Scholls Ferry Road Conceptual Design Plan

Prepared for

Multnomah County
1600 SE 190th Avenue
Portland, OR 97233

June 2009

CITATION

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. This TGM grant is financed, in part, by federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), local government, and State of Oregon funds.

The contents of this document do not necessarily reflect views or policies of the State of Oregon.

Parametrix. 2009. Scholls Ferry Road Conceptual Design Plan.
Prepared by Parametrix, Portland, Oregon. June 2009.

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	(federal) Americans with Disabilities Act
ADAAG	ADA Accessibility Guidelines
DLCD	Oregon Department of Land Conservation and Development
NRCS	Natural Resources Conservation Services
OBPP	Oregon Bicycle and Pedestrian Plan
ODOT	Oregon Department of Transportation
RTP	Regional Transportation Plan
SSD	Stopping Site Distance
TGM	Transportation and Growth Management
TPR	Transportation Planning Rule
TSP	Transportation System Plan
USDOT	United States Department of Transportation

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EXECUTIVE SUMMARY

The Scholls Ferry Road Conceptual Design Plan (Plan) identifies a conceptual improvement plan for street design treatment along SW Scholls Ferry Road between the Sunset Highway and the Multnomah and Washington County Line to better accommodate multi-modal circulation, to support adjacent land use and development, and to address options for treatment of stormwater runoff related to infrastructure improvements. This report is intended to inform the preliminary engineering process and implementation of the Plan.

Scholls Ferry Road is classified as a minor arterial in urban unincorporated Multnomah County and connects Skyline Boulevard and the Sunset Highway with the Raleigh Hills town center in Washington County. The Multnomah County Transportation System Plan and the State of Oregon Transportation Planning Rule calls for multi-modal facilities along minor arterials and to create a corridor that will encourage and support bicycling and walking by facilitating access to transit, schools, neighborhoods, and businesses. The corridor is currently served by one southbound travel lane and two northbound travel lanes without bicycle lanes or sidewalks except in a few sections at the northern and southern ends of the corridor. Although few bicyclist and walkers use the corridor today, citing safety concerns, the improvement of this key connection to surrounding destinations will attract more users and serve an important community need. Public comment during the development of the plan indicated that there is a demand for facilities along Scholls Ferry Road.

The physical constraints of the corridor present a set of unique challenges and restrict viable alternatives. The constraints include:

- Narrow roadway widths, buildable area, and rights of way
- Steep side slopes and roadway grades
- Historical landslide hazards and slope stability concerns
- An existing drainage basin (Sylvan Creek) that is currently in a compromised condition
- Existing retaining walls

The Multnomah County Transportation System Plan calls for multi-modal facilities along minor arterials, however, these physical constraints in the Scholls Ferry corridor could make the implementation of the standard minor arterial roadway section unreasonable in some areas.

The plan explored potential alternatives for widening the roadway to accommodate bike lanes and sidewalks or, alternatively consider facilities on a parallel street network in the study area.

Parallel routes in the study area were found to also have an absence of existing sidewalks and bike lanes, and minimal shoulders. These routes also lack the desirable characteristics of high quality facilities, minimum gradients and directness. The out of direction travel that would be required by pedestrians and bicyclist would be between 0.8 and 2.3 miles.

Modifications to the Multnomah County Adopted Minor Arterial Standard roadway along the Scholls Ferry Corridor are necessary to respond to the varying levels of constraints along the corridor and provide bicycle and pedestrian facilities. Treatment options for the roadway balance the vehicular requirements along Scholls Ferry Road with the needs of bicyclists and pedestrians. Other considerations for the concept design include, stormwater management requirements, minimizing additional right-of-way needs, traffic capacity and safety,

constructibility and funding feasibility. Public and technical comments were also used to refine the conceptual design. The resulting preferred conceptual design is intended to be used as the basis for preliminary engineering and construction of improvements on Scholls Ferry Road.

The roadway cross sections include:

- Construct the County minimum design standard for a Minor Arterial roadway between Raleighwood Lane to Woods Court.
- Construct a modified Minor Arterial roadway by removing the center left-turn lane between Woods Court and Sheridan Lane. This segment does not require left-turns since there are no accesses and is constrained in buildable width by steep slopes.
- Construct a modified Minor Arterial roadway between Sheridan Lane and Humphrey Blvd. with two lanes northbound and one lane southbound. This section is similar to the existing cross-section in this area, but with the addition of standard bike lanes and sidewalks.

The stormwater approach includes:

- Construct traditional curb and piped stormwater facilities between Raleighwood Lane to Humphreys Blvd. except south of Patton Road where green street facilities are possible.
- Construct green street stormwater facilities between Raleighwood Lane to Patton Road where right-of-way, slopes, and soils permit.
- Coordinate water quality and quantity for the corridor project with Washington County, Multnomah County, City of Portland, and Clean Water Services.
- Conduct a detailed stormwater analysis for corridor improvements

The following additional efforts should be addressed prior to preliminary design:

- Conduct survey and mapping to determine existing terrain, features, and property boundaries.
- Complete a soil and geotechnical analysis.

1. INTRODUCTION

The primary objective of the Scholls Ferry Road Conceptual Design Plan (Plan) is to develop a street treatment to better accommodate multi-modal circulation, to support adjacent land use and development, and to identify options for handling stormwater runoff related to infrastructure improvements. This report is intended to inform the preliminary engineering process and implementation of the Plan.

The following process produced the Scholls Ferry Road Design Concept Plan and was documented through a series of technical memoranda.

The steps include:

- Review of federal, state, county, and local transportation plans, policies, and goals with which the Plan must either comply or be consistent.
- Identify the needs and interests of the community and users of the bicycle and pedestrian system.
- Identify bicycle and pedestrian routes critical to meeting community needs and goals.
- Evaluate the existing condition of the corridor and identify opportunities and constraints.
- Identify facility options that address the corridor deficiencies and opportunities.
- Refine facility design options for corridor based on county staff, public, and advisory committee input.
- Compile the results of this work into the final Plan document as a series of improvements, for review and adoption by Multnomah Board of County Commissioners as an amendment to the Transportation System Plan (TSP).
- The project team facilitated public forums and committees to provide information about the plan and obtain direction and feedback for the Plan. The outreach included:
- A Technical Advisory Committee was formed by staff and consisted of representatives of Clean Water Services, Multnomah County, Washington County, City of Portland, Tri-Met, Parks, Metro, ODOT, SW Trails Group, and the Bicycle Transportation Alliance.
- Two well publicized public open houses.
- Information also appeared on the County website.
- Information presented at neighborhood association meetings and in newsletters.

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2. RELEVANT PLANS, POLICIES AND GUIDELINES

2.1 OVERVIEW

The following section discusses county, regional, state, and federal goals, plans, policies, and standards that will affect planning and designing for future improvements to the bicycle and pedestrian system along Scholls Ferry Road. Improvements addressing these facilities should consider the standards and policies described below.

The following plans and guidelines are summarized and relevance to Scholls Ferry Road is discussed:

- Oregon Administrative Rules/Transportation Planning Rule (TPR)
- Transportation System Plan (TSP) for the Urban Pockets of Unincorporated Multnomah County (2005)
- Multnomah County Design and Construction Manual
- Geometric Design of Highways and Streets, by the American Association of State Highway and Transportation Officials (AASHTO) (2004)
- Federal Americans with Disabilities Act (ADA)
- Oregon Bicycle and Pedestrian Plan, ODOT (1995)
- 2035 Regional Transportation Plan, Metro (2008)
- Creating Livable Streets: Street Design Guidelines for 2040, Metro (2002)
- Green Streets: Innovative Solutions for Stormwater and Stream Crossings (2002)
- City of Portland Stormwater Management Manual (2008)

2.2 OREGON ADMINISTRATIVE RULES/TRANSPORTATION PLANNING RULE

Adopted by the Land Conservation and Development Commission in 1991, the Transportation Planning Rule (Oregon Administrative Rule Chapter 660, Division 12) represents an element of Oregon's Statewide Planning Goal #12 – Transportation. The Transportation Planning Rule's (TPR) goal is to promote the development of safe, convenient and economic transportation systems designed to reduce reliance on the automobile so that air pollution, traffic and other livability problems faced by urban areas and other parts of the country might be avoided. The TPR requires each city and county to adopt a TSP and implementing regulations, and also includes specific items that must be addressed in the TSP. The TPR contains a provision regarding the inclusion of bicycle and pedestrian facilities to accommodate convenient pedestrian and bicycle travel.

2.3 TRANSPORTATION SYSTEM PLAN FOR THE URBAN POCKETS OF UNINCORPORATED MULTNOMAH COUNTY (2005)

In compliance with the Transportation Planning Rule (TPR) and Regional Transportation Plan (RTP), Multnomah County developed a TSP for urban unincorporated areas within the County, and that are contiguous with the City of Portland. The Scholls Ferry Road study area is included in the TSP, making the policies and recommendations of that document specifically relevant to the development of corridor improvement concepts.

The purpose of the County TSP was to convert Multnomah County street classifications to City of Portland policy designations to ensure consistency in the policy treatment of the Countywide street system. The TSP also establishes goals and policies to govern the development of street infrastructure improvements for the County. Listed below are relevant policies from the TSP:

- Placing a priority on construction and maintaining the transportation system to improve the safety for bicyclists and pedestrians.
- Coordinating with surrounding jurisdictions and regional partners in the development of the bicycle and pedestrian system.
- Promoting bicycle and walking as a vital transportation choice.
- Ensure that the mobility and access function of a roadway is compatible with the surrounding land uses

Policy 34 Trafficways Descriptions

Minor arterial streets are the lowest order arterial facility in the regional street network. They typically carry less traffic volume then principal and major arterials, but have a high degree of connectivity between communities. Access management may be implemented to preserve traffic capacity. Land uses along the corridor are a mixture of community and regional activities. Minor arterial streets provide major links in the regional road and bikeway networks; provide for truck mobility and transit corridors; and are significant links in the local pedestrian system.

Policy 34A-5 Safety

Safety is a primary objective in the development and operation of the trafficway system through traffic signing and signalization, speed limits and speed control measures, road design and access control measures. Through the use of accepted design and traffic management principles and practices, traffic accidents and conflicts between pedestrians, bicyclists, equestrians, and motorists can be minimized.

Policy 34 Strategy A-3 Fostering Choice

The trafficway system should be managed to provide opportunities for choices among available travel modes so that reliance on automobiles as single-occupant vehicles can be reduced, and so that total vehicle miles traveled as a measure of automobile use per capita can be reduced in the future, in accordance with the state Transportation Planning Rule and Policy 35: Public Transportation.

The TSP classifies Scholls Ferry Road as a Minor Arterial. The TSP also identifies three proposed projects for Scholls Ferry Road. The first project includes the addition of bicycle and pedestrian facilities on Scholls Ferry Road from Humphrey Boulevard to the Washington County line. The second project would provide a dedicated left-turn lane for the southbound direction at the intersection of Scholls Ferry Road with Patton Road. The third project identifies widening Scholls Ferry Road to four lanes to accommodate turns and uphill bike lanes from US 26 to the Washington County line.

