CLACKAMAS COUNTY Update
TRANSPORTATION SYSTEM PLAN

TRANSPORTATION SYSTEM PLAN

BACKGROUND DOCUMENT

PART 2 – TECHNICAL APPENDICES

September 2013

Section 12 Appendices

There are a number of additional documents that contributed to the development of the TSP Update which are included in this set of appendicies.

This document includes the following:

- Phase 0 Document – from the pre TSP Update Process
- TSP White Papers – used in early PAC discussion
- FHWA Functional Class Information

Memorandum

To: Ron Weinman, Clackamas County

From: Carl Springer, PE,
Kevin Chewuk – DKS

Subject: **Clackamas County TSP Policy Update**
Draft Regulatory Review **P10127-000-004**

This memorandum summarizes a regulatory review of Clackamas County's Comprehensive Plan Transportation Element. Regulatory framework in which the County's Transportation Element should be in compliance with includes the Oregon Transportation Planning Rule[1] (TPR), the Metro Regional Transportation Plan (RTP), pending policies for the federal transportation re-authorization, and any House Bills related to Green House gas emission reductions in the transportation sector.

Regulatory Review

The following sections summarize the regulatory framework review, including the TPR, Metro RTP, and emerging issues. The key issues that require updating the Transportation Element are identified and discussed under each of the regulatory areas.

Oregon Transportation Planning Rule

A summary of the regulatory review of the TPR requirements can be found in Table 1. For each TPR requirement, the table displays if the Transportation Element of the Comprehensive Plan is in compliance and provides details where the requirement is addressed within the County's Plan.

Overall, the Transportation Element of the Clackamas County Comprehensive Plan generally addresses most aspects of the TPR. Since most of the TPR requirements are standards oriented (e.g. functional classifications, street-cross sections, access management), they are often referenced in the Transportation Element Policies. Various TPR policy issues that will need to be addressed or strengthened include:

- Higher density along transit systems
- More residents living closer to employment areas
- Balancing accessibility with mobility
- Establish maximum parking area standards
- Funding and investment strategies

[1] OAR 660-012

Table 1: TPR Compliance

TPR	TPR Requirement	Complies with TPR?	Notes from Comprehensive Plan
Roadways			
	A TSP should include a road plan including a functional classification consistent with state and regional TSP's.		
	Road Standards for the layout of local streets shall include:		
	1) Extensions of existing streets	Yes	
	2) Connections to existing or planned streets	Yes	Functional classifications and roadway standards
OAR 660-12-0020 (2) (b)	3) Connections to neighborhood destinations	Yes	included in Roadways Policies 9.0 to 13.0
	Local governments should adopt regulations to protect transportation facilities including:		
	1) Access control measures	Yes	Access standards are shown in Table V-5
OAR 660-12-0045 (2)	2) Standards to protect the future operations of roads	Yes	Operating standards are included in Roadway Policies 27.0, 28.0, and 29.0
OAR 660-12-0045 (7)	Local governments should establish standards for local street and access ways that minimize pavement width and total right-of-way consistent with the operational needs of the facility	Yes	Road standards are addressed in Roadway Policy 9.0
Transit			
	A TSP should include a public transportation plan that describes:		
	1) Services for the transportation disadvantaged and identifies service inadequacies	Partial	Transit Policy addresses transportation disadvantaged, but services may not be identified
	2) Intercity bus and passenger rail system	Partial	Policies regarding bus and passenger rail are
OAR 660-12-0020 (2) (c)	3) Existing and planned frequent transit routes and system	Partial	included but may be out of date
	Local governments should adopt regulations to support transit in urban areas with a population over 25,000 where a determination had been made that a public transit system is feasible		
	1) Design transit routes and transit facilities to support transit use through provision of bus stops, pullouts, shelters, and other facilities	Yes	Addressed in Transit Policies
	2) Require that new retail, office and institutional buildings at or near major transit stops provide for convenient pedestrian access to transit	Yes	New developments along transit routes are required to include provisions for transit amenities and pedestrian access to the transit stop
	3) Require walkways connecting building entrances and streets adjoining the site	Yes	Pedestrian access to transit reviewed in development review process
	4) Connect on-site pedestrian facilities to existing or proposed streets, walkways, and driveways that abut the property	Yes	Transit supportive features and amenities encouraged
	5) At major transit stops require: (i) Buildings be located within 20 feet of the stop or a transit street, (ii) A reasonably direct pedestrian connection between the transit stop and building entrances on the site, (iii) A landing pad for disabled passengers, (iv) Dedication for a passenger shelter if requested by the transit provider, and (v) Lighting at the transit stop	Yes	Standards included for major transit stops. Pedestrian access and transit supportive features and amenities required through the development review process
	6) New roads shall be designed to be adequately served by transit and to incorporate pedestrian access along designated transit routes	Yes	Addressed in roadway standards
OAR 660-12-0045 (4)	7) Designate types and densities of land uses along transit routes adequate to support transit services	Partial	Land use patterns that support transit encouraged
OAR 660-12-0045 (5) (a)	Local governments should adopt regulations to reduce reliance on the automobile by allowing transit oriented development (TOD) along transit routes	Partial	Goal to develop a transit system that supports residential, commercial, and industrial development
Pedestrian and Bicycle			
OAR 660-12-0020 (2) (d)	A TSP should include a bicycle and pedestrian plan	Partial	Pedestrian and Bicycle master plans referenced but may be out of date and not current with TPR requirements
	Local governments should adopt regulations to ensure new development provides on-site streets and access ways that provide routes for pedestrian and bicycle travel in areas where pedestrian and bicycle travel is likely		
	1) Provide bike parking in multi-family developments of 4 units or more, commercial areas, and transit stops	Partial	New development required to add bicycle parking and parking added in areas frequented by bikers, size of development not specified
	2) Require pedestrian connections within and to neighborhood activity centers located within ½ mile of residential development	Yes	Call for network of pedestrian and bicycle systems to activity centers
OAR 660-12-0045 (3)	3) Bikeways shall be required along arterials and major collectors. Sidewalks shall be required along arterials, collectors and most local streets in urban areas.	Yes	Pedestrian and Bicycle facilities considered in all new collector and arterial construction or reconstruction
OAR 660-12-0045 (6)	Bicycle and Pedestrian plans should identify improvements to meet local travel needs in developed areas	Yes	Improvements noted in Pedestrian and Bicycle Policy 2.0 and 22.0
Other Modes			
OAR 660-12-0020 (2) (e)	A TSP should include an air, rail, water, and pipeline transportation plans	Yes	Policies are included for air, rail, water, and pipeline transportation modes
Transportation Demand Management			

