide significance; now therefore; now therefore

BE IT RESOLVED,

1. That the Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council endorse the Portland/Vancouver I-5 Transportation and Trade Partnership's "Final Strategic Plan" (June 2002) including the following improvements for the Interstate-5 corridor, as recommended by the I-5 Transportation and Trade Partnership Task Force at their June 18, 2002 meeting:

   - Three through-lanes in each direction on I-5, between I-405 in Portland and I-205 in Clark County including southbound through Delta Park including designation of one of the three through-lanes as an High Occupancy Vehicle (HOV) lane as feasible.

- A phased light rail loop in Clark County in the vicinity of the I-5, SR500/4th Plain and I-205 corridors

- An additional span or a replacement bridge for the I-5 crossing of the Columbia River, with up to 2 additional lanes in each direction for merging plus 2 light rail tracks

- Interchange improvements and additional ~~merging~~ auxiliary and/or arterial lanes where needed between SR500 in Vancouver and Columbia Boulevard in Portland. These include a full interchange at Columbia Boulevard

- Capacity improvements for freight rail that will improve freight and intercity passenger rail services

- Bi-state coordination of land use and management of our transportation system to reduce demand on the freeway and to protect the corridor investments

- Involving communities along the corridor to ensure that the final project outcomes are equitable and committing to establish a fund for community enhancements

- Develop additional transportation demand and system strategies to encourage more efficient use of the transportation system

2. That the bridge influence area (BIA) improvements be identified as illustrative projects for the purposes of federal review and certification, and therefore included in interim air quality analyses completed prior to the next scheduled RTP update;

3. That Metro staff be directed to incorporate these recommendations into the next update of the Regional Transportation Plan (RTP), scheduled to occur in 2003-04;

4. That I-5 Transportation and Trade Partnership Task Force recommendations for further study of the NW Highway 30 to I-5 connections be incorporated into the North Willamette Crossing Study provisions of Section 6.7 of the RTP, and that this study be elevated to a Type 2 refinement plan as part of the next RTP update.

ADOPTED by the Metro Council this _____ day of _____, 2002

_____
Carl Hosticka, Presiding Officer

Approved as to Form:

_____
Daniel B. Cooper, General Counsel

TRANSPORTATION COMMITTEE REPORT

CONSIDERATION OF **RESOLUTION NO. 02-3237A,** FOR THE PURPOSE OF ENDORSING THE I-5 TRANSPORTATION AND TRADE STUDY RECOMMENDATIONS

Date: November 14, 2002 Presented by: Councilor Burkholder

Committee Recommendation: At its November 7 meeting, the Transportation Committee voted 2-0 to recommend Council adoption of Resolution No. 02-3237A. Voting in favor: Councilor Monroe and Chair Burkholder. Voting against: None. Absent: Councilor Atherton.

Background: In 1999, Oregon Governor Kitzhaber and Washington Governor Locke initiated a public process to examine and make recommendations related to the I-5 Trade Corridor stretching north from the 1-5/Fremont Bridge interchange in Oregon to the I-5/I205 interchange in Washington. The staff report for the proposed resolution provides a detailed review of the history and resulting recommendations from this effort which has become known as the I-5 Partnership.

Committee Issues/Discussion: Kate Dean, Oregon Department of Transportation, and Andy Cotugno, Metro Planning Director, presented the staff report. Dean presented a power point review of the history and work product of the I-5 Partnership entitled "Portland/Vancouver I-5 Transportation and Trade Partnership's Final Strategic Plan". Her review generally covered the historical material and recommendations addressed in the staff report for the resolution

She noted that the partnership included a 28-member task force and involved over 1700 citizens.

Andy Cotugno reviewed the contents of the proposed resolution. He presented an "A" version of the resolution that included several amendments proposed by the Transportation Policy Alternative Committee (TPAC). He explained that the basic purpose of the resolution was to endorse the recommendations of the I-5 Partnership. A similar endorsement will be requested from appropriate local government committees in southwest Washington. The resolution outlines several of the major recommendations. It also includes proposed actions related to bridge influence area (BIA) improvements near the current I-5 Interstate Bridge and directs Metro staff to incorporate the recommendations in the next update of the Regional Transportation Plan.

Cotugno then explained the proposed TPAC amendments. These include:

1) Clarification of a "Whereas" clause that the scope of the study included the area in the I-5 Corridor north of the Fremont Bridge instead of the I-84 interchange as shown in the original version of the resolution.
2) Including the entire title of the "Final Strategic Plan" in the "Be It Resolved" clause to clarify that the endorsement being sought applied to the entire document, not just the listed recommendations, and
3) Clarification that certain interchange improvements could include either auxiliary or arterial lanes.

Councilor Monroe expressed concern that the first "bullet" in the "Be It Resolved" clause related to three lanes of traffic along I-5 between I-205 in Clark County and Delta Park in North Portland did not specifically addressed to desire to have one of these lanes designated as a High Occupancy Vehicle

(HOV) lane. Mr. Cotugno drafted language to address this concern and his amendment language was adopted by the committee.

Key Public Testimony: None.

STAFF REPORT

IN CONSIDERATION OF RESOLUTION NO. 02-3237, FOR THE PURPOSE OF ENDORSING THE I-5 TRANSPORTATION AND TRADE STUDY RECOMMENDATIONS

Date: November 1, 2002 Prepared by: Tom Kloster

BACKGROUND

The I-5 Partnership brought together Washington and Oregon citizens and leaders to respond to concerns about growing congestion on I-5. Governors Gary Locke and John Kitzhaber have appointed a bi-state Task Force of community, business and elected representatives to develop a recommended Strategic Plan for the I-5 Corridor between I-84 in Oregon and I-205 in Washington.

As the only continuous Interstate on the West Coast, I-5 is critical to the local, regional and national economy. At the Columbia River I-5 provides a critical connection to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and much of the region's industrial land. In 1997, 14 million tons of freight (valued at $17 billion) was shipped from the Oregon side of the metro area to locations in Washington. Shipments southbound from Washington into the Oregon side of the region totaled 28.5 million tons (worth an estimated $7.5 billion).

Both the Ports of Portland and Vancouver are located in the I-5 Trade Corridor, as is much of the Portland/Vancouver industrial land. For residents in the Portland and Vancouver area, I-5 provides one of two crossings of the Columbia River for transit and automobiles. It connects the communities of Portland and Vancouver for work, recreation, shopping and entertainment purposes. An average of 125,000 trips are made across the I-5 Bridge every day.

In 1999, a bi-state leadership committee considered the problem of growing congestion on the highway and rail systems in the I-5 Corridor. The committee recommended that the Portland/Vancouver region initiate a public process to develop a plan for the I-5 Corridor based on the following findings:

- **Doing nothing in the I-5 Corridor is unacceptable.** While there are some transportation improvements planned in the corridor, they are insufficient to address the transportation and economic needs of the corridor. Without additional improvements, congestion in the corridor will increase to unacceptable levels. Further, the increased congestion will have a significant impact on our economy, potentially limiting attraction and retention of business throughout our industrial areas.

- **There must be a multi-modal solution in the I-5 Corridor – there is no silver bullet.** The needs of the corridor will require highway, transit, and rail improvements, and better management of traffic demand. In other words, constructing new highway capacity alone will not solve the problem; neither does constructing only new transit capacity or new rail capacity.

- **Transportation funds are limited. Paying for improvements in the I-5 Corridor will require new funds.** The scale of improvements needed in the corridor far exceeds presently available state and federal funds. These sources can contribute but cannot completely pay for the improvements. Assuming the current structure of public funding, tolling will be required to pay for a new Columbia River crossing and other corridor improvements. From a historical perspective, tolls are not new. Tolls were used to construct the original I-5 bridges.

- **The region must consider measures that promote transportation- efficient development.** This includes a better balance of housing and jobs on both sides of the river and other measures that manage additional demand. Even with improvements in the I-5 Corridor, there will be a significant capacity problem that must be managed.

In January 2001, based on the above findings, Washington Governor Locke and Oregon Governor Kitzhaber initiated the Portland/Vancouver I-5 Transportation and Trade Partnership, also known as the I-5 Partnership. A 28-member Task Force was established to guide the development of the *Strategic Plan* for the corridor. This group worked for a year and a half, hosting six rounds of public meetings to get ideas and comments from the community. In addition, a Community Forum of interested stakeholders from both states was invited to closely follow the strategic planning process and to provide input at each milestone in the study.

The overall goal of this strategic planning effort was to determine the overall level of investment needed in the corridor for highways, transit and heavy rail, and to determine how to manage the transportation and land use system to protect investments in the corridor. The Task Force's final product has been sent to the Oregon Transportation Commission, the Washington Department of Transportation, and is now being considered by the metropolitan planning organizations in Portland and SW Washington for review and potential adoption into their transportation plans. After adoption, the environmental review and project development phase may begin.

Before any improvements suggested in this plan can be made, a formal environmental process must to be conducted under the requirements of the National Environmental Policy Act (NEPA) to identify the specific design of improvements and the impacts. The NEPA process is designed to ensure public participation in the process and a thorough assessment of environmental and community impacts. Through the NEPA process, plans for mitigating impacts that cannot be avoided will need to be developed. In addition, issues of environmental justice will receive a thorough exploration.

The foundation for the *Strategic Plan* is the problem, vision and values statement. This statement was created, edited and revised based on feedback from Community Forum members and public input. The recommendations in the *Strategic Plan* document have been crafted to address the identified corridor problems and to do them in a manner that reflects the collective vision for the community.

SUMMARY OF I-5 STRATEGIC PLAN RECOMMENDATIONS

Transit:

- Provide a phased light rail loop in Clark County in the vicinity of the I-5, SR500/4th Plain and I-205 Corridors.
- Provide peak-hour, premium express bus service in the I-5 and I-205 Corridors to markets not well served by light rail.
- Increase transit service in the Corridor over the next 20 years called for in regional transportation plans.

Interstate 5:

- The I-5 freeway between the Fremont Bridge in Portland and the I-205 interchange in Vancouver will be a maximum of three through lanes in each direction. This includes widening I-5 to three lanes between Delta Park and Lombard, and 99th St. to I-205 in Vancouver.
- Designate one of the three through lanes for use as a high occupancy vehicle (HOV) lane during the peak period, in the peak direction.

- Add a new supplemental or replacement bridge across the Columbia River with up to 2 auxiliary and/or arterial lanes in each direction, and 2 light rail tracks.
- Improve interchanges between SR 500 and Columbia Blvd to address safety and capacity problems -- including making Columbia Blvd into a full interchange.
- In adding river crossing capacity and making interchange improvements every effort should be made to: 1) avoid displacements and encroachments, 2) minimize the highway footprint and 3) minimize the use of the freeway for local trips.

Additional Rail Capacity:

- Pursue the rail infrastructure improvements required to accommodate anticipated 20 year freight rail growth in the I-5 Corridor and frequent, efficient intercity passenger rail service.
- Establish a public/private Bi-State rail forum to advise regional decision-makers about prioritizing, scheduling and funding of needed rail improvements.
- The rail forum and regional decision-makers should encourage funding for:
  1. Additional inter-city passenger rail service in the Pacific Northwest High Speed Rail Corridor
  2. High Speed Rail service in the Corridor; and
  3. The replacement of the existing "swing span" with a "lift span" located closer to the center of the river channel

Land Use:

- Adopt and implement a Bi-State Coordination Accord to protect existing and new capacity and support economic development.
- Jurisdictions in the Corridor will develop and agree on a plan to manage land development to avoid adversely impacting I-5 or the Region's growth management plans.
- Commit to formation of a Bi-State Coordination Committee to review and comment on transportation and land use decisions of bi-state significance.

Transportation Demand and System Management:

- Commit to a comprehensive use of TDM/TSM strategies -- alternative modes, work-based strategies, policies and regulatory strategies, pricing and TSM strategies -- and pursue additional funding for transit and TDM/TSM strategies.
- Prepare an "I-5 TDM/TSM Corridor Plan" with guidance from the proposed "Bi-State Coordination Committee"
- Fund and implement additional TDM/TSM strategies now to encourage more efficient use of the transportation system.

Environmental Justice

- Establish a Community Enhancement Fund for use in the impacted areas in the I-5 Corridor in Oregon and Washington
- Map low-income and minority communities in the corridor.
- Take list of potential impacts identified by representatives of environmental justice communities into the EIS for the Bridge and Bridge Influence Area as a starting point for more analysis.
- Work with affected communities to explore ways to offset impacts and/or bring benefits to the community.
- Develop a public outreach plan for EIS process that includes special outreach to low-income and minority communities.
- Form and coordinate two working groups for the EIS -- one for public involvement and one for environmental justice.

Finance

- OR, WA and the Portland/Vancouver region should develop a financing plan for transit and highway capital projects
- Tri-Met and C-Tran need to increase revenues for a significant expansion of transit service, starting within the next five years.
- Establish regional transit financing commitments that will allow for:
  1. an aggressive bi-state TDM program and
  2. an expansion of transit service to support the light rail loop.
  3. Seek funding to widen I-5 to 3 lanes: Delta Park to Lombard after environmental and design work is completed.

Next Steps/Implementation

- Fall 2002: SW Washington Regional Transportation Council and Metro review and amend the Regional Transportation Plans to incorporate recommended I-5 corridor improvements.

- Delta Park to Lombard: widen I-5 to 3 lanes
  - Summer 2002-2004: Conduct environmental assessment and design work
  - Post 2004: Construction of Delta Park to Lombard

- 2003 – 2009: Environmental Impact Study on Bridge Influence Area
  (new supplemental or replacement bridge, interchange improvements between SR 500 and Columbia Blvd., including light rail between Expo Center and downtown Vancouver)

- 2010+: Construct improvements in Bridge Influence Area.

RECOMMENDED ACTION

That the Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council endorse the Interstate-5 corridor strategy, as recommended by the I-5 Transportation and Trade Partnership Task Force at their June 18, 2002 meeting. This endorsement, in the form of the attached resolution, would call for the needed policy and project updates to be included in the next Regional Transportation Plan (RTP) update, scheduled to begin in Spring 2003.

BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF ENDORSING THE I-5 TRANSPORTATION AND TRADE STUDY RECOMMENDATIONS	)))	RESOLUTION NO. 02-3237 Introduced by Councilor Rod Monroe

WHEREAS, I-5 is the only continuous Interstate on the West Coast; and

WHEREAS, I-5, between Portland, Oregon and Vancouver, Washington experiences some of the Portland region's worst congestion; and

WHEREAS, at the Columbia River I-5 provides a key economic connection to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and much of the Portland/Vancouver region's industrial land; and

WHEREAS, the transportation facilities in the I-5 corridor in the vicinity of the Columbia River provide important connections to and from national and international markets for businesses throughout Oregon; and

WHEREAS, in the Portland/Vancouver area, I-5 provides one of two crossings of the Columbia River for cars, trucks and transit vehicles; and

WHEREAS, doing nothing in the I-5 corridor between Portland and Vancouver will result in unpredictable delays and congestion throughout the day, which cannot be tolerated without an adverse impact on the Portland/Vancouver region's economy and quality of life; and

WHEREAS, the Oregon and Washington Departments of Transportation jointly conducted a public planning process to develop a strategic plan for the I-5 Corridor between the I-84 interchange in Oregon and the I-205 interchange in Washington; and

WHEREAS, the development of the I-5 Corridor Strategic Plan was guided by a bi-state Task Force representing a wide range of interests; and

WHEREAS, a thorough process of public outreach and involvement was conducted to seek public input in the development of the I-5 Corridor Strategic Plan; and

WHEREAS, recommendations of the I-5 Transportation and Trade Partnership Task Force for a I-5 Corridor Strategic Plan have statewide significance; now therefore; now therefore

BE IT RESOLVED,

1. That the Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council endorse the following improvements for the Interstate-5 corridor, as recommended by the I-5 Transportation and Trade Partnership Task Force at their June 18, 2002 meeting:

    - Three through-lanes in each direction on I-5, between I-405 in Portland and I-205 in Clark County including southbound through Delta Park

- A phased light rail loop in Clark County in the vicinity of the I-5, SR500/4th Plain and I-205 corridors

- An additional span or a replacement bridge for the I-5 crossing of the Columbia River, with up to 2 additional lanes in each direction for merging plus 2 light rail tracks

- Interchange improvements and additional merging lanes where needed between SR500 in Vancouver and Columbia Boulevard in Portland. These include a full interchange at Columbia Boulevard

- Capacity improvements for freight rail that will improve freight and intercity passenger rail services

- Bi-state coordination of land use and management of our transportation system to reduce demand on the freeway and to protect the corridor investments

- Involving communities along the corridor to ensure that the final project outcomes are equitable and committing to establish a fund for community enhancements

- Develop additional transportation demand and system strategies to encourage more efficient use of the transportation system

2. That the bridge influence area (BIA) improvements be identified as illustrative projects for the purposes of federal review and certification, and therefore included in interim air quality analyses completed prior to the next scheduled RTP update;

3. That Metro staff be directed to incorporate these recommendations into the next update of the Regional Transportation Plan (RTP), scheduled to occur in 2003-04;

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ADOPTED by the Metro Council this _____ day of _____, 2002

_____
Carl Hosticka, Presiding Officer

Approved as to Form:

_____
Daniel B. Cooper, General Counsel

STAFF REPORT

IN CONSIDERATION OF RESOLUTION NO. 02-3237, FOR THE PURPOSE OF ENDORSING THE I-5 TRANSPORTATION AND TRADE STUDY RECOMMENDATIONS

Date: November 1, 2002 Prepared by: Tom Kloster

BACKGROUND

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In 1999, a bi-state leadership committee considered the problem of growing congestion on the highway and rail systems in the I-5 Corridor. The committee recommended that the Portland/Vancouver region initiate a public process to develop a plan for the I-5 Corridor based on the following findings:

- **Doing nothing in the I-5 Corridor is unacceptable.** While there are some transportation improvements planned in the corridor, they are insufficient to address the transportation and economic needs of the corridor. Without additional improvements, congestion in the corridor will increase to unacceptable levels. Further, the increased congestion will have a significant impact on our economy, potentially limiting attraction and retention of business throughout our industrial areas.

- **There must be a multi-modal solution in the I-5 Corridor – there is no silver bullet.** The needs of the corridor will require highway, transit, and rail improvements, and better management of traffic demand. In other words, constructing new highway capacity alone will not solve the problem; neither does constructing only new transit capacity or new rail capacity.

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In January 2001, based on the above findings, Washington Governor Locke and Oregon Governor Kitzhaber initiated the Portland/Vancouver I-5 Transportation and Trade Partnership, also known as the I-5 Partnership. A 28-member Task Force was established to guide the development of the *Strategic Plan* for the corridor. This group worked for a year and a half, hosting six rounds of public meetings to get ideas and comments from the community. In addition, a Community Forum of interested stakeholders from both states was invited to closely follow the strategic planning process and to provide input at each milestone in the study.

The overall goal of this strategic planning effort was to determine the overall level of investment needed in the corridor for highways, transit and heavy rail, and to determine how to manage the transportation and land use system to protect investments in the corridor. The Task Force's final product has been sent to the Oregon Transportation Commission, the Washington Department of Transportation, and is now being considered by the metropolitan planning organizations in Portland and SW Washington for review and potential adoption into their transportation plans. After adoption, the environmental review and project development phase may begin.

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SUMMARY OF I-5 STRATEGIC PLAN RECOMMENDATIONS

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- Provide a phased light rail loop in Clark County in the vicinity of the I-5, SR500/4th Plain and I-205 Corridors.
- Provide peak-hour, premium express bus service in the I-5 and I-205 Corridors to markets not well served by light rail.
- Increase transit service in the Corridor over the next 20 years called for in regional transportation plans.

Interstate 5:

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- The rail forum and regional decision-makers should encourage funding for:
  1. Additional inter-city passenger rail service in the Pacific Northwest High Speed Rail Corridor
  2. High Speed Rail service in the Corridor; and
  3. The replacement of the existing "swing span" with a "lift span" located closer to the center of the river channel

Land Use:

- Adopt and implement a Bi-State Coordination Accord to protect existing and new capacity and support economic development.
- Jurisdictions in the Corridor will develop and agree on a plan to manage land development to avoid adversely impacting I-5 or the Region's growth management plans.
- Commit to formation of a Bi-State Coordination Committee to review and comment on transportation and land use decisions of bi-state significance.

Transportation Demand and System Management:

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- Prepare an "I-5 TDM/TSM Corridor Plan" with guidance from the proposed "Bi-State Coordination Committee"
- Fund and implement additional TDM/TSM strategies now to encourage more efficient use of the transportation system.

Environmental Justice

- Establish a Community Enhancement Fund for use in the impacted areas in the I-5 Corridor in Oregon and Washington
- Map low-income and minority communities in the corridor.
- Take list of potential impacts identified by representatives of environmental justice communities into the EIS for the Bridge and Bridge Influence Area as a starting point for more analysis.
- Work with affected communities to explore ways to offset impacts and/or bring benefits to the community.
- Develop a public outreach plan for EIS process that includes special outreach to low-income and minority communities.
- Form and coordinate two working groups for the EIS -- one for public involvement and one for environmental justice.

Finance

Portland / Vancouver I-5 Transportation and Trade Partnership

Portland/Vancouver I-5 Transportation and Trade Partnership

Washington State Department of Transportation

Findings and Recommendations of the Governors Task Force

Final Strategic Plan

June 2002

Portland/Vancouver I-5 Transportation and Trade Partnership Task Force

OREGON

Lenny Anderson, Swan Island TMA

Mike Burton, Executive Officer, Metro
Andy Cotugno, Participating Representative

Commissioner Serena Cruz, Multnomah County

Brian Fitzgerald, Market Transportation;
Bill Maris, Participating Representative

Stu Hall, Liberty Mutual

Fred Hansen, General Manager, TriMet

Henry Hewitt, Stoel Rives, LLP

Mayor Vera Katz, City of Portland

Dick Reiten, Northwest Natural;
Gary Bauer, Participating Representative

Jeri Sundvall, Environmental Justice Action Group

Walter Valenta, Bridgeton Neighborhood Association

Bruce Warner, Director, Oregon Department of Transportation

Bill Wyatt, Executive Director, Port of Portland;
Dave Lohman, Participating Representative

WASHINGTON

Commissioner Ed Barnes, Washington Transportation Commission

Jeff Beverly, Manager of Facility Engineering, S.E.H. America, Inc.

Lora Caine, Fairgrounds Neighborhood Association

Lynne Griffith, Executive Director, C-Tran

Anne McEnerny-Ogle, President, Shumway Neighborhood Association

John McKibbin, J. Simpson McKibbin Company, Inc.

Scott Patterson, Executive Director, Greater Vancouver Chamber of Commerce

Larry Paulson, Executive Director, Port of Vancouver

Mayor Royce Pollard, City of Vancouver

Commissioner Craig Pridemore, Clark County

Rick Sant' Angelo, Board Member, Friends of Clark County

Elson Strahan, President, Clark College Foundation

Councilman Dan Tonkovich, City of Vancouver

Findings and Recommendations of the Governors Task Force

Final Strategic Plan

This study was supported in part with Federal Highway Administration Borders and Corridors Program Fund. The views expressed and conclusions drawn do not necessarily reflect the view of the U.S.D.O.T.

For additional copies, contact:
Oregon Department of Transportation, Region 1
123 NW Flanders
Portland, OR 97209
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www.i-5partnership.com

June 2002

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PART I: Background

PART II: Key Findings and Recommendations

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Part I

Background

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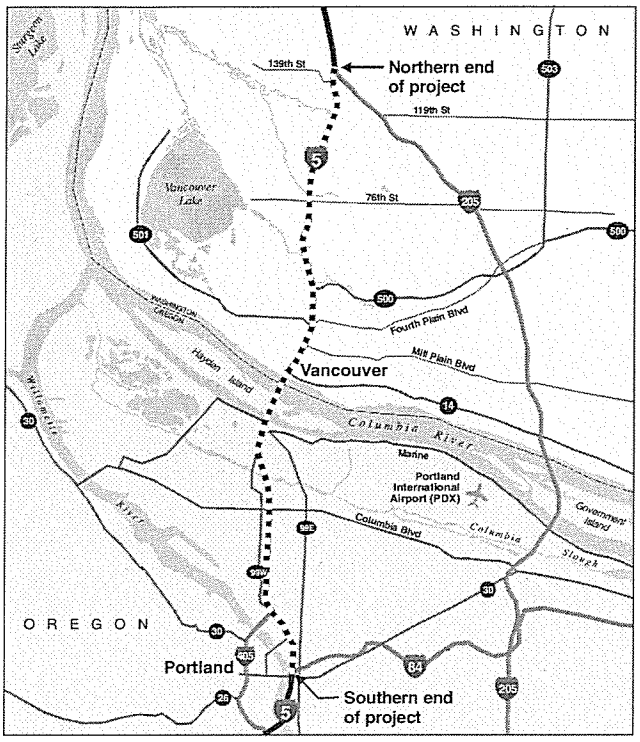
In 2001, Governors Gary Locke of Washington and John Kitzhaber of Oregon appointed a Task Force to address the growing congestion on Interstate 5 (I-5) in the metro areas of Vancouver (Washington) and Portland (Oregon). The 26 members of the I-5 Portland/Vancouver Transportation and Trade Partnership Task Force are listed on the inside front cover. The study area was defined as I-5 between the I-205 interchange in Washington and the I-84 interchange in Oregon and referred to as the I-5 Trade Corridor. The primary goals of the Task Force were to determine the level of investment needed in the corridor for highway, transit, and heavy rail improvements, and how to manage the transportation and land-use systems to protect investments.



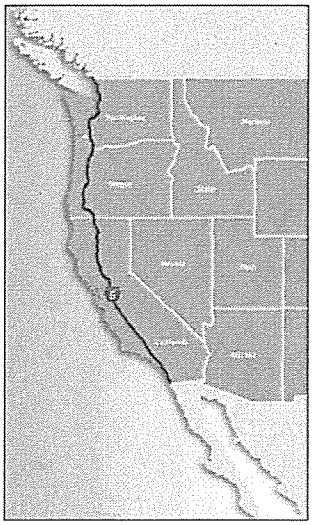
The I-5 Trade Corridor.

The Task Force led an intense 18-month effort to develop a strategic plan to address the growing congestion. The process involved transportation experts, elected officials, representatives from business and industry, citizens' groups, and the public. The Final Strategic Plan is presented in this document.

The Plan is divided into two parts. **Part I** begins by explaining why I-5 is such an important transportation corridor in the region. Next, current and projected conditions in the region are described, followed by an explanation of the work that was done prior to the creation of the Task Force. Finally, the process that was used to develop the Plan is described.

Part II contains key findings and recommendations.

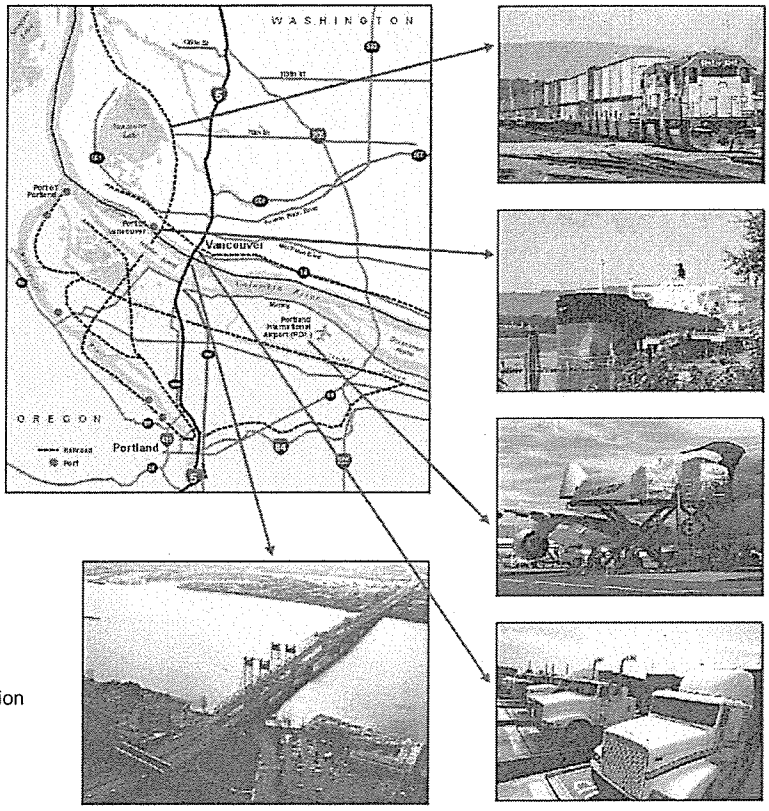
Nine attachments and a glossary provide additional information.


I-5 is the only continuous interstate on the West Coast, extending from Canada to Mexico.

The importance of I-5 to the region

As the only continuous interstate on the West Coast, I-5 is critical to the local, regional and national economy. At the Columbia River, I-5 provides a connection to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and much of the region's industrial land.

In 1997, 14 million tons of freight valued at $17 billion were shipped from the Oregon side of the metro area to locations in Washington. Shipments southbound from Washington into the Oregon side of the region totaled 28.5 million tons valued at $7.5 billion. Both the Ports of Portland and Vancouver and much of the Portland/Vancouver region's industrial land are within the I-5 Trade Corridor.



I-5 is vital to transportation and trade in the region.

For residents of the Portland/Vancouver area, the I-5 Columbia River Bridge is one of two crossings over the Columbia River for travel by transit or automobile. The bridge connects the communities of Portland and Vancouver for work, recreation, shopping and entertainment. An average of 125,000 trips are made across the I-5 bridge every day.

Existing and projected conditions

Regional growth and an increase in trade are driving the demand for more travel in the I-5 Trade Corridor. Comparing existing conditions in 2000 to those projected for 2020:

- the population of the Portland/Vancouver area will increase 39%, from 1.8 million to 2.5 million
- trade in the region is expected to increase 51%, from 293 million tons to 441 million tons
- daily traffic volume across the Interstate Bridge is expected to increase 44%, from 125,000 to 180,000
- traffic conditions will decline in the following ways unless improvements are made:
  - vehicle hours of delay during the evening peak period will increase 77%, from 18,000 hours to 32,000 hours
  - vehicle hours of delay on truck routes during the evening peak period will increase 93%, from 13,400 hours to 25,800 hours
  - transit travel times will double, from 27.3 minutes to 55 minutes

Initial approach to the problem

In 1999, a bi-state leadership committee considered the problem of growing congestion on the highway and rail systems in the I-5 Trade Corridor. The committee made these recommendations:

- *The Portland/Vancouver region should initiate a public process to develop a plan for the I-5 Trade Corridor.*
- *Doing nothing is unacceptable.* Increased congestion will significantly affect the regional economy by limiting the region's ability to attract and retain business. Although there are planned transportation improvements in the corridor, they are insufficient to address the problem.
- *The solution must be multi-modal—highway, transit, and rail improvements, and better management of traffic demand.* Increasing highway capacity alone will not solve the problem, for example.
- *Funding for the scale of improvements that are needed far exceeds the state and federal funds that are available.* Given the current structure of public funding, tolling will be required to pay for a new Columbia River crossing and other improvements. Tolls are not new to the area, having been used to fund the construction of the I-5 bridges.
- *The region must consider measures that promote transportation-efficient development such as a better balance of housing and jobs on both sides of the river.*

Developing the Strategic Plan

The public was heavily involved in the development of the Strategic Plan. A Community Forum of interested stakeholders from both states was invited to provide input at each milestone, and there were six rounds of public meetings. A total of nearly 1,700 people participated. **Table 1** lists the Community Forum meetings and Open Houses that were held. Public involvement was encouraged in a variety of ways:

- advertisements in regional and local papers
- mailing list of 10,000 people
- E-mail address list of 2,000 people
- door-to-door delivery of project information to businesses, homes and apartments along the potential improvement corridors
- billboard advertisements
- bus advertisements
- project Web site, which has been accessed more than 400,000 times
- Web-based survey tools
- press releases
- public notices
- toll-free telephone number
- participation in community-based events such as neighborhood fairs
- soliciting speaking engagements with 275 business, community, and neighborhood groups
- presentations to more than 70 groups

Table 1. Overview of I-5 Partnership Task Force development process for the Strategic Plan.

			Community Forums and Open Houses		
Date	**Task**	**Activities**	**Date**	**Type of meeting**	**Subject**
Jan 2001 to May 2001	Visioning and development of options	• Development of a Problem, Vision and Values Statement • Identification of a wide range of ideas for the corridor • Development of evaluation criteria • Development and selection of a range of multi-modal Option Packages for the corridor to be evaluated	Jan 2001	Community Forum	Visioning /brainstorming
			Feb 2001	Open Houses	Visioning / brainstorming
			Apr 2001	Open Houses	Review of draft Option Package combos
			May 2001	Community Forum and Open Houses	Review of final draft Option Packages
June 2001 to Nov 2001	Evaluation of Option Packages/land use analysis	• Evaluation of Option Packages • Analysis of the land-use implications of making/not making transportation investments	Nov 2001	Community Forum and Open Houses	Review of evaluation results
Dec 2001 to Jan 2002	Development of draft recommendations	• Consideration of evaluation results and feedback from the public and Community Forum members to develop draft recommendations. Draft recommendations focused primarily on transit and highway investments for the I-5 Corridor	Jan 2002	Community Forum and Open Houses	Review of working draft recommendations
Feb 2002 to May 2002	Re-evaluation and development of additional draft recommendations	• Consideration of additional design and evaluation work in the Bridge Influence Area (SR 500 to Columbia Blvd) to assess the level of improvements needed in this section of the corridor and to develop new conceptual designs that had less community impact, particularly in Vancouver • Evaluation of the needs of the heavy rail system and commuter rail • Development of draft recommendations for Transportation Demand Management and Transportation System Management (TDM/TSM), Environmental Justice, Land Use, and Finance	May 2002	Community Forum and Open Houses	Review of additional work and additional draft recommendations
May 2002 to June 2002	Development of final recommendations	• Evaluation of results and feedback from the public and Community Forum members • Development of final recommendations for the I-5 Trade Corridor	June 2002	Open Houses	Review of final draft recommendations

The key components of the process to develop the Strategic Plan were:

- developing a Problem, Vision, and Values Statement
- developing multi-modal Option Packages
- evaluating the Option Packages
- developing recommendations

Table 1 describes the components in more detail.

Problem, Vision and Values Statement. The statement was based on input from the Community Forum and the public and is the foundation of the Strategic Plan.

> The I-5 Trade Corridor is the most critical segment of the regional transportation system in the Portland/Vancouver metropolitan area. The corridor provides access to many of the region's most important industrial sites and port facilities and is a link to jobs throughout the Portland/Vancouver region. Due to infrastructure deficiencies, lack of multi-modal options, land-use patterns, and increasing congestion, businesses and individuals experience more frequent and longer delays in the corridor. Without attention, the corridor's problems are likely to increase significantly, further impacting the mobility, accessibility, livability and economic promise of the entire region.
>
> The Strategic Plan should be a multi-faceted, integrated plan of transportation policies, capital expenditures, personal and business actions, and incentives to address the future needs of the I-5 Trade Corridor. When implemented, the Strategic Plan will improve the quality of life by:
>
> - providing travel mobility, safety, reliability, accessibility and choice of transportation modes for users whether public, private, or commercial, and recognizing the varied requirements of local, intra-corridor, and interstate movement
> - supporting a sound regional economy by addressing the need to move freight efficiently, reliably, and safely through the corridor
> - supporting a healthy and vibrant land use mix of residential, commercial, industrial, recreational, cultural and historical areas
> - respecting and protecting natural resources including air quality, wildlife habitat and water resources
> - supporting balanced achievement of community, neighborhood, and regional goals for growth management, livability, the environment, and a healthy economy with promise for all
> - distributing fairly the associated benefits and impacts for the region and the neighborhoods adjacent to or affected by the corridor
>
> The result will protect our future with an improved and equitable balance of livability, mobility, access, public health, environmental stewardship, economic vitality and environmental justice.

Option Packages. Development of the Option Packages was based on input from the public and on the Problem, Vision and Values Statement. Five multi-modal Option Packages were selected for further analysis:

- Express Bus / 3 Lanes
- Light Rail / 3 Lanes
- Express Bus / 4 Lanes
- Light Rail / 4 Lanes
- West Arterial Road

All Option Packages included new river crossing capacity across the Columbia River for transit and vehicles, a substantial increase in basic transit service levels in Portland and Clark County, and the implementation of a strong transportation demand management program on both sides of the river. Maps of the Option Packages, with descriptions of the physical improvements and comparisons of transportation performance, are in **Attachment A**.

During the analysis, each Option Package was compared to three scenarios:

- Existing Conditions 2000— current conditions in the I-5 Trade Corridor
- No Build 2020—what is expected to happen in 2020 if the region builds only the currently funded projects
- Baseline 2020—what is expected to happen in 2020 if the region constructs the funded projects in the No Build 2020 scenario AND the other projects listed in the region's 20-year plans (see **Attachment A**)

After adopting draft recommendations in January 2002, the Task Force asked for additional evaluation and design work to be completed on the Bridge Influence Area, between SR 500 and Columbia Boulevard, and including light rail between the Expo Center and Downtown Vancouver. This focused examination of the bridge and its influence area resulted in the development of four river crossing concepts, which are shown in **Attachment B**.

The analysis for the Strategic Plan also focused on the needs of the freight and passenger rail system. This analysis was a cooperative effort among the owners of the rail system (Burlington Northern/Santa Fe and Union Pacific) and the users of the system (Amtrak, the states of Oregon and Washington, the Ports of Vancouver and Portland, and the cities of Portland and Vancouver). The rail analysis focused on an agreement among the parties about existing conditions, expected growth rates, short-term/incremental improvements to gain capacity and the long-term needs of the system.

Other areas of analysis and work that contributed to developing the key findings and recommendations are as follows.

- Metroscope, a new land use and transportation model, was used to analyze the implications of making or not making improvements in the I-5 Trade Corridor. The analysis compared two scenarios: doing nothing more than Baseline 202 improvements, and an improvement scenario similar to the Light Rail / 4 Lane Option Package.
- An analysis of commuter rail as a component of a multi-modal system between Portland and Vancouver was undertaken.
- Two work groups of community stakeholders, one in Oregon and one in Washington, were invited to help the Task Force develop key findings and recommendations in environmental justice. Ideas from these two work groups form the basis for much of the ongoing work that will need to be done in the Corridor to (1) identify, avoid and mitigate impacts from potential improvements, (2) ensure that benefits and impacts are equitably distributed, and (3) ensure that outreach efforts include meaningful involvement of low income and minority residents in the corridor.
- Three work groups of technical staff from Oregon and Washington agencies were brought together to assist the Task Force in developing key findings and recommendations in the Land Use Accord, Transportation Demand Management and Transportation System Management (TDM/TSM, and financing options and tools.

Within time and budget constraints, the analysis used the best travel-forecasting techniques and cost estimation methods available. However, the purpose of the analysis was to compare options. Although the cost estimates are fully appropriate for comparison of alternatives, they were based on "conceptual designs" that are not developed in sufficient detail for budgeting purposes. In addition, all costs are estimated as if the options were constructed in 2001 and use 2001 dollars. No finance costs are included. More detailed cost estimates will be prepared in the environmental impact statement (EIS) phase of the study and again for the projects selected for construction after preliminary engineering has been completed.

What's next

The Strategic Plan will be sent to the Oregon Transportation Commission, the Washington Department of Transportation, and the metropolitan planning organizations in Portland and Southwest Washington for review and potential adoption into their transportation plans. After adoption, the environmental review and project development phase may begin.

Before any improvements suggested in the Strategic Plan can be made, a formal environmental process must to be conducted under the requirements of the National Environmental Policy Act (NEPA). Part of the NEPA process is to determine the environmental and community impacts, if any, of proposed improvements and to develop mitigation plans for impacts that cannot be avoided. The process ensures that the public is heavily involved and that issues of environmental justice are thoroughly explored.

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Part II

Key Findings and Recommendations

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1 THE NEED FOR ACTION

1.1 KEY FINDINGS: Portland/Vancouver's unique trade and transportation advantage

1.1.1 The Portland/Vancouver area's location at the convergence of two major rivers, two transcontinental rail lines, two interstate highways, and one international airport is a unique trade and transportation advantage. This advantage allows companies to transport goods from ships and planes to trucks and rail cars in a low-cost, timely manner. The transportation facilities in the I-5 Trade Corridor are at the heart of this system.

1.1.2 Because of this advantage, Portland ranks first on the West Coast in terms of the value of wholesale trade per capita. Employment in the transportation and distribution sectors represents a higher share of total employment than it does in most other cities, including Seattle, Los Angeles, and Houston.

1.1.3 The critical mass of trade and transportation companies allows all businesses to benefit from "bulk" prices in the transportation industry that they would not enjoy in other, more populated regions.

1.1.4 More than 6,000 distribution and logistics companies employ more than 100,000 people in the metro area and pay them family wages. This accounts for 10% of the Region's workforce. The combined payroll for these sectors totals $4.7 billion—13% of the Region's total $36 billion annual payroll.

1.1.5 Of the freight moving in the Portland/Vancouver metro area, the majority (64%), is carried by truck. The remainder is carried by a variety of modes including pipeline (10.8%), ocean (9.7%), rail (5.6%), barge (5.4%), intermodal (4.5%), and air (0.1%).

1.2 KEY FINDINGS: Projected growth

1.2.1 Projected regional growth and an increase in trade are driving the demand for more travel in the I-5 Trade Corridor. Today the Portland/Vancouver area's population is about 1.7 million. By 2020, the population is expected to increase to 2.4 million. Likewise, the amount of trade in the Region is expected to increase from 168 million tons in 1996 to 275 million tons in 2020.

1.2.2 The I-5 Trade Corridor will experience significant growth in truck traffic over the next 20 years. Compared to Existing Conditions 2000, conditions will decline under the No Build 2020 scenario. Vehicle hours of delay on truck routes will increase by 93%, congested lane-miles on truck routes will increase by 58%, and the value of truck delay will increase by 140%.

1.3 KEY FINDINGS: Freeway system

1.3.1 Over 10,000 trucks are in the I-5 Trade Corridor every day carrying goods ranging from auto parts and furniture to fruit juice and clothing. Half of the goods the trucks carry are from or bound for Portland. The value of these shipments is more than $26 billion a year. The value of these shipments is equivalent to one third of the metro area's gross product.

1.3.2 Freeway conditions will decline in the future. As a result of growth, daily traffic demand volumes on I-5 are expected to increase 44%, from 125,000 in 2000 to 180,000 by 2020. Without transportation improvements in the Corridor, there will be a significant impact on travel time, delay and congestion.

1.3.3 Under the No Build 2020 scenario during the evening peak period:*

- Vehicle travel times between Downtown Portland and Salmon Creek will increase 22%, from 38 minutes in 2000 to 44 minutes in 2020.
- Vehicle hours of delay on all routes in the study area will increase 77%, from 18,000 hours in 2000 to 32,000 hours in 2020.
- Congested lane miles on I-5 and I-205 will increase 40%, from 24% in 2000 to 33.7% in 2001.
- The value of truck delay in the study area will increase 140%, from $14.1 million in 2000 to $34 million in 2020.
- Vehicle hours of delay on truck routes in the study area will increase 92%, from 13,390 hours in 2000 to 25,767 hours in 2020.

1.3.4 Baseline 2020 improves these measures of transportation performance, but conditions remain worse than today. Comparing Baseline 2020 with today's conditions during the evening peak period:

- Vehicle travel times will increase 5%, from 38 minutes in 2000 to 40 minutes in 2020.
- Vehicle hours of delay for all routes in the study area will increase 18%, from 18,000 hours in 2000 to 21,477 hours in 2020.
- Congested lane miles on I-5 and I-205 will increase 26%, from 24% in 2000 to 30.4% in 2020.
- The value of truck delay in the study area will increase 88%, from $14.1 million in 2000 to $26.5 million in 2020.
- Vehicle hours of delay on truck routes in the study area will increase 28%, from 13,390 hours in 2000 to 17,088 hours in 2020.

1.4 KEY FINDINGS: Transit system

1.4.1 Compared to Existing Conditions 2000, transit conditions will decline in the future under the No Build 2020 scenario. Travel times in the I-5 Trade Corridor will double, from 27.3 minutes

* See **Attachment A** for graphs of some of the transportation findings.

in 2000 to 55 minutes in 2020. This increase results from the fact that transit riders will face a transfer from MAX to the bus system at the Expo Center and buses will encounter congestion at the freeway on-ramps and across the bridge. Due to the increase in travel time, the number of people using transit in the I-5 Trade Corridor from Downtown Vancouver will decline from 5.6% in 2000 to 4.9% in 2020, and the operating cost of maintaining current levels of bus service will increase significantly due to longer travel times.

1.4.2 Baseline 2020 improves transit travel times due to increased overall transit service in the Region, but travel times remain significantly higher than today (27 minutes today; 41 minutes in 2020). The operating cost to maintain the same level of bus service will likely increase proportionately with the travel time increase.

1.5 KEY FINDINGS: Heavy rail system

1.5.1 Healthy and viable rail service in the I-5 Trade Corridor is a critical component of the regional economy. It is an integral part of the Region's comparative advantage in providing an intermodal focus of marine, barge, highway, and rail services that contributes to the Portland/Vancouver area's recognition as a major national and international trade and distribution center.

1.5.2 The Region contains five major rail yards and numerous smaller yards and port terminals. The Region's rail system serves the states' largest collection of industrial customers and accesses a major, deep draft, ocean port. Intercity passenger service (Amtrak/Cascades) operates over private railroad tracks. The two transcontinental railroads (BNSF and UP) along with Amtrak operate over the BNSF Columbia River Rail Bridge.

1.5.3 Currently, 63 freight trains and 10 Amtrak trains per day cross the BNSF Bridge, not including local switching operations. Freight trains are projected to reach 90 per day in 20 years and long-range, intercity passenger service plans call for 26 trains per day. Congestion on the Region's rail system is approximately 100 hours of accumulated delay per day, which is roughly 50% of the delay experienced in Chicago or Los Angeles. Relatively speaking, there are fewer trains experiencing more delay on our system.

1.5.4 Congestion in the Portland/ Vancouver rail network presents a constraint on the viability of the Region's continued economic growth.

1.5.5 Congestion in the rail network further constrains the opportunity for enhanced intercity passenger rail and commuter rail service along this segment of the federally designated Pacific Northwest High Speed Rail Corridor.

1.5.6 The capacity of the Portland-Vancouver rail network is not sufficient to meet current or future freight and intercity passenger needs. There is insufficient capacity to support development of the Ports of Portland and Vancouver. There will not be capacity to support increased intercity passenger service from Eugene to Portland/Vancouver to Seattle.

1.6 KEY FINDINGS: Overall

1.6.1 In the absence of both freeway and transit investment in the I-5 Trade Corridor, congestion and delay will grow steadily, resulting in the AM and PM periods of congestion spreading into the early morning, midday, and evening hours.

1.6.2 Rush hour congestion is a fact of life in an urban area and is to be expected and tolerated to some degree. However, unpredictable delays and congestion throughout the day cannot be tolerated without an adverse impact on the Portland/Vancouver Region's economy and quality of life.

1.6.3 Future delays in the I-5 Trade Corridor could impact the economy in the following ways:

- Freight and trade will incur additional cost from congestion, especially during the midday.
- The lack of reliability will increase transportation costs more than the increases in delay.
- Increases in cost and uncertainty will influence business location and expansion decisions.
- The lack of accessibility will limit the ability to attract future jobs in key industrial areas such as the Columbia Corridor.

1.6.4 Congestion on the rail system threatens the Region's status as the Pacific Coast's low-cost rail port and puts rail companies and their regional customers at a disadvantage relative to other regions. It also threatens our plans to expand intercity passenger rail service between Oregon and Washington.

1.6.5 The problems in the I-5 Trade Corridor cannot be solved with freeway improvements alone. A high quality bi-state transit system is needed to provide an alternative to driving that provides an improvement in transit travel times and reliable service throughout the day.

1.6.6 The problems in the I-5 Trade Corridor cannot be solved with transit, land use, and demand management actions alone. Additional capacity will need to be added to the road system to ensure that today's accessibility and reliability can be maintained and improved.

RECOMMENDATION 1: The need for action

R 1.1 Physical improvements in the I-5 Trade Corridor beyond the Baseline 2020 projects are warranted and necessary to meet the transportation, economic, and livability needs of the Portland/Vancouver Region.

2 ADDITIONAL TRANSIT CAPACITY AND SERVICE

2.1 KEY FINDINGS: Transportation performance

2.1.1 The Express Bus–Long and the Light Rail Loop Option Packages significantly improve travel times compared to Baseline 2020, and slightly improve travel times compared to today.

2.1.2 The Express Bus–Short Option Packages provides a slight improvement to travel times compared to Baseline 2020, but when compared to existing transit travel times, transit trips can be expected to be approximately 9 minutes longer than they are today.

2.1.3 Transit ridership across the Columbia River (I-5 and I-205 Corridors) is expected to increase under all transit options, with the greatest increase resulting from the Light Rail Loop. Compared to Baseline 2020, Express Bus–Short increases ridership by 38%, Express Bus–Long increases ridership by 63%, and Light Rail Loop increases ridership by 94%.

2.1.4 The Light Rail Loop provides the most consistent travel time and the best reliability of the transit options considered because it runs in its own right of way and is not impeded by roadway congestion.

2.2 KEY FINDINGS: Environmental and community impacts

2.2.1 There could be impacts to historic resources for all transit options, but most of the impacts to historic resources appear to either be indirect or minor.

2.2.2 All transit options are likely to have a moderate impact on fish habitat, due to the fact that they involve new bridges that could have in-stream piers potentially affecting rearing or migration habitat.

2.2.3 Because the improvement area in the I-5 Trade Corridor is highly urbanized, impacts to wildlife habitat, wetlands and native plant communities are likely to be minor for the highway improvements needed to support the Express Bus Option Packages.

2.2.4 For light rail, the I-5 and I-205 segments would have minor impacts to wildlife, wetlands and plant communities. The current concept for the east/west segment could have moderate impacts to natural areas. Actual impacts for each of the segments would depend on the final alignment.

2.2.5 While it is not possible to make the transportation improvements considered in this planning effort without some level of impact to existing properties, the impacts to properties are highly dependent on the design and alignment of the projects.

2.2.6 For freeway improvements in the I-5 Trade Corridor that are needed to support Express Bus, the greatest potential for impacts to property is on Hayden Island.

2.2.7 For the light rail loop, the I-5 and I-205 segments would have few displacements. As studied for this planning effort, it appears that there is a greater potential for property impacts on the east/west segment of the light rail loop. Refinement of various alignment options could reduce or avoid many of these impacts.

2.3 KEY FINDINGS: Cost

2.3.1 Express bus is the lowest cost of transit options due to the fact that it operates on the highway in an already established right of way (Express Bus–Short = $14 million and for Express Bus–Long = $32 million [in 2001 dollars]).

2.3.2 Light rail is the highest cost of the transit options due to the fact that it operates in its own right-of-way with a track system ($1.222 billion [in 2001 dollars]).

2.3.3 The actual costs will vary depending on final design, mitigation, inflation and other factors.

2.4 KEY FINDINGS: Other

2.4.1 Compared to light rail, buses have the following advantages:

- Buses can be flexibly routed to serve different origins and destinations, and to address particular traffic congestion problems.
- Buses can more effectively serve outlying population centers such as Battle Ground and Ridgefield.
- Buses can be readily placed on new routes.

2.4.2 Compared to light rail, express buses serve a more limited transportation market. As evaluated, express bus was a point-to-point system that served the commuter market and ran Monday through Friday in the morning and evening peak periods only.

2.4.3 Compared to express bus, light rail has the following advantages:

- Does the most to promote balanced (multi-modal) use of the system—transit ridership in downtown Vancouver increases by 40 to 50% with light rail, compared with 8 to 10% for express bus.
- Serves a range of trip purposes throughout the day, seven days a week.
- Provides consistent service to multiple points along the line and can be a catalyst for community redevelopment.
- Is consistent with regional and local goals, and reinforces the Vancouver and Portland Central cities and regional centers such as Vancouver Mall and Gateway.

2.4.4 Across all measures, I-5 performs better when paired with light rail than with the express bus packages that were tested because light rail attracts more riders.

RECOMMENDATION 2: Additional transit capacity and service

R 2.1 A light rail loop system, including feeder buses, and new and expanded park and ride lots, should be established in Clark County. In the interim, bi-state transit needs will continue to be served by express bus.

R 2.2 The light rail loop system should provide transit mobility, both within Clark County and between Washington and Oregon, in the I-5 and I-205 Corridors

R 2.3 The light rail loop system may be constructed in phases.

R 2.4 Peak-hour, premium express bus service in the I-5 and I-205 Corridors to markets not well served by light rail may be provided as a supplemental service to light rail.

R 2.5 Transit service in the Corridor should be increased over the next 20 years as planned in the Metro and RTC 20-year transportation plans.

3 ADDITIONAL FREEWAY CAPACITY

3.1 KEY FINDINGS: Fixing two-lane sections

3.1.1 There are three remaining two-lane sections on I-5 in the study area: (1) I-84 – Fremont Bridge near the Rose Quarter, (2) Delta Park to Lombard, and (3) 99th Street to I-205 in Clark County.

3.1.2 Widening these two-lane sections to three lanes, combined with an overall improvement in transit service throughout the Portland/Vancouver Region as called for in Baseline 2020, allows freeway travel times though the Corridor to remain about the same as they are today.

3.1.3 An environmental impact statement (EIS) has been completed for the project to widen I-5 to three lanes in each direction between 99th Street to I-205 in Clark County. This project is ready for construction and awaits funding.

3.1.4 An environmental assessment is currently underway for the project to widen I-5 to three lanes in each direction between Delta Park and Lombard. The environmental impacts of this project (air quality, natural resources, property impacts) are not expected to be significant.

3.1.5 At Columbia Boulevard in Portland, the on-ramp currently joins the freeway to become the third lane on the freeway, thus providing ease of entry to the freeway for trucks. With the widening to three lanes, the Columbia Boulevard on-ramp would become a merge lane. Analysis shows that we can expect the reconfigured on-ramp merge from Columbia Boulevard to operate acceptably with this improvement. The existing ramp has a rising grade of 6% and enables heavy trucks to attain a speed of only 25 mph when entering the freeway. The proposed ramp would have a 4% grade and a 1,400-foot acceleration lane, enabling trucks to attain a speed of

45 mph within the acceleration lane before entering the freeway. The new on-ramp would operate at a Level-of-Service "C-D" during the peak periods, which indicates generally smooth merging conditions.

3.1.6 Widening I-5 to three lanes in the vicinity of the Rose Quarter is likely to have implications for the entire freeway loop around Downtown Portland. Changes to this or any other part of the freeway loop should consider the implications on the entire loop.

3.1.7 There are significant challenges at the junction of I-5 and I-84 near the Rose Quarter. These include safety and operational problems due to closely spaced interchanges and the land use objectives for the Rose Quarter area and Lloyd Center district.

RECOMMENDATION 3a: Fixing two-lane sections

R 3a.1 I-5 should be widened to three lanes in each direction between (a) Delta Park and Lombard and (b) 99th Street and I-205 in Clark County

R 3a.2 The Delta Park to Lombard project should go to construction as quickly as possible.

R 3a.3 The transportation issues south of the I-5/Fremont Bridge junction must be addressed and solved. The Mayor of Portland, the Governor of the State of Oregon, and JPACT should join together to appoint a group of public and private sector stakeholders to study and make recommendations for long-term transportation solutions for the entire I-5/I-405 freeway loop.

3.2 KEY FINDINGS: Overall freeway improvements

3.2.1 Two central questions for this planning effort have been:

- Should the freeway be three through-lanes in each direction between I-84 in Portland and I-205 in Clark County, or it should be expanded to four through-lanes in each direction?
- Should there be new river crossing capacity for vehicles?

3.2.2 The current configuration of interchanges close to the existing Interstate Bridges results in operational problems that make the six-lane bridge function more like a four-lane bridge. This results in significant congestion and delay during the morning and evening peak periods. All Option Packages for making the freeway three lanes or for expanding it to four lanes assumed an additional or new bridge in the I-5 Trade Corridor to address the problems with the existing bridges.

3.2.3 Compared to Baseline 2020, both the three-lane and four-lane options significantly improve travel times in the Corridor.

- During the evening peak periods, the Baseline 2020 travel time between Downtown Portland and Downtown Vancouver for autos and trucks is 30 minutes. Under the three-lane options, travel times are reduced by about 9 minutes; under the four-lane option, travel time is reduced by 12 minutes.

- During the evening peak periods, travelers will experience about 21,450 hours of delay. Under the three-lane options, vehicle hours of delay are reduced by between 22 and 26% to approximately 16,000 hours of delay. Under the four-lane option, delay is reduced by 26%, also about 16,000 hours of delay.

3.2.4 Improved travel times and reduced delay observed in the three-lane and four-lane Option Packages are primarily attributable to the new capacity across the Columbia River in the I-5 Trade Corridor.

3.2.5 If the four lanes are configured as a reversible express lane system (five lanes in the peak direction and three lanes in the non-peak direction), additional transportation performance benefits can result. Time travel savings increase by an additional 10 minutes and delay is reduced by an additional 13% to approximately 13,000 hours of delay.

3.2.6 Options that add a fourth lane to the freeway in each direction have the potential to significantly impact traffic operations on the Portland freeway loop. The four-lane options would increase southbound traffic volumes on I-405 by 9–12%, from 18,293 vehicles under 2020 Baseline to 20,000–25,000 vehicles under the four-lane options. Near the Rose Quarter, traffic volumes would increase by 15–30%, from 12,525 vehicles under 2020 Baseline to 14,361–16,351 vehicles under the four-lane options. The higher traffic volumes would be observed if the fourth lane were added as a reversible express lane.

3.2.7 Options that limit the freeway to three lanes in each direction would increase southbound volumes on I-405 by less than 1% compared to Baseline 2020, and would increase southbound volumes on I-5 near the Rose Quarter by 5–7%, also compared to Baseline 2020.

3.2.8 I-5 is the most direct route for the majority of trips across the Columbia River due to the high number of employment and other activity centers that are served by I-5. With a new river crossing, people have a better ability to choose the shortest and most direct path for their trip.

3.2.9 With the improvements on I-5, volumes on the I-205 Bridge decrease because some trips that now occur on I-205 would shift to I-5. This would allow the I-205 Bridge to better serve future planned growth in the I-205 Corridor.

3.3 KEY FINDINGS: Environmental and community impacts

3.3.1 Historic

- There could be impacts to historic resources for both the three-lane and the four-lane options, but most of the impacts to historic resources appear to either be indirect or minor.
- Expanding the freeway to four lanes in each direction results in the potential for one major impact to one historic property owned by Multnomah County.
- A replacement bridge would involve a full impact on the Columbia River Bridges. The existing northbound bridge is listed on the National Register of Historic Places and the southbound bridge is eligible for listing.

3.3.2 Natural resources

- Both the three-lane and four-lane options would have a moderate impact on fish habitat, because they involve new bridges that could have in-stream piers that would potentially effecting rearing or migration habitat.
- Because the improvement area in the I-5 Trade Corridor is highly urbanized, impacts to wildlife habitat, wetlands and native plant communities are likely to be minor for the Baseline 2020, three-lane and four-lane options.

3.3.3 Property impacts

- While it is not possible to make the transportation improvements considered in this planning effort without some level of impact to existing properties, these impacts are highly dependent on the design and alignment of the projects.
- For improvements in the I-5 Trade Corridor, the greatest potential for impacts to property is on Hayden Island. A replacement bridge has the least number of impacts due to the fact that it follows near the existing bridge and freeway alignment. In Washington, the design of freeway interchange improvements between SR 14 and SR 500 can greatly influence property displacements and impacts. Interchange improvements in Washington can be designed to minimize the number of property impacts.

3.3.4 Air quality

- In the future, air quality is expected to be considerably better than it is today for carbon monoxide (CO), volatile organic compound (VOC) and nitrogen oxides (NOx). This is due primarily to cleaner burning fuels and lower emission vehicles. Comparing Existing Conditions 2000 to Baseline 2020, CO = 30% reduction, VOC = 73% reduction, and NOx = 85% reduction.
- While air quality is expected to improve, the three-lane and the four-lane options have the potential to increase CO, VOC, and NOx emissions when compared to Baseline 2020.
- Based on the analysis completed to date, the differences among Option Packages regarding air quality are relatively small. Adding a fourth lane to the freeway appears to have the most impact on air quality, compared to other options.
- Air quality impacts are a concern that has been raised by advocates and community members alike. Additional examination of air quality impacts is warranted.

3.4 KEY FINDINGS: Cost

3.4.1 As conceptualized, preliminary cost estimates for the freeway options in 2001 dollars are:

- Three-lane = $1 billion (includes costs for interchange improvements between SR 500 and Lombard, and new river crossing capacity)
- Four-lane = $1.6 billion

3.4.2 The actual costs will vary depending on the final design, mitigation, inflation and other factors.

RECOMMENDATION 3b: Overall freeway capacity

R 3b.1 The Task Force recommends that the I-5 freeway between the Fremont Bridge in Portland and the I-205 interchange in Vancouver be a maximum of three through-lanes in each direction.

R 3b.2 The Task Force considered expanding the capacity of the Corridor to four through-lanes in each direction but does not recommend this option.

3.5 KEY FINDINGS: High occupancy vehicle (HOV) lanes

3.5.1 Provision of new river crossing capacity makes a continuous HOV system between Portland and Vancouver a possibility.

3.5.2 HOV performance is highly dependent upon the design of the new freeway system. Current design concepts require changes to better accommodate the HOV system. In some cases the bridge design affects HOV performance. For example, multiple bridges split freeway traffic and would limit HOV access. In addition, direct access ramps will need to be considered at key locations such as SR 500.

RECOMMENDATION 3c: High occupancy vehicle (HOV) lanes

R 3c.1 Further exploration of HOV in the EIS is required to optimize the design of the system and to determine its overall effectiveness.

R 3c.2 One of the three through-lanes should be designated for use as a high occupancy vehicle (HOV) lane during the peak period, in the peak direction. Further exploration is required in the environmental impact statement to optimize its design, particularly within the Bridge Influence Area, and to determine its overall effectiveness in meeting the regional objectives for the I-5 Trade Corridor.

3.6 KEY FINDINGS: Columbia Boulevard Interchange

3.6.1 Making Columbia Boulevard into a full access interchange will provide a direct connection to I-5 for one of the Region's busiest freight routes. It will reduce congestion at the Marine Drive interchange, improve truck utilization of Columbia Boulevard, and reduce traffic in the Kenton neighborhood.

3.6.2 Design of this interchange needs to be done in conjunction with the design of the entire Bridge Influence Area to ensure overall system functionality.

RECOMMENDATION 3d: Columbia Boulevard interchanges

R 3d.1 The Columbia Boulevard interchange in Oregon should be made into a full interchange (add ramps for southbound traffic to exit at Columbia Boulevard and for northbound traffic to enter the freeway from Columbia Boulevard).

R 3d.2 Both the Delta Park to Lombard project and the Columbia Boulevard interchange project should be considered for design at the same time. As part of this design effort, there needs to be a phasing and financing plan, with the recognition that the Delta Park project is the first priority.

4 BRIDGE AND BRIDGE INFLUENCE AREA (SR 500 TO COLUMBIA BLVD)

4.1 KEY FINDINGS: Freight mobility and the economy

4.1.1 According to USDOT's Freight Analysis Framework, the I-5 Trade Corridor carries the highest volume of freight in the states of Oregon and Washington. It is the key route for freight originating or destined for Portland and Seattle.

4.1.2 USDOT's Freight Analysis Framework also shows this segment of I-5 as one of the most congested freight routes in the nation.

4.1.3 By 2020, if we make no improvements in both our freeway and transit system, we can expect delay to nearly double, from about 18,000 hours today to about 32,000 hours in 2020. This delay and the resulting congestion and loss of reliability have an economic cost to our community. Not only will the cost of doing business increase, individual business productivity will be reduced, resulting in a poor quality transportation system to key employment and industrial centers that also threatens our long-term ability to attract and retain living wage employment in the Region.

4.1.4 The BIA improvements would:

- Reduce bottlenecks on the freeway and balance traffic flow.
- Improve key freight interchanges including Columbia Boulevard, Marine Drive, and Mill Plain Boulevard.
- Increase reliability and predictability on I-5.
- Improve bi-state transit service.

4.1.5 The benefits for the economy and freight include:

- Improved access to and from key industrial destinations such as the Port of Vancouver, Rivergate and the Columbia Corridor.

- Improved access to and from key employment centers such as Downtown Portland and Downtown Vancouver, Columbia Corridor, Swan Island, and Lloyd Center.
- Improved travel times and reduced congestion on I-5.
- Increased reliability and predictability in transit service.

4.1.6 The benefits of BIA improvements help to create a positive business climate and help make the Region an attractive place to locate and expand business.

4.2 KEY FINDINGS: River crossing capacity/Bridge Influence Area

4.2.1 Overall, the Bridge Influence Area (BIA) concepts show an improvement in freeway traffic speeds during the peak periods compared to Existing Conditions 2000 and Baseline 2020.

4.2.2 Within the range of concepts considered, however, there are some important differences:

- A replacement bridge provides the best performance in both the morning and the afternoon peak period.
- An eight-lane system plus the arterial connection performs better in the afternoon than in the morning. The morning problems with this concept are primarily a function of design. The concept places the HOV lane on a separate bridge. Because access to the separate bridge is limited in the BIA, many of the HOV trips return to the mainline just as they approach the existing bridge. This is occurring in about the same location as where the SR 14 on-ramp merges onto I-5 south. In combination, the two merges in the same location create congestion on the freeway. Additional engineering work may be able to solve the problems we observe for this concept.
- A collector/distributor system shows the least improvement in performance. In the morning it provides some improvement over Existing Conditions 2000 and Baseline 2020, but in the afternoon it provides little benefit. The design problems associated with this system are the least "fixable" due to its configuration.

4.2.3 An arterial bridge, constructed in combination with additional freeway lanes across the river could benefit the overall performance of the freeway system. It would provide a separate local connection across the river, reducing the need to use the mainline freeway system. The Baseline 2020 analysis shows that an arterial roadway would be heavily used primarily by localized trips.

4.2.4 A two-lane, arterial-only bridge (no increase in freeway lanes) will not address the problems on the freeway. The arterial-only connection would only slightly improve freeway performance by removing local trips. Users of the freeway system would continue to experience a significant increase in congestion and delay throughout the I-5 Trade Corridor.

4.2.5 BIA improvements are likely to result in minimal traffic increases on I-5 outside the Bridge Influence Area. Traffic, however, will increase on roadways with direct access to the BIA. These traffic increases are different in Portland and Vancouver. Portland would see increases on arterial streets near the BIA, while Vancouver's increases would be on state freeways.

4.3 KEY FINDINGS: Cost

4.3.1 Potential highway and transit costs in the BIA are all in the range of $1.2 billion (in 2001 dollars). This estimate includes major maintenance and seismic retrofit costs for the existing bridges.

4.3.2 The actual costs will vary depending on the final design, mitigation, inflation and other factors.

4.3.3 There is not a significant enough cost differential to eliminate any of the options based on cost alone. A full exploration of life cycle costs of the existing bridges and seismic retrofit costs should be completed during the EIS.

4.4 KEY FINDINGS: Property impacts

4.4.1 Potential property impacts vary depending on the Concept. Potential impacts range between 15-43 displacements and 42-59 encroachments for the full bridge influence area (SR 500 to Columbia Boulevard). Generally, for all Concepts, the greatest number of potential displacements and encroachments would be to non-residential properties.

4.4.2 The replacement bridge Concept has the least number of likely property impacts due to the fact that the structure would be located near the existing bridge and freeway alignment.

4.4.3 The majority of the property impacts would occur in Portland where improvements cross Hayden Island.

4.4.4 Additional survey, engineering and design work in the EIS process is needed before the actual number and extent of the displacements and encroachments is known.

4.5 KEY FINDINGS: Environmental impacts

4.5.1 Since all concepts included additional crossings of the Columbia River and North Portland Harbor, there may be potential impacts to fish habitat associated with bridge construction.

4.5.2 Three of the four concepts encroach into the Delta Park green space area (60 to 120 feet depending on concept).

4.5.3 Three of the four concepts have encroachments onto the radio tower wetlands site (100 to 240 feet depending on concept).

4.5.4 All concepts have encroachments onto the Ft. Vancouver Historical Site (60 to 120 feet depending on concept). An encroachment over 60 feet would impact the FHWA building located near the SR14 ramp to I-5 northbound. However, no historic buildings would be impacted.

4.5.5 All concepts would impact the Historic I-5 Columbia River Bridge with the full replacement bridge providing the most impact to the historic structure. The existing northbound bridge is

registered on the National Register of Historic Places and the southbound bridge is eligible for registration.

4.5.6 The EIS process will allow a full exploration of impacts to natural, cultural, historic, fish and park resources to determine the best balance for the environment and the community. Additionally, potential impacts to the radio tower wetland and Delta Park vary by design concept and would under go a detailed evaluation in an EIS.

4.6 KEY FINDINGS: Safety

4.6.1 BIA improvements address traffic safety concerns resulting from the high number of closely spaced entrances and exits. Improvement concepts would significantly reduce the number of entrances and exits by utilizing collector-distributor lanes adjacent to the freeway lanes. In addition, for the locations where ramps remained closely spaced, bridges would typically be used to separate the entering and exiting traffic.

4.6.2 None of the concepts considered would encroach on the restricted air space for the Pearson Air Park.

4.6.3 Impacts to marine navigation would be highest for those concepts that build a supplemental bridge. Multiple bridges with low-level lift span bridges would be built in close proximity to one another. Marine navigation hazards in the shipping channel would increase. The replacement bridge concept designed a high level-fixed span bridge that would relocate the navigational channel from the north shore to the center of the Columbia River. (Improvement to the rail bridge would also occur.) This concept would virtually eliminate the need for barge operators to navigate a curved path between the bridges.

4.6.4 Life-safety and emergency response to a catastrophic event is also a safety concern. The existing bridges do not meet current seismic standards and in the event of a major earthquake, they could fail. New bridges would be built to higher standards and would have a higher probability of withstanding a major earthquake.

4.7 KEY FINDINGS: Implementation

4.7.1 Bridge concepts with ten freeway lanes, and bridge concepts with eight freeway plus arterial lanes, appear promising.

4.7.2 Collector-distributor bridge systems have design problems and therefore provide little transportation benefit. Such design problems will be difficult to overcome.

4.7.3 A joint use (Hwy/LRT) bridge could be cost-effective but needs further study in an EIS. Constructing both LRT and freeway improvements on a single bridge could potentially result in some cost savings compared to building separate bridges. However, many other factors should also be considered, including right-of-way impacts, whether the existing bridges will be main-

tained or replaced, implications for siting the LRT station on Hayden Island, and construction staging.

4.7.4 Supplemental or replacement bridge: The existing bridges provide three lanes of traffic in each direction. They cannot be widened economically. To provide an addition of two lanes of traffic in each direction (for a total of up to five lanes), the bridges will either have to be replaced with a wider bridge, or a supplemental bridge will need to be constructed adjacent to the existing bridges. While further study is needed to conclude whether a new bridge should be supplemental to the existing bridges or should replace them, the analyses have identified several factors that will influence that decision:

- Traffic operations: With a supplemental bridge, freeway traffic in one or both directions would be split into two traffic streams across the river. With two separate traffic streams, along with many closely spaced interchanges near the river, it is difficult to balance traffic flows, and the analyses indicated that congestion would be significant on the bridge serving the near-by interchanges. By comparison, a replacement bridge would keep all directional traffic on one bridge, resulting in more balanced traffic flow.
- Cost: Current cost estimates indicate that there is little cost differential between a supplemental and a replacement bridge. Further exploration of cost issues will need to continue in an EIS.
- Right-of-way impacts: Replacing the existing bridges with a new bridge would focus the new construction within the existing right-of-way, thus minimizing impacts to adjacent parcels on Hayden Island and in downtown Vancouver.
- Impacts to property and natural, cultural and historic resources: All concepts are likely to have an impact on one or more of the key resources in the BIA. Concepts that build a new bridge (either supplemental or replacement) east of the existing bridges (upstream) have a higher probability of impacting the Fort Vancouver National Historic Site than those that replace the existing bridges in place, or those that build a new supplemental bridge to the west (downstream).

4.7.5 Some river crossing concepts include the conversion of one of the existing freeway bridges for LRT use. While that is technically feasible, the cost of retrofitting the bridges to include the modified decking, electric systems, cathodic protection, and other conversion costs would be significant. If upgrading the bridge to meet current seismic standards is required, the retrofit costs could easily exceed the costs of a new LRT bridge. Further study of this concept would require a detailed investigation of the retrofit costs and a comparison of those costs to a new bridge.

4.7.6 Concepts that provide for separate LRT and freeway bridges could potentially allow the LRT and highway projects to move forward independently of each other. However, further analysis is required to address the joint or separate bridge decision. Such a decision is likely to be based on LRT and highway alignment design requirements, right-of-way and environmental impacts, land use opportunities and constraints relative to siting an LRT station on Hayden

Island, construction costs, traffic staging, operating concerns, and potentially other concerns as well.

4.7.7 If subsequent studies indicate that the two modes can and should be considered separately, there is potential time savings for LRT, which may be implemented in a shorter time period given that substantial environmental and design work has already been completed in the South/North EIS.

RECOMMENDATION 4: Bridge Influence Area

R 4.1 New transit and vehicle capacity should be constructed across the Columbia River in the I-5 Trade Corridor.

R 4.2 For vehicles, there should be three through-lanes (and not more than three) in each direction and up to two auxiliary and/or arterial lanes in each direction across the Columbia River (total five lanes in each direction). For transit, there should be two light rail tracks across the Columbia River in the I-5 Trade Corridor.

R 4.3 In the Bridge Influence Area, SR 500 to Columbia Boulevard, the freeway needs to be designed to balance all of the on and off traffic, consistent with three through lane Corridor capacity and up to five lanes of bridge capacity, in each direction.

R 4.4 In adding river-crossing capacity and making improvements in the Bridge Influence Area, every effort should be made to (a) avoid displacements and encroachments, (b) minimize the highway footprint in the Corridor, and (c) minimize use of the freeway for local trips.

R 4.5 The proposed design should include safety considerations.

R 4.6 As a first step towards making improvements, the bi-state region should undertake an Environmental Impact Study for a new river crossing and potential improvements in the Bridge Influence Area.

R 4.7 In the EIS, the following BIA elements should be studied:

- Eight- or ten-lane freeway concepts
- Replacement or supplemental bridge
- Joint use or non-joint use freeway/LRT bridge
- Eight-lane freeway with joint LRT/two-lane arterial
- HOV throughout the I-5 Trade Corridor

R 4.8 Evaluate whether or not a six-lane freeway plus two two-lane arterials, one in the vicinity of the I-5 Trade Corridor and one in the vicinity of the railroad bridge, is a viable alternative for consideration in the EIS.

R 4.9 The following concepts do not show promise for addressing the Corridor's problems and should not be considered in an EIS:

- Collector-distributor bridge concepts
- Arterial-only bridge concepts
- Tunnel concepts

R 4.10 Special consideration needs to be given to the architectural aesthetics of any new structures to be built, particularly any new bridge structures.

5 ADDITIONAL RAIL CAPACITY

5.1 KEY FINDINGS: Freight and intercity passenger rail

5.1.1 Several low-to-medium cost solutions can significantly improve existing rail capacity. A series of projects have been identified by the railroads, Ports and the Oregon and Washington Departments of Transportation as viable, if funding were available. They are already well into planning or development, are operational, or are "relatively" low cost ($132 million) compared to more major improvements.

5.1.2 Additional passenger service in the Portland/Vancouver corridor will require major rail capacity improvements north of Vancouver, and south of Portland, as well as agreements between the railroads and affected state departments of transportation.

5.1.3 The principal "incremental" improvements include:

- Two-main track bypass around BNSF's Vancouver Yard.
- Revised crossovers and higher turnout speeds at North Portland Junction.
- Second main track and increased track speeds between N. Portland Junction, Peninsula Junction, and Fir on UP's Kenton Line.
- Expanded capacity and longer tracks at Ramsay and Barnes Yards.
- Connection in the SE quadrant at E. Portland between UP's Brooklyn and Graham Lines.
- Increased track speeds between UP Willsburg Junction and UP Albina.
- An upgraded "Runner" or River Lead between Albina and East Portland, and a second track through the East Portland interlocking.

5.1.4 The "incremental improvements" are sufficient to address capacity needs for 5 to 10 years, given a growth rate of 1.625 to 3.25% per year, at a performance level of 200 hours of delay (96 hours).

5.1.5 In 10 to 20 years, additional improvements beyond the identified "incremental improvements" will be needed to accommodate growth of both intercity passenger and freight rail, depending on economic growth rates and acceptable levels of service.

5.1.6 Within 10 to 20 years, improvements to accommodate the growth on the rail system may include the separation of the UPRR and BNSF rail lines in the N. Portland Junction and additional capacity across the Columbia River.

5.1.7 The incremental improvements, and later additional improvements noted in Section 5.1.5 above, will provide acceptable freight capacity for 10 to 20 years, and some marginal capacity to accommodate the 10-year plans for eight additional intercity passenger trains, but not for commuter rail service.

5.1.8 Determining the exact nature and cost of these incremental and additional, future improvements will require further study.

5.1.9 If rail capacity does not increase, reliability will decline and travel time and shipping costs may increase. Rail shippers may be forced to divert traffic, change modes or relocate. Intercity passenger service may not be able to be expanded.

- If intercity passenger rail service is to expand, privately owned rail facilities will require public-private cooperation to address capacity issues that constrain the system.
- The economics of freight movement make freight rail not as competitive with trucks at distances less than 500 miles, depending on commodity shipped.
- If capacity improvements are not implemented, rail congestion will increase, and shippers will consider alternative modes of moving freight, particularly by truck.
- The cost of delay to the freight railroads—as related to direct rail operating costs—will vary depending on geographic area, and types of trains and commodities shipped. An average direct cost of delay is estimated at $300 per hour of train delay. This figure, however, does not reflect the full impacts of the costs of delay to the railroads (potential loss of business revenue), and to the regional economy (jobs, loss of local businesses, and impacts on port development).
- A lift span in the center of the railroad bridge would result in greater and safer use of the center span of the Interstate Bridges by barge traffic, resulting in fewer lifts of the Interstate Bridge and reducing delay on I-5.

5.2 KEY FINDINGS: Commuter rail

5.2.1 Commuter rail service cannot operate effectively on the freight rail network over the next 10 to 20 years, even with the identified incremental and additional network improvements. Commuter rail service could be instituted only on a separated passenger rail-only network. A separated passenger rail-only, high-speed rail system would improve intercity passenger rail service and could drive the feasibility of commuter rail in the Region. However, the capacity analysis shows taking intercity passenger rail service off of the freight rail network would not free up enough capacity on the existing rail network.

5.2.2 The unconstrained commuter rail system modeled for the I-5 Partnership process provides fast travel times. It serves areas not well served by transit, particularly suburban and outlying areas (Salmon Creek, North Clark County, I-205 Corridor and East Clark County). It does not appear to serve the same market as light rail.

5.2.3 The cost of a separated passenger network is $1.5 to $1.7 billion. These higher costs have a higher level of uncertainty than the other studied options. This uncertainty is attributed to geologic issues, the potential for significant right-of-way costs, the need for environmental mitigation, and the need for additional connecting transit service, feeder bus service, and Rose Quarter station and connections.

5.2.4 The Commuter Rail service modeled assumes new dual tracks over the entire length of service area (Ridgefield to Washougal). Train frequencies, average speed, travel times, and estimated ridership is based on dual tracks throughout proposed network. A combination of dual tracks,

and single tracks with periodic sidings for train meets and passing may be possible, but will likely result in less frequent service, slower average speed, longer travel times, and reduced ridership.

5.2.5 Potential commuter rail right-of-way displacements associated with a new, dual-track system, include approximately 35 residences on the Ridgefield line, 55 residences on the Washougal line, four to five industrial properties in Portland and eight in Vancouver. The alignment may also require the relocation of SR 14 or the Evergreen Highway at several "pinch points" along the Washougal line. Finally, there will likely be additional neighborhood impacts from noise, traffic, retaining walls, and the high volume of feeder bus connections necessary to serve the 78th St./Lakeshore and Ridgefield stations.

5.2.6 Further study would be needed of the capacity of a joint LRT/transit bus/commuter rail service transit center at the Rose Quarter Transit Center to accommodate the high volume of transferring transit riders anticipated. The commuter rail service modeled assumes sufficient LRT and bus capacity for the necessary regional connections, but does not include the cost for a Transit center. Finally, this particular alignment is not consistent with the City of Portland's plan designation of Union Station as its Regional Transportation Center.

5.2.7 Commuter rail may impact the direction of growth in the Region by facilitating the development of lower density residential housing patterns in suburban and outlying areas of Clark County, instead of to more serviceable urban locations.

5.2.8 The environmental impacts from commuter rail include the crossing of significant wetlands by the Ridgefield line, and the mitigation costs are not included in the above cost estimates.

5.2.9 In regions with similar population characteristics as the Portland/Vancouver area, all-day commuter rail service is not common. Most such systems operate peak-period service only. Systems that offer limited mid-day service have generally experienced a 10 to 20% increase in ridership over their daily, peak-period ridership. The four-hour PM peak ridership estimate is 8,150, and using the 10 to 20% factor, 8,965 to 9,780 all-day riders.

- As modeled, commuter rail with the light rail transit loop will reduce river crossings by 1,700 vehicles during the four-hour PM peak period, or about 560 vehicles in the peak hour, both directions, both bridges. This is a 2% reduction in vehicle crossing of the Columbia River in the PM peak four hours.
- Commuter rail creates potential funding competition between it and LRT because both are eligible for the same federal "New Starts" funding pool.

RECOMMENDATION 5a: Freight rail

R 5a.1 The proposed Bi-State Coordination Committee should establish a public/private forum to implement these rail recommendations. The "Bi-State Rail Forum" should be comprised of representatives from Oregon and Washington Departments of Transportation, regional planning agencies (Metro, RTC), Ports of Portland and Vancouver, cities of Portland and Vancouver, Amtrak and the Union Pacific and Burlington Northern/Santa Fe Railroads. The Rail Forum would serve as an advisory group to the Bi-State Coordination Committee for the identification of needed rail capacity improvements, highway/rail grade separations, and Port access projects.

R 5a.2 The Bi-State Coordination Committee, through the Rail Forum, should initiate an aggressive program to:

- Facilitate the efficient rail movement of freight in the Portland/Vancouver Region
- Coordinate the multi-modal transportation services offered in the area to increase port access and streamline the movement of freight throughout the I-5 Trade Corridor
- Coordinate with other freight movers (truck, barge, marine, aviation) to facilitate inter-modal connections, minimize conflicts among modes, and maximize cooperation.
- Develop strategies to implement the specific findings of the I-5 Partnership Rail Capacity Study, including prioritizing and scheduling the "incremental improvements."
- Study and pursue the rail infrastructure improvements required to accommodate anticipated 20 year freight rail growth in the I-5 Trade Corridor and frequent, efficient intercity passenger rail service between Seattle, Portland and Eugene. This may include: the separation of the UPRR and BNSF rail lines in the N. Portland Junction and additional capacity across the Columbia River.

R 5a.3 The Bi-State Coordination Committee, through the Rail Forum, should also:

- Negotiate the cost allocation responsibilities between public and private stakeholders
- Work collaboratively with regional governments and agencies to advocate for the funding and implementation of rail projects at federal, state, regional and local levels.
- Explore means to facilitate the operation of the BNSF Columbia River Rail Bridge by seeking funding for the replacement of the existing "swing span" with a "lift span" located closer to the center of the river channel. Locating a "lift span" in the center of the river will facilitate safer barge movements between the I-5 Interstate Bridge and the BNSF rail bridge. A "lift span" can be opened and closed more quickly than a "swing span," thus reducing the delay of crossing the river for freight rail.
- Coordinate with the Congressional delegations of both states, regional agencies, and railroads, to encourage the US Coast Guard to recognize the hazard to navigation caused by the existing BNSF railroad bridge, and to award Truman-Hobbs Act funding to replace the existing "swing span" with a "lift span."

RECOMMENDATION 5b: Intercity passenger rail

R 5b.1 The Bi-State Coordination Committee, through the Rail Forum, should:

- Coordinate efforts by both states to encourage greater funding at the state and federal level for additional intercity passenger rail service along the federally designated, Pacific Northwest High Speed Rail Corridor, recognizing the need to ensure compensating capacity to the private railroads for any loss of freight capacity

- Coordinate with the Congressional delegations of both states to encourage passage of pending federal legislation for enhanced funding of High Speed Rail service in the Corridor.
- Work cooperatively with freight railroads to add capacity to the existing rail lines, where appropriate, to enable additional operation of intercity passenger rail service. This capacity might be achieved either by compensating capacity used by the addition of intercity passenger trains on the freight network rail lines, or by separating passenger train service from the freight network and putting it on a passenger rail-only network, as appropriate.
- Support efforts to add capacity outside the Portland/Vancouver Region that will improve train speeds and enable additional intercity passenger rail service.

RECOMMENDATION 5c: Commuter Rail

R 5c.1 Commuter rail should not be studied in an EIS at this time.

6 LAND USE AND LAND USE ACCORD

6.1 KEY FINDINGS: Land use

6.1.1 Without changes in land use policy, the following land use development trends can be expected, regardless of the transportation actions taken in the I-5 Trade Corridor:

- Population and employment growth in the Portland/Vancouver Region are developing in a dispersed pattern. A significant share of households and employment are locating at the urban fringe, within adopted zoning.
- There will be more job growth in Clark County than anticipated in our current adopted plans. Even with a reduced percentage of commuters crossing the river, I-5 will be congested.
- Industrial areas are at risk of being converted to commercial uses, threatening the availability of industrial land in the Portland/Vancouver Region and increasing traffic congestion in the I-5 Trade Corridor.

6.1.2 Without investment in the I-5 Trade Corridor, we can expect that traffic congestion and reduced travel reliability will have an adverse economic effect on industries and businesses in the Corridor.

6.1.3 With highway and transit investments in the Corridor, there will be travel-time savings that can be expected to have the following benefits:

- Attract employment growth toward the center of the Region to the Columbia Corridor along the I-5 Trade Corridor from elsewhere in the Region.
- Strengthen the regional economy by attracting more jobs to the Region.
- New job opportunities for residents near the I-5 Trade Corridor because of their close proximity to the Corridor improvements being considered.
- Mixed-use and compact housing development around transit stations.

6.1.4 Highway and transit investments in the Corridor also carry risks if growth is not well managed:

- Increased demand for housing in Clark County due to the location of jobs in the center of the Region
- Increased pressure to expand the Clark County urban growth area along the I-5 Trade Corridor to the north.
- Industrial areas are at greater risk of being converted to commercial uses at new and improved interchanges with the improved travel times at these locations.

6.1.5 Growth must be managed to ensure that:

- Growth in Clark County does not result in new capacity being used by commuters, instead of for goods movement.
- The expected life span of investments is not shortened
- Scarce industrial land is not converted to commercial uses.
- Local jurisdictions implement necessary zoning and regulatory changes to attract mixed use and compact housings around transit stations.

6.1.6 The recommendations and potential improvements called for in this Strategic Plan are largely compatible with state, regional and local land use plans. See **Attachment C.**

RECOMMENDATION 6: Land use and land use accord

R 6.1 To protect existing and new capacity and support economic development, RTC and Metro, along with other members of the current Bi-State Transportation Committee, should adopt and implement the Bi-State Coordination Accord. (See **Attachment D**). Key elements of the Accord include the following:

- Jurisdictions and agencies agree to protect the I-5 Trade Corridor and will manage development to:
  - Preserve mobility and protect industrial land along I-5
  - Protect existing, modified and new interchanges
  - Adopt development plans for transit station areas
  - Coordinate management plans
- The Bi-State Transportation Committee will expand its role to review and advise JPACT, RTC, other councils, commissions and boards on:
  - Management plans, interchange plans and agreements and transit station plans for the I-5 Trade Corridor.
  - Other transportation, land use and economic development issues of bi-state significance.

- Jurisdictions and agencies agree before new river crossing capacity is added to adopt drafts of management plans, agreements and actions and include in environmental documents.
- Jurisdictions and agencies agree before I-5 is widened at Delta Park to:
  - Form the Bi-State Coordination Committee.
  - Have the Committee review environmental documents.
- Complete plans to manage existing interchanges with deliberate speed.

R 6.2 The Accord signatories need to develop the operational details of the Accord through the proposed Bi-State Coordination Committee.

7 TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)

7.1 KEY FINDINGS: TDM/TSM

7.1.1 Transportation Demand Management (TDM) and Transportation System Management (TSM) are essential strategies for improving our mobility. TDM is about reducing auto trips, shortening some, eliminating others, and making our transportation systems more efficient. TSM measures are designed to manage the transportation system to improve its operation, reliability and efficiency for all users. TSM measures can also be targeted to improve the transportation system for specific users such as carpools, transit or freight.

7.1.2 TDM/TSM can be thought of like a package of common business-management practices known as "asset management." Just as business tries to increase efficiency, respond to its market and use new technology, so does TDM/TSM. Just as business tries to maximize its capital return through adding second employee shifts, TDM tries to maximize the existing highway capacity by managing peak demand and reducing the share of single occupant vehicle trips. Business may use "just-in-time" inventory while TSM uses traffic signal timing and timed transfers. A business uses express checkout stands and frequent flyer benefits while TDM offers HOV bypasses and discounted transit passes. Business develops new products—or new and improved products—while TDM develops new services like vanpooling or new and improved transit routing.

7.1.3 There is no single silver bullet in the TDM/TSM arsenal. However, additional transit service is the single most important investment necessary to achieve TDM/TSM targets and TDM/TSM strategies are most effective when used in a coordinated approach. Current TDM measures focus primarily on peak period commute trips. Future TDM/TSM activities must be broadened to face the challenge of non-work trips as well.

7.1.4 Some TDM/TSM actions can be specifically targeted to the I-5 Trade Corridor. However, most TDM/TSM actions can only be broadly applied, region-wide. The Bi-State Region has basic

TDM/TSM service levels in place. Policies and employer-based programs have increased the visibility and success of demand management programs and have helped to extend them throughout the Region.

7.1.5 TDM and TSM actions are an important part of the I-5 Trade Corridor Strategic Plan. They can minimize transportation capacity needed in the I-5 Trade Corridor and maximize the transportation system's reliability, efficiency and usable life. While the focus is on achieving Corridor-wide targets, these targets cannot be met without regional goals being in place.

7.1.6 The TDM/TSM recommendations will be most effective only if the Region also provides and implements the other Strategic Plan recommendations, especially:

- Transit services will be provided to Clark County with an LRT loop and supplementary express bus service.
- Current planned park and ride lots will be funded and constructed. Additional park and ride spaces will be made available to support the light rail system.
- An HOV lane will operate in both directions between Going Street in Portland and 134th Street in Vancouver.
- The new river crossing(s) will include a quality bicycle/pedestrian facility.
- Land use actions that support alternative mode share will continue to be pursued in the Region and I-5 Trade Corridor.

7.1.7 Costs and effectiveness for the most-promising TDM/TSM actions have not currently been quantified due to the interrelated nature of the activities and lack of detailed accounting for individual TDM and TSM costs. For example, TDM education program success depends on the availability of good transit service, the price of parking, the quality of the education program and many other costs that are not estimated separately in practice.

RECOMMENDATION 7: TDM/TSM

R 7.1 **Final targets:** Ultimately, the proposed Bi-State Coordination committee should adopt *final* TDM/TSM targets for the I-5 Trade Corridor and the Region that are acceptable, attainable and measurable.

R 7.2 The following **interim targets** should be adopted now by the jurisdictions and agencies in the I-5 Trade Corridor and ultimately by the proposed "Bi-State Coordination Committee." The Region's Travel Demand Forecasting Model, monitoring programs, or other mutually agreeable methods should measure them:

- Increase Non-Single Occupancy Vehicle share, including transit and vanpools, across the Columbia River (I-5 and I-205) in the peak periods to 43%* by the year 2020. Year 2000 non-SOV use is estimated at 38%** for the PM peak.
- Maintain average, mid-day travel speeds through the I-5 Trade Corridor at 70% of the maximum posted speed limits (50 to 60 mph) for trucks on I-5 traveling between I-405 and I-205 to avoid spreading the peak hours of congestion into the mid day period when the most trucks are on the road. Currently the

* Data Source: Metro's Regional Travel Forecast Model for year 2020. This scenario assumes additional TDM measures beyond Metro's Regional Transportation Plan TDM assumptions. The percentage excludes trucks and inter-regional trips, i.e., external-to-external trips.

** Data Source: Metro's Regional Travel Forecast Model for year 2000. The percentage excludes trucks and inter-regional trips, i.e., external-to-external trips.

average mid-day speed is at 58 mph between I-84 and I-205 on I-5 (speed limits in the corridor range between 50 and 60 mph).

- Reduce daily VMT/capita for the urban areas of the four-county region by 10% by 2020. Current daily regional VMT/capita is estimated at 16.4 miles/person.
- Increase peak period, travel reliability through the I-5 Trade Corridor and major arterials in the Corridor by maintaining travel times for all vehicles.***

R 7.3 **Overall objectives**: In addition to the other Task Force infrastructure and land use recommendations, the Region's commitment to basic TDM/TSM services should be expanded and enhanced, existing gaps in services should be filled, and funding should be increased beyond current levels. A mix of promising TDM/TSM actions described in the attached "Action Items and Rough Costs Matrix" should be implemented for:

- Alternative mode services that provide an option to driving alone
- Alternative mode support that makes it easier to use other modes
- Worksite-based strategies that focus on education and incentives at the workplace
- Public policy and regulatory strategies that influence mode choice
- Pricing strategies that change parking or road prices
- TSM strategies that improve efficiency of the road system

R 7.4 **Support transit**: Additional transit service is the single most important investment necessary to achieve the TDM/TSM targets. Additional service coverage, frequency and availability throughout the day will provide the foundation for success. The Region's transit agencies, with the support of other jurisdictions and agencies, should seek the necessary public funding for transit service improvements. On a region-wide basis, the Region spends $162 million per year to operate the transit system. An additional $155 million per year is needed to operate transit services at the "Priority" level assumed in the Baseline 2020. Note: TriMet needs the higher "Preferred" level of funding to meet Metro's 2040 Goals.

R 7.5 **Fund study for plan:** The regional transportation partners, with the guidance of the proposed "Bi-State Coordination Committee," should collaboratively prepare an "I-5 TDM/TSM Corridor Plan" to identify the final TDM/TSM targets, implementation details, funding sources, priorities and costs. Upon its completion, the proposed Bi-State Coordination Committee should review the plan, finalize both Corridor and regional targets, and lead an effort to secure additional funding for the selected TDM/TSM measures. The proposed Bi-State Coordination Committee should establish a geographically balanced TDM subcommittee to assist its I-5 Corridor and regional TDM/TSM target-setting and plan implementation. The cost of completing the "I-5 TDM/TSM Corridor Plan" is approximately $250,000.

R 7.6 **Plan elements**: The plan should:

- Evaluate the proposals in the "Action Items and Rough Costs Matrix" (**Attachment E**).
- Include person and truck travel survey results to document existing travel patterns and supplement other ongoing behavior survey data.
- Identify the short-term (before construction of improvements), mid-term (during construction) and long-term (after construction) TDM/TSM actions for the I-5 Trade Corridor and Region, in addition to the recommended current actions noted below.
- Identify the level of funding needed to achieve the level of trip reduction agreed to by the proposed Bi-State Coordination Committee (based on final Corridor and regional targets).
- Identify lead agency/jurisdictional responsibilities for implementation and tracking success.

***This issue and the final target reference points should be part of the study noted in sections F and G, below. Travel time reliability could be improved by decreasing the number, severity and duration of incidents in the Corridor through improved incident response. Improving the travel time reliability on I-5 should be balanced with the suitable travel times on the adjacent arterials.

R 7.7 **Recommended current actions:** The jurisdictions and agencies in the I-5 Trade Corridor and the Region should take action now. At a minimum, the Region should maintain and strengthen the TDM and TSM programs on both sides of the river. Additionally, the Task Force recommends implementation of the "current actions" and the additional "new money" investments noted in the following table. The estimated annual costs for the current actions are roughly $1.9 million per year or about $9.5 million over five years. While the recommended TDM/TSM actions are I-5 Corridor-focused, the Task Force recommends a regional approach, given the inherent inter-relationship of the I-5 Corridor and the regional transportation system.

Recommended current action items — I-5 Trade Corridor focused	Annual cost estimates
1. Education and outreach to provide information about work destination based, peak hour travel options. The first phase would be a survey to document existing origin and destination travel patterns.	$1,000,000
2. Promote business subsidy of transit passes for employers.	$10,000
3. Promote carpoolmatchNW.org to assist in carpool formation.	$150,000
4. Offer guaranteed rides home at work sites.	$20,000
5. Explore methods to better integrate C-TRAN and Tri-Met printed and real-time customer information to expedite Bi-State travel using both systems, e.g., C-TRAN service information on Tri-Met Real Time Kiosks and expanding the number of kiosks would cost approximately $300,000.	$300,000
6. Explore business and community interest for additional and/or expanded Transportation Management Association in the I-5 Trade Corridor between the Columbia River and Lloyd District, including Swan Island, Rivergate and Interstate Avenue. (One-time study).	$50,000
7. Increase coordination between Oregon and Washington Transportation Management Centers to improve freeway management and operations, including incident management.	$200,000
8. Identify priority locations for planned ramp meters and deploy integrated, bi-state, ramp meter timing for the I-5 and I-205 Corridors.	$140,000
Total estimated annual cost	$1,870,000

R 7.8 **Recommended Mid-Term Actions**: The regional partners should begin planning for the TDM/TSM measures necessary during the construction of the I-5 Trade Corridor improvements.

R 7.9 **Recommended Long-Term Actions**: TDM and TSM strategies from the "I-5 TDM/TSM Corridor Plan" should be evaluated further in the environmental process for the I-5 Trade Corridor improvements. The TDM/TSM strategies should be part of any final I-5 Trade Corridor project.

R 7.10 **Timing**: The proposed Bi-State Coordination Committee needs to agree on the "I-5 TDM/TSM Corridor Plan," TDM/TSM targets for the I-5 Trade Corridor and the Region, and the appropriate levels of financial commitment and implementation that must be in place before construction begins on any new river-crossing capacity.

8 ENVIRONMENTAL JUSTICE

8.1 KEY FINDINGS: Environmental justice

8.1.1 The states of Washington and Oregon have initiated the Portland/Vancouver I-5 Transportation and Trade Partnership in response to the problem of growing congestion on the highway and rail systems.

8.1.2 The I-5 Partnership Task force has adopted a Problem, Vision and Values Statement to guide its work. The statement reads in part: "The principles of environmental justice will be followed in developing the Strategic Plan and making recommendations for the corridor."

8.1.3 There are four fundamental environmental justice principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
- To incorporate analysis in the EIS process of cumulative risks and disparate impacts due to multiple exposures.*

8.1.4 Highway and transit projects recommended by the I-5 Partnership Task Force are in or near low-income and/or minority communities both in Oregon and Washington.

8.1.5 To begin defining how the draft recommendations for improvements to the I-5 Trade Corridor may impact and benefit low-income and minority residents, a series of meetings—two meetings in each state—were held with community stakeholders.

RECOMMENDATION 8: Environmental justice

R 8.1 A community enhancement fund for use in the impacted areas in the I-5 Trade Corridor in Oregon and Washington should be established. Such a fund would be in addition to any impact mitigation costs identified through an environmental impact statement and would be modeled conceptually after the "1% for Arts" program, the I-405 Mitigation Fund and the St. John's Landfill Mitigation Fund. The Bi-State Coordination Committee would recommend the specific details in conjunction with the Environmental Justice Work Group noted in Section R8.6 below.

R 8.2 Continued work should be done to complete a list of communities, organizations and agencies to outreach to low income and minority communities during the EIS process.

R 8.3 ODOT and WSDOT, in cooperation with the potentially impacted communities, should develop a methodology and criteria to map low income and minority communities in areas potentially affected by the recom-

* A reasonable effort, consistent with applicable EPA standards should be made in the EIS to assess cumulative impacts.

mendations from the I-5 Partnership. The methodology and criteria will be applied to 2000 Census data (currently income data only exists for 1990 and new data will not be available until the summer of 2002) for use in the EIS.

R 8.4 A list of potential positive and negative community impacts were identified by the stakeholders and should be taken into the EIS process to be used as a beginning point to conduct further analysis on impacts. (See **Attachment F**).

R 8.5 Should there be a finding during the EIS process that there are disproportionate impacts for environmental justice communities, the list of potential community benefits identified by the stakeholders should be a starting point for a community conversation about how to offset impacts and/or bring benefits to the impacted community. (See **Attachment G**).

R 8.6 During the EIS process, special attention needs to be paid to conducting outreach to low-income and minority residents in the Study Area. Community stakeholders generated a list of outreach and involvement ideas. This list should be taken into the EIS process and used as the basis to develop a public outreach and involvement plan that includes outreach to low income and minority communities. (See **Attachment H**).

R 8.7 A Public Involvement and Environmental Justice Working Groups should be formed at the beginning of the EIS. Work group membership should include representatives from environmental justice communities along the corridor. The Public Involvement working group should address public outreach. The Environmental Justice working group membership should include liaisons to the Public Involvement working group to ensure community concerns are incorporated into the EIS and that adequate emphasis is placed on the potential impacts and benefits to low income and minority communities.

9 ADDITIONAL ELEMENTS AND STRATEGIES CONSIDERED

9.1 KEY FINDINGS: West Arterial Road

9.1.1 The West Arterial Road is a possible complement to, but does not substitute for, I-5 improvements. While this potential improvement falls slightly behind on all measures of transportation performance, it does provide significant benefits. Compared to Baseline 2020, time travel savings between downtown Portland and downtown Vancouver are approximately 6 minutes, delay is reduced by 20%, and congestion is reduced by 17%.

9.1.2 This option has several benefits to the regional transportation system including relieving traffic on I-5, providing an additional connection between Oregon and Washington, relieving the St. Johns neighborhood of through truck traffic, and providing an efficient south-north arterial for (a) freight movement between key industrial areas in the Portland/Vancouver area and (b) other traffic in North Portland.

9.1.3 However, the traffic impacts to Vancouver neighborhoods and the downtown Vancouver district are significant. It is very likely that arterial roads leading to this new connection would need to be widened to accommodate the traffic traveling between the West Arterial Road and the freeway. The widening of these arterial roads would need to be mitigated.

9.1.4 The West Arterial Road, as currently conceived, would have similar property impacts as improvements in the I-5 Trade Corridor. This does not account for property impacts that would occur if arterial roads need to be widened to accommodate traffic access to this new road.

9.1.5 Due to the fact that the West Arterial Road crosses Hayden Island, home to a variety of wildlife species and a high quality wetland, it has the greatest potential for impacts to natural resources of all the Option Packages with moderate to major impacts likely.

9.1.6 While the West Arterial Road appears to result in less emissions directly at the freeway, emissions would increase on arterial roads.

9.1.7 The estimated cost of West Arterial Road is $947 million (2001 dollars).

RECOMMENDATION 9a: West Arterial Road

R 9a.1 Further study of this option should be pursued and identified as a potential transportation solution for consideration in the future and should not be an alternative studied in the EIS for the Bridge Influence Area.

9.2 KEY FINDINGS: Additional elements and strategies

9.2.1 As part of the Task Force's work, many potential elements and strategies that are not specifically commented on in this draft document were considered, including:

- Addressing the Corridor's problems with land use actions and/or transportation demand management alone.
- A new freeway with bridge outside the I-5 Trade Corridor (east of I-205, west of I-5) to connect Oregon and Washington.
- Monorail
- Personal rapid transit
- Hovercraft bus
- People-mover
- Water taxi
- Ferry
- Helicopter
- Gondola

9.2.2 The Task Force also considered various combinations of these elements and strategies.

RECOMMENDATION 9b: Additional elements and strategies

R 9b.1 The Task Force does not believe the additional elements and strategies show promise for addressing the corridor's problems and should therefore not be considered in an EIS.

10 FINANCING OPTIONS

10.1 KEY FINDINGS: Financing Options

10.1.1 Highway and transit improvements in the I-5 Trade Corridor between Portland and Vancouver will be an expensive undertaking. Capital costs (in 2001 dollars) are estimated at Bridge Influence Area ($1.2 billion),* and Light Rail Loop ($1.0 billion).

10.1.2 Capital projects of the magnitude recommended by the Task Force typically require a variety of funding and financing mechanisms. The Region will not be able to rely on any single revenue source.

10.1.3 There are several promising federal, state and local revenue sources that could be available for financing the proposed projects (**Attachment I**).

10.1.4 The revenue-generating capacity of several of these sources taken together is quite large and provides the ability to bond all or most of the capital cost of the projects.

10.1.5 While it will be a difficult undertaking, requiring substantial political leadership, Oregon and Washington, in cooperation with federal and local governmental partners and, perhaps, private sector entities, have the financial capacity to construct the projects.

10.1.6 By constructing elements of the highway and transit improvements as separate components or in phases, the financial impacts can be spread over a greater number of years and can enable a wider range of funding sources to be used for construction.

10.1.7 Developing a final funding package for the bi-state improvements will be a complicated process that will involve a number of diverse entities, including state legislatures, federal agencies, and various financial institutions.

10.1.8 To be fully effective, the capital investments must be supported by a significant increase in basic transit service. The light rail loop in Clark County must be served by frequent bus service. In addition, the single most important investment necessary to achieve the TDM/TSM

* BIA costs include light rail costs of approximately $150 to $200 million. The costs, in 2001 dollars, could range from $1.2 to $1.5 billion for the BIA, and $1 to 1.3 billion for light rail depending on the final design, mitigation measures, and other unanticipated factors

targets is additional transit service coverage, frequency and availability throughout the day. Successful implementation of the draft recommendations will require a significant increase in transit operating revenue.

10.1.9 A focused bi-state and regional effort is needed to determine how to meet the Region's goals for increased transit service. C-TRAN operating revenue and service is particularly at risk. Due to the passage of I-695 in 2000, C-TRAN's tax revenue was cut in half. They are currently filling that revenue gap with funds in their reserve account, but without an increase in basic operating revenue by 2007, transit services will be cut dramatically.

RECOMMENDATION 10: Financing

R 10.1 Oregon and Washington, and the Portland/Vancouver Region, should work together to identify opportunities to fund the widening of I-5 to three lanes in each direction between Delta Park and Lombard. This project is anticipated to be ready for construction by September 2004.

R 10.2 Other capital elements of the transit and highway recommendations will take longer to fund. As a first step towards development of a financing plan for the highway and transit improvements, Oregon and Washington, together with regional partners and representatives of both legislatures should begin working together to explore long-term funding opportunities.

R 10.3 TriMet and C-TRAN should undertake separate, yet coordinated efforts to develop a plan to increase operating support to enable an expansion in transit service starting within the next five years. For C-TRAN, a Transit System Development Plan should be developed in conjunction with the next planning steps for the light rail loop system.

R 10.4 Efforts to increase transit operating revenue for TriMet and C-TRAN should be coordinated and discussed by the new Bi-State Coordinating Committee. The goal should be to establish regional transit financing commitments that will allow for an aggressive bi-state TDM program and expansion of transit service to support construction of the phased light rail loop.

11 Next steps and implementation

RECOMMENDATION 11: Next Steps and Implementation

R 11.1 This Strategic Plan should be sent to the Oregon Transportation Commission, the Washington Department of Transportation, and to the metropolitan planning organizations in Portland and SW Washington for review and potential adoption into their transportation plans.

R 11.2 Parallel with the adoption of the transportation recommendations into the regional transportation plans, the metropolitan planning organizations in Portland and SW Washington should adopt a Bi-State Coordination Agreement and establish the Bi-State Coordination Committee. Once established, the Bi-State Coordination Committee should proceed with all deliberate speed to:

- Form the TDM/TSM Forum and begin its work on the I-5 TDM/TSM Corridor Plan.
- Begin discussions and planning for investing more in the I-5 Trade Corridor, including focused TDM/TSM actions that can be taken now.
- Form the Rail Forum and begin its work.

R 11.3 As to highway and transit capital investments in the corridor:

- Oregon and Washington, and the Portland/Vancouver Region, should work together to identify opportunities to fund the widening of I-5 to three lanes in each direction between Delta Park and Lombard. This project is anticipated to be ready for construction by September 2004.
- As a first step towards making improvements, the bi-state region should undertake an Environmental Impact Study for a new river crossing and potential improvements in the Bridge Influence Area. That study and the implementation of these recommendations should be guided by the Task Force's Problem Vision and Values Statement.
- In the EIS, the following BIA elements should be studied:
  - Eight- or ten-lane freeway concepts
  - Replacement or Supplemental Bridge
  - Joint use or non-joint use Freeway/LRT Bridge
  - Eight-lane freeway with joint LRT/two-lane arterial
  - HOV throughout the I-5 Trade Corridor.
  - In addition, a six-lane freeway plus two two-lane arterials, one in the vicinity of the I-5 Trade Corridor and one in the vicinity of the railroad bridge, should be evaluated to determine if it is a viable alternative for consideration in the EIS.
  - The following concepts do not show promise for addressing the Corridor's problems and should not be considered in an EIS:
    - Collector-distributor bridge concepts
    - Arterial-only bridge concepts
    - Tunnel concepts
- Public Involvement and Environmental Justice Working Groups should be formed at the beginning of the EIS. Working group membership should include representatives from environmental justice communities along the Corridor. The Public Involvement working group should address public outreach. The Environmental Justice working group membership should include liaisons to the Public Involvement working group to ensure community concerns are incorporated into the EIS and that adequate emphasis is placed on the potential impacts and benefits to low income and minority communities.
- Parallel to this EIS process, a plan for funding the highway and transit capital expenditures should be developed.

R 11.4 As to transit operations, TriMet and C-TRAN should work with all deliberate speed to undertake efforts to increase operating support to enable an expansion in transit service starting within the next five years. This effort should be coordinated through the Bi-State Coordinating Committee.

R 11.5 ODOT and WSDOT should continue to work with environmental justice stakeholders to complete the research to identify groups and communities to conduct outreach with during the EIS process, and to identify the low income and minority communities that could be affected by the recommendations in this plan.

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Attachment A

Option Packages

The I-5 Portland/Vancouver Transportation and Trade Partnership Task Force developed a number of multi-modal Option Packages. From these, five were selected for further analysis. All five Option Packages contain transit and road elements, a call for increased transportation demand management and transportation system management, and a major increase in transit service throughout the Portland/Vancouver region.

The five Option Packages are:

- Express Bus/3 Lanes
- Light Rail/3 Lanes
- Express Bus/4 Lanes
- Light Rail/4 Lanes
- West Arterial Road

This attachment contains information about the Option Packages. **Figure A-1**, Baseline 2020, is not an Option Package but shows transportation improvements that are already planned over the next 20 years. **Figures A-2 – A-6** describe the improvements that would be made in each of the Option Packages (in addition to the improvements in Baseline 2020). **Figures A-7– A-22** compare the Option Packages based on transportation performance, such as hours of vehicle delay, transit travel time, and vehicle user cost savings.

The Task Force has recommended the Light Rail/3 Lane Option Package (**Figure A-3**).

Baseline 2020

134th to 99th

Add third lane each direction. New SB lane would operate as HOV during the morning peak period.

99th to the I-5 Columbia River Bridges

Third lane opened each direction fall 2001. Implement SB lane only as HOV during the morning peak period.

Hayden Island to Marine Dr.

Add new four-lane bridge.

Marine Dr. from Terminal 6 to Portland Rd.

Widen to five lanes.

Delta Park to Lombard

Add third SB lane and improve shoulders.

Columbia Blvd./Killingsworth St. intersection and connection to I-205

Modify intersection.

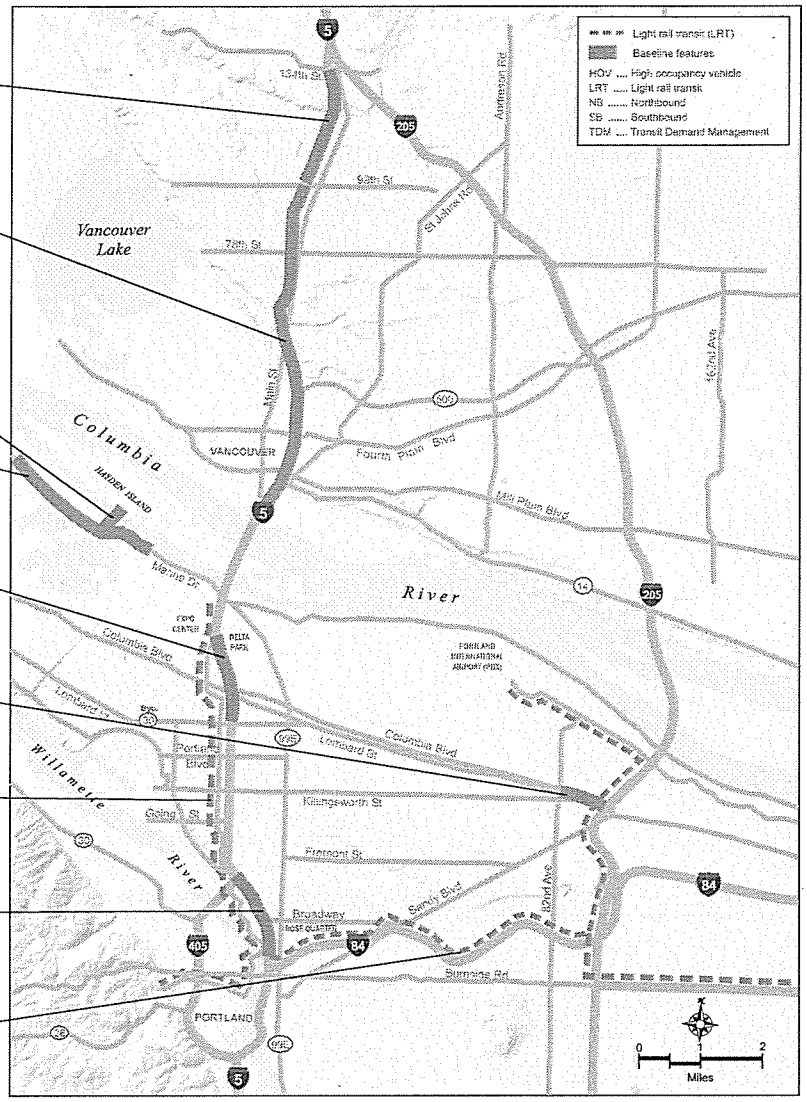
Expo Center to the Rose Quarter

LRT under construction with planned opening in 2004.

