North Bend Transportation System Plan

February 2004

Prepared for

City of North Bend

Submitted by

DKS *Associates*

TRANSPORTATION SOLUTIONS

DKS Associates
TRANSPORTATION SOLUTIONS

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February 19, 2004

Dave Foster
City of North Bend
835 California Avenue
North Bend, OR 97420

Subject: Final North Bend TSP P02221-000

Dear Dave:

DKS Associates is pleased to submit this Transportation System Plan for the City of North Bend. This report reflects comments and revisions collected from the public, the TAC, City Staff, City Council, Planning Commission, ODOT and other interested stakeholders made throughout the draft process.

It has been a pleasure to work with you, and the rest of the TSP team, in developing this plan. We have appreciated your hard work, dedication and guidance in producing a plan that will direct transportation investments in the City of North Bend for years to come and in producing a multi-modal plan that will increase livability and stimulate economic growth for the North Bend/Coos Bay region.

Sincerely,

Carl Springer, P.E.
Principal
***DKS** Associates*
A Corporation

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1. SUMMARY

This Transportation System Plan (TSP) has been developed for the City of North Bend. The purpose of this TSP is to bring the City of North Bend into compliance with the Oregon Transportation Planning Rule.

The plan is a multi-modal plan, addressing improvement to existing roadways, new pedestrian and bicycle facilities, improvement in public transit service, and other modes (including air, rail, water and pipeline). The plan also includes a transportation improvement program, as well as changes to the City's codes and standards to implement the TSP recommendations.

Plan Organization

The plan is organized into four chapters and a Technical Appendix, as described below:

- **Chapter 1—Summary:** An overview of the plan elements, and key findings and recommendations from the plan.
- **Chapter 2—Goals and Policies:** Recommended transportation goals and policies to respond to issues identified through the study process, and to comply with relevant county, state and federal requirements.
- **Chapter 3—The Plan**: The transportation system plan is divided into travel modes (motor vehicle, pedestrian, bicycle, transit, and other) with system wide maps for each and recommended projects.
- **Chapter 4—Financing:** The estimated construction and maintenance costs for recommended transportation projects and program are identified along with the expected revenue from current sources. Suggestions are made to close the gaps in funding needed to implement the plan with the 20-year time horizon.
- **Technical Appendix (separate document)**: Background information, historical and observed data, and technical methods used to develop the plan. Includes chapters formerly included in the plan on Existing Conditions, Future Needs and Alternatives. Also, the city ordinances that are recommended to implement the plan goals, policies and standards are attached in an appendix.

Plan Elements

The Transportation System Plan includes the following major components:

- Modifications to the street functional classification system to reflect current street function and development patterns.
- Modifications to the city street standards, also including access spacing criteria.
- Signal system and intersection improvements, to increase capacity in the roadway system where traffic congestion will become substantial during the next 20 years.
- Expansion of the City's system of pedestrian and bicycle facilities, with the objective of sidewalks or pathways for pedestrians on all collector and arterial streets, and bike lanes or bikeways on major collectors and arterials.

- Street improvement projects mitigating existing and predicted safety, capacity, circulation and other deficiencies.

A total of 44 transportation improvement projects have been identified to be implemented in North Bend over the 20 year planning horizon. These improvements, along with identified transportation enhancement programs (e.g., neighborhood traffic calming) total $28.9 million dollars over the next 20 years. Projects have been prioritized for implementation for the short-term and long-term time frames. To achieve this program, new transportation funding sources—federal, state and/or local—will be required. An added $18.9 million over the next 20 years (beyond the current funding programs) will be required. A summary of the number of projects, estimated costs, and balance of revenue versus plan funding needs is shown in Table 1-1.

Table 1-1: Transportation System Plan Cost Summary

Mode	Number of Projects	Estimated Cost (Million 2003 dollars)
Motor Vehicle	10	$19.5
Bicycle	14	$2.5
Pedestrian	20	$3.7
Other Programs		$3.2
Total		**$28.9**
Annual Existing Revenue (x 20 years)		**$10.0**
Current Plan Deficit Funding		**$18.9**

2. GOALS AND POLICIES

These goals and policies have been developed to guide the City's twenty-year vision of transportation system needs. This chapter summarizes the updated goals and policies by the City of North Bend and includes comments to date from the public, technical and citizen advisory committees. There are seven transportation goals with related policies organized under each goal. The goals and policies are not prioritized. These goals and policies have been developed, in part, based on previously developed plans, policies and standards for the City of North Bend. A review of these can be found in the Appendix.

The goals are brief guiding statements that describe a desired result. The policies describe the actions needed to move the community toward the goal. Below many of the policies, italic text provides details of the implementing actions and clarifies the intent of the policy. The transportation goals and policies are implemented by these actions, by the improvement projects included in the master plans and action plans for each transportation mode, and by the Development Code.

Street standards for improvements are typically found in the Development Code and Engineering Design Manual and Standard Drawings. Street standards have been prepared as part of this TSP process.

Goal #1: Transportation facilities designed and constructed in a manner to enhance North Bend's livability and meet federal, state, regional, and local requirements.

Policies:

a) Maintain the livability of North Bend through proper location and design of transportation facilities.

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

Recognizing that the magnitude and scale of capital facilities also affect aesthetics and environmental quality, the City will require design plans and impact analyses as specified in the Development Code.

b) Consider noise attenuation in the design, redesign, and reconstruction of arterial streets immediately adjacent to residential development.

c) Protect neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas. Build streets to minimize speeding.

Action:
Develop and maintain street design standards and criteria for neighborhood traffic management for use in new development and existing neighborhoods

d) New commercial and industrial development shall identify traffic plans for residential streets where increased cut-through traffic may occur due to the proposed development.

e) Designate major tourist routes for provisions of enhanced streetscape and directional markings.

Action:
Develop and maintain tourist route standards on major travel routes.

Goal #2: A balanced transportation system.

Policies:

a) Implement North Bend's public street standards that recognize the multi-purpose nature of the street right-of-way for utility, pedestrian, bicycle, transit, truck, and auto use, and recognize these streets as important to community identity as well as providing a needed service.

b) Develop and provide a safe, complete, attractive, efficient, and accessible system of pedestrian ways and bicycle ways, including bike lanes, shared roadways, multi-use paths, and sidewalks according to the pedestrian and bicycle system maps and the Development Code and Engineering Design Manual and Standard Drawings requirements.

c) Provide connectivity to each area of North Bend for convenient multi-modal access. Ensure pedestrian, bicycle, transit, and vehicle access to waterfront, schools, parks, employment and recreational areas by identifying and developing improvements that address connectivity needs.

d) Develop neighborhood and local connections to provide adequate circulation into and out of neighborhoods.

e) The permanent closure of an existing road in a developed neighborhood to through traffic is not recommended and will be considered by the City only under the following circumstances: as a measure of last resort, when the quality of life in the neighborhood is being severely threatened by excessive traffic volumes or the presence of a traffic safety hazard; or as part of a plan reviewed through the City's land use and/or site development process(es), including capital improvement projects. Planned roads that have not been built in neighborhoods should be retained as indicated in the Local Street System Plan maps.

f) Design arterial and collector streets to accommodate pads for public transit and to provide convenient access to transit stops.

Action:
Work with Coos County Area Transit (CCAT) to improve transit service, pedestrian facilities leading to transit stop waiting areas, and to make the waiting areas themselves safe, comfortable, and attractive.

Goal #3: A safe transportation system.

Policies:

a) Improve traffic safety through a comprehensive program of engineering, education, and enforcement.

b) Design streets to serve anticipated function and intended uses as determined by the Comprehensive Plan.

Action:
Maintain a functional classification system that meets the City's needs and respects the needs of other agencies including but not limited to Coos County, and ODOT.

c) Where on-street pedestrian and bicycle facilities cannot reasonably be provided on highways and arterials, identify parallel routes that comply with state and city planning and design standards.

d) Enhance safety by prioritizing and mitigating high collision locations within the City.

Action:
Work with ODOT and Coos County to periodically review traffic collision information in an effort to systematically identify, prioritize, and remedy safety problems.

e) Designate safe routes from residential areas to schools.

Action:
The City should work with area schools and the community in developing safe transit, pedestrian, and bicycle routes to schools. Communicate selected safe school route program to community. Improvement projects near schools shall consider school access and safety during project development.

f) Provide satisfactory levels of maintenance to the transportation system in order to preserve user safety, facility aesthetics, and the integrity of the system as a whole.

Action:
Periodically review pavement maintenance system data to update roadway paving budgets, and prioritize facilities with highest need for services.

g) Maintain access management standards for streets consistent with City, County, and State requirements to reduce conflicts between vehicles and trucks, and between vehicles and bicycles and pedestrians.

Action:
Preserve the functional integrity of the motor vehicle system by limiting access per City standards.

h) Ensure that adequate access for emergency services vehicles is provided throughout the City.
Action:
Develop Neighborhood Traffic Management standards based on functional classification to preserve primary response routes.

i) Meet federal and State safety compliance standards for operation, construction, and maintenance of the rail system.

j) Provide safe routing of hazardous materials consistent with federal guidelines, and provide for public involvement in the process.
Action:
Work with federal agencies, the Public Utility Commission, the Oregon Department of Environmental Quality, public safety providers, and ODOT to assure consistent routes, laws, and regulations for the transport of hazardous materials.

Goal #4: An efficient transportation system that reduces the number and length of trips, limits congestion, and improves air quality.

Policies:

a) Support and implement trip reduction strategies developed regionally, including employment, tourist, and recreational trip reduction programs.

Action:
Continue to implement the following action plan to work toward achieving these targets:

- *Encourage development that effectively mixes land uses to reduce vehicle trip generation.*
- *Develop consistent conditions for land use approval that require future employment related land use developments to agree to reduce peak hour trip making through transportation demand management strategies.*
- *Implement the bicycle, transit, pedestrian, and motor vehicle master improvement plans [to be developed in this study] to implement a convenient multimodal transportation system.*

b) Maintain levels of service consistent with the Oregon Transportation Plan. Reduce traffic congestion and enhance traffic flow through such measures as intersection improvements, intelligent transportation systems, signal synchronization, and other similar measures.

Action:
Adopt level of service standards that are consistent with State and County standards.

c) Maintain levels of service or minimum performance thresholds identified by responsible service providers for non-roadway facilities including rail, air, and marine activities.

Action:
Work with Port of Coos Bay, North Bend Municipal Airport, and Central Oregon Railroad to establish appropriate performance thresholds for their respective facilities.

d) Plan land uses to increase opportunities for multi-purpose trips (trip chaining).

e) Require land use approval of proposals for new or improved transportation facilities. The approval process shall identify and consider the project's identified impacts.

f) Support mixed-use development where zoning allows.

g) Work with Coos County Area Transit to encourage the development of transit improvements, improve access and frequency of service, and increase ridership potential and service area.

Goal #5: Transportation facilities that serve and are accessible to all members of the community.

Policies:

a) Construct transportation facilities to meet the requirements of the Americans with Disabilities Act.

b) Support Coos County Area Transit and other transit service provider's efforts that respond to the transit and transportation needs of the elderly and disabled.

Goal #6: Transportation facilities that provide efficient movement of goods and services.

Policies:

a) Designated arterial streets and highway access are essential for efficient movement of goods. Design these facilities and adjacent land uses to reflect the needs of goods movement.

b) Consider existing railroad and air transportation facilities to be City resources and reflect the needs of these facilities in land use decisions.

c) Develop a freight system that takes advantage of the efficiencies of each transportation mode.

Goal #7: Implement the transportation plan by working cooperatively with federal, State, regional, and local governments, the private sector, and residents. Create a stable, flexible financial system.

Policies:

a) Coordinate transportation projects, policy issues, and development actions with all affected governmental units in the area. Key agencies for coordination include : Coos Bay, Port of Coos Bay, Coos County, ODOT, and Coos County Area Transit.

b) Participate in implementing regional transportation, growth management, and air quality improvement policies. Work with agencies to assure adequate funding of transportation facilities to support these policies.

c) Monitor and update the Transportation Element of the Comprehensive Plan so that issues and opportunities are addressed in a timely manner. Maintain a current capital improvement program that establishes the City's construction and improvement priorities, and allocates the appropriate level of funding.

d) Develop and use the street utility fee as an element of an overall funding program to pay for maintenance on the collector and arterial street system.

e) Establish rights-of-way at the time of site development and, where appropriate, officially secure them by dedication of property.

f) Working in partnership with ODOT, and other jurisdictions and agencies, develop a long-range financial strategy to make needed improvements to the transportation system and support operational and maintenance requirements.

Action:

The financial strategy should consider the appropriate elements such as share of motor vehicle fees, impact fees, property tax levies, and development contributions to balance

needs, costs, and revenue. View the process of improving the transportation system as that of a partnership between the public (through fees and taxes) and private sectors (through exactions and conditions of development approval), each of which has appropriate roles in the financing of these improvements to meet present and projected needs.

g) Provide adequate funding for maintenance of the capital investment in transportation facilities.