OAR 660-12-0020 (2) (f)	A TSP should include a plan for transportation system management and demand management	Partial	Transportation Demand Management Policies 1.0 to 6.0; TSM not addressed
OAR 660-12-0045 (5) (b)	Reduce reliance on the automobile by implementing a demand management program	Yes	Non- single occupant vehicle modal split targets are included.
Parking			
OAR 660-12-0020 (2) (g)	A TSP should include a parking plan	No	Parking policies included but may not be compliant with TPR requirements towards parking reduction
Finance			
OAR 660-12-0020 (2) (i)	A TSP should include a transportation finance program	Yes	Finance plan is include. Also includes references to the Capital Improvement Plan.
Planned Facilities			
OAR 660-12-0020 (3) (b)	The TSP should identify a system of planned transportation facilities for the motor vehicle, transit, pedestrian ,and bicycle modes and identify their planned capacities and performance standards	Yes	Needed roadway improvements are discussed in Roadway policies 7.0 and 8.0. Pedestrian and Bicycle improvements noted in Pedestrian and Bicycle Policy 2.0.
Freight			
OAR 660-12-0030 (1) (c)	The TSP should identify transportation needs for freight movement from industrial and commercial development	Yes	Truck circulation plan is included in Map V-10
Adoption			
OAR 660-012-0015 (4)	The TSP should be adopted as part of the Comprehensive Plan	Yes	Implemented as the Transportation section of the Comprehensive Plan

Metro 2035 RTP

Clackamas County will need to respond to the new elements in the Metro 2035 RTP. The RTP includes the following new elements:

- Outcome-based planning focusing on equity, economy, and the environment
- Regional mobility corridors defining focus areas for investments
- Performance targets (see Table 2) for safety, congestion, freight reliability, climate change, active transportation, sidewalk/trail/transit infrastructure, clean air, travel, affordability, and access to daily needs

Table 2: 2035 RTP Performance Targets

Objective	Target by 2035
Safety	Reduce serious injuries and fatalities in all modes of travel by 50% (vs. 2005)
Congestion*	Reduce vehicle hours of delay (VHD) by 10% per person (vs. 2005)
Freight reliability	Reduce VHD per truck trip by 10% (vs. 2005)
Climate change	Reduce transportation greenhouse gas emissions by 40% (vs. 1990)
Active transportation	Triple walking, biking and transit mode share (vs. 2005)
Basic infrastructure	Increase by 50% access times to sidewalks, trails and transit (vs. 2005)
Clean air	Ensure 0% population exposure to at-risk levels of pollution
Travel	Reduce vehicle miles traveled per person by 10% (vs. 2005)
Affordability	Reduce average household combined cost of housing and transportation by 25% (vs. 2000)
Access to daily needs	Increase by 50% the number of essential destinations within 30 minutes by bike, transit for low-income, minority, disabled pop. (vs. 2005)

* Interim volume-to-capacity ratio (v/c) measures still apply

In addition to supporting the performance targets, the Transportation Element will need to incorporate transportation system management and operations (TSMO) into planning. The following RTP policies provide the foundation for TSMO in the region:

- Use advanced technologies, pricing strategies and other tools to actively manage the transportation system
- Provide comprehensive real---time traveler information to people and businesses
- Improve incident detection and clearance times on the region's transit, arterial and throughway networks
- Implement incentives and programs to increase awareness of travel options and incent change

Emerging Issues

Several emerging issues were identified that will need to be addressed in the Transportation Element. The issues were identified through a review of emerging Federal policies and from interviews of various Clackamas County stakeholders. The issues can be grouped into four main categories, including planning policies and measures that support sustainability, the economy, health, and provide flexibility. The emerging issues that will need to be incorporated or updated in the Transportation Element can be seen in Table 3.

Table 3: Emerging Issues

Theme	Issues
Sustainable	Livability
	Greenhouse Gas Emissions
	Emphasize safety and reliability
Economy	Policies connect to priorities and investments
	Maximize return on investment
	Support basic services and economic growth
Health	Access to public services
	Accessibility to non-motor vehicle modes
	Life safety management
Flexibility	Practical design
	Apply solutions to fit location and function
	Mode neutral – move people and goods

Memorandum

To: Ron Weinman, Clackamas County

From: Carl Springer, PE,
Kevin Chewuk

Subject: **Clackamas County TSP Policy Update**
Case Study Review **P10127-000-004**

Case Study Summary

The following sections provide case study reviews of various transportation policy and planning models that fit the unique needs of Clackamas County. The communities summarized have attempted to address several of the issues highlighted in the stakeholder interviews.