Rose Quarter (I-405 to I-84)

Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The Baseline 2020 option includes the regional transit and roadway improvements and transportation demand management (TDM) measures in the adopted transportation plans for Clark County and the Portland metropolitan area. This figure shows the locations of the major improvements expected to affect transportation to, from, and along I-5. Baseline features are common to all options.

Figure A-1. Baseline 2020 transportation improvements.

Express Bus / 3 Lanes

134th to 99th

Add third lane each direction. New SB lane would operate as HOV during the morning peak period.

99th to the I-5 Columbia River Bridges

Third lane opened each direction fall 2001. Implement SB lane only as HOV during the morning peak period.

Along I-5, from 134th in Vancouver to the LRT station at the Expo Center

Add express bus service in HOV lanes.

Along I-205, SR 500, and SR 14

Possibly develop express bus service in general-purpose lanes.

SR 500 to SR 14

Potentially modify interchanges.

Columbia River crossing

Build a new, four-lane, supplemental, joint-use bridge for express bus, HOV, trucks, and Hayden Island access.

Hayden Island to Columbia Blvd.

Potentially modify interchanges.

Delta Park to Lombard

Add third SB lane and improve shoulders.

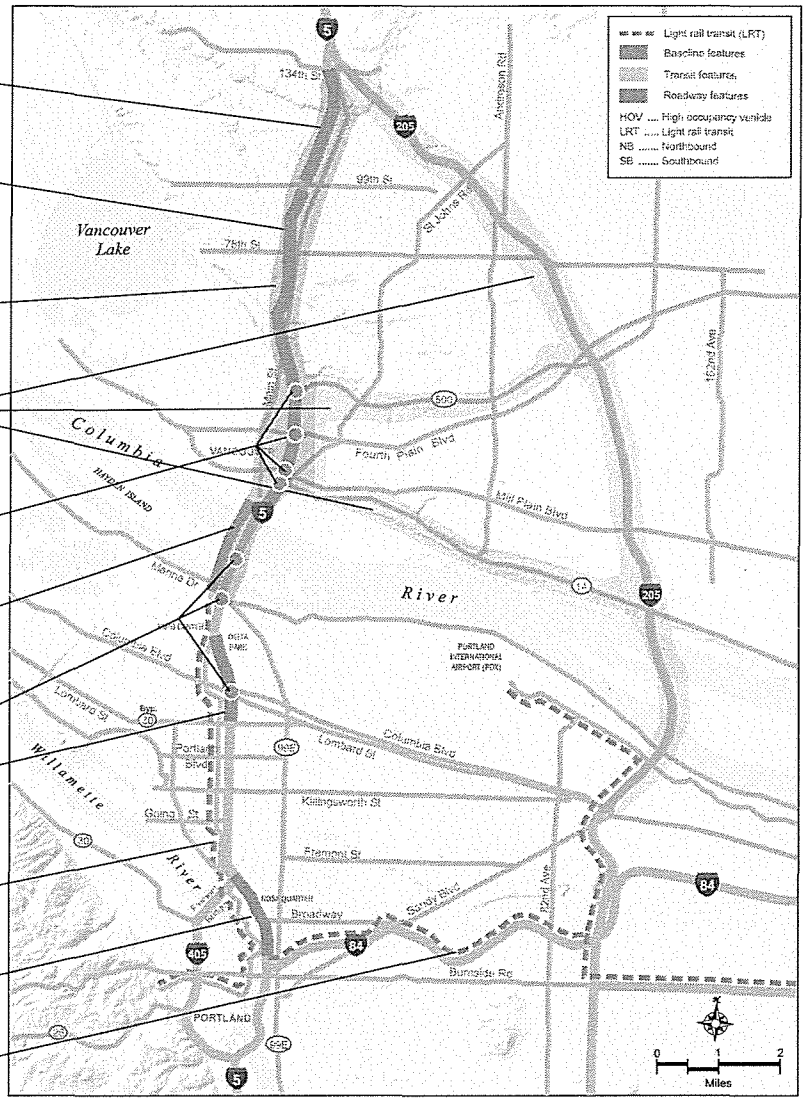
Expo Center to the Rose Quarter

LRT under construction with planned opening in 2004.

Rose Quarter (I-405 to I-84)

Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The major feature of this option is the connection of the express bus service in Clark County with the Portland metropolitan LRT system. The option also includes a new, supplemental I-5 bridge for express bus, HOV, and vehicular traffic.

Figure A-2. Express Bus/3 Lanes Option Package.

Light Rail / 3 Lanes

134th to 99th

Add third lane each direction. New SB lane would operate as HOV during the morning peak period.

99th to the I-5 Columbia River Bridges

Third lane opened each direction fall 2001. Implement SB lane only as HOV during the morning peak period.

134th to SR 500 along I-5 and I-205

Possibly extend LRT.

Downtown Vancouver to Vancouver Mall area along SR 500 or Fourth Plain

Extend LRT.

SR 500 to SR 14

Modify interchanges.

Along I-205, from NE 83rd Padden Expwy to Parkrose Station

Extend LRT and connect to Airport MAX.

To Downtown Vancouver

Extend LRT.

Build supplemental bridge for . . .

(1) Joint use — LRT, HOV, trucks, and Hayden Island access — or

(2) LRT only

Hayden Island to Columbia Blvd

Potentially modify interchanges.

Delta Park to Lombard

Add third SB lane and improve shoulders.

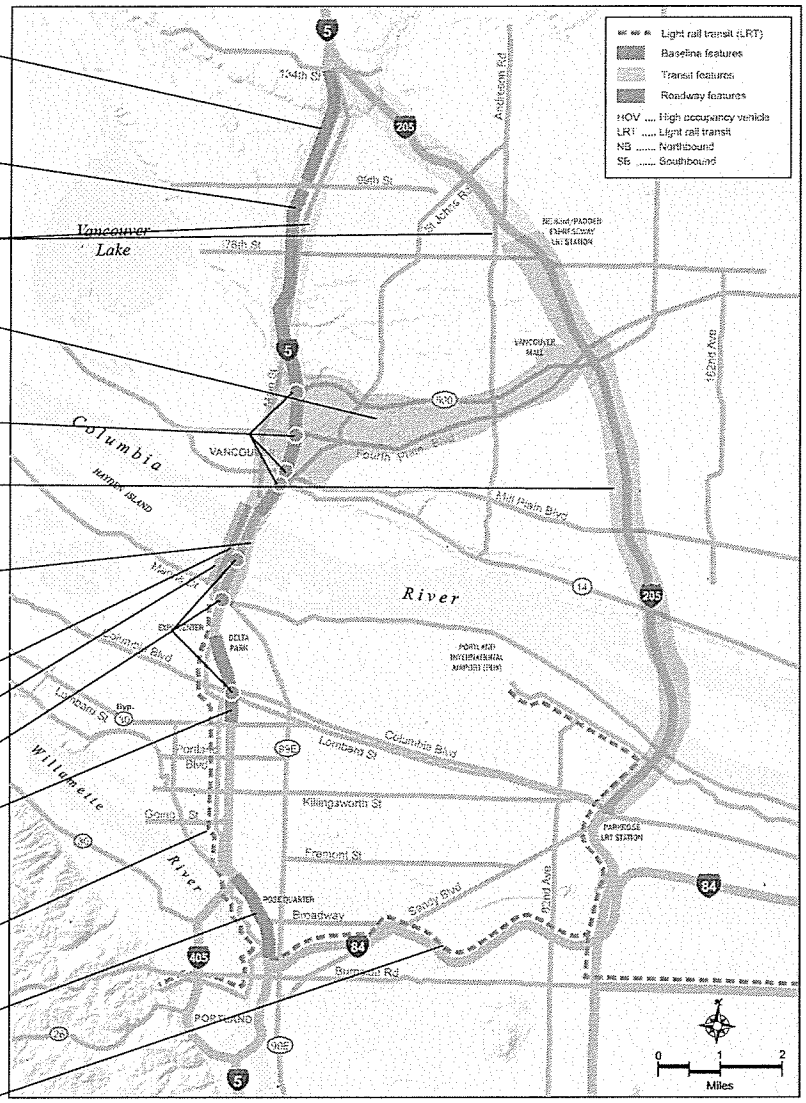
Expo Center to the Rose Quarter

LRT under construction with planned opening in 2004.

Rose Quarter (I-405 to I-84)

Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The major feature of this option is the development of an LRT system in Clark County connecting to the Portland metropolitan LRT system along I-5 and I-205. The option also includes a new supplemental Columbia River bridge. Two variations of the bridge have been studied: (1) a joint-use bridge for LRT and motor vehicle traffic and (2) an LRT-only bridge.

Figure A-3. Light Rail /3 Lanes Option Package.

Express Bus / 4 Lanes

Along I-5 from 134th in Vancouver to the Fremont Bridge in Portland
Add fourth lane in both directions.

Along I-5 from 134th in Clark County to Downtown Portland
Develop express bus service in HOV lanes.

Along I-205 from 134th in Clark County to the Parkrose LRT station and Downtown Portland and from I-5 to I-205 on SR 500
Possibly develop express bus service.

SR 500 to SR 14
Potentially modify interchanges.

Columbia River crossing
Build a new supplemental bridge or completely replace the existing I-5 Columbia River Bridges.

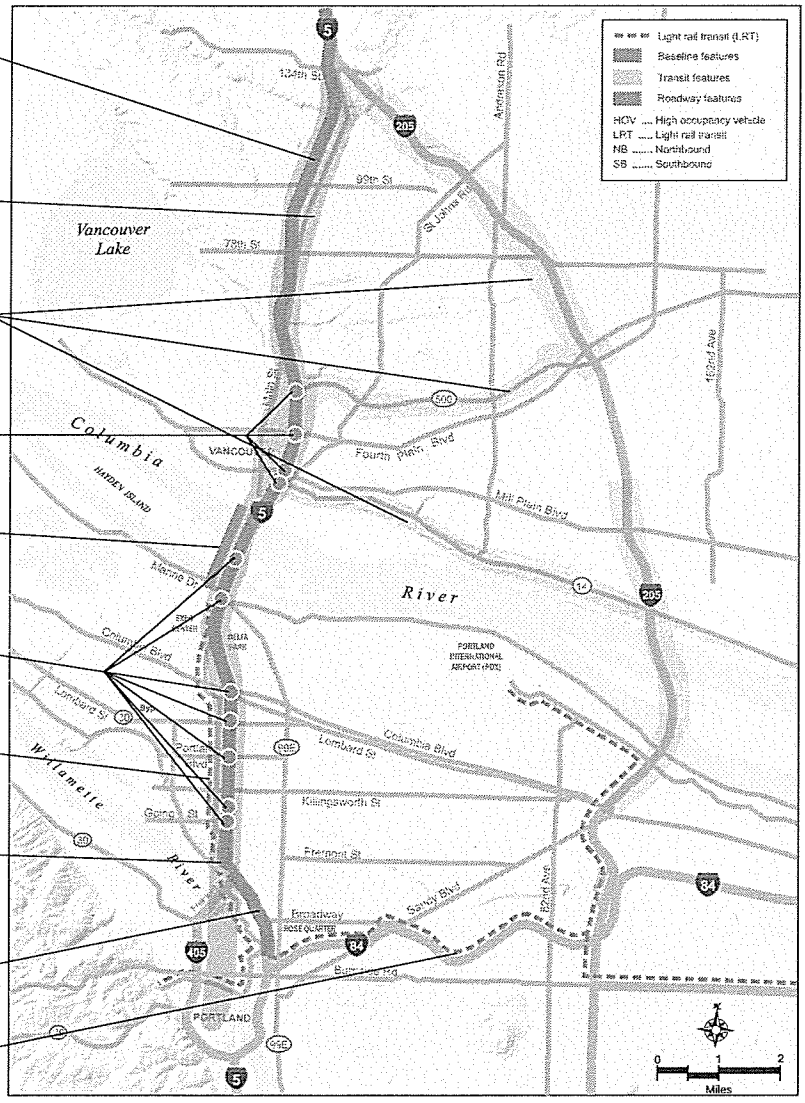
Hayden Island to Going St.
Potentially modify interchanges.

Expo Center to the Rose Quarter
LRT under construction with planned opening in 2004.

Along I-5 from 134th in Clark County to the Fremont Bridge in Portland
Add fourth lane in both directions.

Rose Quarter (I-405 to I-84)
Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The major features of this option are:

- widening I-5 to add a fourth lane in each direction between 134th in Clark County and the Fremont Bridge in Portland, that would operate as an HOV lane during peak periods
- connecting express bus service in Clark County with the Portland metropolitan LRT system

Figure A-4. Express Bus/4 Lanes Option Package.

Light Rail / 4 Lanes

Along I-5 from 134th in Vancouver to the Fremont Bridge in Portland
Add fourth lane in both directions.

134th to SR 500 along I-5 and I-205
Possibly extend LRT.

Downtown Vancouver to Vancouver Mall area along SR 500 or Fourth Plain
Extend LRT.

SR 500 to SR 14
Potentially modify interchanges.

Along I-205, from NE 83rd Padden Expwy to Parkrose Station
Extend LRT and connect to Airport MAX.

Columbia River crossing
Build a new supplemental bridge or completely replace the existing I-5 Columbia River Bridges.

To Downtown Vancouver
Extend Interstate MAX.

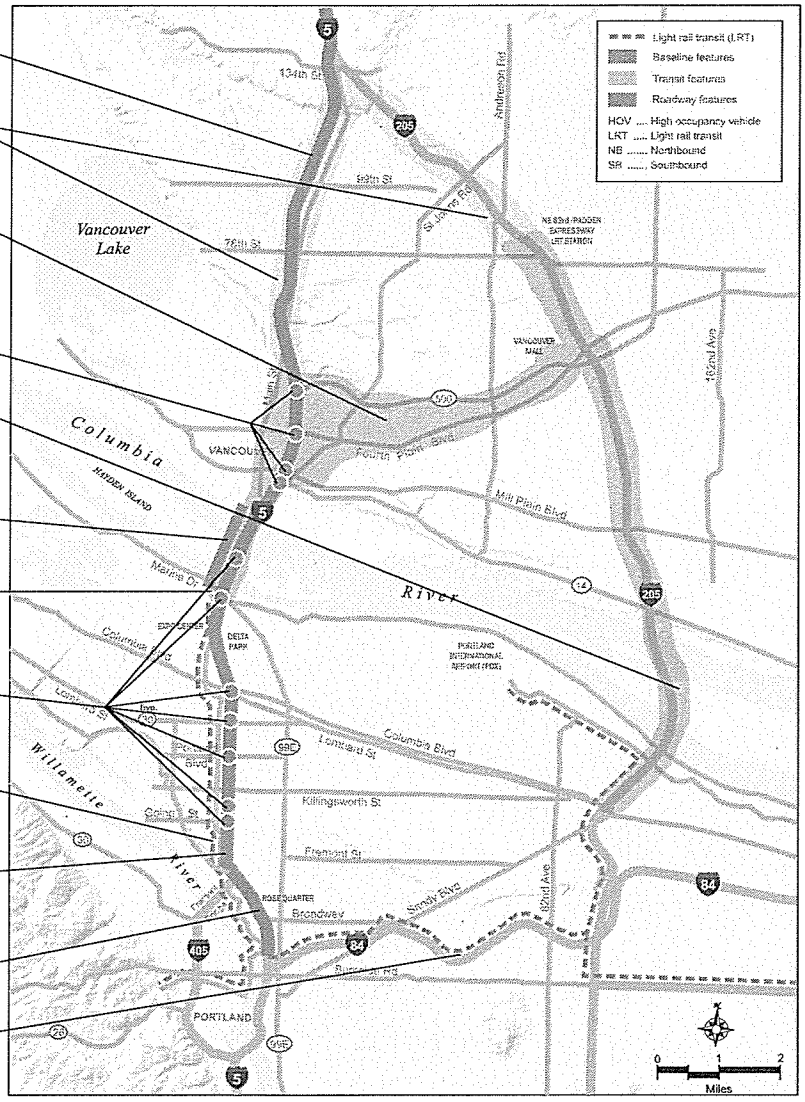
Hayden Island to Going St.
Potentially modify interchanges.

Expo Center to the Rose Quarter
LRT under construction with planned opening in 2004.

Along I-5 from 134th in Clark County to the Fremont Bridge in Portland
Add fourth lane in both directions.

Rose Quarter (I-405 to I-84)
Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The major feature of this option is the development of an LRT system in Clark County connecting to the Portland metropolitan LRT system along I-5 and I-205. The option also includes adding a fourth lane in each direction along I-5 from 134th in Clark County to the Fremont Bridge in Portland for HOV, express lanes, or freight use.

Figure A-5. Light Rail /4 Lanes Option Package.

New West Arterial Road

134th to 99th

Add third lane each direction. New SB lane would operate as HOV during the morning peak period.

99th to the I-5 Columbia River Bridges

Third lane opened each direction fall 2001. Implement SB lane only as HOV during the morning peak period.

SR 500 to SR 14

Potentially modify interchanges.

From Mill Plain in Vancouver to US 30 in Portland

New four-lane arterial generally following BNSF rail corridor.

Delta Park to Lombard

Add third SB lane and improve shoulders.

Hayden Island to Columbia Blvd.

Potentially modify interchanges.

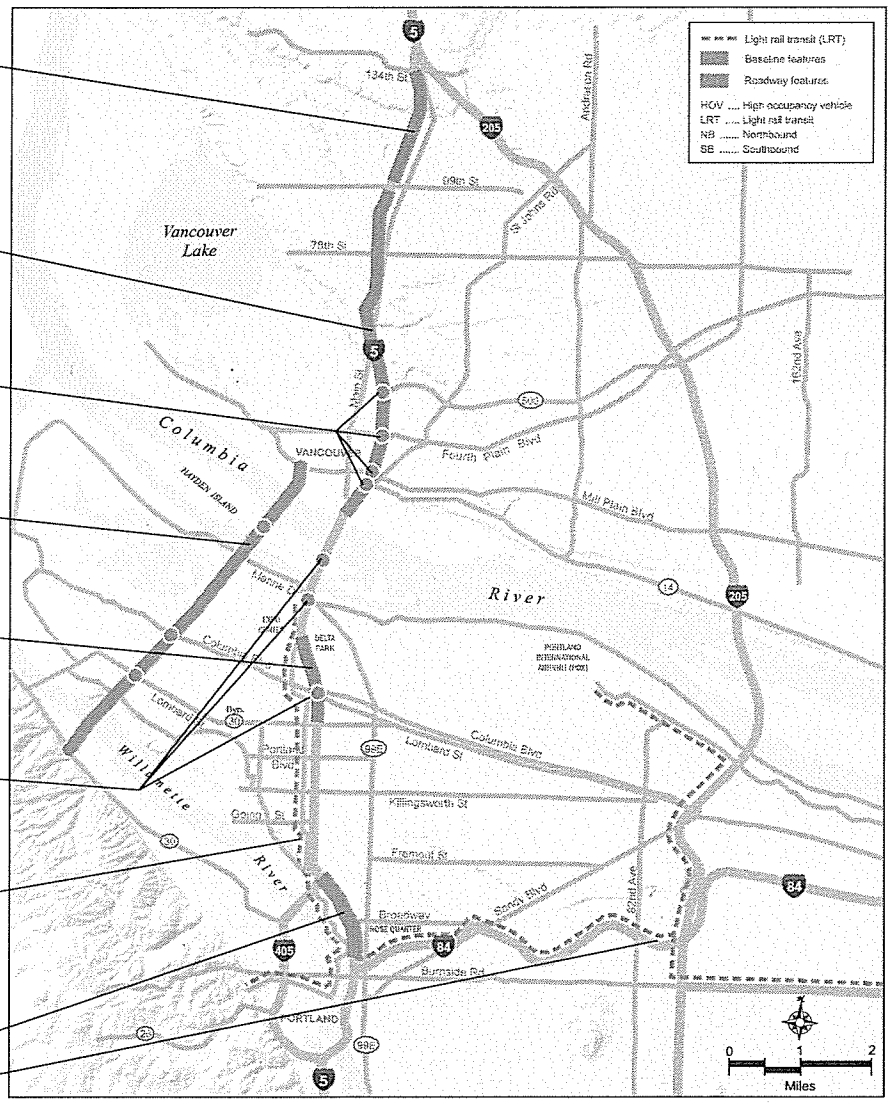
Expo Center to the Rose Quarter

LRT under construction with planned opening in 2004.

Rose Quarter (I-405 to I-84)

Add third lane in each direction. Reconfigure some existing ramps.

Existing LRT



The major feature of this option is a new arterial road along the existing railroad corridor and N. Portland Rd. between Mill Plain Blvd. in Vancouver and US 30 in Portland.

Figure A-6. New West Arterial Road Option Package.

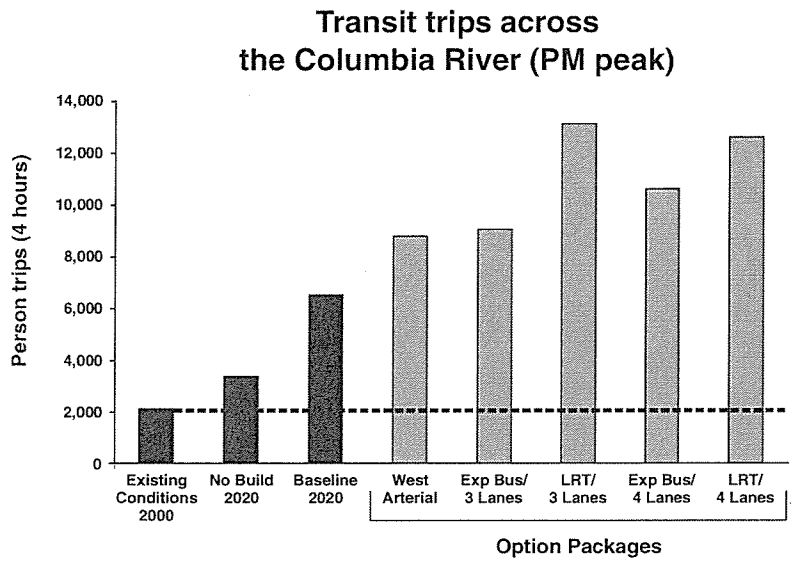


Figure A-7. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in transit trips across the Columbia River (PM peak).

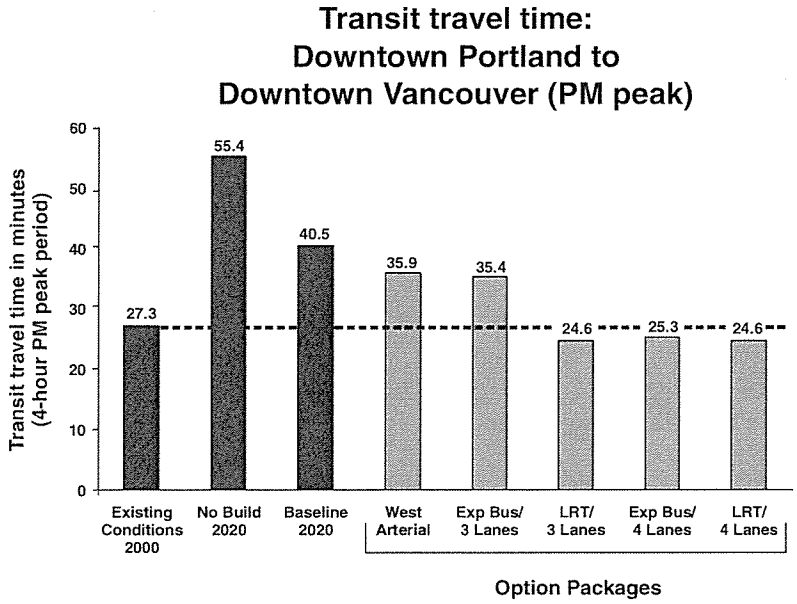


Figure A-8. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in transit travel time from Downtown Portland to Downtown Vancouver (PM peak).

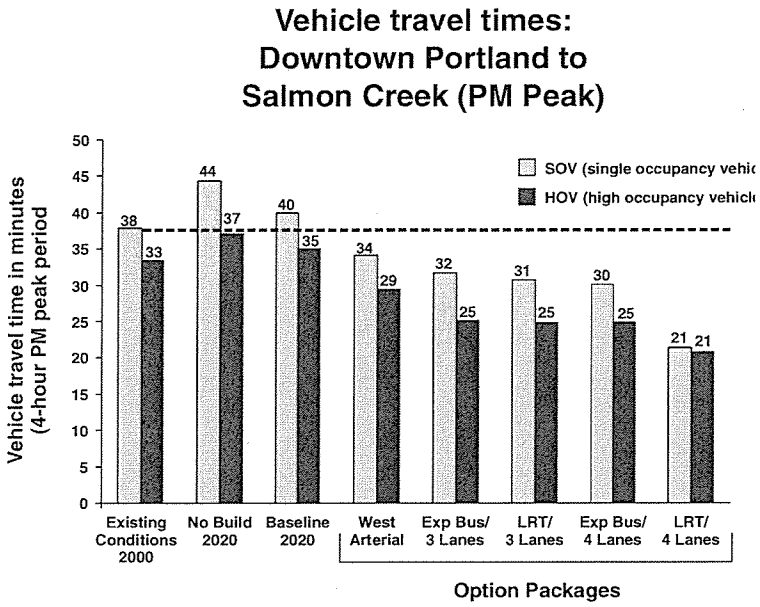


Figure A-9. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in vehicle travel times for SOVs/trucks and HOVs from Downtown Portland to Salmon Creek (PM peak).

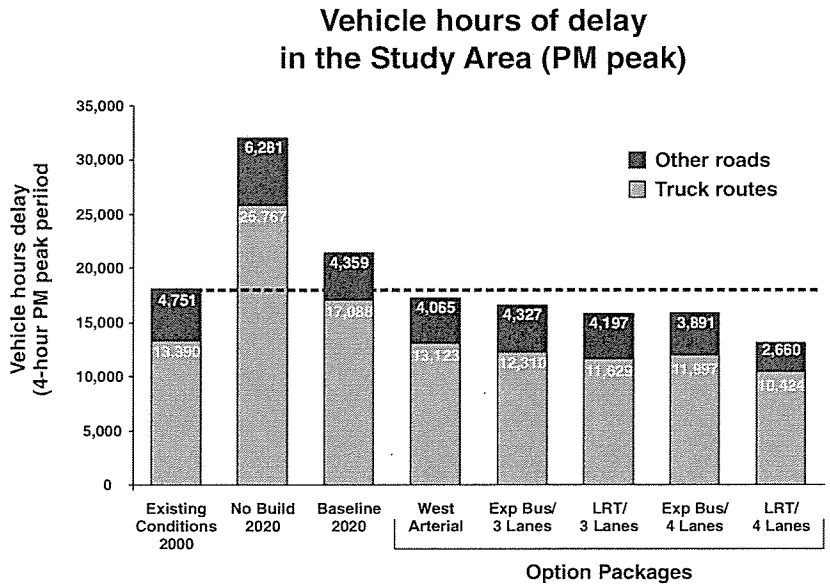


Figure A-10. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in vehicle travel hours of delay in the Study Area (PM peak) for truck routes and other roads.

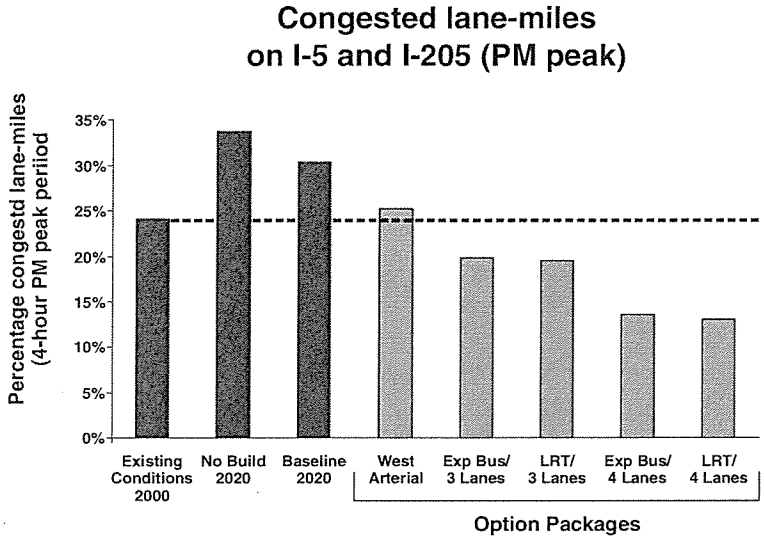


Figure A-11. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in congested lane-miles on I-5 and I-205 (PM peak).

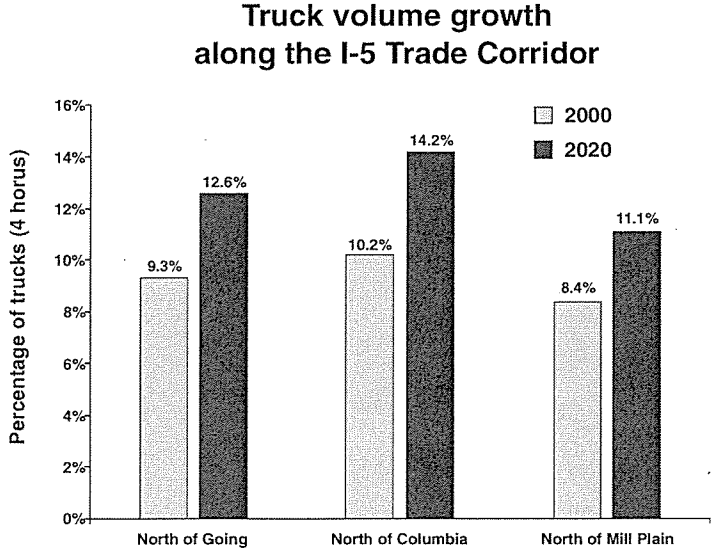


Figure A-12. Truck volumes along the I-5 Trade Corridor at three locations for 2000 and projected for 2020.

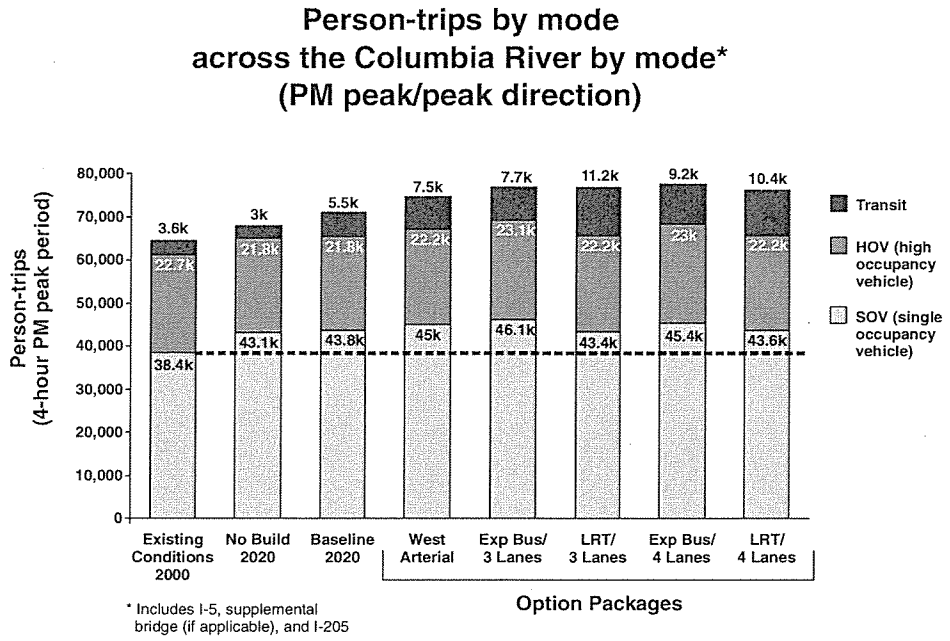


Figure A-13. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in person-trips by mode across the Columbia River by mode (PM peak/peak direction).

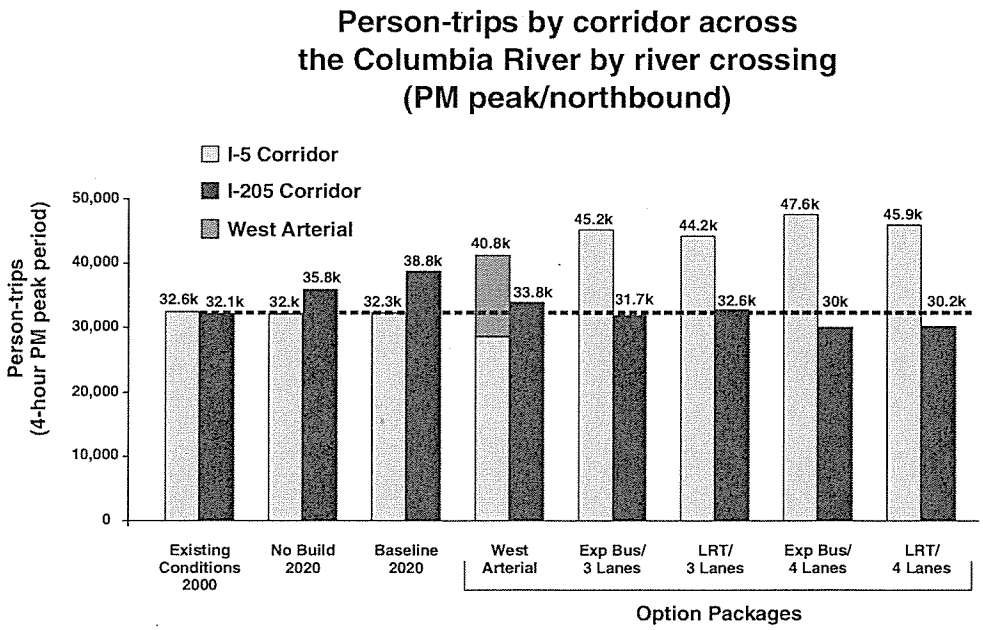


Figure A-14. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in person-trips by corridor across the Columbia River by river crossing (PM peak/northbound).

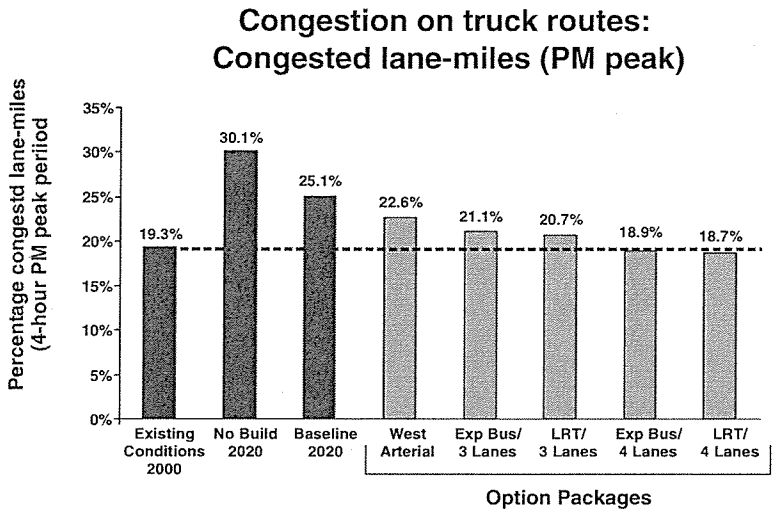


Figure A-15. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in congestion on truck routes in congested lane-miles (PM peak).

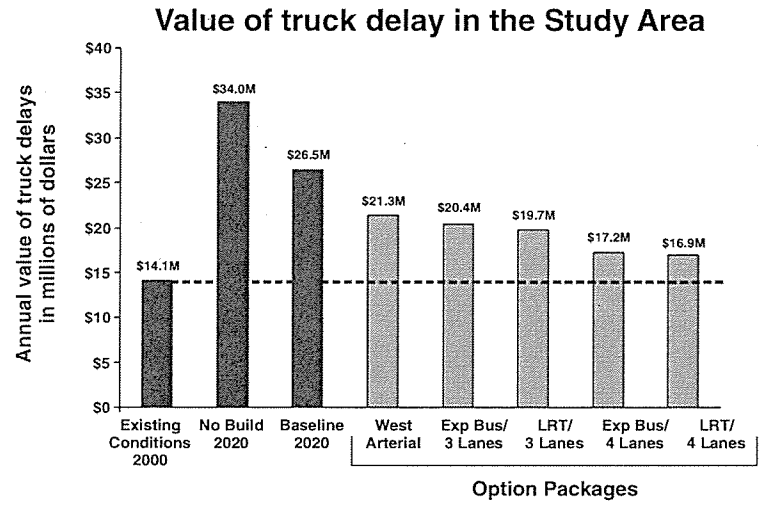


Figure A-16. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in value of truck delay in the Study Area.

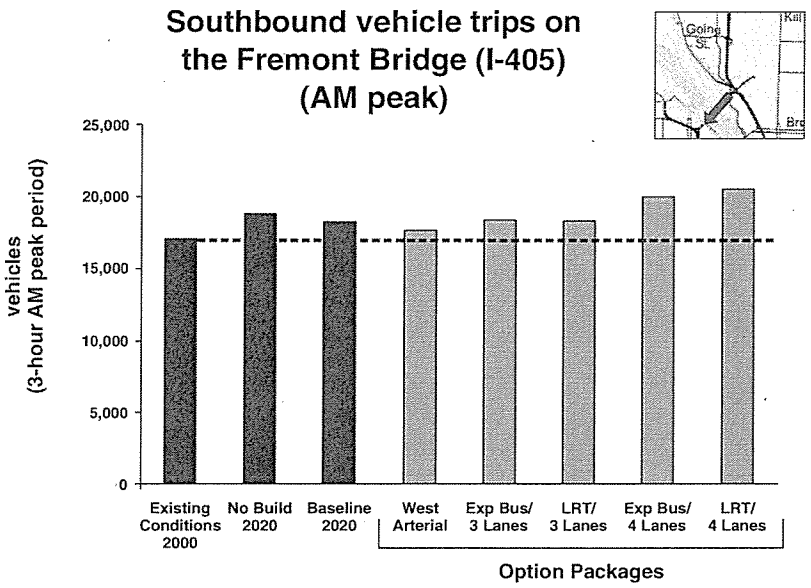


Figure A-17. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in southbound vehicle trips on the Fremont Bridge (I-405) (AM peak).

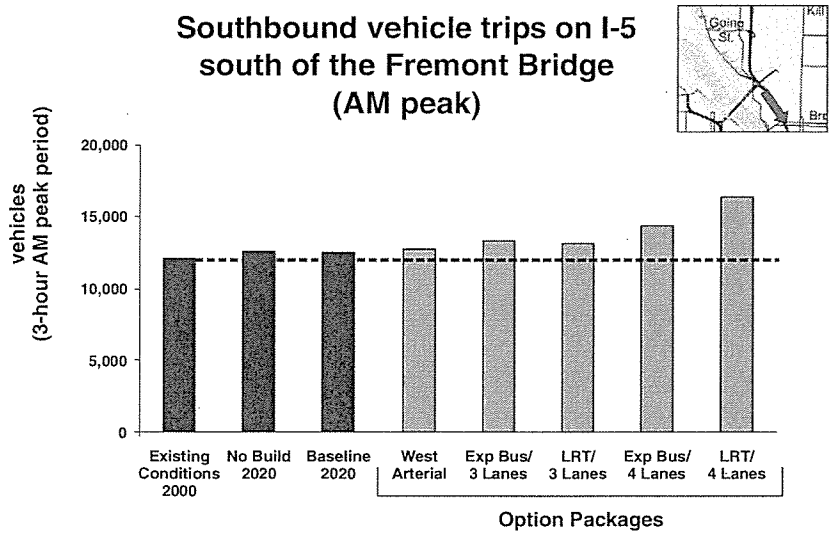


Figure A-18. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in southbound vehicle trips on I-5 south of the Fremont Bridge (AM peak).

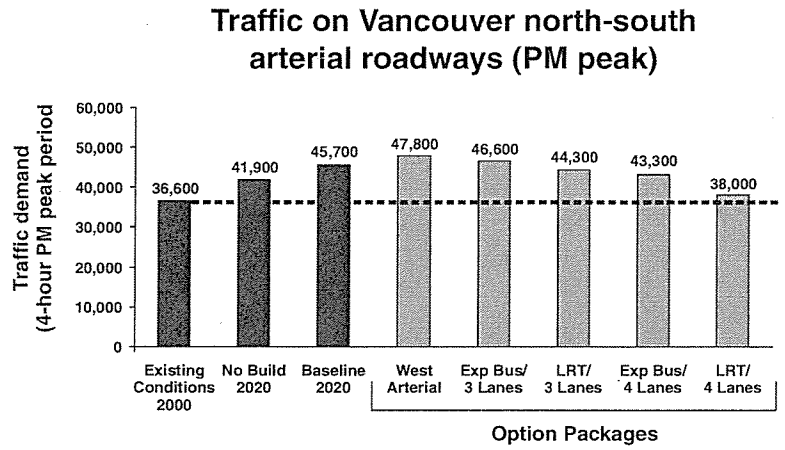


Figure A-19. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in traffic on Vancouver north-south arterial roadways (PM peak).

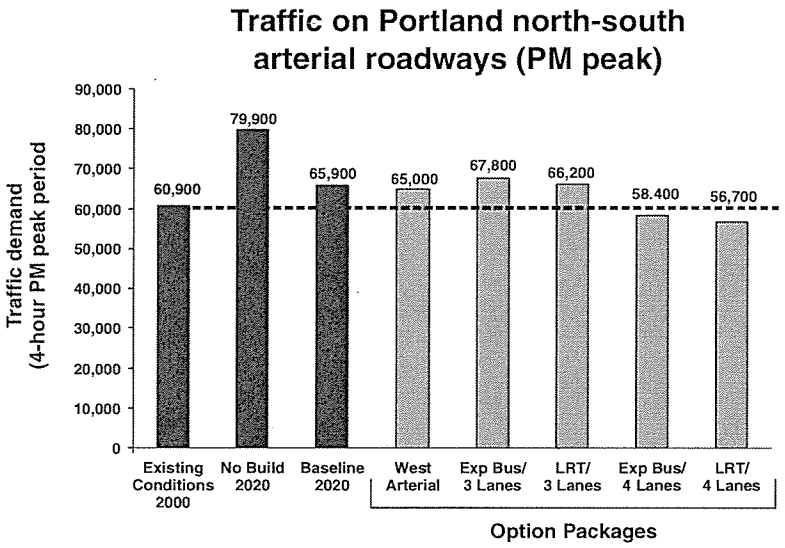


Figure A-20. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in traffic on Portland north-south arterial roadways (PM peak).

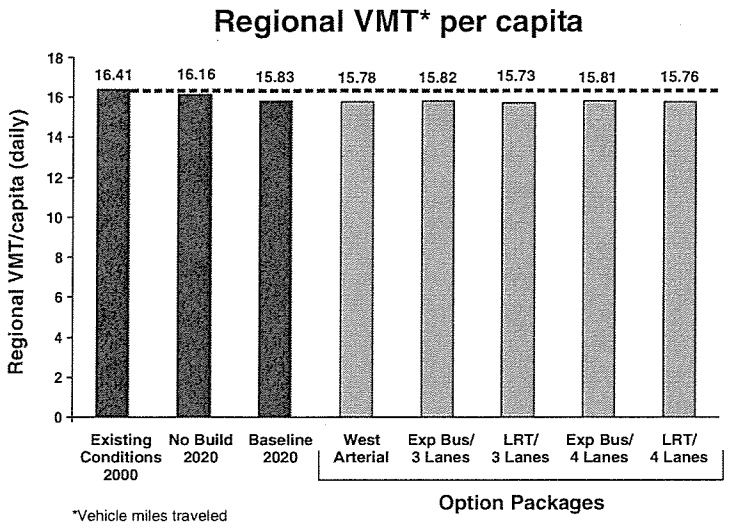


Figure A-21. The Option Packages compared to Existing Conditions 2000, No Build 2020, Baseline 2020, and each other, in regional VMT per capita.

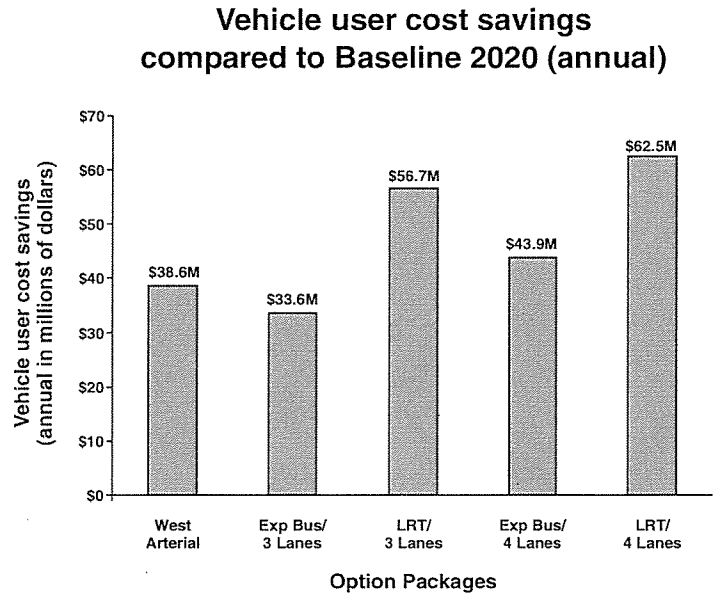


Figure A-22. User cost savings compared to Baseline 2020 (annual) for the Option Packages.

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Bridge Influence Area

A number of river crossing options were considered during analysis of the Bridge Influence Area (BIA). The BIA is defined as I-5 between SR 500 and Columbia Boulevard (**Figure B-1**) and is heavily used. Of the trips across the Columbia River on I-5, 70 to 80% either enter or exit I-5 in the BIA. Between 30 and 40% of those get on and off within the BIA (**Figure B-2**).

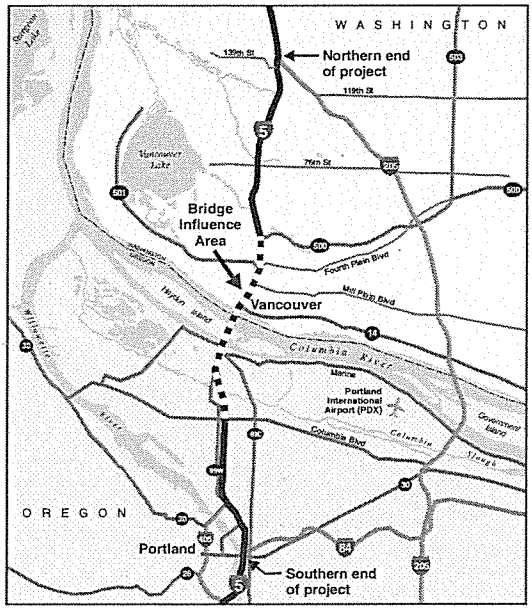


Figure B-1. The Bridge Influence Area (I-5 between SR 500 and Columbia Boulevard).

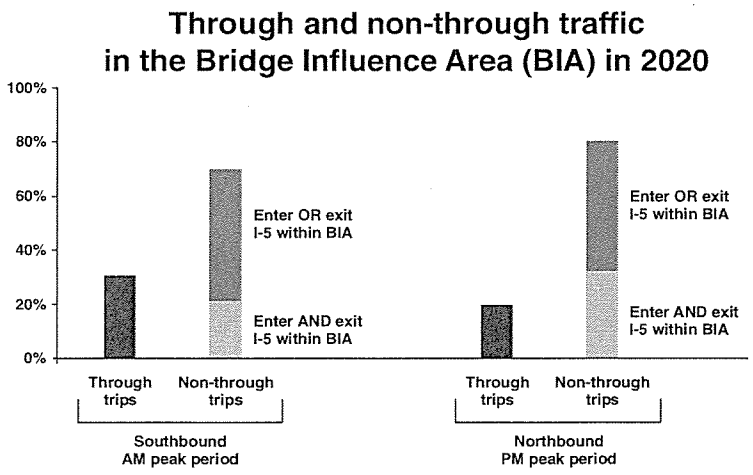


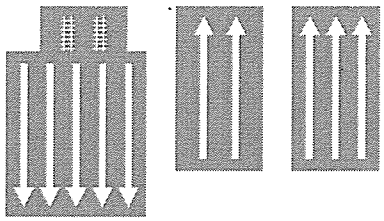
Figure B-2. Traffic in the BIA in 2020.

The Task Force developed eight Columbia River crossing concepts, consisting of combinations of new and existing bridges. The concepts fall into three categories (**Figures B-3 through B-5**).

CATEGORY 1: Five freeway lanes in each direction

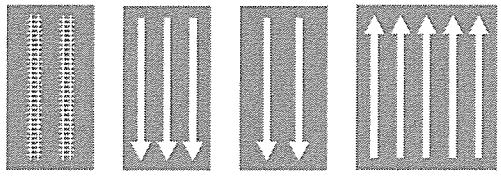
Concept #1

- 5 northbound lanes on existing bridges
- 5 southbound lanes on new double-deck bridge, LRT on lower deck, west of existing bridges



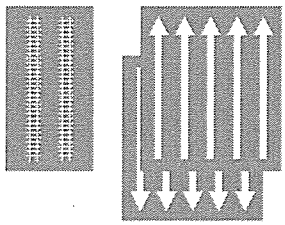
Concept #2

- 5 northbound lanes on new bridge east of existing bridges
- 5 southbound lanes on existing bridges
- New LRT bridge west of existing bridges



Concept #3

- New 5-lane double-deck bridge, northbound upper deck, southbound lower deck
- LRT on existing west bridge



Concept #4

- New 5-lane double-deck bridge, northbound upper deck, southbound lower deck
- LRT on new bridge west of existing bridges
- Only option to shift navigational channel

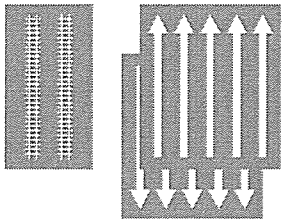
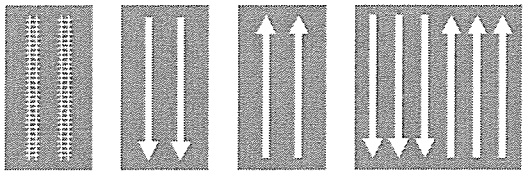


Figure B-3. The four Columbia River crossing concepts in Category 1.

CATEGORY 2: Three through freeway lanes in each direction plus a four-lane collector-distributor bridge/roadway west of the freeway

Concept #5

- New 6-lane bridge east of existing bridges
- 2 lanes northbound/southbound collector-distributor on existing bridges
- LRT on new bridge west of existing bridges



Concept #6

- 3 lanes northbound/southbound on existing bridges
- New 4-lane collector-distributor double-deck bridge with LRT on lower deck

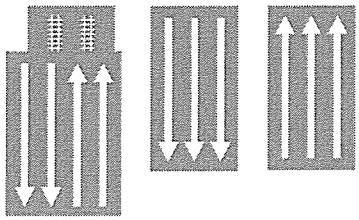
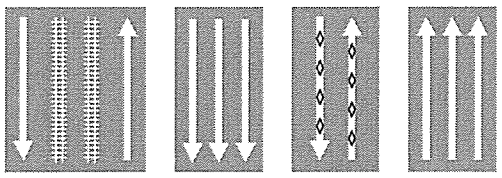


Figure B-4. The two Columbia River crossing concepts in Category 2.

CATEGORY 3: Four through freeway lanes in each direction plus a two-lane arterial system connecting Hayden Island to Marine Drive and Downtown Vancouver

Concept #7

- 3 southbound lanes on existing west bridge
- HOV only, southbound and northbound, on existing east bridge
- 3 northbound lanes on new bridge east of existing bridges
- 2 arterial lanes and LRT on new bridge west of existing bridges



Concept #8

- New 8-lane bridge east of existing bridges
- Local arterials on existing northbound bridge
- LRT on existing southbound bridge

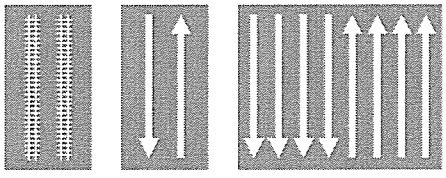
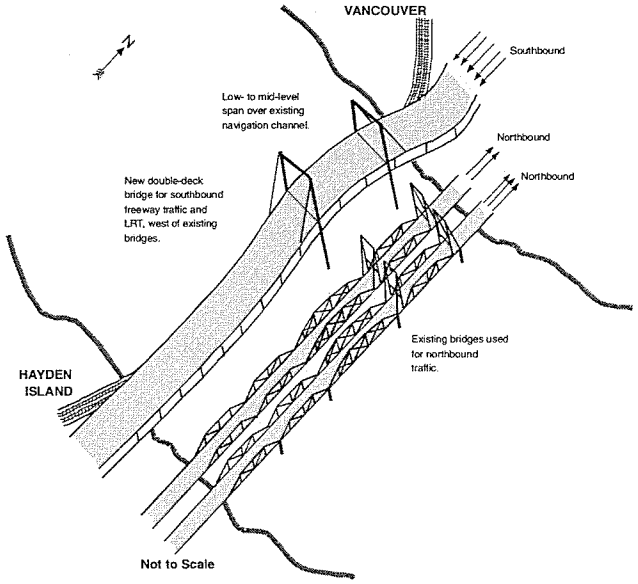


Figure B-5. The two Columbia River crossing concepts in Category 3.

Concepts 1, 4, 6, and 7 were selected for detailed design and evaluation. Analysis of these concepts provides insight into issues of supplemental and replacement bridges, joint use (LRT-highway) and separate bridges, alignments east and west of existing bridges, freeway lanes and arterial lanes across the Columbia River, and a comparison between high-level, fixed span bridges to low-level movable span bridges. See **Figures B-6 through B-9.**



CONCEPT 1

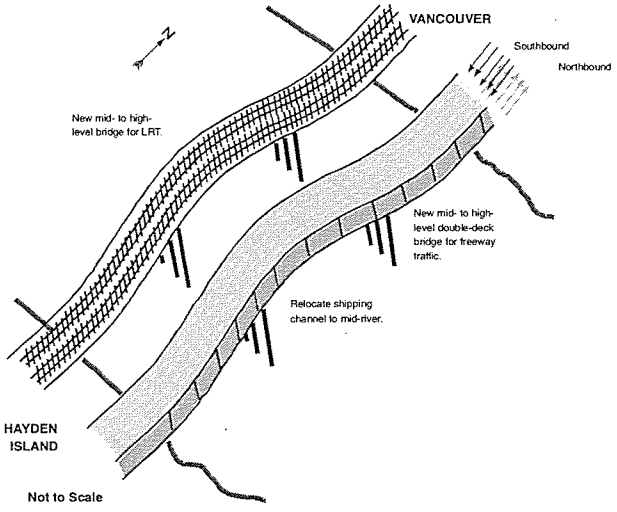
5-lane southbound supplemental bridge for freeway traffic with LRT

1. Southbound traffic on new five-lane bridge, LRT on lower deck west of existing bridges

2. Low- to mid-level bridge, with lift span over existing navigation channel

3. Northbound traffic would be split between the two existing bridges

Figure B-6. Columbia River crossing: Concept 1.



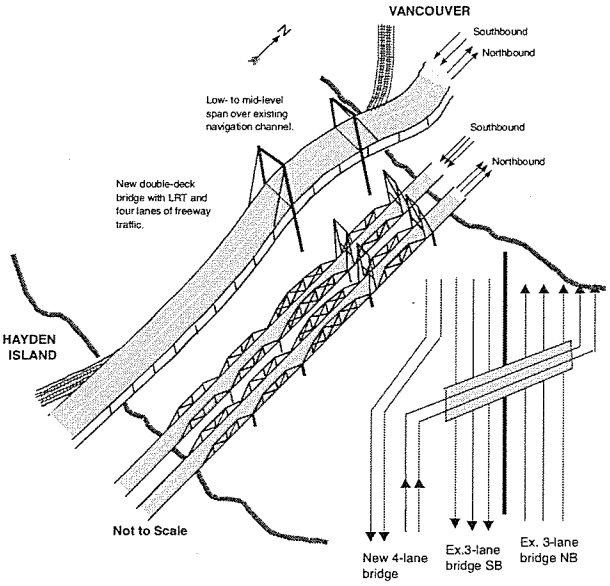
CONCEPT 4

10-lane double deck, replacement bridge, plus LRT on separate new bridge

1. Mid- to high-level bridges. Navigation channel relocated to center of river

2. Potential fixed spans for highway and LRT (with Coast Guard reduction of existing lift requirements), or liftspans

Figure B-7. Columbia River crossing: Concept 4.



CONCEPT 6

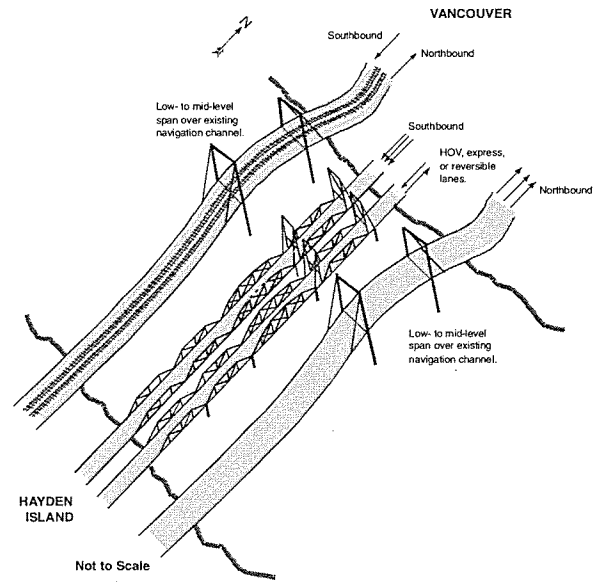
4-lane supplemental collector-distributor bridge w/LRT, plus 6-lane freeway

1. Provides for new 4-lane bridge with LRT west of the existing bridges

2. Low- to mid-level bridge with lift span over current navigation channel

3. Uses 4-lane bridge as collector-distributor (e.g., ramp access for Hayden Island). Requires flyover ramps north and south, as shown

Figure B-8. Columbia River crossing: Concept 6.



CONCEPT 7

8-lane freeway concept plus new LRT bridge with two-lane arterial

1. Provides for new 2-lane bridge plus LRT

2. Low- to mid-level bridges with lift spans over current navigation channel

3. Two lanes on existing northbound bridge could be used for HOV, express lanes, or (potentially) reversible lanes

Figure B-9. Columbia River crossing: Concept 7.

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Attachment C

Land Use Compatibility of Task Force Recommendations

This document summarizes the compatibility of the Task Force recommendations with state, regional and local land use plans. In general, existing land use policies in the region support the Task Force's recommendations for road and transit improvements in the corridor, the implementation of TDM/TSM strategies, and the need for the Bi-State Land Use Accord.

Regional land use issues and related population and employment forecasts are discussed first, followed by a discussion of issues from the Washington perspective (state, RTC, county, city) and the Oregon perspective (state, Metro, city).

Overall compatibility with adopted policies

By reducing delay and congestion in the I-5 Corridor and improving bi-state transit service, all concepts support the Metro 2040 Growth Concept and the Clark County Comprehensive Plans to encourage employment growth in the I-5 Corridor.

The build recommendations raise two issues of regional concern. First, improvements in the corridor are likely to increase land values around interchanges. There will be pressure for development around the interchanges that may unexpectedly increase the demands on the freeway system. Second, improvements may also increase pressure to change existing regional plans as demand for housing increases. Without careful planning, traffic increases that result from development around interchanges and expansions of growth boundaries for housing growth can nullify the transportation performance benefits of the build recommendations.

The I-5 Corridor has one of the most complex and diverse land use types in the metropolitan area. The complexity of the activities requires frequent interchanges and additional lanes to provide access, manage the through traffic, and the on/off ramps. The mix of activity centers and industrial areas will require a comprehensive transportation investment and management approach. It is important to note that:

- The majority of the traffic on I-5 between SR 500 and Columbia Boulevard is accessing adjacent industrial, commercial and residential areas.
- Seventy percent of the southbound AM peak traffic either enters or exits I-5 in the Bridge Influence Area (BIA) with 30% of this traffic entering and exiting within the BIA.
- Eighty percent of the northbound PM peak traffic either enters or exits I-5 in the BIA area with 40% of entering and exiting within the BIA.

- I-5 carries a higher number of trucks than any other regional route, and will double by 2020. I-5 plays a critical role for both through truck traffic and access to industrial areas between Portland and Vancouver.
- The need for a full I-5/Columbia Boulevard interchange has been identified in the Transportation Element of the Comprehensive Plan, the Albina Community Plan Concept Map, and Metro's Regional Transportation Plan.
- I-5 provides the only access to Hayden Island and its residents, hotels and commercial areas.
- The Task Force's recommended transportation investments will strengthen job growth in the corridor. Modeling shows that travel time savings will result in consistent job growth in the corridor. Estimates show that depending on the level of investment, 4,000 more jobs in north and northeast Portland and 1,000 jobs in Clark County could result compared to a scenario without capacity investments in the I-5 Corridor.
- Without these investments, the result will be more dispersed patterns for population and employment growth than anticipated in current, adopted plans.
- The recommended investments support the City of Vancouver's Esther Short Subarea and Redevelopment Plan vision for Downtown Vancouver as its regional center. This vision calls for a multi-modal, active 24-hour downtown with 1,010 new housing units for 1,500 new residents and 540,000 square of commercial space for 2,700 workers.
- The recommended investments also support the transportation and distribution industrial sector as a major component of the regional economy. This region ranks first on the West Coast in terms of the value of wholesale trade per capita. The Columbia Corridor/Rivergate area and Port of Vancouver are major import auto distribution centers for Toyota, Hyundai, and Subaru. The Rivergate area is also the location of warehouse distributions for Nordstrom, Columbia Sportswear, and Meier and Frank. North and Northeast Portland and Vancouver is home to many of the region's inter-modal marine, air cargo, truck and rail terminals.
- Regional transportation plans identify the need for multi-modal investments in the I-5 Corridor, along with a mix of TSM and TDM tools to better manage traffic follows.

Regional population and employment forecasts

The Task Force transportation analysis for the various build options assumed the 20-year population and employment growth forecasts as reflected in current Metro and Clark County plans. Metro and Clark County are required by state law to provide a 20- year land supply to accommodate forecasted population growth. Both are now updating their growth forecasts and the allocations. Each is in the process of amending the Urban Growth Boundary (Metro) and Urban Growth Area (Clark County) to meet the forecasted need.

The Task Force explored the question "Why doesn't Clark County attract more jobs so that fewer people have to commute across the river?" Within the last few years, Clark County has begun to reverse trends by increasing its share of regional employment growth. Policies in Clark County, Vancouver, and other cities are intended to help attract employment. In fact, regional studies show that the availability of land for jobs in Clark County may help attract more jobs than is currently forecast. Even with a smaller percentage of the work force commuting, transportation studies show that I-5 will still be congested in the PM peak period, although the congestion may not extend over as many hours. Instead of lasting six hours in the afternoon as estimated with the current employment forecasts, an increase in employment in Clark County could reduce the afternoon peak to four hours.

The Washington Transportation Plan, state Highway System Plan and Metropolitan Transportation Plan

The Washington Transportation Plan (WTP) 2003 – 2022, was adopted by the Washington State Transportation Commission in February 2002. The WTP recognizes the significance of the I-5 Corridor to the state of Washington. The Washington State Highway System Plan (HSP) 2003 – 2022, is a component of Washington's Transportation Plan (WTP). It addresses the state's highway system. The HSP includes a comprehensive assessment of the current deficiencies and conceptual solutions for the state's highway system for the next 20 years. The I-5 Corridor throughout Clark County is identified as deficient in meeting the existing and future transportation needs.

The Metropolitan Transportation Plan, adopted by the Regional Transportation Council in December 2000, is the Clark County region's principal transportation plan, which supports the County's Comprehensive Plan. The MTP is a financially constrained plan that meets federal planning requirements for a transportation system, which could be built with revenues reasonably expected to be available to the region for transportation purposes in the next twenty years. The list of conceptual transportation projects in the MTP represents the highest priority projects for the region and includes some I-5 Trade Corridor projects.

Metropolitan Transportation Plan projects on I-5 in Washington

The MTP identifies the need for improvements in the I-5 Corridor and the need to determine the nature of the improvements as part of the Portland-Vancouver I-5 Transportation and Trade Partnership. The fiscally constrained MTP lists the following projects in the I-5 Corridor between the Interstate Bridge and I-205:

- **I-5, Salmon Creek to I-205:** Widen from 2 to 3 lanes each direction (with added HOV lane)
- **I-5/NE 134th Street:** Reconstruct interchange (per I-5/I-205 North Corridor Study recommendations). This is awaiting Federal Highway Administration (FHWA) Access Point Decision Report outcome.
- **Transit, Fixed Route System Expansion:** An increase in C-TRAN service hours that would add transit service in the I-5 Corridor.

- **High Capacity Transit Corridor:** The I-5 Corridor is one of the High Capacity Transit corridors designated in the MTP.
- **Light Rail Extension to Clark County:** Part of the designated Regional Transportation System, but is not part of the financially constrained Plan.

Clark County's Community Framework Plan

As part of Washington's Growth Management planning process, Clark County adopted a Community Framework Plan in April 1993 to serve as a guide for the County's long-term growth over fifty-plus years. The Framework Plan envisions a collection of distinct communities and a hierarchy of growth and activity centers. Land outside the population centers is to be dedicated to farms, forests, rural development and open space.

The twenty-year Comprehensive Growth Management Plan for Clark County guides growth toward the future vision. Growth management plans for the urban areas of Clark County were developed by Clark County in partnership with the cities and towns in the county. The Comprehensive Growth Management Plan for Clark County was adopted in December of 1994. Some revisions were made in May 1996 and during 1998. The plans are currently in the process of being updated.

Within the I-5 Corridor, the Community Framework Plan designated major activity centers in Downtown Vancouver and the Salmon Creek area and a Hazel Dell in Hazel Dell.

Clark County's Comprehensive Growth Management Plan and Metropolitan Transportation Plan policies

Both the Comprehensive Growth Management Plan and Metropolitan Transportation Plan for Clark County share common transportation planning policies. The I-5 Partnership recommendations are consistent with policy objectives of providing for mobility of people and freight, while reducing reliance on the single-occupant vehicle.

I-5 is designated as a Highway of Statewide Significance (HSS). WSDOT in consultation with other jurisdictions sets the level of service for HSS facilities. WSDOT has set a Level of Service (LOS) "D" for urban facilities on HSS. HSS facilities are exempt from concurrency analysis.

The focus on improving traffic operations and conditions for the Downtown Vancouver employment center and for the freight movement to and from the Port of Vancouver is consistent with the comprehensive plan and MTP to facilitate job growth in Clark County and to facilitate freight movement. The MTP meets federal Congestion Management System (CMS) requirements to develop plans to manage demand before expanding capacity to meet demand. The Task Force's TDM/TSM recommendations support the RTP policies as tools to manage demand.

Arterials adjacent to I-5 and the MTP

The efforts to maximize use of I-5 for through traffic and minimize use of other arterial roads for through traffic are consistent with the MTP. Further evaluation of the traffic impacts on arterial streets adjacent to I-5 and identification of measures to mitigate traffic impacts will be required in the EIS. Such facilities include Mill Plain and Fourth Plain.

Compatibility with adopted City of Vancouver policies

Each of the proposed improvements is generally compatible with the existing Comprehensive Plan and could be compatible with policies that are being contemplated as part of the ongoing Comprehensive Plan update process. The following comprehensive plan policies are applicable to the proposed BIA concepts.

Transportation access. The proposed improvements will considerably enhance future operating conditions of the freeway system, and indirect benefits (while also in some instances impacts) will accrue to the City's transportation system as a result. Specifically, each of the options proposes enhanced access into the City Center. As the primary regional center and a location that has been planned for considerable growth in activity of the next 20 years, the City's Downtown Transportation System Plan calls for new and enhanced access points into downtown to support the planned residential and commercial/industrial growth. Each of the BIA concepts directly improves and adds access into downtown, directly supporting the existing plans.

The City's transportation plan also contemplates a multi-modal system and relies on the growth in the multi-modal level of service to support the land use plan. Additionally, the City's Plan advances directed policies that support reductions in SOV travel, support effective use of TSM and TDM measures, and encourage growth in urban centers of activity. All of these outcomes are supported, in part, by the Task Force's draft recommendations.

Economic development. Vancouver's Plan contains policies to ensure easy access to employment centers, develop mass transit networks, and encourage priority investments in public facilities that bolster Vancouver's ability to maintain existing and attract additional employment within the City. The proposed concepts directly provide enhanced access into downtown and into the west Vancouver commercial and industrial districts by providing both reduced travel delays along the interstate system and safer interchange areas. Coupled with potential HOV lanes and LRT, the Task Force's draft recommendations also improve mode choice for access to downtown.

Cultural and historic resources. The interchange concepts that serve to directly impact or limit access to designated cultural resources would conflict with the existing City Plan. Specifically, concepts that would destruct, encroach and or appreciably change the character of the Historic Reserve and its environs would conflict with City policy and the long-terms plans for that cultural and historic resource.

The City has plans directly related to the rehabilitation and expansion of the Historic Reserve as a cultural district, and numerous transportation plan elements have laid the groundwork for road improvements within the District to enhance access into and within the Reserve environs.

Active and livable neighborhoods. The City's plans promote urban centers that are directly served by efficient transportation systems. Particular emphasis is given to improving access to multi-modal and transit networks, TDM, and supporting system development to promote reductions in SOV travel. The interchange concepts reviewed by the Task Force are supportive of these policies given the multi-modal options (namely LRT) and the improved access to and from downtown, the primary urban center, and a center where significant residential growth has been planned.

The Oregon Highway Plan

The OHP calls for a transportation system marked by modal balance, efficiency, accessibility, environmental responsibility, connectivity among places, connectivity among modes and carriers, safety, and financial stability. The OHP operates in the context of the federal Transportation Equity Act for the 21st Century, the statewide land use planning goals, the Transportation Planning Rule and the State Agency Coordination Program. The OHP carries out the Oregon Transportation Plan and will be reflected in transportation corridor plans. The Task Force's draft recommendations are generally consistent with OHP policies and goals.

Metro's 2040 Growth Concept

The 2040 Growth Concept sets the direction for planning in the Portland Metropolitan area. Local jurisdiction comprehensive plans are required by State law to be consistent with the 2040 Growth Concept. In the I-5 Corridor, the 2040 Growth Concept designated major land use areas include:

- Portland Central City
- Main Streets: Lombard, Killingsworth, Denver, Martin Luther King Jr. Boulevard
- Columbia Corridor/Rivergate Industrial Area
- Interstate MAX Station Communities
- Future Hayden Island Station Community

Metro's Regional Transportation Plan

The RTP implements the 2040 Growth Concept in the Portland metropolitan area. It identifies three different levels of plans. The "Preferred" is the most extensive and the one that best supports the 2040 Growth Concept. The "Priority" Plan includes strategic investments that, with additional funding, would support the 2040 Growth Concept. The "Financially Constrained" plan meets federal planning requirements for a transportation system that could be built with available financial resources and represents the highest priority projects for the region.

The RTP proposes a Refinement Plan for the I-5 Corridor and concludes "The level of congestion in the corridor suggests that despite a range of different improvements to the I-5 Interstate Bridges and transit service, latent demand exist in the corridor that cannot be addressed with highway capacity improve-

ments alone." Even with the projects in the "Priority" plan, "congestion exceeds proposed performance measures for the corridor. ...Freight movement to inter-modal facilities and industrial areas would be affected by the spreading of congestion to off peak periods."

The RTP policies recognize that congestion must be tolerated in urban centers in order to achieve the density and mixed-use development called for in the 2040 land use designations and to avoid the use of urban land for highways. The RTP proposes levels of service standards ("LOS"), measured over two PM peak hours, for corridors that are to be determined at the completion of the corridor refinement plans. For the I-5 Corridor, the RTP proposes LOS "E" in the first hour and "F" in the second hour of the PM peak period. RTP policies tolerate less congestion in corridors in industrial area and inter-modal corridors where LOS "E" for the first hour and "E" for the second hour have been adopted. Mid-day levels of service in industrial areas are higher and call for "D" as an acceptable operating condition.

The focus of the Task Force recommendations on improving traffic operations in the Columbia Corridor/Rivergate industrial areas is consistent with the intent of the RTP to focus transportation investments in serving the movement of goods. The need to avoid spreading peak period congestion into the mid-day is also consistent with RTP policy.

The RTP meets federal Congestion Management System (CMS) requirements to develop plans to manage demand before expanding capacity to meet demand. The RTP sets modal targets for Non-SOV use for each of the 2040 design types. For the Central City, the Non-SOV modal target for daily trips is 60% to 70%. For industrial areas, the target is 40% to 45%. The TDM/TSM recommendations support the RTP policies as tools to manage demand. The RTP identifies the need for additional transit services, beyond that which can be funded with available revenue forecasts, to support the 2040 Growth Concept and the Non-SOV modal targets.

Metro's RTP projects on I-5

The RTP identifies the need for improvements in the I-5 Corridor and the need to determine the nature of the improvements in a Refinement Plan. The Regional Transportation Plan ("Priority Plan") calls for:

- **I-5 Interstate Bridge and I-5 Widening**: Add capacity to the I-5/Columbia River bridge and widen I-5 from Columbia Boulevard to the Interstate Bridge based on final recommendations from the I-5 Corridor Study. (#4003)
- **I-5/Columbia Boulevard Improvement:** Construct a full direction access interchange at I-5 and Columbia Boulevard based on recommendations from the I-5 Corridor Study. (#4006)
- **I-5 Corridor Study:** Determine an appropriate mix of improvements from I-405 to I-205, including adding capacity and transit service within the corridor. (#4009)

As a higher priority in the Financially Constrained Plan, the RTP includes:

- **Delta Park Lombard Project:** I-5 North Improvements to widen I-5 to three lanes in each direction from Lombard Street to the Expo Center exit (#4005), and

- **Light Rail Expansion:** Extend light rail service from the Rose Quarter transit center north to the Portland Metropolitan Exposition Center and then potentially to Vancouver, Washington (#1000, #1002).

Main Street projects in Metro's RTP

The I-5 Corridor has four designated "Main Streets": Lombard, Killingsworth, Denver, and Martin Luther King, Jr. Boulevard The RTP supports the "Main Street" land use designation by taking actions to discourage through-traffic on these roads. The Killingsworth and Lombard Main Streets are further supported by designations as streets for frequent bus service.

The Task Force's efforts in the BIA concepts to maximize use of I-5 for through traffic and minimize use of other arterial roads, particularly Main Streets for through-traffic, are consistent with the RTP. Further evaluation of the traffic impacts on the Main Streets and identification of measures to mitigate traffic impacts will be required in the EIS.

Compatibility with adopted City of Portland Comprehensive Plan policies

Overall, the Task Force's recommendations are generally compatible with the City of Portland Comprehensive Plan. The combination of freeway improvements and light rail transit support the diversity of existing and planned land uses. The following comprehensive plan policies are applicable to the proposed BIA concepts.

Policy 6.2 Regional and City Traffic Patterns. City policy advances the separation of traffic on different facilities according to the length of trip. Inter-regional traffic should use the Regional Transit and Traffic Way system. City streets should be designed to carry local traffic and not be designed or managed to serve as alternative routes for regional trips.

All of the proposed Task Force concepts support this policy by encouraging inter-regional traffic to use the Regional Traffic Way system and not local city streets. Concept 7 further separates local and regional traffic by providing an arterial connection for local traffic between Portland and Vancouver. The proposed concepts also include light rail, which provides a transit connection to the Regional Transit system.

Policy 6.6 Urban Form/Policy 6.9 Transit Oriented Development. Portland's policy supports a regional form of mixed-use centers served by a multi-modal transportation system. City policy also emphasizes the need for inter-connected public streets to provide for pedestrian, bicycle and vehicle access. Policy 6.9 advances the need to reinforce the connection between transit and adjacent land use through increased residential densities and transit oriented development.

The Task Force's draft recommendations also include a new light rail connection, which supports urban form and transit oriented development. Bridge Concepts 1 (a new 5-lane southbound supplemental bridge to the west of the existing bridges) and 6 (a new 4-lane collector distributor bridge to the west of the existing bridges) conflict with these policies by significantly widening the freeway corridor, diminishing the pedestrian environment, and reducing the potential for mixed-use centers and transit- oriented development, specifically on Hayden Island.

On Hayden Island, the Comprehensive Plan envisions primarily commercial land uses in the freeway corridor with residential uses to the east and west of this commercial center. Between Portland Harbor and Columbia Boulevard, the majority of the land is in the industrial sanctuary or open space with a mixture of commercial and residential uses. Additional study is required to further evaluate the appropriate level and type of future development in the Bridge Influence Area. Future plans should balance the opportunity created for station area development with the preservation of industrial activity. On Hayden Island, obstacles such as airport noise and adequacy of the local street network should be assessed in the EIS.

Policy 6.21 Freight Inter-modal Facilities and Freight Activity Areas/Objective 2.14 Industrial Sanctuaries. City policy advances the development of a multi-modal transportation system for the safe and efficient movement of goods within the City. City Policy also encourages the growth of industrial activities by preserving industrial land in Industrial Sanctuaries primarily for manufacturing purposes.

All of the proposed concepts support the projected increased freight demand for the movement of goods within the corridor. A large amount of the land surrounding the Bridge Influence Area is in the Industrial Sanctuary. Improved freeway access and operations for freight are essential to support the existing and planned industrial uses in the corridor.

Policy 8.15 Wetlands/Riparian/Water Bodies Protection. City Policy stresses the importance of protecting significant wetlands, riparian areas, and water bodies that have significant function and value related to flood protection, sediment and erosion control, water quality, groundwater recharge and discharge, education, vegetation, and fish and wildlife habitat.

All concepts have some impact on wetlands, open space and/or parks lands between Portland Harbor and Columbia Boulevard and would be in conflict with this policy. Concept 4, the Replacement Bridge, minimizes impacts in this area. Additional work is needed to assess how BIA improvements would impact water bodies, their significant functions and values.

Policy 12.1 Portland's Character. City policy advances the need to enhance and extend Portland's attractive identity. New public projects should enhance Portland's appearance and character through innovative design. This includes creating a "built environment" that is attractive and inviting to the pedestrian.

Concepts designed to minimize visual and physical impacts on the surrounding area would support this policy. Bridge concepts 1 and 6, which significantly widen the freeway corridor on Hayden Island and in the Marine Drive interchange, would conflict with this policy.

Overall I-5 land use findings: Effect of investments on growth

The analysis of the transportation options in the I-5 Transportation and Trade Partnership study assumed that the population and employment allocations in 2020 would be the same in all scenarios. Further, the analysis that the level and nature of the investment would change the modal choice, the route and the trip choice, but would not alter the number or locations of employment and households. History tells us otherwise. Transportation investments do change the location and number of jobs and households.

The I-5 Transportation and Trade Partnership study analyzed the potential effects on changes to households and employment with the I-5 investments of an additional freeway lane in the corridor and across the Columbia River, plus a light rail loop in Clark County. The findings of analysis are below.

Without changes in land use policy, the following land use development trends can be expected, regardless of the transportation actions taken in the I-5 Corridor:

- Population and employment growth in the Portland/Vancouver region are developing in a dispersed pattern. A significant share of households and employment are locating at the urban fringe, within adopted zoning.
- There will be more job growth in Clark County than anticipated in our current adopted plans. Even with a reduced percentage of commuters crossing the river, I-5 will be congested.
- Industrial areas are at risk of being converted to commercial uses, threatening the availability of industrial land in the Portland/Vancouver region and increasing traffic congestion in the I-5 Corridor.

Without investment in the I-5 Corridor, we can expect that traffic congestion and reduced travel reliability will have an adverse economic effect on industries and businesses in the corridor.

With highway and transit investments in the corridor, there will be travel-time savings that can be expected to have the following benefits:

- Attract employment growth toward the center of the region to the Columbia Corridor along the I-5 Corridor from elsewhere in the region. The land use model estimates a small by steady increase of jobs to the I-5 Corridor, in both the Columbia Corridor Industrial Area and Clark County with the additional accessibility. This is consistent with Metro's 2040 Growth Concept that supports economic growth in the industrial area and focuses growth inside existing urban areas. This is also consistent with Clark County's goals of attracting more jobs.
- Strengthen the regional economy by attracting more jobs to the region.
- Create new job opportunities for residents near the I-5 Corridor because of their close proximity to the additional employment in the Corridor.
- Support mixed-use and compact housing development around transit stations. Transit station areas can have a positive effect on encouraging redevelopment and supporting transit use, particularly in residential areas. Redevelopment can provide an additional opportunity to accommodate additional housing demand and offer a mix of housing opportunities.

Highway and transit investments in the corridor also carry risks if the development pressure associated with the increased accessibility is not well managed.

- Increased demand for housing in Clark County due to the location of jobs in the center of the region and the faster travel times to jobs in Portland may increase pressure to expand the Clark County urban growth area along the I-5 Corridor to the north. If more new houses are built than jobs in Clark County, I-5 will become overloaded to levels that would exist if no improvements were made. This would be contrary to the regional policy and limit the capacity for freight.

- Industrial areas are at greater risk of being converted to commercial uses at new and improved interchanges with the improved travel times at these locations. As the region's population has increased, the value of land along the freeway has also increased. This increase in value increases development pressure. Value and corresponding development pressure will increase as accessibility is further improved. If not protected, this development will erode the supply of increasingly scarce industrial land, reduce the opportunities to create family wage jobs close to where people live, and generate more traffic than the system can handle, even with new capacity.

Growth must be managed to ensure that:

- Clark County growth does not result in new freeway capacity being used by commuters, instead of truckers for the movement of goods.
- The expected life span of investments is not shortened.
- Scarce industrial land is not converted to commercial uses.
- Local jurisdictions implement necessary zoning and regulatory changes to attract mixed-use and compact housings around transit stations. The availability of land within the Metro UGB and the Clark County UGAs changes where and how the region will grow. If Metro has a tight UGB, it will increase demand for housing in Clark County, even more than the effect of the added accessibility due to the transit and highway investment. If Clark County expands the UGA, it will also attract growth. UGB/A decisions alone can change traffic demands across the river.

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Attachment D

I-5 Bi-State Coordination Accord

The I-5 Portland/Vancouver Transportation and Trade Partnership Task Force recommends that RTC and Metro, along with the other members of the current Bi-State Transportation Committee, adopt and implement the following I-5 Bi-State Coordination Accord and develop the operational details.

I. Purpose

The I-5 Partnership brought together Washington and Oregon citizens and leaders to respond to concerns about growing congestion on I-5 and its effect on the region. Consistent with the Task Force's "Problem, Vision and Values Statement," the Accord signatories find and adopt the following principles, statements, goals and actions:

A. The region functions as one economic marketplace nationally and internationally.

B. Travel demands in the I-5 Corridor need to be met by (1) providing a balance of transit and road improvements to achieve a mix of transportation choices, (2) reducing single occupancy vehicle use in the peak hours across the Columbia River on I-5 and I-205, and (3) reducing daily VMT per capita for the urban areas in the four-county region.

C. The region relies on the efficient movement of freight throughout the I-5 Corridor. Mid-day travel speeds for trucks on I-5 and I-205 must be maintained at a level designed to protect and enhance freight mobility. Additionally, the region should proactively work to increase travel reliability for all users.

D. Healthy and viable rail service in the I-5 Corridor is a critical component of the regional economy. It is an integral part of the region's comparative advantage in providing an inter-modal focus of marine, barge, highway, and rail services that contribute to the Portland/Vancouver area's recognition as a major national and international trade and distribution center.

E. Transportation Demand Management (TDM) and Transportation System Management (TSM) are essential strategies for improving our mobility, both on a Corridor and regional level.

F. The region's growth management plans share a common vision for compact urban growth to preserve farm land, forest land and open space.

G. The region's transportation and land use systems are integrally related, each impacting and influencing the other, with different approaches and implementation regulations.

H. Coordination among region's jurisdictions and agencies in pursuing economic development and the preservation and increase of available industrial lands are important parts of growth management and maintaining a strong economy.

I. The region would benefit from a multi-faceted, integrated plan of personal and business actions/incentives, transportation policies, and capital expenditures.

J. Plans to manage the I-5 Corridor interchanges, adjacent areas, and adjacent industrial lands are needed now to efficiently manage and protect the existing and future investments in the transportation system.

K. The recommended improvements in the I-5 Corridor between Portland and Vancouver will be an expensive undertaking. Capital projects of the magnitude recommended by the Task Force typically require a variety of funding and financing mechanisms. The region will not be able to rely on any single revenue source. There are several promising federal, state and local revenue sources that could be available for financing the proposed projects.

II. Mechanisms for protecting the I-5 Corridor

The "I-5 Corridor" or "Corridor" for purposes of this Accord has as its northern terminus the northern boundary of Clark County. Its southern terminus is the I-5/I-405 loop.

A. **Manage land uses.** Accord signatories with land use authority, in consultation with those signatories with transportation authority, agree to protect the I-5 Corridor by creating their own plans and agreements to (1) manage traffic from land uses surrounding interchanges not to exceed the mobility standard for the interchange (2) manage induced traffic growth in the Corridor beyond that already planned, (3) establish "centers" for intense development and identify those areas preserved for industrial, residential and other uses, and (4) manage the employment or industrial areas that are outside of designated "centers" where traffic from potential development could negatively impact the levels of service on I-5 or the roads leading to it. These plans and agreements will include TDM/TSM strategies, consistent with and designed to achieve, the I-5 Corridor and regional TDM/TSM targets.

B. **Protect existing, modified and new interchanges.** Accord signatories with I-5 Corridor interchanges physically located in their jurisdiction agree to manage the development and resulting traffic around the interchange areas to protect the mobility standard of the interchange and enter into agreements with the relevant DOT. The plans and agreements for the interchanges will specify land uses that are consistent with this Accord.

C. **Transit station areas.** Accord signatories with new light rail and transit stations will adopt plans for the areas around transit station that are consistent with this Accord.

D. **TDM/TSM actions.** Accord signatories will do their part in implementing TDM/TSM strategies that are consistent with Corridor and regional targets.

E. **Selection of strategies and regional consistency.** Each Accord signatory will determine its specific strategies to protect the I-5 Corridor. The strategies should be consistent with the applicable Clark County Comprehensive Plan or the Metro 2040 Growth Concept, as modified. After consultation with the Bi-State Coordination Committee, each Accord signatory with land use authority shall adopt the relevant elements of the Section II plans and agreements into their Comprehensive Plan or Growth Concept Plan.

III. Create "Bi-State Coordination Committee"

The existing "Bi-State Transportation Committee" advises the JPACT/Metro Council and the RTC Board on transportation issues of bi-state significance. It is the only existing forum for discussion of bi-state issues where members represent a balance of regional interests. A new level of bi-state coordination is needed to advise the JPACT/Metro Council, the RTC Board and Clark County on (1) increasing travel demands across the Columbia River and (2) accommodating the 20-year regional projections for population and employment, and jobs and housing. Jurisdictions and agencies in the I-5 Corridor and those that impact its function should supplement their current transportation coordination efforts with coordinated land use planning, TDM/TSM measures, and economic development activities designed to, among other things, effectively manage the existing and new I-5 Corridor transportation investments.

A. **Role of the new Bi-State Coordinating Committee**

(1) **Review, comment and recommend.** Review, comment and provide recommendations, consistent with this Accord, on actions and major transportation, land use, TDM/TSM, and economic development issues of Bi-State Significance to the responsible signatory. Additionally, the Committee can request any Accord signatory to refer an issue or action of major bi-state significance to it for consultation.

(2) **Rail.** Establish a public/private Bi-State Rail Forum to serve as an advisory group. Through the Rail Forum, initiate an aggressive program to:

(a) facilitate the efficient rail movement of freight

(b) coordinate multi-modal transportation services to increase port access and streamline freight movement

(c) develop strategies to implement the specific findings of the I-5 Partnership Rail Capacity Study, including prioritizing and scheduling the "incremental improvements"

(d) pursue the rail infrastructure improvements required to accommodate the anticipated 20-year freight rail growth in the Corridor and frequent, efficient inter-city passenger rail service between Seattle, Portland and Eugene

(e) advocate at federal, state, regional and local levels for the funding and implementation of rail projects, including the need for additional inter-city passenger and high speed rail

(f) negotiate the cost allocation responsibilities between public and private stakeholders.

(3) **TDM/TSM.** Establish a Bi-State TDM Forum to serve as an advisory group. Work with the regional transportation partners to prepare an "I-5 TDM/TSM Corridor Plan" to identify the TDM/TSM targets, implementation details, funding sources, priorities, and costs. Upon its completion, review the plan, finalize both Corridor and regional targets, and lead the effort to secure additional funding.

(4) **Funding.** Identify opportunities to fund the widening of I-5 to 3 lanes between Delta Park and Lombard. Other capital elements of the recommendations will take longer to fund. As a first step towards the development of a financing plan, work to explore long-term funding opportunities. Coordinate and discuss efforts to increase transit operating revenue for TriMet and C-TRAN.

(5) **Community enhancement fund.** Establish a community enhancement fund for use in the impacted areas in the I-5 Corridor in Oregon and Washington. Such a fund would be in addition to any impact mitigation costs identified through an environmental impact statement and would be modeled conceptually after the "1% for Arts" program, the I-405 Mitigation Fund and the St. John's Landfill Mitigation Fund. The Bi-State Coordination Committee will recommend the specific details in conjunction with the Environmental Justice Work Group.

B. **Rights and responsibilities of Accord signatories.** Each signatory:

(1) Retains the right and responsibility to control its own transportation system, planning, economic development, funding priorities and enforcement.

(2) Agrees, prior to adopting management plans, interchange plans and agreements, and transit station plans, to bring them and other actions and issues of major bi-state significance to the Bi-State Coordinating Committee for its comments and recommendations, which the signatories will meaningfully consider.

C. **Membership and coordination.** Currently, the Bi-State Transportation Committee members are elected representatives or directors from: the Cities of Portland and Vancouver, Clark and Multnomah Counties, a smaller city in Clark (now Battle Ground) and one in Multnomah County (now Gresham); ODOT, WSDOT, the Ports of Vancouver and Portland, TriMet, C-TRAN and Metro. Membership in the Bi-State Coordination Committee should be expanded to include

members of the public, and others as needed, to meet the Accord responsibilities while maintaining the existing balance of bi-state representation of interests.

D. **Revise existing Bi-State Transportation Committee.** JPACT/Metro Council, the RTC Board and Clark County should revise the existing "Bi-State Transportation Committee" to be consistent with this Accord. Simultaneously, the Accord signatories need to create the new "Bi-State Coordination Committee," provide for citizen participation in its work, adopt this Accord, and agree to act consistently with it.

IV. Actions and issues with major bi-state significance

The Accord signatories find and adopt the following as issues of major bi-state significance:

A. Plans and agreements for the I-5 Corridor noted in Section II above and the actions noted in Section V below.

B. Four county regional coordination of UGB/UGA expansions to accommodate 20-year projections for population and employment, along with jobs and housing.

C. Coordination of economic development strategies and the preservation of industrial lands.

D. Highway, transit and rail projects in the Corridor, along with TDM/TSM targets and strategies for the Corridor and bi-state region.

E. Other related major issues of bi-state concern.

V. Actions needed before new capacity in the I-5 Corridor

A. As to **new river-crossing capacity, new or modified interchanges**, or **transit stations**, the Accord signatories agree to adopt drafts of the plans, agreements and actions noted in Section II above, include them for review in the relevant environmental process, and finalize them if not already finalized, as part of the environmental process conclusion.

B. As to the **Delta Park to Lombard project specifically**, it is subject only to (1) formation of the Bi-State Coordinating Committee and (2) the Bi-State Coordination Committee's review of the relevant environmental documents. The Accord signatories will, however, consult with each other and the Bi-State Coordination Committee before taking any official action that changes existing land use designations in the areas adjacent to the Delta Park Lombard project if those changes could adversely affect the mobility standard of the interchange. Additionally, the Accord signatories agree to have the plans, agreements and actions noted in Section II above in place or included for review in the relevant environmental process for any new river-crossing capacity, and finalize them if not already finalized, as part of the environmental process conclu-

sion. This includes the City of Portland's agreement to develop a plan to manage the area around the interchanges in the vicinity of Delta Park consistent with this Accord.

C. As to the **WSDOT 99th to I-205 widening project specifically**, the environmental work has been completed. As a result, its construction is conditioned only upon the Accord signatories agreement to consult with each other and the Bi-State Coordination Committee before taking any official action that changes existing land use designations in the areas adjacent to that project. However, the Accord signatories agree to have the plans, agreements and actions noted in Section II above, in place or included for review in the relevant environmental process for any new river-crossing capacity, and finalize them if not already finalized, as part of the environmental process.

D. As to **existing interchanges**, the Accord signatories agree to have the plans, agreements and actions noted in Section II above adopted with all deliberate speed.

E. As to **any other transportation improvements** in the I-5 Corridor, the Accord signatories agree to have the plans, agreements and actions noted in Section II above adopted before construction begins on them.

F. As to **TDM/TSM**, the proposed Bi-State Coordination Committee needs to agree on the "I-5 TDM/TSM Corridor Plan," the TDM/TSM targets for the I-5 Corridor and region, and the appropriate levels of financial commitment and implementation that must be in place before construction begins on any new river-crossing capacity.

VI. Implementation

A. **Timing**. Signatory parties should establish the new Bi-State Coordination Committee as soon as possible, but in any event, it should be established contemporaneously with the adoption of the I-5 Task Force Recommendations into the regional transportation plans.

B. **Staffing and funding.** Metro and RTC should continue to staff the Bi-State Coordination Committee and explore whether additional funding is necessary until the Accord's organizational details are finalized.

Attachment E

TDM/TSM Action Items and Rough Costs Matrix

I. Alternative mode services

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Fund transit services to the level assumed in the Task Force Baseline, upon which other Option Packages were compared. Today the region provides 1.9 million hours of transit service annually. The recommendation scenarios by the Task Force assumed 4.3 million service hours by 2020.	• C-TRAN (Year 2002) 282, 400-fixed-route service hours at $23.5 m/year for transit operations • TriMet (Year 2002) 1.6 million fixed-route service hours at $139 m/yr	• The operating and maintenance cost needed for the baseline service in 2020 is estimated at $317 M/yr. To meet this service level TriMet would need an additional $132 M/yr and C-TRAN would need an additional $23 M/yr.	• Users • Private sector • Public sector
B. Increase the subsidy for the existing C-TRAN Vanpool program to add to fleet and increase service over next five years.	• C-TRAN: $200K/yr operating costs • TriMet: $100K/yr	• C-TRAN: $600K/yr to triple fleet	• Users • Private sector
C. Study the use of casual carpool and pick-up locations to cross the river.	• $0	• $40K	• Public sector
D. Support the planned expansion of the existing Real Time Information for users.	• TriMet: $2 M/yr	• TriMet: $1 M/yr	• Users • Private sector • Public sector
E. Create and expand use of flexible shuttle systems to supplement fixed route services between the employment areas and the LRT stations in Vancouver and Portland.	• C-TRAN: $0 • TriMet: $200K shuttle/worksite	• C-TRAIN and TriMet: $1 M combined budget	• Private sector

II. Alternative mode support

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Make available new park and ride facilities in Clark County in conjunction with recommended and new transit services in the I-5 and I-205 corridors. Begin Park and Ride expansion with those facilities forecasted to be at capacity in the next five years.	• 1,700 spaces currently exist in Clark County. Another 700 will be added with construction of the I-5/99th Park-n-Ride.	• Overall need: 6,600 spaces in Clark County. The additional 4,200 spaces cost $84 M ($20K/space x 4,200 spaces). 1,000 spaces ($20 M) are currently assumed in projected LRT costs.	• Users • Private sector • Public sector
B. Increase funding at the jurisdiction level to ensure that existing pedestrian-oriented street designs in neighborhoods within the I-5 Corridor may be implemented to support connectivity to the corridor.	• Retrofit at $1 M for 1/4-mile section. New construction at $1.25 M for 1/4-mile section.	• $16 M for 4 miles of boulevard retrofits	• Private sector • Public sector
C. Support a sustained marketing program to increase awareness of rideshare programs, for example www.CarpoolMatchNW.org. Target the I-5 Corridor.	• $116K ($80K for staff, $36K for ads) for two years	• Continue and increase budget to $150K to target I-5	• Public sector
D. Establish and fund an ongoing HOV enforcement program.	• ODOT: $50K – $60K/yr • WA State Patrol in charge of enforcement	• ODOT: increase to $100K • WA: increase to $100K	• Users • Public sector
E. Improve connectivity and quality of bike/ped facilities in Portland and Vancouver at both ends of any new river crossing.	• $25K. Lloyd District TMA received $7,500 regional money for bike racks in 2001.	• City of Vancouver: $2.5 M	• Public sector
F. Support existing plans for end of trip facilities (e.g., showers, lockers, bike racks) by committing the funding for these in the corridor.	• Portland spent $9,500 on bike racks and $5,477 on lockers in 2001* • WA: $0	• Portland increases budget to $35K/yr • WA budget: $75K	• Users • Private sector • Public sector
G. Develop TDM programs for special event centers that draw large number of attendees, e.g., Delta Park, Expo Center, PIR, Downtown Vancouver. This will be similar to the shuttle bus and traffic signal coordination implemented for Rose Quarter events.	• TriMet: $5K – $10K/yr	• Increase budgets in both WA and Portland to $300K	• Users • Private sector • Public sector

* Lloyd District TMA revenue: City of Portland $75K; Passport Commissions $31,500; CMAQ grant $15K; BID funding $50K; contributions $2,600

II. Alternative mode support (cont.)

Action item	Current / budgeted spending	Target / additional spending	Who pays
H. Expand the TDM Education program for the region and target special programs for the I-5 Corridor. Examples of education programs are: (1) School programs on Alternative Travel Modes. (2) Identify people who are open to making changes to the way they travel and link them with the resources they need to do it (e.g., Travel Smart program, Perth). (3) Encourage families to live without a second car (Way to Go Seattle).	• City of Portland spent $15K for bikes and helmets plus $80K for staff for elementary school bike & ped training in 2001.	• $1.2 M	• Private sector • Public sector
I. Develop Guaranteed Ride Home Program for employees who have gotten to work by alternatives to SOV. Employees are offered a ride home (e.g., taxi, company vehicles) at no cost if needed for an emergency.	• Minimal cost (+/- $200/yr)	• $30K/yr	• Public sector

III. Worksite-based strategies

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Expand region-wide incentive strategy to encourage employers to offer commute options. This will include promoting education programs tailored to the work sites in the corridor. Add marketing FTE for bus pass marketing.	• TriMet: $400K • WA: $0	• TriMet: $500K • C-TRAN: $100K/yr	• Private sector • Public sector
B. Subsidize transit pass program (like the TriMet Passport) to increase transit use at employment sites.	• City of Portland's TRIP (transit subsidy) and carpool check program cost $340K in 2001 • WA: $0	• $5 M • WA Budget: $450K	• Private sector
C. Increase participation in bike-walk use at more worksite locations, e.g., Bike & Walk Bucks.	• Bike & Walk Bucks pays participant $30/month • Average 500 participants = $180K/yr	• Increase use to 1,000 participants = $360K/yr	• Private sector

IV. Public policy and regulatory strategies

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Expand the funding for the two existing TMAs in the corridor, Swan Island and Lloyd Center, and use public funds to seed new TMAs where business support exists.	• Lloyd District TMA budget: $174K* • Swan Island TMA** budget: $75K	• Create and maintain 4 TMAs total. Increase budget to $175K = $700K	• Private sector • Public sector
B. Review enforcement or incentive mechanism to achieve the goals in Washington State's CTR and Oregon's ECO programs to reduce commuter SOV trips.	• $0	• $300K	• Private sector • Public sector
C. Expand CTR to include businesses with 50 or more employees. CTR currently impacts businesses with 100 or more employees. ECO and CTR to move toward common criteria to include businesses with 50 employees or more.	• $0	• $40K	• Private sector • Public sector
D. Expand transit free fare areas including downtown Vancouver.	• City portion of Fareless Extension to Lloyd District was $300K. Total cost $900K. • WA: $0	• Future costs based on TriMet's estimate of lost revenue. • WA: $300K	• Private sector • Public sector
E. Study expansion of free fare zones for I-5 transit users.	• $0	• $150K	• User • Private sector • Public sector

* Lloyd District TMA revenue: City of Portland $75K; Passport Commissions $31,500; CMAQ grant $15K; BID funding $50K; contributions $2,600

** Swan Island TMA revenue: CMAQ grant $25,500; access to work (carpool and shuttle) $10,500; membership dues $25,750

V. Pricing strategies

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Develop a region-wide parking strategy to encourage fewer parking spaces and to support parking charges. Consider including elements of the strategy such as: (1) Establish trip reduction ordinances to help reduce SOV trips. (2) Support jurisdictions in adopting parking requirements in codes with parking minimums and maximums in place. (3) Provide preferential parking at places of employment and at parking garages for rideshare vehicles as an incentive. (4) Increase the effectiveness of existing pricing strategies by increasing the cost of metered parking and parking garages.	• Portland discounts carpool parking on streets and garages: total $377,472/yr • On-street spaces: 618 • City-owned garage spaces: 217 • City of Vancouver's parking program costs: $2 M/yr	• $500K	• User • Public sector
B. Study opportunities to implement road-pricing strategies as plans for a new river crossing continue. Pricing strategies for consideration to be looked into through EIS.	• $0	• $500K	• User • Private sector • Public sector

VI. TSM strategies

Action item	Current / budgeted spending	Target / additional spending	Who pays
A. Add service patrols to manage incidents in Washington and add to the number of incident response teams in Oregon and Washington.	• COMET operating costs: $85K/ truck, $7,550 maintenance and gas, 5K miles/month/per truck		• Public sector
B. Improve freight traffic flow by moving more drivers from SOV to alternative modes, thereby reducing traffic congestion. As designs for the new river crossing and interchanges in the corridor are developed, truck bypass lanes at ramps and other techniques to facilitate truck movement should be considered.			• Public sector
C. Accelerate funding for planned ramp metering at all WSDOT freeway interchanges in the I-5 and I-205 corridors.	• Ramp meters cost $90K–$100K/unit (includes meter, signage and striping	• $700K for 7 meters	• Public sector
D. Increase coordination between Oregon and Washington Transportation Management Centers to improve freeway management and operations, including incident management. The aim is to decrease the time to clear incidents, maintain traffic flow and increase travel reliability.	• OR: • WA: 30 minutes response and 120 minutes clearance time for major incidents	• $600K for first year and $100K annually for following years	• Public sector
E. Implement Vancouver Area Smart Trek (VAST) System. VAST is a package of Intelligent Transportation System (ITS) elements to better manage the transportation system. ITS uses advanced technology and information to improve mobility and productivity and enhance safety on the transportation system. http://comsvr/vastrek/	• $5.4 M (3-yr budget)	• $45 M over 20 years	• Public sector

Attachment F

Potential Impacts of Recommendations to be Assessed in an EIS

I. Traffic/transportation

A. Clark County

(1) **Increase/decrease in access to jobs and services for low income, minority groups, disabled and elderly.** Need to assess:

(a) Ability to access jobs/employment centers. How will each alternative reduce or increase job opportunities or require dislocating families in order to maintain access?

(b) Choice in transportation within each community and in crossing the river. Large segments of the EJ communities do not drive (particularly women of ethnic groups), do not have reliable cars, or are from cultures that are more comfortable using public transportation.

(c) Availability of public transportation to reach community services. Services in Clark County are not currently always accessible by transit. Low income and minority groups are located throughout the community.

(d) Impact on pedestrian and bicycle access.

(e) Affordability of transportation to jobs and services.

(f) Efficiency of transportation to jobs and services.

(2) **Construction impacts.** Need to assess ability to maintain access to jobs and services during construction.

(3) **Reduced safety in neighborhoods.** Need to assess:

(a) Impact on pedestrian safety. Walkability of neighborhoods is especially important for children and elderly.

(b) Increase in cut-through traffic.

(c) Impact on speeds through neighborhoods, for instance potential impacts of new bridge over 29th in Vancouver.

(4) **Reduced access to homes.** Need to assess impact on residents of changing how homes are accessed (rear access to homes between 35th–37th Street).

B. Portland

(1) **Increase in traffic on local streets and other freeway systems.** Need to assess:

(a) The local traffic impact of removing the bottleneck at Delta Park.

(b) The local traffic impact of making improvements in the Bridge Influence Area.

(c) Impact of freeway ramp meter rates on local streets and on pedestrian safety issues.

(d) The impact of improvements on the Portland freeway loop, SR 500 and SR 14.

(e) Traffic impacts of HOV system.

(f) West Arterial Road as an alternative to improvements on I-5.

(2) **Increase in sprawl in Clark County.** Need to assess the impact of transportation improvements on growth in Clark County.

(3) **Unsustainable transportation system.** Need to assess transit and demand management-only transportation system.

(4) **Unsafe pedestrian conditions during construction.** Need to assess to the extent that construction of improvements impact pedestrian safety and access, it needs to be mitigated. This can be a problem on local streets and also at freeway ramps when traffic backs up. Senior populations are particularly a concern.

II. Environment and health

A. Clark County

(1) **Increase in air and other pollution and subsequent health impacts.** Need to assess:

(a) Health impacts on residents next to or near the facilities due to increases in air pollution and the potentially subsequent increases in contamination of soils and other resources with which residents interact. The assessment should recognize that:

- Children are most vulnerable because they play outside.
- Low income populations have less access to health care and thus may have poorer overall health.
- Health issues of concern include allergies, asthma, lead poisoning, and low birth weights.

(2) **Increased noise.** Need to assess health impacts of increased noise.

(3) **Impacts to other environmental resources.** Need to assess:

(a) Impact on trees — reduction and health of trees.

(b) Reduction in wildlife.

(c) Stormwater drainage.

(d) Water quality.

(e) Sustainable development.

(f) Other natural resources.

B. Portland

(1) **Increase in air pollution and subsequent health impacts.** Need to assess:

(a) Local air quality impacts of highway and transit projects, including an assessment of air toxics. The assessment should also take into account idling traffic at ramp meters.

(b) Health impacts associated with increased air pollution due to highway and transit projects.

- Note: There is concern in the community about the cumulative impacts of automobile and industrial pollution on the health of residents in north and northeast Portland. Advocates on this issue have requested a study of the cumulative air quality impacts. Such a study will require the participation of several state and federal agencies including the Department of Environmental Quality, the Oregon Health Department, and the Environmental Protection Agency. Additional discussion among these agencies and with the community advocates is needed before action on such a study can be taken.

(2) **Increase in pollution to streams and fish.** Need to assess:

(a) Increase in run-off into streams due to the increase impervious surface (more roadway).

(b) Increase in PCBs and toxic organics in streams. Need to pay attention to detection limits.

III. Historic and cultural issues

A. Clark County

(1) **Impacts on historic homes.** Need to assess older Vancouver neighborhoods that have historic homes.

(2) **Impacts on culture of minority and ethnic groups.** Need to assess impacts on the ability of minority and ethnic groups to maintain the cohesiveness and culture of their communities.

(3) **Impacts on Native American tribal resources.** Need to assess impacts that a river crossing or other elements of the alternatives may have on Native American fisheries.

B. Portland

(1) **Impacts to Pioneer Cemetery.** Need to assess whether impacts will occur to this resource.

IV. Property impacts

A. Clark County

(1) **Residential and commercial displacements.** Need to assess:

(a) Displacements and encroachments—low-income households in this corridor are difficult

to relocate because of a lack of decent, affordable housing.

(b) Impact on availability of affordable housing.

B. Portland

(1) **Residential and commercial displacements.** Need to assess:

(a) Displacements and encroachments to residential, business and commercial property.

(b) Impact on property values.

(c) If there is a loss of housing, need to consider the cumulative impacts of all projects in the area.

V. Quality of life

A. Clark County

(1) **Impacts to community life.** Need to assess:

(a) Impacts to community cohesiveness—connections within neighborhoods. This includes pedestrian, bike and vehicle connections within the community and to schools, recreation, community and commercial services.

(b) Connection impacts to other communities.

(c) Impacts to adopted Neighborhood Plans.

(d) Diminishment of community identity, such as of historic character of older Vancouver neighborhoods.

(e) Impacts to community life of minority groups.

(f) Increase in brownfields or rundown and/or vacant properties.

(g) Changes, such as access, within neighborhoods that develop housing pockets that could attract criminal activities into neighborhoods

(2) **Increase in noise.** Need to assess noise impacts of potential improvements.

(3) **Impacts to open space and parks.** Need to assess:

(a) Loss of green space, wetlands and parks.

(b) Access to open space and parks.

(4) **Decrease in overall livability.** Need to assess:

(a) Increase in odors.

(b) Visual impacts

B. Portland

(1) **Increase in noise.** Need to assess:

(a) Noise impacts of potential improvements including widening I-5 to three lanes between Delta Park and Lombard.

(b) Noise impacts due to construction.

(2) **Decrease in overall livability.** Need to assess:

(a) Loss of green space.

(b) Shadow effect of freeways and loss of natural light.

(c) Visual impact of new bridges.

(d) Loss of access to the Columbia Slough.

(e) Increase in litter due to light rail and increased traffic.

(f) Increased grit and grim on homes and vehicles near the corridor.

VI. Employment and economic opportunity

A. Clark County

(1) **Impacts on job opportunities due to access.** Need to assess increase or decrease in reliable transportation access to jobs for low income and minority communities.

(2) **Economic development in Clark County.** Need to assess:

(a) Effects of alternatives on creation of jobs in Clark County.

(b) Impacts on tax revenues for Clark County.

B. Portland

(1) **Decrease in revenue for corridor businesses due to construction.** Need to assess construction impacts to businesses affected by construction of improvements.

(2) **Lack of economic benefit to local community from EIS, construction and maintenance contracts.** Need to ensure that the Departments of Transportation make a special efforts in the following areas: attracting Disadvantaged Business Enterprise (DBE)-eligible firms for all contracts; attracting Emerging Small Businesses for all contracts, and enforcing external equal employment opportunities laws.

VII. Affected environmental justice and Title IV communities

A. Clark County

(1) **Balance of impacts.** Need to assess the demographics of those impacted by the study— who, how many, and of what racial, ethnic and economic groups—in order to determine whether impacts are balanced and what mitigation could be appropriate.

Attachment G

Potential Benefits of Recommendations to be Considered in an EIS

The following information may be used as a basis for exploring benefits in the EIS. The EIS will assess whether environmental justice communities carry an unfair share of the negative impacts of the project, and whether the impacts are or can be balanced by benefits to those communities.

It is important to understand that although impacts would be a natural outcome of transportation improvements, not all benefits would be. The working groups discussed two types of benefits: (1) those that could be a direct outcome of transportation improvements, and (2) those that could be added either to address specific impacts (as mitigation) or to provide overall balance of benefits and impacts to affected communities. The second type would not be ensured until they were included in the final EIS and financing package.

I. Employment/economic opportunity

A. Clark County

(1) **Maintain and improve access to employment centers and high quality jobs.**

(a) Provide reliable, efficient access to key employment areas (such as Ridgefield, Prune Hill, Portland, Port of Vancouver). Need transportation choices: car and transit.

(b) Encourage the creation of jobs in Clark County/Southwest Washington.

(a) Support job training opportunities.

(2) **Support job opportunities during construction.**

(a) Use local contractors and suppliers.

(b) Maintain access to employment centers during construction.

(3) **Encourage the development of local businesses in the corridor.**

(a) Encourage business development for minority groups along the corridor.

(b) Support economic development plans in local Neighborhood Action Plans.

B. Portland

(1) **Provide jobs from the project.**

(a) Improvements should serve as an economic engine by providing jobs and business opportunity to the adjacent communities.

(b) Employment and training and percentage people of color used on project—contracts/workers.

(c) Also percentage of small businesses, women in business.

(d) ODOT should participate in Community Benefits Agency Task Force. Though not yet formally established, ODOT and all other agencies undertaking major public works projects in the area should participate when it is set up. The Task Force will serve as a forum where public agencies and potentially other institutions can share information regarding how their capital improvement projects can best benefit the community. Community benefit objectives can be served by aggressive local hiring/contracting efforts, and there are many other "best practices."

(2) **Help businesses that may be impacted during construction.**

(a) Develop a plan to save jobs during construction. Use lessons learned during Interstate LRT. Look for federal grants now. Don't wait.

(b) Look at how to compensate small business people who lose business.

(c) To help businesses that may be impacted during construction, it is important to get profit and loss statements before construction so that there is a way to determine loss of business during construction.

(d) EPA may have a small business loss income fund that will reimburse any loss that businesses can prove during construction.

(3) **Encourage the development of local businesses in the corridor.**

(a) Set aside space at light rail stations for small, community-oriented, local businesses and connect these businesses with job training center efforts.

(b) Incentives along corridor to help businesses.

II. Traffic/transportation

A. Clark County

(1) **Provide for diverse mobility and access needs of environmental justice communities:**

(a) Jobs. See "Employment/Economic Opportunity. "

(b) See "Health and Community Services" and "Environment."

(c) Community access. See "Community Building and Livability."

(d) Maintain access across the river as a plus for both sides of the river—Portland and Vancouver are culturally and economically linked communities.

