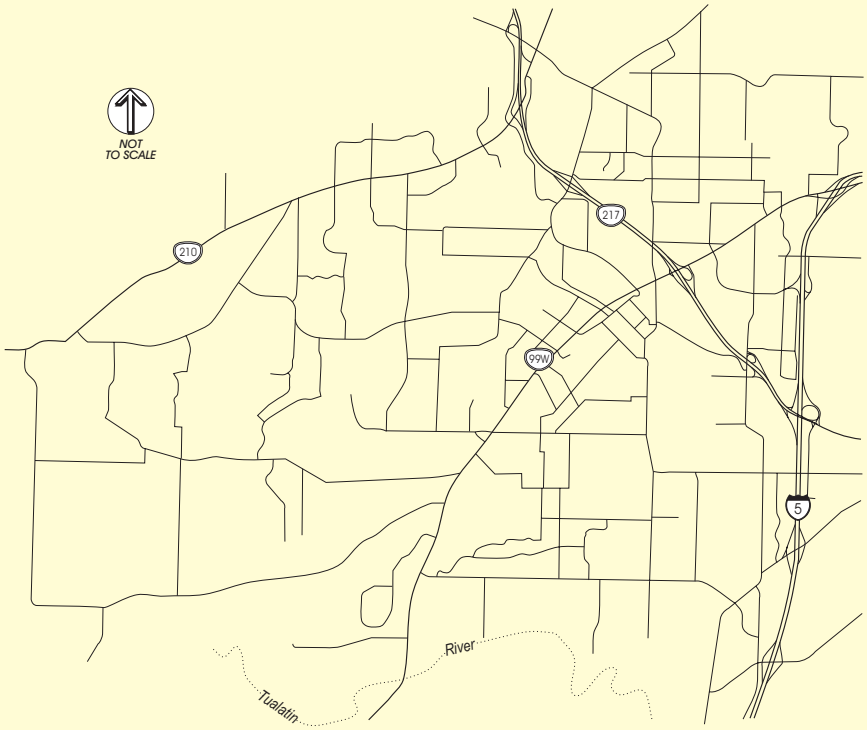
Tigard Transportation System Plan

Final Report



Prepared for

CITY OF TIGARD

Prepared by

DKS Associates

January 2002

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OREGON

TABLE OF CONTENTS

CITY OF TIGARD
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CHAPTER 5: PEDESTRIANS

CHAPTER 6: BICYCLES

CHAPTER 7: TRANSIT

CHAPTER 8: MOTOR VEHICLES

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CHAPTER 9: OTHER MODES

CHAPTER 10: TRANSPORTATION DEMAND MANAGEMENT

CHAPTER 11: FUNDING/IMPLEMENTATION

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LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS / ABBREVIATIONS

- CBD – Central Business District
- D/C – Demand to Capacity Ratio
- DEIS – Draft Environmental Impact Study
- DEQ – Department of Environmental Quality
- ECO – Employee Commute Options
- FHWA – Federal Highway Administration
- HCM – Highway Capacity Manual
- ITS – Intelligent Transportation System
- LID – Local Improvement Districts
- LOS – Level of Service
- LRT – Light Rail Transit
- MSTIP – Major Streets Transportation Improvement Projects
- ODOT – Oregon Department of Transportation
- OHP – Oregon Highway Plan
- RLIS – Regional Land Information System
- ROW – Right of Way
- RTP – Regional Transportation Plan
- SDC – System Development Charges
- SOV – Single Occupancy Vehicle
- SPIS – Safety Priority Indexing System
- SPWF – Special Public Works Fund
- TAC – Technical Advisory Committee
- TAZ – Transportation Analysis Zone
- TDM – Travel Demand Management
- TGM – Transportation and Growth Management
- TIF – Traffic Impact Fee
- TPR – Transportation Planning Rule
- TSM – Transportation System Management
- TSP – Transportation System Plan
- V/C – Volume to Capacity Ratio
- VPD – Vehicles Per Day
- WACO – Washington County

Chapter 1: Summary
Tigard Transportation System Plan

Master Plan for the next 20 years

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What is a TSP?

- **Blue print for Transportation Investment**
- **Enables City to make prudent and effective choices regarding land use**
- **Coordination tool with regional and nearby agencies**
- **Fulfills State mandate (Goal 12) & RTP**
- **Addresses Existing and Future needs**

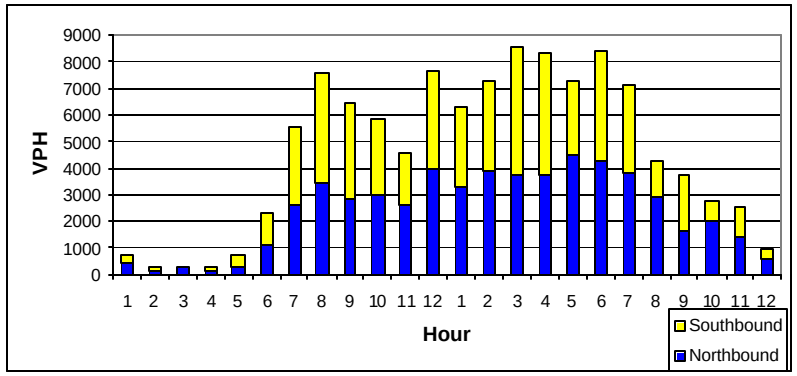
Why do a plan now?

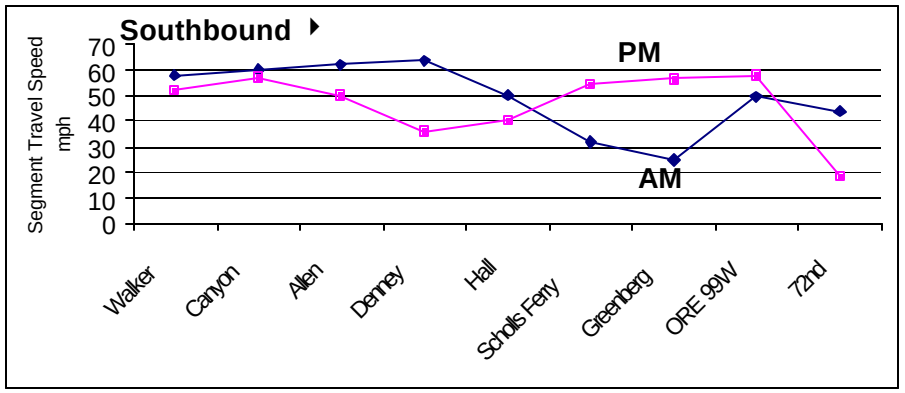
- **To get ready for the future - Now**
- **Growth**
  - Forecasts call for 6,000 more Dwelling Units and 15,000 more employees in the next 20 years
- **Metro RTP completed in 2000**
- **State Requirements (new highway plan)**
- **New Funding Opportunities**

Report Organization

- **Existing Conditions and Forecasting**
- **Policy**
- **Future Demand**
- **Modal Chapters**
  - Pedestrians, Bicycles, Transit, Motor Vehicles
  - Transportation Demand Management, Rail, Freight
- **Funding**

Existing Conditions





- City generates 35,000 PM hour vehicle trips
- ORE 99W and Scholls Ferry ~ 50,000 /day
- Much through traffic in Tigard
- It takes 5-20 minutes to get across Tigard
- Scholls Ferry has the highest collision rating
- 22 intersections near/at capacity in PM peak

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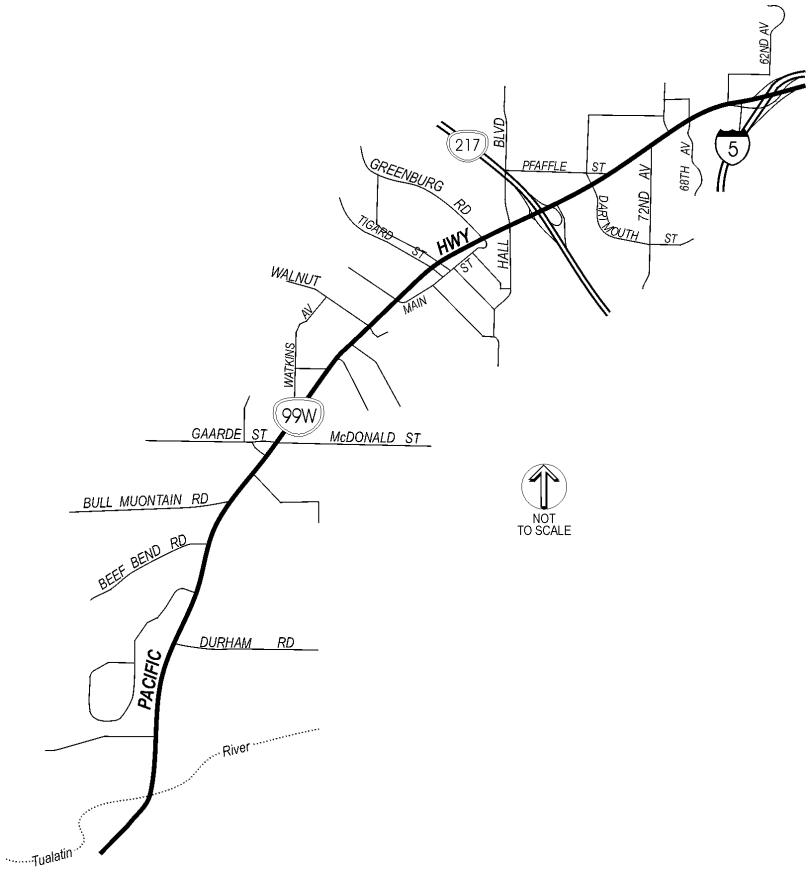
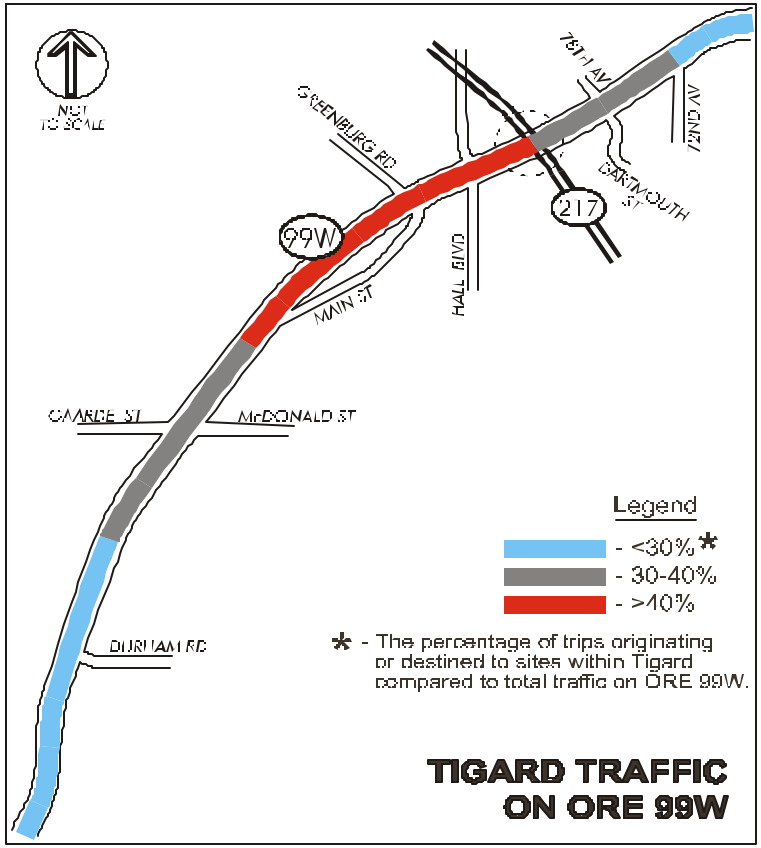
Existing Conditions

- **Key bottlenecks today:**
  - ORE 99W/McDonald
  - ORE 99W/Hall-Greenburg
  - Hall/McDonald
  - Scholls Ferry/Nimbus
  - Scholls Ferry/Hall
  - I-5/Carman Interchange



Where Does Traffic on ORE 99W Go?



- **Throughout Tigard, ORE 99W carries about half Tigard traffic, half through traffic**
- **I-5 to ORE 217 linkage is significant**
- **No alternative route for corridor travel**

Existing Pedestrian/Bicycles

- **Bicycles**
  - No continuous network in Tigard
  - Peak bicycle volume in the 10 to 15 per hour range
  - Most bicycle lanes have been added in last 10 years
- **Pedestrian**
  - Significant gaps in sidewalk system
  - Few interconnected locations linking to schools, retail, parks, transit
  - Peak hour pedestrian volumes heaviest along ORE 99W
  - Most peak hour pedestrain volumes below 50 per hour

Existing Transit

- **Significant bus service in Tigard**
- **9,500 daily bus Tigard bus trips**
- **Transit Centers are most active transit stops in Tigard**
- **Western Tigard and north of Durham area only areas without quarter mile access to buses**

TSP Task Force

- **Planning Commission**
- **Business/Chamber**
- **Bicycle/Transit involvement**
- **Technical Advisory Committee with local jurisdictions**

Transportation Goals

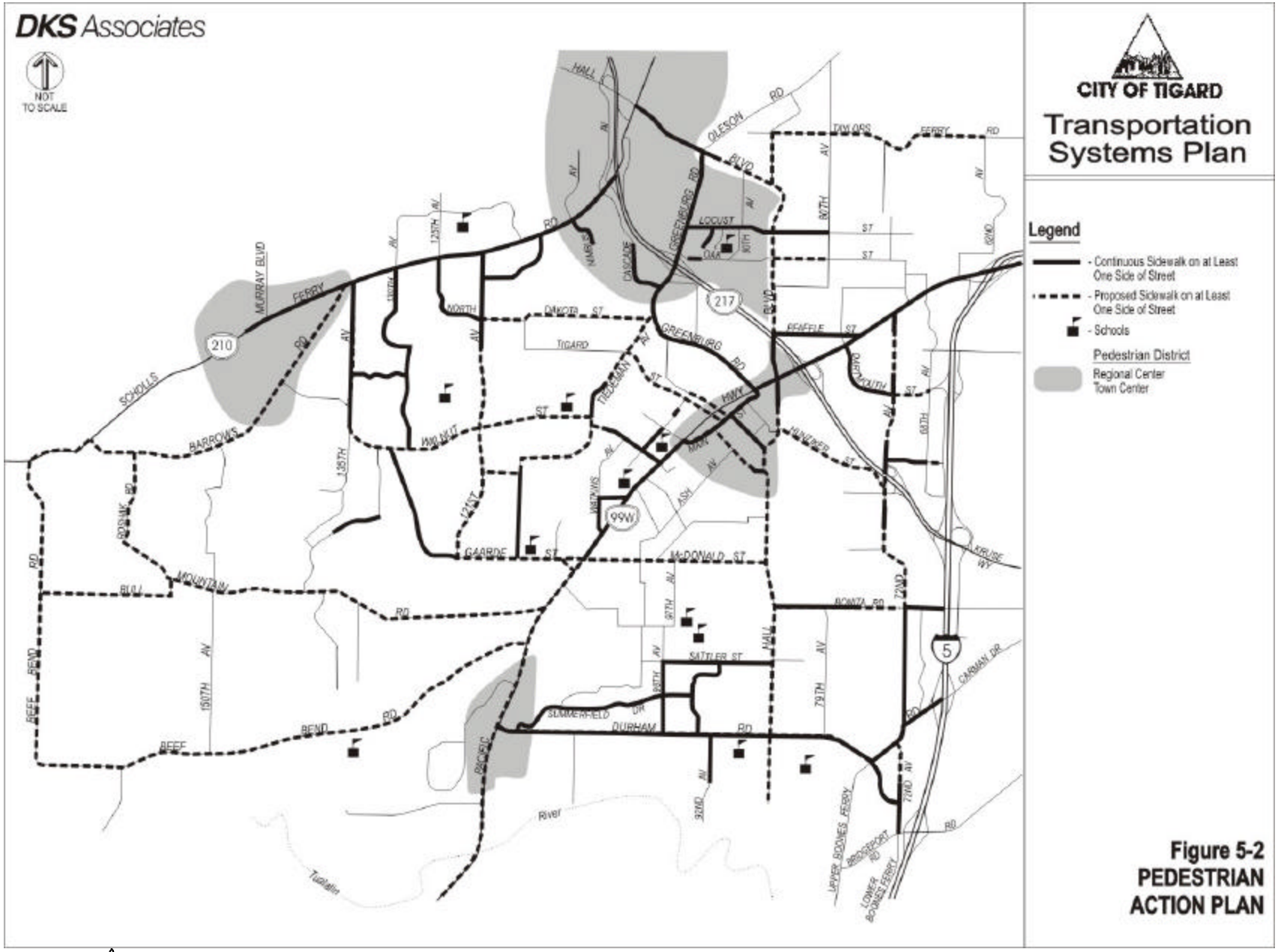
- **Livability**
- **Balanced Transportation System**
- **Safety**
- **Performance**
- **Accessibility**
- **Goods Movement**
- **Coordination**

Future Travel Forecast

- **Based upon regional travel modeling**
  - Assessed both 2015 and 2020 forecasts
- **Disaggregated Tigard into nearly 200 Transportation Analysis Zones**
- **Looked at build out condition in Tigard**
- **Established a modified 2015 forecast that resulted in 8% greater vehicle trip generation in Tigard than 2020**

Pedestrian Plan

- **Top Strategies**
  - Fill in gaps in network
  - Link to schools, parks, recreation, activity centers, transit
- **Establish Pedestrian Districts**
  - Regional Center
  - Town Centers
- **Minimum five feet**
- **Complimenting Land Use Actions**



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Tigard
Transportation System Plan

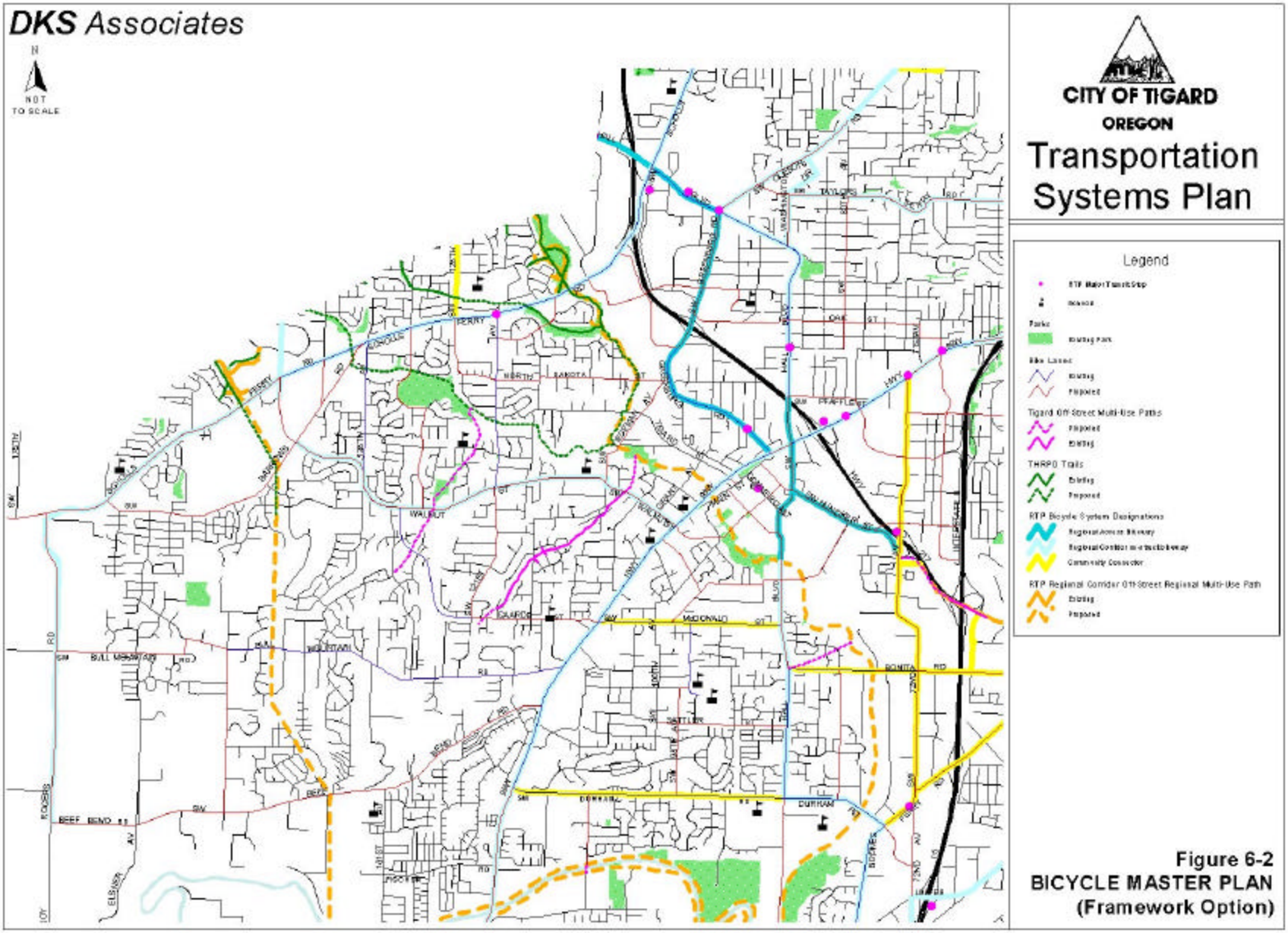
DKS *Associates*

Pedestrian Action Plan Project List

Rank*	Project	From	To	Cost
H	North Dakota Street	121st Avenue	Greenburg Road	$230,000
H	McDonald Street	ORE 99W	Hall Boulevard	$200,000
H	Tiedeman Avenue	Walnut Street	Greenburg Road	$350,000
H	Oak Street (RTP 6019)	Hall Boulevard	80th Avenue	$500,000
H	ORE 99W	McDonald Street	South City Limits	$500,000
M	Bull Mountain Road	ORE 99W	Beef Bend Road	$1,200,000
M	Roshak Road	Bull Mountain Road	Scholls Ferry Road	$300,000
M	121st Avenue	Gaarde Street	North Dakota Street	$450,000
M	Hunziker Street	Hall Boulevard	72nd Avenue	$250,000
M	Washington Square Regional Center	Pedestrian Improvements (RTP 6022)		$6,000,000
L	Taylor's Ferry Rd	Washington Drive	62nd Avenue	$1,000,000
L	Washington Drive	Hall Boulevard	Taylor's Ferry Road	$200,000
			Subtotal	**$11,800,000**
Sidewalks to be built with Street Improvements				
H	Bonita Road	West of 72nd Avenue	72nd Avenue	$50,000
H	Walnut Street	135th Avenue	Tiedeman Avenue	$570,000
H	Gaarde Street	Walnut Street	ORE 99W	$620,000
H	Hall Boulevard	Scholls Ferry Road	Pfaffle Street	$1,000,000
H	Dartmouth Street	72nd	68th Avenue	$120,000
H	Tigard Street	115th Street	Main Street	$350,000
H	Burnham Street	Main Street	Hall Boulevard	$100,000
H	Fonner Street	walnut Street	121st Avenue	$250,000
H	Commercial Street	Main Street	Lincoln Street	$50,000
M	72nd Avenue	ORE 99W	Bonita Road	$1,200,000
M	Hall Boulevard	North of Hunziker Street	South City Limits	$670,000
M	Beef Bend Road	ORE 99W	Scholls Ferry Road	$1,000,000
M	Barrows Road	Scholls Ferry Road (W)	Scholls Ferry Road (E)	$950,000
L	72nd Avenue	Carman/Upper BoonesFry.	Durham Road	$250,000
			Subtotal	**$7,180,000**
	Annual Sidewalk Program at $50,000 per year for 20 years			**$1,000,000**
			Action Plan Total	**$19,360,000**

Bicycle Plan

- **Key Strategies**
  - Fill in gaps in bicycle network
  - Connect to key activity centers, schools, parks
- **Coordinated with adjacent jurisdictions**
- **Selected Framework Alternative**
- **Major Trails:**
  - Loop Fanno/Tualatin/Power
  - Tualatin River Crossing
  - Link to I-5/ORE 217 overcrossing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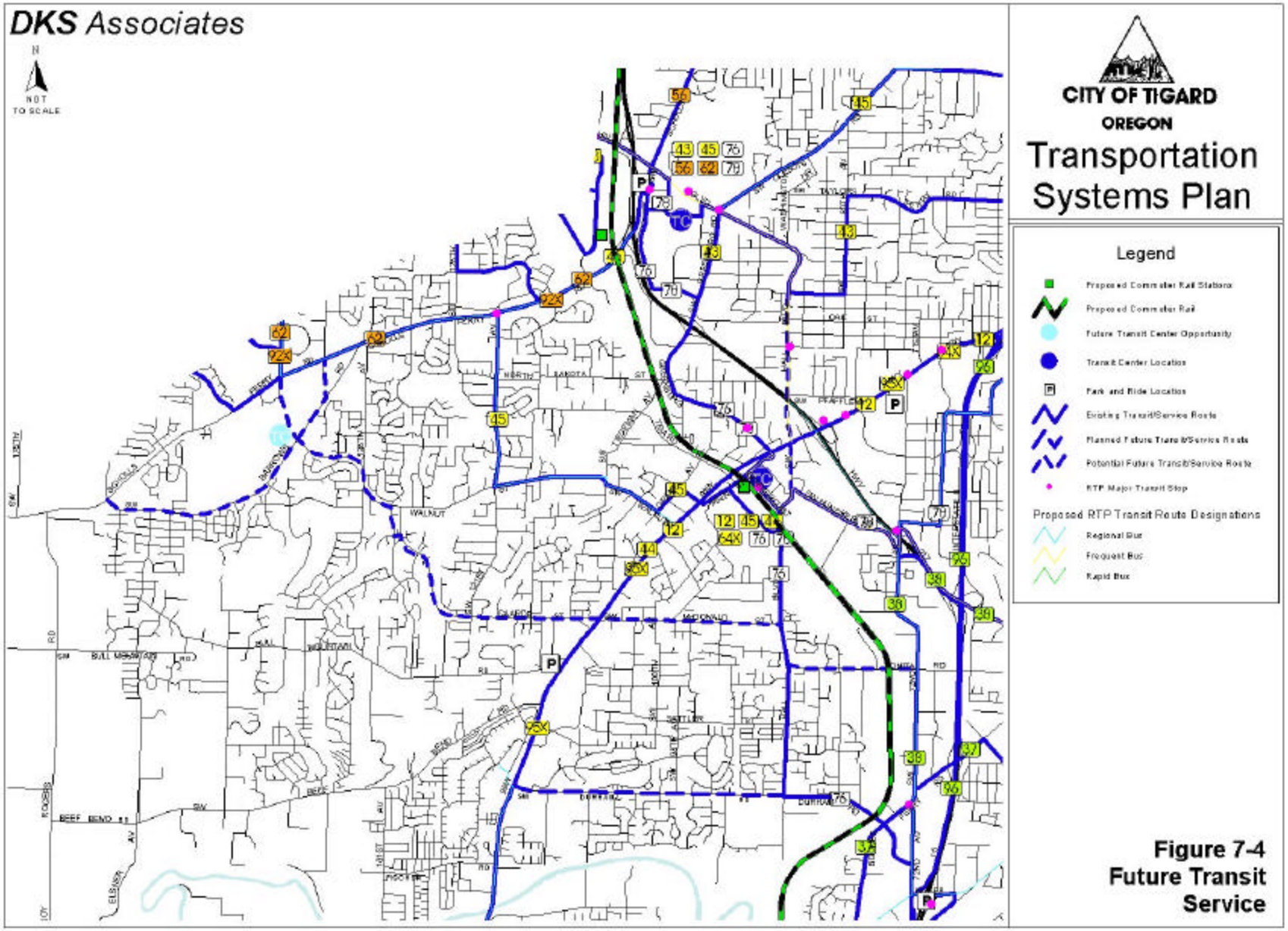
OREGON
Transportation Systems Plan
Legend
Parks
Bike Lanes
Existing
Proposed
Tigard Off-Street Multi-Use Paths
Proposed
Existing
THRPD Trails
Existing
Proposed
RTP Bicycle System Designations
Regional Corridor On-street Bikeway
Community Connector
RTP Regional Corridor Off-Street Regional Multi-Use Path
Existing
Proposed
Figure 6-2
BICYCLE MASTER PLAN
(Framework Option)

Bicycle Action Plan Improvement List and Cost

RANK*	Project	From	To	Cost
H	Hunziker Street	Hall Boulevard	72nd Avenue	$250,000
H	Bonita Road	72nd Avenue	West of 72nd Ave.	$50,000
H	Burnham Street	Main Street	Hall Boulevard	$135,000
H	Oak Street (RTP 6019)	Hall Boulevard	90th Avenue	$300,000
H	98th Avenue	Murdock Stret	Durham Road	$275,000
H	92nd Avenue	Durham Road	Cook Park	$270,000
H	Tiedeman Avenue	Greenburg Road	Walnut Street	$250,000
M	121st Avenue	Walnut Street	Gaarde Street	$400,000
L	Taylor's Ferry Road	Washington Drive	City Limits	$500,000
L	Washington Drive	Hall Boulevard	Taylor's Ferry Rd	$100,000
L	O'Mara Street	McDonald Street	Hall Boulevard	$275,000
L	Frewing Street	ORE 99W	O'Mara Street	$150,000
			Subtotal	**$2,955,000**
H	Gaarde Street	Walnut Street	ORE 99W	$600,000
H	Hall Boulevard	Scholls Ferry Road	Locust Street	$500,000
H	Greenburg Road	Hall Boulevard	Cascade Avenue	$300,000
H	ORE 99W	East City Limits	South City Limits	$1,300,000
M	72nd Avenue	ORE 99W	South City Limits	$960,000
M	Hall Boulevard	Pfaffle Street	Bonita Road	$550,000
M	Carman Drive	I-5	Durham Road	$200,000
M	Walnut Street	ORE 99W	Barrows Road	$1,400,000
M	Barrows Road	Scholls Ferry Road (W)	Scholls Ferry Rd. (E)	$900,000
L	Bull Mountain Road	150th Avenue	Beef Bend Road	$550,000
L	Beef Bend Road	ORE 99W	Scholls FerryRd.	$1,600,000
			Subtotal	**$8,860,000**
Multi- Use Pathways				
H	Hunziker Link to LO	Linkage to Kruse Way Trail in Lake Oswego		$500,000
M	Fanno Creek Trail	Tualatin River to City Hall, ORE 99W to Tigard		$3,600,000
M	Tualatin River Trail	Adjacent to Cook Park from Powerlines to Fanno		$2,600,000
M	Tualatin River Crossing	Near 108th Avenue		$3,000,000
L	Powerlines Corridor	From Beaverton to Tualatin River Trail		$2,500,000
			Subtotal	**$12,200,000**
		Action Plan Total		**$24,015,000**

Transit Plan

- **Key Strategies**
  - Commuter Rail
  - Provide more frequent service, more hours of day
  - Express routes
  - Circulator Service in Tigard
  - Transit Amenities
- **New Transit Center at Murray/Scholls**
- **New Service Coverage: Durham/Gaarde/Barrows/Bonita/Hall**
- **Complimentary Land Use Actions**
  - Transit Center/Rail Station Development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OREGON
Transportation Systems Plan
Legend
Proposed Commuter Rail Stations
Proposed Commuter Rail
Future Transit Center Opportunity
Transit Center Location
Park and Ride Location
Existing Transit/Service Route
Planned Future Transit/Service Route
Potential Future Transit/Service Route
RTP Major Transit Stop
Proposed RTP Transit Route Designations
Regional Bus
Frequent Bus
Rapid Bus
Figure 7-4
Future Transit
Service

Motor Vehicle Plan

CITY OF TIGARD
Transportation
System Plan

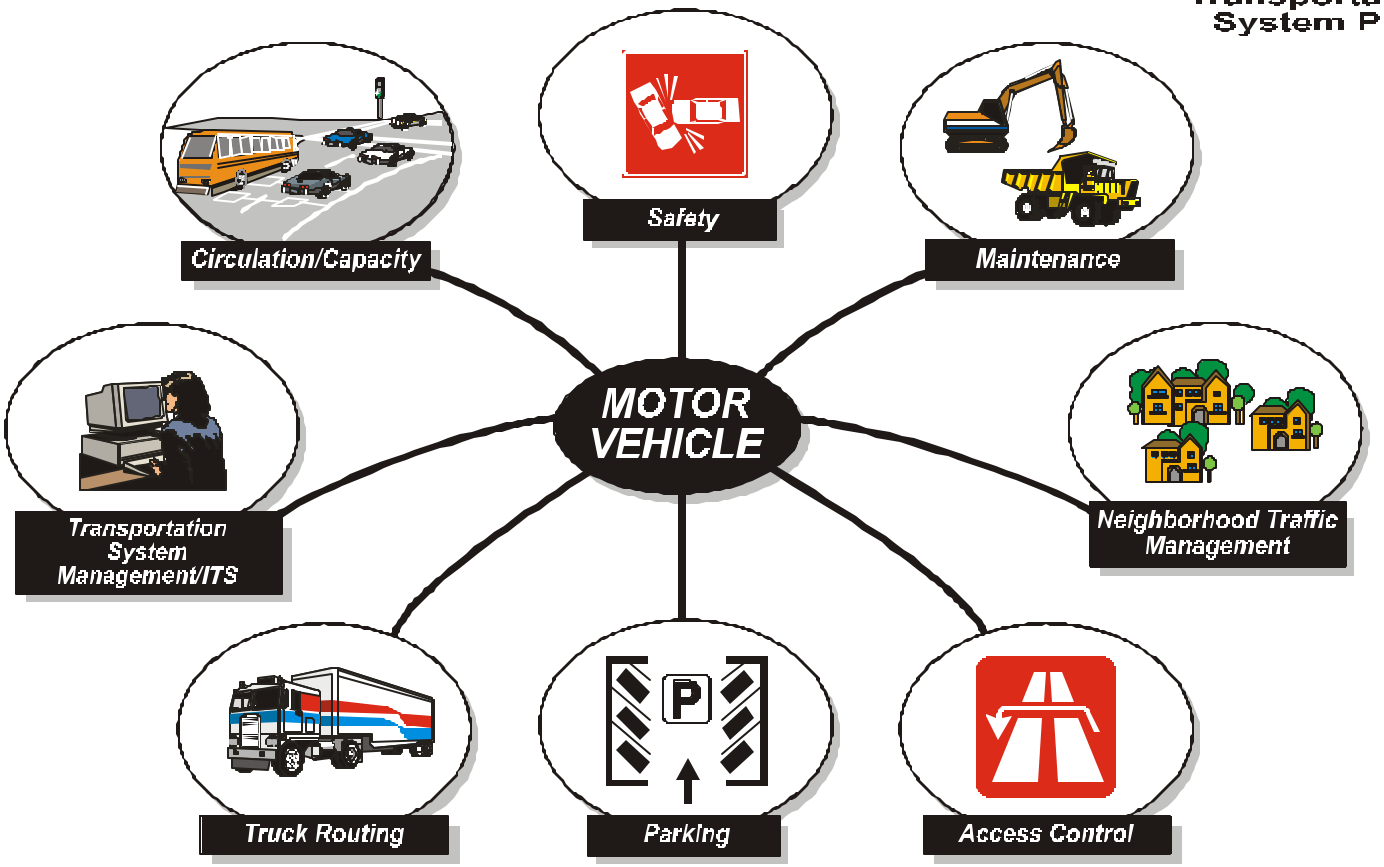
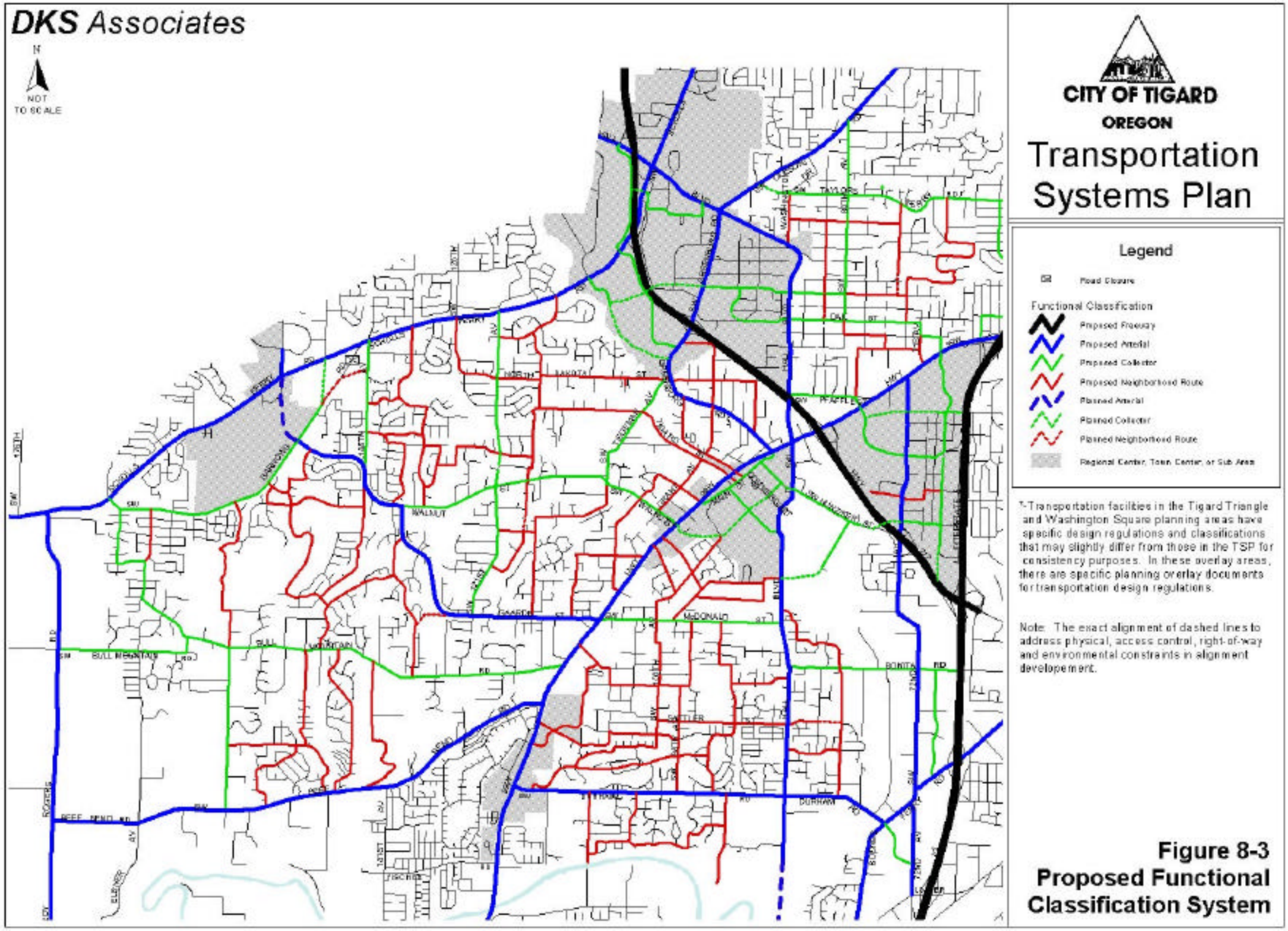


Figure 8-1
VEHICULAR ELEMENTS OF THE STREET PLAN

Functional Classification

CLASSIFICATION	EXAMPLE
• Freeways	• I-5/ORE 217
• Principal Arterials	• ORE 99W/Scholls
• Arterials	• Hall/Gaarde/Durham
• Collectors	• Walnut/Bull Mountain
• Neighborhood	• 130th/Watkins
• Local	• Cul-de-sacs/ redundant streets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Transportation Systems Plan
Legend
Road Closure
Functional Classification
Proposed Freeway
Proposed Arterial
Proposed Collector
Proposed Neighborhood Route
Planned Arterial
Planned Collector
Planned Neighborhood Route
Regional Center, Town Center, or Sub Area
1-Transportation facilities in the Tigard Triangle and Washington Square planning areas have specific design regulations and classifications that may slightly differ from those in the TSP for consistency purposes. In these overlay areas, there are specific planning or erlay documents for transportation design regulations.
Note: The exact alignment of dashed lines to address physical, access control, right-of-way and environmental constraints in alignment developement.
Figure 8-3
Proposed Functional Classification System

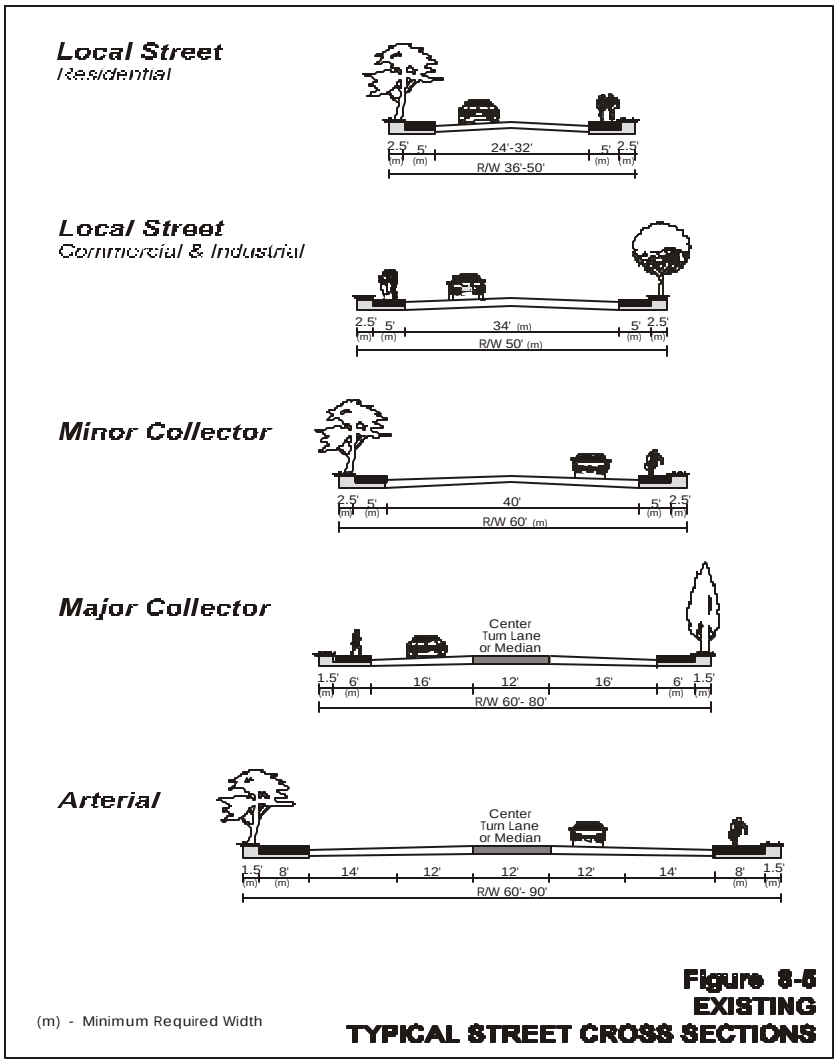

Figure 8-5
EXISTING
TYPICAL STREET CROSS SECTIONS

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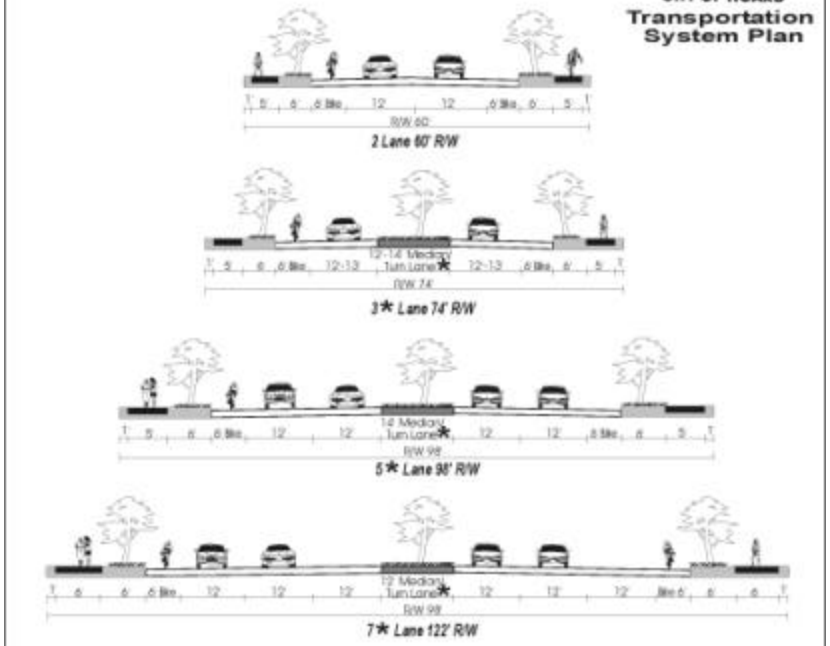
Transportation
System Plan

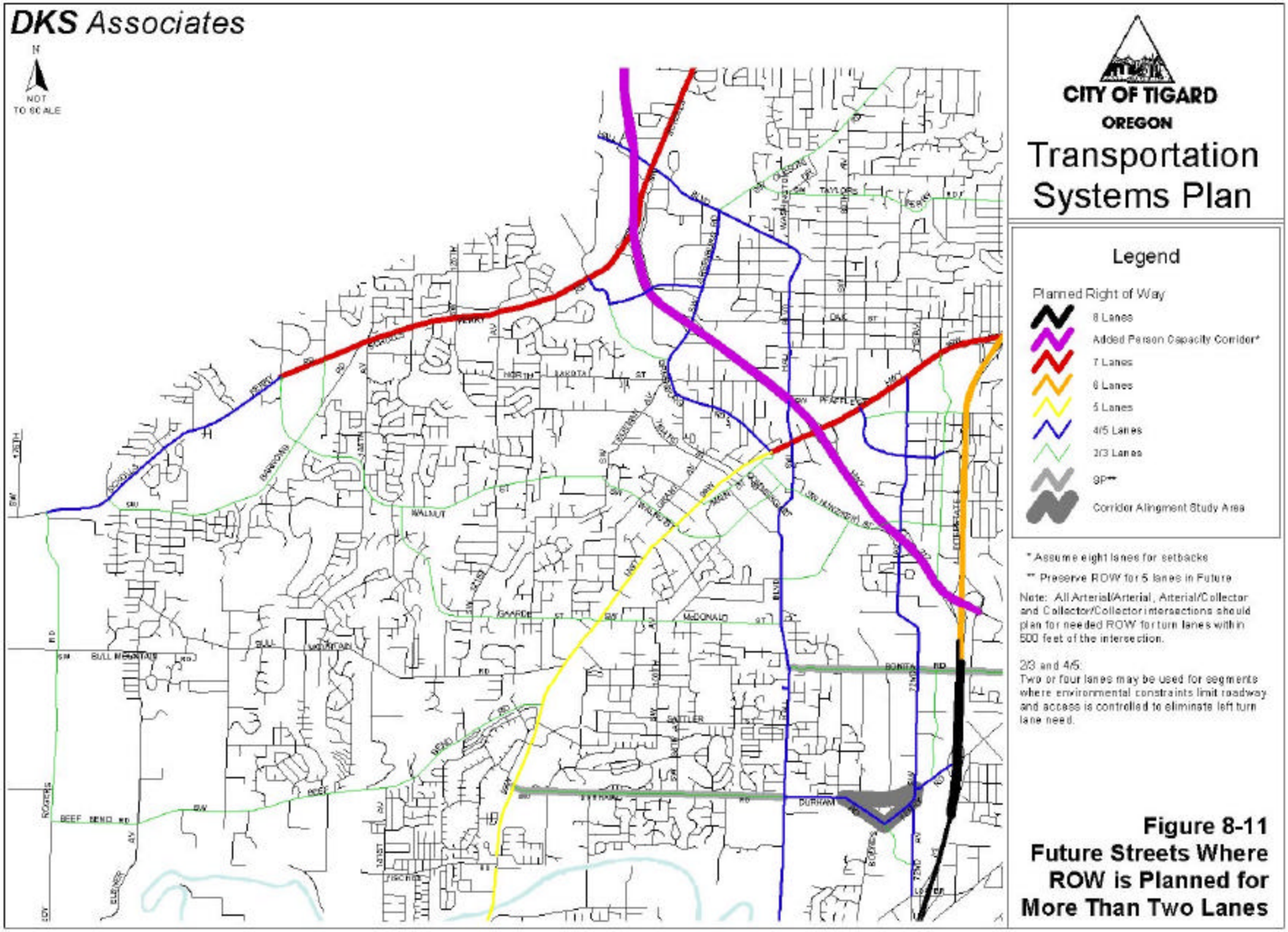


Criteria

Vehicle Lane Widths: (minimum widths)	Truck Route = 12 ft Bus Route = 12 ft 11 ft. (12 ft. Preferred)
Collector	10-11 ft.
On Street Parking:	None (with few existing exceptions)
Bicycle Lanes: (minimum widths)	New Construction = 6 ft. Reconstruction = 5 to 6 ft.
Sidewalks: (minimum width)	5-13 ft. Consider Curb Extensions on Ped Routes
Landscape Strips:	Required
Medians:	5/7 Lane = Required 3 Lane = Optional
Neighborhood Traffic Management:	Only Under Special Conditions: Selected Measures

★ Note that sidewalk widths above 6 ft. may require additional right-of-way. Where appropriate, the median/lane may not be provided resulting in 2,4 and 6 lane cross sections. The removal of the center turn lane must consider both safety and pedestrian needs.

Figure 8-10
ARTERIAL AND COLLECTOR
SAMPLE STREET CROSS SECTIONS
REQUIRED ROW WIDTH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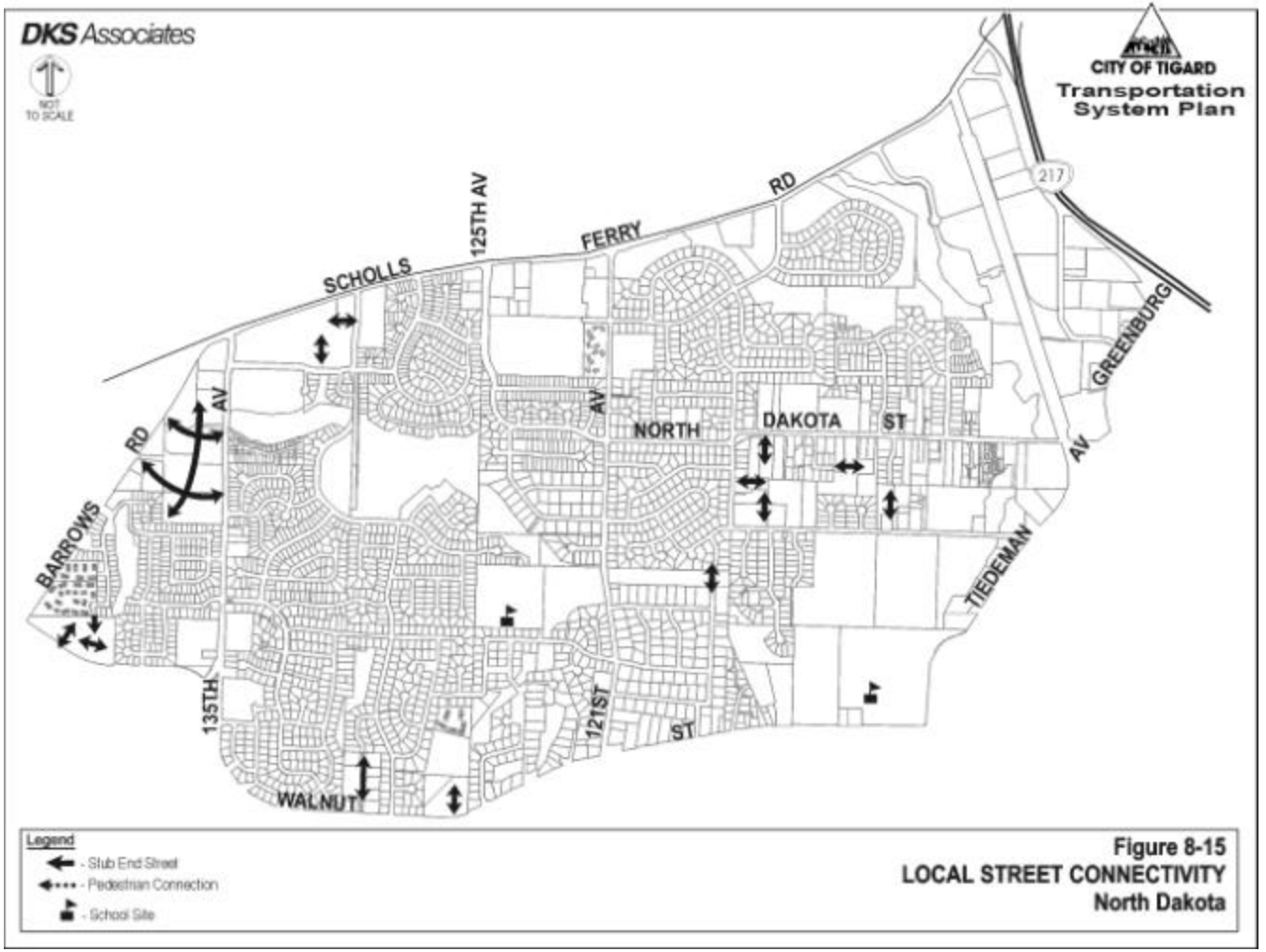
Transportation Systems Plan
Legend
Planned Right of Way
8 Lanes
Added Person Capacity Corridor*
7 Lanes
6 Lanes
5 Lanes
4/5 Lanes
2/3 Lanes
9P**
Corridor Alignment Study Area
* Assume eight lanes for setbacks
** Preserve ROW for 5 lanes in Future
Note: All Arterial/Arterial, Arterial/Collector and Collector/Collector intersections should plan for needed ROW for turn lanes within 500 feet of the intersection.
2/3 and 4/5:
Two or four lanes may be used for segments where environmental constraints limit roadway and access is controlled to eliminate left turn lane need.
Figure 8-11
Future Streets Where ROW is Planned for More Than Two Lanes

Local Connectivity Plans

North Dakota Example



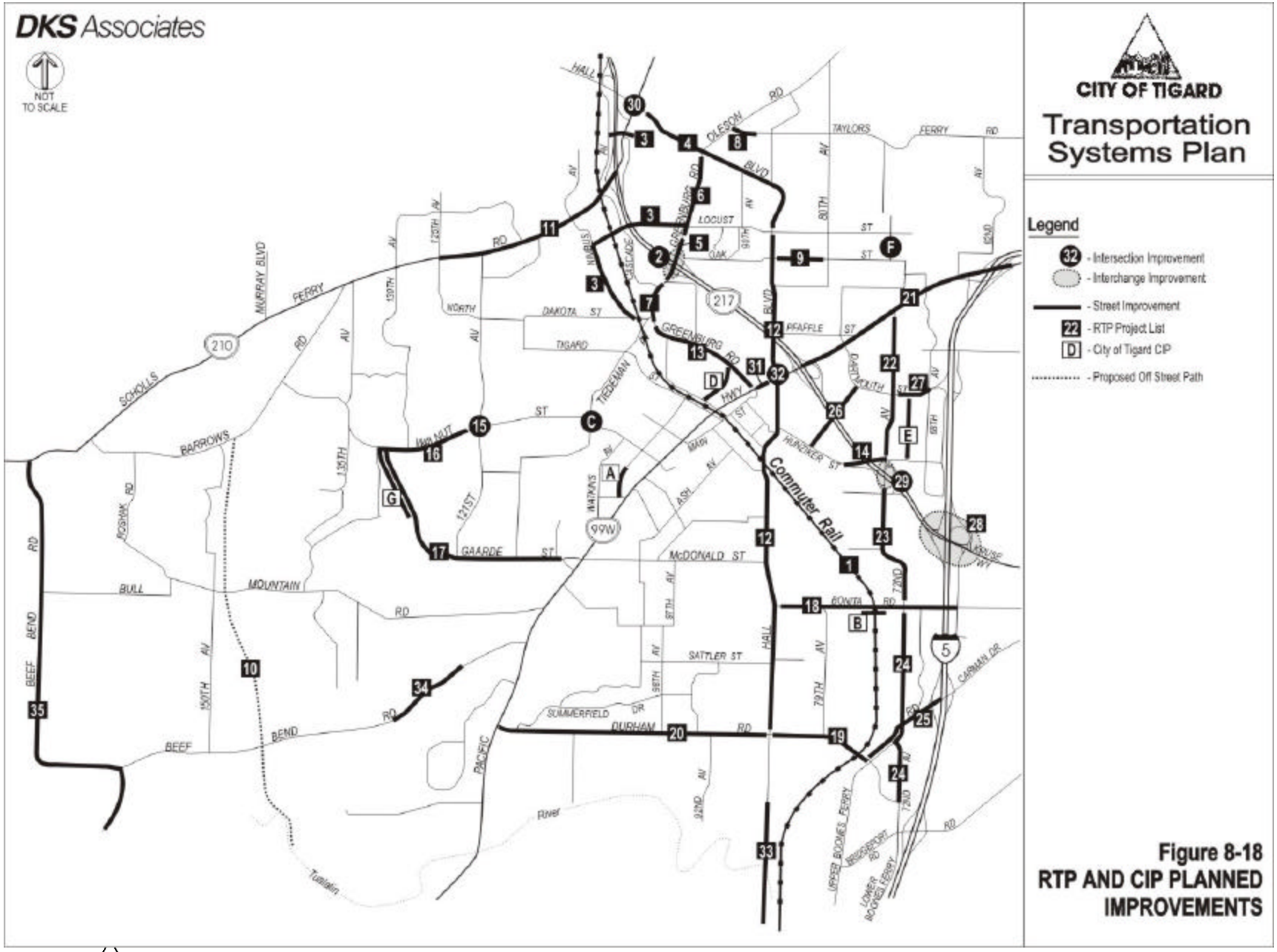
Capacity and Circulation

Key Issues

- **ORE 217 and I-5 are over capacity**
- **Tigard serves more ORE 99W through traffic in future**
- **ORE 99W fails in future**
- **Half of the traffic signalized intersection fail in 20 years assuming no improvements are made**

Key Solution Concepts for Tigard

- **Connectivity/Circulation Enhancement**
  - Washington Square
  - Tigard Triangle
  - Western Tigard
  - East/West
- **Traffic Operational Improvements**
  - Street Improvement Plan
  - Intersection capacity upgrades



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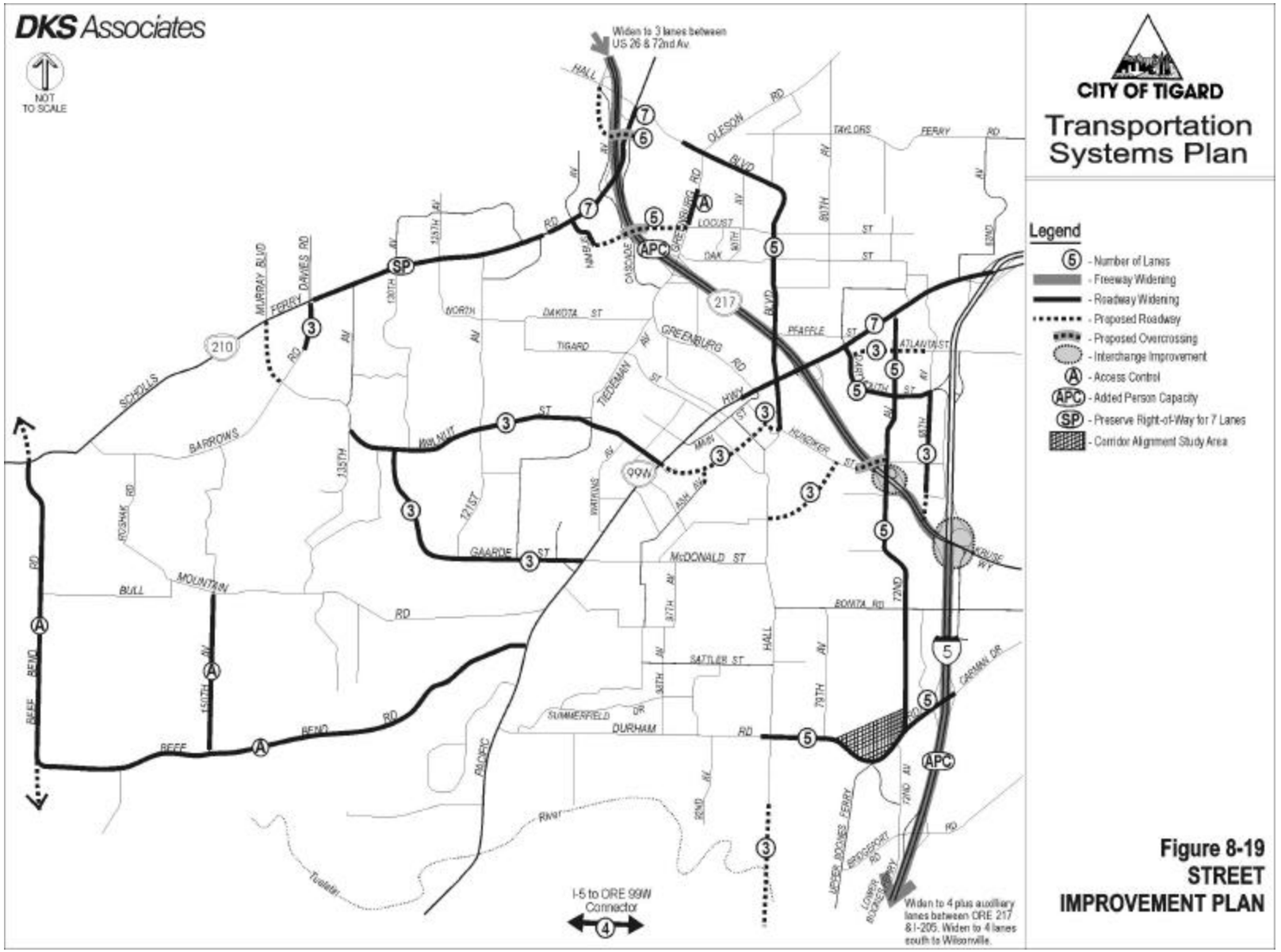

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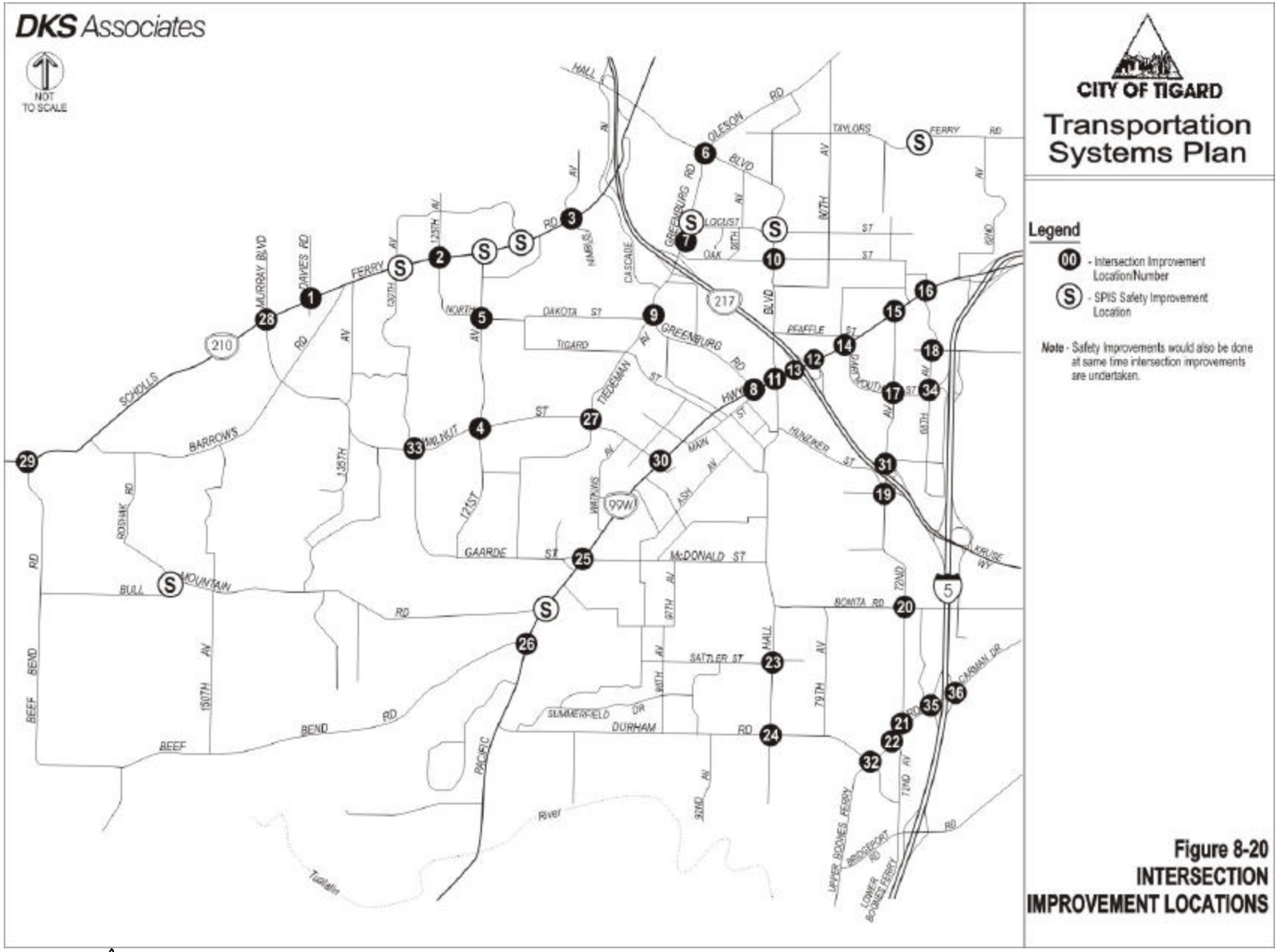

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Recommendations in the following areas:

- **Traffic Signals**
  - Master Plan
  - Coordination
  - ITS
- **Safety**
  - Upgrade record keeping to focus on hot spots
- **Access Management**
  - ORE 99W
  - Beef Bend
  - 150th

More Motor Vehicle Recommendations

- **Maintenance**
  - Continue Pavement Management System
  - Fund program to get rid of pavement reconstruction backlog
- **Neighborhood Traffic Management (NTM)**
  - Continue current city program
  - Incorporate NTM into new land use/road approvals
- **Parking**
  - Metro Maximums already adopted into code
- **Intelligent Transportation Systems**

More Motor Vehicle Recommendations

- **Trucks**
  - Route map
  - Truck Friendly design
- **Key Implementation Items**
  - Access Spacing, Traffic Signal Spacing
  - Level of Service
  - Street spacing/local connections
  - Neighborhood Impact
  - School Access Impact
  - Mixed Use Determination

Other Modes in TSP

- **Rail**
- **Air**
- **Water**
- **Pipeline**
- **Freight**

TDM Plan

- **Coordinate with Regional ECO programs**
- **Encourage the development of high speed communication to residents and businesses**
- **Mixed uses**
- **Park-and-ride**

Preliminary Cost Summary

Modes	20 year Costs
Motor Vehicle: ODOT	$900 M
Motor Vehicle: City	$250 M
Maintenance	$45 M
Commuter Rail	$75 M
Bicycle	$25 M
Pedestrian	$13 M

Why are these estimates so large?

Motor Vehicle

- **Significant new roadway connections and widenings**
- **Major regional needs in the vicinity of Tigard**

Ped/Bike/Transit

- **Commuter Rail**
- **Significant right-of-way and topography to establish bike lanes and sidewalks**
- **Lack of on-going programs for sidewalks,TDM, Traffic Signals**

Potential Transportation Funding

- **Over 20 years current programs would only fund $250,000,000**
- **Substantial shortfall due to regional nature of improvements**
- **Key sources of future funds:**
  - Bond Measures (local, MSTIP, regional)
  - Increase existing fees commensurate with needs (SDC)
  - Focus on high priority needs
  - Exactions
  - Roadway pricing

Steps Taken So Far to Get Here

- **TSP Task Force Approved TSP**
  Spring 2000
- **Planning Commission Approved TSP**
  Winter 2000
- **CIT & Public Open Houses- Nov 2000**
- **City Council Workshops- Nov 2000, March 2001, November 2001**
- **City Council Adoption - Early 2002**

How Can Your Comments be heard?

- **Comment on specific details of the draft plan and provide recommendations**
- **Attend hearings**
- **Review report on the web (www.ci.tigard.or.us)**
- **Call (639-4171), write or email the City**
- **Julia Hajduk (julia@ci.tigard.or.us)**
- **Gus Duenas (gus@ci.tigard.or.us)**

Chapter 2
Goals and Policy

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BACKGROUND

These goals and policies have been developed to guide the City's twenty year vision of transportation system needs. They are intended to replace the current transportation related goals and policies in the Tigard Comprehensive Plan (these can be found in the appendix of this report). Additionally, they build upon material developed in the visioning process from January, 1998[1]. State Transportation Planning Rule, Metro Functional Plan guidelines and the past comprehensive plan call for a more comprehensive and balanced approach to transportation policy, addressing walking, bicycling, transit, rail, truck and other modes as well as automobile travel.

These goals and policies are a result of widespread technical work by staff, Tigard Planning Commission, a Technical Advisory Committee and the consultant. Using input from the Planning Commission regarding their likes/dislikes about transportation in Tigard, goals and policies were developed.

The City of Tigard Draft Transportation System Plan (TSP) Goals and Policies consist of seven goals with related policies organized under each goal. The goals are simple, brief guiding statements which describe a desired result. The policies focus on how goals will be met by describing the types of actions that will contribute to achieving the goal. Figure 2-1 provides an outline of the relationship between goals, policies, actions and implementation. This Transportation System Plan addresses the top three elements identified in Figure 2-1. The existing City of Tigard goals in the Comprehensive Plan have been incorporated into these Goals and Policies, reflecting other regional policy from the state, region and adjacent jurisdictions.

Below many of the policies, the italic text represents a detailed description about the intent of the policy. While the italics provide the intent of the policy, they are not implementable as a land use action without inclusion in land use regulations.[2] The Draft TSP Goals and Policies are linked to mode maps provided in the City of Tigard TSP. The TSP includes master plan maps for motor vehicles, pedestrians, bicycles, transit and other modes.

In addition to the transportation related goals and policies, the goals & policies related to other elements of the Tigard Comprehensive Plan were reviewed in terms of both transportation and land use. Several modifications to these policies in other elements are also recommended.

---

1 *Tigard Beyond Tomorrow*, Community Vision—1st Annual Report, January, 1998.

2 ORS 197.175(2); ORS 197.195(1).

From Vision to Action
Tigard Transportation System Plan

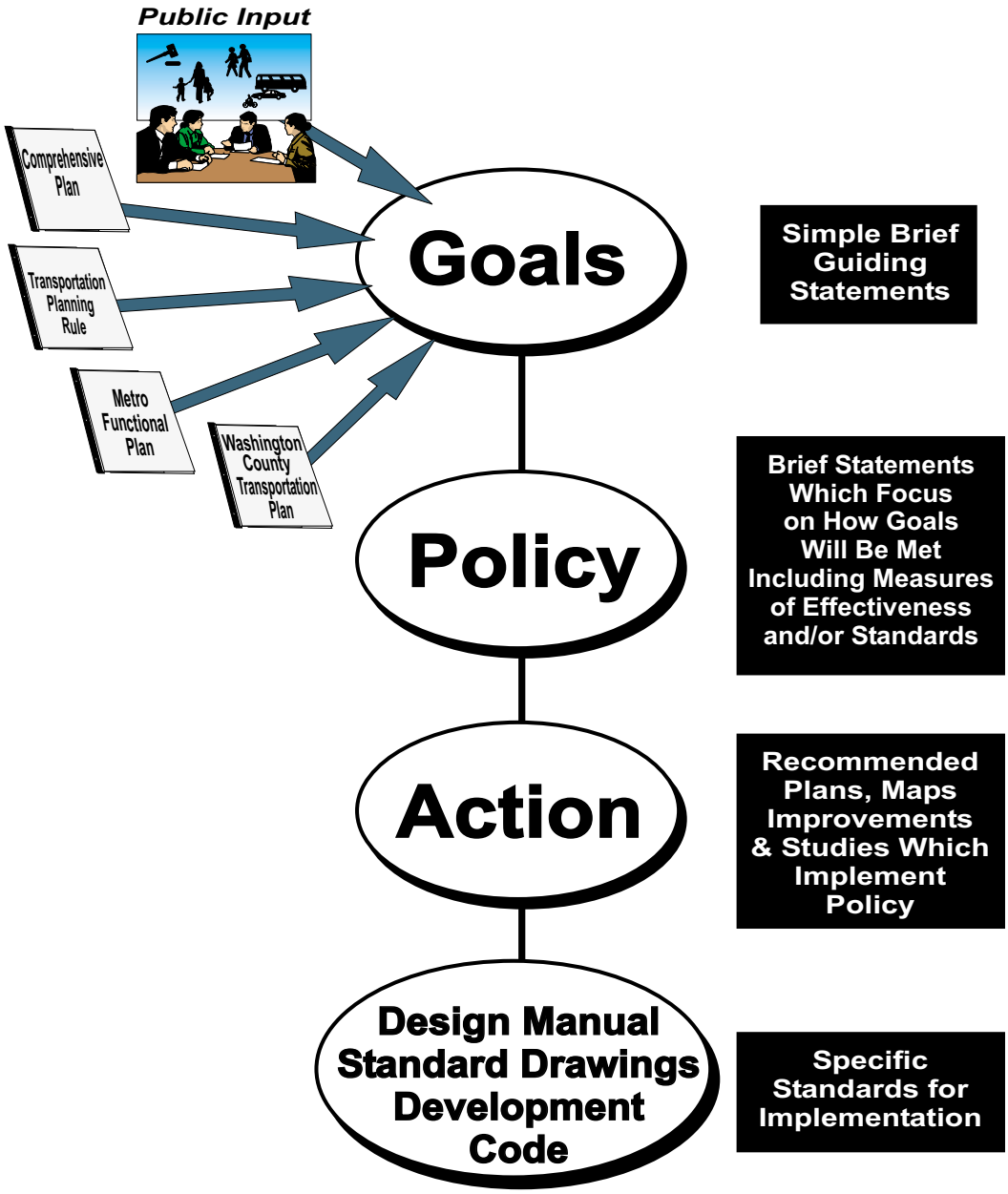


Figure 2-1
GOALS AND POLICIES RELATIONSHIP

GOALS AND POLICIES

Goal 1—Livability

Plan, design and construct transportation facilities in a manner which enhances the livability of Tigard.

Policy 1 Maintain the livability of Tigard through proper location and design of transportation facilities.

Design streets and highways to respect the characteristics of the surrounding land uses, natural features, and other community amenities.

Policy 2 Encourage pedestrian accessibility by providing safe, secure and desirable pedestrian routes.

The City will develop and maintain a pedestrian plan in Tigard, outlining pedestrian routes. Sidewalk standards will be developed to define various widths, as necessary, for City street types.

Policy 3 Address issues of excessive speeding and through traffic on local residential streets through a neighborhood traffic program. The program should address corrective measures for existing problems and assure that development incorporates traffic calming.

Develop and maintain a program of street design standards and criteria for neighborhood traffic management (NTM) for use in new development and existing neighborhoods. Measures to be developed may include (but not limited to) narrower streets, speed humps, traffic circles, curb/sidewalk extensions, curving streets, diverters and/or other measures, as developed as part of a City NTM plan.

Goal 2—Balanced Transportation System

Provide a balanced transportation system, incorporating all modes of transportation (including motor vehicle, bicycle, pedestrian, transit and other modes).