Vancouver, British Columbia

Sustainability: The Vancouver City Council approved a climate change action plan that calls for reducing green house gases, energy consumption, and to create a more sustainable city. The City supports sustainability by getting people out of single-occupancy vehicles and into the walking, biking, and transit modes. The City has set a number of climate change targets compared to 1990 levels:

- 2010 - Reduce municipal operations emissions by 20%
- 2012 - Carbon neutral operations
- 2012 - Reduce community emissions by 6%
- 2020 - Reduce community emissions by 33%
- 2030 - All new buildings are carbon neutral
- 2050 - Reduce community emissions by 80%

The priority areas for community emission reductions include:

1. Home renovations for energy efficiency
2. Energy efficient retrofits for institutional facilities
3. Energy efficient retrofits for large commercial buildings
4. Low carbon vehicle options such as bio-diesel fuel blends
5. Green energy and sustainable dense development
6. Active and public transportation
7. Encouraging residents to reduce individual energy use

The priority areas for municipal emission reductions include:

1. Energy efficient retrofits for facilities
2. Green design for new and replacement civic buildings
3. Efficient driver training and anti-idling
4. Fuel-efficient fleets and fleet management
5. Energy efficient street/park lighting and traffic control signals
6. Corporate waste reduction and landfill gas utilization

Health: The City adopted a Greenways Plan to support the walking and biking through the urban environment by providing public corridors or greenways connecting parks, cultural areas, neighborhoods, and retail areas. The Greenways Plan identified and established a citywide greenways network. The goal is to have every residence in the City to be within a 25 minute walk or 10 minute bike ride of a City greenway. In addition, the city has neighborhood greenways that are a smaller version of the citywide greenways. They connect local community amenities such as schools, parks and shopping.

San Francisco, California

San Francisco is currently updating their transportation plan and has developed the following goals, among others, to guide the process:

- Ensure a healthy community

  This goal supports sustainable growth and resource management by reducing green house gas emissions, and improving air and water quality, and health outcomes.

- Create a more livable city

  This goal will improve travel choices for all income levels and ages, provide safe and attractive walking, biking, and transit options, and create a vibrant public realm. Two concepts to support this are road diets and a pavement to parks program. To date, the City has instituted over 30 road diets where roads have had auto lanes narrowed or removed to calm traffic speeds and provide more room for other modes of travel. The pavement to parks program converts areas of public right-of-way with excessive or unused pavement to parks or plazas.

The City adopted a Climate Action Plan that inventories green house gas emissions and sets a reduction target 20 percent below 1990 levels by 2012. To reduce GHG emissions, the City has developed the following transportation actions:

- Increasing the use of public transit
- Increasing the use of ridesharing
- Increasing bicycling and walking
- Support employer based programs that support trip reduction
- Discourage driving
- Increase the use of clean air vehicles and improve fleet efficiency

The Metropolitan Transportation Commission (MTC) recommends green house gas reductions of 15 percent below 2005 levels by 2035. To support livability, MTC has developed an incentive program that provides funding for projects that support livable communities and housing. The projects support

neighborhood livability by improving walking, biking, and access to transit, major activity centers, and neighborhood commercial areas.

A Bay-area plan (called FOCUS) has been developed that promotes a more compact land use pattern and links land use and transportation by encouraging the development of complete, livable communities served by transit, and promotes conservation of the region's most significant resource lands. The regional goals of FOCUS include:

- Strengthen and support unique existing communities
- Create compact, healthy communities with a diversity of housing, jobs, activities, and services to meet the daily needs of residents
- Increase housing supply and choices
- Improve housing affordability
- Increase transportation efficiency and choices
- Protect and steward natural habitat, open space, and agricultural land
- Improve social and economic equity
- Promote economic and fiscal health
- Conserve resources, promote sustainability, and improve environmental quality
- Protect public health and safety

Redmond, Washington

Redmond supports energy-efficient and environmentally sound transportation systems. The City's Plan-Based Transportation Concurrency System is a tool to manage the pace of development while providing transportation improvements for all users, including bicyclists, pedestrians, drivers, and transit riders. The Concurrency system uses a multimodal approach with a mode-neutral measure referred to as a mobility unit. The key measure is to show that growth in travel demand and system improvements are occurring at the same rates. The purpose is to link the planned facility improvements with forecasted trips.

The mobility unit is measured in terms of person miles traveled rather than vehicle miles traveled. The unit is developed by converting forecasted land use growth to mobility units (or person miles of travel). Person miles of travel (PMT) are estimated with person demand and trip length by mode of travel. The PMT are then compared to the amount of capacity available for each travel mode to determine available mobility units.

Minneapolis, Minnesota

Minneapolis recognizes that transportation must function within an existing built environment and the scale and design of transportation systems must be compatible with that built environment. The City's plan gives high priority to meeting pedestrian, bicycle and transit needs within a multi-modal transportation system. The City has a number of objectives to achieve this vision including:

- Making transportation design decisions based on place type in addition to street function
- Ensuring all streets are safe, convenient, and comfortable for walking

- Encouraging people to walk, drive, and take transit rather than drive by supporting car sharing programs, encouraging carpooling, and providing incentives for walking, biking and transit use
- Optimizing the use, safety, and life of the street system

FCS GROUP
Solutions-Oriented Consulting

Memorandum

To: Carl Springer, PE, Principal, DKS Associates **Date:** November 22, 2010

From: Todd Chase, AICP, LEED, Senior Economist/Project Manager

CC: Ron Weinman, Clackamas County and Don Ganer, FCS GROUP

RE Clackamas County TSP Policy Development, Task 6 Funding Options

Introduction

This memorandum is intended to provide additional policy input on funding for the Clackamas County Transportation System Plan. An earlier memorandum by FCS GROUP (dated October 12, 2010) to you described the general level of the expected transportation funding gap within the Clackamas County, and concluded that existing county funding sources are expected to only generate up to 10.7 percent of planned transportation capital facility cost requirements over the next 20 years, Hence, additional local funding sources and/or innovative land use policies will be needed to help address this emerging funding shortfall.

Transportation Funding Options

Communities and regions across the United State and abroad are challenged to maintain adequate, safe, and cost-effective infrastructure. Aging infrastructure coupled with expanding transportation congestion, inadequate water and sewer capacity, and need for parks and affordable housing are among the problems confronting communities in the Portland Region and elsewhere. Declining funding levels from federal and state governments are putting increased pressure on regions and local governments and service districts to meet transportation infrastructure funding and operational challenges.

When traditional local financing methods, such as issuing general obligation bonds secured by local property taxes are not viable, then communities need to seek alternatives. Local impacts fees (including SDCs) and user fees (such as monthly water, sewer or street utility charges) are two widely used methods to raise infrastructure revenues. However, these two methods have limited funding capacity for several reasons, including:

- Local impact fees (SDCs) can only be used for the eligible portion of local capital projects needed for new growth, not the replacement of existing facilities nor annual operating and maintenance requirements.
- Local impact fees (SDCs) do not usually address community or regional capital needs that transcend local government authorities.