(2) **Improve bike and pedestrian safety and increase connectivity.**

(a) Improve or provide more connections crossing the freeway for pedestrian and bike access.

(3) **Reduce single-occupancy vehicles to reduce related impacts on neighborhoods and the environment.**

(a) Consider employer-to-employee incentives, such as transit vouchers. This can be a tax incentive for employer and could help meet community trip reduction goals.

(b) Consider Downtown Vancouver free zone on buses.

(c) Consider using project to facilitate better ride sharing.

(d) The more public transportation that is available, the more people will ride.

(4) **Improve transit availability and connections.**

(a) Need efficient east-west transit in Clark County to create better access to jobs and services.

(b) More available transit can benefit certain ethnic groups. For some groups who are new to the country, driving is a major obstacle; they have used public transportation—trains and buses —in home country and are more comfortable with transit due to familiarity. Light rail or rail type system would be more inviting.

(c) Consider transit passes for special populations.

(d) Public transit needs to be done well (go where people want to go).

(e) More information on public transportation is needed for EJ communities.

(5) **Calm traffic through neighborhoods.**

(a) Build on Vancouver neighborhoods program of student-designed traffic signs.

B. Portland

(1) **Improve bike and pedestrian safety and increase connectivity.**

(a) Freeway over-crossings are dangerous for bicyclists and pedestrians. Need safe ways to get across freeway, particularly for seniors. There is also a problem crossing at freeway ramps when traffic backs up.

(b) Safer and better bike and pedestrian access to transportation. Emphasize bike and pedestrian facilities in design and mitigation. Need pedestrian and bike friendly overpasses to tie communities back together.

(c) Safer bike/pedestrian access should be emphasized in design for neighborhood.

(d) A new pedestrian/bicycle trail/path connecting Bridgeton to the Expo Center MAX station.

(e) Improve the pedestrian condition of Killingsworth, per the planning work currently underway and led by the Portland Office of Transportation.

(f) Consider integrating I-5 improvements identified in the recently completed *Station Area Revitalization Strategy* into the long-range I-5 Partnership Plan. The strategy identifies the following improvements:

- A new Buffalo Street pedestrian/bicycle freeway crossing.
- Enhanced Killingsworth and Skidmore freeway crossings to make them more pedestrian

friendly (widened sidewalks, landscaping, benches, etc.).

- A possible freeway capping at the Killingsworth crossing.
- A new street crossing to connect Mississippi District (south of Skidmore).

(2) **Improve transit connections.**

(a) Develop better inter-neighborhood transportation in N/NE, for example, streetcars and other alternative modes.

(b) Need improved east-west transit through N/NE Portland to create better access to jobs, shopping, recreation, etc.

(c) Free bus passes to students up to age 22.

(3) **Manage traffic through better land use planning.**

(a) Coordinate land use and transportation to limit sprawl in Clark County and thereby reduce commuters through north Portland.

(4) **Improve congestion.**

(a) Eliminate bridge lifts.

III. Health and community services

A. Clark County

(1) **Improve access to health care and human services.**

(a) Reliable transportation is needed to medical / healthcare resources.

(b) Residents of low-income communities have less health insurance and access to health care.

(c) Consider supporting childcare and facilities in neighborhoods.

(d) Community resource centers could be built in neighborhoods.

(e) Provide easy access to senior community centers in the neighborhoods.

(2) **Improve education on health risks.**

(a) Education is needed on freeway-related health impacts for families within two miles of the corridor.

B. Portland

(1) **Improve access to health care for pulmonary problems.**

(a) Residents of low-income communities have less health insurance and access to health care.

(b) There needs to be consideration of air quality impacts so insurance community will pay for asthma as a long-term health issue.

(2) **Improve lead testing and education.**

(a) Test children and homes and educate to prevent lead poisoning.

IV. Environment

A. Clark County

(1) **Promote natural resource improvement.**

(a) Implement as community projects.

(b) Partner with organizations such as WSU on environmental stewardship.

(2) **Increase green spaces.**

(a) Plant more trees.

(b) Acquire green space.

B. Portland

(1) **Improve knowledge of air quality impacts.**

(a) Establish additional air quality monitoring stations along the freeway corridor.

(b) Study the cumulative effects of automobile and industrial emissions, including an assessment of how the emissions impact different age groups and pregnant and nursing women.

(c) Improved information on air quality will help people make informed choices and can be used to get DEQ to "dial down" impacts from industry; communicate and educate people.

(2) **Improve air quality now and during construction.**

(a) Make sure construction vehicles are up to air quality standards while they are building in the area.

(b) Have DOTs work with environmental agencies/transit to create incentives for reduction of air pollutants, e.g,. clean buses.

(3) **Treat runoff from impervious services.**

(a) Runoff control measures such as berms and swales to capture pollution before it goes into streams.

V. Property benefits

A. Clark County

(1) **Housing**

(a) Preserve low-income housing.

(b) Provide home enhancements, such as added insulation, to offset noise, air pollution, etc.

(c) For displaced families with attachments to home and neighborhood, consider moving houses to a vacant property in close location

B. Portland

(1) **Housing**

(a) Preserve low-income housing (incentive programs).

VI. Community building and livability

A. Clark County

(1) **Foster the ability of the low-income and minority communities to become more engaged in the community.**

(a) Promote capacity of low-income and minority groups to become involved in public discourse. Develop their capacity to be effective citizens and self advocates so they can be empowered to affect their quality of life.

- Possibly partner in outreach and education with Clark College and/or WSU Vancouver.
- Promote knowledge of government services (police, etc.), programs and policies intended to support the community.

(b) Promote and support community-action, community-betterment projects that improve the quality of the community, bring the community together, and educate. Examples cited include:

- Tree planting programs (such as the programs for disadvantaged youth sponsored by the Forest Service).
- Community art programs to represent the character of the community—with art by the community. This could be done in conjunction with sound wall design or light rail stations, and would promote pride and discourage graffiti
- Traffic calming signs made by kids.

(c) Public transportation fosters more interaction between diverse cultures and segments of the community.

(2) **Improve community connectivity and amenities.**

(a) Provide more connections across freeway for pedestrians, bikes, etc.

(b) Consider capping I-5 for connectivity and open space and to addresses noise/ pollution.

(c) Need more parks, gardens and greenspace.

(d) Improve aesthetics, such as with artwork on sound walls. Express the diversity and the unique feel of each neighborhood.

(3) **Strengthen schools and public education.**

(a) Mitigation could include support for schools along freeway, which are the most diverse and have some of the highest rates of poverty.

(b) Community-action projects described in the previous section could be organized through the schools and build on educational goals.

(4) **Create a mitigation fund.**

(a) Consider creation of a mitigation fund that could be used for community-led projects.

(b) Focus of any environmental justice mitigation should be on the EJ communities and households affected by any negative impacts.

B. Portland

(1) **Improve/add community amenities.**

(a) Plan for adding green space with project and improving the green and community spaces we have.

(b) Add libraries, lighting, drinking fountains, Saturday market, and micro-economic space.

(c) Public improvements along the Columbia Slough. The community has identified several priority projects in this area, including the 40-mile loop trail, canoe launch, etc.

(2) **Improve existing community resources.**

(a) Funding for Jefferson and Roosevelt school cluster (elementary-high school). These have the most diverse population, and values clash. Cultural center, day care, immigrant services.

(3) **Create a mitigation fund.**

(a) Consider creation of a mitigation fund, similar to the fund that ODOT established as mitigation for the west-side I-405, or the North Portland Trust Fund that Portland International Raceway (PIR) set up to mitigate for noise impacts.

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Outreach to Environmental Justice Communities during the EIS

A. Clark County

(1) **Improve community capacity to participate in process.**

(a) Many EJ communities do not understand their opportunities to be involved and affect the process.

(b) Potential of negative impacts could help mobilize and unite community to address the problem.

(2) **Apply environmental justice in its fullest sense.**

(a) Environmental Justice Executive Order refers only to low-income and minority, but Title 6 covers more. We need to consider elderly, disabled and non-English speaking.

(3) **No one approach will work for all. General tools could include:**

(a) Schools can be a source of disseminating information, but children may not, or in some cases should not (see #6 below), communicate back to parents.

(b) Local newspapers and newsletters specifically for targeted groups; media for non-English speaking community members cover the Portland/Vancouver area.

(c) Posters at local businesses catering to low-income and minority communities—grocers, restaurants, etc. (many located on 4th Plain Blvd.).

(d) Neighborhoods have been established for a long time and can assist in outreach (as a supplemental effort). Rosemere neighborhood translates newsletter in Spanish and Russian.

(e) C-TRAN has changed advertising policy and will now accept public service ads.

(4) **De-centralized methods of outreach are needed to reach low-income communities.**

(a) Poverty located all over Clark County, not centrally located. They are a significant part of most of the neighborhoods along the corridor.

(b) Large pockets in Hazel Dell and Mill Plain, 136th Avenue to 18th Street. Poor section of town is.

(c) Transients/homeless are mostly found in the area close to rail, transportation hub, and move around a great deal.

(d) Free/reduced lunches indicate the rate of poverty—55% of students in Vancouver schools can qualify for this program. Battle Ground and Evergreen have 30%.

(e) Head Start has 1,000 families. This number is only the ones they serve; know that there is a waiting list.

(f) May be able to contact through the schools.

(g) C-TRAN has changed advertising policy and will now accept public service ads.

(5) **Recognize diversity of non-English speaking groups.**

(a) Primary non-English speaking groups are:

- Eastern European— many languages but usually speak Russian.
- Hispanic.
- Vietnamese, Korean, Cambodian.

(b) Most of these are located around the I-5 corridor, because it is the cheapest area to live in.

(c) Schools along corridor have much diversity.

(d) Headstart students in Clark County: 16% is non-English speaking, 10% is Russian.

(e) Washington Elementary Schools: 23% Hispanic, 7% African American, 3% Asian American.

(6) **Establish culturally sensitive, community-based outreach programs.**

(a) Find out what methods are most effective for each cultural group.

(b) Materials should be culturally relevant.

(c) Some cultures (Hispanic and Eastern European) are leery of government, so approach needs to be non-threatening.

(d) Liaisons from the affected groups that speak their language are good resource.

(e) Programs for refugee placement may be a good way to communicate.

(f) Schools can be a way of disseminating information. Consider consulting students about the project, and recognize that for several ethnic groups, children should not be used as tools to translate to or reach parents, either because it is degrading to parent or it is an inappropriate role for the children.

(g) Minority and ethnic groups generally identify themselves as a Portland/Vancouver community. They do not draw a line at the river.

(7) **Reach Russian/Eastern European communities.**

(a) Schools are "the authority" —the best source of information about and to the community.

(b) Collaborate with the schools and existing community leaders.

(c) Do not go through the churches; they are sacred.

(d) Door-to-door approach works as long as you have an interpreter.

(e) Do not use children as interpreters.

(f) Post information at other agencies that serve these populations.

(g) Large Russian population goes to Clark College. Acceptable outreach there.

(h) Russians won't use celebrations to get information.

(8) **Reach Spanish-speaking communities.**

(a) More than 90% of the Hispanic community Spanish-speaking along I-5, near corridor for commuting to and from Oregon.

(b) 85% of Hispanic community is 1st generation with little to no English skills.

(c) 99% are below federal guidelines for poverty.

(d) Over 90% mono-language (Spanish only).

(e) Over 90% are intergenerational, so there are school-age children in most families.

(f) Focus is survival for today for family.

(g) Literature is not effective because most are not literate in English or Spanish.

(h) Radio is effective way to reach.

(i) Community meetings: won't share information, but will take information. Not considered public involvement.

(j) Don't use children as tools to reach them.

(k) Celebration of food / dancing good way to get large gathering.

(l) Transportation is issue to Hispanic. Majority of women and mothers do not drive.

(m)Hispanic newspaper, Portland resource.

(n) Use Cinco de Mayo celebration for outreach Hispanic

(9) **Reach the African-American community.**

(a) Use churches.

(b) Contact church leaders first.

(c) Use newsletters, such as NAACP newsletter.

(d) Portland / Vancouver economic status for African Americans about the same.

(e) Roosevelt Elementary greater population of African American immigration from Portland coming.

(10)**Reach the Asian American community.**

(a) Asian population low.

(b) Vietnam celebrations good.

(c) Korean church community.

(d) They keep a low profile, but are here.

(11)**Elderly and disabled access to the process.**

(a) Disabled/elderly depend on public transportation.

(b) Mentally ill population also ride buses and homeless in downtown and around servicing programs.

(12) **Partner with existing community groups that have established relationships with the EJ communities.**

(a) Consult/partner to determine best ways of reaching different groups. For example:

- SEA MAR
- Lutheran Family Services
- Catholic Family Services
- Eastern European Council
- Refugee Referral Program
- INR booklet – get this as a resource!
- Independent Living Resources (people with disabilities)
- Elderly: Talk to Vancouver housing authority. Also have data.
- Ombudsman
- Vancouver Office of Mediation (for data on neighborhoods conflict resolution process)
- YWCA Diversity Task Force
- Southwest Washington Medical Center, Marcia Maynard
- New American Social & Cultural Assistance (NASCA), Kim Le
- City of Vancouver Office of Neighborhoods
- Community Outreach Panel, Kim Kapp, City of Vancouver Police
- Minority Youth Leadership Program, Jessica Mata, Children's Home Society
- Clark County Cultural Competency Committee, Renata Rhodes
- Human Services Council in Vancouver, Community Information and Referral service
- SW Washington Health District, for data on the health of our community
- Bureau of Indian Affairs
- VHA—serves many disabled persons

B. Portland

(1) **Improve community capacity to participate in project.**

(a) Many EJ communities are aware but not confident enough to get involved.

(b) Build leadership in communities. Provide opportunities to learn about and develop skills in urban planning, transportation, social justice, environmental justice, and cross-cultural political involvement. Build leadership by experiencing projects—internships, etc. [People exhibited considerable enthusiasm for this suggestion in particular and gave it three stars even though no stars were given as a part of the process.]

(c) The project is too lengthy to keep neighborhood together. Get a community center meeting place open and start training before construction. It could provide technical training and a place for community togetherness. Have it follow through the process and open for people with information on the project.

(d) Help neighborhood associations with technical assistance and training improve ability to participate and to build leadership.

(2) **Establish culturally sensitive, community-based outreach program.**

(a) Hire community outreach workers who are bilingual, bicultural, etc.

(b) Partner with existing community groups (Schools Uniting Neighborhoods, EJAG, IRCO, Community Alliance of Tenants, etc.) to do outreach and get word out about the project.

(3) **Build community and one-on-one relationships.**

(a) More extensive outreach through building relationships. TV shows on public cable access as an example to get the dialogue started.

(b) Go to the places where people naturally gather to talk about the project rather that making them come to you, e.g., churches, grocery stores, community centers, laundromats.

(c) Partner with the Oregon Food Bank to put information in food baskets, or be there when people come to get baskets.

(d) Use door-to-door canvassing to reach residents. This could include community surveys to assess attitudes.

(e) Individual invitation to participate. Establish small but consistent relationships one-on-one.

(f) Participate in community fairs, e.g., Good in the Hood.

(4) **Have tangible, accessible displays.**

(a) Put models of the project in libraries so people can see what it would look like.

(b) Portable geographic information system (GIS) so information on designs, impacts and benefits can be presented at kiosks, community events, or door- to-door. Coordinate information with other projects to show full community impacts.

(c) Commission local artist to create a big, interactive, 3 dimensional, traveling display that could also get feedback and collect data.

(d) Take out interesting and interactive displays with a live person to discuss the issues.

(e) Have school kids participate in bridge design process. Get architects from the community to volunteer time to work with the kids. Involve kids from alternative schools too.

(5) **Make information and bureaucracy understandable.**

(a) Create glossary of terms.

(b) Need a matrix of all of the agencies/partners/community organizations/people that need to collaborate on this project.

(6) **Use community media to reach people.**

(a) Community media—Portland Cable access reader boards, KBOO, KMHD.

(b) Put together a program for cable access where they come to the community.

(c) Use the alternative and mainstream media to run stories, e.g., television, radio, newspapers.

(7) **Involve the community in decision-making.**

(a) Want to see people of color, small businesses, and the disadvantaged—people representative of people in the community on board from beginning to end.

(b) Continue to have the public involved in the project's organizational structure. For example there should be an overall public involvement group and an EJ public involvement group, and analysis group composed of residents should be considered.

(c) Task Force needs to hear from the community to present EJ issues to the community.

(8) **Ensure culturally sensitive communication with immigrant groups. Reach low income more regardless of their ethnic background, find creative ways.**

(a) The following are immigrant groups in N/NE Portland that may have language barriers: Russians, Hmong, Latino, and French-speaking West Africans. The City of Portland has a good model for outreach with these groups. Contact Bureau of Environmental Services.

(b) Experience indicates that many immigrant groups have a high distrust of government and that the most effective way to communicate with these residents is through one-on-one conversations. It is important also to have community leaders involved.

Attachment I

Promising Financing Sources

A summary of the promising financing sources for highway and transit improvements is presented below. More information about the sources follows, on pages I-2 through I-6.

Source	What can it be used for?
I. Federal revenue	
A. Federal High Priority Project Authorization	Highway capital
B. Federal Discretionary Earmark	Highway capital
C. New Starts Discretionary (Sec. 5307)	Transit capital
D. New Program Authorization	Highway and transit capital
II. State revenue	
A. State allocation of federal funds	Highway and transit capital
B. Gas tax, weight mile tax, and/or diesel tax	Highway capital
C. Vehicle Registration Fee	Highway capital
D. Tolls	Highway capital
E. Lottery funds, Oregon only	Transit capital
F. Transportation Reinvestment Account	Highway and transit capital
III. Regional / local revenue	
A. Regional allocation of federal funds	Highway and transit capital
B. Regional Vehicle Registration Fee, Oregon only	Highway capital
C. Regional Finance Authority, Washington only	Highway capital
D. Property tax	Highway and transit capital
E. Basic transit sales tax, Washington only	Transit operations and capital
F. High capacity transit sales tax, Washington only	Transit operations and capital
G. Motor vehicle excise, Washington only	Transit operations and capital
H. Payroll tax, Oregon only	Transit operations
I. Fare box revenues	Transit operations

I. Federal revenue sources

Source	What can it be used for?	Revenue potential	Notes	Currently authorized?	Popular vote needed?	Legislation needed?
A. Federal High Priority Project Authorization	Highway capital	Varies. See notes.	Projects are identified and authorized once every six years in the federal transportation bill. Most allocations are small. In the current bill, Oregon and Washington's largest project amounts were $19 M and $27 M, respectively.	Yes	No	Yes (federal)
B. Federal Discretionary Earmark	Highway capital	Varies. See notes.	Congress identifies projects every year. Amounts can vary. In Oregon, discretionary grants have ranged from $2 M/yr to $5 M/yr year over the last 4 years. Washington has received about $13 M per year over the last 4 years. Programs that have been earmarked in recent years include Borders and Corridors program, Intelligent Transportation Systems program, and the Bridge program.	Yes	No	Yes (federal)
C. New Starts Discretionary (Sec. 5307)	Transit capital	Varies. See notes.	Federal "new starts" funds available to build fixed guideway projects such as light rail and busway. Must be approved by FTA and by Congress. TriMet expects to receive about $70 M/yr in appropriations to fund light rail projects in the region. This is the maximum amount that the region can expect to receive today. The match ratio is about 60% federal to 40% local.	Yes	No	Yes (federal)
D. New Program Authorization	Highway and transit capital	Unknown	Establish new federal program targeted at major interstate facilities with multiple transportation issues: auto, freight, river navigation, railroad and aviation. Seek special authorities to establish public/private ventures.	No	No	Yes (federal, possibly state)

II. State revenue sources

Source	What can it be used for?	Revenue potential	Notes	Currently authorized?	Popular vote needed?	Legislation needed?
A. State allocation of federal funds	Highway and transit capital	Varies. See notes.	Each state receives a yearly allocation of federal funds for transportation projects. Oregon receives about $277 M/yr; Washington receives approximately $500 M/yr. There are a number of restrictions on the use of these funds, but in both states it would be possible to dedicate a portion of these funds over a period of years to improvements proposed for the I-5 Corridor. Special federal programs also allow for bonding of this revenue source.	Yes	No	No
B. Gas tax, weight mile tax, and/or diesel tax	Highway capital	Washington: 1-cent = $32 M/yr Oregon: 1-cent = $22 M/yr	Both Washington and Oregon support their freeway system through gas taxes and diesel or weight-mile taxes. The states share these revenues with cities and counties. In Washington, they are also used for ferries and special grant programs. A new 1-cent gas tax, with its equivalent diesel or weight mile tax, dedicated to projects statewide, could be bonded to raise $350 M in Washington and $250 M in Oregon. If Portland and Vancouver regions received a share based on population, this would result in approximately $21 M for Vancouver and $87 M for Portland.	Yes	No	Yes (state)
C. Vehicle registration fee	Highway capital	Washington: $5 = $27 M/yr Oregon: $5 = $20 M/yr	Oregon and Washington also support their freeway system through a vehicle registration fee. The states typically share these revenues with cities and counties. In Washington, they are also used for ferries and the Washington State Patrol. A new $5 vehicle registration fee, dedicated to projects statewide, could be bonded to raise $300 M in Washington and $230 M in Oregon. If Portland and Vancouver received a share of this revenue based on population, this would result in approximately $18 M for Vancouver and $80 M for Portland.	Yes	No	Yes (state)

II. State revenue sources (cont.)

Source	What can it be used for?	Revenue potential	Notes	Currently authorized?	Popular vote needed?	Legislation needed?
D. Tolls	Highway capital	$2/vehicle = $48 M/yr on I-5	The 1997 Oregon Legislature authorized a toll project on the interstate system in Portland. In Washington, the Washington Transportation Commission is already authorized to toll new bridges. Federal law allows tolls on bridges, provided that funds are used first for replacement/rehabilitation of the tolled bridge. Inflating the 1956 toll of $0.40 to today's dollars results in a $2.20/vehicle round-trip toll. Such a toll would raise about $48 M/yr in gross revenues. Net revenues would be somewhat lower. If bonded, this source could raise approximately $500 M.	Yes	Likely	Likely state and federal
E. Lottery funds (Oregon only)	Transit capital	Varies. See notes	The Oregon Legislature authorized $125 M in state match for Westside MAX. State will pay $10 M/yr between 2000 and 2010 in lottery funds to pay back bonds. Oregon Legislature also committed $35 M to Washington County commuter rail. Concept could be continued beyond 2010.	Yes	No	Yes (state)
F. Transportation reinvestment account	Highway and transit capital	$23 M/yr on transportation investment activity of $450 M/yr	Concept is to identify income tax revenue derived from transportation investment activity. It should only be applied to new revenue/expenditures. The "identified revenue" would then be included in the state budget as a General Fund allocation to transportation spending.	No	Unlikely	Yes (state)

III. Regional/local revenue sources

Source	What can it be used for?	Revenue potential	Notes	Currently authorized?	Popular vote needed?	Legislation needed?
A. Regional allocation of federal funds	Highway and transit capital	Varies. See notes.	Both Portland and Vancouver receive an annual allocation of federal funds for transportation projects. Vancouver receives approximately $6 M/yr, and Portland about $26 M/yr. In both states it would be possible to dedicate a portion of these funds over a period of years to improvements proposed for the I-5 Corridor. Special federal programs also allow for bonding of this revenue source.	Yes	No	No
B. Regional vehicle registration fee (Oregon only)	Highway capital	$15/yr = $20 M/yr	State law authorizes the Portland region to charge a vehicle registration fee for road projects in Multnomah, Washington and Clackamas counties. No such authority exists in Vancouver.	Yes	Yes	No
C. Regional Finance Authority (Washington only)	Highway capital	$15/yr = $20 M/yr	Authority for regional financing tools currently does not exist in Washington. The Legislature has been receptive to the concept for the Puget Sound area.	No	Yes	Yes (state)
D. Property tax	Highway and transit capital	Varies. See notes.	In both states with voter approval, a local property tax can be used to pay back bonds for capital debt.	Yes	Yes	No
E. Basic transit sales tax (Washington only)	Transit operations and capital	0.1% = $4 M/yr	C-TRAN has authority to issue a sales tax of up to 0.9% to fund basic transit operations and capital needs including bus service, park and ride lots, bus acquisitions, etc. C-TRAN is currently using 0.3% of this authority. An increase in this taxing authority requires voter approval.	Yes	Yes	No
F. High capacity transit sales tax (Washington only)	Transit operations and capital	0.1% = $4 M/yr	C-TRAN has the authority to issue a sales tax of up to 1% to fund the capital and operations of a high-capacity transit system. Voter approval is required. This taxing authority has not been used to date. Note: the law authorizing this taxing authority also provided that the county may use 0.1% of the 1% for law and justice.	Yes	Yes	No
G. Motor vehicle excise (Washington only)	Transit operations and capital	0.1% = $2 M/yr	C-TRAN has authority to issue a local motor vehicle excise tax of up to 0.8%. They are currently not using this authority. A popular vote would be required.	Yes	Yes	No

III. Regional/local revenue sources (cont.)

Source	What can it be used for?	Revenue potential	Notes	Currently authorized?	Popular vote needed?	Legislation needed?
H. Payroll tax (Oregon only)	Transit operations	0.1% = $22 M/yr	TriMet is using all of its legislature-approved authority. Would need additional authority from Oregon Legislature to increase the payroll tax.	Yes	No	Yes (state)
I. Fare box revenues	Transit operations	C-TRAN: 5-cent increase = $180K TriMet: 5-cent increase = $1.5 M	Voter approval is not needed to raise fares. This is done by action of the C-TRAN or TriMet board.	Yes	No	No

Glossary

Baseline 2020. Includes the funded projects in No Build 2020 and the projects listed in the Region's 20-year plans: widening I-5 to 3 lanes in each direction between Delta Park and Lombard in Portland, widening I-5 to 3 lanes in each direction between 99th and I-205 in Vancouver, the West Hayden Island Bridge, increased basic transit service throughout the Region, increased TDM/TSM throughout the Region, and other transit and highway capital projects outside the I-5 Corridor that are planned but unfunded.

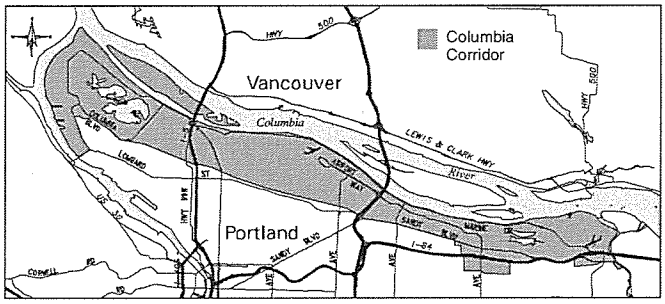
BIA. Bridge Influence Area.

Bridge Influence Area. The I-5 Corridor between Columbia Boulevard in Portland and SR 500 in Vancouver. Includes light rail between the Expo Center in Portland and Downtown Vancouver. See Attachment B.

BSNF. Burlington Northern and Santa Fe Railway Company.

CO. Carbon monoxide. A colorless, odorless, poisonous gas. Vehicular emissions are a major source.

Columbia Corridor. See map.



EA. Environmental Assessment.

EIS. Environmental Impact Statement.

Express Bus / 3 Lanes Option Package. Includes the connection of the express bus service in Clark County with the Portland metropolitan LRT system. Also includes a new supplemental I-5 bridge for express bus, HOV, and vehicular traffic.

Express Bus / 4 Lanes Option Package. Includes widening I-5 to add a fourth lane in each direction between 134th in Clark County and the Fremont Bridge in Portland that would operate as an HOV lane during peak periods. Also includes connecting express bus service in Clark County with the Portland metropolitan LRT system.

HOV. High occupancy vehicle.

I-5 Trade Corridor. See map, page 1.

JPACT. Joint Policy Advisory Committee on Transportation. Makes recommendations to Metro.

Light Rail / 3 Lanes Option Package. Development of an LRT system in Clark County connecting to the Portland metropolitan LRT system along I-5 and I-205. Also includes a new supplemental Columbia River bridge. Two variations of the bridge have been studied: (1) a joint-use bridge for LRT and motor vehicle traffic and (2) an LRT-only bridge.

Light Rail / 4 Lanes Option Package. Development of an LRT system in Clark County connecting to the Portland metropolitan LRT system along I-5 and I-205. Also includes adding a fourth lane in each direction along I-5 from 134th Street in Clark County to the Fremont Bridge in Portland for HOV, express lanes, or freight use.

LRT. Light rail transit.

MAX. Metropolitan Area Express is TriMet's light rail system and serves the greater Portland metropolitan area.

NEPA. National Environmental Policy Act.

New West Arterial Road Option Package. Includes a new arterial road along the existing railroad corridor and N. Portland Road between Mill Plain Boulevard in Vancouver and US 30 in Portland.

No Build 2020. Includes these currently funded projects: construction of Interstate MAX light rail from the Rose Garden to the Expo Center in Portland, widening I-5 to three lanes in each direction between 99th and Main in Vancouver, and other transit and highway projects outside the I–5 Corridor that have funding for construction over the next four to six years.

NOx. Nitrogen oxides. Vehicular emissions are a major source. Can cause respiratory problems.

ODOT. Oregon Department of Transportation.

Option Packages. The sets of improvements evaluated by the Task Force: Express Bus/3 Lanes, Light Rail /3 Lanes, Express Bus/3 Lanes, Light Rail /4 Lanes, and West Arterial.

RTC. Regional Transportation Council.

SR. State Route.

SOV. Single occupancy vehicle.

TDM. Transportation demand management. Purpose is to reduce, shorten or eliminate auto trips. Includes increasing number of persons per vehicle, influencing the time of or need to travel, the use of transit, carpooling, vanpooling, telecommuting, compressed work weeks, and flexible work schedules.

Transit. Public transportation system for moving passengers, for example, bus, light rail, streetcar.

TSM. Transportation system management. The purpose is to increase efficiency.

UP. Union Pacific Railway Company.

VMT. Vehicle miles traveled.

VOC. Volatile organic compound. Vehicular emissions are a major source. Can cause respiratory problems.

WSDOT. Washington State Department of Transportation.

BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF ADOPTING THE LAND USE FINAL ORDER ESTABLISHING THE LIGHT RAIL ROUTE, STATIONS, LOTS AND MAINTENANCE FACILITIES AND THE RELATED HIGHWAY IMPROVEMENTS FOR THE SOUTH/NORTH LIGHT RAIL PROJECT	RESOLUTION NO. 98-2673 Introduced by: Ed Washington, South/North LUFO Steering Committee Chair

WHEREAS, The Oregon Legislature enacted Oregon Laws 1996, Chapter 12 (the Act) establishing procedures for siting the South/North Light Rail Project through adoption by the Metro Council of a Land Use Final Order (LUFO) following application by Tri-Met; and

WHEREAS, In accordance with Section 4 of the Act, the Oregon Land Conservation and Development Commission adopted the South/North Project land use final order criteria on May 30, 1996 following a public hearing; and

WHEREAS, The Act requires that Tri-Met apply to the Metro Council for a LUFO for the South/North Light Rail Project following its receipt of recommendations from the LUFO Steering Committee and the Oregon Department of Transportation (ODOT); and

WHEREAS, On June 5, 1998, the LUFO Steering Committee recommended to Tri-Met a LUFO that establishes a light rail route, stations, lots and maintenance facilities, and highway improvements for the South/North Project; and

WHEREAS, On June 8, 1998, in a letter to the Tri-Met Board from Kay Van Sickel, ODOT Region 1 Manager, ODOT recommended to Tri-Met the same LUFO for the South/North Light Rail Project as was recommended by the LUFO Steering Committee; and

WHEREAS, On July 2, 1998, following consideration of the recommendations from the LUFO Steering Committee and ODOT, Tri-Met submitted to Metro its application for a LUFO establishing the light rail route, stations, lots and maintenance facilities, and the highway improvements for the South/North Project, including their locations, as provided for in Section 6(1)(a) of the Act; and

WHEREAS, Tri-Met's applied-for locations are in the form of boundaries within which the light rail route, stations, lots and maintenance facilities and the highway improvements shall be located, as provided for in Section 6(1)(a) of the Act, and

WHEREAS, Following receipt of Tri-Met's application, public notice of a July 23, 1998 public hearing to consider Tri-Met's application was published on July 6, 1998 in *The Oregonian*, which the Metro Council finds to be a newspaper of general circulation within Metro's jurisdictional area, with the notice being published more than 14 days prior to the July 23, 1998 public hearing; and

WHEREAS, The above identified notice included the information required by Section 7(1)(b) of the Act to be included in the Metro Council's published notice of this LUFO adoption proceeding; and

WHEREAS, The Metro Council provided additional public notice of the July 23, 1998 public hearing by mailing a newsletter with information about the public hearing to the approximately 14,000 addresses on Metro's South/North mailing list, consisting of persons who have indicated an interest in the South/North

Project, and by mailing postcard-type notice to owners of property in close proximity to the proposed alignment (the first two to three parcels or approximately 100 feet from the proposed improvements); and

WHEREAS, Additional public notice of the July 23, 1998 public hearing was mailed to Clackamas and Multnomah Counties; the Cities of Milwaukie, Portland, Gladstone and Oregon City; and the Oregon Department of Transportation; and

WHEREAS, The Metro Council determines and finds that the above described published notice required by the Act, together with the newsletter notice and the mailed notice to persons who own property in close proximity to the proposed project improvements are, in its judgment, reasonably calculated to give notice to persons who may be substantially affected by its decision on Tri-Met's application; and

WHEREAS, On July 16, 1998, a copy of the staff report, identifying and addressing compliance with the applicable South/North land use criteria and also including a description of the proposed boundaries within which the light rail route, stations, lots, maintenance facilities and highway improvements are proposed to be located, was made available for public inspection; and

WHEREAS, On July 23, 1998, the Metro Council held a public hearing at which it accepted oral and written public testimony on Tri-Met's application for a LUFO as described in these recitals; and

WHEREAS, At that July 23, 1998 public hearing, the Metro Council commenced the hearing by making a statement containing the information identified in Section 7(3) of the Act; and

WHEREAS, The Metro Council has considered Tri-Met's application, the recommendations of the LUFO Steering Committee and ODOT, the staff report, and the testimony provided in support or in opposition to Tri-Met's application; and

WHEREAS, A variety of Metro policy documents include reference to the South/North Project such as the *Regional Transportation Plan* (RTP) and the *Regional Urban Growth Goals and Objectives* (RUGGOs), that will need to be amended to be consistent with the Land Use Final Order; and

WHEREAS, On July 23, 1998, the Metro Council adopted Resolution No. 98-2674 that approved the South/North Locally Preferred Strategy (LPS) with which the South/North Land Use Final Order is consistent; now, therefore,

BE IT RESOLVED:

1. That the Metro Council hereby adopts the Land Use Final Order for the South/North Light Rail Project, attached hereto as Exhibit A and incorporated herein by this reference, establishing the light rail route, stations, lots and maintenance facilities, and the highway improvements for the South/North Project, including their locations. As indicated in Exhibit B, attached hereto and incorporated herein by this reference, the South/North LUFO hereby adopted by the Metro Council is identical to the LUFO application submitted by Tri-Met.

2. That the Metro Council hereby adopts the Findings of Fact and Conclusions of Law in Support of a Land Use Final Order, attached hereto as Exhibit C and incorporated herein by this reference, as its written findings of fact demonstrating how the Metro Council's decisions in its adopted Land Use Final Order comply with the applicable review criteria.

3. That the Metro Council hereby states its intent to prepare amendments to Metro's *Regional Transportation Plan* and *Regional Urban Growth Goals and Objectives* and related documents to make those functional plans consistent with the LUFO adopted by this Resolution.

ADOPTED by the Metro Council this 23RD day of July, 1998.

Jon Kvistad, Presiding Officer

Approved as to Form:

Daniel B. Cooper, General Counsel

Attachments: Exhibit A -- Land Use Final Order
Exhibit B -- Tri-Met Application for South/North Land Use Final Order
Exhibit C -- Findings of Fact and Conclusions of Law in Support of a South/North Land Use Final Order

SK:lmk
98-2673.RES
7-8-98

South/North Transit Corridor Study

Adopted South/North Land Use Final Order

Volume 1

Metro Council

July 23, 1998

METRO

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TABLE OF CONTENTS
Volume One

Land Use Final Order for the South/North Light Rail Project

1. Introduction

This document constitutes the Land Use Final Order (LUFO) for the South/North Light Rail Project in accordance with Oregon House Bill 3478. This South/North LUFO, Volumes 1 and 2, were unanimously adopted by the Metro Council on July 23, 1998 in response to an application from Tri-Met that was unanimously adopted by the Tri-Met Board of Directors on July 1, 1995. Volume 1 of the South/North LUFO includes: 1) Metro Council Resolution #98-2673, which adopted the South/North LUFO; 2) a summary of the requirements of HB 3478, which regulated the adoption of the South/North LUFO; 3) a textual description of the South/North Project establishing the light rail route, stations, lots, maintenance facility and highway improvements for the South/North Project; 4) a description of the terms used in this LUFO; 5) maps establishing the boundaries within which the light rail route, stations, lots, maintenance facility and highway improvements for the South/North Project would be constructed; and 6) Tri-Met's South/North LUFO Application (which includes recommendations for the South/North LUFO from the South/North LUFO Steering Committee and the Oregon Department of Transportation). Volume 2 of this report includes the findings of fact for the Land Use Final Order addressing the criteria established by the Land Conservation and Development Commission.

2. Requirements of House Bill 3478

Pursuant to House Bill 3478, upon application by Tri-Met and following a public hearing held on July 23, 1998, the Metro Council hereby adopts this Land Use Final Order for the South/North Light Rail Project ("the Project") establishing the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, including their locations.

3. Establishment of Light Rail Route, Stations, Lots and Maintenance Facilities and Highway Improvements, Including their Locations

The Metro Council adopts the light rail route, stations, lots and maintenance facilities, and the highway improvements identified below. These light rail and highway facilities and improvements are identical to those for which Tri-Met requested Metro Council approval. Additionally, the Metro Council adopts the location boundaries for these light rail and highway facilities and improvements as illustrated in the attached maps, which are the same as the boundary maps attached to Tri-Met's application.

The attached boundary maps are generally drawn at a scale of one inch equals 400 feet. However, Tri-Met also has submitted a copy of these maps drawn at a scale of one inch equals 200 feet, to provide greater clarity as to the boundaries within which the light rail alignment and other light rail and highway facilities and improvements may be located without need to amend this Land Use Final Order. The Metro Council finds that, except for the difference in scale, these 200-scale maps are identical in all respects to the maps attached to this Land Use Final Order. The Metro Council further finds that these 200-scale maps provide greater clarity in deciding whether need exists to amend this Land Use Final Order.

In addition to the facilities and improvements authorized below, the Metro Council finds a need for approximately 1,100 additional park-and-ride spaces beyond those provided in this LUFO, to improve transit ridership. The determination of appropriate locations for these spaces will require further analysis and a LUFO amendment.

3.1 Clackamas Regional Center Segment

The Clackamas Regional Center Segment extends from the north side of the Clackamas Town Center mall in the vicinity of the existing transit center to approximately SE Harmony Road and SE Cedarcrest Drive.

The alignment begins with a terminus station at a reconfigured transit center on the north side of the Clackamas Town Center (CTC) mall. The alignment heads westward, crossing SE 82nd Avenue at grade, then turns southward onto SE 80th Avenue, crossing SE Harmony Road. From here, the alignment turns westward and passes through a study area including Clackamas Community College, the Oregon Institute of Technology and the North Clackamas Aquatic Park and extending west of SE Fuller Road. A master planning process resulting in a land use final order amendment will decide the location of the alignment as well as a station location and the configuration for an approximately 900-space structured and/or surface park-and-ride lot within this area. From the western end of this study area, the alignment then continues westward on the south side of SE Harmony Road to the vicinity of SE Cedarcrest Drive.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Clackamas Regional Center Segment attached to Tri-Met's application.

3.2 East Milwaukie Segment

The East Milwaukie Segment extends from SE Cedarcrest Drive at SE Harmony Road to just east of the Tillamook Branch rail line near Highway 224 at the southern portion of the north Milwaukie industrial area.

From the vicinity of SE Cedarcrest Drive, the alignment continues westward along the south side of SE Harmony Road, crossing over the UP rail line on a new structure to a station and approximately 1300-space structured and/or surface park-and-ride lot located in the vicinity of SE Linwood Avenue. The alignment proceeds westward south of SE Harmony Road, crossing SE Harmony Road diagonally at grade at the intersection of SE Harmony Road, SE Lake Road and SE International Way. It then continues westward, north of and generally parallel to Highway 224, to just east of the Tillamook Branch Line, with a station at SE Freeman Way.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the East Milwaukie Segment attached to Tri-Met's application.

3.3 Milwaukie Regional Center Segment

The Milwaukie Regional Center Segment extends northward from Highway 224 just east of the Tillamook Branch Line near the north Milwaukie industrial area to SE Tacoma Street in the City of Portland.

Starting from north of Highway 224 just east of the Tillamook Branch Line, the alignment crosses over the branch line on a structure, then crosses under Highway 224 and crosses SE Main Street at grade. It extends southward, generally parallel to and east of SE McLoughlin Boulevard, turning eastward north of SE Scott Street to a station and transit center located in the vicinity of the current vacant Safeway store. From the transit center, the alignment curves northward to the east of Kellogg Bowl. It then curves northeast and crosses under Highway 224 and the light rail alignment through a new underpass. North of Highway 224, the alignment makes a wide curve through the Heiberg garbage transfer station east of the Hanna Harvester site, and then extends northward parallel to and west of the Tillamook Branch and UP Main Line. A new connection of freight spur tracks to the Tillamook Branch Line will be constructed in the vicinity of SE Mailwell Drive and would cross the light rail alignment at grade. South of SE Ochoco Street is an alternative light rail vehicle operations and maintenance facility site. North of the Springwater Corridor and south of SE Tacoma Street, a station and an approximately 800-space structured park-and-ride lot will be located. The alignment then crosses over Johnson Creek on a bridge and under an existing span of the SE Tacoma Street overpass.

Highway improvements in this segment include the extension of SE 21st Avenue northward two blocks from SE Harrison Street and two cross streets connecting the extended SE 21st Avenue with SE Main Street.

The proposed boundaries within which the above-described light rail and highway improvements may be located are as illustrated on the boundary maps for the Milwaukie Regional Center Segment attached to Tri-Met's application.

3.4 McLoughlin Boulevard Segment

The McLoughlin Boulevard Segment extends from SE Tacoma Street to SE McLoughlin Boulevard at SE 20th Avenue.

From SE Tacoma Street, the alignment proceeds northward east of SE McLoughlin Boulevard between the roadway and the UP railroad. It proceeds past the Eastmoreland Golf Course, passing under SE Bybee Boulevard. A light rail station is located in the vicinity of SE Bybee Boulevard, with pedestrian access provided at the Bybee overcrossing. The alignment then continues northward east of McLoughlin Boulevard to the vicinity of SE 20th Avenue near the Brooklyn Rail Yard.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the McLoughlin Boulevard Segment attached to Tri-Met's application.

3.5 South Willamette River Crossing Segment

The South Willamette River Crossing Segment extends from SE McLoughlin Boulevard at SE 20th Avenue to the east side of SW Front Avenue at SW Harrison Street.

From SE 20th Avenue, the alignment separates from SE McLoughlin Boulevard and turns northward. North of SE McLoughlin Boulevard, the alignment proceeds north along the western boundary within Brooklyn Yard, to the east of parcels located between SE 18th Avenue and Brooklyn Yard, to a station in the vicinity of SE Holgate Boulevard. An alternative alignment would be just to the west of the western Brooklyn Yard property boundary between SE McLoughlin Boulevard and SE Holgate Boulevard. The alignment then continues northward along the west side of Brooklyn Yard to a station in the vicinity of SE Lafayette Street, with pedestrian access serving the east Brooklyn neighborhood via an overcrossing across the UP rail line. The area bounded by approximately SE Holgate Boulevard, SE 17th Avenue, SE Center Street, the east side of the light rail alignment to approximately SE Rhone Street, and a line bisecting Brooklyn Yard on the east has been identified for further study as a potential light rail vehicle operations and maintenance facility site. Designation of this site as an LRV operations and maintenance facility will require a land use final order amendment.

The alignment then continues in a northwesterly direction, crossing over SE Powell Boulevard on an elevated structure, paralleling the UP rail line. The alignment then crosses SE 12th and SE 11th Avenues at grade, with a station located at approximately SE 12th Avenue. From there, the alignment crosses the Darigold rail spur at grade, crosses under the existing McLoughlin Boulevard viaduct, then crosses the Oregon Pacific Railroad freight rail line and SE Water Avenue at grade, to a station located just south of OMSI. From the OMSI station, the alignment turns westward, crossing the Willamette River on a fixed span bridge with a vertical clearance of not less than 72 feet Columbia River Datum (CRD) and a horizontal clearance of approximately 200 feet. On the west bank of the Willamette River, the alignment continues along the north side of SW Moody Avenue, with a station located in the vicinity of SW River Parkway. The alignment then extends northwestward at grade, parallel to and north of SW Moody Avenue, turning northward parallel to SW Harbor Drive, then crossing SW Harbor Drive on an elevated structure landing at SW Front Avenue and SW Harrison Street.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the South Willamette River Crossing Segment attached to Tri-Met's application.

3.6 Downtown Portland Segment

The Downtown Portland Segment extends from SW Front Avenue at Harrison Street to the east end of the Steel Bridge.

From SW Front Avenue at SW Harrison Street, the alignment crosses SW Front Avenue at grade and continues westward in the median of SW Harrison Street between SW 1st and SW 4th Avenues, with a station located between SW 2nd and SW 3rd Avenues. From the corner of SW Harrison Street and

SW 4th Avenue, the alignment travels diagonally to connect the SW 5th and SW 6th Avenue couplet. A pair of station platforms is located in the Portland State University plaza area that is bordered by SW Harrison and SW Mill Streets and SW 4th and SW 6th Avenues.

From the PSU plaza, light rail extends northward on separate tracks located on SW 5th and SW 6th Avenues. The SW 5th Avenue track serves southbound MAX vehicles, while the SW 6th Avenue track serves northbound MAX vehicles. On both SW 5th and SW 6th Avenues, between SW Mill Street and SW Madison Street, the alignment is located within the road right-of-way. Automobile and bus access also is provided within this right-of-way. On SW 5th and 6th Avenues, stations are located in the vicinity of SW Jefferson Street. From north of SW Madison Street to West Burnside Street, the alignment is located in the center lane of SW 5th and SW 6th Avenues. On both SW 5th and SW 6th Avenues, stations are located between SW Taylor and Yamhill Streets, between SW Washington and SW Stark Streets, and in the vicinity of W Burnside Street.

North of West Burnside Street, the alignment continues across NW Glisan Street in the left lane of NW 5th and 6th Avenues, with buses and automobiles sharing the right lane. On NW 6th Avenue north of NW Hoyt Street, the alignment turns northeastward and crosses diagonally toward the corner of NW 5th Avenue and NW Irving Street. A station is located in the block containing this diagonal crossing. From approximately NW 5th Avenue and NW Irving Street, the alignment turns in a southeasterly direction at grade to a new ramp in the vicinity of NW Glisan Street that takes the alignment onto and over the Steel Bridge. On NW 5th Avenue, a station is located in the vicinity of NW Hoyt Street. From the station, the alignment rejoins the alignment serving NW 6th Avenue in the vicinity of NW Irving Street near NW 4th Avenue, then follows that alignment to and over the Steel Bridge.

There are no highway improvements proposed for this segment. There are no proposed changes to existing through traffic patterns on the existing transit mall.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Downtown Portland Segment attached to Tri-Met's application.

3.7 Eliot Segment

The Eliot Segment extends from the east end of the Steel Bridge to the Edgar Kaiser Medical Facility. From the east end of the Steel Bridge, the alignment moves to an at-grade station and transit center at the Rose Quarter. The alignment then passes under I-5 and turns northward following generally along the eastern edge of I-5, crossing over NE Weidler Street and NE Broadway Street. A station is located between NE Weidler and NE Broadway Streets. The alignment then continues in a northwesterly direction to N Flint Avenue, where it turns northward to N Russell Street. The alignment turns westward along N Russell Street, with a station on N Russell Street west of N Flint Avenue. The alignment continues westward along N. Russell Street to the east side of I-5, then turns northwestward generally following the east side of I-5. In the vicinity of N. Fremont Street, the alignment crosses over I-5 on a structure to a location near the Edgar Kaiser Medical Facility.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Eliot Segment attached to Tri-Met's application.

3.8 North Portland Segment

The North Portland Segment extends from the Edgar Kaiser Medical Facility to North Marine Drive.

From the station located at the Edgar Kaiser Medical Facility near I-5, the alignment runs northward west of and generally parallel to I-5 to just south of N Skidmore Street, where it jogs northwestward to a station in the vicinity of N Skidmore and N Montana. The alignment then returns to the west side of I-5 by jogging northeastward, crossing under N Going Street. The alignment continues along the west side of I-5 to an at-grade crossing of N Killingsworth Street. From here, the alignment continues northward through a study area generally bounded by N Killingsworth Street, N Interstate Avenue, N Lombard Street and I-5. A planning process resulting in a land use final order amendment will decide the location of the alignment as well as the locations of stations in the vicinities of N Killingsworth Street, N Portland Boulevard and N Lombard Street.

From the station in the vicinity of N Lombard Street, the alignment continues northward in the center of N Interstate Avenue to the vicinity of N Denver Avenue, with limited and controlled automobile and pedestrian crossings through this section. A station is located just south of the intersection of N Interstate Avenue and N Denver Avenue, between N Denver Avenue and N Fenwick Street. At N Denver Avenue, the alignment continues northward, east of N Denver Avenue, crossing over the Columbia Slough on a new bridge with a minimum vertical clearance of 34 feet CRD and a minimum horizontal clearance of 66 feet. The alignment then continues northward east of N Denver Avenue to a station in the vicinity of West Delta Park and Portland International Raceway near I-5. From here the track crosses above Highway 99 and then continues adjacent to N Expo Road between N Expo Road and I-5 to N Marine Drive, with a station near the Expo Center.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the North Portland Segment attached to Tri-Met's application.

3.9 Hayden Island Segment

The Hayden Island Segment extends from N Marine Drive to the Oregon/Washington state line at the Columbia River.

From the Expo Center, the alignment crosses over N Marine Drive, the North Portland Harbor and N Jantzen Street on a bridge structure. Over the North Portland Harbor the LRT span would have an approximate vertical clearance of 35 feet CRD and an approximate horizontal clearance of 215 feet. A station is located near N Jantzen Street. The alignment then crosses the I-5 ramps and continues northward towards the state line west of I-5, running onto a new bridge structure parallel to and at the same height as the Interstate Bridge.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Hayden Island Segment attached to Tri-Met's application.

4. Interpretation of Terms

For purposes of this Land Use Final Order, the Metro Council interprets the terms "light rail route," "stations," "lots," "maintenance facilities" and "highway improvements" to have the following meanings:

- ***"Light rail route"*** means the alignment upon which the light rail tracks will be located. The light rail route will be located on land to be owned by or under the operating control of Tri-Met.

- ***"Stations"*** means those facilities to be located along the light rail route for purposes of accessing or serving the light rail system. Stations include light rail station platforms; kiss-and-ride areas; bus transfer platforms and transit centers; vendor facilities; and transit operations rooms.

- ***"Lots"*** means those parking structures or surface parking lots that are associated with a station, owned by or under the operating control of either Tri-Met or another entity with the concurrence of Tri-Met, and intended primarily for use by persons riding transit or carpooling. Parking structures may include some retail or office spaces in association with the primary use.

- ***"Maintenance facilities"*** means those facilities to be located on land to be owned or controlled by Tri-Met for purposes of operating, servicing, repairing or maintaining the light rail transit system, including but not limited to light rail vehicles, the light rail tracks, stations, lots, and ancillary facilities and improvements. Maintenance facilities include maintenance facility access trackways; storage tracks for light rail vehicles; service, repair and maintenance shops and equipment; office facilities; locker rooms; control and communications rooms; transit district employee and visitor parking lots; and storage areas for materials and equipment and non-revenue vehicles.

- ***"Highway improvements"*** include new roads, road extensions or road widenings outside existing rights-of-way that have independent utility in themselves and are not needed to mitigate adverse traffic impacts associated with the light rail route, stations, lots or maintenance facilities.

Additionally, the Metro Council determines that implementation of the South/North LUFO under Sections 8(1)(a) and (b) of House Bill 3478, including the construction, operation and maintenance of the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, necessitates and requires development approval of certain associated actions and the permitting of certain associated or ancillary facilities or improvements. These associated actions or ancillary facilities or improvements generally are required: (1) to ensure the safe and proper functioning and operation of the light rail system; (2) to provide project access; (3) to improve traffic flow, circulation or safety in the vicinity of the Project; or (4) to mitigate adverse impacts caused to the adjoining roadway network resulting from the alignment, stations, lots or maintenance facilities.

For these reasons, the Metro Council determines that these actions, facilities or improvements are integral and necessary parts of the Project.

The Metro Council further determines that the associated actions and ancillary facilities or improvements for the South/North Project include, but are not limited to: ties, ballast, and other track support materials such as tunnels and bridges; modifications to existing tracks; retaining walls and noise walls; culverts and other drainage systems; traction electrification equipment including substations; light rail signals and communications equipment and buildings; lighting; station, lot and maintenance facility accesses, including road accesses, pedestrian bridges and pedestrian and bicycle accessways; roadway crossing protection; and the provision of pedestrian paths, bike lanes, bus stops, bus pullouts, shelters, bicycle storage facilities and similar facilities. They also include temporary LRT construction-related roadways, staging areas and road or lane closures; roadway reconstruction, realignment, repair, widening, channelization, signalization or signal modification, lane reconfiguration or reduction, addition or modification of turning lanes or refuges, modification of traffic circulation patterns, or other modifications or improvements that provide or improve project access, improve traffic flow, circulation or safety in the vicinity of the Project, facilitate or are necessary for the safe or proper functioning and operation of the Project, or are necessary to mitigate adverse traffic impacts created by the Project; modifications of private roadways adjoining the Project; permanent road, lane or access closures associated with and necessitated by the Project; and other associated actions or associated or ancillary facilities or improvements related to the Project.

5. South/North Land Use Final Order Boundary Maps

In accordance with provisions in HB 3478, the attached Land Use Final Order (LUFO) maps establish the boundaries within which the light rail route, stations, park-and-ride lots, operations and maintenance facilities, and the highway improvements for the South/North Project may be located without need to amend the LUFO.

All of the maps are printed from a common Geographic Information System data base. Three levels of detail are represented in the attached maps: 1) Figures 5.1-1 to 5.1-8b illustrate the boundaries of the project elements at the segment level; 2) Figures 5.2.2-1 to 5.2.5-3 provide selected detailed insets to the segment maps that separate out overlapping boundaries into individual maps for each project element (e.g. LRT route, station, etc.); and 3) Figures 5.3-1 to 5.3-25 illustrate the boundaries at the one inch equal 400 foot scale continuously along the LRT Alignment from south to north.

To assist with visual orientation, the maps show the alignments, options and stations studied within the DEIS that most closely correspond to the Locally Preferred Strategy recommendation. The maps generally show the existing property lines and major buildings to provide orientation and clarity with respect to the project facility locations.

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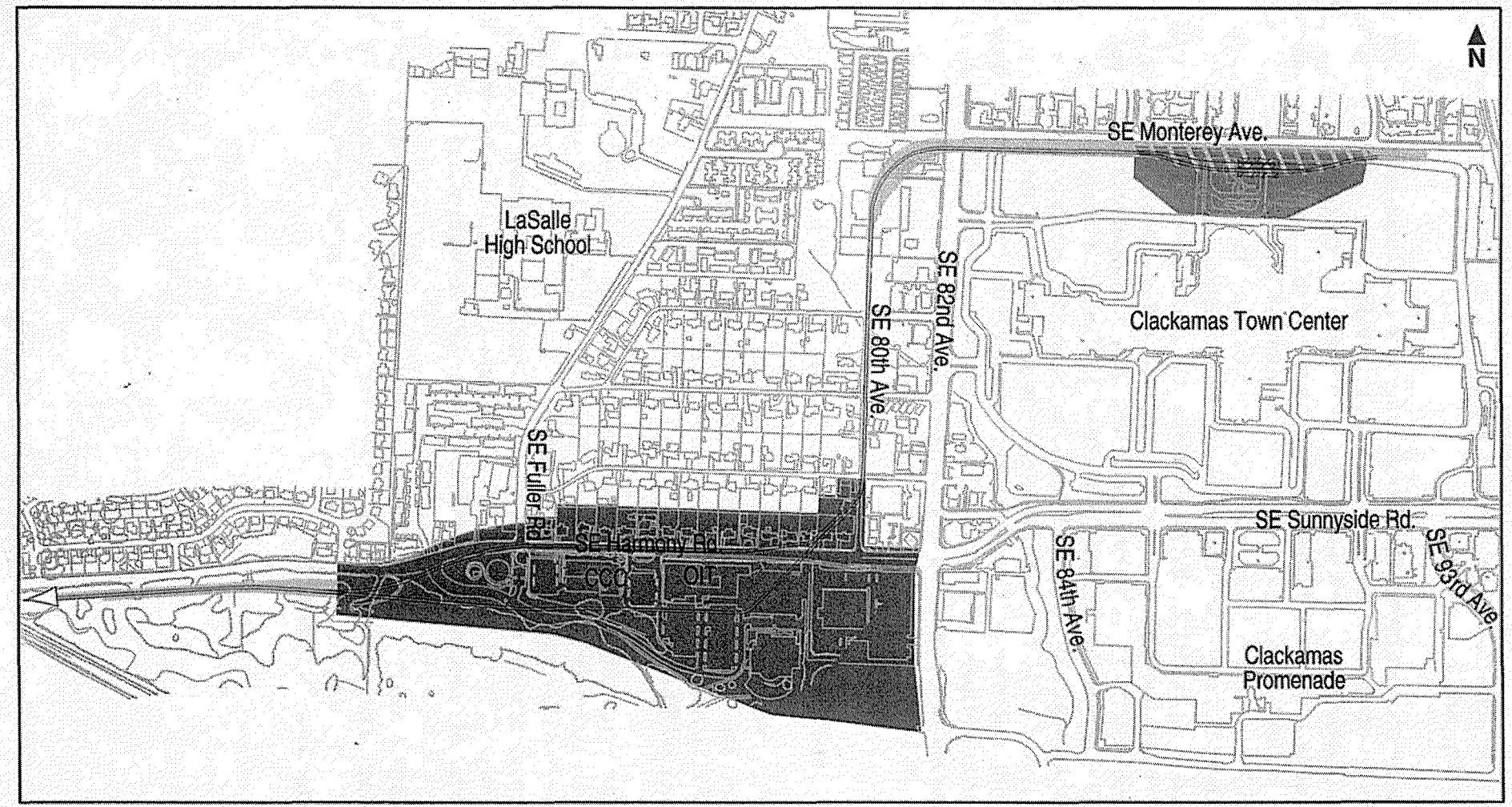


July 1998

South North
Transit Corridor Study

METRO

OIT/CCC Study Area

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

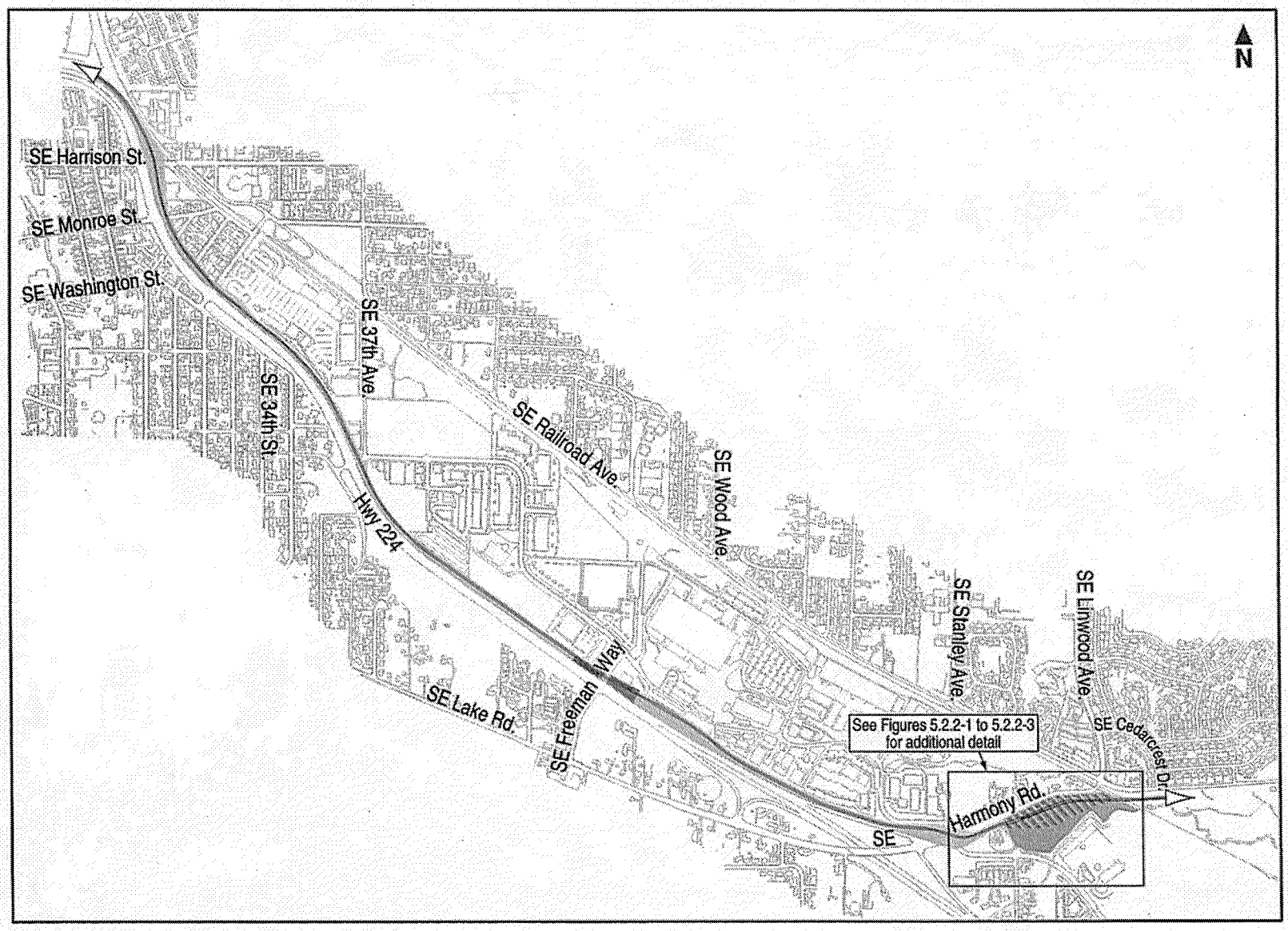
0 400 800
FEET

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

Figure 5.1-1

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation
Clackamas Regional Center Segment



Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 800 1600
FEET

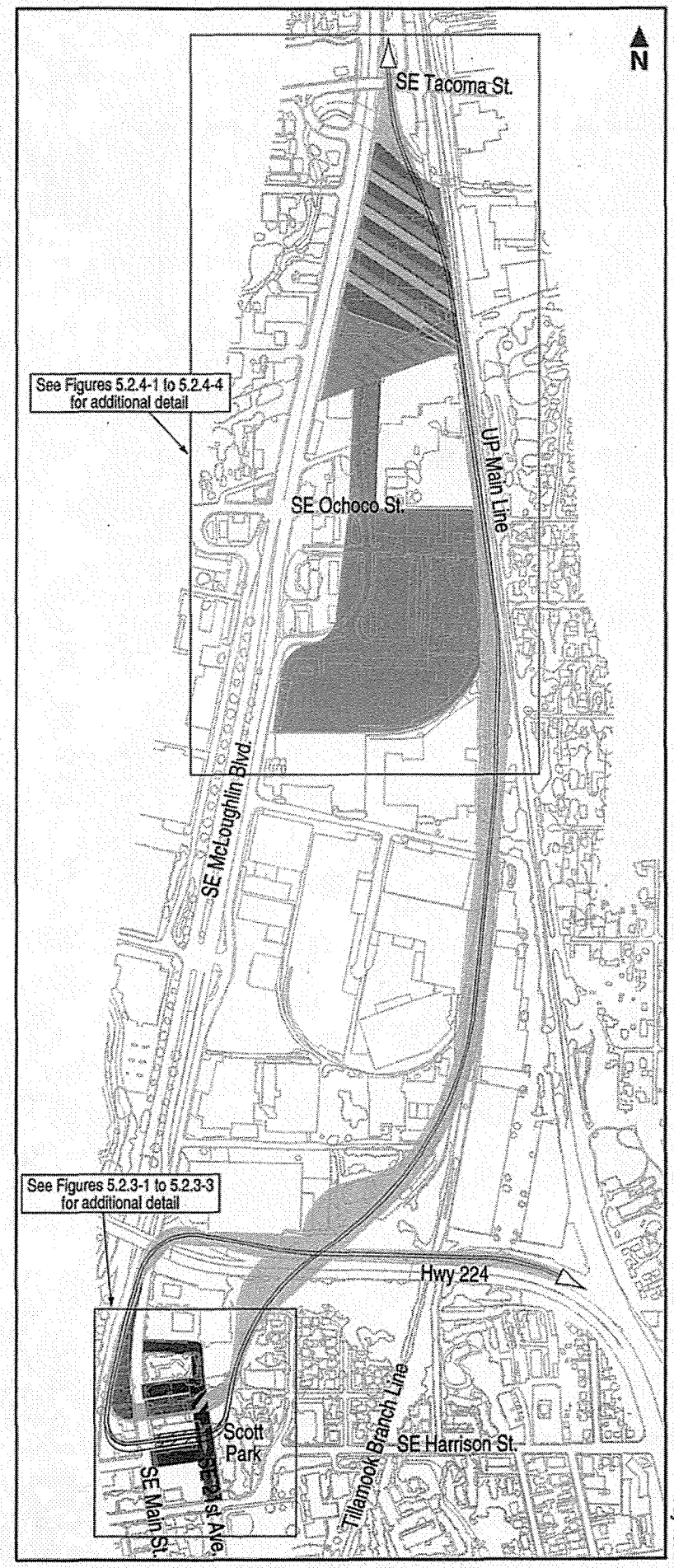
South North Transit Corridor Study

METRO

Figure 5.1-2

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation
East Milwaukie Segment



South North Transit Corridor Study

METRO

Figure 5.1-3

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation Milwaukie Regional Center Segment

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- Highway/Road Improvement
- DEIS Station Platform
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

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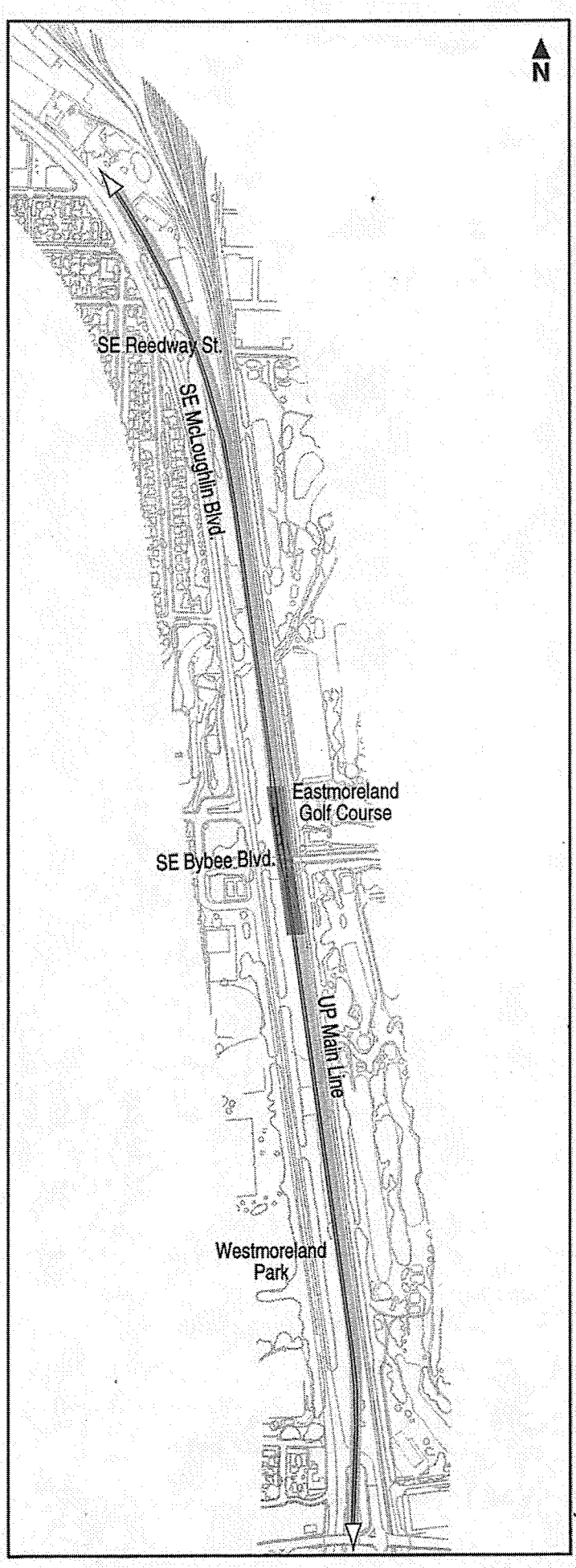
FEET



South North Transit Corridor Study

METRO

Figure 5.1-4

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation McLoughlin Boulevard Segment

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET

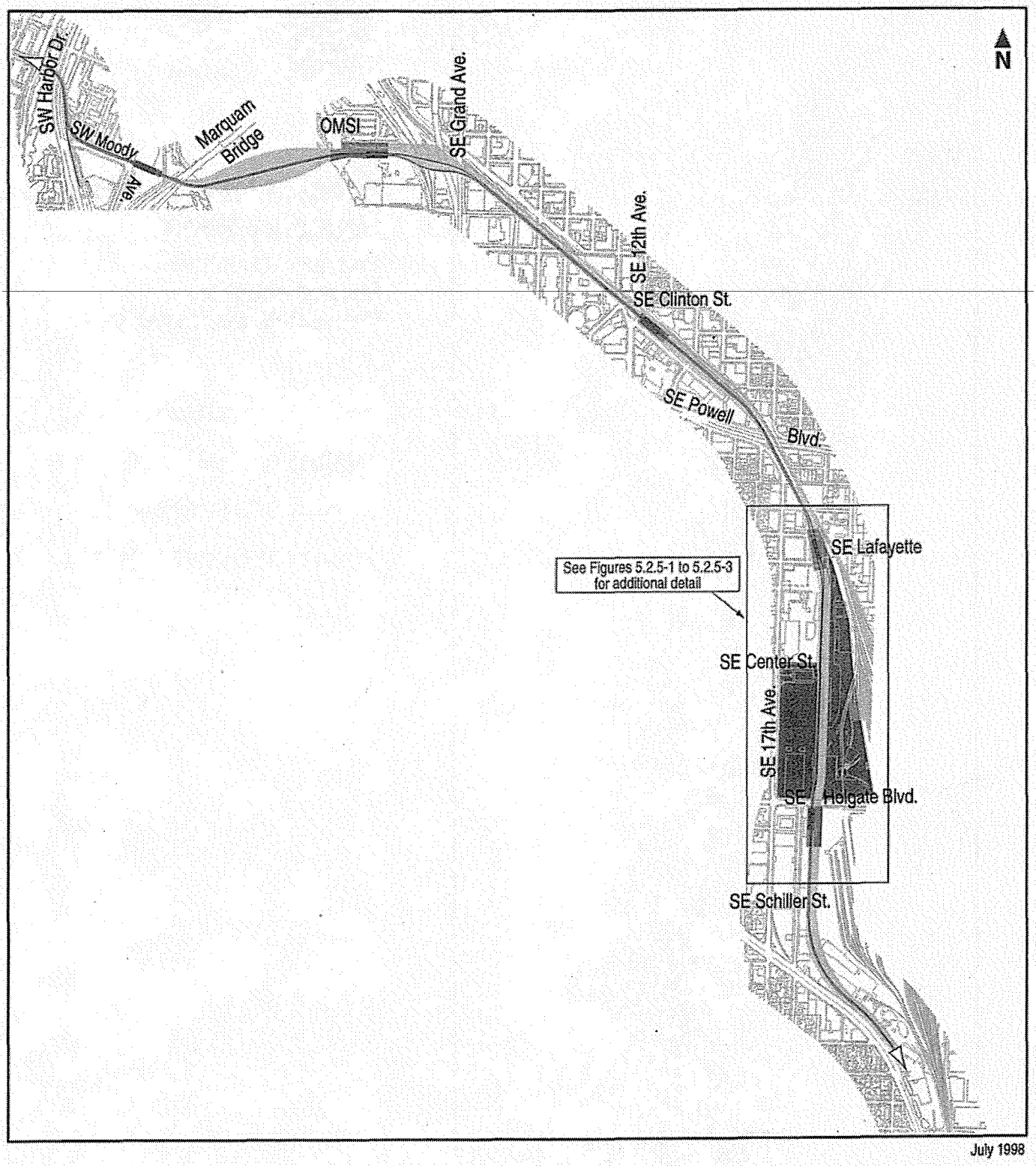


Figure 5.1-5

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation South Willamette River Crossing Segment

South North Transit Corridor Study

METRO

Light Rail Route

Light Rail Station

Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

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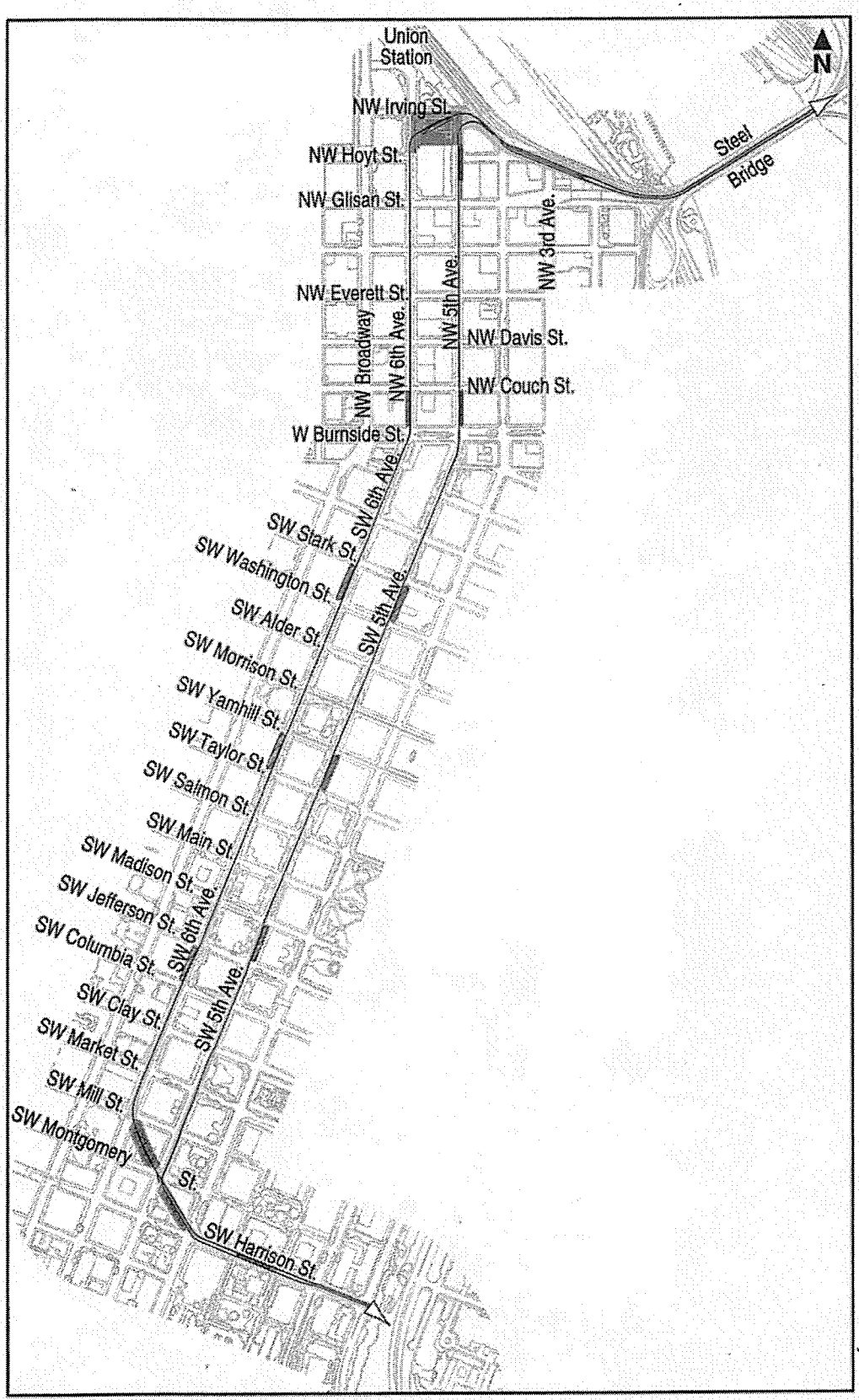
FEET



South North Transit Corridor Study

METRO

Figure 5.1-6

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation Downtown Portland Segment

Light Rail Route

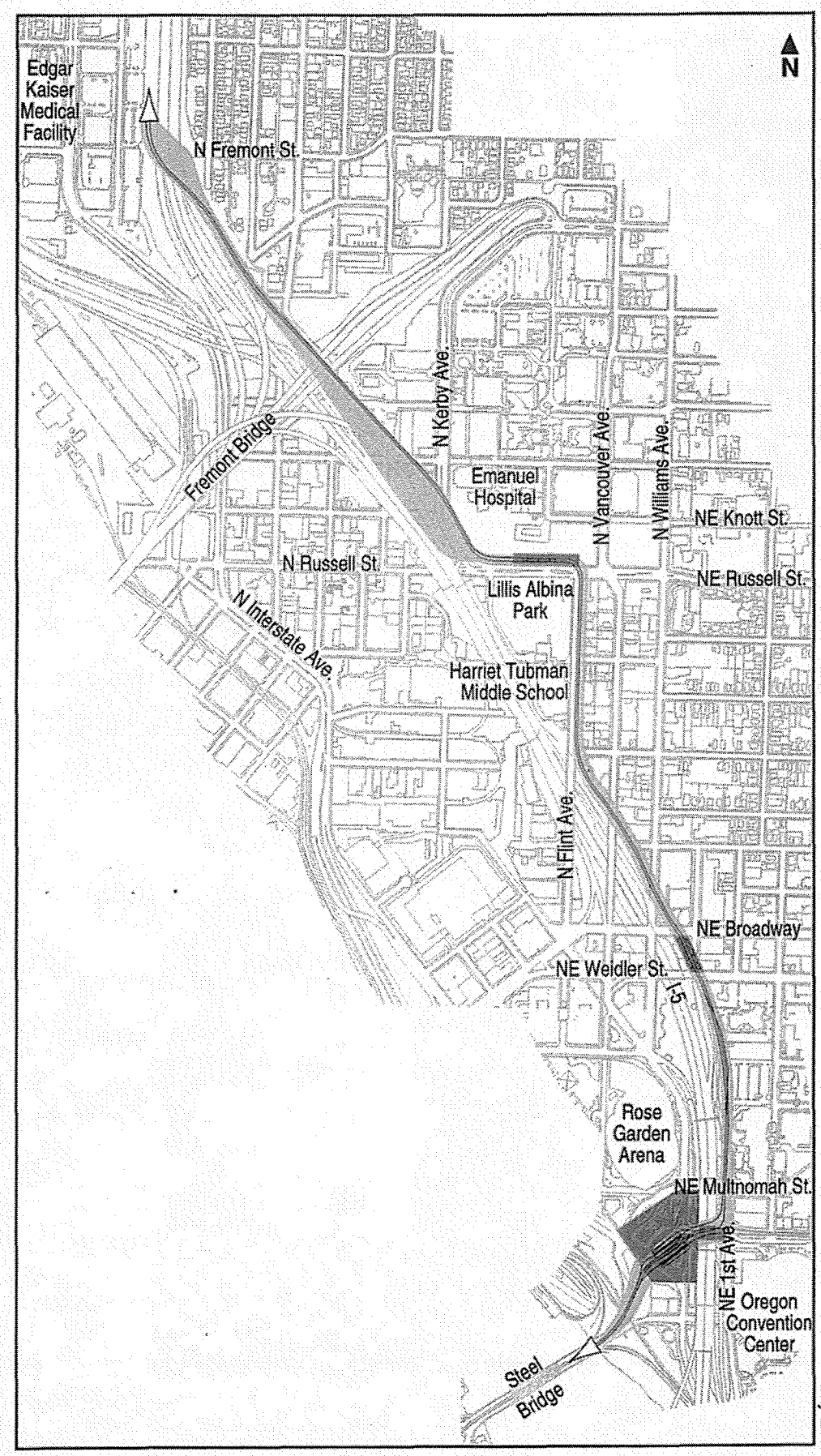
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



South North Transit Corridor Study

METRO

Figure 5.1-7

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation Eliot Segment

Light Rail Route

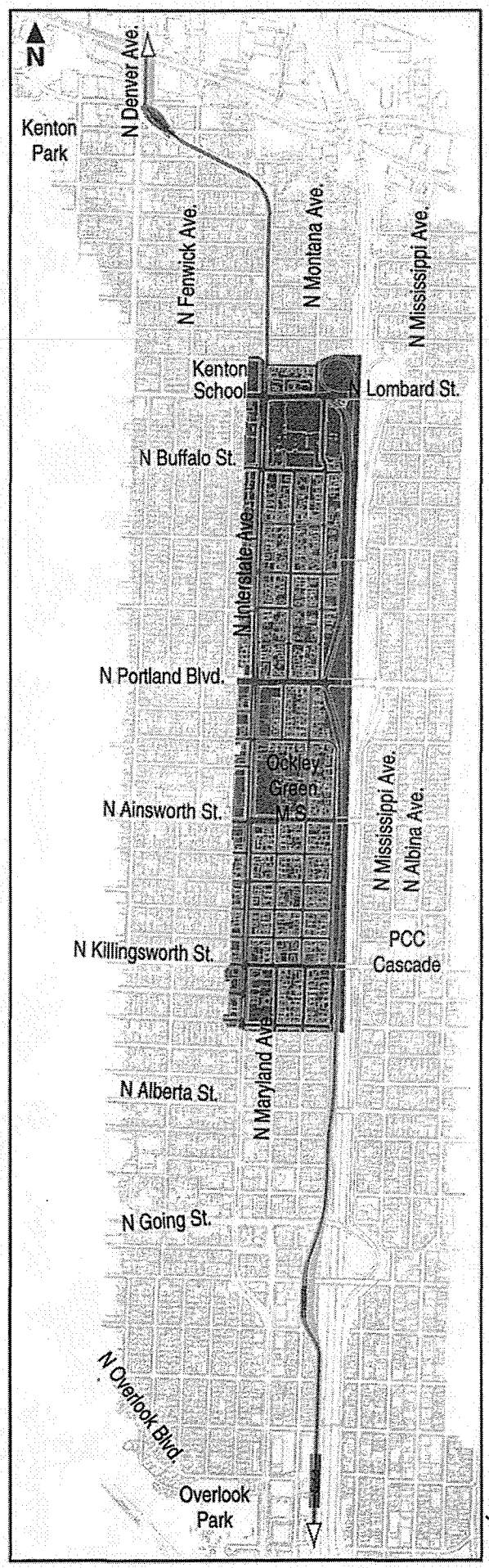
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



South North Transit Corridor Study

METRO

Figure 5.1-8a

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation North Portland Segment

- Light Rail Route
- Light Rail Station
- Crossover Study Area
- DEIS Station Platform
- DEIS Light Rail Route

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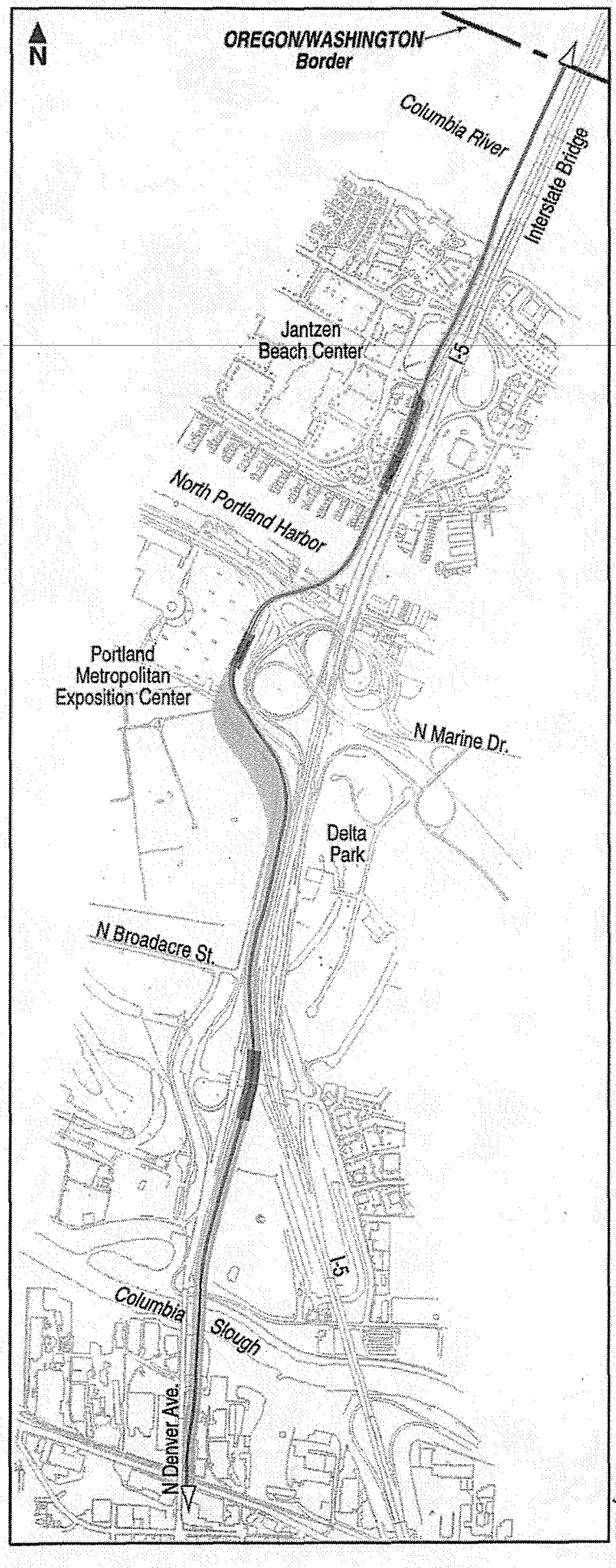
FEET



South North Transit Corridor Study

METRO

Figure 5.1-8b

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation North Portland Segment

Light Rail Route

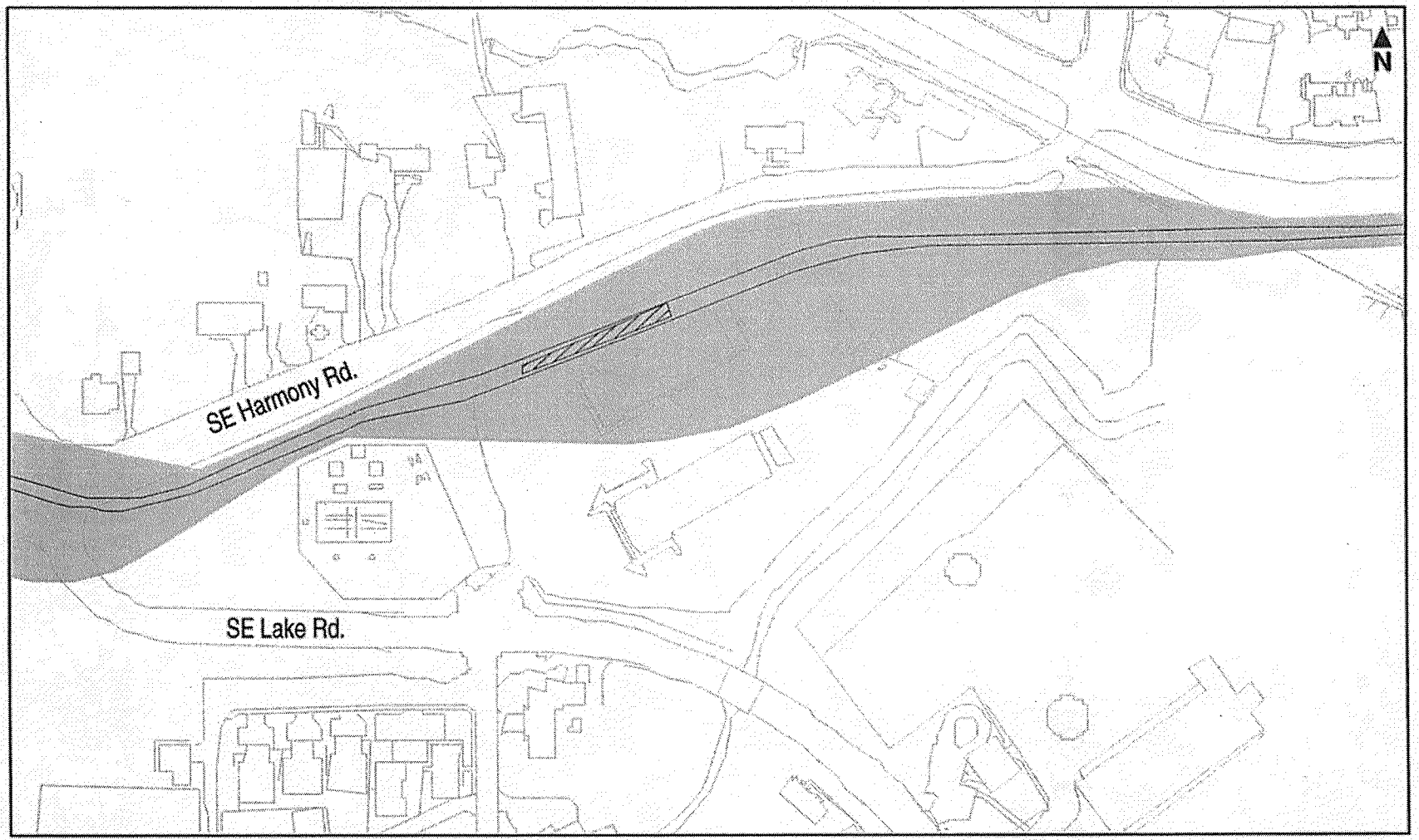
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 800 1600

FEET



July 1998

South North Transit Corridor Study

METRO

Figure 5.2.2-1

Adopted Land Use Final Order Boundary Maps:

Steering Committee Recommendation
East Milwaukie Segment

Light Rail Route

DEIS Station Platform

DEIS Light Rail Route

0 200 400
FEET

South/North Transit Corridor Study

South/North Land Use Final Order

Metro Council

Volume 1

July 9, 1998

METRO

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Metro Publication No. 1998-10130-TRN

TABLE OF CONTENTS

Land Use Final Order for the South/North Light Rail Project

1. Introduction

This document constitutes the Land Use Final Order (LUFO) for the South/North Light Rail Project in accordance with Oregon House Bill 3478.

2. Requirements of House Bill 3478

Pursuant to House Bill 3478, upon application by Tri-Met and following a public hearing held on July 23, 1998, the Metro Council hereby adopts this Land Use Final Order for the South/North Light Rail Project ("the Project") establishing the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, including their locations.

3. Establishment of Light Rail Route, Stations, Lots and Maintenance Facilities and Highway Improvements, Including their Locations

The Council adopts the light rail route, stations, lots and maintenance facilities, and the highway improvements identified below. These light rail and highway facilities and improvements are identical to those for which Tri-Met requested Council approval. Additionally, the Council adopts the location boundaries for these light rail and highway facilities and improvements as illustrated in the attached maps, which are the same as the boundary maps attached to Tri-Met's application.

The attached boundary maps are generally drawn at a scale of one inch equals 400 feet. However, Tri-Met also has submitted a copy of these maps drawn at a scale of one inch equals 200 feet, to provide greater clarity as to the boundaries within which the light rail alignment and other light rail and highway facilities and improvements may be located without need to amend this Land Use Final Order. The Council finds that, except for the difference in scale, these 200-scale maps are identical in all respects to the maps attached to this Land Use Final Order. The Council further finds that these 200-scale maps provide greater clarity in deciding whether need exists to amend this Land Use Final Order.

In addition to the facilities and improvements authorized below, the Council finds a need for approximately 1100 additional park-and-ride spaces beyond those provided in this LUFO, to improve transit ridership. The determination of appropriate locations for these spaces will require further analysis and a LUFO amendment.

3.1 Clackamas Regional Center Segment

The Clackamas Regional Center Segment extends from the north side of the Clackamas Town Center mall in the vicinity of the existing transit center to approximately SE Harmony Road and SE Cedarcrest Drive.

The alignment begins with a terminus station at a reconfigured transit center on the north side of the Clackamas Town Center (CTC) mall. The alignment heads westward, crossing SE 82nd Avenue at

grade, then turns southward onto SE 80th Avenue, crossing SE Harmony Road. From here, the alignment turns westward and passes through a study area including Clackamas Community College, the Oregon Institute of Technology and the North Clackamas Aquatic Park and extending west of SE Fuller Road. A master planning process resulting in a land use final order amendment will decide the location of the alignment as well as a station location and the configuration for an approximately 900-space structured and/or surface park-and-ride lot within this area. From the western end of this study area, the alignment then continues westward on the south side of SE Harmony Road to the vicinity of SE Cedarcrest Drive.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Clackamas Regional Center Segment attached to Tri-Met's application.

3.2 East Milwaukie Segment

The East Milwaukie Segment extends from SE Cedarcrest Drive at SE Harmony Road to just east of the Tillamook Branch rail line near Highway 224 at the southern portion of the north Milwaukie industrial area.

From the vicinity of SE Cedarcrest Drive, the alignment continues westward along the south side of SE Harmony Road, crossing over the UP rail line on a new structure to a station and approximately 1300-space structured and/or surface park-and-ride lot located in the vicinity of SE Linwood Avenue. The alignment proceeds westward south of SE Harmony Road, crossing SE Harmony Road diagonally at grade at the intersection of SE Harmony Road, SE Lake Road and SE International Way. It then continues westward, north of and generally parallel to Highway 224, to just east of the Tillamook Branch Line, with a station at SE Freeman Way.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the East Milwaukie Segment attached to Tri-Met's application.

3.3 Milwaukie Regional Center Segment

The Milwaukie Regional Center Segment extends northward from Highway 224 just east of the Tillamook Branch Line near the north Milwaukie industrial area to SE Tacoma Street in the City of Portland.

Starting from north of Highway 224 just east of the Tillamook Branch Line, the alignment crosses over the branch line on a structure, then crosses under Highway 224 and crosses SE Main Street at grade. It extends southward, generally parallel to and east of SE McLoughlin Boulevard, turning eastward north of SE Scott Street to a station and transit center located in the vicinity of the current vacant Safeway store. From the transit center, the alignment curves northward to the east of Kellogg Bowl. It then curves northeast and crosses under Highway 224 and the light rail alignment through a

new underpass. North of Highway 224, the alignment makes a wide curve through the Heiberg garbage transfer station east of the Hanna Harvester site, and then extends northward parallel to and west of the Tillamook Branch and UP Main Line. A new connection of freight spur tracks to the Tillamook Branch Line will be constructed in the vicinity of SE Mailwell Drive and would cross the light rail alignment at grade. South of SE Ochoco Street is an alternative light rail vehicle operations and maintenance facility site. North of the Springwater Corridor and south of SE Tacoma Street, a station and an approximately 800-space structured park-and-ride lot will be located. The alignment then crosses over Johnson Creek on a bridge and under an existing span of the SE Tacoma Street overpass.

Highway improvements in this segment include the extension of SE 21st Avenue northward two blocks from SE Harrison Street and two cross streets connecting the extended SE 21st Avenue with SE Main Street.

The proposed boundaries within which the above-described light rail and highway improvements may be located are as illustrated on the boundary maps for the Milwaukie Regional Center Segment attached to Tri-Met's application.

3.4 McLoughlin Boulevard Segment

The McLoughlin Boulevard Segment extends from SE Tacoma Street to SE McLoughlin Boulevard at SE 20th Avenue.

From SE Tacoma Street, the alignment proceeds northward east of SE McLoughlin Boulevard between the roadway and the UP railroad. It proceeds past the Eastmoreland Golf Course, passing under SE Bybee Boulevard. A light rail station is located in the vicinity of SE Bybee Boulevard, with pedestrian access provided at the Bybee overcrossing. The alignment then continues northward east of McLoughlin Boulevard to the vicinity of SE 20th Avenue near the Brooklyn Rail Yard.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the McLoughlin Boulevard Segment attached to Tri-Met's application.

3.5 South Willamette River Crossing Segment

The South Willamette River Crossing Segment extends from SE McLoughlin Boulevard at SE 20th Avenue to the east side of SW Front Avenue at SW Harrison Street.

From SE 20th Avenue, the alignment separates from SE McLoughlin Boulevard and turns northward. North of SE McLoughlin Boulevard, the alignment proceeds north along the western boundary within Brooklyn Yard, to the east of parcels located between SE 18th Avenue and Brooklyn Yard, to a station in the vicinity of SE Holgate Boulevard. An alternative alignment would be just to the west of the western Brooklyn Yard property boundary between SE McLoughlin Boulevard and SE Holgate Boulevard. The alignment then continues northward along the west side of Brooklyn Yard to a station in the vicinity of SE Lafayette Street, with pedestrian access serving the east Brooklyn

neighborhood via an overcrossing across the UP rail line. The area bounded by approximately SE Holgate Boulevard, SE 17th Avenue, SE Center Street, the east side of the light rail alignment to approximately SE Rhone Street, and a line bisecting Brooklyn Yard on the east has been identified for further study as a potential light rail vehicle operations and maintenance facility site. Designation of this site as an LRV operations and maintenance facility will require a land use final order amendment.

The alignment then continues in a northwesterly direction, crossing over SE Powell Boulevard on an elevated structure, paralleling the UP rail line. The alignment then crosses SE 12th and SE 11th Avenues at grade, with a station located at approximately SE 12th Avenue. From there, the alignment crosses the Darigold rail spur at grade, crosses under the existing McLoughlin Boulevard viaduct, then crosses the Oregon Pacific Railroad freight rail line and SE Water Avenue at grade, to a station located just south of OMSI. From the OMSI station, the alignment turns westward, crossing the Willamette River on a fixed span bridge with a vertical clearance of not less than 72 feet Columbia River Datum (CRD) and a horizontal clearance of approximately 200 feet. On the west bank of the Willamette River, the alignment continues along the north side of SW Moody Avenue, with a station located in the vicinity of SW River Parkway. The alignment then extends northwestward at grade, parallel to and north of SW Moody Avenue, turning northward parallel to SW Harbor Drive, then crossing SW Harbor Drive on an elevated structure landing at SW Front Avenue and SW Harrison Street.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the South Willamette River Crossing Segment attached to Tri-Met's application.

3.6 Downtown Portland Segment

The Downtown Portland Segment extends from SW Front Avenue at Harrison Street to the east end of the Steel Bridge.

From SW Front Avenue at SW Harrison Street, the alignment crosses SW Front Avenue at grade and continues westward in the median of SW Harrison Street between SW 1st and SW 4th Avenues, with a station located between SW 2nd and SW 3rd Avenues. From the corner of SW Harrison Street and SW 4th Avenue, the alignment travels diagonally to connect the SW 5th and SW 6th Avenue couplet. A pair of station platforms is located in the Portland State University plaza area that is bordered by SW Harrison and SW Mill Streets and SW 4th and SW 6th Avenues.

From the PSU plaza, light rail extends northward on separate tracks located on SW 5th and SW 6th Avenues. The SW 5th Avenue track serves southbound MAX vehicles, while the SW 6th Avenue track serves northbound MAX vehicles. On both SW 5th and SW 6th Avenues, between SW Mill Street and SW Madison Street, the alignment is located within the road right-of-way. Automobile and bus access also is provided within this right-of-way. On SW 5th and 6th Avenues, stations are located in the vicinity of SW Jefferson Street. From north of SW Madison Street to West Burnside Street, the alignment is located in the center lane of SW 5th and SW 6th Avenues. On both SW 5th

and SW 6th Avenues, stations are located between SW Taylor and Yamhill Streets, between SW Washington and SW Stark Streets, and in the vicinity of W Burnside Street.

North of West Burnside Street, the alignment continues across NW Glisan Street in the left lane of NW 5th and 6th Avenues, with buses and automobiles sharing the right lane. On NW 6th Avenue north of NW Hoyt Street, the alignment turns northeastward and crosses diagonally toward the corner of NW 5th Avenue and NW Irving Street. A station is located in the block containing this diagonal crossing. From approximately NW 5th Avenue and NW Irving Street, the alignment turns in a southeasterly direction at grade to a new ramp in the vicinity of NW Glisan Street that takes the alignment onto and over the Steel Bridge. On NW 5th Avenue, a station is located in the vicinity of NW Hoyt Street. From the station, the alignment rejoins the alignment serving NW 6th Avenue in the vicinity of NW Irving Street near NW 4th Avenue, then follows that alignment to and over the Steel Bridge.

There are no highway improvements proposed for this segment. There are no proposed changes to existing through traffic patterns on the existing transit mall.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Downtown Portland Segment attached to Tri-Met's application.

3.7 Eliot Segment

The Eliot Segment extends from the east end of the Steel Bridge to the Edgar Kaiser Medical Facility. From the east end of the Steel Bridge, the alignment moves to an at-grade station and transit center at the Rose Quarter. The alignment then passes under I-5 and turns northward following generally along the eastern edge of I-5, crossing over NE Weidler Street and NE Broadway Street. A station is located between NE Weidler and NE Broadway Streets. The alignment then continues in a northwesterly direction to N Flint Avenue, where it turns northward to N Russell Street. The alignment turns westward along N Russell Street, with a station on N Russell Street west of N Flint Avenue. The alignment continues westward along N. Russell Street to the east side of I-5, then turns northwestward generally following the east side of I-5. In the vicinity of N. Fremont Street, the alignment crosses over I-5 on a structure to a location near the Edgar Kaiser Medical Facility.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Eliot Segment attached to Tri-Met's application.

3.8 North Portland Segment

The North Portland Segment extends from the Edgar Kaiser Medical Facility to North Marine Drive.

From the station located at the Edgar Kaiser Medical Facility near I-5, the alignment runs northward west of and generally parallel to I-5 to just south of N Skidmore Street, where it jogs northwestward to a station in the vicinity of N Skidmore and N Montana. The alignment then returns to the west

side of I-5 by jogging northeastward, crossing under N Going Street. The alignment continues along the west side of I-5 to an at-grade crossing of N Killingsworth Street. From here, the alignment continues northward through a study area generally bounded by N Killingsworth Street, N Interstate Avenue, N Lombard Street and I-5. A planning process resulting in a land use final order amendment will decide the location of the alignment as well as the locations of stations in the vicinities of N Killingsworth Street, N Portland Boulevard and N Lombard Street.

From the station in the vicinity of N Lombard Street, the alignment continues northward in the center of N Interstate Avenue to the vicinity of N Denver Avenue, with limited and controlled automobile and pedestrian crossings through this section. A station is located just south of the intersection of N Interstate Avenue and N Denver Avenue, between N Denver Avenue and N Fenwick Street. At N Denver Avenue, the alignment continues northward, east of N Denver Avenue, crossing over the Columbia Slough on a new bridge with a minimum vertical clearance of 34 feet CRD and a minimum horizontal clearance of 66 feet. The alignment then continues northward east of N Denver Avenue to a station in the vicinity of West Delta Park and Portland International Raceway near I-5. From here the track crosses above Highway 99 and then continues adjacent to N Expo Road between N Expo Road and I-5 to N Marine Drive, with a station near the Expo Center.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the North Portland Segment attached to Tri-Met's application.

3.9 Hayden Island Segment

The Hayden Island Segment extends from N Marine Drive to the Oregon/Washington state line at the Columbia River.

From the Expo Center, the alignment crosses over N Marine Drive, the North Portland Harbor and N Jantzen Street on a bridge structure. Over the North Portland Harbor the LRT span would have an approximate vertical clearance of 35 feet CRD and an approximate horizontal clearance of 215 feet. A station is located near N Jantzen Street. The alignment then crosses the I-5 ramps and continues northward towards the state line west of I-5, running onto a new bridge structure parallel to and at the same height as the Interstate Bridge.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail improvements may be located are as illustrated on the boundary maps for the Hayden Island Segment attached to Tri-Met's application.

4. Interpretation of Terms

For purposes of this Land Use Final Order, the Metro Council interprets the terms "light rail route", "stations", "lots", "maintenance facilities" and "highway improvements" to have the following meanings:

- ***"Light rail route"*** means the alignment upon which the light rail tracks will be located. The light rail route will be located on land to be owned by or under the operating control of Tri-Met.

- ***"Stations"*** means those facilities to be located along the light rail route for purposes of accessing or serving the light rail system. Stations include light rail station platforms; kiss-and-ride areas; bus transfer platforms and transit centers; vendor facilities; and transit operations rooms.

- ***"Lots"*** means those parking structures or surface parking lots that are associated with a station, owned by or under the operating control of either Tri-Met or another entity with the concurrence of Tri-Met, and intended primarily for use by persons riding transit or carpooling. Parking structures may include some retail or office spaces in association with the primary use.

- ***"Maintenance facilities"*** means those facilities to be located on land to be owned or controlled by Tri-Met for purposes of operating, servicing, repairing or maintaining the light rail transit system, including but not limited to light rail vehicles, the light rail tracks, stations, lots, and ancillary facilities and improvements. Maintenance facilities include maintenance facility access trackways; storage tracks for light rail vehicles; service, repair and maintenance shops and equipment; office facilities; locker rooms; control and communications rooms; transit district employee and visitor parking lots; and storage areas for materials and equipment and non-revenue vehicles.

- ***"Highway improvements"*** include new roads, road extensions or road widenings outside existing rights-of-way that have independent utility in themselves and are not needed to mitigate adverse traffic impacts associated with the light rail route, stations, lots or maintenance facilities.

Additionally, the Council determines that implementation of the South/North LUFO under Sections 8(1)(a) and (b) of House Bill 3478, including the construction, operation and maintenance of the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, necessitates and requires development approval of certain associated actions and the permitting of certain associated or ancillary facilities or improvements. These associated actions or ancillary facilities or improvements generally are required (1) to ensure the safe and proper functioning and operation of the light rail system; (2) to provide project access; (3) to improve traffic flow, circulation or safety in the vicinity of the Project; or (4) to mitigate adverse impacts caused to the adjoining roadway network resulting from the alignment, stations, lots or maintenance facilities. For these reasons, the Council determines that these actions, facilities or improvements are integral and necessary parts of the Project.

The Council further determines that the associated actions and ancillary facilities or improvements for the South/North Project include, but are not limited to: ties, ballast, and other track support materials such as tunnels and bridges; modifications to existing tracks; retaining walls and noise walls; culverts and other drainage systems; traction electrification equipment including substations; light rail signals and communications equipment and buildings; lighting; station, lot and maintenance facility accesses, including road accesses, pedestrian bridges and pedestrian and bicycle accessways; roadway crossing protection; and the provision of pedestrian paths, bike lanes, bus stops, bus pullouts, shelters, bicycle storage facilities and similar facilities. They also include temporary LRT construction-related roadways, staging areas and road or lane closures; roadway reconstruction, realignment, repair, widening, channelization, signalization or signal modification, lane reconfiguration or reduction, addition or modification of turning lanes or refuges, modification of traffic circulation patterns, or other modifications or improvements that provide or improve project access, improve traffic flow, circulation or safety in the vicinity of the Project, facilitate or are necessary for the safe or proper functioning and operation of the Project, or are necessary to mitigate adverse traffic impacts created by the Project; modifications of private roadways adjoining the Project; permanent road, lane or access closures associated with and necessitated by the Project; and other associated actions or associated or ancillary facilities or improvements related to the Project.

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Attachment A to Exhibit A of Resolution No. 98-2673

South/North Land Use Final Order Boundary Maps

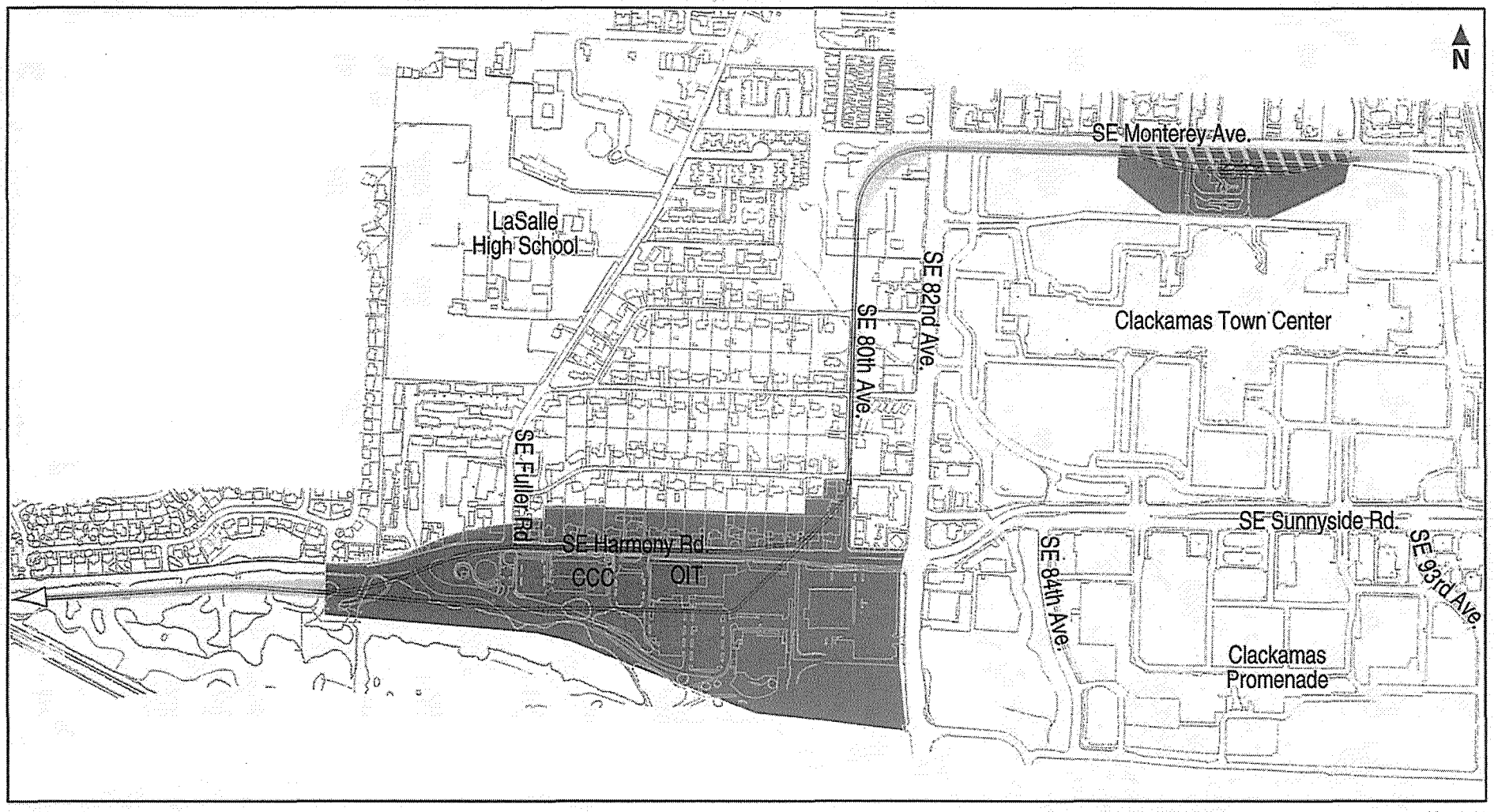
A.1 Introduction

In accordance with provisions in HB 3478, the attached Land Use Final Order (LUFO) maps establish the boundaries within which the light rail route, stations, park-and-ride lots, operations and maintenance facilities, and the highway improvements for the South/North Project may be located without need to amend the LUFO.

All of the maps are printed from a common Geographic Information System data base. Three levels of detail are represented in the attached maps: 1) Figures 1.1 to 1.8b illustrate the boundaries of the project elements at the segment level; 2) Figures 2.2.1 to 2.5.3 provide selected detailed insets to the segment maps that separate out overlapping boundaries into individual maps for each project element (e.g. LRT route, station, etc.); and 3) Figures 3.1 to 3.25 illustrate the boundaries at the one inch equal 400 foot scale continuously along the LRT Alignment from south to north.

To assist with visual orientation, the maps show the alignments, options and stations studied within the DEIS that most closely correspond to the Locally Preferred Strategy recommendation. The maps generally show the existing property lines and major buildings to provide orientation and clarity with respect to the project facility locations.