Policy 1 Develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way for utility, pedestrian, bicycle, transit, truck and auto use.

Develop and maintain a series of system maps and design standards for motor vehicles, bicycle, pedestrian, transit and truck facilities in Tigard.

Policy 2 The City shall coordinate with Tri-Met, and/or any other transit providers

serving Tigard, to improve transit service to Tigard. Fixed route transit will primarily use arterial and collector streets in Tigard. Development adjacent to transit routes will provide direct pedestrian accessibility.

The Regional Transportation Plan (RTP) and Tri-Met service plans will be the guiding documents for development of Tigard's transit plan. The City should provide input to Tri-Met regarding their specific needs as they annually review their system. This input should focus on improving service (coverage and frequency) to underserved areas. New transit service should be considered concurrent to street improvements when significant street extensions are completed. The City should encourage land intensive uses to locate near transitways and require high intensity uses (i.e. large employment, commercial sites) to provide transit facilities When bus stops reach 75 boardings per day, bus shelters should be considered in development review. Sidewalks should be available within ¼ mile from all transit routes and transit should be provided to schools and parks.

Policy 3 Bicycle lanes must be constructed on all arterials and collectors within Tigard consistent with the Bicycle Master Plan (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a bikeway.

The City will develop a bicycle plan which connects key activity centers (such as schools, parks, public facilities and retail areas) with adjacent access. Standards for bicycle facilities within Tigard will be developed and maintained. Where activity centers are on local streets, connections to bicycle lanes shall be designated.

Policy 4 Sidewalks must be constructed on all streets within Tigard (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a sidewalk.

The City will develop a pedestrian plan which connects key activity centers with adjacent access. Standards for pedestrian facilities within Tigard will be developed and maintained.

Policy 5 Bicycle and pedestrian plans shall be developed which link to recreational trails.

The bicycle and pedestrian plans will need to indicate linkages between recreational and basic pedestrian networks. A primary facility in Tigard should link together Fanno Creek, Tualatin River and the BPA right-of-way in the west of Tigard. Design standards for recreational elements will need to be developed and maintained.

Policy 6 Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel. Provide connectivity to activity centers and destinations with a priority for bicycle and pedestrian connections.

[3] *Planning and Design for Transit Handbook*, Tri-Met, January, 1996.

The purpose of this policy is to provide accessibility within Tigard, with a focus on pedestrian connectivity. Pedestrian connectivity can be provided via pedestrian/bike paths between cul-de-sacs and/or greenways where auto connectivity does not exist or is not feasible. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding. As a planning standard, require local streets to have connections every 530 feet in planning local and neighborhood streets.

Policy 7 Tigard will participate in vehicle trip reduction strategies developed regionally targeted to achieve non-single occupant vehicle levels outlined in Table 1.3 of the Regional Transportation Plan.

DEQ and Metro have developed regional policies regarding trip reduction. Some of these policies are aimed at provision of parking and others are aimed at ridesharing (Employee Commute Options—ECO rules).

Policy 8 Tigard will support the development of a commuter rail system as part of the regional transit network.

Tigard will support development of a commuter rail system connecting the south Metro area to the Beaverton/Hillsboro area, with stop(s) in Tigard.

Goal 3—Safety

Strive to achieve a safe transportation system by developing street standards, access management policies and speed controls when constructing streets, by making street maintenance a priority and through a comprehensive program of engineering, education and enforcement.

Policy 1 Design of streets should relate to their intended use.

A functional classification system shall be developed for Tigard which meets the City's needs and respects needs of other agencies (Washington County, Metro, ODOT). Appropriate design standards for these roadways will be developed by the appropriate jurisdiction.

Policy 2 Street maintenance shall be a priority to improve safety in Tigard.

The City shall place a high priority on routine street maintenance to preserve its infrastructure investment.

Policy 3 Safe and secure pedestrian and bikeways shall be designed between parks and other activity centers in Tigard.

Policy 4 Safe and secure routes to schools shall be designated for each school and any new residential project shall identify the safe path to school for children.

Working with the school district, citizens, and developers, the City should undertake a process of defining school routes.

Policy 5 Access management standards for arterial and collector streets shall be developed to improve safety in Tigard.

Guidelines will be developed to provide access control standards. These standards shall be applied to all new road construction and new development. For roadway reconstruction, existing driveways shall be compared with the standards and a reasonable attempt shall be made to comply (consolidating driveway accesses or relocating driveways to a lower classification street are examples).

Policy 6 Establish a City monitoring system that regularly evaluates, prioritizes and mitigates high accident locations within the City.

Review traffic accident information regularly to systematically identify, prioritize and remedy safety problems. Working with the County, develop a list of high collision sites and projects necessary to eliminate such problems. Require development applications to identify and mitigate for high collision locations if they generate 10% increase to existing traffic on an approach to a high collision intersection. Washington County's SPIS (Safety Priority Indexing System) could be used as a basis for determining high collision locations.

Policy 7 New roadways shall meet appropriate Lighting Standards. Existing roadways shall be systematically retrofitted with roadway lighting.

Priority locations for roadway lighting include paths to schools, parks, and town center areas. Local property owners fund lighting districts.

Policy 8 New development shall be required to provide safe access and to gain access from a publicly dedicated street (i.e. dedicate right-of-way, if not already on a public street in rough proportionality to the development's impact) and provide safe access.

Development will be required to provide right-of-way (if needed) and safe access as determined by application of the City's development code and standards for design. The minimum City standards must be met for half-street adjacent to developing property for a development to proceed. This policy applies to both pedestrians and motor vehicles.

Goal 4—Performance

Transportation performance measures shall be set and maintained by the City.

Policy 1 A minimum intersection level of service standard shall be set for the City of Tigard. All public facilities shall be designed to meet this standard.

Level of service E (and demand-to-capacity ratio of 1.0 or less), Highway Capacity Manual, Chapters 15, 16, and 17 (or subsequent updated references) is recommended to balance provision of roadway capacity with level of service and funding. ODOT, Metro and Washington County performance standards should be considered on state or county facilities and for 2040 Concept Areas (as defined in Table 1.2 of the Regional Transportation Plan). Monitor Metro and Washington County's current work to develop a

level of service standard.. The City will work to make the arterial & collector street system operate effectively to discourage "cut-through" traffic on neighborhood and local streets.

Policy 2 Parking ratios shall be set to provide adequate parking, while providing an incentive to limit the use of the single occupant vehicle.

Parking standards shall be listed in the development code for the City of Tigard. DEQ and Metro Functional Plan Title 2 encourages lower parking ratios to encourage use of alternative modes (walking, biking, transit, car pooling, etc.).

Policy 3 Work with other transportation providers in Washington County, including Tri-Met, Metro and ODOT to develop, operate and maintain intelligent transportation systems, including coordination of traffic signals.

Goal 5—Accessibility

Develop transportation facilities which are accessible to all members of the community and minimize out of direction travel.

Policy 1 Design and construct transportation facilities to meet the requirements of the Americans with Disabilities Act.

Policy 2 Develop neighborhood and local connections to provide adequate circulation in and out of the neighborhoods.

Work toward the eventual connection of streets identified on the plan as development occurs, as funds are available and opportunities arise. As a planning guideline, require residential streets to have connections every 530 feet for local and neighborhood streets.

Policy 3 Work with Washington County and ODOT to develop an efficient arterial grid system that provides access within the City, and serves through City traffic.

As outlined in Title 6 of the Metro Urban Growth Management Functional Plan, access connection standards will be developed. The arterial street system should facilitate street and pedestrian connectivity.

Goal 6—Goods Movement

Provide for efficient movement of goods and services.

Policy 1 Design arterial routes, highway access and adjacent land uses in ways that facilitate the efficient movement of goods and services.

Policy 2 Require safe routing of hazardous materials consistent with federal and state guidelines.

Work with federal agencies, the Public Utility Commission, the Oregon Department of Energy and ODOT to assure consistent laws and regulations for the transport of hazardous materials.

Goal 7—Coordination

Implement the Transportation System Plan (TSP) in a coordinated manner.

Policy 1 Coordinate and cooperate with adjacent agencies (including Washington County, Beaverton, Tualatin, Lake Oswego, City of Portland, Tri-Met, Metro and ODOT) when necessary to develop transportation projects which benefit the region as a whole in addition to the City of Tigard.

Maintain plan and policy conformance to the Regional Transportation Plan and Transportation Planning Rule (OAR 660-012). Seek compatibility with all adjacent county and city jurisdiction plans.

OTHER PLANS

The relationship of the TSP to other regional planning documents can be puzzle of acronyms, activities and plans. Figure 2-2 summarizes the transportation planning puzzle, identifying where the Tigard TSP fits within the on-going regional context of planning. Many of the most common planning initiatives and terms are reduced to acronyms, which are summarized below:

TPR - Transportation Planning Rule, Statewide Planning Goal 12 developed by Department of Land Conservation and Development (DLCD) to guide transportation planning in Oregon.

OTP - Oregon Transportation Plan, a federally mandated plan developed by Oregon Department of Transportation (ODOT) to guide statewide transportation development. Consists of several modal plans, developed separately.

OHP – 1999 Oregon Highway Plan, defines policies and investment strategies for Oregon's state highway system for the next 20 years. It further refines the goals and policies of the Oregon Transportation Plan and is part of Oregon's Statewide Transportation Plan. Standards for access management on state highways is clearly defined as adopted May 1999.

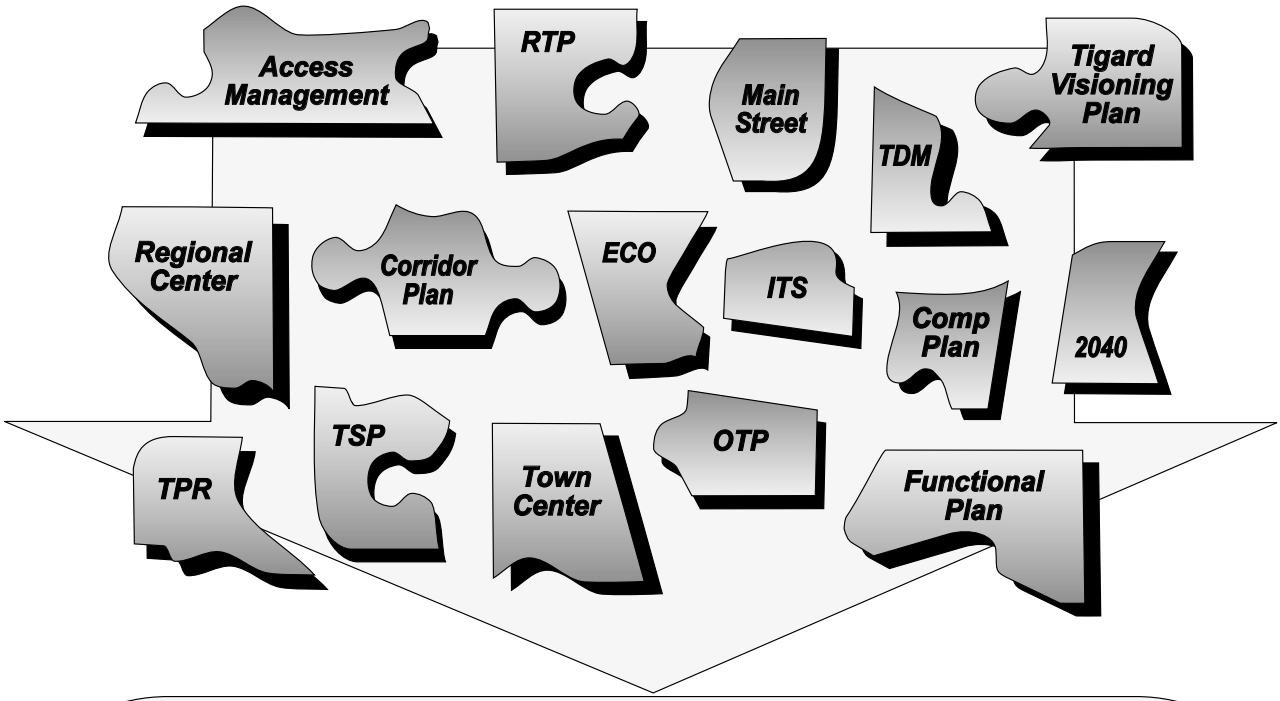
RTP - Regional Transportation Plan, developed by metropolitan planning organizations (MPO) to guide regional transportation investment, required to secure federal funding. In Portland this task is performed by Metro (Metropolitan Service District). Adopted August 10, 2000.

TSP - Transportation System Plan, a requirement of the TPR for cities and counties in Oregon to guide local transportation decisions and investments. (ORS 660-012-0015(3)).

Corridor Plan - ODOT transportation plans which focus on state transportation corridors to specifically outline needs, modes, strategies and effective investment.

City of Tigard Transportation Puzzle

CITY OF TIGARD
Transportation System Plan



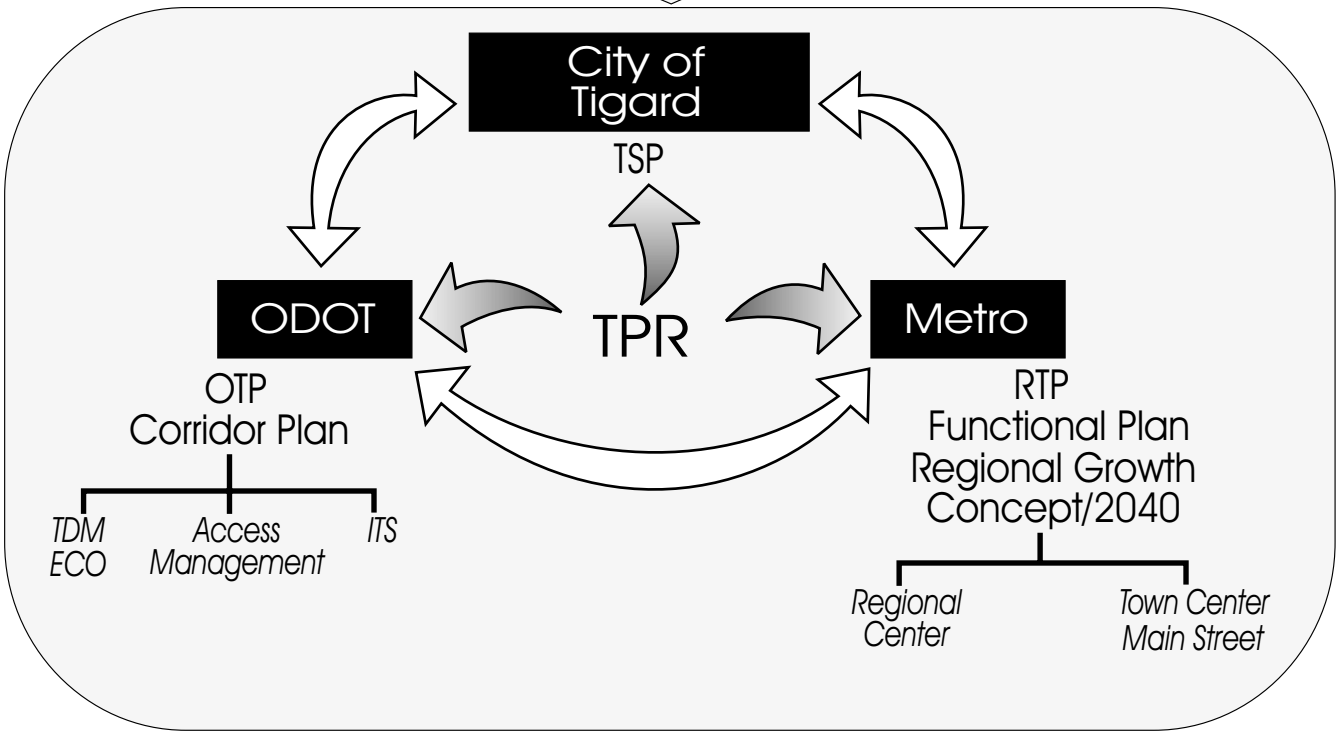


Figure 2-2
RELATIONSHIP OF TSP TO REGIONAL PLANNING

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Access Management - Methods to address improved safety and performance of state highways through control of access commensurate with facility needs.

ITS - Intelligent Transportation Systems. Use of advancing technology to improve movement of people and goods safely.

TDM - Transportation Demand Management. An element of the TSP, that includes a series of actions to reduce transportation demand during peak periods.

ECO - Employee Commute Options. An urban area TDM program required by Department of Environmental Quality (DEQ) of employers of 50 or more persons to reduce vehicle trips.

Functional Plan – A Metro adopted plan (November 21, 1996, updated September, 1998) which outlines mandatory criteria for evaluating transportation systems and land use, translating state and regional policy to local requirements necessary to implement the 2040 planning effort. Title 2 and Title 6 require that the City adopt changes to its land use regulations to address parking ratios, connectivity and level of service. Superceded by the Regional Transportation Plan.

Tigard Comprehensive Plan – This plan is a strategy to guide the City in the conservation, protection and development of the City of Tigard.

2040 - A long range effort directed by Metro to explore the choices for growth in the next 50 years and defining performance standards for local government to implement the regional growth concept. It defines several development types which will create higher density population and employment centers in the region. They are as follows:

- **Regional Center:** Compact centers of employment and housing served by high quality transit. They will become the focus of transit and highway improvements. Washington Square is identified as a regional center.
- **Town Center:** Provides for localized services within a 2-3 mile radius, with a community identity. There is a town center identified in the Main Street area and another identified near the intersection of ORE 99W and Durham Road.
- **Station Areas:** Development centered on LRT or high capacity transit, accessible by all modes.
- **Main Street:** Similar to town centers, an area with a traditional commercial identity, but smaller in scale, along a street with good transit services
- **Corridors:** Development along a primary and frequent transit corridor that encourages mixed use and pedestrian access to transit. ORE 99W, Scholls Ferry Road and Hall Boulevard have been identified as corridors in Tigard.

Chapter 3
Existing Conditions

CITY OF TIGARD
OREGON

This chapter summarizes existing traffic and transportation conditions in the City of Tigard. The focus is on motor vehicle, transit, pedestrian, bicycle and truck facilities. To understand existing travel patterns and conditions, a variety of aspects of the city's transportation system were considered. In the fall of 1994, an inventory of traffic conditions in Tigard was undertaken to establish a base year for all subsequent analysis. As refinements have been made to the regional land use forecasts over the past five years, conditions have changed. Current, up-to-date counts were conducted in 1997 and again in 1999 at many of the same intersections and at some additional intersections. This data collection update provides a unique opportunity to look at intersection level growth trends within the City over a period of approximately five years. Updated counts were conducted only at intersections, however, the remaining data summarized in this chapter would still apply to current conditions, including relative variation among routes, peaking characteristics, speed zones, high accident locations, bus routes, etc.

The following sections briefly describe existing roadway functions, circulation, traffic speeds and volumes and levels of service in the Tigard transportation system as well as existing pedestrian, bicycle and transit facilities.

STREET NETWORK

The Transportation Planning Rule requires that classification of streets within the City be provided. [1] The classification must be consistent with state and regional transportation plans for continuity between adjacent jurisdictions. The City of Tigard has an existing street classification system. This system is shown in Figure 3-1.[2] The number of lanes on roadways in Tigard are shown in Figure 3-2. Existing typical street cross-sections are shown in Figure 3-3.

1 *Transportation Planning Rule*, State of Oregon, Department of Land Conservation and Development, Section 660-12-020(2)(b), May 1991 (updated November, 1998).

2 *Comprehensive Plan: Transportation Map*, City of Tigard, Ordinance No. ORD-91-13, Map adopted June 11, 1991.

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CITY OF TIGARD

Transportation Systems Plan

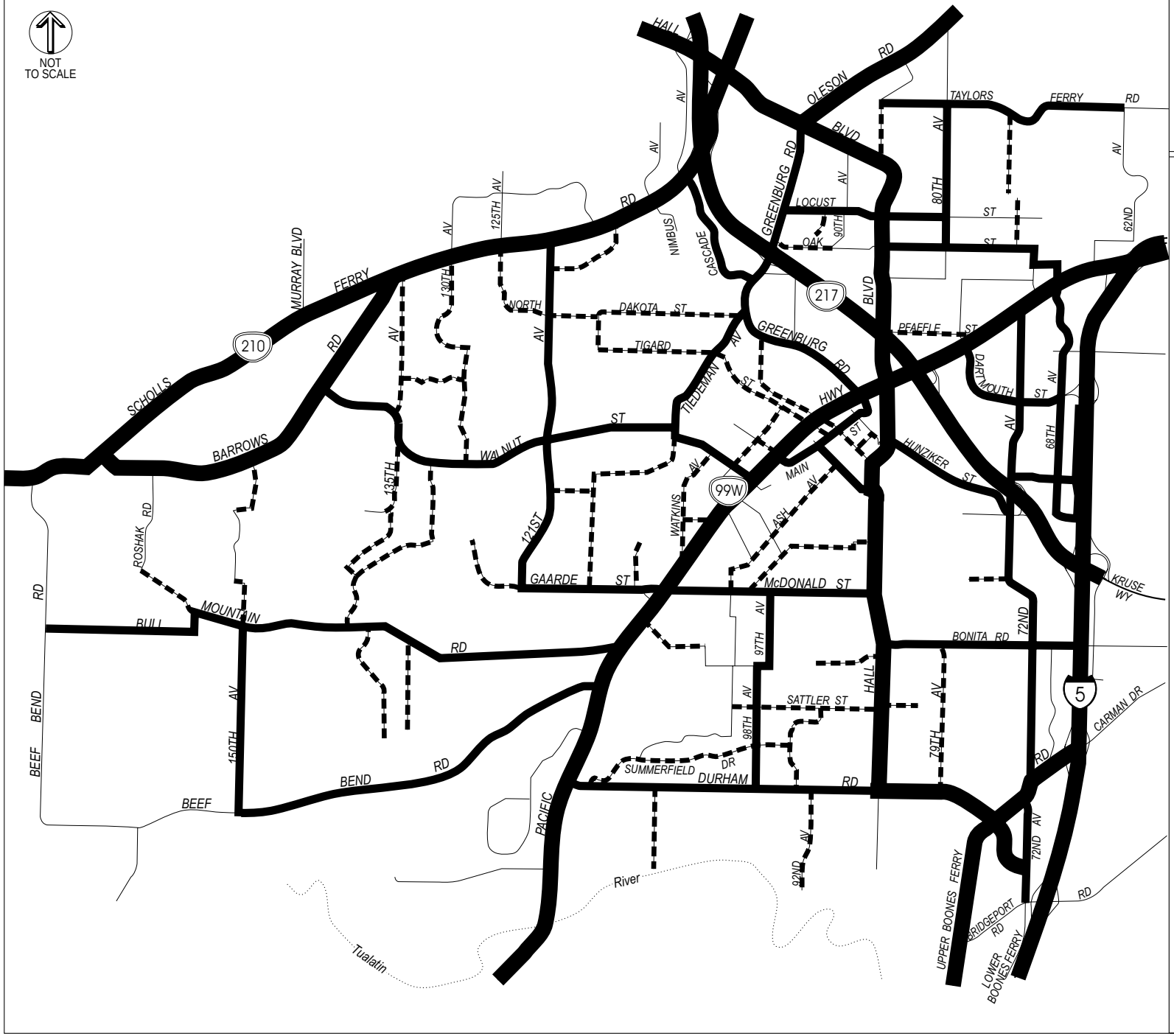

Figure 3-1
EXISTING FUNCTIONAL CLASSIFICATION

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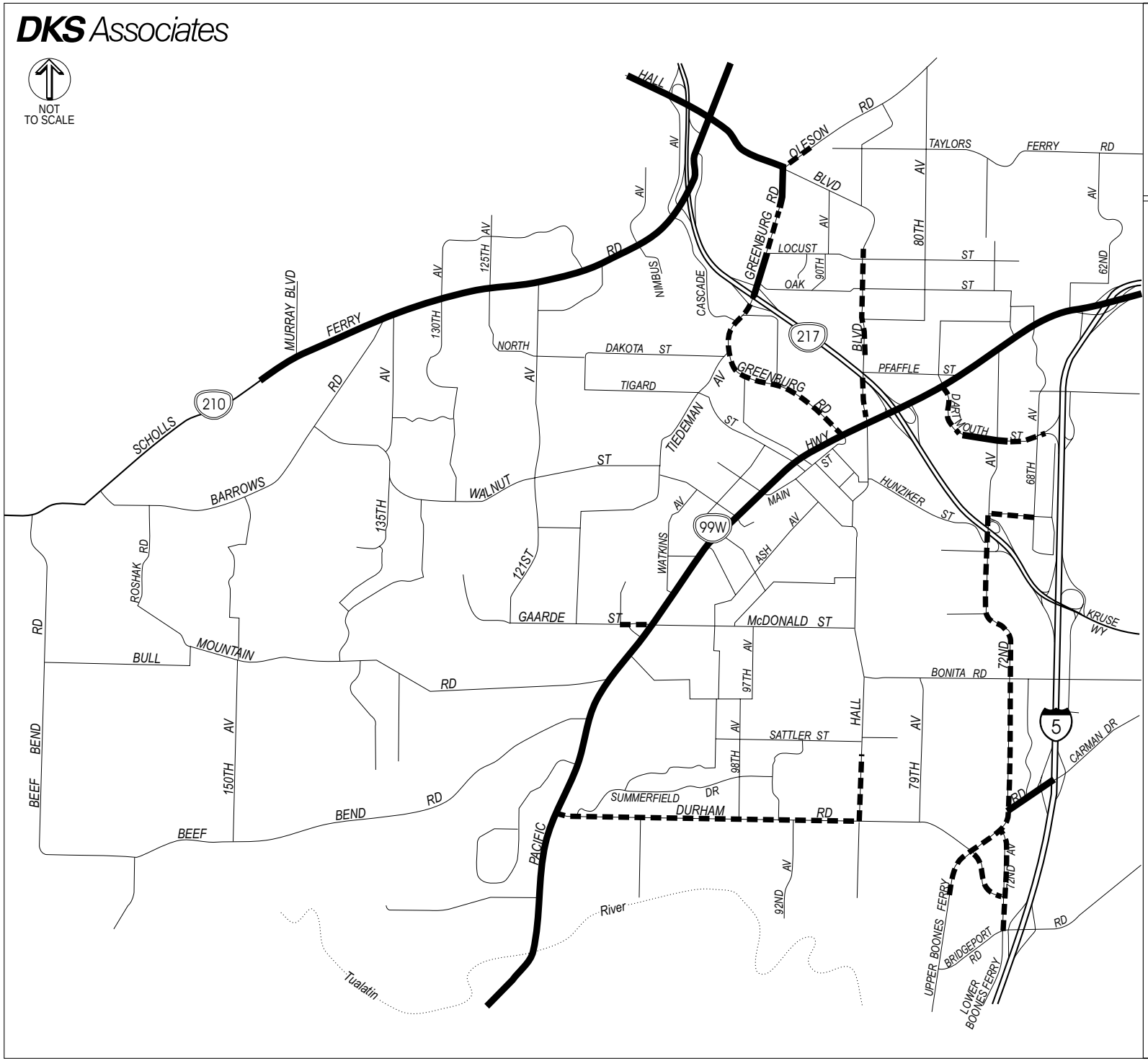

CITY OF TIGARD

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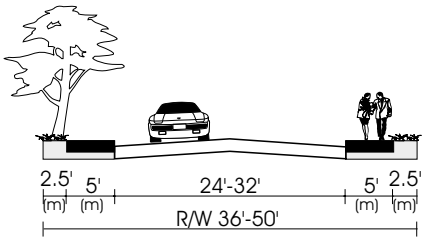
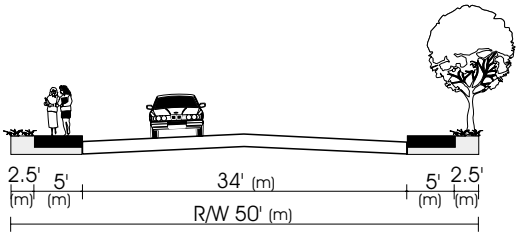
- 3 Lanes
- 5 Lanes

Figure 3-2
ROADWAYS WITH MORE THAN TWO LANES

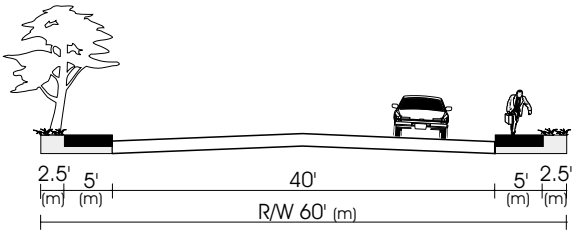
Local Street
Residential



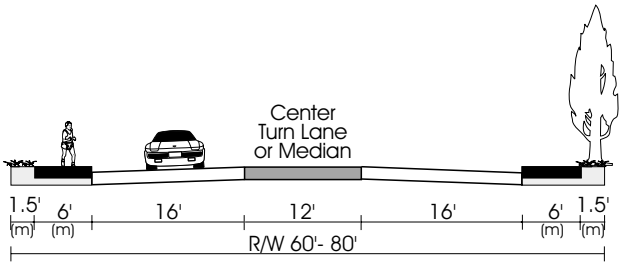
Local Street
Commercial & Industrial



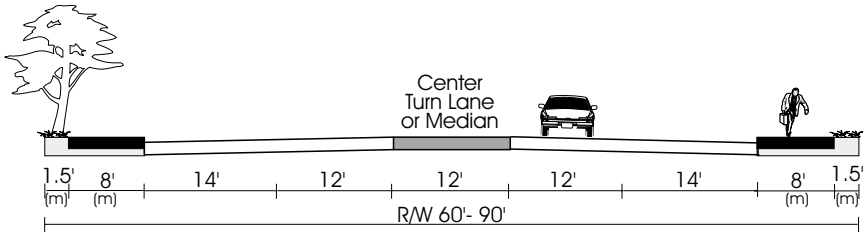
Minor Collector



Major Collector



Arterial



(m) - Minimum Required Width

Figure 3-3
EXISTING
TYPICAL STREET CROSS SECTIONS

Washington County roadway classifications are generally consistent with City of Tigard designations. The following table shows roadway segments where the classification differs between the two jurisdictions. A table summarizing functional classification of Tigard streets by other jurisdictions is shown in the appendix of this report.

Functional Classification Differences

Roadway	**Tigard**	**Washington County**
Greenburg Road	Major Collector	Minor Arterial
Scholls Ferry Road	Arterial	Major Collector

ODOT and **Metro** only classify roads that are of statewide or regional significance, respectively. These classifications are compatible with Tigard classifications, although the specific titles differ to some degree. ODOT and Metro classifications can be found in the Roadway Functional Classification According to Jurisdiction table in the appendix of this report.

TRAFFIC SPEED AND VOLUME

Speed zones on arterials and collectors within the City of Tigard are summarized in Figure 3-4. Speed zones are set by the Oregon's State Speed Control Board (SSCB). The SSCB is an independent board who sets speed zones for city streets, county roads and state highways passing through cities. The SSCB considers any factors such as roadway width, surface, lanes, shoulders, signals, intersections, roadside development, parking, accidents and 85th percentile speed. A decision made by the SSCB is not arbitrary or political, and is based on the considerations described above. Speed zones are set by the State of Oregon using an analysis process which considers the measured 85th percentile speed of traffic on a given roadway. Speed zones are not set arbitrarily or as part of a political decision.[3]

Vehicle speeds on several collector and residential streets are a concern for the community. As examples, streets such as Watkins and Bull Mountain Road are locations mentioned in discussions with the community. In most cases, speeding becomes very noticeable when it is above 35 miles per hour. Speeding can usually be expected on local streets which are wide and straight for long stretches or where downhill grades are extended.

A complete inventory of peak traffic conditions was performed in the fall of 1994 as part of the Tigard Transportation System Plan. The traffic counts conducted as part of this inventory provide the basis for analyzing existing problem areas as well as establishing a base condition for future monitoring. The City of Tigard conducted evening (4-6 PM) peak period turning movement counts at 30 locations to determine intersection operating conditions. Updated counts have been conducted in 1997 and in 1999 at many of these locations, plus a few additional locations, for a total of 62 intersections. Figure 3-5 shows the existing average daily and peak hour traffic volumes on several key routes in Tigard.

On a typical day, ORE 99W is the most heavily traveled street in Tigard. The segment near the ORE 217 ramps carries about 46,000 vehicles per day (two-way). Figure 3-6 shows average daily traffic (ADT) on several routes in Tigard and a comparison of traffic volumes on several routes over the period between 1994 and 1999.

[3] *Speed Zoning: Who Decides*, State Speed Control Board, April, 1992.

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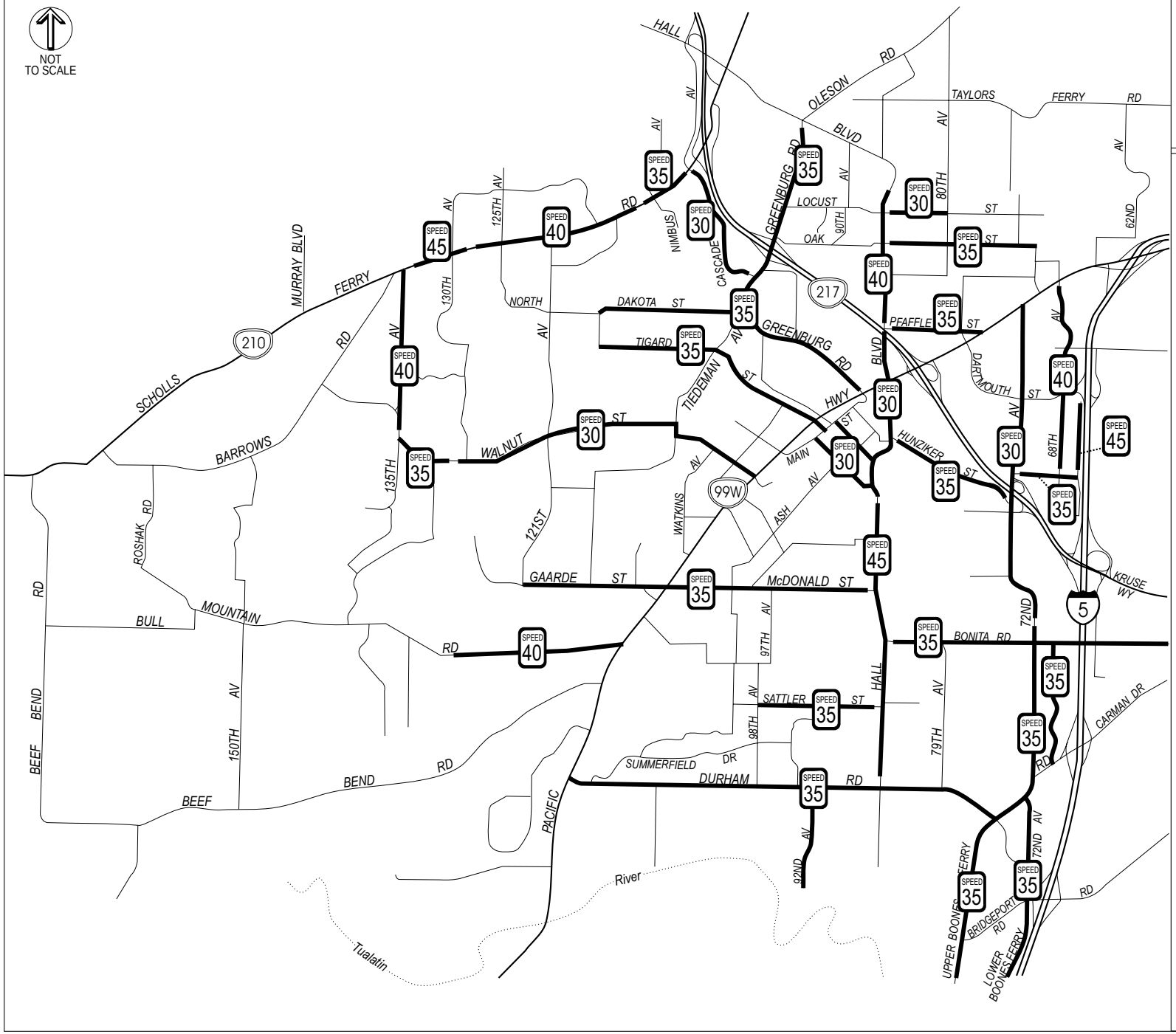

Figure 3-4
EXISTING SPEED ZONES

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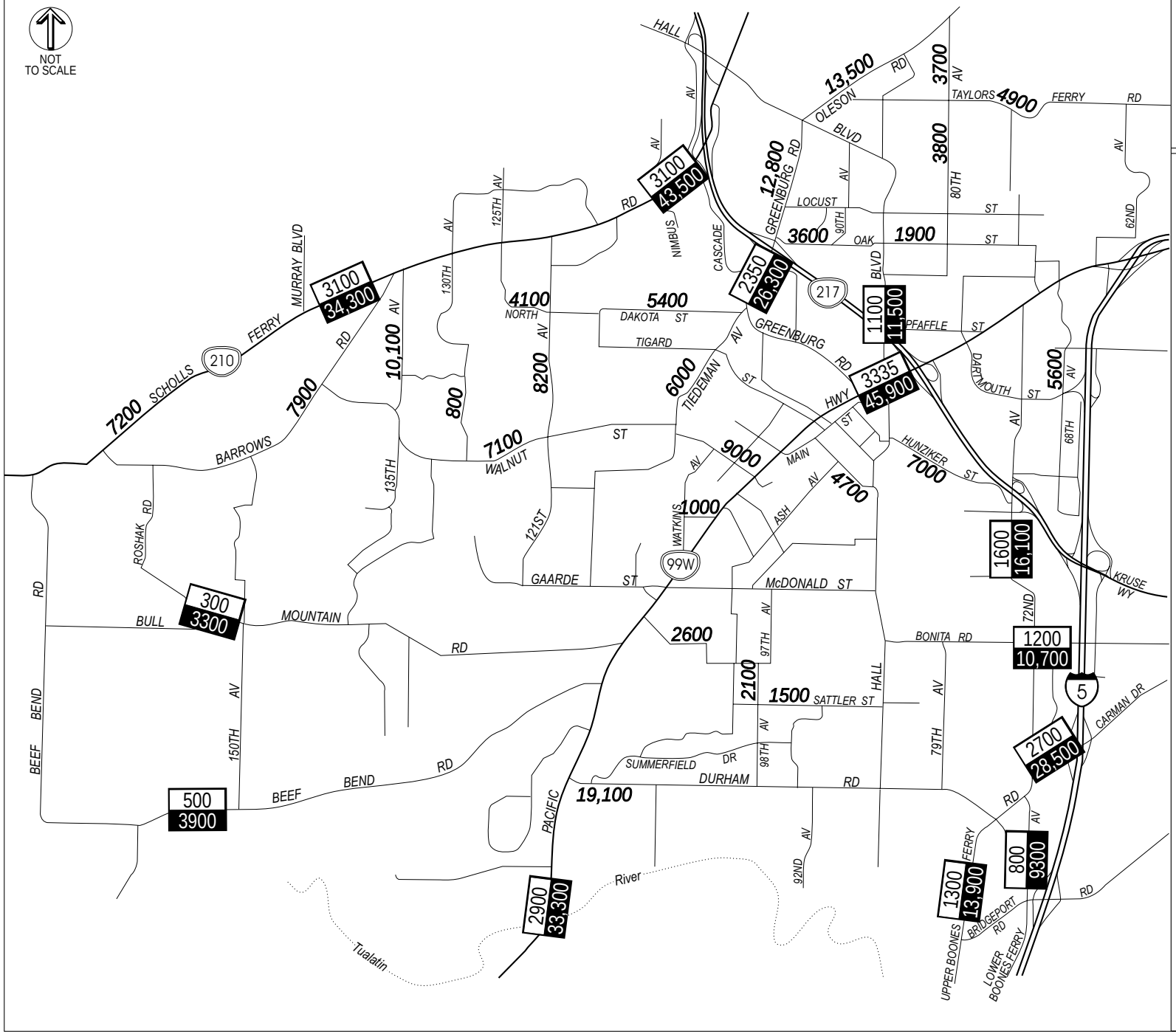

CITY OF TIGARD

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0000 - Peak Hour Volume

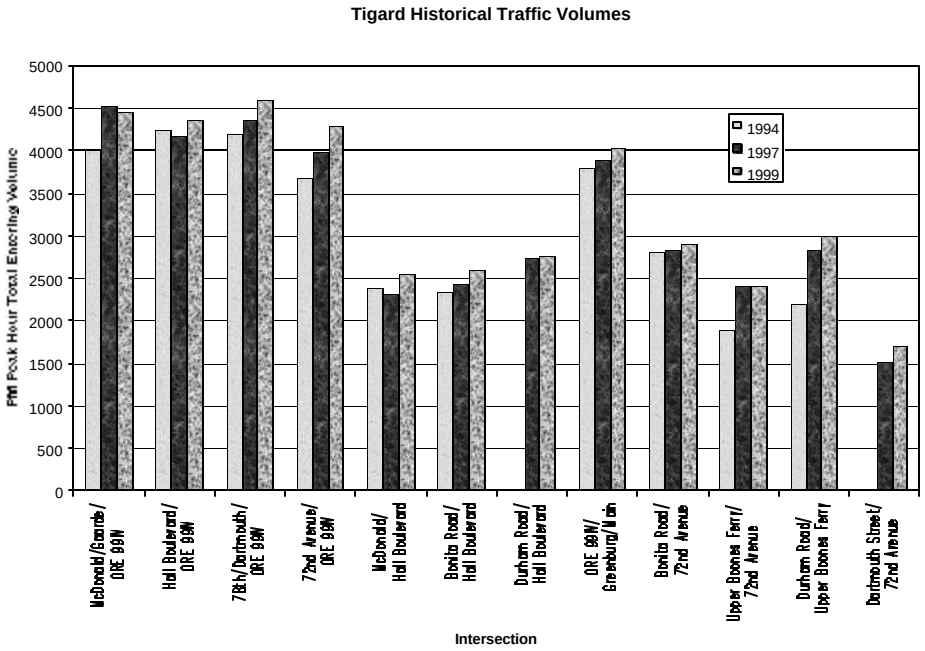
00,000 - ADT Volume

0000 - Daily Volumes from Previous Counts (1993 - 1994)

1999 Traffic Volumes

Street	Peak Hour Volume
Dartmouth Street	1,000
72nd Avenue (south of Dartmouth)	950
Hall Boulevard (north of Durham)	1,375
Durham Road (east of Hall)	2,050
Bonita Road	1,500
McDonald Street	975

Figure 3-5
EXISTING
TRAFFIC VOLUMES



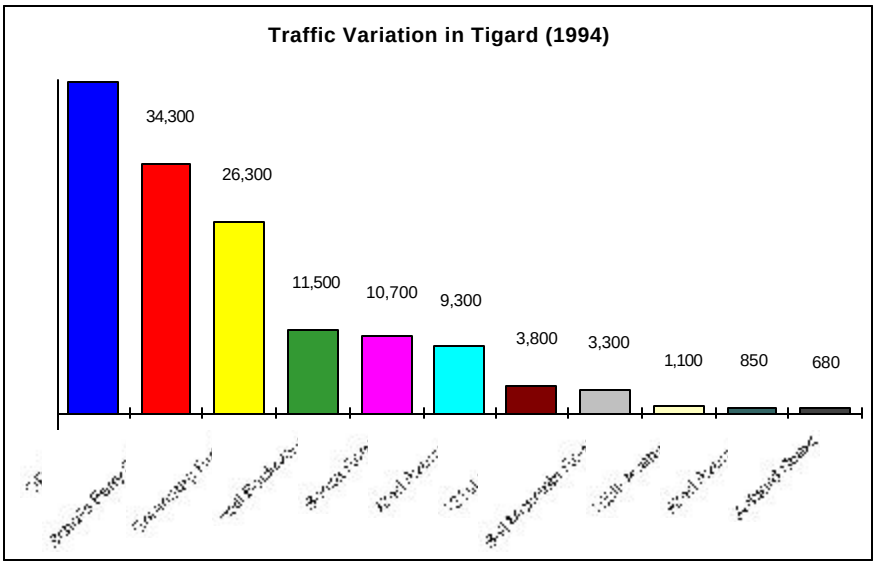


Figure 3-6
Traffic Volume Summaries

Traffic data collected over the course of this study illustrate the typical fluctuations of traffic over the course of a day (Figure 3-7). In particular, Figure 3-7a shows traffic volumes on ORE 99W, both at the south City Limits and near downtown Tigard. This figure demonstrates that morning and evening peak periods have similar characteristics in both locations, but that there is much more midday traffic in downtown than at the south City Limits. In Figure 3-7b, traffic volumes are shown for streets near retail areas of Tigard. These graphs show that traffic volumes generally tend to increase over the course of the day (through the evening peak period). In Figure 3-7c, streets showing typical residential and employment areas are shown. These streets generally tend to peak in the morning and evening peak (commute) hours.

COLLISIONS

Both the regional highway and regional retail facilities in Tigard tend to generate significant traffic incidents to which the police department routinely responds. The following four areas are all regional in nature and have the highest accident rates in the City:

- ORE 99W - In particular, the segment between Hall Boulevard and ORE 217. Many of the accidents are due to access issues or turning traffic (many driveways).

- ORE 217 - In particular, the segment between ORE 99W and I-5. Many of the problems here are related to merging traffic and rear-end accidents the end of the traffic queue.

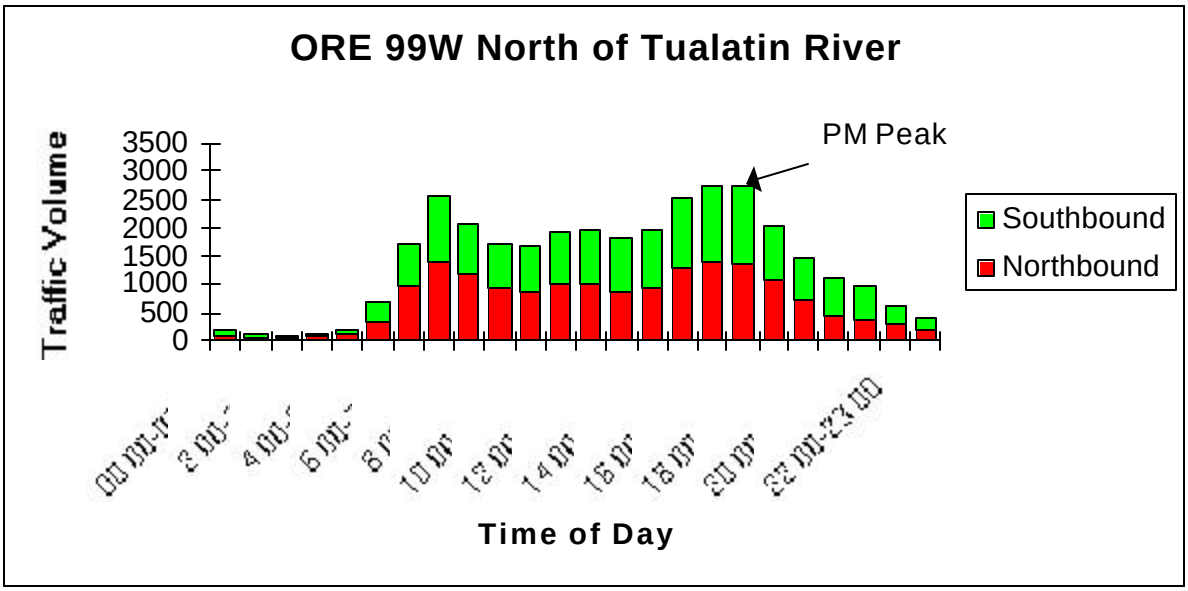
- Washington Square - In particular, on Greenburg Road between Locust Street and the ORE 217 ramps due to the large volume of vehicles, weaving and turning vehicles. The large number of people from outside the area traveling to shopping areas increases the number of system users who are not familiar with the circulation.

- Tigard Triangle (bounded by ORE 99W, I-5, ORE 217) - This is developing as a regional retail center, thereby increasing vehicle trips in the area. It is now experiencing similar "out of area" drivers to the Washington Square area. The accident rate has increased by 50 percent in the last two years.[4]

Recent accident data on state highways in Tigard was obtained from ODOT. This data indicates the following:

Route	*1996*	*1997*	*1998*	*Total (1996-1998)*
ORE 99W	323	276	284	883
I-5	47	57	71	175
Hall Boulevard	87	93	115	295
Scholls Ferry Road	9	32	22	63
ORE 217	165	141	132	438

[4] Per meeting with Tigard Police Chief Ron Goodpaster, February 14, 1995.



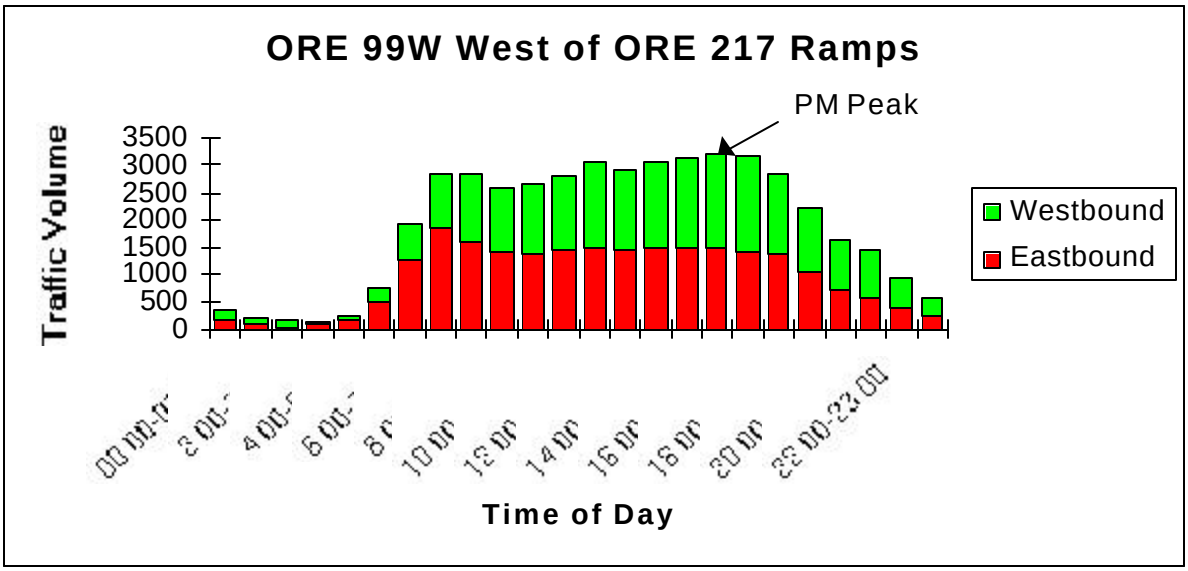
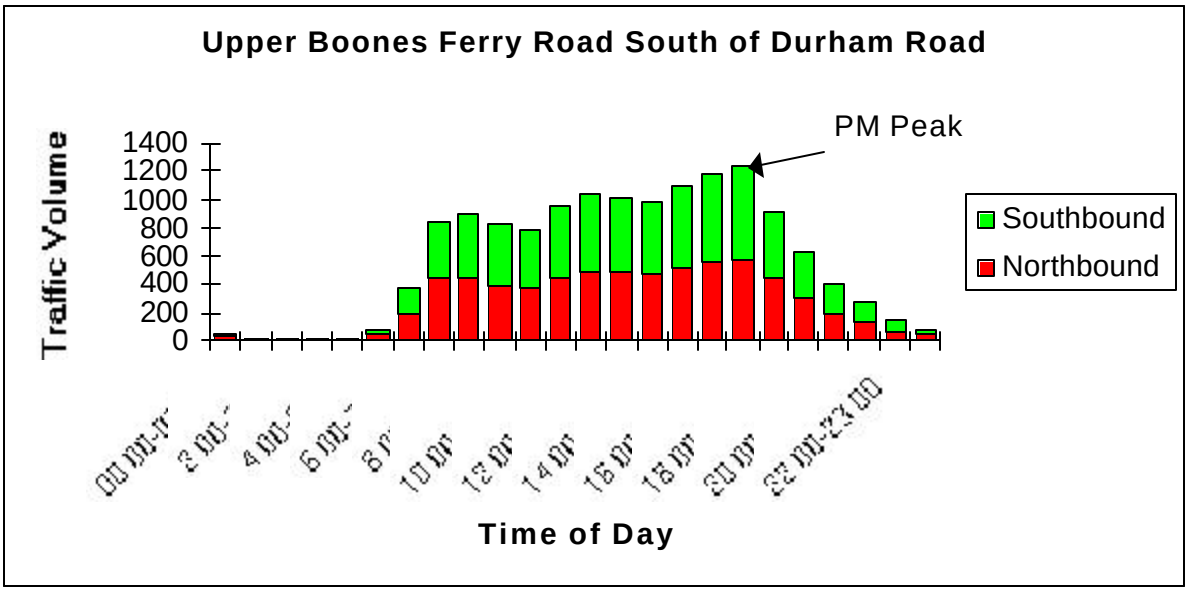


Figure 3-7a
ORE 99W (Hourly Traffic Variation in Tigard)



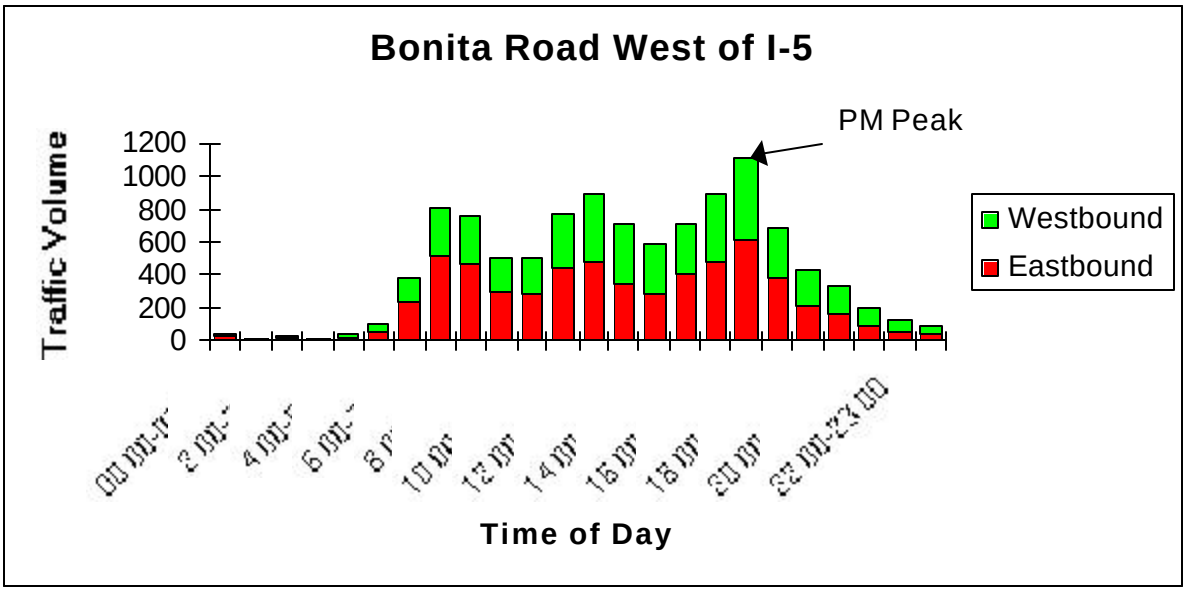
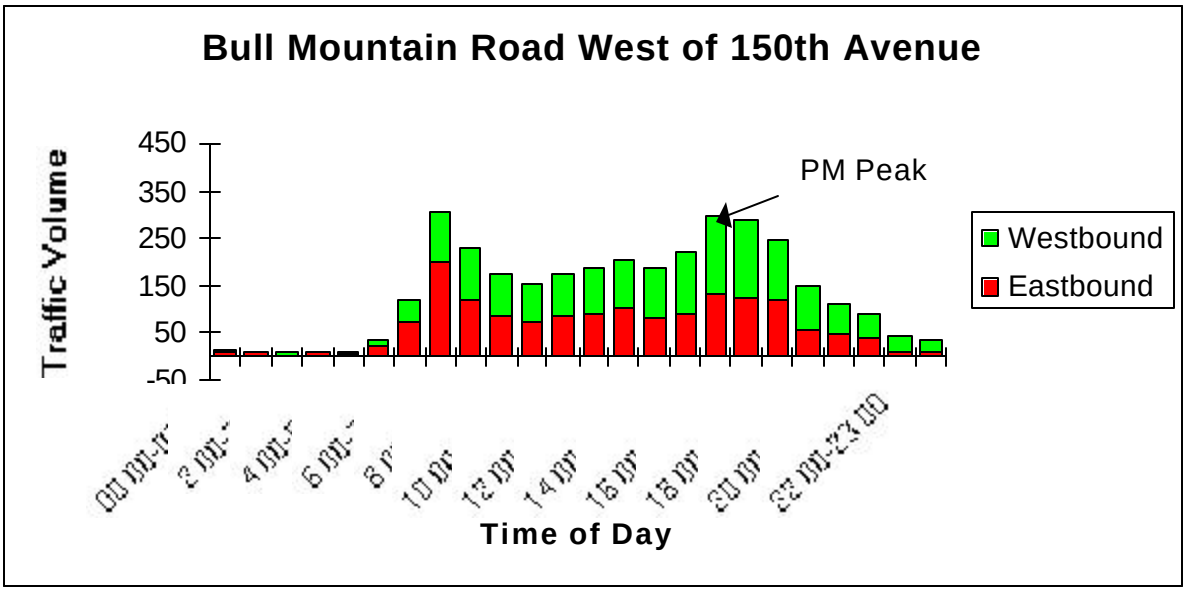


Figure 3-7b
Retail Areas (Hourly Traffic Variation in Tigard)



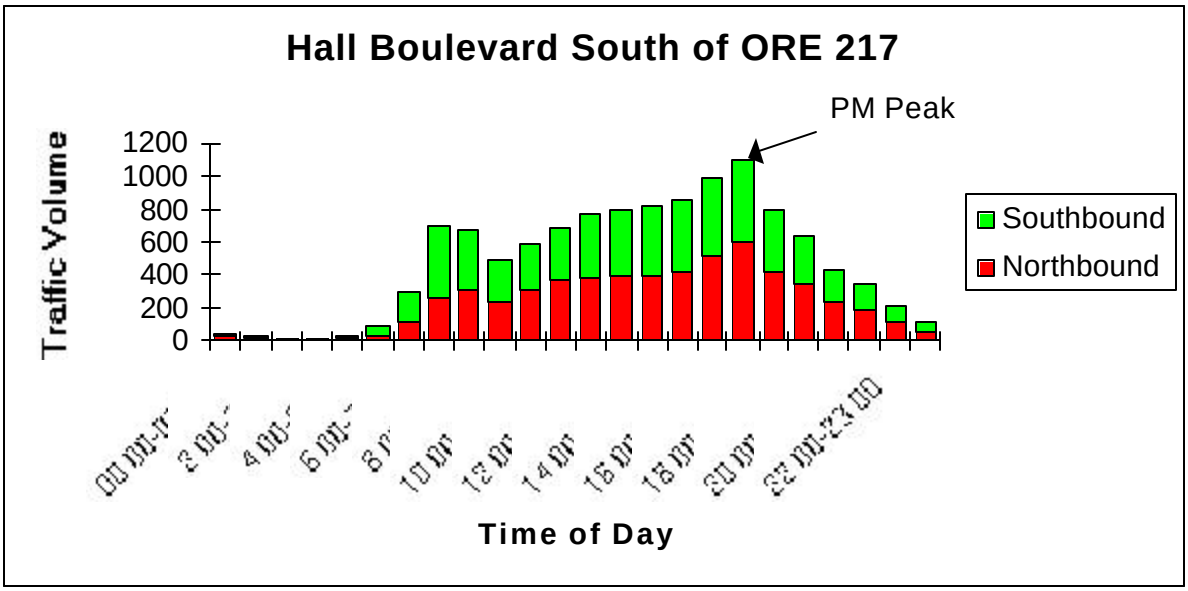


Figure 3-7c
Residential and Employment Areas (Hourly Traffic Variation in Tigard)

Washington County maintains a safety priority index system (SPIS) listing that ranks the high accident locations county-wide. SPIS number and rank are based upon the number, rate and severity of accidents at a particular location. The 1997-1999 is the most current listing. Table 3-1 lists the existing hazard locations as defined by the SPIS value for locations in Tigard for the last three SPIS periods (1994-1996, 1996-1998 and 1997-1999). Fourteen intersections have SPIS values above the threshold identifying existing hazard locations for the 1997-1999 listing produced by Washington County.

Table 3-1
Washington County SPIS Listing
1997-1999

RANK	type	LOCATION	INTERSECTING ROAD	ADT	**SPIS**	**#ACC**
9	co/city	Nimbus Ave/Dr	Scholls Ferry Rd	57877	**99.42**	50
33	co/state	Bull Mountain Rd	Highway 99w	45568	**71.15**	51
36	co/state	Beef Bend Rd	Highway 99w	45460	**69.06**	20
52	co/city	Boones Bend Dr/121st Ave	Scholls Ferry Rd	36158	**60.39**	30
74	co/city	Barrows Road (E)	Scholls Ferry Rd	31305	**50.40**	19
77	co/city	135th Avenue	Scholls Ferry Rd	30654	**49.74**	28
92	co/city	Greenburg Rd	Locust Street	15358	**46.48**	15
94	co/state	Greenberg/Oleson	Hall Blvd	34761	**45.03**	35
139	co/city	North Dakota St/125th Ave	Scholls Ferry Rd	34907	**37.08**	31
143	co/city	Conestoga Drive	Scholls Ferry Rd	38496	**36.31**	17
185	co/city	Taylors Ferry Rd	70th Ave	5957	**29.96**	3
191	co/state	Oak Street	Hall Blvd	16338	**29.45**	10
208	co/state	Locust Street	Hall Blvd	15195	**27.82**	11
218	co/city	130th Avenue	Scholls Ferry Rd	34773	**26.92**	10

SPIS Listing 1996-1998

RANK	type	LOCATION	INTERSECTING ROAD	ADT	**SPIS**	**#ACC**
3	co/state	Hall Blvd	Scholls Ferry Rd	45790	**141.95**	92
10	co/city	Nimbus Ave/Dr	Scholls Ferry Rd	52239	**105.59**	53
31	co/state	Beef Bend Rd	Highway 099w	45460	**74.69**	22
34	co/state	Bull Mountain Rd	Highway 099w	45840	**73.00**	52
38	co/city	Boones Bend Dr/121st Ave	Scholls Ferry Rd	36158	**68.80**	35
48	co/city	Scholls Ferry Rd	135th Ave	30654	**65.79**	30
84	co/state	Greenburg Rd/Oleson Rd	Hall Blvd	34761	**51.36**	39
124	co/state	Garland Rd	Highway 099W	34200	**41.33**	3
142	co/state	Fischer Rd	Highway 099w	38825	**37.42**	24
155	co/city	North Dakota St/125th Ave	Scholls Ferry Rd	34907	**35.55**	28
159	co/co	Old Scholls Ferry Rd (092 Ave)	Scholls Ferry Rd	16462	**35.00**	18
171	co/co	Beef Bend Rd	Bull Mountain Rd	12128	**33.47**	11
173	co/co	Old Scholls Ferry Rd	092nd Ave	620	**33.39**	4
184	co/city	Walnut St	124th Ave	9618	**32.06**	4
192	co/state	Boones Ferry Rd	Bridgeport Rd	23155	**31.25**	6
203	co/co	Scholls Ferry Rd	Scholls Sherwood Rd	8780	**30.17**	3
206	co/state	Hall Blvd	Locust St	15195	**29.32**	11
221	co/city	Scholls Ferry Rd	Springwood Dr	46757	**27.76**	10
249	co/city	Scholls Ferry Rd	130th Ave	34773	**24.52**	9

252	co/state	Hall Blvd	Oak St	16338	**24.23**	8
261	co/co	Walnut St	121st Ave	17165	**23.24**	10
262	co/co	Cedarcrest St	080th Ave	5295	**23.24**	5
264	co/city	Bridgeport Rd/Lwr Boones	072nd Ave	37023	**23.10**	11
267	co/city	Greenburg Rd	Mapleleaf St/WashSq Dr	24645	**22.83**	11
271	co/co	Beef Bend Rd	Elsner Rd	6710	**22.37**	6
288	co/city	Greenburg Rd	Locust St	14035	**20.71**	11
291	co/co	Barrows Rd	Roshak Rd	7108	**20.57**	6
339	co/co	Elsner Rd	Scholls Sherwood Rd	9315	**17.56**	5
342	co/co	Taylors Ferry Rd	080th Ave	10665	**17.17**	7
388	co/co	Scholls Ferry Rd	175th Ave	13375	**14.79**	5
400	co/co	Locust St	080th Ave	7445	**14.17**	3
427	co/co	Old Scholls Ferry Rd (GC)	Scholls Ferry Rd	16144	**12.64**	4
481	co/city	Walnut St	132nd Ave	11484	**9.98**	3
483	co/state	Highway 099w	Pacific Dr (s)	35782	**9.79**	3

Washington County SPIS Listing
1994-1996

						3 YEAR TOTALS					
TYPE	LOCATION	INTERSECTING ROAD	ADT	SPIS	RANK	#ACC	#VEH	F	A	B	C
co/state	Hall Blvd	Scholls Ferry Rd	44690	**56.48**	12	61	130	0	0	7	37
co/city	Nimbus Dr	Scholls Ferry Rd	41990	**47.57**	35	40	84	0	1	1	28
co/co	Beef Bend Rd	Scholls Ferry Rd	14495	**46.73**	42	21	39	0	3	5	4
co/city	Boones Bend Dr/121st Ave	Scholls Ferry Rd	36158	**45.81**	45	27	51	1	2	4	13
co/city	135th Ave	Scholls Ferry Rd	30654	**44.66**	54	25	53	0	3	2	9
co/city	Barrows Rd	Scholls Ferry Rd	15600	**43.53**	65	18	39	0	0	0	11
co/state	Bull Mountain Rd	Hwy 99W	41790	**42.93**	73	32	72	0	0	4	19
co/city	North Dakota St/125th Ave	Scholls Ferry Rd	34907	**42.55**	79	22	48	1	2	1	10
co/city	Greenburg Rd	Locust St	10690	**42.27**	83	11	23	0	1	2	1
co/co	Walnut St	121st Ave	14950	**41.48**	89	15	31	0	0	2	10
co/city	Greenburg Rd	Mapleleaf St/WashSq Dr	24645	**39.85**	104	21	43	0	0	1	10
co/co	Beef Bend Rd	Bull Mtn Rd	7320	**38.15**	122	9	19	0	0	3	11
co/state	Greenburg Rd/Oleson Rd	Hall Blvd	25650	**35.39**	155	16	35	0	0	2	10
co/co	Locust St	72nd Ave	2506	**34.83**	163	3	6	0	0	0	2
co/co	Locust St	80th Ave	7445	**32.75**	189	4	8	0	0	4	0
co/state	Beef Bend Rd	Hwy 99W	40260	**32.54**	193	16	33	0	0	5	9

Source: Washington County. R&O 86-95 defines determines existing hazard locations to be SPIS greater than 32.24.
Key: SPIS = Safety Priority Index System, ADT = Average Daily Traffic, Rank = ranking of Countywide SPIS, #Acc = total collisions, #veh = total vehicles, F = fatalities, A = severe injuries, B = moderate injuries, C = minor injuries

SCHOOLS

There are a number of schools in Tigard where the surrounding roadways create barriers for access due to limited width and pedestrian facilities. In conversations with the Tigard-Tualatin School District, the following issues were noted by school site:[5]

- Metzger Elementary: Adequacy of walking paths and adjacent street width
- Mary Woodword School: Difficult for traffic circulation due to congestion
- Fowler Intermediate School: Access from both Walnut Street and Tiedeman Avenue
- Durham Elementary School: Adequacy of Durham Road width, walking paths, turn lanes
- Tigard High School: Driveway spacing conflicts
- Templeton Elementary School: Adequacy of sidewalks

TRAFFIC CONTROL

Tigard has 66 signalized intersections, with the majority on arterial streets. A summary of the ownership of these signals as well as who operates and maintains them is shown in Table 3-2. There are five key coordinated systems within the City. These include:

- ORE 99W
- 72nd Avenue between ORE 217 southbound ramps and Hampton Street
- Scholls Ferry Road
- Greenburg Road between ORE 217 southbound ramps and Locust Street
- 72nd Avenue between ORE 217 southbound ramps and Hampton Street

Of the 66 signals in the City of Tigard, 11 are owned by the City of Tigard, 11 are owned by Washington County and 44 are owned by ODOT. Most signals do not need upgrade or modernization. The signal at Main Street/Scoffins Street is the oldest in the City and would be the most likely candidate for upgrade. The signal at 72nd Avenue/Bonita Road has recently been upgraded to include protective/permissive left turn phasing on all approaches. The signals at Durham/Upper Boones Ferry Road, 72nd Avenue/Boones Ferry Road and 72nd Avenue/Carman Drive should eventually be intertied.

Figure 3-8 shows the signalized locations. Traffic signals are valuable devices for the control of vehicle and pedestrian traffic. Traffic control signals, properly located and operated, can have one or more of the following advantages:

- They provide for the orderly movement of traffic
- Where proper physical layouts and control measures are used, they can increase the traffic handling capacity of the intersection

[5] Per conversation with Dr. Joki, Superintendent, Tigard-Tualatin School District, February 22, 1995.

- They reduce the frequency of certain types of accidents, especially right angle type
- Under favorable conditions, they can be coordinated to provide continuous or nearly continuous movement of traffic at a definite speed along a given route
- They permit minor street traffic, vehicular or pedestrian, to enter or cross continuous traffic on the major street
- Improper or unwarranted signal installations may cause:
    - Excessive delay
    - Disobedience of signal indications
    - Circuitous travel of alternative routes
    - Increased accident frequency, particularly rear-end type

Consequently, it is important that the consideration of a signal installation and the selection of equipment be preceded by a thorough study and be based on consistent criteria. The study must identify the need for left turn phasing, lanes and phase type. The justification for the installation of a traffic signal at an intersection should be based upon the warrants stated in *the Manual on Uniform Traffic Control Devices*[6] (MUTCD). The MUTCD has been adopted by the state of Oregon and is used throughout the nation.

The same conditions hold true for installation of stop sign traffic controls. Specific warrants identify conditions which may warrant two-way or multi-way stop sign installations. A stop sign is not a cure-all and is not a substitute for other traffic control devices. Guidelines and warrants for stop sign installations are outlined in the MUTCD.

[6] *Manual on Uniform Traffic Control Devices for Streets and Highways*, US Department of Transportation, Federal Highway Administration, 1988, pages 4C1-4C12.

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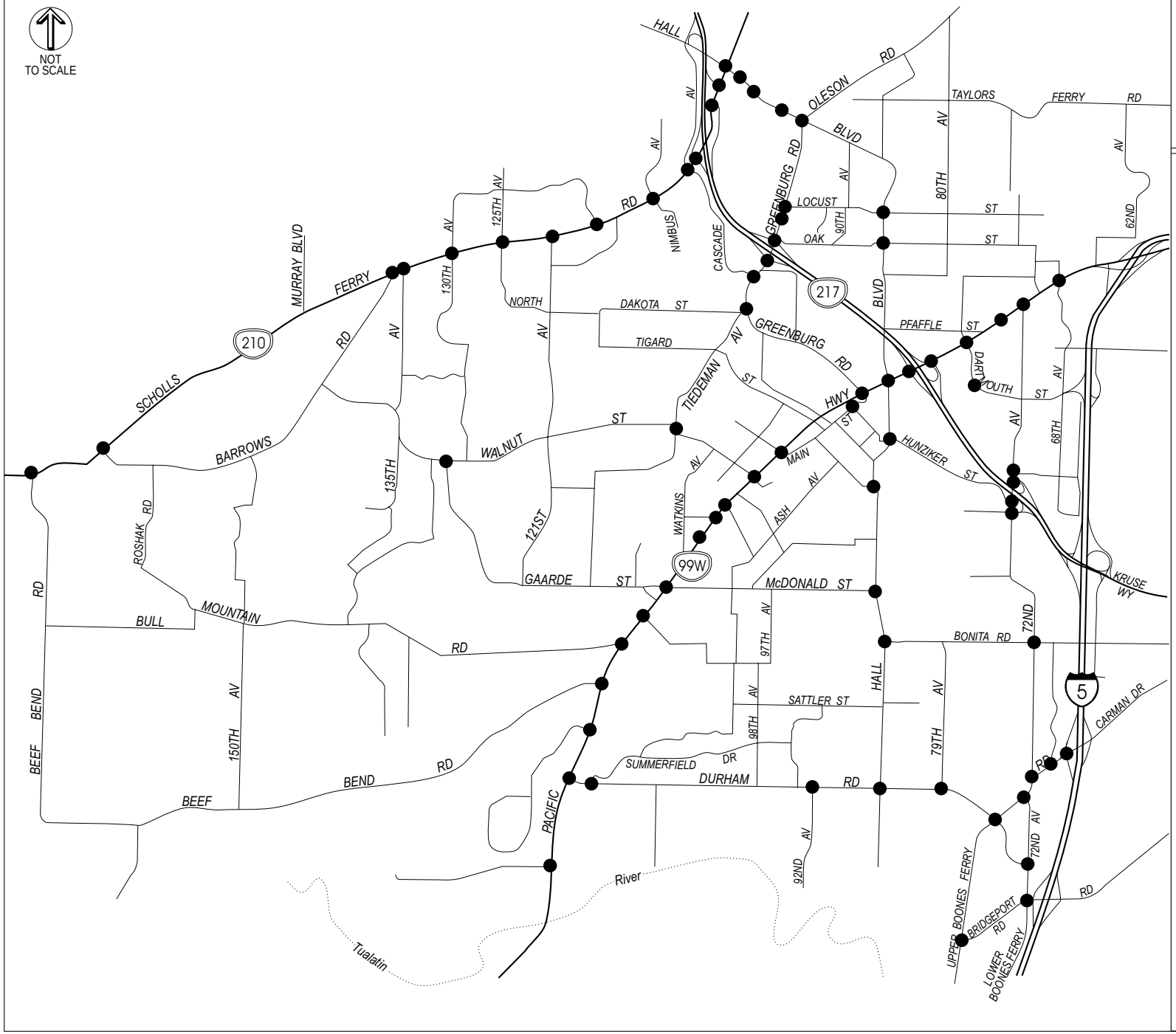

CITY OF TIGARD

Transportation Systems Plan

Legend

- Signalized Intersection

Figure 3-8
SIGNALIZED
INTERSECTIONS

Table 3-2
Tigard Signal System

Intersection	Ownership	Agency Operating	Agency Mainaining
Scholls Ferry Road			
Barrows Road (West)	WA County	WA County	WA County
Barrows Road (East)	WA County	WA County	Beaverton
Murray Boulevard	WA County	WA County	Beaverton
130th Avenue	WA County	WA County	Beaverton
125th Avenue	WA County	WA County	Beaverton
121st Avenue	WA County	WA County	Beaverton
Conestoga Drive	WA County	WA County	Beaverton
Nimbus Avenue	WA County	WA County	Beaverton
Cascade Avenue	ODOT	Beaverton	Beaverton
ORE 217 SB Ramps	ODOT	Beaverton	Beaverton
ORE 217 NB On/WA Square	ODOT	Beaverton	Beaverton
Hall Boulevard	ODOT	Beaverton	Beaverton
Hall Boulevard			
Scholls Ferry Road	ODOT	Beaverton	Beaverton
Embassy Suites Driveway	ODOT	ODOT	ODOT
Target Driveway	ODOT	ODOT	ODOT
Circuit City/US Bank Dwys	ODOT	ODOT	ODOT
Greenburg Road/Oleson Road	ODOT	ODOT	ODOT
Locust Street	ODOT	ODOT	ODOT
Oak Street	ODOT	ODOT	ODOT
ORE 99W	ODOT	ODOT	ODOT
Hunziker Street	ODOT	ODOT	ODOT
Burnham Street	ODOT	ODOT	ODOT
McDonald Street	ODOT	ODOT	ODOT
Bonita Road	ODOT	ODOT	ODOT
Durham Road	ODOT	ODOT	ODOT
Durham Road			
ORE 99W	ODOT	ODOT	ODOT
Summerfield Drive	Tigard	Tigard	WA County
92nd Avenue	Tigard	Tigard	WA County
Hall Boulevard	ODOT	ODOT	ODOT
Upper Boones Ferry Road	ODOT	ODOT	ODOT
72nd Avenue	Tigard	Tigard	WA County
72nd Avenue			
Durham Road	Tigard	Tigard	WA County
Upper Boones Ferry Road	Tigard	Tigard	WA County
Carman Drive	Tigard	Tigard	WA County
Bonita Road	Tigard	Tigard	WA County
Varns /ORE 217 SB Ramps	ODOT	ODOT	ODOT
Hunziker Street	ODOT	ODOT	ODOT
ORE 217 NB Ramps	ODOT	ODOT	ODOT

Intersection	Ownership	Agency Operating	Agency Mainaining
Hampton Street	Tigard	Tigard	WA County
ORE 99W	ODOT	ODOT	ODOT
ORE 99W			
68th Avenue/69th Avenue	ODOT	ODOT	ODOT
72nd Avenue	ODOT	ODOT	ODOT
Tigard Cinemas	ODOT	ODOT	ODOT
Dartmouth Street	ODOT	ODOT	ODOT
ORE 217 NB Ramps	ODOT	ODOT	ODOT
ORE 217 SB Ramps	ODOT	ODOT	ODOT
Hall Boulevard	ODOT	ODOT	ODOT
Greenburg Road	ODOT	ODOT	ODOT
Johnson Street/Main Street	ODOT	ODOT	ODOT
Walnut Place	ODOT	ODOT	ODOT
Garrett Street	ODOT	ODOT	ODOT
Park Street	ODOT	ODOT	ODOT
Tigard Marketplace	ODOT	ODOT	ODOT
Gaarde/McDonald Street	ODOT	ODOT	ODOT
Canterbury Lane	ODOT	ODOT	ODOT
Bull Mountain Road	ODOT	ODOT	ODOT
Beef Bend Road	ODOT	ODOT	ODOT
Royalty Parkway	ODOT	ODOT	ODOT
Durham Road	ODOT	ODOT	ODOT
Fischer Road	ODOT	ODOT	ODOT
Greenburg Road			
ORE 99W	ODOT	ODOT	ODOT
Tiedeman Avenue	Tigard	Tigard	WA County
Cascade Boulevard	Tigard	Tigard	WA County
ORE 217 SB Ramps	ODOT	ODOT	ODOT
ORE 217 NB Ramps	ODOT	ODOT	ODOT
Washington Square Road	WA County	WA County	WA County
Locust Street	WA County	WA County	WA County
Hall Boulevard/Oleson Road	ODOT	ODOT	ODOT
Carman Drive			
I-5 SB Ramps	ODOT	ODOT	ODOT
I-5 NB Ramps	ODOT	ODOT	ODOT
Sequoia Parkway	Tigard	Tigard	WA County
Upper Boones Ferry Road			
Bridgeport Road	ODOT	ODOT	ODOT
Durham Road	ODOT	ODOT	ODOT
Main Street			
Scoffins Street	Tigard	Tigard	WA County

TRAVEL TIME INFORMATION

Travel time information was collected to provide a gauge of roadway system performance. Travel time runs were conducted on several key routes in Tigard. These travel time runs measured the length of time it took to travel from a starting point to and end point of each key route (typically, a mile or more in length) during various time periods during the week. The key routes surveyed were ORE 99W, Hall Boulevard, 72nd Avenue, Main Street/Greenburg Road and Durham Road. The time periods observed were weekday morning peak, weekday midday, weekday evening peak and Saturday midday. The most significant delays were generally observed in the PM peak hour. However, on two routes which are heavily influenced by retail activity, delays were significant at other times (ORE 99W Saturday and Greenburg midday). The results of these travel time runs are shown in Figure 3-9. Travel times from various time periods are shown for comparison.