- Impact fees (SDCs) are an unreliable source of revenues since they rise or fall with construction cycles. Hence, they cannot fully leverage debt in the manner used by government obligation bonds.
- Impact fees (SDCs) are an added cost to new housing that tends to drive up the cost of all housing in a community, which makes providing affordable housing a bigger challenge.
- User fee increases (such as transportation utility fee) are limited by the size and capacity of the service district and its customer base, and complex legal/accounting regulations.

Forward thinking state and local governments around the United States have created several financing alternatives to generate new options for raising much needed capital and operating revenues to accommodate strategic growth and development. Oregon already has several of these strategic financing programs in place, but it is our opinion that existing programs tend to be either over subscribed and/or under-funded. A summary of innovative funding programs being used in Oregon and elsewhere includes:

- State infrastructure banks that provide revolving loans, credit enhancements, and municipal lease-finance programs.
- State project mitigation fee programs.
- Regional impact fee programs.
- State infrastructure funding provided for strategic transportation and community infrastructure projects using special GO Bonds, Revenue Bonds, GARVEE Bonds, or other bond instruments.

Possible State Transportation Funding Initiatives[1]

Clackamas County may attempt to work with other local jurisdictions to seek new state legislation that provides new sources of funding for transportation. This could include:

- Oregon Infrastructure Bank, with additional dedicated funding for metropolitan areas;
- Oregon Infrastructure Bank with expanded role in providing credit-enhancement to local governments;
- Oregon Strategic Transportation Initiative, with dedicated funding for strategic projects in metropolitan areas;
- Oregon state transportation project mitigation fees, for strategic regional projects;
- Oregon real estate transfer fee, with dedicated funding for infrastructure;
- Oregon fuel tax increase, with dedicated funding for strategic infrastructure;
- Oregon lodging accommodations tax, with dedicated funding for infrastructure;

[1] Regional Infrastructure Study (December 2008), prepared for Metro by FCS GROUP et.al.

- Oregon weight-mile tax increase, with dedicated funding for regional freight mobility projects;
- Oregon motor vehicle fee increase, with dedicated funding for strategic regional projects.

Possible Portland Metro Region Transportation Funding Initiatives[2]

Clackamas County may also attempt to work with other local jurisdictions within the Portland Metro Region to seek new legislation that provides new sources of funding for transportation projects inside the Metro Urban Growth Boundary. This could include:

- Portland Region transportation project mitigation fees or system development charges for strategic regional projects;
- Portland Region real estate transfer fee;
- Portland Region fuel tax, with dedicated funding for strategic regional projects;
- Portland Region lodging accommodations tax, with dedicated funding for infrastructure;
- Portland Metro Region motor vehicle fee increase, with dedicated funding for strategic regional projects;
- Portland Metro Region construction excise tax increase, with dedicated funding for strategic community or regional infrastructure projects;
- Portland Metro Region grocery bag tax or fee (e.g., 10 cents per bag) on plastic and/or paper bags with proceeds dedicated to funding strategic community or regional infrastructure projects.

In the absence of new sources of regional, state or federal transportation funding, Clackamas County should explore optimizing existing and new sources of local funding for transportation improvements.

Existing and Potential Local Transportation Funding Sources

There a number of existing and potential local transportation funding sources that may be explored or considered by Clackamas County to help provide enhanced revenues for major transportation improvements. A brief description of existing and potential new funding sources is identified in the following matrix.

It is recommended that each of these funding sources be carefully evaluated during the update of the Clackamas County Transportation System Plan using a set of pre-established criteria. The funding evaluation criteria may include items such as:

[2] IBID

Possible Funding Evaluation Criteria

- Legal Precedence in Oregon
- Current Use in County or Region
- Overall Simplicity (Easy to Understand/Convey)
- Implements 2040 Policy Objectives
- Equity Among Affected Stakeholders
- Ease of Integration with Existing Governments
- Ease of Integration with Existing Service Districts
- Potential Revenue Generation
- Stability of Annual Revenues
- Ability to Leverage Local Public/Private Funds
- Flexibility of the Revenues
- Annual Implementation/ Administrative Costs
- Ability to Leverage Federal or State Funds

Clackamas County may create an ad hoc transportation policy advisory committee to refine and evaluate each of the funding options listed in **Table 1**. A preliminary set of evaluation measures is provided in **Table 2**, and these evaluation metrics can be refined with input from the evaluation committee members and Clackamas County staff and Board of County Commissioners.

Please let us know if you would like to amend these preliminary recommendations regarding local funding sources for Clackamas County.

Table 1 Preliminary List of Existing and Potential Local Transportation Funding Options