11300



May 1998

South North Transit Corridor Study

METRO

OIT/CCC Study Area

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

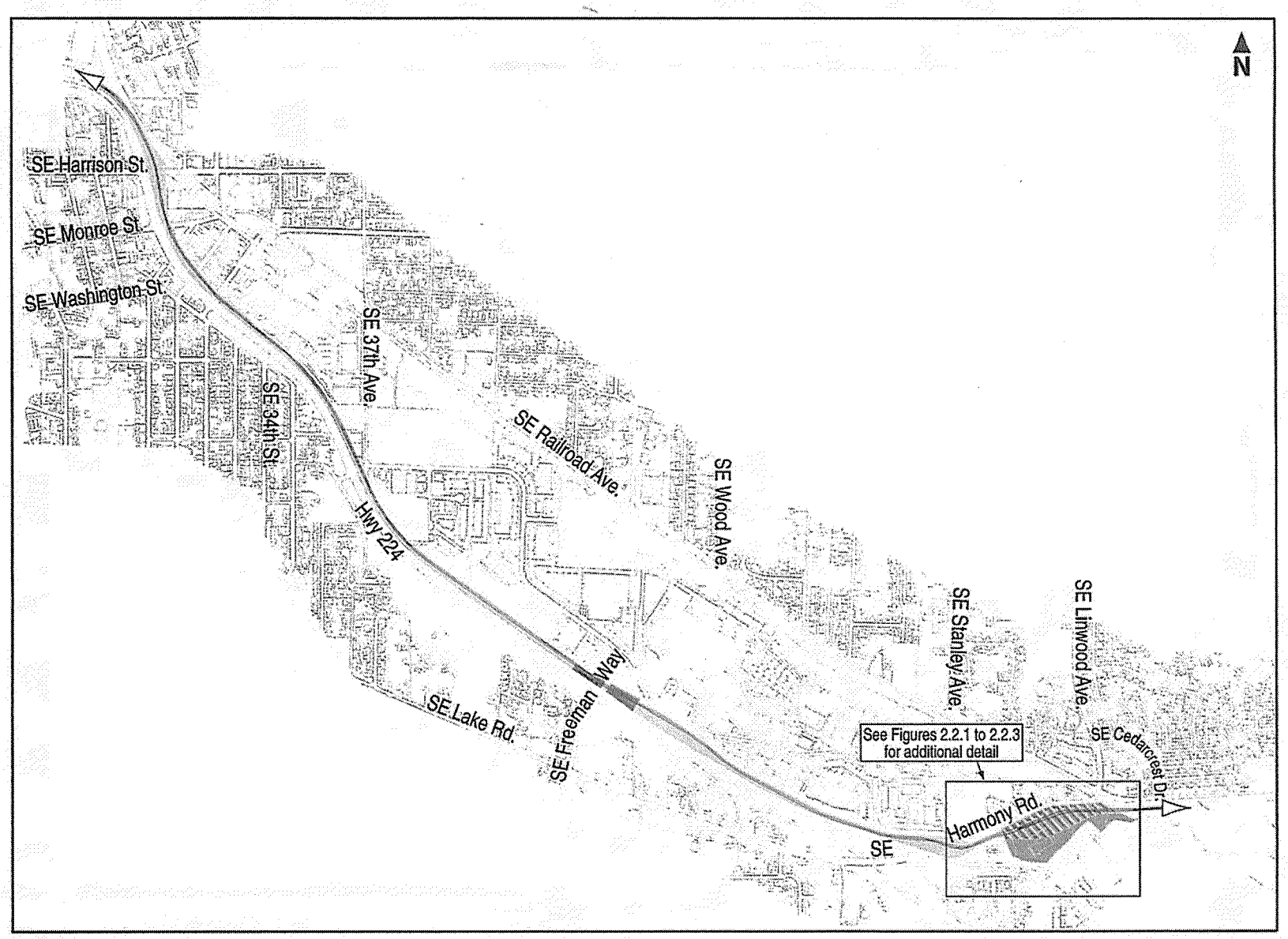
FEET

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

Figure 1.1

Land Use Final Order Boundary Maps:

Clackamas Regional Center Segment



May 1998

Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 800 1600
FEET

South North Transit Corridor Study

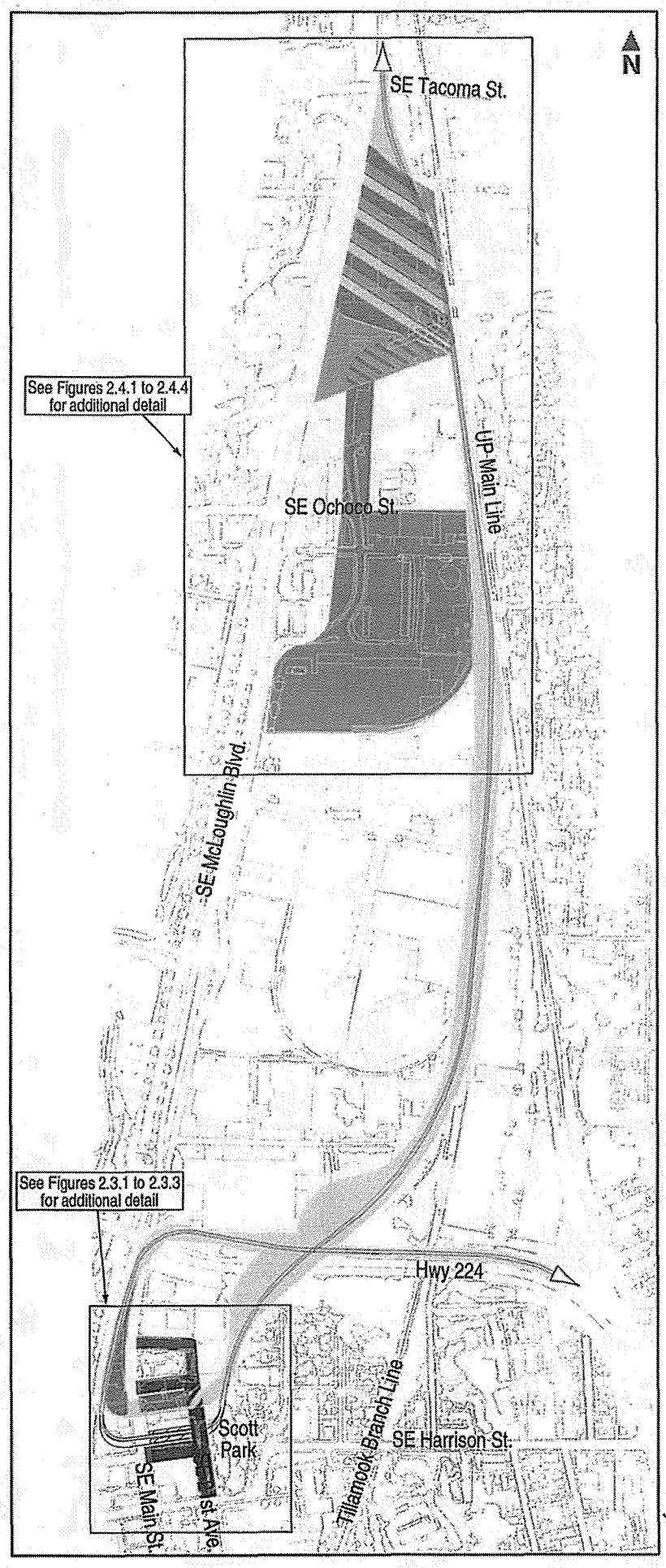
METRO

Figure 1.2

Land Use Final Order Boundary Maps:

East Milwaukie Segment

11301



South North Transit Corridor Study

METRO

Figure 1.3

Land Use Final Order Boundary Maps:

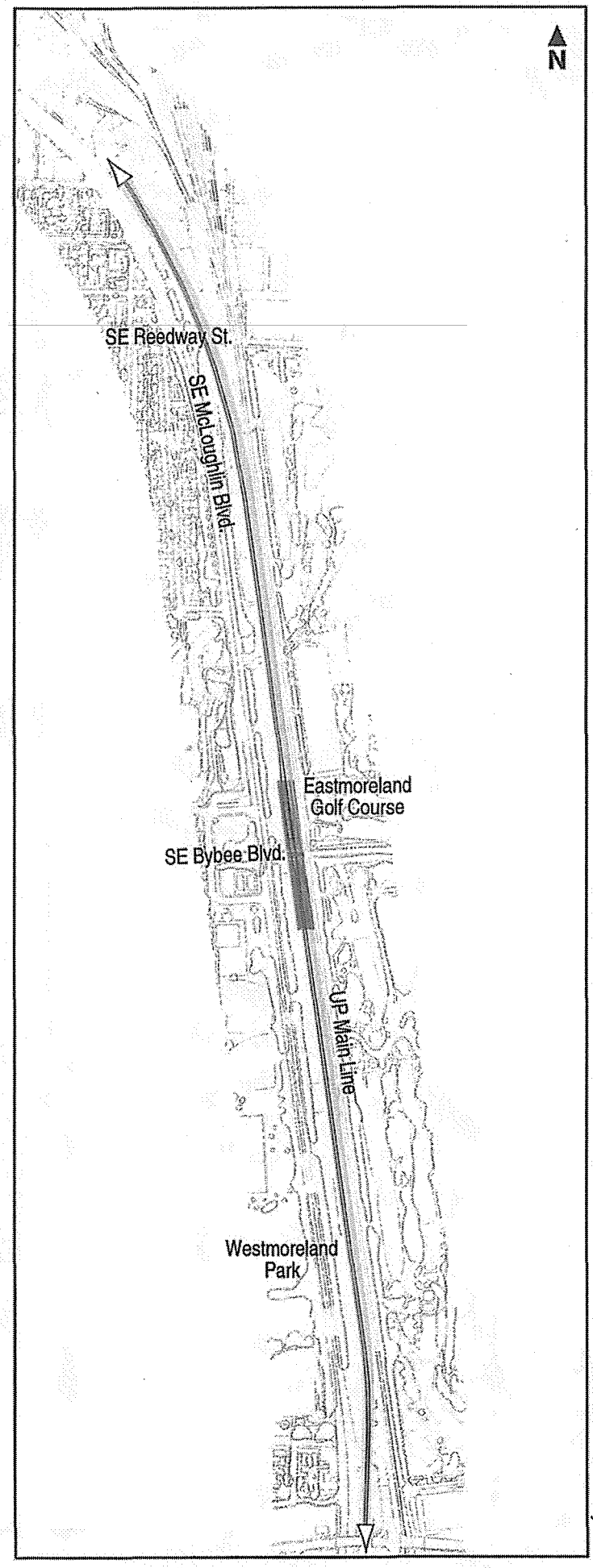
Milwaukie Regional Center Segment

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- Highway/Road Improvement
- DEIS Station Platform
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800
FEET

11302



South North Transit Corridor Study

METRO

Figure 1.4

Land Use Final Order Boundary Maps:

McLoughlin Boulevard Segment

Light Rail Route

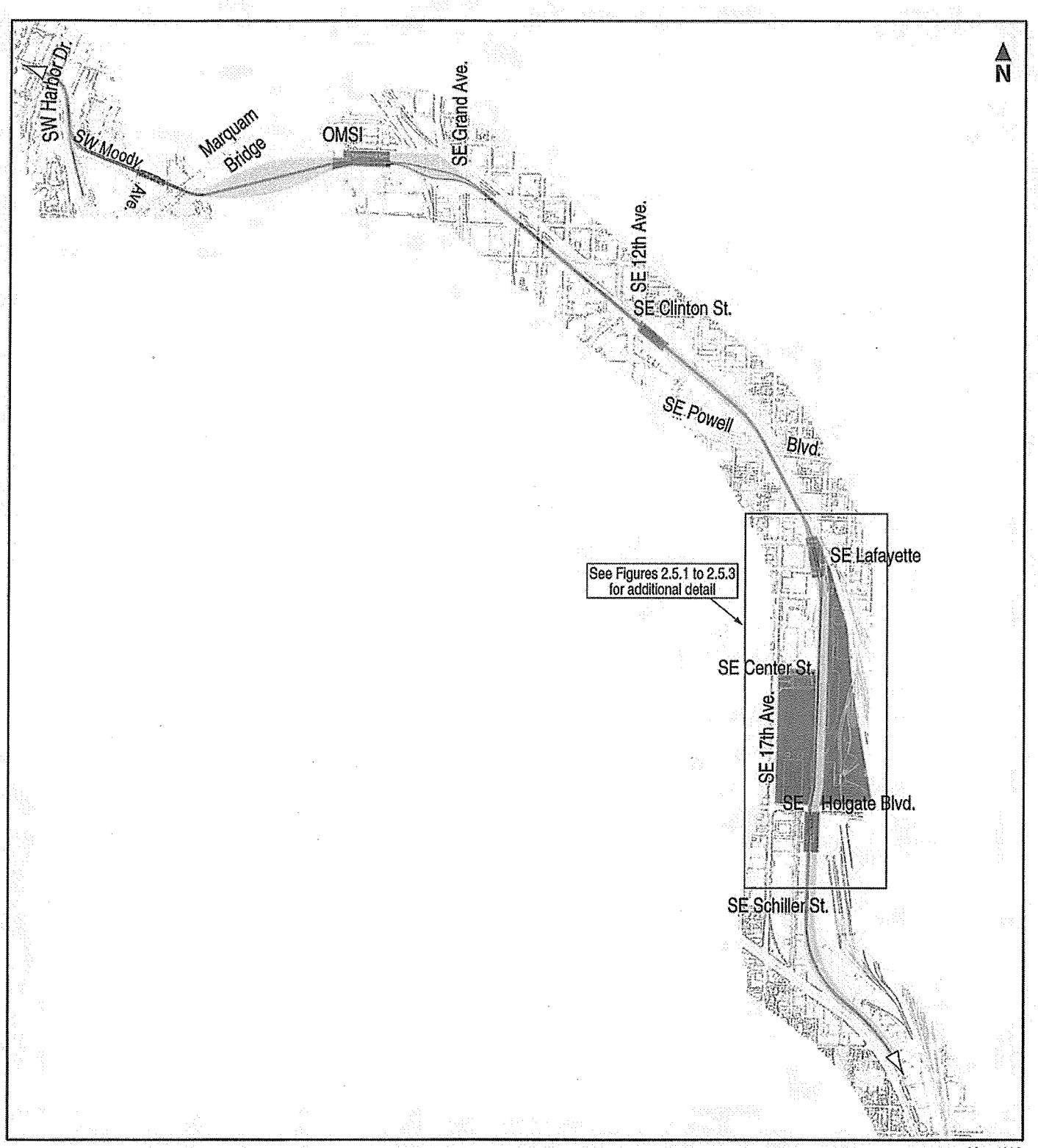
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



Light Rail Route

Light Rail Station

Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

0 800 1600
FEET

South North Transit Corridor Study

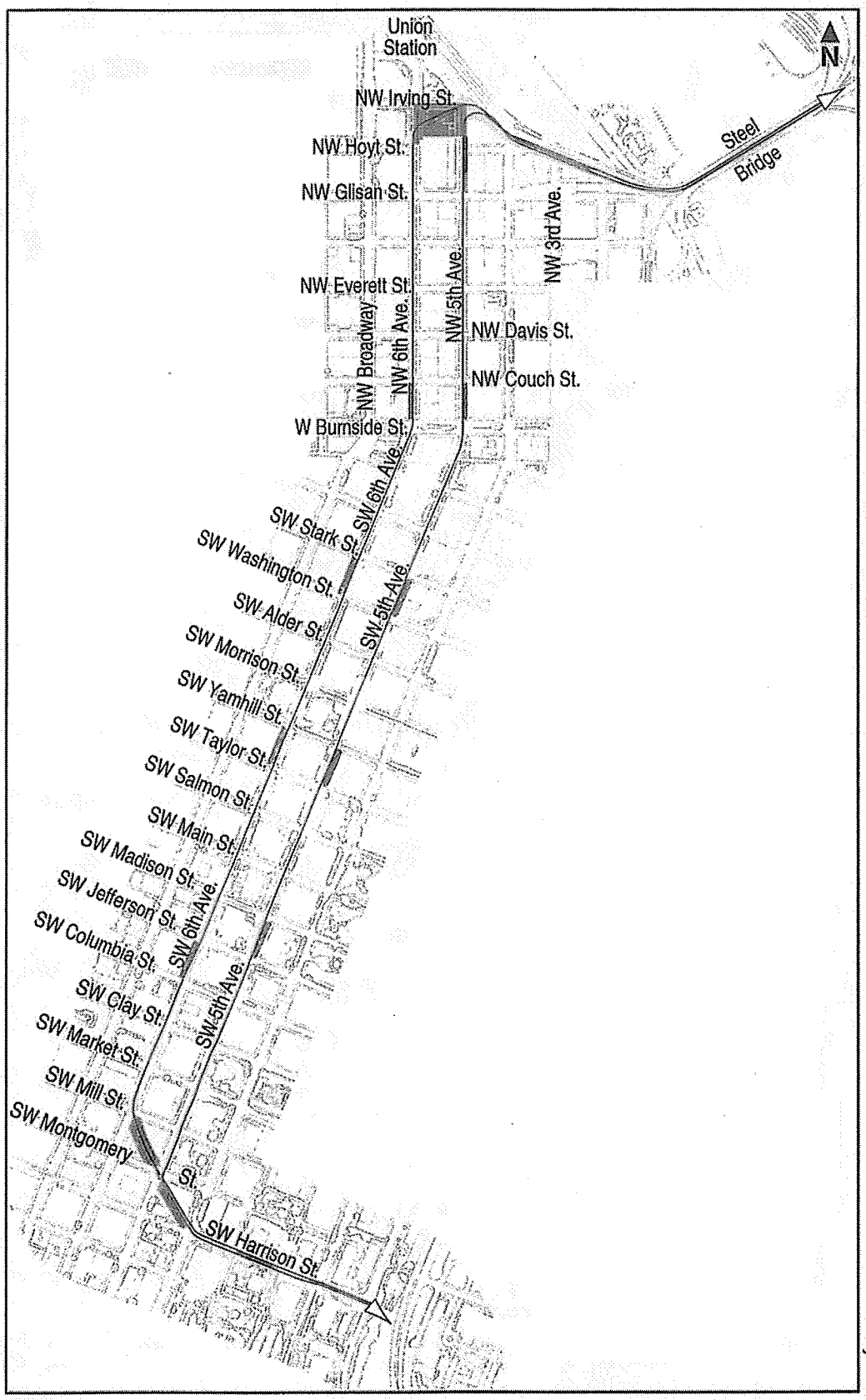
METRO

Figure 1.5

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

11304



South North Transit Corridor Study

METRO

Figure 1.6

Land Use Final Order Boundary Maps:

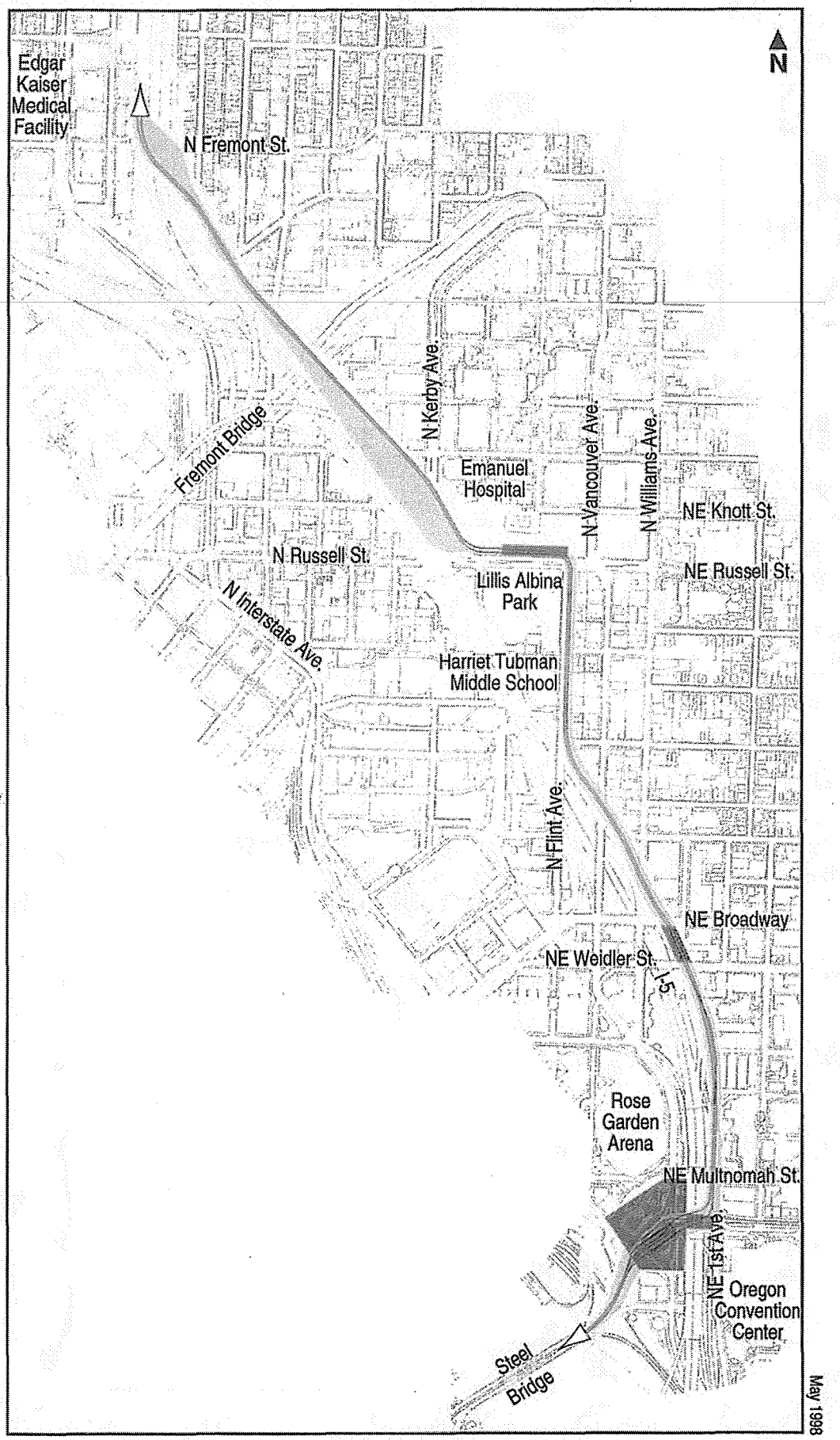
Downtown Portland Segment

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route



South North Transit Corridor Study

METRO

Figure 1.7

Land Use Final Order Boundary Maps:

Eliot Segment

Light Rail Route

Light Rail Station

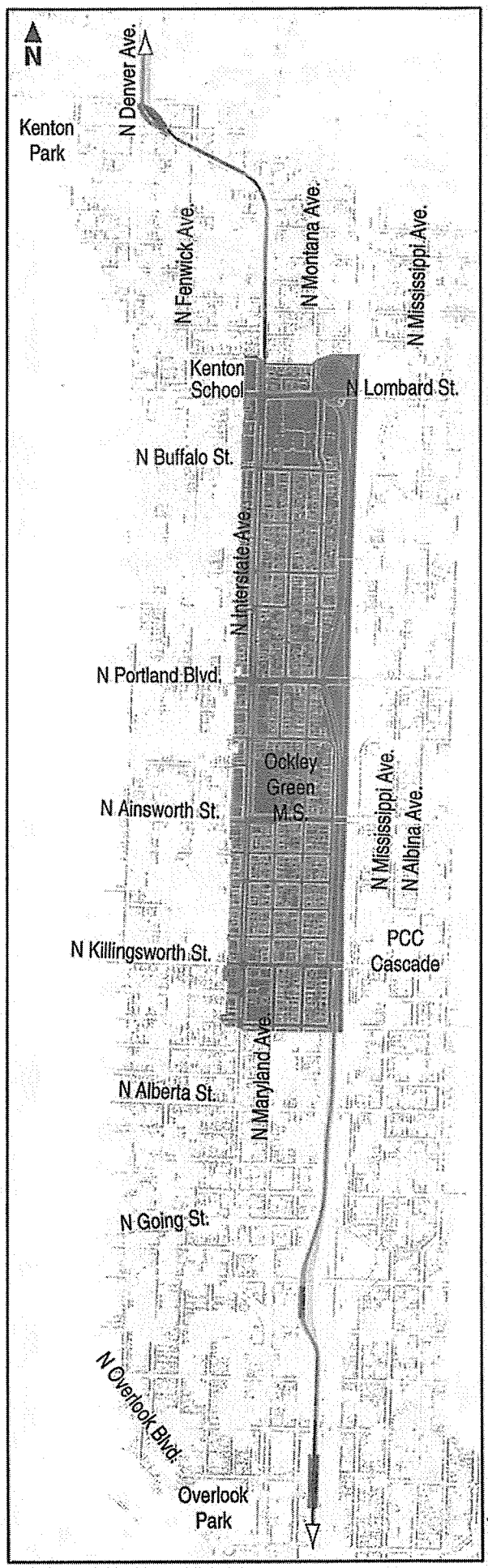
DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET

11306



South North Transit Corridor Study

METRO

Figure 1.8a

Land Use Final Order Boundary Maps:

North Portland Segment

Light Rail Route

Light Rail Station

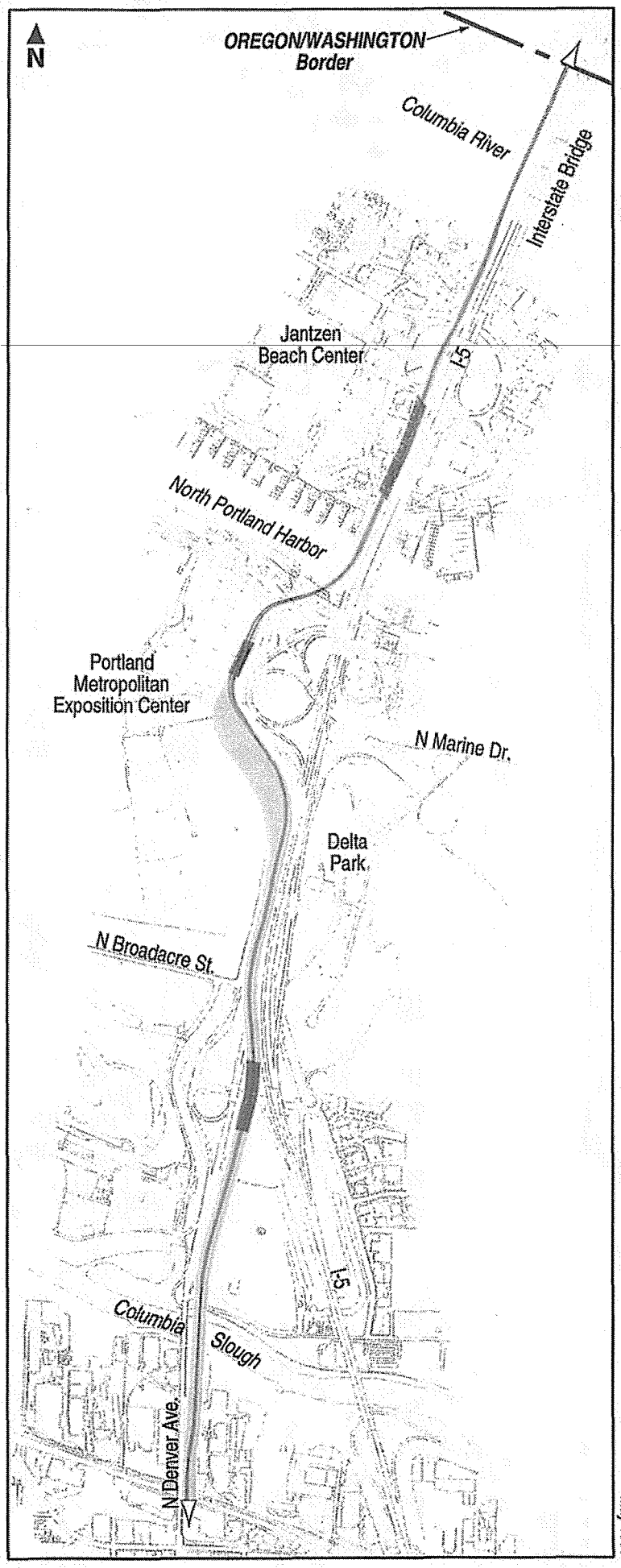
Crossover Study Area

DEIS Station Platform

DEIS Light Rail Route

0 800 1600

FEET



North South Transit Corridor Study

METRO

Figure 1.8b

Land Use Final Order Boundary Maps:

North Portland Segment

Light Rail Route

Light Rail Station

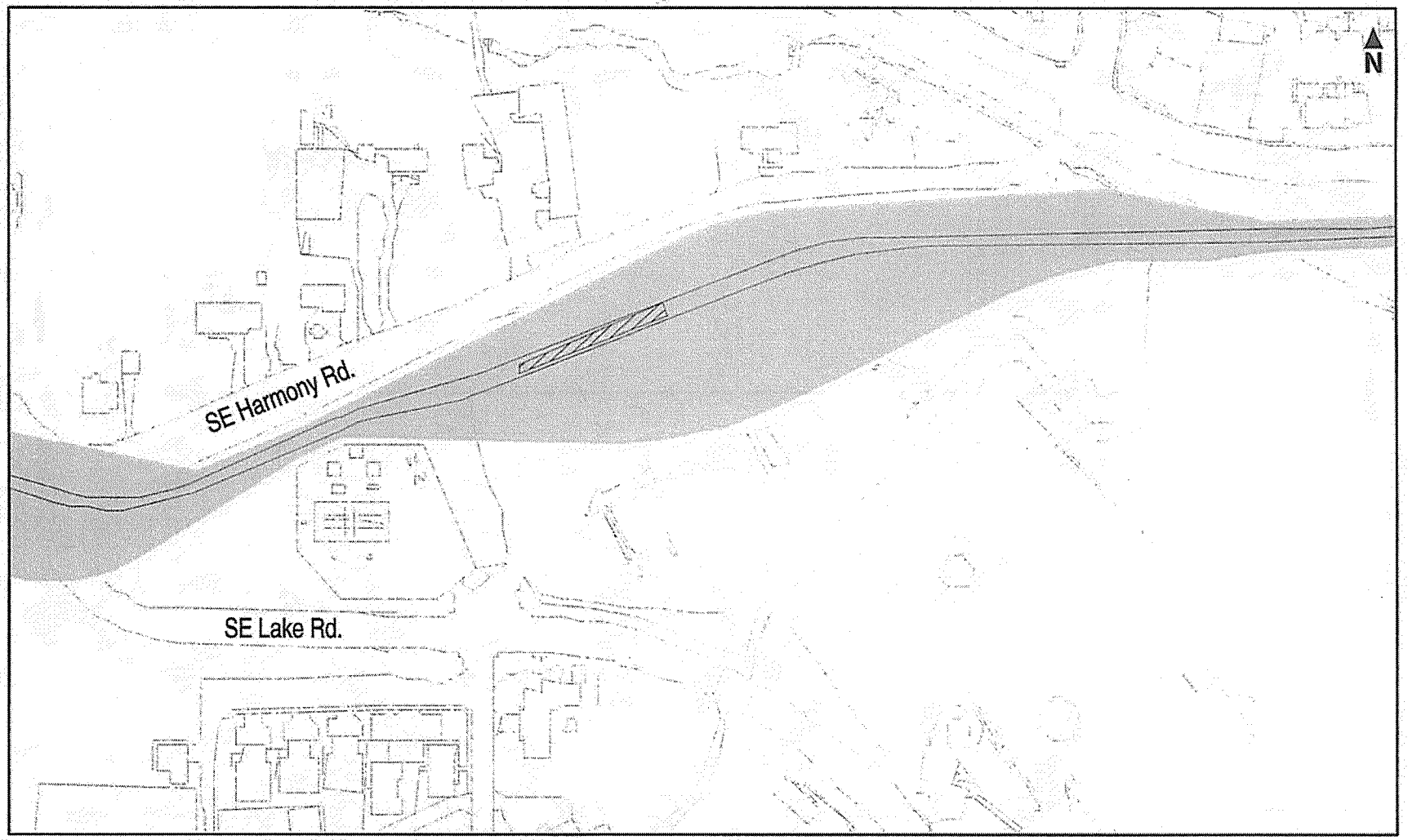
DEIS Station Platform

DEIS Light Rail Route

0 800 1600

FEET

11308



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South North Transit Corridor Study

METRO

Figure 2.2.1

Land Use Final Order Boundary Maps:

East Milwaukie Segment

Light Rail Route

DEIS Station Platform

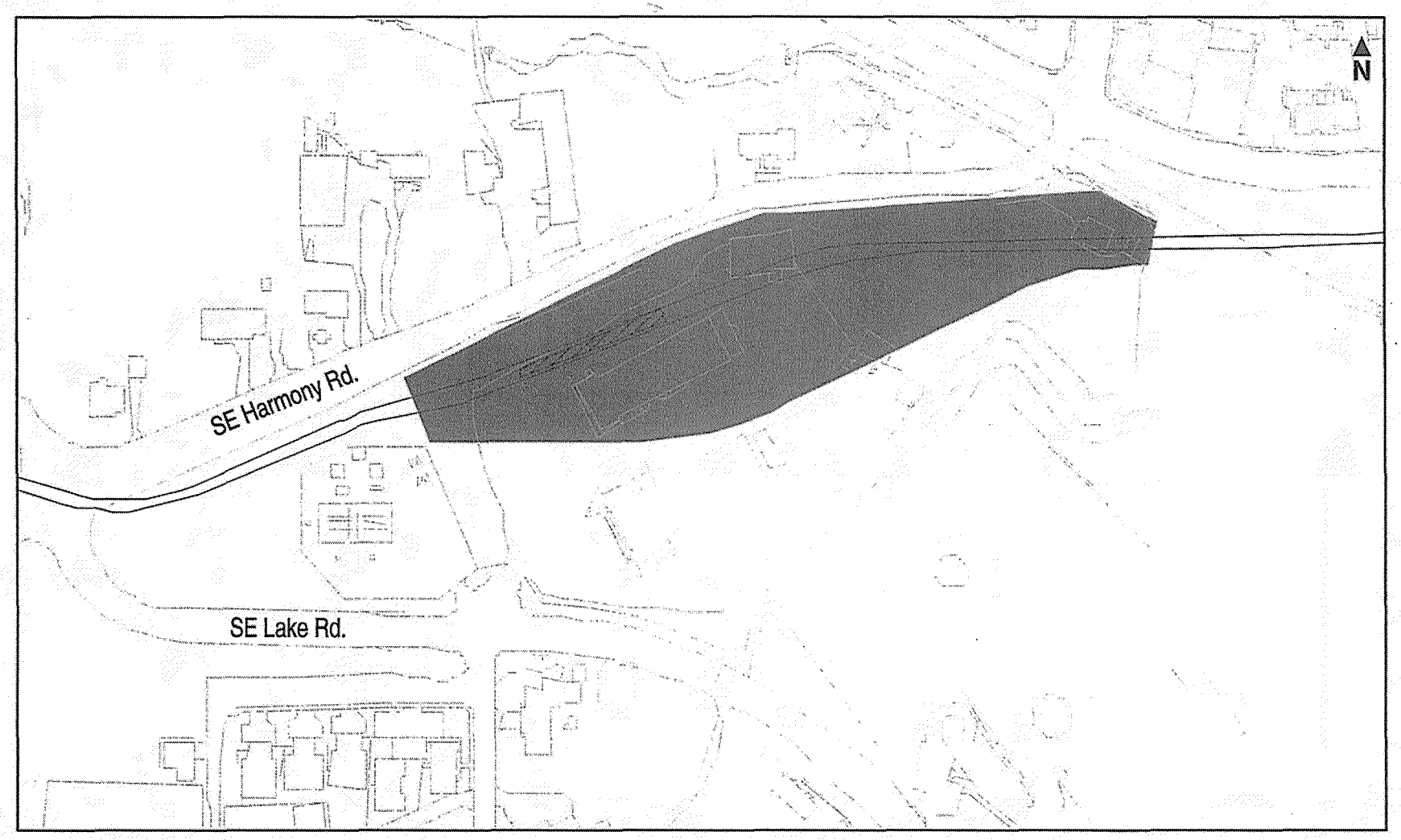
DEIS Light Rail Route

0 200 400

FEET

11309

11310



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South North Transit Corridor Study

METRO

Figure 2.2.2

Land Use Final Order Boundary Maps:

East Milwaukie Segment

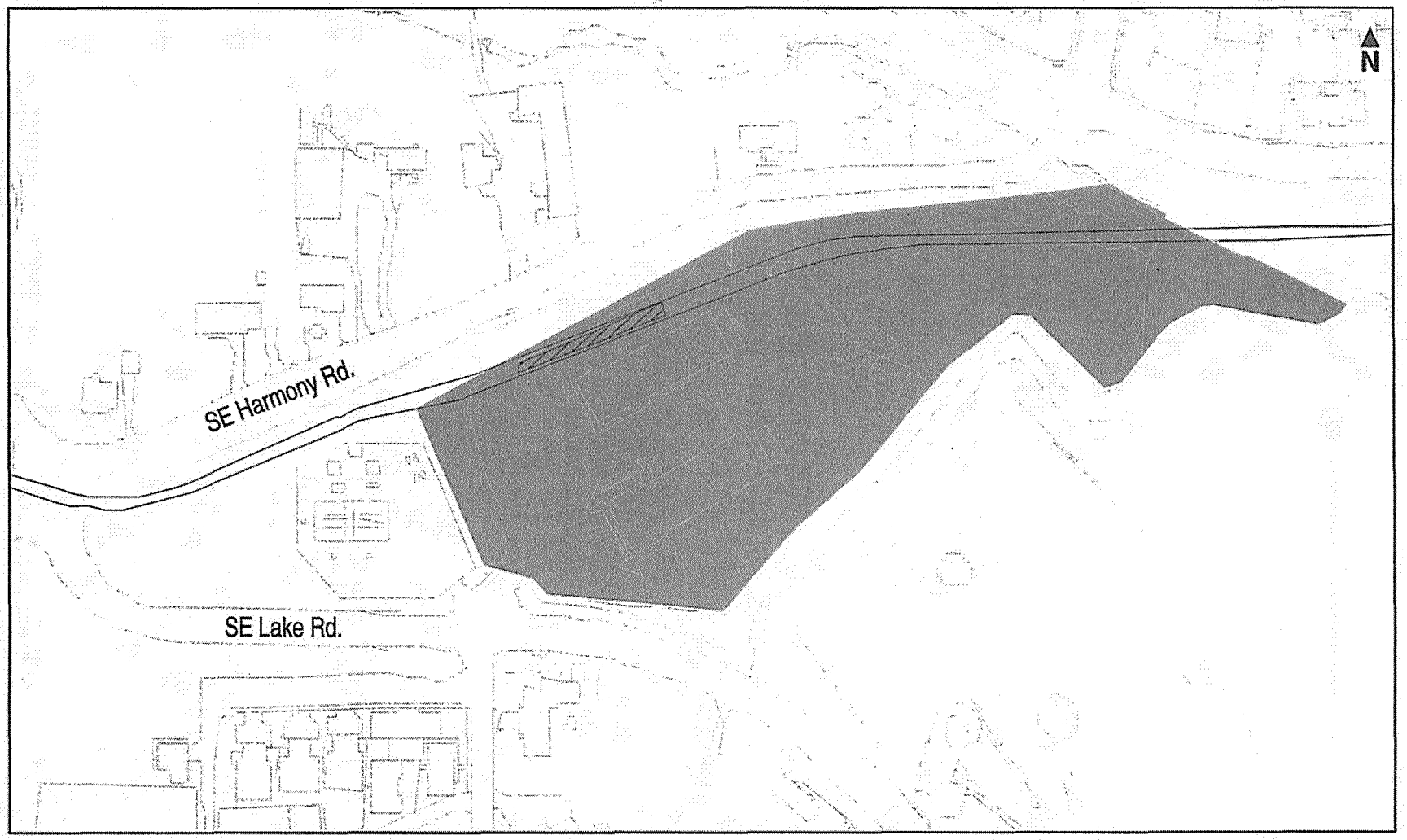
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



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South North Transit Corridor Study

METRO

Figure 2.2.3

Land Use Final Order Boundary Maps:

East Milwaukie Segment

Park-and-Ride Lot

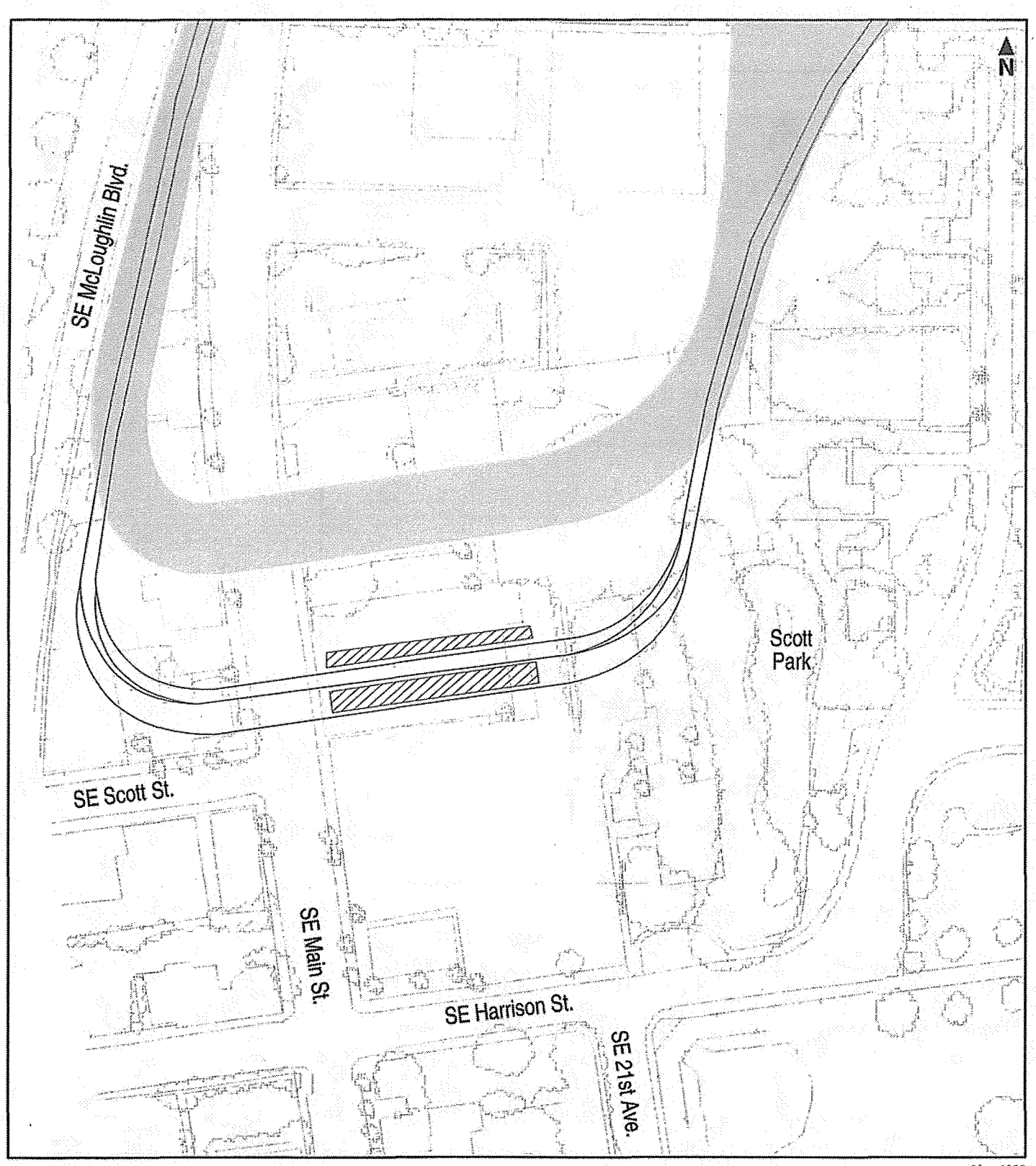
DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET

11311



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South North Transit Corridor Study

Figure 2.3.1

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

METRO

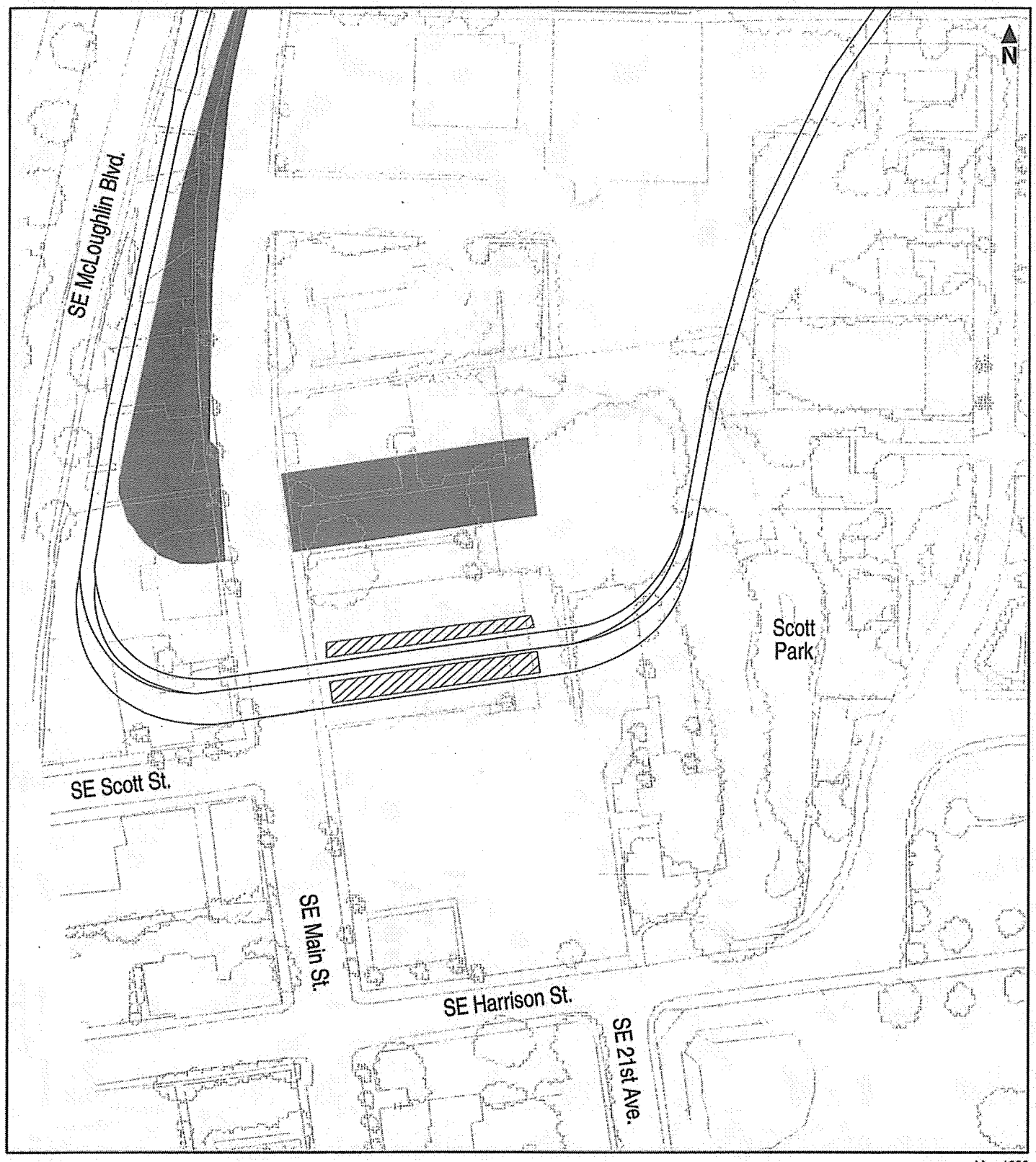
Light Rail Route

DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET



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South North Transit Corridor Study

METRO

Figure 2.3.2

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

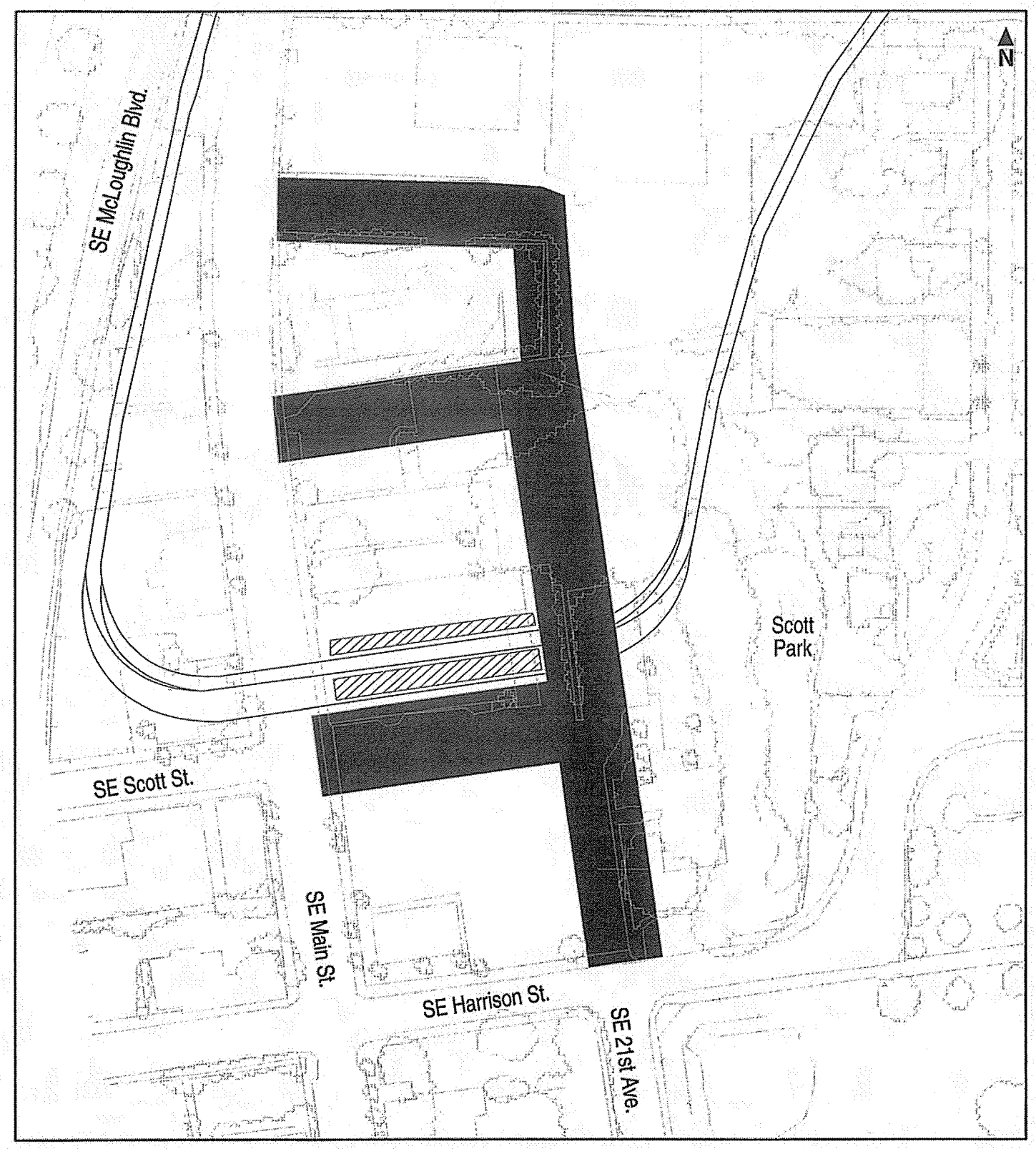
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET



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South North Transit Corridor Study

METRO

Figure 2.3.3

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Highway/Road Improvement

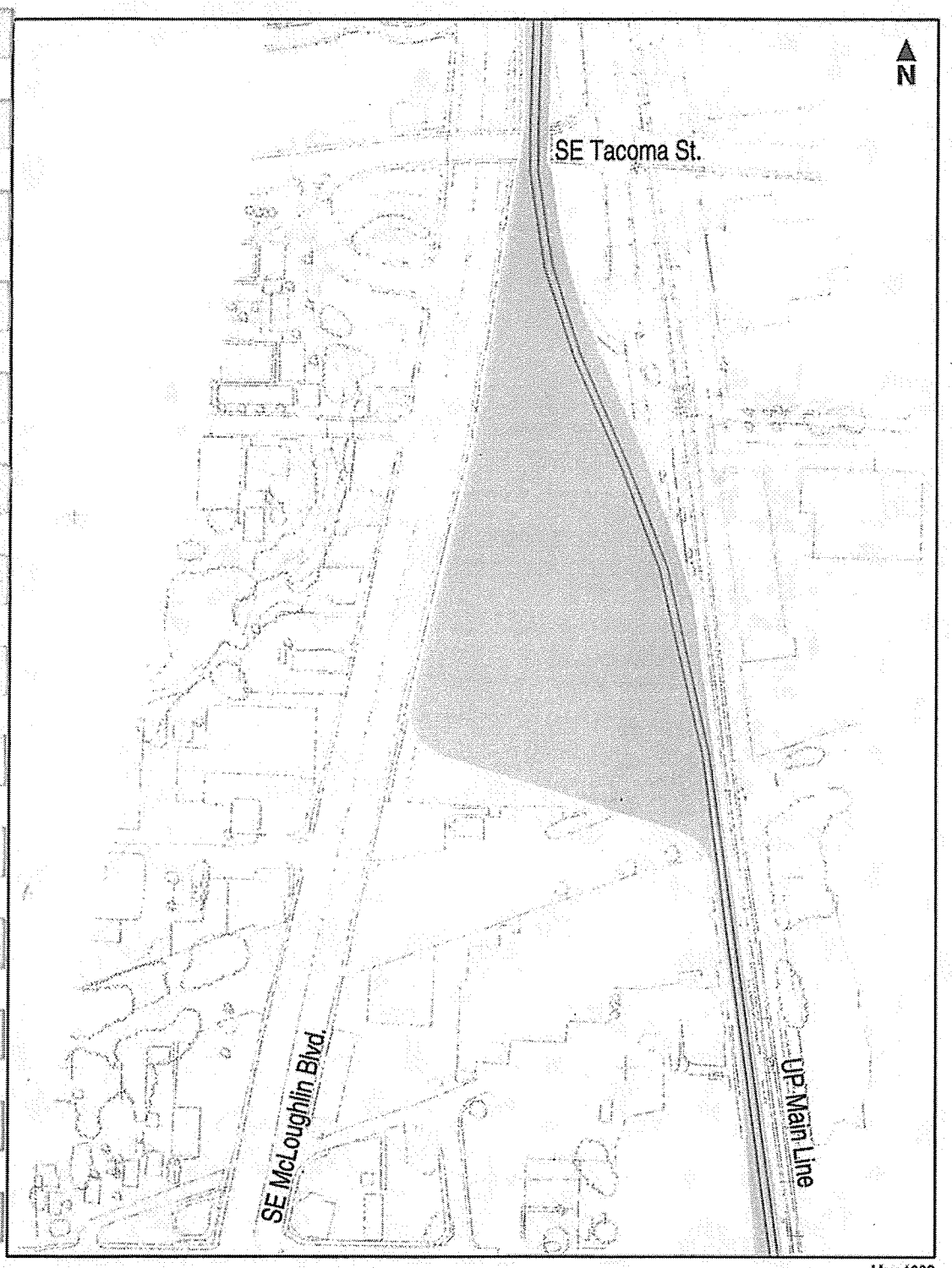
DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET

11314



South North Transit Corridor Study

METRO

Figure 2.4.1

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

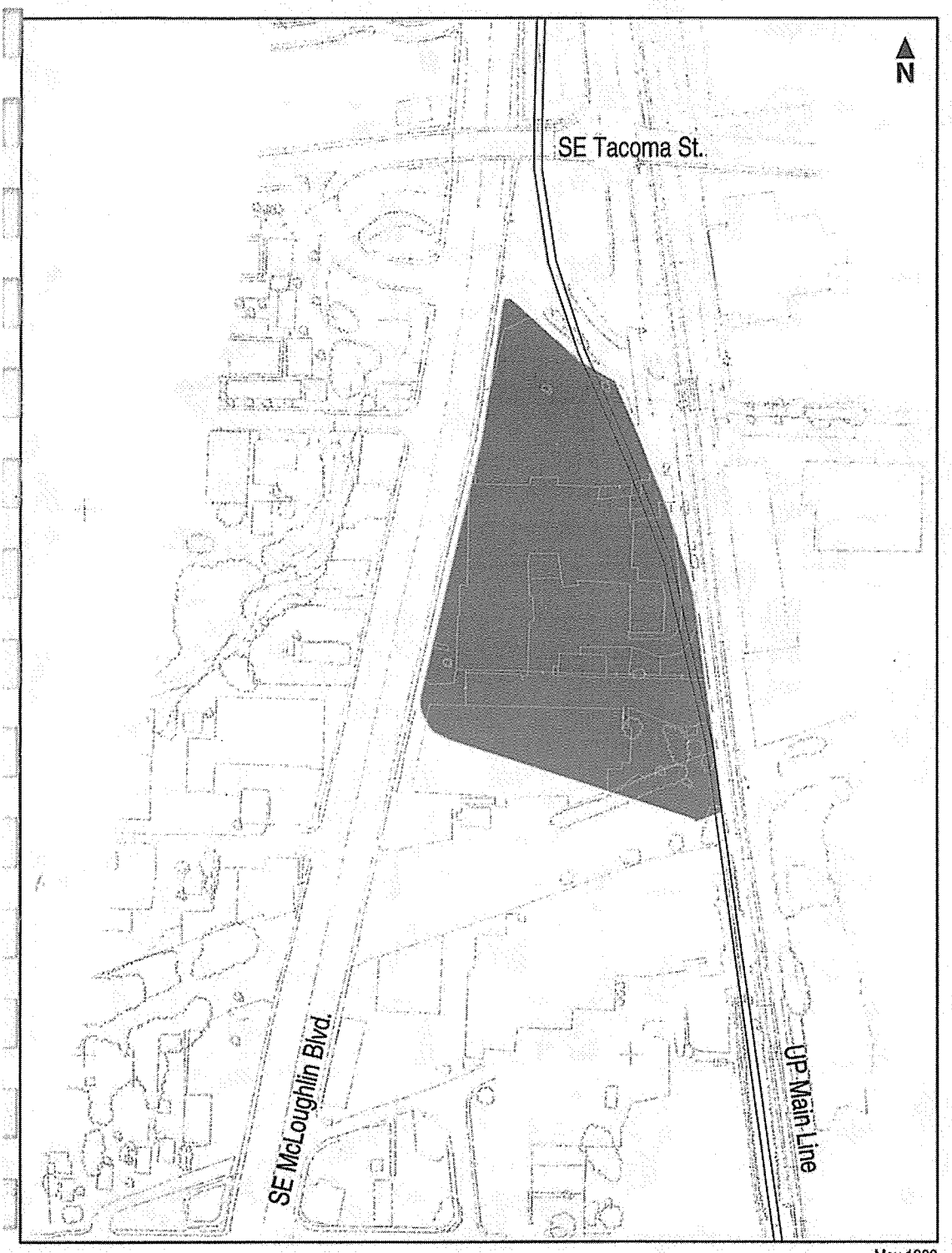
Light Rail Route

DEIS Light Rail Route

0 200 400

FEET

May 1998



South North Transit Corridor Study

METRO

Figure 2.4.2

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

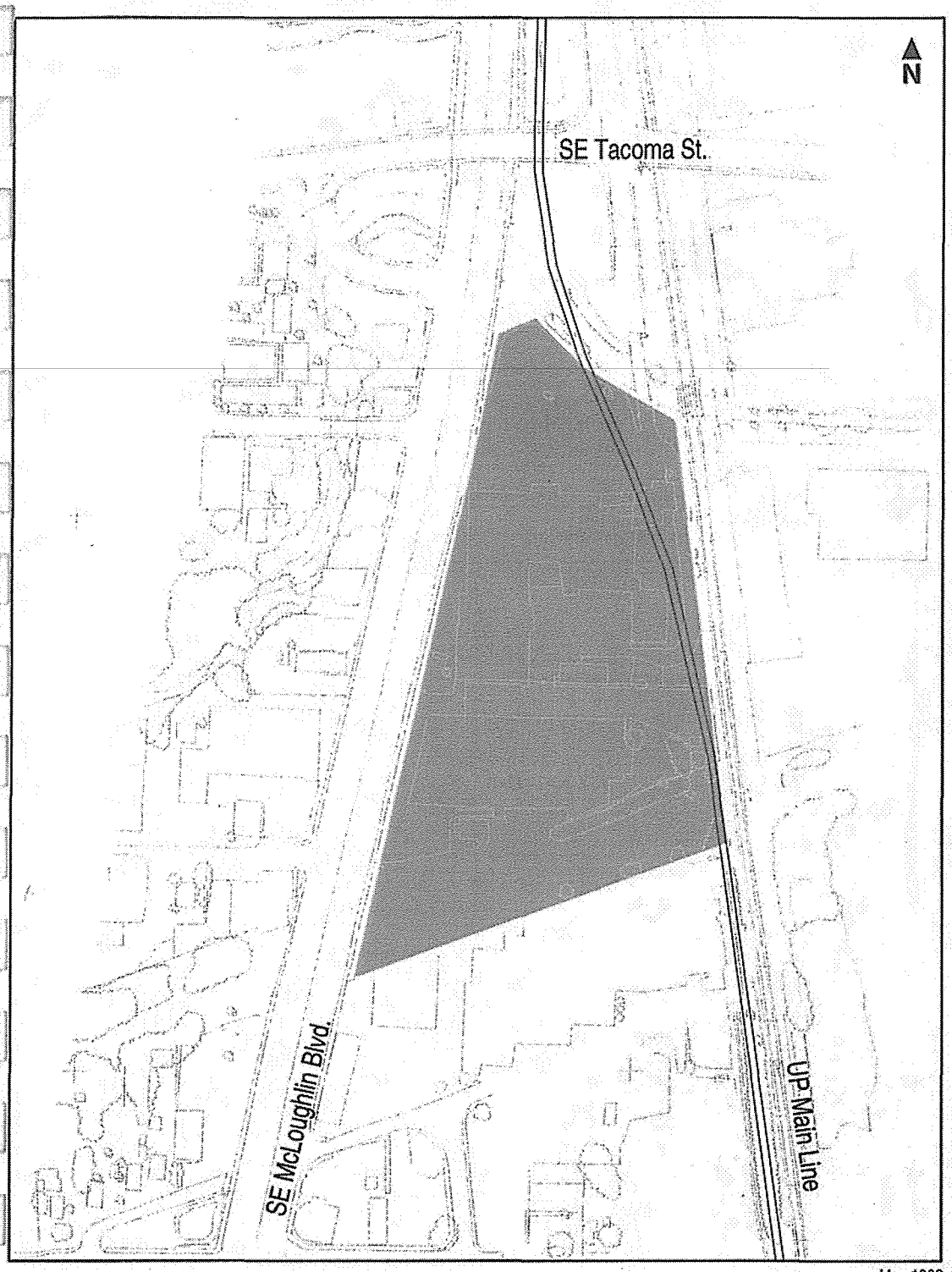
Light Rail Station

DEIS Light Rail Route

0 200 400

FEET

May 1998



South North Transit Corridor Study

METRO

Figure 2.4.3

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

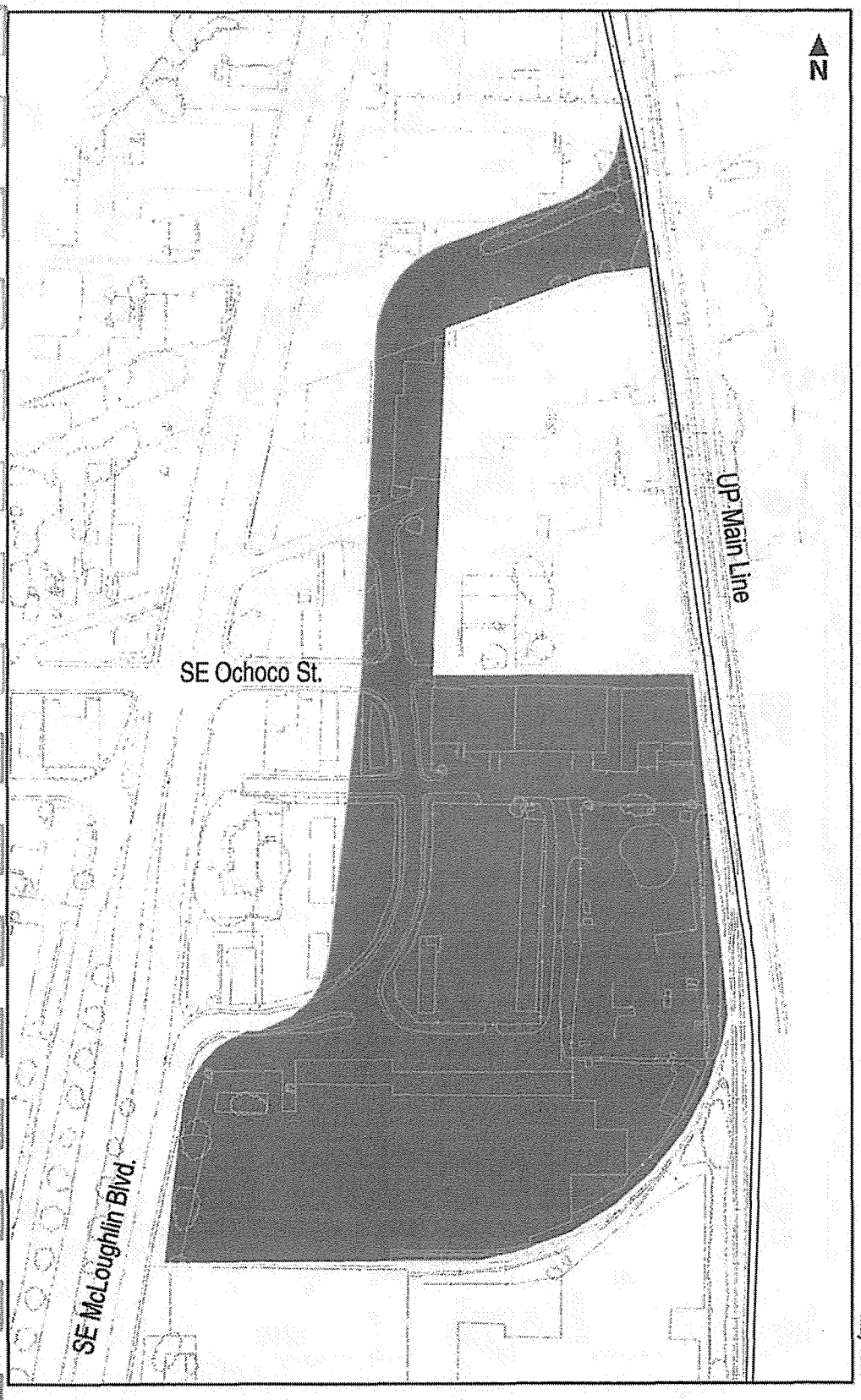
Park-and-Ride Lot

DEIS Light Rail Route

0 200 400

FEET

May 1998



South North Transit Corridor Study

METRO

Figure 2.4.4

Land Use Final Order Boundary Maps:

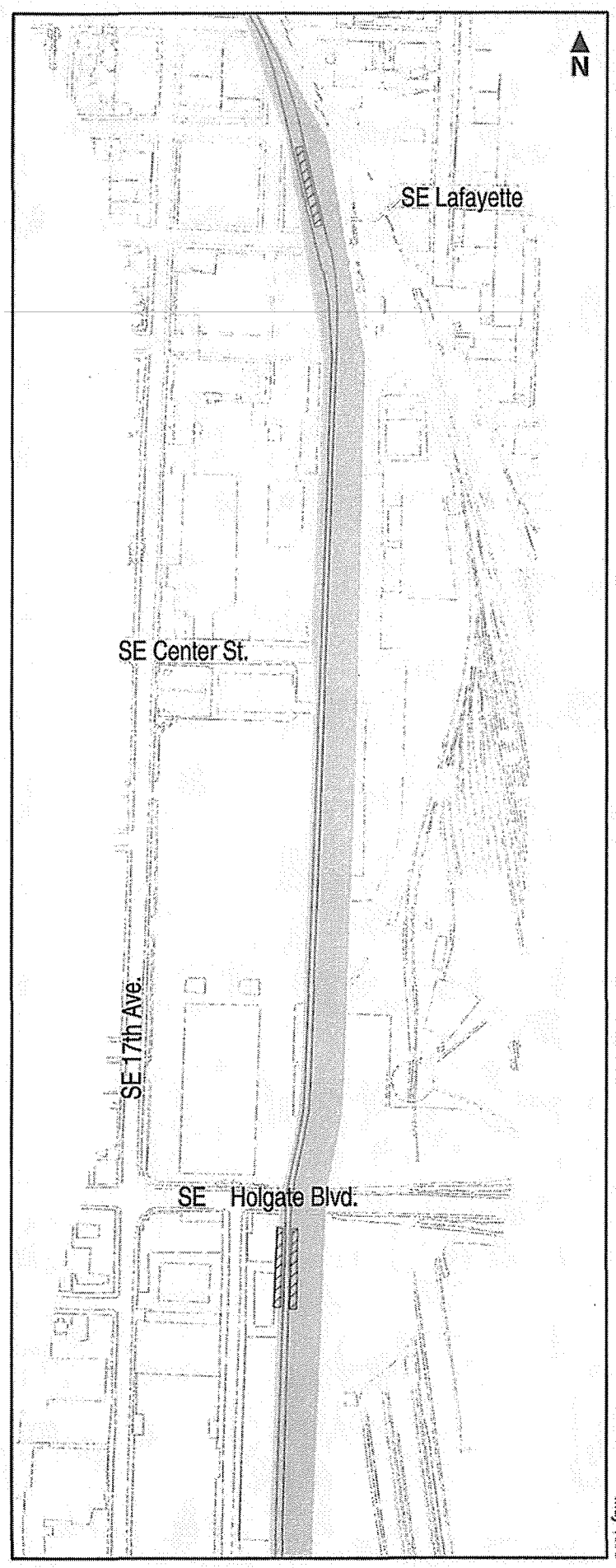
Milwaukie Regional Center Segment

Light Rail Operations and Maintenance Facility

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

METRO

Figure 2.5.1

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

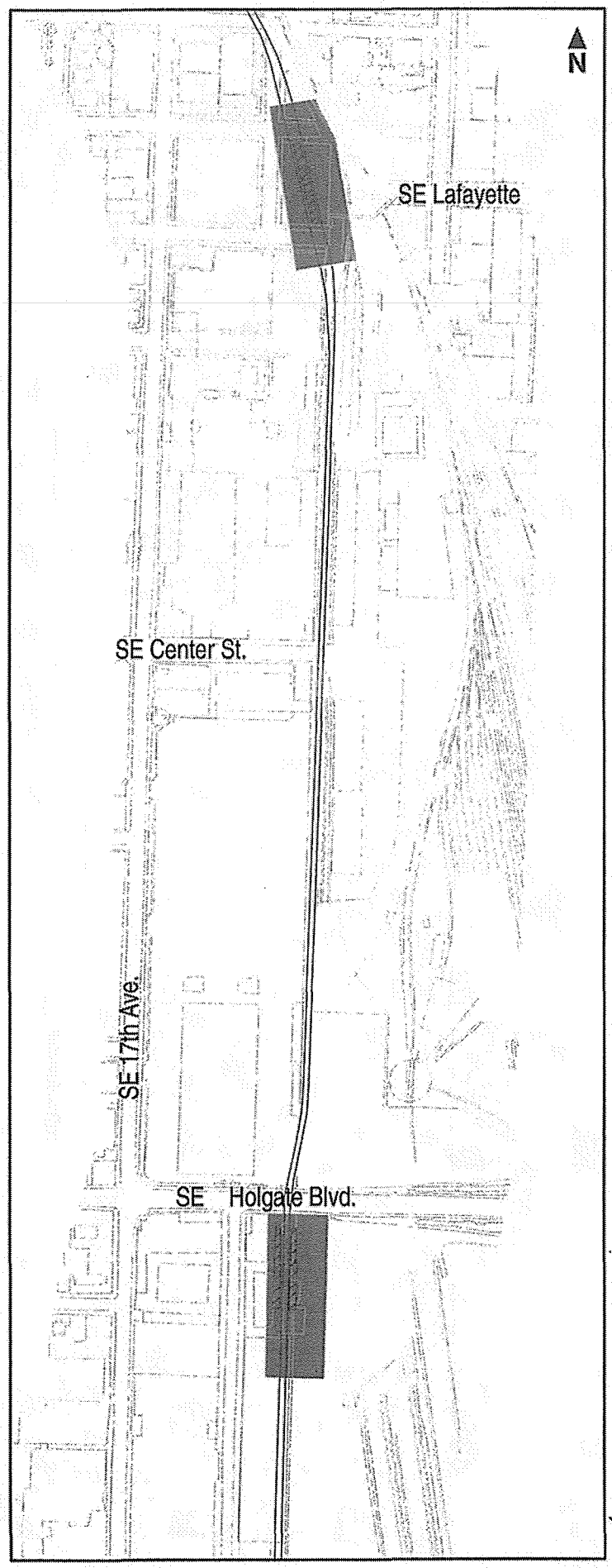
Light Rail Route

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

METRO

Figure 2.5.2

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

Light Rail Station

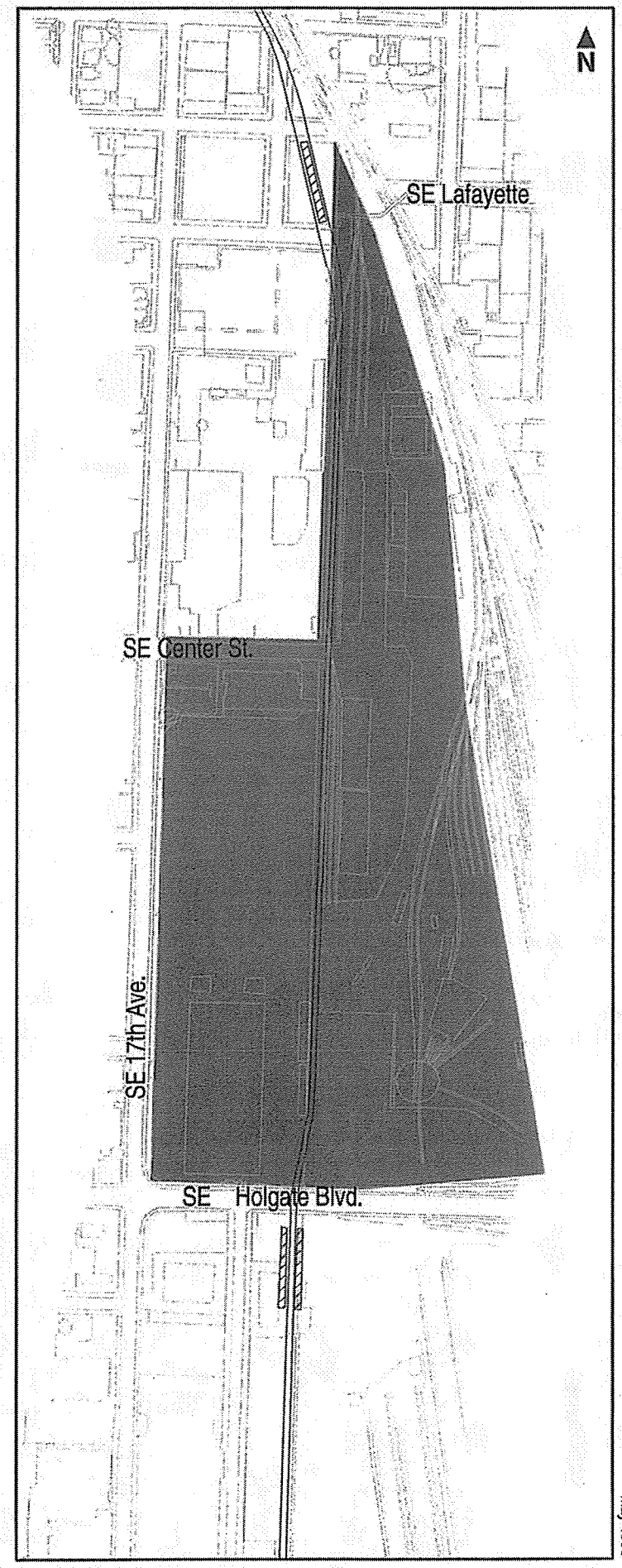
DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET

11320



South North Transit Corridor Study

METRO

Figure 2.5.3

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

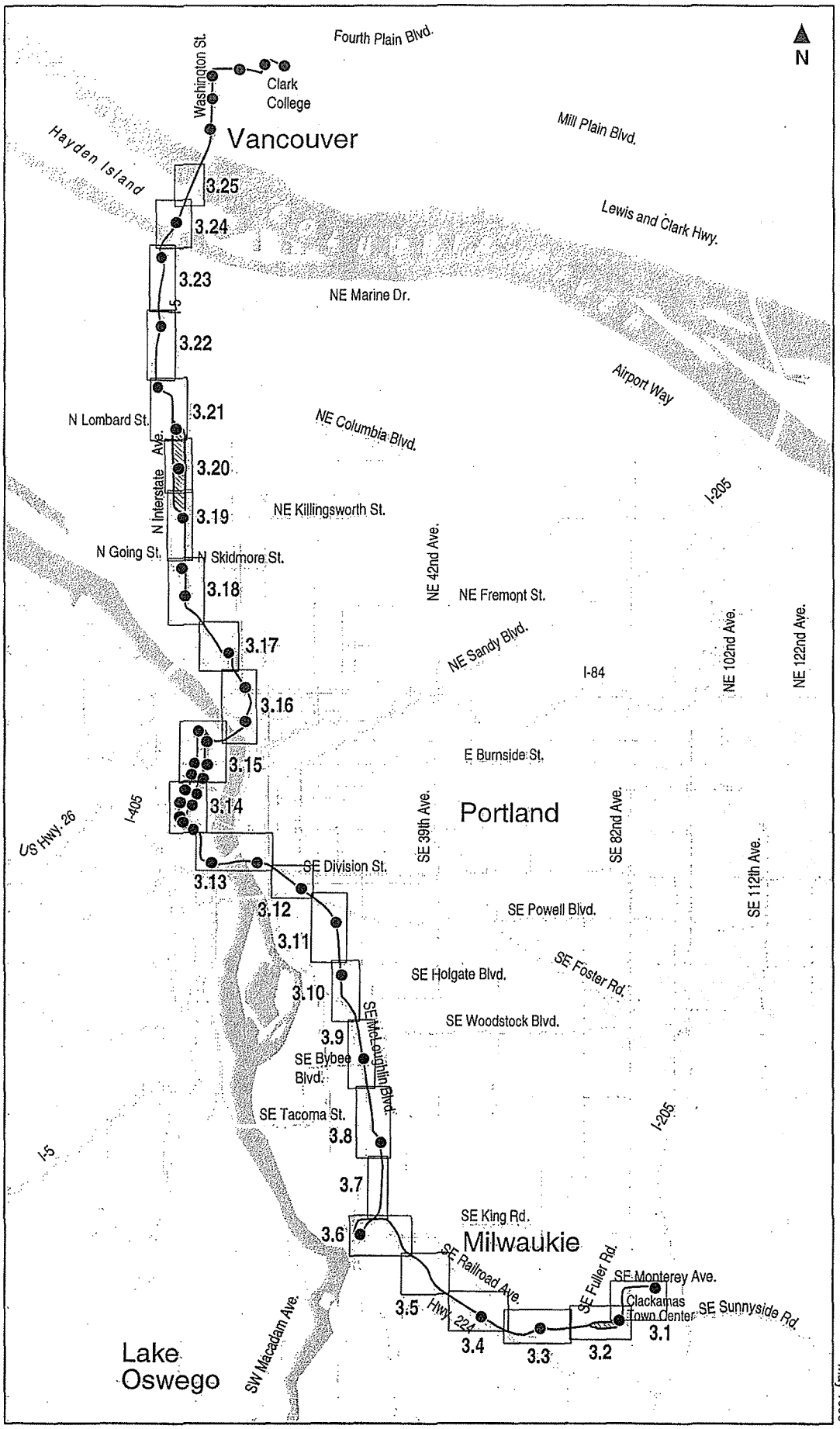
Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

METRO

Figure 3

Index Map for 400' Scale Maps

3.x Detailed Area with Figure #

Recommended LRT Alignment Alternative

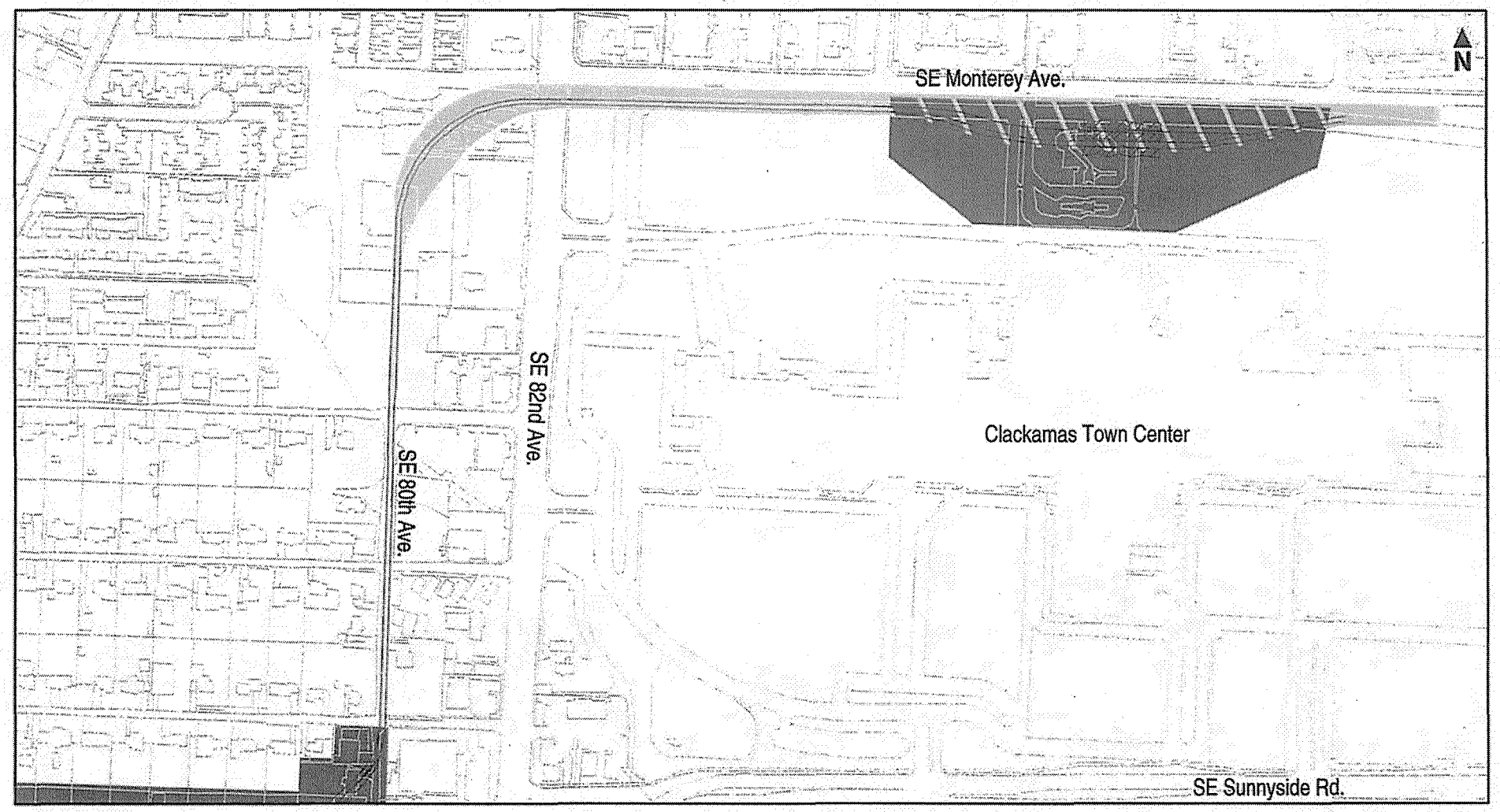
Station

Alignment Study Area

Note: Alignment and station locations are currently under study and may change.

0 1 2 MILE

May 1998



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South North Transit Corridor Study

METRO

OIT/CCC Study Area

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

1 Inch to 400 Feet

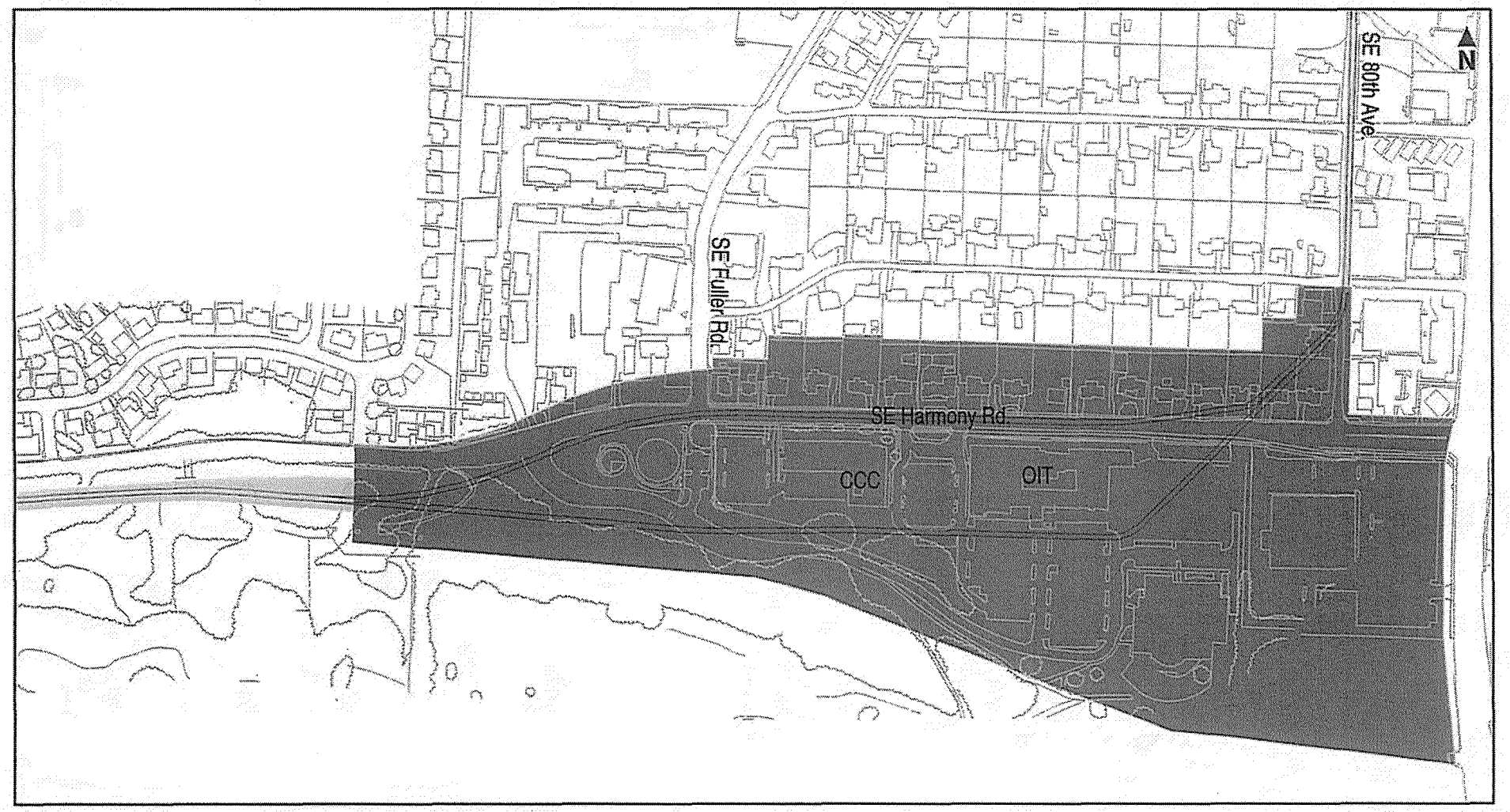
FEET

Figure 3.1

Land Use Final Order Boundary Maps

11323

11324



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South North Transit Corridor Study

METRO

Figure 3.2

Land Use Final Order Boundary Maps

OIT/CCC Study Area

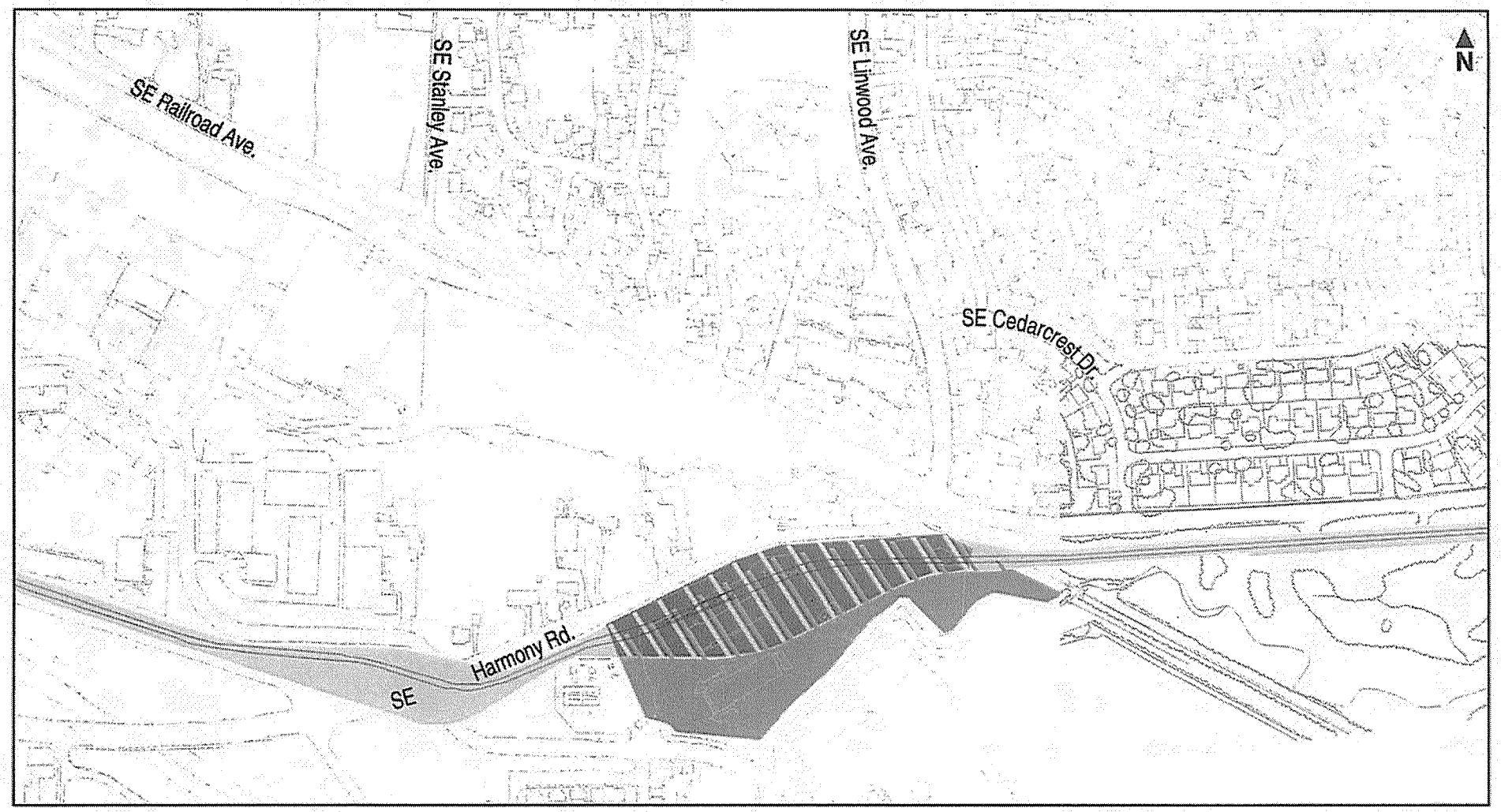
Light Rail Route

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



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North South Transit Corridor Study

METRO

Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

1 Inch to 400 Feet

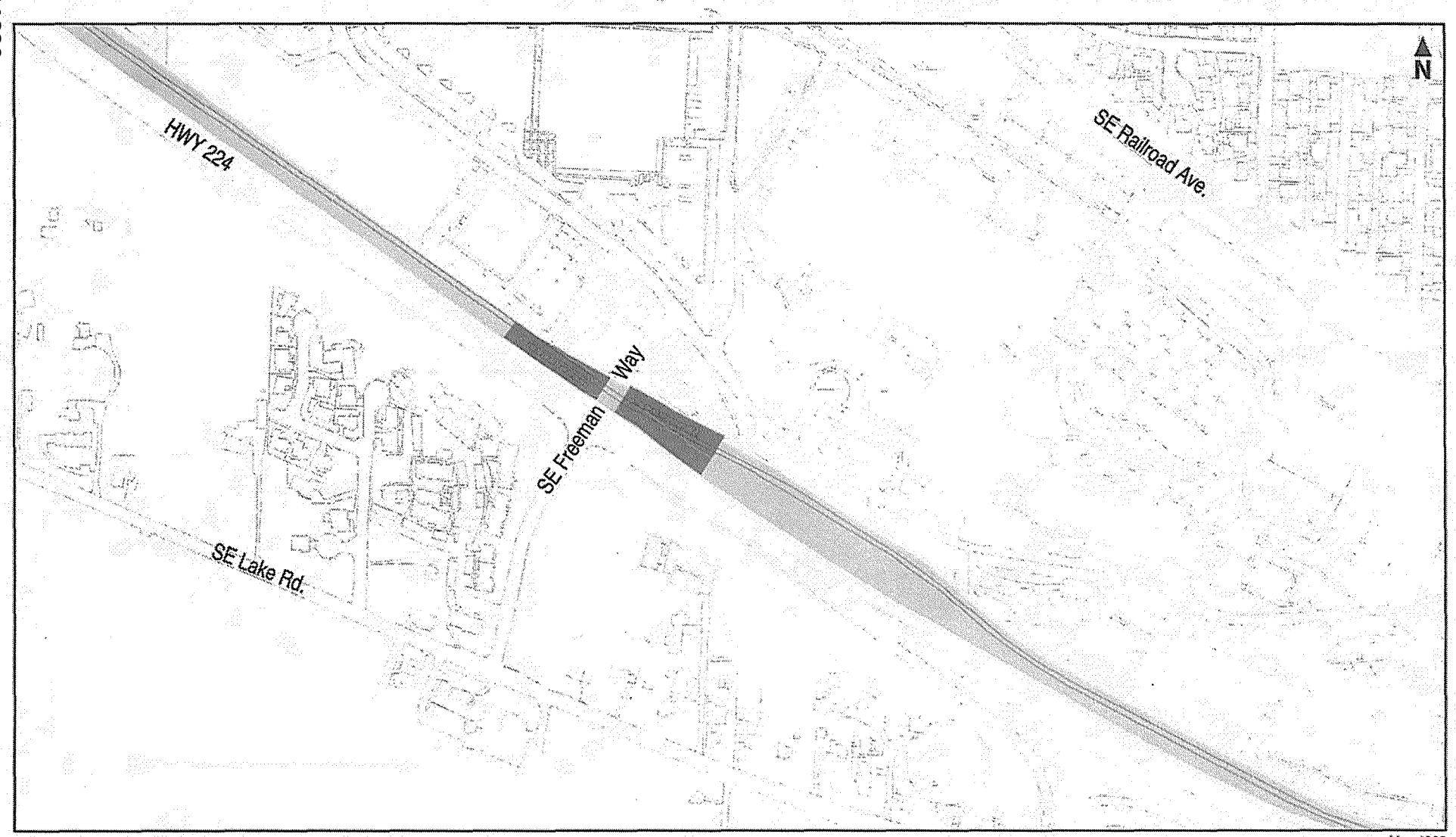
FEET

Figure 3.3

Land Use Final Order Boundary Maps

11325

11326



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South North Transit Corridor Study

METRO

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

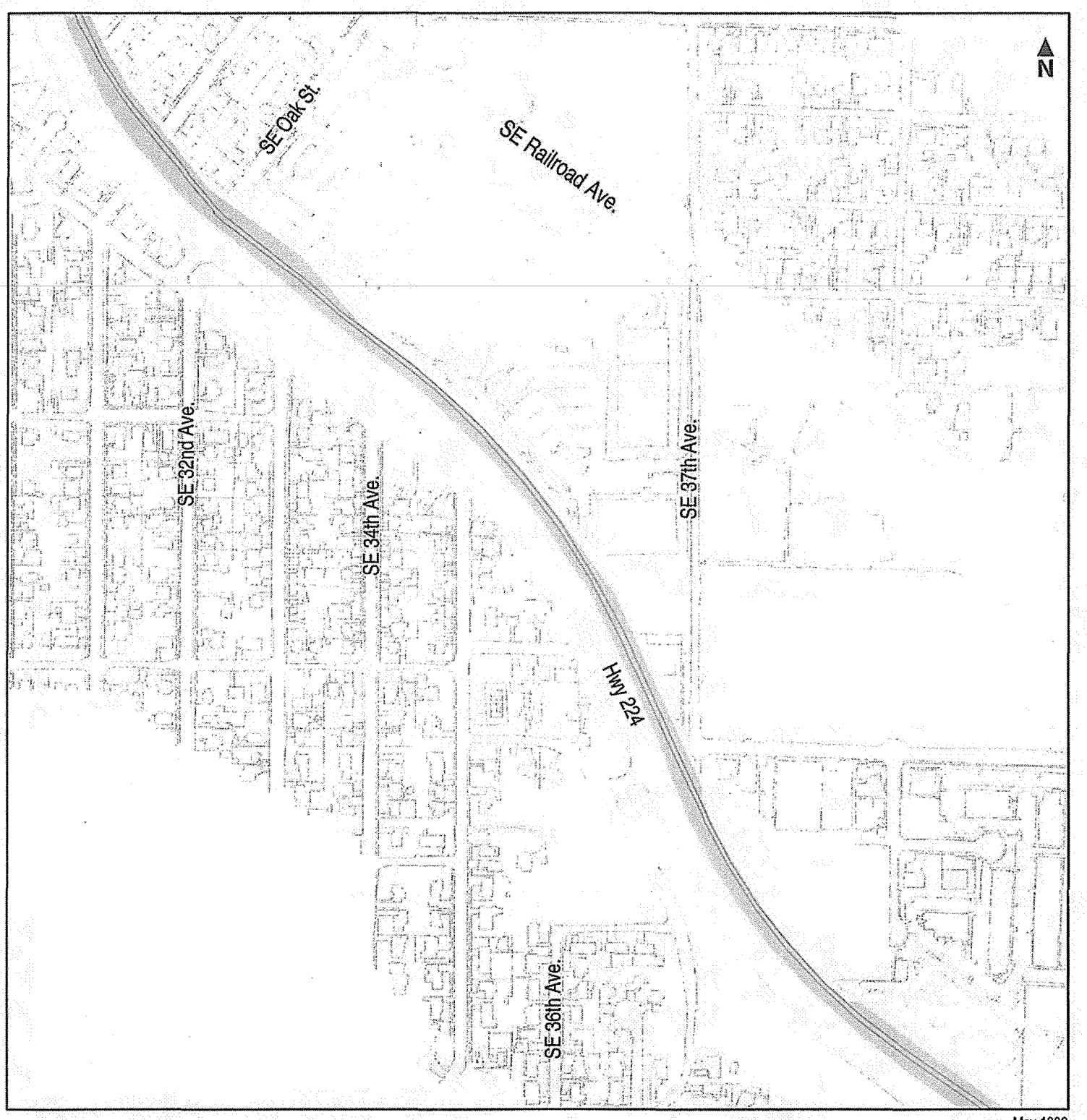
0 400 800

1 Inch to 400 Feet

FEET

Figure 3.4

Land Use Final Order Boundaries



South North Transit Corridor Study

METRO

Figure 3.5

Land Use Final Order Boundaries

Light Rail Route

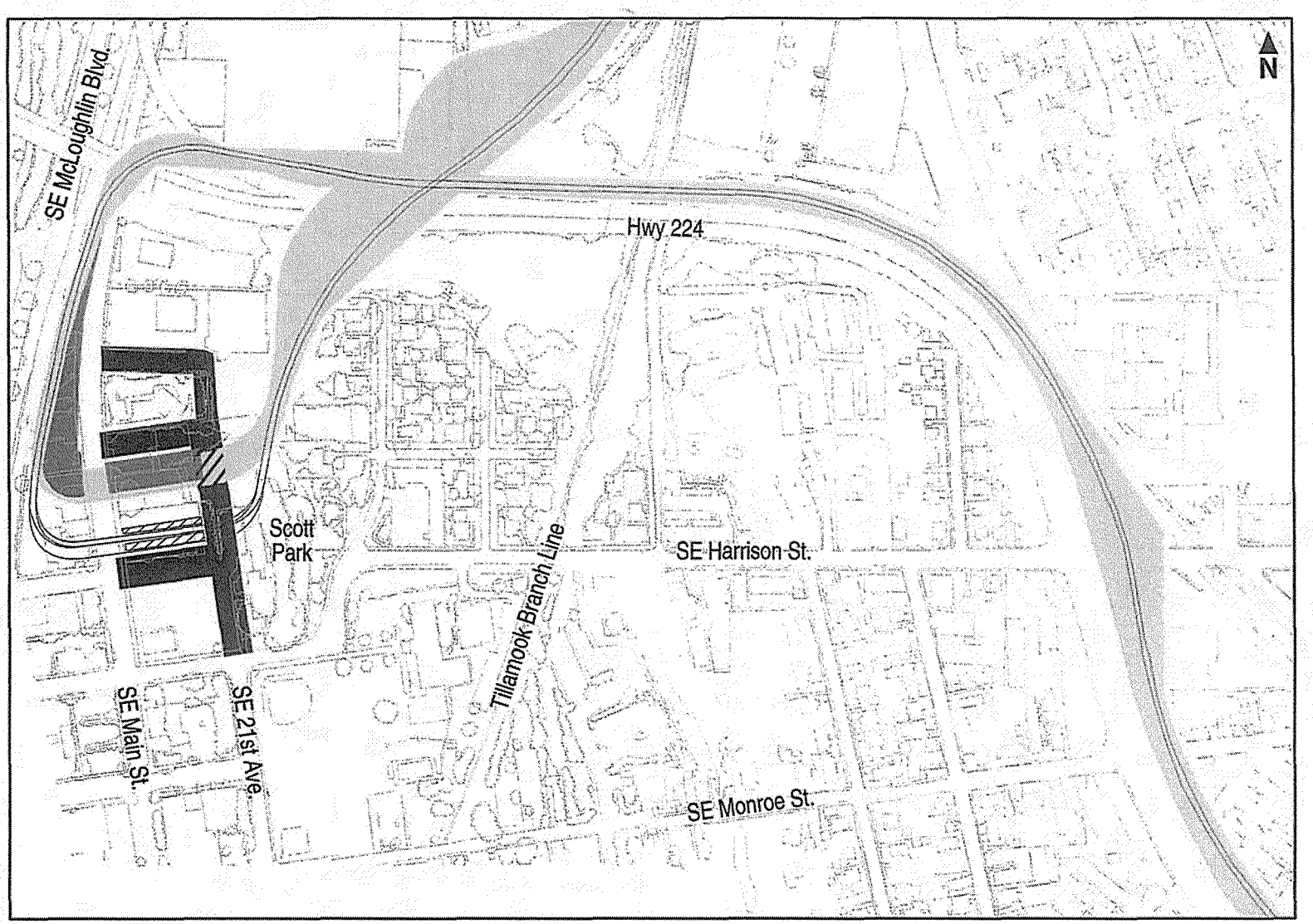
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11328



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South North Transit Corridor Study

METRO

Light Rail Route

Light Rail Station

Highway/Road Improvement

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

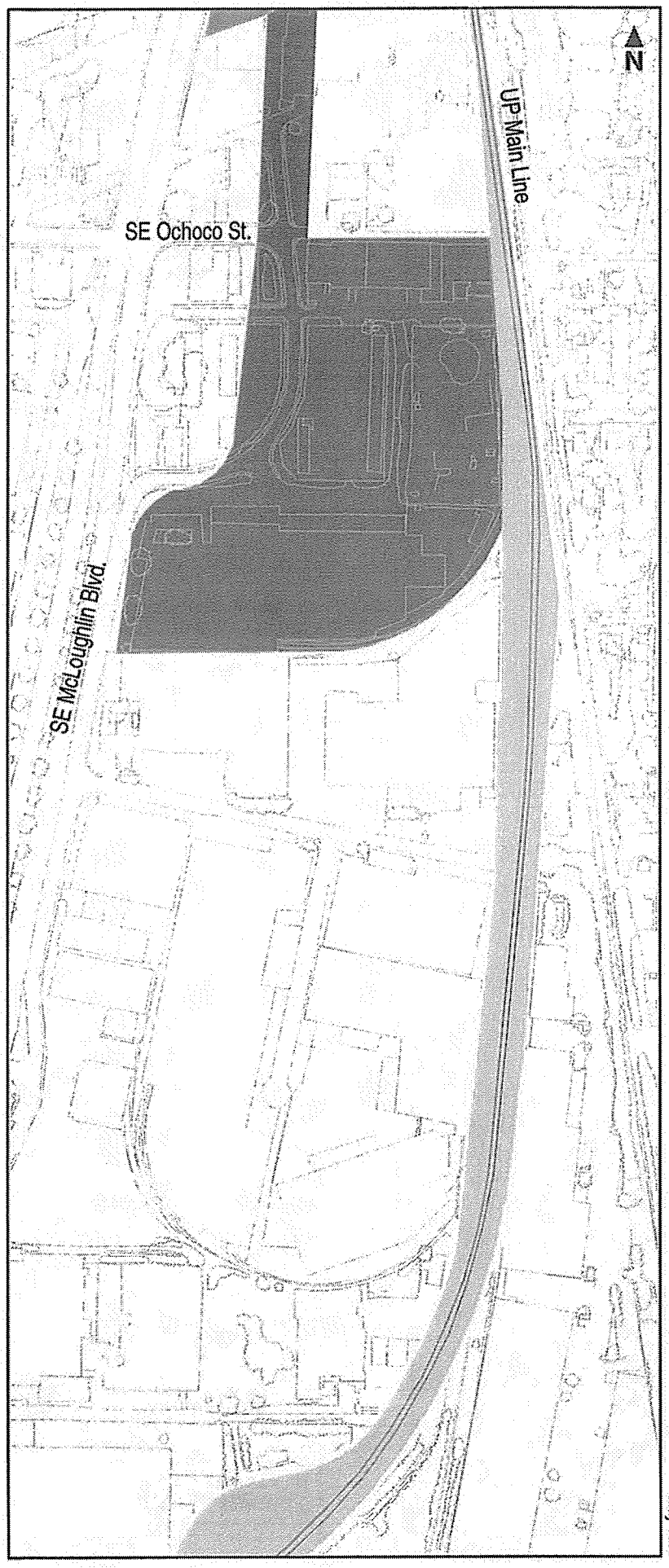
0 400 800

1 Inch to 400 Feet

FEET

Figure 3.6

Land Use Final Order Boundary Maps



South North Transit Corridor Study

METRO

Figure 3.7

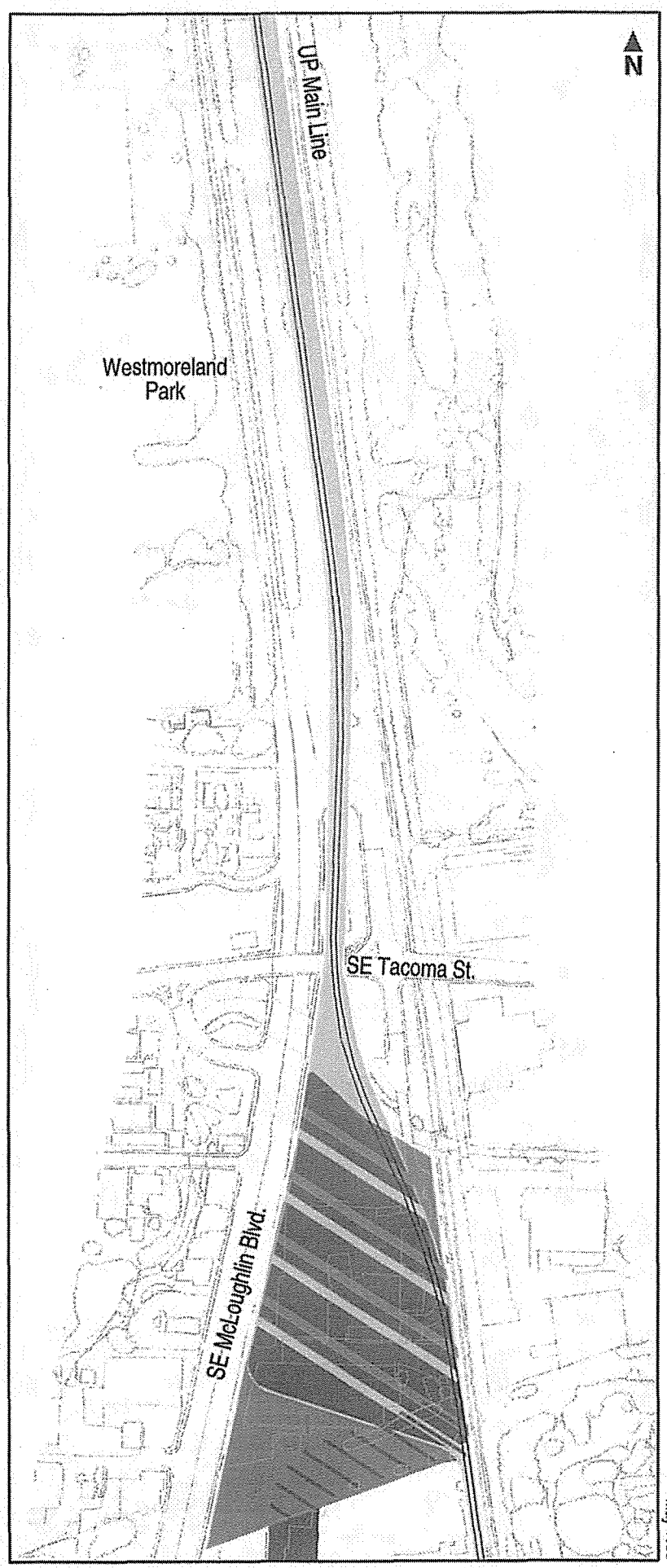
Land Use Final Order Boundary Maps

- Light Rail Route
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.8

Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- DEIS Light Rail Route

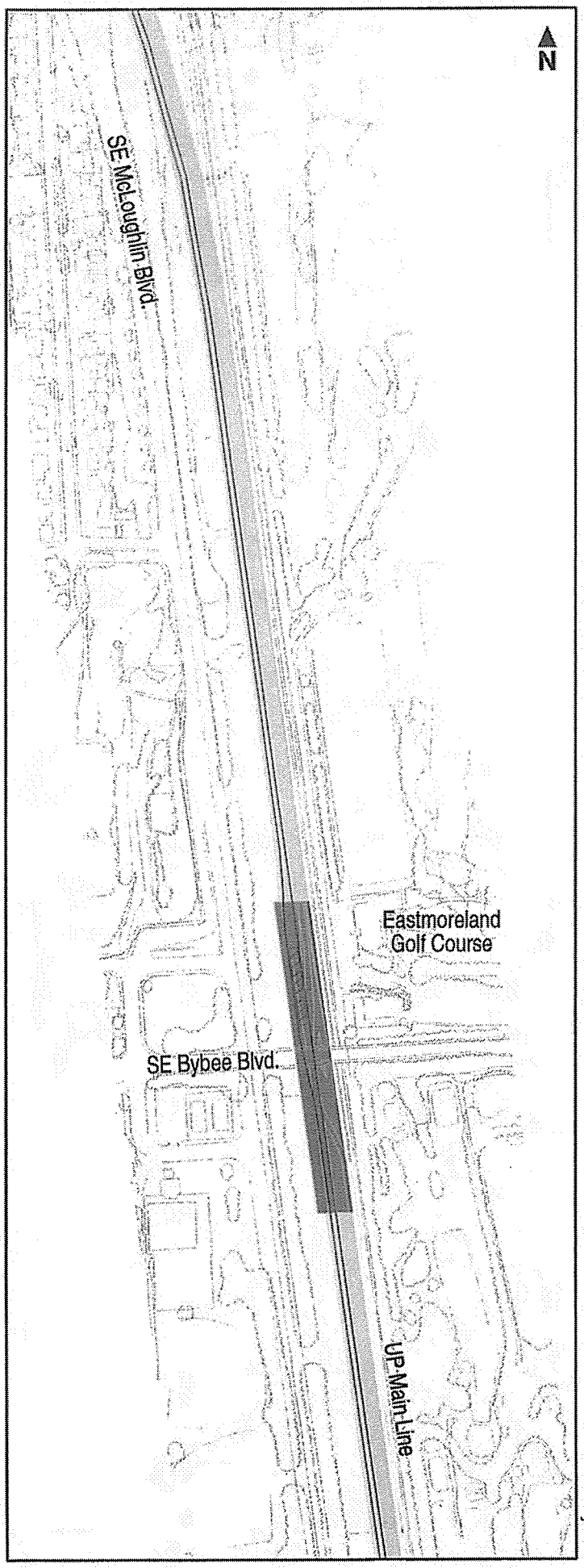
Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