Action:
Develop a long-term financing program that provides a stable source of funds to ensure cost-effective maintenance of transportation facilities and efficient effective use of public funds.

3. THE PLAN

This Chapter of the North Bend Transportation System Plan summarizes the plan as it has been developed in the previous five chapters. This chapter provides plans for each mode, including the following:

- Motor Vehicle Related Plans: Elements included an updated functional classification system, street design standards for each functional class and street width, traffic signal master plan, street lane requirements (i.e. number of travel lanes to plan for), local street connectivity plan, future road improvement needs (circulation/segment and intersection), neighborhood traffic management, parking, access management, transportation demand management, transportation system management, and trucks.
- Bicycle Action Plan
- Pedestrian Action Plan
- Transit Plan
- Other Modal Plans (Rail, Air, Water, Pipeline)

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. Arterial facilities 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 3-1).

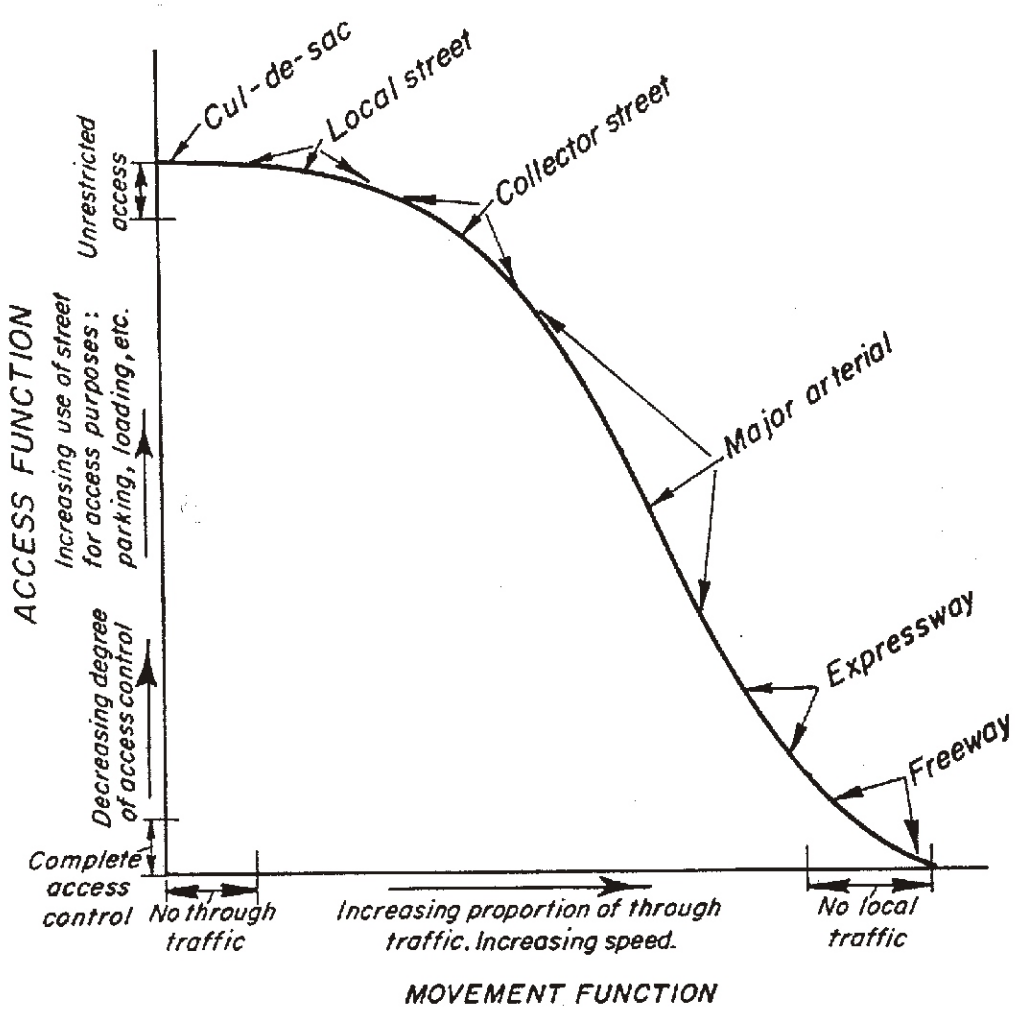
Functional classification has commonly been mistaken as a determinate for traffic volume, road size, urban design, land use and various other features that collectively are the elements of a roadway, but not its function. For example, the traffic on a roadway can be more directly related to land uses 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 movement of persons, goods and services depends on an efficient 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 then define all other routes as local streets, providing the highest level of access to adjoining land uses. These routes do not connect at any significant regional, citywide or district level.

Recent work in the area of neighborhoods and their specific street needs provides 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 level between collector and local streets 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] neighborhood routes are commonly used by residents to circulate into or out of 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 and 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 3-1
STREET FUNCTION RELATIONSHIP

In the past, traffic volume and roadway size were linked to functional classification. More recently, urban design and land use have also been tied to functional classification. The planning effort to identify connectivity of routes in North Bend is essential to preserve and protect future mobility and access, by all modes of travel. In North Bend, 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 new) in North Bend. The outcome would be intolerable delays and much greater costs to address solutions later rather than sooner. By planning an effective functional classification of North Bend 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 33 to 67 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. North Bend'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 North Bend. The adopted land uses in North Bend have been used in this study, working with the ODOT regional forecasts for growth in the region for the next 20 years. 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 North Bend'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 to the city in lieu of functional classification.

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

Functional Classification Definitions

The proposed functional classification of streets in North Bend is represented by Figure 3-3. Any street not designated as 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 connectivity. These routes connect over the longest distance (sometimes 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]

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 in lieu of a well placed arterial street. Many of these routes connect to cities surrounding North Bend.

Collector streets provide both access and circulation within 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 and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system.

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.

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 North Bend and Coos County's functional classification. Table 3-2 summarizes the major differences between the proposed functional classification and the existing designations for streets in North Bend. This table also outlines the streets that were previously designated collectors that are now identified as neighborhood routes. Additionally, this figure identifies circulation/realignment study areas. These are areas where no clear solution has been identified. There are a variety of options that need to be explored in these areas and they will require further study.

The criteria used to assess connectivity 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

[4] Oregon Highway Plan, ODOT, 1991, Appendix A.

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 3-2: Proposed Changes to Existing Roadway Functional Classification

Street	*Existing Class*	*Proposed Class*
Broadway St	Major Arterial	Arterial
Newmark St	Major Arterial	Arterial
Newmark St	Minor Arterial	Arterial
Sheridan Ave	Major Arterial	Principal Arterial
Sherman Ave	Major Arterial	Principal Arterial
Sherman Ave	Minor Arterial	Arterial
US 101	Major Arterial	Principal Arterial
Virginia Ave	Major Arterial	Arterial

Street Design Standards

The design characteristics of streets in North Bend were developed to meet the function and demand for each facility type. Because the actual design of a roadway can vary, 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. Figure 3-3 shows streets where right-of-way should be reserved for more than two lanes. Figures 3-4 to 3-6 depict sample street cross-sections and design criteria for arterials, collectors, neighborhood routes and local streets. The arterial street section indicates a range of sidewalk width. The actual width constructed would reflect right-of-way constraints and land use policies.

The analysis of capacity and circulation needs for North Bend outlines several roadway cross sections. The most common are 2, 3 and 5 lanes wide. Where center left turn lanes are identified (3 and 5 lane sections), the actual design of the street may include sections without center turn lanes (2 or 4 lane sections) 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 that will be used in establishing right-of-way needs for the development review process.

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 3-3 summarizes the North Bend 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 3-4, Table 3-5 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 (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).

These cross sections are provided for guiding discussions that will update the City of North Bend Standard Specifications for Public Works Construction. The City of North Bend will need to coordinate with other regional agencies to assure consistency in cross section planning as the County Transportation Plan moves forward.

DKS *Associates*

City of North Bend Transportation System Plan

Pacific Ocean

Coos Bay

Coos Bay

North Bend Municipal Airport

Lower Empire Lake

Upper Empire Lake

Lake Merrit

Transpacific Pkwy

East Bay Rd

US 101

Colorado Ave

Arthur St

Oak St

Maple St

Virginia Ave

Fenwick St

Connecticut Ave

Sherman Ave

Sheridan Ave

Meade Ave

Lakeshore Dr

Morrison St

17th St

16th St

Broadway St

Crowell Ln

Pacific Ave

Pony Creek Rd

Brussells St

Newmark Ave

Newmark St

Empire Blvd

Ocean Blvd

Thompson Rd

Woodland Dr

Koosbay Blvd

10th St

Hillside Ct

Juniper Ave

Hemlock Ave

Butler Rd

Legend

Proposed Functional Class

- Principal Arterial
- Arterial
- Arterial (Not yet constructed)
- Collector
- Collector (Not yet constructed)
- Neighborhood Route
- Neighborhood Route (Not yet constructed)
- Local
- Circulation/Realingment Study Area
- North Bend City Limits

Source:
-ODOT
-City of Coos Bay
-City of North Bend

Figure 3-2
Proposed Functional Classification

N

NOT TO SCALE

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City of North Bend Transportation System Plan

Pacific Ocean

Coos Bay

Coos Bay

North Bend Municipal Airport

Lower Empire Lake

Upper Empire Lake

Lake Merrit

Transpacific Pkwy

East Bay Rd

US 101

Sherman Ave

Colorado Ave

Arthur St

Oak St

Maple St

Virginia Ave

Connecticut Ave

Meade Ave

Sheridan Ave

Fenwick St

Lakeshore Dr

Broadway St

Crowell Ln

Pacific Ave

Pony Creek Rd

Brussells St

17th St

16th St

Morrison St

Newmark Ave

Newmark St

Empire Blvd

Ocean Blvd

Woodland Dr

Thompson Rd

Koosbay Blvd

10th St

Hillside Ct

Juniper Ave

Hemlock Ave

Butler Rd

Legend

Planned ROW Needs

- 2/3 Lanes
- 4/5 Lanes
- North Bend City Limits

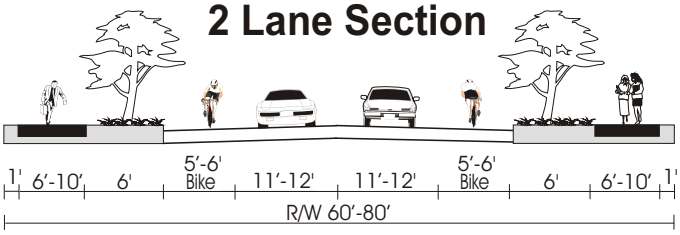
Source:
-ODOT
-City of Coos Bay
-City of North Bend

Figure 3-3
Streets Where ROW Is Planned For More Than Two Lanes

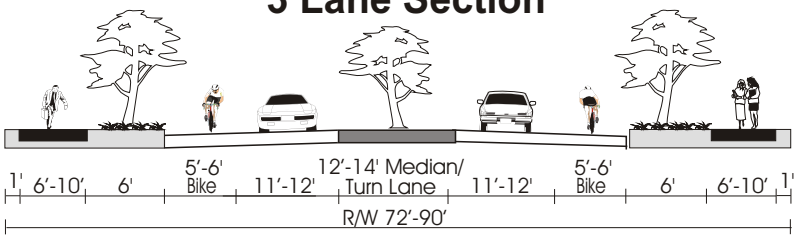
N

NOT TO SCALE

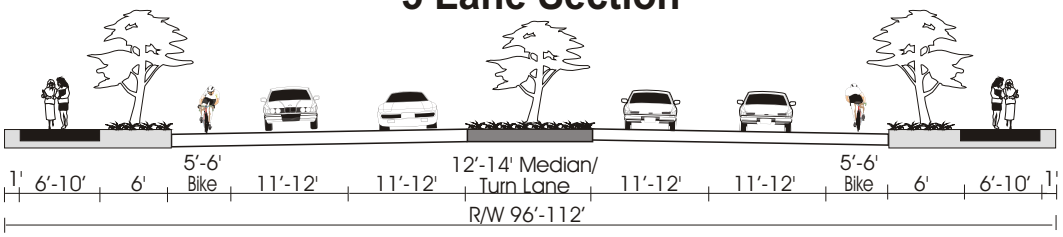
2 Lane Section



3 Lane Section



5 Lane Section



Arterial & Collector Proposed Street Design Characteristics
(typically minimums unless stated otherwise)