2.4 MULTNOMAH COUNTY DESIGN AND CONSTRUCTION MANUAL

As noted above, the study segment of Scholls Ferry Road has been classified as a minor arterial by the County and will rely on the urban arterial cross-section as described in the *Multnomah County Design and Construction Manual* as a guide when designing roadway improvements. Scholls Ferry Road is classified as an arterial by Washington County and the City of Portland. The Sylvan Hill interchange is under the jurisdiction of ODOT. In areas where the corridor is constrained topographically, consideration will be given to combining the standard urban arterial cross-section with elements to best accommodate vehicles, pedestrians, and bicycles within the limited available roadway right-of-way. The standard cross-sections for these two classifications are summarized in Table 2-1 and illustrated in Figure 2-1 and Figure 2-2 below:

Table 2-1. Multnomah County Roadway Standards

		Design Speed (MPH)	ROW (ft)	# of Lanes	Sidewalk (ft)	Planter Strip (ft)	Bike Lane (ft)	Shoulder (ft)	Travel Lanes (ft)	Center Turn Lane (ft)
Urban Arterial	Minimum	35	80	3	5	0	5	NA	11	12
	Maximum	45	115	5	8	8	6	NA	12	14
	Preferred	NA	100	3	6	6	6	NA	11	12

Source: Design and Construction Manual, Multnomah County.

Figure 2-1. Urban Arterial Cross-section (Preferred)

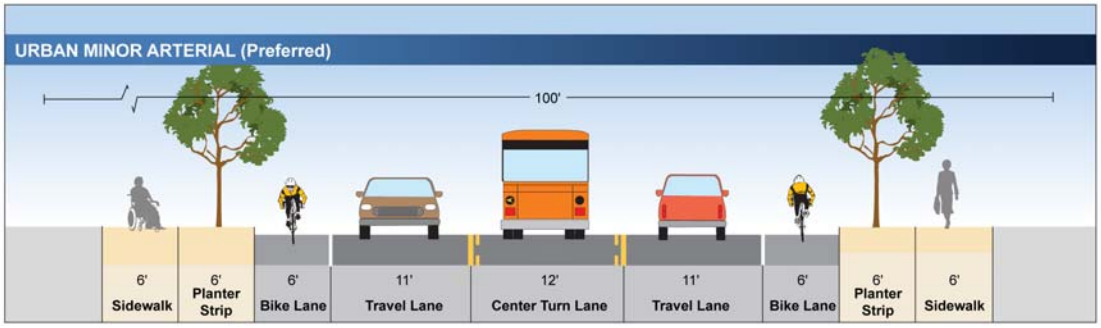
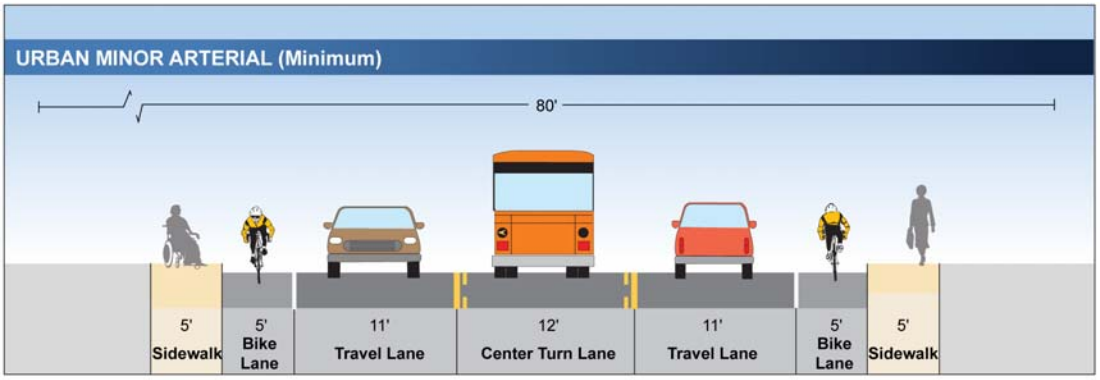


Figure 2-2. Urban Arterial Cross-section (Minimum)



Where feasible, other standards from the Design and Construction Manual must also be used to guide the layout of a variety of design concepts. These include minimum stopping site distance (SSD), horizontal and vertical alignment gradients, and minimum vertical curve radius. These design standards are listed in Table 2-2 below:

Table 2-2. Minimum County Design Standards for a Minor Arterial Roadway

Design Element		Design Standard (40 MPH)
Stopping Site Distance (SSD)	Level Road	305 Feet
	6% Upgrade	278 Feet
	6% downgrade	333 Feet
Horizontal alignment curve	4% superelevation	590 Feet
	6% superelevation	530 Feet
Street Gradient	Maximum	10%
	Minimum	0.5%
Sag vertical curve length	Based on Algebraic Difference in grades (K=Curve Length/Algebraic Difference in Grade)	K=64
Crest vertical curve length	Based on Algebraic Difference in grades. (K=Curve Length/Algebraic Difference in Grade)	K=44

Source: Design and Construction Manual, Multnomah County, latest edition.

2.5 AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS

The Multnomah County Design Standards reference the requirement to meet the current version of the AASHTO Geometric Design of Highways and Streets. The design standards listed in Table 2-2 above were calculated using the 2004 version of the AASHTO Geometric Design of Highways and Streets for the existing posted speed of 35 MPH. This provides a guideline to determine the need for improvements to the existing horizontal and vertical geometry. In areas where reconstructing the roadway to current design standards is not completed, appropriate warning signs should be installed.

2.6 FEDERAL AMERICANS WITH DISABILITIES ACT (ADA)

The Americans with Disabilities Act (ADA) prohibits state and local governments from discriminating against people with disabilities in all programs, services, and activities. Under the ADA, the U.S. Access Board has developed and continues to maintain design guidelines for accessible buildings and facilities known as the *ADA Accessibility Guidelines* (ADAAG). These guidelines were adopted by United States Department of Transportation (USDOT) and are published as the ADA Standards for Accessible Design for transportation facilities. These guidelines are enforceable under the ADA.

Relevant to the development of pedestrian and bicycle facilities on Scholls Ferry Road is the requirement that public and private entities use available guidance from the ADAAG to design and construct sidewalks and trails to make them accessible to and usable by people with disabilities. Relevant sections include:

- Accessible Routes (ADAAG 4.3)

- Curb Ramps (ADAAG 4.7)
- Ramps (ADAAG 4.8)[1]

The design for adding pedestrian facilities to Scholls Ferry Road must meet the requirements of ADAAG which states the facility shall have a minimum clear width of 36 inches, with a maximum cross-slope of 2%. Any accessible route with a longitudinal slope greater than 5% is considered a ramp and shall comply with the requirements of Section 4.8. These requirements only apply to the curb cuts, ramps, and driveways along Scholl Ferry Road. However, during design every effort should be made to meet these requirements on the entire pedestrian network consistent with the ODOT Highway Design Manual. The manual states that any sidewalk parallel to a roadway and built to the grade of the land can be constructed at the same grade as the road, even if the grade is steeper than 5% without requiring an exception.

2.7 OREGON BICYCLE AND PEDESTRIAN PLAN (1995)

The Oregon Bicycle and Pedestrian Plan (OBPP) set forth the standards and guidelines for bikeways, walkways, and other pedestrian facilities, including crossing treatments that should be followed within the State of Oregon. The OBPP is regularly used by local governments as a guide for the planning and design of facilities for alternative travel modes. Many of the standards and guidelines described below are based on federal standards and guidelines.

On-Road Bikeways[2]

Bicycles are legally classified as vehicles in the State of Oregon, and roadways must be designed to allow bicyclists to ride in a manner consistent with the vehicle code. A bikeway is created when a road has the appropriate design treatment to accommodate bicyclists, based on motor vehicle traffic volumes and speed. The basic design treatments to accommodate bicycle travel on the road are: shared roadway, shoulder roadway, or a bike lane. An additional type of facility separated from the roadway is a multi-use path.

There are no specific bicycle standards for most shared roadways; they are simply located on the roads as constructed. Shared roadways function well on local streets and minor collectors, and on low-volume rural roads and highways. Shared roadways are suitable in urban areas on streets with low speeds—25 mph or less—or low traffic volumes (3,000 Average Daily Traffic or less, depending on speed and land use). The TPR requires bicycle lanes and walkways on arterials and collectors. Scholls Ferry Road due to its classification as a minor arterial, the posted speed limit and traffic volumes, bike lanes would be the preferred facility.

Walkways[3]

Pedestrian facilities include walkways, traffic signals, crosswalks, and other amenities such as illumination and benches.

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[1] Federal Highway Administration, U.S. Department of Transportation. "Designing Sidewalks and Trails for Access, Part I of II: Review of Existing Guidelines and Practices" Barbara McMillen, Program Manager; Beneficial Designs, Inc. Author. Clay Butler, Illustrations. September 2001. http://www.fhwa.dot.gov/environment/sidewalk2/.

[2] Oregon Bicycle and Pedestrian Plan (1995), II.1. On-Road Bikeways.

[3] Oregon Bicycle and Pedestrian Plan (1995), II.4 Walkways, B. Standards.

A walkway is a transportation facility built for use by pedestrians and persons in wheelchairs. Walkways include both sidewalks and paths. Sidewalks are located along roadways, separated with a curb and/or planting strip, and have a hard, smooth surface.

Paths are typically used by pedestrians, cyclists, skaters, and joggers and are often referred to as Multi-Use Paths. Paths may be unpaved, constructed with packed gravel or asphalt grindings, if they are smooth and firm enough to meet ADA requirements.

- **Multi-Use Paths** – Well-planned and well-designed multi-use paths can provide good pedestrian and bicycle mobility. Paths can serve both commuter and recreational cyclists. The key components to successful paths include: continuous separation from traffic, scenic qualities, connection to land uses, well-designed street crossings, visibility, good design, and proper maintenance.[4]
- **Unpaved Paths** – The standard width of an unpaved path is the same for sidewalks. An unpaved path should not be constructed where a sidewalk is more appropriate. The surface material should be packed hard enough to be usable by wheelchairs and children on bicycles (the roadway should be designed to accommodate more experienced bicyclists).

2.8 2035 REGIONAL TRANSPORTATION PLAN

The Regional Transportation Plan (RTP) is prepared and regularly updated by Metro, the Metropolitan Planning Organization for the Portland region. The RTP is intended to serve as a blueprint to guide transportation planning and investments in the Tri-County area. State law requires that the RTP be consistent with the Oregon Transportation Plan and relevant provisions of statute such as the Transportation Planning Rule (State Planning Goal 12). State law further requires consistency of local plans with the RTP for jurisdictions located within the Portland metropolitan area.

The 2035 RTP is currently in draft form with additional analysis and public input currently underway. Key goals of the draft plan with relevance for improving pedestrian and bicycle facilities along Scholls Ferry Road include: expanding transportation choices, emphasizing effective and efficient management of the existing transportation system, enhancing safety and security, promoting environmental stewardship, and enhancing human health.

According to the RTP, the Scholls Ferry Road study area is designated as a Minor Arterial and a Regional On-street Bikeway. The RTP also calls for convenient and reliable regional transit bus service on the majority of arterials. Currently, there is no transit service provided along Scholls Ferry Road and none planned in the short or long term. The provision of bus service would require consideration of safe non-motorized access to/from bus stops.