72nd Avenue shows significant delay both northbound and southbound in the PM peak hour. Since 1994, new signal timings were installed at four intersections near ORE 217 and the four intersections linked via interconnect. Delays through these four intersections were initially reduced by more than 40% in both the northbound and southbound directions as a result of this improvement. Since the initial delay reduction a few years ago, the route has attracted additional demand and at least 70-100 additional northbound and about 200-300 additional southbound vehicles now use this route in the evening peak hour, which has increased delays on the route.

Travel time data on ORE 217 indicates that some of the slowest travel speed on the facility occurs in Tigard. Floating car surveys were conducted on ORE 217 during the morning and evening peak periods (see appendix for data summaries). Travel time data were collected along the entire length of ORE 217 at various times through the peak period. The average travel speed for the entire corridor drops to between 30 and 40 miles per hour (mph) during periods of time in both the morning and evening peak representing level of service F conditions for those time segments. Figure 3-10 summarizes the peak travel speeds over the length of ORE 217.

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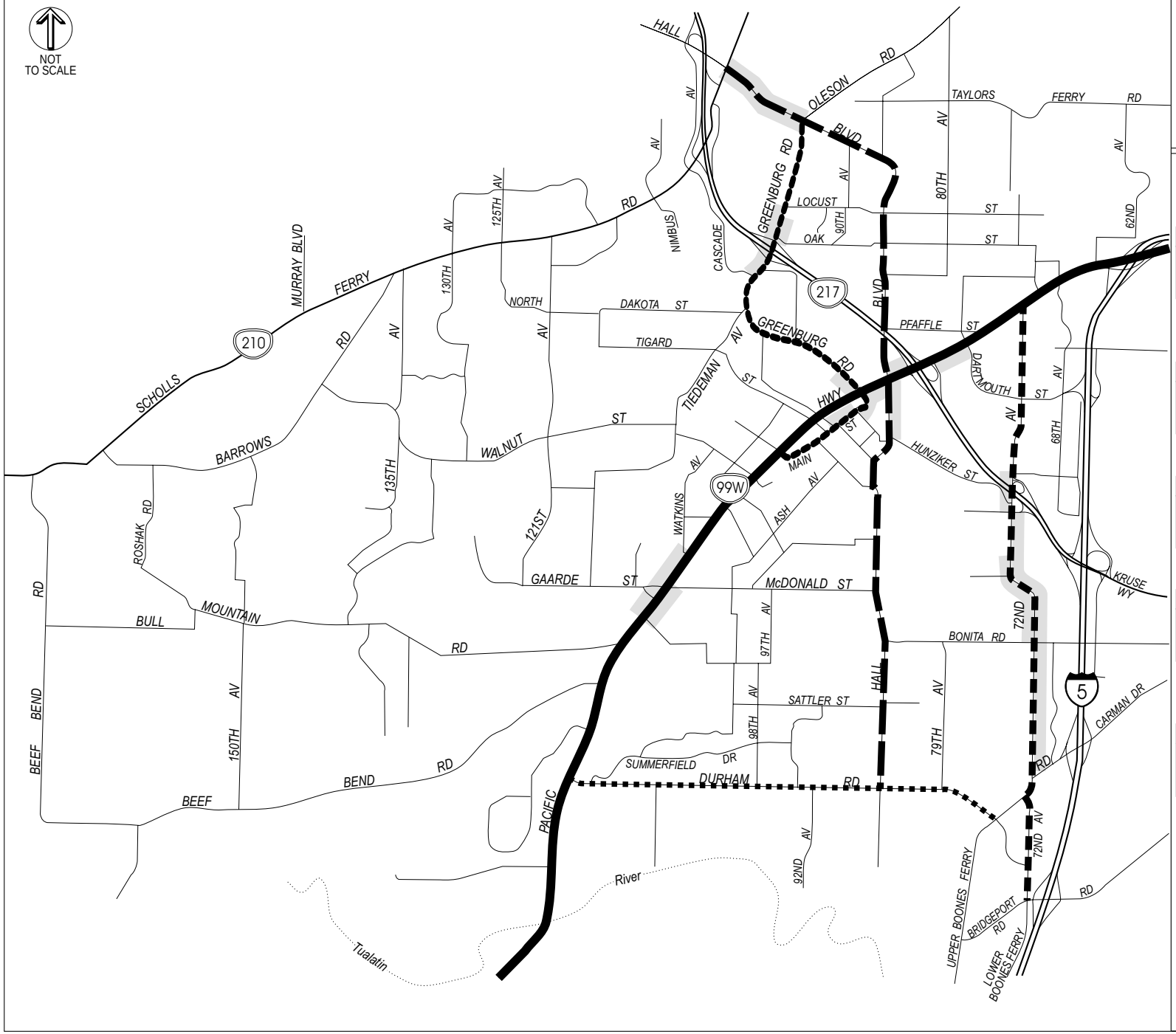


CITY OF TIGARD

Transportation Systems Plan

Legend

Hall Boulevard

DIRECTION	MID	PM
N/B	10:26	11:48
S/B	9:04	12:58

72nd Avenue *

		PM	
DIRECTION	MID	Before	After
N/B	7:41	15:37	13:25
S/B	6:42	9:10	8:49

Main St./Greenburg Rd.

DIRECTION	MID	PM
E/B - N/B	10:22	9:22
S/B - W/B	9:35	9:26

Durham Road

DIRECTION	MID	PM	SAT
E/B	4:15	4:21	4:24
W/B	4:25	6:57	4:56

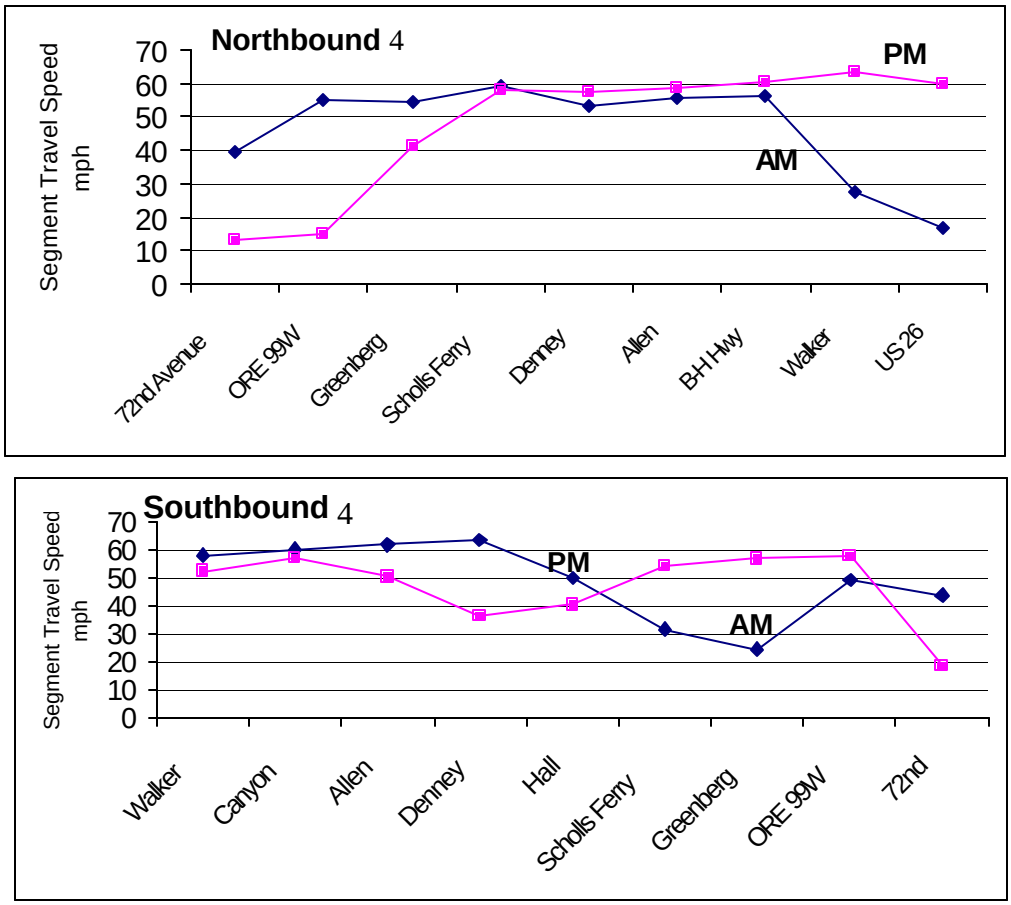
ORE 99W

DIRECTION	MID	PM 1994	PM 1997	SAT
E/B	10:27	13:32	13:47	19:22
W/B	11:12	12:39	15:59	11:25

MID - MIDDAY, 1:00pm - 3:00pm
PM - PM PEAK, 4:00pm - 6:00pm
* - Signal Timing Change 12/94
- Sections with D, E or F - LOS

Figure 3-9
1994
TRAVEL TIME SURVEYS
(Except where Noted)

Figure 3-10
Travel Speed Profiles for ORE 217
April/May 1999
For Critical (slowest) Time Slice



Source: ORE 217 Corridor Study Initial Improvement Concepts Draft, ODOT, February 2000.

TRAFFIC PERFORMANCE ON KEY STREETS

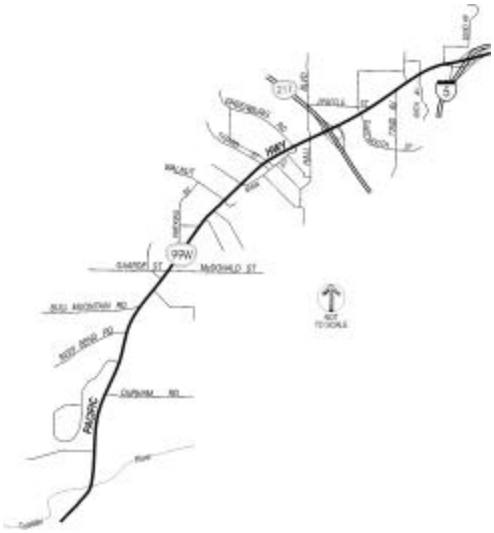
The following sections review the performance of various key routes in Tigard in terms of volumes, capacity, accidents, adjacent land use (including schools), intersection level of service, arterial level of service and general observations. The key routes include ORE 99W, Scholls Ferry Road, Hall Boulevard, Greenburg Road, 72nd Avenue and Durham Road/Boones Ferry Road/Carman Drive. Each route evaluation is organized to provide a description in terms of functional classification, number of lanes, existing traffic volumes, accident locations and a summary of PM peak hour operating conditions. The 1994 calculations were based on the *1985 Highway Capacity Manual.* Since then, the Highway Capacity Manual has been updated twice and the 1997 calculations are based on *the 1994 Highway Capacity Manual* and the 1999 calculations are based on the *1997 Highway Capacity Manual.* While there are some subtle distinctions in the methodologies used, the results produced are comparable.

In general, intersection level of service in Tigard has either remained the same or degraded slightly over the past three years. As regional growth has occurred, traffic volumes around the City have increased. In 1999, most intersections in Tigard operate at level of service D or better, with some exceptions. The intersections which are operating at conditions below level of service D in 1999 are discussed in the following sections.

Travel time runs (which provided the data for the arterial level of service analysis) are shown graphically in Figure 3-9. Areas where arterial level of service is D or worse are identified on these figures. Arterial level of service was calculated according to the *1994 Highway Capacity Manual*.[7] A majority of these runs were conducted in 1994, with updated runs on ORE 99W conducted in 1997. Overall, average evening peak hour travel time along ORE 99W westbound (between 68th Avenue (near I-5) and Fischer Road, west of the City limits) has increased by about three minutes. Travel time in the opposite direction (eastbound) has remained approximately the same. More information on level of service descriptions and calculations (both arterial and intersection) as well as travel time methodology, can be found in the appendix.

ORE 99W

ORE 99W provides regional access to the City of Tigard, but also serves a large percentage of local traffic. ORE 99W connects Tigard with cities to the south and west and eventually to the Oregon Coast. To the east, ORE 99W becomes Barbur Boulevard, a key route in Portland, providing access to downtown Portland. Tigard classifies ORE 99W as an arterial while Washington County and Metro designate it a Major Arterial. ODOT's designation is a Statewide Highway as part of the National Highway System. Portland designates Barbur Boulevard as a regional trafficway.



ORE 99W carries approximately 33,300 vehicles per day (ADT - Average Daily Traffic) near the south Tigard city limits and approximately 45,900 ADT near downtown. ORE 99W is a five lane roadway throughout Tigard. Figure 3-11 shows the percentage of vehicles which are local for various segments.[8] The percentage of local trips on ORE 99W is much higher near downtown Tigard than at either end.

The table below summarizes level of service for a number of signalized intersections along ORE 99W during the weekday evening peak hour. Of the 16 intersections analyzed, all but one intersection performs at level of service D or above. This is generally considered to be acceptable operating performance for a signalized intersection. There are five intersections which operate at level of service D, ORE 99W/Durham Road, ORE 99W/Walnut Street, ORE 99W/Greenburg Road/Main Street, ORE 99W/Hall Boulevard, and ORE 99W/72nd Avenue. If additional traffic is added to these intersections, it is possible that they may decline to an unacceptable level of service. One intersection, ORE 99W/McDonald Street/Gaarde Street,

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7 *1994 Highway Capacity Manual*, Special Report 209, Transportation Research Board, Washington D.C., 1994, Chapter 11.

8 Data provided to the City of Tigard by Metro, December 1992. A plot was generated showing trips on ORE 99W with either an origin or destination in a Tigard traffic analysis zone. This plot was then related to a plot showing all trips on ORE 99W.

currently operates at level of service E. This intersection is already operating at unacceptable levels of service and long queues tend to form on various legs of the intersection. Sometimes these queues extend to other intersections, creating unnecessary operating problems there as well. A long queue (greater than 20 vehicles) forms for about 15-20 minutes in the PM peak hour at the intersection at 68th Parkway/69th Avenue. Over the course of the entire peak hour, this intersection performs acceptably.

It should be noted that the 1997 and 1999 LOS calculations at Hall Boulevard/ORE 99W reflect a lane configuration change in the northbound direction, resulting in a slightly improved level of service over 1994 conditions.

Figure 3-11

PM Peak Hour Intersection Level of Service
Signalized Intersections Along ORE 99W

Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Durham Road	D	27.9	0.77				D	48.7	0.88
Beef Bend Road	B	12.1	0.86	B	11.1	0.80			
Bull Mtn Road	B	8.3	0.67						
Canterbury Lane	B	9.8	0.74						
McDonald/Gaarde	D	33.0	0.93	E	50.5	1.0	E	58.9	1.0
Tigard Mktplace	B	12.4	0.60						
Park Street	A	4.8	0.58						
Walnut Street	D	27.2	0.89	D	31.8	0.95			
Main/Johnson	B	12.6	0.62	B	13.2	0.70			
Greenburg/Main	E	43.1	0.97	D	30.3	0.85	D	43.9	0.85
Hall Boulevard	E	46.3	0.99	D	34.5	0.91	D	49.2	0.87
ORE 217 SB Ramps	C	19.2	0.75	C	21.6	0.83			
ORE 217 NB Ramps	B	5.5	0.65	B	6.5	0.75			
78th Ave/Dartmouth[9]	C	19.7	0.81	C	24.3	0.89	D	35.5	0.86
72nd Avenue[10]	B	14.7	0.75	D	25.6	0.93	C	32.9	0.86
68th/69th Avenues	C	16.0	0.87						

* For analysis purposes the capacity calculation methodology has changed twice over the past six years. The level of service analysis was conducted using the following methodology:

1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 Calculations use 1994 HCM Methodology
1999 Calculations use 1997 HCM Methodology

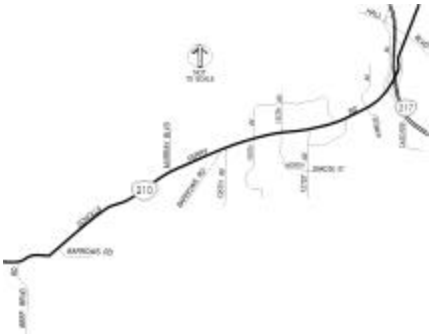
[9] 1994 counts conducted prior to opening of Costco on Dartmouth Street, therefore, counts may be lower than normal.

[10] 1994 counts conducted during Fred Meyer Strike (August, 1994) and may therefore be lower than normal.

The 1994 arterial level of service along ORE 99W tends to mimic that at the signalized intersections. ORE 99W generally flows at a level of service between A and C except in certain areas. These areas generally correspond to areas where intersection level of service is poor. Segments experiencing levels of service D or worse include, ORE 99W northbound between Main Street/Johnson Street and ORE 217 southbound ramps, and southbound from I-5 to 72nd Avenue, from ORE 217 northbound ramps to Hall Boulevard and from Main Street/Johnson Street to Walnut Street. It should be noted that, since ORE 99W is congested between Main Street/Johnson Street and ORE 217, it is unable to deliver as much traffic as is demanded at specific intersections. Because of this, intersection level of service does not appear as poor as arterial level of service, which is more reflective of route (rather than intersection) congestion.

Scholls Ferry Road

Scholls Ferry Road is an east-west roadway that serves as the north city limits for much of Tigard. It is five lanes from Murray Boulevard to Hall Boulevard. It carries approximately 30,000 to 45,000 ADT through Tigard. It has recently been transferred to Washington County, except the portion in the interchange area near ORE 217. It is classified by Metro and Washington an Major Arterial to the west of ORE 217 and as a Minor Arterial to the east of ORE 217. The City of Tigard and Beaverton both classify it as an Arterial for its length within the city limits. Scholls Ferry Road serves local traffic, but also provides regional access to Beaverton, ORE 217 and cities to the west of Tigard.



Arterial level of service was not analyzed for Scholls Ferry Road and intersection level of service was only analyzed for 1999 volumes. Scholls Ferry Road serves as a border between Tigard and Beaverton and is under the jurisdiction of ODOT and Washington County. Although it provides access to Tigard, it is not integral to the internal street network of Tigard.

PM Peak Hour Intersection Level of Service
Signalized Intersections Along Scholls Ferry Road

Signalized Intersections	1999*		
	LOS	Delay	V/C
Beef Bend Road	C	25.5	0.84
Barrows Road (West)	B	8.3	0.54
Murray Boulevard	C	29.8	0.79
Barrows Road (East)	B	15.0	0.57
North Dakota/125th	D	42.9	0.95
Nimbus Avenue	D	47.0	0.98

* 1999 Calculations use 1997 HCM Methodology

Hall Boulevard

Hall Boulevard is a north-south roadway that predominantly serves local Tigard traffic, but also provides access to Beaverton to the north. It is classified by Metro and Washington County as a Minor Arterial and by the City of Tigard and Beaverton as an arterial. ODOT classifies Hall as a District Highway. It carries approximately 12,000 to 23,000 ADT through Tigard. It is generally two lanes, with occasional left turn lanes, from Durham Road to Greenburg Road. It is three lanes between Durham Road and just south of Sattler Street, between ORE 99W and Pfaffle Street and between just north of Spruce Street and just north of Locust Street, and five lanes from Greenburg Road to Scholls Ferry Road. There are 11 traffic signals at intersections on Hall Boulevard. It has many driveways connecting directly to the roadway, serving mostly commercial and residential land uses. A driveway survey was conducted along Hall Boulevard and can be found in the appendix of this report.[11]

The table below summarizes level of service for a number of intersections on Hall Boulevard. Of the seven intersections analyzed, four perform at level of service D. Hall Boulevard/McDonald Street and Hall Boulevard/Durham Road have long queues on some approaches. The queues at Hall Boulevard/McDonald street are on the northbound left and southbound approaches and the queues at the Hall Boulevard/Durham Road intersection are on the southbound and westbound through approaches. These queues generally tend to clear during each signal cycle, but both intersections are virtually at capacity. 1994 arterial level of service along Hall Boulevard shows levels of service C and above are experienced everywhere along Hall Boulevard, except at ORE 99W, where level of service D is experienced both northbound and southbound.

PM Peak Hour Intersection Level of Service
Signalized Intersections Along Hall Boulevard

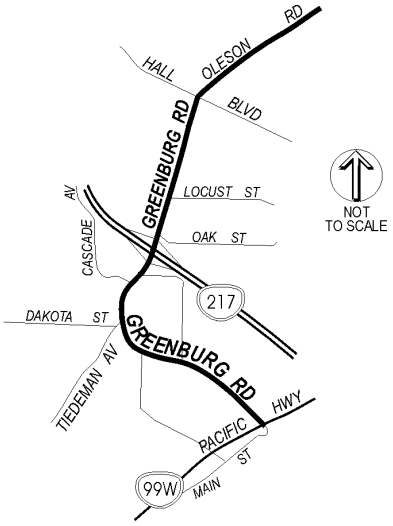
Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Locust Street	B	12.7	0.56	C	19.8	0.86			
ORE 99W	E	46.3	0.99	D	34.5	0.91	D	49.2	0.87
Hunziker Street	B	14.0	0.62						
Burnham Street	B	13.0	0.54						
McDonald Street	C	20.7	0.99	E	52.7	1.0	D	38.0	0.93
Bonita Road	C	16.8	0.68	C	21.0	0.97	D	47.7	0.90
Durham Road	C	24.1	0.83	E	48.1	1.0	D	45.1	0.86

* 1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 Calculations use 1994 HCM Methodology
1999 Calculations use 1997 HCM Methodology

[11] Driveway survey, conducted by DKS Associates, September, 1994.

Greenburg Road

Greenburg Road is a north-south street connecting downtown Tigard to the Washington Square area. It provides direct access to both ORE 99W and ORE 217. At Hall Boulevard, Greenburg Road becomes Oleson Road as it proceeds north into Portland.



Greenburg Road, is classified by Metro as a Major Arterial and by Washington County as a Minor Arterial north of ORE 217 and as a Major Collector south of ORE 217. It is classified, for its length, by Tigard as a Major Collector. The City of Portland designates Oleson as a Neighborhood Collector. It is three lanes between ORE 99W and Hall Boulevard, except between ORE 217 and Locust Street and just south of Hall Boulevard where it is five lanes.

The table below summarizes level of service for four signalized intersections on Greenburg Road. Of these four intersections, two operate acceptably at level of service C and the others, Greenburg Road/Main Sreet/ORE 99W and Greenburg Road/Oleson Road/Hall Boulevard operate at level of service D. Long queues form in the eastbound direction on ORE 99W in the PM peak hour, with vehicles waiting through multiple cycles to clear the intersection. Some of this queuing may be caused by unacceptable operating conditions at Hall Boulevard, where the queue spills back to the Greenburg Road/Main Street/ORE 99W intersection.

Arterial level of service along Greenburg Road/Main Street is above level of service C for most of the length of the route. Locations experiencing levels of service D and lower include northbound Main Street between Scoffins and ORE 99W, northbound Greenburg Road between ORE 217 northbound ramps and Washington Square Road, southbound Greenburg Road between Locust Street and Cascade Boulevard and between Center Street and ORE 99W. The arterial level of service on this route is comparable to intersection level of service, especially since arterial level of service near ORE 99W is poor, where the intersection operates at level of service E.

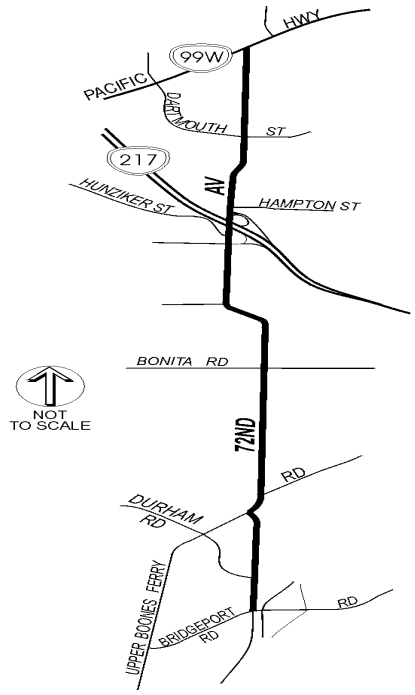
PM Peak Hour Intersection Level of Service
Signalized Intersections Along Greenburg Road

Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
ORE 99W/Main	E	43.1	0.97	D	30.3	0.85	D	43.9	0.85
Tiedeman Ave	C	19.0	0.77						
Wash Square Rd				C	23.3	0.73			
Oleson/Hall Blvd				D	34.3	0.95			

* 1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 Calculations use 1994 HCM Methodology
1999 Calculations use 1997 HCM Methodology

72nd Avenue

72nd Avenue is a north-south roadway serving mostly local traffic in Tigard. It serves industrial traffic from land uses along its frontages, but also provides connections to ORE 99W, ORE 217, I-5 and Tualatin to the south. It is a three lane roadway between Bridgeport Road and the ORE 217 ramps. North of there, it is a two lane roadway with occasional left turn lanes. 72nd Avenue is classified as a Major Collector by the City of Tigard and as a Minor Arterial by Metro. It is not classified by Washington County. 72nd Avenue carries approximately 16,000 ADT.



The table below summarizes level of service for several signalized intersections on 72nd Avenue. Of the 10 signalized intersections, five perform at level of service C or above (generally considered acceptable operating conditions). The five remaining intersections, 72nd Avenue/ORE 99W, 72nd Avenue/ORE 217 Northbound Ramps, 72nd Avenue/ORE 217 Southbound Ramps/Varns Street, 72nd Avenue/Bonita Road and 72nd Avenue/Carman Drive operate at level of service D. Several of these intersections have been improved in the past few years. 72nd Avenue/Bonita Road was changed from protected left turn phasing on all approaches to protected/permissive phasing on all approaches. 72nd Avenue/ORE 217 Northbound Ramps and 72nd Avenue/ORE 217 Southbound Ramps/Varns Street were part of an overall signal timing/coordination project along 72nd Avenue between Varns Street/ORE 217 Southbound Ramps and Hampton Street. While these intersections operate at a better level of service as a result of these improvements, the 72nd Avenue has become a more desirable route, attracting at least 70-100 additional northbound vehicles and approximately 200-300 additional southbound vehicles between Hampton Street and the ORE 217 Southbound Ramps/Varns Street intersections.

Arterial level of service along 72nd Avenue is poor (level of service D or lower) for a significant portion of its length. In particular level of service is poor northbound from Upper Boones Ferry Road to the ORE 217 southbound ramps. In the southbound direction, level of service is poor between Hampton Street and the ORE 217 southbound ramps, between Sandburg Street and Bonita Road and between Carman Drive and Upper Boones Ferry Road. This is fairly consistent with the intersection operating conditions, which are mostly at level of service D in these areas. In this case, arterial level of service is poor, while intersection level of service may not look so bad since a number of closely spaced signals were not interconnected when the travel time runs were made. Since these signals were not interconnected, additional delay was introduced from uncoordinated signal timing. These signals have since been retimed and the arterial level of service is much improved, however increased traffic volumes create increased delay.

PM Peak Hour Intersection Level of Service
Signalized Intersections Along 72nd Avenue

Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
ORE 99W	B	14.7	0.75	D	25.6	0.93			
Hampton Street	B	11.5	0.43						
ORE 217 NB Ramps	B	10.9	0.48	D	29.6	0.99			

Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Hunziker Street	C	16.3	0.84	C	22.7	0.93			
ORE 217 SB/Varns	E	40.7	1.00	D	36.2	0.99			
Bonita Road	E	48.2	0.95	D	37.9	0.89	D	47.7	0.90
Carman Drive	C	24.8	0.79	D	29.4	0.88			
Upper Boones Ferry				B	12.0	0.67	B	17.6	0.65
Durham Road	B	8.7	0.31						
Bridgeport Road	B	12.5	0.54						

* 1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 Calculations use 1994 HCM Methodology
1999 Calculations use 1997 HCM Methodology

Durham Road/Boones Ferry Road/Carman Drive

Durham Road is an east-west roadway that serves the southern part of Tigard. It is three lanes for its length. Durham Road is classified by Metro as a Minor Arterial, by Washington County as a study area west of Hall and as a Minor Arterial east of Hall, and as an Arterial by the City of Tigard east of Hall Boulevard. West of Hall Boulevard, it is classified by the City of Tigard as a Major Collector. Lake Oswego designates Carman Drive as a Major Collector. The route provides predominantly local access, but also serves vehicles traveling to ORE 99W or I-5 via Boones Ferry Road and Carman Drive and through traffic between King City and I-5.

The table below summarizes level of service conditions along Durham Road/Boones Ferry Road/Carman Drive. Five of the six intersections perform at level of service D or above. ORE 99W/Durham Road, Hall Boulevard/Durham Road, Upper Boones Ferry Road/Durham Road and I-5 northbound ramps/Carman Drive all operate at level of service D. I-5 southbound ramps/Carman Drive operates at level of service E and is just about at capacity. Queues tend to form westbound and southbound at ORE 99W/Durham Road, with some vehicles waiting through more than one signal cycle. The same is true at Hall Boulevard/Durham Road.

PM Peak Hour Intersection Level of Service
Signalized Intersections on Durham Road

Signalized Intersections	1994*			1997*			1999*		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
ORE 99W	D	27.9	0.77				D	48.7	0.88
Hall Boulevard	C	24.1	0.83	E	48.1	1.0	D	45.1	0.86
Upper Boones Ferry	C	22.0	0.79	D	32.2	0.97	D	52.0	0.98
72nd /Upper Boones				B	12.0	0.67			
I-5 SB/Carman Dr	D	34.2	0.83	E	42.6	1.0			
I-5 NB/Carman Dr	D	25.9	0.89	D	31.5	0.96			

* 1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 Calculations use 1994 HCM Methodology
1999 Calculations use 1997 HCM Methodology

Unsignalized Intersections

In addition to the signalized intersections along Tigard's key routes, there are a number of unsignalized intersections which are important to traffic operations in Tigard. The table below summarizes the capacity analysis for evening peak conditions at 11 unsignalized intersections in Tigard. These additional intersections, combined with the signalized intersections mentioned above, represent the key study intersections identified by City staff for analysis in this study.[12] Unsignalized intersections are subject to a separate capacity analysis methodology which is described in the appendix of this report.

Of the 11 unsignalized intersections, six are all-way stop controlled and five have one or more approaches which are uncontrolled. The methodology used for each of these cases is different and results are reported slightly differently (please see Appendix for more detail).

PM Peak Hour Intersection Level of Service
Unsignalized Intersections

Intersection	1994 LOS*	1997 LOS*	1999 LOS*
Walnut Street/135th Avenue	A/A	A/B	
Walnut Street/121st Avenue	C	D	
Walnut/Tiedeman/Fonner	B	D	
Main Street/Burnham Street	A/C		
68th Parkway/Atlanta/Haines	C	D	
72nd Avenue/Dartmouth Street	F	F	D
McDonald Street/97th Avenue	A/B		
68th Avenue/Dartmouth Street		D	
Hall/Sattler/Ross		B/E	
Greenburg Road/Oak Street		B/C	
121st Avenue/North Dakota Street		F	

* 1994 Calculations use 1985 Highway Capacity Manual (HCM) Methodology
1997 and 1999 Calculations use 1994 HCM Methodology

Most of the unsignalized intersections that were analyzed operate acceptably at level of service D or above. However, three intersections are shown as level of service E or F. Often poor levels of service at unsignalized intersections affect only a small number of vehicles, since a majority of the vehicles (on the main street) are uncontrolled and flow freely at level of service A or B.

Other Key Routes in Tigard

Interstate 5 is the west coast's major north-south corridor and it provides regional and interstate access directly to the City of Tigard. I-5 connects Tigard with adjoining cities in the Portland Metropolitan Region as well as with cities further south in Oregon such as Salem and Eugene. I-5 also provides access to other states such as Washington and California. ODOT classifies I-5 as an Interstate Highway as part of the National Highway System. For access management it is designated a Freeway.

[12] Per discussions with Laurie Nicholson, City of Tigard staff, December, 1996 and spring 1999.

ORE 217 provides regional access to the City of Tigard. ORE 217 connects Tigard with Beaverton and Lake Oswego and provides access to US 26 and I-5. US 26 is a major route leading to the Oregon Coast to the west and to eastern Oregon. ODOT classifies ORE 217 as a Statewide Highway as part of the National Highway System. For access management it is designated an Expressway.

Gaarde Street is an east-west Major Collector providing local access to residential streets in Tigard. It is two lanes and, in conjunction with 121st Avenue, connects ORE 99W and Scholls Ferry Road via Walnut Street.

Main Street is an east-west Major Collector serving the commercial downtown core of Tigard. It parallels ORE 99W from Johnson Street to Greenburg Road.

Bull Mountain Road serves residential and rural traffic west of Tigard as a Major Collector. This area is developing rapidly and, besides Beef Bend Road, Bull Mountain Road is one of the only roadways accessing this area. In addition, as ORE 99W becomes more congested, both Bull Mountain Road and Beef Bend Road are becoming part of an alternate route to rural areas to the west of Tigard.

McDonald Street is an east-west Major Collector which runs between Hall Boulevard and ORE 99W. It serves predominantly residential traffic, although, as areas to the west in Tigard develop, it is being used more and more as a cut-through route.

121st Avenue is a north-south Major Collector which runs through mostly residential areas in Tigard. In conjunction with Gaarde Street, it connects Scholls Ferry Road with ORE 99W.

North Dakota Street is an east-west Minor Collector which runs through mostly residential areas in Tigard. It connects Scholls Ferry Road to Greenburg Road and generally runs parallel to Scholls Ferry Road.

Beef Bend Road is parallel to, and south of, Bull Mountain Road. It is classified as a Major Collector and functions in a similar way as Bull Mountain Road as growth occurs in the area to the west of Tigard.

Walnut Street is an east-west Major Collector serving primarily residential traffic in Tigard. In conjunction with 135th Avenue, and with a short jog at Tiedeman Avenue, it provides a connection from ORE 99W to Scholls Ferry Road.

Hunziker Street is an east-west Major Collector connecting Hall Boulevard with 72nd Avenue near the ORE 217 ramps. This street serves both commercial and residential traffic and is increasingly being used as a cut-through route across Tigard.

Dartmouth Street is a relatively new Major Collector in Tigard. It is five lanes at its west end and three at its east end. It serves the new Cub Foods and Costco developments and provides direct access to ORE 99W and I-5.

Bonita Road is an east-west Major Collector which connects Hall Boulevard with Lake Oswego (via Bangy Road) and I-5 (via 72nd Avenue and Carman Drive or via Bangy Road and Kruse Way).

Locust Street is an east-west Major Collector which provides access to local neighborhood streets and between Hall Boulevard and Greenburg Road.

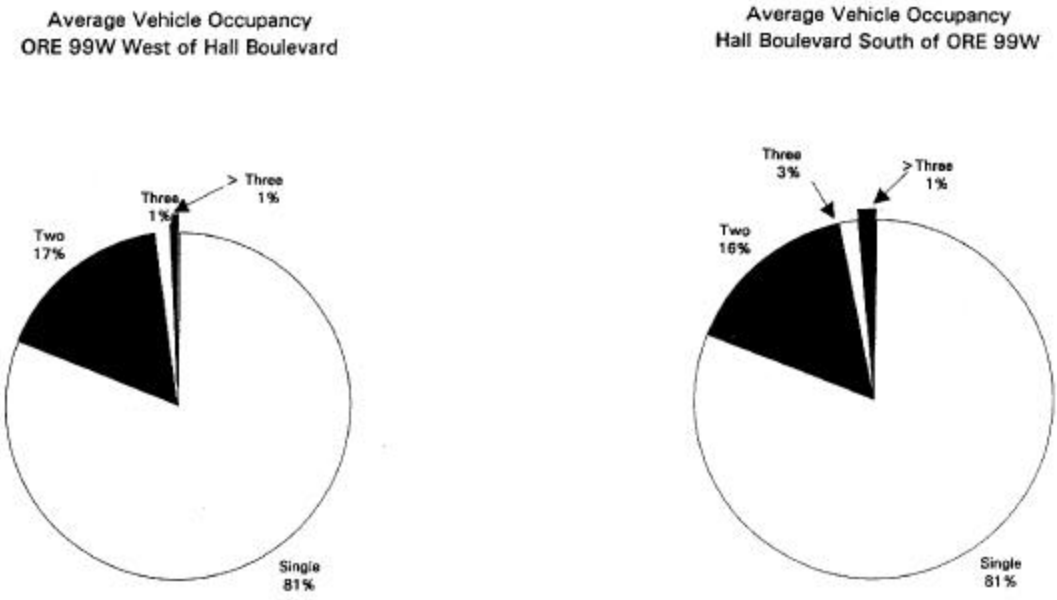
Upper Boones Ferry Road is a north-south Arterial which connects Durham Road with I-5 and Tualatin. Since there is very limited access to Tualatin due to the Tualatin River, much of the traffic between Tigard and Tualatin uses this route.

Taylors Ferry Road is a Major Collector that serves as the northern boundary of the Tigard planning area. This route provides a link between the Metzger area and I-5 and Portland to the east.

AVERAGE VEHICLE OCCUPANCY

Average vehicle occupancy (AVO) was measured at two locations in Tigard.[13] These locations were at **ORE 99W west of Hall Boulevard**, and on **Hall Boulevard south of ORE 99W**. Overall AVO measured in Tigard (between the two locations, over all time periods) was 1.21. This rate is somewhat lower than observed typical ranges for auto occupancy (over all time periods and trip purposes) which range from about 1.31 to 1.54.[14] A breakdown by time period and location is shown in Table 3-3 and the percentage of vehicles by number of passengers and location is shown in Figure 3-12.

Figure 3-12
Average Vehicle Occupancies



[13] Counts conducted for DKS Associates on September 28 through October 6, 1994.

[14] *Calibration and Adjustment of System Planning Models*, U.S. Department of Transportation and Federal Highway Administration, December, 1990, *and Quick-Response Urban Travel Estimation Techniques and Transferable Parameters: User's Guide*, NCHRP Report 187, Transportation Research Board, Washington, D.C., 1978.

Table 3-2
Average Vehicle Occupancy in Tigard

Time	Period	ORE 99W	Hall Blvd	Overall
Weekday				
7:00-9:00 AM	Morning	1.13	1.14	1.13
11:30 AM–1:30 PM	Midday	1.23	1.24	1.23
4:00-6:00 PM	Evening	1.27	1.24	1.26
Overall		**1.21**	**1.21**	**1.21**
Saturday				
1:00-3:00 PM	Midday	1.58	1.54	1.57

ORE 217	Weekday	Northbound	Southbound
7:00-9:00 AM	Morning	1.08	1.08
4:00-6:00 PM	Evening	1.16	1.12

Source: DKS Associates surveys – Tigard Streets 1994, ORE 217 1999.

ACCESS ISSUES

Two major corridors in Tigard are key locations where some form of access management may be applied. These corridors are ORE 99W, which has a significant portion of its frontage occupied by commercial land uses, and Hall Boulevard, which has a large number of access locations for such a major route.

An inventory of driveway conditions along Hall Boulevard was conducted as part of this study. The results of this inventory indicate that access conditions vary greatly along Hall Boulevard. In some segments there are as many as 15 driveways between street intersections. Other segments have as few as zero driveways between street intersections. When adjacent land use was considered, a combination of residential and commercial tended to have the highest number of driveways between streets. A summary of the driveway inventory can be found in the appendix of this report.

LAND USE

Existing land use in Tigard is shown in Figure 3-13. In general, most retail activity in Tigard is located on arterial and major collector roadways.[15] Although residential development is found on arterial and major collector roadways, much of the residential land uses in Tigard generally have access to minor collector or local streets.

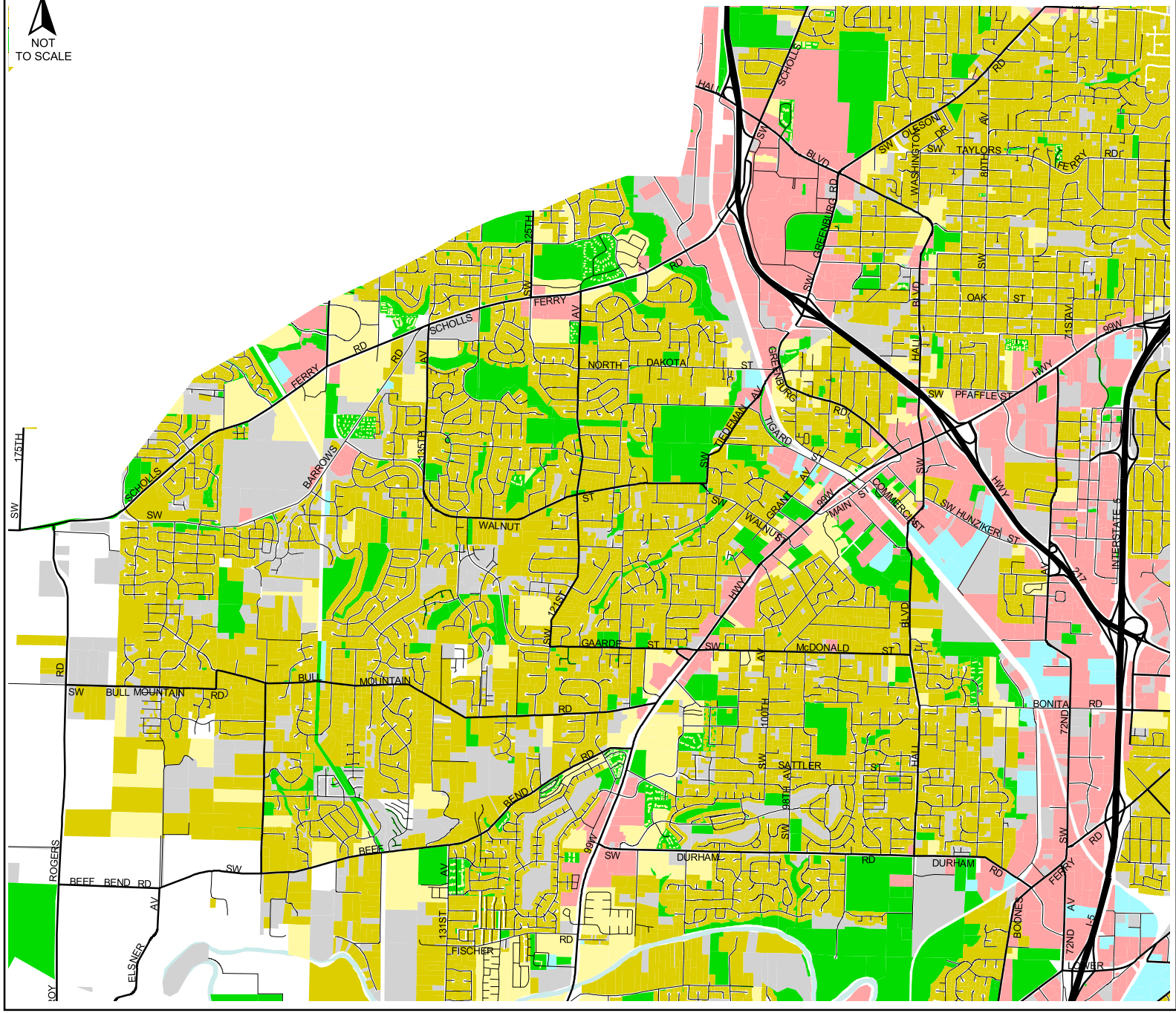
The transportation system is most impacted by changes in land use. Trip generation from added land use has and will create needs for new transportation facilities. The most significant changes in land use which have occurred recently are occurring in the area west of Tigard, in the Tigard Triangle and in the southern and western areas of Tigard.

[15] Tigard City Code requires retail development to gain access from arterial or collector streets.

DKS *Associates*

N

NOT TO SCALE



CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

Existing Land Use

- Commercial
- Industrial
- Multi-Family Residential
- Public
- Single-Family Residential
- Vacant Land

Source: Metro RLIS Database

Figure 3-13
Existing Land Use

TRANSIT

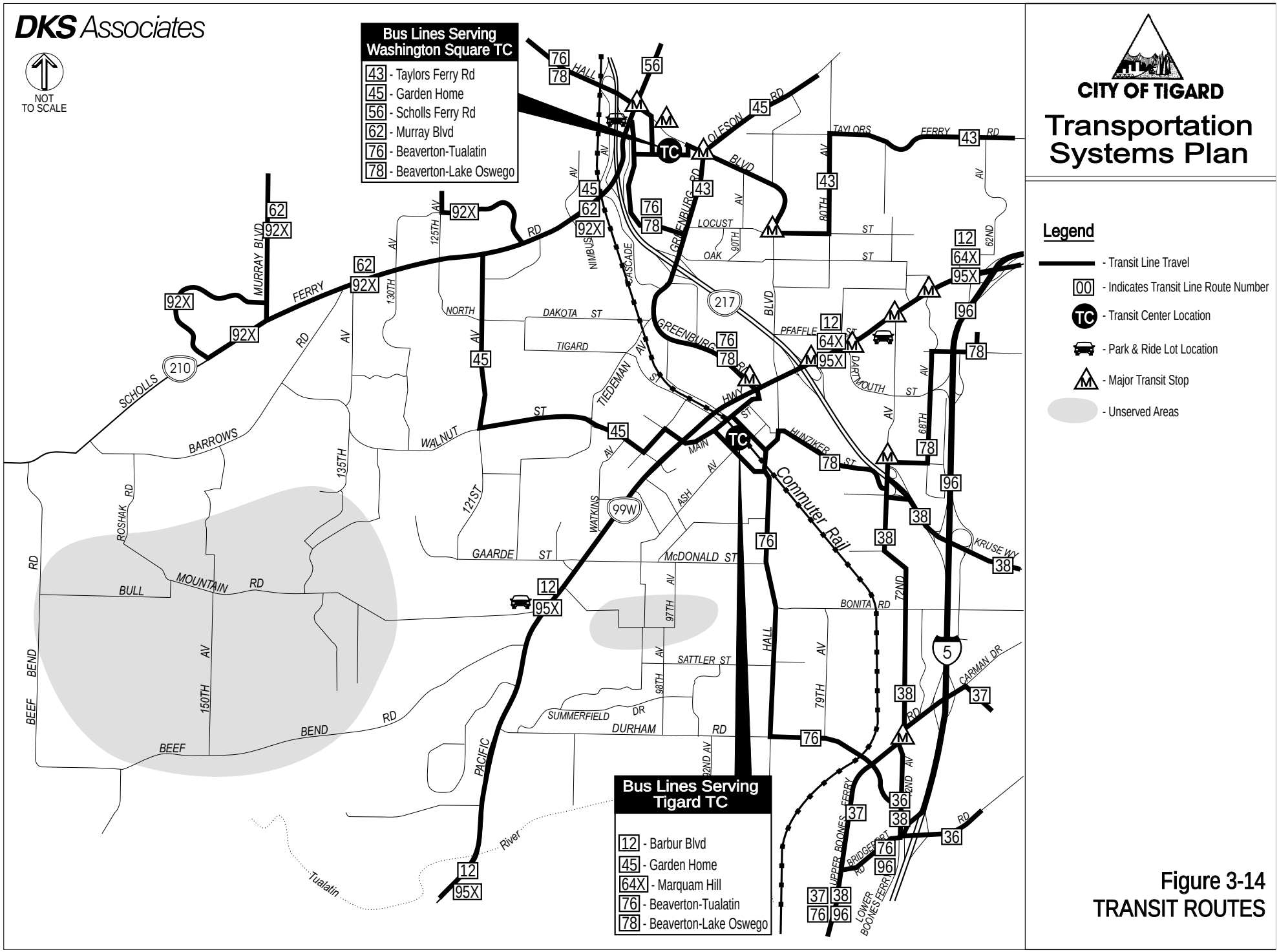
Transit service is provided to the general population of the City of Tigard by Tri-Met. Figure 3-14 shows the routes passing through Tigard. There are two transit centers and two express routes serving Tigard. There are two express routes which have a limited number of stops. Coming from Portland, route 95X stops only at the Tigard Cinemas before it begins making regular stops at Walnut/ORE 99W. Also coming from Portland, route 92X does not stop before reaching the Progress Park & Ride station, where it begins making regular stops. Other routes have stops approximately every 200 feet within Tigard. A comparison of 1990, 1994 and 1999 transit ridership in Tigard is summarized in Table 3-4. No data was available for 1994 for route 38 or for 1990 for route 95. More complete data from 1999 indicates appoximately 9,500 daily transit riders in Tigard[16].

Table 3-4
Daily Transit Ridership in Tigard
1990 , 1994 and 1999

		1990			1994			1999		
Route	**Dir**	**Ons**	**Offs**	**Tot**	**Ons**	**Offs**	**Tot**	**Ons**	**Offs**	**Tot**
12 Barbur	Out	152	683	835	316	941	1257	386	1017	1403
12 Barbur	In	691	160	851	900	254	1154	894	389	1283
38 Boones Ferry	SB	34	33	67				9	37	46
38 Boones Ferry	NB	30	17	47				29	16	45
43 Taylors Ferry	WB	24	110	134	24	127	151	20	158	178
43 Taylors Ferry	EB	109	19	128	109	19	128	148	24	172
44 King City	Out							110	84	194
44 King City	In							19	45	64
45 Garden Home	WB	48	209	257	65	241	306	65	252	317
45 Garden Home	EB	220	47	267	199	66	265	235	71	306
56 Scholls Ferry	SB	1	241	242	3	306	309	3	300	303
56 Scholls Ferry	NB	253	4	257	261	40	301	303	2	305
62 Murray Blvd	EB	24	93	117	43	214	257	94	430	524
62 Murray Blvd	WB	67	24	91	200	58	258	418	107	525
64X Marquam-Tig	Out							4	36	40
64X Marquam-Tig	In							41	1	42
76 Tig-Tual	SB							377	530	907
76 Tig-Tual	NB							552	357	909
78 Beav-LO	SB	224	442	666	275	580	855	252	498	750
78 Beav-LO	NB	434	219	653	562	285	847	419	225	644
92X S. Beav Exp	WB							13	103	116
92X S. Beav Exp	EB							138	10	148
95 Tig I-5 Exp	WB				3	84	87	12	117	129
95 Tig I-5 Exp	EB				64	1	65	104	2	106
							TOTAL	**4645**	**4811**	**9456**

SOURCE: Tri-Met Passenger Census, ons and offs occurring in Tigard.

[16] Route Level Passenger Census, Tri-Met, Spring 1999.


DKS Associates
NOT TO SCALE
Bus Lines Serving Washington Square TC
43 - Taylors Ferry Rd
45 - Garden Home
56 - Scholls Ferry Rd
62 - Murray Blvd
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
Bus Lines Serving Tigard TC
12 - Barbur Blvd
45 - Garden Home
64X - Marquam Hill
76 - Beaverton-Tualatin
78 - Beaverton-Lake Oswego
CITY OF TIGARD
Transportation Systems Plan
Legend
- Transit Line Travel
00 - Indicates Transit Line Route Number
TC - Transit Center Location
- Park & Ride Lot Location
- Major Transit Stop
- Unserved Areas
Figure 3-14
TRANSIT ROUTES
Commuter Rail
HALL
OLESON RD
TAYLORS FERRY RD
BOONES FERRY RD
MURRAY BLVD
SCHOLLS FERRY RD
BARROWS RD
ROSHAK RD
BULL MOUNTAIN RD
BEEF BEND RD
GREENBURG RD
TIEDEMAN AV
NIMBUS
CASCADE
LOCUST ST
OAK ST
NORTH DAKOTA ST
TIGARD ST
WALNUT ST
MAIN ST
ASH AV
WATKINS
GAARDE ST
McDONALD ST
SUMMERFIELD DR
DURHAM RD
SATTLER ST
BONITA RD
PFAFFLE ST
DARTMOUTH ST
HUNZIKER ST
KRUSE WY
CARMAN DR
BRIDGEPORT RD
LOWER BOONES FERRY RD
PACIFIC HWY
BLVD
AV
ST
RD
DR
WY
217
210
99W
5
TC
Tualatin River

BICYCLES

Existing bike lanes and off-street multi-use paths are shown in Figure 3-15. While there is significant inventory of bicycle lanes, most existing lanes are only for short segments. Except for I-5 and ORE 217, bicycles are permitted on all roadways in Tigard. However, because there are few continous and interconnected bikeways in the City, bicycle use is relatively low. Bicycle use in Tigard is generally used for recreational, school and commuting purposes. Bicycle counts at study intersections indicate fewer than 10 bicycle trips at each intersection over a two-hour period of time (either 7-9 AM or 4-6 PM), except at the following intersections, which had between 10 and 15 bicycles in the two hour period:

- Hall Boulevard/McDonald Street (AM peak period)
- Upper Boones Ferry Road/Durham Road (AM and PM peak period)

Metro identifies the following facilities as part of the Regional Bicycle System:

Regional Access	**Regional Corridor (on-street)**	**Community Connector**	**Regional Corridor Off-Street**
• Hall to Greenberg to Main to Hunziker	• Walnut Street • Scholls Ferry Rd • Hall Boulevard • ORE 99W • Hall-Durham-Boones	• 72nd Avenue • Bonita-McDonald • Carman-Durham	• Fanno Creek • Tualatin River • Powerlines • Hunziker to LO through I-5/ORE 217

The adjacent jurisdictions have adopted bicycle maps that provide the opportunity for interconnection between jurisdictions. The Washington County Transportation Plan shows on-street bicycle routes on ORE 99W, Scholls Ferry Road, Hall Boulevard, Greenberg Road, Durham Road, Walnut/Gaarde/McDonald, Oak Street and Locust Street. The County Plan also shows an on-street bicycle route on ORE 217 and I-5 in Tigard (which would be inconsistent with ODOT policy). The powerlines off-street route is the only off-street route shown in Tigard. Using the Transportation Planning Rule criteria, all arterial and collector streets would require bikeways. The City of Portland designates Oleson Road and Barber Boulevard as City Bikeways (which would connect in Tigard to Greenberg Road and ORE 99W). The City of Lake Oswego designates Bonita Road, Carman Drive and Kruse Way as bike lanes or pathways. These routes would link in Tigard to Bonita/McDonald, Carman/Durham and Hunziker (via the ORE 217/I-5 interchange). The City of Beaverton designates Murray Boulevard (which would link to Walnut), Scholls Ferry Road, Barrows Road, 125th Avenue (which would link to North Dakota Street), Nimbus Avenue and Cascade Avenue as bike lanes/bikeways.

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CITY OF TIGARD

Transportation Systems Plan

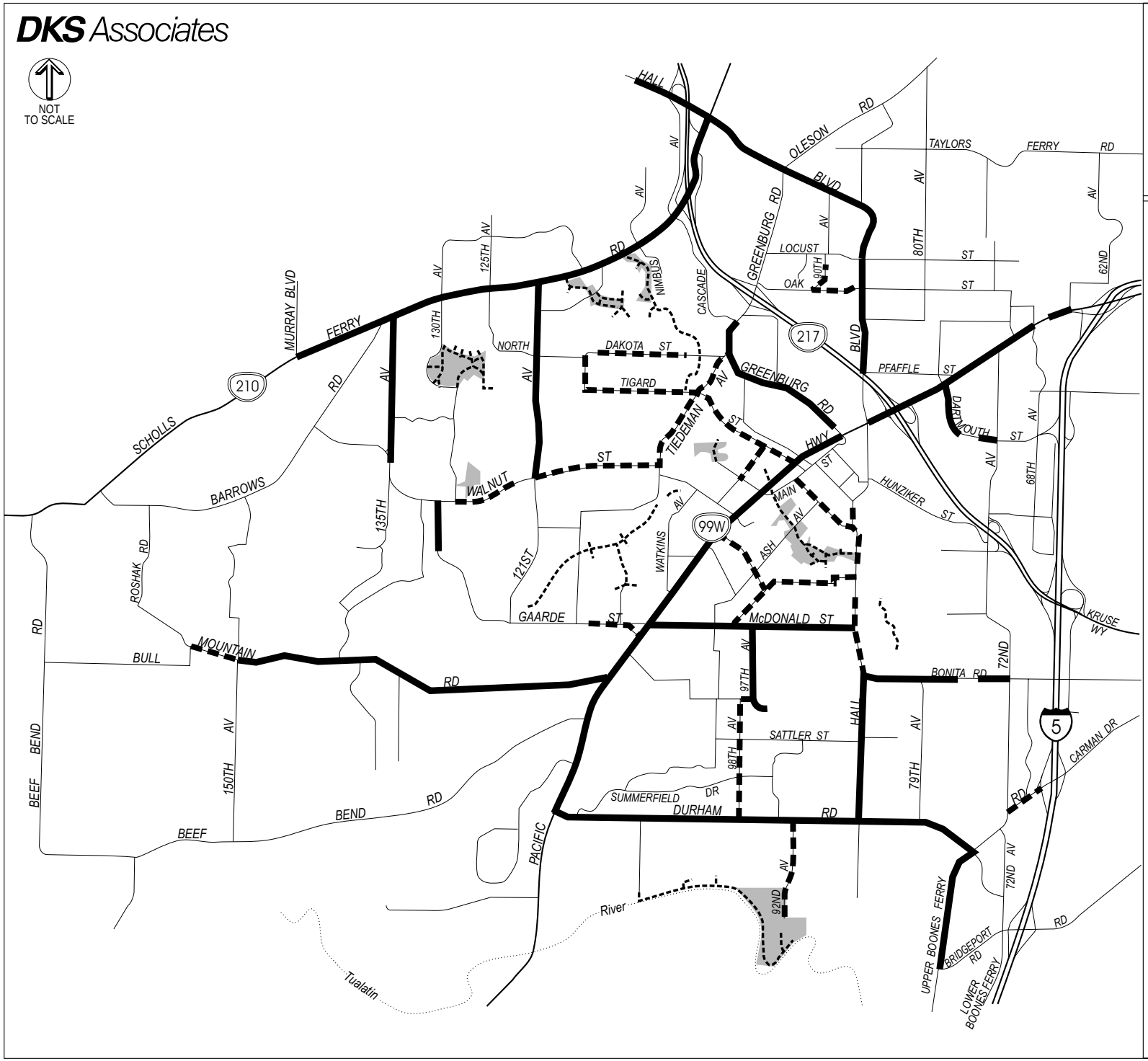

Figure 3-15
EXISTING BICYCLE FACILITIES

PEDESTRIANS

Existing sidewalks are shown in Figure 3-16. A majority of arterial and collector streets in Tigard do not have sidewalks on either side of the street. Connectivity and pedestrian linkages are generally fair to poor on the arterial and collector street system. Although sidewalk availability on the arterial and collector system is poor, many residential streets do have sidewalks, especially in areas developed within the past ten to fifteen years.

Pedestrian counts were conducted during the evening peak period (4:00-6:00 PM) at several key intersections in Tigard. A majority of these intersections had fewer than 10 pedestrians in the PM peak hour. However, there were more than 10 pedestrians at many intersections[17], including the following:

- Hall Boulevard/Sattler Street 11 pedestrians
- ORE 217 NB Ramps/ORE 99W 12 pedestrians
- ORE 217 SB Ramps/ORE 99W 13 pedestrians
- 72nd Avenue/Upper Boones Ferry Road 13 pedestrians
- Main Street/Johnson Street/ORE 99W 14 pedestrians
- Hall Boulevard/ORE 99W 15 pedestrians
- Hall Boulevard/Bonita Road 18 pedestrians
- 72nd Avenue/Bonita Road 18 pedestrians
- Dartmouth Street/ORE 99W 19 pedestrians
- Hall Boulevard/Locust Street 21 pedestrians
- Greenburg Road/Washington Square Road 23 pedestrians
- 72nd Avneue/Varns Street/ORE 217 SB 26 pedestrians
- ORE 99W/Gaarde Street 37 pedestrians
- ORE 99W/Walnut Street 50 pedestrians
- ORE 99W/Greenburg Road/Main Street 54 pedestrians

Sidewalks at least five feet wide are required in all new developments and many new local streets do have sidewalks in the City. Metro has classified several routes in Tigard as part of its Regional Pedestrian System[18]:

Transit/Mixed-Use Corridors	**Multi-use Facility with Pedestrian Function**	**Pedestrian Districts**
• ORE 99W	• Fanno Creek	• Washington Square Regional Center
• Hall Boulevard	• Tualatin River	• Tigard Downtown Town Center
• Scholls Ferry Road	• Powerlines	• Murray/Scholls Town Center
• Hunziker Street	• Hunziker to LO	• King City Town Center

[17] Pedestrian volumes represent the number of crossings on all crosswalks combined.
[18] Metro's Regional Pedestrian System map, draft Regional Transportation Plan, 2000.

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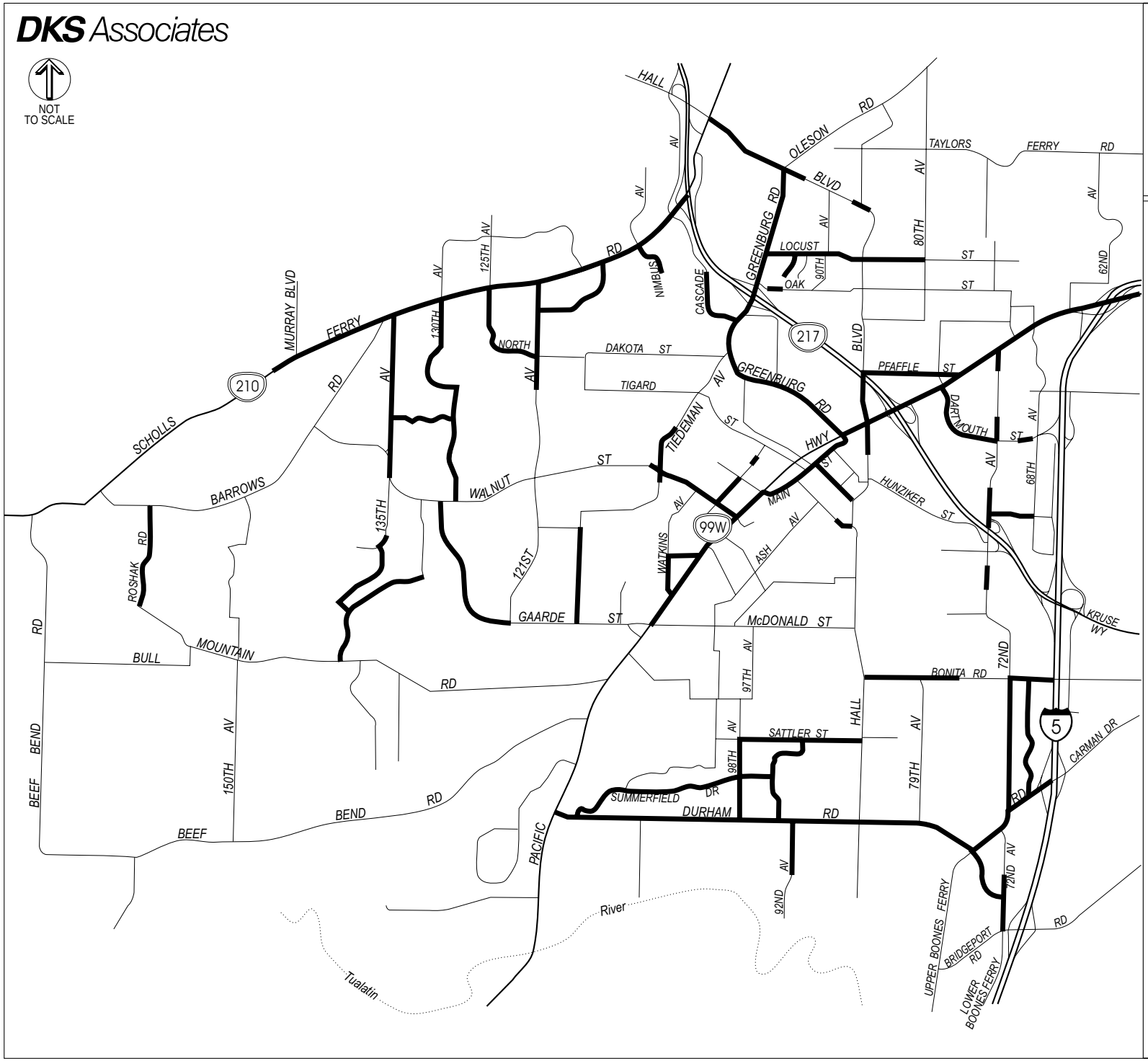

Legend

- Continuous Sidewalk on at Least One Side of Street

Figure 3-16
EXISTING SIDEWALK FACILITIES

TRUCKS

Principal truck routes in Tigard (as identified by Washington County) include I-5, ORE 217, ORE 99W and some arterial streets. This system provides connections with truck routes serving areas within and outside of Tigard making efficient truck movement and the delivery of raw materials, goods, services and finished products possible. These routes are generally found in and serve areas where there are concentrations of commercial and/or industrial land uses. Figure 3-17 shows truck routes within Tigard. In general, trucks make up about 2-5 percent of the overall traffic at a majority of intersections in Tigard.

RAIL

Railroad tracks traverse Tigard from its northern boundary to the southeast. There are two adjacent but separate tracks south from north of North Dakota Street to Bonita Road. South of Bonita Road, one set of tracks crosses the Tualatin River to Tualatin and the other set of tracks turns east to Lake Oswego. They are both owned by Portland & Western (P&W), a sister company of Willamette & Pacific (W&P) Railroad.

AIR

Tigard is served by the Portland International Airport, located in Northeast Portland on the Columbia River. The Portland International Airport is a major air transportation and freight facility, which serves Oregon and Southwest Washington. It provides a base for over twenty commercial airlines and air freight operations. The Port of Portland reported that 12.6 million passengers were served at the Portland International Airport in 1997.

Tigard is also served by the Portland-Hillsboro Airport, a general aviation facility located in the north central portion of the City. The airport facility is owned and operated by the Port of Portland as part of the Port's general aviation reliever system of airports. The Port of Portland maintains a Master Plan for this facility which was most recently updated in October, 1996.

WATER

The Tualatin River is located along the southern border of Tigard. It is used primarily for recreational purposes. No policies or recommendations in this area of transportation are provided.

PIPELINE

There are high pressure natural gas feeder lines owned and operated by Northwest Natural Gas Company along several routes in Tigard. Figure 3-18 shows the feeder line routes for Tigard.[19].

[19] Based on the Portland Area Distribution System Map (Dated September, 1998) received from Northwest Natural Gas Company.

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Transportation Systems Plan

Legend

- Existing Truck Routes

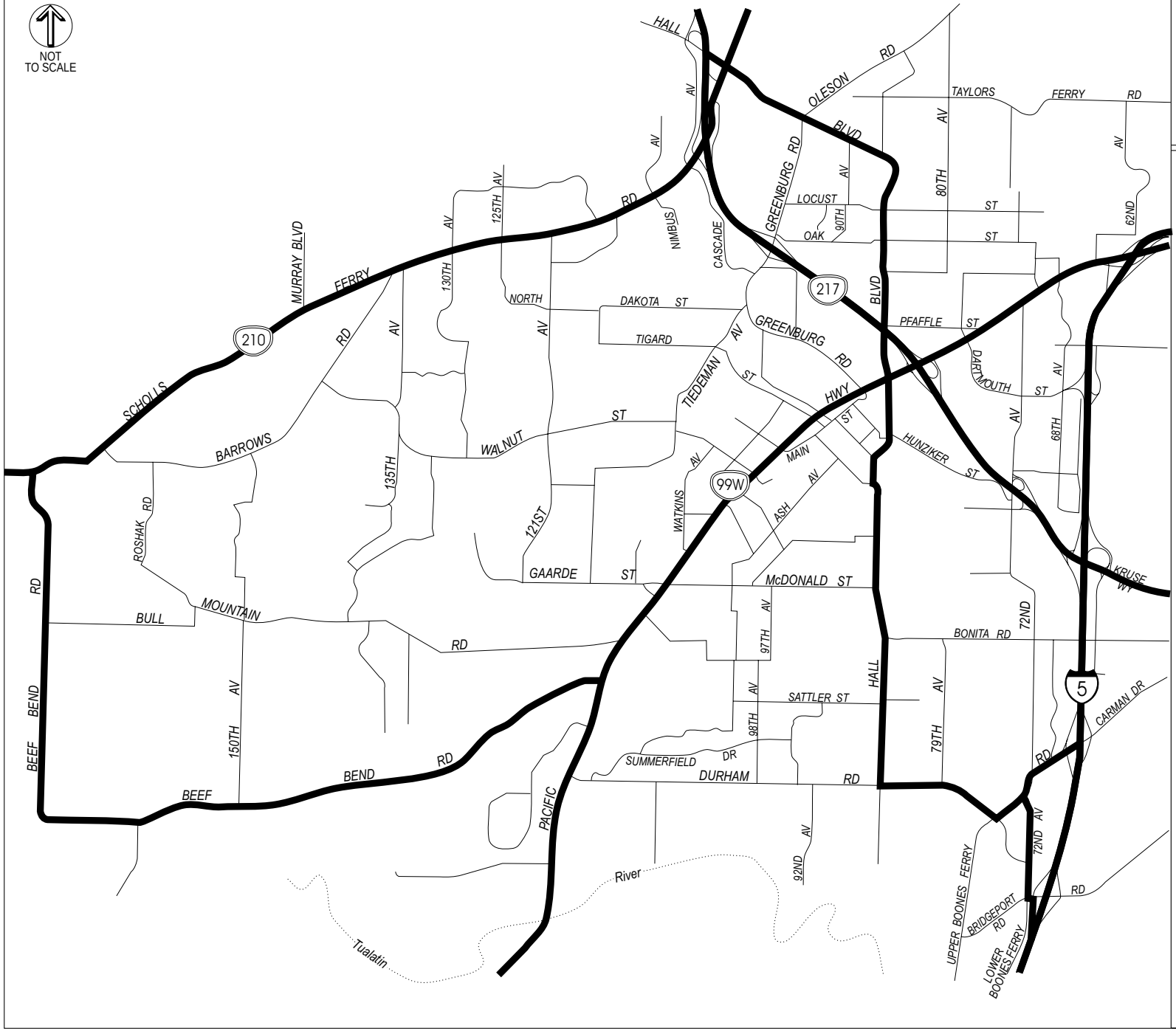

Figure 3-17
EXISTING TRUCK ROUTES

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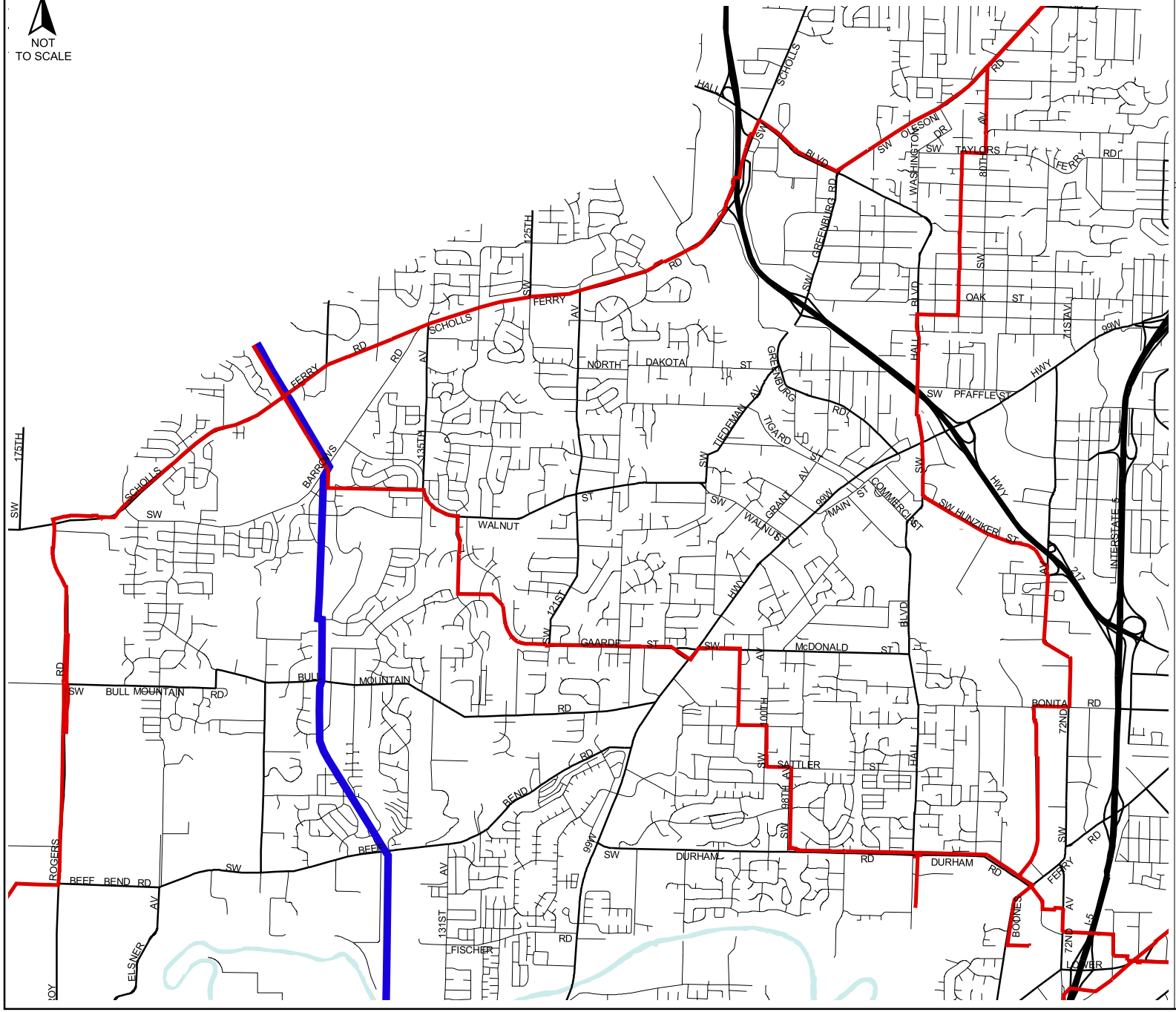

CITY OF TIGARD
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Legend

- Existing High Pressure Gas Pipeline
- Existing Kinder Morgan Pipeline

Figure 3-18
MAJOR PIPELINE ROUTES

Chapter 4
Future Demand and Land Use

CITY OF TIGARD
OREGON

This chapter summarizes the methodology used to obtain future year forecasts for various modes in the City of Tigard.