1 Inch to 400 Feet

FEET

11330



South North Transit Corridor Study

METRO

Figure 3.9

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

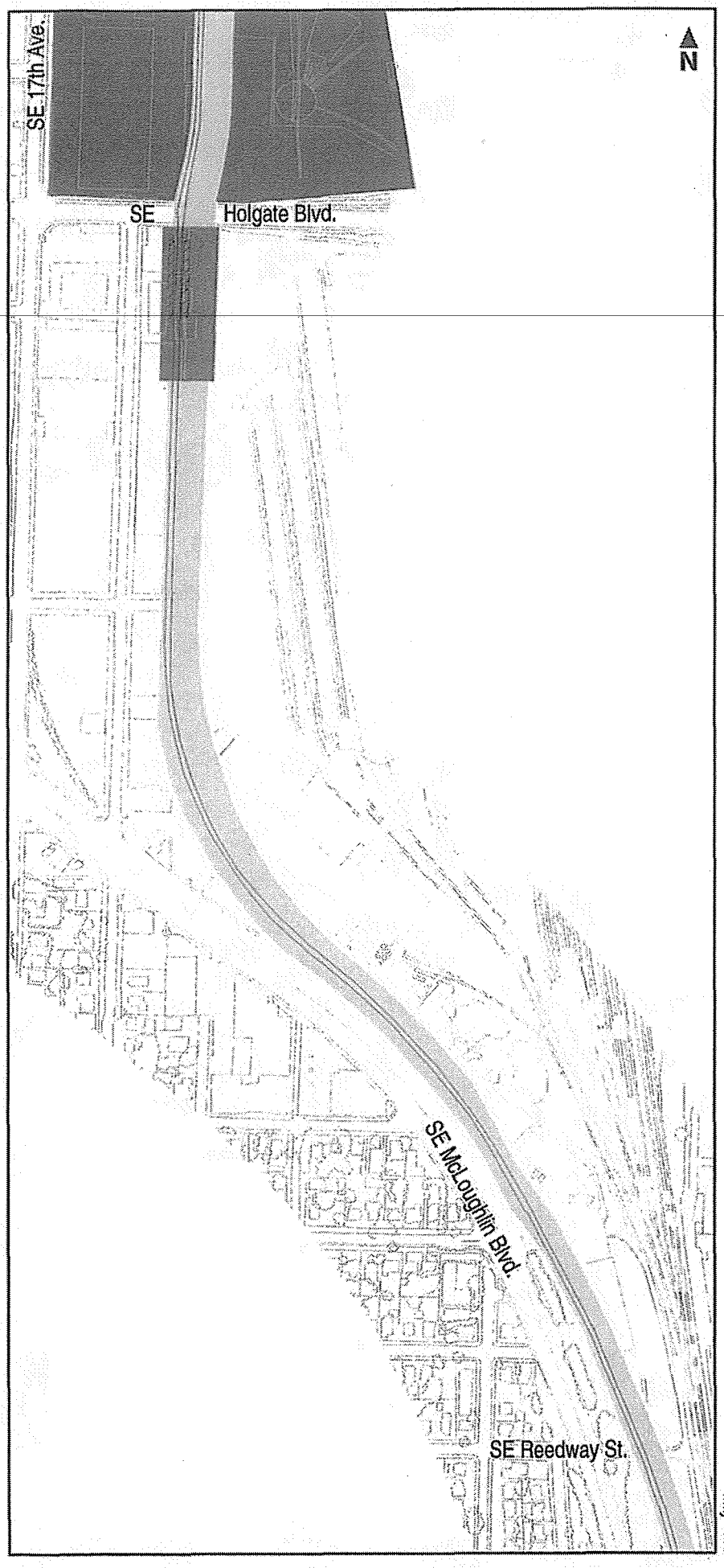
DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.10

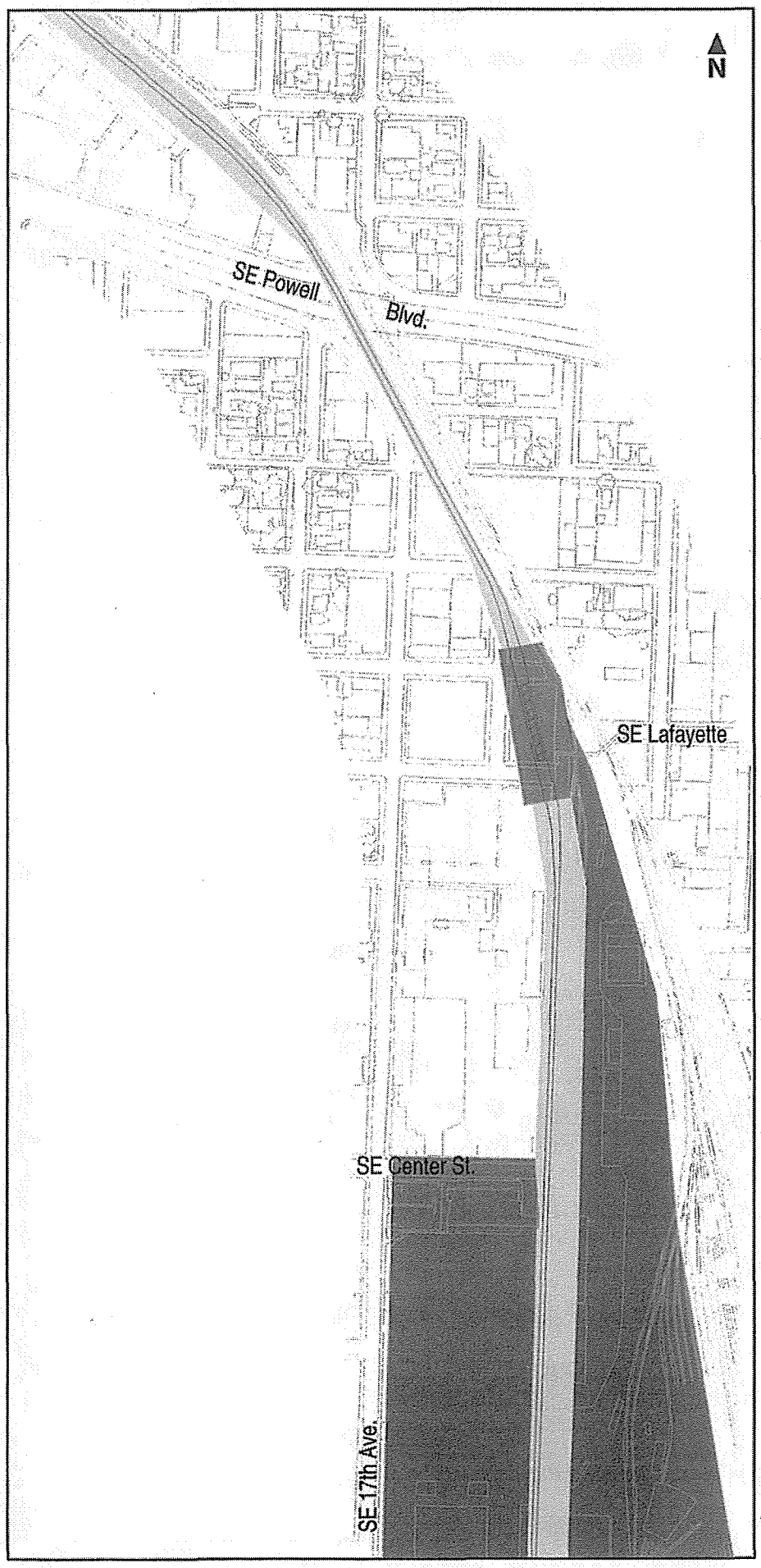
Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- Operations and Maintenance Facility Study Area
- DEIS Station Platform
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.11

Land Use Final Order Boundary Maps

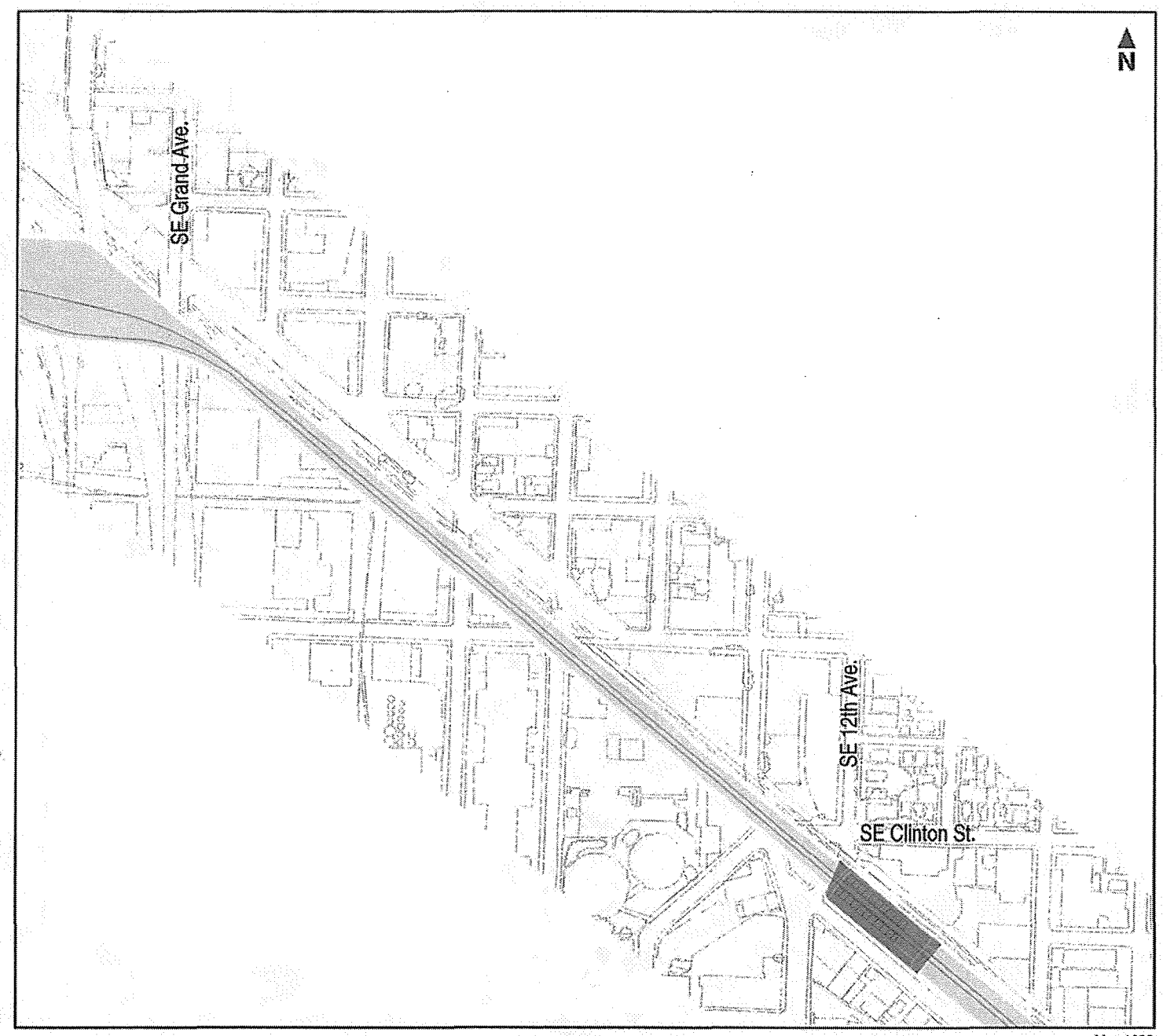
- Light Rail Route
- Light Rail Station
- Light Rail Operations and Maintenance Facility Study Area
- DEIS Station Platform
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

May 1998



South North Transit Corridor Study

METRO

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

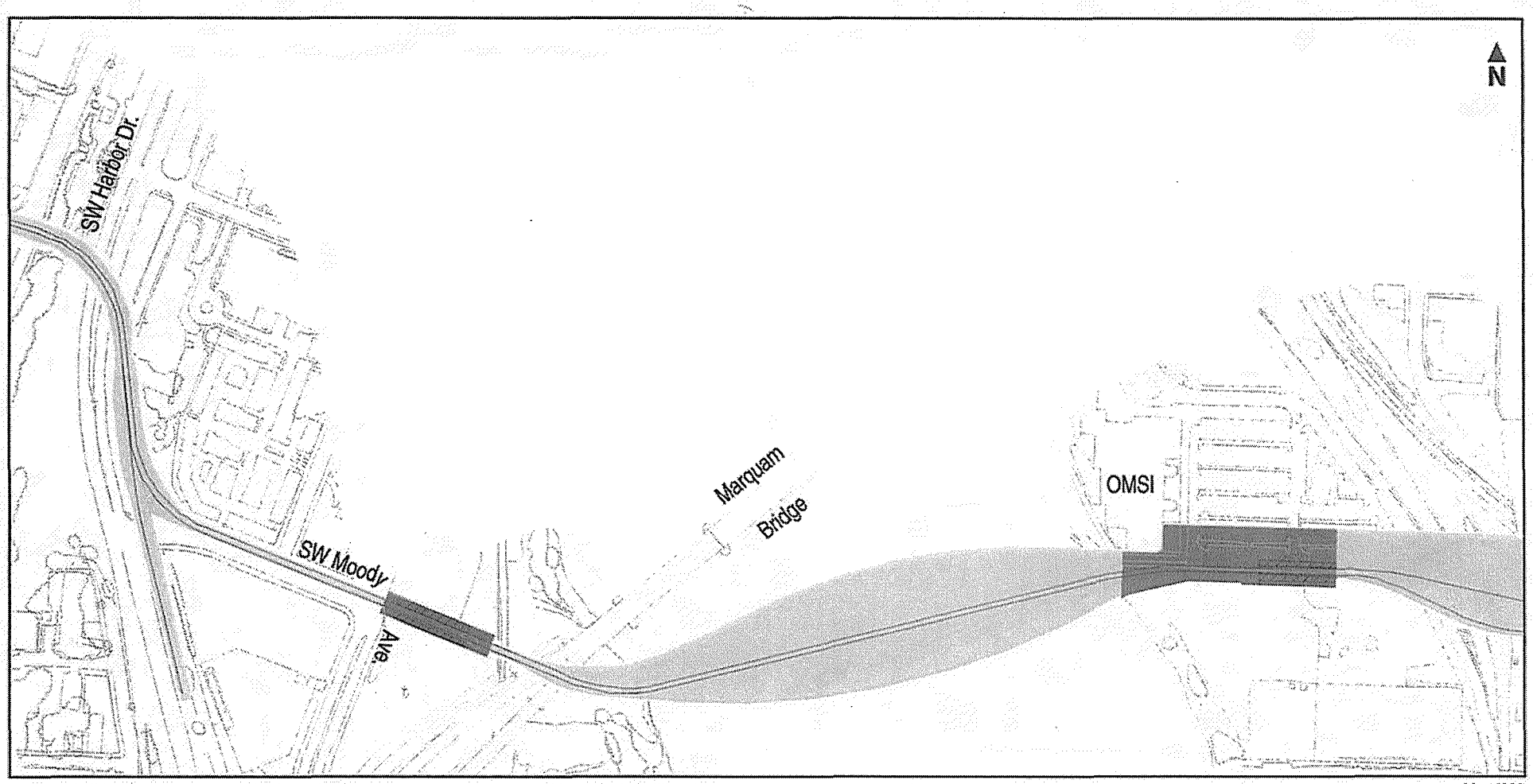
0 400 800

1 Inch to 400 Feet

FEET

Figure 3.12

Land Use Final Order Boundary Maps



South North Transit Corridor Study

METRO

Figure 3.13

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

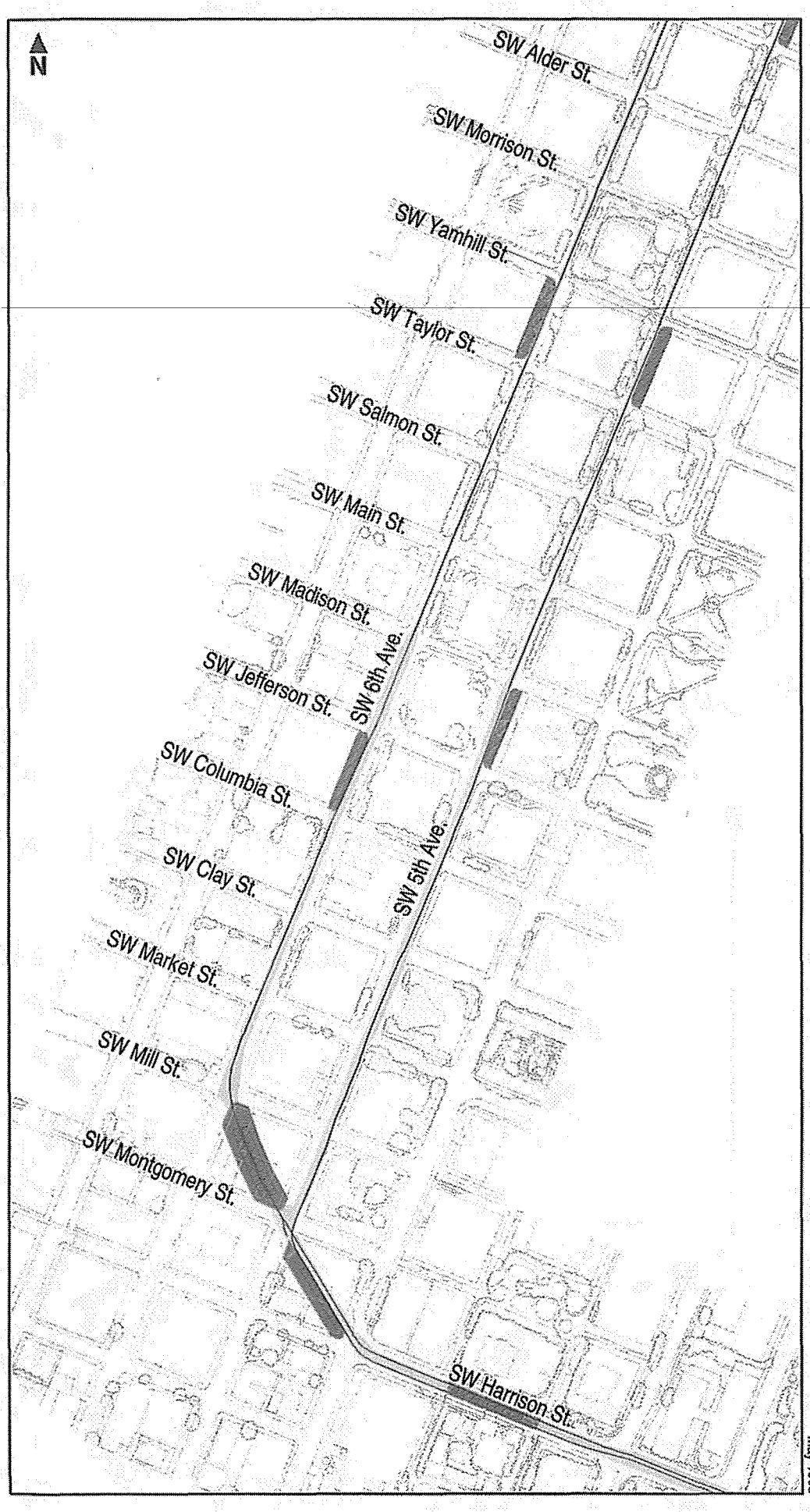
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11335



South North Transit Corridor Study

METRO

Figure 3.14

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

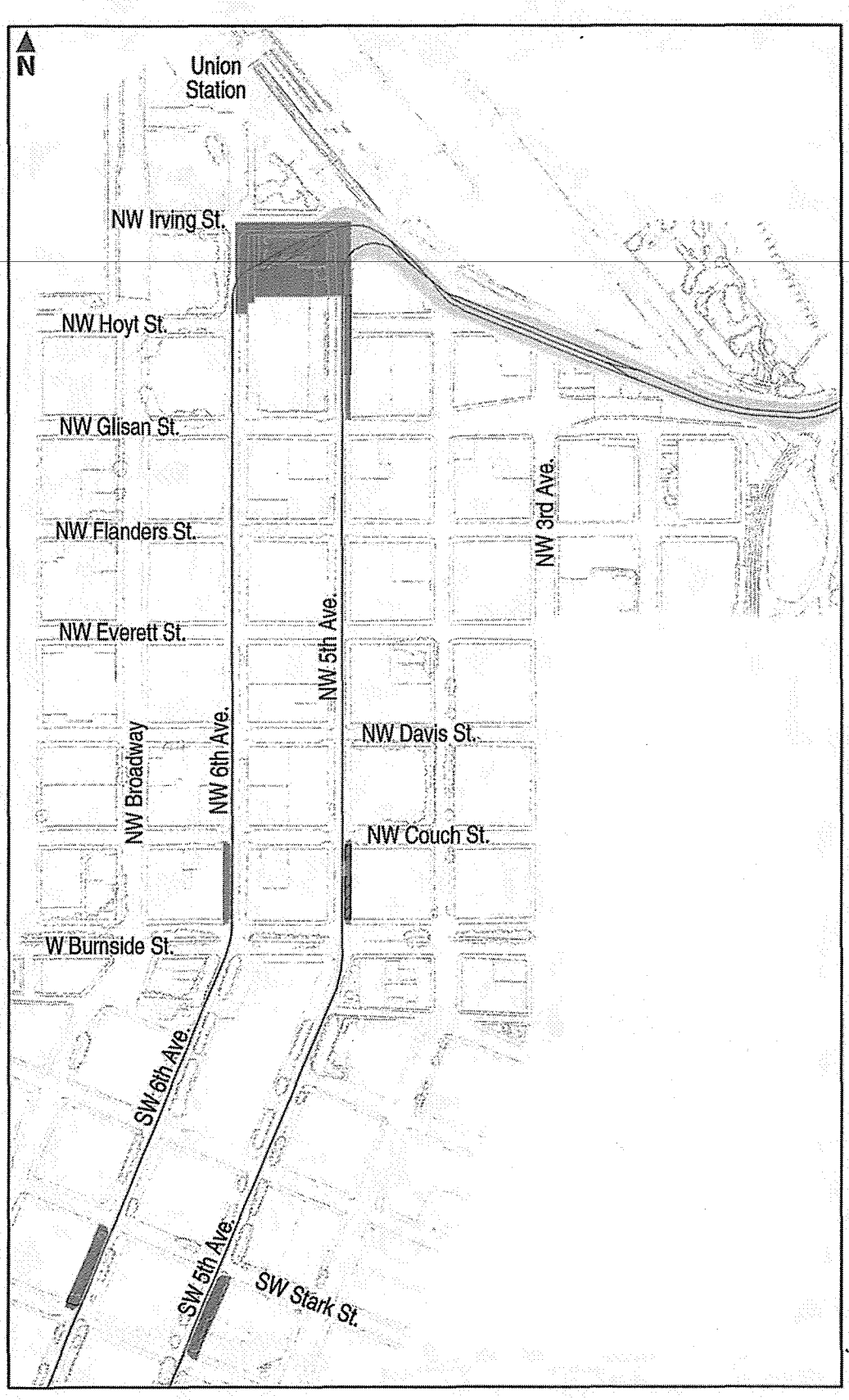
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11336



May 1998

South North Transit Corridor Study

METRO

Figure 3.15

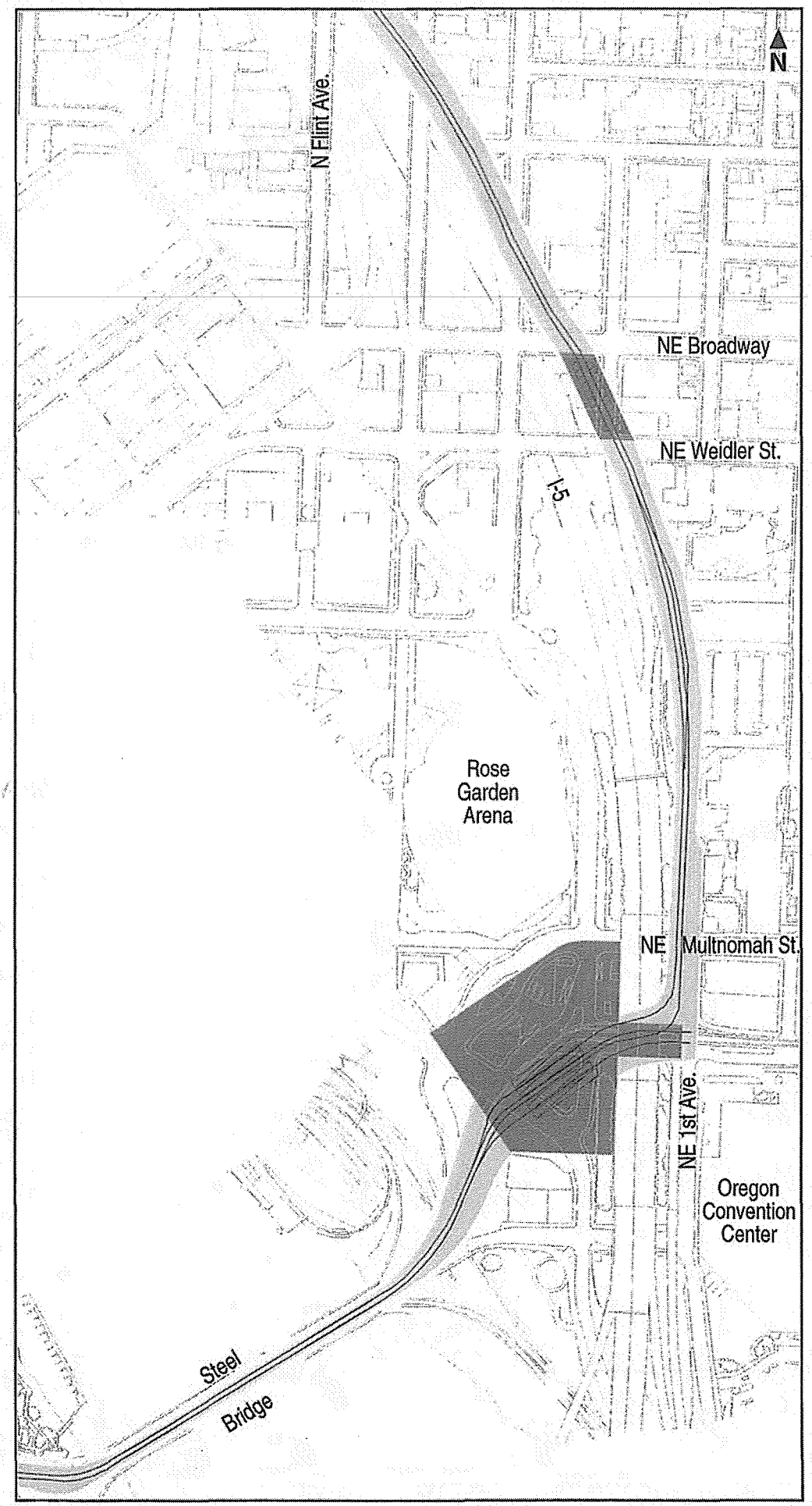
Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- DEIS Station Platform
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.16

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

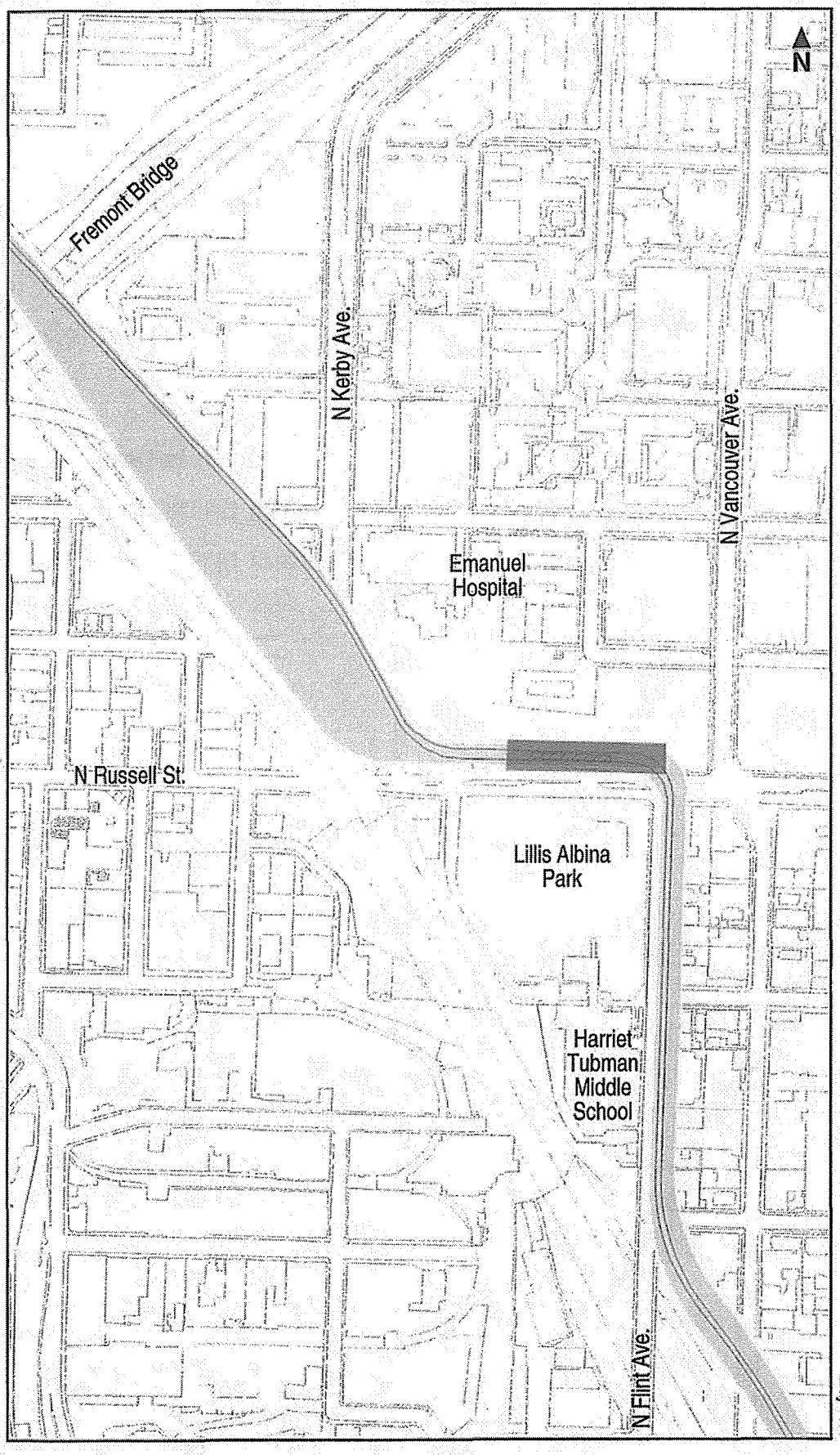
May 1998

0 400 800

1 Inch to 400 Feet

FEET

11338



South North Transit Corridor Study

METRO

Figure 3.17

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

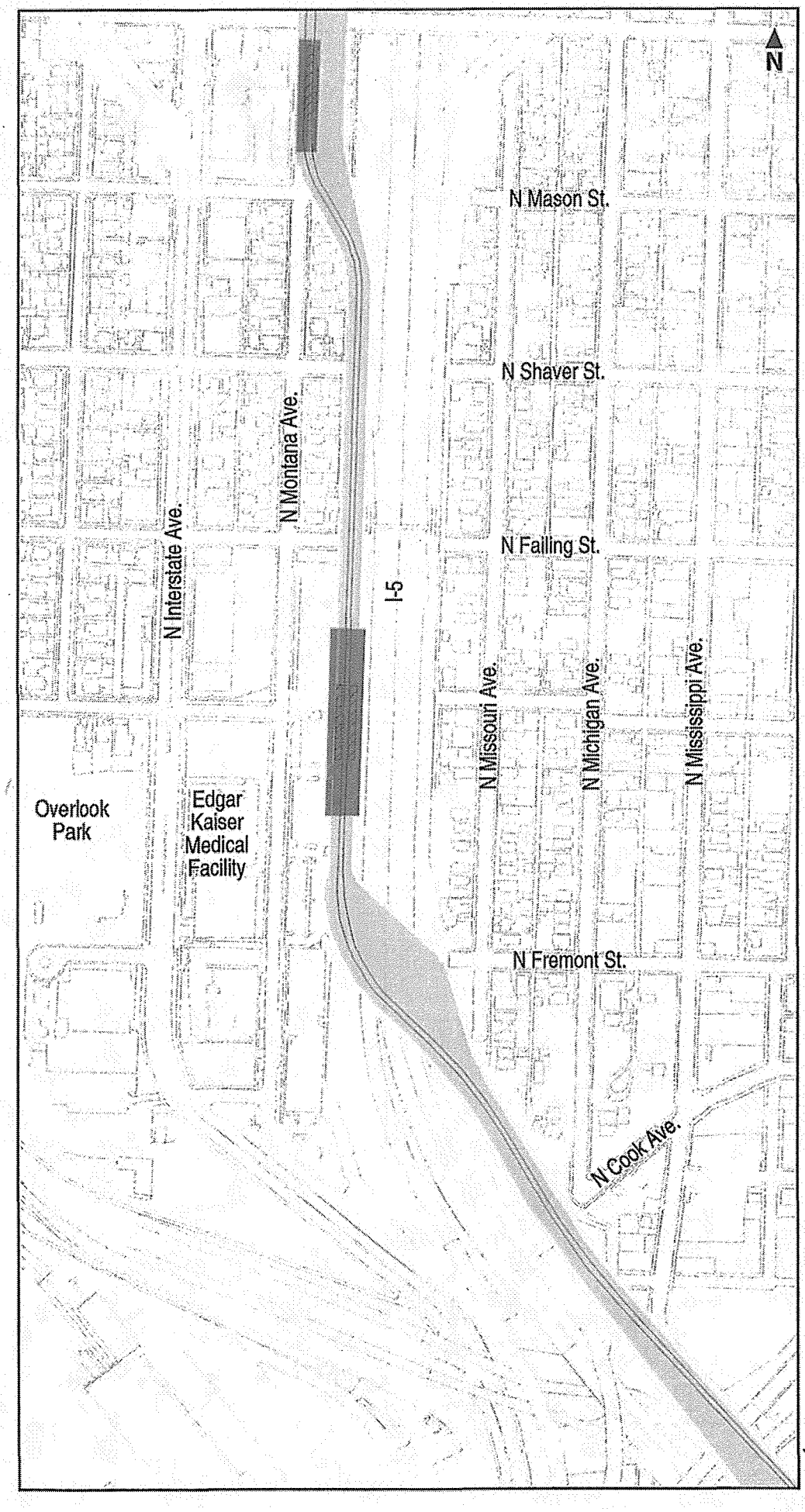
DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.18

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

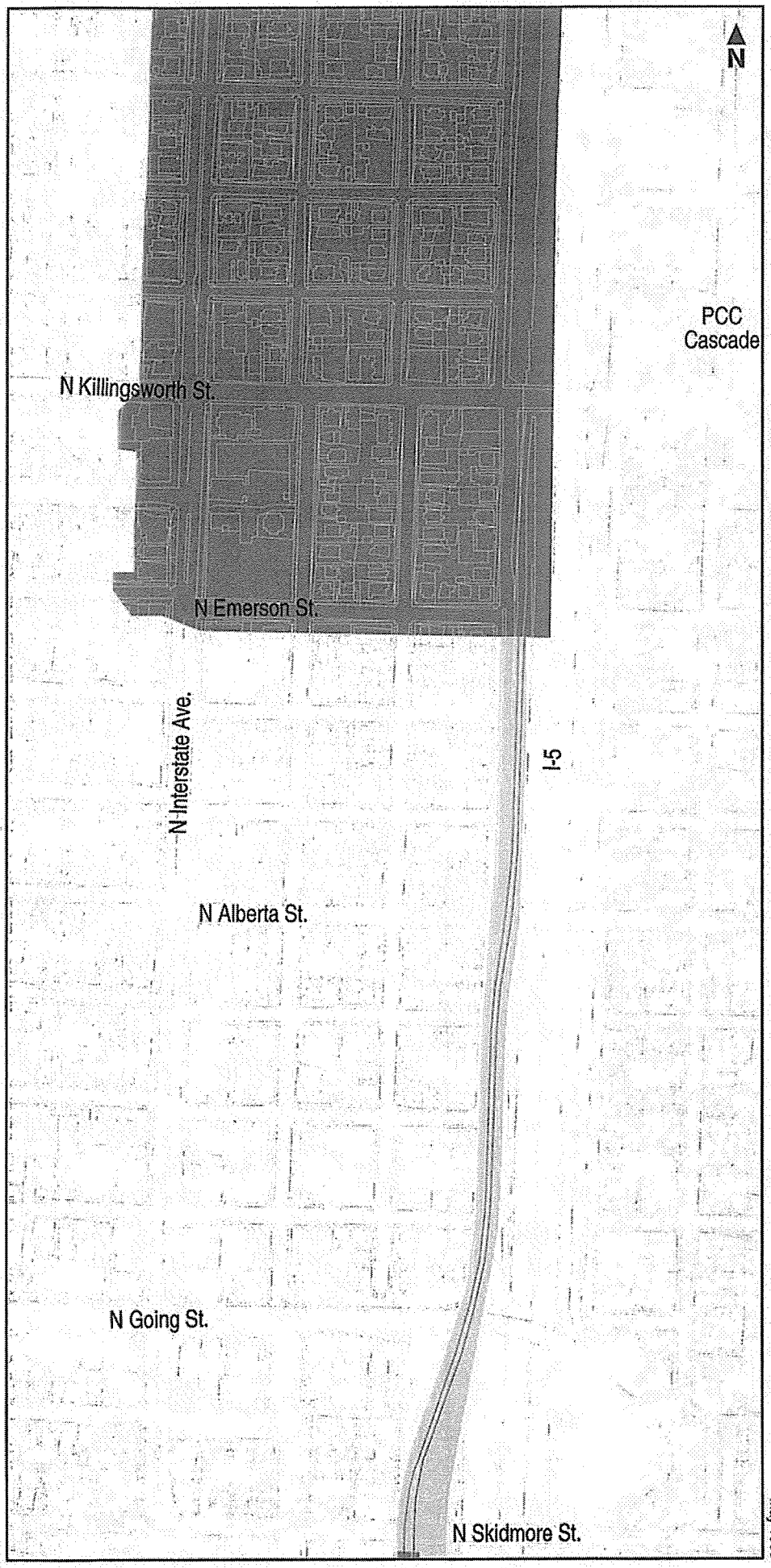
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11340



South North Transit Corridor Study

METRO

Figure 3.19

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

Crossover Study Area

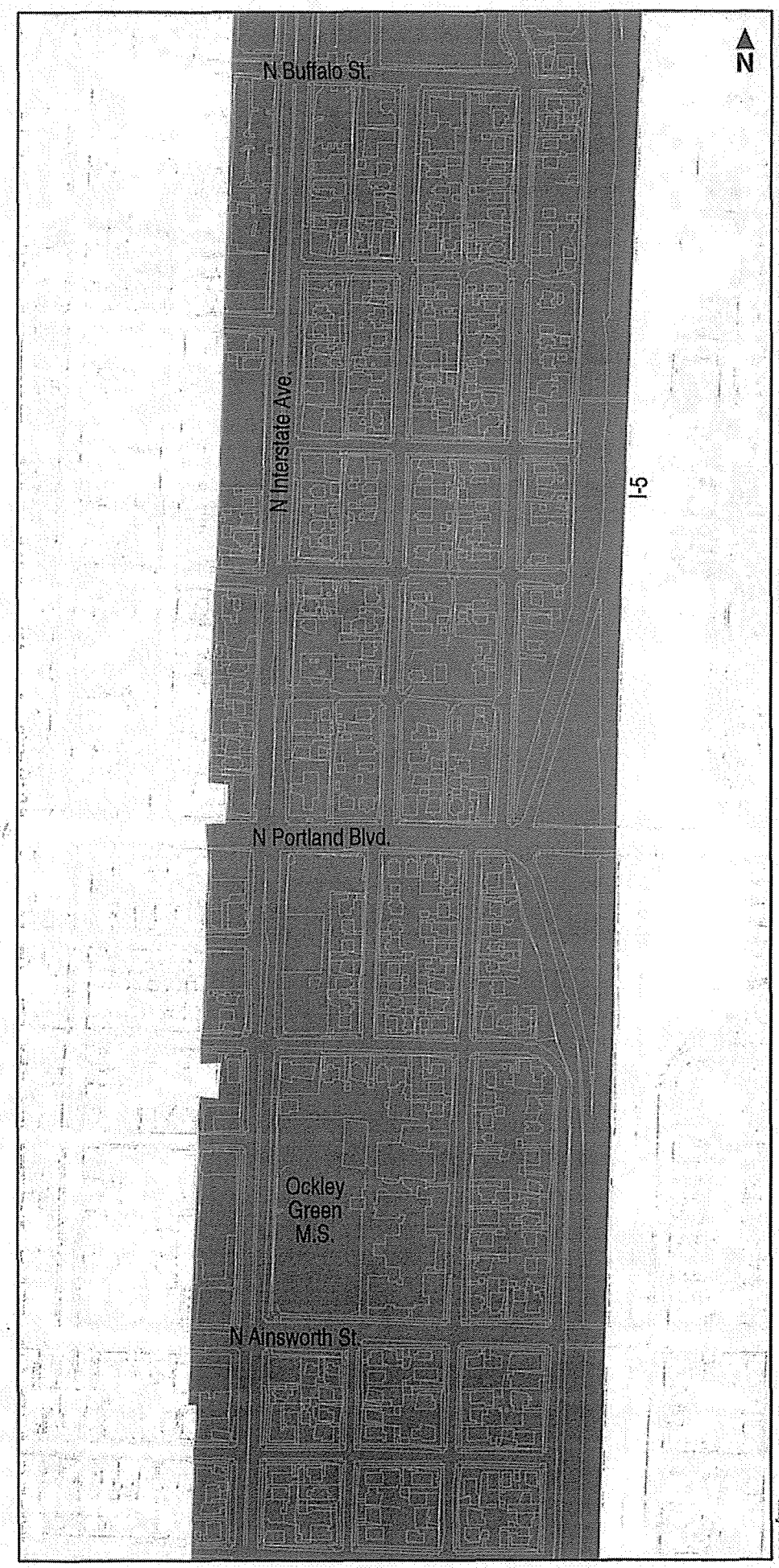
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11341



South North Transit Corridor Study

METRO

Figure 3.20

Land Use Final Order Boundary Maps

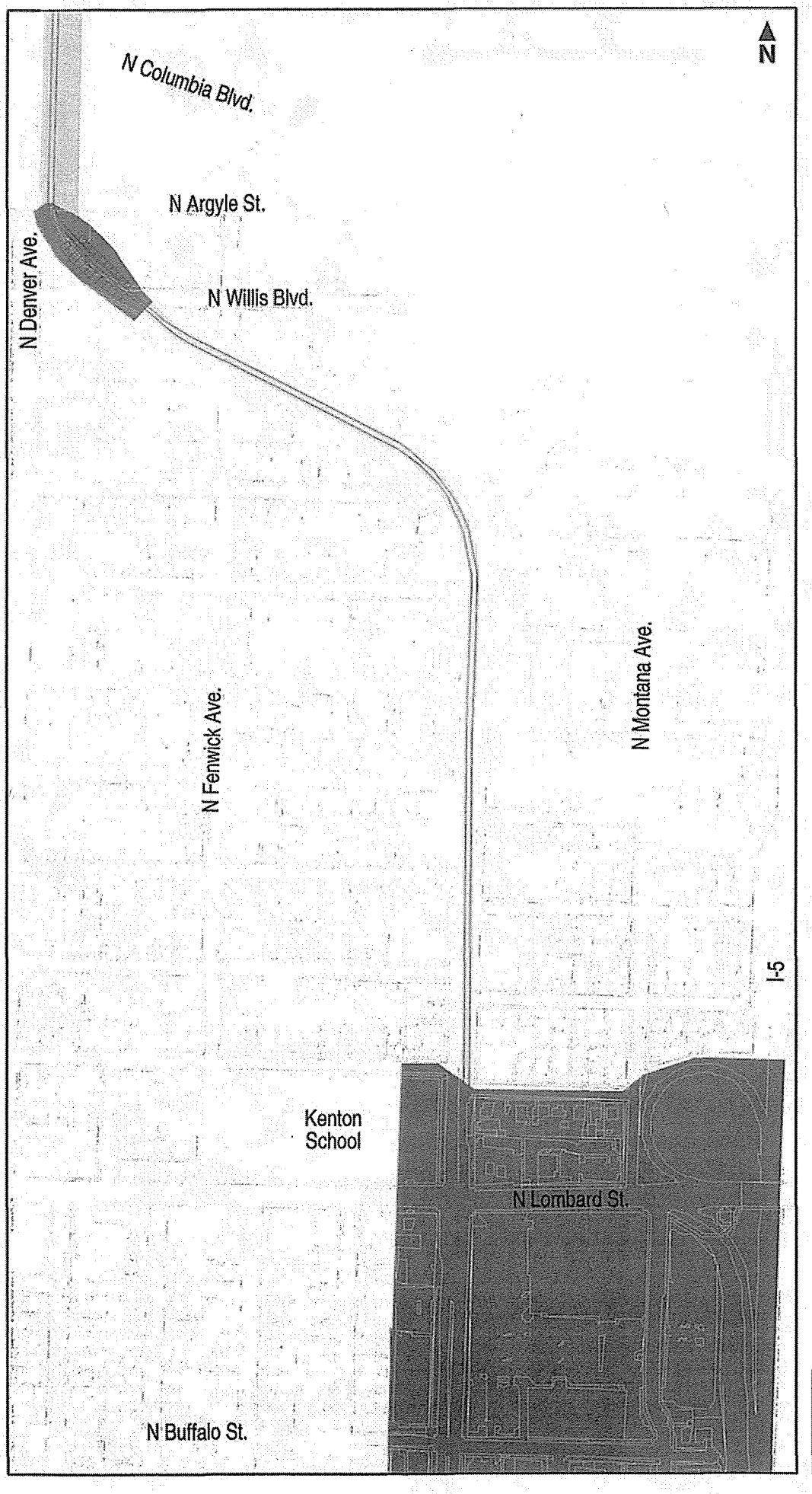
Crossover Study Area

0 400 800

1 Inch to 400 Feet

FEET

11342



South North Transit Corridor Study

METRO

Figure 3.21

Land Use Final Order Boundary Maps

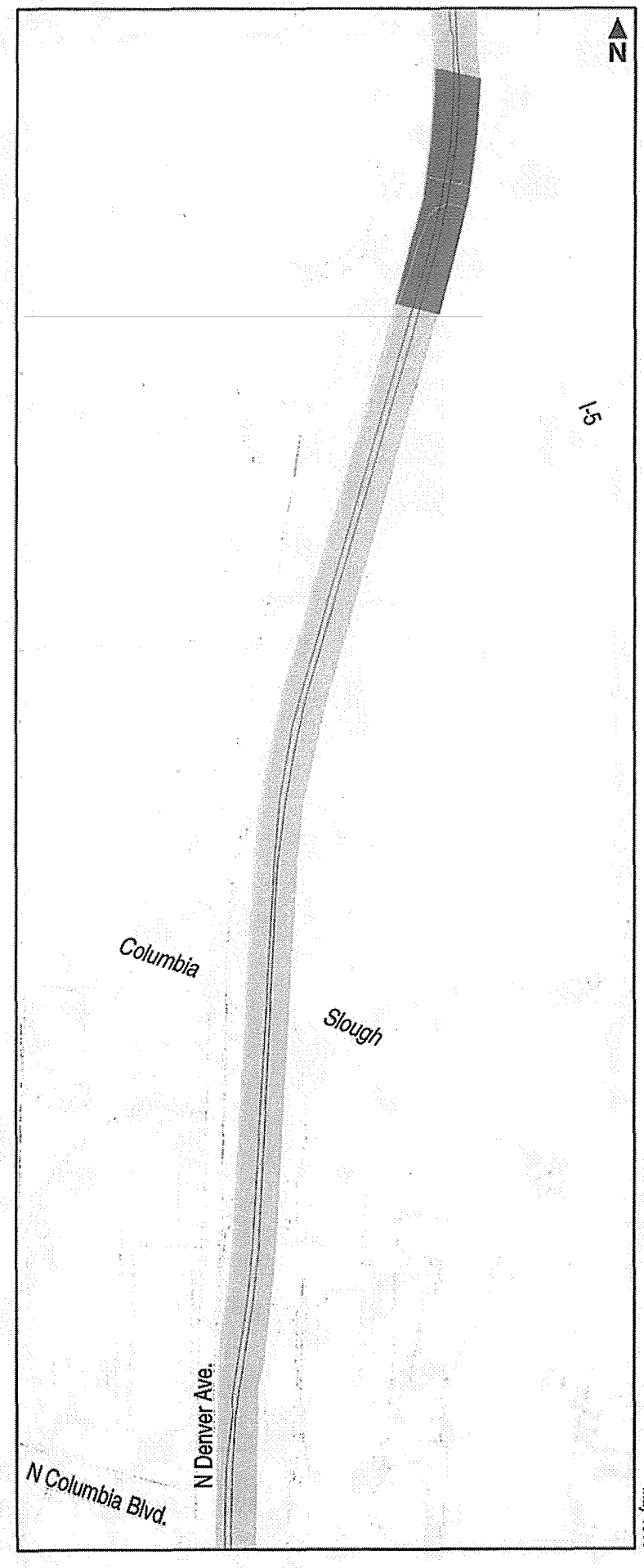
- Light Rail Route
- Light Rail Station
- Crossover Study Area
- DEIS Station Platform
- DEIS Light Rail Route

May 1998

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.22

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

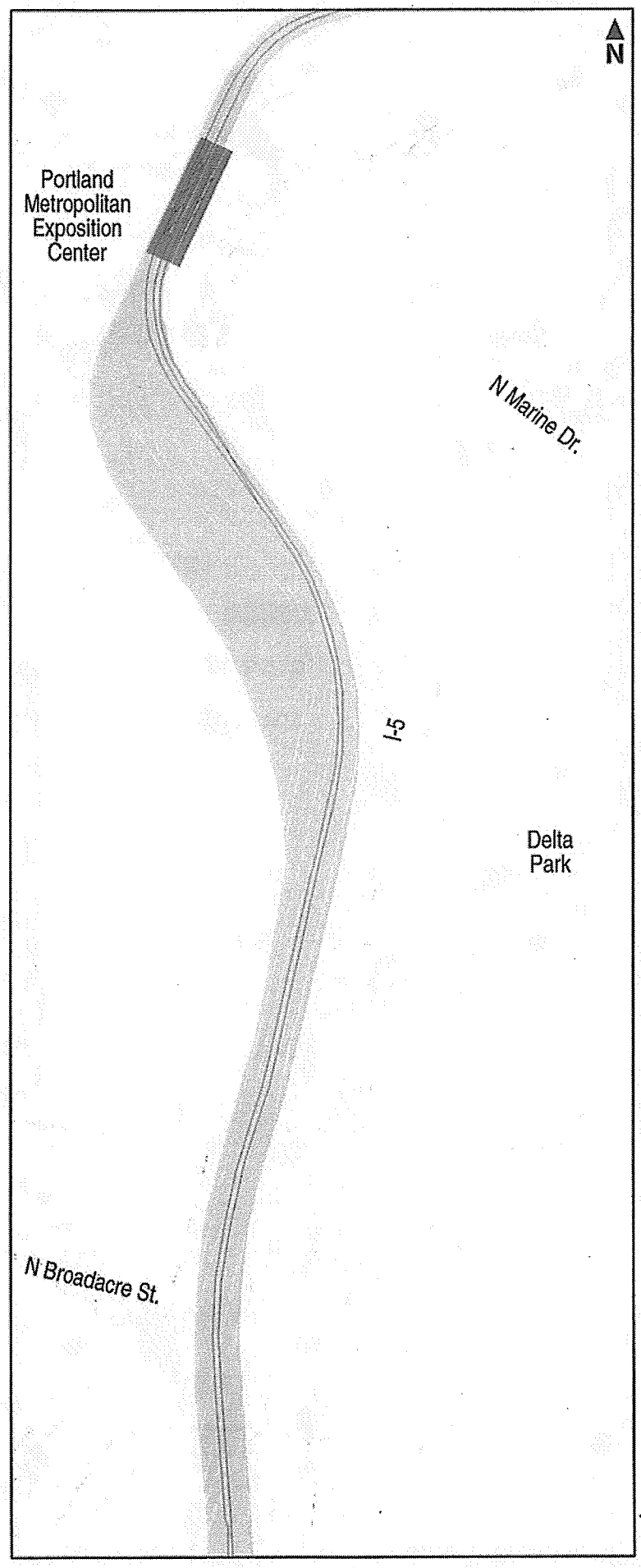
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11344



South North Transit Corridor Study

METRO

Figure 3.23

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

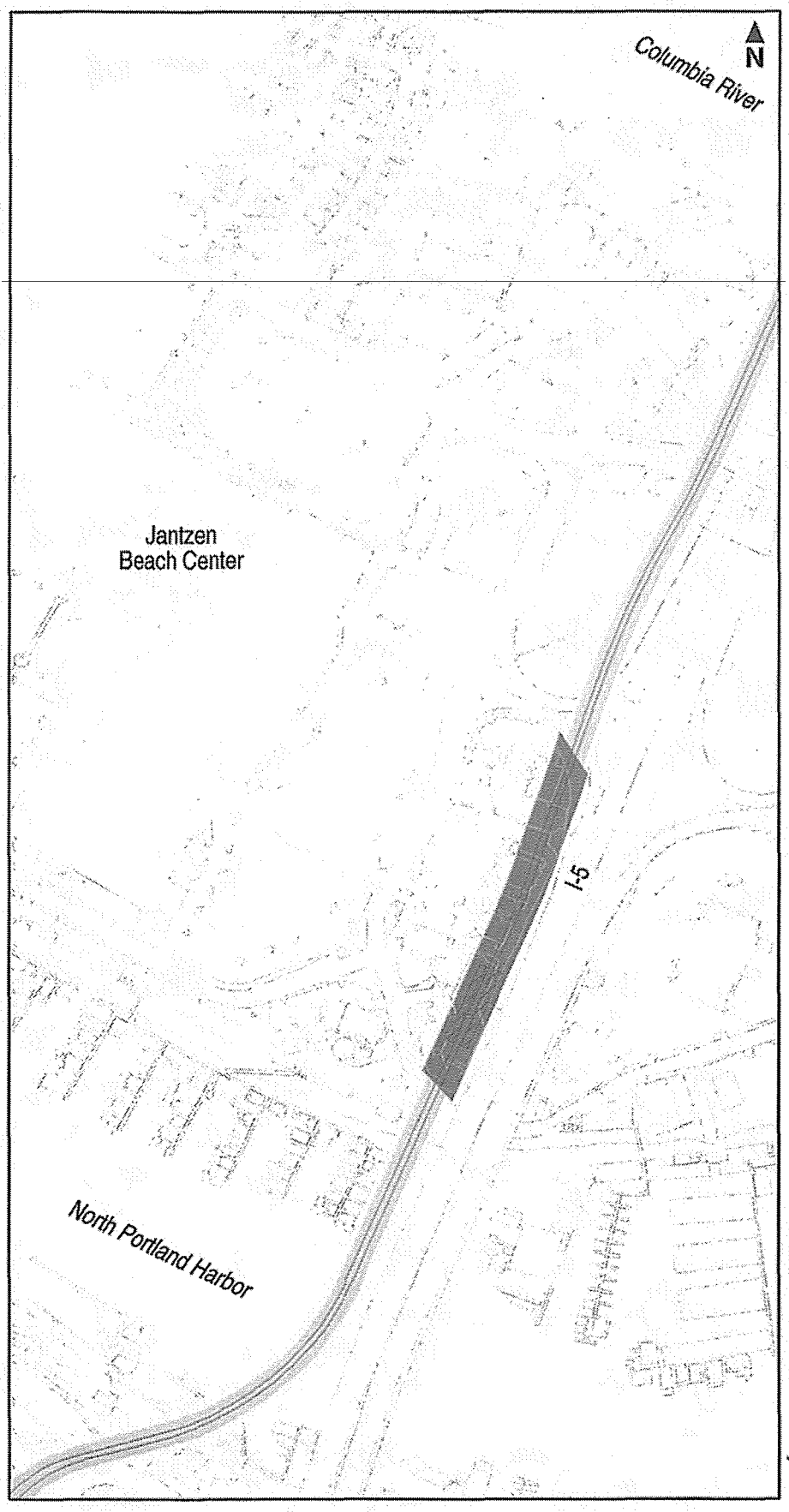
DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

METRO

Figure 3.24

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

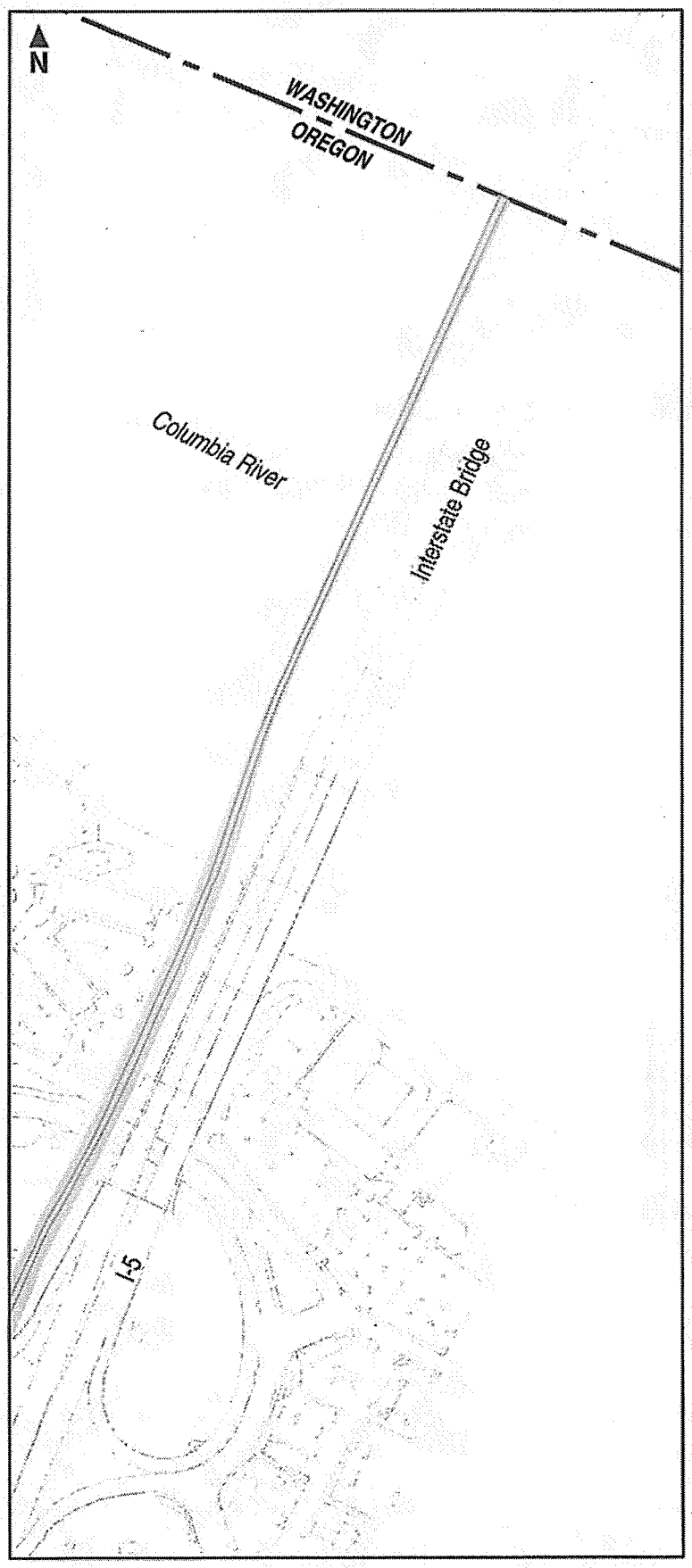
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11346



May 1998

South North Transit Corridor Study

METRO

Figure 3.25

Land Use Final Order Boundary Maps

Light Rail Route

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

Exhibit B to Resolution No. 98-2673
South/North Land Use Final Order

Tri-Met Application for South/North Land Use Final Order

July 2, 1998

Please note that copies of this document (approximately 100 pages) are available from the Metro Transportation Department. To obtain a copy contact:

Anna Kemp
Metro Transportation Department
600 NE Grand Avenue
Portland, OR 97232

Telephone (503) 797-1757
fax (503) 797-1929,

TRI-COUNTY METROPOLITAN
TRANSPORTATION DISTRICT OF OREGON

SOUTH/NORTH LIGHT RAIL PROJECT
710 N.E. HOLLADAY STREET
PORTLAND, OREGON 97232
PHONE: 239-6725
FAX: 239-6700

WML091.136
DocC: 75309

July 2, 1998

Mr. Jon Kvistad
Presiding Officer
Metro Regional Center
600 NE Grand Avenue
Portland, OR 97232-2736

Dear Mr. Kvistad:

Please find enclosed, Tri-Met's Application for a Land Use Final Order (LUFO) relating to the South/North Light Rail Project.

This LUFO application is being submitted to Metro pursuant to the provisions of 1996 Oregon Laws, Chapter 12 (House Bill 3478), which directs Tri-Met to submit such an application to the Metro Council after Tri-Met has received recommendations from the LUFO Steering Committee and the Oregon Department of Transportation. I am pleased to report that Tri-Met has now received and considered both of those recommendations.

It should be noted that the Locally Preferred Strategy, which has been approved by the Tri-Met Board of Directors, includes a proposed alignment from Clackamas Town Center to Vancouver, Washington. However, the enclosed LUFO Application only covers the proposed alignment for the Oregon portion of the Project from Clackamas Town Center to the Columbia River.

It should also be noted that this LUFO Application is consistent with the recommendations from the Steering Committee and ODOT, both in the facilities and improvements it proposes, and in that it identifies three areas for further study. Those study areas are: 1) the area in the Clackamas Regional Center Segment around the North Clackamas Aquatic Park, Clackamas Community College and the Oregon Institute of Technology; 2) the area in the South Willamette Crossing Segment around SE Holgate and 17th Avenue, and; 3) the area in the North

Portland Segment generally bounded by N. Killingsworth Street, N. Interstate Avenue, N. Lombard Street and I-5.

The enclosed LUFO Application will provide the basis for the findings to be made as part of Metro's adoption of the Land Use Final Order. I am requesting that Metro proceed with the scheduled public hearing and adoption of the Land Use Final Order on July 23, 1998.

Thank you for your cooperation and assistance on this very important component of our planned regional transportation system.

Sincerely,

Tom Walsh
General Manager

/llc
enclosure

cc: Neil McFarlane, Bob Stacey, Ron Higbee, Brian Playfair, Dean Phillips, Larry Shaw

APPLICATION FOR SOUTH/NORTH

LAND USE FINAL ORDER

July 2, 1998

Application for South/North Land Use Final Order

South/North Light Rail Project

July 2, 1998

A. Introduction.

This document constitutes Tri-Met's application to the Metro Council for approval of a Land Use Final Order (LUFO) for the South/North Light Rail Project. This application is filed in accordance with the provisions governing applications for LUFOs set out in House Bill 3478.

This application addresses the light rail route, light rail stations, lots and maintenance facilities, and the highway improvements for an area extending from the Clackamas Regional Center in Clackamas County, Oregon, to the Oregon/Washington state line ("the Project" or "the South/North Project"). Although the Project is a bi-state project, HB 3478 applies only to the portion within the State of Oregon. At a future date, following preparation of a draft environmental impact statement, Tri-Met will apply to the Council for approval of a LUFO extending the light rail route to Oregon City ("the Project Extension").

B. Requirements of House Bill 3478.

House Bill 3478 authorizes the Metro Council, upon application by Tri-Met, to adopt a Land Use Final Order for the South/North Project. A LUFO is a written order of the Metro Council deciding the light rail route, the stations, lots and maintenance facilities, and the highway improvements for the South/North Project, including their locations. The LUFO identifies the light rail route, stations, lots, maintenance facilities and highway improvements that comprise the South/North Project, and it further specifies the locations within which these facilities and improvements may be located. As explained in Section 6(1)(a) of House Bill 3478,

> "The applied for locations shall be in the form of boundaries within which the light rail route, stations, lots and maintenance facilities, and the highway improvements shall be located. These boundaries shall be sufficient to accommodate adjustments to the specific placements of the light rail route, stations, lots and maintenance facilities, and the highway improvements for which need commonly arises upon the development of more detailed environmental or engineering data following approval of a Full Funding Grant Agreement."

House Bill 3478 provides that Tri-Met submit its application to the Metro Council following its receipt of recommendations from the Oregon Department of Transportation and the South/North LUFO Steering Committee established pursuant to Section 1(21) of the Act. On June 5, 1998, the South/North LUFO Steering Committee adopted its recommendations to Tri-Met on the light rail route, stations, lots, maintenance facilities and highway improvements for the South/North Project. The Oregon Department of Transportation followed with its

recommendations on June 8, 1998, in the form of a letter to the Tri-Met Board from Kay Van Sickel, Region 1 Manager, expressly endorsing the recommendation of the South/North LUFO Steering Committee. Tri-Met has received and considered these recommendations from the South/North LUFO Steering Committee and ODOT, copies of which are attached to this application. Tri-Met's application to the Metro Council is consistent with those recommendations.

House Bill 3478 further requires the Metro Council to demonstrate that its decisions comply with approval criteria established by the Land Conservation and Development Commission under Section 4 of the Act. These criteria are identified and discussed later in this application.

C. Requested Light Rail and Highway Improvements.

Tri-Met requests Metro Council adoption of a LUFO approving the light rail route, the stations, lots and maintenance facilities, and the highway improvements for the South/North Project as identified textually below and in the attached maps, which illustrate the location "boundaries" as required by Section 6(1)(a) of House Bill 3478.

The maps all are printed from a common Geographic Informational System data base and represent three levels of detail: 1) Figures 1.1 to 1.8b illustrate the boundaries of the project elements at the segment level; 2) Figures 2.2.1 to 2.5.3 provide selected detailed insets to the segment maps that separate out overlapping boundaries into individual maps for each project element (*e.g.* LRT route, station, etc.); and 3) Figures 3.1 to 3.25 illustrate the applied-for boundaries at the one inch equals 400 foot scale continuously along the LRT alignment from south to north. These maps are the same maps recommended to Tri-Met by the South/North LUFO Steering Committee and ODOT.

In addition to these maps, Tri-Met also is submitting, as part of its application, maps illustrating the location boundaries continuously along the LRT alignment from south to north at a scale of one inch equals 200 feet. These maps are intended to provide greater clarity as to the boundaries within which the light rail alignment and the other proposed light rail and highway improvements may be located without need for LUFO amendments. Except for the difference in scale, these 200-scale maps are identical in all respects to the 400-scale maps attached hereto.

Consistent with the South/North Draft Environmental Impact Statement, Tri-Met has divided the South/North Project into nine segments, beginning with the Clackamas Regional Center Segment at the southern terminus and ending with the Hayden Island Segment at the Oregon/Washington state line. For each segment, the project description begins with a brief summary of the segment, followed by identification of the light rail route, the stations, lots and maintenance facilities, and the highway improvements.

Consistent with the recommendations from the Steering Committee and ODOT, this application identifies three areas for further study. These areas are (1) the area in the Clackamas Regional Center Segment including Clackamas Community College, the Oregon Institute of

Technology and the North Clackamas Aquatic Center and extending westward from approximately SE 80th Avenue and SE Harmony Road to a location west of SE Fuller Road; (2) the area in the South Willamette Crossing Segment bounded by approximately SE Holgate Boulevard, SE 17th Avenue, SE Center Street, the east side of the light rail alignment to approximately SE Rhone Street, and a line bisecting Brooklyn Yard on the east; and (3) the area in the North Portland Segment generally bounded by N Killingsworth Street, N Interstate Avenue, N Lombard Street and I-5.

For the areas in the Clackamas Regional Center and North Portland segments, additional planning resulting in LUFO amendments will determine the specific identity and locations of the light rail route, stations, lots and/or highway improvements. For now, Tri-Met requests only a decision authorizing these uses within the identified study area boundaries. The South Willamette Crossing Segment area will be studied further to determine whether the identified study area is appropriate for a light rail operations and maintenance facility. Any designation of this area as an operations and maintenance facility would require a LUFO amendment.

Tri-Met also believes further study should be given to the number of park-and-ride spaces along the alignment. To improve transit ridership, Tri-Met believes need exists for approximately 1100 more park-and-ride spaces beyond what this application provides for. The determination of appropriate locations for these spaces would require further analysis and a LUFO amendment.

The light rail route, stations, lots and maintenance facilities, and the highway improvements for which Tri-Met seeks approval are as follows:

Clackamas Regional Center Segment

The Clackamas Regional Center Segment extends from the north side of the Clackamas Town Center mall in the vicinity of the existing transit center to approximately SE Harmony Road and SE Cedarcrest Drive.

The alignment begins with a terminus station at a reconfigured transit center on the north side of the Clackamas Town Center (CTC) mall. The alignment heads westward, crossing SE 82nd Avenue at grade, then turns southward onto SE 80th Avenue, crossing SE Harmony Road. From here, the alignment turns westward and passes through a study area including Clackamas Community College, the Oregon Institute of Technology and the North Clackamas Aquatic Park and extending west of SE Fuller Road. A master planning process resulting in a land use final order amendment will decide the location of the alignment as well as the station location and the configuration for an approximately 900-space structured and/or surface park-and-ride lot within this area. From the western end of this study area, the alignment then continues westward on the south side of SE Harmony Road to the vicinity of SE Cedarcrest Drive.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Clackamas Regional Center Segment attached to this application.

East Milwaukie Segment

The East Milwaukie Segment extends from SE Cedarcrest Drive at SE Harmony Road to just east of the Tillamook Branch rail line near Highway 224 at the southern portion of the north Milwaukie industrial area.

From the vicinity of SE Cedarcrest Drive, the alignment continues westward along the south side of SE Harmony Road, crossing over the UP rail line on a new structure to a station and approximately 1300-space structured and/or surface park-and-ride lot located in the vicinity of SE Linwood Avenue. The alignment proceeds westward south of SE Harmony Road, crossing SE Harmony Road diagonally at grade at the intersection of SE Harmony Road, SE Lake Road and SE International Way. It then continues westward, north of and generally parallel to Highway 224, to just east of the Tillamook Branch Line, with a station at SE Freeman Way.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the East Milwaukie Segment attached to this application.

Milwaukie Regional Center Segment

The Milwaukie Regional Center Segment extends northward from Highway 224 just east of the Tillamook Branch Line near the north Milwaukie industrial area to SE Tacoma Street in the City of Portland.

Starting from north of Highway 224 just east of the Tillamook Branch Line, the alignment crosses over the branch line on a structure, then crosses under Highway 224 and crosses SE Main Street at grade. It extends southward, generally parallel to and east of SE McLoughlin Boulevard, turning eastward north of SE Scott Street to a station and transit center located in the vicinity of the current vacant Safeway store. From the transit center, the alignment curves northward to the east of Kellogg Bowl. It then curves northeast and crosses under Highway 224 and the light rail alignment through a new underpass. North of Highway 224, the alignment makes a wide curve through the Heiberg garbage transfer station east of the Hanna Harvester site, and then extends northward parallel to and west of the Tillamook Branch and UP Main Line. A new connection of freight spur tracks to the Tillamook Branch Line will be constructed in the vicinity of SE Mailwell Drive and would cross the light rail alignment at grade. South of SE Ochoco Street is an alternative light rail vehicle operations and maintenance facility site. North of the Springwater Corridor and south of SE Tacoma Street, a station and an approximately 800-space structured park-and-ride lot will be located. The alignment then crosses over Johnson Creek on a bridge and under an existing span of the SE Tacoma Street overpass.

Highway improvements in this segment include the extension of SE 21st Avenue northward two blocks from SE Harrison Street and two cross streets connecting the extended SE 21st Avenue with SE Main Street.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Milwaukie Regional Center Segment attached to this application.

McLoughlin Boulevard Segment

The McLoughlin Boulevard Segment extends from SE Tacoma Street to SE McLoughlin Boulevard at SE 20th Avenue.

From SE Tacoma Street, the alignment proceeds northward east of SE McLoughlin Boulevard between the roadway and the UP railroad. It proceeds past the Eastmoreland Golf Course, passing under SE Bybee Boulevard. A light rail station is located in the vicinity of SE Bybee Boulevard, with pedestrian access provided at the Bybee overcrossing. The alignment then continues northward east of McLoughlin Boulevard to the vicinity of SE 20th Avenue near the Brooklyn Rail Yard.

There are no highway improvements in this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the McLoughlin Boulevard Segment attached to this application.

South Willamette River Crossing Segment

The South Willamette River Crossing Segment extends from SE McLoughlin Boulevard at SE 20th Avenue to the east side of SW Front Avenue at SW Harrison Street.

From SE 20th Avenue, the alignment separates from SE McLoughlin Boulevard and turns northward. North of SE McLoughlin Boulevard, the alignment proceeds north along the western boundary within Brooklyn Yard, to the east of parcels located between SE 18th Avenue and Brooklyn Yard, to a station in the vicinity of SE Holgate Boulevard. An alternative alignment would be just to the west of the western Brooklyn Yard property boundary between SE McLoughlin Boulevard and SE Holgate Boulevard. The alignment then continues northward along the west side of Brooklyn Yard to a station in the vicinity of SE Lafayette Street, with pedestrian access serving the east Brooklyn neighborhood via an overcrossing across the UP rail line. The area bounded by approximately SE Holgate Boulevard, SE 17th Avenue, SE Center Street, the east side of the light rail alignment to approximately SE Rhone Street, and a line bisecting Brooklyn Yard on the east has been identified for further study as a potential light rail vehicle operations and maintenance facility site. Designation of this site as an LRV operations and maintenance facility will require a land use final order amendment.

The alignment then continues in a northwesterly direction, crossing over SE Powell Boulevard on an elevated structure, paralleling the UP rail line. The alignment then crosses SE 12th and SE 11th Avenues at grade, with a station located at approximately SE 12th Avenue. From there, the alignment crosses the Darigold rail spur at grade, crosses under the existing McLoughlin Boulevard viaduct, then crosses the Oregon Pacific Railroad freight rail line and SE Water Avenue at grade, to a station located

just south of OMSI. From the OMSI station, the alignment turns westward, crossing the Willamette River on a fixed span bridge with a vertical clearance of not less than 72 feet Columbia River Datum (CRD) and a horizontal clearance of approximately 200 feet. On the west bank of the Willamette River, the alignment continues along the north side of SW Moody Avenue, with a station located in the vicinity of SW River Parkway. The alignment then extends northwestward at grade, parallel to and north of SW Moody Avenue, turning northward parallel to SW Harbor Drive, then crossing SW Harbor Drive on an elevated structure landing at SW Front Avenue and SW Harrison Street.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the South Willamette River Crossing Segment attached to this application.

Downtown Portland Segment

The Downtown Portland Segment extends from SW Front Avenue at Harrison Street to the east end of the Steel Bridge.

From SW Front Avenue at SW Harrison Street, the alignment crosses SW Front Avenue at grade and continues westward in the median of SW Harrison Street between SW 1st and SW 4th Avenues, with a station located between SW 2nd and SW 3rd Avenues. From the corner of SW Harrison Street and SW 4th Avenue, the alignment travels diagonally to connect the SW 5th and SW 6th Avenue couplet. A pair of station platforms is located in the Portland State University plaza area that is bordered by SW Harrison and SW Mill Streets and SW 4th and SW 6th Avenues.

From the PSU plaza, light rail extends northward on separate tracks located on SW 5th and SW 6th Avenues. The SW 5th Avenue track serves southbound MAX vehicles, while the SW 6th Avenue track serves northbound MAX vehicles. On both SW 5th and SW 6th Avenues, between SW Mill Street and SW Madison Street, the alignment is located within the road right-of-way. Automobile and bus access also is provided within this right-of-way. On SW 5th and 6th Avenues, stations are located in the vicinity of SW Jefferson Street. From north of SW Madison Street to West Burnside Street, the alignment is located in the center lane of SW 5th and SW 6th Avenues. On both SW 5th and SW 6th Avenues, stations are located between SW Taylor and Yamhill Streets, between SW Washington and SW Stark Streets, and in the vicinity of W Burnside Street.

North of West Burnside Street, the alignment continues across NW Glisan Street in the left lane of NW 5th and 6th Avenues, with buses and automobiles sharing the right lane. On NW 6th Avenue north of NW Hoyt Street, the alignment turns northeastward and crosses diagonally toward the corner of NW 5th Avenue and NW Irving Street. A station is located in the block containing this diagonal crossing. From approximately NW 5th Avenue and NW Irving Street, the alignment turns in a southeasterly direction at grade to a new ramp in the vicinity of NW Glisan Street that takes the alignment onto and over the Steel Bridge. On NW 5th Avenue, a station is located in the vicinity of NW Hoyt Street. From the station, the alignment rejoins the alignment serving NW 6th Avenue in the

vicinity of NW Irving Street near NW 4th Avenue, then follows that alignment to and over the Steel Bridge.

There are no highway improvements proposed for this segment. There are no proposed changes to existing through traffic patterns on the existing transit mall.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Downtown Portland Segment attached to this application.

Eliot Segment

The Eliot Segment extends from the east end of the Steel Bridge to the Edgar Kaiser Medical Facility.

From the east end of the Steel Bridge, the alignment moves to an at-grade station and transit center at the Rose Quarter. The alignment then passes under I-5 and turns northward following generally along the eastern edge of I-5, crossing over NE Weidler Street and NE Broadway Street. A station is located between NE Weidler and NE Broadway Streets. The alignment then continues in a northwesterly direction to N Flint Avenue, where it turns northward to N Russell Street. The alignment turns westward along N Russell Street, with a station on N Russell Street west of N Flint Avenue. The alignment continues westward along N. Russell Street to the east side of I-5, then turns northwestward generally following the east side of I-5. In the vicinity of N. Fremont Street, the alignment crosses over I-5 on a structure to a location near the Edgar Kaiser Medical Facility.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Eliot Segment attached to this application.

North Portland Segment

The North Portland Segment extends from the Edgar Kaiser Medical Facility to North Marine Drive.

From the station located at the Edgar Kaiser Medical Facility near I-5, the alignment runs northward west of and generally parallel to I-5 to just south of N Skidmore Street, where it jogs northwestward to a station in the vicinity of N Skidmore and N Montana. The alignment then returns to the west side of I-5 by jogging northeastward, crossing under N Going Street. The alignment continues along the west side of I-5 to an at-grade crossing of N Killingsworth Street. From here, the alignment continues northward through a study area generally bounded by N Killingsworth Street, N Interstate Avenue, N Lombard Street and I-5. A planning process resulting in a land use final order amendment will decide the location of the alignment as well as the locations of stations in the vicinities of N Killingsworth Street, N Portland Boulevard and N Lombard Street.

From the station in the vicinity of N Lombard Street, the alignment continues northward in the center of N Interstate Avenue to the vicinity of N Denver Avenue, with limited and controlled automobile and pedestrian crossings through this section. A station is located just south of the intersection of N Interstate Avenue and N Denver Avenue, between N Denver Avenue and N Fenwick Street. At N Denver Avenue, the alignment continues northward, east of N Denver Avenue, crossing over the Columbia Slough on a new bridge with a minimum vertical clearance of 34 feet CRD and a minimum horizontal clearance of 66 feet. The alignment then continues northward east of N Denver Avenue to a station in the vicinity of West Delta Park and Portland International Raceway near I-5. From here the track crosses above Highway 99 and then continues adjacent to N Expo Road between N Expo Road and I-5 to N Marine Drive, with a station near the Expo Center.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the North Portland Segment attached to this application.

Hayden Island Segment

The Hayden Island Segment extends from N Marine Drive to the Oregon/Washington state line at the Columbia River.

From the Expo Center, the alignment crosses over N Marine Drive, the North Portland Harbor and N Jantzen Street on a bridge structure. Over the North Portland Harbor the LRT span would have an approximate vertical clearance of 35 feet CRD and an approximate horizontal clearance of 215 feet. A station is located near N Jantzen Street. The alignment then crosses the I-5 ramps and continues northward towards the state line west of I-5, running onto a new bridge structure parallel to and at the same height as the Interstate Bridge.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Hayden Island Segment attached to this application.

D. Applicable Land Use Criteria.

On May 30, 1996, in accordance with Section 4 of HB 3478, LCDC established the criteria to be used by the Council in making land use decisions establishing the light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project or Project Extension, including their locations. The approved criteria include two procedural, six substantive, and two alignment-specific standards, set out below. In its LUFO, the Council must demonstrate compliance with these criteria.

Procedural Criteria

1. Coordinate with and provide an opportunity for Clackamas and Multnomah Counties, the cities of Gladstone, Milwaukie, Oregon City and Portland, the Tri-County Metropolitan Transportation District of Oregon and the Oregon Department of Transportation to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations.

2. Hold a public hearing to provide an opportunity for the public to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations.

Substantive Criteria

3. Identify adverse economic, social and traffic impacts on affected residential, commercial and industrial neighborhoods and mixed use centers. Identify measures to reduce those impacts which could be imposed as conditions of approval during the National Environmental Policy Act (NEPA) process or, if reasonable and necessary, by affected local governments during the local permitting process.

A. Provide for a light rail route and light rail stations, park-and-ride lots and vehicle maintenance facilities, including their locations, balancing (1) the need for light rail proximity and service to present or planned residential, employment and recreational areas that are capable of enhancing transit ridership; (2) the likely contribution of light rail proximity and service to the development of an efficient and compact urban form; and (3) the need to protect affected neighborhoods from the identified adverse impacts.

B. Provide for associated highway improvements, including their locations, balancing (1) the need to improve the highway system with (2) the need to protect affected neighborhoods from the identified adverse impacts.

4. Identify adverse noise impacts and identify measures to reduce noise impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by affected local governments during the permitting process.

5. Identify affected landslide areas, areas of severe erosion potential, areas subject to earthquake damage and lands within the 100-year floodplain. Demonstrate that adverse impacts to persons or property can be reduced or mitigated through design or construction techniques which could be imposed during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

6. Identify adverse impacts on significant fish and wildlife, scenic and open space, riparian, wetland and park and recreational areas, including the Willamette River Greenway, that are protected in acknowledged local comprehensive plans. Where adverse impacts cannot practicably be avoided, encourage the conservation of natural resources by demonstrating that there are

measures to reduce or mitigate impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

7. Identify adverse impacts associated with stormwater runoff. Demonstrate that there are measures to provide adequate stormwater drainage retention or removal and protect water quality which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

8. Identify adverse impacts on significant historic and cultural resources protected in acknowledged comprehensive plans. Where adverse impacts cannot practicably be avoided, identify local, state or federal review processes that are available to address and to reduce adverse impacts to the affected resources.

Alignment-Specific Criteria

9. Consider a light rail route connecting the Clackamas Town Center area with the City of Milwaukie's Downtown. Consider an extension of the light rail route connecting the City of Oregon City and the City of Gladstone with the City of Milwaukie via the Interstate 205 corridor and/or the McLoughlin Boulevard corridor.

10. Consider a light rail route connecting Portland's Central City with the City of Milwaukie's Downtown via inner southeast Portland neighborhoods and, in the City of Milwaukie, the McLoughlin Boulevard corridor, and further connecting the Central City with north and inner northeast Portland neighborhoods via the Interstate 5/Interstate Avenue corridor.

E. Interpretation of Terms.

The LUFO for which Tri-Met seeks Metro Council approval establishes the light rail route, stations, lots, maintenance facilities and the highway improvements for the South/North Project. Consistent with the South/North LUFO Steering Committee's recommendation, Tri-Met asks that the Metro Council interpret these terms to have the following meanings:

"Light rail route" means the alignment upon which the light rail tracks will be located. The light rail route will be located on land to be owned by or under the operating control of Tri-Met.

"Stations" means those facilities to be located along the light rail route for purposes of accessing or serving the light rail system. Stations include light rail station platforms; kiss-and-ride areas; bus transfer platforms and transit centers; vendor facilities; and transit operations rooms.

"Lots" means those parking structures or surface parking lots that are associated with a station, owned by or under the operating control of either Tri-Met or another entity with the concurrence of Tri-Met, and intended primarily for use by persons riding transit or carpooling. Parking structures may include some retail or office spaces in association with the primary use.

"Maintenance facilities" means those facilities to be located on land to be owned or controlled by Tri-Met for purposes of operating, servicing, repairing or maintaining the light rail transit system, including but not limited to light rail vehicles, the light rail tracks, stations, lots, and ancillary facilities and improvements. Maintenance facilities include maintenance facility access trackways; storage tracks for light rail vehicles; service, repair and maintenance shops and equipment; office facilities; locker rooms; control and communications rooms; transit district employee and visitor parking lots; and storage areas for materials and equipment and non-revenue vehicles.

"Highway improvements" include new roads, road extensions or road widenings outside existing rights-of-way that have independent utility in themselves and are not needed to mitigate adverse traffic impacts associated with the light rail route, stations, lots or maintenance facilities.

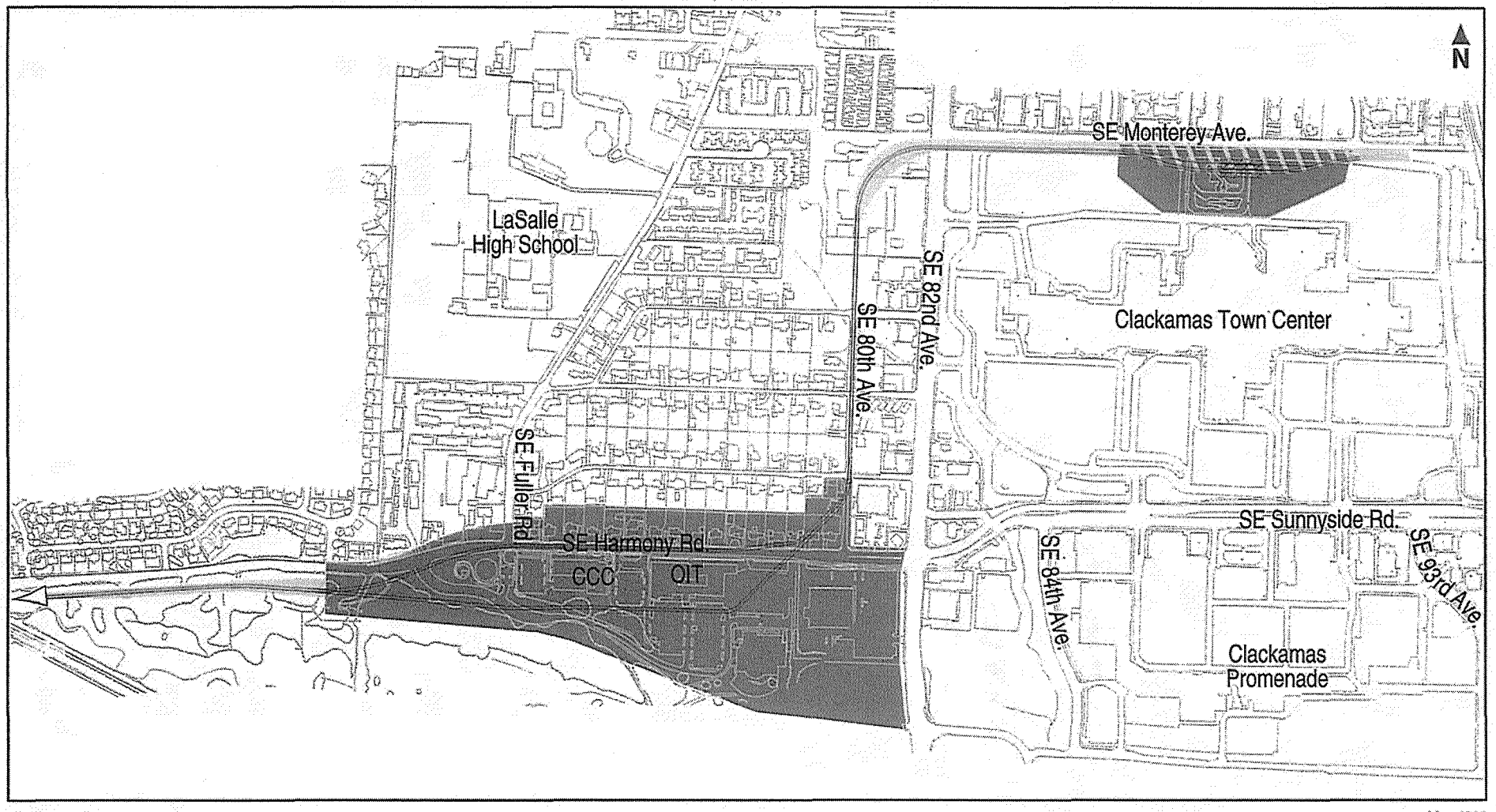
Additionally, Tri-Met asks the Council to acknowledge in its LUFO that implementation of the South/North LUFO under Sections 8(1)(a) and (b) of House Bill 3478, including the construction, operation and maintenance of the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, necessitates and requires development approval of certain associated actions and the permitting of certain associated or ancillary facilities or improvements. These associated actions or ancillary facilities or improvements generally are required (1) to ensure the safe and proper functioning and operation of the light rail system; (2) to provide project access; (3) to improve traffic flow, circulation or safety in the vicinity of the Project; or (4) to mitigate adverse impacts caused to the adjoining roadway network resulting from the alignment, stations, lots or maintenance facilities. For these reasons, these actions, facilities or improvements are integral and necessary parts of the Project.

Consistent with the Steering Committee's recommendation, Tri-Met asks the Metro Council to find that the associated actions and ancillary facilities or improvements for the South/North Project include, but are not limited to: ties, ballast, and other track support materials such as tunnels and bridges; modifications to existing tracks; retaining walls and noise walls; culverts and other drainage systems; traction electrification equipment including substations; light rail signals and communications equipment and buildings; lighting; station, lot and maintenance facility accesses, including road accesses, pedestrian bridges and pedestrian and bicycle accessways; roadway crossing protection; and the provision of pedestrian paths, bike lanes, bus stops, bus pullouts, shelters, bicycle storage facilities and similar facilities. They also include temporary LRT construction-related roadways, staging areas and road or lane closures; roadway reconstruction, realignment, repair, widening, channelization, signalization or signal modification, lane reconfiguration or reduction, addition or modification of turning lanes or refuges, modification of traffic circulation patterns, or other modifications or improvements that provide or improve project access, improve traffic flow, circulation or safety in the vicinity of the Project, facilitate or are necessary for the safe or proper functioning and operation of the Project, or are necessary to mitigate adverse traffic impacts created by the Project; modifications of private roadways adjoining the Project; permanent road, lane or access closures associated with and necessitated by the Project; and other associated actions or associated or ancillary facilities or improvements related to the Project.

Attachment A

South/North Land Use Final Order
Boundary Maps

11364



May 1998

North South Transit Corridor Study

METRO

OIT/CCC Study Area

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

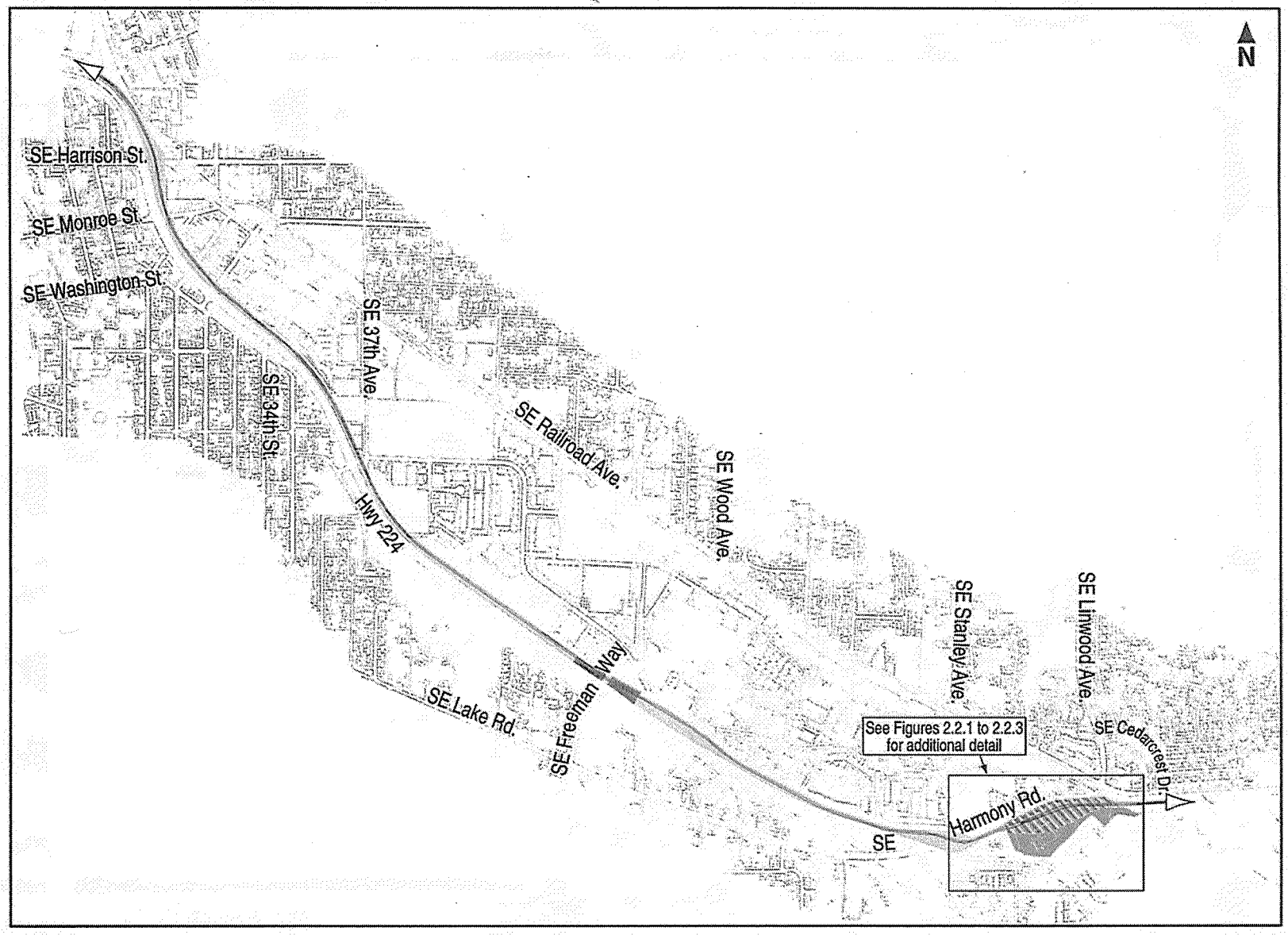
FEET

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

Figure 1.1

Land Use Final Order Boundary Maps:

Clackamas Regional Center Segment



May 1998

Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 800 1600
FEET

South North Transit Corridor Study

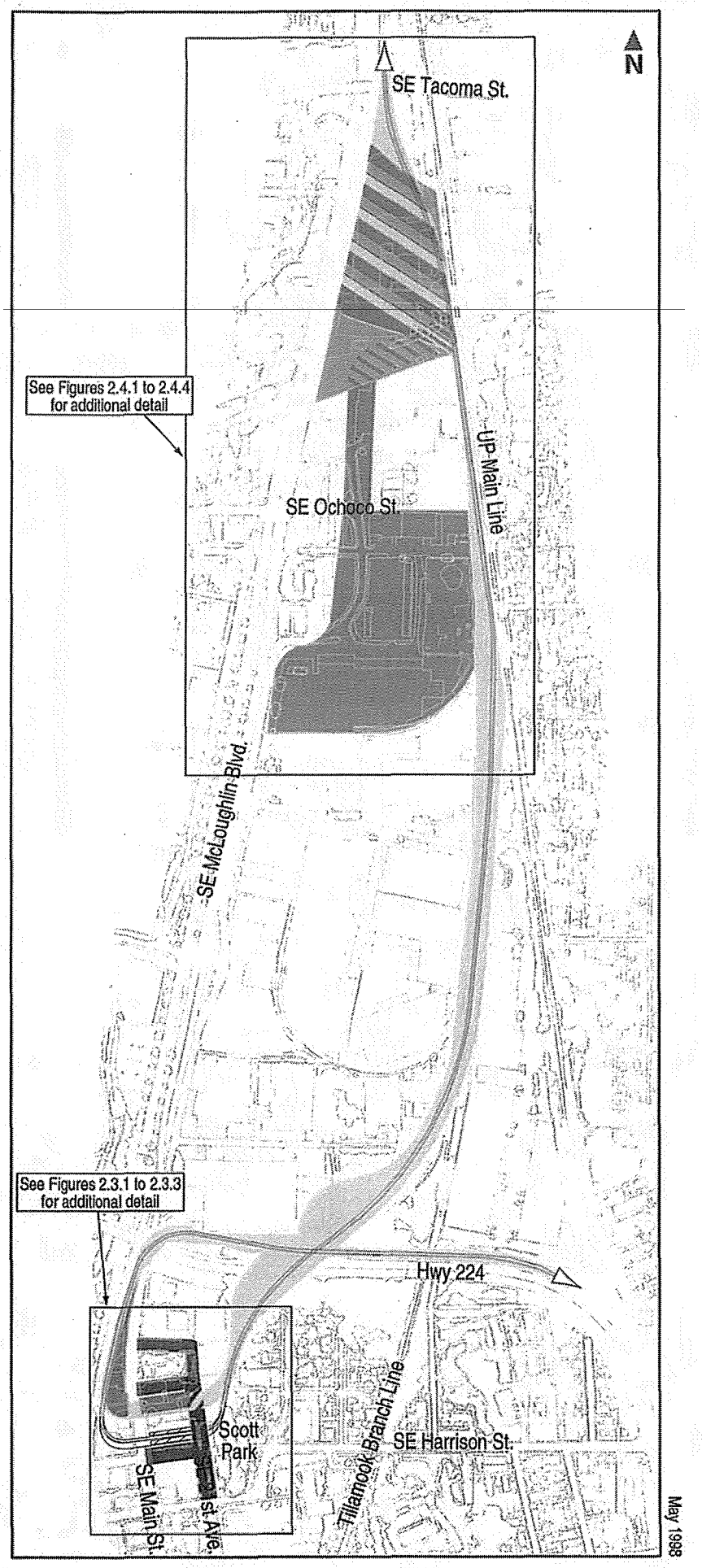
METRO

Figure 1.2

Land Use Final Order Boundary Maps:

East Milwaukie Segment

11365



South North Transit Corridor Study

METRO

Figure 1.3

Land Use Final Order Boundary Maps:

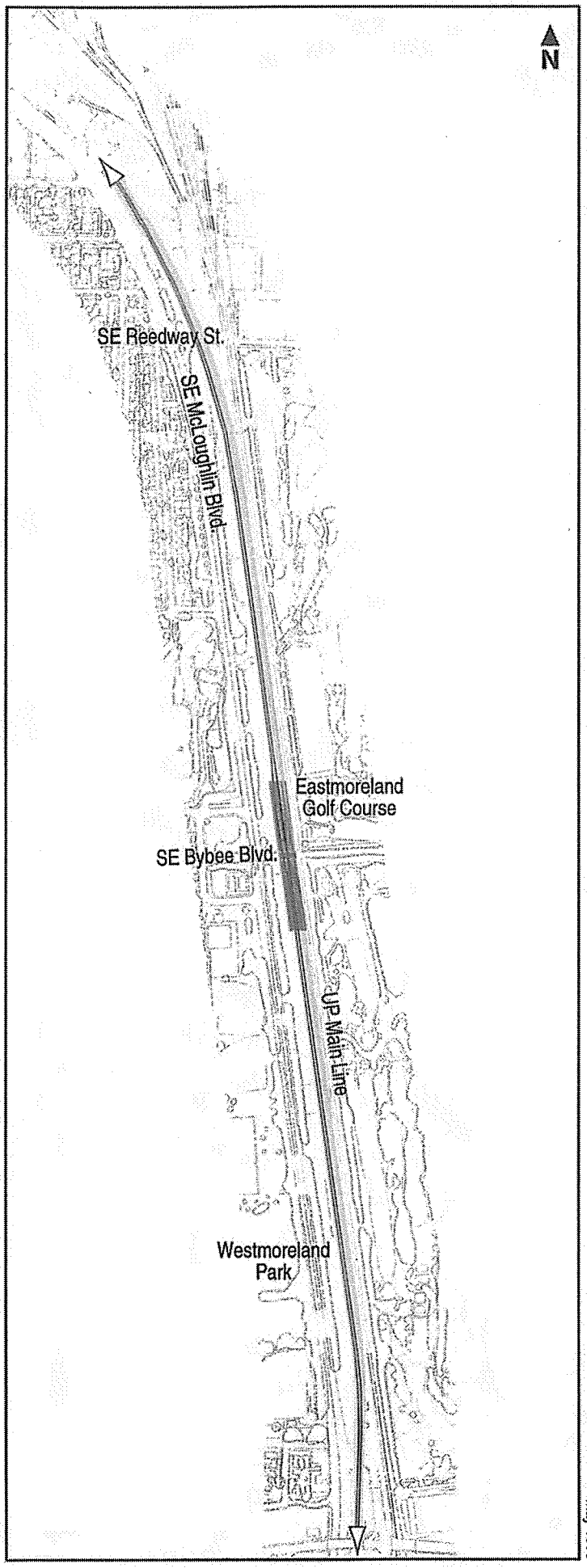
Milwaukie Regional Center Segment

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- Highway/Road Improvement
- DEIS Station Platform
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800
FEET

11366



South North Transit Corridor Study

METRO

Figure 1.4

Land Use Final Order Boundary Maps:

McLoughlin Boulevard Segment

Light Rail Route

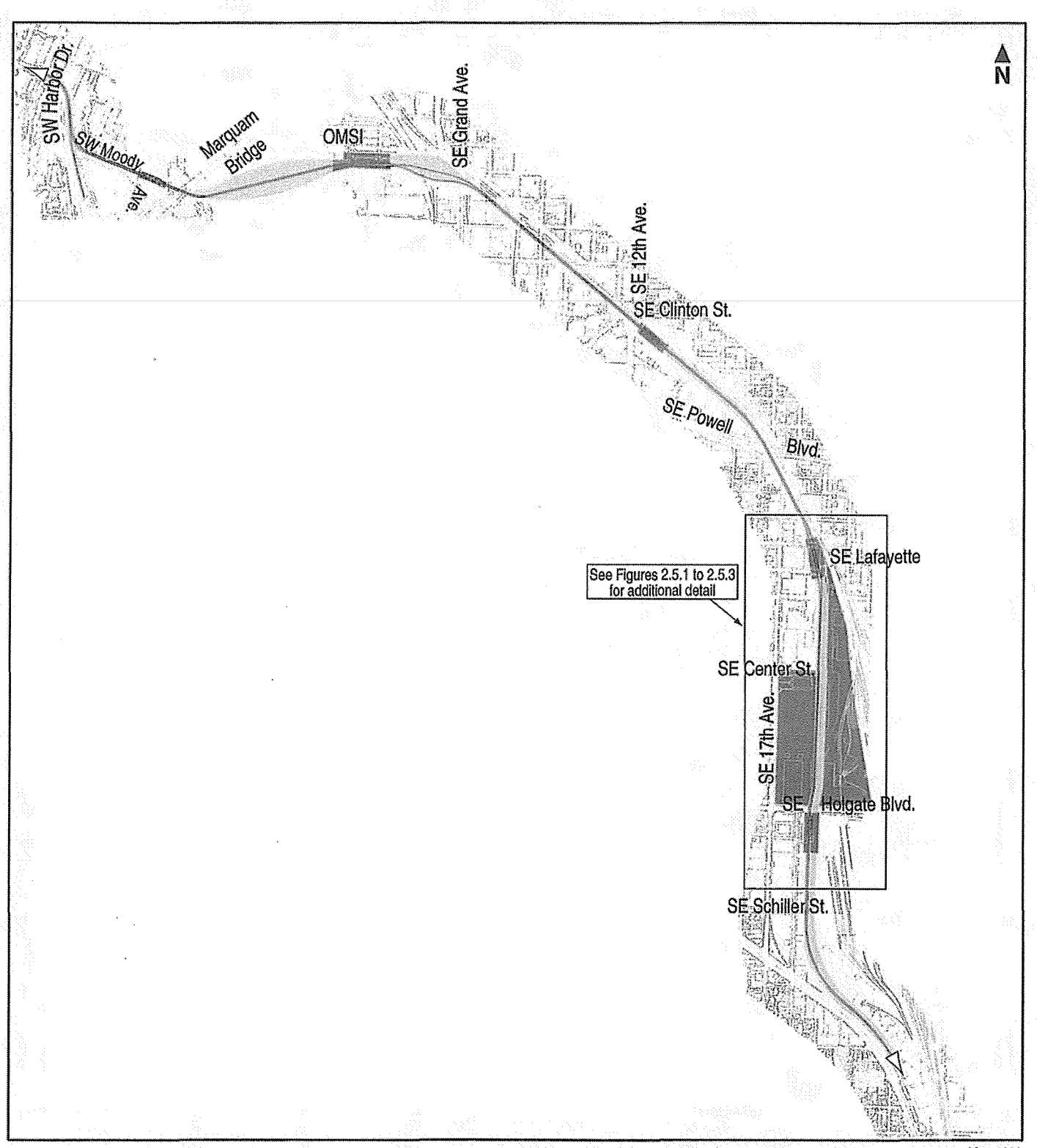
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



Light Rail Route

Light Rail Station

Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

0 800 1600
FEET

South North Transit Corridor Study

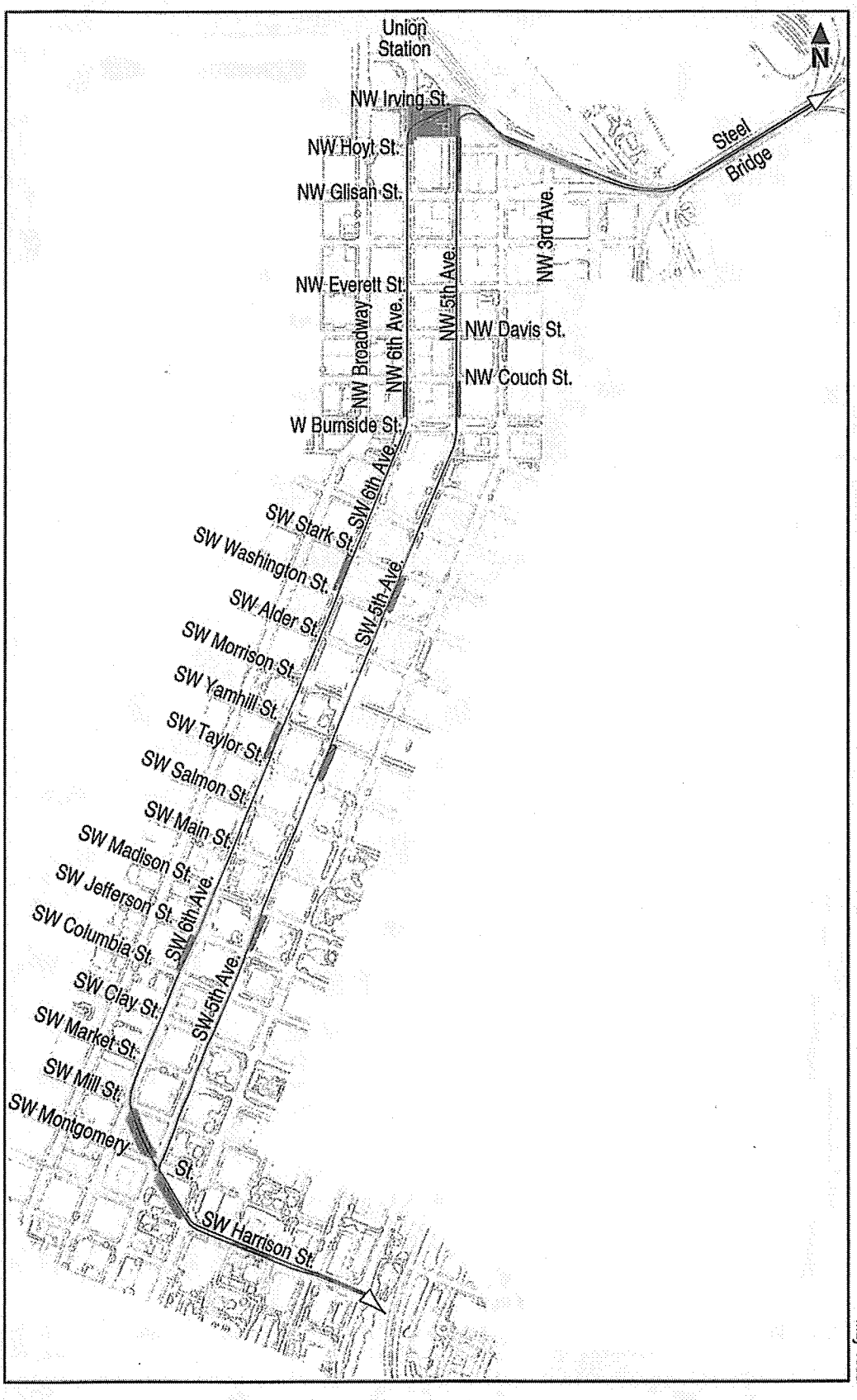
METRO

Figure 1.5

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

11368



South North Transit Corridor Study

METRO

Figure 1.6

Land Use Final Order Boundary Maps:

Downtown Portland Segment

Light Rail Route

Light Rail Station

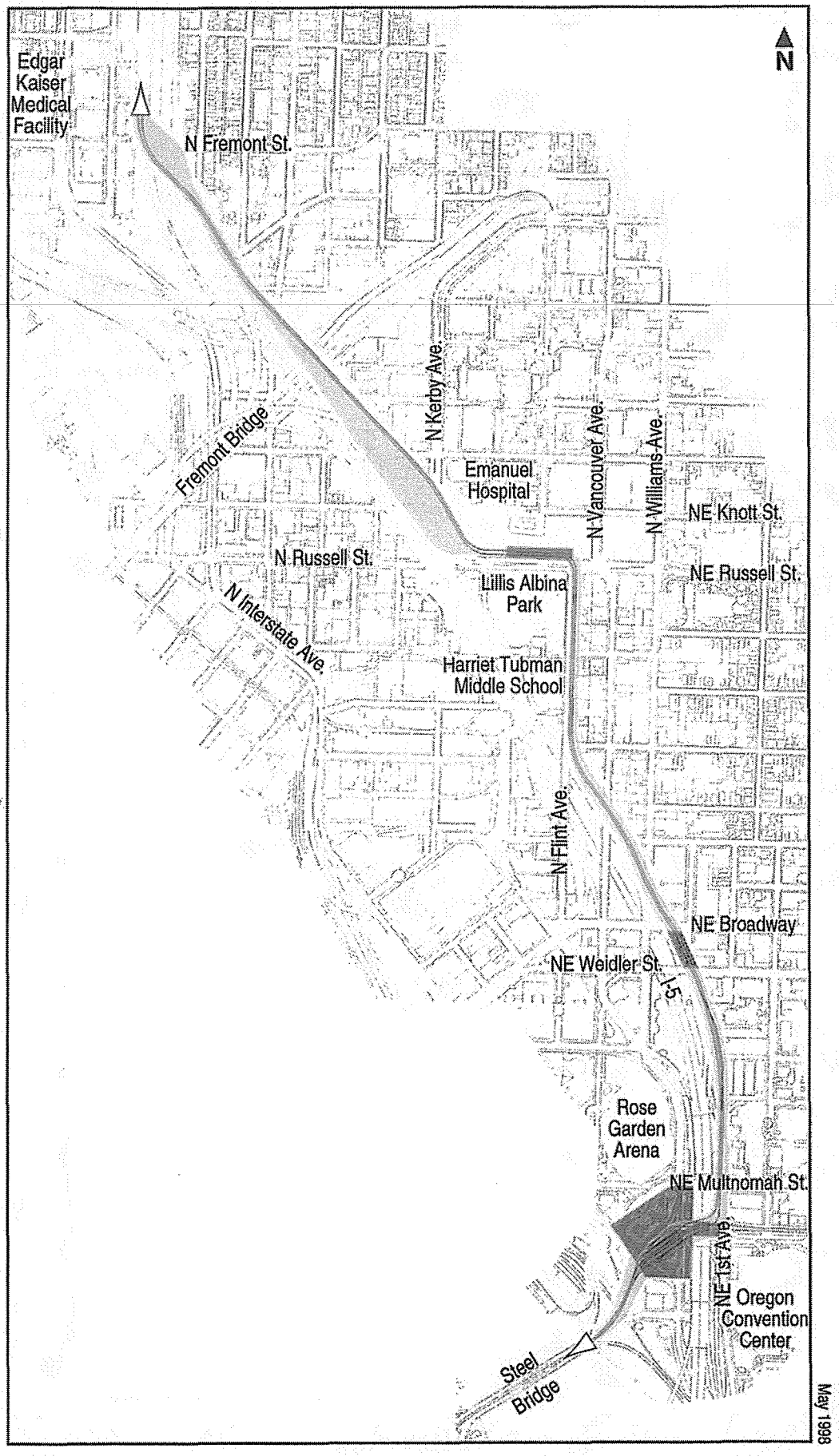
DEIS Station Platform

DEIS Light Rail Route

May 1998

0 400 800

FEET



South North Transit Corridor Study

METRO

Figure 1.7

Land Use Final Order Boundary Maps:

Eliot Segment

Light Rail Route

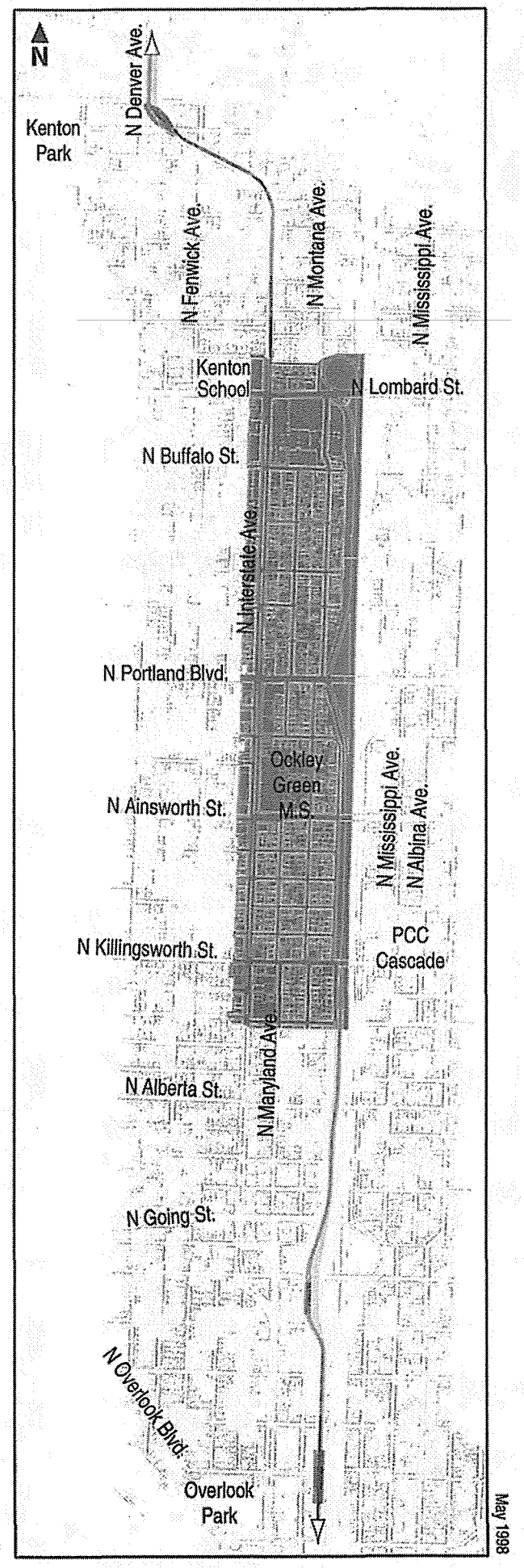
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