2.9 CREATING LIVABLE STREETS: STREET DESIGN GUIDELINES FOR 2040

This handbook outlines Metro's approach to designing streets of regional significance that improve livability and safety within a community and support the goals adopted in the Regional Transportation Plan (RTP) and 2040 Growth Concept. The guidelines are intended to be used as tools to improve existing streets and for designing new streets by linking street design that is based on traditional functional classification designations (e.g., mobility vs. accessibility) with multi-modal functions, community livability and economic vitality. The design guidelines are not standards, but are instead recommendations intended to complement existing standards and guidelines in adopted local plans.

[4] Oregon Bicycle and Pedestrian Plan (1995), II.6. Multi-Use Paths.

The guidelines in the Creating Livable Streets Handbook address the following design issues that are relevant to the Scholls Ferry Road corridor:

- *"How regional street design can enhance the identity and livability of the region with principles and design guidelines for multi-modal street design;*
- *How streets can be retrofitted and upgraded with pedestrian-oriented amenities to promote walking, bicycling and transit use;*
- *How streets should integrate bikeways consistent with the regional street design types;*
- *How to ensure that pedestrian improvements do not preclude reasonable truck and bus movement at major intersections and that truck and bus improvements do not inhibit pedestrian movement;*
- *How to incorporate regional street design elements where right-of-way constraints limit desired design elements."*

2.10 GREEN STREETS: INNOVATIVE SOLUTIONS FOR STORMWATER AND STREAM CROSSINGS (2002)

This handbook outlines Metro's approach to designing green streets in the Portland metro area and provides stormwater management concepts. Metro defines a Green Street as a transportation facility that is designed to:

- "Integrate a system of stormwater management within its right of way
- Reduce the amount of water that is piped directly to streams and rivers
- Be a visible component of a system of "green infrastructure" that is incorporated into the aesthetics of the community
- Make the best use of the street tree canopy for stormwater interception as well as temperature mitigation and air quality improvement
- Ensure the street has the least impact on its surroundings, particularly at location where it crosses a stream or other sensitive area. "[5]

The following are goals in the Green Streets Handbook are applicable to the design and development of bicycle and pedestrian facilities on Scholls Ferry Road:

- Maintain and restore natural processes
- Conserve, protect and restore habitat quantity and quality
- Improve water quality[6]

The Green Streets Handbook also highlights that right of way for retrofitting existing roadways may be limited by adjacent development, in which case the following standard would apply:

- Must ensure that installation of designs does not come at [the] expense of pedestrian and bicycle facilities.[7]

[5] What is a Green Street?, http://www.oregonmetro.gov/index.cfm/go/by.web/id=26335
[6] Green Streets: Innovative Solutions for Stormwater and Stream Crossings (2002), pg 9.
[7] Green Streets: Innovative Solutions for Stormwater and Stream Crossings (2002), pg 40.

2.11 CITY OF PORTLAND STORMWATER MANAGEMENT MANUAL (2008)

Multnomah County currently defers to the City of Portland (COP) stormwater standards for guidance. The City of Portland's Stormwater Management Manual outlines required stormwater management for all development. The City's approach is to treat and infiltrate stormwater onsite using vegetated surface facilities *to the maximum extent feasible*[8], before discharging to a surface drainage canal or pipe system with limited capacity. The following is the City's pollution reduction target for water treatment facilities:

- 70 percent removal of total suspended solids (TSS) is required from 90 percent of the average annual runoff.

The above requirement is applicable to projects that develop or redevelop more than 500 square feet of impervious surface.

[8] City of Portland *Stormwater Management Manuel* (2008), pg. 1-9.

3. EXISTING CONDITIONS

This chapter presents a summary that highlights existing features and characteristics of the study area and focuses on identifying opportunities and constraints that impact the development of design concepts for bicycle and pedestrian facilities along Scholls Ferry Road.

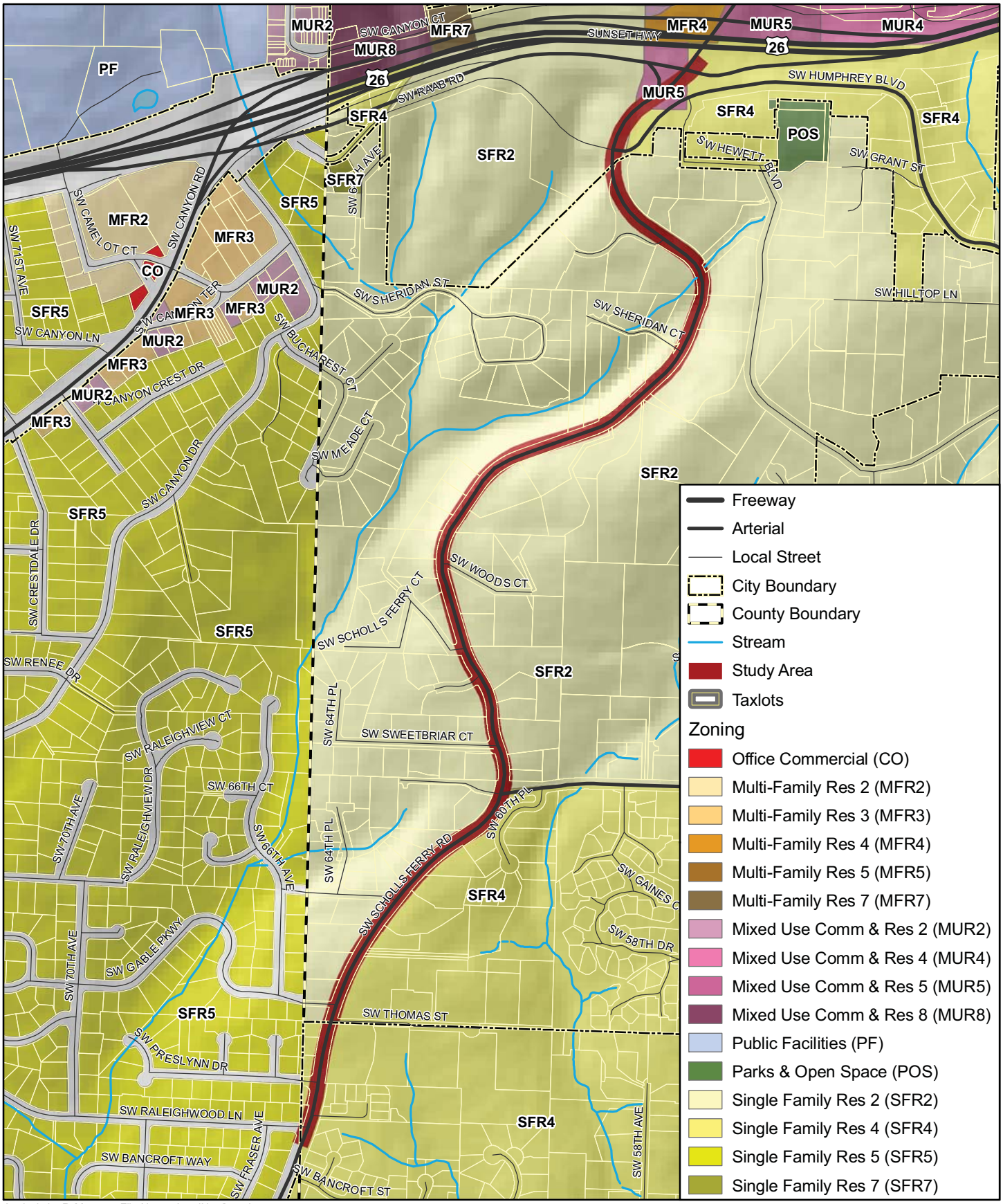
3.1 LAND USE

As seen in Figure 3-1, the study area is predominantly made up of single-family residential land uses, although there is some mixed-use development and a designated Open Spaces area at the north end near the US 26 interchange. There are no Commercial or Industrial uses along Scholls Ferry Road. The Raleigh Hills Center, a large commercial center, is located approximately ½ mile south of the study area. The Sylvan Hills interchange area also has commercial businesses, school, and connections to transit. Given the topography of this area, it is reasonable to see why residential development is clustered around transportation facilities that offer a limited degree of access and connectivity.

High school students living in the corridor area are expected to walk to the TriMet stops at Sylvan Blvd or Hamilton Street. The Portland Public Schools student transportation policy states:

> *High school students who reside more than one and one-half miles from the school they attend which is within their attendance boundary and one mile or more from Tri-Met, private, or other public services. Measurement shall be determined from the street immediately in front of the student residence to the closest stop*.

Public comment during the development of the plan indicated that there is a demand for facilities along Scholls Ferry Road. Although no field data has been collected regarding pedestrian and bicycle use along Scholls Ferry Road, existing travel by these modes was observed to be low. This is due to several factors, including: perceived unsafe or uncomfortable nature of the existing road for these travel modes, lack of direct transit service along Scholls Ferry Road reduces pedestrian demand, and the sometimes steep incline of the roadway requires extra effort by a pedestrian or bicyclist. Pedestrian demand is higher at the north end, near the Sunset Highway, and at the south end of the corridor where multiple roads intersect with Scholls Ferry Road, the topography is less steep, sidewalks are in place, transit service and commercial uses are present. Because of the limited number of homes and the lack of commercial development along Scholls Ferry Road the demand for local trips would be between neighborhoods and the north or south ends of the corridor. However, there is unserved demand for trips to the schools, church, offices, retail development, transit and other bicycle corridors in the Sylvan area and the Raleigh Hills area. Additionally, there is demand for longer distance trips between Sylvan and Raleigh Hills. At public meetings, residents related experiences of large numbers of bicyclists and pedestrians using Scholls Ferry Road when landslides closed the roadway to vehicular traffic.



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Scholls Ferry Road
Conceptual Design Plan

Figure 3-1. Land Use Designations

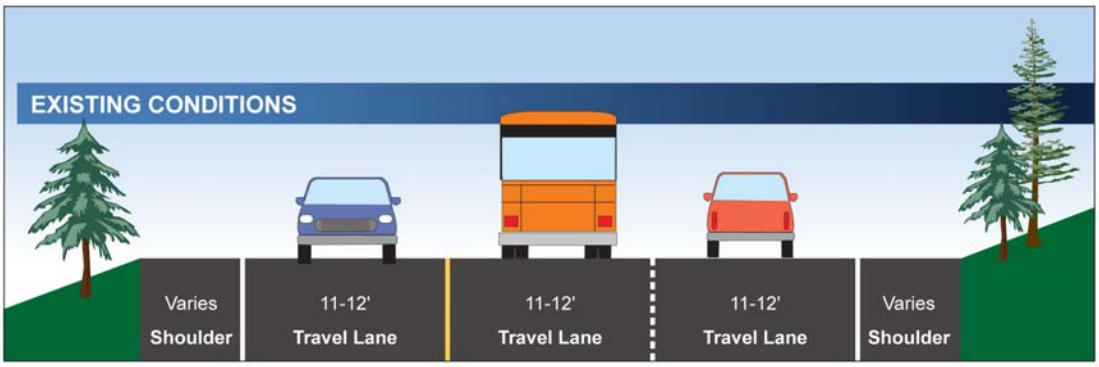
3.2 TRANSPORTATION

Scholls Ferry Road is classified as a minor arterial in urban unincorporated Multnomah County and connects Skyline Boulevard and the Sunset Highway with the Raleigh Hills town center in Washington County. The various designations of Scholls Ferry Road is summarized in Table 3-1 below. The roadway section includes three travel lanes, with one travel lane in the southbound direction and two travel lanes in the northbound direction. The purpose of the second northbound lane is used to pass slow-moving vehicles going up the steeper grade approaching US 26. The Scholls Ferry Road also has varying shoulder width throughout the study corridor. Currently, a left-turn lane is provided at Patton Road for vehicles traveling southbound on Scholls Ferry Road. The existing and typical roadway cross-sections for Scholls Ferry Road in the study area are detailed in Figure 3-2 below.