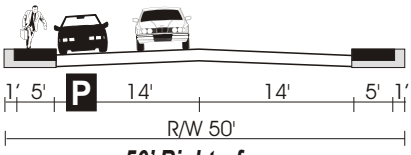
Characteristic	Arterials	Collectors
Vehicle Lane Widths (Truck Route - 12 ft.) (Bus Route - 11 ft.) (Turn Lane - 12-14 ft.)*1	12 ft.	11 ft.
On-Street Parking	8 ft.	
Bicycle Lanes (minimums)	New Construction - 6 ft. Reconstruction - 5-6 ft.	
Sidewalks (minimums)	6-10 ft.	6-8 ft.
Landscape Strips	Optional (compensate with wider sidewalk on arterials & collectors if omitted)	
Medians	5-Lane - Required 3-Lane - Optional	
Neighborhood Traffic Management (NTM)	Only Under Special Conditions	Under Special Conditions
Transit	Appropriate	
Turn Lanes	When Warranted *2	
Access Control	See Later Discussion	

Notes:

1. *In constrained conditions on collectors, neighborhood and local routes, a minimum width of 10 feet may be considered (except on bus routes). 14-feet is desirable for continuous two-way left turn lanes.*
2. *Turn lane warrants should be reviewed using Highway Research Record No. 211, NCHRP Report No. 279 or other updated/superseding reference.*

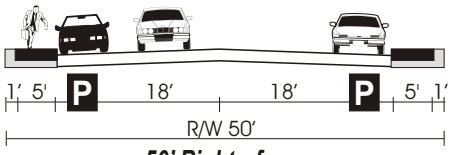
Figure 3-4
ARTERIAL/COLLECTOR STREETS
NORTH BEND
SAMPLE STREET CROSS SECTIONS

28' Standard Residential



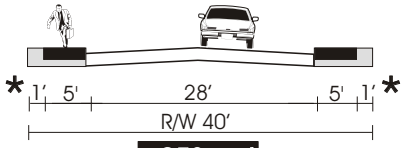
50' Right-of-way
<1,000 vpd

36' Neighborhood Residential



50' Right-of-way
<1,000 vpd

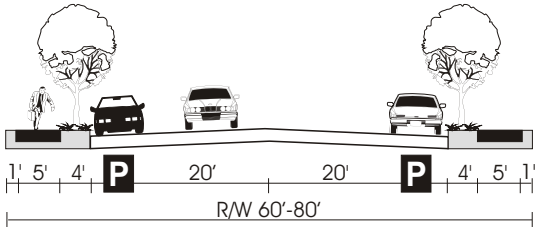
Cul-de-sac



<250 vpd

* - *Adjacent to private landscape*

40' Standard Commercial/Industrial



60'-80' Right-of-way

Local Proposed Street Design Characteristics
(typically minimums unless stated otherwise)

Characteristic	Neighborhoods	Locals
Vehicle Lane Widths (Bus Route - 11 ft.)	10 ft.	9 - 10 ft.*2
On-Street Parking	8 ft.*3	
Sidewalks (minimums)	5 ft.	5 ft.
Medians		
Neighborhood Traffic Management (NTM)	Should Consider	Should Not be Necessary
Transit	Special Circumstances	Not Appropriate
Turn Lanes		
Access Control		

Notes:

1. *In constrained conditions on collectors, neighborhood and local routes, a minimum width of 10 feet may be considered (except on bus routes).*
2. *9 foot lanes would only be used in conjunction with on-street parking.*
3. *For local residential streets, the City recognizes that there will not be 20 feet of unobstructed pavement.*

Legend

P - *On-street Parking Lane*

Figure 3-5
LOCAL STREETS
NORTH BEND
SAMPLE STREET CROSS SECTIONS

Flags and Flowers Program[5]

In considering the transportation picture, it is important not to discount the importance of an aesthetically pleasing, safe, well maintained streetscape. Improvements in this area – in line with design guidelines that combine visual appeal with access and practicality – help to jump-start the chain reaction of business refurbishment, development and growth, by contributing to an environment that encourages positive change.

The Flags & Flowers program developed by the South Coast Development Council's Tourism Committee targets both appearance and access along our community's major traffic corridor (Highway 101) and at key gateway points such as the city limits and the airport terminal. Strategic placements of attractive lighting and flower baskets, seasonal flags and banners, and landscaping elements will lend a needed boost to business districts while visually "softening" industrial properties. As foot traffic to these areas can be expected to increase, the plan also includes greatly improved pedestrian facilities, with new or upgraded sidewalks and better handicap access. This pedestrian improvement helps to diversify the area's transportation mix and is very much in line with this Transportation System Plan.

All Flags & Flowers components are designed to be implemented in phases, allowing for minimal disruptions in the initial stages and easy expansion to other areas as development increases. These design elements will enhance both transportation flow and economic development, and inclusion of the Flags & Flowers standards in the Transportation Plan is strongly recommended.

The proposed elements of these designs will need to be coordinated with ODOT since there are strict standards that must be followed for many of these items.

Connectivity / Local Street Plan

Much of the local street network in North Bend already exists and, in many cases, it is fairly well connected. In other words, multiple access opportunities exist for entering or exiting neighborhoods. However, there are several locations in North Bend 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. 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 North Bend, 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 areas where there is a significant amount of undeveloped land. Figure 3-6 shows the proposed Local Street Connectivity Plan for North Bend. In some 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 dashed lines 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. In other cases, the arrow reflects a pending in-fill development project's proposed street alignment.

The criteria used for providing connections is as follows:

- Every 300 to 500 foot grid for pedestrians and bicycles

[5] Text provided by South Coast Development Council's Tourism Committee, June, 2003.

- Every 500-1,000 foot 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.

The dashed lines shown on the local connectivity figures indicate priority connections only. Topography, railroads and environmental conditions limit the level of connectivity in North Bend. Other stub end streets in the City's road network may become cul-de-sacs, extended cul-de-sacs or provide local connections. Connections from these stub end streets could be deemed appropriate and beneficial to the public, as future development occurs. The goal would continue to be improved city connectivity for all modes of transportation.

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City of North Bend Transportation System Plan

Pacific Ocean

Coos Bay

Coos Bay

Lake Merrit

North Bend Municipal Airport

Upper Empire Lake

Lower Empire Lake

Transpacific Pkwy

East Bay Rd

US 101

Colorado Ave

Virginia Ave

Connecticut Ave

Newmark Ave

Newmark St

Thompson Rd

Ocean Blvd

Lakeshore Dr

17th St

16th St

Crowell Ln

Juniper Ave

Hemlock Ave

10th St

Arthur St

Fenwick St

Oak St

Maple St

Broadway St

Pacific Ave

Meade Ave

Sheridan Ave

Sherman Ave

Pony Creek Rd

Brussells St

Morrison St

Empire Blvd

Woodland Dr

Koosbay Blvd

Butler Rd

Hillside Ct

Legend

- Potential Local Street Connections
- North Bend City Limits

Source:
-ODOT
-City of Coos Bay
-City of North Bend

Figure 3-6
Local Street Connectivity

N

NOT TO SCALE

Motor Vehicle Improvement Plans

Circulation/Capacity Needs

The motor vehicle capacity and circulation needs in North Bend were determined for existing and future conditions. The process used for analysis is described in Technical Memorandum entitled "Existing and Future Traffic Volumes", which can be found in the appendix of this plan. The findings and recommendations of the analysis are presented below. The extent and nature of the street improvements for North Bend are generally consistent with current transportation plans. 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. Most importantly, it should be understood that the improvements outlined in the following section are a guide to managing growth in North Bend, defining the types of right-of-way and street needs that will be required as development occurs.

Model Forecasts

Existing conditions were identified in Chapter 3. Future capacity needs were developed using a detailed travel demand forecast tool, based on a travel demand model developed for the North Bend area by ODOT. Evening peak hour traffic volumes were forecast for the future (year 2020) scenario for the North Bend area. The 2020 test was performed on a street network which included existing roads, plus those improvements which are currently funded and would likely be implemented before the 2020 scenario is reached.

In general, traffic volumes were typically up around 15 percent citywide over the 20 year horizon.

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.

Forecasts of 2020 traffic volumes were developed using the forecast model. These data were reviewed and refined to produce detailed year 2020 PM peak hour traffic forecasts at intersections. When assigned to the roadway network, this level of traffic growth is expected to create the need for improvements at only a few locations. Intersection levels of service under year 2020 base future conditions were summarized in Appendix B and have been incorporated into the recommended street improvements described below.

System Alternatives

The transportation improvements and programs developed through the existing and future needs analyses of the transportation system plan process were reviewed to consider effectiveness and priorities for implementation. Three groups of system alternatives were assembled for this purpose:

1) **No Build** – Only projects with previously committed funding from city, county or state would be included;
2) **Priority** – Projects with relatively higher benefits and relatively lower implementation costs to the city would be included;
3) **Full Build** – All the projects and programs identified in the transportation system plan would

be included, with the assumption that necessary funding could be secured.

The first and third groups of projects were readily identified from the previous analysis. The middle group (Priority) was assembled based on how well each proposed project or program element influence compliance with the seven transportation goals established for the city, and previous analysis about project need. Table 3-3 summarizes these influences for the city based on the general types of projects proposed. The most influential projects across all of the goals relate to pedestrian, bicycle and safety/access management improvements. The next most influential is roadway capacity improvements. In addition to these policy compliance considerations, the system improvements for pedestrian, bicycle and motor vehicle were divided into near-term (Action Plan) and long-term (Master Plan) categories based on performance standards (e.g., distance to major ped/bike generator, or the estimated year where demands would exceed minimum v/c ratio standards). The elements of each System Alternative are described in the next section.

Table 3-3: Influence of Recommended Transportation Improvements on Major Transportation Goals

Transportation Goals	Roadway Capacity	Safety / Access Mgmt,	Sidewalk Construction / Pedestrian Crossings	Bike Facilities	Neighborhood Traffic Mgmt.	Transportation System Management
Goal #1: Transportation facilities designed and constructed in a manner to enhance Coos Bay's livability and meet federal, state, regional, and local requirements.	◐	●	●	●	◐	
Goal #2: A balanced transportation system.	●		●	●		
Goal #3: A safe transportation system		●	◐	◐	○	
Goal #4: An efficient transportation system that reduces the number and length of trips, limits congestion, and improves air quality.	◐		◐	◐		◐
Goal #5: Transportation facilities that serve and are accessible to all members of the community.			●	●		
Goal #6: Transportation facilities that provide efficient movement of goods and services.	●	◐				●
Goal #7: Implement the transportation plan by working cooperatively with federal, State, regional, and local governments, the private sector, and residents. Create a stable, flexible financial system.	○	◐	○	○		

● **Substantial Influence**

◐ **Moderate Influence**

○ **Minimal Influence**

Road Improvements

The improvements that would mitigate 2020 conditions are described in Table 3-3. Projects have been categorized as Action Plan (high priority near-term projects) and Master Plan (longer-term) projects. The Action Plan (Table 3-3) consists of projects that the City should actively try to fund in the next ten years. More specific prioritization should occur in coordination with the CIP process. All improvements on arterials and collectors shall include sidewalks, bike lanes and transit facilities.

Based upon the evaluation of intersection level of service, none of the study intersections operate at worse than level of service D in the 2020 evening peak hour with planned improvements. In general, the existing roadway network will be sufficient to accommodate the growth predicted for the 20-year period. The primary needs in North Bend are to correct existing safety deficiencies as identified previously in the plan and to plan for and accommodate other modes of transportation, including bicycles, pedestrians and transit. Table 3-4 and Figure 3-7 summarize the future street and intersection improvements that will be required in the next 20 years.

Table 3-34: Future Street/Intersection Improvements

No.	Location	Description	Funding Status
Action Plan Projects			
A	Newmark/Broadway	Add 2nd eastbound left turn lane, northbound right turn lane, develop and construct access management plan (median which restricts access to driveways to right-in/right-out only), upgrade traffic signal, add advance traffic signal head on westbound approach for better visibility. Reconfigure travel lanes and right of way to eliminate "Deadman's Curve."	Not Funded
B	Newmark between Broadway and Sherman	Restripe existing four lane roadway to include two travel lanes, a center left turn lane and bike lanes in both directions	Not Funded
C	Virginia Avenue between Harrison Avenue and Sherman	Restripe existing four lane roadway to three lanes to allow for bike lanes and left turn lanes at cross-streets. Install traffic and pedestrian signal at Meade Avenue. Install interconnect to traffic signals between Harrison and Sherman. Narrow Meade Avenue approach to Virginia to 40 feet to reduce crosswalk length	Not Funded
E	Virginia/Meade Avenue	See project C above	Not Funded
F	Sherman/Virginia	Implement a one-second all-red phase in the traffic signal phasing to help eliminate this problem.	Not Funded
G	Newmark Avenue between City Limits and Broadway/Woodland	Restripe to include bike lanes. Consolidate access to retail uses where possible.	Not Funded
H	McCullough Bridge	Conduct design studies as soon as possible	Not Funded
J	Ferry Road/Sherman (US 101)	Install left turn lane on US 101.	Not Funded
Master Plan Projects			
D	Virginia Avenue/Pony Village Entrance	Construct traffic and pedestrian signal at driveway nearest to Taco Bell. Construct raised center median between signal and other Pony Village Mall driveway to restrict driveways to right-turns only.	Not Funded
I	Washington/Sheridan (US 101)	Evaluate alternative solutions to confusing access from highway down to waterfront.	Not Funded

Note: All projects include sidewalks, bicycle lanes and transit accommodations as required.