South North Transit Corridor Study

METRO

Figure 1.8a

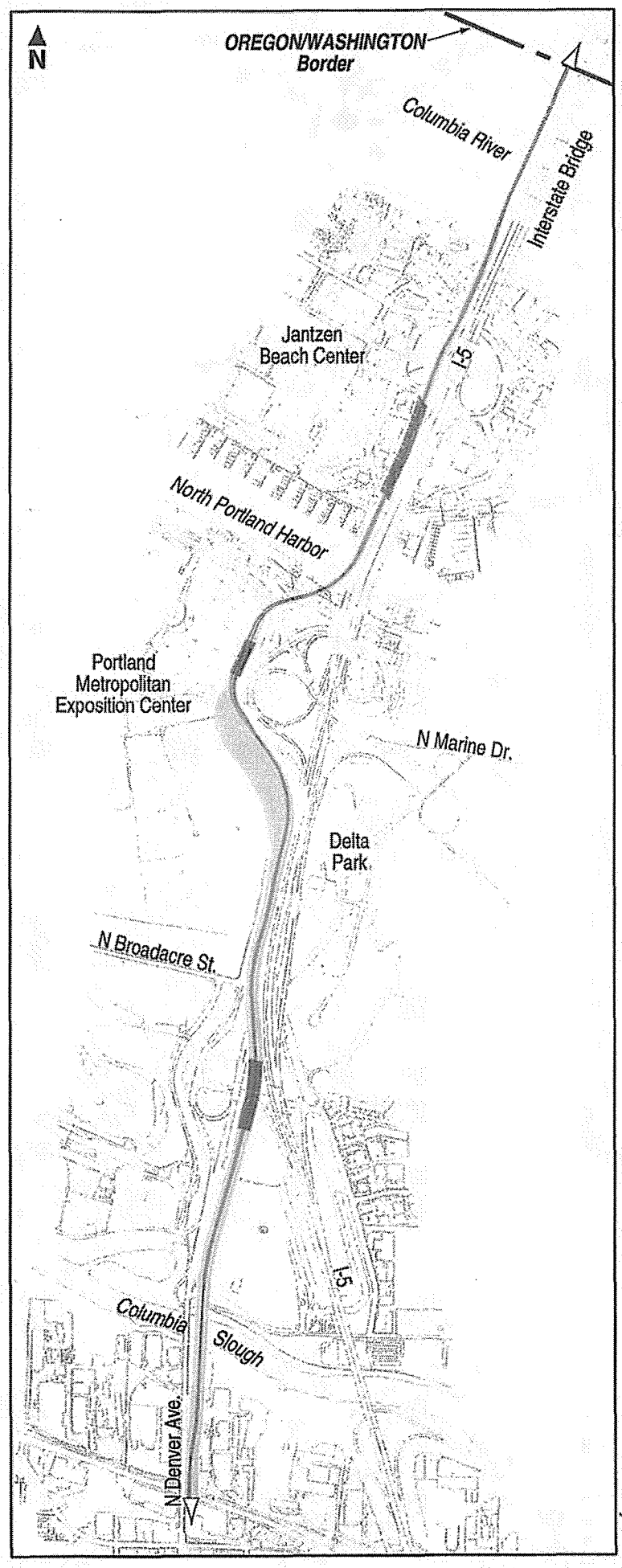
Land Use Final Order Boundary Maps:

North Portland Segment

- Light Rail Route
- Light Rail Station
- Crossover Study Area
- DEIS Station Platform
- DEIS Light Rail Route

0 800 1600

FEET



North South Transit Corridor Study

METRO

Figure 1.8b

Land Use Final Order Boundary Maps:

North Portland Segment

Light Rail Route

Light Rail Station

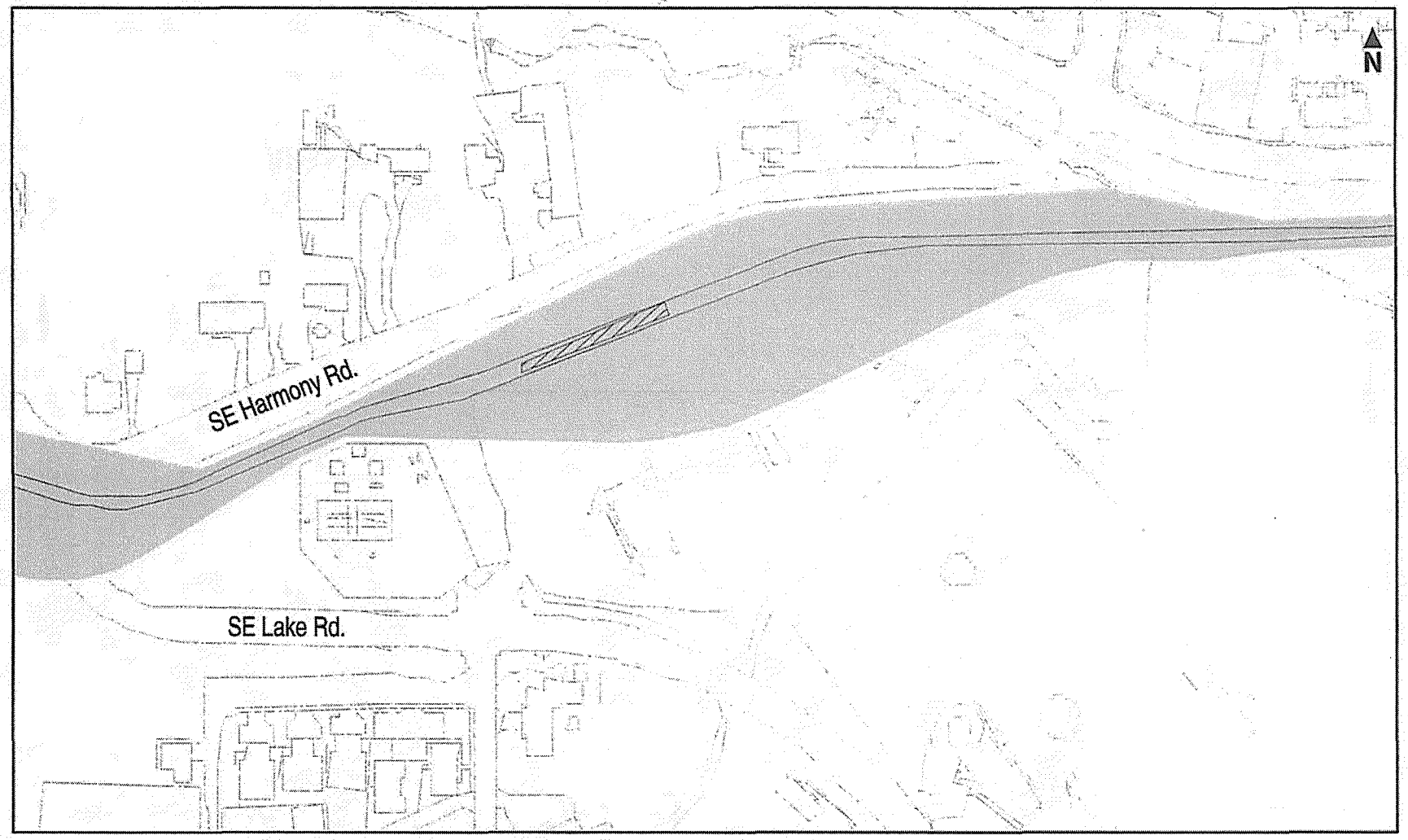
DEIS Station Platform

DEIS Light Rail Route

0 800 1600

FEET

11372



May 1998

South North Transit Corridor Study

METRO

Figure 2.2.1

Land Use Final Order Boundary Maps:

East Milwaukie Segment

Light Rail Route

DEIS Station Platform

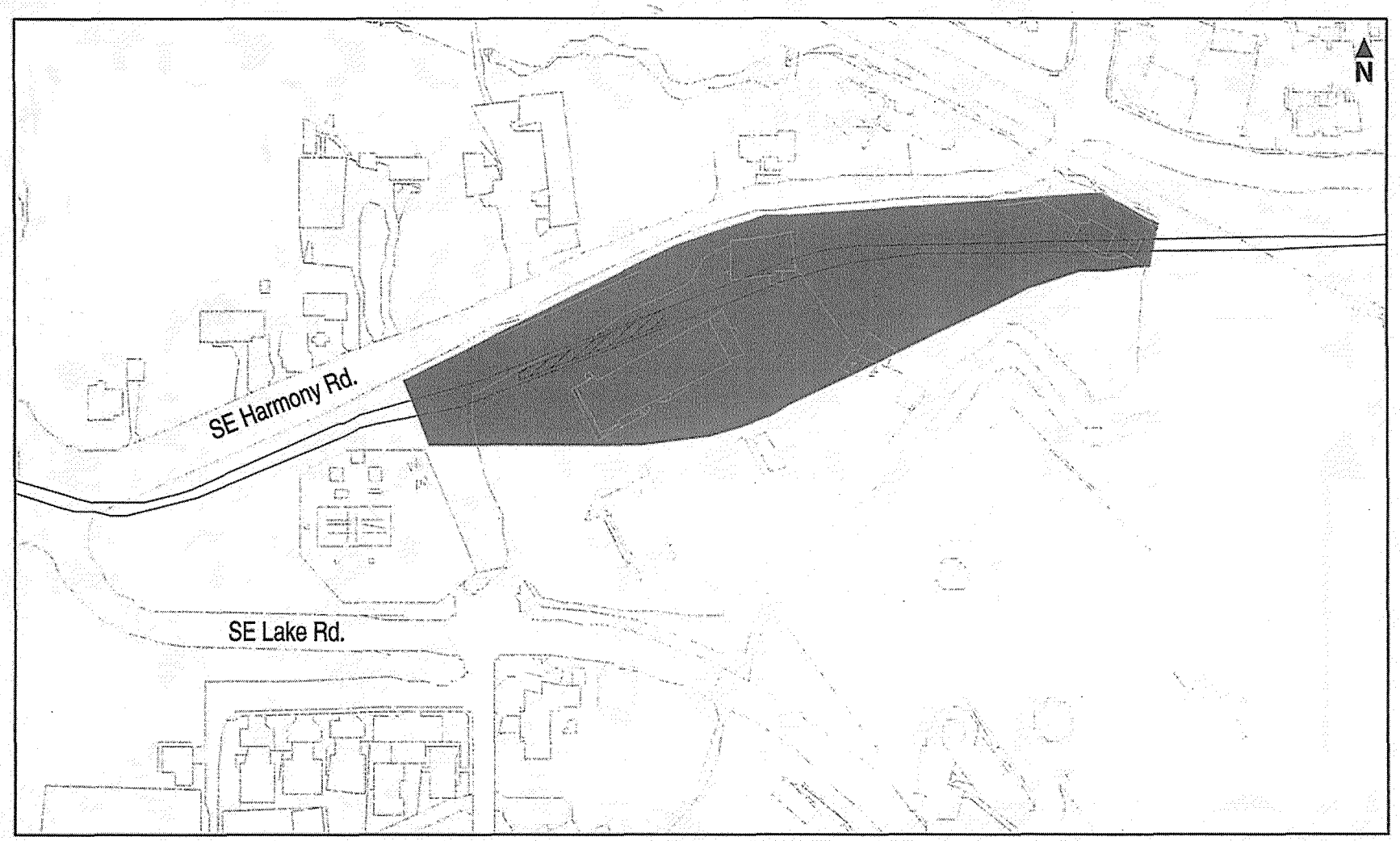
DEIS Light Rail Route

0 200 400

FEET

11373

11374



May 1998

South North Transit Corridor Study

METRO

Figure 2.2.2

Land Use Final Order Boundary Maps:

East Milwaukie Segment

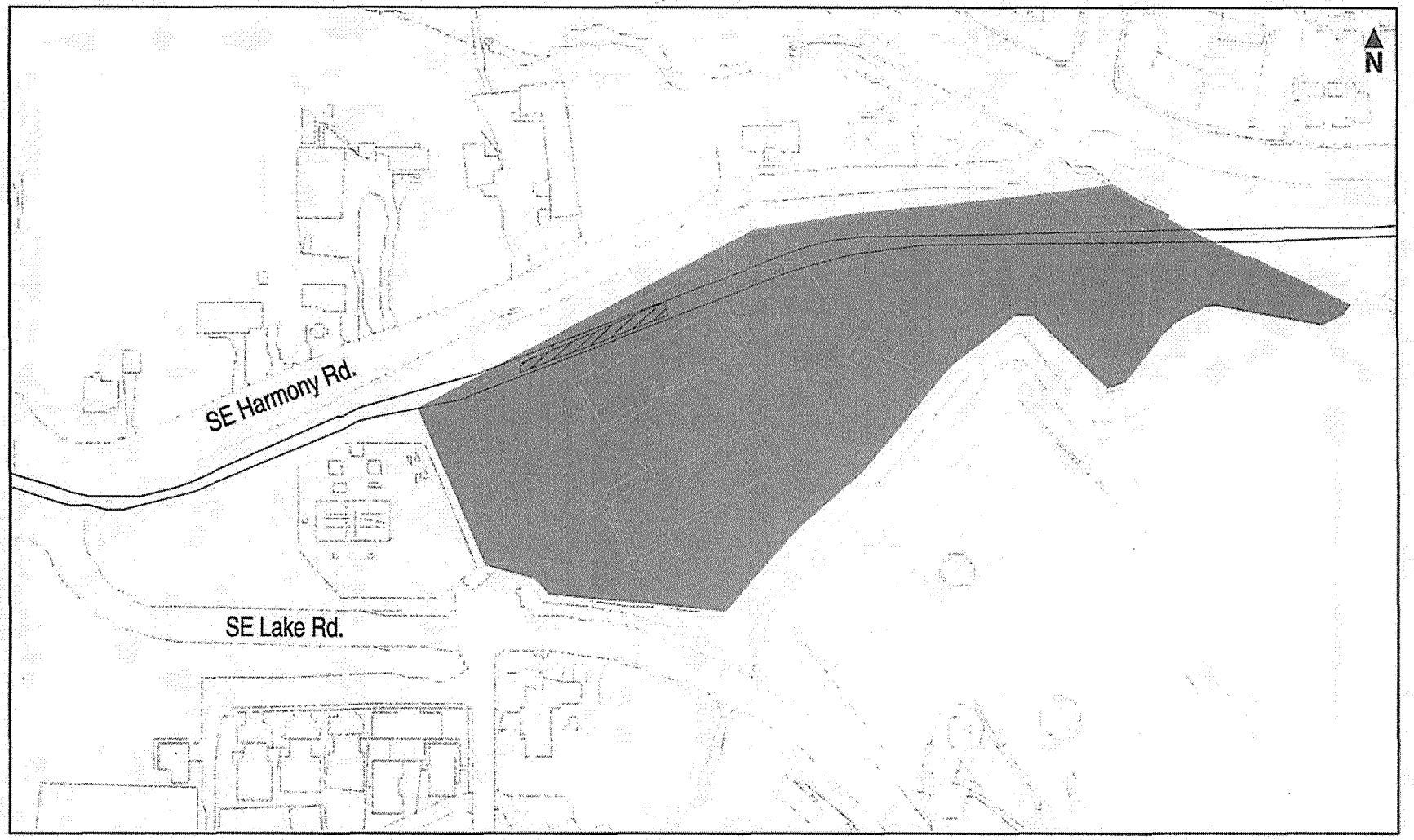
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



May 1998

South North Transit Corridor Study

METRO

Figure 2.2.3

Land Use Final Order Boundary Maps:

East Milwaukie Segment

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET

11375

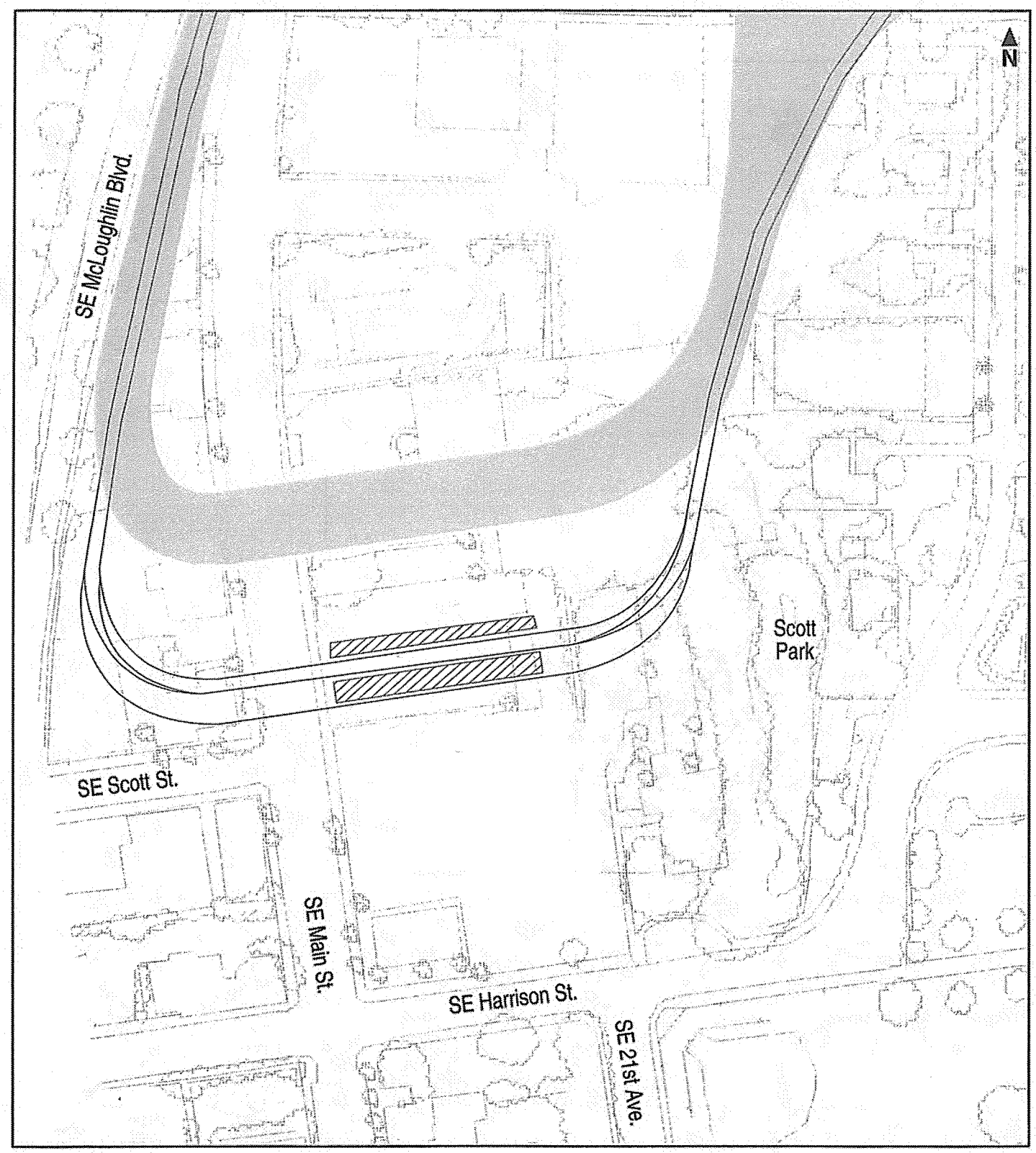


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Figure 2.3.1

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Light Rail Route

DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET

11376

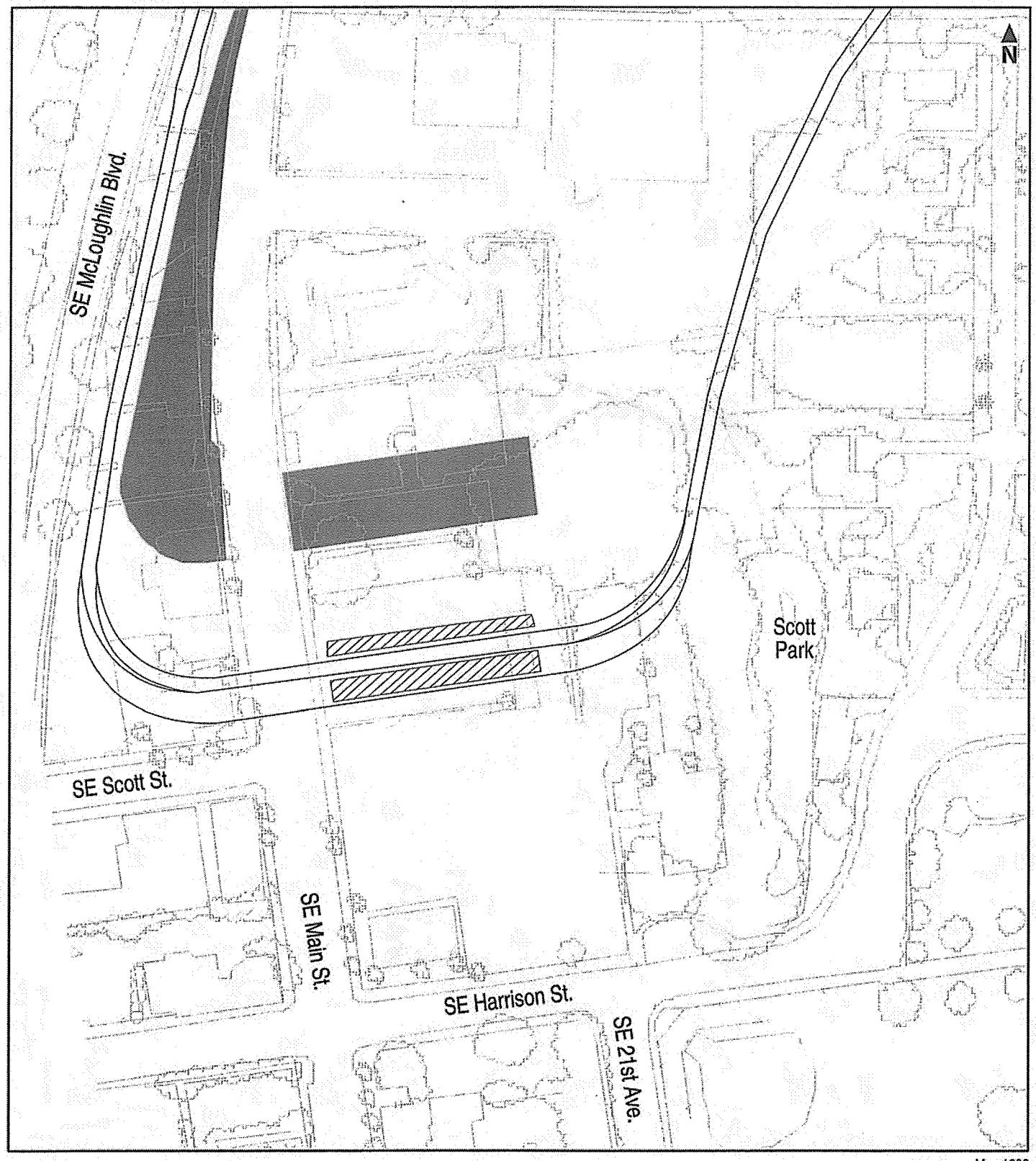

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Figure 2.3.2

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET

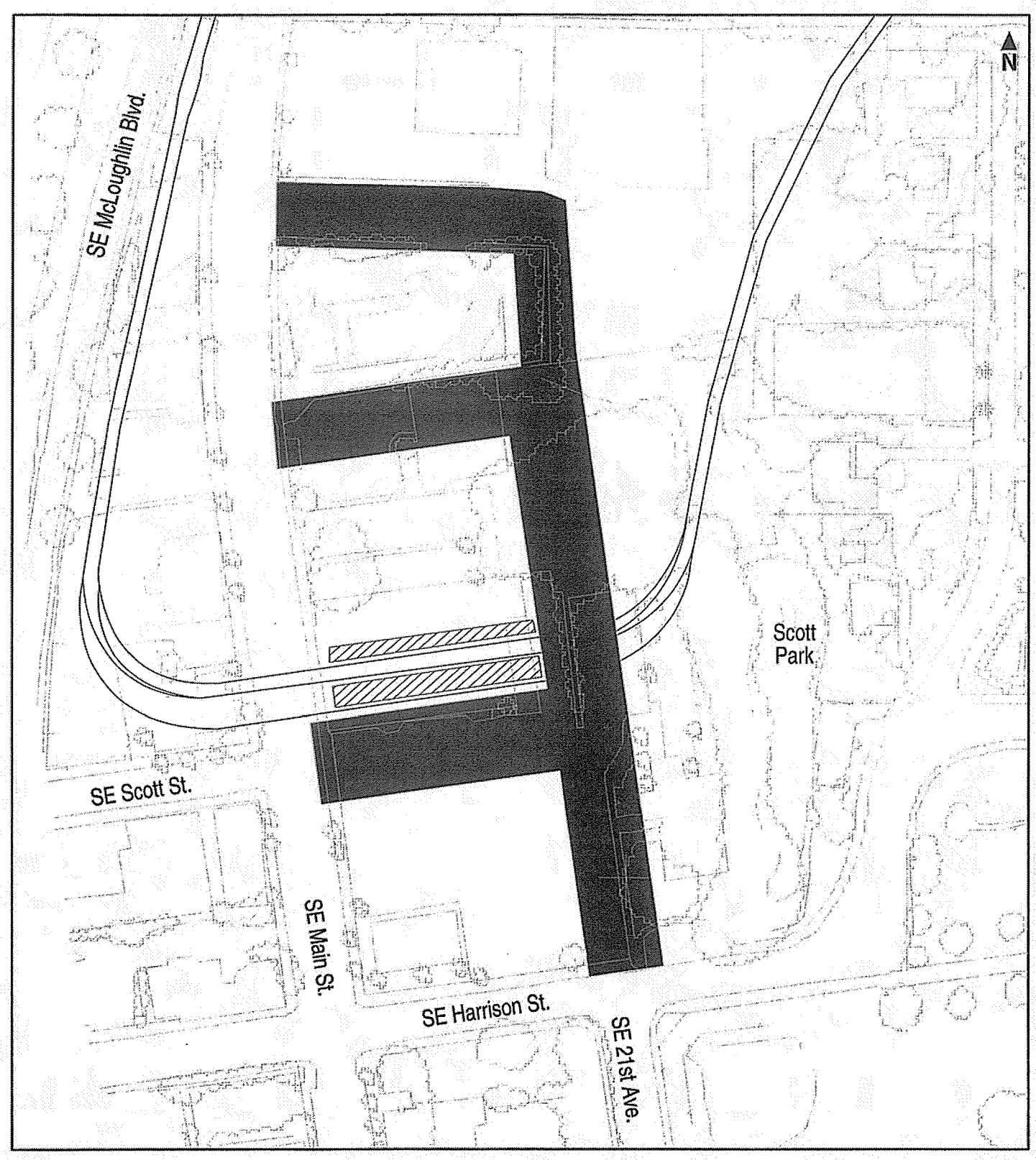

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Figure 2.3.3

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Highway/Road Improvement

DEIS Station Platform

DEIS Light Rail Route

0 100 200

FEET

METRO

11378

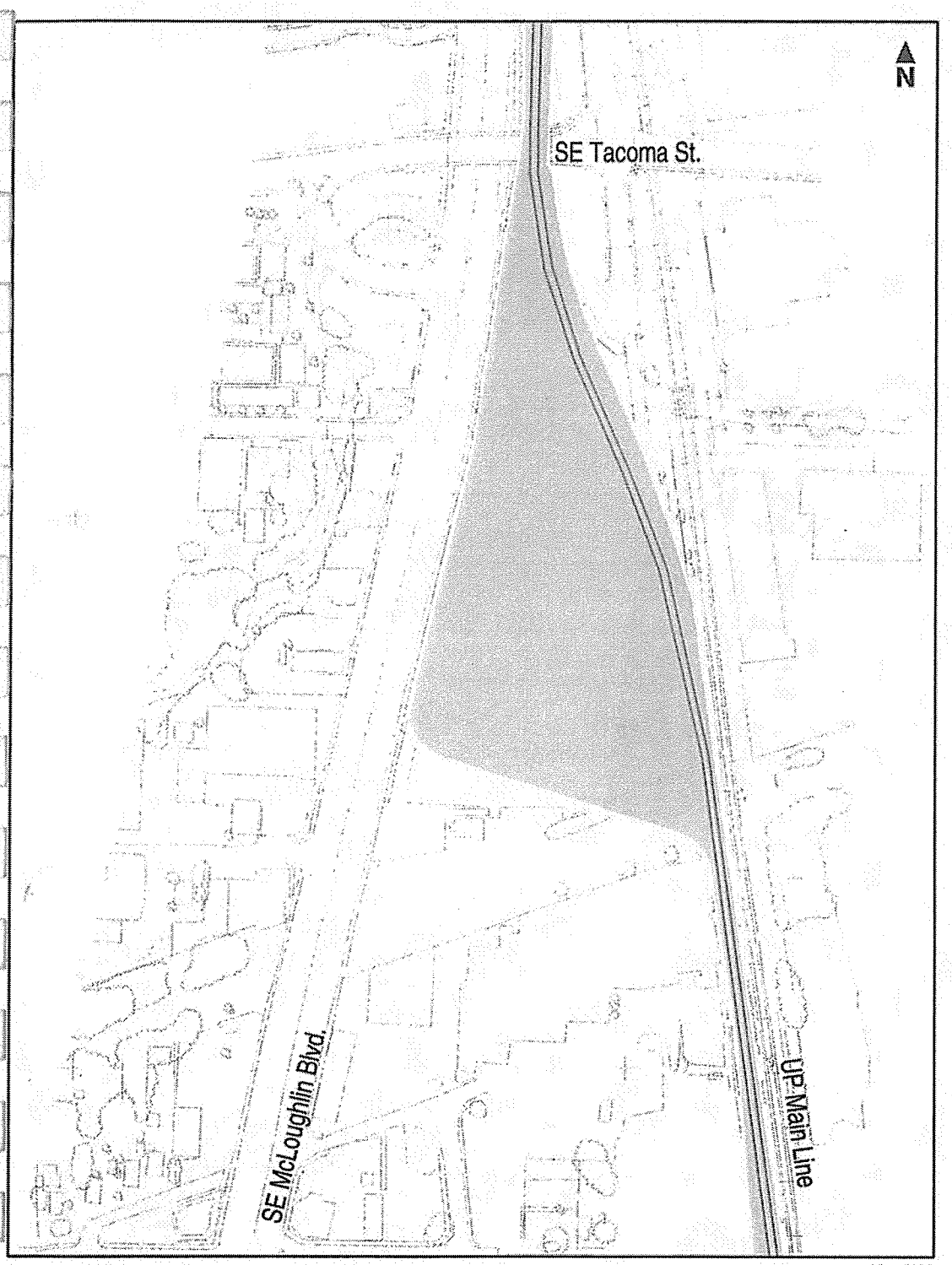

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Figure 2.4.1

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Light Rail Route

DEIS Light Rail Route

0 200 400

FEET

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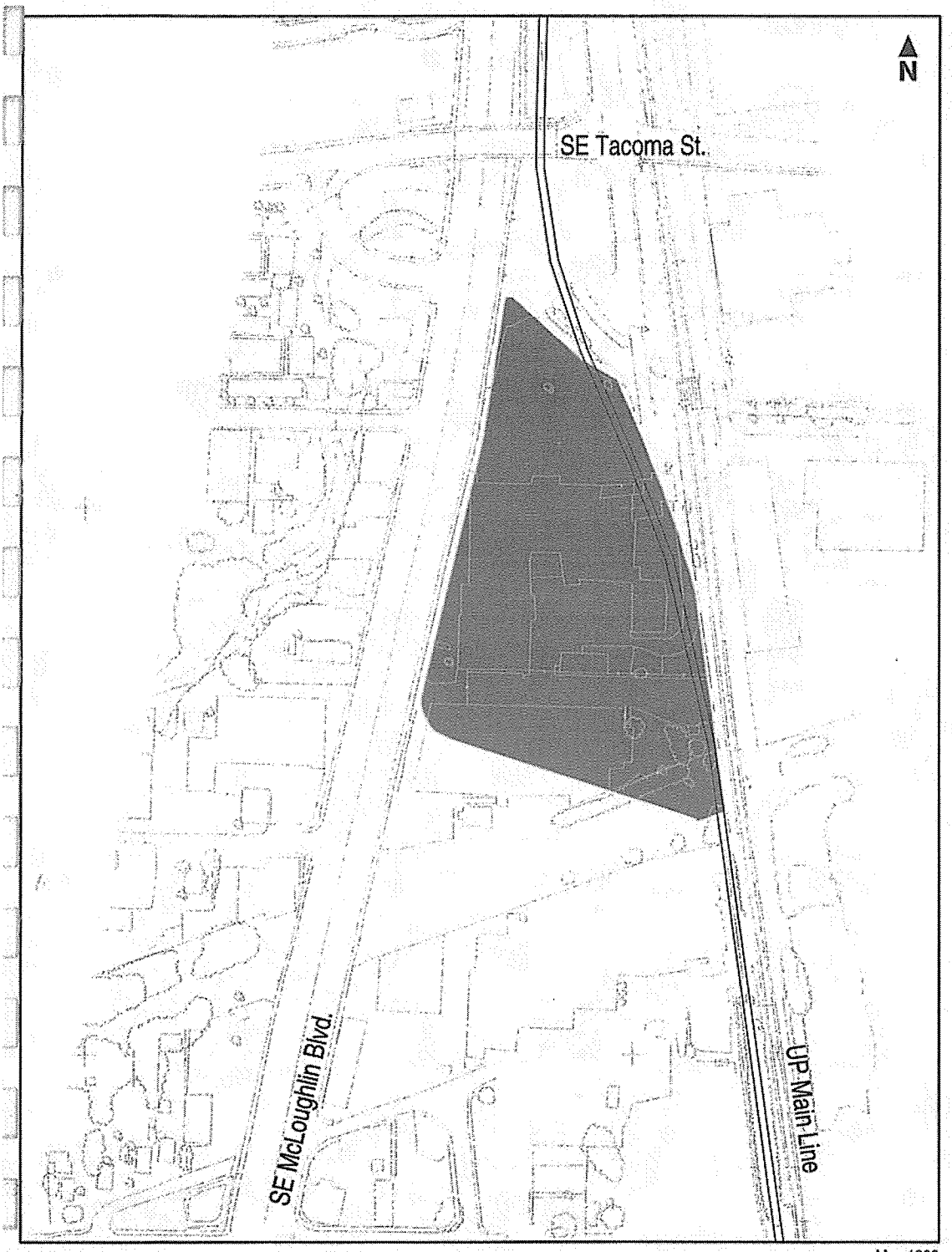

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Figure 2.4.2

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Light Rail Station

DEIS Light Rail Route

0 200 400

FEET

May 1998

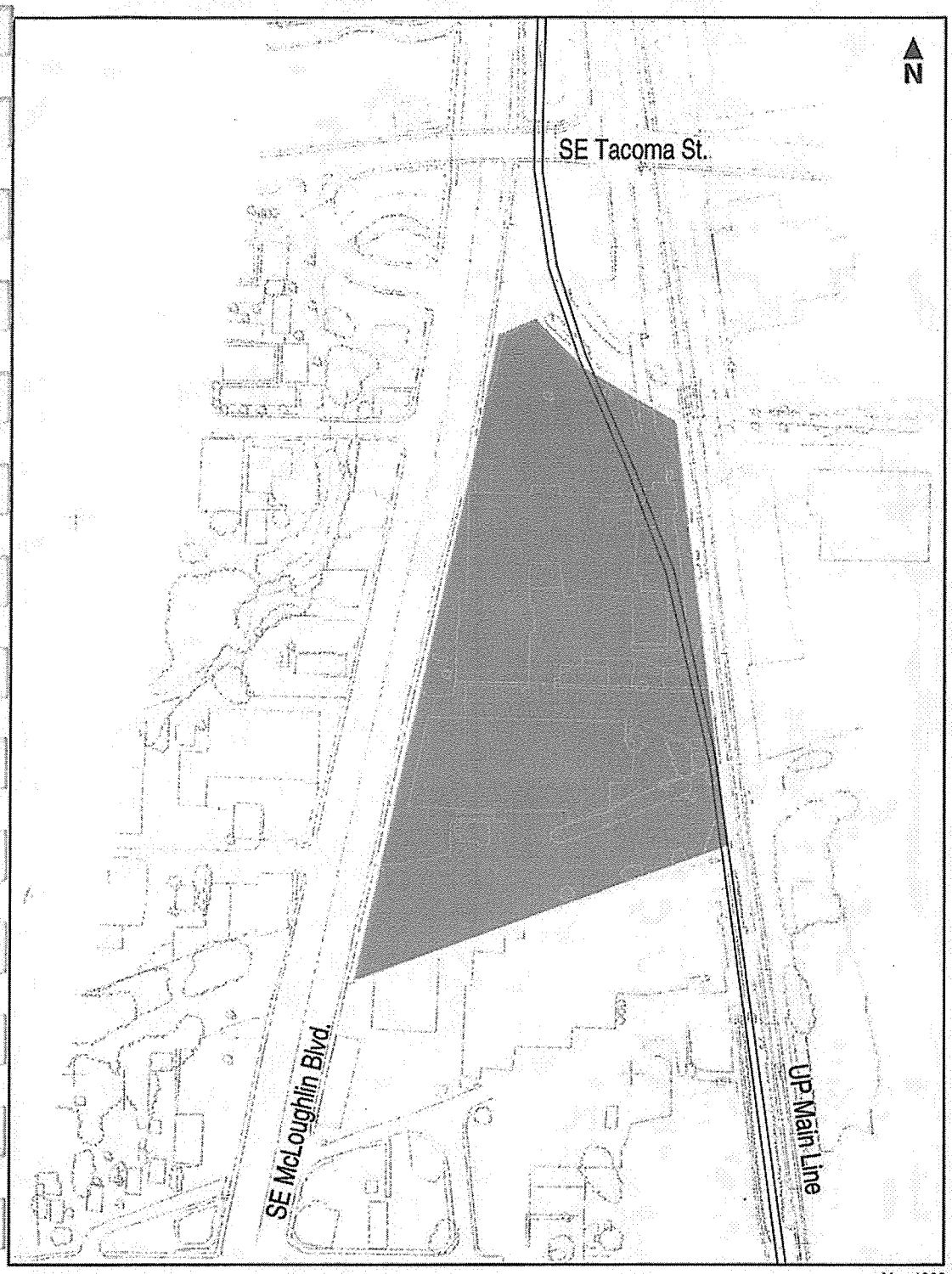

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Figure 2.4.3

Land Use Final Order Boundary Maps:

Milwaukie Regional Center Segment

Park-and-Ride Lot

DEIS Light Rail Route

0 200 400

FEET

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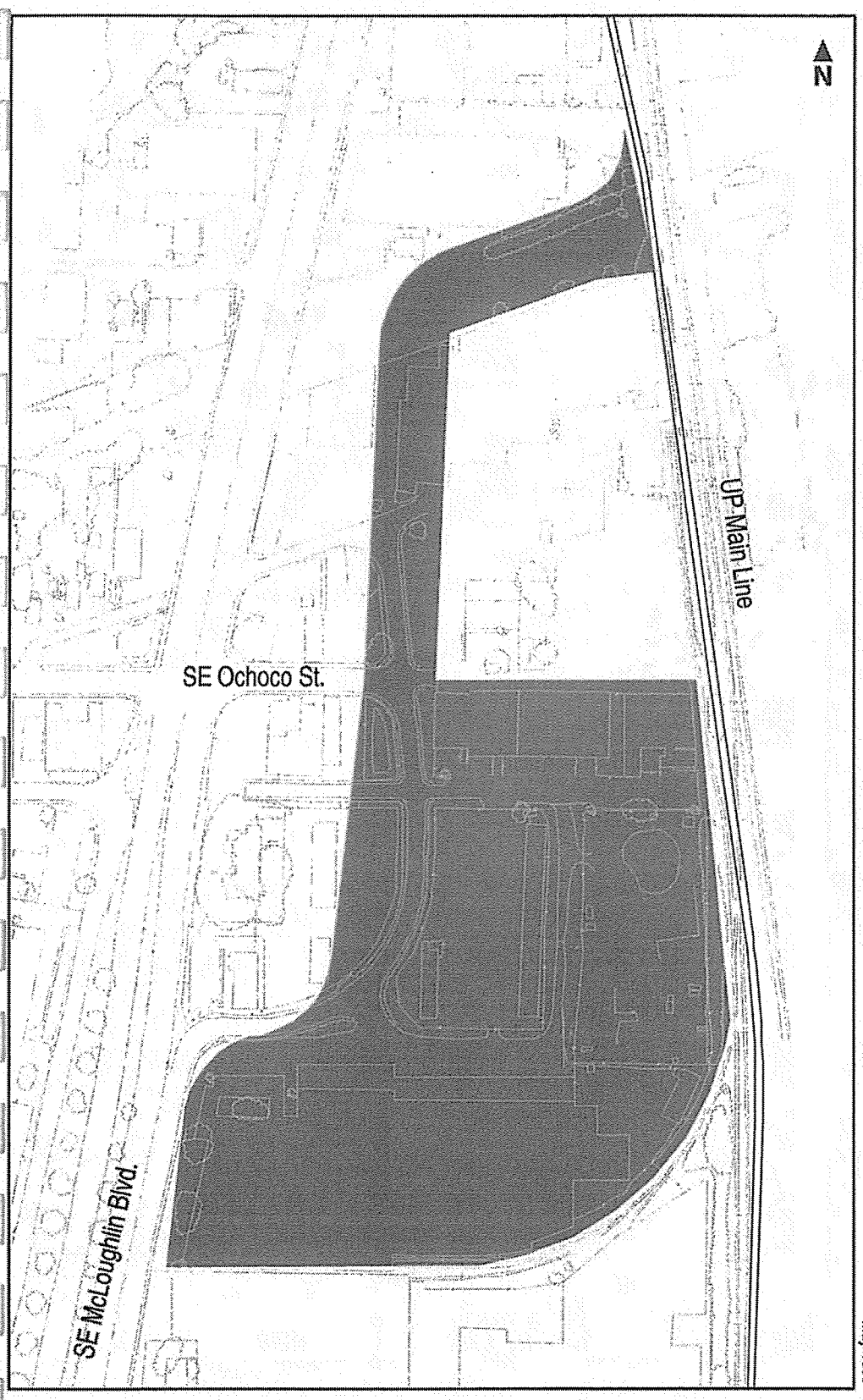

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METRO

Figure 2.4.4

Land Use Final Order Boundary Maps:

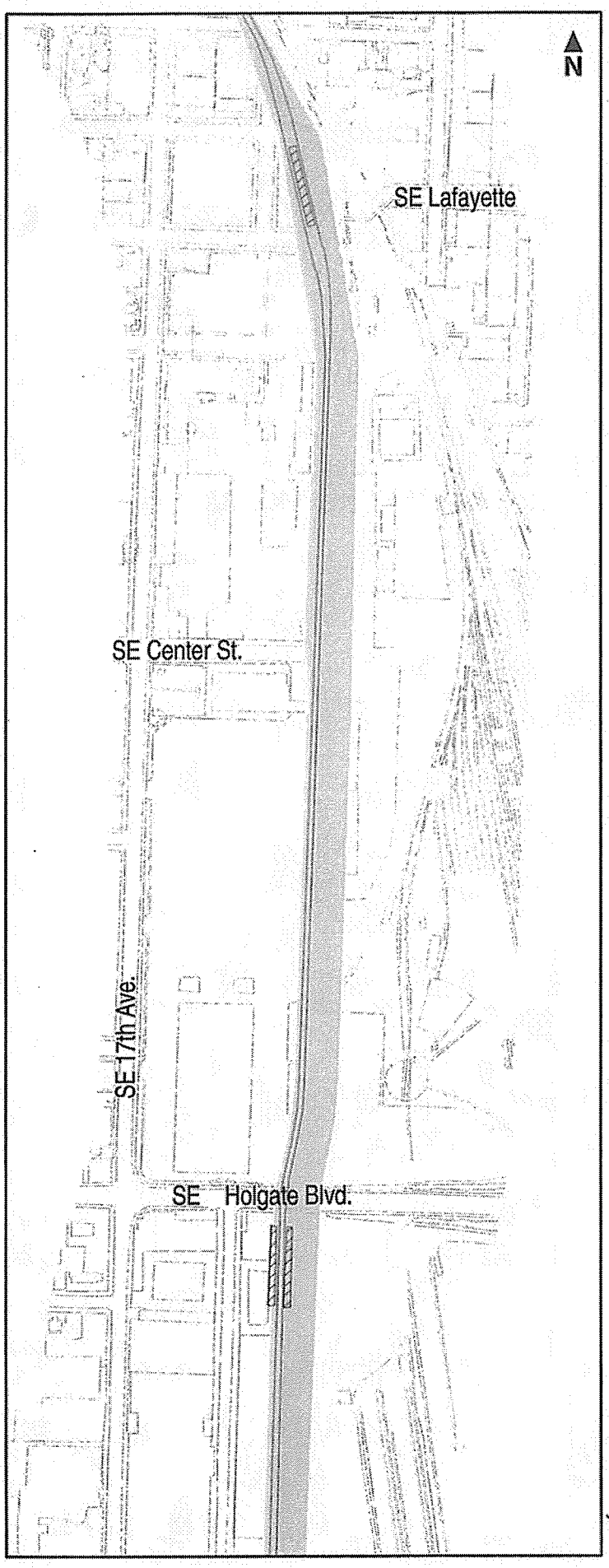
Milwaukie Regional Center Segment

Light Rail Operations and Maintenance Facility

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

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Figure 2.5.1

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

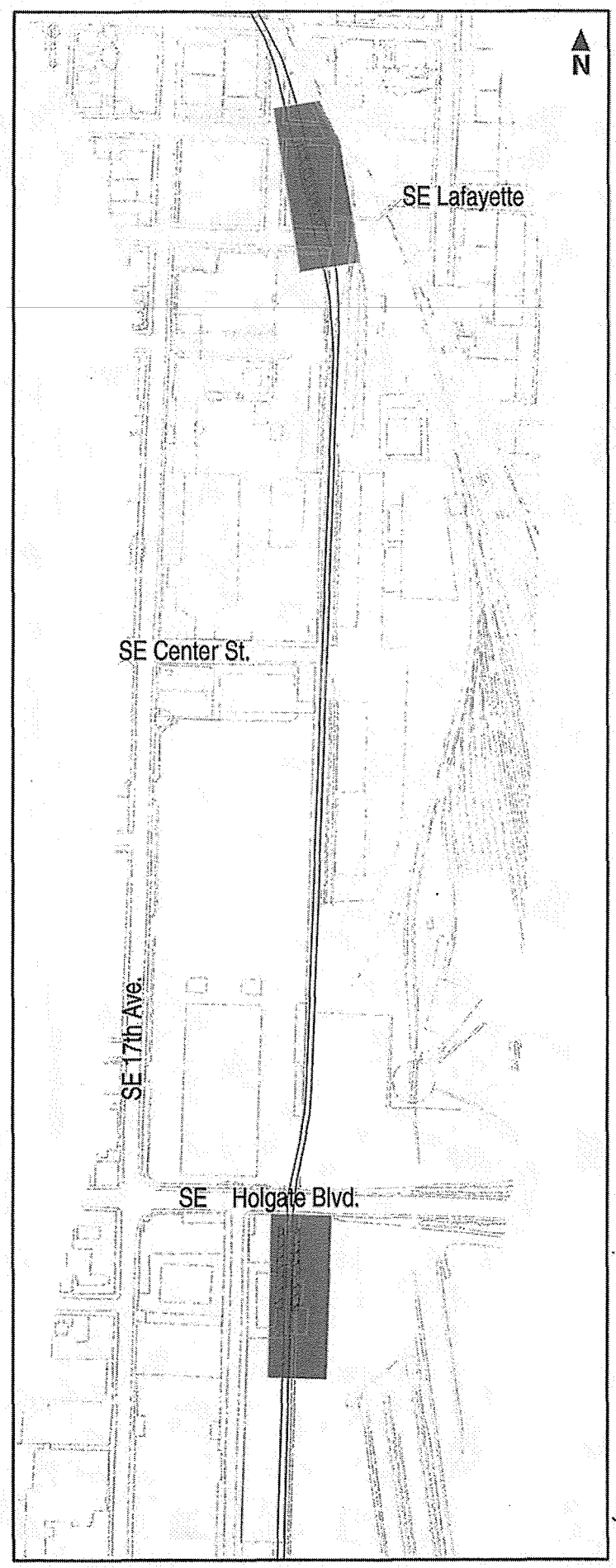
Light Rail Route

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

METRO

Figure 2.5.2

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

Light Rail Station

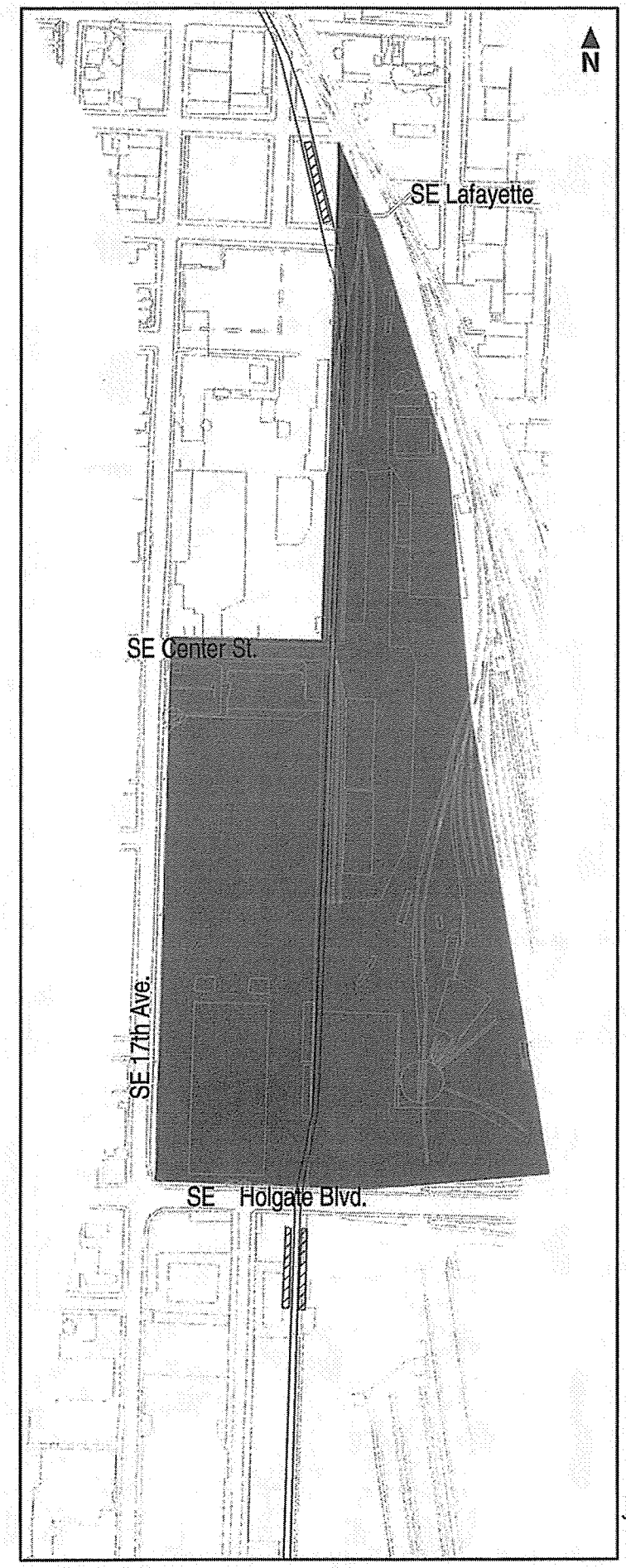
DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET

11384



South North Transit Corridor Study

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Figure 2.5.3

Land Use Final Order Boundary Maps:

South Willamette River Crossing Segment

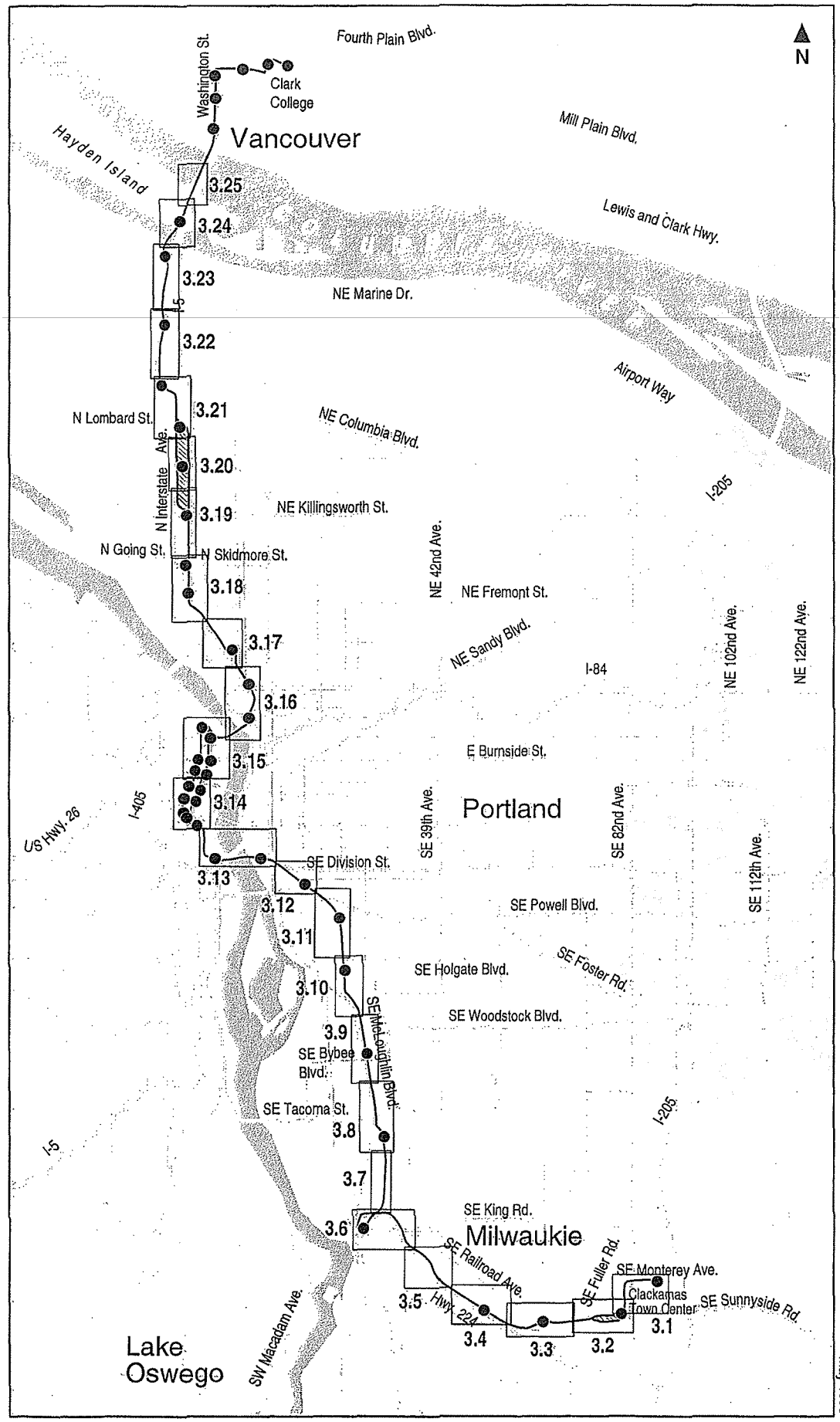
Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

0 200 400

FEET



South North Transit Corridor Study

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Figure 3

Index Map for 400' Scale Maps

3.x Detailed Area with Figure #

Recommended LRT Alignment Alternative

Station

Alignment Study Area

Note: Alignment and station locations are currently under study and may change.

0 1 2 MILE

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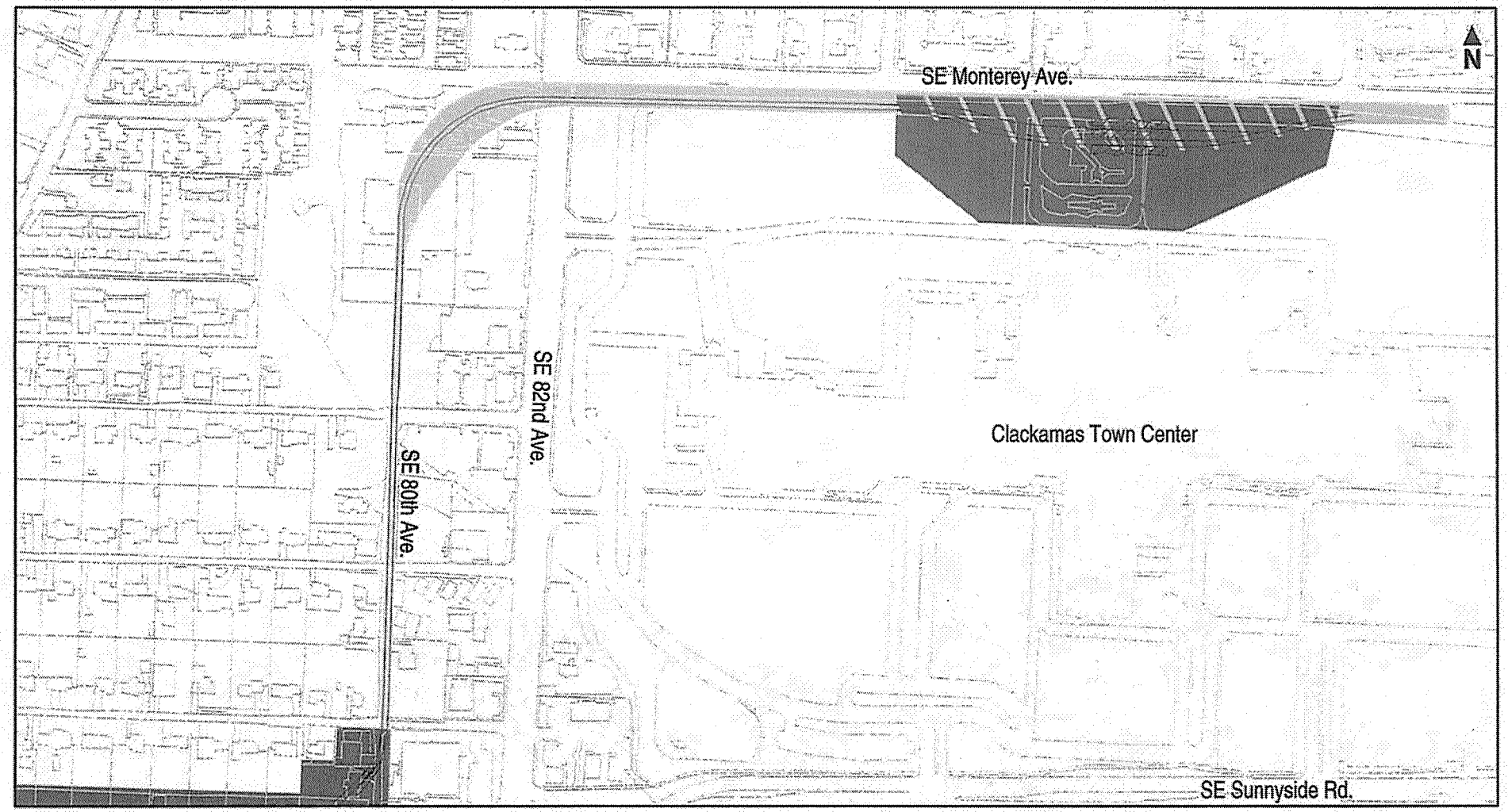

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North South Transit Corridor Study

METRO

Figure 3.1

Land Use Final Order Boundary Maps

- OIT/CCC Study Area
- Light Rail Route
- Light Rail Station
- DEIS Station Platform
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

1 Inch to 400 Feet

FEET

11387

11388

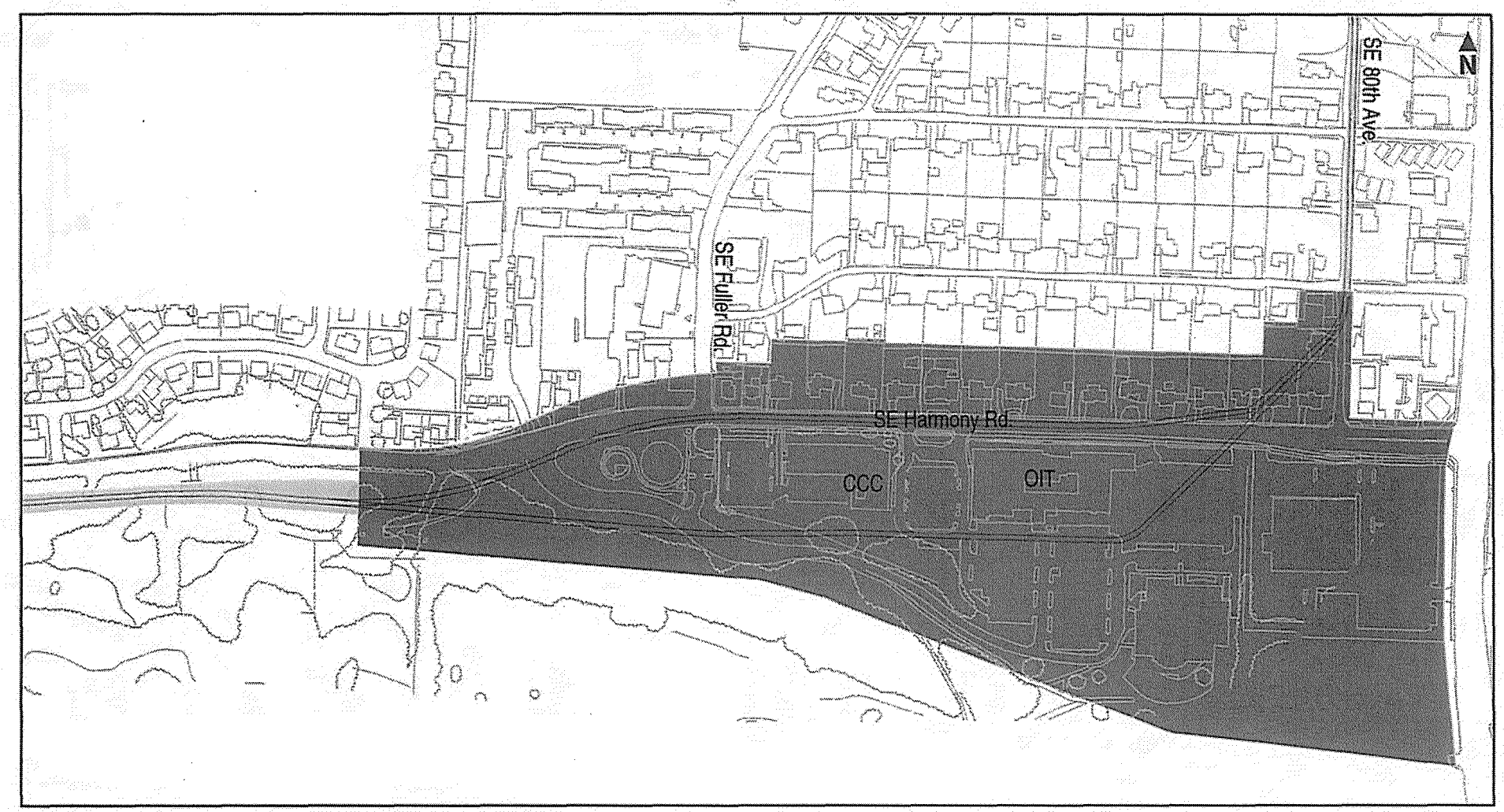

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Figure 3.2

Land Use Final Order Boundary Maps

OIT/CCC Study Area

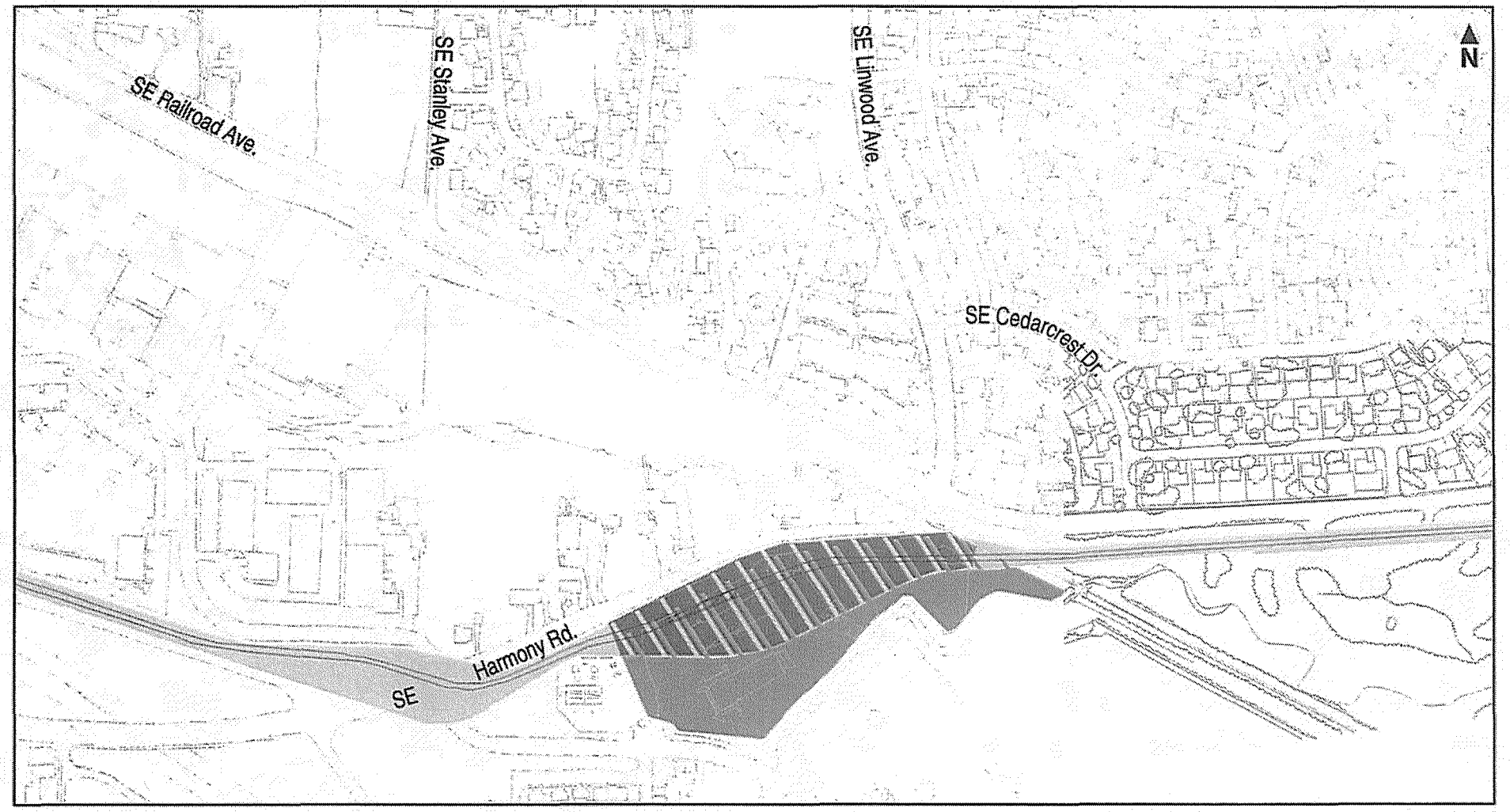
Light Rail Route

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



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Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

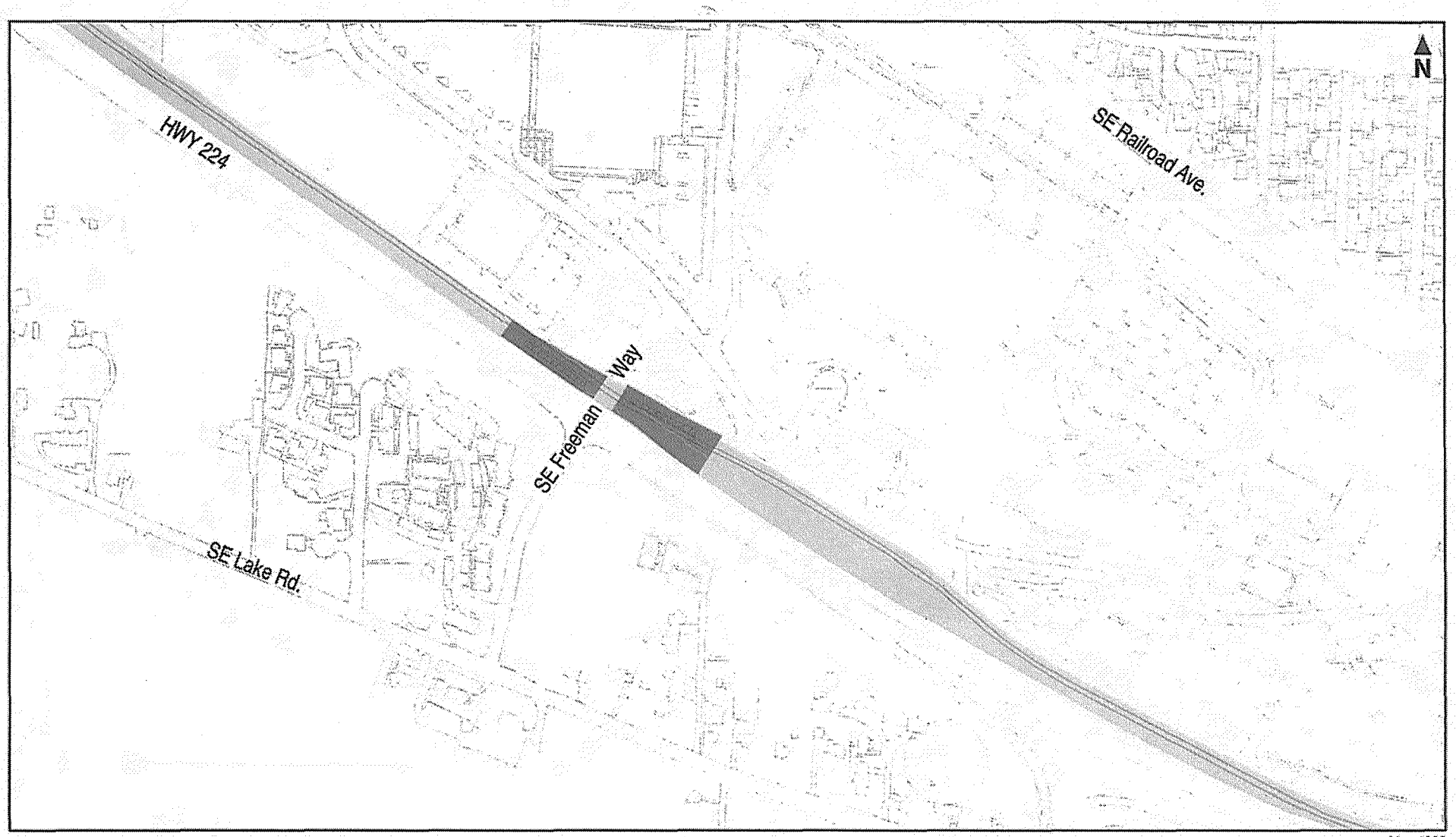
1 Inch to 400 Feet

FEET

Figure 3.3

Land Use Final Order Boundary Maps

11389



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Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

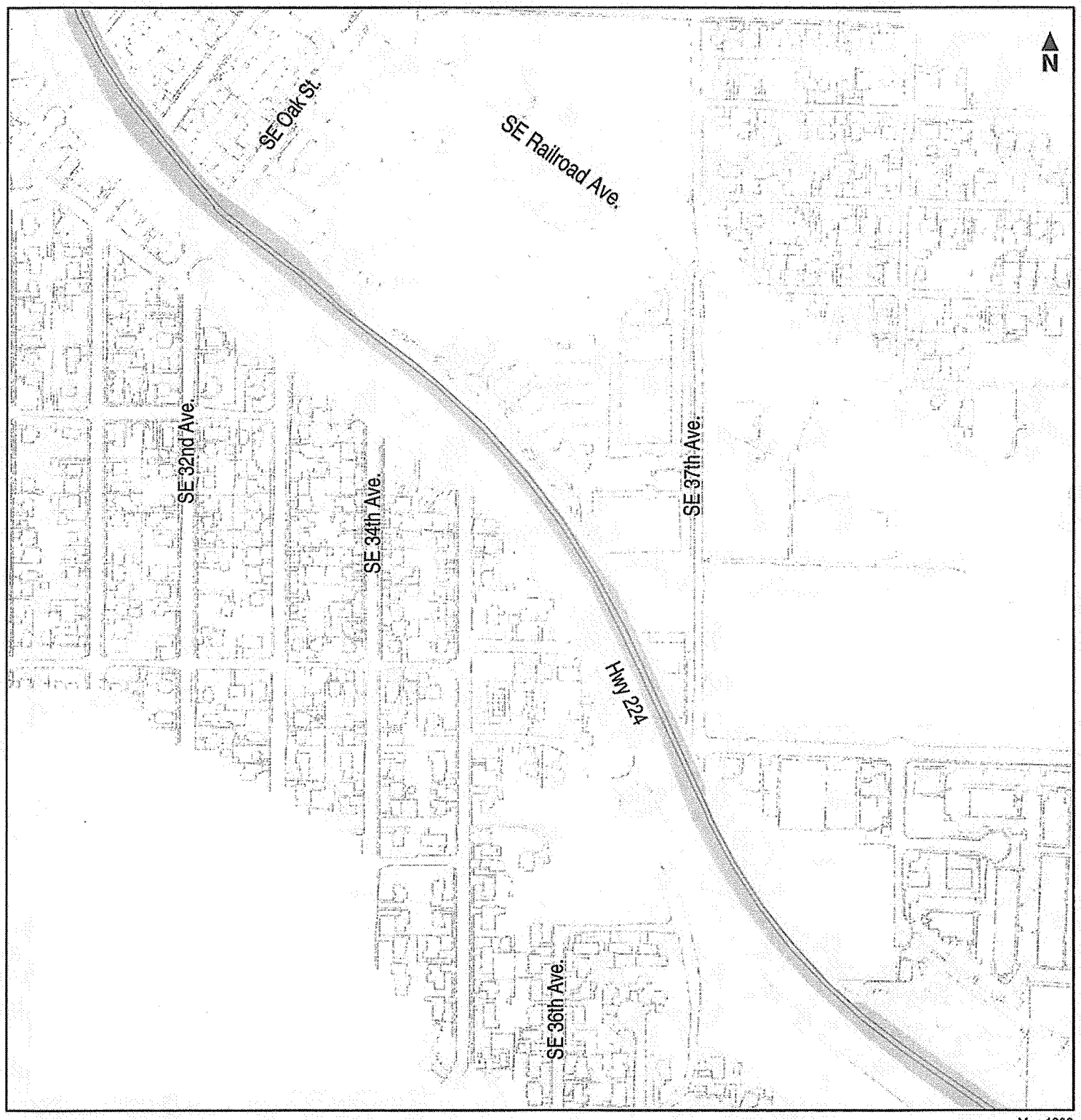
0 400 800

1 Inch to 400 Feet

FEET

Figure 3.4

Land Use Final Order Boundaries



South North Transit Corridor Study

METRO

Figure 3.5

Land Use Final Order Boundaries

Light Rail Route

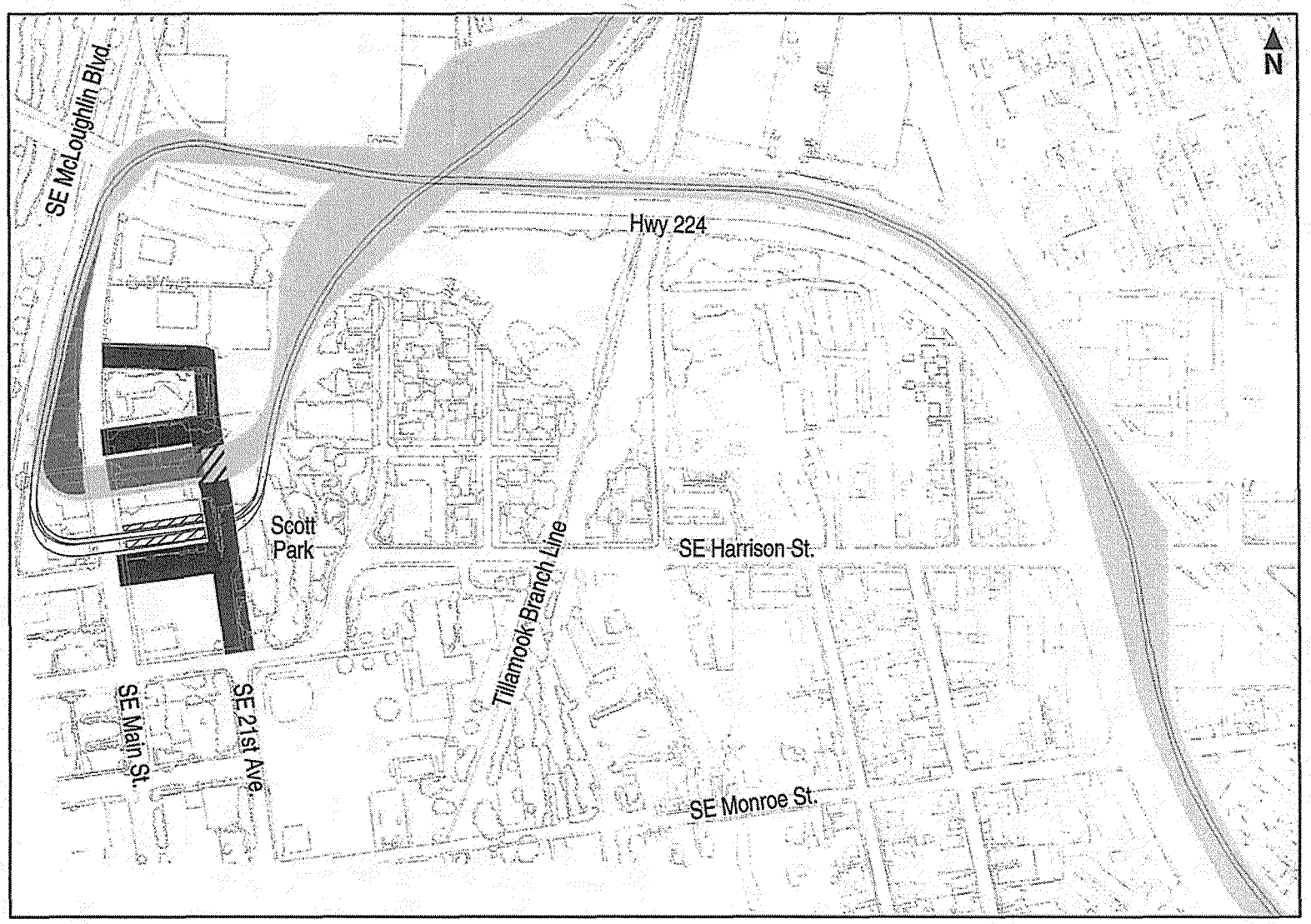
DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11392



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Light Rail Route

Light Rail Station

Highway/Road Improvement

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

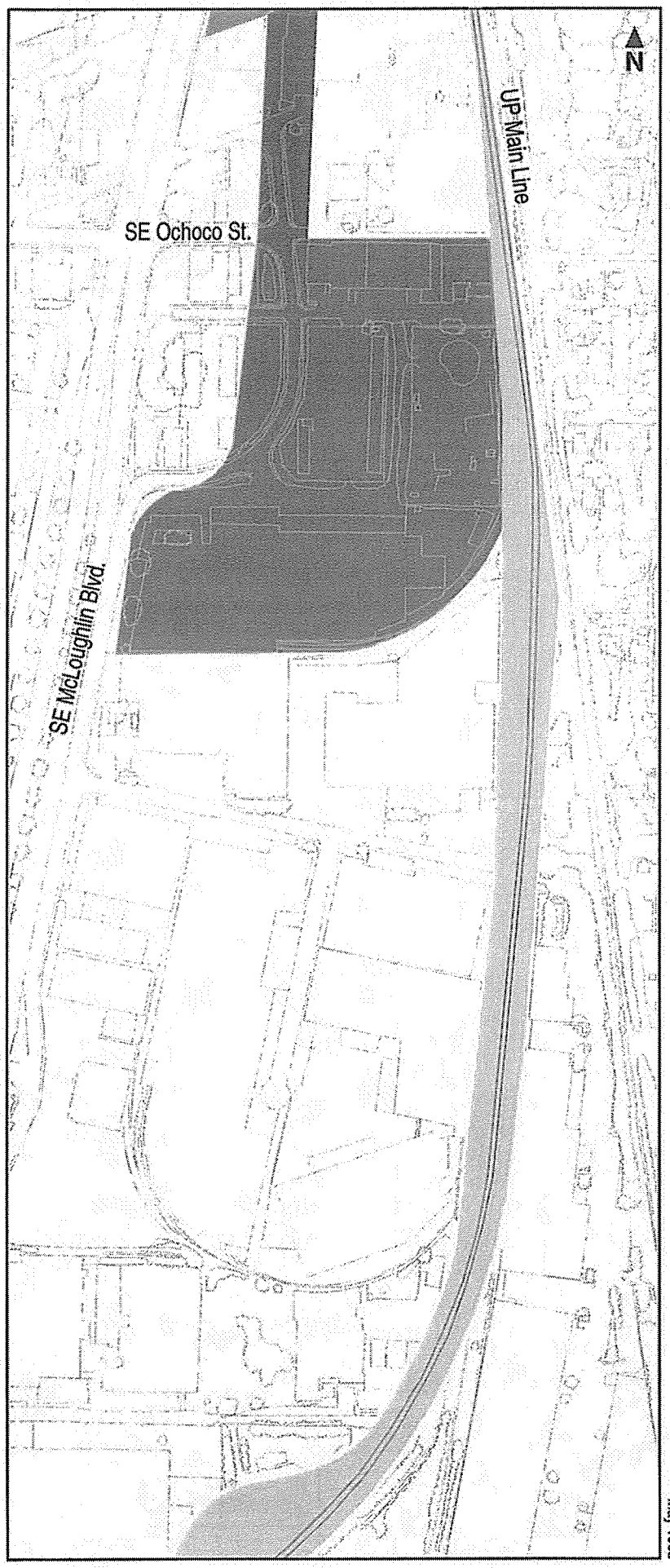
0 400 800

1 Inch to 400 Feet

FEET

Figure 3.6

Land Use Final Order Boundary Maps



South North Transit Corridor Study

METRO

Figure 3.7

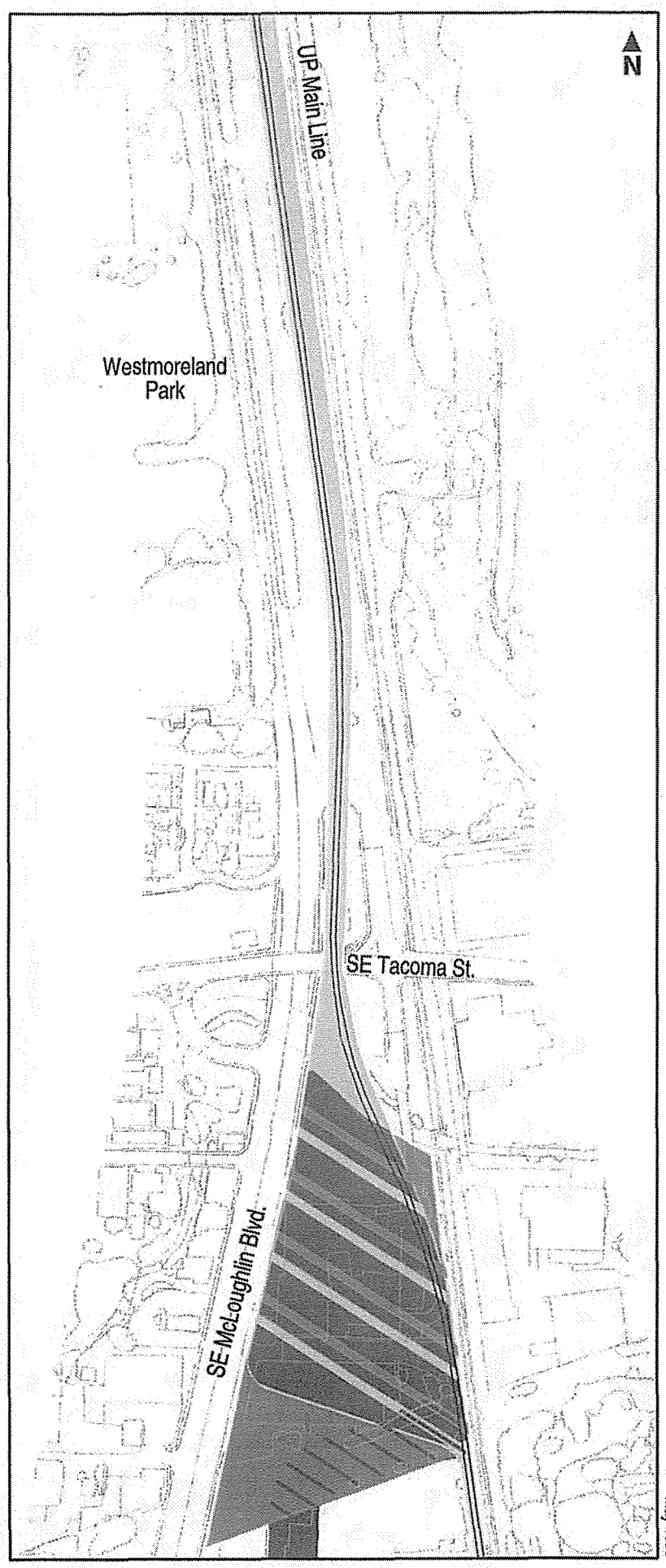
Land Use Final Order Boundary Maps

- Light Rail Route
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET



South North Transit Corridor Study

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Figure 3.8

Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800

1 Inch to 400 Feet

FEET

11394

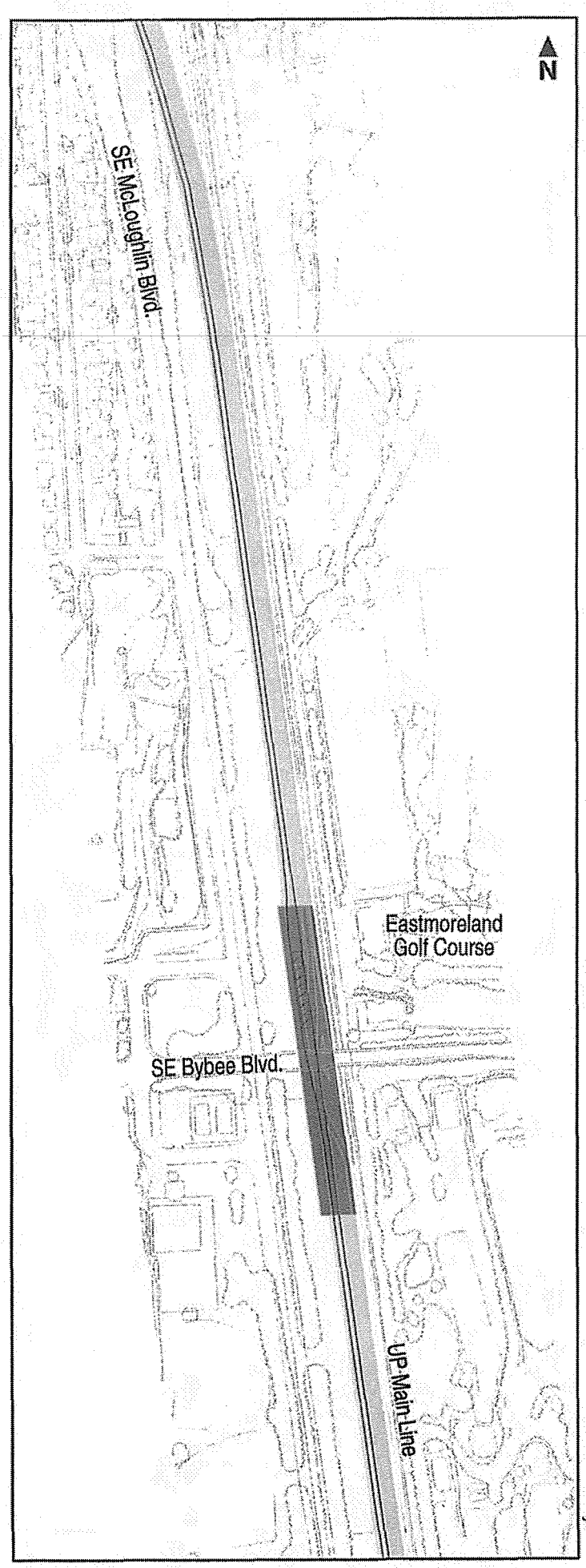

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Figure 3.9

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

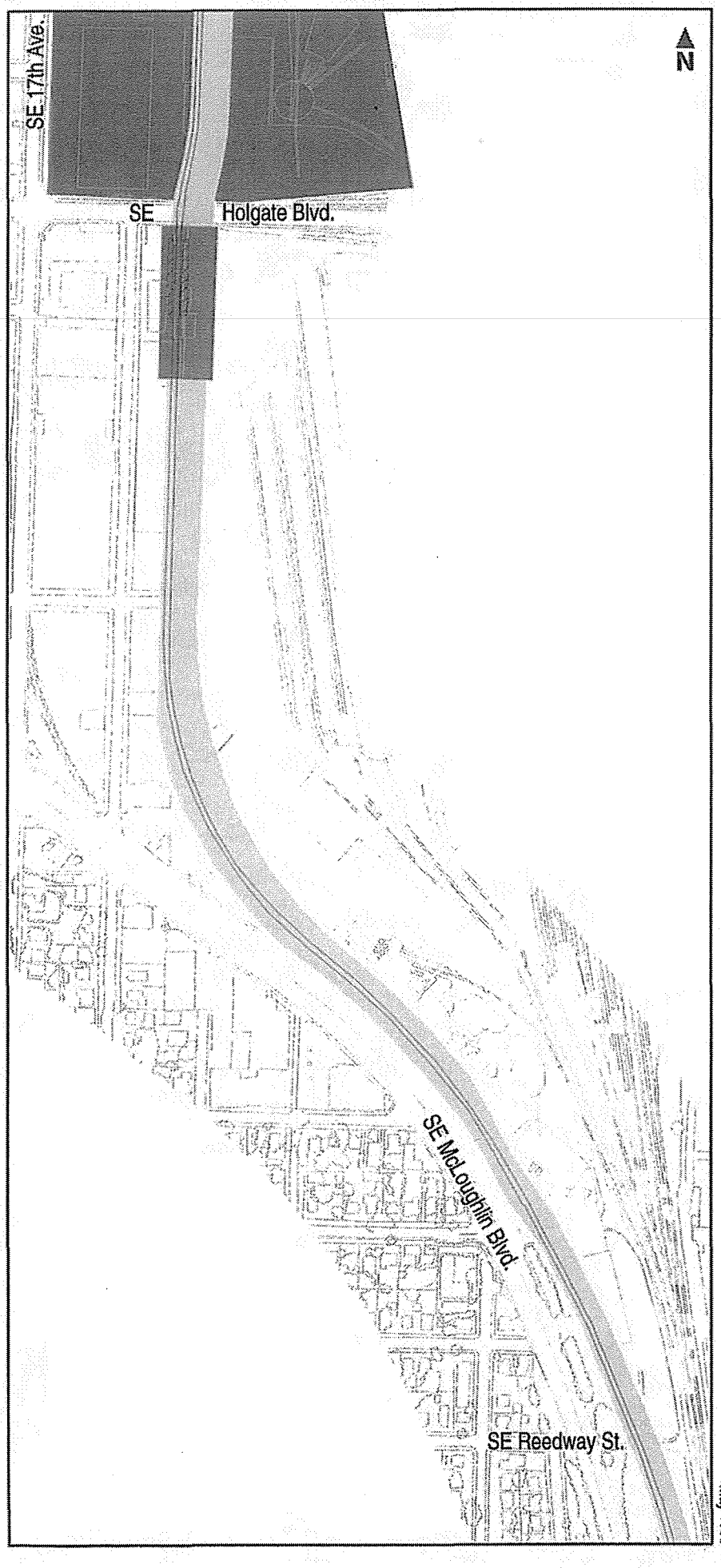

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Figure 3.10

Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- Operations and Maintenance Facility Study Area
- DEIS Station Platform
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11396

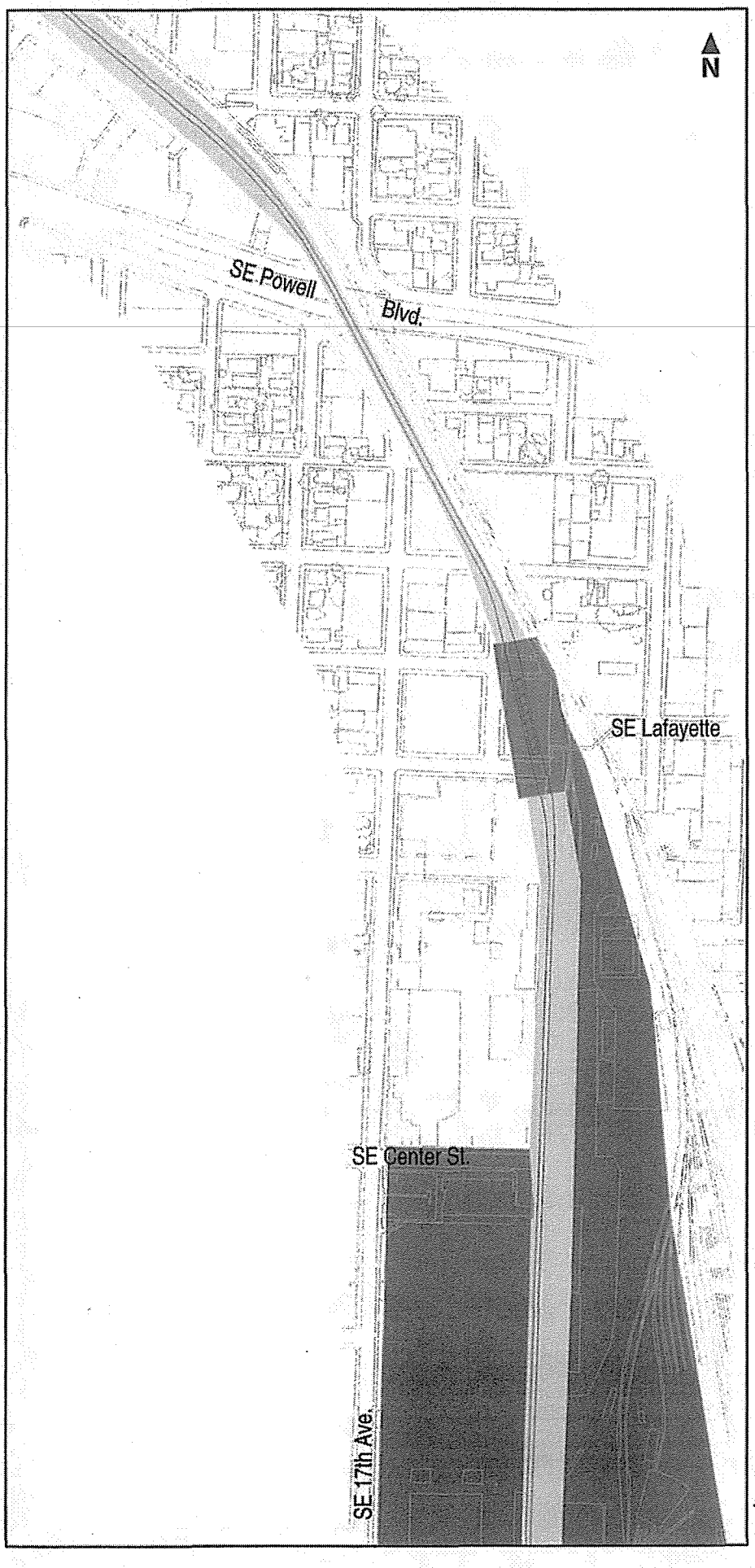

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Figure 3.11

Land Use Final Order Boundary Maps

- Light Rail Route
- Light Rail Station
- Light Rail Operations and Maintenance Facility Study Area
- DEIS Station Platform
- DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

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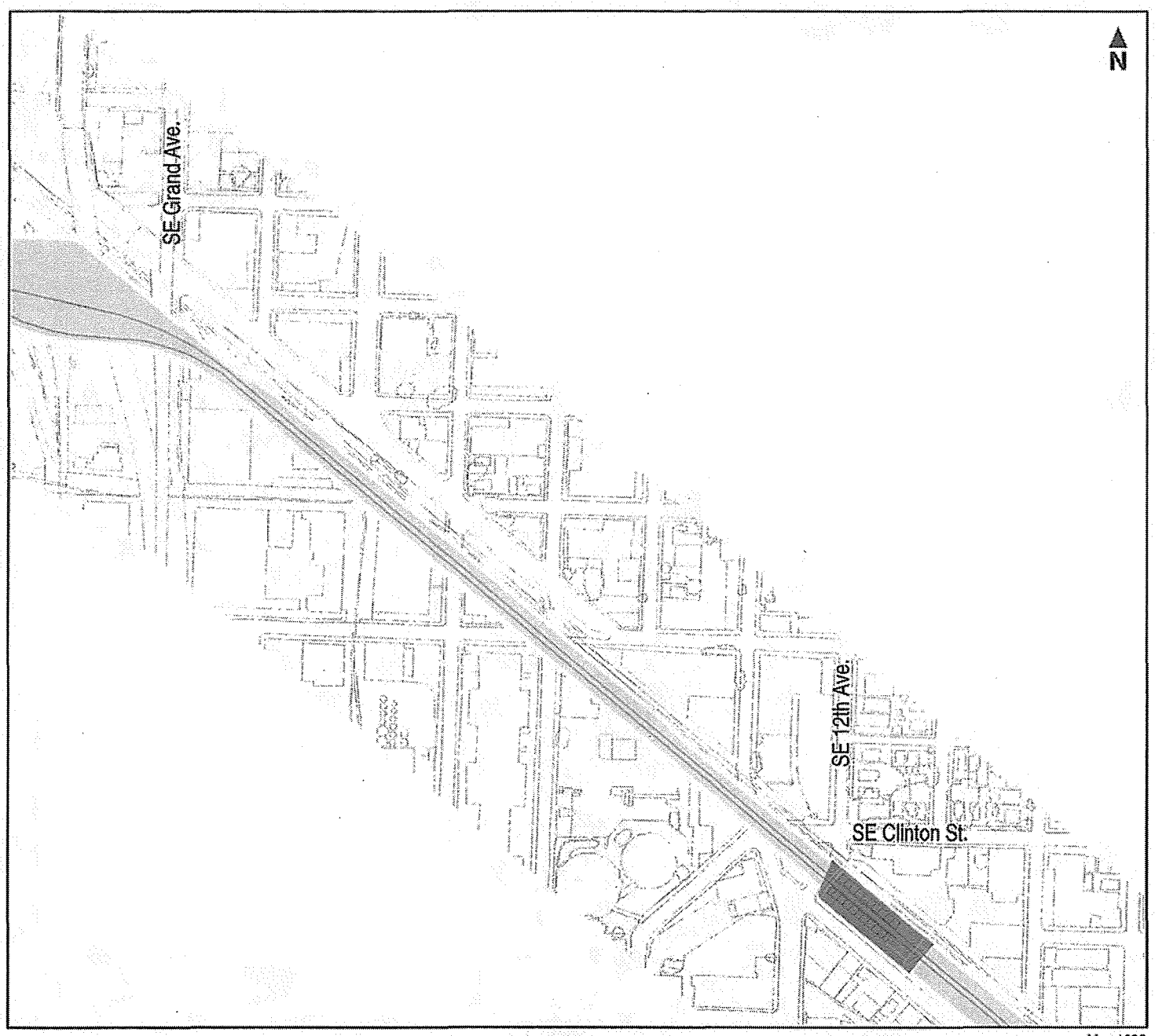

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Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