Table 3-1. Scholls Ferry Road Designations

Jurisdiction	Designations
Multnomah County	Minor Arterial Roadway Not a designated truck route
Washington County	Arterial Roadway, Street Design Considerations Truck Route Planned number of lanes 2 or 3 Urban Bicycle Route
City of Portland	District Collector, Community Transit Street, City Bikeway City Walkway, Minor Truck Street, Minor Emergency Response, Community Corridor
METRO	Minor Arterial, Regional Street, Regional on-street bikeway corridor No designation for transit for freight

Figure 3-2. Exiting Conditions Cross-section



Roadway right of way along Scholls Ferry road is 60 feet with two exceptions:

- As Scholls Ferry Road approaches Patton Road at the south end of the study area, the right of way widens to the 70 feet.
- As Scholls Ferry Road approaches Humphrey Boulevard at the north end of the study area, the right of way widens to 90 feet.

Scholls Ferry Road is accessed on both sides by local streets and private driveways. Widening of the existing roadway would be required to provide the minor arterial cross section. This widening would be less desirable on the east side due to the steep cut slopes and retaining walls and would, therefore, have less of an impact on the grade of these roadways as they approach Scholls Ferry Road. Widening on the west side is more likely to occur by constructing retaining walls or embankments and could have a major impact on certain roadways.

The existing alignment of Scholls Ferry Road contains horizontal curves that do not meet the County design standards for a minor arterial. Beginning at the intersection with Patton Road and proceeding north, there are at least seven horizontal curves with radii ranging from 230 feet to 430 feet, all below the 440 foot (assuming a 6% super) design standard for the 35 MPH posted speed. In addition, in many locations due to the poor visibility on these tight horizontal curves from barriers such as walls, cut slopes, and vegetation, the stopping sight distance is also below standards. Sight distance could be improved by trimming vegetation or flattening existing cut slopes, or in areas where the limited sight distance is caused by a man-made obstruction such as a wall, sight distance may be improved by adding a path or bike lane on the inside of these curves and shifting the lane away from the obstruction. For example, on an existing horizontal curve north of SW Woods Court, the sight distance is approximately 130 feet due to a retaining wall on the inside of the curve. By shifting the driving lane away from the wall through the addition of a bike lane, curb, and sidewalk; the sight distance could be improved above the minimum standard sight distance of 229 feet. Similar improvements in sight distance could be made on other curves, depending on the distance available and the distance that the road is shifted away from the obstruction.

The current gradient of Scholls Ferry Road in the study area consists of the following vertical gradients:

Slope	Lineal Feet
Less than 5%	1,750
5% to 6.25%	2,250
6.25% to 8.33%	2,400
More than 8.33%	150

Approximately 1,750 feet of the corridor existing roadway gradient is less than 5% and would meet ADA standards for pedestrian facilities. For approximately 4,800 feet of the corridor, the pedestrian facilities would likely follow the gradient of the roadway, and be steeper than 5%.

The County's 2005-2009 Capital Improvement Plan (CIP) and Program is based on the County's TSP and identifies several projects proposed to be constructed within the vicinity of the Scholls Ferry Road corridor. Table 3-2 presents a short list of proposed projects taken from the CIP that have relevance to the enhancement of bicycle and pedestrian circulation in the project area.

Table 3-2. Multnomah County Capital Improvement Projects in Study Area

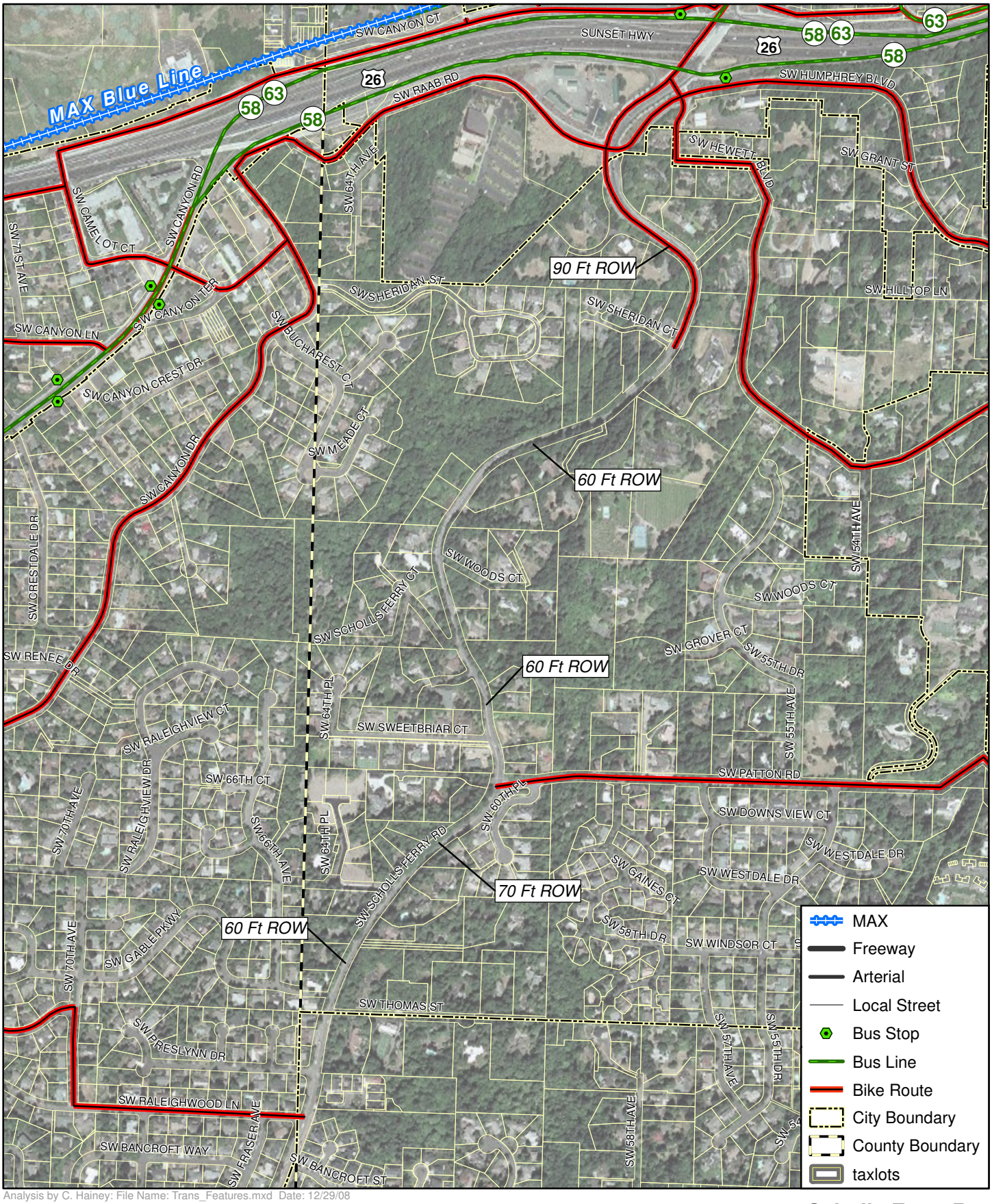
Project No.	Project Name	Project Description	Score (out of 100)	Total Cost (2009 $)
101	Scholls Ferry Road: US 26 to Wash. Co. Line	Widen roadway to add lane for turns and uphill bike lanes	15	$2,300,000
262	Hewitt Blvd: Humphrey Blvd-5200 ft W/o Patton Road	Shoulder Bikeway	12	$250,000
265	Humphrey Blvd: Patton Road–Hewitt Blvd	Add a shared lane bikeway	31	$113,000
279	Patton Road: Scholls Ferry Road-Hewitt Blvd	Shoulder/ Shared lane bikeway	52	$358,000
774	Scholls Ferry Road at Patton Road	Improve safety and reduce delay at intersection. Improvements will include ADA, new signals, curb ramps and add permissive/protective phasing	10	$307,000
283	Scholls Ferry Road: Hewitt Blvd–County Line	Widen to add an uphill bicycle lane.	53	$572,000

Tri-Met's MAX Blue and Red Line stops in the vicinity of the northern study boundary at the Oregon Zoo, providing light-rail service with an average headway of 7 minutes during morning and afternoon commute times. While there are no existing transit routes on this segment of Scholls Ferry Road, the area is served by Tri-Met bus lines 58 (Canyon Road) and 63 (Washington Park). Line 58 operates seven days a week with an average headway of 30 minutes during commute periods increasing to 60 minutes in the off-peak. Line 63 operates seven days a week with an average headway of 60 minutes throughout the day. The routes are illustrated in Figure 3-3.

Currently, bicycle facilities on Scholls Ferry Road are limited to striped bike lanes from US 26 to approximately Sheridan Circle. There are several, Metro designated, bike routes in close proximity to Scholls Ferry Road. Bike routes near Scholls Ferry Road can be found on:

- Canyon Drive
- Canyon Lane
- Humphrey Boulevard
- Hewitt Boulevard
- Patton Road
- Raleighwood Lane

Further discussion of these potential alternative corridors is presented in section 3.3 and are illustrated in Appendix A.



Analysis by C. Hainey: File Name: Trans_Features.mxd Date: 12/29/08

Data Sources: 2008 Metro RLIS Data, ESRI.
Note: Bike Route Locations Designated by Metro

N

0 500 1,000

Feet

Scholls Ferry Road
Conceptual Design Plan

Figure 3-3. Transportation Features

3.3 STUDY AREA BICYCLE AND PEDESTRIAN CIRCULATION CORRIDORS

Scholls Ferry Road corridor and its surrounding area offer limited provisions for bicycle and pedestrian circulation as shown in Figure 3-3. The lack of safe and friendly bicycle and pedestrian facilities on Scholls Ferry Road may force users to seek out alternative routes. When options are available, pedestrians and bicyclists generally choose a route that provides the best balance of the following desirable characteristics:

- Directness between the origin and destination point
- Minimal gradients to be negotiated
- A high quality and well-maintained surface
- Lower volumes of motor vehicle traffic
- Adequate space for allowing faster traffic to safely pass
- Pleasant environmental surroundings, safe and secure
- Minimal number of stops or delays

In the vicinity of Scholls Ferry Road, there are three alternative north/south roads that provide bicycle and pedestrian connectivity between US 26 and Beaverton-Hillsdale Highway. However these routes don't provide the best balance of desirable characteristics. The routes are further described below and are illustrated in the graphic found in Appendix A.

- **Canyon Drive/Laurelwood Drive** – Located in Washington County, this route begins at US 26 and Canyon Road turning onto Canyon Drive and following it to the south and west. At the intersection with 78th Avenue this route turns south onto 78th until it intersected the Beaverton-Hillsdale Highway. This route is listed as a secondary bicycle route by Washington County, which is characterized by low (under 30 mph) traffic speeds. There are no sidewalks or bike lanes present.