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City of North Bend Transportation System Plan

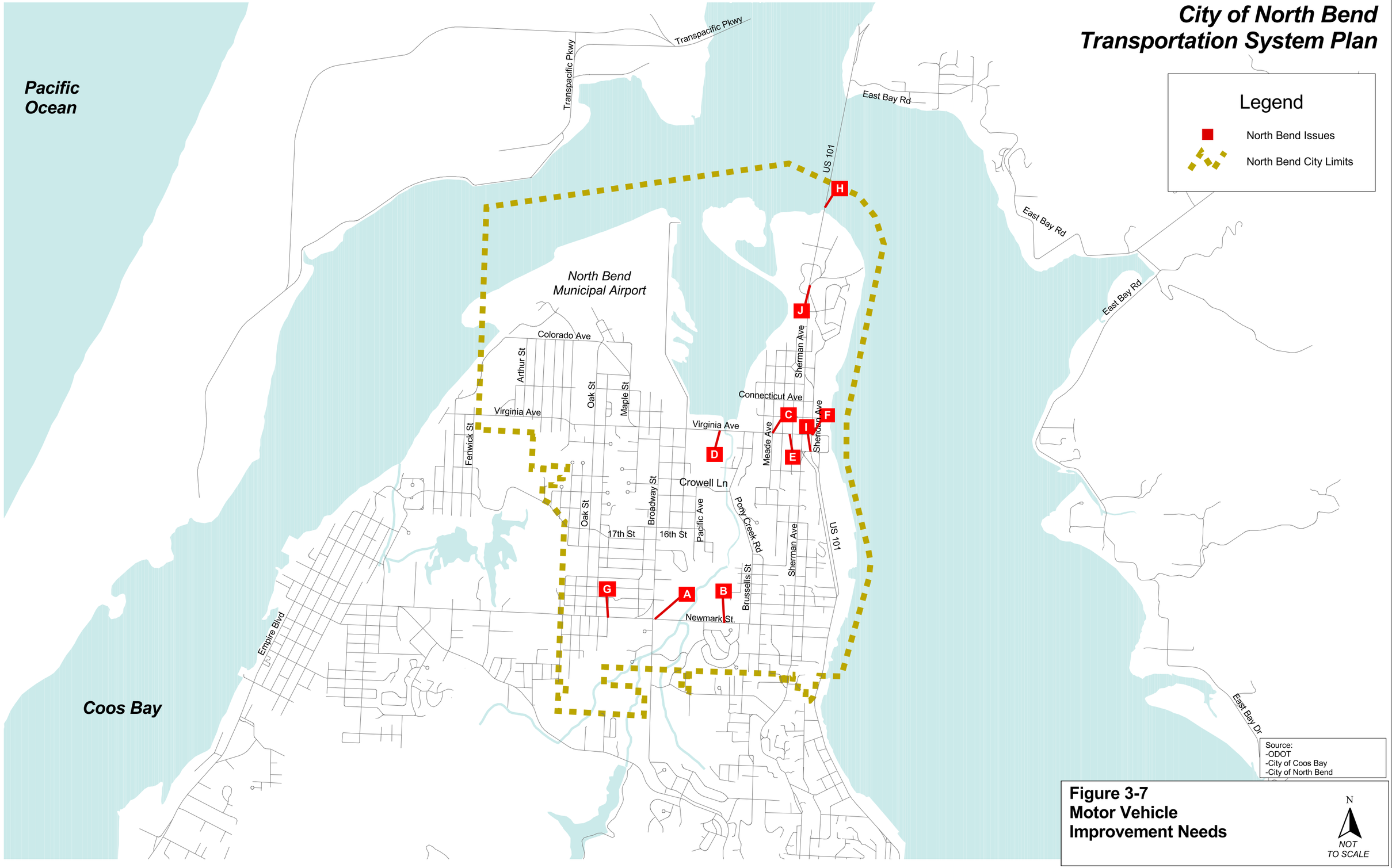

Figure 3-7
Motor Vehicle Improvement Needs

Special "Issue" Areas

McCullough Bridge Capacity Analysis

An analysis has been conducted to determine operating status of the McCullough Bridge. This analysis is based on work done in the BATS study (1995). Since that study was completed, a new edition of the Highway Capacity Manual (HCM) was published, and the methods now recommended for assessing highway level of service has been changed. The latest method is highly dependent on percent no-passing zones to determine level of service, and this approach is not appropriate for the bridge, where no passing is allowed. Therefore, the previous 1985 HCM methodology was applied.

The BATS study assumed an hourly bridge capacity of 1,360 vehicles per direction. Our evaluation determined that this was derived by assuming an ideal capacity of 2,800 (both directions), with capacity reducing adjustments for the following conditions:

- Three percent heavy vehicle factor
- Level terrain
- An evenly split directional distribution and
- Standard lane widths (12 feet)

Current data show that heavy vehicles account for more like 10 percent of the total traffic (including everything with 3 or more axles), resulting in a directional capacity of 1,274 vehicles hourly. Based on the more recent data, we recommend that the peak hourly directional capacity of the bridge be changed to 1,274 vehicles per hour. ODOT's volume threshold for this facility is 70% of capacity[6], or 892 vehicles per hour per direction. Current volumes are 786 vehicles hourly southbound and 956 vehicles hourly northbound in the evening peak hour. Table 3-5 summarizes current volumes, calculated capacity, ODOT's Volume Threshold and how the current volumes relate to capacity and ODOT's Volume Threshold.

Table 3-5: McCullough Bridge Capacity Analysis Findings

Direction	Current Volume	Estimated Capacity	ODOT's Volume Threshold	Volume/ Capacity	Volume Threshold
Existing					
Southbound	690	1274	892	54%	77%
Northbound	1205	1274	892	95%	135%
Future (2020)					
Southbound	778	1274	892	61%	87%
Northbound	1293	1274	892	101%	145%

Currently, existing northbound traffic volumes exceed ODOT's Volume Threshold, however, the volumes are still significantly less than the bridge capacity. In the future, northbound traffic is right at capacity, but continues to exceed ODOT's threshold. Based on the updated bridge capacity analysis, the bridge replacement design study and alignment selection process should be initiated to prepare the necessary environmental approval, right-of-way acquisition and construction documents.

[6] US 101 is identified in the Oregon Highway Plan as a facility of statewide significance. The plan identified a v/c ratio of 0.70 as the minimum acceptable condition for that type of facility in a rural area.

Traffic Control Master Plan

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 3-8). The intent of this plan is to outline potential locations where future traffic 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. The following key traffic signal issue should be addressed within the transportation policy of North Bend:

- Establish 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 could 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 placement 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.

Emergency Vehicle Preemption – The existing traffic signals do not have the capability to be preempted by emergency vehicles. This is a significant asset to reducing emergency response time. This technology is readily available and includes receivers at each intersection, transmitters in emergency vehicles, and control units attached to the existing signal controllers. The existing controllers may require upgrades to enable this feature. The general cost for adding these units is $10,000 per intersection. This type of installation is recommended for every traffic signal in the city.

Traffic Signal Coordination – The existing traffic signals along US 101 generally are configured to provide progressive traffic flow through town. These are fixed-time settings that are not responsive to fluctuations in traffic demands, but they can be effective on one-way grid patterns. During peak periods when volume fluctuates, the controllers are not responsive to changes in demand. To upgrade these signals will likely require new controllers (in order to facilitate communication between signals), traffic detector loops and new signal timing plans. The upgrade cost may range up to $50,000 per signal, depending on the state of the existing equipment.

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City of North Bend Transportation System Plan

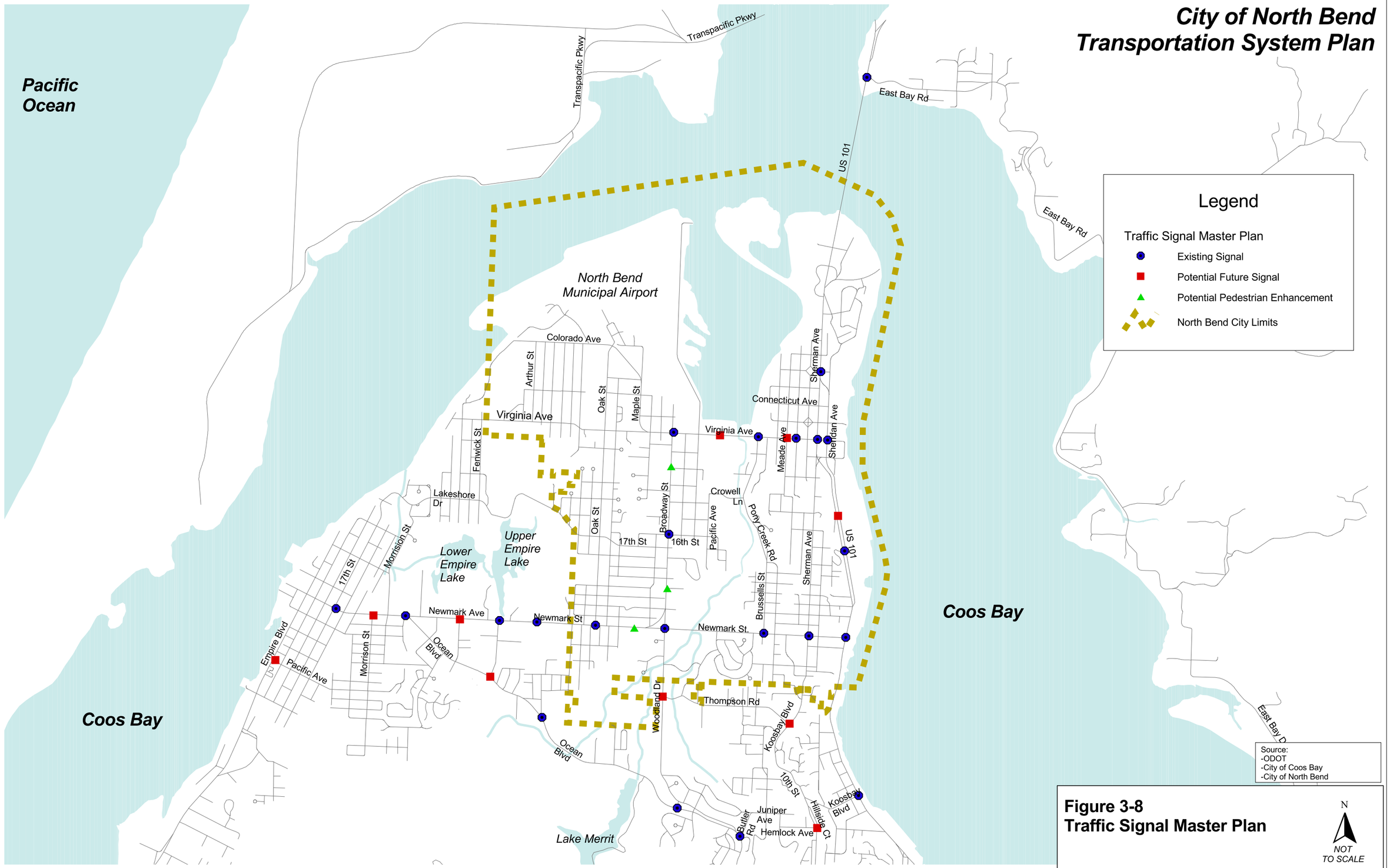


Figure 3-8
Traffic Signal Master Plan

Safety Needs

Accident data was obtained for the City of North Bend from ODOT. Appendix A provides detailed data regarding motor vehicle accidents in North Bend. Several strategies are suggested for improving safety in North Bend. These strategies are aimed at providing the City with priorities that meet the goals and policies of the City.

- Work with other agencies such as the City of Coos Bay, Coos 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 previously. In the short term, specific action plans should be prepared to address whether beneficial improvements at these locations can be made without negatively 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[7]. 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).[8]

Another safety action that can have an immediate impact is to reprogram traffic signals to include a one-second all-red clearance phase at intersections that have a high number of crossing conflicts. This allows vehicles extra time to clear the intersection before crossing vehicles enter.

Maintenance

Preservation, maintenance and operation are essential to protect the City's 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

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

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

of not spending money wisely. North Bend should maintain an annual program of pavement management and monitor conditions in setting priorities for overlays, slurry seals and joint sealing.

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 that makes the most sense. With a pavement management program, professional judgment is enhanced, not replaced.

A visual inspection of North Bend's surface street system has been conducted by the City. This inspection, basically a "report card" of the street system rates each roadway in North Bend. Actual roadway ratings prepared by the City of North Bend are provided in the appendix.