Figure 3.12

Land Use Final Order Boundary Maps

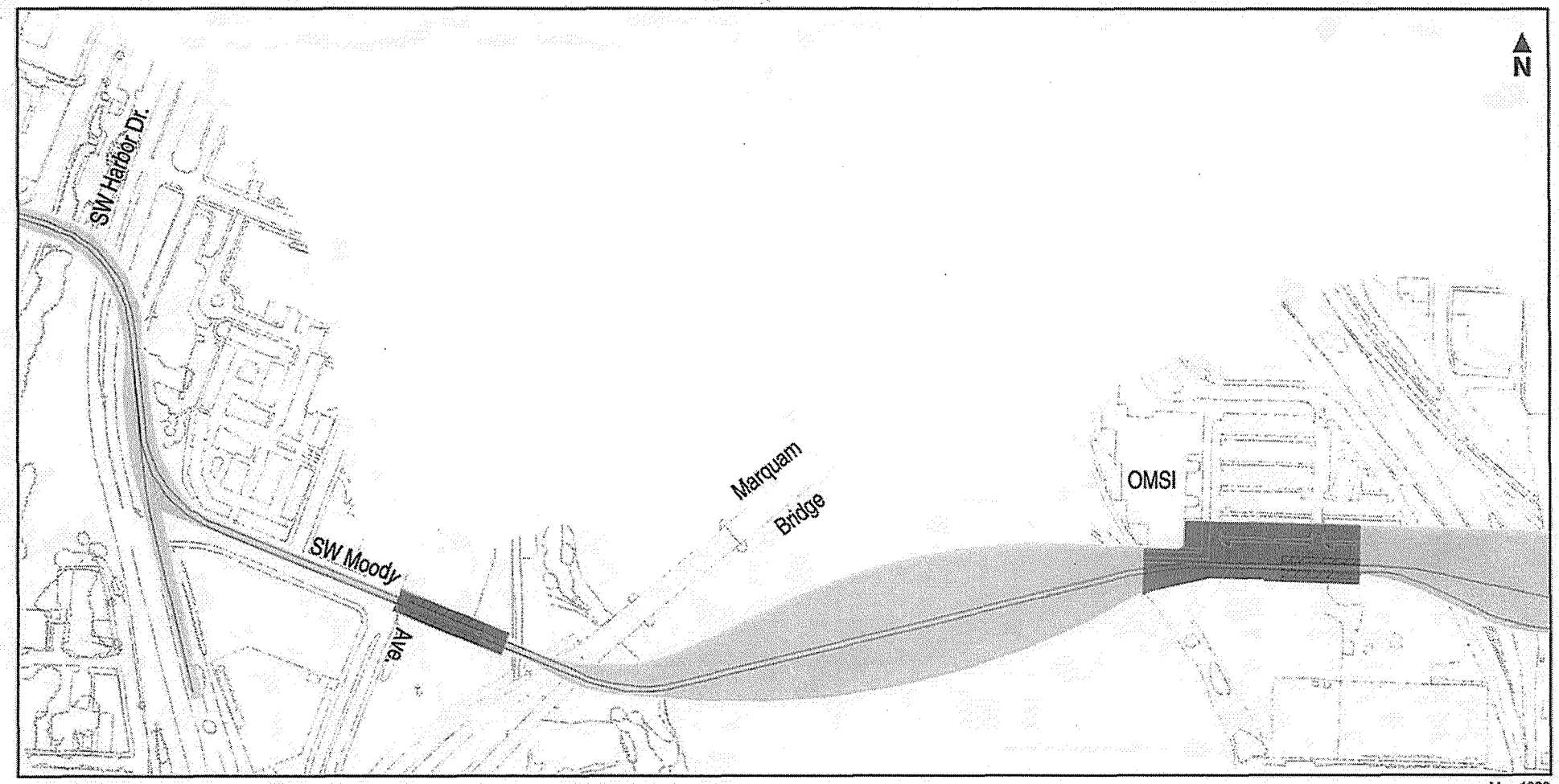

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Figure 3.13

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11399

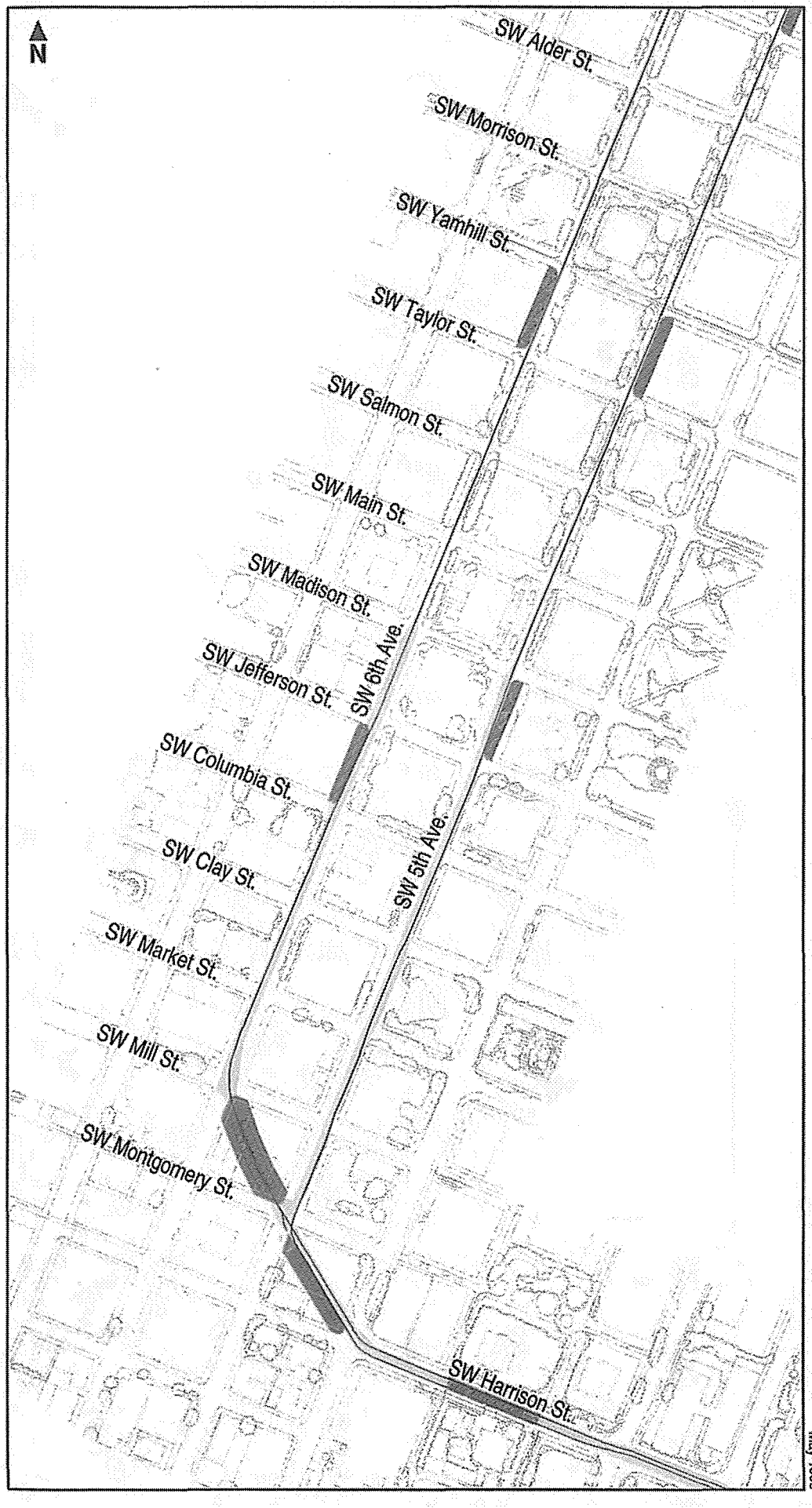

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Figure 3.14

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11400

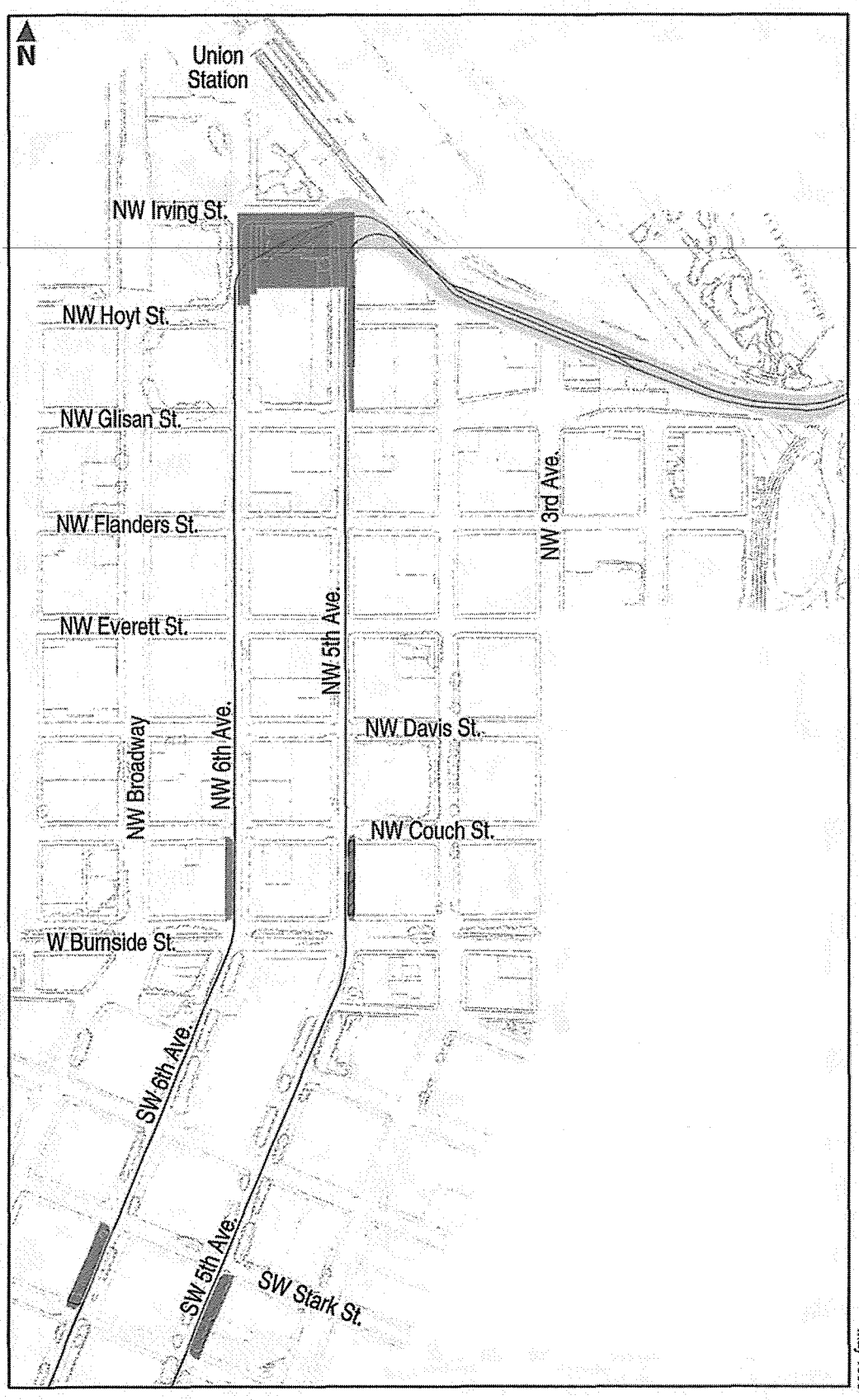

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Figure 3.15

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

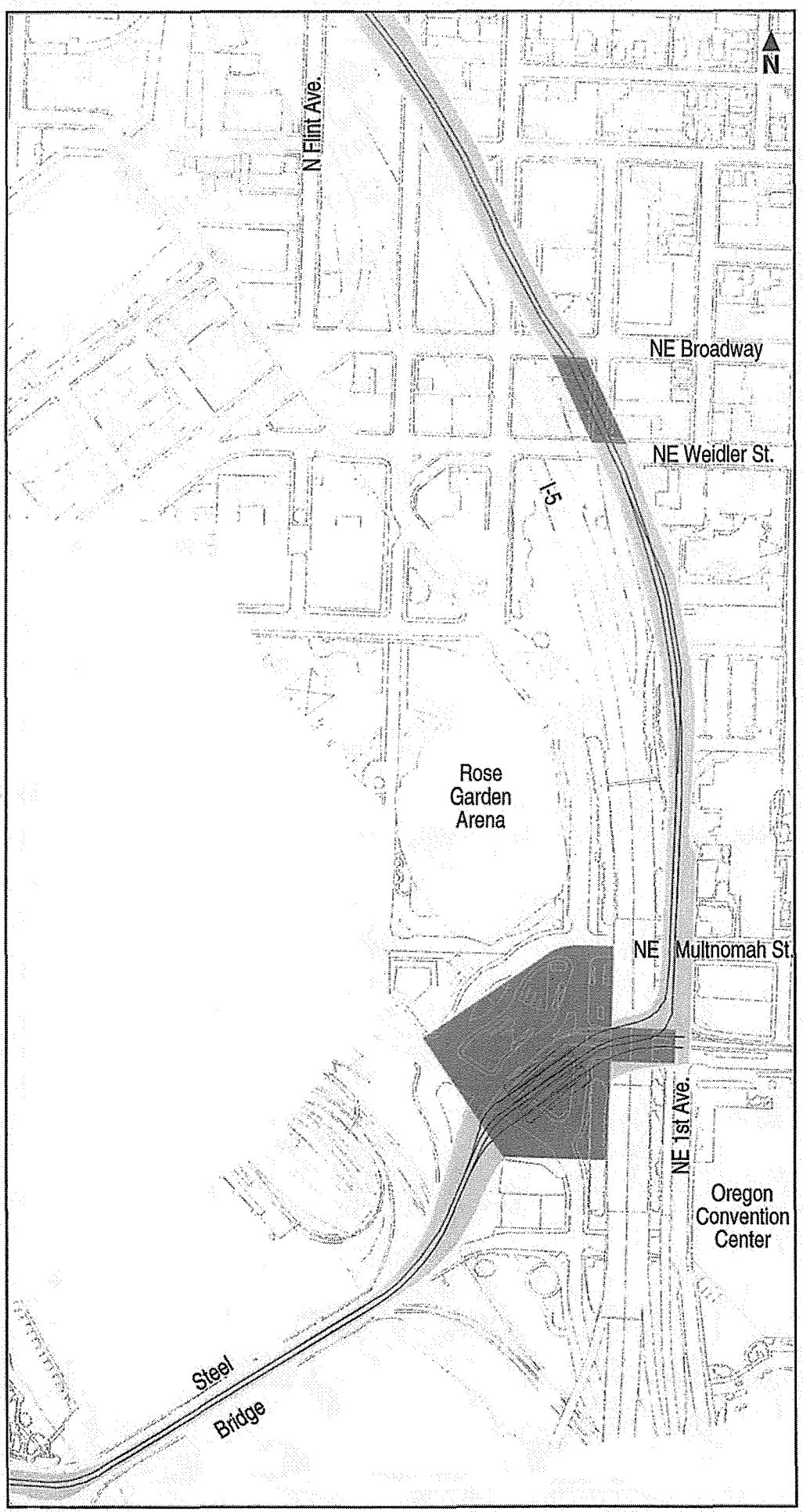

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Figure 3.16

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

May 1998

0 400 800

1 Inch to 400 Feet

FEET

11402

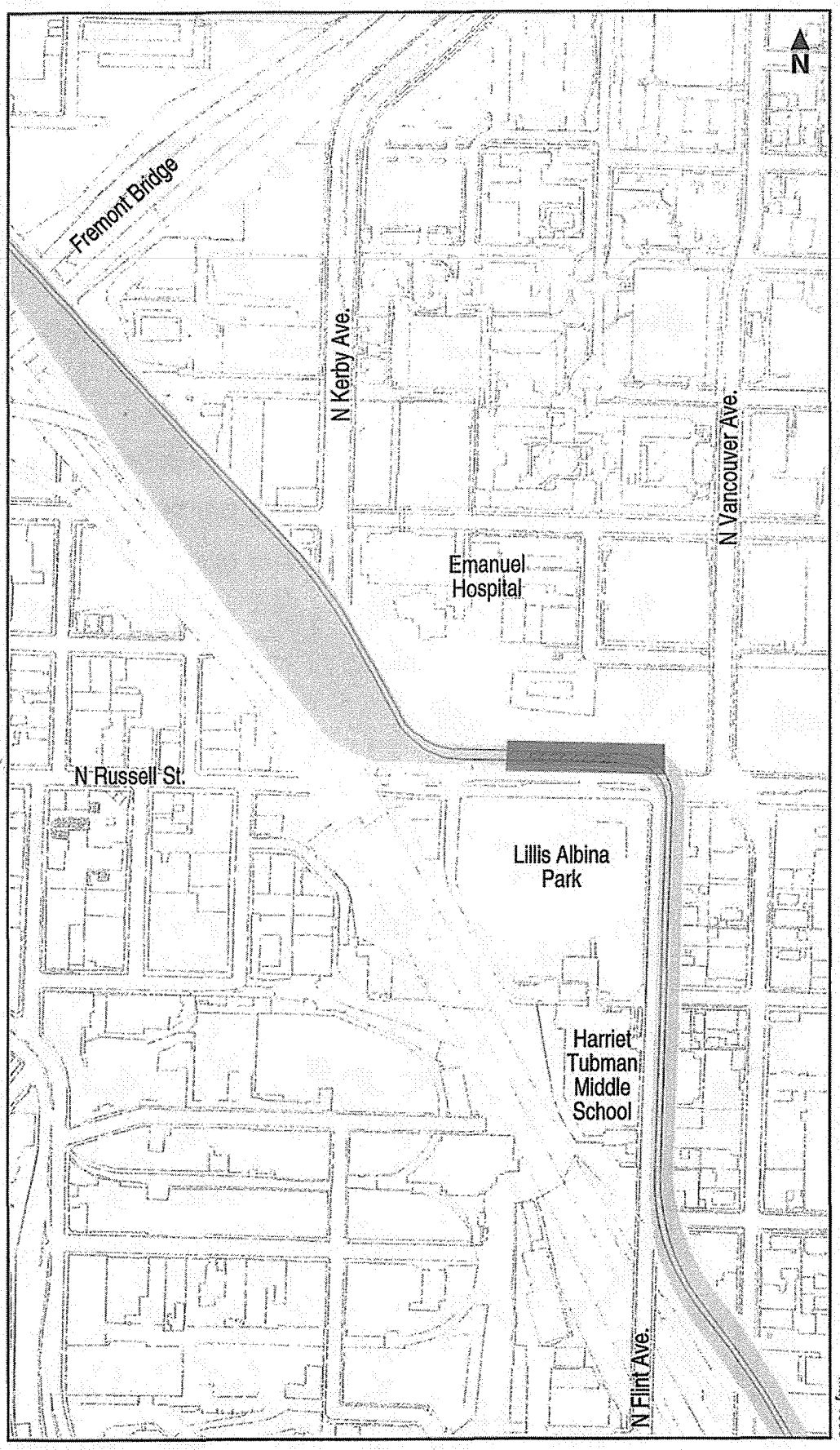

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Figure 3.17

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

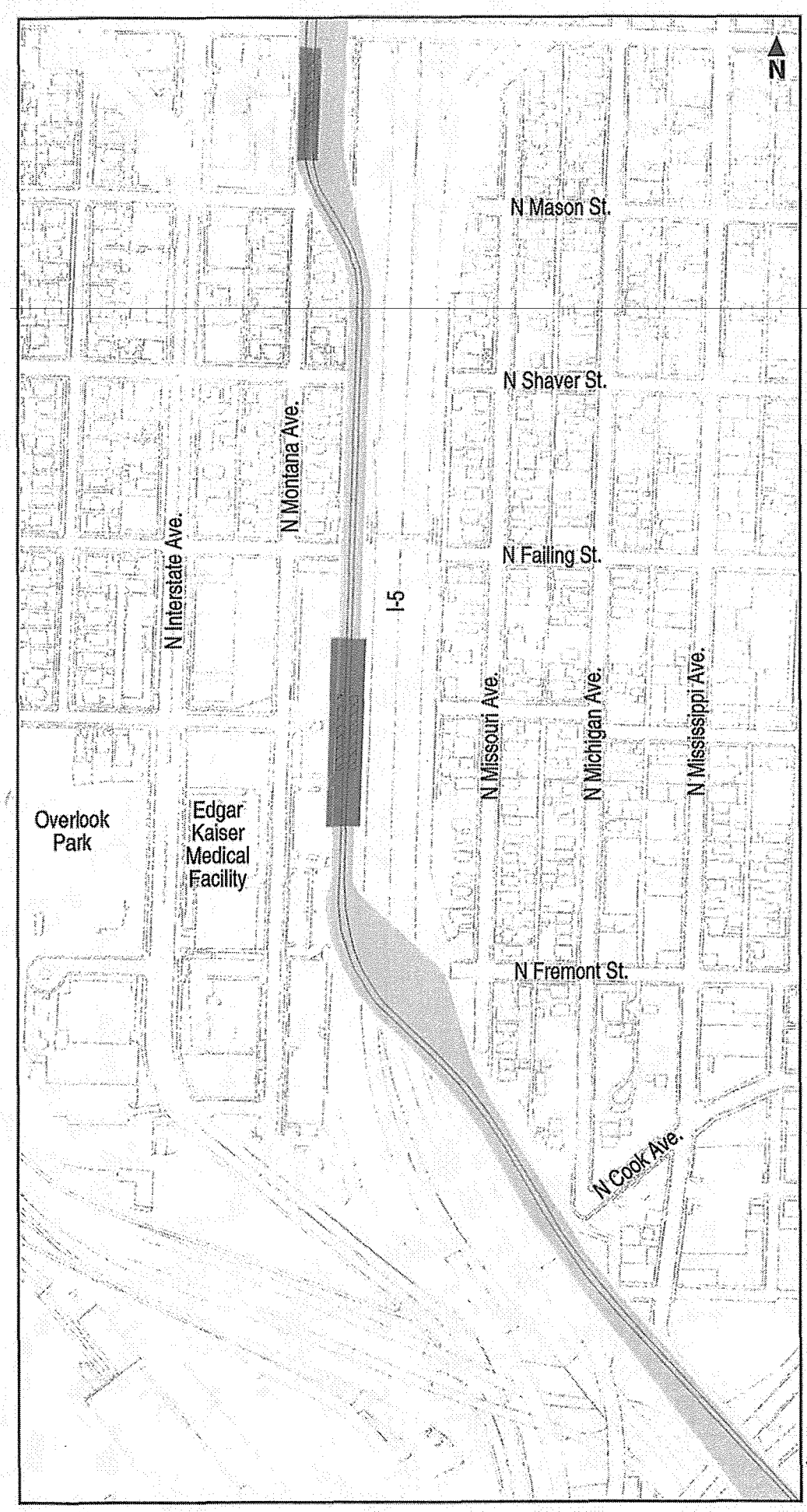

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Figure 3.18

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11404

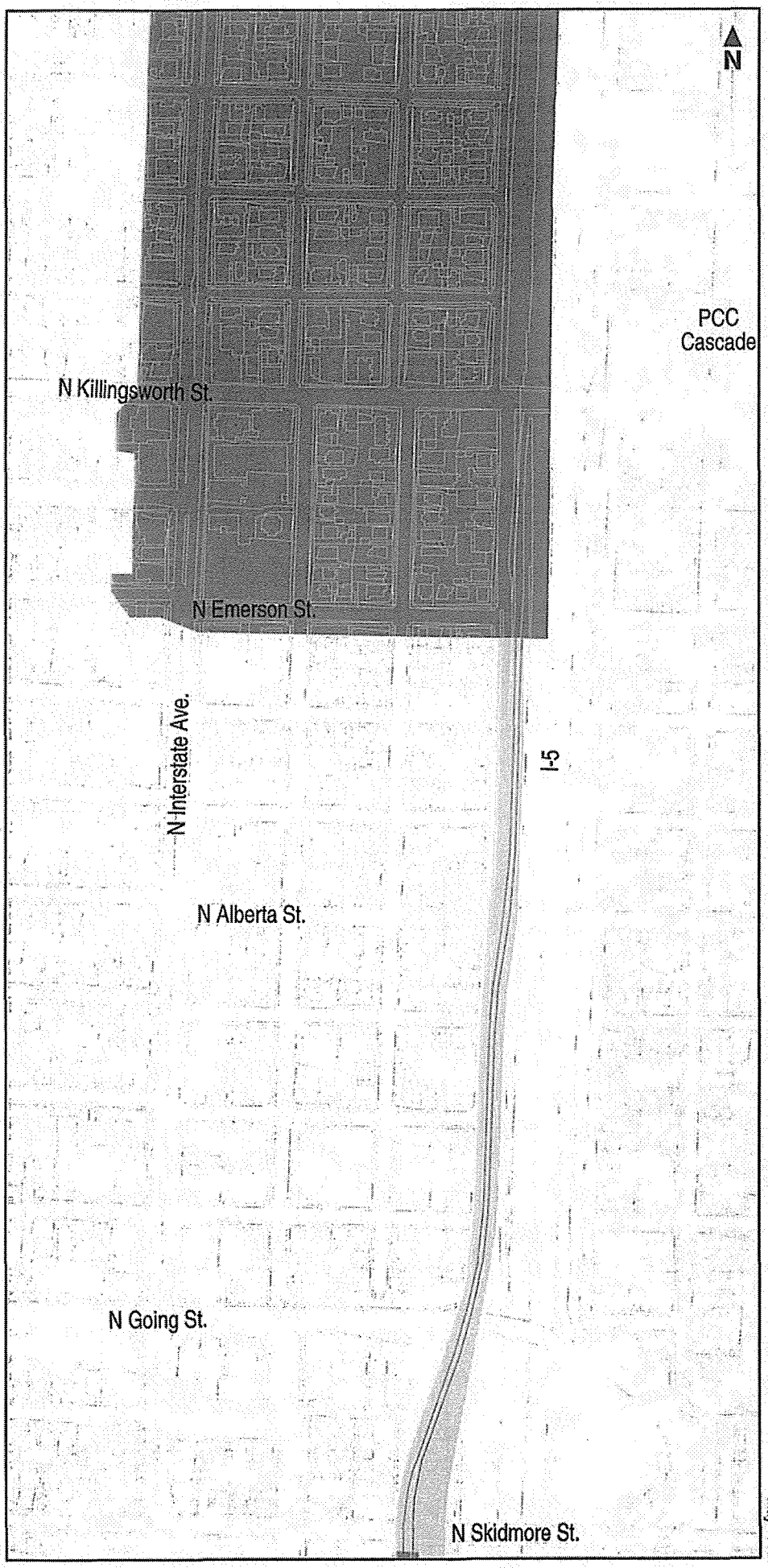

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Figure 3.19

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

Crossover Study Area

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11405

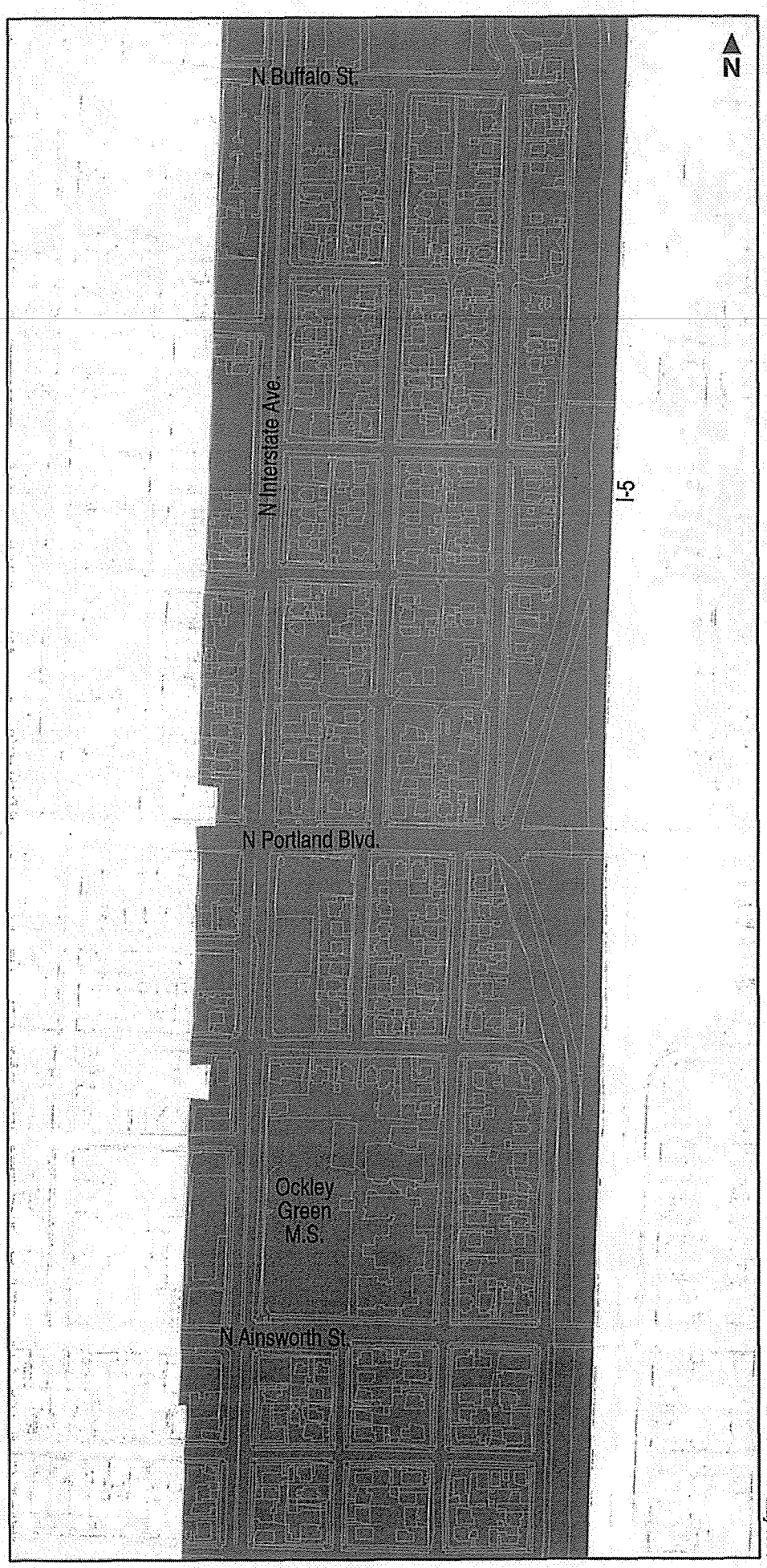

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Figure 3.20

Land Use Final Order Boundary Maps

Crossover Study Area

0 400 800

1 Inch to 400 Feet

FEET

11406

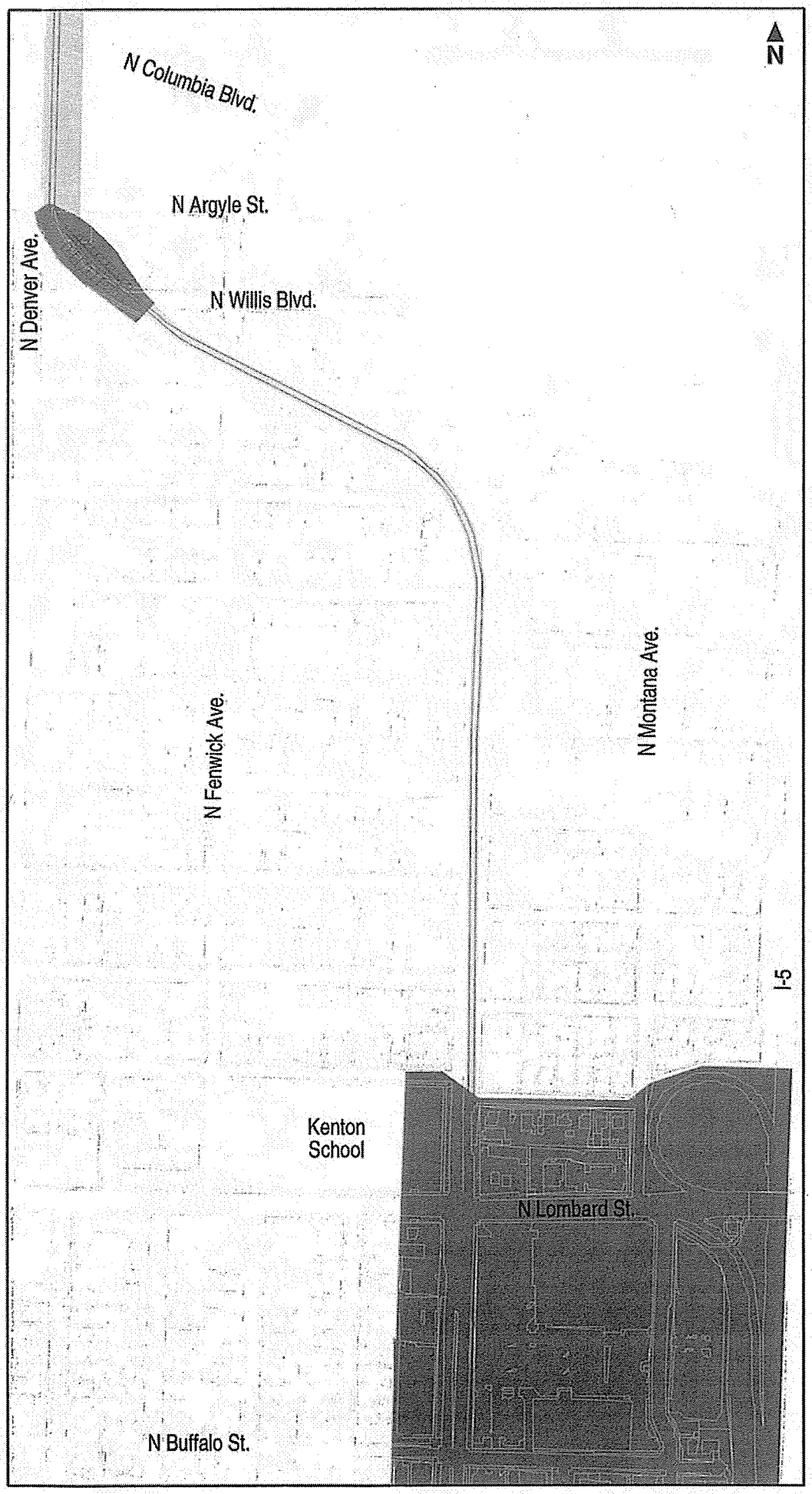

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Figure 3.21

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

Crossover Study Area

DEIS Station Platform

DEIS Light Rail Route

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0 400 800

1 Inch to 400 Feet

FEET

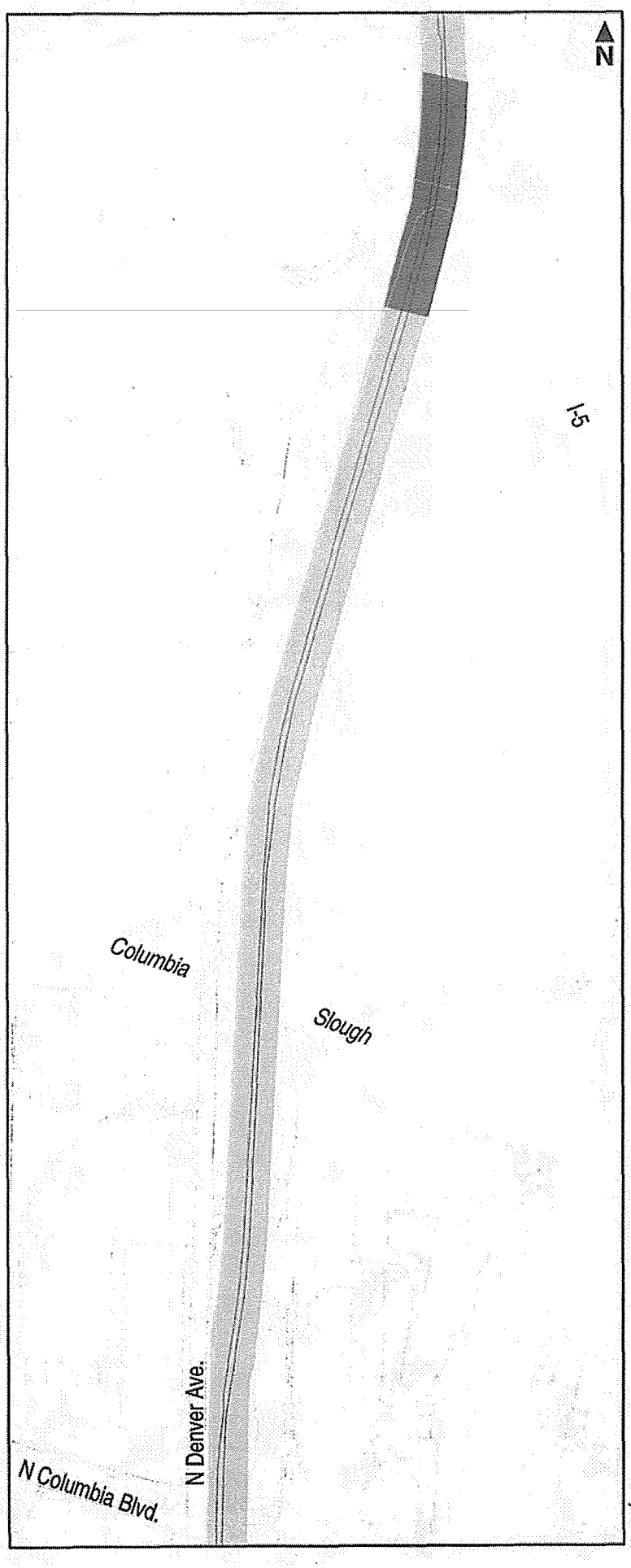

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Figure 3.22

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11408

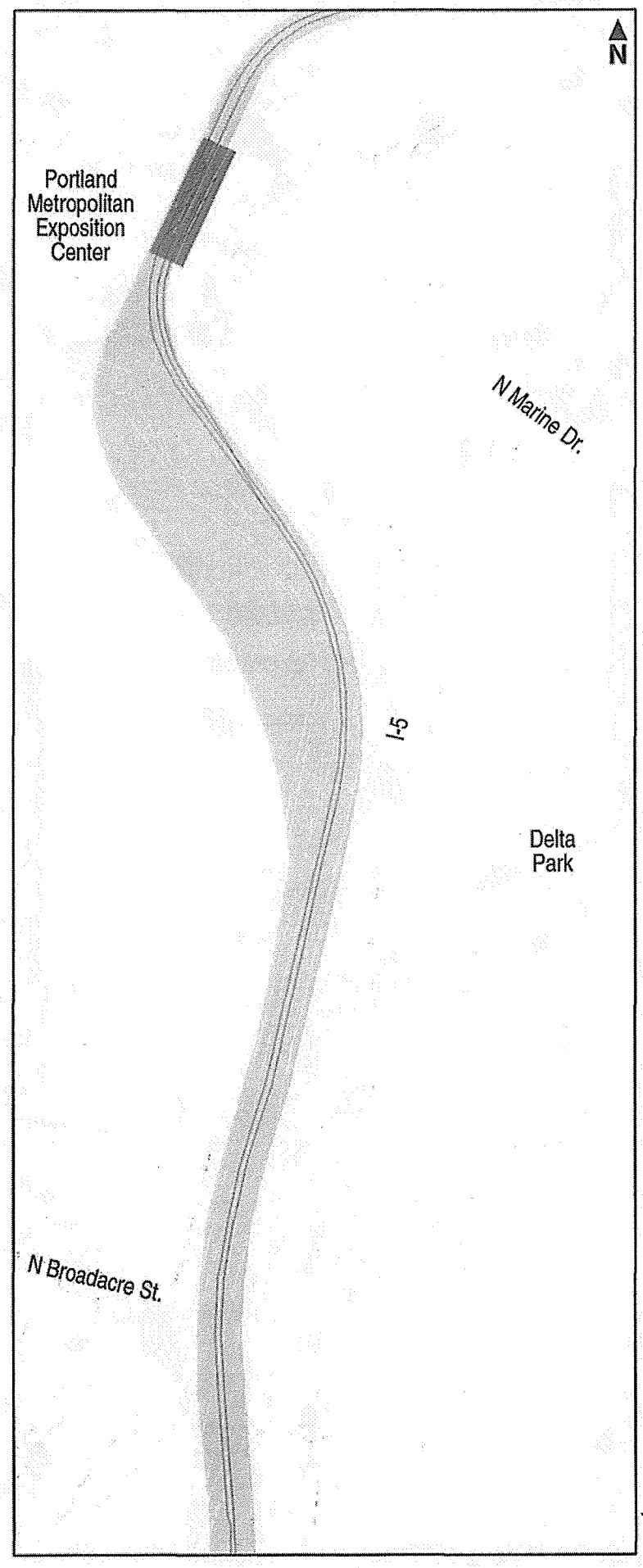

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Figure 3.23

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

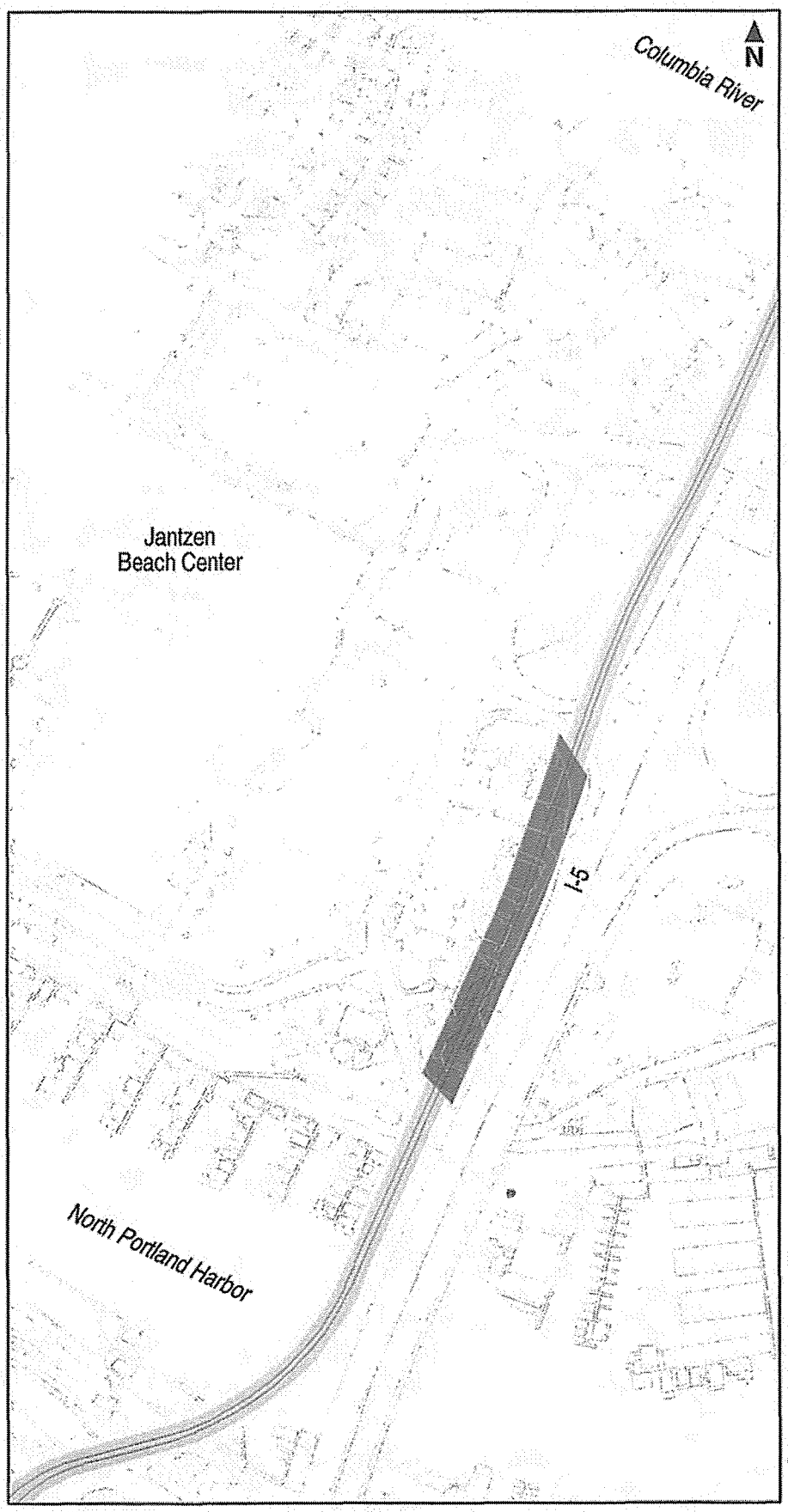

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Figure 3.24

Land Use Final Order Boundary Maps

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

11410

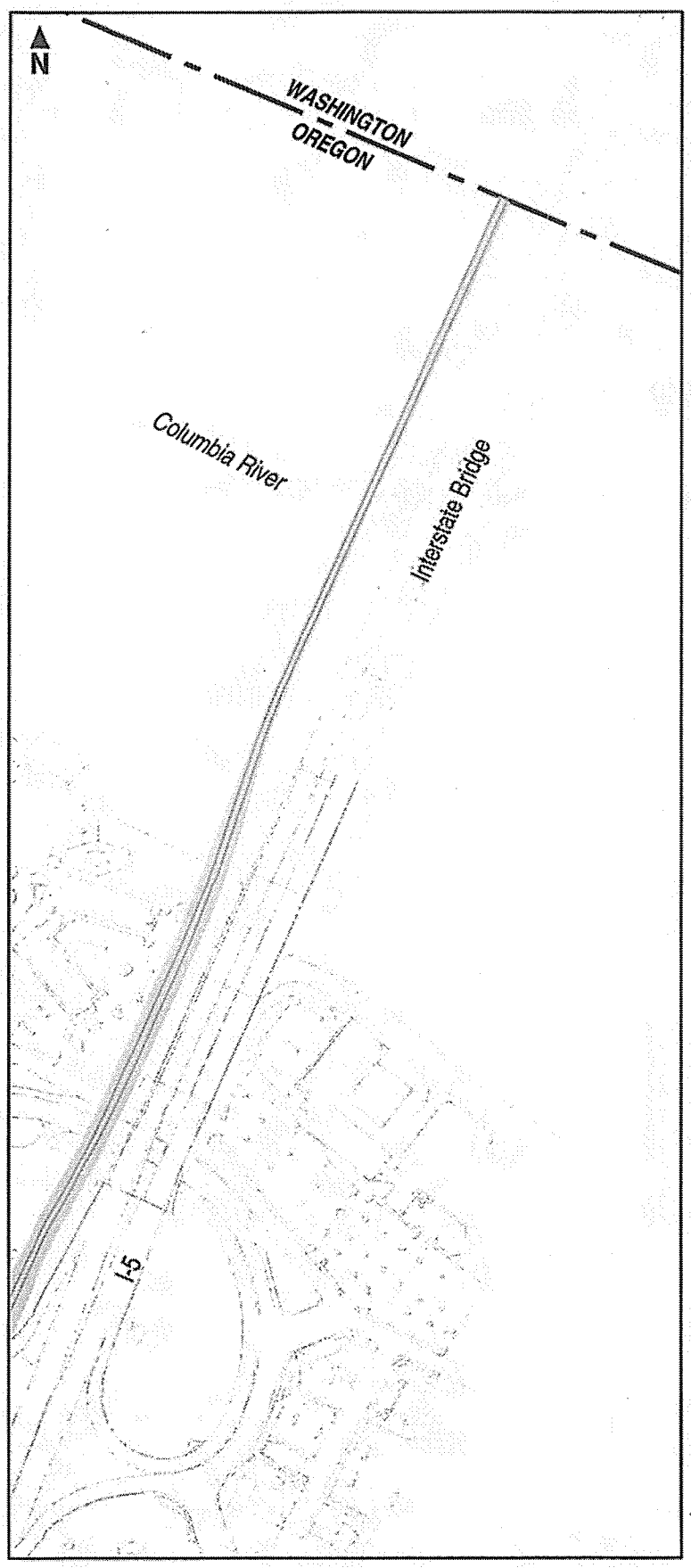

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Figure 3.25

Land Use Final Order Boundary Maps

Light Rail Route

DEIS Light Rail Route

0 400 800

1 Inch to 400 Feet

FEET

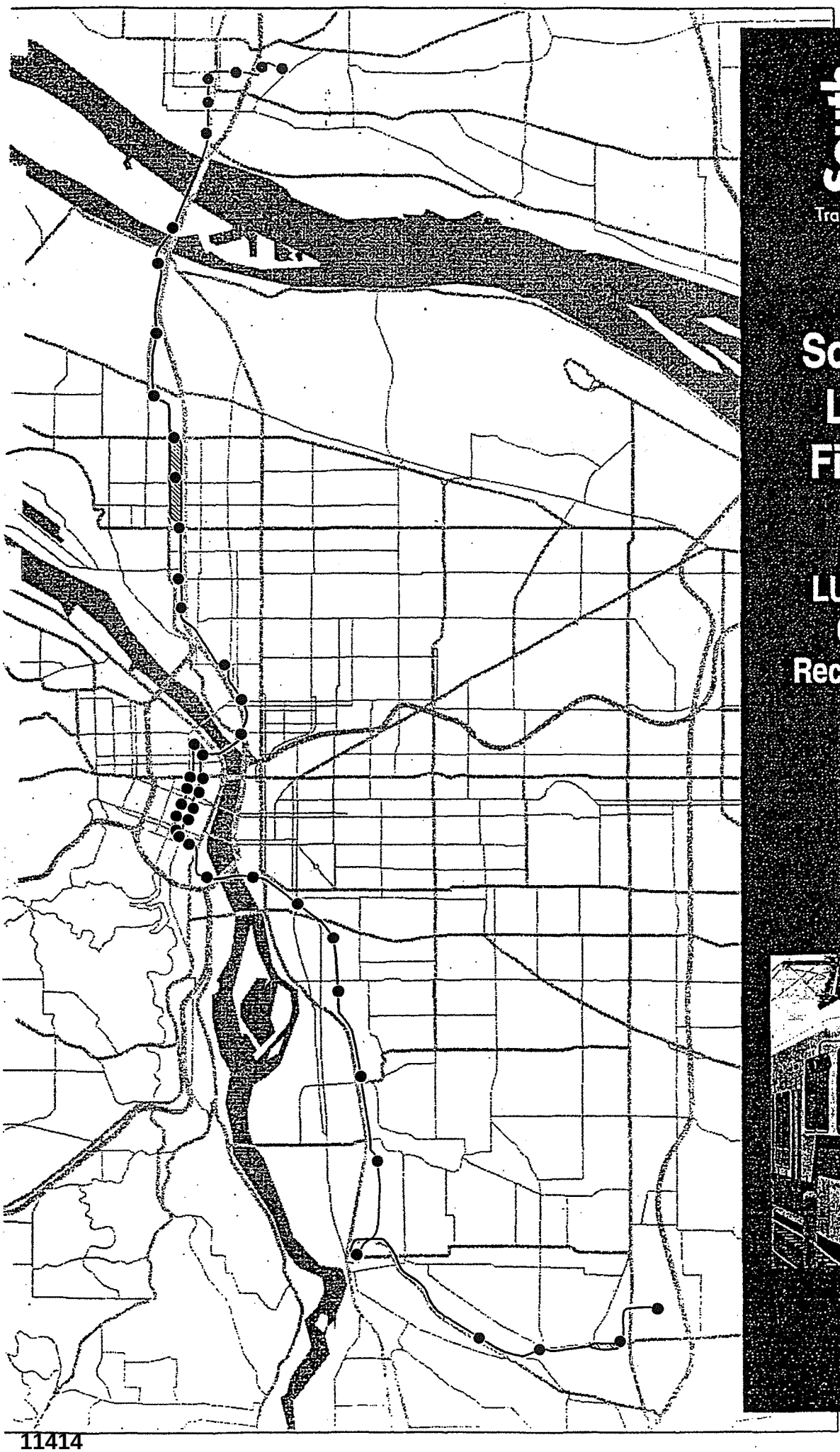
Attachment A

South/North Land Use Final Order
Boundary Maps

Attachment B

South/North Land Use Final Order
LUFO Steering Committee Recommendation

June 5, 1998



South North
Transit Corridor Study

South/North Land Use Final Order

LUFO Steering Committee Recommendation

June 5, 1998

METRO

South/North Transit Corridor Study

South/North Land Use Final Order

LUFO Steering Committee Recommendation

Adopted
June 5, 1998

METRO

The preparation of this report was financed in part by the U.S. Department of Transportation, Federal Transit Administration. The opinions, findings and conclusions expressed in this report are not necessarily those of the U.S. Department of Transportation, Federal Transit Administration.

Metro Publication No. 1998-10127-TRN

TABLE OF CONTENTS

1. Introduction

This document constitutes the South/North Land Use Final Order (LUFO) Steering Committee's recommendation to Tri-Met regarding Tri-Met's application to the Metro Council for approval of a LUFO for the South/North Light Rail Project. This recommendation is provided in accordance with Section 6(1) of House Bill 3478, which directs Tri-Met to apply to the Metro Council for a Land Use Final Order approving the light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project, including their locations, following receipt of recommendations from the Department of Transportation and the LUFO Steering Committee.

In June 1998, in accordance with Section 1(21) of Oregon House Bill 3478, the South/North LUFO Steering Committee was established through Intergovernmental Agreement between Metro, Tri-Met, ODOT, Clackamas County, Multnomah County, the City of Portland and the City of Milwaukie, and includes ex-officio members from the City of Oregon City, the City of Vancouver, Clark County, WSDOT and RTC.

This recommendation from the LUFO Steering Committee was adopted on June 5, 1998 and addresses the light rail route, light rail stations, lots and maintenance facilities, and the highway improvements for an area extending from the Clackamas Regional Center in Clackamas County, Oregon, to the Oregon/Washington state line. Although the South/North Project is a bi-state project, HB 3478 applies only to the portion within the State of Oregon.

2. Requirements of House Bill 3478

House Bill 3478 authorizes the Metro Council, upon application by Tri-Met and following recommendations from the South/North LUFO Steering Committee and the Oregon Department of Transportation, to adopt a Land Use Final Order for the South/North Project. A LUFO is a written order of the Metro Council deciding the light rail route, stations, lots and maintenance facilities, and the highway improvements for the South/North Project, including their locations. The LUFO identifies the light rail route, stations, lots, maintenance facilities and highway improvements that comprise the South/North Project, and it further specifies the locations within which these facilities and improvements may be located. As explained in Section 6(1)(a) of House Bill 3478,

> "The applied for locations shall be in the form of boundaries within which the light rail route, stations, lots and maintenance facilities, and the highway improvements shall be located. These boundaries shall be sufficient to accommodate adjustments to the specific placements of the light rail route, stations, lots and maintenance facilities, and the highway improvements for which need commonly arises upon the development of more detailed environmental or engineering data following approval of a Full Funding Grant Agreement."

3. Interpretation of Terms

As noted, the LUFO establishes the light rail route, stations, lots, maintenance facilities and the highway improvements for the project. The LUFO Steering Committee recommends that Tri-Met and the Metro Council interpret these terms as having the following meanings:

temporary LRT construction-related roadways, staging areas and road or lane closures; roadway reconstruction, realignment, repair, widening, channelization, signalization or signal modification, lane reconfiguration or reduction, addition or modification of turning lanes or refuges, modification of traffic circulation patterns, or other modifications or improvements that provide or improve project access, improve traffic flow, circulation or safety in the vicinity of the project, facilitate or are necessary for the safe or proper functioning and operation of the project, or are necessary to mitigate adverse traffic impacts created by the project; modifications of private roadways adjoining the project; permanent road, lane or access closures associated with and necessitated by the project; and other associated actions or associated or ancillary amenities, facilities or improvements related to the project.

Finally, in making its recommendations to Tri-Met, the LUFO Steering Committee recognizes that the proposed South/North Project must be demonstrated to comply with the ten land use criteria established for this project by the Land Conservation and Development Commission adopted in May, 1996. Based on the testimony provided to date, the LUFO Steering Committee expresses its confidence that such compliance can be demonstrated.

4. Recommended Light Rail and Highway Improvements

The South/North LUFO Steering Committee recommends that Tri-Met request and that the Metro Council adopt a LUFO approving the light rail route, the stations, lots and maintenance facilities, and the highway improvements as identified textually below and in the attached maps, which illustrate the location "boundaries" as required by Section 6(1)(a) of the Act.

Consistent with the South/North Draft Environmental Impact Statement, the LUFO Steering Committee has divided the South/North project into nine segments, beginning with the Clackamas Regional Center Segment at the southern terminus and ending in the Hayden Island Segment at the Oregon/Washington state line. For each segment, the project description begins with a brief summary of the segment, followed by identification of the light rail route, the stations, lots and maintenance facilities, and the highway improvements.

The recommended project identifies three areas for further study and refinement. These areas are: 1) the area in the Clackamas Regional Center Segment including Clackamas Community College, the Oregon Institute of Technology and the North Clackamas Aquatic Center and extending westward from approximately SE 80th Avenue and SE Harmony Drive to a location west of SE Fuller Road; 2) the area in the South Willamette Crossing Segment bounded by approximately SE Holgate Boulevard, SE 17th Avenue, SE Center Street, the east side of the light rail alignment to approximately SE Rhone Street, and a line bisecting Brooklyn Yard on the east; and 3) the area in the North Portland Segment generally bounded by N Killingsworth Street, N Interstate Avenue, N Lombard Street and I-5. For the areas in the Clackamas Regional Center and North Portland segments, the LUFO Steering Committee recommends additional planning resulting in LUFO amendments to determine the identity and locations of the light rail route, stations, lots and/or highway improvements. The LUFO Steering Committee recommends that the South Willamette Crossing Segment area be studied further to determine whether the identified study area is appropriate for a light rail operations and maintenance facility. Any designation of this area as an operations and maintenance facility would require a LUFO amendment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the East Milwaukie Segment attached to this recommendation.

4.3 Milwaukie Regional Center Segment

The Milwaukie Regional Center Segment extends northward from Highway 224 just east of the Tillamook Branch Line near the north Milwaukie industrial area to SE Tacoma Street in the City of Portland.

Starting from north of Highway 224 just east of the Tillamook Branch Line, the alignment crosses over the branch line on a structure, then crosses under Highway 224 and crosses SE Main Street at grade. It extends southward, generally parallel to and east of SE McLoughlin Boulevard, turning eastward north of Scott Street to a station and transit center located in the vicinity of the current vacant Safeway store. From the transit center, the alignment curves northward to the east of Kellogg Bowl. It then curves northeast and crosses under Highway 224 and the light rail alignment through a new underpass. North of Highway 224, the alignment makes a wide curve through the Heiberg garbage transfer station east of the Hanna Harvester site, and then extends northward parallel to and west of the Tillamook Branch and UP Main Line. A new connection of freight spur tracks to the Tillamook Branch Line will be constructed in the vicinity of SE Mailwell Drive and would cross the light rail alignment at grade. South of SE Ochoco Street is an alternative light rail vehicle operations and maintenance facility site. North of the Springwater Corridor and south of SE Tacoma Street, a station and an approximately 800-space structured park-and-ride lot will be located. The alignment then crosses over Johnson Creek on a bridge and under an existing span of the SE Tacoma Street overpass.

Highway improvements in this segment include the extension of SE 21st Avenue northward two blocks from SE Harrison Street and two cross streets connecting the extended SE 21st Avenue with SE Main Street.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Milwaukie Regional Center Segment attached to this recommendation.

4.4 McLoughlin Boulevard Segment

The McLoughlin Boulevard Segment extends from SE Tacoma Street to SE McLoughlin Boulevard at SE 20th Avenue.

From SE Tacoma Street, the alignment proceeds northward east of SE McLoughlin Boulevard between the roadway and the UP railroad. It proceeds past the Eastmoreland Golf Course, passing under SE Bybee Boulevard. A light rail station is located in the vicinity of SE Bybee Boulevard, with pedestrian access provided at the Bybee overcrossing. The alignment then continues northward east of McLoughlin Boulevard to the vicinity of SE 20th Avenue near the Brooklyn Rail Yard.

There are no highway improvements in this segment.

4.6 Downtown Portland Segment

The Downtown Portland Segment extends from SW Front Avenue at SW Harrison Street to the east end of the Steel Bridge.

From SW Front Avenue at SW Harrison Street, the alignment crosses SW Front Avenue at grade and continues westward in the median of SW Harrison Street between SW 1st and SW 4th Avenues, with a station located between SW 2nd and SW 3rd Avenues. From the corner of SW Harrison Street and SW 4th Avenue, the alignment travels diagonally to connect the SW 5th and SW 6th Avenue couplet. A pair of station platforms is located in the Portland State University plaza area that is bordered by SW Harrison and SW Mill Streets and SW 4th and SW 6th Avenues.
From the PSU plaza, light rail extends northward on separate tracks located on SW 5th and SW 6th Avenues. The SW 5th Avenue track serves southbound MAX vehicles, while the SW 6th Avenue track serves northbound MAX vehicles. On both SW 5th and SW 6th Avenues, between SW Mill Street and SW Madison Street, the alignment is located within the road right-of-way. Automobile and bus access also is provided within this right-of-way. On SW 5th and 6th Avenues, stations are located in the vicinity of SW Jefferson Street. From north of SW Madison Street to West Burnside Street, the alignment is located in the center lane of SW 5th and SW 6th Avenues. On both SW 5th and SW 6th Avenues, stations are located between SW Taylor and Yamhill Streets, between SW Washington and SW Stark Streets, and in the vicinity of W Burnside Street.

North of West Burnside Street, the alignment continues across NW Glisan Street in the left lane of NW 5th and 6th Avenues, with buses and automobiles sharing the right lane. On NW 6th Avenue north of NW Hoyt Street, the alignment turns northeastward and crosses diagonally toward the corner of NW 5th Avenue and NW Irving Street. A station is located in the block containing this diagonal crossing. From approximately NW 5th Avenue and NW Irving Street, the alignment turns in a southeasterly direction at grade to a new ramp in the vicinity of NW Glisan Street that takes the alignment onto and over the Steel Bridge. On NW 5th Avenue, a station is located in the vicinity of NW Hoyt Street. From the station, the alignment rejoins the alignment serving NW 6th Avenue in the vicinity of NW Irving Street near NW 4th Avenue, then follows that alignment to and over the Steel Bridge.

There are no highway improvements proposed for this segment. There are no proposed changes to existing through traffic patterns on the existing transit mall.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Downtown Portland Segment attached to this recommendation.

4.7 Eliot Segment

The Eliot Segment extends from the east end of the Steel Bridge to the Edgar Kaiser Medical Facility.

From the east end of the Steel Bridge, the alignment moves to an at-grade station and transit center at the Rose Quarter. The alignment then passes under I-5 and turns northward following generally

4.9 Hayden Island Segment

The Hayden Island Segment extends from N Marine Drive to the Oregon/Washington state line at the Columbia River.

From the Expo Center, the alignment crosses over N Marine Drive, the North Portland Harbor and N Jantzen Street on a bridge structure. Over the North Portland Harbor the LRT span would have an approximate vertical clearance of 35 feet CRD and an approximate horizontal clearance of 215 feet. A station is located near N Jantzen Street. The alignment then crosses the I-5 ramps and continues northward towards the state line west of I-5, running onto a new bridge structure parallel to and at the same height as the Interstate Bridge.

There are no highway improvements proposed for this segment.

The proposed boundaries within which the above-described light rail and/or highway improvements would be located are as illustrated on the boundary maps for the Hayden Island Segment attached to this recommendation.

I:\HCT\SNORTH\LUFO\0605SC.REC

Appendix A

Land Use Final Order Boundary Maps: LUFO Steering Committee Recommendation

South North Transit Corridor Study

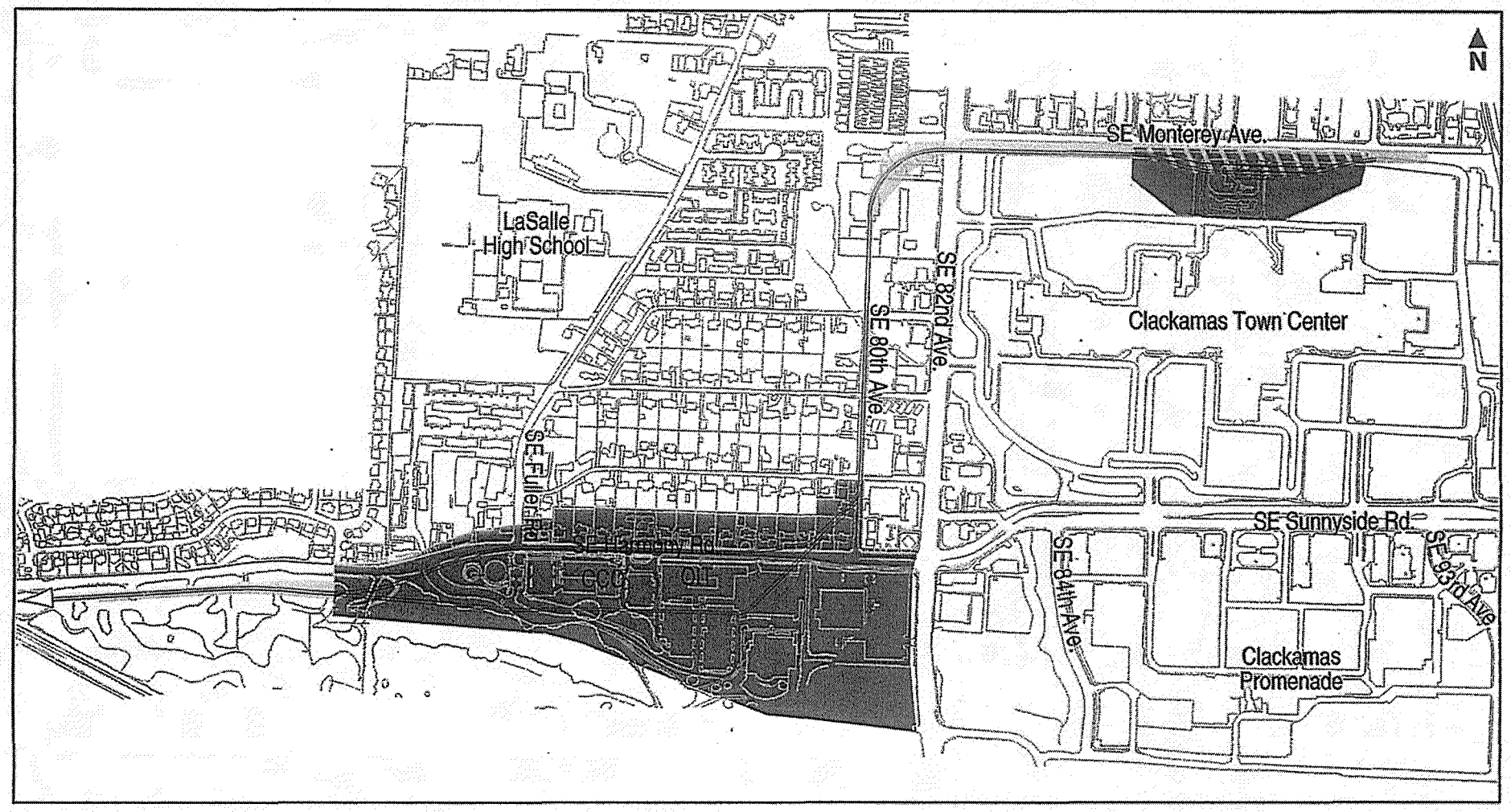
June 5, 1998

A.1 Introduction

The attached maps delineate the Land Use Final Order (LUFO) Steering Committee's recommended boundaries within which the light rail route, stations, park-and-ride lots, operations and maintenance facilities, and the highway improvements for the project shall be located in accordance with provisions in HB 3478.

The boundaries shown on these maps represent the areas where specific light rail facilities are recommended to be located. To assist with visual orientation, the maps show the alignments, options and stations studied within the DEIS that most closely correspond to the Steering Committee's Locally Preferred Strategy recommendation and LUFO recommendation. The maps generally show existing property lines and major buildings to provide orientation and clarity with respect to the proposed project facility locations.

The maps are printed from a common Geographic Information System data base. The level of detail represented in the attached maps illustrates the boundaries of the project elements at the segment level. Printed and bound separately in Appendix B are details of these segment maps that separate overlapping boundaries into individual maps for each project element (e.g., LRT route, station, etc.).



May 1998

South North Transit Corridor Study

METRO

OIT/CCC Study Area

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

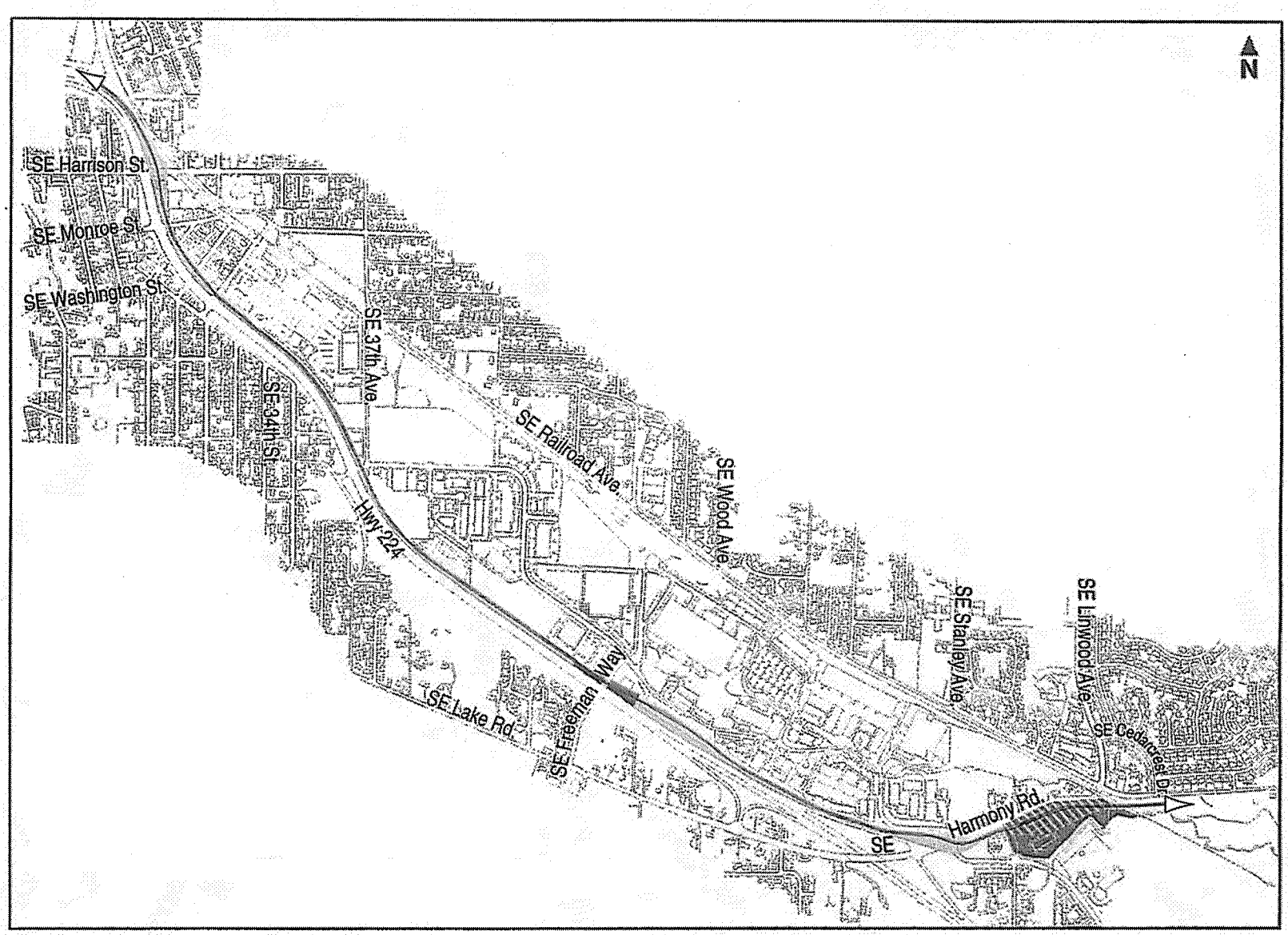
0 400 800
FEET

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

Figure 1.1

Land Use Final Order Boundary Maps:

Steering Committee Recommendation
Clackamas Regional Center Segment



May 1998

Light Rail Route

Light Rail Station

Park-and-Ride Lot

DEIS Station Platform

DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 800 1600
FEET

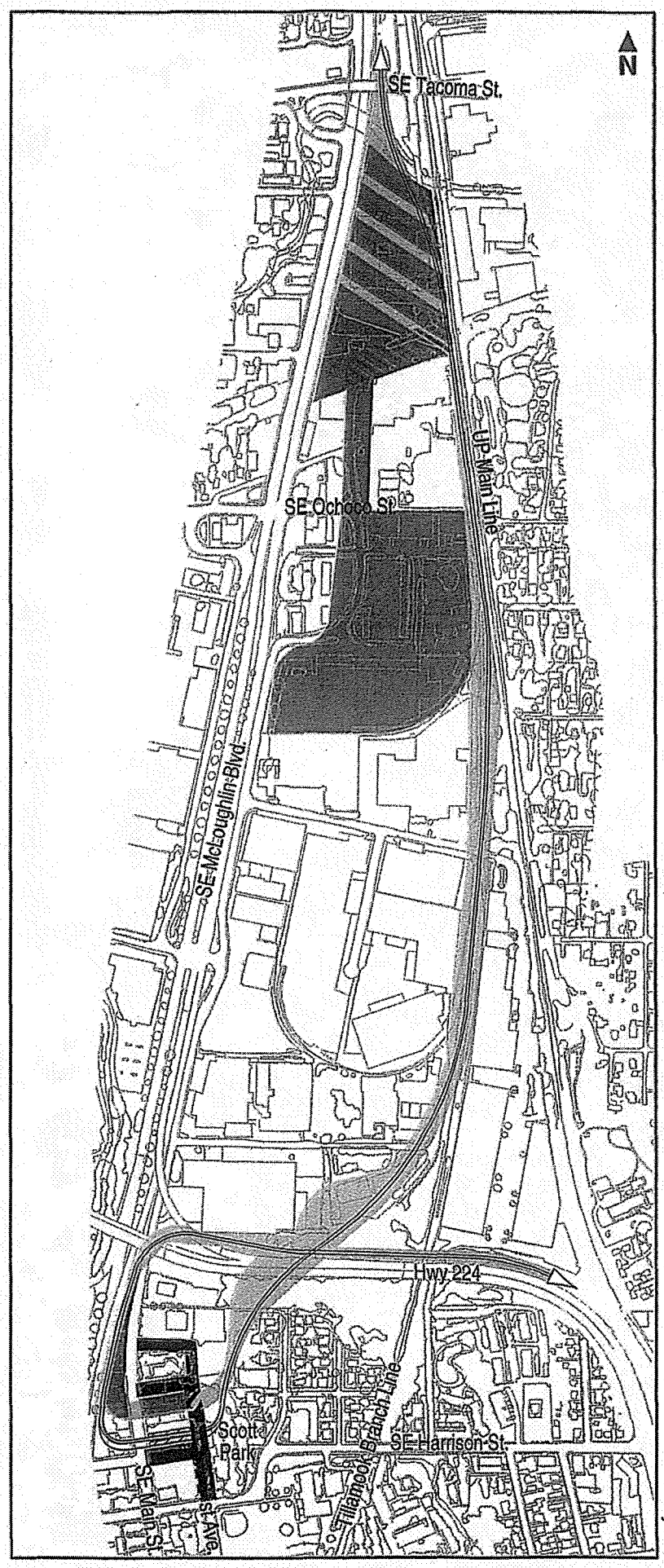
South North Transit Corridor Study

METRO

Figure 1.2

Land Use Final Order Boundary Maps:

Steering Committee Recommendation
East Milwaukie Segment



South North Transit Corridor Study

METRO

Figure 1.3

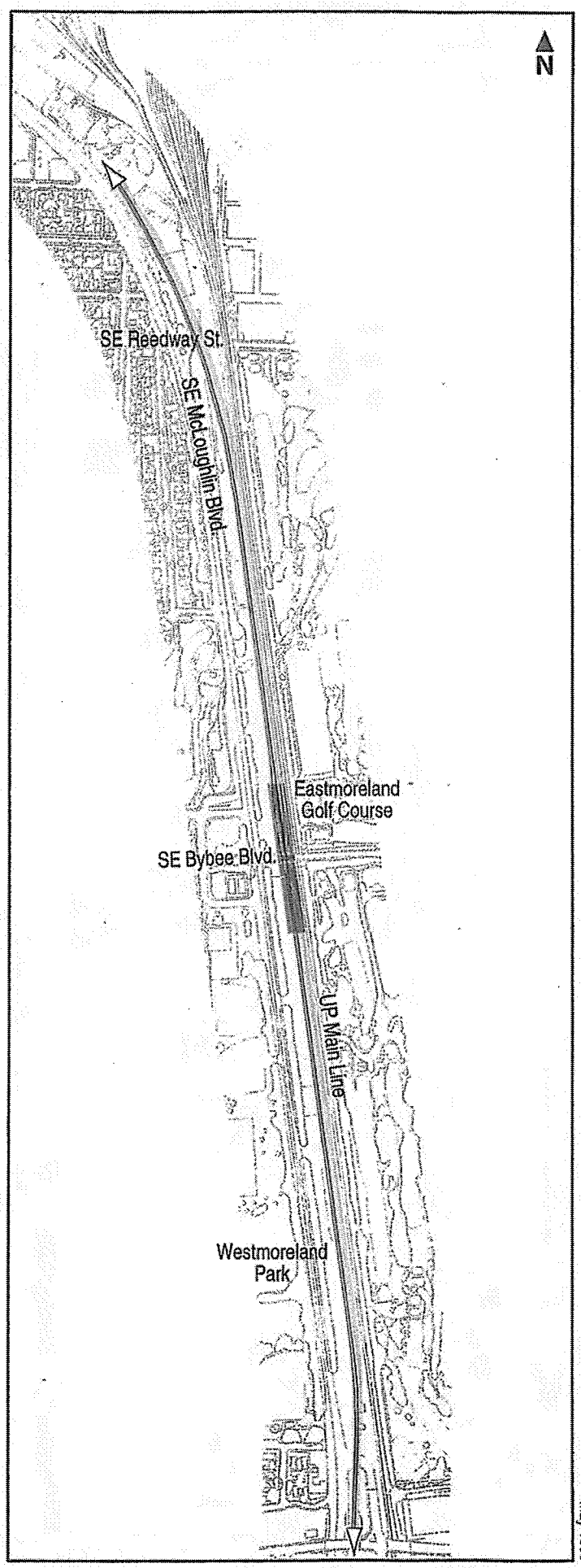
Land Use Final Order Boundary Maps:

Steering Committee Recommendation Milwaukie Regional Center Segment

- Light Rail Route
- Light Rail Station
- Park-and-Ride Lot
- Light Rail Operations and Maintenance Facility
- Highway/Road Improvement
- DEIS Station Platform
- DEIS Light Rail Route

Note: Cross-hatching of colors indicates an area where more than one light rail facility (route, station, etc.) could be located. Most of these areas are shown in a separate detail map of larger scale.

0 400 800
FEET



South North Transit Corridor Study

METRO

Figure 1.4

Land Use Final Order Boundary Maps:

Steering Committee Recommendation McLoughlin Boulevard Segment

Light Rail Route

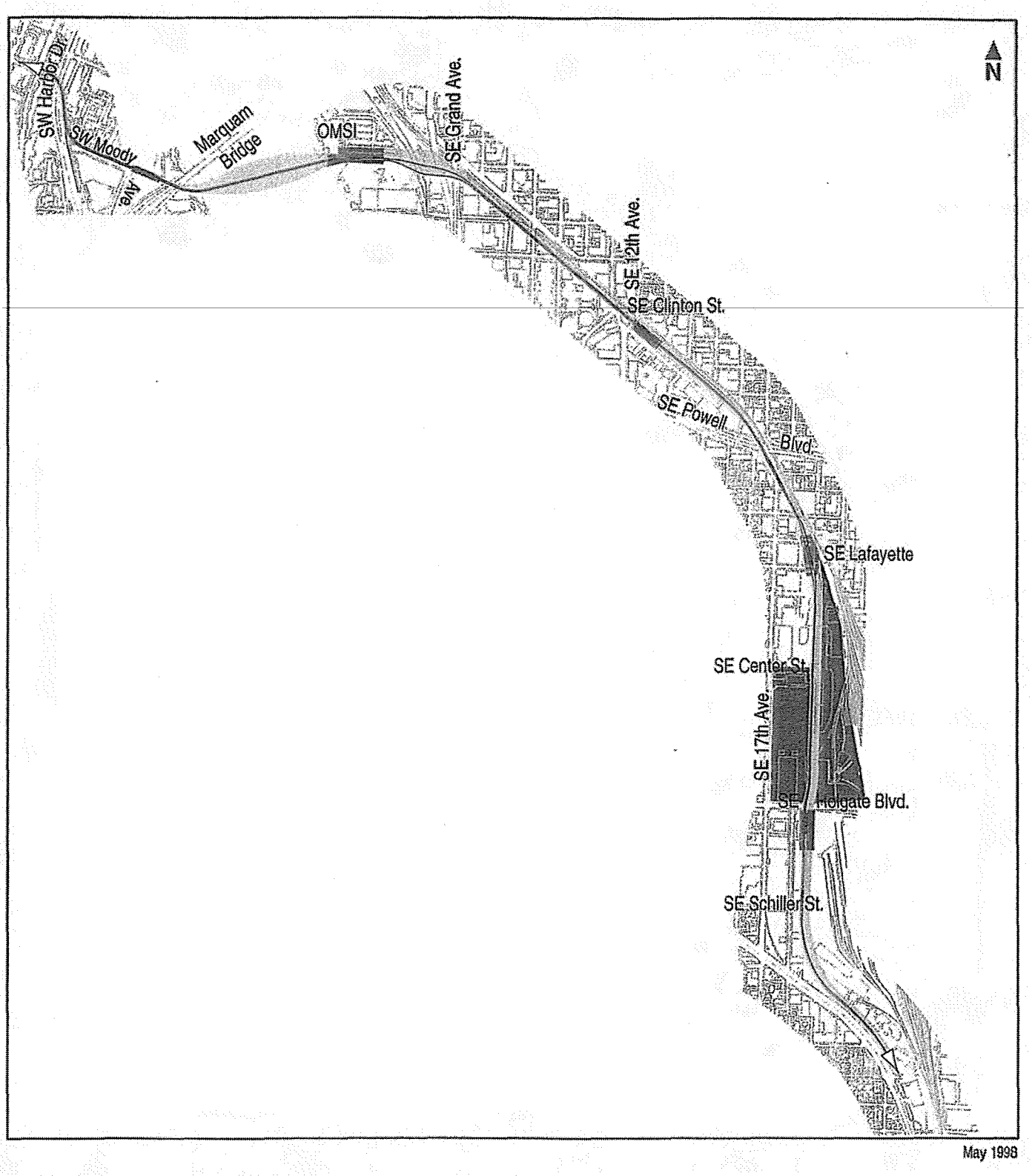
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



Light Rail Route

Light Rail Station

Light Rail Operations and Maintenance Facility Study Area

DEIS Station Platform

DEIS Light Rail Route

0 800 1600
FEET

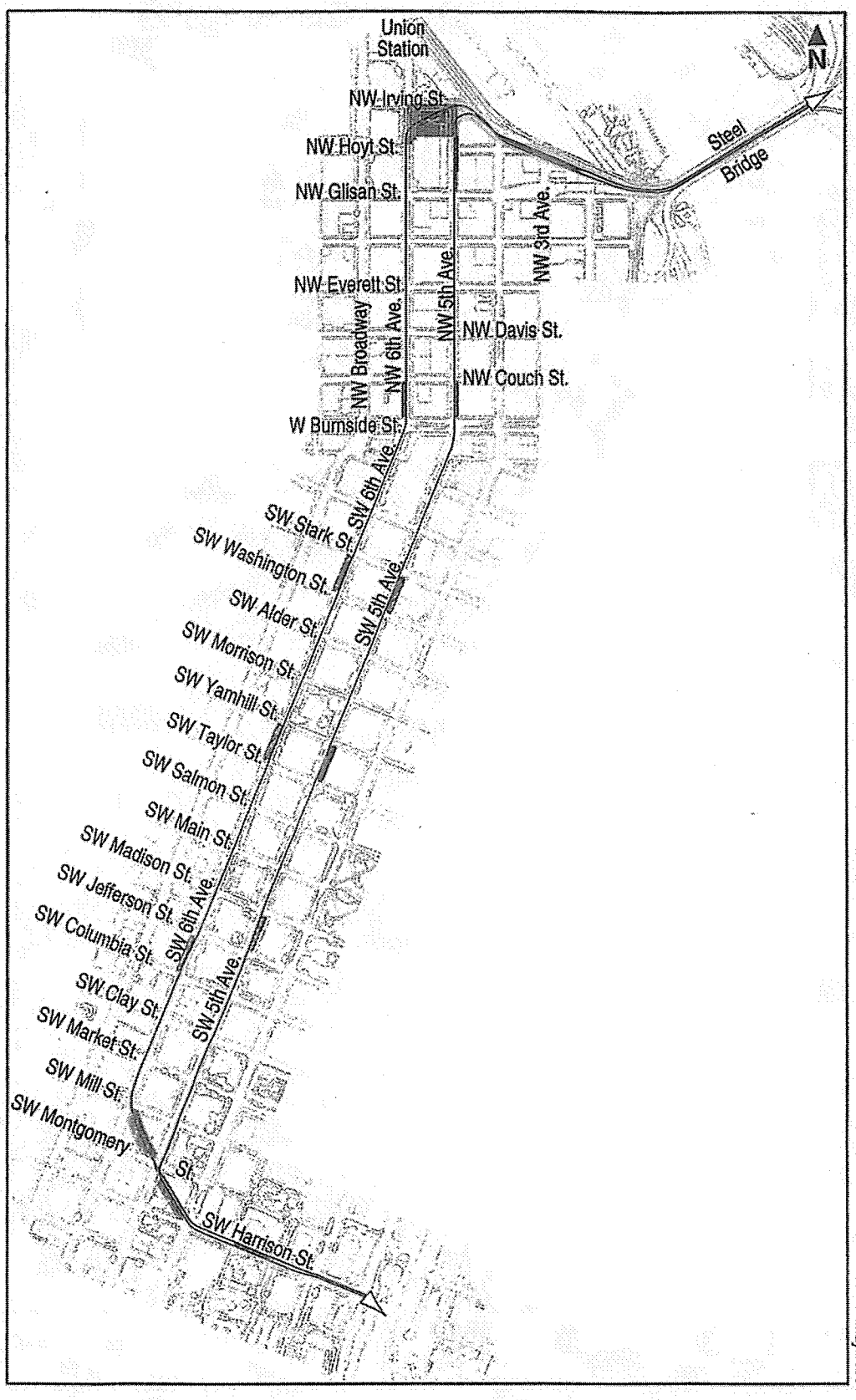
South North Transit Corridor Study

METRO

Figure 1.5

Land Use Final Order Boundary Maps:

Steering Committee Recommendation South Willamette River Crossing Segment



South North Transit Corridor Study

METRO

Figure 1.6

Land Use Final Order Boundary Maps:

Steering Committee Recommendation Downtown Portland Segment

Light Rail Route

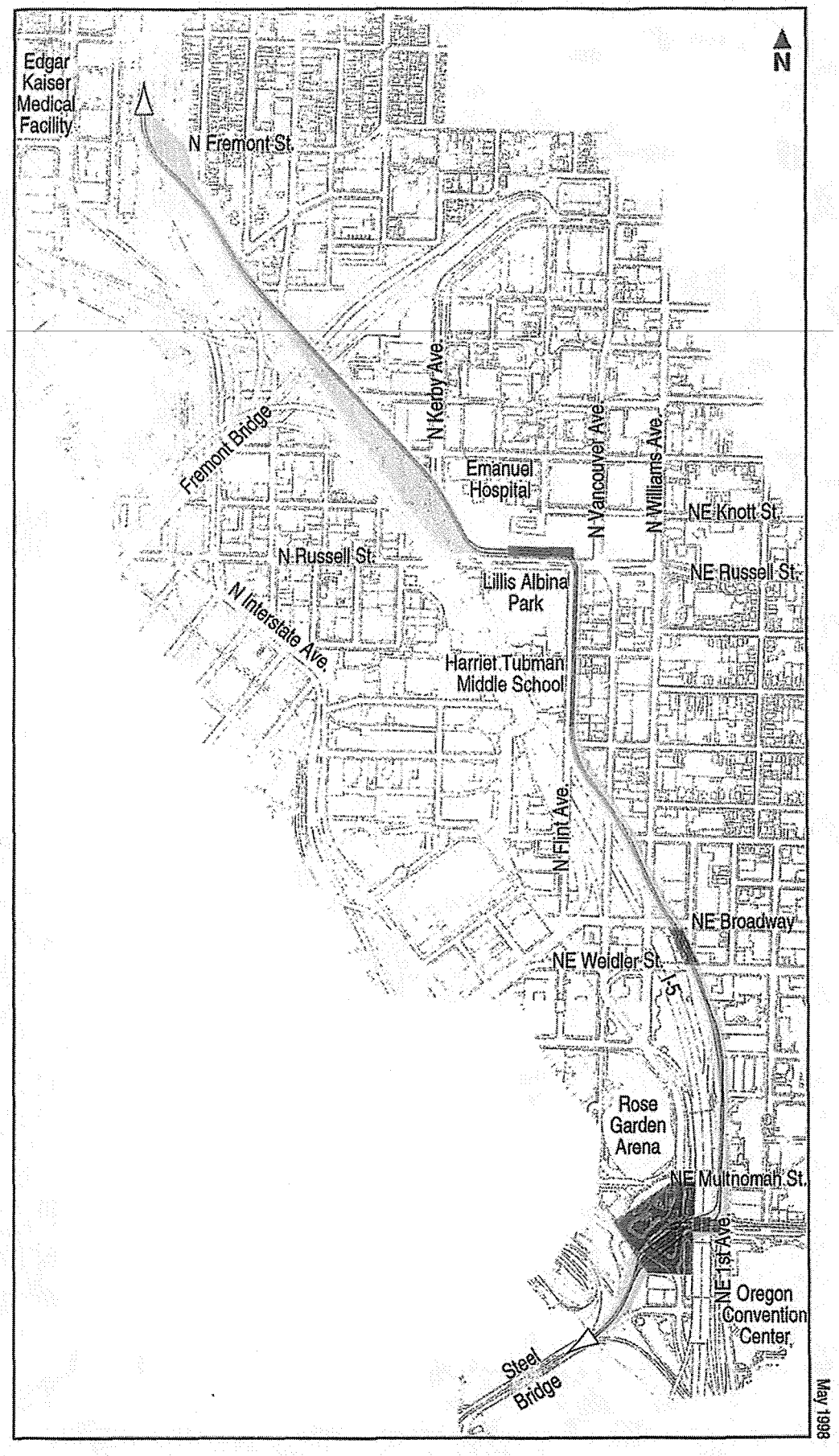
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



South North Transit Corridor Study

METRO

Figure 1.7

Land Use Final Order Boundary Maps:

Steering Committee Recommendation Eliot Segment

Light Rail Route

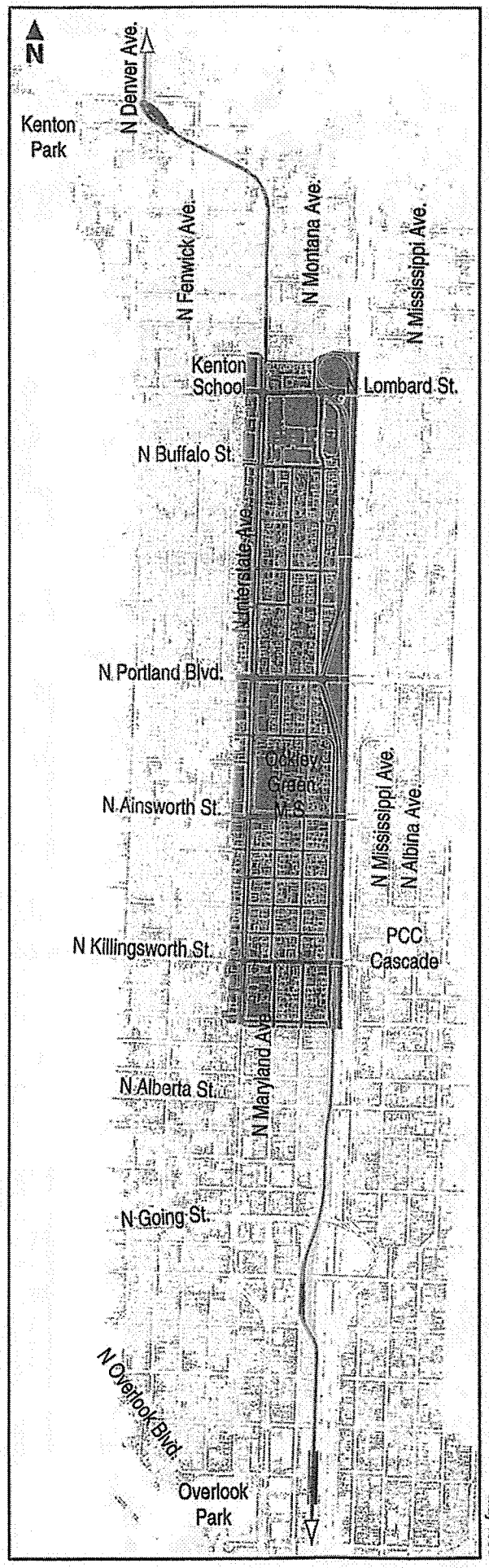
Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 400 800

FEET



South North Transit Corridor Study

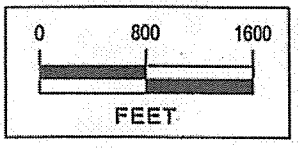
METRO

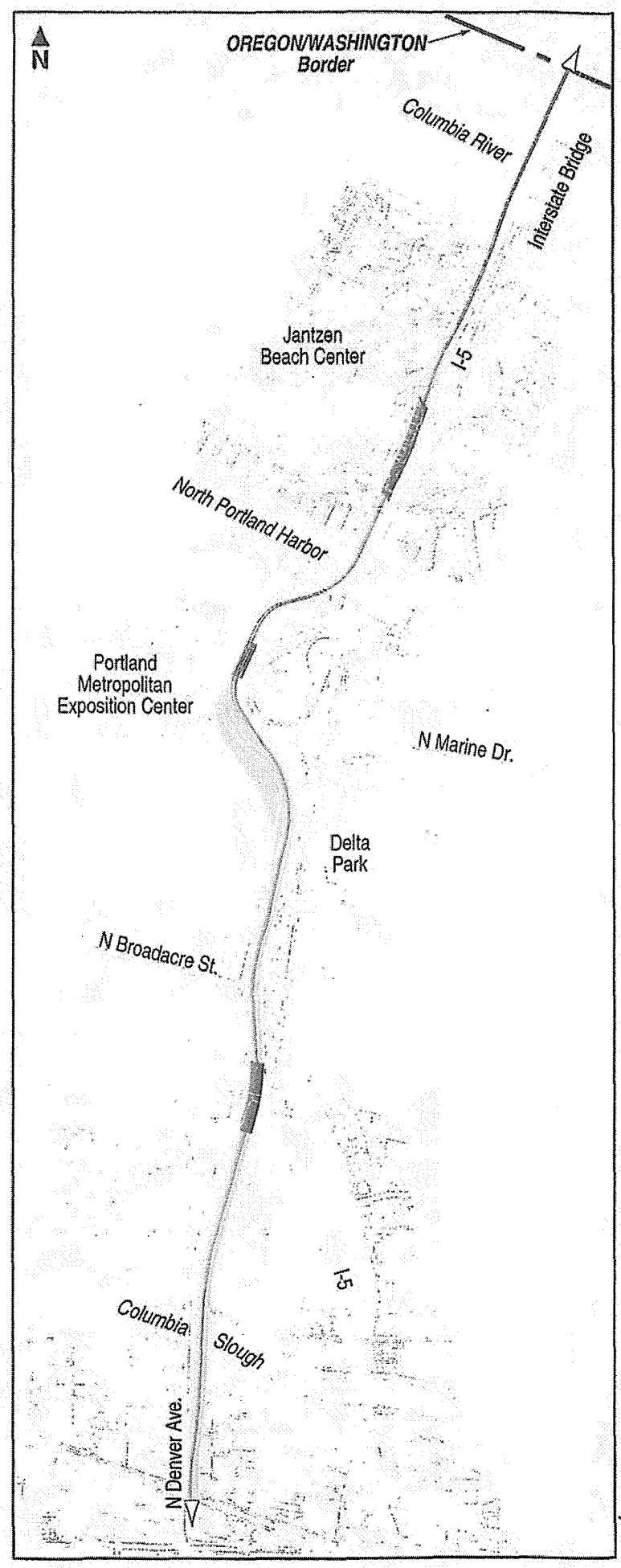
Figure 1.8a

Land Use Final Order Boundary Maps:

Steering Committee Recommendation North Portland Segment

- Light Rail Route
- Light Rail Station
- Crossover Study Area
- DEIS Station Platform
- DEIS Light Rail Route





South North Transit Corridor Study

METRO

Figure 1.8b

Land Use Final Order Boundary Maps:

Steering Committee Recommendation North Portland Segment

Light Rail Route

Light Rail Station

DEIS Station Platform

DEIS Light Rail Route

0 800 1600

FEET

Attachment C

South/North Land Use Final Order
Oregon Department of Transportation Recommendation

June 8, 1998

Oregon
John A. Kitzhaber, M.D., Governor

Department of Transportation
Region 1
123 NW Flanders
Portland, OR 97209-4037
(503) 731-8200
FAX (503) 731-8259

June 8, 1998

FILE CODE:

Board of Directors
Tri-Met
4012 SE 17th Ave
Portland, OR 97202

Subject: South/North Light Rail Land Use Final Order

Dear Board of Directors

The Oregon Department of Transportation (ODOT) has been charged by the Oregon Legislative Assembly with preparing a recommendation on the South/North Light Rail Transit Project Land Use Final Order (LUFO). ODOT has participated from the outset with Tri-Met, Metro, and the local jurisdictions, in the planning and development of this project.

We believe the project team has done a commendable job in meeting both the intent and the specific requirements established by the Oregon Legislature concerning the conduct of this project. The project's Draft Environmental Impact Statement is viewed by the Federal Transit Administration as a model for projects nationwide. The report of the Expert Review Panel states that the level of work "represents an unusually thorough level of analysis to support the identification of the locally preferred alternative." The public process, including informational meetings, public hearings, and direct involvement of business, civic, and neighborhood associations, as well as elected and appointed local officials, has been exemplary. The proposed Land Use Final Order includes no improvements to state highways, and has no negative impacts on the operation of state highway facilities.

Therefore, on behalf of the Oregon Department of Transportation, I am recommending approval of the Locally Preferred Strategy and the Land Use Final Order application, as adopted by the Steering Committee at its meeting on June 5, 1998. We at ODOT look forward to continuing our partnership with you in pursuing this project to its successful conclusion.

Sincerely

Kay Van Sickel

Kay Van Sickel
Region 1 Manager

KVS:rd:jr

Oregon
John A. Kitzhaber, M.D., Governor

Department of Transportation
Office of the Director
135 Transportation Bldg.
Salem, OR 97310
(503) 986-3200

June 1, 1998

File Code:

Kay Van Sickel
Region 1 Manager
ODOT
123 NW Flanders
Portland, Oregon 97209-4037

Subject: South/North Light Rail Land Use Final Order

Dear Kay:

ODOT has been charged by the Oregon Legislative Assembly with preparing a recommendation on the South/North Light Rail Transit Project Land Use Final Order (LUFO). The Project Management Group has selected a Locally Preferred Strategy (LPS) which is currently being reviewed by the affected local jurisdictions and several citizen groups. The Steering Committee will make its recommendation on June 5, 1998.

Tri-Met is preparing to submit an application to the Metro Council for such a Land Use Final Order, which will specify the light rail alignment, and the locations of park and ride lots, stations, a maintenance facility, and highway improvements. Before doing so, however, Tri-Met must obtain ODOT's recommendation in order to comply with provisions in the controlling legislation.

As Region 1 Manager, you are closer to the project, have regular contact with the affected neighborhoods and jurisdictions, and are in a suitable position to make judgements on routes, alignments, and impacts on affected local transportation facilities. I am therefore delegating to you the authority to make the Department's recommendation on the Land Use Final Order to the Tri-Met Board, and to sign the intergovernmental agreement relating to that order.

Sincerely

Grace Crunican
Director

Exhibit C to Resolution No. 98-2673
South/North Land Use Final Order

Findings of Fact and Conclusions of Law in Support of the South/North Land Use Final Order

July 16, 1998 - Draft

Please note that copies of this document (approximately 300 pages) are available from the Metro Transportation Department on (and after) July 16, 1998. To obtain a copy contact:

Anna Kemp
Metro Transportation Department
600 NE Grand Avenue
Portland, OR 97232

Telephone (503) 797-1757
fax (503) 797-1929,

Exhibit C to Resolution No. 98-2673
South/North Land Use Final Order

Findings of Fact and Conclusions of Law in Support of the South/North Land Use Final Order

July 16, 1998 - Draft

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600 NE Grand Avenue
Portland, OR 97232

Telephone (503) 797-1757
fax (503) 797-1929,

South/North Transit Corridor Study

South/North Land Use Final Order Findings

Volume 2

July 23, 1998

METRO

The preparation of this report was financed in part by the U.S. Department of Transportation, Federal Transit Administration. The opinions, findings and conclusions expressed in this report are not necessarily those of the U.S. Department of Transportation, Federal Transit Administration.

Printed on 100% recycled post-consumer paper.

Metro Publication No. 1998-10131-TRN

TABLE OF CONTENTS

1. Introduction

1.1 Nature of the Metro Council's Action

This action adopts a Land Use Final Order (LUFO) for the South/North Light Rail Project. The action is taken pursuant to House Bill 3478 (Or Laws 1996, Chapter 12) (also referred to herein as "the Act"), which governs land use decision-making for the South/North Project, a two-phased light rail transit project intended ultimately to extend from the City of Oregon City, Oregon to the City of Vancouver, Washington. HB 3478 directs the Metro Council (the "Council") to issue LUFOs establishing the light rail route, the light rail stations, park-and-ride lots and maintenance facilities, and the highway improvements for the South/North Project, including their locations (i.e. the boundaries within which these facilities and improvements are to be located).

This action adopts a LUFO establishing the light rail route, stations, lots and maintenance facilities and the highway improvements, including their locations, just for Phase 1 of the South/North Project, *i.e.* that portion extending from Clackamas Town Center to the Columbia River[1] (hereinafter the "Project")[2]. At a future date, the Council will address these matters as they relate to the extension of the South/North Project southward to Oregon City (hereinafter the "Project Extension").

1.2 Relationship of Council's Order to Requirements of the National Environmental Policy Act of 1969

Council actions on the South/North Project must comply with (1) the requirements of the National Environmental Policy Act of 1969 (NEPA), and (2) Oregon land use requirements as described in House Bill 3478. *This LUFO is intended solely to implement the provisions in HB 3478 authorizing the Council to make land use decisions on the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project and Project Extension, including their locations.* This action is consistent with NEPA, which takes into consideration state, regional and local land use plans, policies and controls.

NEPA reflects the Federal Government's desire to integrate environmental impact statements into state and local planning processes. House Bill 3478 reflects the Oregon Legislature's interest in establishing a consolidated and expedited land use decision-making process that can be integrated into the NEPA process. Under federal law, the Council at this time must identify the locally preferred light rail route and light rail station, park-and-ride lot and maintenance facility locations. The Council does this through adoption of a Locally Preferred Strategy (LPS). However, the Council's LPS does not limit the future choice of reasonable alternatives. All reasonable alternatives remain available until the time the federal "Record of Decision" (ROD) is entered. Following adoption of the ROD, the federal government will enter into a Full Funding Grant Agreement with Tri-Met to finance project construction.

---

[1]The Council's jurisdiction is limited only to the Oregon portion of the South/North Project.

[2]Section 1(18) of HB 3478 defines the "Project" as that portion of the South/North Project set forth in the Phase I South North Corridor Project Locally Preferred Alternative Report. In lay terms, this is the segment extending westward from the Clackamas Town Center area to downtown Milwaukie and then northward through downtown Portland to northeast and north Portland. Section 1(19) of HB 3478 defines the "Project Extension" as that portion of the South/North Project set forth in the Phase 2 South North Corridor Project Locally Preferred Alternative Report. This would include the extension of light rail southward through Gladstone to Oregon City.

House Bill 3478 recognizes that modifications may occur during the federal NEPA process, and it allows for those changes to happen. Specifically, Section 12 of HB 3478 provides:

> "(1) Upon execution of a Full Funding Grant Agreement, the council shall amend the land use final order to be consistent with the terms and conditions of the Full Funding Grant Agreement.
>
> "(2) The following amendments to a land use final order shall be considered technical and environmental and shall not be subject to judicial or administrative review:
>
> "(a) Amendments resulting from adoption of a Final Statement;
>
> "(b) Amendments required to ensure consistency with an executed Full Funding Grant Agreement; and
>
> "(c) Amendments to defer or delete a portion of the project or project extension as provided for in Section 11(2) of this Act."

These provisions ensure that any modifications required as a consequence of the application of NEPA regulations to the Project may be made and will remain consistent with Oregon's land use planning requirements.

1.3 Requirements of House Bill 3478

Section 6(1) of House Bill 3478 requires the Council to "establish the light rail route, stations, lots and maintenance facilities, and the highway improvements for the project or project extension, including their locations." Section 6(1)(a) further provides that the locations for each of these facilities and improvements:

> "shall be in the form of boundaries within which the light rail route, stations, lots and maintenance facilities, and the highway improvements shall be located. These boundaries shall be sufficient to accommodate adjustments to the specific placements of the light rail route, stations, lots and maintenance facilities, and the highway improvements for which need commonly arises upon the development of more detailed environmental or engineering data following approval of a Full Funding Grant Agreement."

Section 7 of HB 3478 requires the Council to apply land use criteria established by the Land Conservation and Development Commission ("LCDC") in making decisions in a land use final order on the light rail route, stations, lots and maintenance facilities, and the highway improvements, including their locations, and to prepare and adopt findings of fact and conclusions of law demonstrating compliance with those criteria. *These findings serve to demonstrate compliance with LCDC's criteria.* Section 3(1) of HB 3478 provides that the procedures and requirements set out in the Act are the only land use procedures and requirements to which the Council's decisions on the light rail route, the stations, lots and maintenance facilities, and the highways improvements for the Project, including their locations, are subject. Consequently, these findings focus on the matters identified in HB 3478 as land use actions being taken at this time.

2. Establishment of the Light Rail Route, Stations, Lots and Maintenance Facilities, and the Highway Improvements for the Project, Including Their Locations

2.1 Selected South/North Project

In accordance with Section 6(1) of House Bill 3478, the Council has adopted a Land Use Final Order establishing a light rail route, stations, lots and maintenance facilities, and highway improvements for the Project, including their locations. The Council finds that its selected light rail route, stations, lots, maintenance facilities and highway improvements, including their locations, are identical to those for which Tri-Met requested Metro Council approval in its July 2, 1998 "Application for South/North Land Use Final Order", incorporated herein by this reference. These facilities and improvements are described textually and illustrated on maps in the Council's adopted LUFO. The selected route and associated light rail facilities and highway improvements are summarized below. More detailed descriptions are provided on a segment by segment basis later in these findings.

Clackamas Regional Center Segment

- North of Clackamas Town Center (CTC) alignment with CCC/OIT/Aquatic Park study area; 2 LRT stations; 1 Park-and-Ride Lot
- Terminus at Clackamas Town Center (CTC) Transit Center/Station
- Station within CCC/OIT/Aquatic Park study area
- Park-and-Ride Lot within CCC/OIT/Aquatic Park study area

East Milwaukie Segment

- Highway 224 alignment; 2 LRT stations; 1 Park-and-Ride Lot
- Stations in vicinity of SE Linwood Avenue and SE Freeman Way
- Park-and-Ride Lot in vicinity of SE Linwood Avenue

Milwaukie Regional Center Segment

- Tillamook Branch Line Alignment; 2 LRT stations; 1 Operations & Maintenance Facility; 1 Park-and-Ride Lot
- Transit Center/Station in vicinity of Scott Park; Station in vicinity of SE Tacoma Street
- Potential Operations & Maintenance Facility South of SE Ochoco Street
- Park-and-Ride Lot in vicinity of SE Tacoma Street
- Highway improvements in vicinity of SE 21st Avenue

McLoughlin Boulevard Segment

- UP Main Line Alignment; 1 LRT station
- Station and pedestrian access in vicinity of SE Bybee Boulevard

South Willamette River Crossing Segment

- Caruthers Alignment and Crossing; 5 LRT stations; 1 Operations & Maintenance Facility
- Stations in vicinity of SE Holgate Boulevard, SE Lafayette Street, SE Clinton Street, OMSI and SW Moody Avenue
- Potential Operations & Maintenance Facility within Brooklyn Yard study area

Downtown Portland Segment

- Full Mall Alignment; 13 LRT stations
- Stations on SW Harrison Street and (north and south-bound) in the vicinity of PSU, SW Jefferson Street/City Hall, SW Taylor Street, SW Washington Street, W Burnside Street and NW Irving Street

Eliot Segment

- East I-5/Russell Alignment; 3 LRT stations
- At-Grade Transit Center/Station in vicinity of Rose Quarter, Grade-Separated Station in vicinity of NE Broadway/Weidler Streets, Station in vicinity of N Russell Street/Emanuel Hospital

North Portland Segment

- Interstate Avenue Alignment with Crossover from I-5; 8 LRT stations
- Stations in vicinity of Edgar Kaiser Medical Facility, N Skidmore Street, N Killingsworth Street, N Portland Boulevard, N Lombard Street, N. Denver Avenue, Portland International Raceway, and Exposition Center

Hayden Island Segment

- I-5 Alignment; 1 station
- Station at Jantzen Beach Center

2.2 Definitions

House Bill 3478 requires the Council to adopt the "light rail route", "stations", "lots", "maintenance facilities" and "highway improvements" for the South/North Project. However, House Bill 3478 does not define the scope of these terms. For purposes of this LUFO, and upon request by Tri-Met and recommendation of the LUFO Steering Committee and Metro staff, the Council interprets these terms to have the following meanings.

"Light rail route" means the alignment upon which the light rail tracks will be located. The light rail route will be located on land to be owned by or under the operating control of Tri-Met.

"Stations" means those facilities to be located along the light rail route on land to be owned or controlled by Tri-Met for purposes of accessing or serving the light rail system. Stations include

light rail station platforms; kiss-and-ride areas; bus transfer platforms and transit centers; vendor facilities; and transit operations rooms.

"Lots" means those parking structures or surface parking lots that are associated with a station, owned by or under the operating control of either Tri-Met or another entity with the concurrence of Tri-Met, and intended primarily for use by persons riding transit or carpooling. Parking structures may include some retail or office spaces in association with the primary use.

"Maintenance facilities" means those facilities to be located on land to be owned or controlled by Tri-Met for purposes of operating, servicing, repairing or maintaining the light rail transit system, including but not limited to light rail vehicles, the light rail tracks, stations, lots, and ancillary facilities and improvements. Maintenance facilities include maintenance facility access trackways; storage tracks for light rail vehicles; service, repair and maintenance shops and equipment; office facilities; locker rooms; control and communications rooms; employee parking lots; and storage areas for materials and equipment and non-revenue vehicles.

"Highway improvements" include new roads; road realignments or widenings outside existing rights-of-way that have independent utility in themselves and are not needed to mitigate adverse traffic impacts associated with the light rail route, stations, lots or maintenance facilities.

As described in the LUFO, House Bill 3478, Section 8(1) requires local governments to amend their comprehensive or functional plans and land use regulations to make them consistent with a land use final order for the South/North Project, and to issue the appropriate development approvals, permits, licenses and certificates necessary to implement the land use final order. The Council finds that implementation of the land use final order, including the construction, operation and maintenance of the light rail route, stations, lots and maintenance facilities and the highway improvements for the Project, necessitates and requires development approval of certain associated actions and the permitting of certain ancillary facilities or improvements. It finds that these associated actions or ancillary facilities or improvements generally are required (1) to ensure the safe and proper functioning and operation of the light rail system; (2) to provide project access; (3) to improve traffic flow, circulation or safety in the vicinity of the project; or (4) to mitigate adverse impacts caused to the adjoining roadway network resulting from the alignment, stations, lots or maintenance facilities.

More particularly, the Council finds that the associated actions and ancillary facilities or improvements for the South/North project include, but are not limited to: ties, ballast, and other track support materials such as tunnels and bridges; modifications to existing tracks; retaining walls and noise walls; culverts and other drainage systems; traction electrification equipment including substations; light rail signals and communications equipment and buildings; lighting; station, lot and maintenance facility accesses, including road accesses, pedestrian bridges and pedestrian and bicycle accessways; roadway crossing protection; and the provision of pedestrian paths, bike lanes, bus stops, bus pullouts, shelters, bicycle storage facilities and similar facilities. They also include temporary LRT construction-related roadways, staging areas and road or lane closures; roadway reconstruction, realignment, repair, widening, channelization, signalization or signal modification, lane reconfiguration or reduction, addition or modification of turning lanes or refuges, modification of traffic circulation patterns, or other modifications or improvements that provide or improve project access, improve traffic flow, circulation or safety in the vicinity of the project, facilitate or are necessary for the safe or proper functioning and operation of the project, or are necessary to

mitigate adverse traffic impacts created by the project; modifications of private roadways adjoining the project; permanent road, lane or access closures associated with and necessitated by the project; and other associated actions or ancillary facilities or improvements related to the project.

The Council concludes that these associated actions and ancillary facilities or improvements are integral and necessary components of the Project. It finds that Tri-Met has substantial knowledge and experience concerning the associated actions and ancillary facilities or improvements that are necessary to construct, operate and maintain a light rail system, and it believes and accepts Tri-Met's assertions to this effect and so finds. Further, the DEIS, the DEIS technical reports and these findings support the conclusion that the above-identified actions, facilities or improvements are integral elements of the South/North Project.

3. South/North Project Land Use Final Order Criteria

On May 30, 1996, pursuant to Section 4 of HB 3478, LCDC established the criteria to be used by the Metro Council in making land use decisions establishing the light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project or Project Extension, including their locations. The approved criteria include two procedural, six substantive, and two alignment-specific standards, set out as follows:

3.1 Procedural Criteria

1. Coordinate with and provide an opportunity for Clackamas and Multnomah Counties, the cities of Gladstone, Milwaukie, Oregon City and Portland, the Tri-County Metropolitan Transportation District of Oregon and the Oregon Department of Transportation to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations.

2. Hold a public hearing to provide an opportunity for the public to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations.

3.2 Substantive Criteria

3. Identify adverse economic, social and traffic impacts on affected residential, commercial and industrial neighborhoods and mixed use centers. Identify measures to reduce those impacts which could be imposed as conditions of approval during the National Environmental Policy Act (NEPA) process or, if reasonable and necessary, by affected local governments during the local permitting process.

   A. Provide for a light rail route and light rail stations, park-and-ride lots and vehicle maintenance facilities, including their locations, balancing (1) the need for light rail proximity and service to present or planned residential, employment and recreational areas that are capable of enhancing transit ridership; (2) the likely contribution of light rail proximity and service to the development of an efficient and compact urban form; and (3) the need to protect affected neighborhoods from the identified adverse impacts.

   B. Provide for associated highway improvements, including their locations, balancing (1) the need to improve the highway system with (2) the need to protect affected neighborhoods from the identified adverse impacts.

4. Identify adverse noise impacts and identify measures to reduce noise impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by affected local governments during the permitting process.

5. Identify affected landslide areas, areas of severe erosion potential, areas subject to earthquake damage and lands within the 100-year floodplain. Demonstrate that adverse impacts to persons or property can be reduced or mitigated through design or construction techniques which could

be imposed during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

6. Identify adverse impacts on significant fish and wildlife, scenic and open space, riparian, wetland and park and recreational areas, including the Willamette River Greenway, that are protected in acknowledged local comprehensive plans. Where adverse impacts cannot practicably be avoided, encourage the conservation of natural resources by demonstrating that there are measures to reduce or mitigate impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

7. Identify adverse impacts associated with stormwater runoff. Demonstrate that there are measures to provide adequate stormwater drainage retention or removal and protect water quality which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process.

8. Identify adverse impacts on significant historic and cultural resources protected in acknowledged comprehensive plans. Where adverse impacts cannot practicably be avoided, identify local, state or federal review processes that are available to address and to reduce adverse impacts to the affected resources.

3.3 Alignment-Specific Criteria

9. Consider a light rail route connecting the Clackamas Town Center area with the City of Milwaukie's Downtown. Consider an extension of the light rail route connecting the City of Oregon City and the City of Gladstone with the City of Milwaukie via the Interstate 205 corridor and/or the McLoughlin Boulevard corridor.

10. Consider a light rail route connecting Portland's Central City with the City of Milwaukie's Downtown via inner southeast Portland neighborhoods and, in the City of Milwaukie, the McLoughlin Boulevard corridor, and further connecting the Central City with north and inner northeast Portland neighborhoods via the Interstate 5/Interstate Avenue corridor.

Compliance with Criteria 1 and 2 is demonstrated in Section 5 of these findings. Compliance with Criteria 3 through 8 is demonstrated in Section 6 (long-term impacts) and Section 7 (short term construction impacts) of these findings. Compliance with Criteria 9 and 10 is demonstrated in Section 8 of these findings. For all of the reasons set out in these findings, the Council finds and concludes that its LUFO complies with the applicable LCDC criteria.

4. Implementation of a Land Use Final Order

4.1 Overview of Process for Selecting Mitigation Measures

LCDC Criteria 3 through 8 require the Council to identify (1) specified adverse impacts (*e.g.*, impacts to neighborhoods and natural resources) that would result as a consequence of its decisions, and (2) "measures" to reduce those impacts which potentially could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the local jurisdiction permitting processes. Consideration of appropriate measures is consistent with local comprehensive plan policies and land use regulations which recognize that development can have adverse impacts on persons and property and which seek to reduce those impacts to the extent reasonable and permitted by law.[1]

The Council's decisions establishing the light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project or Project Extension, including their locations, are not the final steps in the process culminating with completion of construction of the South/North Project. Subsequent to Council actions, Final Environmental Impact Statements (FEIS) will be prepared and submitted to the Federal Transit Administration (FTA). As part of that process, mitigation plans will be developed addressing mitigation of adverse impacts associated with the selected rail and highway improvements for the Project or Project Extension. In each case, following federal approval of the FEIS, issuance of a Record of Decision by FTA and the signing of a Full Funding Grant Agreement with FTA, the Final Design phase will begin. During Final Design, all necessary federal and state permits for project construction are obtained.

Also during Final Design, the siting of light rail and highway improvements is subject to local permitting processes. Section 8(1)(b) of House Bill 3478 directs all affected local governments and agencies to "issue the appropriate development approvals, permits, licenses and certificates necessary for the construction of the project or project extension consistent with a land use final order." Section 8(1)(b) further allows these affected local governments to attach approval conditions to their development approvals permits, licenses and certificates. However, any such conditions must be "reasonable and necessary" and "may not, by themselves or cumulatively, prevent implementation of a land use final order." Under Section 8(3) of HB 3478, unreasonable or unnecessary conditions would include 1) measures for which there are insufficient funds within the project budget to pay for those measures; 2) measures that would significantly delay the completion or otherwise prevent the timely implementation of the project; and 3) measures that would significantly negatively impact project operations. See also *Tri-Met v. City of Beaverton*, 132 Or App 253 (1995). A condition prevents implementation of a LUFO if its imposition would require Tri-Met to finance construction of the condition at the expense of improvements funded under the Full Funding Grant Agreement or to go beyond the available federal funds and local matching funds for the Project. The Council finds that these funds constitute the envelope of available funds for the Project.

In summary, Criterion 3 through 8 require the Council to identify measures which potentially "could be imposed" later on in the process as part of an approved mitigation plan under NEPA or through local permitting (if reasonable and necessary). However, the actual determination and imposition of

[1]Section 1(17) of HB 3478 defines "measures" to include "any mitigation measures, design features, or other amenities or improvements associated with the project or project extension."

appropriate measures occurs only through these latter federal or local processes, not through this action by the Council. The Council finds this approach to be reasonable and appropriate, particularly given that the LUFO is based on conceptual engineering plans rather than more detailed preliminary or final engineering plans. Through preliminary and final engineering, many impacts identified during conceptual engineering may be avoided, and appropriate mitigation can be better determined.

4.2 Effect of Land Use Final Order on Local Comprehensive Plans and Land Use Regulations

Section 8(1)(a) of HB 3478 requires the affected cities and counties and Metro to amend their comprehensive or functional plans, including their public facility and transportation system plans and land use regulations, to the extent necessary to make them consistent with a land use final order. Section 8(2) further provides that a LUFO "shall be fully effective upon adoption."

The legal effect of these provisions are (1) to immediately authorize, as permitted uses, the light rail route, stations, lots and maintenance facilities and the highway improvements, including their locations, as identified and approved in a land use final order, and (2) to require appropriate plan and land use regulation amendments so that local land use requirements are consistent with a land use final order.[2] However, as noted above, the uses approved in a land use final order remain subject to local imposition of reasonable and necessary approval conditions under Section 8(1)(b).

While approval of a LUFO identifies where rail and highway improvements may go and authorizes their development at these locations subject to reasonable and necessary conditions, it does not concurrently prevent other uses allowed by existing zoning. Stated another way, a LUFO is not a right-of-way preservation tool. It does not prevent development of economically feasible uses currently permitted under acknowledged plans and land use regulations. Instead, it merely adds to the list of uses permitted on the properties affected by the LUFO without eliminating other uses from that list.

Similarly, a LUFO does not require local zoning amendments to allow more intense scales of development. Instead, it requires amendments only as necessary to authorize the approved project elements and ancillary facilities or improvements that may be required to ensure the safe and proper functioning and operation of the light rail system, provide project access, improve traffic flow, circulation or safety in the project vicinity, or to mitigate adverse impacts resulting from the project.

In summary, Council adoption of a LUFO has the immediate effect of permitting, on the affected properties, the light rail and highway facilities and improvements approved in the LUFO. It also identifies the affected locations for future public acquisition for rail or highway purposes. However, LUFO adoption in no way prevents or limits currently allowed uses on these properties during the interim period pending ultimate public acquisition, nor does it mandate the rezoning of areas nearby light rail stations to achieve regional growth management objectives.

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[2]This may require amendments to authorize the ancillary facilities and improvements for the South/North Project.

5. Compliance with Procedural Criteria (1-2)

5.1 Criterion 1: Agency Coordination

> **"Coordinate with and provide an opportunity for Clackamas and Multnomah Counties, the cities of Gladstone, Milwaukie, Oregon City and Portland, the Tri-County Metropolitan Transportation District of Oregon and the Oregon Department of Transportation to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations."**

Criterion 1 ensures Metro coordination with the Tri-County Metropolitan Transportation District of Oregon (Tri-Met), the Oregon Department of Transportation (ODOT), and the six cities and counties that are directly affected by the Project or Project Extension. Criterion 1 further requires Metro to provide these jurisdictions and agencies an opportunity to submit testimony on the light rail and highway facilities and improvements for the Project or Project Extension, including their locations.

Coordination

In 1990, the Metro Council adopted Resolution No. 90-1300, which provided funding for an East Portland/Clackamas County Light Rail Study. In 1991, the Council adopted Resolution No. 91-1456, which called for a preliminary alternatives analysis (Pre-AA) to be conducted within the I-5 North and I-205 North Corridors between Portland and Clark County, Washington, in coordination and concurrently with an I-205/Milwaukie Pre-AA in East Portland/Clackamas County. In late 1991, these Pre-AAs were integrated into a single study entitled the North/South Transit Corridor Study.

In April, 1993, following evaluations during the Pre-AAs and recommendations of the Project Management Group (PMG), the Citizen Advisory Committee (CAC) and the participating jurisdictions, the Metro Council adopted Resolution No. 93-1784, selecting the Milwaukie Corridor as the South Priority Corridor and the I-5 North Corridor as the North Priority Corridor. The resolution consolidated the two corridors into a single corridor to be advanced into a Federal Alternatives Analysis for further study. Following a recommendation from the CAC, the study's title was changed to the South/North Transit Corridor Study to reflect adopted regional policy that the southern portion of the corridor was the region's first priority and the northern portion of the corridor would be constructed concurrently with or following the southern portion of the corridor.

The Council finds that there has been substantial coordination with the affected jurisdictions, Tri-Met and ODOT since the Council's adoption of Resolution No. 90-1300 in 1990. It finds that this coordination has been ongoing throughout the eight year period leading up to its adoption of the LUFO and the federally-required Locally Preferred Strategy (LPS). The various steps and processes that have occurred along the way are described in Chapter 2 of the DEIS, incorporated herein by this reference. During this multi-year process, Clackamas and Multnomah Counties, the Cities of Milwaukie, Portland, Gladstone and Oregon City, and Tri-Met and ODOT, through their representatives, have been provided relevant information and frequent opportunities to express their views and concerns. The Council finds that this coordination process has resulted in numerous

changes to the Project responsive to the concerns of the affected jurisdictions and agencies. Many of those changes are addressed in these findings.

The Council finds that Metro representatives and staff repeatedly met or spoke with representatives of the affected jurisdictions and agencies regarding their interests in and concerns about the South/North Project. The Council also finds that coordination took place through the participation of these local governments, agencies and Metro on the PMG (comprised of management-level staff to these jurisdictions and agencies), the LPS Steering Committee (comprised of policymakers from participating jurisdictions and agencies established for the federally Locally Preferred Strategy process), and the LUFO Steering Committee (comprised of representatives of Tri-Met and ODOT and elected representatives of the directly affected cities, counties and Metro as provided by HB 3478).

When Metro proposed South/North LUFO review criteria to LCDC as authorized by HB 3478, it accompanied its proposal with a letter signed by the Administrative or Planning Directors of each of these governments or agencies, indicating that they "had participated in a coordinated effort among [the affected jurisdictions and agencies] to develop the proposed criteria as a consensus document."

Opportunity to Submit Testimony

The Council also finds that Clackamas and Multnomah Counties, the Cities of Milwaukie, Portland, Gladstone and Oregon City, and Tri-Met and ODOT each were provided the opportunity to submit testify to the Council at its LUFO public hearing to determine the light rail route, the stations, lots and maintenance facilities, and the highway improvements for the Project, including their locations. It finds that notice of the public hearing was mailed directly to each jurisdiction and agency.