The plan for street improvements within Tigard depends on determining existing needs and needs of future growth. As a first step in assessing future needs, Metro's urban area traffic forecast model and land use forecast for 2015 was identified as a source for determining future traffic volumes in Tigard. This traffic forecast model translates land uses into roadway volume projections. These traffic volume projections form the basis for identifying potential roadway deficiencies and for evaluating alternative circulation improvements. This section describes the forecasting process, including key assumptions and the analysis of the land use scenario developed from the current Comprehensive Plan development designations and allowed densities. Future change of these variables could significantly change the future travel forecast.

The 2015 forecast was refined to include detailed information about Tigard buildout. This 2015 forecast was used for detailed operational analysis[1]. The refined 2015 forecast was used in concert with the updated 2020 Metro forecasts. This chapter compares the land use inputs between refined 2015 and 2020.

PROJECTED LAND USES

Land use is a key factor in how the transportation system operates. The amount of land that is developed, the type of land uses and how the land uses are mixed together have a direct relationship to expected demands on the transportation system. Understanding the amount and type of land use is critical to taking actions to maintain or enhance transportation system operation.

Projected land uses were developed for all areas within the urban growth boundary reflecting the comprehensive plan and Metro's land use assumptions for year 2015. Complete land use data sets were developed for the following conditions:

- Existing Base 1994 Conditions
- Year 2015

The base year model is updated every few years. For this study effort, the available base model provided by Metro was for 1994. Land uses were inventoried throughout Tigard (and the adjacent jurisdictions) by Metro and then again by the City of Tigard (the City conducted a detailed inventory of commercial uses in three key

[1] All references to 2015 in this document refer to the refined Tigard land use 2015 model and its co-use with updated 2020 forecasts.

areas: Tigard Triangle, ORE 99W, Sequoia Parkway area). This land use database includes the number of dwelling units, number of retail employees and number of other employees and is based on Metro's data and was adjusted to reflect the results of the City's inventory. Table 4-1 summarizes the adjusted land uses for existing conditions and the future scenario in the Tigard area.[2] A detailed summary of the land uses for each Transportation Analysis Zone (for both the 1994 and 2015 model years) is included in the appendix. As the land use data is updated in the future, TSP updates can reflect current conditions and new forecasts.

Table 4-1
Tigard Area Adjusted Land Use Summary

Land Use	*1994*	*Modified 2015*	**Growth**	**Percent Increase**
Households	21,765	32,481	10,716	+49%
Retail Employees	9,152	13,257	4,105	+45%
Other Employees	33,553	50,382	16,829	+50%

Source: Metro/City of Tigard

The land use for 2015 used in this study was refined from the base Metro 2015 data. Year 2020 land uses and trip generation were compared to the modified 2015 information. Table 4-2 summarizes the vehicle trip generation for the base 1994 forecast, future 2015 Metro forecast, modified 2015 Tigard forecast and the Metro 2020 forecast. The modified 2015 forecast generated the greatest number of vehicle trips and was used for the TSP. For the detailed study of Tigard streets, the modified 2015 forecast represented near build out, worst case conditions and provides a reasonable assessment of motor vehicle needs within the city (which the forecast was primarily used to determine). More detailed forecasting of the 2020 for regional conditions could be undertaken following this TSP analysis, but it is unlikely (based upon the trip generation) to generate substantially different needs. This would best be undertaken following Metro's adoption of the RTP, and would be a minor update to this TSP.

[2] Based on Metro=s 2015 land use forecasts.

Table 4-2
Forecasted Vehicle Trips in Tigard
PM Peak Hour

Scenario	Peak Hour Vehicle Trips
1994 Base Model	34,500
2015 Metro Model	46,000
2020 Metro Model	48,500
2015 Modified Tigard Model	52,600

If land uses are significantly changed in proportion to each other (i.e. there is a significant increase in retail employment relative to households), there will be a shift in the overall operation of the transportation system. Retail land uses generate significantly higher numbers of trips than do households and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment, all residential), the system must support export of trip making. Typically, there should be both residential type land uses as well as employment type land uses so that some residents may work locally, reducing the need for residents to commute long distances to work. Tigard has a mix of land uses, however, many residents must travel outside the City for employment opportunities.

Table 4-1 indicates that a significant amount of growth is expected in Tigard area in the coming years. These land use quantities should be monitored to make sure that Tigard is working to achieve a balance of land use that is compatible with the available transportation system. This TSP balances transportation needs with the forecasted 2015 land uses.

Transportation Analysis Zones: For traffic forecasting, the land use data is stratified into geographical areas called traffic analysis zones (TAZ's) which represent the sources of vehicle trip generation. There are about 30-40 Metro TAZ's which represent Tigard and its vicinity (Figure 4-1). These 30-40 TAZ's were disaggregated, as part of this plan, into about 130-140 TAZ's to more specifically represent land use in and around Tigard. The original Metro and disaggregated model zone boundaries for Tigard are shown in Figure 4-2. Metro uses EMME/2, a computer based program for transportation planning, to process the large amounts of data for the Portland Metropolitan area.

Land uses were inventoried throughout Tigard by Metro and adjusted to reflect Tigard's more detailed land use inventory in 2015. The adjustments reflected what was termed to be "near buildout". This land use data base includes the number of dwelling units, number of retail employees and number of other employees. Table 4-3 summarizes the land uses for existing conditions and the future scenario by transportation analysis zones (TAZ's).

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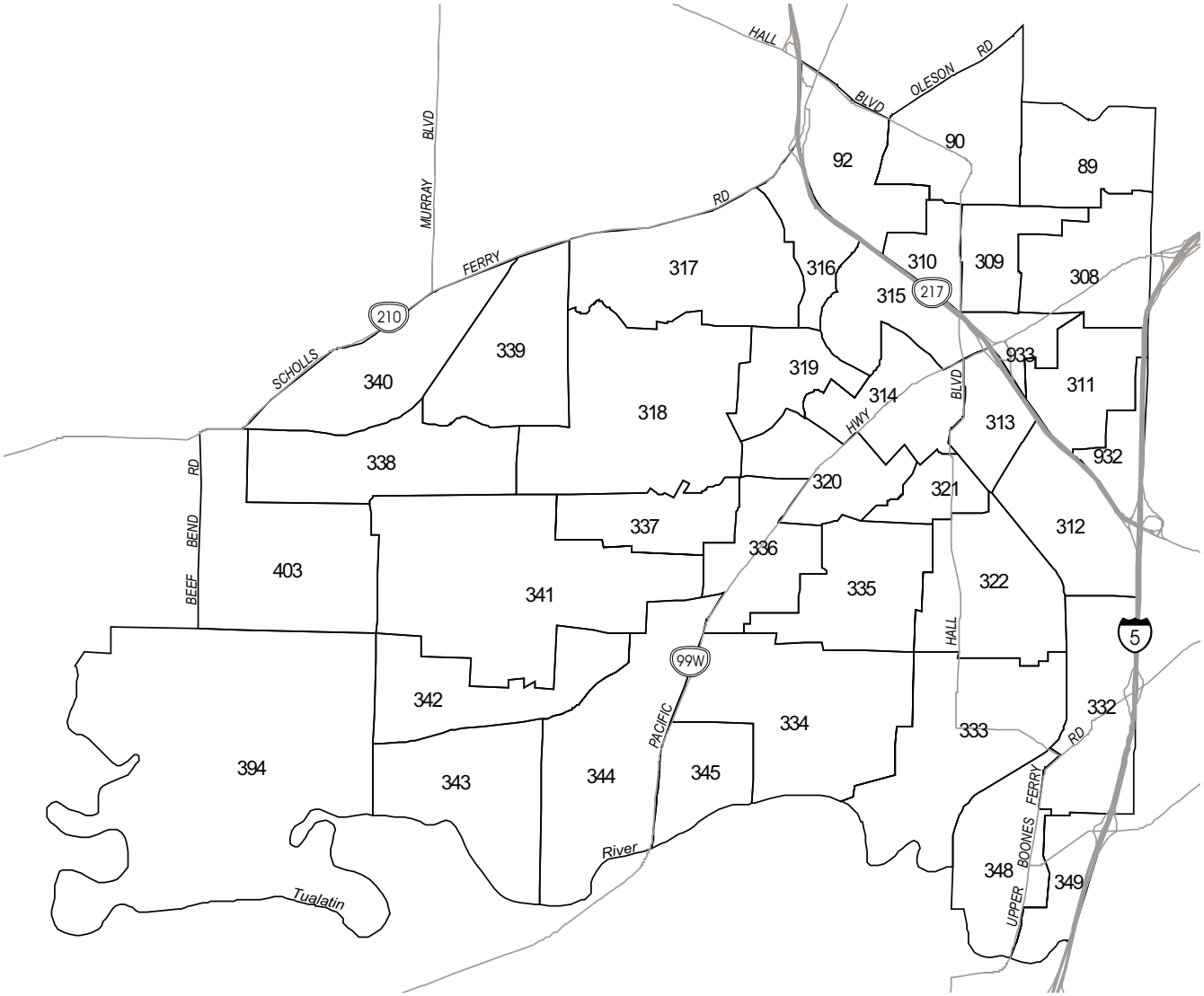

Figure 4-1
METRO TAZ

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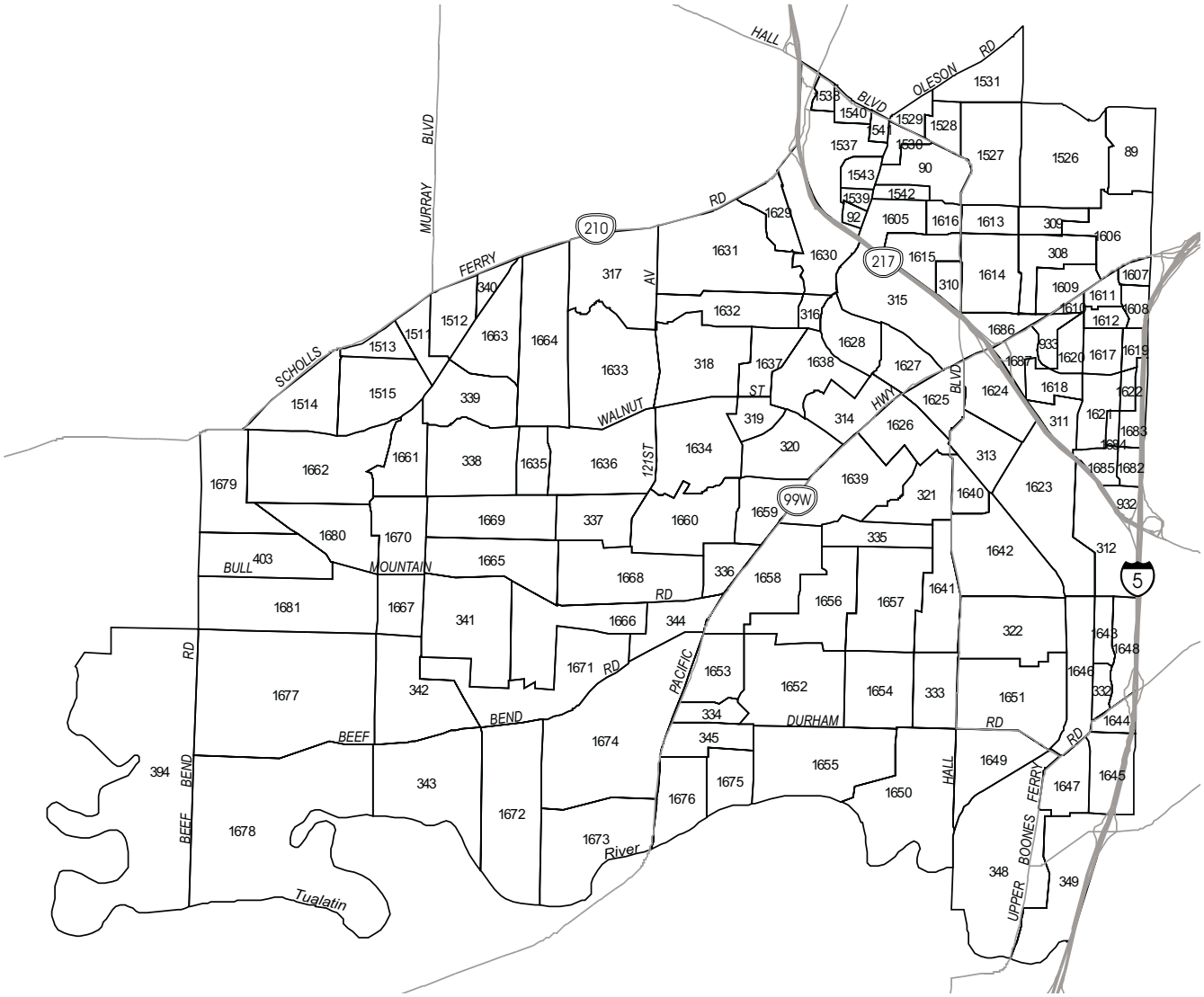

Figure 4-2
DISAGGREGATED TIGARD TAZ

Table 4-3
Tigard Land Use Summary

	Households		*Retail Employees*		*Other Employees*	
TAZ	*1994*	*2015*	*1994*	*2015*	*1994*	*2015*
67	888	958	3	3	61	76
89	191	217	0	0	17	23
90	299	409	3	4	261	489
92	0	9	143	207	273	519
308	185	195	28	28	21	27
309	77	78	1	1	9	11
310	69	96	2	11	4	22
311	33	37	0	400	58	58
312	0	22	12	12	1,193	1,363
313	3	32	62	51	1,208	1,306
314	160	184	24	24	117	147
315	624	825	212	293	647	1,165
316	77	76	22	24	64	91
317	683	705	161	141	955	1,096
318	303	321	0	0	28	33
319	58	68	0	0	7	16
320	225	251	72	72	100	491
321	120	251	0	0	406	416
322	324	158	0	0	433	518
332	0	1	18	18	422	600
333	125	243	0	5	3	42
334	223	262	43	59	69	166
335	86	167	0	1	2	21
336	170	201	63	70	152	219
337	11	206	0	0	7	40
338	66	163	0	0	4	11
339	66	254	1	2	11	46
340	239	309	0	1	0	139
341	199	294	0	0	27	40
342	269	390	6	5	45	60
343	105	265	0	0	0	102
344	92	260	4	15	19	101
345	223	368	331	397	111	174
394	25	26	0	0	17	20
403	81	231	0	1	17	53
932	0	10	42	42	399	941
933	5	9	92	137	40	78
1511	61	194	0	2	0	104
1512	207	374	0	6	0	331
1513	45	130	0	0	0	24
1514	26	503	0	3	0	167
1515	33	178	1	5	41	298
1526	364	517	0	0	39	91

	Households		Retail Employees		Other Employees	
TAZ	1994	2015	1994	2015	1994	2015
1527	412	487	1	1	87	104
1528	92	130	0	0	12	22
1530	54	146	5	5	496	653
1537	8	115	1,406	2,064	2,686	5,167
1538	97	103	153	149	292	373
1539	0	0	164	142	314	355
1540	25	44	316	418	604	1,048
1541	6	20	78	143	149	357
1542	30	42	152	186	290	467
1543	1	3	52	57	99	144
1605	24	31	1,226	1,084	2,343	2,715
1606	188	241	109	135	80	129
1607	2	10	97	102	71	97
1608	4	22	0	242	168	231
1609	198	236	349	363	110	156
1610	2	18	24	54	18	51
1611	1	29	95	139	70	132
1612	2	45	0	298	170	285
1613	86	93	1	2	8	24
1614	269	308	2	4	26	59
1615	61	92	25	86	38	170
1616	39	63	9	34	14	66
1617	43	61	0	100	188	286
1618	7	37	0	600	41	41
1619	7	13	0	0	116	300
1620	11	16	202	278	44	78
1621	39	77	0	0	165	180
1622	1	16	161	200	54	137
1623	221	323	12	12	2,130	2,800
1624	32	76	61	101	1,189	1,326
1625	206	315	400	500	270	400
1626	269	324	147	250	716	1,019
1627	299	334	36	45	176	283
1628	255	330	20	41	62	162
1629	0	6	73	72	312	368
1630	29	27	131	218	377	830
1631	635	689	89	74	529	573
1632	194	230	22	20	137	162
1633	588	607	0	0	60	64
1634	250	354	0	0	14	46
1635	24	117	0	0	1	27
1636	192	480	0	0	10	93
1637	45	43	1	1	186	182
1638	119	137	0	0	94	131
1639	485	511	283	350	296	375

	Households		Retail Employees		Other Employees	
TAZ	1994	2015	1994	2015	1994	2015
1640	29	102	0	0	24	101
1641	209	358	0	0	85	141
1642	317	533	0	0	60	407
1643	0	5	42	42	422	502
1644	1	3	26	26	466	466
1645	1	9	113	113	3,001	3,552
1646	2	15	129	129	2,999	3,986
1647	4	11	149	149	500	617
1648	1	26	312	433	317	843
1649	40	75	11	20	76	20
1650	62	112	11	10	76	10
1651	394	521	2	12	14	12
1652	548	655	5	8	26	8
1653	259	446	18	247	95	127
1654	432	467	4	4	19	27
1655	472	520	7	7	33	45
1656	316	402	0	1	5	28
1657	261	404	3	3	53	89
1658	451	584	74	83	177	261
1659	148	172	224	224	128	128
1660	258	310	0	0	96	104
1661	15	106	0	0	3	13
1662	127	466	0	0	4	45
1663	526	689	2	4	32	81
1664	379	522	4	4	56	86
1665	116	277	0	0	22	45
1666	60	312	0	0	11	47
1667	73	112	0	0	9	14
1668	180	307	0	0	24	42
1669	53	259	0	0	2	32
1670	60	114	0	0	11	18
1671	38	362	1	5	12	54
1672	74	223	0	0	18	111
1673	548	645	8	13	39	89
1674	1,717	1,903	186	186	444	489
1675	116	155	13	17	4	7
1676	392	468	23	33	8	14
1677	28	29	0	0	16	18
1678	55	57	0	0	25	29
1679	21	349	0	1	1	69
1680	54	182	0	1	13	46
1681	92	299	0	1	20	71
1682	6	28	35	35	247	600
1683	10	20	60	60	426	569
1684	4	12	29	29	208	241

	Households		*Retail Employees*		*Other Employees*	
TAZ	*1994*	*2015*	*1994*	*2015*	*1994*	*2015*
1685	1	27	64	64	455	700
1686	9	20	257	335	113	191
1687	10	15	87	300	38	69
1688	115	296	2	49	4	82
1689	89	389	0	0	18	248
Tota1	**21,765**	**32,481**	**9,152**	**13,257**	**33,553**	**50,382**

Source: Metro/City of Tigard

A comparison of the modified 2015 land use assumptions to 2020 land use assumptions indicates that the 2020 forecast assumes more households, more retail employees and fewer other employees than the modified 2015 forecast. Key areas where discrepancies occurred were the Washington Square area (more retail employees and fewer other employees in 2020), Downtown (more "other" employees in 2020), Sequoia Parkway area (significantly fewer "other" employees in 2020) and Tigard Triangle (significantly fewer "other" employees in 2020). Detail regarding the trip generation by TAZ is provided in the appendix.

METRO AREA TRAFFIC MODEL

The development of future traffic system needs for Tigard depends on the ability to accurately forecast travel demand resulting from estimates of future population and employment for the City. The objective of the transportation planning process is to provide the information necessary for making decisions on when and where improvements should be made in the transportation system to meet travel demands.

Metro has developed an urban area travel demand model as part of the Regional Transportation Plan Update process to help identify street and roadway needs. Traffic forecasting can be divided into several distinct but integrated components that represent the logical sequence of travel behavior (Figure 4-3). These components and their general order in the traffic forecasting process follow:

- Trip Generation
- Trip Distribution
- Mode Choice
- Traffic Assignment

The initial roadway network used in the traffic model was the existing streets and roadways. Future land use scenarios were tested and roadway improvements were added in to mitigate traffic conditions, using programmed improvements as a starting basis. Forecasts of PM peak hour traffic flows were produced for every major roadway segment within the Tigard area. Traffic volumes are projected on most arterials and collector streets. Some local streets are included in the model, but many are represented by centroid connectors in the model process.

Trip Generation. The trip generation process translates land use quantities (in numbers of dwelling units and retail and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ) using trip generation rates established during the model verification process. The trip rates were based upon

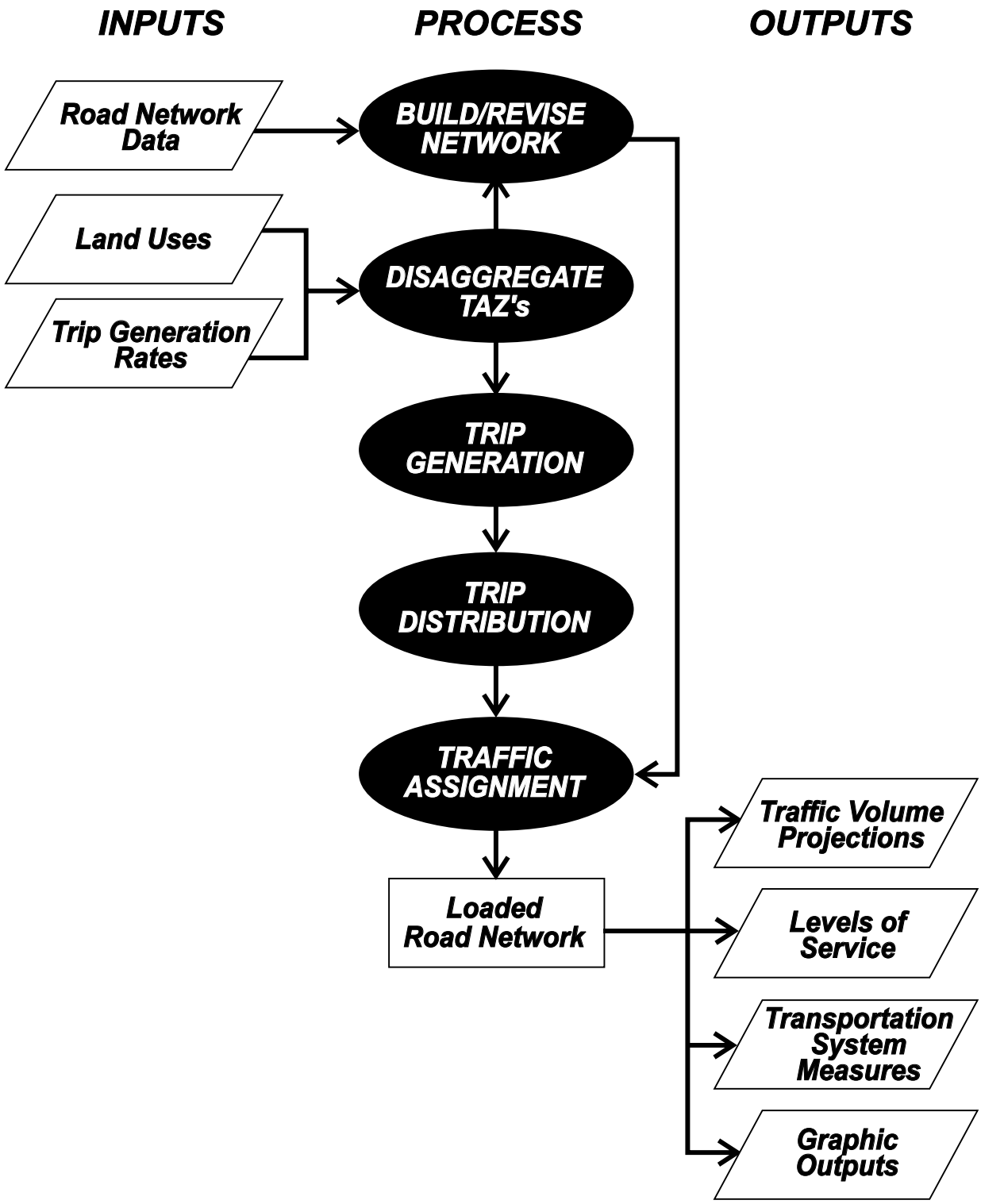

Figure 4-3
TRAFFIC FORECASTING MODEL PROCESS

Institute of Transportation Engineers research[3] and documentation and adjusted to suit the Portland area in the calibration process. PM peak hour trip rates used in the Metro model are summarized in Table 4-4.

Table 4-4
Approximate Average PM Peak Hour Trip Rates Used in Metro Model

Unit	*Average Trip Rate/Unit* In	Out	Total
Household	0.43	0.19	0.62
Retail Employee	0.78	0.69	1.47
Other Employee	0.07	0.29	0.36

Source: Metro

Table 4-5 illustrates the estimated growth in daily vehicle trips generated within the Tigard, between 1994 and 2015. It indicates that vehicle trip generation in Tigard would grow by approximately 50 percent between 1994 and 2015 if the land develops according to the assumptions made. Assuming a 20 year time horizon to the 2015 scenario, this represents a growth rate of about 2 percent per year.

Table 4-5
Existing and Future Projected External Trip Generation*
PM Peak Hour Vehicle Trips

Trips	*1994*	*Modified 2015*	*2020*	*2015M -1994 Growth*	*Percent Increase*
Tigard Area	34,447	52,606	48,518	18,159	+53%

Source: Metro/City of Tigard
NOTE: * - External trips refer to model trips that exit a Tigard centroid

Trip Distribution. This step estimates how many trips travel from one zone in the model to any other zone. The distribution is based on the number of trip ends generated in each zone pair, and on factors that relate the likelihood of travel between any two zones to the travel time between the zones.

In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the locations and amounts of traffic generation in Tigard are essentially a function of future land use in the city, the distribution of trips is influenced by growth in neighboring areas such as Portland, Beaverton, Lake Oswego, Tualatin, etc. External trips (trips which have either an origin or destination in Tigard and the other trip end outside Tigard) and through trips (trips which pass through Tigard and have neither an origin nor a destination there) were projected using trip distribution patterns based upon census data and traffic counts performed at gateways into the Metro area UGB.

Mode Choice. This is the step where it is determined how many trips will be by single-occupant vehicle, transit or carpool. The 1994 mode splits would be incorporated into the base model and adjustments to that mode split may be made for the future scenario, depending on any expected changes in transit or carpool use. These considerations are built into the forecasts used for 2015. In the Tigard area, the 2015 model assumes

[3] *Trip Generation Manual,* Institute of Transportation Engineers.

approximately two percent would use transit and average vehicle occupancy would be about 1.24 passengers during the evening peak period.

Traffic Assignment. In this process, trips from one zone to another are assigned to specific travel routes in the roadway network, and resulting trip volumes are accumulated on links of the network until all trips are assigned.

Different models are actually used for auto assignment versus transit assignment. Various techniques exist for auto assignment, such as all-or-nothing, stochastic, incremental capacity restraint and equilibrium capacity restraint. The EMME/2 package, among others, uses the equilibrium capacity restraint technique, which is considered to produce the most realistic network traffic loading of all the techniques. With this technique, the auto trips are assigned iteratively to the network in such a way that the final traffic loading will closely approximate the true network "equilibrium." Network equilibrium is defined as the condition where no traveler can achieve additional travel time savings by switching routes. Between iterations, network travel times are updated to reflect the congestion effects of the traffic assigned in the previous iteration. Congested travel times are estimated using what are called "volume-delay functions" in EMME/2. There are different forms of volume/delay functions, all of which attempt to simulate the capacity restraint effect of how travel times increase with increasing traffic volumes. The volume-delay functions take into account the specific characteristics of each roadway link, such as capacity, speed, and facility type.

Model Verification. The base 1994 modeled traffic volumes were compared against actual traffic counts across screenlines, on key arterials and at key intersections. Most arterial traffic volumes are closely replicated, even down to turn movements by the model based upon detailed calibration. Based on this performance, the model was used for future forecasting and assessment of circulation changes.

MODEL APPLICATION TO TIGARD

Intersection turn movements were extracted from the model at key intersections for both year 1994 and future scenarios. These intersection turn movements were not used directly, but the increment of the future year turn movements over the year 1994 turn movements was applied (added) to existing (actual 1994/1997/1999) turn movement counts in Tigard. Actual turn movement volumes used for future year intersection analysis can be found in the appendix (Level of Service Calculations).

Chapter 5
Pedestrians

CITY OF TIGARD
OREGON

This chapter summarizes existing and future pedestrian needs in the City of Tigard, outlines the criteria to be used in evaluating these needs, provides a number of strategies for implementing a pedestrian plan and recommends a pedestrian Action Plan for the City of Tigard. The needs, criteria and strategies were identified in working with the City's TSP Task Force. This committee provided input regarding the transportation system in Tigard, specifically exploring pedestrian needs. The methodology used to develop the pedestrian plan combined citizen and staff input, specific Transportation Planning Rule requirements[1] and continuity to the regional pedestrian network.[2]

NEEDS

A limited number of sidewalks are provided on the arterial and collector roadways (see Figure 3-15) in the City of Tigard, resulting in a fair existing pedestrian network. However, many residential subdivisions in Tigard are relatively new and a majority of them have sidewalks available. A problem exists outside the limits of the new developments where connecting sidewalks often do not exist. Continuity and connectivity are key issues for pedestrians in Tigard since, generally, if there is a sidewalk available, there will be sufficient capacity. In other words, it is more important that a continuous sidewalk be available than that it be of a certain size or type.

The most important existing pedestrian needs in Tigard are providing sidewalks on arterials and collectors and connectivity to key activity centers in the City. This includes the need for safe, well lighted arterial and collector streets. Arterials and collectors can act as barriers to pedestrian movement if safe facilities are not provided. In the future, pedestrian needs will be similar, but there will be additional activity centers that will need to be considered and interconnected.

Walkway needs in Tigard must consider the three most prevalent trip types:

- Residential based trips – home to school, home to home, home to retail, home to park, home to transit, home to entertainment, home to library
- Service based trips – multi-stop retail trips, work to restaurant, work to services, work/shop to transit
- Recreational based trips – home to park, exercise trips, casual walking trips

Residential trips need a set of interconnected sidewalks radiating out from homes to destinations within one-half to one mile. Beyond these distances, walking trips of this type become significantly less common (over 20 minutes). Service based trips require direct, conflict-free connectivity between uses (for example,

[1] *Transportation Planning Rule*, State of Oregon, DLCD, Sections 660-12-020(2)(d) and 660-12-045-3.

[2] Metro Draft RTP, 1999, Regional Pedestrian System.

a shopping mall with its central spine walkway that connects multiple destinations). Service based trips need a clear definition of connectivity. This requires mixed use developments to locate front doors which relate directly to the public right-of-way and provide walking links between uses within one-half mile. Recreational walking trips have different needs. Off-street trails, well landscaped sidewalks and relationships to unique environmental features (creeks, trees, farmland) are important.

Because all of these needs are different, there is no one pedestrian solution. The most common need is to provide a safe and interconnected system that affords the opportunity to consider the walking mode of travel, especially for trips less than one mile in length.

FACILITIES

Sidewalks should be built to current design standards of the City of Tigard/Washington County and in compliance with the Americans with Disabilities Act (at least four feet of unobstructed sidewalk).[3] Wider sidewalks may be constructed in commercial districts or on arterial streets. Additional pedestrian facilities may include accessways, pedestrian districts and pedestrian plazas, as defined in the *Transportation Planning Rule*:[4]

> *Accessway*: A walkway that provides pedestrian and/or bicycle passage either between streets or from a street to a building or other destination such as a school, park or transit stop.
>
> *Pedestrian District*: A plan designation or zoning classification that establishes a safe and convenient pedestrian environment in an area planned for a mix of uses likely to support a relatively high level of pedestrian activity.
>
> *Pedestrian Plaza*: A small, semi-enclosed area usually adjoining a sidewalk or a transit stop which provides a place for pedestrians to sit, stand or rest.

These designations will be provided as the TSP is implemented. Any pedestrian districts, for example the downtown area (Main Street), may be identified in further studies which address pedestrian issues. In addition, pedestrian issues in *Main Street* and *Town Center* areas (as defined by Metro) should be reviewed in greater detail for pedestrian accessibility, facilities and/or street crossing treatments. The land uses proposed in the *Main Street* and *Town Center* areas will help to promote more pedestrian use. Better pedestrian access should be developed to support and encourage this use.

Sidewalks should be sized to meet the specific needs of the adjacent land uses and needs. Guidance to assess capacity needs for pedestrians can be found in the *Highway Capacity Manual* and *Pushkarev and Zupan*.[5] Typically, the base sidewalk sizing for local and neighborhood routes should be 5 feet (clear of obstruction).

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[3] Americans with Disabilities Act, Uniform Building Code.

[4] Transportation Planning Rule, State of Oregon, Department of Land Conservation and Development, OAR-660-12-005(2, 14 and 15).

[5] Highway Capacity Manual, Special Report 209, Transportation Research Board, 1994; Chapter 13; and Pushkarev, Zupan, Urban Spaces for Pedestrians, 1975.

Pushkarev & Zupan define impeded pedestrian flow occurring at 2 to 6 pedestrians per foot per minute. At this upper level (6 p/f/m) a five foot sidewalk would have peak five minute capacity of 150 pedestrians. There is no location in Tigard with this level of pedestrian activity. While identified as level of service B in the Highway Capacity Manual, no sidewalk in Tigard should exceed 6 pedestrians per foot per minute without widening. The critical element of this analysis is the effective width of walkway. Because of street utilities and amenities, a five foot walkway can be reduced to two feet of effective walking area. This is the greatest capacity constraint to pedestrian flow. Therefore, landscape strips should be considered on all walkways to reduce the impact of utilities and amenities – retaining the full sidewalk capacity.

As functional classification of roadways change, so should the design of pedestrian facilities. Collectors may need to consider minimum sidewalk widths of 6 to 8 feet and arterials should have sidewalk widths of 6 to 10 feet. Wider sidewalks may be necessary depending upon urban design needs and pedestrian flows (for example, adjacent to storefront retail or near transit stations). Curb-tight sidewalks are generally acceptable at the local and neighborhood route classification, however, with high vehicle volumes and on collector/arterial streets, landscape strips between the curb and the sidewalk should be required. Where curb-tight sidewalks are the only option, additional sidewalk width must be provided to accommodate the other street side features (light poles, mail boxes, etc… potentially an additional 3 to 4 feet).

CRITERIA

Tigard's TSP Task Force created a set of goals and policies to guide transportation system development in Tigard (see Chapter 2). Several of these policies pertain specifically to pedestrian needs:

Goal 1

Policy 2 *Encourage pedestrian accessibility by providing safe, secure and desirable pedestrian routes.*

Goal 2

Policy 1 *Develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way for utility, pedestrian, bicycle, transit, truck and auto use.*

Policy 4 *Sidewalks must be constructed on all streets within Tigard (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a sidewalk.*

Policy 5 *Bicycle and pedestrian plans shall be developed which link to recreational trails.*

Policy 6 *Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel. Provide connectivity to activity centers and destinations with a priority for bicycle and pedestrian connections.*

Goal 3

Policy 3 *Safe and secure pedestrian and bicycle ways shall be designed between parks and other activity centers in Tigard.*

Policy 4 Safe and secure routes to schools shall be designated for each school and any new residential project shall identify the safe path to school for children

Goal 5

Policy 1 Design and construct transportation facilities to meet the requirements of the Americans with Disabilities Act.

These goals and policies are the criteria that all pedestrian improvements in Tigard should be compared against to determine if they conform to the intended vision of the City.

STRATEGIES

Several strategies were evaluated by the TSP Task Force for future pedestrian projects in Tigard. These strategies aimed at providing the City with priorities to direct its funds toward pedestrian projects that meet the goals and policies of the City:

Strategy 1 - "Fill in Gaps in the Network Where Some Sidewalks Exist"

This strategy provides sidewalks which fill in the gaps between existing sidewalks where a significant portion of a pedestrian corridor already exists. This strategy maximizes the use of existing pedestrian facilities to create complete sections of an overall pedestrian network.

Strategy 2 – "Connect Key Pedestrian Corridors to Schools, Parks, Recreational Uses and Activity Centers"

This strategy provides sidewalks leading to activity centers in Tigard, such as schools and parks. This strategy provides added safety on routes to popular pedestrian destinations by separating pedestrian flow from auto travel lanes. These routes are also common places that children may walk, providing them safer routes. A key element of this strategy is to require all new development to define direct safe pedestrian paths to parks, activity centers, schools and transit (in the future) within one mile of the development site. Direct will be defined as 1.25 times the straight line connection to these points from the development. Any gaps (off-site) will be defined (location and length).

Strategy 3 – "Coordination of Land Use Approval Process to Provide Sidewalks & Links to Existing Sidewalks"

This strategy uses the land use approval process to ensure that sidewalks are provided adjacent to new development and that links from that new development to existing sidewalks are evaluated. If there are existing sidewalks in close proximity, either the developer or the City will be required to extend the sidewalk adjacent to the new development to meet the existing nearby sidewalk. The development shall use the pedestrian master plan as a basis for determining adjacent sidewalk placement. To effectively implement this strategy, close proximity shall be determined to be within 300 feet of the proposed development. In addition, if extension is not found to be roughly proportional to the development, the City Shall add this to future years CIP consideration list.

Strategy 4 – "Improved Crossings"

This strategy focuses on ensuring that safe street crossing locations are available, particularly along

high traffic volume streets or locations where there is a lot of pedestrian traffic (i.e. adjacent to schools, activity centers, etc.)

Strategy 5 – "Pedestrian Corridors that Connect to Major Recreational Uses"

This strategy provides a connection between the sidewalk network and major recreational facilities, such as the Greenway Trail, the the Fanno Creek Trail and other recreational uses.

Strategy 6 – "Pedestrian Corridors that Connect to Major Transit Locations"

This strategy provides sidewalks leading to major transit facilities, such as bus stops which service a high volume of riders. This strategy increases pedestrian safety and encourages transit use.

Strategy 7 – "Pedestrian Corridors that Connect Neighborhoods"

This strategy puts priority on linking neighborhoods together with pedestrian facilities. This can include walkways at the end of cul-de-sacs and direct connections between neighborhoods (avoiding "walled" communities).

Strategy 8 - "Reconstruct All Existing Substandard Sidewalks to City of Tigard Standards"

This strategy focuses on upgrading any substandard sidewalks to current city standards. Current standards are for five foot sidewalks to meet ADA[6] requirements. Several sidewalks exist that do not meet the minimum five foot requirement. Fronting property owners are responsible for sidewalk maintenance where pavement has fallen into disrepair.

Strategy 9 – "Pedestrian Corridors that Commuters Might Use"

This strategy focuses on providing sidewalks in areas where commuters might walk. For example, connecting neighborhoods to large employment areas (i.e Washington Square Regional Center or the Tigard Triangle).

Table 5-1 lists each strategy in the order it was ranked by the committee and provides an assessment of how each of the strategies meets the requirements of each of the goals and policies.

[6] *Americans with Disabilities Act*, Uniform Building Code.

Table 5-1
Pedestrian Facility Strategies Comparisons

Strategy	Policies						
	1-2	2-4	2-5	2-6	3-3	3-4	5-1
1. Fill in gaps in network where some sidewalks exist	◖	◖	❍	❍	◖	◖	❍
2. Connect pedestrian corridors to schools, parks, activity centers	◖	●	◖	◖	●	●	◖
3. Coordination of land use approval process to provide sidewalks & links to existing	◖	◖	❍	◖	❍	◖	◖
4. Improved crossings	●	◖	❍	◖	◖	◖	◖
5. Pedestrian corridors that connect to major recreational uses	◖	◖	●	❍	◖	◖	◖
6. Pedestrian corridors that connect to major transit locations	◖	◖	❍	◖	❍	❍	◖
7. Pedestrian corridors that connect neighborhoods	◖	❍	❍	◖	❍	◖	❍
8. Reconstruct substandard sidewalks to City standards	❍	◖	❍	❍	●	❍	◖
9. Pedestrian corridors commuters might use	◖	●	❍	◖	❍	◖	◖

✖ Does not meet criteria ◖ Mostly meets criteria
❍ Partially meets criteria ● Fully meets criteria

RECOMMENDED PEDESTRIAN FACILITY PLAN

The strategies that had been evaluated by the TSP Task Force were ranked by each member of the committee according to his or her vision of priorities for the City of Tigard. The ranking of these strategies is listed in Table 5-1 from most important to least important. Three strategies were considered to be a high priority for pedestrians in Tigard and ranked significantly higher than the remaining strategies. These strategies were filling in network gaps, connections to schools, parks and activity centers and coordination of land use approval process to provide sidewalks and links to existing sidewalks.

DKS *Associates*

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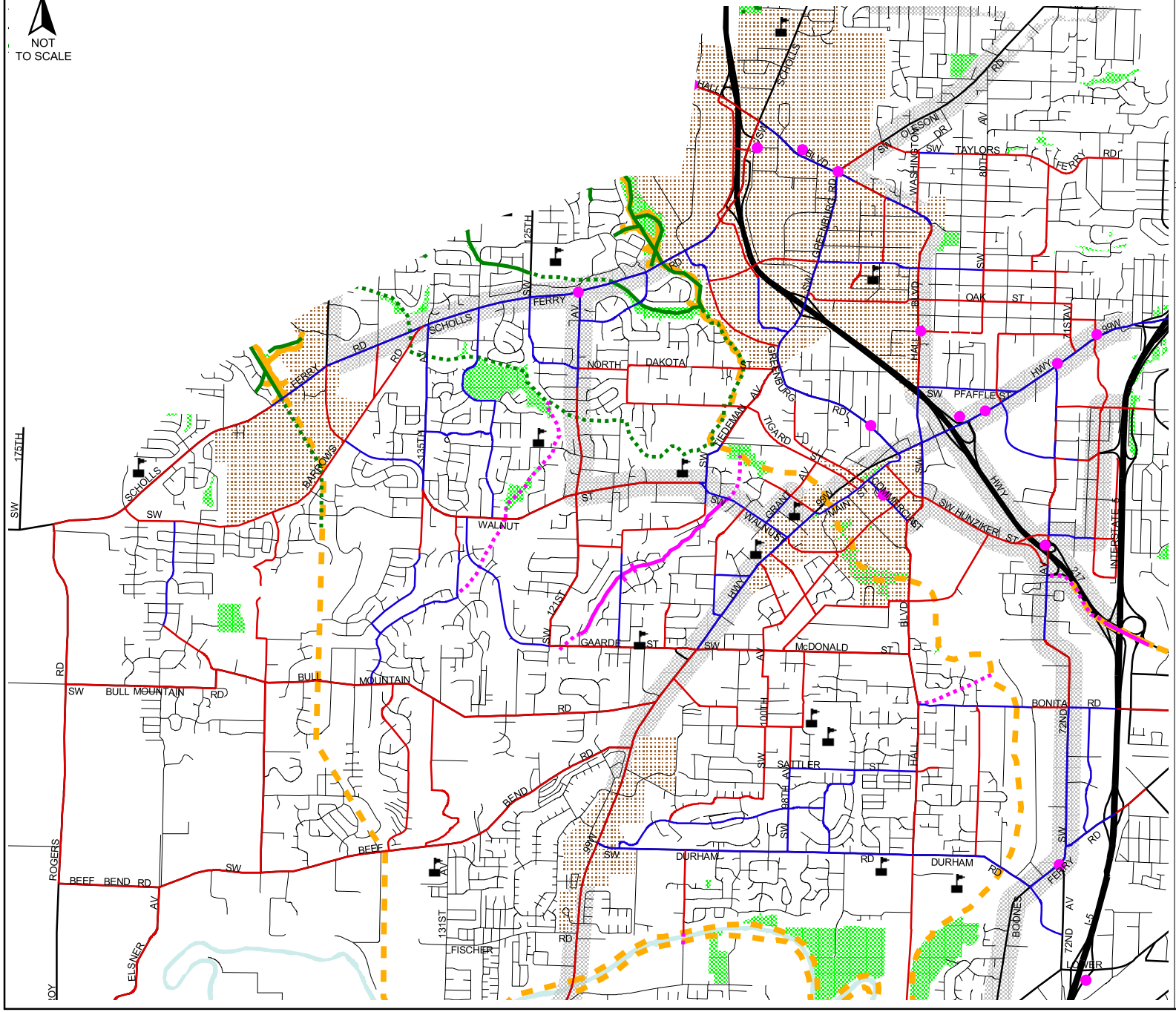

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- RTP Major Transit Stop
- Schools
- RTP Transit/Mixed Use Corridor
- RTP Pedestrian Districts

Parks
- Existing Park

Tigard Off-Street Multi-Use Paths
- Proposed
- Existing

THRPD Trails
- Existing
- Proposed

RTP Regional Corridor Off-Street Regional Multi-Use Path
- Existing
- Proposed

Sidewalks
- Existing (Continuous on at Least One Side - Future Both Sides)
- Proposed (Both Sides)

Figure 5-1
PEDESTRIAN MASTER PLAN

A list of likely actions to achieve fulfillment of these priorities was developed into a Pedestrian Master Plan. The Pedestrian Master Plan (Figure 5-1) is an overall plan and summarizes the "wish list" of pedestrian-related projects in Tigard. From this Master Plan, a more specific, shorter term, Action Plan was developed.

The Action Plan consists of projects that the City should give priority to in funding. As development occurs, streets are rebuilt and other opportunities (such as grant programs) arise, projects on the Master Plan should be pursued as well.

It is preferable to provide pedestrian facilities on one side of the street if it means a longer section of the system could be covered (i.e. sidewalk on one side of the street for two miles is preferable to sidewalk on both sides of the street for one mile). In the case of significant stretches where sidewalk is only provided on one side of the road, particular emphasis should be placed on developing safe crossing locations. Development shall still be responsible for any frontage improvements, even if a pedestrian facility already exists opposite the proposed development. Sidewalks on both sides of all streets is the ultimate desire.

POTENTIAL PROJECT LIST

Table 5-2 outlines potential pedestrian projects in Tigard. The City, through its Capital Improvement Program (CIP), joint funding with other agencies (Washington County, Metro) and development approval would implement these projects. The following considerations should be made for each sidewalk installation:

- Every attempt should be made to meet City standards
- All sidewalks should be a minimum of five feet wide
- Landscape strips should be considered and are encouraged (see standard street cross-sections in Motor Vehicles chapter)

Action Plan Projects

Figure 5-2 and Table 5-2 summarize the Pedestrian Action Plan.

Table 5-2
Potential Pedestrian Projects

Rank*	Project	From	To
Action Plan Projects			
H	Taylor's Ferry Rd	Washington Drive	62nd Avenue
H	Washington Drive	Hall Boulevard	Taylor's Ferry Road
H	Hall Boulevard	Scholls Ferry Road	Pfaffle Street
H	Dartmouth Street	72nd	68th Avenue
H	72nd Avenue	ORE 99W	Bonita Road
H	72nd Avenue	Carman/Upper Boones Ferry	Durham Road
H	Hunziker Street	Hall Boulevard	72nd Avenue
H	Hall Boulevard	North of Hunziker Street	South City Limits
H	Bonita Road	West of 72nd Avenue	72nd Avenue
H	McDonald Street	ORE 99W	Hall Boulevard
H	ORE 99W	McDonald Street	South City Limits
H	Beef Bend Road	ORE 99W	Scholls Ferry Road
H	Bull Mountain Road	ORE 99W	Beef Bend Road
H	Roshak Road	Bull Mountain Road	Scholls Ferry Road
H	Barrows Road	Scholls Ferry Road (West)	Scholls Ferry Road (East)
H	Walnut Street	135th Avenue	Tiedeman Avenue
H	Gaarde Street	Walnut Street	ORE 99W
H	121st Avenue	Gaarde Street	North Dakota Street
H	North Dakota Street	121st Avenue	Greenburg Road
H	Tiedeman Avenue	Walnut Street	Greenburg Road
H	Tigard Street	115th Avenue	Main Street
H	Burnham Street	Main Street	Hall Boulevard
H	Fonner Street	Walnut Street	121st Avenue
H	Commercial Street	Main Street	Lincoln Street
H	Oak Street (RTP 6019)	Hall Boulevard	80th Avenue
Other Potential Projects			
M	80th Avenue	Taylor's Ferry Road	Spruce Street
M	Spruce Street	Hall Boulevard	80th Avenue
M	Oak Street	Greenburg Road	Hall Boulevard
M	Oak Street	80th Avenue	71st Avenue
M	Locust Street	80th Avenue	72nd Avenue
M	74th Avenue	Taylor's Ferry Road	South of Barbara Lane
M	72nd Avenue	North of Locust Street	Oak Street
M	Spruce Street	78th Avenue	71st Avenue
M	71st Avenue	Oak Street	ORE 99W
M	78th Avenue	Spruce Street	ORE 99W

Rank*	Project	From	To
M	Pine Street	71st Street	69th Street
M	69th Street	Pine Street	ORE 99W
M	90th Avenue	Hall Boulevard	Locust Street
M	62nd/61st Avenues	Taylor's Ferry Road	Pomona Street
M	Pomona Street	61st Avenue	64th Avenue
M	64th Avenue	Pomona Street	ORE 99W
M	68th Avenue	ORE 99W	South of Hampton Street
M	66th Avenue	South of Hampton Street	Dartmouth Street
M	Hampton Street	68th Avenue	66th Avenue
M	Haines Street	68th Avenue	Tigard City Limits
M	Shady Lane	Greenburg Road	95th Avenue
M	95th Avenue	Shady Lane	Greenburg Road
M	98th Avenue	Greenburg Road	Main Street
M	115th Avenue	North Dakota Street	Tigard Street
M	Cascade Avenue	Scholls Ferry Road	Existing sidewalk
M	Johnson Street	ORE 99W	End
M	Grant Avenue	Johnson Street	Tigard Street
M	Scoffins Street	Main Street	Hall Boulevard
M	Ash Avenue	Commercial Street	Scoffins Street
M	Ash Avenue	McDonald Street	Burnham Street
M	Frewing Street	ORE 99W	O'Mara Street
M	Garrett Street	ORE 99W	Ash Avenue
M	O'Mara Street	McDonald Street	Hall Boulevard
M	97th Avenue	McDonald Street	Murdock Street
M	Murdock Street	97th Avenue	103rd Avenue
M	103rd Avenue	Murdock Avenue	Canterbury Lane
M	Canterbury Lane	103rd Avenue	ORE 99W
M	100th Avenue	McDonald Street	Highland Drive
M	Highland Drive	100th Avenue	Summerfield Drive
M	Sattler Street	100th Avenue	98th Avenue
M	98th Avenue	Sattler Street	Murdock Avenue
M	Ross Street	Hall Boulevard	East End
M	79th Avenue	Durham Road	Bonita Road
M	108th Avenue	Durham Road	South End
M	133rd Avenue	Bull Mountain Road	South End
M	Peachtree Drive	Bull Mountain Road	South End
M	150th Avenue	Bull Mountain Road	Beef Bend Road
M	135th Avenue	Walnut Street	Hillshire Drive
M	Hillshire Drive	135th Avenue	Mistletoe Drive

Rank*	Project	From	To
M	Mistletoe Drive	Hillshire Drive	Benchview Terrace
M	Benchview Terrace	White Cedar Place	Bull Mountain Road
M	132nd Avenue	Walnut Street	Benchview Terrace
M	Menlor Lane	Barrows Road	Sunrise Lane
M	Sunrise Lane	Menlor Lane	150th Avenue
M	150th Avenue	Sunrise Lane	Bull Mountain Road
M	Washington Square Regional Center	Pedestrian Improvements (RTP 6022)	
M	Tiedeman Avenue	Walnut Street	Existing Sidewalk to North
M	Watkins Avenue	Park Street	Walnut Street
M	Off-Street Multi-Use Path	Tualatin River Crossing at approximately 108th Avenue	
M	Off-Street Multi-Use Path	I-5/ORE 217 Kruse Way Bridge linkage to 72nd Avenue south of ORE 217	
M	Off-Street Multi-Use Path	Powerline Corridor/Tualatin River/Fanno Creek/Greenway Park Loop	

- H=High, M=Medium, L=Low Priority

DKS Associates

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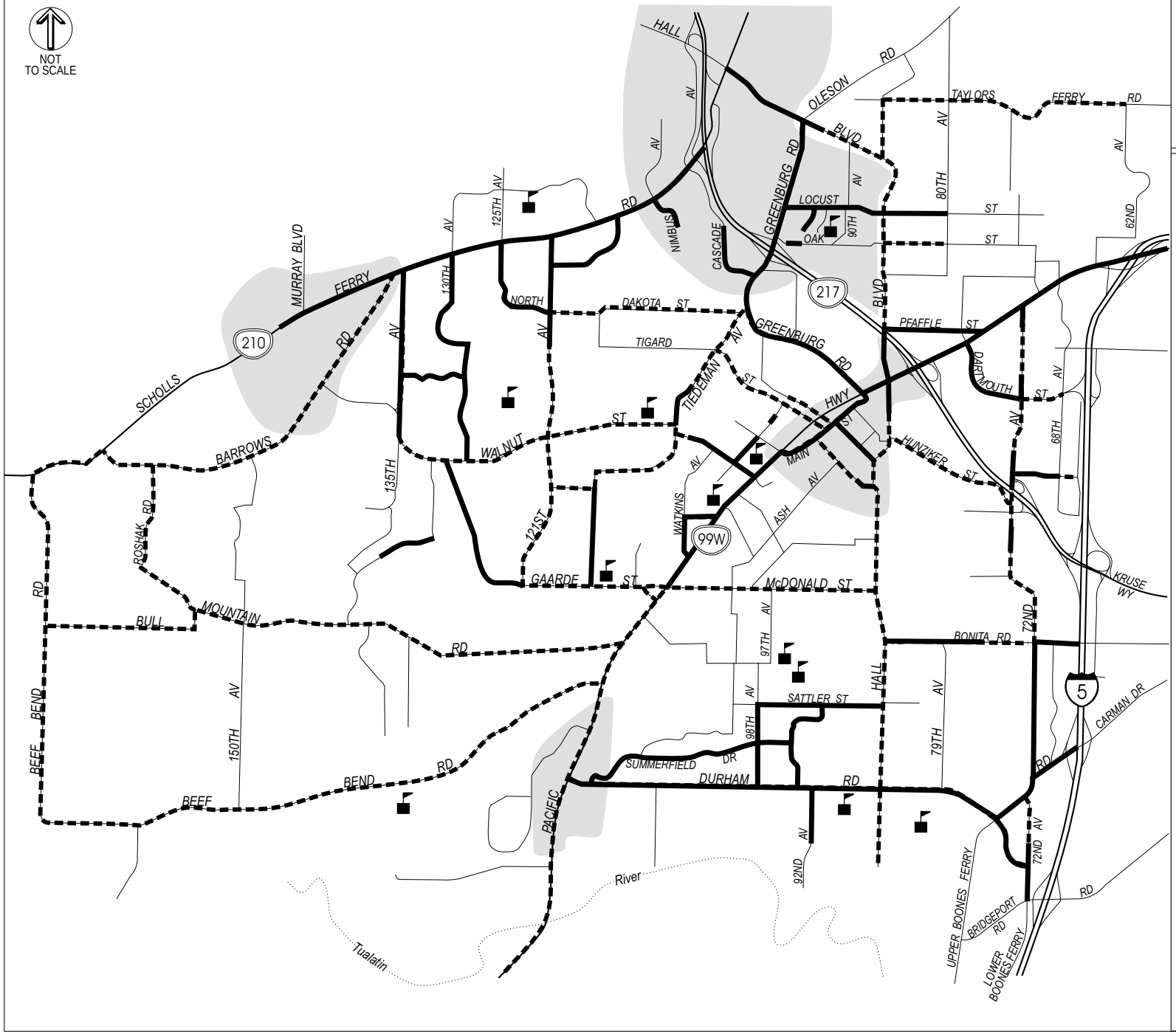
CITY OF TIGARD

Transportation Systems Plan



Legend

- Continuous Sidewalk on at Least One Side of Street
- Proposed Sidewalk on at Least One Side of Street
- Schools

Pedestrian District

Regional Center
Town Center

Figure 5-2
PEDESTRIAN ACTION PLAN

Complementing Land Development Actions

Land use actions are where significant improvements to the pedestrian system can occur. Basically a change in land use from vacant or under utilized land creates two key impacts to the pedestrian system:

1. Added vehicle trips that conflict with pedestrian flows
2. Added pedestrian volume that requires safe facilities

These impacts require mitigation to maintain a safe pedestrian system. Pedestrians walking in the traveled way of motor vehicles are exposed to potential conflicts that can be minimized or removed entirely with sidewalk installation. The cost of a fronting sidewalk to an individual single family home would be about $1,000 to $2,000 (representing less than one percent of the cost of a house). Over a typical 50 year life of a house this would represent less than $50 per year assuming the cost of money is 4% annually. This cost is substantially less than the potential risk associated with the cost of an injury accident or fatality without safe pedestrian facilities (injury accidents are likely to be $10,000 to $50,000 per occurrence and fatalities are $500,000 to $1,000,000). Sidewalks are essential for the safety of elderly persons, the disabled, transit patrons and children walking to school, a park or a neighbor's home. No area of the city can be isolated from the needs of these users (not residential, employment areas or shopping districts). Therefore, fronting improvements including sidewalk are required on every change in land use or roadway project.

For any developing or redeveloped property in Tigard, the benefit of not providing sidewalks is only the cost savings to the developer – at the potential risk and future expense to the public. Therefore, sidewalks are required in Tigard with all new development and roadway projects.

It is important that, as new development occurs, connections or accessways are provided to link the development to the existing pedestrian facilities in as direct manner as possible. As a guideline, the sidewalk distance from the building entrance to the public right-of-way should not exceed 1.25 times the straight line distance. If a development fronts a proposed sidewalk (as shown in the Pedestrian Master Plan), the developer shall be responsible for providing the walkway facility as part of any frontage improvement required for mitigation of development.

It is also very important that residential developments consider the routes that children will use to walk to school and provide safe and accessible sidewalks to accommodate these routes, particularly within one mile of a school site. Additionally, all commercial projects generating over 1,000 trip ends per day should provide a pedestrian connection plan showing how pedestrian access to the site links to adjacent uses, the public right-of-way and the site front door. Conflict free paths and traffic calming elements should be identified, as appropriate.

Address Gaps in Pedestrian System

Many of the areas developed in Tigard 10 to 25 years ago did not provide sidewalks. With as much of the City built-out (as is the case today) there are limited opportunities for development to create major portions of the missing pedestrian system. The historic gaps in the pedestrian walking system become more important as land development and activity grow creating new demands for an integrated pedestrian system. Current land developments build sidewalks on project frontages, but have little means or incentive to extend sidewalks beyond their property. Property owners without sidewalks are unlikely to independently build sidewalks that do not connect to anything. In fact, some property owners are resistant to sidewalk

improvements due to cost (they do not want to pay) or the impact to their frontage (they may have landscaping in the public right-of-way). As an incentive to fill some of these gaps concurrent with development activities, the City could consider an annual walkway fund that would supplement capital improvement-type projects. A fund of about $40,000 to $50,000 per year could build over a quarter mile of sidewalk to help fill gaps. If matching funds were provided, over double this amount may be possible. The fund could be used several ways:

- Matching other governmental transportation funds to build connecting sidewalks identified in the master plan.
- Matching funds with land use development projects to extend a developer's sidewalks off-site to connect to non-contiguous sidewalks (especially with residential development and its access to schools and parks, commercial development linking retail (ie deli, bank, ..) with employment)
- Supplemental funds to roadway projects which build new arterial/collector sidewalks to create better linkages into neighborhoods.
- Matching funds with adjacent land owners that front the proposed sidewalk.
- Reimbursement agreements with developers

Parks and Trails Development

The City Parks and Recreation Department and Metro Greenspaces programs are responsible for the majority of off-street trail opportunities. These two agencies must coordinate their pedestrian plans to provide an integrated off-street walking system in Tigard. Recent Metro Greenspaces initiatives and City park projects provide an opportunity to implement the off-street trails in Tigard as an integrated element of the pedestrian action plan. The Fanno Creek Trail and Powerlines trail systems are already well developed north of Tigard in Beaverton. Because of the regional nature of the interconnected powerlines to Tualatin River to Fanno Creek trail system, Tigard will need to work cooperatively with Metro, Washington County, Tualatin Hills Parks and Recreation District and the City of Beaverton.

Safety

Pedestrian safety is a major issue. Pedestrian conflicts with motor vehicles are a major issue in pedestrian safety. These conflicts can be reduced by providing direct links to buildings from public rights-of-way, considering neighborhood traffic management (see Chapter 8: Motor Vehicles), providing safe roadway crossing points and analyzing/reducing the level of pedestrian/vehicle conflicts in every land use application.

In setting priorities for the pedestrian action plan, school access was given a high priority to improve safety. However, beyond simply building more sidewalks, school safety involves education and planning. Many cities have followed guidelines provided by Federal Highway Administration and Institute of Transportation Engineers. Implementing plans of this nature has demonstrated accident reduction benefits. However, this type of work requires staffing and coordination by the School District as well as the City to be effective.

Several "pedestrian crossing evaluation" locations were identified on the Pedestrian Master Plan and on the Pedestrian Action Plan. These are locations where it may be desirable (where warrants are met) to install a pedestrian activated signal for the sole purpose of allowing pedestrians to cross the roadway.

2040 Coordination

Metro has designated three areas within Tigard as 2040 land use designated pedestrian districts. These areas will require the greatest attention to the development of integrated pedestrian networks. The three areas include:

- Washington Square Regional Center
- Downtown Tigard Town Center/Main Street/Commuter Rail Station Area
- King City Town Center

The City of Tigard has developed a plan for the Washington Square Regional Center which is in the final approval process. While not a 2040 land use designated area, the Tigard Triangle has special development code regulation in Tigard that pertain to pedestrian design. Plans will need to be developed for both the Tigard Downtown and King City. The areas designated on Figures 5-1 and Figure 5-2 are the pedestrian districts in Tigard.

Chapter 6
Bicycles

CITY OF TIGARD
OREGON

This chapter summarizes existing and future facility needs for bicycles in the City of Tigard. The following sections outline the criteria to be used to evaluate needs, provide a number of strategies for implementing a bikeway plan and recommend a bikeway plan for the City of Tigard. The needs, criteria and strategies were identified in working with the City's TSP Task Force. As part of the TSP Task Force, the Planning Commission provided input regarding the transportation system in Tigard, specifically exploring bicycle needs. The methodology used to develop the bicycle plan combined citizen and staff input, specific Transportation Planning Rule requirements[1] and continuity to the regional bicycle system.[2]

Metro's *Draft Regional Transportation Plan (RTP)* has identified a Proposed Regional Bicycle Network. As such, these routes will eventually have bicycle lanes, if they don't already. The following Tigard streets are classified as follows in the RTP:

Regional Access	**Regional Corridor (on-street)**	**Community Connector**	**Regional Corridor Off-Street**
• Hall to Greenburg to Main to Hunziker	• Walnut Street • Scholls Ferry Rd • Hall Boulevard • ORE 99W • Hall-Durham-Boones	• 72nd Avenue • Bonita-McDonald • Carman-Durham	• Fanno Creek • Tualatin River • Powerlines • Hunziker to LO through I-5/ORE 217

NEEDS

Continuous bikeways are currently only provided for the full length of Durham Road, McDonald Street and Tigard Street in the City of Tigard. Bikeways are also currently provided for significant portions of ORE 99W, Hall Boulevard, Bonita Road, 97th/98th Avenues, Greenburg Road, Walnut Street, 121st Avenue and Bull Mountain Road. In addition, there are a few segments where bikeways do exist where new development and roadway improvements have occurred. Continuity and connectivity are key issues for bicyclists and the lack of facilities (or gaps) cause significant problems for bicyclists in Tigard. Without connectivity of the bicycle system, this mode of travel is severely limited (similar to a road system full of cul-de-sacs). The TPR[3] calls for all arterial and collector streets to have bicycle facilities. To meet the TPR requirements and fill in existing gaps in the existing bicycle system, an action plan that focuses on a framework system should be developed to prioritize bicycle investment.

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1 Transportation Planning Rule, State of Oregon, DLCD, Section 660-12-020(2)(d), 660-12-035(3)(e), 660-12-095(3)(b & c).

2 Regional Bicycle System Map, Regional Transportation Plan Draft, Metro, 1999.

3 Oregon Administrative Rules, Chapter 660, Division 12, Section 045(3).

Bicycle trips are different from pedestrian and motor vehicle trips. Common bicycle trips are longer than walking trips and generally shorter than motor vehicle trips. Where walking trips are attractive at lengths of a quarter mile (generally not more than a mile), bicycle trips are attractive not only for these short trips, but lengths of two to three miles. Bicycle trips can generally fall into three groups: commuters, activity-based and recreational. Commuter trips are typically home/work/home (sometimes linking to transit) and are made on direct, major connecting roadways and/or local streets. Bicycle lanes provide good accommodations for these trips. Activity based trips can be home-to-school, home-to-park, home-to-neighborhood commercial or home-to-home. Many of these trips are made on local streets with some connections to the major functional classification streets. Their needs are for lower volume/speed traffic streets, safety and connectivity. It is important for bicyclists to be able to use through streets[4]. Recreational trips share many of the needs of both the commuter and activity-based trips, but create greater needs for off-street routes, connections to rural routes and safety. Typically, these bike trips will exceed the normal bike trip length.

FACILITIES

Bicycle facility needs fall into two primary categories: route facilities and parking facilities. Bicycle lanes are the most common route facilities in Tigard. Racks, lockers and shelters are typical bicycle parking facilities that are provided at individual land use sites. Bicycle ways can generally be categorized as bike lanes, bicycle accommodation, or off-street bike paths/multi-use trails. Bike lanes are areas within the street right-of-way designated specifically for bicycle use. Federal research has indicated that bike lanes are the most cost effective and safe facilities for bicyclists when considering all factors of design. Bicycle accommodations are where bicyclists and autos share the same travel lanes, including a wider outside lane and/or bicycle boulevard treatment (priority to through bikes on local streets). Multi-use paths are generally off-street routes (typically recreationally focused) that can be used by several transportation modes, including bicycles, pedestrians and other non-motorized modes (i.e. skateboards, roller blades, etc.). The term bikeway is used in this plan to represent any of the bicycle accommodations described above. The bicycle plan designates where bike lanes and multi-use paths are anticipated and any other bicycleways are expected to be bike accommodations (i.e. shared with motor vehicles).

Bicycle lanes adjacent to the curb are preferred to bicycle lanes adjacent to parked cars or bicycle lanes combined with sidewalks. Six foot bicycle lanes are recommended. Provision of a bicycle lane not only benefits bicyclist but also motor vehicles which gain greater shy distance/emergency shoulder area and pedestrians which gain buffer between walking areas and moving vehicles. On reconstruction projects, bicycle lanes of five feet may need to be considered. Bicycle accommodations can be provided by widening the curb travel lane (for example, from 12 feet to 14 or 15 feet. This extra width makes bicycle travel more accommodating and provides a greater measure of safety). Off-street trails should be planned for 12 feet in width, desirable for mixed-up activity (ped and bike). Signing and marking of bicycle lanes should follow the *Manual on Uniform Traffic Control Devices*, as adopted for Oregon. Design features in the roadway can improve bicycle safety[5]. For example, using curb storm drain inlets rather than catch basins significantly improves bicycle facilities.

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[4] This can include end of cul-de-sac connections, but even better is regular spacing of local streets.

[5] Oregon Bicycle and Pedestrian Plan, ODOT, June, 1995; this provides an in-depth discussion on bicycle network development.

Bicycle parking is required in Tigard for new land use applications (see Development Code Section 18.765, Table 18.765.2 Minimum and Maximum Required Off-street Vehicle and Bicycle Parking) Requirements in Community Development Code Section 18.765.050 outline the design and placement of bicycle parking (within 50 feet of building entrance).

CRITERIA

Tigard's TSP Task Force created a set of goals and policies to guide transportation system development in Tigard (see Chapter 2). Several of these policies pertain specifically to bicycle needs:

Goal 2 *Policy 3 Bicycle lanes must be constructed on all arterials and collectors within Tigard (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a bikeway.*

Policy 5 Bicycle and pedestrian plans shall be developed which link to recreational trails.

Policy 6 Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel. Provide connectivity to activity centers and destinations with a priority for bicycle and pedestrian connections.

Goal 3 *Policy 3 Safe and secure pedestrian and bikeways shall be designed between parks and other activity centers in Tigard.*

These goals and policies are the criteria that all bikeway improvements in Tigard should be measured against to determine if they conform to the intended direction of the City. Policy 2-3 sets a specific requirement that bicycle lanes be constructed on all arterials and collectors within Tigard consistent with the Bicycle Master Plan and that all schools, parks, public facilities and retail areas have direct access to a bikeway. Table 6-1 summarizes the bicycle corridors created by overlaying the bicycle network over the arterial and collector system in Tigard.

Since bicyclists can generally travel further than pedestrians, connections that lead to regional destinations such as Portland, Beaverton, Tualatin and Lake Oswego are important. Tigard's bicycle network should connect to Washington County's, Beaverton's, Tualatin's and Lake Oswego's bicycle networks and be consistent with the Regional Bicycle System. Key locations where connections should be made to these other jurisdiction's networks are shown in Table 6-2.

STRATEGIES

Several strategies were considered for construction of future bikeway facilities in Tigard. These strategies were studied to provide the City with priorities since it is likely that the available funding will be insufficient to address all of the projects identified in the Bikeway Master Plan.

Strategy 1 - "Fill in Gaps in the Network where Some Bikeways Exist"

This strategy provides bikeways which fill in the gaps between existing bikeways where a significant portion of a bikeway corridor already exists. This strategy maximizes the use of existing bicycle facilities to create complete sections of an overall bikeway network. Examples would include ORE 99W, Hall Boulevard, Bull Mountain Road, Greenburg Road and 121st Avenue, where short segments would complete routes.

Table 6-1
Corridors in Proposed Bikeway Network

North-South Corridors	East-West Corridors	
Beef Bend Road	Taylor's Ferry Road	Walnut Street
121st Avenue	Barrows Road	Bull Mountain Road
Greenburg Road	Nimbus/Oak Street	Beef Bend Rd./Durham Rd./ Carman Drive
ORE 99W	North Dakota/Greenburg/ Hunziker	Gaarde St/McDonald St./ Bonita Road
Hall Boulevard	Pfaffle/Dartmouth Street	
72nd Avenue		

Table 6-2
Bicycle Connectivity to Adjacent Jurisdictions

City	Interface Street	Link Included in Tigard Master Plan?
Lake Oswego	Haines Street	Atlanta
	Kruse Way multi-use pathway	Hunziker
	Bonita Road	Bonita
	Carman Drive	Carman
Beaverton	Scholls Ferry Road	Scholls Ferry
	Barrows Road	Barrows
	Powerlines multi-use path	Powerlines off-street path
	Murray Boulevard	Walnut
	Davies Road	Barrows
	125th Avenue	North Dakota
	Nimbus Avenue	Nimbus to Locust
	Hall Boulevard	Hall
Portland	Taylors Ferry	Taylors Ferry
	Barbur Boulevard	ORE 99W
	Oleson Road	Greenburg
Tualatin	Tualatin Road/Boones Ferry Rd.	Hall Boulevard
	Upper Boones Ferry Road	Upper Boones Ferry
	Lower Boones Ferry Road	72nd
Washington County	Elsner Road	Beef Bend

Strategy 2 – "Connect Key Bicycle Corridors to Schools, Parks and Activity Centers (public facilities, etc.)"

This strategy provides bikeway links to schools, parks, recreational facilities and activity centers from the arterial/collector bikeway network. This alternative provides added safety to likely bicyclist destinations as well as destinations where children are likely to travel. Examples would include Hall Boulevard, Durham Road, Walnut Street, Tiedeman Avenue, Bull Mountain and the off-street multi-use paths throughout Tigard.

Strategy 3 – "Develop Bicycle Network on Flat Routes"

This strategy focuses on providing bicycle lanes on "flat" routes, or those routes without significant grade changes. This strategy provides bicycle facilities where a larger percentage of the population is likely to travel. Examples would include routes such as Walnut Street, Hall Boulevard, Durham Road, North Dakota Street, etc.

Strategy 4 – "Develop a Bike Sign Program—Focus on Low Volume Streets"

This strategy would provide signs to guide bicyclists to appropriate bicycle routes in the City

Strategy 5 – "Bicycle Corridors that Connect to Major Recreational Facilities"

This strategy provides a connection between the bikeway network and major recreational facilities, such as the Greenway Trail. Examples would be the Greenway Trail, Fanno Creek Trail and the proposed powerline corridor in the western part of the City.

Strategy 6 – "Develop Maintenance Program to Clean Bike Lanes"

This strategy establishes a program to provide maintenance services to clean the bike lanes. Debris in bike lanes is one of the biggest complaints (deterrents) of bicyclists.

Strategy 7 – "Bicycle Corridors that Commuters Might Use"

This strategy focuses on providing bicycle facilities where commuters are likely to go such as local (within Tigard) or regional (i.e. Beaverton, Tualatin, Lake Oswego or downtown Portland) employment centers or leading to transit which provides access to regional employment centers. Examples would include ORE 99W, Scholls Ferry Road and Hall Boulevard.