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 3-9 illustrates the pavement life cycle. For this reason, support of gradual increases to the gas tax to support maintenance is critical.

Neighborhood Traffic Management (NTM)

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. North Bend has done very little in the way of testing and implementing NTM measures such as speed humps, chokers, pavement texturing, circles, chicanes and other elements. It is recommended that a neighborhood traffic management program be established to take a more proactive position in managing neighborhood concerns. This would include establishing minimum performance criteria, a ranking system, and preferred conditions for implementing other control devices and strategies. 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

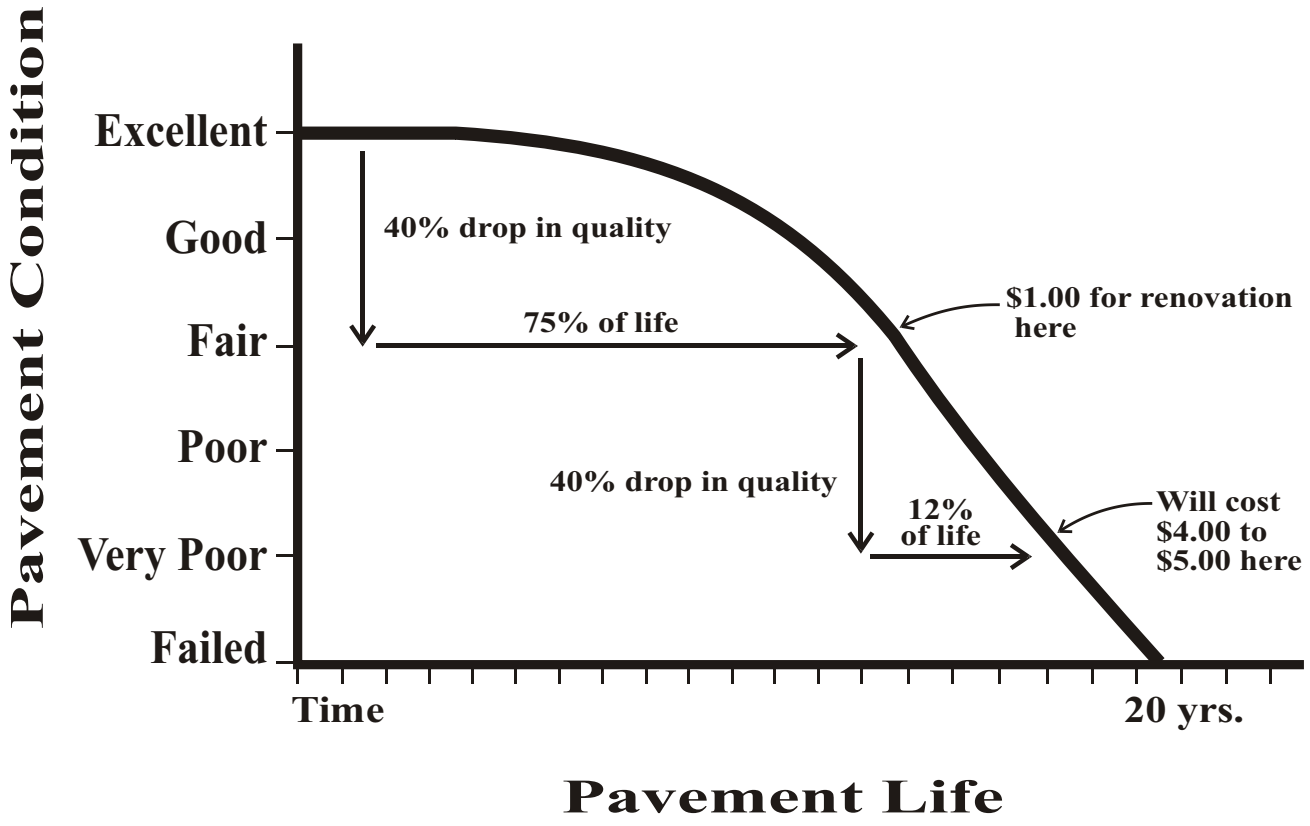


Figure 3-9
PAVEMENT LIFE CYCLE

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 North Bend 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 are being tested around the state, including such devices as chokers, medians, traffic circles and speed humps. NTM traffic control devices should be tested within the confines of North Bend 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 3-6 summarizes nationwide research of over 120 agencies in North America.

Table 3-6: Neighborhood Traffic Management Performance

Measures	No. of Studies	*Speed Reduction (MPH)*			*Volume Change (ADT)*			Public Satisfaction
		Low	High	Ave.	Low	High	Ave.	
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.*

It is recommended that the City of North Bend explore the development of a NTM program. This program can use statewide experience and success to 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, special conditions for functional classifications other than neighborhood routes and the required public process. NTM applications on state highways, though unlikely because of their typically arterial status, would require approval from the state highway engineer.

Access Management

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. Whereas local and neighborhood streets function to provide access, collector and arterials 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. North Bend, as with every city, needs a balance of streets that provide access with streets that serve mobility.

Proposed Access Management Strategies

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

- Provide left turn lanes where warranted for access onto cross streets
- Work with land use development applications to consolidate driveways where feasible
- Meet ODOT access requirements on arterials
- Establish City access standards for new developments on collectors and arterials
- New single family accesses should be prohibited on arterials and collectors, with provisions made for land locked parcels with no alternative access
- Driveways should not be placed 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 100 and 300 feet)[9].
- Use and ODOT standards for access on arterials and collectors under their jurisdiction.
- Specific access management plans be developed for arterial streets in North Bend to maximize the capacity of the existing facilities and protect their functional integrity (in particular, Newmark Avenue between Broadway and Fir Street and Virginia Avenue between US 101 and Harrison). New development should meet the requirements shown in Table 3-7.

Table 3-7: Proposed Access Spacing Guidelines

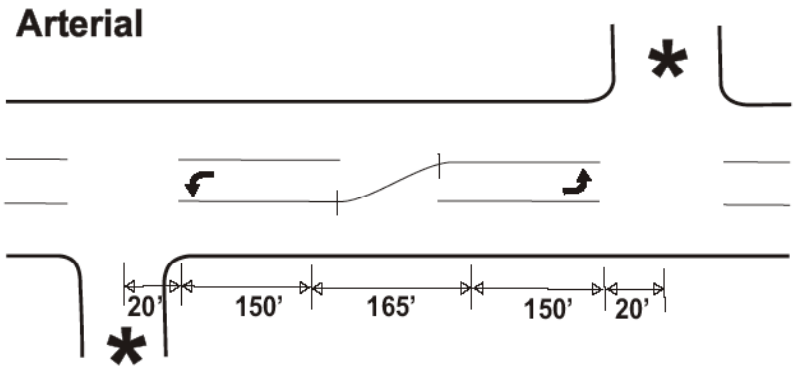
Functional Classification	*Minimum Spacing Between Access Points**
Arterial	500 ft
Collector	300 ft

* Access spacing at intersections may be slightly less, see discussion below. Also, ODOT standards supercede City and County standards on state facilities. On higher classified state facilities, standards may be more stringent (i.e. longer minimum spacing between access points).

[9] In a case where a project has less than 100 feet of frontage, the site would need to explore potential shared access, or if that were not practical, place driveway as far from the intersection as the frontage would allow (permitting for 5 feet from the property line).

Access Spacing

The access spacing criteria presented in Table 3-7 was developed based on creating safe back-to-back deceleration tapers and adequate storage length for vehicles queuing for left turns on opposite sides of the street. 500 feet was chosen for arterials because is adequately allows for two 150 foot left turn storage pockets as well as a 165 foot transition taper in between. While left turn pockets and transition tapers may not actually be striped on the roadway, 500 feet would allow adequate space for vehicles to function as if they were. For collectors, slower speeds require a shorter transition taper and lower volumes would require shorter storage pockets. Overall, the minimum length needed between access points on a collector would be more like 300 feet.



Intersection Setback

The basis for establishing intersection setback requirements is founded in allowing for adequate vehicle queuing and providing adequate sight distance. At congested arterial/arterial and arterial/collector intersections, vehicle queues commonly extend up to 300 feet from the intersection. These congested intersections typically have dedicated turn lanes, which can create additional conflict points for side-street turning vehicles. Therefore, arterial/arterial and arterial/collector intersections should have a minimum access setback of 300 feet based on vehicle queues.

At collector/collector intersections, vehicle queuing is commonly not a controlling design factor for access spacing. However, maintaining sight distance to access points near the intersection is crucial. The curb radius and turn speed of the intersection controls the required sight distance for this scenario. For turn design speeds of 20 mph or less, access points should be set back at least 100 feet from the intersection. AASHTO stopping sight distance standards can be applied to increase the required setback for higher turn speed designs. Table 3-8 summarizes access spacing guidelines adjacent to intersections.

Existing lots that are currently undeveloped cannot be "land locked." The maximum access spacing possible should be provided, even if the entire lot frontage is less than the desired access spacing. When corner lots front on two differently classified roadways, all attempts should be made to provide access on the lesser classified street, even if the available frontage is less (assuming the frontage available falls short of the standards on both street classifications). For example, if a residential lot has 50 feet of frontage on a collector and

100 feet of frontage on an arterial, the access should be provided 50 feet from the intersection on the collector, even though the access could be provided further from the intersection on the arterial.

Table 3-8: Proposed Access Spacing Guidelines at Intersections

Intersection Type	*Minimum Access Spacing From Intersection*
Arterial/Arterial	300 feet
Arterial/Collector	300 feet
Collector/Collector	100 feet-150 feet*

* 150 feet is desired, 100 feet is minimum for 20 mph design speed.

How Does Access Management Work on Non-Compliant Built Roadways?

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.

Access management polices are applied in two cases:

- **New Development** – New development on a vacant parcel (or soon to be vacant parcel with demolition), which requires some sort of land use permit,
- **Re-Development**/**Re-Use** – A re-development or remodel project makes application for approval that may only require a building permit.

Depending on the City's land use compliance review process, there may or may not already be a mechanism for enforcing access management for the second category. If the current land use compliance process is not required for building-only improvements, this step should be added into the process. The land use review will then trigger the street and access management standards.

Added Policy Narrative Enable Requirements

The foundation for authorizing the City to require street improvements, stub streets, access consolidation will lie in the purpose statement of the standards section. The purpose statement should include language such as "Proposed development shall provided necessary street improvements and access management to maintain an adequate level of service and safety of abutting public streets as required by the TSP."

A section could be added in the standards that gives the City explicit powers to do so. Some codes include a section titled: Conditions of Approval - The City may require the closing of existing curb cuts, consolidation of vehicle access points, recording of reciprocal access easements for shared driveways, street improvements, installation of traffic control devices, and/or other mitigation measures to ensure the safe and efficient operation of the transportation system.

Reciprocal access easements are an exaction or condition of approval and granted for free, but are complicated by timing. You have to get them one at time. The first parcel in may have to stub a connection to adjacent parcel and record an easement, but have temporary access elsewhere with a condition that it be closed when alternative access becomes available. Then, when the adjacent parcel comes in for a permit, they are required to grant an access easement and complete the connection. If the first parcel has no alternative access, then it is up to them to acquire an access easement prior to development.

The same is true for street stubs in a subdivision. Street stubs are required to adjacent vacant property, but are by their nature secondary access. The first development gets to set the stub

points, unless they have been predetermined in the TSP. If it is a public street, then there is no access easement issue. Private streets will require a reciprocal access agreement. Then, it is a waiting game for the future development. The second development must connect to stubs and, if private streets, grant reciprocal access as a condition of approval. The authority to require stubs and access, if private streets, goes back to authority to implement TSP, which ultimately is a public safety issue.

Transportation Demand Management

The Transportation Planning Rule outlines a goal of reducing vehicle miles traveled (VMT) per capita. Transportation Demand Management 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 following are examples of TDM measures:

- Work with employers to install 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

Transportation System Management

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 (High Occupancy Vehicle) lanes, ramp metering, rapid incident response, and programs that smooth transit operation. 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[10]. This can be done without the major cost of roadway widening.

Several of the strategies are 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 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). Most of this information 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.