In adopting this LUFO and the LPS, the Council carefully considered the recommendations of the PMG and the Steering Committee and the comments of the affected jurisdictions and agencies. The Council's decision in this LUFO proceeding is fully consistent with Tri-Met's application, which in turn is consistent with the recommendation of the LUFO Steering Committee.

5.1.1 Clackamas County

The Council finds that Metro has coordinated with Clackamas County and provided opportunity for the County to submit testimony, as required by Criterion 1. Coordination has occurred through contacts between Metro staff and the County's planning staff; through County participation on the PMG, the LPS Steering Committee and the LUFO Steering Committee; through mailed notice to the County of the LUFO public hearing; and through consideration of concerns raised by the County during the LUFO and LPS decision-making processes.

The Council also finds that on June 25, 1998, the Clackamas County Board of Commissioners approved Resolution 6-25-98I1 recommending adoption of the LPS to the Metro Council It finds that the LPS is substantially identical to the LUFO. The principal differences between the LUFO and the LPS are that 1) the LUFO does not address project improvements in the State of Washington; 2) the LUFO does not provide for phasing of the improvements; 3) the LPS does not establish locations, in the form of boundaries, as required by HB 3478; and 4) the LPS does not identify highway improvements as provided for in HB 3478.

5.1.2 Multnomah County

The Council finds that Metro has coordinated with Multnomah County and provided opportunity for the County to submit testimony, as required by Criterion 1. Coordination has occurred through the contacts between Metro staff and the County's planning staff; through County participation on the PMG, the LPS Steering Committee and the LUFO Steering Committee; through mailed notice to the County of the LUFO public hearing; and through consideration of concerns raised by the County during the LUFO and LPS decision-making processes.

The Council also finds that on July 16, 1998, the Multnomah County Board of Commissioners approved a resolutino recomending Metro Council adoption of the LPS for the South/North Project.

5.1.3 City of Milwaukie

The Council finds that Metro has coordinated with the City of Milwaukie and provided opportunity for the City to submit testimony, as required by Criterion 1. The Council finds that coordination has occurred through the contacts between its staff and the City's planning staff; through City participation on the PMG, the LPS Steering Committee and the LUFO Steering Committee; through mailed notice to the City of the LUFO public hearing; and through consideration of concerns raised by the City during the LUFO and LPS decision-making processes.

The Council also finds that on July 1, 1998, the Milwaukie City Council approved Resolution No. 22-1998 recommending accepting the LPS Steering Committee's recommendation for the Project, provided that the Project works with the City to mitigate impacts expressed by the City Council its DEIS comments. As noted, the LPS is substantially identical to the LUFO.

In comments submitted prior to the LUFO hearing, the City raised concerns about ongoing coordination following LUFO adoption. It stated that because impacts will be felt on a local level, continued coordination with local governments is necessary. The Council agrees. It finds that discussions with all of the affected local governments to reduce impacts and develop appropriate mitigation measures will take place prior to, during and following the local permitting processes. These discussions can address the wide range of impacts identified in these LUFO findings. Any mitigation measures imposed as conditions of approval during local permitting processes as a result of coordination would, of course, remain subject to the requirements of Section 8(1)(b) of HB 3478

5.1.4 City of Portland

The Council finds that Metro has coordinated with the City of Portland and provided opportunity for the City to submit testimony, as required by Criterion 1. The Council finds that coordination and the opportunity to submit testimony occurred through the contacts between its staff and the City's planning staff; through City's participation on the PMG, the LPS Steering Committee, and the LUFO Steering Committee; through mailed notice to the City of the LUFO public hearing; and through consideration of concerns raised by the City during the LUFO and LPS decision-making processes.

The Council also finds that on June 18, 1998, the Portland City Council approved Resolution No. 35704, recommending the Metro Council's approval of the LUFO.

5.1.5 City of Gladstone

Although the Project does not cross land in the City of Gladstone, the Council finds that Metro has coordinated with the City of Gladstone and provided opportunity for the City to submit testimony, as required by Criterion 1. The Council finds coordination and the opportunity to submit testimony occurred through the participation of Gladstone's City Manager on the PMG; through the City's participation (through the mayor of Oregon City, representing the cities of Oregon City and Gladstone) on the LPS Steering Committee; through mailed notice to the City of the LUFO public hearing; and through consideration of concerns raised by the City during the LUFO and LPS decision-making processes.

5.1.6 City of Oregon City

Although the Project does not cross land in the City of Oregon City, the Council finds that Metro has coordinated with the City of Oregon City and provided opportunity for the City to submit testimony, as required by Criterion 1. The Council finds that coordination and the opportunity to submit testimony occurred through the City's participation on the PMG and the LPS Steering Committee; through mailed notice to the City of the LUFO public hearing; through consideration of concerns raised by the City during the LUFO and LPS decision-making processes.

5.1.7 Tri-Met

Tri-Met is the applicant in this proceeding before the Metro Council Because Tri-Met will operate the light rail system, the Council finds that close coordination with Tri-Met from the very outset of the LPS and LUFO adoption processes has been ongoing and very important. It finds that Metro has coordinated with Tri-Met and provided opportunity for Tri-Met to submit testimony, as required by Criterion 1. The Council finds that coordination has occurred through the contacts between its staff and Tri-Met's staff; through Tri-Met's participation on the PMG, the LPS Steering Committee and the LUFO Steering Committee; and through consideration of concerns raised by Tri-Met during the LUFO and LPS decision-making processes.

The Council also finds that on July 1, 1998, the Tri-Met Board of Directors approved Resolution 98-07-42 authorizing Tri-Met's General Manager to file an application with Metro for the South/North Light Rail Land Use Final Order. As noted in the LUFO, the light rail and highway facilities approved in the LUFO, including their locations, are identical to those applied for by Tri-Met.

5.1.8 Oregon Department of Transportation

The Council finds that Metro has coordinated with ODOT and provided opportunity for ODOT to submit testimony, as required by Criterion 1. The Council finds that coordination has occurred through the contacts between its staff and ODOT's planning staff; through ODOT's participation on the PMG, the LPS Steering Committee and the LUFO Steering Committee; through mailed notice to the City of the LUFO public hearing; and through consideration of concerns raised by ODOT during the LUFO and LPS decision-making processes.

The Council also finds that on June 8, 1998, ODOT recommended to Tri-Met's Board of Directors its approval of the LUFO application as adopted by the LUFO Steering Committee at its June 5, 1998 meeting. Tri-Met's application is consistent with that recommendation.

5.1.9 Overall Conclusion with Respect to Criterion 1

Clackamas and Multnomah Counties, the Cities of Milwaukie, Portland, Gladstone and Oregon City, and Tri-Met and ODOT have been well represented in the process leading to this decision. The process has been carefully coordinated among these jurisdictions and agencies, through their planners, engineers and other technical staff, and through their elected officials and/or administrative representatives. The jurisdictions directly affected have made recommendations which the Council has carefully considered consistent with HB 3478. As described in these findings, many of those recommendations have been incorporated into the LUFO. Accordingly, Criterion 1 is satisfied.

5.2 Criterion 2: Citizen Participation

> **"Hold a public hearing to provide an opportunity for the public to submit testimony on the light rail route, light rail stations, park-and-ride lots and vehicle maintenance facilities, and the highway improvements, including their locations."**

5.2.1 Hearing and Opportunity for Testimony

Criterion 2 ensures that the public has an opportunity to submit testimony and be heard in the process leading to the Council's selection of the light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project, including their locations.

On July 23, 1998, the Council held a LUFO public hearing and accepted public testimony on these matters, consistent with Criterion 2. This followed public notice, which Metro published in *The Oregonian* on July 6, 1998, more than 14 days prior to its hearing. The Council finds that this publication of notice in *The Oregonian* meets all requirements for notice set out in HB 3478.

Additionally, the Council finds that on or before July 7, 1998, Metro mailed written postcard notice of its July 23, 1998 meeting to the owners of property within approximately 100 feet of the proposed South/North project improvements, and that Metro also provided notice of the July 23 public hearing in its July 1998 *South/North News* newsletter, with a distribution of approximately 15,000. Further, the Council finds that meeting notice was posted in June on Metro's transportation hotline meetings list; on *The Oregonian's* Inside Line telephone information service in Metro's South/North category; and on Metro's Transportation web page.

Moreover, Metro and Tri-Met took a number of steps to increase the level of citizen participation in the project, including: a telephone hotline to receive comments and to announce project meeting times and dates; an Internet WEB site; a Tri-Met bus retrofitted with informational displays, computers and interactive stations that is scheduled at major community events (e.g. county fairs) and local shopping centers throughout the region; and the posting of project information on *The Oregonian*'s "Inside Line", a free, 24-hour telephone information service. These and many other

citizen participation efforts are described in greater detail in Appendix A of the DEIS, incorporated herein by reference.

5.2.2 Overall Conclusion with Respect to Criterion 2

Following public notice, the Council held a public hearing and heard testimony relevant to the Council's selection of a light rail route, stations, lots and maintenance facilities, and the highway improvements for the Project, including their locations. The Council concludes that this action satisfies Criterion 2.

6. Compliance with Substantive Criteria (3 - 8) Long-Term Impacts

6.1 Introduction

The South/North Project will provide an approximately 20-mile, double-tracked light rail route extending from the Clackamas Regional Center on the south to the vicinity of Clark College and the Veterans Administration Medical Center in Clark County, Washington on the north. The Project will link with the existing East/West MAX line in downtown Portland. This Land Use Final Order applies only to the Oregon portion of the Project.

For the purposes of these findings, the area affected by the South/North Project is generally described from south to north and is divided into nine segments as described in the South/North Corridor Project DEIS. The major project facilities are described below by segment:

Clackamas Regional Center Segment

- North of Clackamas Town Center (CTC) alignment with CCC/OIT/Aquatic Park study area; 2 LRT stations; 1 Park-and-Ride Lot
- Terminus at Clackamas Town Center (CTC) Transit Center/Station
- Station within CCC/OIT/Aquatic Park study area
- Park-and-Ride Lot within CCC/OIT/Aquatic Park study area

East Milwaukie Segment

- Highway 224 alignment; 2 LRT stations; 1 Park-and-Ride Lot
- Stations in vicinity of SE Linwood Avenue and SE Freeman Way
- Park-and-Ride Lot in vicinity of SE Linwood Avenue

Milwaukie Regional Center Segment

- Tillamook Branch Line Alignment; 2 LRT stations; 1 Operations and Maintenance Facility; 1 Park-and-Ride Lot
- Transit Center/Station in vicinity of Scott Park; Station in vicinity of SE Tacoma Street
- Potential Operations and Maintenance Facility South of SE Ochoco Street
- Park-and-Ride Lot in vicinity of SE Tacoma Street
- Highway improvements in vicinity of SE 21st Avenue

McLoughlin Boulevard Segment

- UP Main Line Alignment; 1 LRT station
- Station and pedestrian access in vicinity of SE Bybee Boulevard

South Willamette River Crossing Segment

- Caruthers Alignment and Crossing; 5 LRT stations; 1 Operations and Maintenance Facility
- Stations in vicinity of SE Holgate Boulevard, SE Lafayette Street, SE Clinton Street, OMSI and SW Moody Avenue

- Potential Operations and Maintenance Facility within Brooklyn Yard study area

Downtown Portland Segment

- Full Mall Alignment; 13 LRT stations
- Stations on SW Harrison Street and (north and south-bound) in the vicinity of PSU, SW Jefferson Street/City Hall, SW Taylor Street, SW Washington Street, W Burnside Street and NW Irving Street

Eliot Segment

- East I-5/Russell Alignment; 3 LRT stations
- At-Grade Transit Center/Station in vicinity of Rose Quarter, Grade-Separated Station in vicinity of NE Broadway/Weidler Streets, Station in vicinity of N Russell Street/Emanuel Hospital

North Portland Segment

- Interstate Avenue Alignment with Crossover from I-5; 8 LRT stations
- Stations in vicinity of Edgar Kaiser Medical Facility, N Skidmore Street, N Killingsworth Street, N Portland Boulevard, N Lombard Street, N. Denver Avenue, Portland International Raceway, and Exposition Center

Hayden Island Segment

- I-5 Alignment; 1 station
- Station at Jantzen Beach Center

6.2 Supporting Documentation

In addition to these findings of fact addressing the selected light rail route, stations, lots, maintenance facilities and highway improvements for the Project, including their locations, the Metro Council believes, adopts and incorporates by reference herein the facts set forth in the following documents:

South/North Corridor Project Draft Environmental Impact Statement (February, 1998)
South/North Land Use and Economic Impacts Results Report
South/North Social and Neighborhood Impacts Results Report
South/North Historic, Archaeological and Cultural Resources Impacts (Section 106) Results Report
South/North Parklands, Recreation Areas, Wildlife and Waterfowl Refuges (Section 4(f)) Impacts Results Report
South/North Ecosystems Impacts Results Report
South/North Hydrology and Water Quality Impacts Results Report
South/North Visual Quality and Aesthetics Impacts Results Report
South/North Displacement and Relocation Impacts Results Report
South/North Local and Systemwide Traffic Impacts Results Report
South/North Air Quality Impacts Results Report

South/North Noise and Vibration Impacts Results Report
South/North Energy Impacts Results Report
South/North Geology and Soils Impacts Results Report
South/North Hazardous Materials Impacts Results Report
South/North Navigable Waterways Impacts Technical Memorandum
South/North Transit and Travel Demand Forecasting Impacts Results Report
South/North Operations and Maintenance Facility/North Milwaukie Park and Ride Results Report
Wetland Determination and Delineation Report
Biological Assessment for Bald Eagles and Peregrine Falcons
Biological Assessment for Threatened, Endangered and Candidate Fish
Clackamas County Comprehensive Plan
City of Milwaukie Comprehensive Plan
City of Portland Comprehensive Plan
Scott Park Mitigation Report (March 1998)
North Portland Economic Development Analysis
Acquisition and Relocation (Tri-Met --1998)
Safety and Security Guidelines (Tri-Met --May 1998)
South/North Locally Preferred Strategy
Downtown Portland Tier I Final Report (Metro -- December 21, 1995)
Construction Impacts Assumptions Matrix for the South/North Project

The Council also takes official notice of the following documents:

City of Milwaukie Comprehensive Plan and Land Use Regulations
City of Portland Comprehensive Plan and Land Use Regulations
Clackamas County Comprehensive Plan and Land Use Regulations

6.3 General Impacts and Mitigation Measures Applicable to All Segments ("General Findings")

This section provides a general overview of LCDC Criteria 3 through 8, summarizes general impacts of the South/North Project, and highlights mitigation measures that are applicable in all nine segments. Because so many individual properties are affected by the South/North Project, the Council finds that it is appropriate to adopt both specific findings identifying particular impacts on a segment basis, and general findings addressing impacts applicable to properties throughout the South/North Corridor. To avoid redundancy, the Council incorporates by reference the general findings in this section into its more site-specific findings for each of the nine segments.

6.3.1 Criterion 3: Neighborhood Impacts

> **"Identify adverse economic, social and traffic impacts on affected residential, commercial and industrial neighborhoods and mixed use centers. Identify measures to reduce those impacts which could be imposed as conditions of approval during the National Environmental Policy Act (NEPA) process or, if reasonable and necessary, by affected local governments during the local permitting process."**

"A. **Provide for a light rail route and light rail stations, park-and-ride lots and vehicle maintenance facilities, including their locations, balancing (1) the need for light rail proximity and service to present or planned residential, employment and recreational areas that are capable of enhancing transit ridership; (2) the likely contribution of light rail proximity and service to the development of an efficient and compact urban form; and (3) the need to protect affected neighborhoods from the identified adverse impacts."**

"B. **Provide for associated highway improvements, including their locations, balancing (1) the need to improve the highway system with (2) the need to protect affected neighborhoods from the identified adverse impacts."**

Criterion 3 requires the Council to provide for a light rail route, stations, lots, maintenance facilities and associated highway improvements, "balancing" identified adverse economic, social and traffic impacts of the South/North Project on affected neighborhoods with the positive benefits provided by light rail proximity and service, including the development of an efficient and compact urban form.

Description of affected residential, commercial and industrial neighborhoods and mixed use centers

The neighborhoods affected by the South/North Project are identified and described in the *Social and Neighborhood Impacts Results Report*, incorporated herein by reference, and in Section 3.3 of the DEIS. These neighborhoods are described with particularity in the segment findings which follow these general findings.

Figure 1.1-1 of the DEIS illustrates the South/North Corridor. The corridor includes portions of the Cities of Oregon City, Gladstone and Milwaukie, the Clackamas Regional Center area of unincorporated Clackamas County, a section of southeast Portland, Portland's Central City, a section of north/northeast Portland, the City of Vancouver and other parts of Clark County, Washington.

Clackamas County is a fast growing sector of the region. Between 1980 and 1994, the number of households in the county increased by about 2.3 percent per year and the number of jobs increased by 4.0 percent per year. The Clackamas Regional Center, located near the northeast corner of urban Clackamas County, has been a major commercial and residential development node in recent years and is projected to continue rapid development.

The portion of the South/North Corridor along Highway 224 in the City of Milwaukie features primarily industrial and commercial development north of Highway 224 and residential development south of the highway. West of Harrison Street, the alignment passes through Milwaukie's Central Business District and an industrial park north of Highway 224 before entering the City of Portland.

The South/North Corridor encompasses inner portions of southeast Portland. Southeast Portland contains many older, established residential areas. Southeast Portland also provides significant employment opportunities. The alignment serves a wide range of employers, including Tri-Met, Fred Meyer, Portland General Electric, PCC, KPTV, Goodwill and OMSI. North of OMSI is the

Central Eastside Industrial District, a major industrial sanctuary with over 600 businesses and 6000 employees. Substantial industrial activity also occurs in the vicinity of Brooklyn Yard.

The South/North Corridor also encompasses Portland's Central City, which includes the Central Business District (CBD). The Central City contains the largest concentration of employment in the region.

The portion of the South/North Corridor in north/northeast Portland is characterized by a lower rate of growth that reflects north/northeast Portland's established neighborhoods, with few vacant parcels of developable land. Growth in this area is generally dependent on infill and redevelopment opportunities.

There are twenty-seven neighborhoods recognized by the affected local governments within the Oregon portion of the South/North Corridor that could potentially be affected by the project: three in Clackamas County, six in Milwaukie, and eighteen in Portland. The location of each neighborhood adjacent to the South/North Project is shown in Figure 3.3-1 of the DEIS and Figure 4.1-1 of the *Social and Neighborhood Impacts Results Report.* Neighborhood level socioeconomic information (1990 Census Data) is summarized in Table 3.3-1 and illustrated in Figures 3.3-2 and 3.3-3 of the DEIS. The data includes the following for each neighborhood, the corridor and the region: total employment; total number of households; percent of minority population; poverty level households; residents over age 65; renter-occupied households; limited-mobility residents; and median home value.

Maps within DEIS Appendix D identify existing land uses at the parcel level and existing comprehensive plan designations. The maps are presented by segment and identify the LRT alignment and a ¼ mile radius around each LRT station. The maps illustrate the varied pattern of land uses and plan designations along the South/North Corridor. Residential neighborhoods are present in all nine segments. Commercial areas predominate in the Clackamas Regional Center, Downtown Portland, Eliot and Hayden Island Segments. Industrial areas are found in the East Milwaukie and South Willamette River Crossing Segments.

The South/North Project links a number of "mixed use centers" identified in the Region 2040 Growth Concept and its implementing document, the *Region 2040 Framework Plan.* This plan establishes the urban growth boundary (UGB) for the next 20 years and the pattern and density goals for development within the boundary to the year 2040. The plan is designed to accommodate an additional 720,000 residents in the Oregon portion of the metropolitan region by the year 2040 with as little expansion of the existing UGB as possible.

A fundamental key to the Region 2040 Growth Concept is the designation of a hierarchy of mixed use centers. Creating higher density centers of employment and housing with compact development is intended to provide efficient access to goods and services, enhance multi-modal transportation and create vital, attractive neighborhoods and communities. The Growth Concept recognizes Downtown Portland as the "Central City" and reinforces downtown's role as the high density employment, cultural, tourism and commerce hub of the region. Outside of the Central City market area, the Growth Concept designates nine "Regional Centers". In the South/North Corridor, these include downtown Oregon City, the Clackamas Town Center area and downtown Milwaukie. These

regional centers are anticipated over time to become the focus of compact development and redevelopment, with high capacity transit service and multi-modal street networks.

The plan also designates "Station Communities," which are mixed use areas surrounding light rail stations where development is predominantly oriented toward transit riders and pedestrians. The *Region 2040 Framework Plan* seeks to encourage intensification of land uses in the Central City, Regional Centers, Town Centers and Station Communities, and to a lesser extent along Transit Corridors and Main Streets. The Region 2040 Growth Concept is predicated on the implementation of a south/north transit spine that links and supports the designated mixed use areas. The South/North Project is intended to create the transit spine needed to help implement the Growth Concept and link key mixed use centers in the Corridor. By accomplishing this objective, the South/North Project helps facilitate the movement of people between employment centers and contributes to development of an efficient and compact urban form, consistent with Criterion 3.

It is noted that the South/North Project does not, in itself, rezone or convert adjacent or nearby lands to higher densities or more intensive uses. Rather, it serves current and future development in these areas and encourages more efficient levels of development. While the South/North Project facilitates an efficient urban form, the Council finds that the implementation of the *Region 2040 Framework Plan* must occur through separate local action taken independently of this land use decision.

Identify adverse economic, social and traffic impacts on affected neighborhoods. Identify measures to reduce those impacts.

Extensive information identifying long-term adverse economic, social and traffic impacts of the South/North Project on affected neighborhoods is included in the DEIS and supporting results reports. The following *Results Reports* provide key data on impacts: *Land Use and Economic Impacts Results Report, Social and Neighborhood Impacts Results Report, Visual Quality and Aesthetics Impacts Results Report, Displacement and Relocation Impacts Results Report, Local and Systemwide Traffic Impacts Results Report, and North Portland Economic Development Analysis,* each incorporated by reference herein.

For the purpose of these findings, long-term adverse impacts generally are grouped under one of three headings: economic, social or traffic impacts. The Council recognizes, however, that impacts often can fall under more than one heading. For example, South/North Project impacts on freight movement may be relevant as both economic and traffic impacts. Displacements have both economic and social implications. Parking can be categorized as an economic, social and traffic concern. The Council intends these findings to be interpreted broadly to allow overlap among these different categories.

Although the following list is not exclusive, the Council finds that the economic, social and traffic impacts associated with the South/North Project fall primarily within the following categories:

Economic Impacts

- Business displacements
- Loss of parking/access
- Tax base

- Freight movement (train, truck and water)

Social Impacts

- Residential displacements
- Access to community facilities
- Barriers to neighborhood interaction
- Safety and security
- Visual/aesthetic

Traffic Impacts

- Transit
- Systemwide and local traffic impacts

Positive and negative impacts are summarized in a general manner for the South/North Project in the following section. Potential mitigation measures to reduce adverse impacts are also highlighted. More detailed information on these and other identified economic, social and traffic impacts are presented in the segment findings.

Economic Impacts

The overall quality of the transportation system is an important factor in the viability of the local and regional economy. Transit will play an increasing role in maintaining the level of service and operation of the overall transportation system, particularly because the region has made a policy commitment to invest in transit improvements rather than expanded highway capacity.

Historically, accessibility has not been a limiting factor for development within the South/North Corridor. However, recent growth in traffic and degradation of the level of service on the regional roadway system have raised concerns among local and regional officials that deteriorating accessibility could limit development and have adverse economic impacts.

The Council finds that a balanced transportation system, in part achieved through the expansion and improvement of transit service in the South/North Corridor, will help to assure that the regional and local land use plans are realized. By using the South/North Project as a tool to help shape growth, the regional and local jurisdictions can focus future development around light rail stations with the greatest opportunities for new development and redevelopment, or around stations with the most vacant and redevelopable lands. In many station areas, improved accessibility could lead to higher land values and therefore support more intensive mixed use development. The result is consistent with the Council's adopted Region 2040 Growth Concept.

For reasons set forth in the segment findings, the Council finds that there are numerous significant commercial and industrial employment centers that should benefit substantially from the South/North Project. These include, but are not limited to, the Clackamas Town Center, industrial Parks in east Milwaukie and north of Highway 224; the Milwaukie Central Business District; Brooklyn Yard; the Central Eastside Industrial District; the Portland CBD; Lloyd Center and the Rose Quarter; Interstate Avenue; and Jantzen Beach. In addition, the Council finds that by linking

communities along the South/North Corridor with communities along the Eastside and Westside MAX lines, access is provided to major commercial and employment centers in Gresham, east Portland, Beaverton and Hillsboro.

Displacements. In every instance where the South/North Project displaces an existing commercial or industrial use, that represents an adverse economic impact. Displacement has an effect on employment, incomes, services and taxes. Even though the adverse economic impacts associated with displacement may not be significant on a region-wide level, the Metro Council recognizes and is sympathetic to the significance of each displacement at the individual business and neighborhood level. It understands and acknowledges that relocations can cause significant anxiety and trauma not only to the company being displaced, but also to the employees who work for the company. It also recognizes that these impacts can be social as well as economic, as they can affect employee's commuting distance and where employees choose to live or work.

Given that the South/North Project will serve a largely developed urban area, it is impossible to avoid displacement impacts while still providing transit accessibility. To the extent feasible and practicable, the LRT route is following existing public road and railroad rights-of-way to minimize displacement impacts. Locations for related facilities such as LRT stations, park-and-ride lots and operations and maintenance facilities also have been selected with the objective of balancing displacement and other adverse impacts with the positive benefits of LRT proximity and service.

Indeed, the Council finds that the application before it for review and approval reflects serious and significant efforts by Tri-Met and the regional partners to reduce and minimize the number of displacements. The Council understands that during the DEIS process, significant testimony was offered encouraging efforts to reduce the number of displacements. The Council finds that Tri-Met's application incorporates many such efforts, such as the efforts to avoid displacing industrial developments east of SE 18th Avenue next to Brooklyn Yard, and to that extent, it provides mitigation for adverse impacts identified in the DEIS alternatives.

The methods used to determine displacement impacts are described in the *Displacement and Relocation Impacts Results Report.* A project impact was considered as having potential for displacement if any one or more the following circumstances would occur:

- Any building used for residential, social/recreational or businesses purposes lies in the path of a portion of the proposed transit facility such that it could not continue to function in its current use;

- Access to any building used for residential, social/recreational or business purposes would be permanently eliminated by any portion of the transit facility and could not be restored by reconfiguring the access or building;

- A residence, business or other building would not be in the path of any portion of the transit facility, but would be so close to the operating trackway that it may not be able to function in its current use because of noise and/or vibration impacts caused by ongoing LRT operations;

- The widening of streets, relocation of utilities, constructions of sidewalks, or other ancillary improvement required in conjunction with the LRT Project would come into physical contact

with or encroach upon a building, such that it could not continue to function in its current use; and

- The nature and extent of construction would likely have a severe impact that could not be mitigated.

Applying the methods described above, and based on conceptual design, the DEIS estimates that on a project-wide basis (including Vancouver, Washington), the South/North Project could displace approximately 77 commercial and industrial businesses. With more detailed design and alignment reconfiguration and by using some partial acquisitions instead of full displacements, this number could decrease. Displacement impacts on *commercial* facilities are scattered throughout the South/North Corridor, with a slightly higher concentration in the northern segments. *Industrial* displacements are concentrated in the southern segments, most specifically the East Milwaukie, Milwaukie Regional Center and South Willamette River Crossing segments. Displaced industrial uses tend to be large, one to two-story buildings between 10 and 40 years old.

In some instances, there may be opportunities for minor design modifications during Preliminary and final engineering to avoid or reduce business displacement impacts. Based on the applicant's actions to date, the Council believes that these efforts will be fully explored. Where displacements are unavoidable, relocation assistance will be available to assist displaced businesses. The relocation program will be designed in compliance with the requirements of the *Uniform Relocation Assistance and Real Property Acquisition Regulations for Federal and Federally Assisted programs (Title 49 Code of Federal Regulations, part 24).* Under these regulations, relocation experts would:

- Explain all relocation programs to the affected businesses;
- Assist in preparing and filing reimbursement claims; and
- Assist in completing forms required by the lending institutions, the Small Business Administration, and others associated with the lease or purchase of new properties.

All properties required for the South/North Project will be acquired at fair market value for land and improvements. If only a portion of a property is required, the acquisition price will also reflect any measurable loss in value to the remaining property due to the partial acquisition. Generally, the relocation process occurs concurrently with the acquisition of affected properties. Relocation benefits vary between residential and business properties and may include payment for actual reasonable expenses of moving a business or personal property and/or other benefits, such as rent supplements, increased interest costs on replacement dwellings, reasonable search costs for new business sites, and business re-establishment costs.

Loss of Parking/Access. Parking space supplies and costs vary throughout the South/North Corridor, including limited supply and relatively high costs in the Portland Central City, large supplies of free parking at Clackamas Town Center, and on-street parking at relatively low or no cost along N Interstate Avenue and in the Milwaukie Regional Center. Demand for parking spaces also varies depending upon location throughout the corridor, with relatively high demand in the Portland Central City, more moderate demand at Clackamas Town Center (although this varies significantly with the season) and the central business district of Milwaukie, and low demand along N Interstate Avenue.

An analysis of parking supply, demand and potential impacts associated with the South/North Project focused on areas with the greatest potential impact. These included:

- Clackamas Town Center
- Milwaukie Central Business District
- Portland Central City
- NE Flint Avenue between NE Weidler and NE Russell Streets
- N Interstate Avenue between N Denver Avenue and N Skidmore Streets

The loss of parking or change of access can have adverse economic impacts on businesses. If an existing access must be removed by the Project and cannot be relocated or reconfigured to provide adequate and safe access, the entire business use is assumed to be displaced. Even if alternative access is available, it may not be as convenient as the existing access and could result in some loss of business. Parking impacts are described on a segment basis in the *Local and Systemwide Traffic Impacts Results Report* for the following South/North Project Segments: Clackamas Regional Center, Milwaukie Regional Center, Downtown Portland, Eliot, North Portland and Hayden Island. LUFO findings that identify the adverse economic impact associated with loss of parking and/or access are provided in the segment findings.

The *Local and Systemwide Traffic Impacts Results Report* notes that the LRT alignment will displace a significant number of on-street and off-street parking spaces. Where existing parking demand could be expected to exceed the available parking spaces remaining after development of LRT, replacement parking may need to be provided. In many instances, existing off-street parking lots can be reconfigured to provide additional spaces to replace spaces displaced by the LRT alignment or associated facilities. In some instances, structured parking might replace lost parking spaces.

Tax Base. Local jurisdiction tax bases are affected in two ways by the development of large public infrastructure projects such as South/North light rail. First, and by far the greatest long-term impact, is the development and redevelopment that could occur in conjunction with the project. As this development occurs, the value of the investments are added to the tax base. The effect of this kind of impact is difficult to estimate because it is dependent upon many independent private decisions that would occur in the future. However, the Council finds that the overall impact should be positive.

The second type of impact is the direct impact to tax bases that occurs through property acquisition for construction of the project. Private property is typically acquired by the Project. Through acquisition, this property converts to public property and, as such, is removed from the tax rolls unless resold for private purchase. The Council finds that while the Project will cause reductions in the tax base, the short term impacts will be minimal. It finds that the loss in value in the tax rolls would be offset over time by the expected greater increase in value added to the tax base due to new development in the corridor, specifically in station areas.

Freight Movement.

Rail. The area encompassed by the South/North Corridor is of critical importance to the movement of commodities within and through the Portland metropolitan area. The freight movement system in the Corridor is comprised of two primary transportation modes: freight railroads and trucking.

Five separate railroads operate within the South/North Corridor:

- Union Pacific Railroad Company (merged with the Southern Pacific Railroad)
- Portland and Western Railroad Company
- Oregon Pacific Railroad (formerly the East Portland Traction Company)
- Portland Terminal Railroad
- Burlington Northern/Santa Fe Railroad

A study commissioned by the Port of Portland to support Metro's Region 2040 planning process indicates that freight rail transportation will increase significantly in the region during the next 20 years. Much of this increase will be experienced along the Union Pacific line, which generally parallels the South/North Corridor between the Clackamas Town Center area and North Portland.

Of the freight rail lines operating in the corridor, three locations are expected to be affected by the South/North Project: (1) in north Milwaukie near SE Mailwell Drive in the Kellogg Industrial Park, where the project will rearrange several industrial spur tracks to provide an at-grade crossing; (2) in SE Portland, where LRT tracks cross a freight spur track at-grade; and (3) just east of OMSI, where a light rail crossing of the East Portland Traction Company branch line occurs. A potential light rail vehicle operations and maintenance facility that has identified for further study near Brooklyn Yard would be located in part on UPRR right-of-way and could affect freight rail and truck-to-rail operations at that location. See Figure 2.5.3 attached to Tri-Met's application.

The following mitigation could be provided to reduce the adverse rail impacts highlighted above.

In north Milwaukie (Milwaukie Regional Center Segment), the at-grade crossing near SE Mailwell Street could include an interlock protected crossing so that freight switching movements and light rail movements would not conflict. The crossing would normally be set for light rail and would be temporarily preempted by the freight railroad's engineer through Tri-Met's central control when a railroad switching movement would be needed to cross the light rail tracks. The crossing would then be reset for light rail operations.

In SE Portland (South Willamette River Crossing Segment), light rail would cross the Darigold/Lone Star spur tracks at grade. An interlock protected crossing could be installed at this location, similar to the one described above.

The third location is also in the South Willamette River Crossing Segment. A light rail crossing of the East Portland Traction Company (EPTC) spur line would occur just east of OMSI. This crossing would be located close to the sidings used by EPTC for interchange with the UPRR. EPTC makes one to two daily freight movements through the crossing. To avoid the need for multiple train movements at the light rail crossing when EPTC switches the interchange sidings, the sidings would need to be realigned. The protection and operation of this crossing would be similar to that described for the north Milwaukie crossing.

Truck. Truck traffic relies heavily on the major streets and highways in the South/North Corridor and the region, including, but not limited to: I-5, I-84, I-205, Highway 224, SE McLoughlin Boulevard and portions of N Interstate Avenue, N Going Street, N Lombard Street and N Argyle Street. Major truck distribution centers are located within the North Milwaukie Industrial Park, the

Brooklyn Rail Yard, the Central Eastside Industrial District, the Albina Rail Yard (near N Interstate Avenue), the Swan Island Industrial Area, the Rivergate Industrial Area, and areas adjacent to the I-5/N Marine Drive interchange in North Portland.

Adverse impacts to truck movements in the South/North Corridor include both potential delays due to increased congestion or out-of-direction travel associated with light rail, and the possible loss of on-street loading zones. Localized delays to peak-period truck activity could occur due to increased congestion that would result from light rail park-and-ride lot traffic or to reductions in roadway/intersection capacity associated with light rail operations. Major truck routes that could be affected include Highway 224, SE McLoughlin Boulevard, the SE 11th/12th Avenue pair, SW Front Avenue, the NE Broadway/Weidler Street pair, and N Interstate Avenue.

The DEIS identifies potential mitigation strategies for local traffic impacts associated with the South/North Project. For DEIS purposes, local traffic impact mitigation is intended to identify strategies to achieve the level of service associated with the No-Build Alternative, not to resolve existing congestion problems. Implementation of strategies to mitigate adverse traffic impacts, particularly intersection improvements, would also benefit trucking and freight movement. Regional truck travel would benefit from reduced travel times on regional arterials and highways due to a reduction in congested lane miles and hours of delay associated with light rail.

Water. Segments of four navigable waterways are located within the South/North Corridor: the Willamette River (including the Holgate Slough), the Columbia Slough, the North Portland Harbor and the Columbia River. The United States Coast Guard (USCG) has jurisdiction over navigation within these waterways, and construction of a bridge across these waterways will require the USCG's approval of a bridge permit under Section 9 of the Rivers and Harbors Act of 1899 and the General Bridges Act of 1946, as amended.

Section 3.2.7 of the DEIS provides a description of the vertical and horizontal clearances for the South/North light rail crossings of the navigable waterways and addresses the potential long-term and short-term impacts to the waterways. Primary factors affecting navigation include horizontal and vertical clearances provided between bridge piers and between the surface of the water and the bottom of the span, respectively. Navigation could also be affected by the placement of the span relative to the navigational channel and by the placement of bridge piers relative to the piers of existing spans immediately upstream and downstream of the proposed span.

Based on a concrete segmental bridge design, the Caruthers Crossing of the Willamette River would reduce vertical clearances upstream to the Sellwood Bridge by 30 to 48 feet. Surveys of current and anticipated future river users indicate that the light rail bridge could have a limited adverse impact on navigation in this area. Mitigation could include increasing the bridge's vertical clearances. The remaining potentially impacted river traffic generally consists of machinery (dredges, cranes, etc.) that could be lowered or partially dismantled to reduce vertical clearance requirements.

The light rail bridge across the Columbia River would be located approximately 90 feet downstream of the existing Interstate Bridge. Based on the current bow string design, the light rail bridge would match the existing fixed spans, lift spans and pier placement of the Interstate Bridges. Due to the reduced distance between the proposed LRT bridge and the existing railroad bridge downstream, river traffic could experience more difficulty maneuvering between the bridges.

Other. Other economic impacts include the disruption of business during construction, possible loss of property values, possible inability to sell a business or secure loans to pay off mortgages or other business debts due to proximity to the light rail alignment or related light rail facilities, and utility relocations. Construction impacts are addressed in the Short-Term Impacts portion of these findings. The Council finds that generally, there is no required mitigation for temporary economic loss or business interruption during construction of a public project. However, for this specific project, the Council finds that Tri-Met would be willing to provide staff assistance to impacted property owners in assisting the property owners with their loan refinancing and/or loan application processes. Tri-Met frequently assists affected businesses by providing additional signage, temporary access, and other assistance to mitigate economic impacts during construction. The Council also finds that there may be reductions in property values, but it believes and finds that most of these properties will increase in value over the long term following construction. The Council finds that no mitigation is necessary for possible temporary reductions in property value.

The project will require relocation of certain utility facilities and lines. Utility relocations typically are addressed during preliminary engineering and final design. The Council finds that the costs of relocating utilities impacted by the project are addressed, and can be paid, as provided in existing law.

As explained in the social impact findings below, the project may affect localized access to properties by police, fire and ambulance vehicles. However, the project should not otherwise increase these governmental services. The Council has seen no evidence to this effect, and it finds that any significant increase in police, fire or emergency medical services as a result of the project is speculative. The Council concludes that no mitigation is necessary in this regard.

Social Impacts

Residential Displacements. As with business displacements, the Council recognizes that in every instance where the South/North Project displaces an existing residential use, that represents an adverse social impact, and the Council is sympathetic to the significance of each residential displacement. It understands and acknowledges that relocations can cause significant anxiety and trauma to families, uprooting them from neighborhoods, schools and friends and imposing change on them.

Given that the South/North Project will serve a largely developed urban area, it is impossible to avoid residential displacement impacts while still providing transit accessibility. To the extent feasible and practicable, the LRT route follows existing public road and railroad rights-of-way to minimize displacement impacts. Locations for related facilities such as LRT stations and park-and-ride lots have also been selected with the objective of balancing displacement and other adverse impacts with the positive benefits of LRT proximity and service.

Indeed, the Council finds that the application before it for review and approval reflects serious and significant efforts by Tri-Met and the regional partners to reduce and minimize the number of displacements. The Council understands that during the DEIS process, significant testimony was offered encouraging efforts to reduce the number of displacements. The Council finds that Tri-Met's application incorporates many such efforts, such as the selection of Highway 224 instead of Railroad

Avenue in Milwaukie, and the creation of a study area in North Portland in part to find ways to reduce residential displacements along I-5. To that extent, it provides mitigation for adverse impacts identified in the DEIS alternatives.

The methods used to determine displacement impacts are described in the *Displacement and Relocation Impacts Results Report (Displacement Impacts Report)* and are summarized above under the discussion of economic impacts. The same methods applicable to business displacements are relevant to determination of residential displacement impacts and are incorporated by reference.

Applying the methods described in the *Displacement Impacts Report,* the DEIS estimates that on a project-wide basis (including Vancouver, Washington), the South/North Project could displace approximately 333 residential units. No residential displacements will occur in the Milwaukie Regional Center Segment, the McLoughlin Boulevard Segment or the Downtown Portland Segment; and there is only one residential displacement in the South Willamette River Crossing Segment. Elsewhere, residential displacements will occur in greater numbers, with the majority of residential displacements concentrated in the Eliot and North Portland Segments. Because these segments include higher proportions of minority populations and low-income populations, the Council finds that significant efforts have been and continue to be made, subsequent to release of the DEIS, to reduce displacements in these neighborhoods. It finds that the establishment of a North Portland study area is one such effort to reduce and minimize displacements.

Appendix C of the DEIS summarizes the South/North Project's public involvement and decision-making processes in relation to Executive Order 128998 on environmental justice. The findings in DEIS Section C.2.2, which the Federal Transit Agency has reviewed and accepted, state that the South/North Corridor was selected, in large part, because direct light rail service to the communities in the corridor would result in increased transit ridership and would be supportive of both local and regional land use and transportation planning goals and policies. Many of the neighborhoods that will be directly served by South/North light rail are currently highly urbanized, with established street patterns and relatively dense development. Because there is relatively little undeveloped land available within the South/North Corridor, the Council finds that some impacts in these communities are unavoidable. In addition, because many of these neighborhoods have higher than average low-income populations and minority populations, adverse impacts on these populations are unavoidable, except with the No-Build Alternative. However, with the No-Build Alternative, increased congestion and air pollution would adversely affect these low-income and minority populations.

Although all adverse impacts cannot be avoided, the South/North Project alignment was designed and selected to minimize neighborhood and human health impacts. Nearly half of the neighborhoods that will be directly served by the South/North Project have higher than average minority populations, including three neighborhoods with some of the highest proportions of minority populations in the region (i.e., Boise, Eliot and Humboldt). In addition, nearly two-thirds of the neighborhoods that will be directly served by the South/North Project have higher than average low-income populations.

The South/North Project will provide quicker, more reliable and more comfortable transit access for virtually the entire corridor, compared to the No-Build Alternative. Travel time and mobility benefits will be experienced by the low-income and minority residents and neighborhoods within the South/North Corridor. Further, displacement, noise and vibration and neighborhood quality impacts

associated with light rail would not occur in a neighborhood that would not be directly served by light rail. Therefore, the Council finds that the adverse effects related to residential displacements are not disproportionate relative to the positive social benefits associated with improved transit service to minority and low income populations. It finds and concludes that a substantially greater number of transportation-disadvantaged, low-income and/or elderly people residing in these predominantly lower income and minority neighborhoods will benefit from the South/North Project than will be adversely affected by the Project.

Mitigation of residential displacements could include minor redesign of the project during Preliminary and final engineering to avoid or reduce displacements. Some displacements could be mitigated by taking only a portion of the property and/or structure and by modifying the remaining property and/or structure to allow continued occupancy. Where displacements are unavoidable, the project will provide compensation to property owners based on fair market value and a comprehensive relocation program. The compensation/relocation program operates in the same manner as described above for business relocations.

Access to Community Facilities. The South/North Project will increase the number of households with transit access to major activity centers in the region. In the Clackamas Regional Center Segment, the South/North Project will improve transit access to regional employment centers and to the following community facilities and services: Clackamas Town Center (and associated community facilities such as the library), the North Clackamas Aquatic Park, the Oregon Institute of Technology and Clackamas Community College.

In the East Milwaukie Segment, the Highway 224 alignment and stations will provide improved transit access to community facilities and employment centers such as the Milwaukie Industrial Center.

In the Milwaukie Regional Center Segment, the South/North Project will improve transit access to community facilities and services within the downtown area, such as Milwaukie City Hall, the Ledding Library and the Milwaukie Junior and Senior High Schools. The Milwaukie Transit Center will improve accessibility by residents of nearby neighborhoods to regional employment and community facilities. The Springwater Corridor recreational trail also will have improved regional transit access.

In the McLoughlin Boulevard Segment, residents of the Eastmoreland and Sellwood-Moreland neighborhoods will receive improved transit access to regional employment centers. Westmoreland Park, the Eastmoreland Golf Course, the Crystal Springs Rhododendron Gardens and Reed College will have improved regional transit access.

In the South Willamette River Crossing Segment, residents of the Brooklyn and Hosford-Abernethy Neighborhoods will have improved transit accessibility to regional employment centers and community facilities. South/North LRT will improve access to OMSI, the Portland Community College Work Force Training Center and the Central Eastside Industrial District.

In the Downtown Portland Segment, the full transit mall alignment will improve access to community facilities and employment centers for neighborhood residents throughout the Downtown and the Old Town-Chinatown neighborhoods. Neighborhoods in the Downtown Segment have a

higher proportion of mobility-impaired, elderly and poverty-level households than the corridor or regional average. These people would benefit from increased transit accessibility to community facilities. The full transit mall alignment provides improved accessibility to Portland State University and the Civic Auditorium near the south end of downtown; to Pioneer Courthouse Square, Tom McCall Waterfront Park, the Oregon Historical Society, the Portland Art Museum, and other cultural, recreational and shopping opportunities in or near the heart of downtown; and to community facilities and services located at the northern end of the mall, including the US Customs House, the US Bureau of Immigration and Naturalization, the US Post Office, the Union Train Station and the Greyhound/Trailways Bus Terminal.

In the Eliot Segment, residential neighborhoods will have increased transit access to regional employment and entertainment centers and community facilities. Stations in this segment will provide regional access to the Oregon Convention Center, the Rose Garden Arena, the Memorial Coliseum, Harriet Tubman Middle School and Emanuel Hospital.

In the North Portland Segment, the Interstate Avenue Alignment with a crossover from I-5 will provide improved neighborhood access to regional entertainment centers, regional employment centers and community facilities such as the Edgar Kaiser Medical Facility, Ockley Green Middle School, the PCC Cascade Campus, and Kenton Elementary School. Most of the neighborhoods in this segment have higher percentages of mobility-impaired, elderly, low-income and minority residents than the regional or the corridor average and would benefit from this increased transit access. Recreational facilities such as Delta Park, Portland International Raceway and the Expo Center also will have improved regional transit access.

In the Hayden Island Segment, the South/North Project will provide improved transit access to regional employment and entertainment centers including the Jantzen Beach shopping center, and will not have an adverse effect on access to community facilities.

In addition, the Council finds that the linkage of South/North light rail with the Eastside and Westside MAX light rail will provide access to community facilities in east Portland, downtown Gresham, downtown Beaverton and Hillsboro, including schools, hospitals, parks, fairgrounds, government centers and other facilities. The Council finds that completion of the South/North Project will greatly enhance travel and accessibility throughout the region.

In summary, the Council finds that the South/North Project will have beneficial rather than adverse impacts on access to community facilities. The South/North Project will provide improved transit access to numerous community facilities along the route and will dramatically expand and link the number of regional facilities accessible by transit.

Barriers to Neighborhood Interaction. In general, the South/North Project will not result in long-term barriers to social interaction or neighborhood cohesion in the Corridor. In many instances, the LRT alignment parallels an existing highway or railroad alignment (such as Highway 224, the Tillamook Branch Rail Line, McLoughlin Boulevard, the Union Pacific Rail Line and I-5) that already constitutes an existing barrier or edge to neighborhood boundaries. In the Downtown Portland Segment, the existing MAX line has not functioned as a barrier, as frequent intersections provide numerous opportunities for crossing the light rail line. Likewise, the South/North MAX line will not function as a barrier. In the North Portland Segment, the location of the alignment in a

segment of N Interstate Avenue will change local pedestrian and auto circulation patterns. The project will include pedestrian crossings approximately every 600 to 1000 feet to ensure that light rail does not become a significant barrier separating neighborhoods.

In the Milwaukie Regional Center and McLoughlin segments, the project will include pedestrian accesses over SE McLoughlin Boulevard to the Tacoma Park-and-Ride lot and station and to the Bybee Station. These pedestrian accesses, and sidewalk improvements around all of the stations in the Corridor, will actually reduce existing barriers to neighborhood circulation and provide the opportunity for improved pedestrian/bicycle access over McLoughlin Boulevard and the UPRR track and an important link to the Springwater Corridor recreational trail.

Safety and Security. The Council is sensitive to the importance of safety and security at stations and in neighborhoods affected by the South/North Project. For the Project to succeed, passengers must feel safe using the stations and trains. The Council finds that with appropriate location and design, and with implementation of systemwide transit security measures as described below, safety and security would not be adversely affected by any of the LRT stations or park-and-ride facilities. Reports from police officials in jurisdictions served by MAX show no causal relationship between LRT stations and criminal activity in surrounding neighborhoods.

The Council finds that Tri-Met has 21 sworn law enforcement officers that make up its Transit Security Division, including police officers from jurisdictions along the Eastside MAX line. The security unit will be expanded to 27 sworn officers to include Westside jurisdictions when the Westside light rail extension is opened in 1998. Tri-Met will also expand its security division to incorporate jurisdictions that will be served by the South/North light rail line.

In addition, Tri-Met has adopted a system-wide Transit Security Plan that applies community policing techniques to transit security. Elements of the Transit Security Plan that will be incorporated into the design and operation of the South/North light rail line include: increased in-house training of transit district employees in crime prevention; a high level of coordination with local law enforcement agencies and personnel; improved facility design and operation standards to increase visibility and security enforcement levels, and investment in new tracking and surveillance technology. A Citizens Advisory Group has been established by Tri-Met to assist the district in implementing the Transit Security Plan.

The Council further finds that security lighting and telephones will be provided at station platforms, all stations will be visible from nearby public streets and landscape design will ensure consideration of safety and security (i.e., low shrubbery). In response to concerns raised by citizens, stations have been moved away from I-5 to locations with better circulation and visibility. Additional potential mitigation measures include emergency call boxes and monitoring/surveillance cameras.

Localized access to properties by fire, police and ambulance vehicles could be affected by changes in local street configurations throughout the corridor. The current level of design reflects consideration of access by emergency vehicles (e.g., street and bike path dimensions, proximity to emergency facilities, primary access routes for emergency vehicles, etc.) As an element of Preliminary and final engineering, the project will conduct a review of the South/North Project design with staffs from the affected local emergency service providers to ensure emergency vehicle access to LRT facilities and properties along the route.

Visual/Aesthetic. The South/North Project will result in impacts to visual and aesthetic resources as a consequence of introducing:

- Cut/fill slopes, bridges, overhead structures, sound/retaining walls, catenary poles and overhead wires;
- Stations and park-and-ride structures and lots;
- Changes to existing structures, roads, vegetation, topography;
- Changes of scale and patterns of existing neighborhoods;
- Disruptions of existing visual resources, viewpoints, view corridors and vistas; and
- New views.

Photographs of existing conditions and visual simulations of future conditions at selected locations are included in Appendix E of the DEIS.

The visual and aesthetic resources within the corridor are elements of the landscape and neighborhood character, and include area features that are visible from scenic viewpoints. The analysis in the *Visual and Aesthetic Resources Impacts Results Report (Visual Results Report)* identifies the project's visual impacts to resources adjacent to the LRT alignment on a scale of "high," "medium" or "low," as determined by views' sensitivity, the location and duration of views of project elements, and the degree to which light rail would alter neighborhood character.

The *Visual Results Report* describes neighborhood visual impacts on a segment basis. LUFO findings for each segment will describe the key visual impacts. The Council finds that the South Willamette River Crossing is a key component of the overall visual/aesthetic impact of the South/North Project. The scale, form, character and alignment of the bridge over the Willamette River will be the defining visual element of the project. The crossing of the Willamette River near the Marquam Bridge will introduce a large-scale visual element into the river corridor. However, the Council finds that the design, including the bridge span, piers and horizontal and vertical alignment, can complement the existing larger structure to the north.

Given the types of visual impacts identified in the study area and summarized in the *Visual Results Report,* the Council finds that the following strategies can be used to reduce adverse visual impacts to affected neighborhoods:

- Fit the alignment and other light rail facilities into the existing neighborhood pattern and scale;
- Use light rail facilities to integrate vacant or unused areas into the neighborhood or to improve the visual character of neighborhood areas along the alignment;
- Buffer and screen impacts from sensitive areas such as residential streets, parkland and waterways;
- Prevent or reduce the loss of visual resources identified by the neighborhood as important; and
- Prevent obstructions or limits to designated views, view corridors or viewpoints and important neighborhood features affected by the alignment.

In each affected neighborhood, the Council recognizes that potential mitigation measures will vary to fit neighborhood scale, character and concerns. In some neighborhoods, potential measures could

improve the visual character of impacted areas. In other areas, the South/North Project will be a prominent visual feature even with mitigation. The Council finds that measures to reduce adverse visual impacts could be imposed as conditions of approval during final design or, if reasonable and necessary, by the affected local governments during the local permitting process.

Finally, the Council finds that the visual and aesthetic impacts of the tracks and trains is highly subjective and can vary significantly from individual to individual. Some people find light rail tracks and trains unattractive. Others find them to be visually pleasing and a benefit to the local landscape. The Council personally finds the tracks and trains to be attractive, and it finds the tracks and alignment to be well designed and attractive.

Other. Other social impacts include loss of property values, loss of trees along roadsides and in neighborhoods, and perceived reductions in "quality of life" associated with light rail transit, both during construction and in the long term. Construction impacts are addressed in the Short-Term Impacts portion of these findings. The Council finds that there may be reductions in property values, especially during the construction phase, but it believes that most of these properties will increase in value following completion of construction. The Council also finds that residing immediately next to the alignment or a station may result in some property owners experiencing perceived reductions in quality of life. Others may see a reduction in quality of life associated with increased density that might result from the proximity of rail to an area. These are very subjective matters that can vary from individual to individual. Landscaping and noise barriers might help mitigate adverse impacts. Where trees are removed, potential mitigation includes equivalent tree replacement.

Social benefits include cleaner air by providing improved transit access in the region, resulting in less automobile driving than would otherwise occur and less congestion and air pollution. Social benefits also include the clean-up of certain identified hazardous waste areas during construction of the South/North light rail system. Contaminated areas directly affected by the project will be remediated as required by law. Another social benefit is improved quality of life from lower and more reliable transit travel times, resulting in more time for people to spend doing things other than commuting.

Traffic Impacts

The South/North Project will have long-term positive and negative impacts on the regional transit system, the regional highway system and the local road system. Project impacts to the freight system were described under economic impacts. Detailed information on the transportation impacts of the South/North Project is provided in the *Travel Demand and Transit Impacts Results Report* and the *Local and Systemwide Traffic Impacts Results Report (Traffic Results Report)*. Key findings on general impacts are highlighted in this section, with more detailed findings provided on a segment-by-segment basis.

Transit. Impacts of the South/North Project on transit service are highlighted below and are generally positive. For comparison purposes, they are measured in some instances against the "No-Build" (all bus) alternative identified in the DEIS.

- Peak-hour, peak-direction in-vehicle transit travel times will be substantially less (typically a reduction of approximately one-third) with light rail than with the No Build alternative.

- Peak-hour, peak-direction in-vehicle automobile travel times will be reduced by approximately four to nine percent from the No Build Alternative.

- Between key regional centers in the South/North corridor and downtown Portland, year 2015 in-vehicle transit travel times will be less than in-vehicle auto travel times in the p.m. peak. In-vehicle auto travel times to locations not directly served by LRT will be less than in-vehicle transit travel times.

One of the major contributing factors to reliable transit service is reserved or separated right-of-way for transit vehicles. Transit vehicles operating in mixed traffic are subject to delays caused by accidents, breakdowns and congestion. For example, Tri-Met experience with LRT and bus service operations shows that LRT has a 98 percent a.m. peak on-time arrival rate, while trunk line buses have an 82 percent a.m. peak on-time arrival rate.

Additionally, most of the intersections within the South/North Corridor through which light rail vehicles will operate have traffic signals preempted for LRT, have gated crossings for LRT, or actually have the LRT separated from other traffic. In summary, the South/North Project will provide significantly more reliable transit service than the No-Build Alternative, and the improvement in reliability with light rail will be experienced by a significant portion of the corridor's transit riders.

The South/North Project will place light rail on the existing Portland Downtown Transit Mall, with stations approximately every four blocks. In the south and north portions of the transit mall streets, SW 5th and 6th Avenues, light rail trains will operate jointly with buses. In the south portion, buses will have exclusive use of the right lane and automobiles will have exclusive use of the intermittent left lane. In the north portion, which has only two lanes available, light rail and buses will operate jointly in the left lane, and buses and automobiles will operate jointly in the right lane, with the possible exception of one block between W Burnside Street and NW Couch Street. In the south portion, the transit mall will be extended from SW Madison Street to the PSU Station at SW Harrison Street, and light rail trains will generally operate in exclusive rights-of-way.

Approximately 158 buses currently operate through the central mall during the p.m. peak hour with an average speed of 3.9 miles per hour. With the introduction of South/North light rail, bus volumes in the central mall will be reduced to approximately 118 buses during the p.m. peak hour. Light rail operating speeds will be over 40 percent faster than current or future p.m. peak-hour bus operating speeds on the transit mall, a travel time savings of approximately four minutes within the north and central portions of the transit mall.

In summary, the Council finds that the impacts of the South/North Project on transit service are generally positive. If Tri-Met finds that the South/North Project results in significant adverse affects on bus operations in the transit mall, mitigation could include rerouting some bus lines from the transit mall. The remaining buses and light rail could then have slightly higher operating speeds during the peak hour.

Highway and Street Impacts. Section 4.2 of the DEIS evaluates impacts of the South/North Project on the highway and street network. Impacts are measured in terms of systemwide and local

measures of congestion, as well as changes in accessibility on the roadway system, and specific impacts on adjacent roadway facilities associated with the alignment, transit stations and park-and-ride lots.

Transit improvements in the South/North Corridor could affect traffic congestion in two basic ways. First, these improvements could divert trips from automobiles to transit, resulting in reduced systemwide vehicular travel. Second, transit facilities could also affect localized traffic operations on highways and streets in the study area. The localized effects are described in detail in the segment findings.

Based on the level of service standards summarized in Table 3.2-1 of the DEIS, mitigation strategies were identified for locations that both exceeded Level of Service D and represented a worsening of traffic conditions from the 2015 No-Build Alternative beyond a minimum threshold. The threshold and the process used to identify locations for impact mitigation are described more fully in the *Local and Systemwide Traffic Impacts Results Report ("Traffic Report").*

Mitigation strategies for qualitative traffic impacts are presented in Section 6.1 of the *Traffic Report.* Some mitigation strategies related to station area parking, potential neighborhood traffic intrusion and other factors that could be implemented include: monitoring of potential impacts; and traffic management strategies such as a permit parking program and/or physical improvements to restrict through-vehicle access to the neighborhood.

Based on the information in the *Traffic Report* and the DEIS, the Council finds that the South/North Project will not have adverse systemwide transportation impacts. Light rail will result in fewer Vehicle Miles Traveled (VMT), Vehicle Hours of Travel (VHT), Vehicle Hours of Delay, congested lane-miles and p.m. peak-hour vehicle trips than the No-Build Alternative. Light rail will reduce p.m. peak-hour, peak-direction vehicle trip demand at several key highway congestion points such as on I-5 on the North Portland Harbor bridge and on the Interstate Bridge and along SE McLoughlin Boulevard. The Council generally finds that the South/North Project will have positive systemwide transportation impacts.

Localized traffic impacts are measured in terms of level of service or volume-to-capacity changes at intersections or on key roadway segments. These impacts could be the result of changes in traffic volumes related to the provision of light rail service (particularly the access to and egress from park-and-ride lots), light rail priority treatments at intersections, modifications to existing roadway cross-sections which reduce roadway capacity, or at-grade street crossings by light rail.

Local traffic impacts associated with the alignment, stations and park-and-ride lots are discussed by segment. These include local congestion, neighborhood infiltration, traffic safety concerns, and out-of-direction travel for local residents. In general, the Council finds that a range of measures is available to mitigate the adverse impacts of the South/North Project on the local transportation system. Opportunities for mitigation of long-term (2015) impacts are identified in the DEIS based on key intersections which do not meet established level of service standards. These measures include physical modification, such as grade separations or added lanes, or operations changes such as signal phasing or different LRT preemption strategies.

Specific mitigation requirements for local traffic impacts will be deferred until selection of the Locally Preferred Strategy (LPS), completion of preliminary and final engineering, and preparation of the FEIS and Mitigation Plans. However, based on the information in the *Traffic Results Report* and the DEIS, the Council is confident that mitigation options are available to address adverse local traffic impacts.

Regarding traffic safety, light rail transit is designed to be safe through methods and devices such as speed control, signalization, gated crossings, and pedestrian movement controls. Light rail vehicles operate in a mixed traffic environment within the Portland central business district and other urban core areas. In the Portland CBD, trains travel at a maximum speed of 15 miles per hour, the same speed allowed for adjacent road vehicles. In general, light rail vehicle speeds match road vehicle speeds where the vehicles run in adjacent lanes. Light rail vehicles operate in accordance with normal traffic control devices (traffic signals) as supplemented by specific light rail signals where needed. Specific train warning signals may be provided as needed. Pedestrian movements are governed by pedestrian signals at signalized intersections. At gated intersections, pedestrian movements are controlled by the gates and warning signals. At non-signalized, non-gated pedestrian crossings, barriers ("z-crossings") may be used to focus pedestrian attention on the direction of approaching light rail vehicles. The Council concludes that these methods and devices provide for a safe multi-modal environment. It also adopts and incorporates by reference herein the facts contained in the July 6, 1998 memorandum from Mike Eidlin to Leon Skiles regarding traffic and pedestrian safety.

Provide for a light rail route and associated facilities, balancing the need for light rail proximity and service to areas that are capable of enhancing transit ridership; the likely contribution of light rail proximity and service to the development of an efficient and compact urban form; and the need to protect affected neighborhoods from the identified adverse impacts.

The South/North Steering Committee assembled to recommend the federal Locally Preferred Strategy adopted the following goal for the project[1]: *To implement a major transit expansion program in the South/North Corridor that supports bi-state land use goals, optimizes the transportation system, is environmentally sensitive, reflects community values and is fiscally responsive.* That "LPS Steering Committee" also adopted the following objectives for the project:

1. Provide high quality transit service;
2. Ensure effective transit system operations;
3. Maximize the ability of the transit system to accommodate future growth in travel;
4. Minimize traffic congestion and traffic infiltration through neighborhoods;
5. Promote desired land use patterns and development;
6. Provide a fiscally stable and financially efficient transit system; and
7. Maximize the efficiency and environmental sensitivity of the engineering design of the proposed project.

[1]This Steering Committee was assembled under requirements of federal law. It differs from the LUFO Steering Committee assembled to comply with House Bill 3478.

The project goal and objectives closely parallel the emphasis of Criterion 3(A) for this Land Use Final Order. The effectiveness evaluation of the South/North Project relative to meeting the objectives is summarized below.

Ability to Provide High Quality Transit Service. The Council finds that the proposed South/North Project provides the greatest amount of light rail coverage in the corridor of the various alternatives studied as part of the federal DEIS process. By comparison, a no-build alternative would not increase the number of residents or jobs within one-quarter mile access to light rail. It finds that the South/North Project will provide improved reliability over the No-Build Alternative. Factors that affect reliability include the amount of reserved right-of-way, percent of protected trunk-line intersections and percent of passengers on exclusive transit right-of-way.

The Council finds that the South/North Project will result in improved peak-hour in-vehicle and total weighted travel times between major destinations in the corridor, compared to the No-Build Alternative. It will increase transit trips within the South/North Corridor and increase the transit mode split for peak-hour radial trips. Moreover, compared to an expanded all-bus system, the Council finds that the Project will

- Increase corridor transit ridership 30 percent by the year 2015, an increase amounting to over 10 million rides a year;
- Increase weekday transit ridership into downtown Portland by 40 percent;
- Decrease rush-hour transit travel times between downtown Portland and key activity centers within the corridor, including the Clackamas Regional Center, downtown Milwaukie, and downtown Vancouver, by 30 percent;
- Increase the people-carrying capacity in and out of downtown Portland, both to the south and the north, equivalent to the capacity of a six-lane freeway, at a fraction of the costs and impacts that would be associated with a new freeway.

Ensure Effective Transit System Operations. By locating the South/North light rail alignment on the downtown Portland transit mall, all alignment alternatives would allow for easy transfers to other transit routes serving most of the metropolitan region. The Council believes that this improved transit access will enhance transit ridership, and it so finds. The Full Transit Mall Alternative is selected primarily because the Half Transit Mall Alternative would essentially be at capacity in the year 2015 due to the combined service levels of East/West and South/North LRT along the shared segment of the existing MAX line.

Maximize the Ability of Transit to Accommodate Growth in Travel Demand. The South/North Project has the greatest ability to accommodate growth of the various DEIS alternatives studied. According to DEIS estimates, it would attract 49 percent of new peak-hour radial trips in the corridor in the year 2015 (eight times higher than the No-Build).

The ultimate capacity of the light rail alternatives would be restricted by the two-car train limitation resulting from the 200-foot blocks in downtown Portland, and by the three-minute headway capacity of the train signal system. With these constraints, the ultimate capacity of the light rail alternatives would be 6,640 persons per hour at the peak-load point. This would be two to two and one half times the peak-hour capacity provided in the proposed year 2015 service plans. Besides their

capability to provide additional capacity at peak-load points, the light rail alternatives could be extended, both north and south, to accommodate additional transit demand.

Minimize Traffic Congestion and Traffic Infiltration Through Neighborhoods. The Council finds that the South/North Project will help slow the rate of traffic congestion and related problems, compared to the No-Build Alternative. It will:

- Reduce almost 133,000 vehicle miles of travel per average weekday from the corridor road system;
- Eliminate 16 lane-miles of congested roadways; and
- Avoid 4,500 hours of traffic delays each weekday (compared to the No-Build Alternative in the year 2015).

By slowing the rate of traffic congestion growth, avoiding delay, and reducing the number of vehicle miles of travel per average weekday as compared to the No-Build Alternative, the South/North Project will minimize traffic congestion. The Council finds that the slowing of congestion and reductions in vehicle miles of travel also will reduce the amount of traffic infiltrating Portland and Clackamas County neighborhoods by causing fewer vehicles to be on the roads than would otherwise occur in the absence of light rail transit.

The Council finds that in comparison to a No-Build alternative with an expanded bus system, light rail will result in a three to nine percent decrease in rush-hour automobile travel times between downtown Portland and key activity centers within the corridor, including the Clackamas Regional Center, downtown Milwaukie and downtown Vancouver. It also finds that the Project will result in combined travel time savings of over four million hours in the corridor for automobile, transit and truck travel, a savings valued at approximately $50 million per year using federal standards for calculating the value of travel time benefits.

Facilitate Efficient Land Use Patterns. Light rail influences the quality of access to vacant developable and redevelopable parcels of land in the South/North Corridor. Among the DEIS length alternatives, the selected South/North Project, which is the "Full Length" alternative, provides the greatest increase in light rail station access to both vacant (142 acres) and redevelopable (288 additional acres) land within the corridor.

The Council finds that in the Clackamas Regional Center, the South/North Project will be supportive of the *Clackamas County Comprehensive Plan,* providing access to approximately 18 percent more households than the No-Build Alternative.

In Downtown Milwaukie, the City of Milwaukie's adopted Comprehensive Plan designates the majority of the central business district area for commercial uses with residential uses in the surrounding area. The Council finds that the South/North Project will improve the size of the labor and consumer pools accessible to downtown Milwaukie.

In Downtown Portland, the Council finds that the South/North Project provides increased transit capacity needed to support the *Central City Plan's* development objectives, which include designating the majority of downtown Portland and several surrounding districts for high density commercial and residential uses. The plan depends on high quality transit to provide regional

access to the Central City and a high quality pedestrian environment to support trips within the downtown. Also, the South/North Project, which would reduce projected parking demand by approximately 3,790 spaces in downtown Portland, provides the highest support for the City of Portland's *Central City Transportation Management Plan's* very restrictive parking development ratios of the various DEIS alternatives studied.

In the Lloyd District, the *Central City Plan* calls for relatively high-density commercial and residential development, the expansion of major entertainment and public assembly uses and strong controls on new parking. The South/North Project provides the greatest improvement in 45-minute weighted transit travel time access to the Lloyd District.

In summary, the Council finds that the South/North Project will support the region's growth management strategy and the urban growth boundary (UGB) by:

- Providing access to vacant and redevelopable infill properties;
- Providing transportation capacity to the Portland Central City that will enable the region's core to accommodate the expected high growth levels;
- Providing the high quality transit needed to make the Clackamas Regional Center and Milwaukie Regional Center function in accordance with the growth strategy;
- Establishing new station communities which can be developed as mixed-use areas; and
- Instituting a pattern of growth that conforms to the goals, objectives and policies of local land use and infrastructure plans.

Balance the Efficiency and Environmental Sensitivity of the Engineering Design. Indicators of environmental sensitivity include displacements, noise and vibration impacts, parkland impacts, floodplain impacts, wetland impacts and historic and archaeological resources impacts. These impacts are addressed under other relevant LCDC criteria applicable to this proposal. For reasons stated under these other criteria and in the segment findings, the Council concludes that the positive impacts of the Project outweigh the negative environmental impacts.

Social Equity Considerations. In addition to the Steering Committee objectives listed above, the Council believes and finds that social equity considerations should be taken into account. The percentage of minority populations in nearly one half of the neighborhoods in the South/North Corridor is higher than the regional average of 8.6 percent. Nearly two-thirds of corridor neighborhoods have a percentage of low-income households that is higher than the regional average (1990 US Census). The Council finds that the South/North Project will serve both low-income and minority neighborhoods. However, the Council believes and finds that the South/North Project will not adversely affect low income or minority neighborhoods disproportionate to the benefits they will receive with improved transit access. Indeed, it finds that the project will substantially benefit a much larger segment of the populations of these affected areas, including low-income, transportation-disadvantaged, minority and elderly populations, than are otherwise directly adversely affected by the project.

Conclusions Regarding Neighborhood Impacts

In summary, the Council finds and concludes that the selection of the light rail route and associated facilities, including their locations, has included a balancing of:

- The need for light rail proximity and service to present or planned residential, employment and recreational areas that are capable of enhancing transit ridership;
- The likely contribution of light rail proximity and service to the development of an efficient and compact urban form; and

- The need to protect affected neighborhoods from identified adverse impacts.

The Council further finds and concludes that the South/North Project will enhance transit service to areas all along the South/North Corridor and improve connections and mobility throughout the Portland metropolitan region, including to areas along the existing eastside and westside MAX light rail lines; that the presence of light rail transit within the South/North corridor will encourage and support new and efficient development, consistent with Region 2040 Growth Concepts, that will benefit the affected local communities and the region; and that the improved accessibility provided by the South/North Project, and its many benefits, especially when compared with the No-Build Alternative, combined with available measures to mitigate adverse impacts created by the Project, result in a substantial net benefit to the affected local communities, the region and the state.

For the reasons stated herein and in the segment findings, the Council finds that it has considered the adverse economic, social and traffic impacts of the Project and balanced these impacts against the Project's benefits. It finds and concludes that the South/North light rail line will make a significant positive contribution to the quality of life in the Portland region, through improved mobility, decreased congestion, improved air quality, reduced energy consumption, and decreased reliance on the automobile, which will benefit Oregonians now and well into the future. It further finds that light rail transit can and will stimulate and enhance development of an efficient and compact urban form in appropriate locations identified for such development. It also finds that with mitigation imposed as part of the NEPA process or during local permitting processes, most of the adverse consequences identified in these findings can be reduced or avoided. Potential mitigation measures are identified in these General Findings and in the segment findings.

Provide for associated highway improvements, balancing the need to improve the highway system with the need to protect affected neighborhoods from the identified adverse impacts.

The South/North Project includes only a single highway improvement, in the Milwaukie Regional Center Segment. All other street and highway changes, such as intersection modifications, installation of traffic signals, access changes, etc. are ancillary to light rail improvements or proposed as mitigation to address specific adverse impacts of the South/North Project, and are not classified as highway improvements.

In the Milwaukie Regional Center Segment, the existing grid street system of downtown Milwaukie will be extended northward two blocks from SE Harrison Street; with two cross streets connecting the extended SE 21st Avenue with SE Main Street.

The extension of the grid street system will provide improved opportunities for pedestrian and vehicle circulation and access to South/North light rail and the relocated Milwaukie Transit Center. The street extensions will also carry the small-block, pedestrian character of the Milwaukie Downtown to the north, consistent with the Milwaukie Regional Center Master Plan. The extension

of SE 21st Avenue will have an adverse impact on the off-street parking lot for Ledding Library and Scott Park. However, these adverse impacts are addressed in findings for the LRT alignment and Transit Center and are not repeated here for the street improvement. Replacement parking will be provided for the library/park users in a reconfigured parking lot.

The Council finds that the 2-block extension of the downtown Milwaukie street grid will have a positive impact on nearby neighborhoods and improve opportunities for pedestrian, bicycle and vehicle circulation to and around the Milwaukie Transit Center. While the grid expansion may result in some adverse impacts identified and discussed below in the segment findings, the Council believes and concludes that on balance, this highway improvement will be a substantial benefit to the City of Milwaukie and its residents and businesses in terms of accessibility, bicycle and pedestrian transport, and improvements to Milwaukie's downtown. The Council concludes that the benefits of these improvements strongly outweigh the adverse impacts that are associated with them.

6.3.2 Criterion 4: Noise Impacts

> **"Identify adverse noise impacts and identify measures to reduce noise impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by affected local governments during the permitting process."**

General Overview of Noise and Vibration Impacts and Mitigation Measures

Noise is a form of vibration that causes pressure variations in elastic media such as air and water. The ear is sensitive to this pressure variation and perceives it as sound. The intensity of these pressure variations causes the ear to discern different levels of loudness, and these differences are measured in decibels, or dBs. Vibrations can also be carried by ground, in which case they are described in terms of vibration velocity levels in dB referenced to one micro-inch per second. As with air or water borne vibrations, ground vibrations have a threshold of human perception. Because air and ground borne vibrations have similar properties and are measured in similar ways, the Council finds that vibration impacts are appropriately considered with noise impacts in these findings.

Noise and vibration impacts are identified, along with corresponding mitigation measures, in the *Noise and Vibration Impacts Results Report (Noise Results Report).* The specific methodology for evaluating noise and vibration impacts is described in Section 2 of the *Noise Results Report.* The Council accepts the methodology established in the *Noise Results Report*, and it adopts and incorporates by reference herein the facts set forth in that document.

Generally, acceptable noise and vibration impacts vary according to type of land use; i.e., residential land uses are affected at lower decibel and vibration levels than commercial or industrial land uses. The Federal Transit Administration Noise Impact Criteria groups noise sensitive land uses into the following three categories:

Category 1: Buildings or parks where quiet is an essential element of their purpose.

Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.

Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, and office buildings which depend on quiet as an important part of operations.

The FTA criteria define two levels of impact, *severe impact* and *impact,* as summarized below:

Severe: Severe noise impacts are considered "significant" as this term is used in the National Environmental Policy Act (NEPA) and implementing regulations. Noise mitigation will normally be specified for severe impact area unless there is no practical method of mitigating the noise.

Impact: This level is sometimes identified as "moderate impact." In this range, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels.

The main goals of noise and vibration criteria as they apply to a new transit facility, or to an extension of existing facilities, are to minimize impacts on the community resulting from transit system construction and operation by controlling transmission of noise and vibration to adjacent properties.

Existing noise and vibration levels were measured at representative locations throughout the South/North Corridor, as shown in Figure 3.6-3 of the South/North DEIS. Table 3.6-6 summarizes the noise measurement results, indicating the monitoring location and the measured noise levels. Relevant Federal and State noise and vibration impact criteria are listed in Section 3.6 of the DEIS.

The projected noise and vibration impacts of the South/North Project are described in section 5.5 of the DEIS. The following types of impacts were analyzed: traffic noise from roads and highways that would be modified by the project; traffic noise at park-and-ride lots and transit centers; wayside LRT noise; LRT wheel squeal; noise from LRT ancillary facilities such as electrical substations and crossing bells; and LRT ground-borne vibration. The noise and vibration impacts associated with the South/North Project are summarized in Table 5.5-2.

Road Traffic and Bus Noise Impacts. Noise impacts resulting from LRT-induced changes to roads and to motor vehicle (including bus) traffic volumes and patterns are described in Section 5.5.2 of the DEIS. Because the project is being constructed in a largely built-up, urban environment, existing noise levels in the affected areas are already high in many segments. The projected noise increase for traffic noise would generally be less than three dBA. Human hearing typically cannot perceive a change of less than three dBA in broadband noise such as traffic noise.

Because no sensitive receivers are located near the three park-and-ride lot locations, no traffic noise impacts due to park-and-ride activity is expected.

The South/North Project includes transit centers at Clackamas Town Center, in downtown Milwaukie, and at the Rose Quarter. There are residences near the Clackamas Town Center and Milwaukie transit centers. However no significant traffic noise impacts are projected at the sensitive noise receptors closest to either of the transit centers. The Rose Quarter Transit Center does not have noise sensitive receptors near enough to be affected by the increased traffic.

Wayside LRT Noise Impacts and Mitigation. Projected wayside LRT noise levels have been modeled, based on measurements of existing LRT systems, the length and speed of trains, rates of acceleration and deceleration, location of special trackwork, auxiliary equipment and other factors. Table 5.5-4 of the DEIS summarizes projected Wayside LRT noise impacts along the corridor. Specific wayside LRT noise impacts are described on a segment-by-segment basis.

Options generally available to mitigate the wayside noise impacts include sound walls, crossover relocation, and reduced LRT speeds.

LRT Wheel Squeal Impacts and Mitigation. Wheel squeal noise is generated by the train wheels as they traverse a curve. Whether wheel squeal occurs and how loud it is depends on many factors, including the material used to make the rail, the level of wheel/rail contact point lubrication, the sharpness of the curve, train speed and wheel profile. There are a few locations in the South/North Corridor where track curvature is acute enough to create wheel squeal impacts.

Table 5.5-5 of the DEIS summarizes anticipated wheel squeal impacts by segment.

Wheel squeal noise impacts can be reduced or eliminated using the following general techniques:

- Dampening the wheel or using resilient wheels;
- Lubricating the wheel surface that slides against the rail;
- Using track designed to dampen squeal on sharply curved sections of the alignment.

If any wheel squeal impacts remain following the use of these mitigation measures, the use of barriers near affected receivers could be considered.

Noise from Ancillary Facilities. LRT ancillary facilities include crossing bells and electrical substations located adjacent to the LRT trackway and LRT switching gear and transformers. The substations will be designed and built to meet Federal noise criteria for transit system ancillary facilities. Noise levels less than 60 dBA, which is a level typical of many residential areas, is expected at one foot from the exterior substation wall. This noise level can be reduced by much as 10 dBA through the use of enhanced substation housing, for those substations located near sensitive receivers. No noise impacts from crossing bells or substations is expected in any of the segments.

LRT Vibration Impacts and Mitigation. Vibration impacts resonate from the wheel/rail interface, and are influenced by wheel/rail roughness, transit vehicle suspension, train speed, track construction and the geologic strata underlying the track. Vibration from a passing light rail train moves through the geologic strata into building foundations, potentially causing the buildings to vibrate. Groundborne vibration is of such a low level that there is almost no possibility of structural damage to buildings near the alignment. The main concern of groundborne vibration is that it can be annoying to building occupants.

Table 5.5-6 of the DEIS summarizes vibration impacts associated with the South/North Project. The majority of the impacted properties are single family residences, with a few multi-family residences affected in the North Portland Segment.

The Council finds that the primary options available to mitigate vibration impacts include: incorporating state-of-the-art vehicle specifications; keeping special trackwork (such as crossovers) as far as possible from sensitive receptors; using either spring-loaded frogs in tie-and-ballast track sections or flange-bearing rail in paved track sections where special trackwork cannot be moved; and installing ballast masts (in tie-and-ballast sections) or vibration isolation technology, such as "whisper rail," "booted" track-type support systems or resilient supported rail (for paved track sections). Small speed reductions may be able to reduce impacts to acceptable levels in a few locations, provided the speed reductions do not affect service schedules. The Council further finds that these kinds of measures could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by affected local governments during the permitting process.

6.3.3 Criterion 5: Natural Hazards

> **"Identify affected landslide areas, areas of severe erosion potential, areas subject to earthquake damage and lands within the 100-year floodplain. Demonstrate that adverse impacts to persons or property can be reduced or mitigated through design or construction techniques which could be imposed during the NEPA process or, if reasonable and necessary, by local governments during the permitting process."**

General Overview of Natural Hazards Impacts and Mitigation Measures

The South/North Project lies within the Portland Basin, the northernmost portion of the Willamette Valley. Section 3.9 of the DEIS describes the physiography, geologic character, soils, geologic hazards and soil and rock resources in the potentially affected area. Further detail is provided in the *Geology and Soils Impacts Results Report (Geology Results Report).* Information on existing floodplain conditions and impacts is provided in the *Hydrology and Water Quality Impacts Results Report (Hydrology Results Report).*

Much of the overall South/North Project alignment crosses developed land. Long-term impacts to the geologic environment consist of relatively minor changes in topography and drainage patterns, minor settlement of near-surface materials, increased erosion, and potential changes in slope stability. These impacts could occur as a result of excavation, placement of structures and fills and clearing and grading.

The geology and soils in the area of the South/North Project are typical of the Portland Basin. Known existing soils and geologic conditions are described in Chapter 4 of the *Geology Results Report.* Soils within the South/North Corridor developed on flood and alluvial deposits. Where undisturbed, they are generally sandy to clayey loam and are well to poorly drained. Much of the area is classified as urban land, where the original soils have been extensively modified or covered. Associated with the channel deposits, areas of highly organic silt and clay and deposits of peat may

be encountered and require special construction techniques. Expansive (high shrink-swell) soils are present in the corridor.
The potential for major landslides within the South/North Corridor is very limited because the topography within the corridor is relatively gentle, and the geologic conditions are generally favorable.

The Northwest is a seismically active area and subject to earthquakes. Oregon has the potential for three types of earthquakes: crustal, intraplate and subduction zone. Although earthquake prediction is an inexact science, it is reasonable to assume that earthquakes will occur in Oregon.

Studies of relative earthquake hazards have been completed for much of the Portland area. These studies do not attempt to determine the likelihood of an earthquake occurring, only the relative degree of likely damage. These maps show that much of the light rail corridor lies in areas with relatively high potential for earthquake damage. The LRT design and estimated construction costs reflect the need to conform to the relevant seismic standards for capital construction.

To mitigate earthquake hazards, the American Association of State Highway Transportation officials (AASHTO) has established national seismic design standards for bridges or structures. Tri-Met will apply AASHTO's standards for bridges and structures to such construction in the South/North Project, as those standards have been refined to meet State of Oregon requirements as defined in a January, 1995 study entitled "Seismic Design Mapping Study – State of Oregon."

Groundwater may be encountered at shallow depths along sections of the corridor that cross the flood plains of rivers and creeks. Other areas of shallow groundwater levels may exist locally, controlled by local variations in soil type and drainage.

Additionally, the study area intersects major rivers, minor water courses and floodplains within the lower Columbia and Willamette River basins, including the Willamette and Columbia Rivers, as well as Johnson Creek, Crystal Springs Creek, Spring Creek and Mt. Scott Creek and their tributaries. Floodplains are valuable natural resource areas providing fish and wildlife habitat, flood control, stormwater storage, water quality enhancement, sediment and erosion control, and educational, recreational, research, and aesthetic uses. Executive Order 11988 directs federal agencies to conduct their activities in ways designed to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains.

Section 2.3.5 of the Geology Results Report describes potential measures that could mitigate geologic and geotechnical impacts, including construction techniques, ground preparations, surface and groundwater drainage, erosion control and slope stability. Prior to construction, site-specific geotechnical engineering studies will be conducted to determine design refinements and construction techniques to avert potential geological problems. The Council finds that the following potential mitigation measures described in the *Geology Results Report* and the *Hydrology Results Report* are feasible to mitigate identified natural hazards. It also finds that these types of measures could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the local permitting process.

1. Existing unstable slopes can be avoided. If this is not practical, these slopes can be regraded to a more stable configuration or mechanically reinforced. New slopes will be constructed for necessary stability. If groundwater is encountered, it can be controlled with drains. Soft foundation conditions can be mitigated with proper design.

2. Designing slopes to minimize the effect of surface run-off can control erosion. Collection and routing of surface water away from cut and fill slopes will limit erosion damage. Exposed soil can be seeded to control erosion and prevent sediment laden run-off from reaching streams. Stream banks at bridges can be reinforced to prevent erosion and undercutting.

3. In areas where settlement is anticipated, several options are available. If the extent of the unstable material is limited, that material can be removed and replaced with fill. In areas where excavation is not practical, settlement can be accelerated by surcharging and installing wick drains, or the structures can be mechanically supported.

4. The risk of damage due to seismic activity is dependent upon site-specific foundation conditions and is difficult to generalize. A thorough geotechnical investigation will delineate those areas where seismically unstable materials are present, and designs can be developed to limit earthquake damage as much as practical.

5. For floodplain impacts associated with major crossings, compensatory flood storage can be provided (balanced cut and fill).

6. For areas with weak foundation soils, detailed engineering can identify the appropriate form of mitigation, including techniques such as excavation and backfilling, special footing and foundation designs, and special construction techniques such as pilings.

6.3.4 Criterion 6: Natural Resource Impacts

> **"Identify adverse impacts on significant fish and wildlife, scenic and open space, riparian, wetland and park and recreational areas, including the Willamette River Greenway, that are protected in acknowledged local comprehensive plans. Where adverse impacts cannot practicably be avoided, encourage the conservation of natural resources by demonstrating that there are measures to reduce or mitigate impacts which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process."**

General Overview of Natural Resource Impacts, Avoidance and Mitigation Measures

Section 3.7 of the DEIS summarizes the existing condition of vegetation, wetland, wildlife and fish resources within the South/North Corridor. Additional detail is provided in the *Ecosystems Impacts Results Report, Wetland Determination and Delineation Report, Biological Assessment for Bald Eagles and Peregrine Falcon,* and *Biological Assessment for Threatened, Endangered and Candidate Fish.* Park and recreation areas and scenic and open space areas are addressed in the *Parklands, Recreation Areas, Wildlife and Waterfowl Refuges Impacts Results Report* and the *Visual*

and Aesthetic Resources Impacts Results Report, respectively. These reports are incorporated herein by reference.

Land uses in the South/North Corridor are typical of urbanized areas and include commercial, industrial, transportation, residential, institutional and recreational development. Activities such as agriculture and logging have caused varying degrees of disturbance to currently undeveloped areas along the corridor. For example, all of the forested habitat within the Corridor is second or third growth, and most of the streams have been channelized for flood control or agricultural purposes.

Several natural areas within the South/North Corridor provide habitat expected to support various types of wildlife. Many of these habitat areas overlap riparian areas. Federally listed threatened and endangered wildlife known to occur within the corridor includes the peregrine falcon and bald eagle. The South/North Project crosses nine rivers and streams, most of which provide at least limited habitat for resident or anadromous fish. These waterways include Phillips, Minthorn, Spring, Johnson and Crystal Springs Creeks, the Willamette River, the Columbia Slough, North Portland Harbor and the Columbia River. In addition, open water habitat associated with small ponds occurs at several locations along the alignment. Wetlands associated with several of these waterways are primarily small in size and relatively degraded. Several small, isolated wetlands are scattered along the length of the South/North Corridor. Habitat for several threatened, endangered and candidate species of fish lies within the LRT corridor.

Visual and aesthetic resources in the South/North Corridor are described in the *Visual Quality and Aesthetic Impacts Results Report.* Changes to visual and aesthetic resources along the South/North Corridor, and changes to area landscape patterns, features and views, could result from new light rail facilities. Photographs and visual simulations of existing and future conditions within the corridor are located in Appendix E of the DEIS.

Twenty-six planned or existing public parks, recreation areas or wildlife and waterfowl refuges have been identified within the potentially affected area of the South/North Project. The location of each resource is shown in the DEIS and the *Parklands, Recreation Areas, Wildlife and Waterfowl Refuges Impacts Results Report* summarizes the South/North Project impacts on each 4(f) resource. The Willamette River Greenway is briefly addressed in the 4(f) analysis for the South Willamette River Crossing Segment.

Criterion 6 of this Land Use Final Order requires identification of adverse impacts on *significant* resources (fish and wildlife, scenic and open space, riparian, wetland and park and recreational areas, including the Willamette River Greenway) that are *protected* in acknowledged local comprehensive plans. Oregon planning under Statewide Goal 5 calls for inventories and protection of significant natural resources including fish and wildlife habitat, wetlands, and scenic and open space areas. Goal 5 is implemented by local jurisdictions through the Clackamas County and City of Milwaukie Natural Resource Overlays and the City of Portland's Environmental Zone. Statewide Goal 15 requires local jurisdictions to protect, enhance and maintain the natural, scenic, economic and recreational qualities of the lands along the Willamette River. Goal 15 is also implemented by local jurisdictions with Willamette River Greenway Overlay zones.

The scope of natural resources identified as significant and protected in the acknowledged local comprehensive plans is much narrower than the scope of natural resources addressed in the DEIS for the South/North Project and in the detailed *Results Reports.*

Throughout earlier phases of the South/North Project, alternatives and options have been developed, evaluated, narrowed and refined. A significant objective in the narrowing and refinement of alternatives and options has been to avoid where practicable, or to minimize where avoidance is impracticable, potential impacts to significant natural resources. Through this process, the number and level of impacts to resources affected by the South/North Project has been reduced.

General Discussion of Natural Resource Mitigation Measures

Section 5.6 of the DEIS describes general measures available to mitigate natural resource impacts that cannot be avoided.

1. Because of Federal and state policies of "no net loss" of *wetland* functions and values, mitigation for impacts to wetlands and non-wetland waters will be required as a condition of project permitting and approval. Mitigation could consist of protection of existing high quality wetlands or wetlands enhancement, restoration, or creation. Mitigation may occur on-site, off-site, or in areas identified as mitigation banks.

2. Impacts to *fisheries* could be mitigated by habitat enhancement along the creeks and streams, and by implementation of best management practices to minimize runoff and soil erosion.

3. Impacts to *riparian areas* could be mitigated by replacing or enhancing habitat in the affected area.

4. Details regarding potential project-related effects to bald eagle and peregrine falcon, and recommended conservation measures for minimization and avoidance of impacts, are presented in the *South/North Biological Assessment for Bald Eagle and Peregrine Falcon.*

5. Specific Federal regulations are applicable to 4(f) resources (historic, archaeological and parkland resources) potentially affected by the South/North Project. Section 6.5 of the DEIS includes a preliminary evaluation that summarizes potential impacts of the project's alternatives and options to 4(f) resources. During the preparation of the project's FEIS and preliminary and final engineering, the Locally Preferred Strategy will be developed in sufficient detail to evaluate design modifications to reduce, avoid and mitigate potential impacts to Section 4(f) resources.

The Council finds that these types of measures could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the local permitting process.

6.3.5 Criterion 7: Stormwater Runoff

> **"Identify adverse impacts associated with stormwater runoff. Demonstrate that there are measures to provide adequate stormwater drainage retention or**

removal and protect water quality which could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the permitting process."

General Overview of Stormwater Runoff Impacts

The South/North Project will intersect major rivers, minor water courses and floodplains within the lower Columbia and Willamette River basins, including the Willamette and Columbia Rivers, as well as Johnson Creek, Crystal Springs Creek, Spring Creek and Mt. Scott Creek and their tributaries. Existing waterways in the South/North Project area receive large volumes of stormwater and surface runoff containing a variety of pollutants, including chemicals and nutrients from fertilizers and pesticides, sediment, motor vehicles and other man-made or natural sources. Water quality in the corridor is typical of drainage basins with urban development.

Development increases the rate and volume of peak stormwater discharges from sites that are developed or under construction. The peak runoff rate and volume of stormwater discharges usually increase when construction removes vegetation, compacts soils, and/or covers significant portions of a site with buildings or pavement. Typical problems associated with increases in peak discharge rates include higher flow velocities in streams, more erosion, and more frequent flooding. These problems degrade habitat areas, damage property, and require increased maintenance of culverts and stormwater facilities.

A range of federal laws, state statutes, and local and regional ordinances address water quantity impacts from development. State and local regulations typically establish standards for controlling the peak rate of stormwater runoff. Regional standards, contained in Title 3 of Metro's *Urban Growth Management Functional Plan*, more broadly address flood mitigation, erosion and sediment control, and the protection of long term regional continuity and integrity of water quality and flood management areas. Federal National Flood Insurance Program criteria and Executive Order 11988 regulate development in floodprone and floodplain areas. In general, post-development runoff rates are required to match existing runoff rates.

Potential sources of water quality problems include pollutants from chemicals and nutrients from natural or man-made sources. Eroded sediments and other pollutants can be carried by stormwater to downstream receiving waters. Resulting water quality problems can impair the beneficial use of local waterways for recreation, wildlife habitat, and watering of livestock or other farm animals.

Water quality impacts are generally regulated by federal and state guidelines, usually through required standards for receiving water quality and limitations on the generation and release of urban pollutants.

General Discussion of Stormwater Mitigation Measures

Stormwater detention facilities can be used to mitigate the effects of long-term and short-term hydrologic changes. State and local regulations establish standards for detention and other methods of stormwater control which can be applied as conditions of approval during local permitting proceedings. Mitigation is usually accomplished by reducing or attenuating peak runoff rates, by either detaining (store and release), retaining (store but do not release), or infiltrating runoff from a

developed site. "Dry" ponds, "wet" ponds, retention ponds, biofiltration swales, underground vaults, and constructed wetlands are typically used.

All of these facilities detain stormwater by releasing runoff through a regulating structure, such as an orifice or weir. Stormwater detention provides water quality benefits because storage promotes settlement of suspended sediments and other pollutants. Stormwater detention and water quality facilities are typically combined to use land more efficiently.

Source control Best Management Practices (BMPs) are intended to mitigate pollutants generated through normal operation and use of buildings, roadways, and other urban facilities. The Council finds that water quality degradation resulting from erosion and sedimentation and the release of pollutants can be minimized through the use of BMPs during construction. Construction BMPs include use of barrier berms, silt fencing, temporary sediment detention basins, plastic covering for exposed ground, vegetative buffers (hay bales), and restricting clearing activities to dry weather periods to contain sediment on-site. Further requirements could include diapering of all dump trucks to avoid spillage, and cleaning of heavy equipment tires and trucks before they are allowed to drive off-site. A variety of special BMPs can also be used at crossings or adjacent to streams or watercourses during construction.

In general, the Council finds that water quantity and quality impacts created by the construction and operation of the South/North Project can be substantially mitigated by complying with the following: DEQ water quality standards; Army Corps of Engineers Section 404 permit regulations; Division of State Lands regulations for instream activities; Metro Title 3 regional standards; and Clackamas County, City of Milwaukie and City of Portland erosion control and stormwater regulations. These rules and regulations outline Best Management Practices (BMPs) to prevent or limit pollutants from entering surface waters through urban drainage systems. These types of measures could be imposed as conditions of approval during the NEPA process or, if reasonable and necessary, by local governments during the local permitting process.

BMPs for water quality impacts typically include sediment and erosion controls, construction spill control measures, oil/water separators, biofiltration swales, and water quality retention ponds. The Council finds that a range of measures are available and site-specific mitigation for stormwater quantity and quality impacts will be refined and selected during the Final Design and local permitting processes.

6.3.6 Criterion 8: Historic and Cultural Resources

> **"Identify adverse impacts on significant historic and cultural resources protected in acknowledged comprehensive plans. Where adverse impacts cannot practicably be avoided, identify local, state or federal review processes that are available to address and to reduce adverse impacts to the affected resources."**

General Overview of Historic and Cultural Resource Impacts

Section 106 of the National Historic Preservation Act of 1966, as amended, and Executive Order 11593 require that a federal agency consider the effect of a federally assisted project on any historic

district, sites, buildings, structures, objects or any archaeological sites listed in or eligible for inclusion in the National Register of Historic Places.

Throughout earlier phases of the South/North Project, alternatives and options have been developed, evaluated, narrowed and refined. A significant objective in the narrowing and refinement of alternatives and options has been to avoid where practicable, or to minimize where avoidance is impracticable, potential impacts to historic and cultural resources. Through this process, the number and level of impacts to resources affected by the South/North Project has been reduced.

During the preparation of the project's FEIS and preliminary and final engineering, further design work will be completed that would further attempt to avoid, minimize and/or mitigate adverse impacts to historic and cultural resources. Under federal procedures, the resulting impact analyses and commitment to feasible mitigation measures will be completed in coordination with the Oregon State Historic Preservation Officer (SHPO) and the Advisory Council for Historic Preservation (ACHP). At the conclusion of the process, a Memorandum of Agreement between FTA, SHPO and ACHP will be executed to define how the project will mitigate adverse effects to historic and cultural resources.

Project staff, in consultation with Oregon's State Historic Preservation Officer, made a determination of the "area of potential effect" for that portion of the South/North Project within Oregon. Through that consultation, it was determined that the area of potential effect within the downtown areas of Milwaukie and Portland, and in fully developed portions of North Portland, would be one-half block (approximately 100 feet) on either side of each alignment alternative. Outside these highly urbanized areas, the "area of potential effect" was established at 200 feet on either side of each alignment and design option. The Council accepts these determinations as to the "area of potential effect", and it adopts them as appropriate for purposes of determining compliance with Criterion 8.

The criteria of effect and criteria of adverse effect as set forth in the National Historic Preservation Act are highlighted below. Again, the Council agrees with and adopts these criteria for purposes of measuring compliance with Criterion 8.

An undertaking has *an effect* on an historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the *National Register*. For the purpose of determining effect, alteration to features of the property's location, setting, or use may be relevant depending on a property's significant characteristics and should be considered.

An undertaking is considered to have an *adverse effect* when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association. Adverse effects on historic properties include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the *National Register*;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease or sale of the property.

The *South/North Historic, Archeological and Cultural Resources Impacts (Section 106) Results Report (Historic Results Report)* includes an analysis of 187 historic resources and five historic districts within the South/North corridor to determine the National Register of Historic Places status. Short and long-term impacts of the South/North Project on historic, cultural and archeological resources are assessed in the *Historic Results Report* based on criteria developed by the Advisory Council for Historic Preservation. The Council accepts the methodology for determining "adverse effect" established in the *Historic Results Report*, and it adopts and incorporates by reference herein the facts and conclusions set forth in that document.

Local jurisdictions within the South/North Corridor have completed cultural resource inventories and designated significant resource sites in their respective comprehensive plans. Some resources, which are inventoried in the local comprehensive plans under LCDC Goal 5, are not necessarily defined as "significant" through the NEPA process. Conversely, the DEIS includes discussion of some resources which are not inventoried or protected in the local comprehensive plans. Criterion 8 only requires identification of adverse impacts on significant historic and cultural resources *protected* in acknowledged comprehensive plans.

General Discussion of Historic and Cultural Resource Mitigation Measures

Section 6 of the *Historic Results Report* outlines general mitigation measures for long-term impacts and short-term construction impacts. The *Historic Results Report* also includes a more specific discussion of mitigation measures for resources that may be adversely affected by the South/North Project. The Council finds the following to be examples of mitigation options:

1. Demolition of resources could be avoided in some instances through relatively minor changes in the design of the project in a specific area.

2. Demolition could also be avoided through relocating the resource.

3. If these options are not feasible, recordation and salvage of the resource could mitigate for its loss.

4. Loss of access or isolation of resources could be minimized through design treatments such as creation of alternative access points, more visible signage, or traffic control to facilitate accessibility.

5. Noise and vibration impacts to resources could be minimized through design treatments and vibration suppression.

6. Visual impacts could be mitigated through enhanced design treatments. Station and shelter design, construction materials, and street improvements could be chosen to complement existing building and street settings. Stations could be moved to avoid placement in front of historic resources. Where possible, overhead wiring could be attached to existing support structures.

7. Areas with a high probability of archaeological resources have been identified. A professional archaeologist would be on site to monitor construction activities in these specified areas.

The Council finds that the discussion of general mitigation measures included within the *Historic Results Report* provides a good base for more detailed mitigation commitments in the FEIS.

Federal, State and Local Review Processes to Reduce Resource Impacts

Federal and State Processes

Section 106 of the National Historic Preservation Act of 1966, described above, defines the federal review process designed to ensure that historic and cultural properties, including archaeological objects and sites, are considered during federal project planning and execution. The process is administered by the ACHP and coordinated at the state level by the SHPO. An agency must afford the ACHP a reasonable opportunity to comment on the agency's project. Section 106 requires that every federal agency take into account how each of its undertakings could affect historic and cultural properties.

For the purposes of Section 106, any historic property or archaeological site listed in or eligible for listing in the National Register of Historic Places is considered historic. The process has five steps as follows: 1) identify and evaluate historic properties; 2) assess effects of the project on historic properties; 3) if an adverse effect would occur, then consultation with the SHPO and other interested parties would occur, and if necessary, a Memorandum of Agreement would be developed which defines what will be done to reduce, avoid or mitigate the adverse effects; 4) ACHP comment; and 5) proceed with the project, incorporating the mitigation in the Memorandum of Understanding.

At the state level, the historic and cultural preservation process is defined in ORS Chapter 358 and in the Land Conservation and Development Commission's Goal 5. For historic resources, the state process is implemented by the local jurisdictions through the adoption of historic preservation identification and protection plans in their individual comprehensive plans. The state process limits local preservation options. Under current law, local protection of historic properties requires owner consent. However, properties listed on the National Register must be preserved by local governments. Demolition must be reviewed and may be denied.

For archaeological objects and sites, state protection is provided under ORS 358.905 to 358.955. These laws prohibit excavation, injury, destruction or alteration of an archaeological site or object, or removal of archaeological objects, when located on public or private lands in Oregon unless authorized by a permit issued by the State Parks and Recreation Department under ORS 390.235. Prior to issuing permits, the State Parks and Recreation Director must consult with the land-owning or land managing agency and, if the site is associated with a prehistoric or historic native Indian culture, the Commission on Indian Services and the most appropriate Indian tribe. Circumstances under which permits may be issued are limited by ORS 390.235(2). Mediation and arbitration of disputes is authorized under ORS 390.240.

State law in ORS Chapter 358 and LCDC's Goal 5 rule, OAR 660-023-0200, encourage the preservation, management, and enhancement of structures of historic significance. It authorizes local governments to adopt or amend lists of significant historic resource sites. However, owners of inventoried historic resources must be notified and may refuse local historic resource designation at any time prior to adoption of the designation. No property may be included on the local list of

significant historic resources where the owner objects. Moreover, a property owner may remove from the property a local historic property designation that was imposed by the local government.

OAR 660-023-0200(7) encourages local governments to adopt historic preservation regulations regarding the demolition, removal or major exterior alteration of all designated historic resources. It encourages consistency of such regulations with the standards and guidelines recommended in the Standards and Guidelines for Archaeology and Historic Preservation published by the US Secretary of the Interior. Further, OAR 660-023-0200(9) prohibits local governments from issuing permits for demolition or modification of an inventoried significant historic resource for at least 120 days from the date a property owner requests removal of historic resource designation from the property. It requires that local governments protect properties that are listed on the National Register, including demolition review and design review.

Local Processes

The jurisdictions of Clackamas County, Milwaukie and Portland all have local processes in place to address alteration or demolition of historic and cultural resources that are identified as significant and protected in local comprehensive plans. These processes could be applied to address and to reduce adverse impacts to the affected historic and cultural resources.

As described below in the segment findings, there are no significant historic or cultural resources protected in the acknowledged Clackamas County or Milwaukie comprehensive plans that the South/North Project would adversely affect. Accordingly, the Council finds that it is unnecessary, for purposes of Criterion 8, to identify processes that would otherwise be available in those jurisdictions to reduce adverse impacts to such resources.

However, in the city of Portland, certain protected historic resources would be adversely affected, as identified below. City review processes to address and to reduce adverse impacts to such resources are provided in the City's Zoning Code at Chapter 33.445, Historic Resources Protection, and Chapter 33.846, Historic Reviews.

Under these chapters, two levels of historic resource designation are created: Historic Landmarks and Conservation Landmarks. The Historic Landmark designation offers the highest level of protection for resources of citywide significance. Resources in this designation have access to incentives for historic preservation, including transfer of development rights and the right to a more flexible range of uses (such as multi-family use in a single family zone; reuse of institutional and business buildings in residential zones for commercial or institutional purposes; and streamlined review procedures). However, owners doing projects that utilize incentives must consent to designation and agree not to demolish or modify the building without City approval.

Conservation Landmarks are available for resources whose significance is local rather than citywide. Although part of the city's inventory, these sites generally are not qualified to be Historic Landmarks.

The City has the option to deny demolition only for those resources designated as landmarks that have taken advantage of one or more of the preservation incentives offered by the code or are listed on the National Register. A condition for use of the incentives is the owners entering into a covenant

with the city agreeing not to modify or demolish the resource without city approval. Also, demolition delays have been adjusted to meet the requirements of state law. The delay period is 90 days for Conservation Landmarks and 180 days for Historic Landmarks and resources in the Historic Resources Inventory. These delay periods start the day an application for demolition is received by the city.

Clackamas County and the cities of Milwaukie and Portland have no additional standards for protecting archaeological sites and objects affected by the project beyond those provided by state law.

6.4 Segment-Specific Findings and Mitigation Measures

6.4.1 Clackamas Regional Center Segment

6.4.1.1 Description of Light Rail and Highway Improvements

The Clackamas Regional Center Segment of the South/North Project includes the following LRT-related facilities:

- An alignment that extends from the north side of the Clackamas Town Center mall in the vicinity of the existing transit center to approximately SE Harmony Road and SE Cedarcrest Drive.

- A light rail station at a reconfigured transit center on the north side of the Clackamas Town Center (CTC) mall.

- A second light rail station, to be located in the vicinity of Clackamas Community College (CCC), the Oregon Institute of Technology (OIT) and the North Clackamas Aquatic Park. A master planning process resulting in a Land Use Final Order (LUFO) amendment will decide the location of the alignment as well as the station location and the configuration for an approximately 900-space structured and/or surface park-and-ride lot within this study area.

See **Figure 1.1** of the LUFO for LUFO boundaries for the Clackamas Regional Center Segment.

Light Rail Alignment

The alignment begins with a terminus station at a reconfigured transit center on the north side of the Clackamas Town Center (CTC) mall. The alignment heads westward, crossing SE 82nd Avenue at grade, then turns southward onto SE 80th Avenue, crossing SE Harmony Road at grade. From here, the alignment turns westward and passes through a study area including Clackamas Community College, the Oregon Institute of Technology and the North Clackamas Aquatic Park and extending west of SE Fuller Road. A master planning process resulting in a land use final order amendment will decide the location of the alignment as well as a station location and the configuration for an approximately 900-space structured and/or surface park-and-ride lot within this area. From the western end of this study area, the alignment then continues westward on the south side of SE Harmony Road to the vicinity of SE Cedarcrest Drive.

Light Rail Stations

Two stations are provided in the Clackamas Regional Center Segment: the CTC Transit Center Station and the OIT/Aquatic Center Station.

CTC Transit Center Station. The CTC Transit Center Station will be located on the north side of the Clackamas Town Center mall as part of a reconfigured transit center. The precise location of the station within the transit center will be determined during final design. This station and transit center will serve the major activity center of the Clackamas Town Center mall, and will also provide light rail accessibility to high density neighborhoods located to the north of the mall.

OIT/Aquatic Center Station. A second station in this segment will serve the cluster of destinations located on the south side of SE Harmony Road, including the Aquatic Park and the satellite facilities for Clackamas Community College and Oregon Institute of Technology. The precise location of the light rail alignment and station to serve these destinations will be determined through a master planning process and a subsequent LUFO amendment.

Park-and-Ride Lots

One park-and-ride will be located in the Clackamas Regional Center Segment. The precise location and configuration for the 900-space structured and/or surface park-and-ride lot will also be determined through the OIT/CCC master planning process and subsequent LUFO amendment.

Operations and Maintenance Facilities

There are no operations and maintenance facilities located in the Clackamas Regional Center Segment.

Highway Improvements

There are no highway improvements in the Clackamas Regional Center Segment.

6.4.1.2 Criterion 3: Neighborhood Impacts

> **"Identify adverse economic, social and traffic impacts on affected residential, commercial and industrial neighborhoods and mixed use centers. Identify measures to reduce those impacts which could be imposed as conditions of approval during the National Environmental Policy Act (NEPA) process or, if reasonable and necessary, by affected local governments during the local permitting process."**

> **"A. Provide for a light rail route and light rail stations, park-and-ride lots and vehicle maintenance facilities, including their locations, balancing (1) the need for light rail proximity and service to present or planned residential, employment and recreational areas that are capable of enhancing transit ridership; (2) the likely contribution of light rail proximity and service to the development of an efficient and compact**

urban form; and (3) the need to protect affected neighborhoods from the identified adverse impacts."

"B. Provide for associated highway improvements, including their locations, balancing (1) the need to improve the highway system with (2) the need to protect affected neighborhoods from the identified adverse impacts."

Description of Affected Neighborhoods in the Clackamas Regional Center Segment

The Clackamas Regional Center Segment extends westward from the terminus at the Clackamas Town Center Transit Center to approximately SE Cedarcrest Drive and SE Harmony Road. The segment includes portions of the Southgate, North Clackamas and Linwood neighborhoods. Major structures and land uses in the segment include the Clackamas Town Center mall and Clackamas Promenade, the North Clackamas Aquatic Park and branch campuses of Clackamas Community College and the Oregon Institute of Technology. I-205, SE Sunnyside and SE Harmony Roads and SE 82nd Avenue are the dominant surface roads through the segment.

The *Southgate Neighborhood* is bounded by the Milwaukie city limits on the west, I-205 on the east, the City of Portland boundary to the north and SE Harmony Road and a bluff south of SE Sunnybrook Street to the south. The major east/west roads in this neighborhood are SE Johnson Creek Boulevard, SE King Road and SE Harmony Road/SE Sunnyside Road. The major north/south road is SE 82nd Avenue, which parallels I-205 and is a major regional travel corridor.

The neighborhood has a full range of land uses including industrial uses in the northern corner, commercial uses along SE 82nd Avenue and several residential areas. In addition to single family neighborhoods, the area also has older mobile home courts, a mobile home subdivision, and apartments, including a retirement center north of the Clackamas Town Center mall. The neighborhood contains two low-income housing developments owned and operated by the Housing Authority of Clackamas County. Sidewalks are non-existent in much of the neighborhood. The street system is irregular and discontinuous.

Clackamas Town Center (CTC), a major regional shopping center, and Clackamas Promenade south of CTC dominate the southern section of the neighborhood and serve as a major employment center within the neighborhood. Commercial uses along SE 82nd Avenue include fast food restaurants, auto services and a variety of retail establishments. Several schools and a Town Center Branch Library are located within the Southgate Neighborhood.

The Southgate Neighborhood contained an estimated 1990 US Census population of 10,918. The mobility limited population is somewhat higher for the neighborhood than for both the county and the region. The percentage of population over 65 years of age and the proportion of households below the poverty level is considerably greater than for the county and the region as a whole. The median value of housing in the neighborhood is significantly less than either the county or region. In addition, a larger proportion of neighborhood residents rent their homes.

The *North Clackamas Neighborhood* is bounded on the north by SE Harmony Road on the north, on the east by SE 82nd Avenue and on the south and west by a line extended from SE Linwood Avenue to southwest of Clackamas High School. Major streets in the neighborhood include those forming

the boundaries as well as Highway 224, SE Lake/Johnson Road, SE Webster Road and SE Thiessen. Mt. Scott Creek flows through the northern end of the neighborhood between SE Harmony Road and the Union Pacific Railroad (UP).

Land use in the neighborhood is mixed with industrial and public/institutional uses within the northern portion of the neighborhood along SE Harmony/SE Sunnyside Road and the UP tracks. These uses transition to commercial along SE Lake Road and then the neighborhood becomes predominantly residential south of SE Lake Road.

The neighborhood includes several significant institutional and public uses, including the Oregon Institute of Technology (OIT), Clackamas Community College (CCC) and the North Clackamas Aquatic Park along SE Harmony Road, and Clackamas High School on SE Webster Road. OIT and CCC serve as an employment center in the neighborhood.

The North Clackamas Neighborhood contained an estimated 1990 US Census population of 7,179. The percentage of population over 65 years of age is slightly higher than for the county and the region. The proportion of households below the poverty level is somewhat higher in the neighborhood than for Clackamas County, but lower for the region as a whole. Median value of housing in the neighborhood is less than the county but higher than the region. A much lower proportion of neighborhood residents rent their homes than is the case in the county or region.

The *Linwood Neighborhood* lies within the eastern part of Milwaukie and is bounded by the city limits and the Southgate Neighborhood on the east, SE Railroad Avenue and SE Harmony Road on the south, SE Wood and SE 52nd Avenues on the west and SE King Road on the north. SE Linwood Avenue is a major street bisecting the neighborhood.

Land use in this neighborhood is almost exclusively single family housing built in the 1950's and 1960's. Commercial services are located at both ends of SE Linwood Avenue on SE King Road and SE Railroad Avenue/SE Harmony Road.

The street pattern in this neighborhood is discontinuous with few east/west connections between predominantly north/south streets on the west side of SE Linwood Avenue and a curvilinear street system on the east side of SE Linwood Avenue. Sidewalks are discontinuous or lacking in most of the neighborhood. Linwood Elementary is the only community facility in the neighborhood.

The Linwood Neighborhood contained an estimated 1990 US Census population of 3,770. The percentage of population over 65 years of age is somewhat less than for the county and the region. The proportion of households below the poverty level is nearly the same for the neighborhood as for Clackamas County, but is lower than the region as a whole. Median value of housing in the neighborhood is significantly less than the county, and is also less than the region median value. A smaller percentage of neighborhood residents rent their homes when compared with the county and region.