Strategy 8 - "Bicycle Corridors that Connect Neighborhoods"

This alternative puts priority on bicycle lanes for routes which link neighborhoods together. Some of these could include paths crossing parks, schools or utility rights-of-way.

Strategy 9 – "Construct All Bikeways to City of Tigard/Washington County Standards"

This strategy focuses on upgrading any substandard existing bikeways to current city/county standards. Current standards are for six foot wide bike lanes with appropriate striping and signs for bicycle safety.

Strategy 10 – "Bicycle Corridors that Access Commercial Areas"

This strategy puts priority on bicycle lanes for arterials/collectors which provide access to commercial areas within the City. Examples would include ORE 99W, 72nd Avenue, Dartmouth Street and Hall Boulevard.

Table 6-3 summarizes the strategies in the priority order ranked by the TSP Task Force in terms of meeting the transportation goals and objectives.

Table 6-3
Bikeway Facility Strategies Comparisons

Strategy	Policies			
	2-3	**2-5**	**2-6**	**3-3**
1. Fill in gaps in the network where some bikeways exist	◖	❍	❍	❍
2. Connect key bicycle corridors to schools, parks and activity centers (public facilities, etc.)	◖	◖	◖	●
2. Develop bicycle network on flat routes	❍	❍	◖	◖
3. Develop a bike sign program—focus on low volume streets	❍	❍	❍	◖
4. Bicycle corridors that connect to major recreational facilities	◖	●	◖	◖
5. Develop maintenance program to clean bike lanes	✖	✖	✖	✖
7. Bicycle corridors that commuters might use	◖	❍	❍	❍
8. Bicycle corridors that connect neighborhoods	❍	❍	◖	❍
8. Construct all bikeways to City of Tigard standards	❍	❍	❍	❍
10. Bicycle corridors that access commercial areas	◖	❍	◖	◖

✖ Does not meet criteria ◖ Mostly meets criteria
❍ Partially meets criteria ● Fully meets criteria

ALTERNATIVES

Two basic alternative bicycle networks were developed through the TSP Task Force discussion. The first option was to place bicycle lanes on every existing arterial and collector street. Figure 6-1 summarizes the All Arterial and Collector alternative. The end result is several redundant bicycle facilities on routes that will no longer be collectors or arterials in the new functional classification. Additionally the cost and right-of-way impact is so significant that this alternative may be difficult to successfully implement. A second alternative was developed by the TSP Task Force that is build upon a framework of bicycle lanes through Tigard. This alternative provides framework grids of bicycle lanes with fewer lanes identified on lower classification streets (which typically have lower traffic volumes). Based upon the highest priority strategies the TSP Task Force recommended the framework option as the Tigard Bicycle Master Plan (Figure 6-2).

RECOMMENDED BIKEWAY FACILITY PLAN

A list of likely actions to achieve fulfillment of these priorities was developed into a Bicycle Master Plan. The Bicycle Master Plan (Figure 6-2) is an overall plan and summarizes the "wish list" of bicycle-related projects in Tigard, providing a long-term map for planning bicycle facilities. From this Master Plan, a more specific, shorter term, Action Plan was developed. The Action Plan (Figure 6-3) consists of projects that the City should actively try to fund. These projects form a basic bicycle grid system for Tigard. As development occurs, streets are rebuilt and other opportunities (such as grant programs) arise, projects on the Master Plan should be pursued as well.

POTENTIAL PROJECT LIST

Table 6-4 outlines potential bicycle projects in Tigard. The City, through its Capital Improvement Program (CIP) and bond measure funding (along with joint funding with other agencies such as Washington County or Metro or development approval) would implement these projects. Figure 6-3 summarizes the Bicycle Action Plan. Multi-use paths identified on the bicycle plans should be aligned to cross roadways at intersections for safe crossing rather than crossing roadways at mid-blocks without traffic control.

There is an off-street multi-use trail shown along the powerline corridor in the western part of Tigard. This corridor is designated as a proposed *Off-Street Multi-Use Path* in Metro's Regional Bicycle System[6], however, the corridor follows a very steep grade and would be extremely difficult for most bicyclists. The corridor could be developed as a multi-use path that could be used by serious bicyclists as well as pedestrians.

[6] Regional Bicycle System Map, Version 4.0, Metro, December 1, 1997.

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CITY OF TIGARD

Transportation Systems Plan

Legend

- Existing Bike Lanes
- Proposed Bike Lanes*
- Off Street Paths
- Parks
- Schools

* Note: There may be existing bike lanes on one side of street - *see Existing Bike Lanes* graphic for clarification.

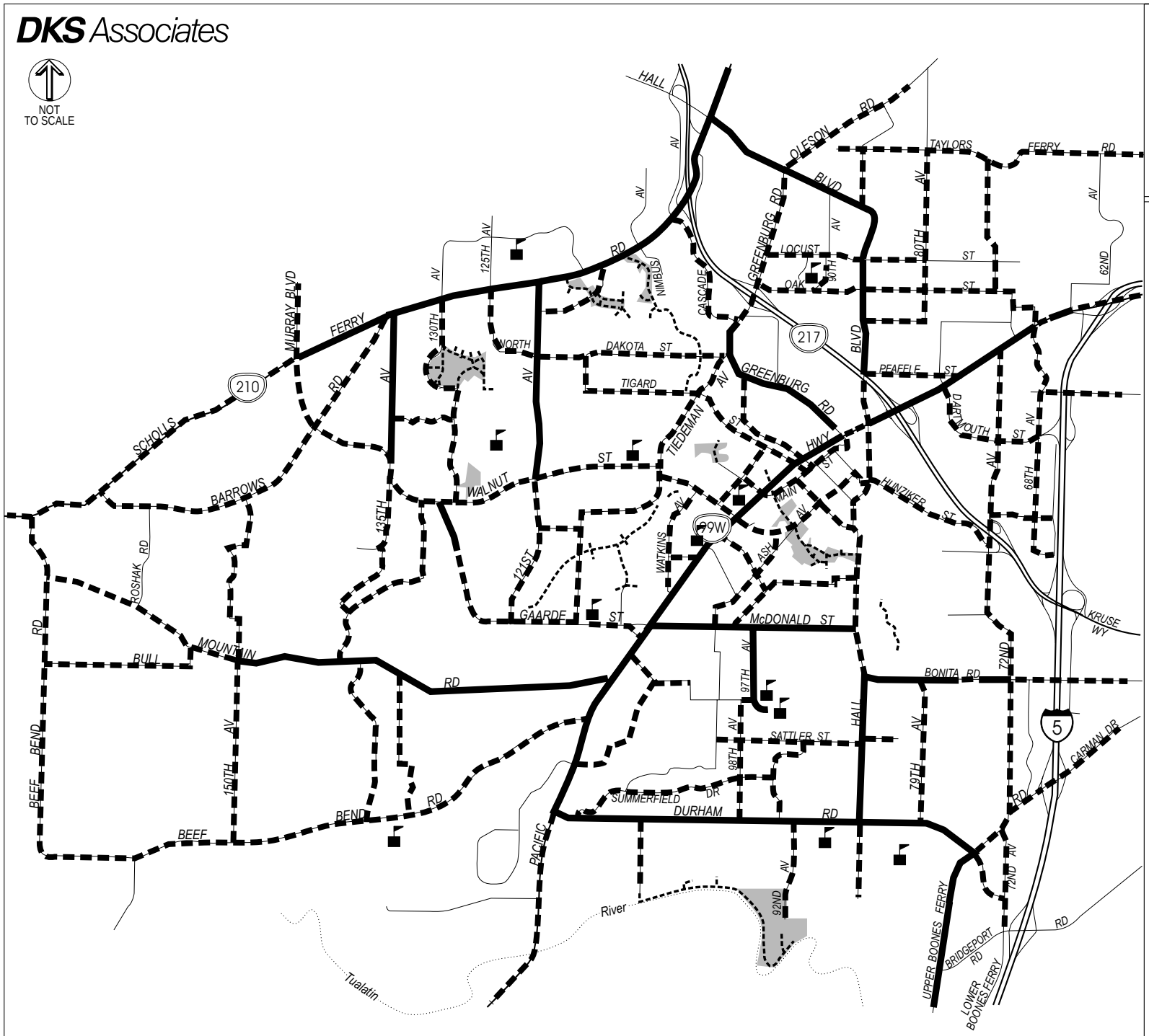

Figure 6-1
BICYCLE PLAN ALTERNATIVE
(All Arterials/Collectors Option)

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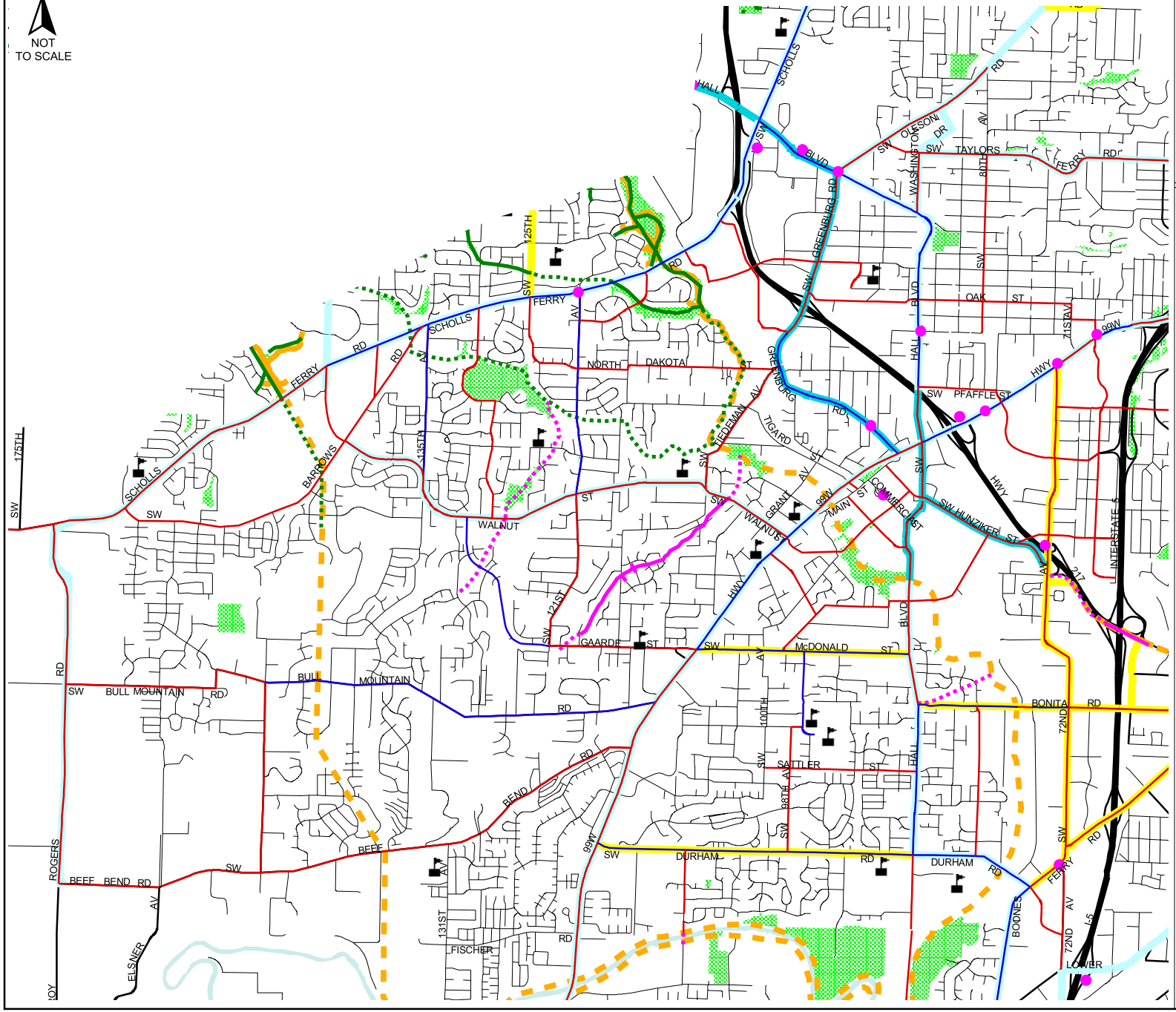

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- RTP Major Transit Stop
- Schools

Parks
- Existing Park

Bike Lanes
- Existing
- Proposed

Tigard Off-Street Multi-Use Paths
- Proposed
- Existing

THRPD Trails
- Existing
- Proposed

RTP Bicycle System Designations
- Regional Access Bikeway
- Regional Corridor on-street bikeway
- Community Connector

RTP Regional Corridor Off-Street Regional Multi-Use Path
- Existing
- Proposed

Figure 6-2
BICYCLE MASTER PLAN
(Framework Option)

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CITY OF TIGARD

Transportation Systems Plan

Legend

- Existing Bike Lanes
- Proposed Bike Lanes*
- Off Street Paths
- Parks
- Schools

* Note: There may be existing bike lanes on one side of street - *see Existing Bike Lanes* graphic for clarification.

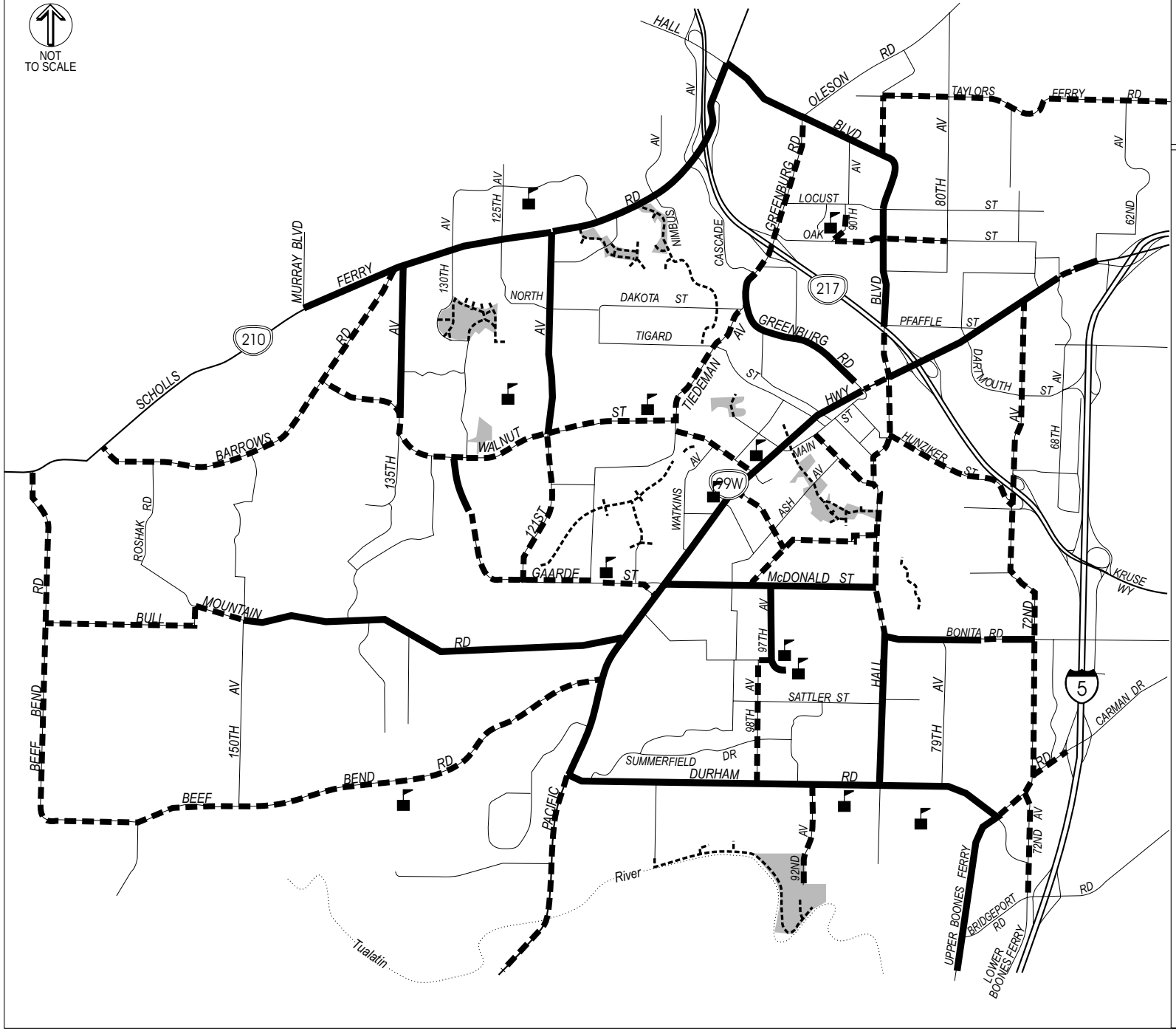

Figure 6-3
BICYCLE
ACTION PLAN

Table 6-4
Bicycle Project Priorities

Rank *	Project	From	To
Action Plan Projects			
H	Taylor's Ferry Road	Washington Drive	City Limits
H	Washington Drive	Hall Boulevard	Taylor's Ferry Road
H	Hall Boulevard	Pfaffle Street	Bonita Road
H	Greenburg Road	Hall Boulevard	Cascade Avenue
H	Oak Street (RTP 6019)	Hall Boulevard	80th Avenue
H	Oak Street	Hall Boulevard	90th Avenue
H	ORE 99W	East City Limits	South City Limits
H	72nd Avenue	ORE 99W	South City Limits
H	Hunziker Street	Hall Boulevard	72nd Avenue
H	Upper Boones Ferry Rd	I-5	Durham Road
H	Bonita Road	72nd Avenue	West of 72nd Avenue
H	Burnham Street	Main Street	Hall Boulevard
H	O'Mara Street	McDonald Street	Hall Boulevard
H	Frewing Street	ORE 99W	O'Mara Street
H	Murdock Street	98th Avenue	97th Avenue
H	98th Avenue	Murdock Stret	Durham Road
H	92nd Avenue	Durham Road	Cook Park
H	Tiedeman Avenue	Greenburg Road	Walnut Street
H	Walnut Street	ORE 99W	Barrows Road
H	121st Avenue	Walnut Street	Gaarde Street
H	Gaarde Street	Walnut Street	ORE 99W
H	Barrows Road	Scholls Ferry Road (West)	Scholls Ferry Road (East)
H	Scholls Ferry Road	Hall Boulevard	Barrows Road
H	Bull Mountain Road	150th Avenue	Beef Bend Road
H	Beef Bend Road	ORE 99W	Scholls Ferry Road
H			
Other Master Plan Projects			
M	80th Avenue	Taylor's Ferry Road	Spruce Street
M	Oak Street	Greenburg Road	90th Avenue
M	Oak Street	80th Avenue	71st Avenue
M	71st Avenue	Oak Street	Pine Street
M	Pine Street	71st Avenue	69th Avenue
M	69th Avenue	Pine Street	ORE 99W
M	68th Avenue	ORE 99W	South End of Street
M	Dartmouth Street	ORE 99W	68th Avenue
M	Hampton Street	72nd Avenue	68th Avenue
M	Pfaffle Street	Hall Boulevard	ORE 99W
M	Haines Street	68th Avenue	East City Limits

Rank *	Project	From	To
M	Bonita Road	72nd Avenue	East City Limits
M	Scoffins Street	Hall Boulevard	Main Street
M	Sattler Street	100th Avenue	Hall Boulevard
M	Ross Street	Hall Boulevard	East End of Street
M	Hall Boulevard	Durham Road	South City Limits
M	108th Avenue	Durham Road	South End of Street
M	150th Avenue	Bull Mountain Road	Beef Bend Road
M	130th Avenue	Scholls Ferry Road	Winterlake Drive
M	Winterlake Drive	130th Avenue	128th Avenue
M	128th Avenue	Winterlake Drive	Walnut Street
M	North Dakota Street	Scholls Ferry Road	Greenburg Road
M	Springwood Drive	Scholls Ferry Road	121st Avenue
M	Cascade Avenue	Scholls Ferry Road	Greenburg Road
M	Durham Road	Upper Boones Ferry Road	72nd Avenue
M	79th Avenue	Durham Road	Bonita Road
M	Off-Street Multi-Use Path	Powerline corridor in west Tigard	
M	Off-Street Multi-Use Path	Southside ORE 217 from Hunziker to I-5 Bridge	
M	Off-Street Multi-Use Path	Adjacent to Tualatin River	
M	Off-Street Multi-Use Path	Bridge over Tualatin River at 108th	
M	Off-Street Multi-Use Path	Adjacent to Fanno Creek	

***** H=High, M=Medium, L=Low Priority

COMPLEMENTING LAND DEVELOPMENT ACTIONS

The Transportation Planning Rule requires that bicycle parking facilities be provided as part of new residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park and ride lots.[7] The City through its Community Development Code has in place requirements for bicycle parking.

It is important that, as new development occurs, connections or accessways are provided to link the development to the existing bicycle and pedestrian facilities in as direct manner as is reasonable. If a development fronts a proposed bikeway or sidewalk (as shown in the Bicycle or Pedestrian Master Plans), the developer shall be responsible for providing the bikeway or walkway facility as part of any half-street improvement required for project mitigation.

[7] Transportation Planning Rule, State of Oregon, Department of Land Conservation and Development, Section 660-12-045(3)(a).

Chapter 7
Transit

CITY OF TIGARD
OREGON

This chapter summarizes existing and future transit needs in the City of Tigard. The following sections outline the criteria to be used to evaluate needs, provides a number of strategies for implementing a transit plan and recommends a transit plan for the City of Tigard. The needs, criteria and strategies were identified in working with the City's TSP Task Force. This committee provided input regarding the transportation system in Tigard, specifically exploring transit needs. The methodology used to develop the transit plan combined citizen and staff input.

NEEDS

There are currently 12 fixed bus routes which provide service within the City of Tigard. These bus routes are summarized in Chapter 3 (Existing Conditions). There are four express routes providing service to Tigard residents (12E, 64X, 92X and 95X). Existing transit headways on bus routes in Tigard range from 10-15 minutes on Routes 12 and 92X to about 30 minutes on Routes 76 and 78 during peak commute periods.

Metro's Draft Regional Transportation Plan (RTP) identifies the following routes on its Public Transportation System Map (Figure 7-1)[1]:

- ORE 217 HCT Corridor
- Greenburg/Hall/Durham HCT Corridor
- ORE 99W (East of ORE 217) HCT Corridor
- Hall Boulevard (North of ORE 217) Frequent Bus
- Hunziker Street Frequent Bus
- ORE 99W (West of ORE 217) Primary Bus
- Scholls Ferry Road (East of Murray) Primary Bus
- 121st/Walnut Street Primary Bus
- 68th Parkway/Hampton Street Primary Bus
- 72nd Avenue (South of Hampton) Primary Bus

Based upon these designations, the City of Tigard designates all bus stops on HCT Corridors and Frequent Bus routes as Major Transit Stops. In addition, all park and ride sites and transit stations are designated major transit stops (Downtown Tigard, Washington Square, park and ride at ORE 99W/72nd Avenue). While Tri-Met bus ridership in Tigard increased by 35% from 1990 to 1994 and another 15% from 1994 to 1999 (comparing 12 routes), transit ridership represents 6 percent of Tigard PM peak hour trip making.

[1] *Public Transportation System Map*, Metro, Version 4.0, December 1, 1997.

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CITY OF TIGARD

Transportation Systems Plan

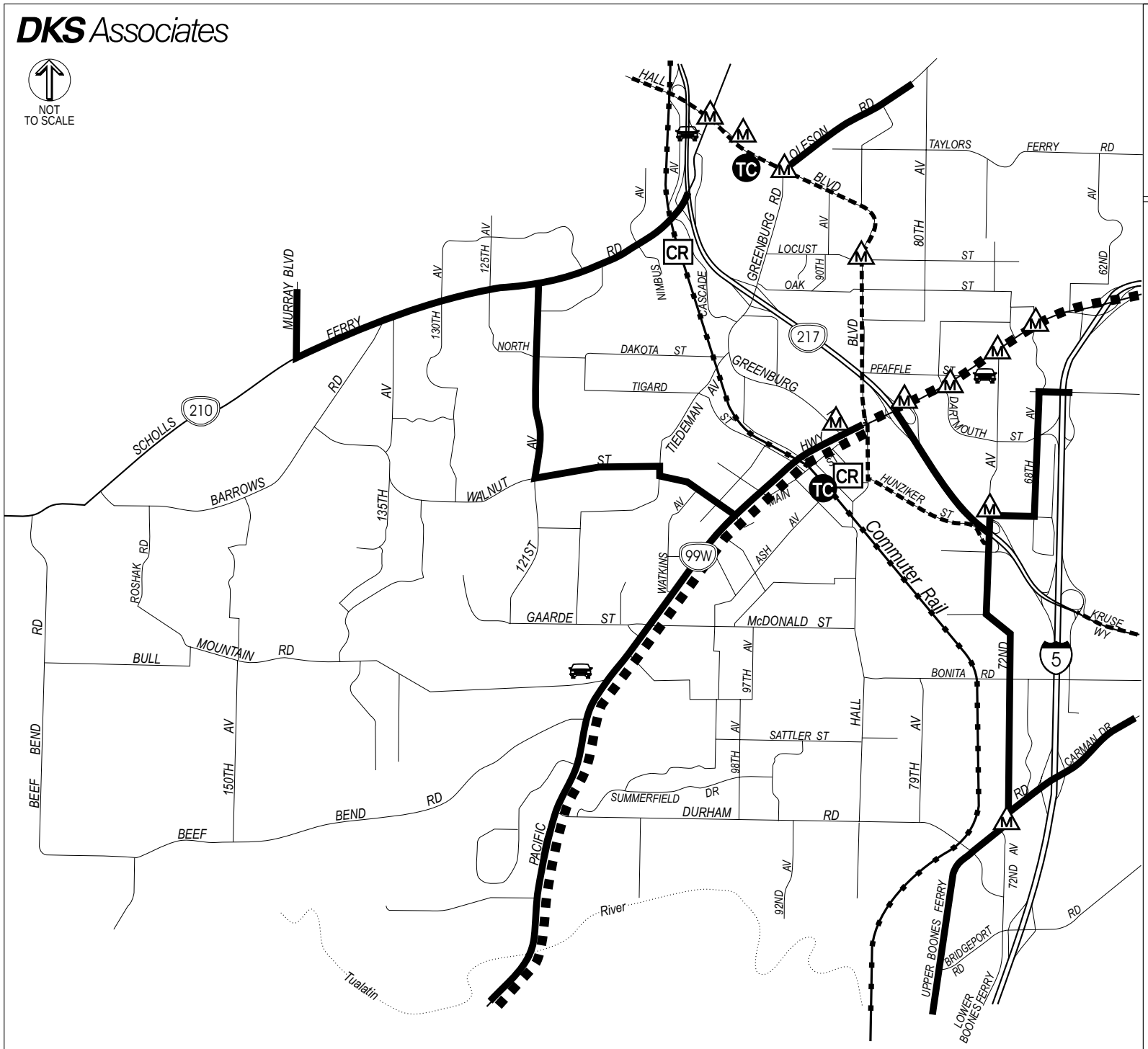

Figure 7-1
RTP PUBLIC TRANSPORTATION SYSTEM CLASSIFICATION

Existing Tri-Met service covers nearly all of the routes established in the Metro Public Transportation Plan today. Primary routes provide the backbone of the transit system and are intended to provide high quality service operating at frequencies of 15 minutes all day. The HCT service on Hall that diverges to Durham should be considered to stay on Hall to the south when Hall is extended in the future.

All of Tri-Met's bus routes are accessible and most are equipped with lifts. Every Tri-Met bus has priority seating near the front for seniors and passengers with disabilities. Tri-Met also operates a LIFT program for those who are unable to use Tri-Met buses or MAX because of a disability. One of Tigard's greatest transit needs in the future will be improving transit service to the southwest portion of the City where much of the new development is occurring. Tri-Met has identified Durham Road and Barrows Road for transit service in the future. Rapidly increasing employment and housing creates a much greater opportunity to create productive public transit routing in Tigard.

CRITERIA

Tigard's TSP Task Force created a set of goals and policies to guide transportation system development in Tigard. These goals and policies represent the criteria that all transit improvements in Tigard should be compared against to determine if they conform to the intended vision of the City. A few of these policies pertain specifically to transit needs:

Goal 2

Policy 2 *The City shall coordinate with Tri-Met, and/or any other transit providers serving Tigard, to improve transit service to Tigard. Fixed route transit will primarily use arterial and collector streets in Tigard. Development adjacent to transit routes will provide direct pedestrian accessibility.*

Policy 7 *Tigard will participate in vehicle trip reduction strategies developed regionally targeted to achieve non-single occupant vehicle levels outlined in Table 1.3 of the Regional Transportation Plan.*

Policy 8 *Tigard will support the development of a commuter rail system as part of the regional transit network.*

Goal 5

Policy 1 *Design and construct transportation facilities to meet the requirements of the Americans with Disabilities Act.*

STRATEGIES

Tri-Met is responsible for any changes in routes through their annual transit service plan process. In order for the City to have its transit needs assessed, the City can provide input to Tri-Met through this process.

Several strategies were developed for the implementation of future transit facilities in Tigard. These strategies were developed to provide the City with priorities in providing guidance to Tri-Met since it is likely that the available funding will be insufficient to address all of the projects identified in the Transit Master Plan.

Strategy 1 - "Provide Commuter Rail"

This strategy focuses on providing Commuter Rail through Tigard. This allows greater connectivity to the regional transit network and to other nearby Cities such as Hillsboro, Tualatin and Wilsonville. Stations in the Tigard area would be located in the Downtown Area and near Washington Square. Beyond the current Beaverton/Wilsonville proposal, the significant traffic operational problems in the ORE 99W corridor make extended commuter rail service to Sherwood, Newberg, McMinnville, Spirit Mountain and the coast requires further study.

Strategy 2 (Tie) - "Provide Service Often (i.e. every 15 minutes) in Peak Commute Periods"

This strategy focuses on decreasing the headways between buses during peak morning and evening commute periods. This increases operating costs for Tri-Met and without increased ridership (or potential for more ridership), Tri-Met would not upgrade services. In the 1999 service plan, Tri-Met focused on more frequent service.

Strategy 2 (Tie) - "Provide Express Routes to Regional Employment Centers (i.e. Downtown Portland, Washington Square)"

This strategy is aimed at providing service directly from Tigard to regional employment centers. This might include a few stops in Tigard followed by express service to downtown Portland (one or two stops at park & ride lots along the way) or Beaverton Transit Center, etc.

Strategy 2 (Tie) – "Provide Bus Shelters/Improved User Amenities"

This strategy focuses on installation of bus shelters and other user amenities along bus routes in Tigard. The need for bus shelters at bus stops, as well as other user amenities, should be evaluated in conjunction with any new commercial or residential development adjacent to a transit street. One user amenity that got a favorable reaction from the Task Force was "real time" bus schedule information at bus stops, indicating how long it would be before the next bus arrives at a particular stop. Tri-Met's *Planning and Design for Transit Handbook* should be used as a guide in providing transit amenities. Generally, when a transit stop has 75 or more daily boardings, transit amenities should be pursued.

Strategy 5 (Tie) - "Provide Access to Employment Areas"

This strategy focuses on providing access to locations where people work in Tigard. Employment areas in and near Tigard might include Washington Square, Tigard Triangle, ORE 99W and Sequoia Parkway/72nd Avenue.

Strategy 5 (Tie) – "Provide More Local Transit Service"

This strategy focuses on providing more transit service on local routes (typically near where people live), rather than primarily on arterials and collectors. An assessment of existing transit route coverage in Tigard was done comparing current and future placement of transit services in relationship to land use densities that would be supportive of transit use. The land use data from the travel demand forecast model was

utilized in this assessment. A one quarter mile "buffer" was established around each transit stop and compared to the adjacent land use. The existing conditions indicate that about 80 percent of the land area in Tigard with density supportive of transit use would be within one-quarter mile of a transit stop (Figure 7-2). With the proposed future transit service coverage, approximately 85 percent of the land area in Tigard with land use densities supportive of transit service would be within one-quarter mile of a transit stop (Figure 7-3). This does not specifically address the frequency of some of the transit services or the destinations (which would require coordination with Tri-Met for this strategy to be effectively implemented).

Strategy 7 – "Provide Access to Commercial Areas"

This strategy focuses on providing access to locations where people choose to do their shopping. Commercial areas in Tigard might include Washington Square, the Tigard Triangle, ORE 99W, Main Street, and the area adjacent to Sequoia Parkway.

Strategy 8 - "Provide Park & Ride Lots"

This strategy provides park & ride lots at locations where concentrated transit demand exists or where it is desirable for Tri-Met to stop.

Strategy 9 - "Provide Access to Activity & Service Centers"

This strategy focuses on providing transit access to destinations such as community centers, hospitals, schools, churches, etc.

Table 7-1 summarizes the strategies in terms of meeting the transportation goals and policies of Tigard. The strategies are listed in the priority order as determined by the TSP Task Force.

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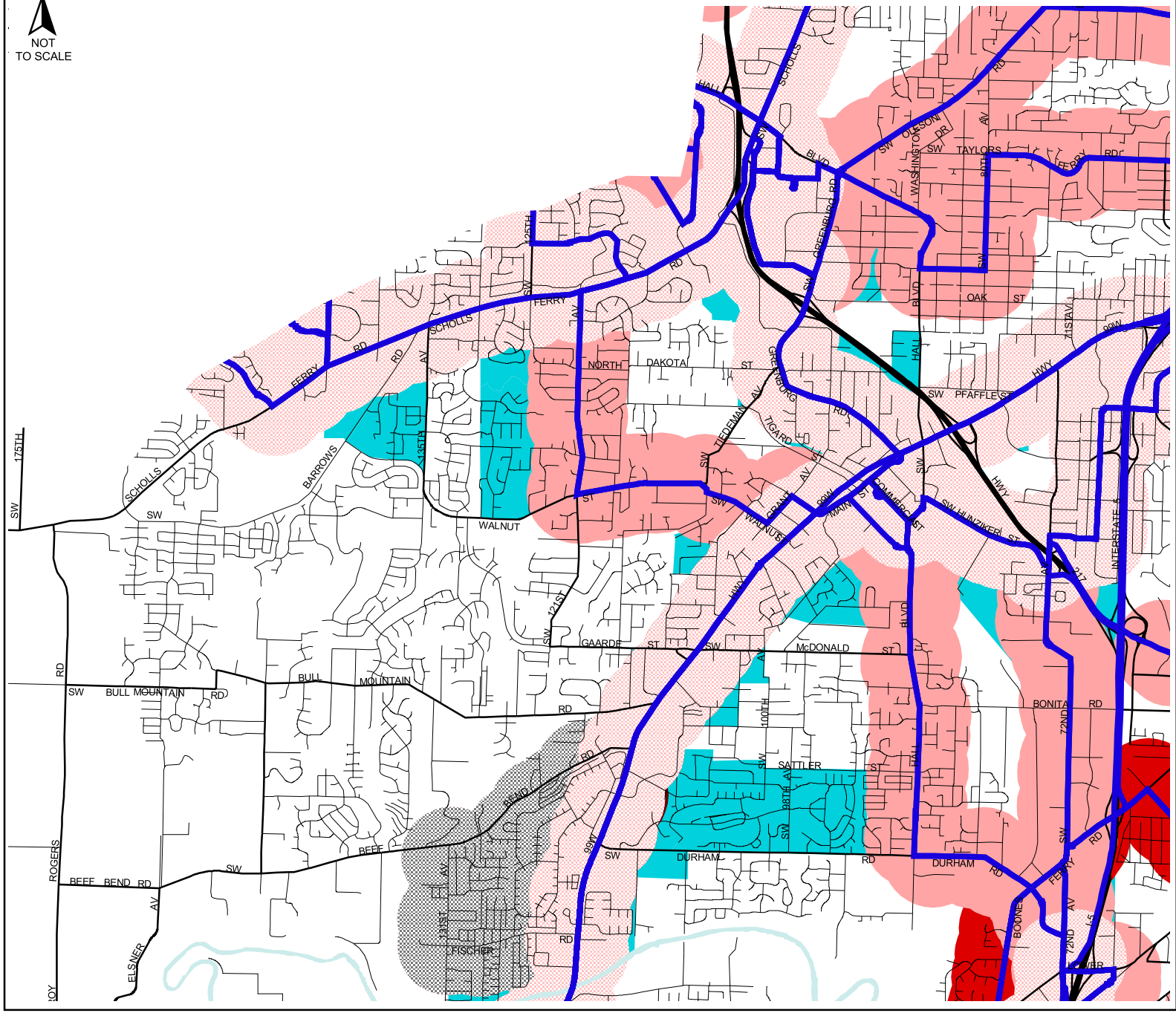

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Existing Transit/Service Route
- Shuttle Area
- Existing LOS A-C Transit Buffer
- Existing LOS D Transit Buffer
- Existing LOS E Transit Buffer
- Existing LOS F Transit Buffer
- 1994 Transit Supportive Zones Not Covered by Buffer

Note: Transit LOS is based on headway in the PM Peak Period, as defined in the 2000 Highway Capacity Manual.

LOS A: 1-9 minutes
LOS B: 10-14 minutes
LOS C: 15-20 minutes
LOS D: 21-30 minutes
LOS E: 31-60 minutes
LOS F: Greater than 60 minutes

Figure 7-2
Existing Transit Coverage

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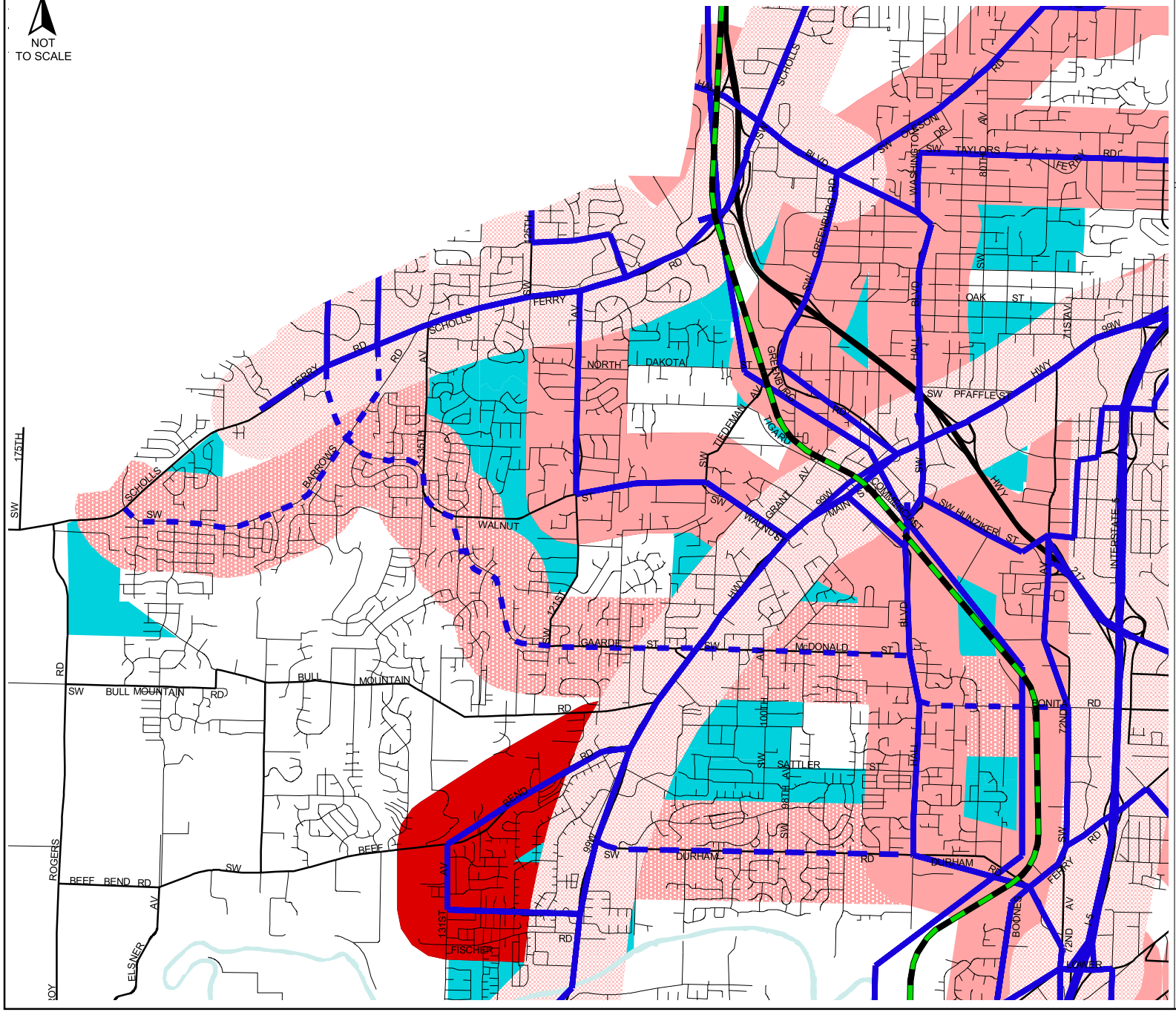

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Proposed Commuter Rail
- 2020 Committed Model Transit/Service Routes
- Planned Future Transit/Service Route
- Potential Future Transit/Service Route
- 2020 Comitted LOS A-C Transit Buffer
- 2020 Committed LOS D Transit Buffer
- 2020 Committed LOS E Transit Buffer
- 2020 Committed LOS F Transit Buffer
- Potential Future Transit Route LOS D Buffer
- Planned Future Transit Route LOS D Buffer
- 2015 Transit Supportive Zones Not Covered By Buffer

Note: Transit LOS is based on headway in the PM Peak Period, as defined in the 2000 Highway Capacity Manual.

LOS A: 1-9 minutes
LOS B: 10-14 minutes
LOS C: 15-20 minutes
LOS D: 21-30 minutes
LOS E: 31-60 minutes
LOS F: Greater than 60 minutes

Figure 7-3
Future Transit Coverage

Table 7-1
Transit Strategies Comparisons

Strategy	Policies			
	2-2	2-7	2-8	5-1
1. Provide Commuter Rail	◖	◖	●	◖
2. Provide Service Often in Peak Commute Periods	◖	◖	◖	◖
3. Provide Express Routes to Regional Employment Centers	◖	◖	◖	◖
4. Provide Bus Shelters/User Amenities	◖	◖	❍	◖
5. Provide Access to Employment Areas	◖	◖	◖	◖
6. Provide More Local Transit Service	◖	◖	❍	◖
7. Provide Access to Commercial Areas	◖	❍	◖	◖
8. Provide Park & Ride Lots	◖	◖	❍	◖
9. Provide Access to Activity & Service Centers	◖	◖	◖	◖

✖ Does not meet criteria
❍ Partially meets criteria
◖ Mostly meets criteria
● Fully meets criteria

RECOMMENDED TRANSIT PLAN

The strategies that had been developed by the TSP Task Force were then ranked by the committee. Each committee member was assigned a certain number of points that he or she could allocate to each of the strategies according to his or her priorities. The ranking of these strategies is the same as listed previously.

Potential Project List

Proposed transit routes/facilities are summarized in Table 7-2 and Figure 7-4. Transit projects were determined based on strategies listed above and project feasibility. Park and ride lots, pedestrian districts and potentially new service areas are shown on Figure 7-4.

Table 7-2
Potential Transit Projects

Rank	Project	Description
1	Provide Commuter Rail Station in Tigard	As part of the Beaverton to Wilsonville Commuter Rail system provide a park and ride station in downtown Tigard. Support regional study of western extensions of commuter rail service (or comparable options).
2	Provide Transit Amenities at Major Transit Stops	Provide shelters, information kiosks, etc key transit routes in Tigard with land use development. Focus on development of "SMART" bus stops.
3	Improve Pedestrian Connections to Transit Facilities	Construct sidewalks, crosswalks, etc. adjacent to transit routes and facilities (i.e. park-and-ride lots, bus stops, etc.). Within ¼ mile of bus stops, focus on enhancing pedestrian access. Enhance Regional Center and Town Center pedestrian access to transit.
4	Decrease Headways	Provide more frequent transit service during peak commute periods.
5	Establish Additional Transit Routes	Provide service along Durham Road and in the western part of the City (i.e. Durham Road, Barrows Road, Murray/Walnut/Gaarde) . Time additional transit service to coordinate with major road extensions or street improvements.
6	Add a new Transit Center at the Murray/Scholls Town Center	Provide a new transit center with the development of the Murray/Scholls Town Center. The Downtown Town Center and Washington Square Regional Center are the existing Transit Center locations.

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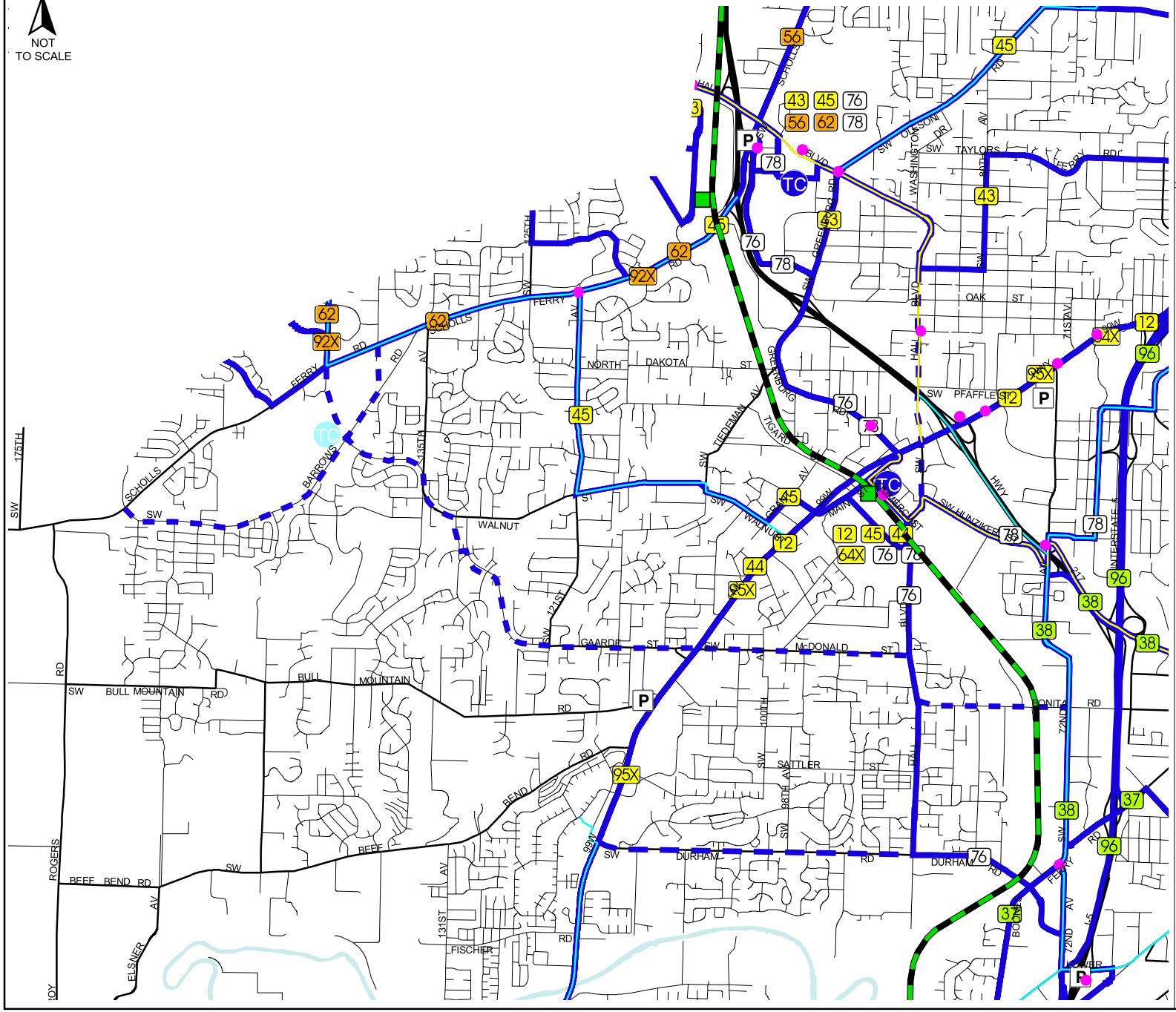


CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Proposed Commuter Rail Stations
- Proposed Commuter Rail
- Future Transit Center Opportunity
- Transit Center Location
- Park and Ride Location
- Existing Transit/Service Route
- Planned Future Transit/Service Route
- Potential Future Transit/Service Route
- RTP Major Transit Stop

Proposed RTP Transit Route Designations

- Regional Bus
- Frequent Bus
- Rapid Bus

Figure 7-4
Future Transit Service

Recommended Land Use Actions

The City of Tigard Development Code includes requirements for land use changes to address transit access. Section 18.360.090 provides approval criteria related to public transit.

a. Provisions within the plan shall be included for providing for transit if the development proposal is adjacent to existing or proposed transit route;

b. The requirements for transit facilities shall be based on:
   (1) The location of other transit facilities in the area; and
   (2) The size and type of the proposal.

c. The following facilities may be required after City and Tri-Met review:
   (1) Bus stop shelters;
   (2) Turnouts for buses; and
   (3) Connecting paths to the shelters.

The only modification to this code provision is to define adjacent as having a bus stop within 500 feet of the property.

Chapter 8
Motor Vehicles

CITY OF TIGARD
OREGON

This chapter summarizes needs for the motor vehicle system for both existing and future conditions in the City of Tigard. This chapter also outlines the criteria to be used in evaluating needs, provides a number of strategies and recommends plans for motor vehicles (automobiles, trucks, buses and other vehicles). The needs, criteria and strategies were identified in working with the City's Task Force (which consisted primarily of the Tigard Planning Commission). This group explored automobile and truck needs in the City of Tigard and provided input about how they would like to see the transportation system in their city develop. The Motor Vehicle modal plan is intended to be consistent with other jurisdictional plans including Metro's *Draft Regional Transportation Plan (RTP),* Washington County's Transportation Plan and ODOT's *Oregon Highway Plan* (OHP).

The motor vehicle element of the TSP involves several elements as shown in Figure 8-1. This chapter is separated into the following ten sections:

- Criteria
- Functional Classification (including summary of cross sections and local street connectivity)
- Circulation and Capacity Needs
- Safety
- Access Management
- Maintenance
- Neighborhood Traffic Management
- Parking
- Transportation System Management/Intelligent Transportation Systems
- Truck Routes

CRITERIA

Tigard's TSP Task Force created a set of goals and policies to guide transportation system development in Tigard (see Chapter 2). Many of these goals and policies pertain specifically to motor vehicles. These goals and policies represent the criteria that all motor vehicle improvements or changes in Tigard should be measured against to determine if they conform to the intended direction of the City.

Goal 1 Livability

Policy 1 Maintain the livability of Tigard through proper location and design of transportation facilities.

Policy 3 Address issues of excessive speeding and through traffic on local residential streets through a neighborhood traffic program. The program should address corrective measures for existing problems and assure that development incorporates traffic calming.

CITY OF TIGARD
Transportation System Plan

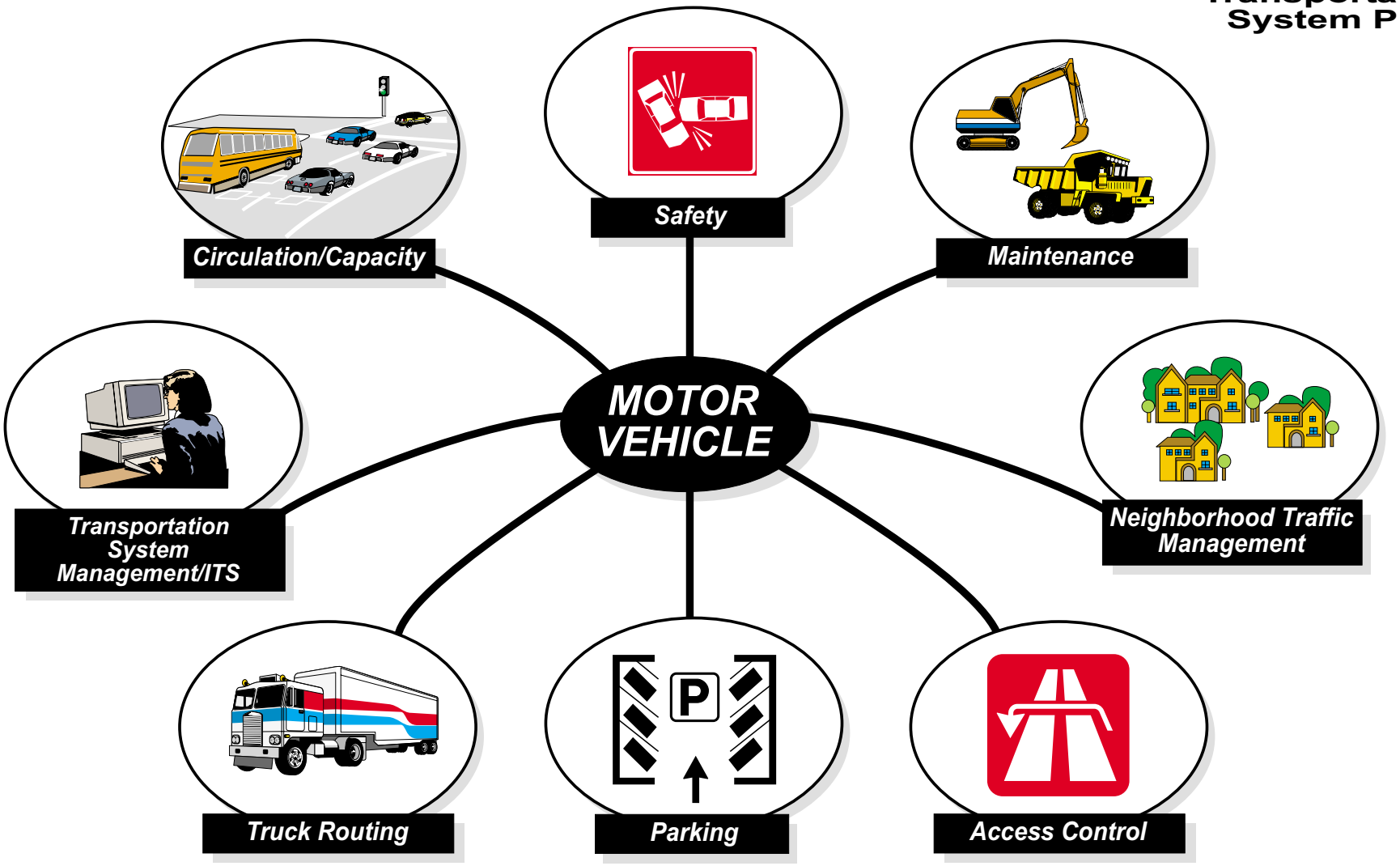


Figure 8-1
VEHICULAR ELEMENTS OF THE STREET PLAN

Goal 2 Balanced Transportation System

Policy 1 Develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way for utility, pedestrian, bicycle, transit, truck and auto use.

Policy 6 Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel. Provide connectivity to activity centers and destinations with a priority for bicycle and pedestrian connections

Policy 7 Tigard will participate in vehicle trip reduction strategies developed regionally targeted to achieve non-single occupant vehicle levels outlined in Table 1.3 of the Regional Transportation Plan.

Goal 3 Safety

Policy 1 Design of streets should relate to their intended use.

Policy 2 Street maintenance shall be a priority to improve safety in Tigard.

Policy 5 Access management standards for arterial and collector streets shall be developed to improve safety in Tigard.

Policy 6 Establish a City monitoring system that regularly evaluates, prioritizes and mitigates high accident locations within the City.

Goal 4 Performance Measures

Policy 1 A minimum intersection level of service standard shall be set for the City of Tigard. All public facilities shall be designed to meet this standard.

Policy 3 Work with Washington County, Metro, and ODOT to develop, operate and maintain intelligent transportation systems including coordination of traffic signals.

Goal 5 Accessibility

Policy 2 Develop neighborhood and local connections to provide adequate circulation in and out of the neighborhoods.

Policy 3 Work to develop an efficient arterial grid system that provides access within the City and serves through City traffic.

Goal 6 Goods Movement

Policy 1 Design arterial routes, highway access and adjacent land uses in ways that facilitate the efficient movement of goods and services.

FUNCTIONAL CLASSIFICATION

Roadways have two functions, to provide mobility and to provide access. From a design perspective, these functions can be incompatible since high or continuous speeds are desirable for mobility, while low speeds are more desirable for land access. Arterials emphasize a high level of mobility for through movement; local facilities emphasize the land access function; and collectors offer a balance of both functions (Figure 8-2).

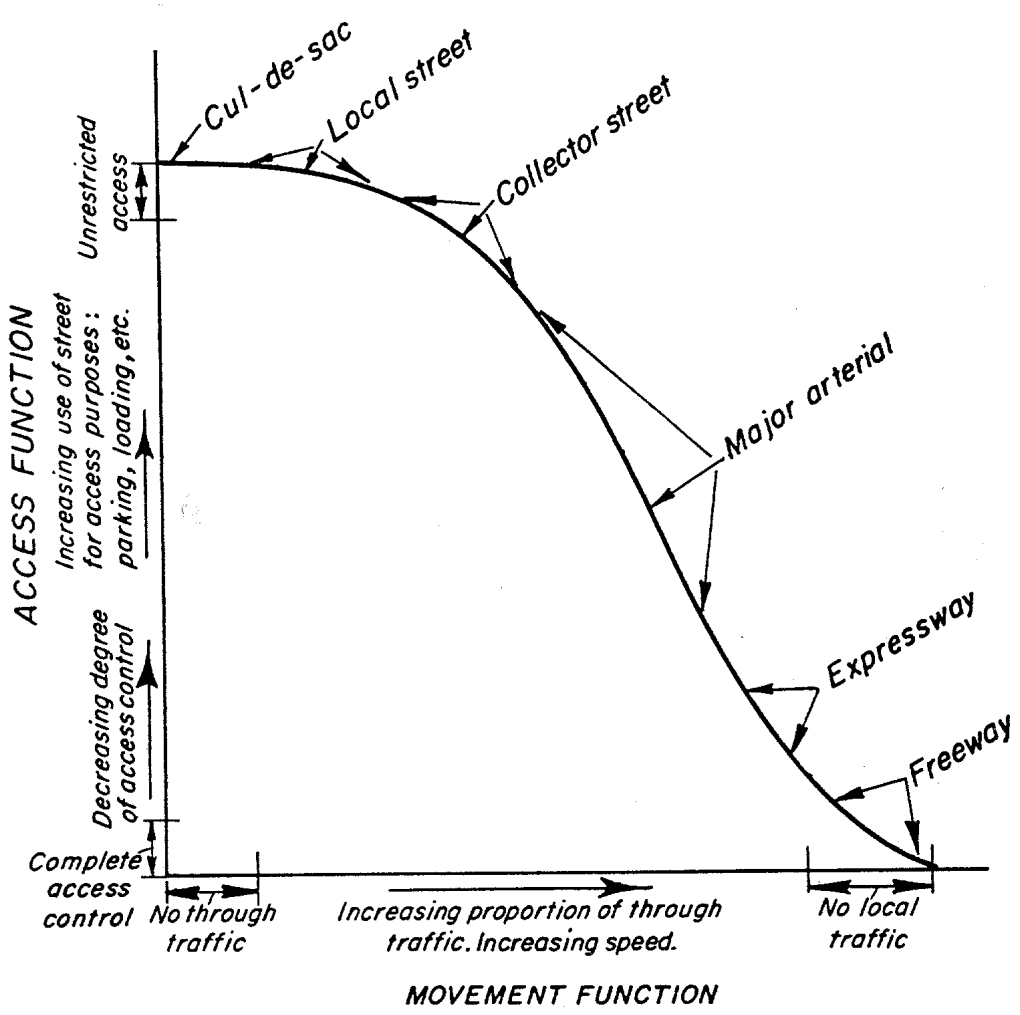
Functional classification has commonly been mistaken as a determinate for traffic volume, road size, urban design, land use and various other features which collectively are the elements of a roadway, but do not represent function. For example, the volume of traffic on a roadway is directly related to land uses and because a roadway carries a lot or a little traffic does not necessarily determine its function. The traffic volume, design (including access standards) and size of the roadway are outcomes of function, but do not define function.

Function can be best defined by connectivity. Without connectivity, neither mobility nor access can be served. Roadways that provide the greatest reach of connectivity are the highest level facilities. **Arterials** can be defined by regional level connectivity. These routes go beyond the city limits in providing connectivity and can be defined into two groups: principal arterials (typically state routes) and arterials. The efficient movement of persons, goods and services depends on an interconnected arterial system.

Collectors can be defined by citywide or district wide connectivity. These routes span large areas of the city but typically do not extend significantly into adjacent jurisdictions. They are important to city circulation. The past textbooks on functional classification generally defined all other routes as **local streets**, providing the highest level of access to adjoining land uses. These routes do not provide through connection at any significant regional, city-wide or district level.

Based upon connectivity there is a fourth level of functional classification - **neighborhood route**. In many past plans, agencies defined a minor collector or a neighborhood collector; however, use of the term collector is not appropriate. Collectors provide citywide or large district connectivity and circulation. There is a function between a collector and a local street that is unique due to its level of connectivity. Local streets can be cul-de-sacs or short streets that do not connect to anything.[1] Other routes people use to get in and around their neighborhood. They have connections within the neighborhood and between neighborhoods. These routes have neighborhood connectivity, but do not serve as citywide streets. They have been the most sensitive routes to through, speeding traffic due to their residential frontages. Because they do provide some level of connectivity, they can commonly be used as cut-through routes in lieu of congested or less direct arterial or collector streets that are not performing adequately. Cut-through traffic has the highest propensity to speed, creating negative impacts on these neighborhood routes. By designating these routes, a more systematic citywide program of neighborhood traffic management can be undertaken to protect these sensitive routes.

[1] Or in the case of neo-traditional grid systems, extensive redundancy in facilities results in local status to streets that have greater than local connectivity.



Source: University of California, 'Fundamentals of Traffic Engineering' Wolfgang S. Homburger and James H. Kell

Figure 8-2
STREET FUNCTION RELATIONSHIP

In the past, traffic volume and the size of a roadway have been directly linked to functional classification. More recently, urban design and land use designations have also been tied to functional classification. Discussions of neo-traditional street grids that eliminate the need for functional classification creates another commentary on this issue. All of these approaches to functional classification tend to be confusing and ever changing, complicating an essential transportation planning exercise. The planning effort to identify connectivity of routes in Tigard is essential to preserve and protect future mobility and access, by all modes of travel. In Tigard, it is not possible to have a citywide neo-traditional layout. Past land use decisions, topography and environmental features preclude this[2]. Without defining the varying levels of connectivity now in the TSP, the future impact of the adopted Comprehensive Plan land uses will result in a degraded ability to move goods and people (existing and future) in Tigard. The outcome would be intolerable delays and much greater costs to address solutions later rather than sooner.

By planning an effective functional classification of Tigard streets[3], the City can manage public facilities pragmatically and cost effectively. These classifications do not mean that because a route is an arterial it is large and has lots of traffic. Nor do the definitions dictate that a local street should only be small with little traffic. Identification of connectivity does not dictate land use or demand for facilities. The demand for streets is directly related to the land use. The highest level connected streets have the greatest potential for higher traffic volumes, but do not necessarily have to have high volumes as an outcome, depending upon land uses in the area. Typically, a significant reason for high traffic volumes on surface streets at any point can be related to the level of land use intensity within a mile or two. Many arterials with the highest level of connectivity have only 35 to 65 percent "through traffic". Without the connectivity provided by arterials and collectors, the impact of traffic intruding into neighborhoods and local streets goes up substantially.

If land use is a primary determinate of traffic volumes on streets, then how is it established? In Oregon, land use planning laws require the designation of land uses in the Comprehensive Plan. Tigard's Comprehensive Plan land uses have been designated for over two decades. These land use designations are very important not only to the City for planning purposes, but to the people that own land in Tigard. The adopted land uses in Tigard have been used in this study, working with the Metro regional forecasts for growth in the region for the next 20 years. A regional effort, coordinated by Metro and local agencies, has been undertaken to allocate the determined overall land use in the most beneficial manner for transportation. Without this allocation, greater transportation impacts would occur (wider and more roads than identified in this plan). As discussed in Chapter 10, if the outcome of this TSP is either too many streets or solutions that are viewed to be too expensive, it is possible to reconsider the core assumptions regarding Tigard's livability - its adopted land uses or its service standards related to congestion. The charge of this TSP (as mandated by State law) is to develop a set of multi-modal transportation improvements to support the Comprehensive Plan land uses. Key to this planning task is the functional classification of streets.

[2] While subdivisions or areas of neo-traditional development exist and are possible (even desirable), on the whole, the concept cannot be generically applied citywide in lieu of functional classification.

[3] Including definition of which routes connect through Tigard, within Tigard and which routes serve neighborhoods and the local level in the city.

Functional Classification Definitions

The proposed functional classification of streets in Tigard is represented by Figure 8-3. Any street not designated as either an arterial, collector or neighborhood route is considered a local street.

Principal Arterials are typically freeways and state highways that provide the highest level of regional connectivity. These routes connect over the longest distance (many miles long) and are less frequent than other arterials or collectors. These highways generally span several jurisdictions and many times have statewide importance (as defined in the ODOT Level of Importance categorization).[4] In Tigard, I-5 is designated an Interstate Highway and two routes (ORE 217 and ORE 99W) are designated Statewide Highways. All three of these routes are part of the National Highway System. While State Highways make up only 10 percent of Oregon's road mileage, they handle over 60 percent of the daily traffic[5].

Arterial streets serve to interconnect and support the principal arterial highway system. These streets link major commercial, residential, industrial and institutional areas. Arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well placed arterial street. Access control is the key feature of an arterial route. Arterials are typically multiple miles in length. Many of these routes connect to cities surrounding Tigard and commonly provide access to freeways via interchanges.

Collector streets provide both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access (compared to arterials) and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system. Collectors are greater than 0.5 to 1.0 miles in length.

Neighborhood routes are usually long relative to local streets and provide connectivity to collectors or arterials. Because neighborhood routes have greater connectivity, they generally have more traffic than local streets and are used by residents in the area to get into and out of the neighborhood, but do not serve citywide/large area circulation. They are typically about a quarter to a half mile in total length. Traffic from cul-de-sacs and other local streets may drain onto neighborhood routes to gain access to collectors or arterials. Because traffic needs are greater than a local street, certain measures should be considered to retain the neighborhood character and livability of these routes. Neighborhood traffic management measures are often appropriate (including devices such as speed humps, traffic circles and other devices - refer to later section in this chapter). However, it should **not** be construed that neighborhood routes automatically get speed humps or any other measures. While these routes have special needs, neighborhood traffic management is only one means of retaining neighborhood character and vitality.

Local Streets have the sole function of providing access to immediate adjacent land. Service to "through traffic movement" on local streets is deliberately discouraged by design.

[4] 1999 Oregon Highway Plan, ODOT, March 1999.

[5] 1999 Oregon Highway Plan, ODOT, March 1999, page 13.

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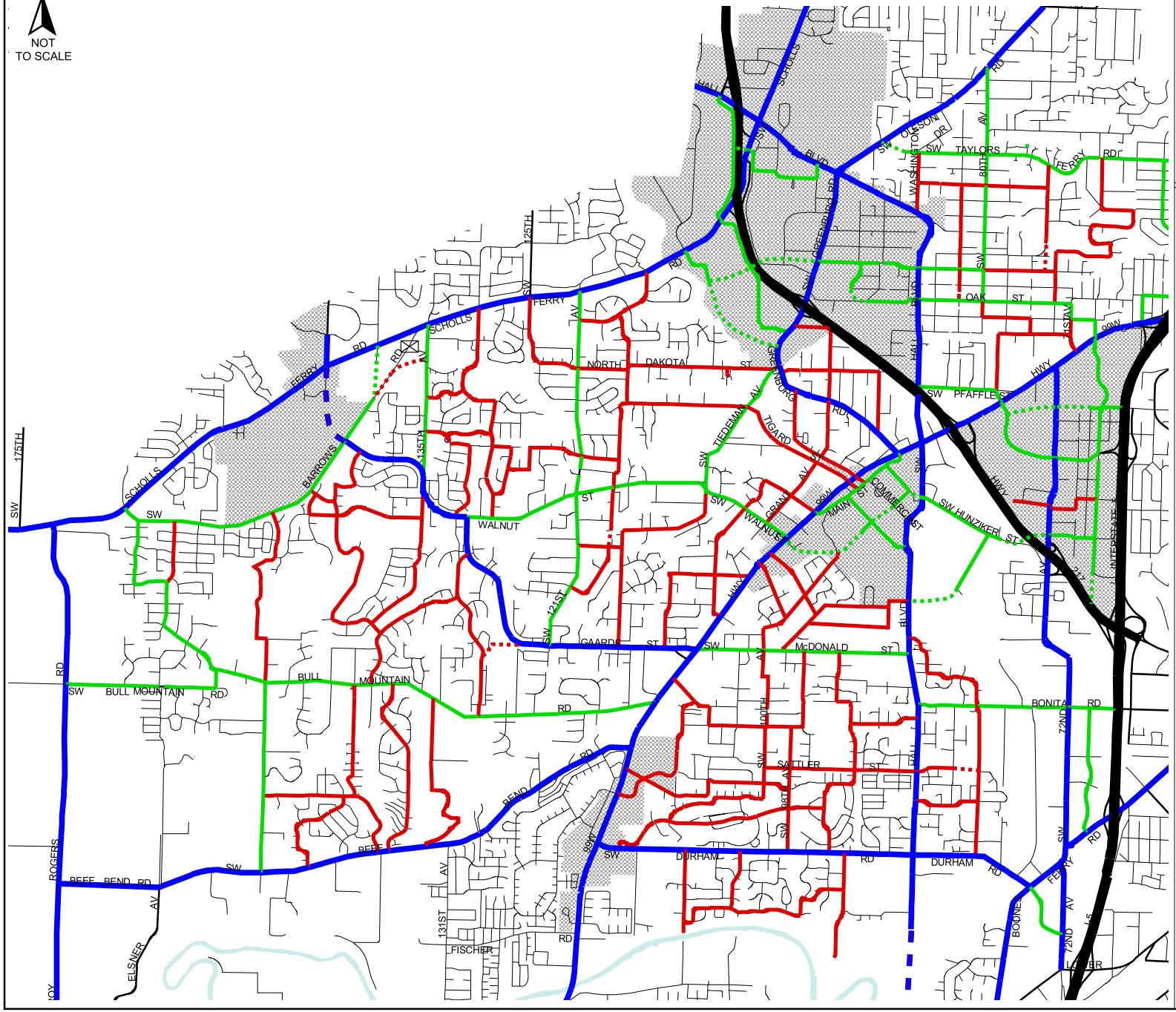

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Road Closure

Functional Classification

- Proposed Freeway
- Proposed Arterial
- Proposed Collector
- Proposed Neighborhood Route
- Planned Arterial
- Planned Collector
- Planned Neighborhood Route
- Regional Center, Town Center, or Sub Area

*-Transportation facilities in the Tigard Triangle and Washington Square planning areas have specific design regulations and classifications that may slightly differ from those in the TSP for consistency purposes. In these overlay areas, there are specific planning overlay documents for transportation design regulations.

Note: The exact alignment of dashed lines to address physical, access control, right-of-way and environmental constraints in alignment developement.

Figure 8-3
Proposed Functional Classification System

Functional Classification Changes

The proposed functional classification differs from the existing approved functional classification. Neighborhood routes were not defined in the existing functional classification. The proposed functional classification was developed following detailed review of Tigard's, Washington County's and Metro's current functional classification maps. Table 8-1 summarizes the major differences between the proposed functional classification and the existing designations for streets in Tigard. This table also outlines the streets which were previously designated collectors that are now identified as neighborhood routes.

Criteria for Determining Changes to Functional Classification

The criteria used to assess functional classification have two components: the extent of connectivity (as defined above) and the frequency of the facility type. Maps can be used to determine regional, city/district and neighborhood connections. The frequency or need for facilities of certain classifications is not routine or easy to package into a single criterion. While planning textbooks call for arterial spacing of a mile, collector spacing of a quarter to a half mile, and neighborhood connections at an eighth to a sixteenth of a mile, this does not form the only basis for defining functional classification. Changes in land use, environmental issues or barriers, topographic constraints, and demand for facilities can change the frequency for routes of certain functional classifications. While spacing standards can be a guide, they must consider other features and potential long term uses in the area (some areas would not experience significant changes in demand, where others will). Linkages to regional centers and town centers are another consideration for addressing frequency of routes of a certain functional classification. Connectivity to these areas is important, whereas linkages that do not connect any of these centers could be classified as lower levels in the functional classification.

Table 8-1
Proposed Changes to Existing Roadway Classification

	Roadway Classification According to Jurisdiction			
Roadway	**Tigard**	**Wash County**	**Metro**	**Proposed TSP**
Greenburg Road	Major Collector	Minor Arterial/ Major Collector	Major Arterial	Arterial
72nd Avenue	Major Collector	Study Area	Minor Arterial	Arterial
Durham (W. of Hall)	Major Collector	Study Area	Minor Arterial	Arterial
Murray (Scholls Ferry to Barrows)	Major Collector	Proposed Collector	Proposed Collector of Regional Significance	Arterial
Walnut (Barrows to Gaarde)	Major Collector	Proposed Collector	Collector of Regional Significance	Arterial
Gaarde Street	Major Collector	Proposed Collector/ Major Collector	Collector of Regional Significance	Arterial
Beef Bend Road	Major Collector	Major Collector	Collector of Regional Significance	Arterial
Barrows Road	Arterial	Major Collector	Not Classified	Collector
Sequoia Parkway	Not Classified	Not Classified	Not Classified	Collector
Oak St (e of Lincoln)	Not Classified	Not Classified	Not Classified	Collector
Oak St (w of Lincoln)	Minor Collector	Not Classified	Not Classified	Local

Table 8-1 (cont.)

Tech Center Drive	Minor Collector	Not Classified	Not Classified	Local
97th/98th Avenue	Major Collector	Major Collector	Not Classified	Neighborhood

Routes that Change from Minor Collector to Neighborhood Route

135th (s/o Gaarde)	Sunrise Lane	Watkins Avenue	Summerfield Drive
133rd Avenue	Benchview Terrace	Grant Avenue	Sattler Street
130th Avenue	Peachtree Drive	Park Street	Ross Street
128th Avenue	Morning Hill Drive	Johnson Street	Alderbrook Drive
115th Avenue	Falcon Rise Drive	Commercial Street	Pinebrook Street
109th Avenue	Winter Lake Drive	Shady Lane	
98th Avenue	North Dakota St.	Washington Drive	
95th Avenue	Springwood Drive	Ash Avenue	
79th Avenue	Tigard Street	O'Mara Street	
74th/72nd Avenue	Fonner Street	Canterbury Lane	

Changes from Collector or Local designation to Neighborhood Route (see Figure 8-4)

Metzger Area	**South Tigard**	**Central Tigard**	**North Dakota Area**	**Southwest**
Washington Drive	Sattler Street	Shady Lane	North Dakota Street	Horizon Boulevard
Cedarcrest Street	Pinebrook Street	95th Avenue	Springwood Drive	Creekshire Drive
82nd Avenue	Alderbrook Drive	Dakota Street	115th Avenue	Fern Street
Locust Street	92nd Avenue	90th Avenue	Tigard Street	Ascension Drive
74th Avenue	Inez Street	98th Avenue	Tigard Drive	Windsong Court
69th Avenue	93rd Avenue	Commercial Street	116th Avenue	Northview Drive
Alfred Street	97th Avenue	Tigard Street	Ann Street	Mistletoe Drive
Ventura Court	Murdock Street	Grant Avenue	Katherine Street	135th Avenue
Ventura Drive	98th Avenue	Johnson Street	125th Avenue	Essex Drive
72nd Avenue	100th Avenue	Brookside Avenue	Karen Street	Benchview Terrace
80th Avenue	103rd Avenue	Watkins Avenue	127th Avenue	132nd Avenue
Pine Street	Canterbury Lane	Park Street	128th Avenue	Greenfield Drive
75th Street	Highland Drive	110th Avenue	Winter Lake Drive	Menlor Lane
Spruce Street	Summerfield Drive	115th Avenue	130th Avenue	Sunrise Lane
78th Avenue	92nd Avenue	Fonner Street	Brittany Drive	150th Avenue
69th Avenue	108th Avenue	116th Avenue	Morning Hill Drive	Uplands Drive
East Tigard	Riverwood Lane	Howard Drive	Falcon Rise	141st Avenue
Fanno Creek Drive	Copper Creek Drive	Garrett Street	131st Avenue	Woodhue Street
79th Avenue	Millen Drive	Frewing Street		Tewkesbury Drive
Ross Street	River Drive	Ash Avenue		Barrington Terrace
Ashford Street	Tualatin Drive	O'Mara Street		Westminster Drive
		Edgewood Street		Peachtree Drive
				133rd Avenue

The proposed changes in functional classification on Durham Road, Murray Boulevard, Gaarde Street, 72nd Avenue, Greenburg Road and Beef Bend Road affect Washington County roadways. These proposed changes have been discussed with County staff and the County is in the process of reviewing these changes.