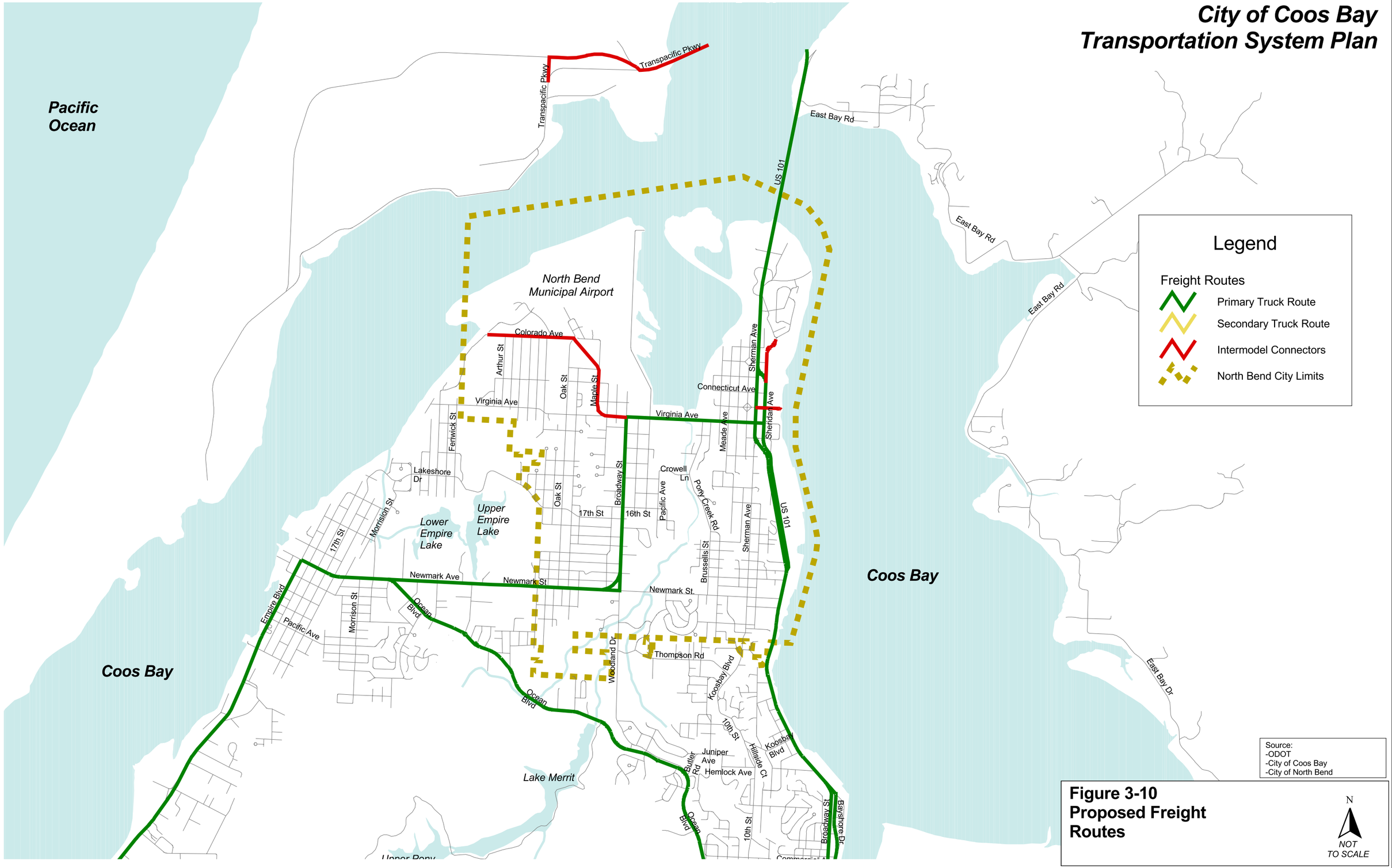
[10] *Portland Regionwide Advanced Traffic Management System Plan,* ODOT, by DKS Associates, October 1993.

Trucks

Efficient truck movement plays a vital role in maintaining and developing North Bend'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 North Bend 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 North Bend was developed (Figure 3-10) based on ODOT's existing freight route designations and logical origins and destinations for trucks in the North Bend area. This 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.

DKS *Associates*

City of Coos Bay Transportation System Plan



Legend

Freight Routes

- Primary Truck Route
- Secondary Truck Route
- Intermodel Connectors
- North Bend City Limits

Source:
-ODOT
-City of Coos Bay
-City of North Bend

Figure 3-10
Proposed Freight Routes

N

NOT TO SCALE

Bicycle Action Plan

The existing Bicycle Route map reflects bicycle accessibility in North Bend. Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways. A number of bicycle strategies have been identified and are listed from most important to least important:

- Connect Key bicycle corridors to schools, parks, recreational uses and activity centers (public facilities, commercial areas, etc.)
- Fill in gaps in the network where some segments of bikeway exist
- Bicycle corridors that connect neighborhoods
- Construct bike lanes with roadway improvement projects
- Bicycle corridors that commuters might use
- Bicycle corridors providing mobility to and within commercial areas

The Bicycle Master Plan builds from state policy from the Transportation Planning Rule and from the North Bend policies that all arterial and collector roads have bikeways. The Action Plan is consistent with plans developed by Coos County and the State. Additional linkages with lanes or accommodations are outlined to make a complete network. The Bicycle Action Plan (Table 3-9) consists of projects that the City should actively try to fund in the next ten years. With the action plan, a substantial bicycle network would be in place and would allow attention to move toward Master Plan projects. The bicycle plan will require incremental implementation. As development (or redevelopment) occurs, streets are rebuilt and other project funding opportunities (such as grant programs) arise, projects on the Master Plan should be integrated into project development. Many of the projects would be elements of multi-modal street improvement projects. The City, through its Capital Improvement Program, joint funding with other agencies (County, State) and development approval would implement these projects.

Cost Estimates

Rough cost estimates were made for the Bicycle Action Plans, however, the general unit cost for providing bike facilities depends on a number of factors, including whether sufficient pavement width is available (requiring only restriping), or if roadway widening is required. If roadway widening is required, there are a number of additional factors to consider, including whether there are existing sidewalks that need to be torn out and replaced, whether there are drainage issues that need to be accommodated, etc. For planning purposes, a cost of $300 per lineal foot was assumed. This cost does not include the acquisition of right-of-way and does not include the cost of installing sidewalks. The specific unit costs vary depending on the number of travel lanes, and the need for additional right-of-way; but, in general, re-striping is ten times less expensive than roadway widening. The project list should be reviewed to determine where re-striping can be performed without compromising motor vehicle capacity.

An example in North Bend would be Newmark Street. The length of the improvement requiring bike lanes is approximately 7,700 feet. If this segment could be re-striped to add bike lanes, the estimate cost would be $70,000 to $140,000. If the paved width were not sufficient to carry motor vehicle traffic and minimum width bike lanes, then roadway widening is needed at a cost of up to $2.1 million. This difference is very significant, and the need for roadway widening to facilitate bike lanes should be considered as bike lane projects are further developed.

Table 3-9: Bicycle Action Plan

Project	*From*	*To*	*Approximate Project Length*
Priority: Connect key bicycle corridors to schools, parks, recreational uses and activity centers			
US 101*	North City Limits	Ohio Street	9000 ft
Virginia Avenue*	US 101	Pony Creek	2000 ft
Virginia Avenue*	Marion Avenue	Broadway Street	1500 ft
Broadway Street*	Virginia Avenue	Newmark Street	5500 ft
Broadway/Newmark Curve*	Broadway Street	Newmark Street	850 ft
Newmark Street	US 101	Broadway Street	*
Newmark Street	Broadway Street	West City Limits	2650 ft
Sherman Avenue	Oregon Street	Delaware Street	1100 ft
Sherman Avenue	Lewis Street	Newmark Street	1250 ft
Meade Avenue	Virginia Avenue	Connecticut Ave	1000 ft
Connecticut Avenue	Meade Avenue	Sherman Avenue	900 ft
Hamilton Avenue**	Virginia Avenue	Flordia Avenue	2600 ft
Priority: Fill in gaps in bicycle network			
Woodland Drive	Newmark Street	Public Square Court	500 ft
US 101	Ohio Street	South City Limits	4000 ft
Bicycle Action Plan Projects Total Length (State funded projects):			**18,850 ft**
Bicycle Action Plan Projects Total Length (City funded projects):			**14,000 ft**
Bicycle Action Plan Estimated Cost (City funded projects only)			**$2.5 million**

** State funded projects*

***Off street trail*

North Bend Municipal Airport

Upper Empire Lake

Lower Empire Lake

Coos Bay

US 101

Colorado Ave

Arthur St

Oak St

Maple St

Virginia Ave

Fenwick St

Lakeshore Dr

Morrision St

17th St

Empire Blvd

Pacific Ave

Morrison St

Ocean Blvd

Newmark Ave

Newmark St

Newmark St.

Broadway St

16th St

Crowell Ln

Pacific Ave

Porty Creek Rd

Brussells St

Sherman Ave

Meade Ave

Sheridan Ave

Connecticut Ave

Woodland Dr

Thompson Rd

Koosbay Blvd

10th St

Hillside

Juniper Ave

Butler Rd

East Bay Rd

East Bay Dr

Pedestrian Action Plan

The existing pedestrian system network map reflects pedestrian accessibility in North Bend. In most cases, sidewalk improvements are aimed at closing gaps in the existing sidewalk network to provide connectivity rather than capacity. In other words, it is much more important that a continuous sidewalk be available than it be of a certain type or size.

The most important existing pedestrian need in North Bend is a well-connected pedestrian system within a half-mile grid and connectivity to key centers in North Bend (parks, schools, retail, etc.). Needs include safe, direct and convenient access to transit and crossings of large arterial streets which act as barriers to pedestrian movement, as well as an inventory of local street sidewalk locations in order to complete a detailed sidewalk connectivity plan. In the future, pedestrian needs will be similar in the City, but there will be additional activity centers that will need to be considered and interconnected. A number of pedestrian strategies have been identified and they are listed from most important to least important:

- Connect key pedestrian corridors to schools, parks, recreational uses and activity centers (public facilities, commercial areas, etc.)
- Fill in gaps in the network where some sidewalks exist
- Pedestrian corridors to transit stations and stops
- Signalized pedestrian crossings
- Pedestrian corridors that connect neighborhoods
- Improve streets having sidewalks on one side to two sides
- As development occurs, construction of sidewalks by developers
- Pedestrian corridors that commuters might use
- Reconstruct all existing substandard sidewalks to the City of North Bend Standards

The Pedestrian Master Plan is an overall plan and summarizes the desired framework plan to meet local policy. The more specific, shorter-term Action Plan (Table 3-10 and Figure 3-12) consists of projects that the City or responsible agency could give priority to when funding becomes available. As development occurs, streets are rebuilt, and other opportunities (such as grant programs) arise, projects on the Master Plan should be pursued as well. In addition, all development projects should include an inventory of local street sidewalk conditions in order to complete the City database of sidewalk locations.

An initial cost estimate for the North Bend Pedestrian Action Plan is $4 million. This estimate assumes 6 foot wide sidewalks and new curbs where projects are indicated in Table 3-10, and do not consider additional costs related to extra right-of-way, storm drainage relocation or improvements, or relocation of utility poles. Further engineering study is required to provide a more accurate cost estimate for budgeting these improvement projects.

Table 3-10: Pedestrian Action Plan

Project	*From*	*To*	*Approximate Project Length*
Priority: Connect key pedestrian corridors to schools, parks, recreational uses and activity centers			
Colorado Avenue (one side)	Arthur Street	Oak Street	2100 ft
Oak Street	Newmark Street	17th Street	2800 ft
17th Street	W. City Limits	Broadway Street	3250 ft
Arthur Street	Connecticut Avenue	Colorado Avenue	1400 ft
Virginia Avenue	Cedar Court	Maple Street	550 ft
Sheridan Avenue	Sherman Avenue	SE of Sherman Ave	400 ft
Connecticut Avenue	Meade Avenue	McPherson	300 ft
Pony Creek Road/Brussels Street (one side)	Virginia Avenue	Newmark Street	5800 ft
Crowell Lane (one side)	Pony Creek Road	Pacific Avenue	1000 ft
Pacific Avenue (one side)	Crowell Lane	16th Street	1200 ft
Newmark Avenue (one side)	Sherman Avenue	Broadway Street	4000 ft
Newmark Avenue (one side)	Broadway Street	West City Limits	2650 ft
Newmark Avenue	Sherman Avenue	US 101	1000 ft
Priority: Fill in gaps in pedestrian network			
Colorado Avenue (one side)	Oak Street	Maple Street	1500 ft
Oak Street	17th Street	Colorado Avenue	5250 ft
17th Street	Broadway Street	Myrtle Street	650 ft
Arthur Street (one side)	Connecticut Avenue	Virginia Avenue	900 ft
Virginia Avenue (one side)	Crocker Street	Arthur Street	1400 ft
Virginia Avenue (one side)	Arthur Street	Hayes Street	500 ft
Pedestrian Action Plan Projects Total Length			**52,250**
Pedestrian Action Plan Project Cost Estimate (without ROW Costs) **			**$3.7 M**

*Sidewalks to be built with roadway improvement projects are dependent on the ROW and alignment of the road improvement and would not be built without the road improvement

** Cost estimate assumes 3-foot wide sidewalk at $10 per square foot construction cost plus $10 per linear foot for curb construction. No allocation for ROW or other improvements (storm drain relocation, etc.) assumed.