	Funding Option Name	Description	Notes
Existing Revenue Sources	Vehicle Registration Fees	Local fee per motor vehicle registered within Clackamas County	Clackamas County may elect to apply local registration fees after Sellwood Bridge is funded; and utilize future revenues as a source of matching funds for projects within participating local jurisdictions.
	System Development Charge (SDC)	Development Impact Fees for eligible transportation projects	Clackamas County may revise or update current SDC methodology for unincorporated portions of the county.
	System Development Charge (Joint City/County)	Development Impact Fees for eligible transportation projects in designated urbanizing areas	Clackamas County may revise or update current SDC methodology for urbanizing portions of the county (e.g.,east Happy Valley) in concert with participating jurisdictions.
	Urban Renewal District	Incremental tax increment revenues inside Urban Renewal Areas can be used for projects listed in Urban Renewal Plans.	Clackamas County may update Urban Renewal Plans or create new districts in concert with participating special districts and jurisdictions.
	Transportation Management Association (TMA)	TMAs may be created to provide enhanced transit service within designated areas, usually through creation of a special business improvement district.	TMAs canbe created in employment areas (such as Clackamas Town Center or Kruse Way) to help facilitate transit trips during both peak and off-peak (e.g., lunch) time periods and lower parking and peak trip demand requirements.
	Local Improvement Districts (LIDs)	LIDs can be created to help fund local share of roadway improvements, after agreement by majority of benefitting property owners.	LIDs have been successfully utilized throughout Clackamas County in conjunction with other local, regional and state funding sources.
	Reimbursement Districts	Reimbursement districts may be created to help reimburse county or developer financed infrastructure by collecting a proportional fee during future land use approvals.	Reimbursement districts are often more risky to the originator of the funding, since there is no set timeline for revenue payments from benefitting properties.
Potential Revenue Sources	GO Bonds for Transport. Improvements	Voter-approved ad valorem special levy for specific transportation projects	Washington County has conducted three successful MSTIP programs since 1986 with funding for about $555 million in transportation improvements.
	Revenue Bond for Transportation Improvements	Voter-approved special assessments could be created in designated areas of the county, with proceeds slated for debt payments on authorized projects.	WA County and Oregon City are exploring establishment of Community Facility Districts with either an ad valorem tax or a special assessment
	Local Fuel Tax	Voter-approved local fuel tax	Several jurisdictions in Oregon have local fuel taxes to pay for street projects
	Local Transportation Utility Fee	Locally-created fee to cover maintenance costs for transportation projects, may help "free up" other (e.g., state) funds for capital funding.	Several local jurisdictions in Oregon have transportation maintenance fees. The ability to administer and collect this fee is often a challenge.
	Transportation Benefit District (see Revenue Bond for Transportation Improvements)	see revenue bond	see revenue bond
	Construction Activity Fee	Special charges on heavy vehicles that cause roadway damage	Applied in California (but not Oregon at this time) as a local fee on truck deliveries and solid waste vehicles that cause damage to local streets
	High Occupancy Travel (HOT) Lanes (tolls)	User charges for traveling during peak hour time periods on eligible roadways	Bridge tolls are collected in Oregon, but so far now HOT lanes yet
	Public/Private Partnerships	Agreements between private contractors and public entities to share future user revenues and/or development rights in exchange for designing, constructing and/or financing strategic projects.	ODOT has explored establishing public/private partnerships for the Sunrise Corridor.

Table 2 Preliminary Local Transportation Funding Option Evaluation Criteria

Criteria	Evaluation Question to be Addressed	Evaluation Result
Legal Precedence in Oregon	Is this technique allowed under Oregon law?	Yes, No, or It Depends
Current Use in PDX Region	How many jurisdictions or districts use it today?	Listing and count (number)
Overall Simplicity (Easy to Understand/Convey)	Can it be explained in 20 words or a simple graphic?	Yes, No, or It Depends
Implements 2040 Policy Objectives	Can funding be focused on Centers, Corridors, Employment and Industrial Areas?	Yes, No, or It Depends
Equity Among Affected Stakeholders	Who pays the cost? Are they the beneficiaries?	Listing of affected stakeholders
Ease of Integration with Existing Governments	How many inter-agency agreements/modifications will be required?	Listing and count (number)
Ease of Integration with Existing Service Districts	How many inter-agency agreements/modifications will be required?	Listing and count (number)
Potential Revenue Generation	What is revenue generation potential: high, med., low?	High, medium, low revenue forecast over 30 years (amount)
Stability of Annual Revenues	How much does the revenue stream rely on variable factors, such as construction cycles?	Measurement of variation between high, medium and low revenue forecasts (percent).
Ability to be Used for Annual O&M	Can the revenue be used for annual O&M?	Yes, No, or It Depends
Flexibility of the Revenues	Can the revenue address multiple infra needs?	List type of infra this can address
Annual Implementation/ Administrative Costs	What will be the cost of administering this to local governments?	High, medium, low revenue forecast over 30 years (amount of time and dollars)
Ability to Leverage Federal or State Funds	Can this revenue source leverage non-	Yes, No, or It Depends

	local grants?	
Ability to Leverage Local Public/Private Funds	Can this revenue source leverage private investment?	Yes, No, or It Depends

County TSP and Metro

Streets

CLASS

- Freeway
- Expressway / State Highway
- Major Arterial / State Highway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Private w/ Address
- Alley
- Private w/out Address
- Driveway, School Roads
- Railroad
- Unnamed park roads, school roads
- Trails, ferry crossings
- Forest Service Paved
- Forest Service Aggregate Road
- General dirt, unknown road or trail
- Freeway Ramp
- Metro district boundary

CLACKAMAS COUNTY TRANSPORTATION MAINTENANCE

County Road Jurisdiction within City Boundaries - 2010

LEGEND

- County Maintained Bridge

County Jurisdiction within City Limits

Functional Class

- UNKNOWN
- LOCAL
- CONNECTOR
- COLLECTOR
- MINOR ARTERIAL
- MAJOR ARTERIAL

Mt. Hood National Forest

N

CLACKAMAS COUNTY

DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

TRANSPORTATION MAINTENANCE DIVISION
902 ABERNETHY RD
OREGON CITY, OR 97045

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CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.1

Regional and Statewide Policies, Initiatives, and Trends

Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Marc Butorac, PE, PTOE, and Susan Wright, PE, Kittelson & Associates
Joe Dills, OTAK
Steve Decker and Elizabeth Wemple, Cambridge Systematics
Steve White, Oregon Public Health Institute

cc: Larry Conrad, Clackamas County

The following provides an overview of current regional (Portland Metro) and statewide (Oregon) trends in analysis tools, policy, funding and initiatives related to transportation, land use, energy use, climate change and health. More specifically, this paper identifies trends in each of these areas and how those trends may be carried forward in the 1-2, 5-10, and 10-20 year timeframes. Also included are recommendations of the initiatives and trends that are most applicable and recommended for Clackamas County's consideration. The purpose of this white paper is to inform the vision, goals and objectives developed for the County's Transportation System Plan (TSP) update.