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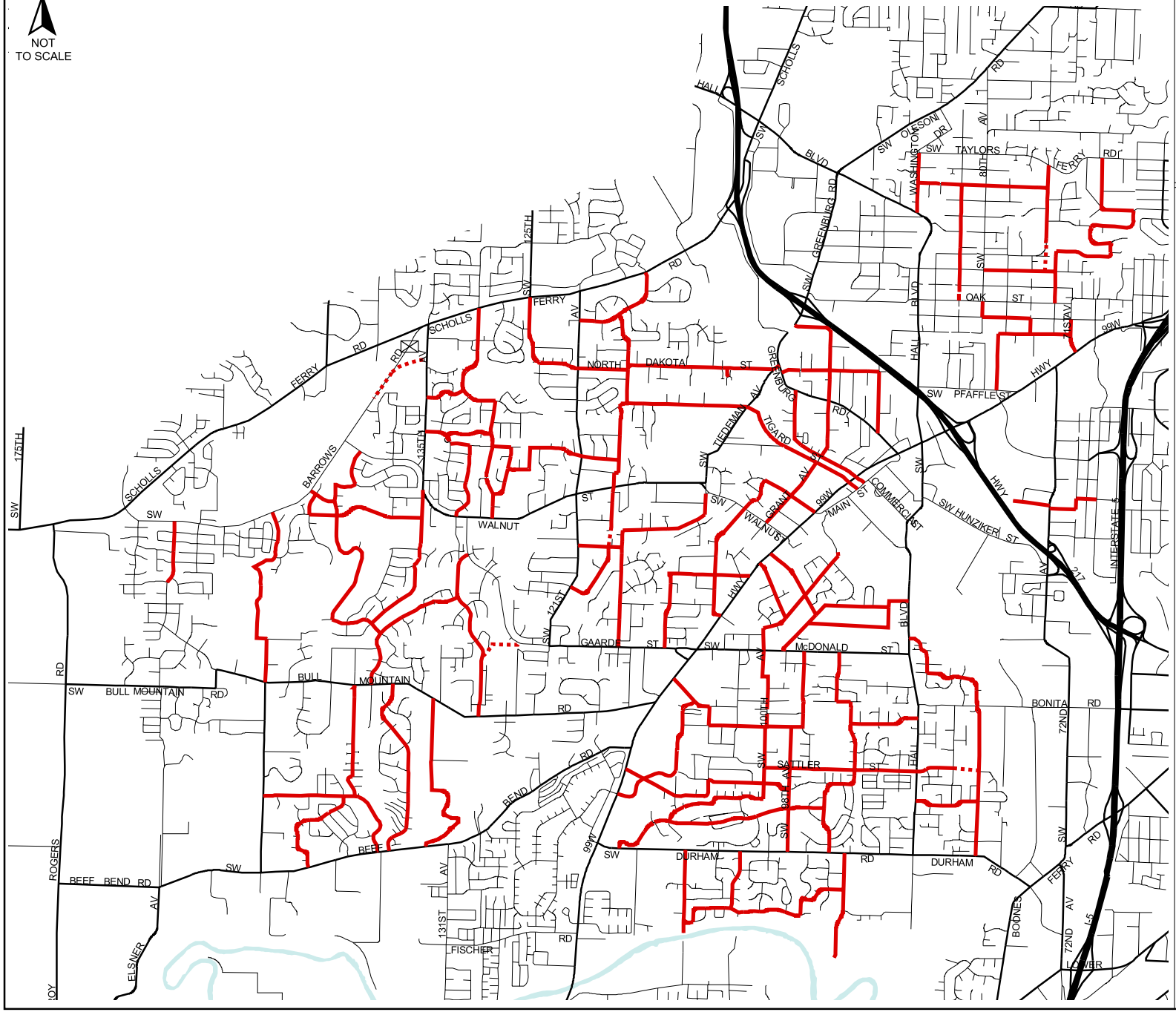

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Road Closure
- Neighborhood Routes
  - Proposed
  - Planned

Figure 8-4
Proposed Neighborhood Routes

Characteristics of Streets for each Functional Classification

The design characteristics of streets in Tigard were developed to meet the function and demand for each facility type. Because the actual design of a roadway can vary from segment to segment due to adjacent land uses and demands, the objective was to define a system that allows standardization of key characteristics to provide consistency, but also to provide criteria for application that provides some flexibility, while meeting standards. Figures 8-5 to 8-10 depict sample street cross-sections and design criteria for arterials, collectors, neighborhood routes and local streets. Figure 8-5 shows the Existing Tigard Standard Cross-Sections, Figure 8-6 and 8-7 shows Washington County's Standard Cross-Sections (these apply to Washington County owned roadways) and Figures 8-8 through 8-10 show the *proposed* Tigard Standard Cross-Sections. Planning level right-of-way needs can be determined utilizing these figures and Table 8-2 and the lane geometry outlined later in this chapter. Specific right-of-way needs will need to be monitored continuously through the development review process to reflect current needs and conditions[6] (that is to say that more specific detail may become evident in development review which requires improvements other than these outlined in this 20 year general planning assessment of street needs).

The analysis of capacity and circulation needs for Tigard outlines several roadway cross sections. The most common are 2, 3 and 5 lanes wide. Where center left turn lanes are identified (3 or 5 lane sections), the actual design of the street may include sections without center turn lanes (2 or 4 lane sections[7]) or with median treatments, where feasible. The actual treatment will be determined within the design and public process for implementation of each project. The plan outlines requirements which will be used in establishing right-of-way needs for the development review process. The right-of-way (ROW) requirements for arterial and collector streets on the Washington County system are 50-74 feet for collector streets, 90 feet for three-lane arterials and 90-122 feet for four-to-seven-lane arterials[8].

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[6] For example, designations by Metro, ODOT and Washington County all play a role in the ROW determination.

[7] For example, adjacent to environmentally sensitive or physically constrained areas.

[8] Washington County Uniform Road Improvement Design Standards, Ordinance No. 524, Adopted July 28, 1998, pages 13-18.

Table 8-2
Proposed Street Characteristics

Vehicle Lane Widths: (minimum widths)	Truck Route = 12 feet Bus Route = 11 feet Arterial = 12 feet Collector = 11 feet Neighborhood = 10 feet Local = 9[9] to 10 feet Turn Lane = 12 feet[10]
On-Street Parking:	8 feet[11]
Bicycle Lanes: (minimum widths)	New Construction = 6 feet Reconstruction = 5 to 6 feet
Curb Extensions for Pedestrians:	Consider on any Pedestrian Master Plan Route
Sidewalks: (minimum width)	Local = 5 feet[12] Neighborhood = 5 feet[12] Collector = 6 to 8[13] feet Arterial = 6 to 10[13] feet
Landscape Strips:	Residential/Neighborhood = Required Collector/Arterial = Required
Medians:	5-Lane = Required 3-Lane = Optional
Neighborhood Traffic Management:	Local = Should not be necessary Neighborhood = Should Consider Collectors = Under Special Conditions Arterials = Only under Special Conditions
Transit:	Arterial/collectors = Appropriate Neighborhood = Only in special circumstances
Turn Lanes:	When Warranted[14]
Access Control:	See later section for Arterials and Collectors

[9] 9 foot lanes would only be used in conjunction with on-street parking.

[10] In constrained conditions on collectors, neighborhood and local routes, a minimum width of 10 feet may be considered (except on bus routes)

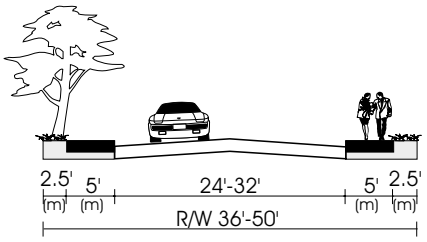
[11] For 32 foot streets, the City recognizes that there will not be 20 feet of unobstructed pavement.

[12] 5 foot with landscape strip, 6 foot against curb.

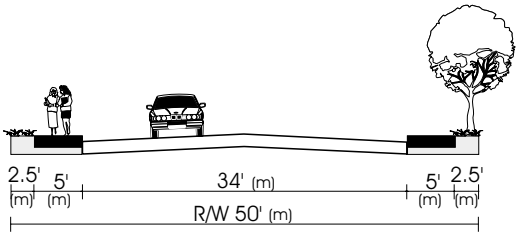
[13] Larger sidewalks than minimums should be considered for areas with significant pedestrian volumes. In commercial areas where pedestrian flows of over 100 pedestrians an hour are present or forecast, specific analysis should be conducted to size sidewalks appropriately for safe movement.

[14] Turn lane warrants should be reviewed using Highway Research Record, No. 211, NCHRP Report No. 279 or other updated/superseding reference.

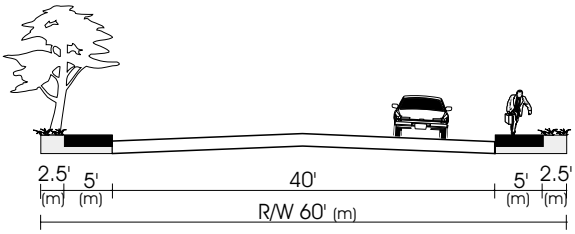
Local Street
Residential



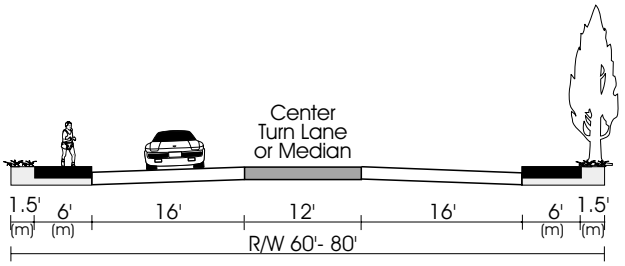
Local Street
Commercial & Industrial



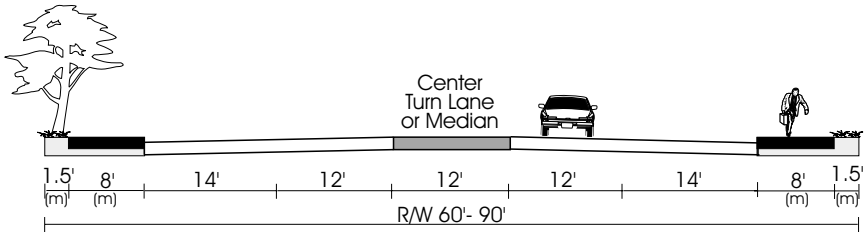
Minor Collector



Major Collector



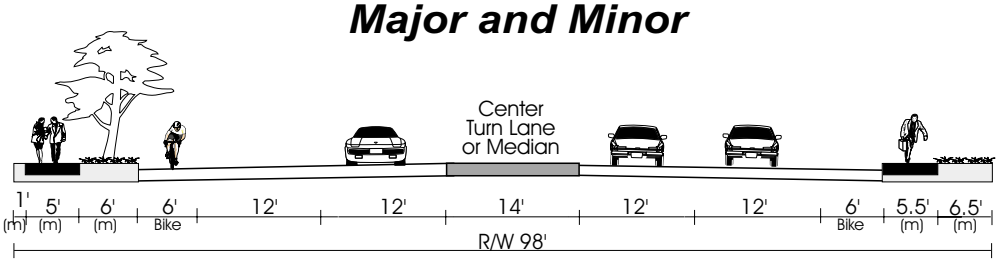
Arterial



(m) - Minimum Required Width

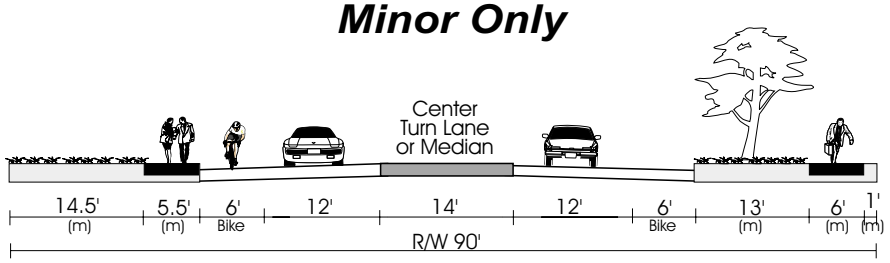
Figure 8-5
EXISTING
TYPICAL STREET CROSS SECTIONS

Arterial
Major and Minor



5 Lanes

Arterial
Minor Only

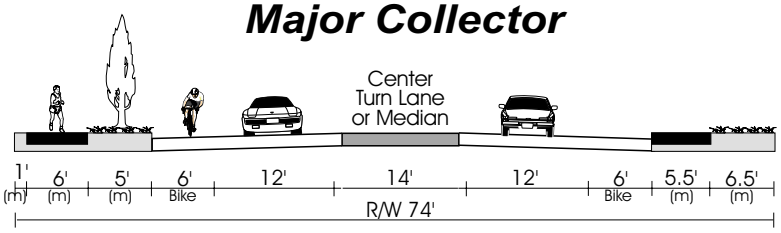


3 Lanes

(m) - Minimum Required Width

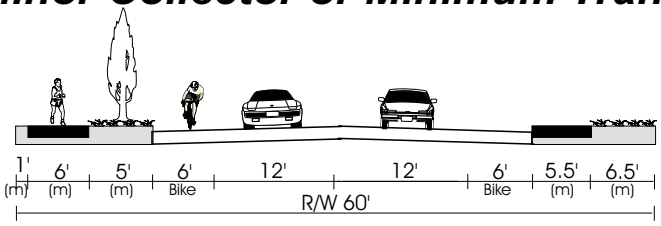
Figure 8-6
WASHINGTON COUNTY ARTERIAL
TYPICAL STREET CROSS SECTIONS

Major Collector



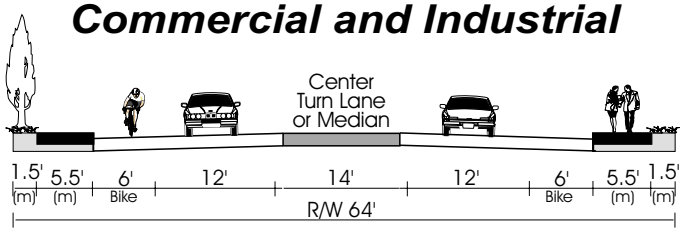
3 Lanes

Minor Collector or Minimum Transit



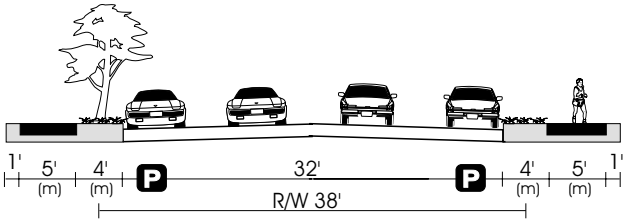
2 Lanes

Commercial and Industrial



3 Lanes

Local Street (Standard)



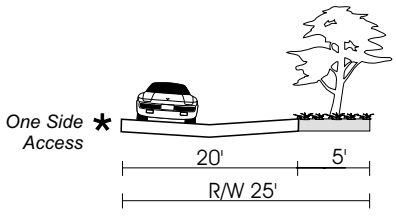
Parking Both Sides

(m) - Minimum Required Width

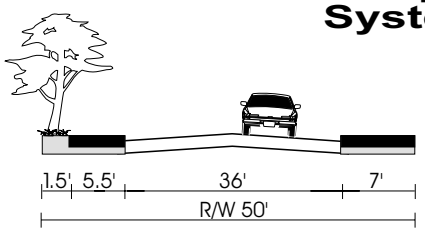
P - *On-street Parking*

Figure 8-7
WASHINGTON COUNTY
TYPICAL STREET CROSS SECTIONS

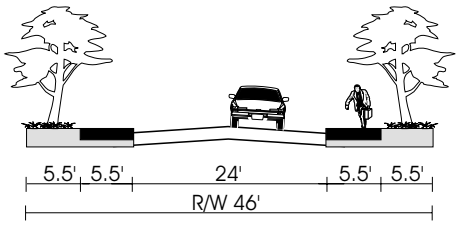
CITY OF TIGARD
Transportation System Plan



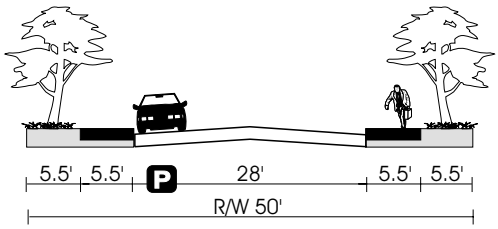
Alley
(No parking)



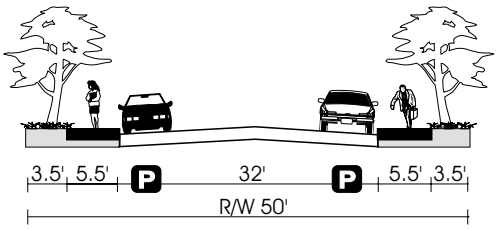
Industrial/Commercial Local



Cul-de-sac/Residential Local Street
<200 vpd
(No parking)



Residential Local Street/Cul-de-sac
One Side On-street Parking
<500 vpd



On-street Parking
<1500 vpd *

If parking on both sides, block length not to exceed 600 feet

Notes:

1. *Selection of placement of sidewalk and planter strip specific to application.*
2. *Width of curb is included in sidewalk width when adjacent to street.*
3. *Samples show the desirable applications given number of lanes; minimum standards can be applied case by case.*
4. *Actual width of street and sidewalk area can be adjusted within R/W based on modal priorities and adjacent land use.*
5. *Volume guides represent estimated Full Buildout Conditions, not just existing or project needs.*
6. *The 36' street shall be used in any area adjacent to commercial or industrial zoning. Sidewalk would be 7' curb tight in Commercial areas and 5.5' for Industrial areas (cross section shows both samples).*
7. *Where existing street curb to curb widths vary from those shown, the minimum length of new cross section should be (or have the potential to be) 500 feet contiguous.*

P *- On-street Parking*

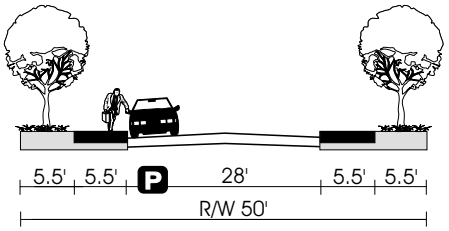
<1500 vpd *- Guide for Traffic Volume Per Day (does not require conversion of existing routes)*

* *Where volume exceeds 1500 vpd, this cross section may still be utilized however land use actions or roadway projects impacting such streets may require additional connectivity to reduce volume and/or neighborhood traffic management measures to reduce impacts.*

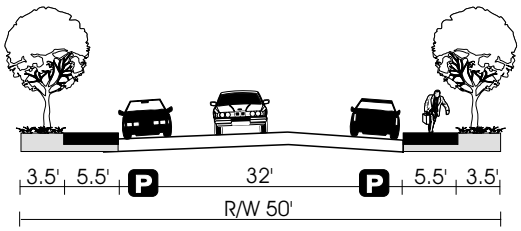
Criteria

Vehicle Lane Widths: *(minimum widths)*	*9 to 10 ft.*
On-Street Parking	*8 ft.*
Sidewalks: *(minimum width)*	*5 ft.*
Landscape Strips:	*Where Appropriate*
Neighborhood Traffic Management:	*Should not be necessary (under special conditions & over 1500 vpd)*

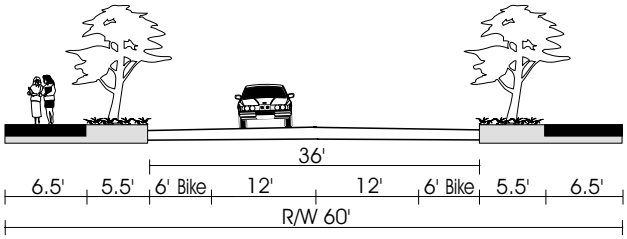
Figure 8-8
ALLEY, CUL-DE-SAC AND LOCAL STREET SAMPLE STREET CROSS SECTIONS REQUIRED ROW WIDTH



No Parking on One Side



With Parking on Both Sides



With Bike Lanes / No Parking

Notes:

1. *Selection of placement of sidewalk and planter specific to application.*
2. *Width of curb is included in sidewalk width when adjacent to street.*
3. *Samples show the desirable applications given number of lanes; minimum standards can be applied case by case.*
4. *Actual width of street and sidewalk area can be adjusted within R/W based on modal priorities and adjacent land use.*
5. *These are guidelines for future neighborhood route development and does not require changes/conversion to existing streets.*

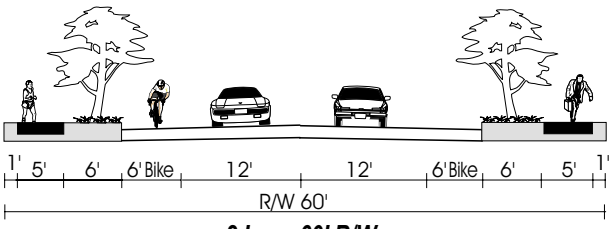
Criteria

Vehicle Lane Widths: *(minimum widths)*	*9-10 ft.*
On-Street Parking	*8 ft.*
Curb Extensions for Pedestrians:	*Consider on Pedestrian Routes*
Sidewalks: *(minimum width)*	*5 ft.*
Landscape Strips:	*Where Appropriate*
Neighborhood Traffic Management:	*Appropriate when Warranted*

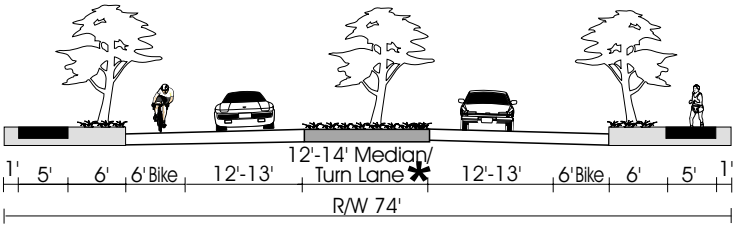
P - *On-street Parking*

Figure 8-9
NEIGHBORHOOD
SAMPLE STREET CROSS SECTIONS
REQUIRED ROW WIDTH

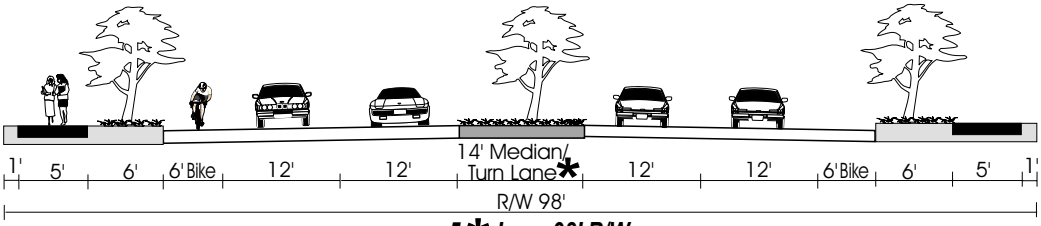
CITY OF TIGARD
Transportation System Plan



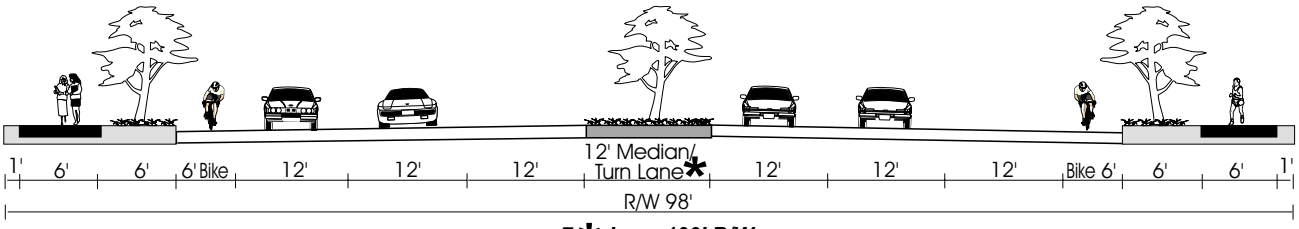
2 Lane 60' R/W



3* Lane 74' R/W



5* Lane 98' R/W



7* Lane 122' R/W

Criteria

Vehicle Lane Widths: *(minimum widths)* ***Collector***	*Truck Route = 12 ft.* *Bus Route = 12 ft.* *11 ft. (12 ft. Preferred)* *10-11 ft.*
On Street Parking:	*None (with few existing exceptions)*
Bicycle Lanes: *(minimum widths)*	*New Construction = 6 ft.* *Reconstruction = 5 to 6 ft.*
Sidewalks: *(minimum width)*	*5-13 ft. Consider Curb Extensions on Ped Routes*
Landscape Strips:	*Required*
Medians:	*5/7 Lane = Required* *3 Lane = Optional*
Neighborhood Traffic Management:	*Only Under Special Conditions: Selected Measures*

Figure 8-10
ARTERIAL AND COLLECTOR
SAMPLE STREET CROSS SECTIONS
REQUIRED ROW WIDTH

* *Note that, sidewalk widths above 6 ft. may require additional right-of-way. Where appropriate, the median/lane may not be provided resulting in 2,4 and 6 lane cross sections. The removal of the center turn lane must consider both safety and pedestrian needs.*

Wherever arterial or collectors cross each other, planning for additional right-of-way to accommodate turn lanes should be considered within 500 feet of the intersection. Figure 8-11 summarizes the Tigard streets that are anticipated within the TSP planning horizon to require right-of-way for more than two lanes. Planning level right-of-way needs can be determined utilizing Figure 8-11 and the lane geometry outlined later in this chapter. Specific right-of-way needs will need to be monitored continuously through the development review process to reflect current needs and conditions. This will be necessary since more specific detail may become evident in development review which requires improvements other than these outlined in this 20 year general planning assessment of street needs.

These cross sections are provided for guiding discussions that will update the City of Tigard *Public Improvement Design Standards for Public Works Construction*. There is an on-going discussion at the regional level regarding street cross sections. Several of the major streets in Tigard are maintained and operated by Washington County or ODOT. Metro has specified Regional Street Design designations in their draft of the RTP[15]. These designations change over the length of the road. The City of Tigard will need to coordinate with regional agencies to assure consistency in cross section planning as the County Transportation Plan and the Metro Regional Transportation Plan move forward. The designations are summarized in Table 8-3. The Metro definitions for their designations are provided in the Appendix.

Table 8-3
Metro Regional Street Design and Motor Vehicle Designations

Roadway	Regional Street Design	Motor Vehicle Classification
ORE 217	Freeway	Principal Arterial (Freeway)
I-5	Freeway	Principal Arterial (Freeway)
ORE 99W	Regional St./Regional Boulevard	Major Arterial
Scholls Ferry Road	Regional St./Regional Boulevard	Major Arterial
Greenburg Road	Regional St./Regional Boulevard	Major Arterial
Hall Boulevard (Scholls Ferry to Greenburg)	Regional Boulevard	Major Arterial
Hall Boulevard (Greenburg to South City Limits)	Community St./Community Blvd	Minor Arterial
Durham Road	Community Street	Minor Arterial
72nd Avenue	Urban Road	Minor Arterial
Upper Boones Ferry Road	Urban Road	Minor Arterial
Beef Bend Road (West of City Limits to Scholls Ferry)	Rural Road	Rural Arterial
Dartmouth Street	Community Street	Collector of Regional Significance
Gaarde/Walnut/Murray	Community Street	Collector of Regional Significance
McDonald Street	Community Street	Collector of Regional Significance
Beef Bend Rd (East of City Limits)	Community Street	Collector of Regional Significance

NOTE: Refer to Metro's RTP Policy Chapter for background on guidelines for streets, 1997.

[15] Refer to Regional Street Design System, Preliminary Draft RTP, Metro, June 17, 1999.

DKS *Associates*

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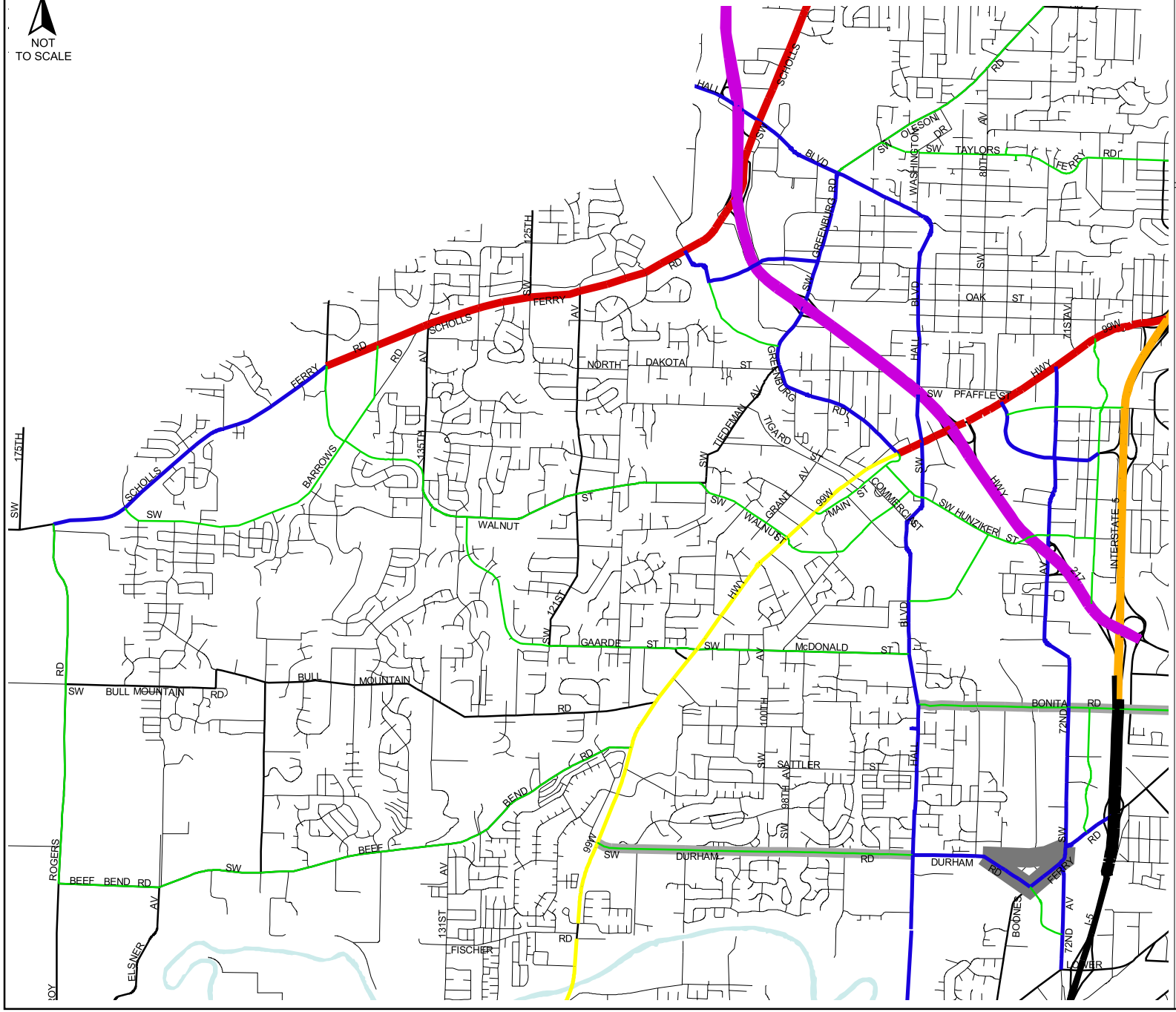

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

Planned Right of Way

- 8 Lanes
- Added Person Capacity Corridor*
- 7 Lanes
- 6 Lanes
- 5 Lanes
- 4/5 Lanes
- 2/3 Lanes
- SP**
- Corridor Alingment Study Area

* Assume eight lanes for setbacks

** Preserve ROW for 5 lanes in Future

Note: All Arterial/Arterial, Arterial/Collector and Collector/Collector intersections should plan for needed ROW for turn lanes within 500 feet of the intersection.

2/3 and 4/5:
Two or four lanes may be used for segments where environmental constraints limit roadway and access is controlled to eliminate left turn lane need.

Figure 8-11
Future Streets Where ROW is Planned for More Than Two Lanes

Connectivity/Local Street Plan

Much of the local street network in Tigard is already existing and, in many cases, fairly well connected. In other words, multiple access opportunities exist for entering or exiting neighborhoods. However, there are a number of locations in Tigard where, due to the lack of connection points, the majority of neighborhood traffic is funneled onto one single street. This type of street network results in out-of-direction travel for motorists and an imbalance of traffic volumes that impacts residential frontage. The outcome can result in the need for wider roads, traffic signals and turn lanes (all of which negatively impact traffic flow and degrade safety). By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility between various modes can be enhanced and traffic levels can be balanced out between various streets. Several goals and policies established by this TSP are intended to accomplish these objectives.

In Tigard, some of these local connections can contribute with other street improvements to mitigate capacity deficiencies by better dispersing traffic. Several roadway connections will be needed within neighborhood areas to reduce out of direction travel for vehicles, pedestrians and bicyclists. This is most important in the sub-areas to the west where a significant amount of new development is possible (i.e. Bull Mountain area). In many areas of Tigard, most of the land is built out. Figures 8-12 through 8-17 show the proposed Local Street Connectivity Plans for Tigard. In most cases, the connector alignments are not specific and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on neighborhood routes. The arrows shown in the figures represent potential connections and the general direction for the placement of the connection. In each case, the specific alignments and design will be better determined upon development review. The criteria used for providing connections is as follows[16]:

- Every 330 feet, a grid for pedestrians and bicycles
- Every 530 feet, a grid for automobiles

To protect existing neighborhoods from potential traffic impacts of extending stub end streets, connector roadways should incorporate neighborhood traffic management into their design and construction. Neighborhood traffic management is described later in this chapter. All stub streets should have signs indicating the potential for future connectivity.

The arrows shown on the local connectivity figures indicate priority connections only. Topography, railroads and environmental conditions limit the level of connectivity in Tigard. Other stub end streets in the City's road network may become cul-de-sacs, extended cul-de-sacs or provide local connections. Pedestrian connections from the end of any stub end street that results in a cul-de-sac should be considered mandatory as future development occurs. The goal would continue to be improved city connectivity for all modes of transportation.

[16] The Regional Transportation Plan calls for pedestrian/bicycle connectivity every 330 feet and motor vehicle connectivity every 530 feet for vacant areas of residential and mixed use zoning greater than five acres.

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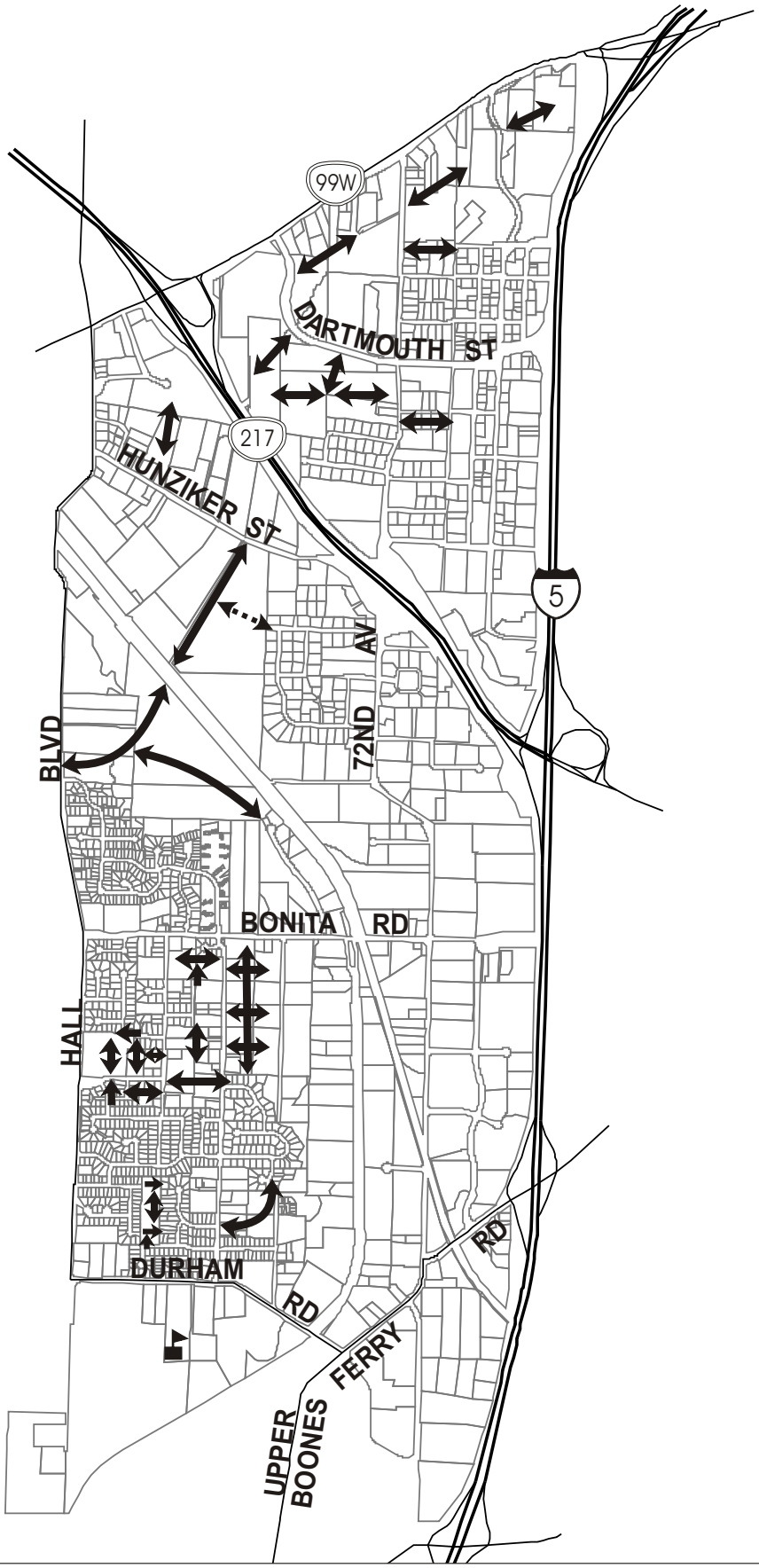
CITY OF TIGARD
Transportation System Plan



Legend
- Stub End Street
- Pedestrian Connection
- School Site

Figure 8-12
LOCAL STREET CONNECTIVITY
East Tigard

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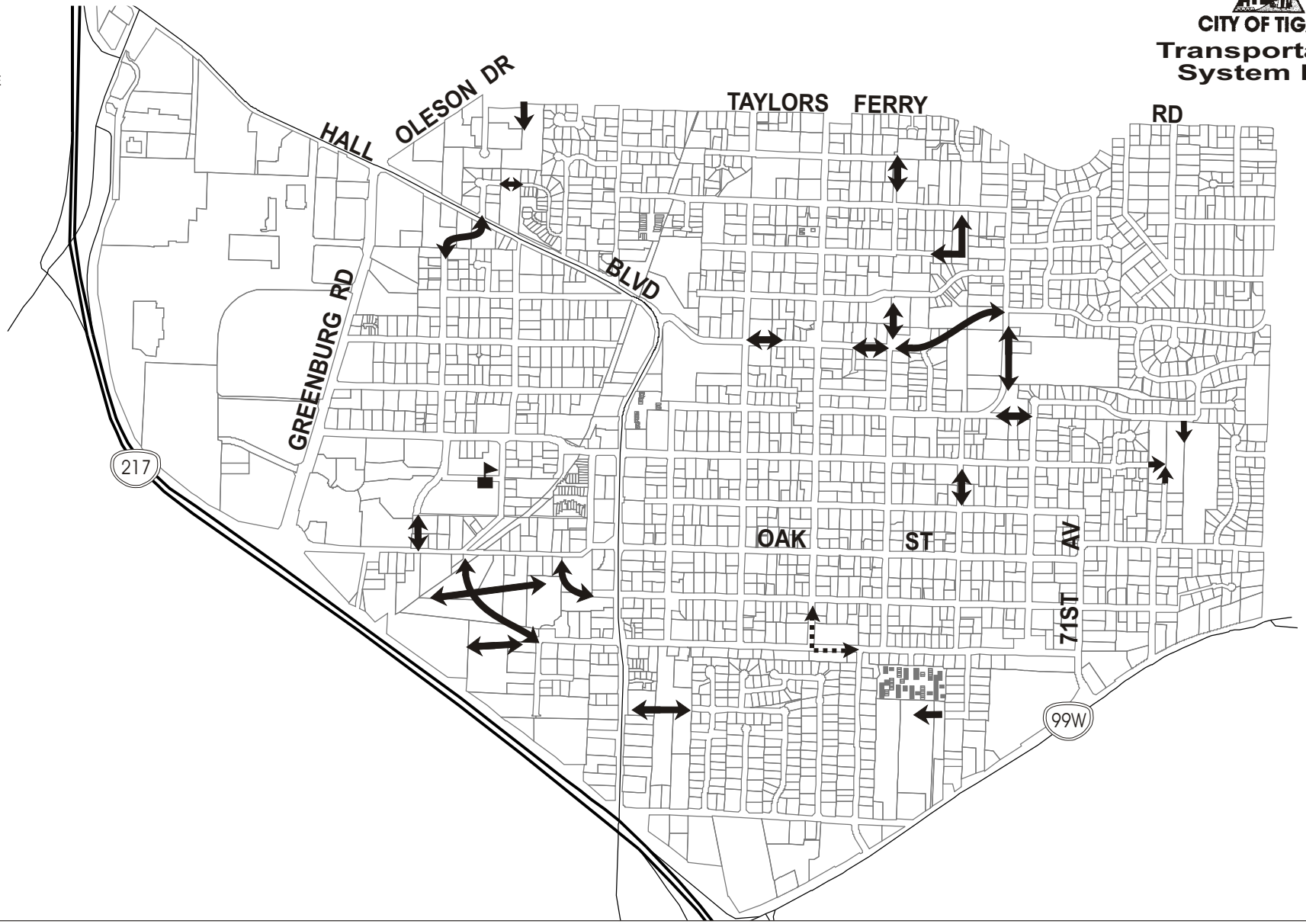
CITY OF TIGARD
Transportation System Plan



Legend
- Stub End Street
- Pedestrian Connection
- School Site

Figure 8-13
LOCAL STREET CONNECTIVITY
Metzger

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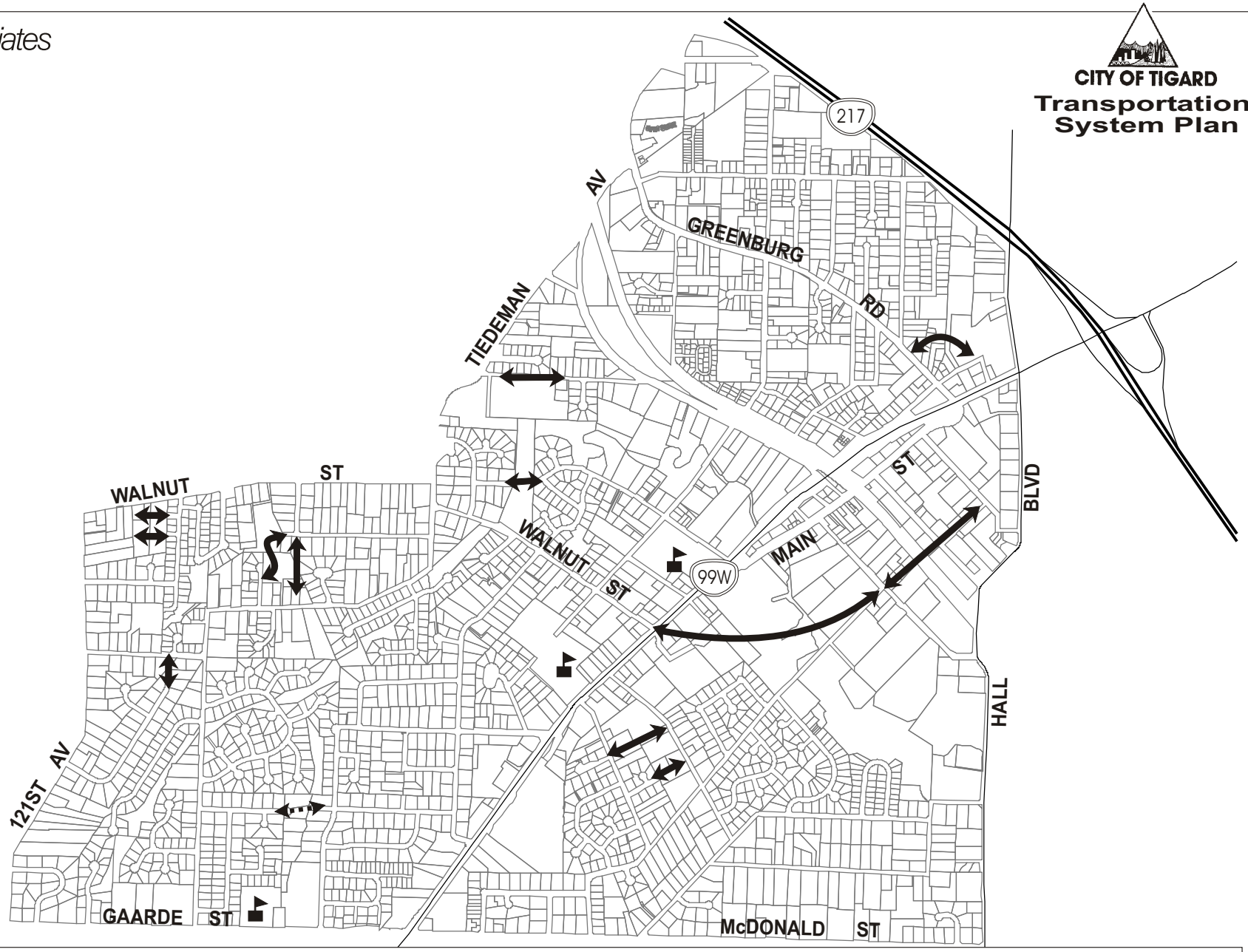
CITY OF TIGARD
Transportation System Plan



Legend
- Stub End Street
- Pedestrian Connection
- School Site

Figure 8-14
LOCAL STREET CONNECTIVITY
Central Tigard

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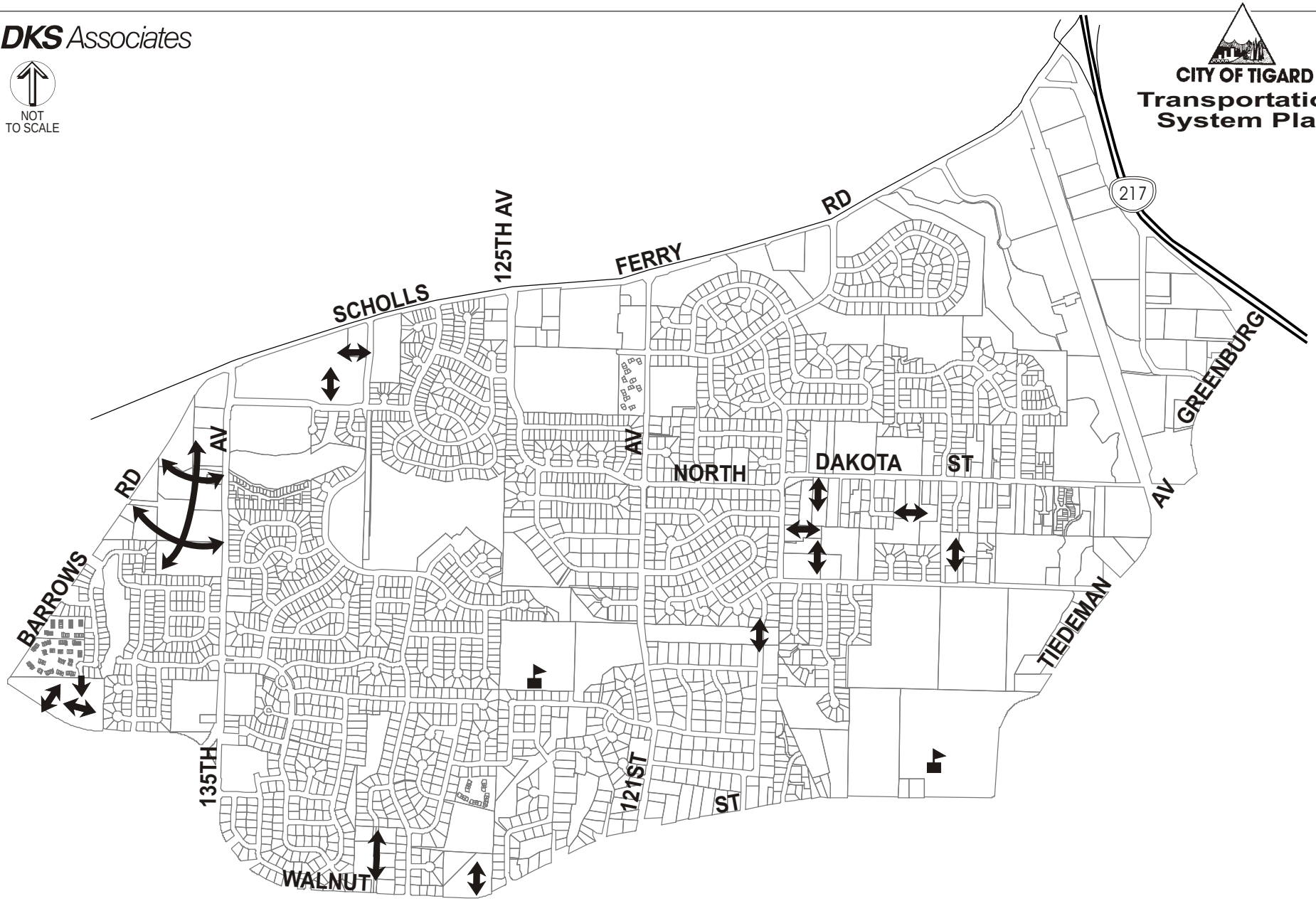
Transportation System Plan



Legend

- Stub End Street
- Pedestrian Connection
- School Site

Figure 8-15
LOCAL STREET CONNECTIVITY
North Dakota

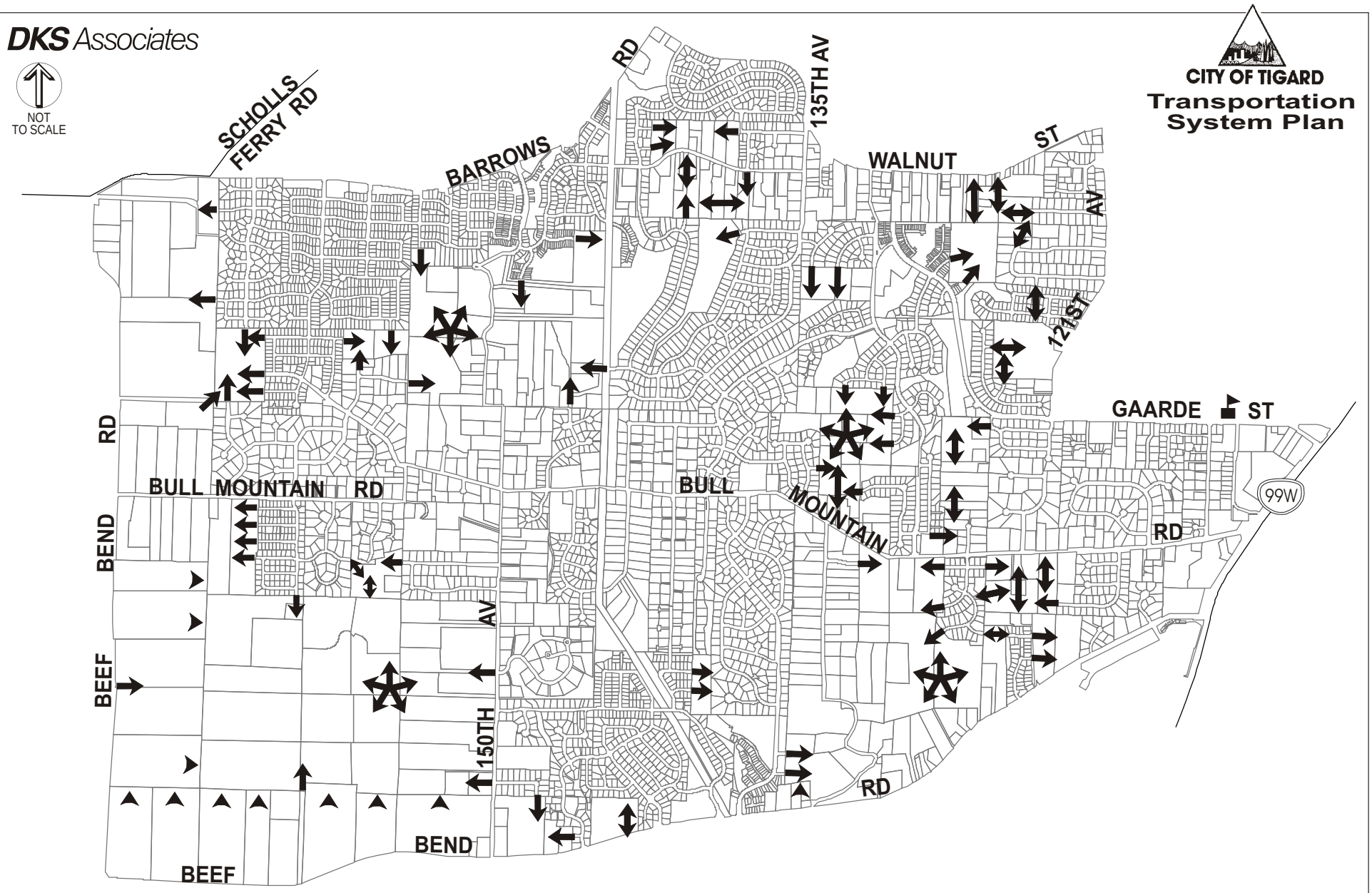


Figure 8-16
LOCAL STREET CONNECTIVITY
Southwest Tigard

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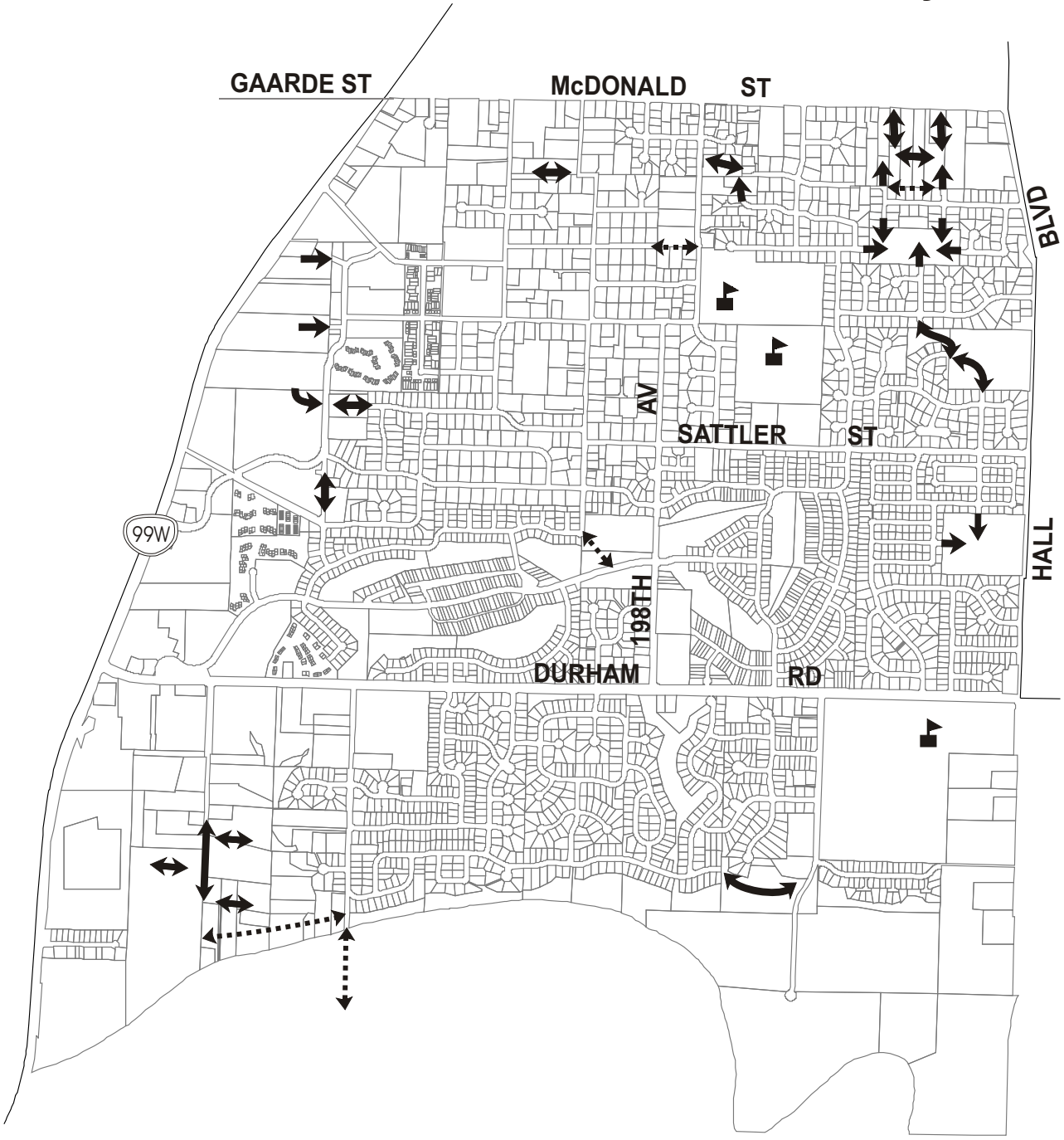
CITY OF TIGARD
Transportation System Plan



Legend
- Stub End Street
- Pedestrian Connection
- School Site

Figure 8-17
LOCAL STREET CONNECTIVITY
South Tigard

CIRCULATION AND CAPACITY NEEDS

The motor vehicle capacity and circulation needs in Tigard were determined for existing and future conditions. The process used for analysis is outlined below, followed by the findings and recommendations of the analysis. The extent and nature of the street improvements for Tigard are significant. This section outlines the type of street improvements that would be necessary as part of a long range master plan. Phasing of implementation will be necessary since all the improvements cannot be done at once. This will require prioritization of projects and periodic updating to reflect current needs. It should be understood that the improvements outlined in the following section are a guide to managing growth in Tigard, defining the types of right-of-way and street needs that will be required as development occurs.

Strategies

A series of strategies were developed to address the future motor vehicle needs of Tigard. Each of these strategies were discussed by the TSP Task Force and prioritized. The initial prioritization was reviewed and refined following discussion about the implications of the high priority strategies. The actual strategy selected is a prioritization of the highest priority strategies. The following listing reflects the initial prioritization of strategies.

- Promote Regional Circulation (I-5, ORE 217, ORE 99W)
- Improve Local Street Circulation (connectivity)
- Provide Additional Street System Capacity to LOS D[17] (turn lanes, signals, widening, new roads)
- Improve Operation of Existing System (signal coordination, intelligent transportation systems, neighborhood traffic management)
- Transportation Demand Management (telecommuting, alternative modes, pricing)
- Change Land Use to Promote Alternative Modes Use
- Improve Access Control to increase capacity
- Change Level of Service Definitions

Model Forecasts

Existing conditions were identified in Chapter 3. Future capacity needs were developed using a detailed travel demand forecast tool, based on the Metro regional travel demand model. This detailed model more accurately reflects access and land use in Tigard than the regional travel demand model. Evening peak hour traffic volumes were forecast for the future (modified year 2015 buildout) scenario for the Tigard area. This 2015 forecast included the highest level of transit service given regional funding constraints. It also assumes that Transportation Demand Management (TDM) will occur. The initial 2015 test was performed on a street network that included existing roads, plus those improvements which are currently funded and would likely be implemented before the 2015 scenario is reached. The most significant of these improvements in Tigard include the following:

[17] Level of service D as defined by the Highway Capacity Manaul.

- ORE 217 widened one additional lane each direction and the ORE 217/I-5 interchange improvements
- Gaarde Street linking from ORE 99W to Murray Boulevard
- Walnut Street improved to three lanes
- Dartmouth Street as five lanes from ORE 99W to I-5
- Hall Boulevard as a continuous three lane roadway with improvements at ORE 99W

The modified 2015 forecast for Tigard is unique in that it reflect greater land use in Tigard than the Metro 2015 forecast (reflective of a build out-like scenario). 2015 was used as a base rather than the 2020 because of the greater Tigard trip generation and detailed network included in the 2015 forecast. A separate 2020 forecast was done for a sensitivity analysis of recommended motor vehicle improvements to validate their need.

Future Needs

Future transportation conditions were evaluated in a similar manner to existing conditions. Improvements to intersections, roadways between intersections and brand new or extended facilities were considered and a package of recommended improvements was determined. Where level of service conditions approached level of service E or volume-to-capacity ratio of 0.90 or above, improvements were initially considered. The final conditions for mitigation were set at conditions below V/C of 1.0 and level of service E. Table 8-4 summarizes the intersection levels of service under year 2015 base future conditions and the recommended mitigated scenario.

In summary, nearly half of the study intersections fail in the future, even with funded roadway improvements. The extent of failure is so severe that it is unlikely that the land use scenario assumed for the modified 2015 forecast would be achieved with the extent of congestion. Because of this many alternatives were evaluated in developing the recommended set of mitigation measures for the TSP. The following sections explore the options and the findings for each alternative.

Table 8-4
2015 Intersection Level of Service
PM Peak Hour

Intersection	**2015 Base**	**2015 Mitigated**
Signalized Intersections (future)	*Delay LOS V/C*	
Davies/Scholls Ferry Road	>60.0 F >1.0	33.2 C 0.89
Barrows (E)/Scholls Ferry Road	11.1 B 0.73	15.3 B 0.93
North Dakota/125th/Scholls Ferry Road	>60.0 F >1.0	38.7 D 0.95
Nimbus/Scholls Ferry Road	>60.0 F >1.0	44.7 D 0.94
121st/Walnut	>60.0 F >1.0	33.0 C 0.87
Greenburg/Oleson/Hall	>60.0 F >1.0	46.8 D 0.91
Greenburg/Washington Square Road	>60.0 F >1.0	51.4 D 0.92
Greenburg/Locust	43.6 D 1.0	29.9 C 0.91
Hall/Locust	32.7 C 0.86	25.5 C 0.79
Greenburg/ORE 217 WB Ramps	27.8 C 0.74	29.3 C 0.65

Intersection	**2015 Base**	**2015 Mitigated**
Signalized Intersections (future)	*Delay LOS V/C*	
Greenburg/ORE 217 EB Ramps	29.1 C 0.72	23.4 C 0.58
Greenburg/Tiedeman	53.1 D >1.0	39.6 D 0.96
Main/Greenburg/ORE 99W	60.4 E 0.96	51.3 D 0.88
Hall/Oak	56.2 E >1.0	33.4 C 0.88
Hall/ORE 99W	>60.0 F >1.0	54.7 D 0.95
ORE 217 NB Ramps/ORE 99W	28.8 C 0.95	18.0 B 0.79
ORE 217 SB Ramps/ORE 99W	40.7 D 0.99	31.6 C 0.86
Main/Johnson/ORE 99W	23.1 C 0.80	16.4 B 0.75
Dartmouth/ORE 99W	>60.0 F >1.0	52.1 D 0.96
72nd/ORE 99W	41.7 D 0.88	53.8 D 0.92
68th/ORE 99W	>60.0 F >1.0	48.3 D 0.94
72nd/Dartmouth	>60.0 F >1.0	31.3 C 0.70
68th/Dartmouth	>60.0 F >1.0	21.4 C 0.72
72nd/Hampton	34.0 C 0.90	52.8 D 0.84
68th/Atlanta/Haines	29.9 D 0.92	16.5 B 0.61
Hall/Hunziker	>60.0 F >1.0	40.7 D 0.88
Hall/Burnham	19.6 B 0.75	21.0 C 0.65
ORE 217 SB Ramps/72nd/Varns	65.4 E 1.0	31.0 C 0.83
72nd/Bonita	>60.0 F >1.0	49.9 D 0.97
Hall/McDonald	47.0 D 0.99	36.1 D 0.93
Hall/Bonita	33.5 C 0.86	45.0 D 0.82
72nd/Carman	50.1 D 0.97	43.7 D 0.95
I-5 SB Ramps/Carman	>60.0 F >1.0	58.9 E 1.0
72nd/Upper Boones Ferry	51.4 D 1.0	49.8 D 0.97
72nd/Durham	20.6 C 0.75	9.0 A 0.50
I-5 NB Ramps/Carman	>60.0 F >1.0	47.1 D 0.91
Upper Boones Ferry/Durham	62.3 E >1.0	31.0 C 0.85
Upper Boones Ferry/Bridgeport	>60.0 E 1.0	31.9 C 0.79
Hall/Sattler/Ross	>60.0 F >1.0	27.4 C 0.85
Hall/Durham	>60.0 F >1.0	45.6 D 0.86
ORE 99W/Walnut	40.6 D 0.93	52.0 D 0.87
ORE 99W/Garrett	3.4 A 0.51	3.4 A 0.51
ORE 99W/Park	22.8 C 0.84	18.6 B 0.76
ORE 99W/Tigard Marketplace	18.5 B 0.57	18.5 B 0.57
ORE 99W/McDonald/Gaarde	>60.0 F >1.0	67.1 E 1.0
ORE 99W/Canterbury	16.9 B 0.83	15.4 B 0.76
ORE 99W/Bull Mountain	30.1 C 0.95	27.0 C 0.89
ORE 99W/Beef Bend	67.2 E >1.0	54.8 D 0.88
ORE 99W/Durham	>60.0 E >1.0	40.2 D 0.82
Tiedeman/Walnut	>60.0 F >1.0	24.0 C 0.90
Murray/Old Scholls Ferry	79.4 E >1.0	51.1 D 0.92
Barrows (W)/Scholls Ferry	8.7 B 0.73	9.1 B 0.70

Intersection	2015 Base	2015 Mitigated
Signalized Intersections (future)	*Delay LOS V/C*	
Beef Bend/Scholls Ferry	>60.0 F >1.0	40.2 D 0.96
Unsignalized Intersections		
Greenburg/Oak	A/C	A/C
Burnham/Main	A/C	A/E
97th Ave/McDonald	A/E	A/D
135th/Walnut		

Alternatives

To address these deficiencies, a series of alternatives and strategies were considered by the TSP Task Force. The range of strategies includes:

- **Do nothing:** This results in severe impacts to motor vehicle and transit circulation in Tigard with delays which would not be tolerable.

- **Assume that alternative modes can serve excess demand.** The TSP analysis assumed that alternative modes would be developed to their optimal levels. The order of magnitude of trips to be served in 2015 goes well beyond the capacity of the alternative mode systems by themselves, even at their optimal levels. Forecasted vehicle trips in the PM peak hour range from 40,000 to 50,000 in the future – transit would serve only about 3,000 to 5,000 person trips in Tigard.

- **Build all the road capacity necessary to achieve level of service D conditions at intersections.** This strategy would have significant impact on right-way-way for roads. Larger roads would be the result; that is contrary to the more livable, pedestrian friendly outcome expressed by the TSP Task Force.

- **Pragmatically add capacity to all modes, developing a balanced system.** Outline the long term configuration of streets to allow development to best accommodate future needs**.** The TSP Task Force chose to pursue this strategy. It involves significant system improvements, but is the only alternative that balances performance between modes, consistent with regional policy**.**

With the chosen strategy, there were numerous alternatives explored in developing the balanced system. Street improvements are required throughout Tigard in the next twenty years. Working with the top three priorities of the TSP Task Force, alternatives were considered in each of the following:

1. Regional Circulation Enhancements
2. Connectivity/Circulation Improvements within Tigard
3. Traffic Operational Improvements

Regional Circulation Enhancements

Through the travel forecasting efforts, tests were conducted of a variety of motor vehicle improvements. Within Tigard, the most significant changes in future traffic volume resulted from

improvements to regional highways. Because Tigard is located at the junction of two major urban freeways and is bifurcated by ORE 99W, its arterial street system (which is very limited – not a traditional grid) is impacted by the performance of these regional facilities. Today, incidents on I-5 or ORE 217 send traffic cascading through Tigard, snarling local circulation that has few options. Future solutions could focus on regional highways alone – however, this TSP takes an integrated approach to regional, city circulation and traffic operational improvements. Therefore, while the following regional improvements are substantial – they are part of an overall package of improvements needed to balance future circulation needs. The following four sections outline problems identified in the future forecasts and possible solutions for ORE 217, traffic between ORE 99W and I-5, I-5 and ORE 99W.

1. ORE 217 is Overcapacity. Many prior adopted plans have identified the need for additional capacity on ORE 217 (RTP, Western Bypass Study, Washington County Transportation Plan, Beaverton TSP). Recent studies by ODOT[18] indicate additional corridor capacity can accommodate 20 year demand and that various alternatives are possible (ranging from general purpose lanes to high occupancy vehicle lanes to high occupancy toll lanes to a transitway to off-system improvements). Further analysis in the ORE 217 Corridor Study will lead to a preferred alternative for this corridor. Tigard is substantially impacted by the lack of additional capacity on ORE 217 (routes such as Scholls Ferry Road, Hall Boulevard, ORE 99W, Greenburg Road and Walnut Street all will operate over capacity without ORE 217 improvements). An improvement to ORE 217 is critical to maintaining adequate circulation capacity in Tigard. However, the improvements to ORE 217 are of regional significance and the City should work together with other agencies to define the most appropriate corridor enhancement. ***For this TSP, a space holder project of widening ORE 217 by one lane each way is identified (similar to other approved plans noted above) until the Corridor Study gains consensus on the preferred ORE 217 alternative.***

2. Tigard continues to serve growing cut-through traffic on ORE 99W. Future forecasts for ORE 99W show it is well over capacity in future demand. A significant share of traffic is regional in nature and cuts through Tigard. This demand (Sherwood/Yamhill County/Oregon Coast) has limited other alternative routes. Prior studies in the Washington County Transportation Plan called for a Western Bypass connecting I-5 with ORE 99W and further to the north toward Hillsboro. This connection has been studied in the Western Bypass Corridor Study conducted by ODOT in the early 1990's. There are few alternatives to serving this regional traffic. Therefore tests were conducted of two regional options to determine their impact on Tigard streets. The first is a connection between I-5 and ORE 99W. ODOT continues to evaluate this connection. While helpful in reducing cut through traffic on ORE 99W in Tigard (a few hundred vehicles in the peak hour), its benefit to Tigard traffic operation is minimal. ORE 99W still fails with or without the I-5/ORE 99W connector. The greatest benefits of the I-5/ORE 99W connector are east-west streets in Tualatin. Even Durham Road benefits from the I-5/ORE 99W connector***. While by itself the benefits are not large in Tigard, the I-5/ORE 99W contributes to mitigating ORE 99W and should be supported by Tigard as a helpful regional improvement.***

The northern portion of the Western Bypass was also investigated as to its benefits to Tigard circulation. In testing this connection with the regional model, there was little if any benefit of

[18] ORE 217 Corridor Study Initial Improvement Concepts Draft, ODOT, February 2000.

northerly connections north of Scholls Ferry Road. While traffic is attracted to the new route, it creates significant impact on streets such as Scholls Ferry Road (creates balanced peak flows rather than directional flows resulting in capacity failures). Additionally, routes such as ORE 99W which are in the most need of benefits from such a facility sees less than 100 vehicles per hour benefit. ORE 99W gains as much mitigation benefit from an enhanced Beef Bend/Elsner Road arterial as it does from any "Western Bypass". ***Therefore, this analysis finds little or no operational benefit to Tigard from a Western Bypass.***

3. I-5 fails south of ORE 217 impacting Tigard streets at peak times. The modified 2015 travel forecasts show congestion on I-5 south from ORE 217 to I-205 and Wilsonville. The lack of capacity on I-5 results in diversion onto Tigard surface streets (and as with ORE 217, the limited circulation network breaks down). Without I-5 improvements, it is unlikely that the southeastern portion of Tigard will be without extensive congestion in peak periods. Unlike improvements to ORE 217 (which have been adopted in various plans) there is little regional recognition of the I-5 south corridor deficiencies and need for improvements. No amount of ramp metering or freeway management can avoid this deficiency. Based upon the modified 2015 forecasts, the addition of one lane each direction (including ramp braids between ORE 217 and Carman Drive, retaining auxiliary lanes from Carman Drive to Lake Oswego/Durham exit) is necessary to reduce impact of several hundred peak hour vehicles on Tigard surface streets. As with ORE 217, this improvement is of regional significance and Tigard should work with affected agencies in determining the most appropriate corridor improvements. There is a strong relationship between the ORE 217 needs and I-5 needs and any corridor improvement to one corridor should consider the other**. For this TSP, a space holder of additional person carrying capacity on I-5 south of ORE 217 to I-205 is identified until appropriate corridor studies can determine the preferred solution for both I-5 and ORE 217.**

4. ORE 99W fails in the future without improvement. Of all the regional transportation issues in Tigard, ORE 99W is probably the closest to a "rubik's cube". Tigard depends heavily on ORE 99W as its primary arterial. There are no parallel routes to ORE 99W and its diagonal alignment and the physical features of Tigard make using ORE 99W essential for also any trip in Tigard. ORE 99W's statewide status and linkage to Yamhill County and the Oregon Coast have similar issues – the only route servicing northeast-southwest travel. The future demand for this corridor is well beyond its five lane capacity without system-wide improvements. Ten various alternatives to improving ORE 99W were investigated, ranging from the no improvement to radical capacity improvements. Table 8-5 summarizes the wide range of alternatives. Unfortunately, no one improvement results in desirable (better than level of service F) operation. The most significant finding was that no matter whether ORE 99W was widened southwest of Greenburg Road, the end result was failure. Added capacity on ORE 99W (tested by modeling seven lanes) resulted in significantly higher turning movements on/off ORE 99W and large through movements on ORE 99W. The end result was that not only would you have to widen to seven lanes but at nearly every intersection additional turning lanes were needed (double lefts, right turn) creating nearly a 10 lane cross section at intersection. And even after that the end result was level of service F conditions. Therefore the recommended approach combines several elements to produce a minimally acceptable operating condition. ***The TSP recommends: 1) widening ORE 99W to seven lanes between I-5 and Greenburg Road; 2) retaining the five lane cross section southwest of Greenburg Road; 3) extensive intersection improvements – turning lanes; 4) access management; 5) improvements to ORE 217 and I-5 noted above; 6) off-system***

improvements such as freeway improvements and arterials such as Walnut extension; and 7) consideration of a western/Yamhill County commuter rail corridor.