Hewitt Blvd/Shattuck Road – This route begins at US 26 and Scholls Ferry Road turning onto Hewitt Blvd and following it south and east. At the intersection with Patton Road this route turns west and follows Patton Road until it reaches Shattuck Road. At the intersection with Shattuck Road, this route turns south on Shattuck Road until it intersects with the Beaverton-Hillsdale Highway. It should be noted that Shattuck Road has been designated by the County as a Caution Area, where cyclists may encounter narrow travel lanes, high traffic volumes, sharp curves, limited visibility, large trucks, or difficult intersections All these roadways function as shared lane facilities.

- **Hewitt Blvd/Dosch Road –** This route begins at US 26 and Scholls Ferry Road turning onto Hewitt Blvd and following it south and east. At the intersection with Patton Road, this route turns onto Patton Road before continuing south on Dosch Road until it intersects the Beaverton-Hillsdale Highway. It should be noted that Dosch Road north of Hamilton Street is designated by the County as a Caution Area, and south of Hamilton Street Dosch is designated as a High Traffic Street. All these roadways function as shared lane facilities. These routes do not have existing sidewalks and bike lanes, and minimal shoulders. These routes also lack the desirable characteristics of high quality facilities, minimum gradients and directness. The out of direction travel that would be required by pedestrians and bicyclist would be between 0.8 and 2.3 miles. As noted previously, the County's CIP currently includes some projects that would enhance bicycle and/or pedestrian facilities in the vicinity of Scholls Ferry Road including:

- Project #262: Hewitt Blvd, Humphrey Blvd to Patton Road (shoulder bikeway)
- Project #265: Humphrey Blvd, Patton Road to Hewitt Blvd (add shared lane bikeway)
- Project #279: Patton Road, Scholls Ferry Road to Hewitt Blvd (shoulder/shared lane bikeway)

The SW Trails Group, a neighborhood organization, has developed a plan and strategy for improving the bicycle network in southwest Portland. The plan, acknowledged by the City of Portland Bureau of Transportation, recommends several bicycle system improvements in the larger Scholls Ferry Road study area and identifies the Hewitt Boulevard project as a priority.

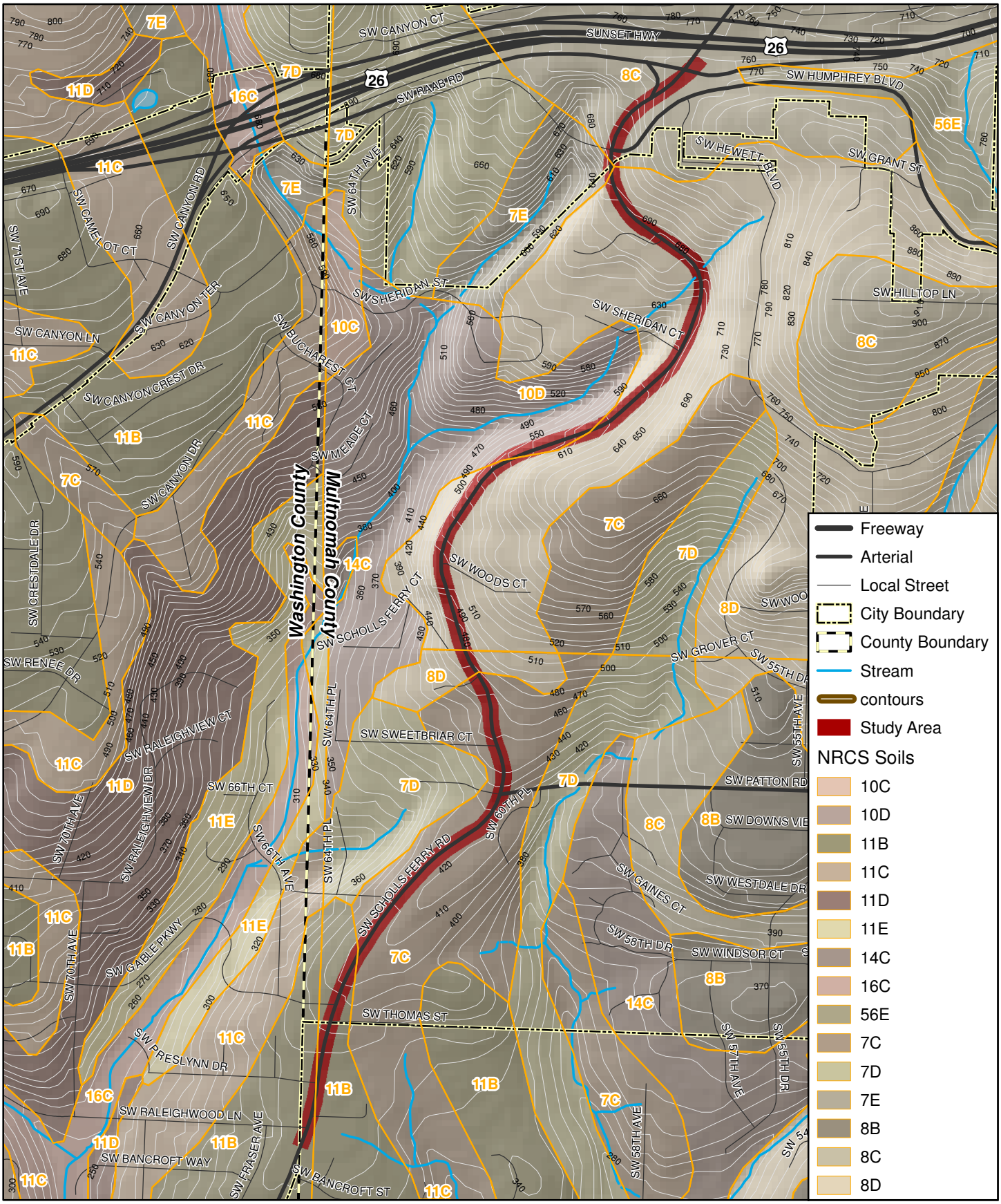
There may be potential to create off-street connections that would link streets close to Scholls Ferry Road and provide non-motorized access to Raleigh Hills. One option that has been discussed includes seeking an access easement to create a multi-use path through the First church of the Nazarene at 6100 SW Raab Road, across a small piece of property to link with SW Sheridan Street and then to connect with SW Canyon Road. From this point connections could then be made via SW Ridgewood and SW 74th Avenue through the neighborhood to the Beaverton-Hillsdale Highway. The challenges to making these connections include topography and lack of available right-of-way. Opportunities to make these connections should be explored as they present themselves through the private development process.

While these types of facilities may enhance connections to the Sylvan area with Beaverton-Hillsdale Highway or neighborhoods/destinations to the east or west of Scholls Ferry Road, they do not serve the same purpose as bike lanes and sidewalks on Scholls Ferry Road and do little to accommodate bicycle and/or pedestrian demand itself due to their distance from this road.

3.4 GEOLOGY & HYDROLOGY

As shown in Figure 3-4, much of the study area is bounded by steep slopes, some in excess of 40 percent. These steeper slopes are located predominantly around the northern end of the study area and coupled with poorly draining soils are at a high risk of landslides. In 1996 Scholls Ferry Road experienced a landslide that closed the road and resulted in the construction of the taller retaining wall on the eastside of the roadway between Woods Court and Sheridan Lane. Based on discussions with Multnomah County, this landslide can mainly be attributed to an existing culvert that was plugged, causing saturation of the existing soil and soil stability failure. Landslide risk is reduced, with a gradual decrease in steepness as the road moves toward the southern end of the study area.

Any stormwater improvement made in conjunction with pedestrian and bicycle system improvements along Scholls Ferry Road may impact the Sylvan drainage system which is already experiencing problems with erosion, siltation and sedimentation. An increase in impervious surface and resulting increases in stormwater runoff could exacerbate existing flooding problems.



Analysis by C. Hainey: File Name: Geo_Hydro.mxd

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Feet

Scholls Ferry Road
Conceptual Design Plan

Figure 3-4. Geology/Hydrology Map

Table 3-3 and Table 3-4 below describe existing Natural Resources Conservation Service (NRCS) soil types and infiltration characteristics in the study area for both Multnomah and Washington County. The soil types listed in these tables may be correlated with the information presented in Figure 3-4.

Table 3-3. NRCS Soil Types – Multnomah County

Soil Type Code	Soil Type Name	Infiltration Characteristics
10C	Cornelius silt loam, 8 to 15 percent slopes	Moderately well drained
10D	Cornelius silt loam, 15 to 30 percent slopes	Moderately well drained
11B	Cornelius-Urban land complex, 3 to 8 percent slopes	Moderately well drained
11C	Cornelius-Urban land complex, 8 to 15 percent slopes	Moderately well drained
14C	Delena silt loams, 3 to 12 percent slopes	Poorly drained
56E	Wauld very gravelly loam, 30 to 70 percent slopes	Well drained
7C	Cascade silt loam, 8 to 15 percent slopes	Somewhat poorly drained
7D	Cascade silt loams, 15 to 30 percent slopes	Somewhat poorly drained
7E	Cascade silt loams, 30 to 60 percent slopes	Somewhat poorly drained
8B	Cascade-Urban land complex, 0 to 8 percent slopes	Somewhat poorly drained
8C	Cascade-Urban land complex, 8 to 15 percent slopes	Somewhat poorly drained
8D	Cascade-Urban land complex, 15 to 30 percent slopes	Somewhat poorly drained

Source: Natural Resources Conservation Service; website, November 24, 2008

Table 3-4. NRCS Soil Types – Washington County

Soil Type Code	Soil Type Name	Infiltration Characteristics
11B	Cornelius and Kinton silt loams, 2 to 7 percent slopes	Moderately well drained
11C	Cornelius and Kinton silt loams, 7 to 12 percent slopes	Moderately well drained
11D	Cornelius and Kinton silt loams, 12 to 20 percent slopes	Moderately well drained
11E	Cornelius and Kinton silt loam, 20 to 30 percent slopes	Moderately well drained
16C	Delena silt loams, 3 to 12 percent slopes	Poorly drained
7C	Cascade silt loam, 7 to 12 percent slopes	Somewhat poorly drained
7D	Cascade silt loam, 12 to 20 percent slopes	Somewhat poorly drained
7E	Cascade silt loams, 20 to 30 percent slopes	Somewhat poorly drained

Source: Natural Resources Conservation Service; website, November 24, 2008

In summary, it should be noted that the majority of the study area includes slopes ranging from 10 to 25 percent and is generally affected by four different soil types. Much of the northern end of the study includes slopes ranging from 10 to 25 percent with soils that drain poorly. The central section of the study area is much steeper with slopes ranging from 25 to over 40 percent in certain locations. Soils vary from those that drain somewhat poorly to those that drain moderately well. At the southern end of the study area slopes range from 0 to 10 percent with soils typically draining poorly. Immediately adjacent to the Washington County line, soil drainage improves to moderate.

3.5 STORMWATER ISSUES

The issues of concern limiting stormwater management and the use of Green Streets or LID alternatives and options on Scholls Ferry Road are;

1. Steep slopes
2. Space constraints
3. Poor soil conditions
4. An existing drainage basin (Sylvan Creek) that is currently in a compromised condition

This area also has a high potential for slide activity and a thorough geotechnical investigation complete with soil stabilization recommendations is necessary. Not included in this study but necessary in the future is the analysis of the basins draining to the existing Scholls Ferry Road stormwater infrastructure and a master plan to determine the adequacy of the existing system to manage the existing and future full build out runoff conditions.