TRANSPORTATION

This section discusses new tools and trends in evaluating transportation needs, setting transportation policy, and funding transportation improvements in the Portland metropolitan region and statewide. The diversity of Clackamas County's roadway network and roadway users presents a particular opportunity for the County to implement an innovative and forward-thinking TSP.

Tools

A number of recently-developed transportation planning tools and analysis procedures are and will continue to influence transportation planning in the future. Among these are multi-modal level of service (MMLOS) measures in the *Highway Capacity Manual* (HCM) 2010, methods for predicting crash frequency in the first edition of the *Highway Safety Manual* (HSM), and dynamic traffic

assignment (DTA) models that greatly improve analysts' abilities to forecast travel demand and associated operational characteristics.

Multi-Modal Level-of-Service

The latest version of the *Highway Capacity Manual* (HCM) was completed in 2010 and includes major changes to the traditional traffic engineering evaluation process. The 2010 HCM now includes a method for calculating a multi-modal level of service (MMLOS) for transportation facilities. MMLOS takes into consideration the perspective of a traveler who is using a particular mode given the impact of other surrounding travel modes and roadway characteristics. MMLOS measures the degree to which the urban street design and operational characteristics meet the needs and desires of each mode's user.

Highway Safety Manual

The first edition of the *Highway Safety Manual* (HSM) provides an important new opportunity for jurisdictions to evaluate and make decisions to improve transportation safety. The HSM provides guidance on how to quantify and predict crash frequency for specific roadway facilities based on traffic volumes, physical roadway characteristics and surrounding land uses. Two primary benefits of the HSM are: 1) The ability to inform the decision-making process by quantifying existing and potential future safety in terms of crash frequency; and 2) the potential for using the HSM to identify cost-effective safety improvement strategies.

Dynamic Traffic Assignment Modeling

Traditional travel demand modeling is starting to be supplemented with Dynamic Traffic Assignment (DTA) models. DTA enables agencies to better understand and plan for future transportation needs by more accurately assessing traffic operations, travel demand management and ITS strategies than traditional four-step travel demand models. DTA models are time and system sensitive enabling them to more accurately model travel behavior under congested conditions and traveler responses to ITS strategies, Travel Demand Management (TDM) strategies, and other similar treatments. As a result, DTA is able to produce systems based performance measures such as travel time reliability (as opposed to the amount of travel time or delay).

Policies

Many Oregon jurisdictions are either beginning or well on their way to shifting their transportation policies away from point-based assessments and toward a systems approach to the design of urban streets. This is being done to increase mobility, access and equity for all users, and it is increasingly referred to within the transportation profession as a "complete streets" philosophy. A complete street policy helps transportation planners and engineers plan and design for streets to serve a full spectrum of users (e.g., pedestrians, bicyclists, transit riders and vehicles) as well as adjacent

businesses, neighborhoods, and residents. In conjunction with the complete streets philosophy, many jurisdictions are also implementing green street design standards. Green streets incorporate treatments such as bioswales, biorention planters, and permeable pavement into common roadway features (e.g., medians, landscape buffers, curb extensions) to help reduce and treat storm water runoff. Such treatments have environmental benefits in addition to helping achieve complete street goals.

Many jurisdictions in Oregon also include sustainability policies in their transportation plans. A common focus is on reducing vehicle miles traveled by encouraging transit and non-motorized travel, carpool and vanpool programs, and promoting the use of alternative fuels and technologies. Some cities and counties are also adopting policies incentivizing mixed-use and compact developments. The incentives provide a range of financial, land use and zoning benefits (e.g., exempt from minimum vehicle parking requirements) to developers to encourage residential and commercial property development near transit nodes and/or oriented to pedestrian and bicycle travel.

Funding

Transportation funding in Oregon and in the Portland metropolitan region continues to face numerous challenges. A six-cent increase in the statewide gasoline tax took effect in January, 2011. This was the first increase in the gasoline tax since 1993, but the six-cent rise does not match the increase in inflation and construction and material costs over the intervening 18 years. In addition, the State has been researching replacing the gas tax with a system based tax on total vehicle miles traveled. Oregon's passage of the Jobs and Transportation Act (JTA) in 2009 provided additional funds for infrastructure development and the bill (HB 2001) contained multiple earmarks for specific projects around the state. Jurisdictions are looking toward innovative sources for future funding, including user fees such as tolls, increasing use of public-private partnerships and multi-modal system development charges (Multimodal SDCs).

Trends

Within the short term (1-2 years), local and regional transportation authorities will continue and even accelerate their move away from sole reliance on traditional macroscopic travel demand forecasting models, and toward routinely using and incorporating DTA modeling. Metro is currently developing a DTA model for the region and, once available, it will enable agencies in the Metro Region to better understand and plan for future transportation needs as well as to more accurately assess operations, demand management and ITS strategies. Other short term transportation trends include an increased focus on and move to systematically identifying and evaluating projects based on more robust performance measures such as MMLOS, predicted crash frequency and travel time reliability.

Midterm (5-10 years), the state of Oregon may see a new dedicated funding package (JTA II) from the Oregon state legislature, a small state increase in the gas tax, and potential decrease in the amount of federal funds received. Locally, it is expected that transportation agencies will further refine their

focus to concentrate on system operations rather than construction of new capacity within developed areas, though the Sunrise project will be an exception in that it incorporates both of these elements. The regional and national economies are expected to continue their recovery during this timeframe, and the impact of the resulting economic growth will further affect reliability and capacity on rural and county roads. Trimet's Green Line will have been in operation long enough that transportation, growth and land use patterns near the County line will have started to change. The midterm could also see the introduction of variable speed limits and other ITS applications to manage traffic flow, and other technologies and safety improvements may be made to mitigate the impacts of inclement weather events in the County, especially in rural areas near Mt. Hood or in areas of higher elevation.

Longer term (10-20 years) trends in the region and state could include a move away from a gasoline tax towards a vehicle miles traveled based road pricing model, and incorporating region-wide highway tolling or other funding mechanisms such as public-private partnerships. Expected regional growth in population and employment would continue to place additional stresses on the existing transportation system if issues of capacity and operations are not fully addressed. The impacts from the opening of the Portland-Milwaukie Light Rail line are expected to appear during this time frame, as well as the potential construction of other high capacity corridors as outlined in Metro's 2035 RTP.