Table 8-5
ORE 99W Alternatives Evaluation

Alternative	Key Elements	Findings
Retain ORE 99W as 5 lanes	No improvement	Level of Service F operation in 20 years; extensive congestion beyond existing levels
Widen to 7 lanes I-5 to Greenburg **Retain 5 lanes west of Greenburg**	Widening of ORE 99W in key segment between I-5 and ORE 217	Resolves many of the Tigard Triangle operational problems, requires off-system improvements and access management to work at Level of Service E, significant business impact
Widen ORE 99W to seven lanes	Complete corridor widening Requires extensive intersection improvement (multi-turn lane)	Attracts significant traffic from arterials that can be made to work in future – added ORE 99W traffic is nearly unmitigatable at intersections due to heavy through traffic and conflicts with turning vehicles – results in LOS F conditions after widening, substantial business impact
Retain 5 lane ORE 99W, use other regional routes to mitigate	Widening of ORE 217, I-5 and a new ORE 99W to I-5 Connector	Helps ORE 99W significantly (several hundred vph) but segment between I-5 and Greenburg (Tigard Triangle area) remains at LOS F
Retain 5 lane ORE 99W, widen Hall/McDonald/Bonita/Durham	Other Tigard arterials widened to five lanes to improve other arterials	Does not resolve Tigard Triangle area, major residential impacts of multiple arterial widening, other arterials can get by with three lanes
Build a viaduct above ORE 99W from I-5 to southwest of Durham	Provide ramps only at the ends and at ORE 217	Pulls substantial (30 to 60%) portion of traffic off ORE 99W, a few local intersections still operate poorly, very expensive (~$300,000,000)
Implement Access Management	Closes driveways, limits access points to 1,000 feet	Improves capacity 25-35%, substantial business impact, difficult to implement – could take 50 years to fully implement – minor capacity gain with phased or limited implementation – level of service is still a problem
Build a bypass around ORE 99W in Tigard	New roadway near Beef Bend/Elsner linking to Scholls Ferry Road and heading further north	Does not substantially reduce traffic on ORE 99W, LOS F remains
Fronting Roadways along ORE 99W	Build entirely new fronting roadway either adjacent to ORE 99W or behind fronting land uses	Substantial land use impact, traffic benefit is marginal on the whole but good benefits in selected locations, LOS still F, could consider better connectivity between I-5 and ORE 217
Commuter Rail to the west serving Sherwood, Newberg,	Would require large park and ride lots, could consider bus alternative	May be useful in twenty years to reduce ORE 99W potential demand by 400 to

Alternative	Key Elements	Findings
Yamhill County, Spirit Mountain and the coast	however, congestion on ORE 99W would result in slower operation	800 vehicles per hour – by itself not enough to mitigate problems on ORE 99W but helps reduce through traffic

Connectivity/Circulation Improvements in Tigard

Several alternative connections were explored throughout Tigard to address future deficiencies. While improvements were considered in many locations, there were four primary areas where future problems are significant:

- Washington Square Area
- Tigard Triangle Area
- Western Tigard capacacity
- East-West Circulation Capacity
    1. Durham Road area
    2. North of Durham

Washington Square Area. The Washington Square Regional Center Plan has recently been completed and will be adopted by City Council. It outlines many of the transportation alternatives for this area. There are three significant improvements that have been identified for the regional center area:

- **Overcrossings of ORE 217.** To relieve the over-capacity ORE 217 interchanges near Washington Square, two new overcrossings are identified for the next 20 years. The first is between Greenburg and Scholls Ferry Road, linking Washington Square Road over the top of ORE 217 connecting Locust with Nimbus Avenue. This overcrossing is highly effective in reducing traffic at ORE 217/Scholls Ferry Road (about 10,000 to 20,000 vehicles per day). The linkage to Nimbus is critical in mitigating problems at the Scholls Ferry interchange. ODOT has evaluated this overcrossing for its potential to serve drop-in ramps to any high occupancy toll lane scenario on ORE 217. The second overcrossing is an extension of the Washington Square Road near Scholls Ferry, over ORE 217 to access Cascade Avenue (potentially Nimbus Avenue also). This linkage may become necessary with the widening of ORE 217 and the close proximity of the Scholls Ferry/Cascade intersection to ORE 217. Widening of ORE 217 may require the closure of the Scholls Ferry/Cascade intersection and this new overcrossing would be a replacement to that lost access. The southern overcrossing should be viewed as the higher priority of the two overcrossings since it carries more traffic (the southerly crossing has 5,000 to 10,000 vehicles per day).

- **Scholls Ferry Road widened to seven lanes**. Future traffic in the regional center area results in level of service F conditions without additional lanes on Scholls Ferry Road. Even with new overcrossings, Scholls Ferry fails in 20

years. Because widening Scholls Ferry Road is a complex right-of-way task, the overcrossings of ORE 217 should be implemented first before full widening of Scholls Ferry Road. The timing of ORE 217 improvements will also affect the timing of the seven lane improvement. Based upon capacity analysis for the future years, the seven lane widening should extend to Barrows Road/Davies Road. Right of way for seven lanes should be preserved in this corridor to Murray Boulevard to address potential future Town Center and other future growth potential needs possibly within or outside the 20 year planning horizon. An alternative to be considered in this projects development would be a viaduct from ORE 217 west over the railroad tracks forming an expressway for approximately a half mile from Hall to west of Nimbus.

- **Greenburg Road widening**. The eastern face of Washington Square will require reevaluation of access to the center. Widening of Greenburg Road to two lanes each way north of Locust past the cemetery will require extensive right-of-way acquisition. The four lanes are needed to avoid level of service F conditions on Greenburg at Locust and Hall. The segment adjacent to the cemetery could be four lanes with no access and no left turn lanes to minimize right of way taking.

- **Other roadway connections**. Three other roadway connections were considered in the Washington Square area. Two were recommended in the Regional Center Plan. While these roadway connections have some benefit to capacity in the area, but these linkages are significant in improving circulation in the Washington Square area. The first connection is the extension of Nimbus Avenue south to Greenburg Road. This linkage attracts 9,000 to 15,000 vehicles per day (in the future with ramp metering). It is very helpful in reducing short trips on ORE 217 and minimizing impacts to streets such as 121st Avenue. Wetland and railroad constraints require further investigation as to the feasibility of this linkage. The second was a collector roadway linking Locust Street to Oak Street east of Greenburg Road. This linkage serves between 5,000 and 10,000 vehicles per day, reducing the burden of local trips on Greenburg Road. Both of these connections were recommended in the Washington Square Regional Center Plan. The third connection studied was a link from Pfaffle Street with Oak Street and Lincoln Street, paralleling ORE 217. This linkage was rejected in the Washington Square Regional Center Plan study. While helpful in relieving Hall Boulevard, the impacts were found to be greater than the benefits in that study. The outcome of not selecting this connector is that Hall Boulevard must have right-of-way set aside for a five lane roadway.

Tigard Triangle Area. This subarea is also subject of a recently adopted plan. The basic package of street improvements needed to mitigate level of service F conditions in this area include:

- ORE 99W seven lanes
- Dartmouth Street five lanes
- 72nd Avenue five lanes
- Atlanta Street extended from Haines Street to 72nd Avenue
- Backage roads to ORE 99W (providing access to business but not directly on ORE 99W)

- Reconstructed ORE 217/72nd Avenue interchange utilizing 68th Parkway for northbound ORE 217 access (closing the existing substandard northbound 72nd ramps).
- A Hunziker to Hamption overcrossing of ORE 217

Other options considered in this sub area included a Dartmouth to Hunziker overcrossing of ORE 217, an extension of Atlanta Street to Dartmouth Street and five lanes on ORE 99W. The following summarizes the findings of these options:

Dartmouth to Hunziker ORE 217 Overcrossing	Attracts less than 5,000 vehicles per day by itself; extend Walnut to link up with the overcrossing of ORE 217 and the volume increase to 8,000 per day. Implement complete ramp metering in the Tigard Triangle area (on ORE 217 and I-5) and the volume increases to 13,000 vehicles per day. Most of the traffic benefits of the overcrossing are produced with the Hunziker to Hampton overcrossing and the Dartmouth to Hunziker overcrossing has limited additional benefit. Unfortunately, ORE 99W still requires mitigation with or without overcrossing; access to ORE 217 would not be allowed by ODOT due to substandard spacing resulting in unsafe operation at large expense. One option where this overcrossing may be desirable in the future would be where ramp metering is fully operational and improvements to ORE 217 include a High Occupancy Toll (HOT) or High Occupancy Vehicle (HOV) lane alternative where direct connections to ORE 99W are desired. The Dartmouth to Hunziker overcrossing could provide access to the Tigard Triangle and ORE 99W area via drop in ramps. Therefore, a potential alignment should be preserved for future consideration (where the alignment would go through parking lots). However, the overcrossing is not part of the street improvement plan in the TSP.
Atlanta Extension to Dartmouth	While the Atlanta extension to 72nd is 10,000 to 15,000 vehicles per day the segment to the south connecting to Dartmouth is well below that level. Recent development has blocked an optimal alignment. Backage roads will be more effective in this setting. The TSP includes the Atlanta extension to 72nd and backage roads with redevelopment.
Five lane ORE 99W	Level of service F conditions result in Tigard Triangle without 7 lanes. This option would limit the potential of the Tigard Triangle to serve the projected land use in the future. There were no subarea alternatives that precluded the need for 7 lanes between I-5 and 217.

Western Tigard Capacity. Future growth in western Tigard results in the need for improved north-south and east-west capacity. Today most of the western Tigard land is vacant or under utilized. While Beef Bend Road serves this area adequately today, future land use growth will generate demand for over 10,000 vehicles per day. For Beef Bend to operate satisfactory in the future with two to three lanes, access must be limited to maximize the operating capacity of the only north/south and east/west linkage in the western end of Tigard. With 1,000 foot spacing the capacity of Beef Bend Road can be preserved at 1,200 to 1,500 vehicles per hour per lane. With current access spacing the capacity of Beef Bend Road would drop to 700 to 900 vehicles per hour per lane. Because of its rural stature today and under developed frontage, there is potential to avoid similar mistakes made on other arterial routes (such as ORE 99W or Greenburg Road) where frequent driveways rob the potential capacity of the roadway. Access from local streets not Beef Bend, consolidation of driveways and the use of medians should all be implemented on Beef Bend. Without this treatment, Bull Mountain

Road will carry the additional load and the lost capacity from frequent driveways will virtually require another new roadway to service the same traffic. Similar consideration should be given to 150th Avenue. Spacing of access points every 600 feet should be considered on 150th.

East-west Circulation Capacity. Future demand for east-west travel on Tigard's east side will result in level of service F conditions. Two options were evaluated to address this future deficiency. First widening Bonita and McDonald to five lanes was considered. Because Bonita does not connect to the I-5 freeway ramps (Carman does), there is limited benefit achieve by five laning the McDonald-Bonita corridor. Both Carman and Durham remain at LOS F. A second option was considered by widening Carman Drive at I-5 to five lanes and connecting it directly to Durham Road. This option eliminates the level of service F conditions and provided safer operation for the majority of vehicular traffic. The heavy traffic on Durham Road is prevalent from Carman Drive to Hall Boulevard. Traffic on Durham drops sharply west of Hall and can be handled by a three lane cross section. Right-of-way in the Durham corridor should be preserved for a five lane roadway, even though this TSP calls for three lanes west of Hall Boulevard. The impacts of the Carman to Durham option are less than the Bonita/McDonald option for the following reasons: 1) level of service is adequate with Carman/Durham and not with Bonita/McDonald resulting in unsafe operating conditions; 2) Carman/Durham accesses I-5; 3) even with three lanes Durham is carrying high traffic volume east of Hall (15,000 to 20,000 vehicle per day). The impacts of street improvements to Carman/Durham can be minimized through design (medians, landscaping). Other alternatives to serve future east-west demand are precluded due to the railroad , wetlands, river and being too far north or south to serve the projected demand.

Traffic Operational Improvements

A series of intersection improvements were identified which primarily add turning movement capacity. These roadway improvements typically consist of left and right turn lanes and/or traffic signals. Nine of the study intersections require significant improvements. Most of these intersection improvements are complementary to the regional improvements and connectivity enhancement noted above.

DKS Associates

NOT TO SCALE

CITY OF TIGARD

Transportation Systems Plan

Legend

- 32 - Intersection Improvement
- - Interchange Improvement
- - Street Improvement
- 22 - RTP Project List
- D - City of Tigard CIP
- ..... - Proposed Off Street Path

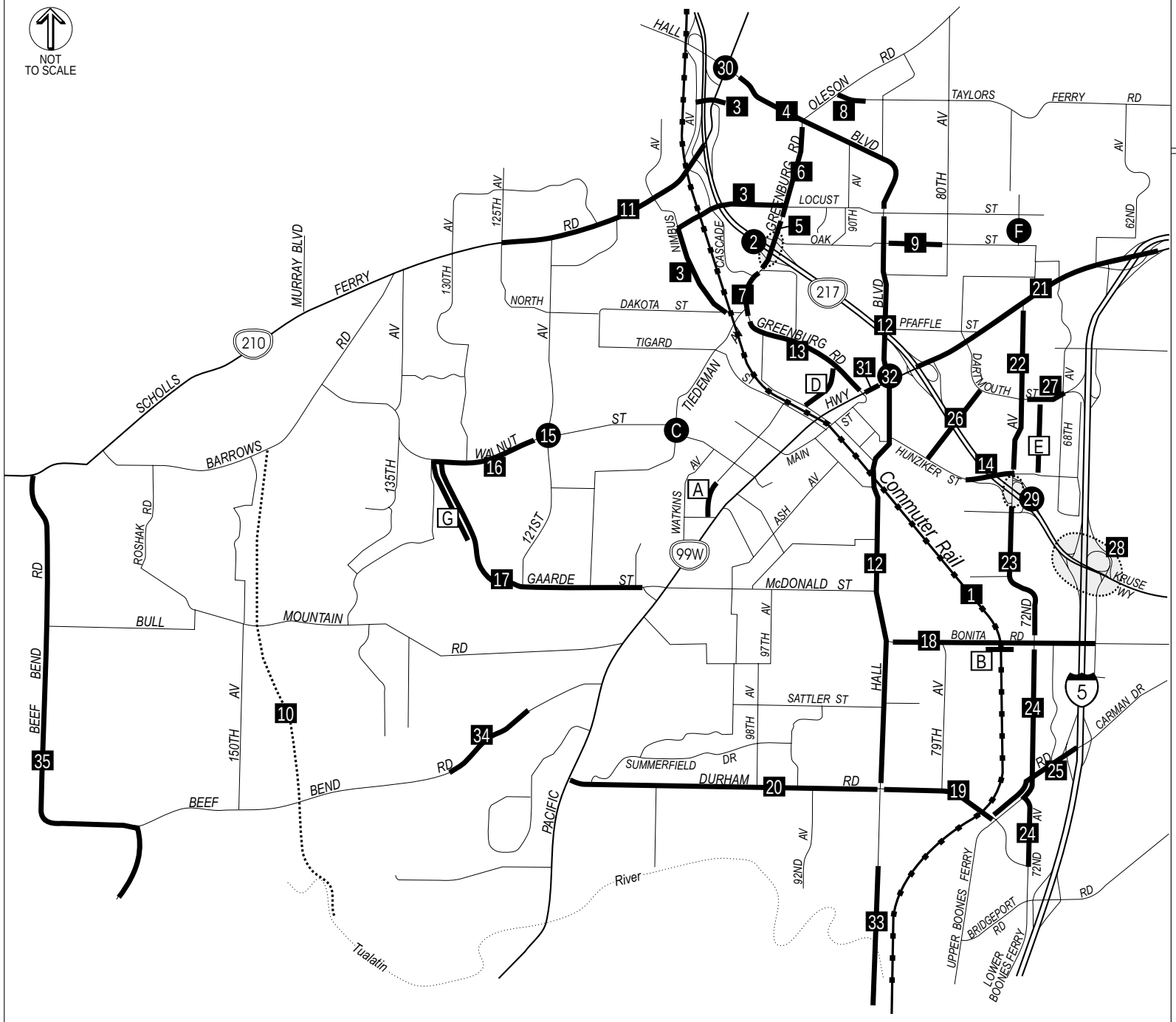


Figure 8-18
RTP AND CIP PLANNED IMPROVEMENTS

Table 8-6
Proposed 20 Year Metro and Planned CIP Projects

Table 8-6				
Project No.	**Project Name (Facility)**	**Project Location**	**Project Description**	**Estimated Project Cost**
Regional Transportation Plan, August 2000				
1	Beaverton-Wilsonville Commuter Rail	Wilsonville to Beaverton	Constructs peak-hour service only with 30-minute frequency	$75,000,000
2	Highway 217 Ramp Improvements - Greenburg	Greenburg Road and Highway 217	Widen Greenburg off-ramps; install ramp meter to Highway 217	$ 12,000,000
3	Highway 217 Overcrossings & Connections	Washington Square Area	Cascade Plaza to Washington Square OC Locust to Nimbus OC Nimbus to Greenburg connector	$25,000,000 $15,000,000 $15,000,000
4	Hall Boulevard Improvements	Scholls to Locust	Widen to 5 lanes with boulevard design	$ 4,700,000
5	Greenburg Road Improvements	WashingtonSquare Road to Shady Lane	Widen to 5 lanes with boulevard design; NB Highway 217 off-ramp improvement	$ 2,500,000
6	Greenburg Road Improvements, North	Hall Boulevard to Washington Square Road	Widen to five lanes with bikeways and sidewalks	$ 2,500,000
7	Greenburg Road Improvements, South	Shady Lane to N. Dakota	Widen to five lanes with bikeways and sidewalks	$ 2,000,000
8	Taylors Ferry Road Extension	Washington Drive to Oleson Road	Three lane extension with bikeway and sidewalks	$ 1,900,000
9	Oak Street Improvements	Hall Boulevard to 80th Avenue	Signal improvement, bikeway and sidewalks	$ 800,000
10	Powerline Trail Corridor	Farmington Road to Lower Tualatin Greenway	Plan, design and construct multi-use path	n/a
11	Scholls Ferry Road Improvements	Highway 217 to 125th Avenue	Widen to seven lanes with access management	$ 15,760,000
12	Hall Boulevard Improvements	Locust to Durham Road	Improve Hall Boulevard to 5 lanes	$ 4,700,000
13	Greenburg Road Improvements	Tiedeman Road to 99W	Widen to 5 lanes	$ 4,800,000
14	Highway 217 Overcrossing - Tigard	Hunziker Street to 72nd at Hampton	Construct new two-lane crossing of Highway 217	$ 4,000,000
15	Walnut Street Improvements, Phase 1	at 121st Avenue	Install traffic signal at 121st Avenue	$ 1,750,000
16	Walnut Street Improvements, Phase 3	Gaarde Street to 121st Avenue	Widen to three lanes with bikeways and sidewalks	$ 5,720,000
17	Gaarde Street Improvements	110th Avenue to Walnut Street	Widen to three lanes with bikeways and sidewalks	$ 4,000,000
18	Bonita Road Improvements	Hall Boulevard to Bangy Road	Widen to four lanes	$ 8,000,000
19	Durham Road Improvements	Upper Boones Ferry Road to Hall Boulevard	Widen to five lanes	$ 3,500,000

Table 8-6				
Project No.	**Project Name (Facility)**	**Project Location**	**Project Description**	**Estimated Project Cost**
20	Durham Road Improvements	Hall Boulevard to 99W	Widen to two lanes westbound, 1 lane eastbound, turn lane, bikeways and sidewalks	$ 5,000,000
21	99W Improvements	I-5 to Highway 217	Widen to seven lanes	$ 25,000,000
22	72nd Avenue Improvements	99W to Hunziker Road	Widen to five lanes	$ 3,000,000
23	72nd Avenue Improvements	Hunziker Road to Bonita Road	Widen to five lanes	$ 5,000,000
24	72nd Avenue Improvements	Bonita Road to Durham Road	Widen to five lanes with bikeways and sidewalks	$ 5,000,000
25	Upper Boones Ferry Road	I-5 to Durham Road	Widen to five lanes	$ 3,000,000
26	Dartmouth Street Extension	Dartmouth Road to Hunziker Road	Three lane extension; new Highway 217 overcrossing	$ 28,000,000
27	Dartmouth Street Improvements	72nd Avenue to 68th Avenue	Widen to four lanes with turn lanes	$ 500,000
28	I-5/ORE 217 Improvements	I-5/ORE 217 Interchange	Interchange Modernization Phases 2 & 3	$ 54,000,000
29	Highway 217/72nd Avenue Interchange Improvements	Highway 217 and 72nd Avenue	Complete interchange reconstruction with additional ramps and overcrossings	$ 15,000,000
30	Scholls Ferry Road Intersection Improvement	At Hall Boulevard	Add SB right turn lane from SB Hall Boulevard	$ 500,000
31	Highway 99W Bikeway	Hall Boulevard to Greenburg Road	Retrofit for bike lanes	$ 500,000
32	Highway 99W/Hall Boulevard Intersection Improvements	99W/Hall Boulevard	Add turn signals and modify signal	$ 3,700,000
33	Hall Boulevard Extension	Extension from Durham to Tualatin Road	Extend Hall Boulevard to connect across the Tualatin River	$ 25,000,000
34	Beef Bend Road	King Arthur to 131st	Widen to three lanes	$5,000,000
35	Beef Bend/Elsner	ORE 99W to Scholls Ferry	Widen to three lanes	$24,000,000
	Subtotal		**RTP Group**	**$410,830,000**
Tigard CIP Projects (FY 1999-2000 CIP, Includes Projects through 2001-2002)				
A	Grant Avenue Pedestrian Improvements	Park Street to School Street to Charles F. Tigard Elementary School	Provide a pedestrian path along Grant Avenue connecting the existing walkway to Charles F. Tigard Elementary School	$ 47,000

Table 8-6				
Project No.	**Project Name (Facility)**	**Project Location**	**Project Description**	**Estimated Project Cost**
B	Bonita Road Improvements (completed)	Railroad Tracks to Fanno Creek	Underground utilities, reconstruction of railroad crossings, street widening	$ 386,000
C	Walnut/Tiedeman Realignment (completed)	Walnut Street/Tiedeman Avenue	Intersection realignment and signalization	$1,300,000
D	Lincoln Street Improvements	Between Greenburg Road and Commercial Street	Construct half-street improvements, including sidewalks, curbs and streetlights	$ 190,000
E	69th Avenue LID	Between Hampton Street and Dartmouth Street, also includes Beveland Street from 68th Avenue to 70th Avenue	Construct 69th Avenue to ultimate section in compliance with Tigard Triangle Design Standards	$ 1,600,000
F	Mapleleaf/71st Avenue	from 72nd Avenue to Oak Street	Widens existing pavement on 71st Avenue and Mapleleaf Street to the standard width of a local street	$ 650,000
G	Gaarde Street Extension (completed)	Quail Hollow to Walnut	Construct street to ultimate section (Cost is for design & ROW only)	$ 50,000
	Subtotal		**City CIP Group**	**$ 4,223,000**
	Total			**$ 415,053,000**

Recommended Improvements

The improvements needed to mitigate modified 2015 future conditions combine both those identified in prior plans (Figure 8-18 and Table 8-6) and those determined as the outcome of the TSP transportation analysis. The improvements shown in Figure 8-18 are part of the updated RTP listing for the Tigard area which is in process of approval (planned summer 2000). Also shown on Table 8-6 is a listing of the City of Tigard Capital Improvement Program projects through 2002. Of all the improvements identified in the TSP analysis, only three projects were not included in the TSP improvements. Each of these three improvements may be necessary within or after the 20 year time frame of the TSP. The forecasts for the TSP did not indicate they were necessary with the modified 2015 forecast. Right-of-way should be preserved for each of these projects for future consideration.

- Bonita Road widening to four lanes from Hall to Bangy (preserve right-of-way)
- Durham Road widening west of Hall Boulevard (preserve right-of-way)
- Dartmouth to Hunziker overcrossing of ORE 217 (retain an alignment for future ORE 217 HOT/HOV options)

Of all the TSP recommended improvements most projects have been discussed for several years. There is one significant project (the extension of Walnut) that is different than prior plans. Circulation and capacity deficiencies along ORE 99W and Tigard Triangle required more than spot intersection improvements or roadway widening to mitigate future growth impacts. The ability to circulate in Tigard from northwest to east is severely limited except for ORE 99W. There are few options to accommodate additional circulation. One option was to realign Greenburg Road to Johnson Street. Another was to extend Walnut Street west of ORE 99W. The Greenberg Road realignment did little to improve capacity. The Walnut extension helped resolve problems in the ORE 99W area near Hall/Greenburg and in the Tigard Triangle area on ORE 99W. The specific alignment of this improvement would need to be detailed in project development. However, three alignments were initially investigated. First an alignment from ORE 99W/Walnut northeasterly over Fanno Creek to the Ash Street right-of-way running north to intersect with Scoffins/Hunziker. This allowed traffic to proceed on Hunziker east to Tigard Triangle over the recommended overcrossing to 72nd/Hampton. It would also serve as direct access to the proposed commuter rail station area. Other alignment options that should be explored would be connecting to Burnham/Hall and continuing northward to Hunziker to a likely location for the conceptual overcrossing of ORE 217 from Dartmouth (not part of this TSP – more than 20 years in the future). A third alignment would utilize City Hall right-of-way and align similar to the second option with Hunziker. More detailed study of the alignment will be part of the future project development.

A key issue in determining need was the level of service calculation. The 1997 Highway Capacity Methodology for the peak hour was utilized. ODOT and Metro have recently adopted two hour level of service. To approximate this measure, the volume-to-capacity ratios in Table 8-4 can be multiplied by a ratio of the average of the two hour volume divided by the peak hour volume. This ratio ranges from 0.93 to 0.97 at intersections in Tigard in 1999. Very few improvements would change under this assessment of capacity. Nearly all the improvements needed in the peak hour would also be necessary in the two hour.

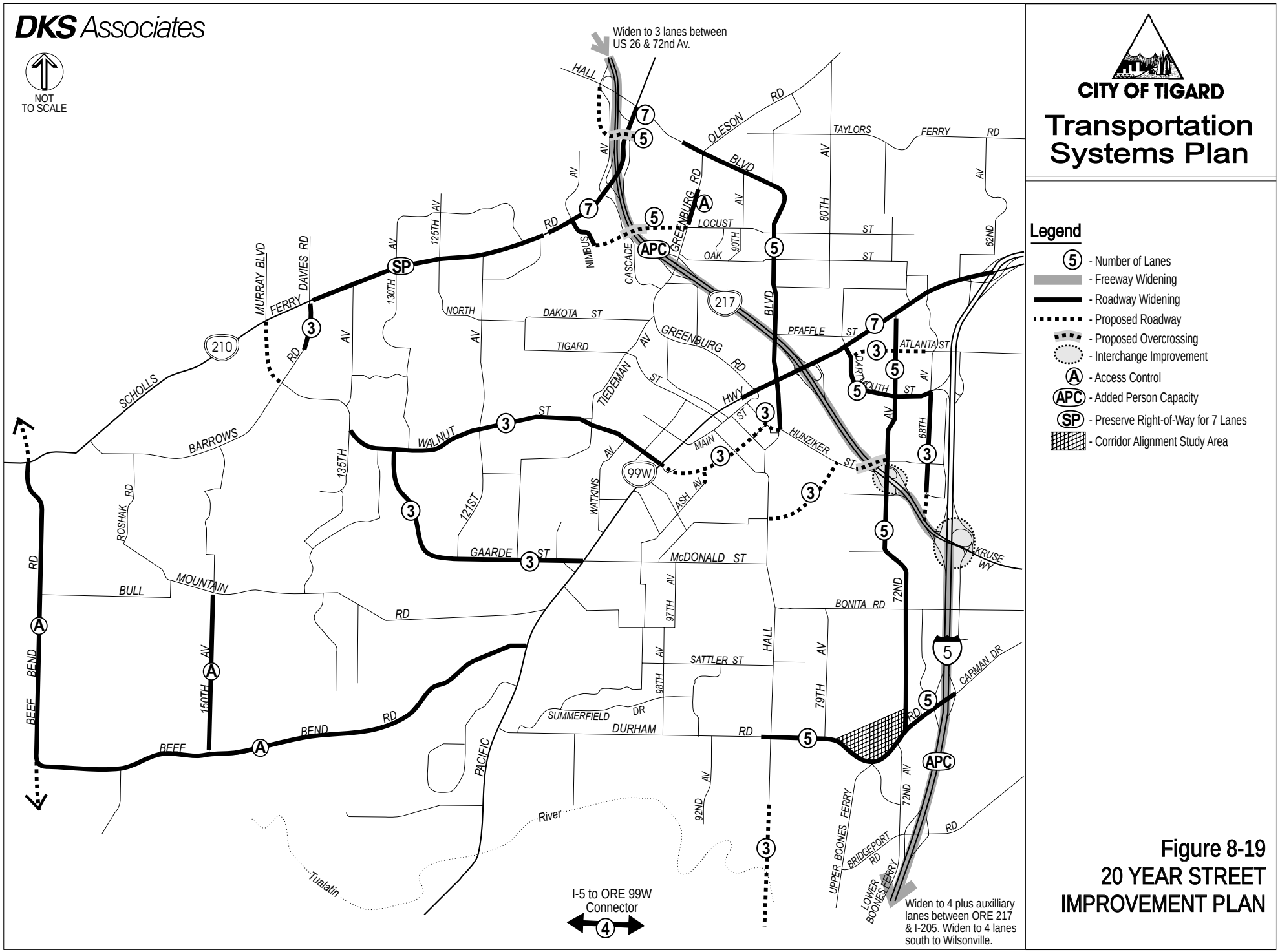
The recommended TSP motor vehicle improvements are summarized in Table 8-7 and Figure 8-19. Several spot improvements were also identified at various intersection in Tigard and they are summarized in Figure 8-20 and Table 8-8. Prioritization should occur in coordination with the CIP Figure 8-18 Street Improvement Plan process. All improvements on arterials and collectors shall include sidewalks, bike lanes and transit facilities. These improvement lists should be used as a starting point for inclusion in regional funding programs for streets.

Table 8-7
Future Street Improvements
(All Projects include sidewalks, bicycle lanes and transit accommodations as required)

Location	Description	Funding Status*
I-5	Widen to 4 plus auxiliary lanes (each direction) between ORE 217 and I-205/Wilsonville Widen to 4 lanes (each direction) south to Wilsonville	Not Funded Not in any plan
ORE 217	Widen to 3 lanes plus auxiliary lanes (each direction) between US 26 and 72nd Avenue New ORE 217/I-5 interchange between 72nd Avenue and Bangy Road	Not Funded In RTP (as widening or HOV or HOT) Phase I Funded Phase II in RTP
ORE 99W	Widen to 7 lanes (total—both directions) between I-5 and Greenburg Road	In RTP
I-5 to ORE 99W Connector	Connector linking I-5 and ORE 99W (model assumed connector would be located north of Sherwood—specific location to be determined by further study)	In RTP
Overcrossings over ORE 217	5 lane overcrossings linking Washington Square and Cascade Avenue—one north of Scholls Ferry Road, one south of Scholls Ferry Road to Nimbus. The Washington Square Regional Center study also identifies linking Nimbus to Greenburg.	Not Funded (identified in Washington Square Regional Center Study & RTP)
Overcrossing of I-5	Widen Carman Drive interchange overcrossing to six lanes from four (two through lanes each way, side by side left turn lanes).	Not Funded In no Plans
Scholls Ferry Road	Widen to 7 lanes (total—both directions) between ORE 217 and Barrows Road (East). Preserve right-of-way for seven lanes to Murray Boulevard for future corridor needs.	Not Funded (widening to 125th identified in Wa.Co, Beaverton TSP & RTP)
Greenburg Road	Widen to 4 lanes adjacent to cemetary	Not funded In Wa.Co. Plan
Walnut Boulevard	Widen to 3 lanes (total—both directions) between 135th (or where Gaarde connects) to ORE 99W Extend Walnut east of ORE 99W to meet Hall Boulevard and Hunziker Street (3 lanes—total, both directions)	In RTP MSTIP for parts Not Funded In no plans
Gaarde Street	Widen to 3 lanes west of 121st to ORE 99W Use access control and 2 lanes in sensitive areas	In RTP

Location	Description	Funding Status*
Hall Boulevard	Extend south to Tualatin (3 lanes—total, both directions)	In RTP
Durham Road	Widen to 5 lanes (total, both directions) between Hall Boulevard and Upper Boones Ferry Road. Reserve right-of-way to the west for 5 lanes	In RTP
Durham Road/Upper Boones Ferry Road intersection	Realign intersection so that Durham Road continues on continous route to I-5/Carmen interchange—Upper Boones Ferry Road would "tee" into Durham Road/Upper Boones Ferry Road intersection	Not Funded In no plans
72nd Avenue	Widen to 5 lanes (total, both directions) between ORE 99W and south city limit at Upper Boones Ferry Road/Carman Drive/Durham Road	In RTP (could be partially funded by development in Tigard Triangle—ie. LID)
Hunziker/Hampton	Realign Hunziker Road to meet Hampton Road at 72nd Avenue—requires overcrossing over ORE 217—removes existing 72nd Avenue/Hunziker intersection	In RTP
Atlanta Street	Extend Atlanta Street west to meet 72nd Avenue	To be funded with development in Tigard Triangle (i.e. LID)
Dartmouth Street	Widen to five lanes from ORE 99W to I-5	In RTP, To be funded by fronting improvements
68th Avenue	Widen to 3-lanes between Dartmouth/I-5 Ramps and ORE 217 Extend 68th Avenue south to meet ORE 217 providing right-in/right-out only access to 68th Avenue from ORE 217, replacing the NB ramps to 72nd at ORE 217	Not Funded (could be partially funded by development in Tigard Triangle—ie. LID)
Scoffins/Hunziker/Hall intersection	Realign Scoffins to meet Hunziker at Hall	Not Funded
Hall Boulevard	Widen to 5 lanes between Washington Green and ORE 99W	In RTP
Beef Bend Road	Access Control should be implemented to preserve capacity with 2 lanes (with intersection turn lanes). Minimum 1,000 foot spacing should be used between any driveway(s) and/or public street(s) Widen from King Aruther to 131st to 3-lanes Widen Beef Bend/Elsner Road to 3-lanes from ORE 99W to Scholls Ferry Road	Not Funded Implemented with adjacent development In RTP MSTIP In RTP MSTIP

* - Refers to inclusion in prior plans such as Regional Transportation Plan (RTP), Major Streets Transportation Improvement Program (MSTIP), Washington County Transportation Plan, Beaverton TSP or other subarea plan. The RTP anticipates funding for projects within the plan in a 20 year horizon.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CITY OF TIGARD
Transportation Systems Plan
Legend
5 - Number of Lanes
- Freeway Widening
- Roadway Widening
- Proposed Roadway
- Proposed Overcrossing
- Interchange Improvement
A - Access Control
APC - Added Person Capacity
SP - Preserve Right-of-Way for 7 Lanes
- Corridor Alignment Study Area
Widen to 3 lanes between US 26 & 72nd Av.
I-5 to ORE 99W Connector
Widen to 4 plus auxilliary lanes between ORE 217 & I-205. Widen to 4 lanes south to Wilsonville.
HALL
OLESON RD
TAYLORS FERRY RD
BLVD
GREENBURG RD
LOCUST ST
OAK ST
NIMBUS
CASCADE
APC
SP
MURRAY BLVD
DAVIES RD
FERRY RD
NORTH DAKOTA ST
TIGARD
GREENBURG RD
217
PFAFFLE ST
ATLANTA ST
CLAYDON ST
210
SCHOLLS FERRY RD
BARROWS RD
WALNUT ST
TIEDEMAN AV
HWY 99W
MAIN ST
HUNZIKER ST
ROSHAK RD
135TH AV
121ST AV
WATKINS AV
ASH AV
GAARDE ST
McDONALD ST
KRUSE WY
BULL MOUNTAIN RD
97TH AV
BONITA RD
72ND AV
SATTLER ST
HALL BLVD
98TH AV
79TH AV
CARMAN DR
SUMMERFIELD DR
DURHAM RD
BEEF BEND RD
150TH AV
PACIFIC HWY
92ND AV
Tualatin River
UPPER BOONES FERRY RD
BRIDGEPORT RD
LOWER BOONES FERRY RD
Figure 8-19
20 YEAR STREET IMPROVEMENT PLAN

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Transportation Systems Plan

Legend

00 - Intersection Improvement Location/Number

(S) - SPIS Safety Improvement Location

Note - Safety Improvements would also be done at same time intersection improvements are undertaken.

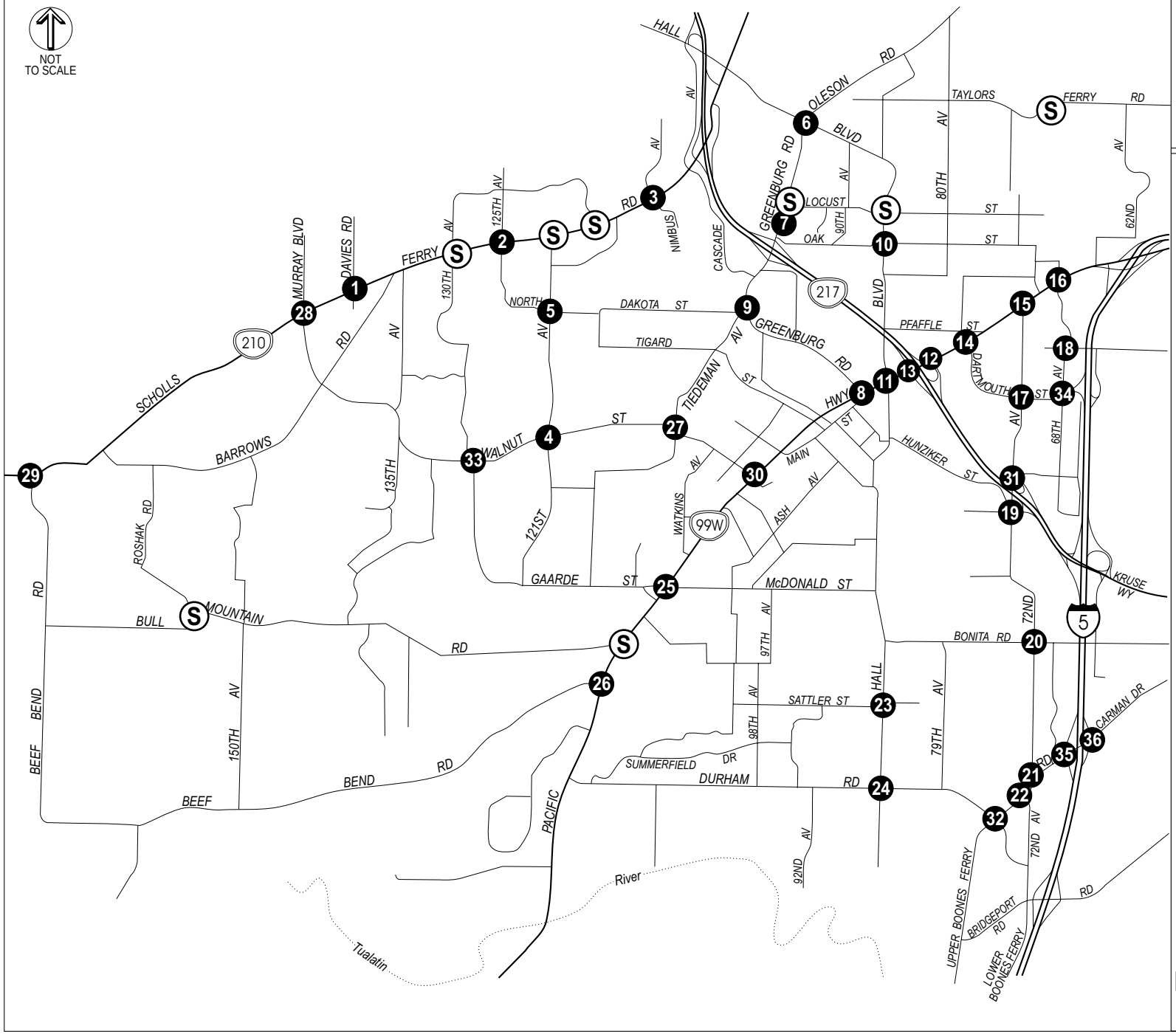

Figure 8-20
INTERSECTION IMPROVEMENT LOCATIONS

Table 8-8
City of Tigard Future Intersection Improvements

Table 8-8: Future Intersection Improvements		
No.	**Intersection**	**Description**
1	Davies/Scholls Ferry Road	• Traffic signal • Northbound right turn lane • Realign to meet Barrows Road, close Barrow to local traffic
2	North Dakota/125th/Scholls Ferry Road	• Southbound right turn lane • Retain westbound right turn lane when 3rd lane added on Scholls Ferry Road • Change from protected left turn phasing to permitted phasing north/south
3	Nimbus/Scholls Ferry Road	• Retain eastbound right turn lane when 3rd lane added on Scholls Ferry Road • Retain westbound right turn lane when 3rd lane added on Scholls Ferry Road • Southbound right turn lane • Reconfigure northbound and southbound lanes to create exclusive left turn lanes • Change from split phasing to protected left turn phasing north/south
4	121st/Walnut	• Traffic signal • Northbound left turn lane • Southbound left turn lane • Eastbound left turn lane • Westbound left turn lane
5	121st/North Dakota	• Traffic signal
6	Greenburg/Oleson/Hall	• 2nd northbound left turn lane • Extend signal cycle length • Assumes Hall widened to 5 lanes
7	Greenburg/Washington Square Road	• Southbound right turn lane • Overlap eastbound right turn • Extend signal cycle length
8	Main/Greenburg/ORE 99W	• Southbound left turn lane • Retain westbound right turn lane when ORE 99W widened to 7 lanes
9	Greenburg/Tiedeman	• Extend signal cycle length • Improved geometry/alignment
10	Hall/Oak	• Extend signal cycle length • Assumes Hall widened to 5 lanes
11	Hall/ORE 99W	• Southbound right turn lane • Northbound left turn lane • Westbound right turn overlap • Retain westbound right turn lane when ORE 99W widened to 7 lanes
12	ORE 217 NB Ramps/ORE 99W	• Retain eastbound right turn lane when ORE 99W widened to

Table 8-8: Future Intersection Improvements

No.	Intersection	Description
		7 lanes • Retain westbound right turn lane when ORE 99W widened to 7 lanes • 2nd northbound left turn lane
13	ORE 217 SB Ramps/ORE 99W	• 2nd southbound right turn lane • Retain eastbound right turn lane when ORE 99W widened to 7 lanes
14	Dartmouth/ORE 99W	• Retain eastbound right turn lane when ORE 99W widened to 7 lanes
15	72nd/ORE 99W	• Southbound right turn lane • Northbound right turn overlap • Change to protected left turn phasing north/south • Retain eastbound right turn lane when ORE 99W widened to 7 lanes
16	68th/ORE 99W	• 2nd westbound left turn lane • Northbound left turn lane • Southbound left turn lane • Change to protected left turn phasing north/south
17	72nd/Dartmouth	• Traffic signal • Assumes 72nd Avenue and Dartmouth widened to 5 lanes
18	68th/Atlanta/Haines	• Traffic signal
19	ORE 217 SB Ramps/72nd	• Assumes 72nd Avenue widened to 5 lanes
20	72nd/Bonita	• Assumes 72nd Avenue widened to 5 lanes
21	72nd/Carmen	• 2nd northbound right turn lane
22	72nd/Upper Boones Ferry Road	• Assumes Durham/Upper Boones Ferry/72nd widened to 5 lanes
23	Hall/Sattler/Ross	• Traffic signal • Northbound left turn lane • Southbound left turn lane
24	Hall/Durham	• 2nd southbound left turn lane • Widen west of intersection to introduce 5-lane section on Durham (include existing westbound right turn lane)
25	ORE 99W/McDonald/Gaarde	• Westbound right turn lane • 2nd Northbound left turn lane
26	ORE 99W/Beef Bend	• Southbound right turn lane (on ORE 99W) • Adjust cycle length
27	Tiedeman/Walnut	• Completed • Southbound left turn lane • Eastbound left turn lane • Westbound left turn lane
28	Murray/Scholls Ferry Road	• 2nd westbound right turn lane

Table 8-8: Future Intersection Improvements		
No.	**Intersection**	**Description**
		• Add additional southbound lane to achieve 2 southbound left turn lanes and two southbound through lanes • Extend signal cycle length • Changes to protected left turn phasing north/south and east/west
29	Beef Bend/Scholls Ferry Road	• Eastbound right turn lane • Northbound left turn lane • Eastbound right turn overlap • Change to protected phasing east/west • Change to split phasing north/south
30	Walnut/ORE 99W	• Retain westbound right turn lane when ORE 99W is widened to 7 lanes • Change to protected left turn phasing on Walnut
31	72nd/Hampton/Hunziker	• Southbound right turn lane OR eastbound right turn lane • Change to protected left turn phasing all directions
32	Durham/Upper Boones Ferry Road	• Reconfigure intersection to make through route between Durham and I-5/Carmen interchange
33	Gaarde/Walnut	• Traffic signal • Eastbound right turn lane
34	68th/Dartmouth	• Traffic signal
35	Carman/I-5 southbound	• Eastbound right turn lane
36	Carman/1-5 northbound	• 2nd westbound through lane • 2nd northbound left turn lane • Eastbound separate through and left turn (2) lanes
	Intersection Safety Enhancements	Evaluate improvements to reduce collisions at high SPIS intersections (refer to 1997-99 intersection list in Chapter 3)
	Pedestrian Crossing Evaluation/Signals	Study and determine appropriate locations for Pedestrian Crossing Signals

Traffic Signal Guidelines

Traffic signal warrant analyses were performed for all unsignalized study intersections operating at LOS E or worse under future base (2015) conditions (Table 8-9). Traffic signal warrants were based on the *Manual on Uniform Traffic Control Device*'s (MUTCD) Warrant 11 (Peak Hour Volume).[19]
To guide future implementation of traffic signals to locations which have the maximum public benefit by serving arterial/collector/neighborhood routes, a framework master plan of traffic signal locations was developed (Figure 8-21). The intent of this plan is to outline potential locations where future traffic

[19] *Manual on Uniform Traffic Control Devices for Streets and Highways*, Federal Highway Administration, 1988 Edition.

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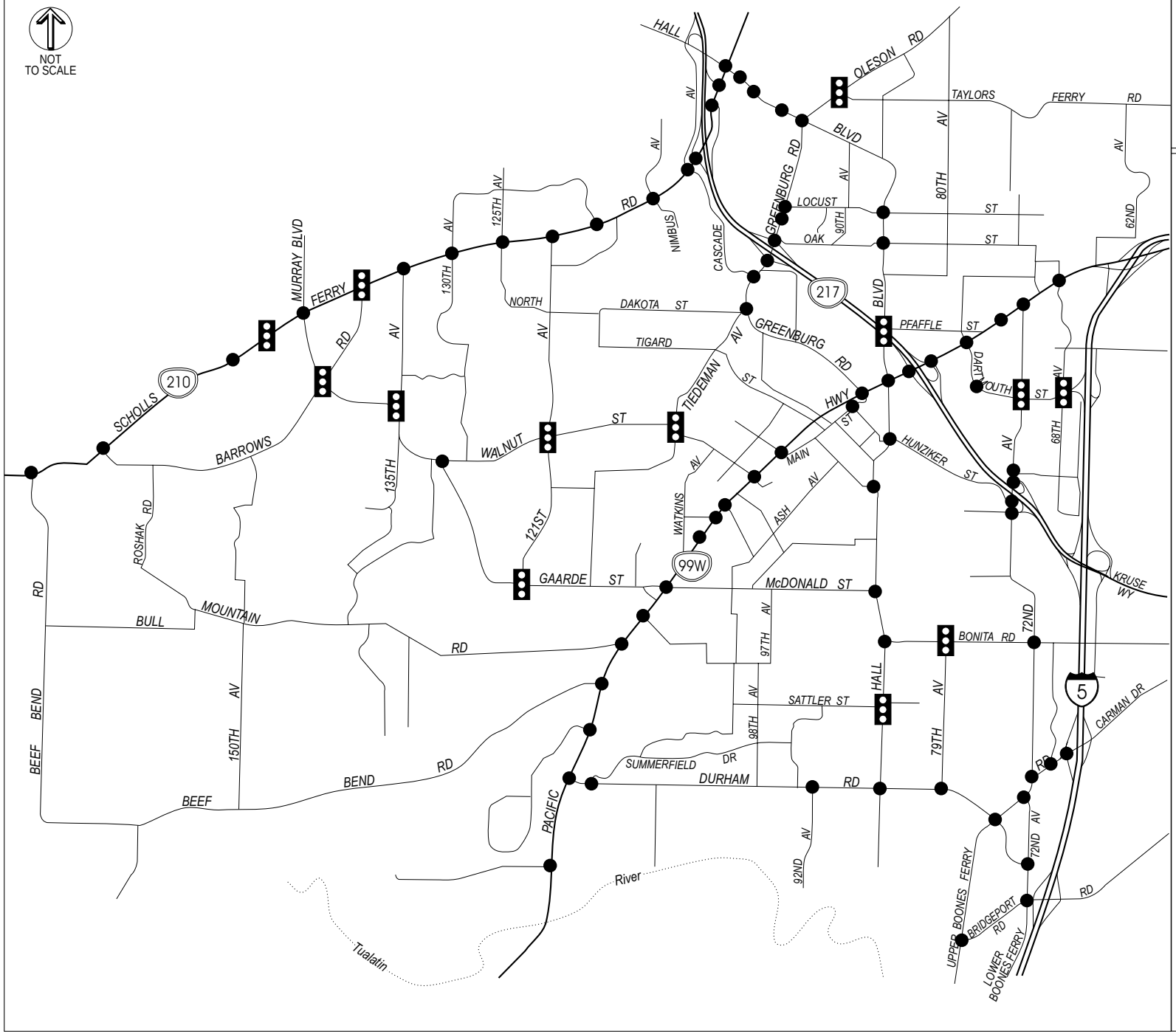

CITY OF TIGARD

Transportation Systems Plan

Legend

- ● - Existing Signalized Intersection
- ▮ - Potential Future Traffic Signal

Note: Signals may be needed at other sites if warranted. This map shows those locations that are most likely to be signalized consistent with TSP objectives.

Figure 8-21
TRAFFIC SIGNAL MASTER PLAN

signals would be placed to avoid conflicts with other development site oriented signal placement. To maintain the best opportunity for efficient traffic signal coordination on arterials, spacing of up to 1,000 feet should be considered. No traffic signal should be installed unless it meets *Manual of Uniform Traffic Control Devices* warrants. Three key traffic signal issues are outlined in this TSP as part of the transportation policy of Tigard:

- Establishing a traffic signal spacing standard of 1,000 feet and a traffic signal master plan to guide future traffic signal placements. When this standard is not met, additional evaluation should be prepared to assure signal progression can be efficiently maintained;
- Traffic signals disrupt traffic flow. Their placement is important for neighborhood access, pedestrian access and traffic control. To not utilize the limited placements of traffic signals to serve private land holdings will limit the potential for use that will generally benefit the public, neighborhoods and pedestrian access. Limiting placement of traffic signals to locations that are public streets would minimize or eliminate the potential for traffic signals solely serving private access.
- ODOT signal design and signal phasing guidelines should be followed for all traffic signal installations.

Table 8-9
Traffic Signal Warrants
MUTCD Peak Hour Volume Warrant

Intersection	Warrant Met?
72nd/Dartmouth	Yes
68th/Dartmouth	Yes
Gaarde/121st	Yes
Gaarde/Walnut	Yes
Walnut/121st	Yes
Walnut/Tiedeman	Yes
Sattler/Hall	Yes
Bonita/79th	Yes

SAFETY

Needs

Accident data was obtained for the City of Tigard from Washington County. Chapter 3 provides detailed data regarding motor vehicle accidents in Tigard. Several strategies are suggested for improving safety in the City of Tigard. These strategies aimed at providing the City with priorities that meet the goals and policies of the City.

- Work with other agencies such as Washington County and ODOT to help prioritize and fund safety programs - coordinated approach
- Develop a citywide safety priority system which identifies high accident locations, ranks the locations and identifies safety mitigation measures
- Address safety issues on an as needed basis

Suggested Improvements

Most of these high accident locations are included in future street improvements listed in Tables 8-6 and 8-7. The only two intersection not being improved are the two on Locust Street (at 72nd and 80th). Accident numbers over three years at these all-way stop sign controlled intersections are very low (3-4 in 3 years). Beyond maintenance, signing and lighting there is little else necessary at these two locations. In the short term, specific action plans should be prepared to address whether beneficial improvements at these locations can be made without affecting future plans.

A future issue with regard to safety involves the decision to go to three lanes from two lanes or five lanes from four lanes. National research has clearly demonstrated the benefits of providing a turning lane when daily traffic volumes exceed 15,000 vehicles per day[20]. While widening the street can commonly be viewed as pedestrian unfriendly, the potential impact of not having a turning lane is that accident rates will increase substantially (11 to 35 percent) on two lane roads compared to three lane roads.

One safety action that can have an immediate impact is to condition all land use development projects that require access on city streets to maintain adequate sight distance. This should address all fixed or temporary objects (plants, poles, buildings, signs, etc.) that potentially obstruct sight distance. Any property owner, business, agency or utility that places or maintains fixed or temporary objects in the sight distance of vehicles, bicycles or pedestrians should be required to demonstrate that adequate sight distance is provided (per American Association of State Highway and Transportation Officials).[21]

Finally, the City should coordinate with Washington County and ODOT to develop real-time accident reporting statistics that allow the city to prioritize current collision issues, not four to seven year old data. Current vendors exist that provide accident report software (Washington County uses Intersection Magic). Tigard, as one of several cities with this need, should work cooperatively with peer jurisdictions to implement software that prioritizes collision locations, produces detailed accident diagrams to allow for assessment and is real time (no more than 3 to 6 months old data with five years of historical data).

[20] Multilane Design Alternatives for Improving Suburban Highways, TRB NCHRP Report No. 282, March 1986.

[21] "A Policy on Geometric Design of Highways and Streets", Green Book American Association of State Highway and Transportation Officials, 1994.

ACCESS MANAGEMENT

Access Management is a broad set of techniques that balance the need to provide efficient, safe and timely travel with the ability to allow access to the individual destination. Both Washington County and ODOT have clear and concise access management policies and the supporting documentation to ensure that the highway system is managed as wisely as possible for the traveling public. Proper implementation of Access Management techniques should guarantee reduced congestion, reduced accident rates, less need for highway widening, conservation of energy, and reduced air pollution.

Access management is control or limiting of access on arterial and collector facilities to preserve their functional capacity. Numerous driveways erode the capacity of arterial and collector roadways. Preservation of capacity is particularly important on higher volume roadways for maintaining traffic flow and mobility. Where as local and neighborhood streets function to provide access, collector and arterial streets serve greater traffic volume. Numerous driveways or street intersections increase the number of conflicts and potential for accidents and decrease mobility and traffic flow. Tigard, as with every city, needs a balance of streets that provide access with streets that serve mobility.

Several access management strategies were identified to improve access and mobility in Tigard:

- Provide left turn lanes where warranted for access onto cross streets
- Work with land use development applications to consolidate driveways where feasible
- Meet Washington County/ODOT access requirements on arterials
- Establish City access standards for new developments on collectors and arterials
- Develop city access requirements that are consistent with Metro Title 6 access guidelines

The following recommendations are made for access management:

- Incorporate a policy statement regarding prohibition of new single family residential access on arterials and collectors. A design exception process should be outlined that requires mitigation of safety and NTM impacts. This addresses a problem in Tigard where property owners consume substantial staff time on issues of residential fronting impacts after they have chosen to build adjacent to an arterial.
- Use Washington County and ODOT standards for access on arterials and collectors under their jurisdiction (see tables showing Washington County and ODOT standards in Appendix).
- Specific access management plans be developed for arterial streets in Tigard to maximize the capacity of the existing facilities and protect their functional integrity. New development and roadway projects should meet the following requirements:

  Arterial: Maximum spacing of roadways and driveways = 1,000 feet
  Minimum spacing of roadways and driveways = 600 feet

  Collector: Maximum Spacing of roadways and driveways = 400 feet
  Minimum Spacing of roadways and driveways = 200 feet

  All Roads: Require an access report stating that the driveway/roadway is safe as designed meeting adequate stacking, sight distance and deceleration requirements as set by ODOT, Washington County and AASHTO.

Access management is not easy to implement and requires long institutional memory of the impacts of short access spacing – increased collisions, reduced capacity, poor sight distance and greater pedestrian exposure to vehicle conflicts. The most common opposition response to access control is that "there are driveways all over the place at closer spacing than mine – just look out there". These statements are commonly made without historical reference. Many of the pre-existing driveways that do not meet access spacing requirements were put in when traffic volumes were substantially lower and no access spacing criteria were mandated. With higher and higher traffic volume in the future, the need for access control on all arterial roadways is critical – the outcome of not managing access properly is additional wider roadways which have much greater impact than access control.

Staff will have to come back at a later to date to propose revisions to the development code to reflect the standards being developed in the TSP and Comprehensive Plan. At that time, additional attention can be given to the specific standards and whether exceptions are appropriate to be written into the code or if variances are the action needed. The ODOT Highway Plan spacing standards will apply to ORE 99W (530 - 740 feet), Hall Boulevard (400 - 475 feet) and streets/driveways within 1,320 feet of ORE 217 or I-5 interchanges. For Washington County roads access spacing standards would be 1,000 feet for major arterials, 600 feet for minor arterials and 150 feet for major collectors. The spacing standards outlined in the TSP would apply for City streets 1,000 feet maximum/600 feet minimum for arterials and 400 feet maximum/200 feet minimum for collectors. The maximum and minimum standards balance safety needs and connectivity needs. Additionally, three other standards are recommended. First, a restriction of direct access of new single family units on arterials and collectors (this would include an exception process that addresses safety and neighborhood traffic management needs). Second, an access report with new land development that requires applicants to verify design of their driveways and streets are safe meeting adequate stacking needs, sight distance and deceleration standards as set by ODOT, Washington County, the City and AASHTO (utilizing future traffic volumes from this TSP as a future base for evaluation). Third, driveways should not be place in the influence area of intersections. The influence area is that area where queues of traffic commonly form on the approach to an intersection (typically between 150 to 300 feet). In a case where a project has less than 150 feet of frontage, the site would need to explore potential shared access, or if that were not practical, place driveways as far from the intersection as the frontage would allow (permitting for 5 feet from the property line).

MAINTENANCE

Preservation, maintenance and operation are essential to protect the City investment in transportation facilities. The majority of current gas tax revenues are used to maintain the transportation system. With an increasing road inventory and the need for greater maintenance of older facilities, protecting and expanding funds for maintenance is critical.

A Pavement Management Program is a systematic method of organizing and analyzing information about pavement conditions to develop the most cost effective maintenance treatments and strategies. As a management tool, it aids the decision-making process by determining the magnitude of the problem, the optimum way to spend funds for the greatest return on the dollar, and the consequences of not spending money wisely. Tigard maintains an annual program of pavement management and monitors

conditions in setting priorities for overlays, slurry seals and joint sealing. With over 130 miles of roadway, maintenance is one of the largest transportation expenditures, requiring almost $1,500,000 per year (to put this budget in perspective, this relates to about $2 per foot of road).

A pavement management program can be a major factor in improving performance in an environment of limited revenues. A pavement management program is not and should not be considered the answer to every maintenance question. It is a tool that enables the public works professional to determine the most cost-effective maintenance program. The concept behind a pavement management system is to identify the optimal rehabilitation time and to pinpoint the type of repair which makes the most sense. With a pavement management program, professional judgment is enhanced, not replaced. A critical concept is that pavements deteriorate 40 percent in quality in the first 75 percent of their life. However, there is a rapid acceleration of this deterioration later, so that in the next 12 percent of life, there is another 40 percent drop in quality. A pavement management system can identify when pavements will begin to deteriorate before rapid deterioration starts to focus preventative maintenance efforts cost effectively. These solutions are generally one-fifth to one-tenth the cost required after a pavement is 80 percent deteriorated. Figure 8-22 illustrates the pavement life cycle.

A visual inspection of Tigard's surface street system was prepared by a consultant for the City of Tigard in 1998/99. This inspection produced a "report card" of the street pavement status for each roadway in Tigard. Figure 8-23 summarizes the pavement condition identified on City streets in the last pavement management inspection. The next pavement inspection will be conducted in 2001. Based upon the last inspection, a determination was made that Tigard has approximately a $3,000,000 back log of needed maintenance that cannot be addressed by annual on-going maintenance programs. Tigard has recently taken on the maintenance and operation of several county roads over the past several years. The on-going maintenance budget has increased as Tigard receives more of the statewide motor vehicle fee allocation for roadway preservation and operation. Table 8-10 summarizes the roadway maintenance funding history for the last five fiscal years.

Table 8-10
City of Tigard Street Maintenance Budget Summary[22]

Requirements	FY 96-97 actual	FY 97-98 actual	FY 98-99 budgeted	FY 99-00 budgeted	FY 00-01 budgeted	Description
Street Maintenance						
Overlays/Slurry Seal	$300,000	$300,000	$300,000	$300,000	$380,000	Contracted out
Minor Safety Imp.	$140,000	$140,000	$140,000	$140,000	$140,000	Small Improvements
NTM	$ 45,000	$ 45,000	$ 60,000	$ 60,000	$ 60,000	Traffic Calming
Striping	$ 7,000	$ 7,000	$ 7,000	$ 7,000	$ 12,000	Restriping roads
Street Program						
Dig Outs/Contracts						Reconstruction, Signs,
LaborOutlay	$523,000	$620,000	$814,000	$1,050,000	$774,000	Guard rail, Sweeping
Capital/Equipment						
Administration	$30,000	$31,000	$41,000	$58,000	$55,000	
Total	**$1,045,000**	**$1,143,000**	**$1,362,000**	**$1,615,000**	**$1,421,000**	

Note: Tigard started maintaining an increase share of County streets from 1997 to present.

[22] Based on information received from Gus Duneas, City of Tigard, February 2000.

CITY OF TIGARD
Transportation
System Plan

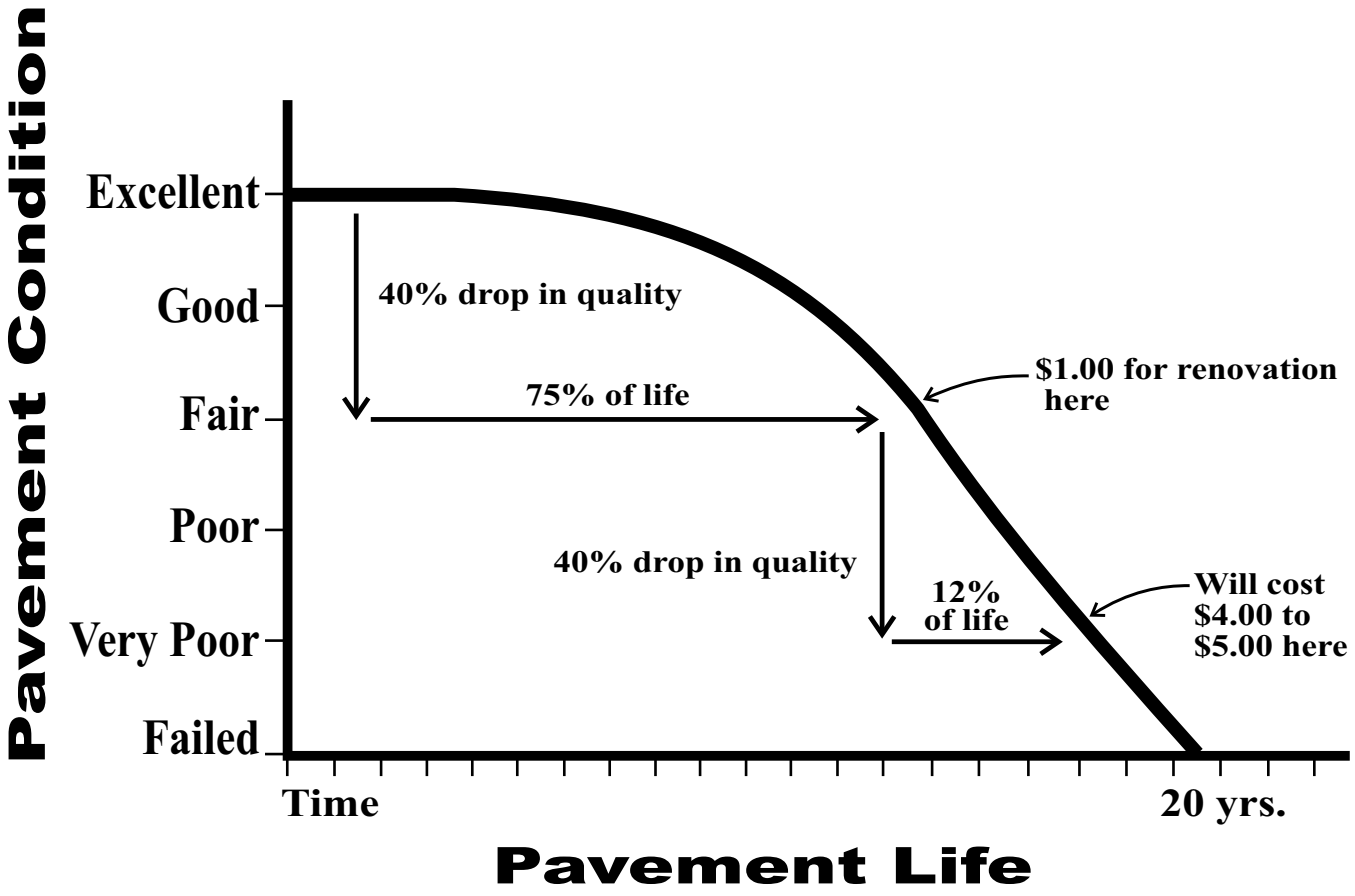

Figure 8-22
PAVEMENT LIFE CYCLE

DKS Associates

NOT TO SCALE

CITY OF TIGARD

Transportation Systems Plan

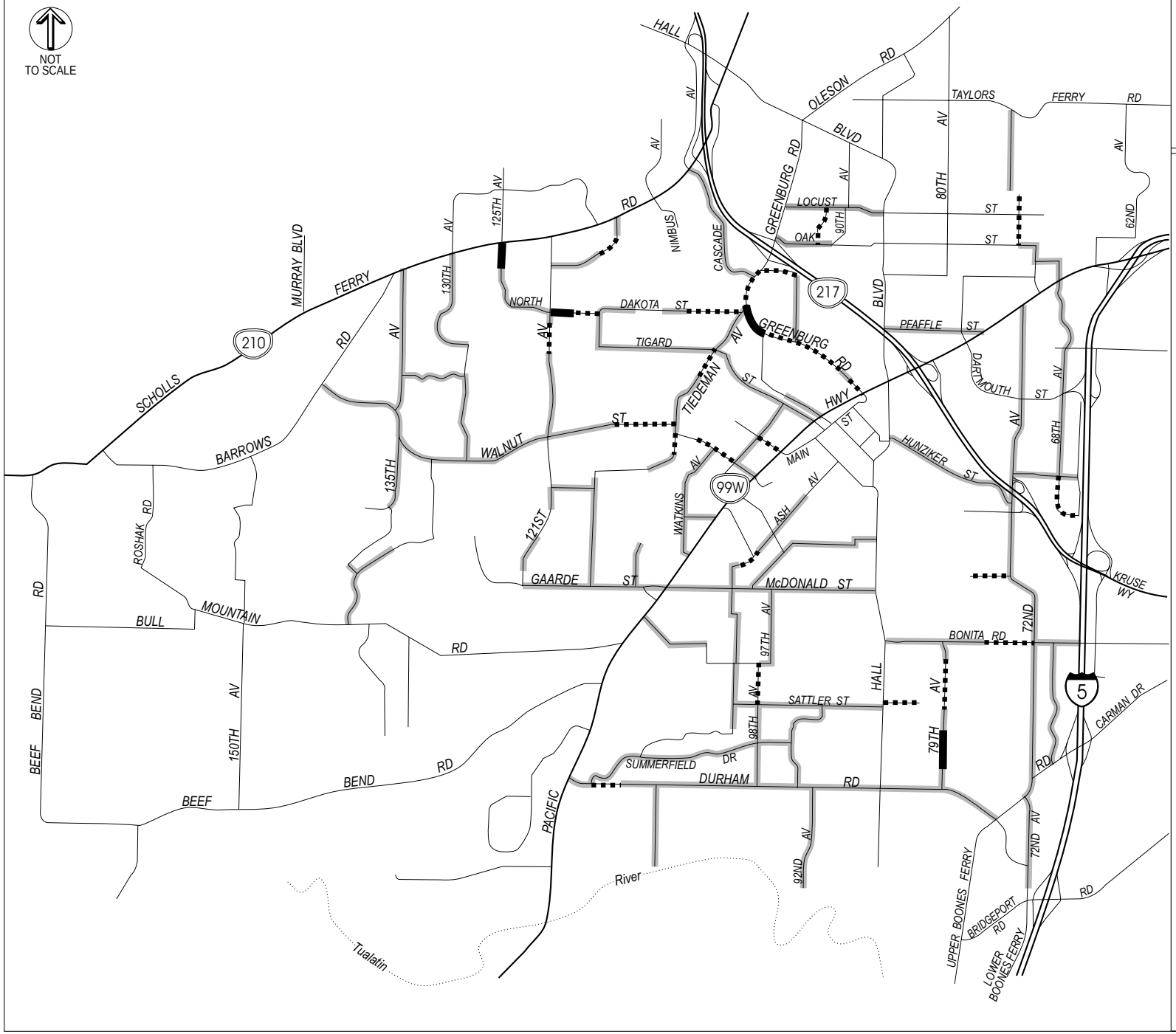

Figure 8-23
PAVEMENT CONDITION ON CITY STREETS

NEIGHBORHOOD TRAFFIC MANAGEMENT

Neighborhood Traffic Management (NTM) is a term that has been used to describe traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. NTM is descriptively called traffic calming due to its ability to improve neighborhood livability. Tigard has done extensive work in the way of testing and implementing NTM measures such as speed humps, chokers, pavement texturing, circles, chicanes and other elements (Figure 8-24). The City initiated a formalized NTM program in 1995 and expends about $60,000 per year in traffic calming city wide. The following are examples of neighborhood traffic management strategies:

- speed wagon (reader board that displays vehicle speed)
- speed humps
- traffic circles
- medians
- landscaping
- curb extensions
- chokers (narrows roadway at spots in street)
- narrow streets
- closing streets
- photo radar
- on-street parking
- selective enforcement
- neighborhood watch

Typically, NTM can receive a favorable reception by residents adjacent to streets where vehicles travel at speeds above 30 MPH. However, NTM can also be a very contentious issue within and between neighborhoods, being viewed as moving the problem rather than solving it, impacting emergency travel or raising liability issues. A number of streets in Tigard have been identified in the draft functional classification as neighborhood routes. These streets are typically longer than the average local street and would be appropriate locations for discussion of NTM applications. A wide range of traffic control devices is being tested throughout the region, including such devices as chokers, medians, traffic circles and speed humps. NTM traffic control devices should be tested within the confines of Tigard before guidelines are developed for implementation criteria and applicability. Also, NTM may be considered in an area wide manner to avoid shifting impacts between areas and should only be applied where a majority of neighborhood residents agree that it should be done. Strategies for NTM seek to reduce traffic speeds on neighborhood routes, thereby improving livability. Research of traffic calming measures demonstrates their effectiveness in reducing vehicle speeds. Table 8-11 summarizes nationwide research of over 120 agencies in North America.

The City could consider adopting a neighborhood traffic management program. This program would help prioritize implementation and address issues on a systematic basis rather than a reactive basis. Criteria should be established for the appropriate application of NTM in the City. This would address warrants, standards for design, funding, the required public process, use on collectors/arterials (fewer acceptable measures – medians) and how to integrate NTM into all new development design.

DKS Associates

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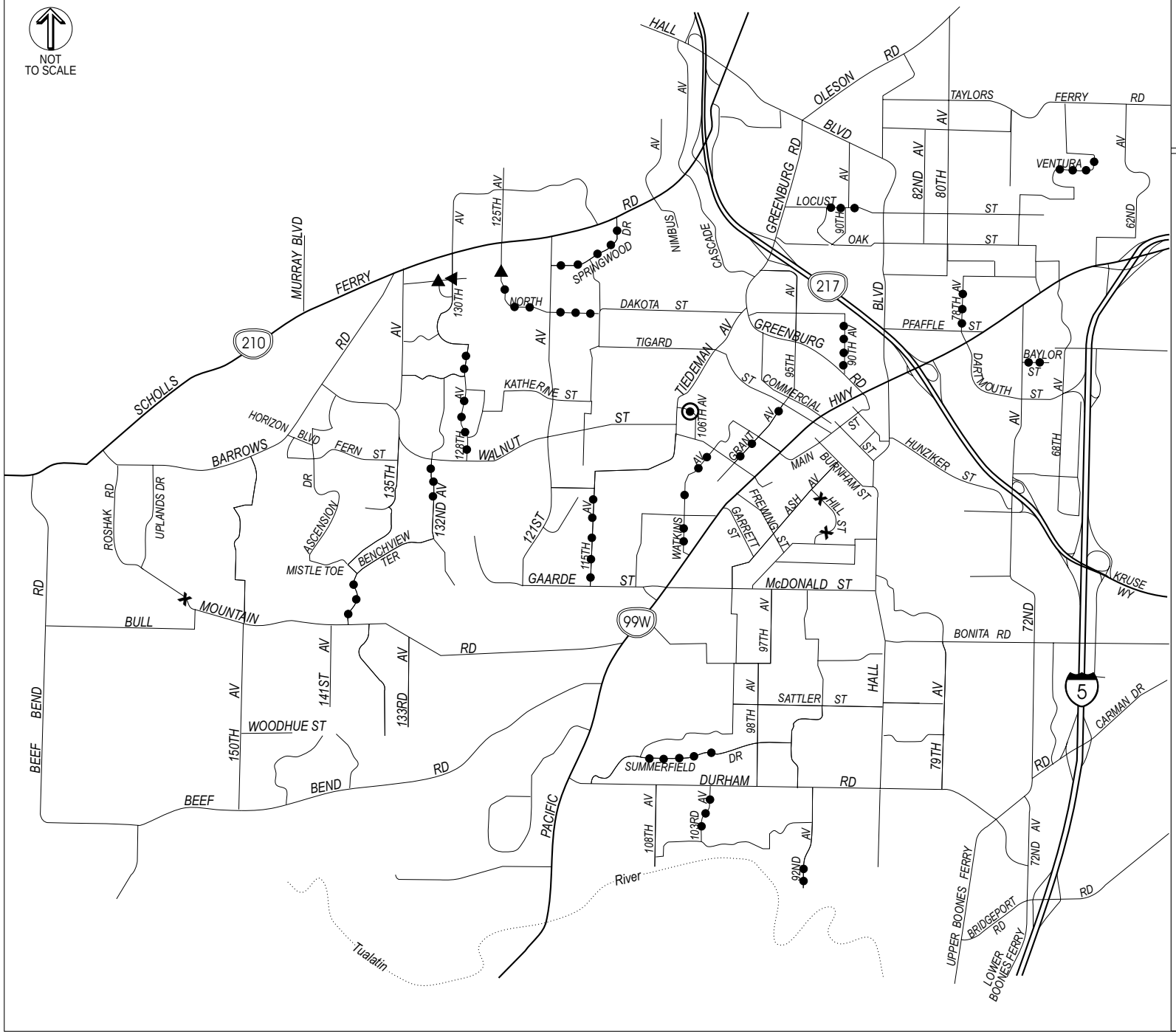

CITY OF TIGARD

Transportation Systems Plan

Legend

- ● - Speed Hump
- ◉ - Portable Speed Hump
- ▲ - Diverter (Shows Direction)
- x - Islands in Intersection

Figure 8-24
TRAFFIC CALMING MEASURES INVENTORY

Table 8-11
NTM Performance

Measures	No. of Studies	Speed Reduction (MPH) Low	High	Average	Volume Change (ADT) Low	High	Ave.	Public Satisfaction
Speed Humps	262	1	11.3	7.3	0	2922	328	79%
Speed Trailer	63	1.8	5.5	4.2	0	0	0	90%
Diverters	39	-	-	.4	85	3000	1102	72%
Circles	26	2.2	15	5.7	50	2000	280	72%
Enforcement	16	0	2	2	0	0	0	71%
Traffic Watch	85	.5	8.5	3.3	0	0	0	98%
Chokers	32	2.2	4.6	3.3	45	4100	597	79%
Narrow Streets	4	5	7	4.5	0	0	0	83%

SOURCE: *Survey of Neighborhood Traffic Management Performance and Results, ITE District 6 Annual Meeting, by R S. McCourt, July 1997.*

PARKING

Parking has not typically been a significant transportation issue in the past for Tigard. New land uses were required to provide the code designated number of parking spaces to assure there would be no impact to surrounding land uses (overflow parking). These parking ratios were developed based upon past parking demand characteristics of each land use type. Most recently, parking has become an element of transportation planning policy through two actions. The adoption of the Transportation Planning Rule in 1991, which was updated in November 1998 (sections 660-12-020(2g) and 660-12-045(5c)) and the Metro Functional Plan of November 1996, Title 2. The City of Tigard has adopted these changes in section 18.765 of its Development Code (refer to Table 18.765.2 Minimum and Maximum Required Off-street Vehicle and Bicycle Parking Requirements). By adopting the minimum and maximum parking ratios outlined in Title 2, the City has addressed the TPR required reduction in parking spaces per capita over time.