DKS *Associates*

City of North Bend Transportation System Plan

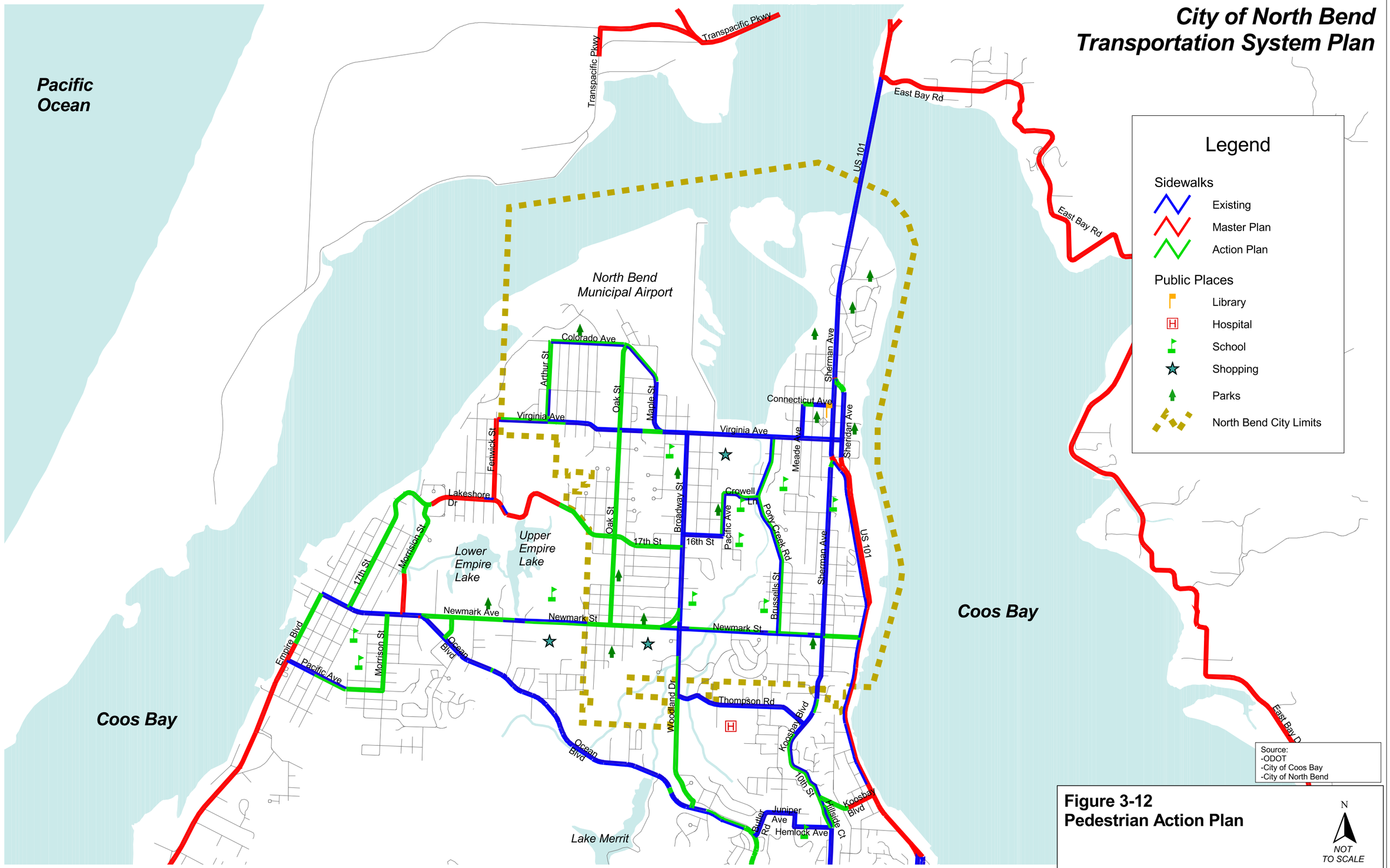


Figure 3-12
Pedestrian Action Plan

Transit Plan

Federal funding for the fixed-route transit services that did exist in North Bend was terminated and service ceased operation as of the end of December 2002. The CCTA has applied for federal grants from the Federal Transit Authority to extend these basic operations. Currently, only the dial-a-ride service is operational.

This section outlines a transit plan for the City of North Bend. It incorporates input from the local transit district (CCAT), as well as input obtained over the course of the project through the technical advisory committee and open houses with local citizens.

The highest priority for transit in North Bend is obtaining a stable source of funding. Assuming a base level of funding could be restored and additional funding could be secured, Table 3-11 summarizes projects that would be desirable in North Bend. Many of these projects were recommendations from a Transit Feasibility Study conducted for Coos and Curry Counties by Weslin Consulting Services in 1999.

Table 3-11: Potential Transit Projects

No.	*Project*
1	Reestablish Previously Existing Fixed Route Service ("East Loop" and "West Loop")
2	Add third fixed route
3	Add a home-to-work job commuter service
4	Provide weekend service
5	More fully integrated inter-city services connecting communities throughout the county
6	Providing service connections with Reedsport, Eugene and Roseburg
7	Transit depot
8	Additional shelters
9	A vanpool program to be coordinated with large area employers
10	More demand-response (dial-a-ride) service

Other Modal Plans

Rail

No planned changes in rail service have been indicated by the Oregon International Port of Coos Bay. The most significant rail-related issue in North Bend is the Coos Bay Rail Bridge. It is owned by the Oregon International Port of Coos Bay (Port), who acquired it from Union Pacific in August, 2000, in order to access state and federal funds for long-term rehabilitation of the bridge. Phase I of the rehabilitation is under way now and involves rebuilding the swing span and minor repair of two approach spans. Phase I construction should be completed within two years. Phase II will involve the complete rehabilitation of the approach spans to provide a minimum 25 year additional service life for the structure. Port staff is working on acquiring the funding for Phase II.

Air

An Airport Master Plan for the North Bend Municipal Airport was completed in December 2001, updating the previous Master Plan from 1997. The plan will serve as the development document for the airport during a 20-year planning period. The most significant improvements planned for the next 10 years are additional navigation system upgrades and the relocation and construction of a new passenger terminal. In 1999, management and operations of the North Bend Municipal Airport transferred from the City of North Bend to the Oregon International Port of Coos Bay under an intergovernmental agreement. In November 2002, Coos County voters approved the formation of a new Coos County Airport District. The district is scheduled to take over operations at the North Bend airport on July 1, 2003.

The North Bend airport complex includes more than 100 acres of non-aviation related property designated as the North Bend Airport Business Park. The property is located south and west of the runways and primary aviation facilities, and is being developed for commercial and light industrial tenants and uses. Vehicle traffic accessing the business park uses Maple Street and Colorado Avenue as feeders to and from Virginia Avenue. A multi-year development plan for the park projects an additional access to Virginia Avenue being established near the southwest corner of the property as demand warrants in future years.

Water

The information reported here is based on the Bay Area Transportation Study (1995). The following challenges are key to increasing utilization and providing effective future development of the marine transportation system at the Port of Coos Bay:

- Dependable rail service and additional improvements to the highway system are key to capitalizing on opportunities in the changing worldwide maritime industry.
- There is limited availability of fully serviced commercial and industrial sites and developable industrial property.
- Some ships are limited in their hours of access to the port by the channel depth (35 feet) and by the orientation of the railroad bridge, which has a narrow opening and is oriented in a way that makes it very difficult to maneuver under the McCullough Bridge.
- Greater cooperation and coordination between business owners is necessary to achieve the long-term development of the harbor. Short-term and competing interests prevent development of a long-term vision, making the Port less likely to realize its full potential as a deep-draft west coast port.

Pipeline

The only major pipeline facility that would affect the location of future transportation corridors in North Bend is a planned high-pressure natural gas feeder line. The approximate pipeline location is shown in Figure 3-13. The pipeline is currently under construction (since July, 2003). At the time this document was published, it was reported that the mainline had been mostly completed (by October, 2003) and a number of diversions had been made from the plan, but that "as-builts" had not yet been completed[11]. Therefore, maps are provided in this document are based on the originally planned route.

The purpose of the proposed pipeline is to construct a 12-inch natural gas transmission pipeline from near Roseburg to Coos County. Natural gas transported by the pipeline would provide an alternative source of energy for existing or potential residential, commercial or industrial customers within the

[11] Per telephone conversation with Paul Rodriquez, Bureau of Land Management, October 14, 2003.

Coos County service area. The total length of the pipeline is about 60 miles. Approximately 28 miles of smaller pipeline laterals would eventually be constructed to serve the Coos County cities of Coquille, Myrtle Point and possibly Bandon. Gas distribution systems would be built in each city, most likely by Northwest Natural Gas (hereafter referred to as NW Natural). The laterals and distribution lines would be located entirely on private properties. Coos County has never had direct access to natural gas as an energy source, but has relied on petroleum products and propane, electricity, or wood for energy sources. A ballot measure authorizing additional taxpayer funds for construction of a natural gas pipeline, was passed by Coos County voters in November 1999.

Coos County is the owner of the pipeline main and is completely isolated from transportation facilities in North Bend. Northwest Natural is in the process of developing a distribution system within North Bend that is typically put in with about 3 feet of cover. Northwest Natural will need to coordinate with the City of North Bend and Coos County when locating their distribution pipes to minimize the need for any pipeline changes in the future.

DKS *Associates*

City of North Bend Transportation System Plan

Pacific Ocean

Coos Bay

Coos Bay

North Bend Municipal Airport

Lower Empire Lake

Upper Empire Lake

Lake Merrit

Transpacific Pkwy

Transpacific Pkwy

East Bay Rd

East Bay Rd

US 101

US 101

Colorado Ave

Arthur St

Oak St

Maple St

Connecticut Ave

Sherman Ave

Virginia Ave

Virginia Ave

Fenwick St

Meade Ave

Sheridan Ave

Lakeshore Dr

Crowell Ln

Pony Creek Rd

Broadway St

Pacific Ave

Oak St

17th St

16th St

Morrison St

17th St

Brussells St

Sherman Ave

Newmark Ave

Newmark St

Newmark St

Empire Blvd

Pacific Ave

Morrison St

Ocean Blvd

Ocean Blvd

Woodland Dr

Thompson Rd

Koosbay Blvd

10th St

Koosbay Blvd

Juniper Ave

Hemlock Ave

Hillside Ct

Butler Rd

East Bay D

Legend

Service Mains

- 4 Inch Pipe
- 6 Inch Pipe
- 12 Inch Pipe
- Main Pipeline
- North Bend City Limits

Source:
-ODOT
-City of Coos Bay
-City of North Bend

Figure 3-13
Other Mode Plans

N

NOT TO SCALE

4. FINANCING AND IMPLEMENTATION

This chapter presents the estimated costs for the projects and programs identified in the North Bend Transportation System Plan, and describes existing and potential new funding mechanisms that will be required to implement the TSP over the next 20 years. Implmentation of the TSP will require modifications to several of the city's development codes and ordinances as noted in the final section of this chapter. Specific changes to the codes are identified in the attached Technical Appendix.

Overview

Table 4-1 shows that existing city revenues for transportation projects and programs in North Bend are about $800,000. This amounts to $16 million over 20 years for capital projects and roadway maintenance.

Table 4-1: Existing Transportation Funding Sources (2003 Dollars)

Source	Annual Revenue ($1,000)
State Motor Vehicle Fees to City	$0
State Gas Tax to City (1)	$400
Other (State STP, Other Gas Taxes Funds)	$100
Annual TOTAL	$500
20 YEARS OF CURRENT FUNDING ($1,000's)	**$10,000**

Notes: (1) The City collects $400,000 in state gas taxes annually, but this amount is allocated to maintenance expenses, and none is available for capital project funding.

Table 4-2 summarizes the costs outlined in the TSP to implement the Action Plans for Streets, Bicycles, Pedestrians, and several other recommended transportation programs (see Table 4-3 for details). The 20-year cost is estimated at $30 million, which is $20 million higher than current revenues provide. The great majority of new costs are associated with motor vehicle projects ($20 million). The following sections outline several methods for increasing transportation funding or seeking alternative solutions to better balance transportation costs and revenue.

Table 4-2: North Bend Transportation Action Plans Costs over 20 years (2003 Dollars,)

Transportation Element		Approximate Cost ($1000)
Street Improvement Projects:	Funded	$0
	Unfunded Action Plan	$3,495
Road Maintenance ($800,000/yr)		$16,000
Bicycle Action Plan		$2,500
Pedestrian Action Plan		$3,700
Pedestrian/School Safety Program ($10,000/yr)		$200
Sidewalk Grant Program ($50,000/yr)		$1,000
Neighborhood Traffic Management ($75,000/yr)		$1,500
TSP Support Documents (i.e. Design standard update, TSP updates)		$500
20 YEAR TOTAL in 2003 Dollars		**$28,895**
Initial Funding Shortfall for 20-year plan (minus $10 million available)		**$18,895**

Recommended Projects and Programs

This section present the recommended projects and programs developed for the City of North Bend to serve local travel for the coming 20 years. The Pedestrian, Bicycle and Motor Vehicle projects were identified in the Action Plan for each mode, and represent those projects that have the highest short-term need for implementation to satisfy performance standards, or other policies established for the North Bend Transportation System Plan. The costs for the remaining motor vehicle projects noted in the Master Plan are identified, but these have not been included in the funding needs analysis for the city.