Recommendations for Clackamas County

1. The County should remain involved in the development of Metro's DTA model as well as develop in-house familiarity with DTA. The County should seek to incorporate Metro's DTA model into the planning process and seek to use the model to evaluate new development in the County.
2. The County should adopt performance metrics and establish transportation project evaluation criteria and procedures, an example of which is using the 2010 HCM multi-modal level of service methodology.
3. The County should maintain focus on confirming the validity of (with robust performance measures in item 2 above) and implementing the backlog of transportation planning and engineering projects.
4. The County should seek out diverse transportation funding sources such as user fees and tolling, solidify and stabilize existing funding options; and develop new stable funding sources.

LAND USE

The land use planning trends affecting Clackamas County are as diverse as the County itself. The trends span from urban to rural, from uniquely Oregon to national, and from environmental to economic. Key trends include:

- A continuing need to integrate land use and transportation planning.
- Reshaping and expanding planning efforts to integrate sustainability.

- In urban areas, implementing strategies to make the best use of land already within urban growth boundaries and implementing regional goals.
- In small towns, planning for local economic development and maintaining small town character.
- Increasing awareness of the connection between good health and community forms that support walking, biking, and livability.
- A renewed emphasis on the importance of the agricultural economy, with many farms adjusting to be smaller scale and more local.
- The use of "Scenario" planning, where alternative futures are illustrated, measured, and evaluated as choices.

Policy

Land use policy initiatives, at the Metro and State level, that could shape the Clackamas County TSP include those listed below. Please note that other parts of this white paper address related topics (e.g., climate change).

- The 2011 Urban and Rural Reserves Map and strategies, and upcoming limited boundary expansions;
- Rulemaking for the Transportation Planning Rule;
- Rulemaking for siting commercial scale solar power generation facilities on Oregon's farm and ranch lands;
- Metro's Community Investment Strategies;
- Upcoming work on Climate Smart Communities Scenarios (at Metro); and
- Expanding the regional Intertwine system of parks and green spaces.

Trends

Near term (1-2 year) trends at the planning forefront include: the slow pace of local regional and national economic recovery, a flat housing market and few new residential building permits and housing starts in the Portland metropolitan region, the slowing of overall population growth in the region, faster population growth in Washington, Clackamas and Clark counties relative to Multnomah County, and implementing key transportation projects already in the pipeline (e.g., Sunrise Phase 1 projects). With limited budgets and resources, identifying, prioritizing and programing key transportation projects will continue to be critical to support the economic growth that is occurring.

Midterm (5-10 years) planning trends include the need to developing funding sources for infrastructure projects to support key districts and centers such as the Clackamas Regional Center, Happy Valley Town Center and the McLoughlin Corridor. Other planning events on the horizon are the next expansion of the urban growth boundary, and the construction of the Columbia River Crossing and its impact on the region.

Longer term (10-20 years), there are the possibilities of an in-migration of "climate refugees" from other parts of the country, Oregon's emergence as a substantial player in international commerce, and the redevelopment of key brownfield areas (e.g. Blue Heron mill) into new uses.

Funding

How will land use planning help deal with less money for transportation, fewer funding options, and a tough economy? Given these realities, it is more important than ever that transportation investments are tied, where appropriate, to achieving land use goals and providing transportation options. Each transportation dollar must leverage more and more private investment and provide a high return on public investment.

Recommendations for Clackamas County

1. Prioritize transportation investments that support complete and sustainable communities as a long term strategy to reduce reliance on long commutes out of the County to employment destinations.
2. Ensure that the transportation needs of the County's diverse agricultural sector are identified and planned for in the TSP.
3. Ensure adequate funding sources are developed to meet the transportation needs of the County's key urban employment districts, including: Clackamas Industrial Area; Rock Creek Employment District (Happy Valley); McLoughlin Corridor; Hwy 224 Corridor (Milwaukie); and Wilsonville Industrial areas.
4. Form the long-term, intergovernmental partnerships that will be needed to solve transportation problems in the Mt Hood Corridor and Government Camp.

ENERGY USE

This following provides an overview of recent Oregon energy use policies and trends and highlights how they might impact alternatives development during the County's TSP update. This section concludes with recommendations for the County to consider in creating its vision and goals, and identifies how these trends may be carried forward in the short, mid and long term.

Policy

Policy 4.2 of the Oregon Transportation Plan states that Oregon supports efforts to move to a cleaner and more diversified energy supply, increase fuel efficiencies, and prepare for fuel shortages. In 2007, Governor Ted Kulongoski mandated state agencies use renewable sources to meet all of their electrical needs. ODOT was able to achieve this in part through the Oregon Solar Highway project, which went on-line in December 2008. A solar installation was built at the junction of I-5 and I-205 on the public right-of-way. The energy produced from the array powers the lights located around the interchange. Innovative financing between Portland General Electric; U.S. Bank; SunWay1, LLC; and

ODOT made this project possible. While lighting one interchange accounts for a small percentage of ODOT's overall energy use, policies in place at the state level support energy conservation. Clackamas County could seek similar opportunities for using innovative public-private partnerships to fund county transportation projects that conserve energy or apply new energy technologies.[1]

Initiatives

In addition to the Oregon Solar Highway Project, electric vehicle programs and other initiatives have emerged in the state as potential ways to reduce reliance on traditional fuels. For example, six cities in the Portland region partnered with PGE to develop a network of electric vehicle charging stations in the region. Three of the cities - Lake Oswego, Oregon City, and Tualatin – are in Clackamas County. Additionally, charging stations are being built in Northwest Oregon as part of a U.S. Department of Energy grant. As part of a national effort to share information about alternative fuels and fueling infrastructure in the Willamette Valley, coalitions have formed in the Columbia River Valley and the Rogue Valley. These coalitions help provide technical information, promote the use of alternative fuels and help lower costs of new fueling systems.[2]

Trends

Short term (1-2 years) energy use trends related to transportation in Oregon and the Portland Metro area include: energy conservation among government agencies and consumers, and use of alternative fuels in municipal fleets. Midterm trends (5-10 year) include the increased development of alternative fuels, increased fuel efficiency in vehicles and strategic financing for large-scale energy projects. Longer terms (10-20 years) trends include the development and potential build-out of an electric vehicle infrastructure and the widespread adoption of electric vehicles and trucks.