Several strategies were identified to address the desire to reduce parking needs in Tigard:

- Shared parking
- Parking pricing
- Parking needs should be reviewed by individual developments at the site plan review stage. Parking provisions should be compared to demand, as identified by ITE or DEQ.[23]
- Maximum Parking Ratios

One of the concerns with parking reduction policies is the impact to adjacent land uses should the vehicle needs of a site exceed the provision of parking.

[23] *Parking Demand*, 2nd Edition, Institute of Transportation Engineers, 1987; and *Peak Parking Space Demand Study*, Oregon Department of Environmental Quality, by JHK & Associates, June 1995.

TRANSPORTATION SYSTEM MANAGEMENT/ INTELLIGENT TRANSPORTATION SYSTEMS

Transportation System Management (TSM) focuses on low cost strategies to enhance operational performance of the transportation system. Measures that can optimize performance of the transportation system include signal improvements, intersection channelization, access management (noted in prior section), HOV lanes, ramp metering, rapid incident response, and programs that smooth transit operation (refer to Table 8-7 for samples of intersection-level TSM improvements). The most significant measure that can provide tangible benefits to the traveling public is traffic signal coordination and systems. Traffic signal system improvements can reduce the number of stops by 35 percent, delay by 20 to 30 percent, fuel consumption by 12.5 percent and emissions by 10 percent[24]. This can be done without the major cost of roadway widening. Ramp metering has been proven to improve freeway performance, reducing travel time, reducing accidents, increasing vehicle speed and reducing fuel consumption. ODOT plans to meter all the on-ramps to I-5 and ORE 217 within Tigard (presently the ORE 217 ramps are metered). As ramp metering is installed in Tigard, the City should work with ODOT to develop ramp meter bypass lanes for high occupancy vehicles and transit.

Several of the strategies were elements of an Intelligent Transportation System (ITS) plan being implemented regionally by ODOT and participating agencies. ITS focuses on a coordinated, systematic approach toward managing the region's transportation multi-modal infrastructure. ITS is the application of new technologies with proven management techniques to reduce congestion, increase safety, reduce fuel consumption and improve air quality. One element of ITS is Advanced Traffic Management Systems (ATMS). ATMS collects, processes and disseminates real-time data on congestion alerting travelers and operating agencies, allowing them to make better transportation decisions. Examples of future ITS applications include routine measures such as "smart" ramp meters, automated vehicle performance (tested recently in San Diego), improved traffic signal systems, improved transit priority options and better trip information prior to making a vehicle trip (condition of roads - weather or congestion, alternative mode options - a current "real time" schedule status, availability/pricing of retail goods). Some of this information will be produced by Tigard, but most will be developed by ODOT or other ITS partners (private and public). The information will be available to drivers in vehicles, people at home, at work, at events or shopping. The Portland region is just starting to implement ITS and the City of Portland, Tri-Met and ODOT have already developed their own ITS strategic plans.

TRUCKS

Efficient truck movement plays a vital role in maintaining and developing Tigard's economic base. Well planned truck routes can provide for the economical movement of raw materials, finished products and services. Trucks moving from industrial areas to regional highways or traveling through Tigard are different than trucks making local deliveries. The transportation system should be planned to accommodate this goods movement need. The establishment of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety and minimizing maintenance costs of the roadway system. A map of proposed through truck routes in Tigard was developed (Figure 8-25). This map is built from the approved Through Truck Route Map

[24] *Portland Regionwide Advanced Traffic Management System Plan,* ODOT, by DKS Associates, October 1993.

in the Washington County Transportation Plan (1988), the recent Metro Regional Freight System (1999) and this plan.

The plan is aimed at addressing the through movement of trucks, not local deliveries. The objective of this route designation is to allow these routes to focus on design criteria that is "truck friendly", i.e., 12 foot travel lanes, longer access spacing, 35 foot (or larger) curb returns and pavement design that accommodates a larger share of trucks. Because these routes are through routes and relate to regional movement, they should relate to the regional freight system. The Draft Regional Transportation Plan[25] includes the following routes in the regional freight system in Tigard, which are consistent with the city map:

- I-5, ORE 217 and ORE 99W — Main Roadway Route
- 72nd Avenue south of ORE 217 — Road Connector
- Hunziker Street east of Hall Boulevard — Road Connector
- Scholls Ferry Road from east of Nimbus to ORE 217 — Road Connector

Key differences from the City TSP truck plan to the to the previously adopted Washington County Plan and Metro RTP include the following:

- Hall Boulevard south of Hunziker Street is removed from the plan along with Durham Road east of Hall Boulevard as shown in the Washington County Plan. In its place Hunziker Street and 72nd Avenue south of ORE 217 are added (as they are in the Regional Freight System).

- Scholls Ferry Road west of Nimbus and east of ORE 217 to Hall Boulevard are retained from the Washington County Plan (although not part of the Regional Freight System) along with Hall Boulevard from ORE 217 to Hunziker.

There are other streets in Tigard that due to their adjacent land uses will need to be "truck friendly". Local industrial streets such as Tech Center Drive and Wall Street would represent samples of streets which where the local industrial street cross-section (Figure 8-7) would apply. In the future, industrial land development will need similar connections to the through truck routes.

Criteria

Tigard's TSP Advisory Committee created a set of goals and policies to guide transportation system development in Tigard (see Chapter 2). Several of these policies pertain specifically to trucks:

Goal 2: Multi-Modal

Policy 1 Develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way for utility, pedestrian, bicycle, transit, truck and auto use.

[25] *Draft Regional Transportation Plan*, Metro, December 1999.

DKS Associates

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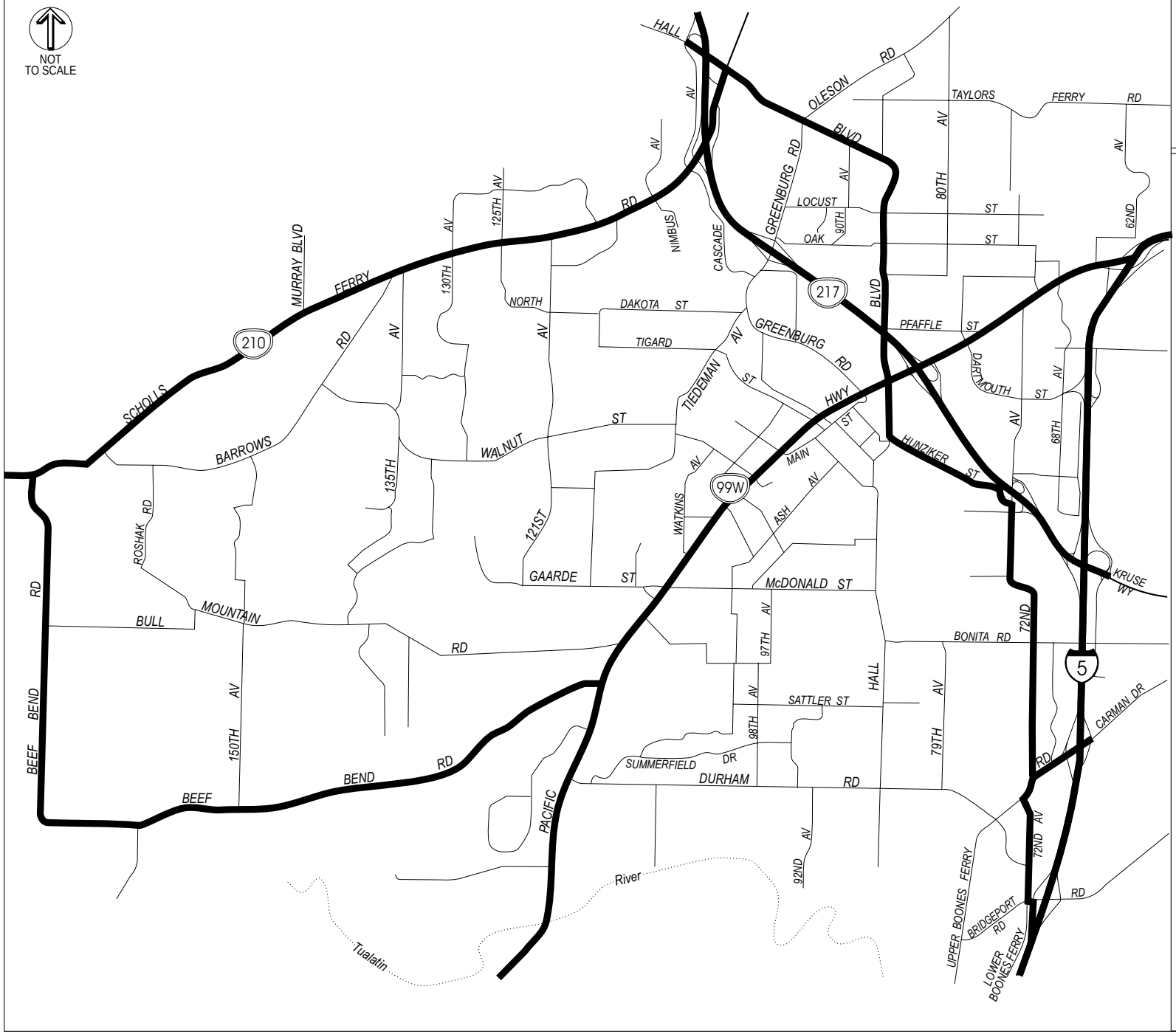

CITY OF TIGARD

Transportation Systems Plan

Legend

- Through Truck Routes

Figure 8-25
THROUGH TRUCK ROUTES

Goal 6: Goods Movement

Policy 1 Design arterial routes, highway access and adjacent land uses in ways that facilitate the efficient movement of goods and services.

Policy 2 Require safe routing of hazardous materials consistent with federal and state guidelines.

These goals and policies are the criteria that all truck related improvements in Tigard should be measured against to determine if they conform to the intended vision of the City.

Chapter 9
Other Modes

CITY OF TIGARD
OREGON

This chapter summarizes existing and future rail, air, water and pipeline needs in the City of Tigard. While auto, transit, bicycle and pedestrian transportation modes have a more significant effect on the quality of life in Tigard, other modes of transportation must be considered and addressed.

CRITERIA

No goals or policies were developed related to rail, air, water or pipeline transportation systems.

RECOMMENDED FACILITIES

RAIL

Railroad tracks traverse Tigard from its northern boundary to the southeast. There are two adjacent but separate tracks south from north of North Dakota Street to Bonita Road. South of Bonita Road, one set of tracks crosses the Tualatin River to Tualatin and further south (parallel to I-5 to just north of Salem). The other set of tracks turns east to Lake Oswego/Milwaukie and Southeast Portland. North of Tigard, both tracks go on into Beaverton and Hillsboro. They are both owned by Portland & Western (P&W), a sister company of Willamette & Pacific (W&P) Railroad.

Within the next five years all of the rubberized at-grade crossing panels will be replaced with concrete panels. The concrete panels have longer life and are more skid resistant. Presently all the grade crossings of the railroad and roadways in Tigard are controlled by gated crossings. There are a few private crossings which are not gated. Grade separation of the railroad crossings has not been determined to be necessary at any of the existing crossings. The highest volume at-grade crossing in Tigard is on Scholls Ferry Road. Because of the close proximity of the rail crossing to the ORE 217 interchange, future expansion of ORE 217 should consider the operational need of Scholls Ferry Road south of ORE 217[1].

A commuter rail system, linking Wilsonville and Beaverton/Hillsboro, has been discussed and preliminary analysis has been conducted to determine possible alignments and station locations. The system would travel through Tigard with at least one or two stops in the City. One of the City's policies is to support

[1] Outside the 20 year perspective of this plan, it may become necessary to consider a grade separation of the railroad crossing. While not part of this TSP, this concept should be considered in future planning of the Scholls Ferry Corridor. A grade separation concept may include a viaduct Scholls Ferry Road from ORE 217 to south of Nimbus. Urban interchanges would need to be designed for Nimbus and Cascade This viaduct approach may preclude the need for seven lanes on Scholls Ferry Road. This type of alternatives analysis would be necessary in the project development of any Scholls Ferry Road widening, ORE 217 widening and/or rail crossing changes.

the development of a commuter rail system as part of the regional transit network[2]. The commuter rail project would enhance the rail line by providing sidings (double track) over portions of the alignment. The commuter rail would operate when there is little freight activity.

There has been a recent increase in volume to about eight trains per day through Tigard (includes both northbound and southbound trains—total of about four round-trips per day). P & W anticipates changes in freight service in the near future, but the changes are likely to affect timing rather than the number of trains passing through Tigard.

AIR

Tigard is served by the Portland International Airport, located in Northeast Portland on the Columbia River. The Portland International Airport is a major air transportation and freight facility, which serves Oregon and Southwest Washington. It provides a base for over twenty commercial airlines and air freight operations. The Port of Portland reported nearly 13.7 million passengers were served at the Portland International Airport in 1999[3]. Ground access to Portland International Airport from Tigard is available by automobile, taxi and shuttle (in year 2001 light rail access will be available).

Tigard is also served by the Portland-Hillsboro Airport, a general aviation facility located in the north central portion of the City. The airport facility is owned and operated by the Port of Portland as part of the Port's general aviation reliever system of airports. The Port of Portland maintains a Master Plan for this facility which was most recently updated in October 1996.

No airports exist or are expected within the City in the future. Therefore, no policies or recommendations in this area of transportation are provided for Tigard.

WATER

The Tualatin River is located along the southern border of Tigard. It is used primarily for recreational purposes. No policies or recommendations in this area of transportation are provided.

PIPELINE

There are high pressure natural gas feeder lines owned and operated by Northwest Natural Gas Company along several routes in Tigard. Figure 9-1 shows the feeder line routes for Tigard.[4] No future pipelines are expected within the City. No policies or recommendations in this area of transportation are provided for Tigard.

[2] *Washington County Commuter Rail Study*, Phase II, Prepared by BRW, etc., May, 1999.
[3] Based upon Port of Portland web page, http://www.portofportlandor.com/1299month.htm
[4] Based on the Portland Area Distribution System Map (Dated September, 1998) received from Northwest Natural Gas Company.

DKS *Associates*

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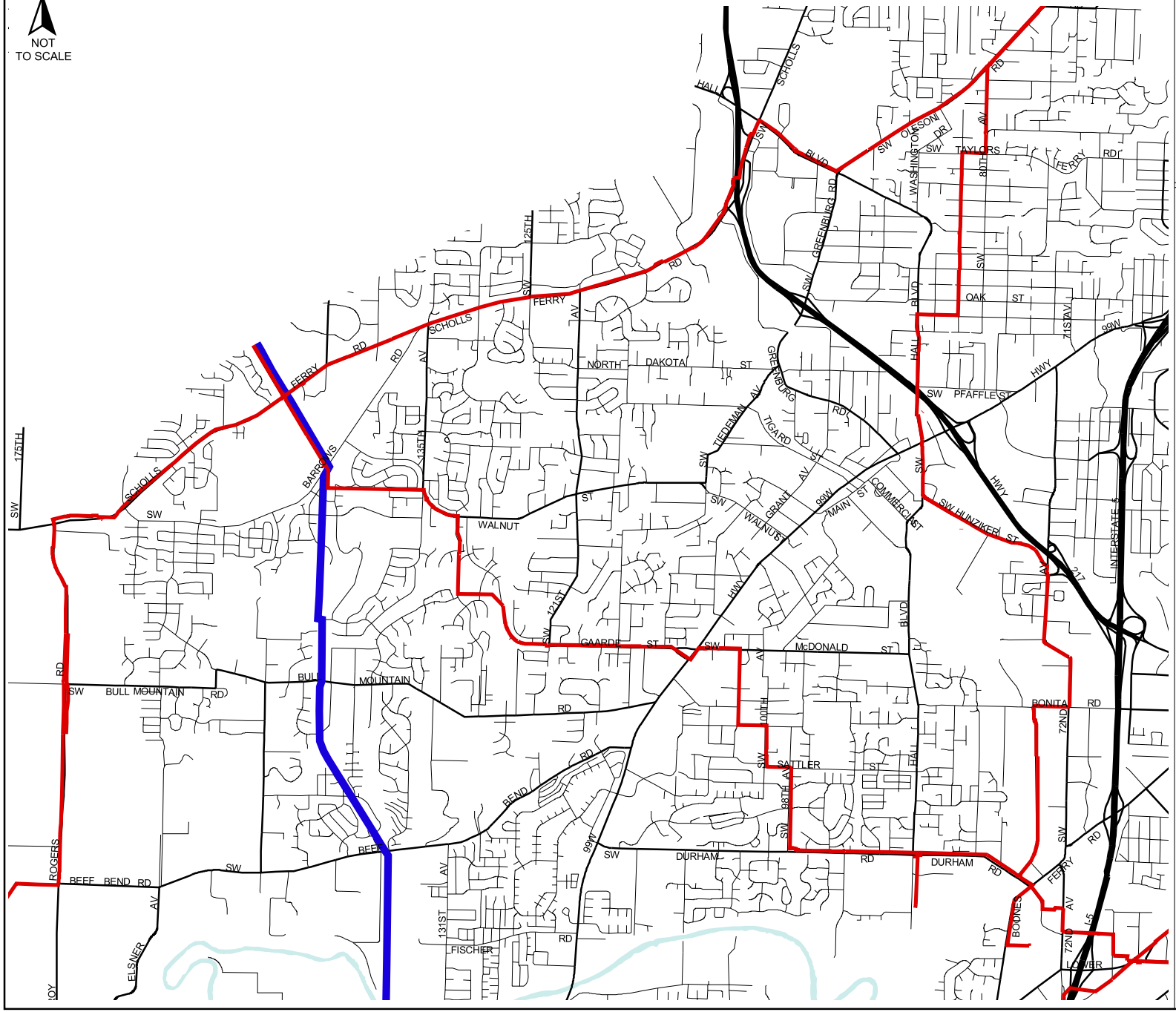

CITY OF TIGARD
OREGON

Transportation Systems Plan

Legend

- Existing High Pressure Gas Pipeline
- Existing Kinder Morgan Pipeline

Figure 9-1
MAJOR PIPELINE ROUTES

Chapter 10
Transportation Demand Management

CITY OF TIGARD
OREGON

INTRODUCTION

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. The Transportation Planning Rule outlines a goal of reducing vehicle miles traveled (VMT) per capita.[1] TDM measures applied on a regional basis can be an effective tool in reducing vehicle miles traveled. Samples include:

- Employers installing bicycle racks
- Work with property owners to place parking stalls for carpoolers near building entrances
- Provide information regarding commute options to larger employers
- Encourage linkage of housing, retail and employment centers
- Encourage flexible working hours
- Encourage telecommuting
- Provide incentives to take transit and use other modes (i.e. free transit pass)
- Schedule deliveries outside of peak hours

The strategies for transportation demand management were identified in working with the City's TSP Task Force which included the City Planning Commission. These committees provided input regarding the transportation system in Tigard, specifically exploring TDM needs.

BACKGROUND

In 1993, the Oregon Legislature passed a law to help protect the health of Portland area residents from air pollution and to ensure that the area complies with the federal Clean Air Act. The Employee Commute Options (ECO) rules are provisions of the law.[2] The ECO program requires larger employers to provide commute options to encourage employees to reduce auto trips to the work site. It is one of several strategies included in the Ozone Maintenance Plan for the Portland Air Quality Maintenance Area (AQMA) which will be in place until the year 2006. Employers in the Portland AQMA with more than 50 employees at a work site must provide commute options that have the potential to reduce employee commute auto trips by 10 percent within three years, and maintain the trip reductions through the life of the plan.

TDM can include a wide variety of actions tailored to the individual needs of employers to achieve trip reduction. Table 10-1 provides a list of several strategies identified in the ECO program. Research

[1] By 10 percent over 20 years

[2] Oregon Administrative Rules Chapter 340, Division 30.

Table 10-1
Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected work days. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 day/wk)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week (for example, a 40 hour week in 4 days or 36 hours in 3 days)	7-9% (9 day/80 hr) 16-18% (4/40) 32-36% (3/36)
Transit Pass Subsidy	For employees who take transit to work on a regular basis, the employer pays for all or part of the cost of a monthly transit pass.	19-32% (full subsidy, high transit service) 2-3% (half subsidy, medium transit service)
Cash Out Employee Parking	An employer that has been subsidizing parking (free parking) discontinues the subsidy and charges all employees for parking. An amount equivalent to the previous subsidy is then provided to each employee, who then can decide which mode of travel to use (with subsidy above the cost of a monthly transit pass, those employees would realize monetary gain for using transit).	8-20 % (high transit service available) 5-9 % (medium transit services available) 2-4% (low transit services available)
Reduced Parking Cost for HOVs	Parking costs charged to employees are reduced for high occupancy vehicles (HOV) such as carpools and vanpools.	1-3 %
Alternative Mode Subsidy	For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee. Most often, the bonus is provided monthly in the employee's paycheck.	21-34% (full subsidy of cost, high alt.modes) 2-4% (half subsidy of cost,medium alt.modes)
On-Site Services	Provide services at the worksite that are frequently used by the employees of that worksite. Examples include cafes, restaurants, dry cleaners, day care and bank machines.	1-2 %
Bicycle Program	Provides support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.	0-10 %
On-site Rideshare Matching for HOVs	Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.	1-2 %
Provide Vanpools	Employees that live near each other are organized into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van.	15-25% (company provided van with fee) 30-40% (company subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3 %
Provide Buspools	Employees that live near each other or along a specified route are organized into a buspool for their trip to work	3-11 %
Walking Program	Provide support services for those who walk to work. This could	0-3 %

Strategy	Description	Potential Trip Reduction
	include buying walking shoes or providing showers.	
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day.	0-1 %
Guaranteed Ride Home Program	A company owned or leased vehicle or taxi fare is provided in the case of an emergency for employees that use alternative modes.	1-3 %
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes (rather than monetary, bonus, gift or awards)	1-2 %

SOURCE: *Guidance for Estimating Trip Reductions From Commute Options,* Oregon Department of Environmental Quality, August 1996.

has indicated that a comprehensive set of complementary policies implemented over a large geographic area can have an effect on vehicle miles traveled[3]. However, the emphasis of much of the research indicates that these policies must go well beyond the low-cost, uncontroversial measures commonly attributed to TDM (such as carpooling, transportation coordinators/associations, priority parking spaces) to be effective. Elements including parking and congestion pricing, improved services for alternative modes and other market-based measures are needed for TDM to have significant impact on reducing overall vehicle miles traveled.

At the same time, the same research indicates that employee trip reduction programs can be an effective instrument of localized congestion relief[4]. For example, employers can substantially reduce peak hour trips by shifting work schedules, which may not reduce VMT but can effectively manage congestion. In Wilsonville, a Nike warehouse/distribution site generates 80% less vehicle trips than standard similar uses in the evening peak hour by using employee shifts that are outside the peak period (4 - 6 PM) [5]. This type of congestion management technique can extend the capacity of transportation facilities.

CRITERIA

Tigard TSP Task Force created/refined a set of goals and policies to guide transportation system development in Tigard (see Chapter 2). Goal 2 directly addresses reduction in travel, forming the basis for TDM.

Goal 2 *Policy 7* *Tigard will participate in vehicle trip reduction strategies developed regionally*

DEQ and Metro have developed regional policies regarding trip reduction. Some of these policies are aimed at provision of parking and others are aimed at ridesharing (Employee Commute Options—ECO rules).

[3] *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips,* ODOT, by ECO Northwest, June 1992.

[4] *Evaluation of Employee Trip Reduction Programs Based upon California's Experience with Regulation XV,* Institute of Transportation Engineers, Technical Council Committee 6Y-51, January 1994.

[5] *Nike Parking Lot Expansion Trip Generation Study,* City of Wilsonville, by DKS Associates, May 1997.

STRATEGIES

Several strategies were evaluated by the TSP Task Force for transportation demand management in Tigard. These strategies are aimed at providing the City with priorities toward implementing transportation demand management projects that meet the goals and policies of the City. The ranking of the strategies follows from most important to least important:

- Focus programs on high demand districts (ie. Downtown Tigard, Tigard Triangle and Washington Square)
- Telecommuting/Fiber Optic to all residents and businesses
- Require larger employers to meet DEQ's ECO rules
- Encourage linkage of housing with retail and employment centers
- Mandate TDM though development review (would reinforce regional DEQ requirements)
- Limiting Parking (establish maximum parking ratios)
- City funded program to provide information regarding commute options to larger employers (possibly via web page and email)
- Support regional pricing policies/strategies
- Do nothing related to TDM
- Provide business association support for TDM coordination

RECOMMENDED PLAN

State, regional and county policy[6] all call for encouraging and promoting transportation demand management. The proposed policy of this plan calls for the city to support TDM. Collectively, the implementation of the modal plans in this TSP, along with the TDM plan, will contribute to the regional VMT reduction goal. Unlike bicycles, pedestrians and motor vehicles, implementation of this policy does not necessarily require capital infrastructure. In fact, much more of TDM is policy and management rather than concrete and asphalt. Because of this, the recommended TDM plan for Tigard consists of the following:

- Support continued efforts by Washington County, Metro, ODOT, DEQ, Tri-Met and the Westside Transportation Alliance to develop productive TDM measures that reduce VMT and peak hour trips. Focus attention in Washington Square, downtown Tigard and Tigard Triangle.

- Encourage the development of high speed communication in all parts of the city (fiber optic, digital cable, DSL,….). The objective would be to allow employers and residents the maximum opportunity to rely upon other systems for conducting business and activities than the transportation system during peak periods.

- Encourage development that effectively mix land uses to reduce vehicle trip generation. These plans may include development of linkages (particularly non-auto) that support greater use of alternative modes. Land use density should be higher at commuter rail transit stations (half mile radius) than elsewhere in the community (Tigard Transit Center and Washington Square Station areas).

- Mixed land use projects have demonstrated the ability to reduce vehicle trips by capturing internal

[6] Transportation Planning Rule, Section 660-12-035; Regional Transportation Policy, Metro, July 1996, page 1-39; and Washington County Transportation Plan, October 1988, page 30.

trips between land use types, encouraging walk/bike trips and producing shorter vehicle trips[7].

- As vehicle traffic levels increase with the build out of land uses within Tigard, it may become necessary to go beyond the coordination with the regional Employee Commute Options program developed by DEQ. This may include developing localized TDM programs for the city or subareas of the city to address vehicle trip reduction. For example, measures which are appropriate for site planning such as close-in parking for carpools, bicycle parking and convenient transit stops are already part of the Community Development Code (Section 18.765.030(F) calls for close in carpool parking for lots with 20 or more long term spaces and Section 18.360.090 requires pedestrian access to transit).

- As a capital oriented element, coordinate with ODOT and Tri-Met on the development of park-and -ride transit station or freeway interchange locations in Tigard (these are locations proven to be successful in attracting carpool/transit use). Figure 7-2 shows the current park and ride locations. Expansion of these sites should focus on transit station or freeway interchange locations. Interchange reconstruction projects should be required to identify potential sites for park-and-ride (even small sites of 50 spaces). Over the next 20 years, a reasonable budget for park-and-ride expansion might be about $100,000 per year (about 50 spaces a year, assuming pre-existing ROW).

[7] *Trip Generation, 5th edition,* Institute of Transportation Engineers, 1991, Chapter VII, indicates potential for PM peak hour capture of between 27% and 66%.

Chapter 11 Funding/ Implementation

CITY OF TIGARD
OREGON

This chapter outlines the funding sources that can be used to meet the needs of the transportation system. The costs for the elements of the transportation system plan are outlined and compared to the potential revenue sources. Options are discussed regarding how costs of the plan and revenues can be balanced.

Transportation funding is commonly viewed as a user fee system where the users of the system pay for infrastructure through motor vehicle fees (such as gas tax and registration fees) or transit fares. However, a great share of motor vehicle user fees goes to road maintenance, operation and preservation of the system rather than construction of new system capacity. Much of what the public views as new construction is commonly funded (partially or fully) through property tax levies, traffic impact fees and fronting improvements to land development. In Washington County, the Major Streets Transportation Improvement Program (MSTIP) and traffic impact fees (TIF), similar to system development charges (SDC) are key examples.

The transportation needs typically out pace dedicated funding sources. The key to balancing needs and funding are user fees. Motor vehicle fees have become a limited source of funding new transportation system capacity due to many factors:

- Gas taxes have been applied on a fixed cents per gallon basis not a percentage basis. Increases in the gasoline tax have not kept pace with cost of transportation needs. The Department of Transportation's Bureau of Transportation Statistics data indicates that in real terms the amount of federal gas tax paid by American households has actually declined by 41 percent from 1965 (when Interstate freeway building was at its peak) to 1995. That occurred with the real dollar gas tax increasing from 4 cents to 18.4 cents in the same time frame.

- Oregon gas taxes have not increased since 1992 (currently 24 cents per gallon) and registration fees have been at $15 per vehicle per year for over ten years. Significant new roadway construction particularly that attributed to new development, has increased Tigard's inventory of roads and maintenance during this time. Additionally, the demands of region-wide growth have increased the need for capacity improvements in the system. The most current proposal for increased gas tax (Measure 82) is before the voters in May 2000.

- Significant improvements in fuel economy over the last 15 years have reduced the relationship of user fees to actual use. For example, a passenger car with 12,000 miles of use in a year at 15 miles per gallon could generate about $350 per year in revenue using current federal, state and county gas tax levels (about 44 cents) compared to less than $200 per year with a 27 miles per

gallon vehicle (a 45 percent reduction). Unfortunately the same vehicle does not use less roadway capacity.

- The bill is coming due on many roads built 20 years ago in terms of maintenance. As the inventory of roads increased, the use of the roads increased faster. This is evident from national transportation statistics. The number of passenger cars and miles of urban roadways doubled from 1960 to 1995. However, the number of vehicle miles traveled on those roadways increased 470%. This increased use proportionally increases maintenance needs. Many of these roads are heavily used and the maintenance activities in the urban area have a substantial impact on operation unless work is conducted in off-peak periods, which increases the cost to maintain these roads. To compound matters, the amount of passenger car fuel consumed from 1960 to 1995 has only increased 66%, reducing the rate that revenue comes in from user fees relative to actual use.

FUNDING

Funding Sources and Opportunities

There are several potential funding sources for transportation improvements. Table 11-1 summarizes several funding options available for transportation improvements. These are sources that have been used in the past by agencies in Oregon. In most cases these funding sources when used collectively are sufficient to fund transportation improvements for local communities. Due to the complexity of today's transportation projects, it is necessary to seek several avenues of funding projects. Unique or hybrid funding of projects generally will include these funding sources combined in a new package. Examples of funding sources which generally do not provide funding for roadways include: Property Tax General Funds, Car Rental Tax, Transient Lodging Tax, Business Income Tax, Business License Tax and Communication Services Tax.

The federal gas tax is allocated through Intermodal Surface Transportation Efficiency Act (ISTEA). The United States Congress has approved reauthorization of transportation funding (TEA 21) for another six years. Federal transportation funds are primarily distributed in the Portland region by Metro (hence the term "regional funds"). ISTEA/TEA 21 funds are much more flexible than state gas tax funds, with an emphasis on multi-modal projects. ISTEA/TEA 21 funds are allocated through several programs including the National Highway System (NHS), Surface Transportation Program (STP) and Congestion Mitigation and Air Quality (CMAQ) Improvement Programs. NHS funds focus on the interstate highway system and CMAQ funds are targeted for air quality non-attainment areas.

Within the Portland region, funding for major transportation projects often is brought to a vote of the public for approval. This is usually for a large project or list of projects. Examples of this public funding includes the Major Streets Transportation Improvement Program (MSTIP) in Washington County, the Westside Light Rail Project and prior transportation bond measures in Tigard. Because of the need to gain public approval for transportation funding, it is important to develop a consensus in the community that supports needed transportation improvements. That is the value of the Transportation System Plan. In most communities where time is taken to build a consensus regarding a transportation plan, funding sources can be developed to meet the needs of the community.

Table 11-1
Potential Transportation Revenue Sources

Type	Description
Traffic Impact Fees (TIF) & System Development Charges (SDC)	Traffic Impact Fees or System Development Charges (SDCs) have been used in Oregon and throughout the United States. The cornerstone to development of TIF/SDCs involves two principles: 1) there must be a reasonable connection between growth generated by development and the facilities constructed to serve that growth (generally determined by level of service or connectivity); and 2) there must be a general system-wide connection between the fees collected from the development and the benefits development receives. Charges are typically developed based on a measurement of the demand that new development places on the street system and the capital costs required to meet that demand. Washington County has a traffic impact fee (TIF) which is a voter approved tax. SDCs do not require a vote of the public and are not a tax.
Gas Tax	The State, cities and counties provide their basic roadway funding through a tax placed on gasoline. State gas tax is approved legislatively while voters approve local gas taxes. State funds are dedicated to roadway construction and maintenance, with one percent allocated to pedestrian and bicycle needs. This tax does not fall under the Measure 5 limits, because it is a pay-as-you-go user tax. Washington County has a one cent gas tax and a recent ballot initiatives to increase this county tax failed.
Other Motor Vehicle Fees	The state collects truck weight mile taxes, vehicle registration fees and license fees. These funds are pooled together with the gas tax in distributing state motor vehicle fees to local agencies. Annual motor vehicle fee allocations to Washington County highways amount to about $100 million (including gas tax). Washington County considered raising motor vehicle registration by $15 per year in 1997 but it was not approved.
Street Utility Fees	Certain cities have used street utility fees for maintenance. The fees are typically collected monthly with water or sewer bills. These funds are not for capacity improvements, but for supporting local roadway maintenance based upon land use type and trip generation. This frees other revenue sources for capacity needs. Utility fees can be vulnerable to Measure 5 limitations, unless they include provisions for property owners to reduce or eliminate charges based on actual use.
Exactions	Frontage improvements are common examples of exaction costs passed to developers. These have been used to build much of Tigard's local street system. Developers of sites adjacent to unimproved roadway frontage are responsible for providing those roadway improvements. Developers of sites adjacent to improvements identified as TIF/SDC projects can be credited the value of their frontage work, which is included in the TIF/SDC project-list cost estimate.
Local Improvement Districts (LID)	LIDs provide a means for funding specific improvements that benefit a specific group of property owners. Assessments are placed against benefiting properties to pay for improvements. LIDs can be matched against other funds where a project has system wide benefit beyond benefiting the adjacent properties. Similarly, districts can be created for tax increment type financing. In Tigard, legal and public acceptance issues with LIDs have made them less effective and expense to administer.
Special Assessments	A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking and CBD or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations. In Washington County, other examples of transportation assessments include MSTIP (Major Streets Transportation Improvement Program) and the urban road maintenance district property tax levy. Both of these are property tax assessments which have been imposed through votes of the public. A regional example would be the Westside LRT where the local share of funding was voter approved as an addition to property tax. Tigard is forwarding a transportation bond measure to the voters in 2000.
Driveway Fees	Gresham collects a Public Street Charge and a Driveway Approach Permit Fee. These fees are project specific and revenue varies year to year based upon development permits. These funds are used for city maintenance and operation.
Employment Taxes	Tri-Met collects a tax for transit operations in the Portland region through payroll and self employment taxes. Approximately $120 million are collected annually in the Portland region for transit.
Oregon Special Public Works Fund	The Special Public Works Fund (SPWF) Program was created by the legislature in 1985 as an economic development element of the Oregon Lottery. The program provides grants and loan assistance to eligible municipalities. There has been limited use of these funds on urban arterials. These funds are commonly used on state highways (a recent Portland area example being Immediate Opportunity Funds used for the US 26/Shute interchange associated with Nike).

Traffic impact fees (TIF) are used to off set the cost of growth related capacity needs within the transportation system. Washington County oversees administration of the TIF program coundtywide, but each city assesses, collects and spends TIF funds for their own jurisdiction. The fee is updated periodically to adjust for inflation. System development charges (SDCs) are similar to TIF, except TIF require a vote of the public for implementation where SDCs do not. Both SDCs and TIFs rely upon a strong nexus between the impact of growth on the transportation system and the cost for transportation capacity improvements to serve land use growth. For example, maintenance costs or upgrading design without adding capacity are elements that would not be included in a TIF or SDC. SDC can also be placed over districts to address growth related impacts. In Wilsonville, the city has imposed an interchange SDC to provide local matching funds to ODOT for the widening of the I-5/Wilsonville Road interchange. New development pays a SDC for each trip they add to the I-5/Wilsonville Road interchange area in the PM peak hour. Table 11-2 provides a comparison of SDC/TIF rates in the Portland region.

Table 11-2
Sample TIF in the Region

Land Use	Residential Cost per Dwelling Unit		Non-Residential Cost per 1,000 Square Feet				
	Single Family	Multi-Family	Light Indust	Office*	Medical Office	Retail*	Fast Food
ITE Code	210	220	110	710	720	820	834
Lake Oswego	$ 3,592	$ 2,573	$ 3,820	$ 6,383	$ 13,221	$ 4,002	$ 61,052
Vancouver	$ 989	$ 672	$ 313	$ 710	$ 1,844	Traffic Stdy	$ 4,071
Gresham	$ 1,202	$ 750	$ 1,166	$ 2,225	$ 4,855	$ 3,641	$ 17,386
Troutdale	$ 588	$ 285	$ 570	$ 1,088	$ 2,375	$ 3,393	$ 24,642
Wilsonville	$ 2,256	$ 1,573	$ 2,547	$ 3,700	$ 3,700	$ 4,755	$ 14,265
Washougal	$ 775	$ 445	$ 752	$ 1,159	$ 3,132		
Clark County: Mt. Vista	$ 2,638	$ 1,787	$ 1,807	$ 3,169	$ 7,415	$ 3,359	$ 32,062
Clark County: Orchards	$ 1,161	$ 786	$ 795	$ 1,394	$ 3,262	$ 1,478	$ 14,107
Washington County	$ 1,790	$ 1,181	$ 1,199	$ 2,034	$ 5,604	$ 2,998	$ 4,500
Clackamas County	$ 1,277	$ 884	$ 985	$ 1,557	$ 5,108	$ 2,874	$ 12,895
Battleground	$ 2,869	$ 1,988	$ 1,955	$ 3,169	$ 8,489	$ 3,894	$ 27,226
Ridgefield	$ 1,913	$ 1,099	$ 1,858	$ 4,243	$ 7,728	$ 11,042	$ 80,192
Camas (proposed)	$ 1,416	$ 921	$ 1,348	$ 2,626	$ 4,592	$ 2,708	$ 21,636
West Linn	$ 2,170	$ 1,470	$ -	$ 2,961	$ -	$ 8,349	$ -

Note: Assumes a 100,000 sf office and a 150,000 sf retail center.

COSTS

Cost estimates (general order of magnitude) were developed for the projects identified in the motor vehicle, bicycle and pedestrian elements. Costs estimates from the RTP or MSTIP projects in Tigard were used in this study. Other projects were estimated using general unit costs for transportation improvements, but do not reflect the unique project costs that can (on some projects due to right-of-way, environmental mitigation and/or utilities) significantly add to project cost (25 to 75 percent in some cases, due to environmental, utility or right-of-way issues). Development of more detailed project costs can be prepared in the future with project development. Since many of the projects are multi-modal, the costs were developed at a project level incorporating all modes, as appropriate. It may be desirable to break project mode elements out separately, however, in most cases, there are greater cost efficiencies of undertaking a combined, overall project. Each of these project costs will need further refinement to detail right-of-way requirements and costs associated with special design details as projects are pursued. Table 11-3 summarizes the elements of the plan that were not project specific and how costs will be addressed for these elements.

It should be noted that all costs are 2000 based. Using the Engineering News Record[1] research on historical construction costs, it can be anticipated that (based on the past ten years) construction costs will increase 2.5 percent per year. Since 1980, construction costs have increased 196 percent over 20 years.

Tables 11-4, 11-5, 11-6 and 11-7 summarize the key projects in the TSP by three key groups including:

- Bicycle Improvements
- Pedestrian Improvements
- Motor Vehicle Improvements

Many of the project costs have been developed by Washington County, Metro or ODOT for projects in the RTP. These project costs have been utilized for the purposes of this TSP.

[1] Engineering News Record, construction cost index data, enr.com.

Table 11-3
Issues With Non-Auto, Pedestrian and Bicycle Costs

Mode	Issues
Parking	The TSP does not define specific projects. Off-street parking will be provided by private property owners as land develops.
Neighborhood Traffic Management	Specific NTM projects are not defined. Traffic humps can cost $2,000 to $4,000 each and traffic circles can cost $3,000 to $8,000 each. A speed trailer can cost about $10,000. Based upon this continuing the existing City program of about $50,000 per year meet future needs.
Public Transportation	Tri-Met will continue to develop costs for implementing transit related improvements. The City can supplement this by incorporating transit features through development exactions and roadway project design. Developing new transit services in Tigard similar to the corridor services outlined in the TSP will require Tri-Met to reallocate funding or seek additional sources of operating funds.
Commuter Rail	Washington County is currently in the environmental phase of this project that may cost between $60 and $80 million. The City should work with Washington County and Yamhill County to encourage the development of a western commuter rail line to Yamhill County and points west.
Trucks/Freight	Roadway funding will address these needs. Roadway overcrossings of railroads can use special Public Utilities Commission funds set aside for safety improvements to railroad crossings.
Rail	Costs to be addressed and funded by private railroad companies and the state.
Air, Water, Pipeline	Not required by City.
Transportation Demand Management	DEQ has established regional guidelines. Private business will need to support employee trip reduction programs. In the future, the city may need to support a supplemental program that may have a cost range of $25,000 to $50,000 per year.

Table 11-4

Pedestrian Action Plan Project List

Rank*	Project	From	To	Cost
H	North Dakota Street	121st Avenue	Greenburg Road	$230,000
H	McDonald Street	ORE 99W	Hall Boulevard	$200,000
H	Tiedeman Avenue	Walnut Street	Greenburg Road	$350,000
H	Oak Street (RTP 6019)	Hall Boulevard	80th Avenue	$500,000
H	ORE 99W	McDonald Street	South City Limits	$500,000
M	Bull Mountain Road	ORE 99W	Beef Bend Road	$1,200,000
M	Roshak Road	Bull Mountain Road	Scholls Ferry Road	$300,000
M	121st Avenue	Gaarde Street	North Dakota Street	$450,000
M	Hunziker Street	Hall Boulevard	72nd Avenue	$250,000
M	Washington Square Regional Center	Pedestrian Improvements (RTP 6022)		$6,000,000
L	Taylor's Ferry Rd	Washington Drive	62nd Avenue	$1,000,000
L	Washington Drive	Hall Boulevard	Taylor's Ferry Road	$200,000
			Subtotal	**$11,800,000**
Sidewalks to be built with Street Improvements				
H	Bonita Road	West of 72nd Avenue	72nd Avenue	$50,000
H	Walnut Street	135th Avenue	Tiedeman Avenue	$570,000
H	Gaarde Street	Walnut Street	ORE 99W	$620,000
H	Hall Boulevard	Scholls Ferry Road	Pfaffle Street	$1,000,000
H	Dartmouth Street	72nd	68th Avenue	$120,000
H	Tigard Street	115th Street	Main Street	$350,000
H	Burnham Street	Main Street	Hall Boulevard	$100,000
H	Fonner Street	walnut Street	121st Avenue	$250,000
H	Commercial Street	Main Street	Lincoln Street	$50,000
M	72nd Avenue	ORE 99W	Bonita Road	$1,200,000
M	Hall Boulevard	North of Hunziker Street	South City Limits	$670,000
M	Beef Bend Road	ORE 99W	Scholls Ferry Road	$1,000,000
M	Barrows Road	Scholls Ferry Road (W)	Scholls Ferry Road (E)	$950,000
L	72nd Avenue	Carman/Upper BoonesFry.	Durham Road	$250,000
			Subtotal	**$7,180,000**
	Annual Sidewalk Program at $50,000 per year for 20 years			**$1,000,000**
			Action Plan Total	**$19,360,000**

Table 11-5
Bicycle Action Plan Improvement List and Cost

RANK*	Project	From	To	Cost
H	Hunziker Street	Hall Boulevard	72nd Avenue	$250,000
H	Bonita Road	72nd Avenue	West of 72nd Ave.	$50,000
H	Burnham Street	Main Street	Hall Boulevard	$135,000
H	Oak Street (RTP 6019)	Hall Boulevard	90th Avenue	$300,000
H	98th Avenue	Murdock Stret	Durham Road	$275,000
H	92nd Avenue	Durham Road	Cook Park	$270,000
H	Tiedeman Avenue	Greenburg Road	Walnut Street	$250,000
M	121st Avenue	Walnut Street	Gaarde Street	$400,000
L	Taylor's Ferry Road	Washington Drive	City Limits	$500,000
L	Washington Drive	Hall Boulevard	Taylor's Ferry Rd	$100,000
L	O'Mara Street	McDonald Street	Hall Boulevard	$275,000
L	Frewing Street	ORE 99W	O'Mara Street	$150,000
			Subtotal	**$2,955,000**
H	Gaarde Street	Walnut Street	ORE 99W	$600,000
H	Hall Boulevard	Scholls Ferry Road	Locust Street	$500,000
H	Greenburg Road	Hall Boulevard	Cascade Avenue	$300,000
H	ORE 99W	East City Limits	South City Limits	$1,300,000
M	72nd Avenue	ORE 99W	South City Limits	$960,000
M	Hall Boulevard	Pfaffle Street	Bonita Road	$550,000
M	Carman Drive	I-5	Durham Road	$200,000
M	Walnut Street	ORE 99W	Barrows Road	$1,400,000
M	Barrows Road	Scholls Ferry Road (W)	Scholls Ferry Rd. (E)	$900,000
L	Bull Mountain Road	150th Avenue	Beef Bend Road	$550,000
L	Beef Bend Road	ORE 99W	Scholls FerryRd.	$1,600,000
			Subtotal	**$8,860,000**
Multi- Use Pathways				
H	Hunziker Link to LO	Linkage to Kruse Way Trail in Lake Oswego		$500,000
M	Fanno Creek Trail	Tualatin River to City Hall, ORE 99W to Tigard		$3,600,000
M	Tualatin River Trail	Adjacent to Cook Park from Powerlines to Fanno		$2,600,000
M	Tualatin River Crossing	Near 108th Avenue		$3,000,000
L	Powerlines Corridor	From Beaverton to Tualatin River Trail		$2,500,000
			Subtotal	**$12,200,000**
		Action Plan Total		**$24,015,000**

***** H=High, M=Medium, L=Low Priority

Table 11-6
Future Street Improvements
(All Projects include sidewalks, bicycle lanes and transit accommodations as required)

Table 11-6 Location	Description	Cost Estimate	Funding Status*
I-5	Widen to 4 plus auxiliary lanes (each direction) between ORE 217 and I-205	$200,000,000	Not Funded Not in any plan
	Provide additional throughput capacity (each direction) south to Wilsonville	$50,000,000	
ORE 217	Widen to 3 lanes plus auxiliary lanes (each direction) between US 26 and 72nd Avenue	$240,000,000	Not Funded In RTP (as widening or HOV or HOT)
	New ORE 217/I-5 interchange between 72nd Avenue and Bangy Road Phase 2	$39,000,000	Phase 1 Funded Phase 2 & 3 in RTP
	Phase 3	$15,000,000	RTP 6027 & 6028
ORE 99W	Widen to 7 lanes (total—both directions) between I-5 and Greenburg Road	$25,000,000	RTP 6039
I-5 to ORE 99W	Connector linking I-5 and ORE 99W (model assumed connector would be located north of Sherwood—specific location to be determined by further study)	$250,000,000	RTP 6005 (Toll Route)
Overcrossings over ORE 217	5 lane overcrossings linking Washington Square and Cascade Avenue—one north of Scholls Ferry Road, one south of Scholls Ferry Road to Nimbus	$40,000,000	RTP 6011 & 6052
	Connector Road Nimbus south to Greenburg	$15,000,000	RTP 6053
Overcrossing of I-5	Widen Carman Drive interchange overcrossing to six lanes from four (two through lanes each way, side by side left turn lanes).	$4,000,000	Not Funded In no Plans
Scholls Ferry Road	Widen to 7 lanes (total—both directions) between ORE 217 and Barrows Road (East)	$30,000,000	To 125th – RTP 6021 West of 125th not funded
	TSM/Corridor Signal Timing/ITS	$500,000	RTP 6025
Greenburg Road	Widen to 4 lanes adjacent to cemetery (Hall to Locust)	$2,500,000	RTP 6015
	Widen to 5 lanes:		
	Locust to Shady Lane	$2,500,000	RTP 6014
	Shady Lane to North Dakota	$2,000,000	RTP 6016
	Tiedeman to ORE 99W	$4,800,000	RTP 6031
Walnut Boulevard	Widen to 3 lanes between 135th (or where Gaarde connects) to ORE 99W	$11,800,000	RTP 6033 & 6034
	Extend Walnut east of ORE 99W to meet Ash/Scoffins and Hunziker Streets (3 lanes)	$19,000,000	Not Funded In no plans

Table 11-6 Location	Description	Cost Estimate	Funding Status*
Gaarde Street	Extend and widen to 3 lanes Walnut to ORE 99W Use access control and 2 lanes in sensitive areas	$4,000,000	RTP 6035
Hall Boulevard	Widen to 5 lanes Scholls Ferry to Locust Widen Hall south of Locust Extend south to Tualatin (3 lanes—total, both directions)	$4,700,000 $4,700,000 $25,000,000	RTP 6013 RTP 6030 RTP 6069
Durham Road	Widen to 5 lanes (total, both directions) between Hall Boulevard and Upper Boones Ferry Road. Reserve right-of-way to the west for 5 lanes	$8,000,000	RTP 6037
Durham Road/Upper Boones Ferry Road intersection	Realign intersection so that Durham Road continues on continous route to I-5/Carmen interchange—Upper Boones Ferry Road would "tee" into Durham Road/Upper Boones Ferry Road intersection	$5,000,000	RTP 6043
72nd Avenue	Widen to 5 lanes: ORE 99W to Hunziker Hunziker to Bonita Bonita to Durham	 $3,000,000 $5,000,000 $5,000,000	Tigard Triangle LID RTP 6040 RTP 6041 RTP 6042
Hunziker/Hampton	Realign Hunziker Road to meet Hampton Road at 72nd Avenue—requires overcrossing over ORE 217—removes existing 72nd Avenue/Hunziker intersection	$10,000,000	RTP 6032
Atlanta Street	Extend Atlanta Street west to meet 72nd Avenue	$2,500,000	To be funded with development in Tigard Triangle (i.e. LID)
Dartmouth Street	Widen to five lanes from ORE 99W to I-5	$750,000	RTP 6045 To be funded by fronting improvements
68th Avenue	Widen to 3-lanes between Dartmouth/I-5 Ramps and ORE 217 Extend 68th Avenue south to meet ORE 217 providing right-in/right-out only access to 68th Avenue from ORE 217, replacing the NB ramps to 72nd at ORE 217	$3,600,000 $15,000,000	Not Funded (could be partially funded by development in Tigard Triangle—ie. LID) RTP 6047
Scoffins/Hunziker/Hall intersection	Realign Scoffins to meet Hunziker at Hall	$1,000,000	Not Funded
Beef Bend Road	131st to King Arthur – 3 lanes Access Control should be implemented to preserve capacity with 2 lanes (with intersection turn lanes). Minimum 1,000 foot spacing should be used between any driveway(s) and/or public street(s) Beef Bend/Elsner from ORE 99W to Scholls Ferry Rd	$5,000,000 $500,000 $24,000,000	RTP 6059 Not Funded Implemented with adjacent development RTP 6111

Table 11-6 Location	Description	Cost Estimate	Funding Status*
Taylors Ferry Road	Extend to Oleson Road	$1,900,000	RTP 6017
Wall Street	New roadway connecting Hunziker Street and Hall Boulevard	$10,000,000	Not Funded
ORE 99W Traffic Signal System/Management	Signal interconnection from I-5 to Durham	$2,000,000	RTP 6054 & 6055
	TOTAL	**$1, 091,750,000**	

***** - RTP cost estimates and project numbers utilized where available

Table 11-7
City of Tigard Future Intersection Improvements

Table 11-7 No.	Intersection	Description	Cost Estimate
1	Davies/Scholls Ferry Road	• Traffic signal • Northbound right turn lane • Realign to meet Barrows Road	$3,230,000
2	North Dakota/125th/Scholls Ferry Road	• Southbound right turn lane • Retain westbound right turn lane when 3rd lane added on Scholls Ferry Road • Change from protected left turn phasing to permitted phasing north/south	$450,000
3	Nimbus/Scholls Ferry Road	• Retain eastbound right turn lane when 3rd lane added on Scholls Ferry Road • Retain westbound right turn lane when 3rd lane added on Scholls Ferry Road • Southbound right turn lane • Reconfigure northbound and southbound lanes to create exclusive left turn lanes • Change from split phasing to protected left turn phasing north/south	$1,150,000
4	121st/Walnut RTP 6033	• Traffic signal • Northbound left turn lane • Southbound left turn lane • Eastbound left turn lane • Westbound left turn lane	$2,150,000
5	121st/North Dakota	• Traffic signal	$150,000
6	Greenburg/Oleson/Hall	• 2nd northbound left turn lane • Extend signal cycle length • Assumes Hall widened to 5 lanes	$550,000
7	Greenburg/Washington Square Road	• Boulevard Treatment • RTP 6015	$2,500,000
8	Main/Greenburg/ORE 99W	• Southbound left turn lane • Retain westbound right turn lane when ORE 99W widened to 7 lanes	$700,000
9	Greenburg/Tiedeman	• Extend signal cycle length • Improved geometry/alignment	$2,050,000
10	Hall/Oak	• Extend signal cycle length	

Table 11-7			
No.	**Intersection**	**Description**	**Cost Estimate**
		• Assumes Hall widened to 5 lanes	$50,000
11	Hall/ORE 99W RTP 6056	• Southbound right turn lane • Northbound left turn lane • Westbound right turn overlap • Retain westbound right turn lane when ORE 99W widened to 7 lanes	$3,700,000
12	ORE 217 NB Ramps/ORE 99W	• Retain eastbound right turn lane when ORE 99W widened to 7 lanes • Retain westbound right turn lane when ORE 99W widened to 7 lanes • 2nd northbound left turn lane	$900,000
13	ORE 217 SB Ramps/ORE 99W	• 2nd southbound right turn lane • Retain eastbound right turn lane when ORE 99W widened to 7 lanes	$400,000
14	Dartmouth/ORE 99W	• Retain eastbound right turn lane when ORE 99W widened to 7 lanes	$200,000
15	72nd/ORE 99W	• Southbound right turn lane • Northbound right turn overlap • Change to protected left turn phasing north/south • Retain eastbound right turn lane when ORE 99W widened to 7 lanes	$500,000
16	68th/ORE 99W	• 2nd westbound left turn lane • Northbound left turn lane • Southbound left turn lane • Change to protected left turn phasing north/south	$1,550,000
17	72nd/Dartmouth	• Traffic signal • Assumes 72nd Avenue and Dartmouth widened to 5 lanes	$150,000
18	68th/Atlanta/Haines	• Traffic signal	$150,000
19	ORE 217 SB Ramps/72nd	• Assumes 72nd Avenue widened to 5 lanes	Roadway Widening
20	72nd/Bonita	• 72nd Avenue widened to 5 lanes	Roadway Widening
21	72nd/Carmen	• 2nd northbound right turn lane	$200,000
22	72nd/Upper Boones Ferry Road	• Assumes Durham/Upper Boones Ferry/72nd widened to 5 lanes	$1,000,000 (Also see Table 11-6a)
23	Hall/Sattler/Ross	• Traffic signal • Northbound left turn lane • Southbound left turn lane	$1,150,000
24	Hall/Durham	• 2nd southbound left turn lane • Widen west of intersection to introduce 5-lane section on Durham (include existing westbound right turn lane)	$1,220,000
25	ORE 99W/McDonald/Gaarde	• Westbound right turn lane	$700,000

Table 11-7			
No.	**Intersection**	**Description**	**Cost Estimate**
		• 2nd Northbound left turn lane	
26	ORE 99W/Beef Bend	• Southbound right turn lane (on ORE 99W) • Adjust cycle length	$250,000
27	Tiedeman/Walnut	• Completed •	
28	Murray/Scholls Ferry Road	• 2nd westbound right turn lane • Add additional southbound lane to achieve 2 southbound left turn lanes and two southbound through lanes • Extend signal cycle length • Changes to protected left turn phasing north/south and east/west	$800,000
29	Beef Bend/Scholls Ferry Road	• Eastbound right turn lane • Northbound left turn lane • Eastbound right turn overlap • Change to protected phasing east/west • Change to split phasing north/south	$850,000
30	Walnut/ORE 99W	• Retain westbound right turn lane when ORE 99W is widened to 7 lanes • Change to protected left turn phasing on Walnut	$250,000
31	72nd/Hampton/Hunziker	• Southbound right turn lane OR eastbound right turn lane • Change to protected left turn phasing all directions	$300,000
32	Durham/Upper Boones Ferry Road	• Reconfigure intersection to make through route between Durham and I-5/Carmen interchange	$1,000,000 (Also see Table 11-6a)
33	Gaarde/Walnut	• Traffic signal • Eastbound right turn lane	$350,000
34	68th/Dartmouth	• Traffic signal	$150,000
35	Carman/I-5 southbound	• Eastbound right turn lane	$200,000
36	Carman/1-5 northbound	• 2nd westbound through lane • 2nd northbound left turn lane • Eastbound separate through and left turn (2) lanes	$500,000
	Safety Enhancements	Several Intersections	$20,000,000
	Pedestrian Crossings	Several Locations	$8,000,000
Total Intersection Improvements			**$57,450,000**

* - Based upon tentative draft RTP preferred improvement list from Metro, reference numbers from November 1998 listing. Planned indicates projects included in the MSTIP, STIP, CIP or approved (1995) RTP funding programs. Not in Plans indicates projects that have not be previously addressed in one of the local or regional transportation improvement plans.

FINANCING ISSUES

The collective funding requirements of the Tigard TSP is outlined by mode in Table 11-8. Based upon current sources of funding, the cost of the needs far exceeds the existing funding projected over the next 20 years. It should be noted that elements of the bicycle and pedestrian project lists that are redundant to the street improvement list were deducted to avoid double counting. A small portion of this difference can be made up by land use development exactions, where unimproved frontage is built to the TSP standards as projects are implemented. A rough estimate of the potential value of fronting development exactions is about $50 million dollars over 20 years, assuming that all the unimproved frontages of roadway projects (sidewalk plus 18 feet of street) identified in this plan were exactions. This would assume that the fronting improvements would **not** be credited to TIF/SDC revenue that is already included in the existing funding outlook. The magnitude of the fronting improvements is such that the City and County will need to develop private/public partnerships to assure the reasonable delivery of future improvements in a timely manner.

Table 11-8
Costs for Tigard Transportation Plan over 20 years (2000 Dollars)

Transportation Element	**Approximate Cost**
Street Improvement Projects*: Current Plans (RTP)	$529,350,000
Unfunded/Not in Plans	$619,850,000
Signal Coordination/ITS Systems ($100,000/yr)	$2,000,000
Road Maintenance (assumes 4% per year growth)	$46,000,000
Bicycle Master Plan (Total $24,015,000)	$15,155,000
Pedestrian Action Plan (Total $19,436,000)	$12,480,000
Pedestrian/School Safety Program ($10,000/yr)	$250,000
Sidewalk Grant Program ($50,000/yr)	$1,000,000
Park-and-ride Expansion (1,000 spaces)	$2,000,000
Commuter Rail (Beaverton-Wilsonville)	$71,500,000
Neighborhood Traffic Management ($50,000/yr)	$1,000,000
TSP Support Documents (i.e., Design standard update, …)	$1,000,000
TDM Support ($25,000/yr)	$500,000
TWENTY YEAR TOTAL in 2000 Dollars	**$1,302,085,000**

* Many of these projects include multi-modal elements built with streets, such as bike lanes and sidewalks. Project costs are included here and not repeated in bicycle and pedestrian costs. While projects in the RTP do not have committed funds, they represent a level of funding that is considered likely over the next 20 years given current funding sources.

Of this total, ten projects on I-5, ORE 217, I-5/ORE 99W connector and ORE 99W (state facilities) represent about $900,000,000 of the total. The remaining projects in Tigard represent about $400,000,000.

The funding sources, which can be used for various modes of transportation are summarized in Table 11-9. Historically, funding sources have been developed to support roadways for automobiles. Few funding sources have been allocated to other travel modes. Other travel modes were commonly implemented as an element of a roadway project, if funded at all. A few funding sources that the City receives for other modes include an allocation of the state motor vehicle fees which come to the City being dedicated to pedestrian/bicycle paths (about $24,000 per year) and a small set aside of the MSTIP funds for bikeways (about $20,000 per year). While federal gas tax funds are specifically allocated to multi-modal and balanced investments in transportation, other sources of funds such as state gas tax cannot be used for anything but highway use. To address these other modes the City will need to specifically seek funds for a balanced transportation system, while managing the overall needs and revenues.

Table 11-9
Fund Source by Project Type

Source	Bicycle	Pedestrian	Streets	Maintenance	Transit
Traffic Impact Fee (TIF) System Development Charges (SDC)	•	•	✓		
Gas Tax/Motor Vehicle Fees					
STATE	•	•	✓	✓	
FEDERAL	✓	✓	✓	✓	✓
Street Utility Fees				✓	
Exaction's	•	✓	✓		
Local Improvement Districts (LID)	•	•	✓		
Tax Increment Financing	✓	✓	✓		
Special Assessments		•	✓	✓	✓
Driveway Fees			✓	✓	
Payroll Employee Tax					✓
Oregon Special Public Works Fund	•	•	✓		✓

• Typically as part of roadway project where other modes are incorporated
✓ Used as a primary source of funding

Current transportation revenue for the City of Tigard is summarized in Table 11-10. Presuming a constant funding level for 20 years, this would potentially fund about $250,000,000 of transportation projects (maintenance, operation, construction). As a comparison to this number, the amount of regional funding allocated to transportation projects in Tigard was calculated using the RTP constrained funding scenario. Approximately $150 million of transportation projects have been identified in the current funding programs.[2] While these numbers are not exactly the same (the numbers from Table 11-10 include all City and local funding sources), they clearly point out that there is a serious shortfall between the cost of the transportation plan and the current funding sources. The transportation plan costs of $1.3 billion are much greater than the best case revenue scenario of about $250 million using existing funding sources. While fronting improvements and exactions have the potential to be roughly $120 million in the best scenario, this leaves a billion dollar gap between needs and reasonably expected revenue.

Table 11-10
Estimation of Available Transportation Funding From Existing Sources
2000 Dollars (approximate)

Source	Approximate Annual Revenue
State Motor Vehicle Fees to City	$1,500,000
County Gas Tax to City	$100,000
TIF to City	$1,200,000
MSTIP with City (approximate)	$2,000,000
State/Federal Fees use in City (approximate, assuming 30% capital allocation)	$5,000,000
ANNUAL TOTAL	**$9,800,000**
20 YEAR Tigard Transportation Bond Potentail	**$50,000,000**
20 YEARS OF CURRENT FUNDING	**$250,000,000**

Exploring Funding Concepts

The gap between transportation plan costs and existing revenue sources creates the need to explore several other concepts. Several options are outlined below:

A. **Reduce the transportation plan costs.** This can eliminate funding shortfalls by deferring or eliminating projects. While some cost reduction is expected in the normal implementation of transportation projects of this size, to meet the total funding shortfall by this strategy would have negative impacts. Lower service levels for all modes of transportation, more extensive congestion, and impacts on community livability would be expected. Depending how much of the plan is eliminated (assuming land use forecasts occur), this strategy could negatively impact the economic potential of Tigard (businesses relocate, people move out and development does not reach modified 2015 forecasts). Additionally, by deferring capital costs of significant projects outside of 20 years it can be expected that the same projects will cost multiples of their estimated costs in the short term. This is similar to deferring roadway maintenance and paying 4 to 5 times the cost of the same improvement by waiting years into the future to act. Rising land costs and the development of vacant land adjacent to roadways, which increases mitigation requirements (dealing with hundreds of residents rather than one

[2]Interim Federal Regional Transportation Plan, Metro, July 1995, Table 7-2.

landowner). Additionally changing water quality/detention needs with Salmon legislation result in higher project costs with time. These increases in cost erode transportation dollars, making deferral of transportation system improvements an unwise choice in managing the public interest.

B. **Build alternative mode projects and eliminate costly road projects.** This strategy is commonly discussed by people as a way to "get people out of their cars". However, the overall future need for transportation in Tigard results from the majority of people using motor vehicles (single occupant vehicles and carpool/vanpools). By not building road projects, the resulting congestion would severely impact bus transit, bicycle and pedestrian travel which all use the same streets as automobiles. The forecast increase in PM peak hour vehicle use in Tigard (about 7,000 to 15,000 additional vehicle trips in 20 years is 5 to 7 times the total existing Tri-Met bus ridership in Tigard. While transit will play a significant role in reducing motor vehicle trips, it is unlikely it could eliminate the need for the majority of roadway projects.

C. **Increase gas tax to meet TSP needs.** The gas tax, although assumed to be the major transportation funding element is one of many sources of funds. It is primarily used to maintain the transportation system not build new local street system capacity. Presently, the state gas tax generates about $2.5 million per year in revenue for the city and the county one cent gas tax generates about $100,000 per year for the city. If all the motor vehicle fees of the state, county and city were increased proportionately to ***by themselves*** fund the Tigard transportation (less ODOT projects) shortfall, it would require an increase of over $0.40 per gallon of gasoline in Tigard. Major increases to motor vehicle fees of this type would likely require voter approval. This amount of gas tax increase by itself would not be reasonable today, and points to the fact that funding will need to be from a variety of sources, not just one fee.

D. **Make development pay for all the difference in future transportation needs since they are caused by growth.** If all the excess funds for Tigard improvements (less ODOT projects) were divided by the increment of trips between 1997 and the year 2015 and Tigard was responsible for the total cost of improvements it would require $8,000 per evening peak trip would need to be charged to all development on top of all existing fees, taxes and exactions. This would double the current TIF by just adding on Tigard's needs. An increase of this type would impact the economic development potential of Tigard since other cities (or states) may not have similar charges. Additionally, many of the transportation projects identified in the TSP serve **existing and** future users. For example, a roadway connection project with sidewalks and bicycle lanes (such as Walnut Street) is beneficial to all system users. This approach would unfairly impose the entire responsibility of TSP implementation on development. Additionally, some improvements are needed even if no growth were to occur, creating a need to fund at least some transportation improvements by other means.

E. **Do not allow land development unless all transportation needs can be funded.** This concept is known as concurrency. This has been implemented in various forms through level of service code amendments required by state laws (Florida and Washington). The examples over the last 15 years of these policies is clear. Funding policy redirects itself to fix capacity problems. Transit, pedestrian, bicycle and other mode facilities are generally not based on capacity but connectivity and access. The outcome in these communities is always larger

roads - from Clark County, Washington to Contra Costa County, California to Boward County, Florida. A balanced transportation system is difficult to develop under concurrency assumptions. Outright development moratoria based upon transportation are difficult to impose given Oregon Planning and property rights laws. Creating extraordinary requirements for development would impact economic vitality and likely move the problem rather than fix it. ODOT has taken positions recently that have opposed rezoning of land if state facilities do not have adequate capacity and funding is not programmed. This is similar to concurrency. It blends assumptions that Comprehensive Plan land uses could be adequately served and that all new/additional vehicle trips are bad for the transportation system. Again, the linkage of concurrency in any form, no matter how simple or appealing, does not produce the most effective or efficient transportation system. This approach defers improvements increasing their eventual cost of implementation. It is a reactive policy, not a progressive plan to reduce overall transportation system costs.

F. **Use bonds to fund transportation needs.** Bonds are commonly used for financing transportation projects (the Westside LRT project property tax levy uses tax receipts to fund bond payments to fund the project). The use of public bonds would require a vote of the public. This type of program would include a list of transportation projects that would be funded and a general time frame for completion. Based upon an estimate of property value in Tigard, the funding gap would require an increase in property tax approximately $500 per year over 20 years for a homeowner of a $200,000 home. If all the transportation improvement in the Tigard area were pass on via bonds to Tigard property owners it would represent over $2,000 per year to a $200,000 home. Because increases to property tax are not generally viewed positively by the public, an extensive public involvement effort would be necessary to coordinate the understanding of need, the extent that the bonds should fund transportation needs and what the actual program elements would include.

In studying various strategies, it is clear a "one size fits all" plan will not succeed. It is recommended that a diversified and pragmatic strategy be developed that reflects political realities, economic needs, community livability and a balanced transportation system. Since transportation funding is not controlled locally, it will require steps to be taken at the state, regional, county and city level to be effective and fair. The following steps are necessary to implement the Tigard TSP.

- Prioritize all transportation projects in Tigard so that the Regional Transportation Plan includes the projects of greatest need. The other projects should be included in preferred and strategic project lists to be eligible to compete for future regional funding. Additionally, as conditions change in the future the need for certain projects may change.

- Use the priority listing to create City of Tigard transportation bond measures – this would have the potential to fund $50 to $100 million over 20 years. The current bond measure would be part of this implementation step.

- Start with funding the highest priority TSP needs on the anticipation that over the next 20 years, new and complementary funding programs will be developed. This is more pragmatic than presuming all projects must have funding commitments today and accommodates changing needs and priorities over time. It is important not to stop everything today until a plan to fully fund all the transportation needs approved. Over time policies and programs in the plan which are intended to reduce vehicle demand can mature and new technologies that improve transportation

efficiency can evolve that may change how much or when funding becomes needed.

- Given the relative size of a gas tax increase to fund transportation improvements in Tigard, a more diverse source of state and regional funding will be needed. Assuming that funding shortfalls can best be paid by gas tax statewide ignores the fact that the rest of the state may not share Tigard's or the Portland region's need to fund transportation. Three steps can be taken including:

  Statewide: Support gradual and incremental increases to the state gas tax are made (about $0.06 to $0.10 per gallon each six to eight years (assumes three increases in 20 years). Support statewide collection and proportional increases to truck fees (presently weight-mile tax and diesel tax in other states).

  Regionally: Support increases to motor vehicle registration and air quality surcharges (payable every two years at DEQ inspection or upon sale of vehicle based upon actual miles driven). These relate the urban needs and problems. However, if air quality improves the nexus of higher fees may be difficult.

  County: Update the TIF to better reflect arterial and collector needs in the county. Credits and fronting improvements will need to be reevaluated, particularly with more and more potential for redevelopment. It can almost be assured that TIF's would need to be increased given the county wide transportation needs. In addition, a program similar to the MSTIP where a property tax levy is used to fund the most significant projects in Tigard (or regionally, as in Washington County) could be done over the next 20 years, potentially funding up to a quarter to a half of the funding shortfall. Additionally, county gas tax and vehicle registration fees could be increased or created.

- Maximize the use of funding sources from smaller pedestrian and bicycle projects. Over a twenty year period the following funding sources could generate a few million dollars which is significant for those modes of travel:

  1. Obtain planning assistance money from the Transportation/Growth Management Program. This could include project grants or planning assistance through "Quick Response" teams. The TGM program is administered by ODOT/DLCD.
  2. ODOT's Bicycle and Pedestrian Program administers two grant programs to assist in the development of walking and bicycling options. Local grants up to $100,000 are shared 80% state/20% local can be useful in filling gaps.
  3. The Oregon Livability Initiative could be a source of funds for further commuter rail planning to Yamhill County.
  4. TEA-21 Congestion Mitigation Air Quality Improvement Program is a source of funds administered by Metro that provides a regional source of money for smaller pedestrian/bicycle projects.

- At a city level, consider needed city code/charter changes to allow broad use of local improvement districts, area SDC's and bond measures to fund elements of the transportation plan. One of the toughest problems for development of concurrency are initial costs for street improvements. Tax increment financing commonly used for redevelopment has nearly been discontinued by public agencies due to tax reduction measures. Tax increment refers to selling bonds to pay for infrastructure that are paid off by the net income of increased tax revenues

created by increased property value. Tax increment financing can be very effective in district level master plans or redevelopment.

- Another bonding concept requiring legislative change, would be to bond sidewalk/fronting improvements in already-developed areas with net proceeds tied to the title on the land such that upon transfer or resale the city is paid back, including interest. Current property owners would benefit from the improvements and could pay off the assessment earlier at their discretion. The city would need to front and back the bonds and if over the bond life resale/transfer does not occur the city would be responsible. Given that the great majority of homes change ownership over 20 years the risks should be minimal. This concept requires further study and legislative review before testing the application.

- Using the development review process to protect the needed right-of-way in the next twenty years to meet transportation system demands is another possible tool. This can reduce the ultimate cost of street improvements. This requires an analysis process (build out assessment or frequent updates) to stay current of future right-of-way needs based upon changing land use (for example, three lanes in 2015 may need to be 5 lanes in 2025). Also known as a corridor set back strategy, this approach helps preserve long term right-of-way needs.

- Develop funding programs (using new motor vehicle fees or other funding sources) to encourage private/public cooperation in funding transportation improvements. This may take several forms and will require more assessment. One example would be establishing a city funding source that can be matched with private funding sources to implement elements of the TSP.

- Roadway pricing strategies may become necessary for the large deficit in ODOT projects in not only the Tigard area, but the Portland region. While tolls would not represent the full deficit, they would (like all the above measures) contribute to funding the needed transportation system. Any road pricing strategy would not be predicated upon past "toll booth" approaches, but would be built on new technology that would not require people to stop and pay (automatic vehicle identification and debiting).