Project Cost Estimates

Cost estimates (general, order of magnitude) were developed for the projects identified in the motor vehicle, bicycle and pedestrian elements. Cost estimates from the existing CIP projects in North Bend were used in this study, if any. Other projects were estimated using general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to project costs[12].

Development of more detailed project costs can be prepared in the future with more refined financial analysis. Since many of the projects overlap elements of various modes, 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. All cost estimates are based on 2003 dollars. Historical construction costs price index has risen by 2.5 to 2.75

[12] General plan level cost estimates do not reflect specific project construction costs, but represent an average estimate. Further preliminary engineering evaluation is required to determine impacts to right-of-way, environmental mitigation and/or utilities. Experience has shown that individual projects costs can increase by 25 to 75 percent as a result of the above factors.

percent per year according to Engineering News Record research[13] on historical construction costs. Since 1979, construction costs have increased 100 percent over 20 years.

Transportation Programs

Table 4-3 summarizes the elements of the plan that were not specifically defined in the recommended project lists, and explains how costs will be addressed for these elements.

Table 4-3: Non-Auto, Pedestrian and Bicycle Costs Issues

Travel 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 (NTM)	Specific NTM projects are not defined. These projects will be subject to neighborhood consensus based upon City placement and design criteria. A city NTM program, if desired, should be developed with criteria and policy adopted by the City Council. Traffic humps can costs $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 (the City already has one). It is important, where appropriate, that any new development incorporate elements of NTM as part of its on-site design. The City currently has no allocation for NTM in the current budget.
Public Transportation	CCAT will continue to develop costs for implementing transit related improvements. The Cities can supplement this by incorporating transit features through development exactions and roadway project design. Developing new transit services in North Bend will require CCAT to reallocate funding or seek additional sources of operating funds.
Trucks/Freight	Roadway funding will address these needs.
Rail	Costs to be addressed and funded by private railroad companies and the state.
Air, Water, Pipeline	Not required by the City
Transportation Demand Management	Not required by the City

Transportation Projects

Tables 4-4 and 4-5 summarize the key projects in the TSP by Bicycle and Pedestrian (detailed information about specific projects was listed in Chapter 3) and Motor Vehicle improvements. These tables also indicate the cost responsibility for each project between the city, state and private parties. In a few cases, it is assumed that project costs would be shared between city and state agencies. It was assumed that this cost sharing would be 50/50 between the agencies, but the specific cost allocations may be subject to further negotiations. An additional cost item is listed in Table 4-5 for right-of-way acquisition reserve funds. This was assumed equivalent to 50% of the estimated construction cost.

Table 4-4: Bicycle and Pedestrian Modes Cost Summary

Project	Cost Estimate
Bicycle Action Plan	$2.5 million
Pedestrian Action Plan	$3.7 million

[13] Engineering News Record Construction Cost Index as reported for the past ten years for 20 cities around the United States. Reference: http://www.enr.com/features/conEco/costIndexes/constIndexHist.asp

Table 4-5: Motor Vehicle Project List (Action Plan)

ID	Location	Description	Funding Status/ Responsibility	Cost (1,000's)
A	Newmark/Broadway	Add 2nd eastbound left turn lane, develop and construct access management plan (median which restricts access to driveways to right-in/right-out only), upgrade traffic signal, add advance traffic signal head on westbound approach for better visibility.	Not Funded (City/State)	$3,050
B	Newmark between Broadway and Sherman	Restripe existing four-lane roadway to include two travel lanes, a center left turn lane and bike lanes in both directions	Not Funded (City)	$42
C	Virginia Avenue between Harrison Avenue and Sherman	Restripe existing four-lane roadway to three lanes to allow for bike lanes and left turn lanes at cross-streets. Install traffic and pedestrian signal at Meade Avenue. Install traffic signal interconnect between Harrison and Sherman. Narrow Meade Avenue southbound approach to Virginia to 40 feet to reduce crosswalk length	Not Funded (City/State)	$500
E	Virginia/Meade Avenue	See project C above	Not Funded (City/State)	See C above
F	Sherman/Virginia	Implement a one-second all red phase into the traffic signal timing plan to help prevent right-angle collisions	Not Funded (State)	$1
G	Newmark Avenue between City Limits and Broadway/Woodland	Restripe to include bike lanes. Consolidate access to retail uses where possible.	Not Funded (City/State)	$1,026
H	McCullough Bridge	Conduct design studies	Not Funded (State)	$200
		Subtotal Unfunded North Bend Projects		$2,330
		Right-of-Way Contingency (50% of construction cost)		$1,165
	North Bend Total			**$3,495**
	State Total		See Note 1	**$964**
	Total	**All Jurisdictions**		**$4,459**

Note: **(1)** The projects noted for state funding have been assumed, and are not necessarily supported by the State until the Statewide Transportation Improvement Plan is updated to include these projects.

An additional $150,000 in long-range capital projects for city facilities in noted in the Master Plan Motor Vehicle Project list in Table 4-6 below. Further studies will be required to better define the project scopes and cost estimates.

Table 4-6: Master Plan Motor Vehicle Project List

ID	Location	Description	Funding Status/ Responsibility	Cost (1,000's)
D	Virginia Avenue/Pony Village Entrance	Construct traffic and pedestrian signal at driveway nearest to Taco Bell. Construct raised center median between signal and other Pony Village Mall driveway to restrict driveways to right-turns only.	Not Funded (City/Private)	$280
I	Washington/Sheridan (US 101)	Conduct study to determine and evaluate alternatives to confusing access situation	Not Funded (City/State)	$25
J	Ferry Road/Sherman (US 101)	Install left turn lane for trucks on US 101	Not Funded (State)	$500
		Subtotal North Bend Projects		$2,815
		Right-of-Way Contingency (50% of construction cost)		$1,408
	North Bend Total			**$152**
	State Total			**$512**
	Grand Total	**All Jurisdictions**		**$664**

It is noted that inclusion of an improvement in the TSP does not represent a commitment by ODOT to fund, allow, or construct the project. Projects on the State Highway System that are contained in the TSP are not considered "planned" projects until they are programmed into the Statewide Transportation Improvement Program (STIP). As such, projects proposed in the TSP that are located on a state highway cannot be considered mitigated for future development or land use actions until they are programmed into the STIP. Highway projects that are programmed to be constructed may have to be altered or cancelled at a later time to meet changing budgets or unanticipated conditions such as environmental constraints.

Funding Alternatives

Due to the complexity of today's transportation projects, it is necessary to seek several avenues for funding projects. Unique or hybrid funding of projects generally will include many of the funding sources identified in this section. Table 4-7 summarizes several funding options available for transportation improvements. 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. Packaging of transportation funding to provide various improvements or service is summarized in Table 4-8.

Local funding for major transportation projects is typically brought to a vote of the public for approval. Specific projects are often outlined for use of public funds. 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.

Table 4-7: Potential Transportation Revenue Sources

Type	Description
System Development Charges (SDC)	SDCs or Traffic Impact Fees have been used in Oregon and throughout the United States. The cornerstone to development of SDC's involves two principals: 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. As an example, Washington County has a traffic impact fee (TIF) which was voter approved. SDCs do not require a vote of the public.
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 local gas taxes are approved by voters. 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.
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.
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 onto developers. These have been used to build much of North Bend's local street system. Developers of sites adjacent to unimproved roadway frontage are responsible to provide those roadway improvements. Developers of sites adjacent to improvements identified as SDC projects can be credited the value of their frontage work, which is included in the 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. LIDs require owner/voter approval and a specific project definition. 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. Fees are paid through property tax bills.
Special Assessments	Varieties 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 5 limitations. As an example, in Washington County, examples of transportation assessments include MSTIP (Major Streets Transportation Improvement Program) and the local maintenance property tax levy. Both of these are property tax assessments, which have been imposed through votes of the public. Another example would be the Westside LRT (Light Rail Transit) where the local share of funding was voter approved as an addition to property tax.
Driveway Fees	As an example, Gresham collects a Public Street Charge and a Driveway Approach Permit Fee. These fees are project specific and vary year to year based upon development permits. These funds are used for city maintenance and operation.
Employment Taxes	As an example, 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 using employment taxes.
Oregon Special	The Special Public Works Fund (SPWF) Program was created by the legislature in 1985

Type	Description
Public Works Fund	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. This is commonly used on state highways.

Table 4-8: Funding Source by Project Type

Source	Bicycle	Pedestrian	Streets	Mainte-nance	Transit
Traffic Impact Fee (TIF)	•	•	♦		
System Development Charges (SDC)	♦	♦	♦		
Gas Tax/Motor Vehicle Fees					
State	•	•	♦	♦	♦
Federal	♦	♦	♦	♦	
Street Utility Fees				♦	
Exactions	•	♦	♦		
Local Improvement Districts (LID)	•	•	♦		
Tax Increment Financing	♦	♦	♦		
Special Assessments		•	♦	♦	♦
Driveway Fees			♦	♦	
Payroll Employee Tax					♦
Oregon Special Public Works Fund	•	•	♦		♦

♦ = Primary

• = Secondary. Typically as part of roadway project where other modes are incorporated

Codes and Ordinances

This section identifies proposed changes to the City of North Bend's Comprehensive Plan, Zoning Ordinance, and Subdivision Ordinance to implement the Transportation System Plan and to comply with the Transportation Planning Rule (OAR 660, Division 12). Further detailed language and proposed changes are attached in the Technical Appendix.

Comprehensive Plan

Chapter 5 – Plan Elements – Transportation should be wholly replace with a new chapter that is based on the findings of the Transportation System Plan and should include the following sections:

- Update system descriptions for each mode of travel (e.g. air, rail, ports, highway, freight, and transit).
- Update list of proposed improvement projects.
- Adopt new goals and policies (see attached).

Zoning Ordinance

The City of North Bend's zoning ordinance (Ordinance No. 1175) includes development standards (i.e. setbacks, lot coverage) for each zoning district. Other types of development standards, such as parking and loading requirements are in a separate ordinance (Ordinance No. 1192). In keeping with that structure, a new ordinance is proposed with the consolidated Transportation Standards (see attached). These standards include street standards, access management, connectivity, and other implementation measures.

In addition to the Transportation Standards, changes to the Off-Street Parking and Loading ordinance are proposed to include bicycle parking (see table). In general, the number of bicycle parking spaces is tied to the number of vehicle parking spaces. In addition to the table, another section should be added to guide placement of bicycle parking. Suggest language:

> *Bicycle Parking Location. Bicycle parking shall be conveniently located with respect to the street and building entrance, but not impede or create a hazard to pedestrians (at least 36 inches between bicycles and other obstructions or buildings).*

Type of Use	*Number of Bicycle Parking Spaces*
Multi-Family Residential	1 space per dwelling unit[1]
Commercial	1 space per use plus 1 space per 10 vehicle parking spaces
Institutional, Public and Quasi-Public	Schools - 1 space per 10 students Other uses - 1 space per use plus 1 space per 10 vehicle parking spaces
Industrial	1 space per use plus 1 space per 10 vehicle parking spaces

1. Bicycle parking space may be located within garage, storage shed, basement, utility room or similar area.

Subdivision Ordinance

The City of North Bend's subdivision ordinance (Ordinance No. 1175) includes design and improvement standards. The street standards are in Section 23. This section should be replaced with a cross-reference to the new Transportation Standards ordinance. Suggested language:

> *The location, width, and grade of streets and access driveways shall conform to the requirements in Ordinance No. 1915 – Transportation Standards.*

Comprehensive Plan, Zoning Map and Ordinance Amendments

The City of North Bend's approval criteria for comprehensive plan amendments, zoning map changes, and zoning ordinance text amendments need to be revised to fully account for potential impacts to the transportation system. The following language should be added to the list of approval criteria:

> *Amendments to [the comprehensive plan, zoning map, zoning ordinance] shall assure that allowed land uses are consistent with the function, capacity, and performance standards of the Transportation System Plan. This assurance shall be accomplished by one of the following:*
>
> *1) Limiting allowed land uses to be consistent with the planned function of the affected transportation facility; or*
>
> *2) Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with requirements of the Transportation Planning Rule (OAR 660, Division 12); or*
>
> *3) Altering land use designations, densities, or design standards to reduce demand for automobile travel and meet travel needs through other modes; or*
>
> *4) Amending the TSP to modify the planned function, capacity and performance standards, as needed, to accept greater vehicle congestion where multimodal travel choices are provided.*