Roughly two thirds of the roadway corridor being studied can be characterized as having slopes of 6% or greater. A good approximation of this section extends from Highway 26 to near Patton Road (upper reach). As discussed in the previous section, longitudinal slopes of this magnitude are less than ideal for implementing Green Street and LID applications. Additionally, this stretch of roadway is space constrained with limited room to install roadside Best Management Practices (BMPs) requiring excavation or embanking of the existing steep side slopes (see Figure 3-5 below). The lower one third of the study corridor can be characterized by having wider cross sections and longitudinal slopes in the 1–2% range which are more appropriate for Green Street and LID applications.

Figure 3-5. Upper Reach

Figure 3-6. Lower Reach

The soils as seen on the NRCS Soils map attached are not conducive to infiltration, and as described in the Sylvan Creek Basin discussion below, are prone to slide activity. Utilizing infiltration as a component of Green Street BMPs would require amending soils and underlying them with a high flow bypass pipe system and an impermeable liner. Such a subsurface stormwater management system is not typically associated with pervious pavements presumably because of maintenance/access and prohibitive cost concerns. For this project, we don't recommend pervious pavements as they perform best on soils with infiltration potential and would provide little value in this application.

Sylvan Creek Basin

Sylvan Creek will be the primary receiving body of water for improvements along Scholls Ferry Road, and its basin has a history of sloughing soils, landslides and stream degradation. This area has been subject to numerous studies by Clean Water Services and Washington County. Raleighwood Marsh/Park is the southern portion of this study area drainage basin where there exists a significant grade break. Grade breaks reduce flow velocities, allowing suspended sediment to drop out, and accumulate. Development pressure in the basin and the floods of 1996 have resulted in problematic and chronic stream degradation. The resulting siltation and aggregate deposition are exacerbating local property flooding problems and filling roadway culverts. Currently much of the existing Scholls Ferry Road stormwater infrastructure discharges into the Sylvan Creek basin. These outfalls should be assessed, and any improvements to Scholls Ferry Road should be done collaboratively with Washington County and Clean Water Services who have been studying, managing, and attempting to improve the Sylvan Creek drainage system. Because the Sylvan Creek basin has a history of slide activity, a thorough geotechnical analysis should be performed prior to any roadway or stormwater improvements.

There are drainages east of Scholls Ferry Road that contribute to Fanno Creek. This Creek has existing stress issues (flooding, erosion, habitat damage) and it would challenging to gain approval and engineer conveyance of water out the existing basin to Fanno Creek.

4. DESIGN CONCEPT

4.1 OPPORTUNITIES AND CONSTRAINTS FOR CONSIDERATION

The initial existing conditions research in the study area provided valuable information on feasibility of treatments options.

Scholls Ferry Road is classified as a minor arterial in urban unincorporated Multnomah County and connects Skyline Boulevard and the Sunset Highway with the Raleigh Hills town center in Washington County. The adopted County roadway cross section for an urban minor arterial requires a right of way width of 89 feet and improvement width of 70 feet, which includes two travel lanes, a center turn lane, bikes lanes, planter strips and sidewalks. There is insufficient existing right of way and buildable width to provide this cross-section throughout the entire corridor. The existing cross sections does not adequately accommodate bicyclists and pedestrians along the corridor and convey them safely to connecting facilities. The minor arterial and existing roadway sections are illustrated in the attached tables.

Generally, the available buildable width along Scholls Ferry Road for the length of the study area is approximately 50 feet. There is a 750-foot segment within the full 6,550-foot study corridor where 50 feet of width is not available. The available width in this segment is closer to 40 feet or less. This segment of the road has two key constraints that influence the ability to provide a full 50-foot facility width. There is an existing stone wall on the eastside of the roadway, approximately 300 feet in length, situated just a few feet from the edge of pavement. Another constraint is the presence of severe cut and fill slopes on both sides of the roadway. The existing conditions of the most constrained sections are represented in Figure 4-1 and Figure 4-2. Additional information is presented in Appendix B.

Figure 4-1. Typical Existing Cross Section

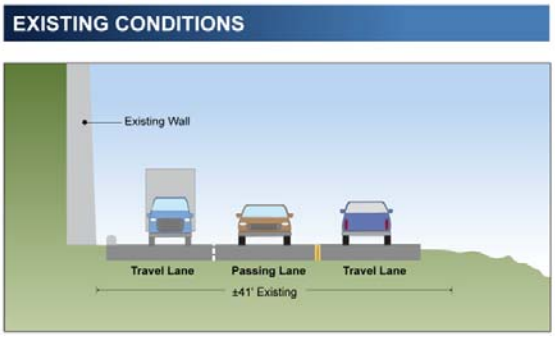
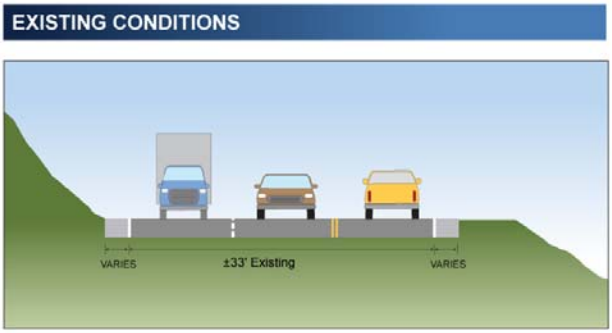


Figure 4-2. Typical Existing Cross Section



Stormwater is typically handled through sheet flow off the existing shoulders on the westside of the roadway in embankment areas and piped from ditch inlets on the eastside to outfalls along the existing embankment slopes. Narrow widths, poorly draining soils, and steep slopes preclude infiltration of stormwater in the upper reaches of the corridor. Flatter terrain and wider right of way widths provide opportunities for limited infiltration and Green Street applications near the lower or southern section of the corridor.

The Multnomah County Transportation System Plan calls for multi-modal facilities along minor arterials, however, physical constraints in the Scholls Ferry corridor could make the implementation of even the minimum standard minor arterial roadway cross section unreasonable in some areas. Therefore, exceptions to the *Multnomah County Adopted Minor Arterial Standard* roadway along the Scholls Ferry Corridor will be necessary to respond to the varying levels of constraints along the corridor. Treatment options for the roadway need to balance the vehicular capacity requirements along Scholls Ferry Road with the needs of bicyclists and pedestrians.

Considerations for Concept Development include:

Existing conditions restrict viable alternatives:

- Narrow widths, buildable area, and rights of way
- Environmental impacts
- Stormwater requirements
- Retaining walls
- Landslide hazards / steep slopes

Planning and Engineering

- Bike and pedestrian facilities should be provided on both sides of Arterial roadways
- Geotechnical investigation and Stormwater Plan will be required for design
- Balance the capacity and safety needs for all users
- Constructibility and funding feasibility

4.2 INITIAL CONCEPTS

An initial series of concepts for providing bike and/or pedestrian facilities was developed considering the existing policy and physical constraints and opportunities in the corridor. The options included a range of reasonably feasible designs for modifying the existing cross-section of Scholls Ferry Road to accommodate all travel modes and applying the minor arterial minimum standard where possible.

As previously noted, a 50-foot width is available along most of the corridor with some minor cut slopes and small retaining walls. In the narrower roadway segments, implementing the minor arterial minimum standard and maintaining the existing lane configuration would require additional modifications such as creating a separate walkway rather than a standard curbed sidewalk or building larger retaining walls. Graphics are provided in Appendix C illustrate these draft concepts. The full range of options included:

- Minor Arterial (Preferred Standard) – two travel lanes, a center turn lane or additional travel lane, 6 foot bikes lanes and sidewalks on both sides of the street.
- Minor Arterial (Minimum Standard) – two travel lanes, a center turn lane or additional travel lane, 5 foot bikes lanes and sidewalks on both sides of the street.
- Option 1 – a 12-to 14-foot shared use pathway along the east side of the road adjacent to the outside northbound travel lane. This pathway would be separated from the vehicle travel lane by a barrier. The outside northbound travel lane would be widened from 11-feet in width to 14-feet.
- Option 2 – a 6-foot bike lane along the east side of the road immediately adjacent to the outside northbound travel lane. A 6-foot raised sidewalk with curb and gutter would be provided along the west side of the roadway.
- Option 3 – a 6-foot raised bike lane along the east side of the road adjacent to the outside northbound travel lane, and a 5 to 6-foot raised sidewalk with curb and gutter immediately to the east of the bike lane.

In each of the concepts for the most constrained segment of the corridor, a shared travel lane with bicycle and motor vehicles was proposed for the southbound travel lane. This would entail widening the existing southbound travel lane from 11 / 12-feet to 14-feet. It was assumed that bicycles traveling downhill would travel at speeds closer to that of the motorists and could mix easier and more safely with traffic than in the northbound or uphill directions where the speed differential would be greater. Because of the speed differences between bicycles and pedestrians traveling downhill, a shared pedestrian facility in the southbound direction was not recommended.

The options were presented at a TAC meeting and a public meeting. A summary of the public comments received include:

- Provide bicycle and pedestrian facilities on both sides as it is unsafe to have unprotected crosswalks.
- Bike lanes need separation from traffic and bike and pedestrian facilities need to be separate from each other.
- Modifying Scholls Ferry to allow TriMet buses and bus stops is a must. The area is bus-line free.
- Two traffic lanes going uphill are needed to accommodate rush hour traffic. A slow truck would be crippling.
- A center turn-lane might be better and safer than providing two uphill lanes.
- A shared lane downhill would be okay due to faster speeds for bicyclists. A separate bike lane is needed uphill due to slower speeds.

The project team discussed the comments and other factors influencing the transportation conditions for all users. The following conclusions were reached:

- Traffic analysis should be conducted for Scholls Ferry Road to evaluate the climbing lane and crash history.
- For safety and to satisfy the requirements for an urban Arterial Roadway; separate bike and pedestrian facilities should be provided on both sides of SFR.
- Stormwater impacts should be minimized by eliminating curb and allowing sheet flow where possible, or it should be contained entirely.
- A boardwalk should be considered in areas that have a narrow width.
- A County Minimum Standard Urban Arterial Section with, center turn lanes, curb and sidewalk should be provided where possible.

4.3 REFINEMENT OF CONCEPTS

Based on comments from the TAC and first public meeting, the County commissioned a traffic analysis to evaluate the warrant for a climbing lane, center turn lane, and crash history along the corridor. The study can be obtained from the County. The results of the study are summarized below:

- The operation of Scholls Ferry Road between Patton Road and Humphrey Blvd was evaluated as three configurations: existing condition with a climbing lane, with a continuous center left turn lane, and without a third vehicle lane. The results indicate that in 2009 and 2029, for the AM and PM peak hour, the segment will operate within acceptable Metro level of service under all scenarios.
- The traffic study determined that the climbing lane does provide a capacity benefit north of Patton Road. A two-way center turn lane was recommended south of Patton Road.
- The route has a 6% vertical grade in some sections and has a curvy horizontal alignment. While the posted speed is 35 mph, the 85th percentile speed northbound on

Scholls Ferry Road is 46 mph. Only 1% of the truck traffic is traveling less than 30 mph.

- The classification counts indicate a 10% truck volume but only 1.2% of these are double trailer trucks and 0.2% were double trailers with more than one axle.
- Recommended the segment, from SW Thomas Street to Patton Road, should be switched from two lanes northbound to a single lane in each direction with a center turn lane.
- Most collisions along Scholls Ferry Road occurred at intersections and driveways.

The following two refined concepts were developed and considered for review by the TAC and presented at the second public meeting.

Concept 1 – Provide the Minimum County Minor Arterial Standard with center turn lane or climbing lane. This would be provided the entire length of the project and would require; extensive widening, retaining walls, acquisition of right-of-way, and stormwater facilities at a very high cost in the narrowest sections. The following assumptions were used in developing Scenario 1:

- Standard curb/gutter/sidewalk could be used on a majority of the project to manage stormwater and provide facilities.
- In order to fit bicycle lanes/sidewalk, the narrowest segments would need to be widened. A retaining wall of varying heights would be required in about 1,200 feet of the project.
- Due to the AASHTO Clear Zone requirements and to provide safety, a concrete barrier would be required where a retaining wall is used. These areas would also need a stormwater collection and conveyance system.
- Water quality and quantity could be handled in some of the lower sections of Scholls Ferry Road. Also, other detention/control facilities in the area would likely be needed consisting of either a regional facility or one created for this project.
- A boardwalk would reduce the height of retaining walls and provide an opportunity to provide a wider facility.
- Eliminating the third vehicle lane through the narrowest segments where there are no street or driveway accesses would eliminate many of the issues cited above.

Concept 2 – Minimum County Minor Arterial Standard and Toolbox of Designs – Generally provide the minimum standard in areas where existing terrain allows widening. In areas where the right-of-way and terrain are constrained use a toolbox of designs to provide shoulders, bike lanes, and walkways as shown in Appendix C. This would include widening the existing pavement where feasible and providing pedestrian facilities to fit the existing terrain. The toolbox of treatments for the constrained segment just north of Patton includes:

- The Minor Arterial Standard, which includes curb, sidewalk, and bike lanes, would be provided from just north of Patton to the southern terminus of the project where the terrain is flatter and construction is more feasible and less costly.
- From the end of the Minor Arterial Standard north, the following criteria would be applied:
    a. The existing roadway would be widened for bicycle and pedestrian facilities only where feasible without retaining walls.

b. Pedestrian facilities would be provided in both directions in different form, and may include a shared shoulder facility. Shoulder widening would be done where feasible to provide a minimum five-foot shoulder northbound and varying shoulder and shared lane southbound.

c. A separated pedestrian path would be provided where feasible.

d. Boardwalks would be used southbound in areas with steep terrain or existing walls or where shoulder widening is not possible.

e. Provide for stormwater including swales in flatter areas south of Patton; minimize additional impervious areas and curbs that concentrate flows and allow natural sheet-flow of stormwater.

4.4 PREFERRED CONCEPT

The preferred concept considered the data collected for the corridor including: traffic, environmental, geotechnical, geometry, safety conditions, and other factors influencing the existing transportation conditions. This information was used to further refine and evaluate needs and deficiencies for all users. Considerable public comment, and input from a Technical Advisory Committee (TAC) throughout the process helped refine the preferred conceptual design presented in Figure 4-3, Figure 4-4, Figure 4-5, and Figure 4-6.

The cross sections include:

- Constructing the County minimum design standard for a Minor Arterial roadway between Raleighwood Lane to Woods Court.
- Constructing a modified Minor Arterial roadway by removing the center left-turn lane between Woods Court and Sheridan Court. This segment does not require left-turns since there are no accesses and is constrained in buildable width by steep slopes.
- Constructing a modified Minor Arterial roadway between Sheridan Lane and Humphrey Blvd. with two lanes northbound and one lane southbound. This section is similar to the existing cross-section in this area, but with the addition of standard bike lanes and sidewalks.

The follow factors were considered in the selection of the preferred conceptual sections in addition to those previously discussed:

- Provides consistent facilities for bicyclists and pedestrians along the length of the corridor.
- While vehicular traffic may experience increased delay over the current configuration between Patton Road and Humphrey Blvd, bicyclist and pedestrians would be provided with continuous and safe facilities along both sides of the arterial where none exist today.
- Continues to provide the minimum section for vehicles and accommodates truck traffic.
- Provides sidewalks on both sides of the arterial which will reduce the need for pedestrians to cross Scholls Ferry Road at undesignated crossing locations.
- Provides bicycle and pedestrian facilities that are safe and secure for a variety of users, including students.

Figure 4-3. Preferred Conceptual Design Plan

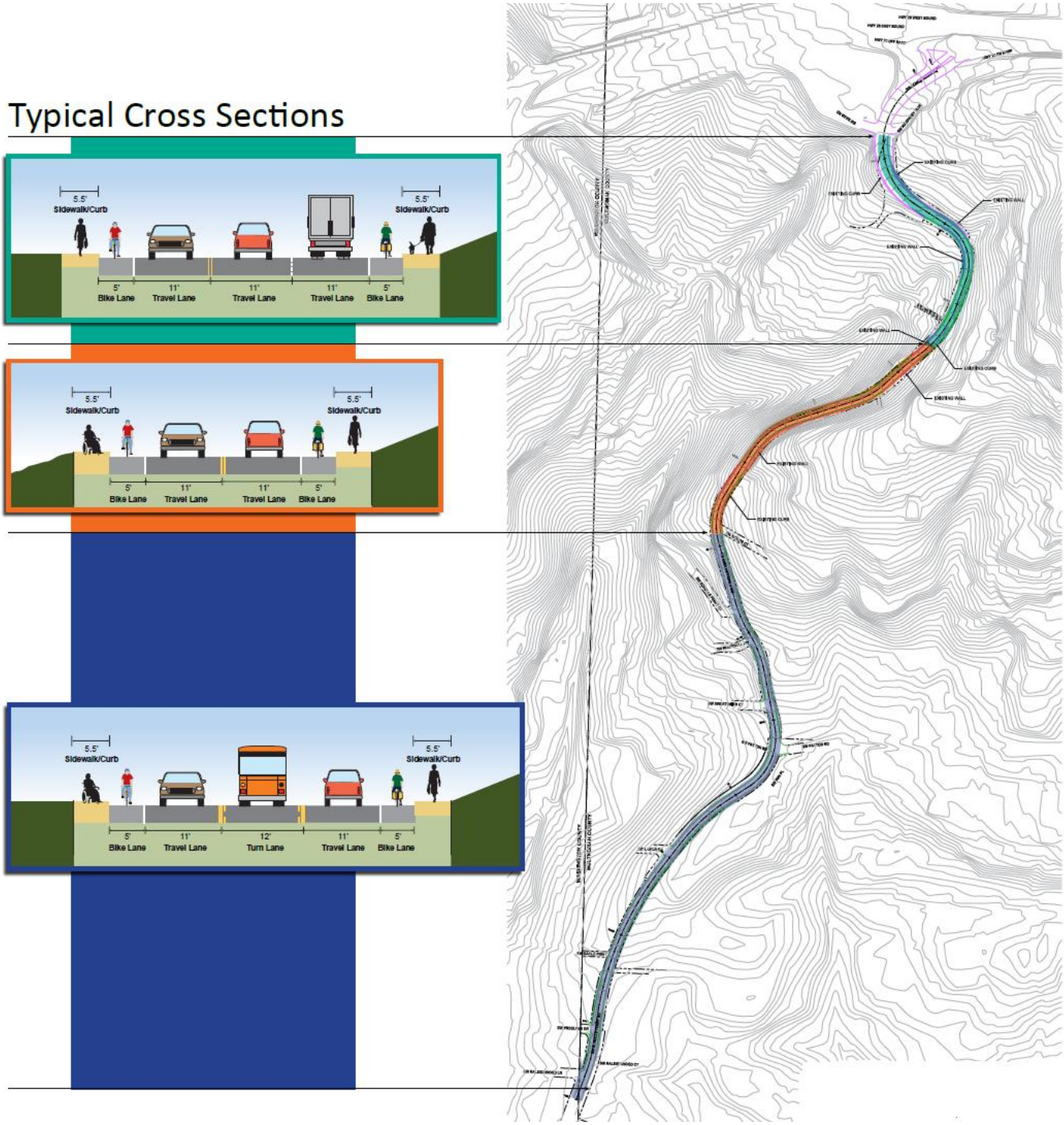
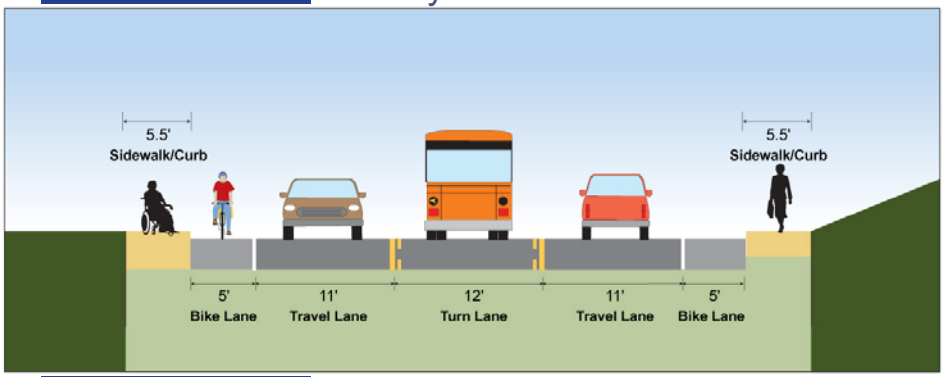


Figure 4-4. Preferred Conceptual Design Section

Raleighwood Lane – Woods Court

County Minimum Arterial Standard Roadway



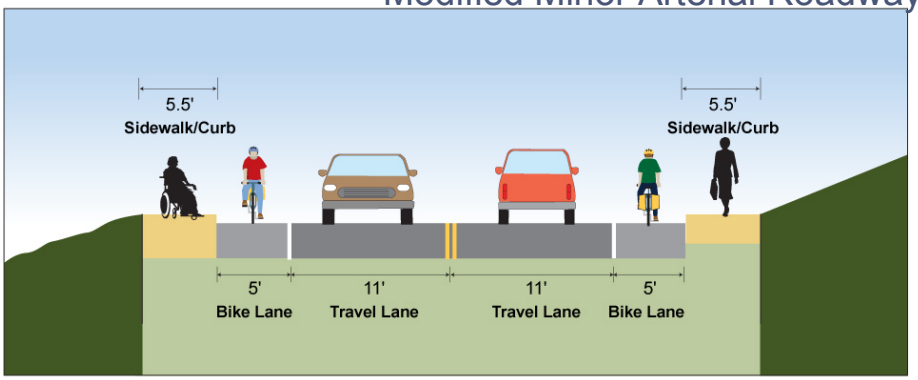
Two-way left-turn lane

Minimum 5’ bike lanes & sidewalks

Figure 4-5. Preferred Conceptual Design Section

Woods Ct – Sheridan Lane

Modified Minor Arterial Roadway



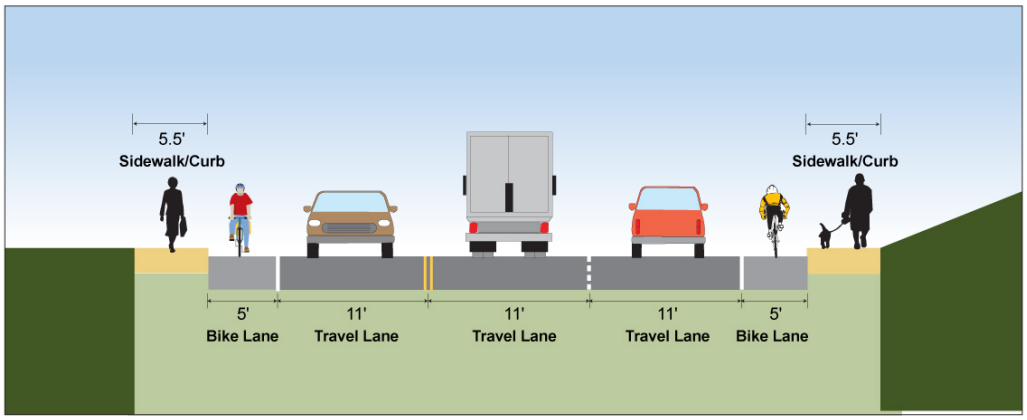
Two travel lanes

Minimum 5’ bike lanes & sidewalks

Figure 4-6. Preferred Conceptual Design Section

Sheridan Lane–Humphreys Blvd

Modified Minor Arterial Roadway



2 Northbound Travel Lanes

Minimum 5’ bike lanes & sidewalks

- The existing traffic's 85th percentile speed is exceeds the posted speed by more than 10 mph despite the vertical grade and curvy horizontal alignment of the roadway. Passenger vehicles traveling behind a truck northbound on Scholls Ferry Road with the two travel lane configuration would likely be traveling the speed limit. It is estimated that only of 1% of trucks would travel below 30 mph, which make up less than 1% of vehicles traveling Scholls Ferry Road.
- Onsite infiltration and sheet flow is not a feasible option for the majority of the Scholls Ferry Road corridor due to the steep terrain, poor draining soils, and history of landslides. The proposed improvements will likely require an enclosed stormwater conveyance system for the entire length of the improvements with quality and quantity control handled at the south end of the corridor. There are some small sections south of Patton Road where swale or other green street treatment and storage options are available within the right of way. The enclosed system will increase costs. Stormwater quantity and quality control facilities will likely require the purchase of additional right of way or property. Stormwater will likely need to be piped to the Sylvan Creek on the west side of Scholls Ferry Road. Outfall to the east connects to the Fanno Creek drainage basin which currently experiences stressors such as erosion, flooding, and habitat damage without additional flow form Scholls Ferry Road.
- The construction of pedestrian and bicycle facilities along Scholls Ferry Road will support the desire of residents for future transit service.
- The existing Sylvan Creek basin cannot currently handle additional stormwater volume from the proposed project. Mitigation opportunities exist and include purchasing property in the floodplain to increase available storage.
- The preferred conceptual designs provide more standard and consistent pedestrian and bicycle facilities, than alternative concepts.

The identification of a design concept is an important step in focusing the further efforts to secure funding and promoting a positive walking and bicycling environment.

4.5 STORMWATER ALTERNATIVES

Alternatives that address the stormwater management challenges and issues are summarized below and are limited due to the; steep terrain, narrow right of way widths, and unstable soil conditions throughout the corridor. These alternatives were developed after considering three stormwater approaches including using green street and low impact development, using a traditional curb and piped system, or adding multimodal facilities while maintaining the existing stormwater sheet flow. A description of these approaches is included below.

Stormwater Applications

Green Street and Low Impact Development - The primary mechanisms that make Green Street and Low Impact Development (LID) Best Management Practices (BMPs) effective are their ability to detain, retain, and infiltrate stormwater. The ability to manage stormwater at the site reduces or eliminates the downstream impacts to the infrastructure and the environment. The benefits go beyond mitigation, repair and maintenance cost savings. The ideal conditions for implementing these BMPs include plenty of room, flat terrain, and highly permeable soils. Conditions along the SFR study area are less than ideal for this application. This is not to say that Green Street and LID BMPs cannot be implemented, but to do so in less than ideal conditions increases costs, increases risk of failure, and BMPs will likely be

less effective than in ideal conditions. Before proceeding with any roadway or stormwater improvements, further geotechnical investigation is recommended. See further discussions in the subsection describing the Sylvan Creek Basin in Section 3.5, Stormwater Issues.

As previously discussed, one approach to LID would be to construct roadside bio-swales. Roadside bio-swales could be designed to provide stormwater quality treatment and convey high flows. However, the higher energies associated with high flows tend to render these facilities maintenance intensive compared to swales with high flow bypasses. The primary disadvantage of bio-filtration swales from a green streets perspective is that they do little to control flow at the source and instead can behave like traditional conveyance systems that introduce higher flows and energies downstream along with the associated detrimental environmental impacts listed above.

In order to control flow at the source in the lower reach, flow would need to be retained or detained along Scholls Ferry Road to the maximum extent practicable. This could be accomplished utilizing infiltration swales with amended soils over a high flow bypass pipe installed above an impermeable liner. See examples in Figure 4-7 and Figure 4-8 below. These could be installed with or without curbs and sidewalks.

Traditional curbed and piped system – This traditional approach to stormwater collection and management has often proven detrimental to natural systems by either removing the amount of stormwater that a site has historically seen, and or concentrating it into an area that historically hasn't seen such inundation. Mitigation for such impacts has traditionally been done by flow quality and quantity and control facilities that were somewhere downstream of the improvements. In addition to the potential negatives listed above, traditional curb/gutter and piping infrastructure and stormwater management facilities are relatively expensive to install and maintain compared to alternatives that don't require them.

Figure 4-7. Roadside Green Street/LID Application Under Construction

Figure 4-8. Roadside Green Street/LID Application Under Construction

A potential benefit to a traditional approach to managing stormwater on Scholls Ferry Road, is the prospect of a reduction in existing runoff flow currently draining to the stressed Sylvan Creek basin system. See this discussion in the Sylvan Creek Basin subsection in Section 3.5.

To develop this recommendation further will require additional stormwater analysis and stormwater management planning to pipe the stormwater from the upper reaches of the corridor to an outfall at Sylvan Creek. This stormwater analysis would be prepared as the first step in the engineering project development and would include coordination between Multnomah and Washington Counties, the City of Portland, and Clean Water Services. For Multnomah County, this analysis will need to be based on the City of Portland (COP) stormwater standards for guidance. COP standards require water quality and flow control considerations when impervious areas are increased as is proposed in this study area.

Maintain existing condition – This approach is based on minimizing new impervious area and constructing multi-modal facilities where possible. For the Scholls Ferry Road corridor, this could include expanding the upper reach to the minimum practicable yet still achieve the bike, pedestrian, and lane improvement goals. The stormwater could then be allowed to continue to sheet flow off of the roadway shoulder on the west side of the roadway in areas where it currently does, and continue to be collected in a curb or piping systems where that infrastructure currently exists. A further feasibility analysis of the existing outfalls, receiving system, and collection system would be required to determine if they can handle the additional flows resulting from this expansion. However, this approach would only allow minor roadway widening to achieve the multimodal project goals.

Stormwater Concept

For the full build-out of the project, the recommended stormwater facilities include a combination of Green Street and LID applications, and curb and piped systems. The appropriate stormwater approach should be determined by considering the existing project deficiencies and completing a topographic survey and base map, and a geotechnical and stormwater analysis. These recommendations include curb and piped sections to be used the entire length of the project from Raleighwood Lane to Humphreys Boulevard. With the exception, in areas with flatter terrain and a wider right of way width, Green Street and LID applications would be used to minimize water quantity needing to be piped to Sylvan Creek. In addition, current policies and technology should be evaluated to address the latest stormwater quantity and quality requirements.

In the constrained section from Woods Court to Sheridan Lane, where left-turns are not required, the center-left turn lane will be eliminated and a curb and piped system is recommended. As described in the Sylvan Creek Basin Section, in this section there are likely increased risks of soil instability if the roadway prism is expanded significantly (build up of downhill shoulders, or cut into uphill side slopes). Also, there would likely be significant cost increases to further expanding the width of the road prism to accommodate roadside Green Streets or LID applications. However, in the this section where wider areas do exist such as just south of Sheridan Lane, alternative water quality treatment applications such as filter strips should be considered to minimize piping and flow concentration.

In the wider and flatter sections between Labor Road and Patton Road, Green Street and LID applications would be used, where feasible, to handle a portion of the roadway runoff, minimizing the quantity that would need to be piped to an outfall in Sylvan Creek. This section would include a combination of traditional curb, gutter, and sidewalk with Green Street BMPs. The Green Street applications could be located behind the curbs and between the sidewalks. They would be in the form of biofiltration or lined infiltration swales as illustrated in the examples below. In addition, south of Patton Road, it may also prove

feasible to install smaller localized roadside Green Street applications that achieve water quality treatment and flow control goals for a part of Scholls Ferry Road in the project area.

4.6 WATER QUALITY

Multnomah County currently defers to the City of Portland (COP) stormwater standards for guidance. The City of Portland's Stormwater Management Manual outlines required stormwater management for all development. The City's approach is to treat and infiltrate stormwater onsite using vegetated surface facilities *to the maximum extent feasible*[9], before discharging to a surface drainage canal or pipe system with limited capacity. The following is the City's pollution reduction target for water treatment facilities:

- 70 percent removal of total suspended solids (TSS) is required from 90 percent of the average annual runoff.

The above requirement is applicable to projects that develop or redevelop more than 500 square feet of impervious surface.

[9] City of Portland *Stormwater Management Manuel* (2008), pg. 1-9.

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5. DESIGN CONCEPT

The purpose of this study was to identify bicycle and pedestrian improvements along the Scholls Ferry corridor at the conceptual level including a planning level approach for handling stormwater runoff. The work effort focused on identifying and presenting existing policy considerations, physical constraints and opportunities in the corridor and a set of preferred conceptual design cross sections. The cross section concepts include:

- Constructing the County minimum design standard for a Minor Arterial roadway between Raleighwood Lane to Woods Court.
- Constructing a modified Minor Arterial roadway by removing the center left-turn lane between Woods Court and Sheridan Court. This segment does not require left-turns since there are no accesses and is constrained in buildable width by steep slopes.
- Constructing a modified Minor Arterial roadway between Sheridan Lane and Humphrey Blvd. with two lanes northbound and one lane southbound. This section is similar to the existing cross-section in this area, but with the addition of standard bike lanes and sidewalks.

In addition to the cross section concepts, several other elements should be considered when the project begins preliminary design. They include:

- The preferred width for sidewalks and bike lanes is 6 feet and should be provided where possible with a minimum of 5 foot width.
- Design of the roadway should consider treatment options to discourage vehicle over-tracking into bike lane such as profiled striping to alert drivers.
- Appropriate pedestrian crossing locations need to be indentified to ensure safety and best accommodate users, clearly marked and well lit. Pedestrian refuges and other treatments should be considered.
- Private driveway and residential street intersections grades at Scholls Ferry Road will also require review to insure that safety and sight distance is maintained or improved.
    - The lane storage required at intersections and left turn lanes should be reviewed with the preliminary design. A left turn lane should be provided at Sheridan Lane if practical.

Following additional studies or efforts should to be addressed prior to preliminary design.

- Conduct survey and mapping to determine existing terrain, features, and property boundaries.
- Complete a more detailed stormwater analysis.
- Complete a soil and geotechnical analysis.
- Evaluate current environmental policies, regulations, and technology relating to stormwater.
- Coordinate water quality and quantity for the corridor project with Washington County, Multnomah County, City of Portland, and Clean Water Services.

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APPENDIX A

Background Maps and Materials

APPENDIX B

Existing Conditions

APPENDIX C

Draft Concept Alternatives

APPENDIX D

Preferred Design Concept