Funding

Outside of the transportation funding available from federal, state, and local sources summarized in White Paper #5.2, a state source called the Business Energy Tax Credit (BETC) provides an incentive for Oregon businesses to reduce energy used in transportation. Eligible projects include the purchase of bicycles by an employer for employee use, an employer-organized carpool or vanpool service, or employer-provided transit passes among others. While Clackamas County is ineligible to receive these funds because it has no tax liability, it could partner with a private entity and the team could

1 Oregon Department of Transportation. 2011. "Office of Innovative Partnerships and Alternative Funding." http://www.oregon.gov/ODOT/HWY/OIPP/inn_solarhighway.shtml

2 Oregon Department of Energy. 2011. "Alternative Transportation Fuels." http://www.oregon.gov/ENERGY/TRANS/altfuels.shtml

then take advantage of the credit. This was done in the Oregon Solar Highway project, in which ODOT partnered with Portland General Electric (PGE). The 50 percent BETC was used in combination with the 30 percent federal Investment Tax Credit and utility incentives provided by the Energy Trust of Oregon. Clackamas County could consider partnering with a private organization to fund an energy-related project and take advantage of the BETC.

Recommendations for Clackamas County

Clackamas County should begin to explore, participate in, and implement the following strategies over the next several years.

1. Gather information about alternative fuels and what it would mean to incorporate those into the County transportation system. Both ODOT and Metro's Climate Change Toolkits provide information about strategies related to conserving energy and alternative energy sources.
2. Play a leading role in supporting energy conservation through local initiatives such as partnering with PGE to install electric vehicle charging stations throughout the County as individual cities in the region have done.
3. Begin to transform its vehicle fleet into an electric-powered or other alternative fuel-powered fleet and help support a statewide electric vehicle network.
4. Look for innovative financing opportunities to fund larger-scale energy and transportation projects such as the Oregon Solar Highway Project.

CLIMATE CHANGE

The purpose of this section is to provide an overview of recent Oregon climate change policies and trends and highlight how they might impact alternatives planning development during the County's TSP update. The section concludes with recommendations for the County to consider in creating its vision and goals, and identifies how these trends may be carried forward in the short, mid and long term.

Policy

Transportation is a focus in climate change discussions because roughly one-third of the U.S.'s greenhouse gas (GHG) emissions come from the transportation sector[3]. Two pieces of state legislation form the major policy direction with respect to transportation and climate change: 1) House Bill 2001 (HB 2001), enacted in 2009; and 2) Senate Bill 1059 (SB 1059), which followed in 2010. HB 2001

3 Airport Cooperative Research Program (ACRP) Report 11: Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories. 2009. http://www.aci-na.org/static/entransit/acrp_guidebook_on_greenhouse_gases_april09.pdf

directed MPOs to develop land use and transportation scenarios that meet GHG emissions reduction targets. SB 1059 mandated that the Oregon Department of Transportation (ODOT) and the Oregon Department of Land Conservation and Development (DLCD) create a Statewide Transportation Strategy (STS) for reducing GHG emissions from light duty vehicles. SB 1059 also required the following actions: a) create a toolkit of strategies aimed at reducing transportation-related GHG emissions; b) develop scenario planning guidelines; and c) set GHG reduction targets for Oregon's MPOs ("rulemaking"). While other agencies are responsible for implementing these policies, Clackamas County and other jurisdictions are active participants in these processes. The toolkit is designed to help inform MPOs and local jurisdictions which GHG-reducing strategies would be most appropriate for their particular context. Clackamas County will also play a role in the scenario planning process designed by Metro as part of HB 2001 and SB 1059.[4]

Initiatives

In addition to the statewide climate change work, many local jurisdictions have created climate change initiatives. In 2008, the Sustainable Clackamas County Advisory Task Force created an Action Plan which included, among many actions, reducing vehicle miles traveled as a way to decrease fossil fuel use. The City of Portland and Multnomah County completed a Climate Action Plan in 2009 that included objectives for addressing climate change in numerous categories including transportation. Metro continues to collaborate with regional members to create tools and relevant data sources such as the Regional Greenhouse Gas Emissions Inventory and a toolkit for assessing GHG emissions among resources. Research and new data are being published constantly, so these climate change resources should be viewed as "living" documents that need to be updated regularly.

Trends

Short term (1-2 years) feasible climate change trends related to transportation in Oregon and the Portland Metro area include: providing transportation options and emphasize active modes, providing employer-based commuting programs and low-cost options that reduce congestion by taking people out of their cars or off the road at congested times.

Midterm (5-10 years) potential trends include: designing compact communities with multiple modes in mind. This encompasses the idea of reducing VMT and thus emissions. Create "Complete Streets" that allow travel by bicycle, pedestrians, transit, and autos. Complete gaps in the transportation network such as missing links in the sidewalk or bicycle network. Another midterm trend is to use alternative fuel technology for County vehicle fleets. ITS methods such as adaptive signal control system could be installed and implemented to reduce travel time and fuel consumption.

4 The Oregon Sustainable Transportation Initiative: A Primer. 2011. http://www.oregon.gov/ODOT/TD/OSTI/docs/Media/Overview.pdf?ga=t

Longer term (10-20 years) desired trends include creating transportation pricing signals to Charge people the "real" value of their trip with road user fees, dynamic parking fees and other options. On the other side, give people an incentive to pay less with Pay As You Drive (PAYD) insurance. Additionally, begin to adjust natural or human-created systems (e.g. the transportation system) in response to or in preparation for climate change-related events.[5]

Funding

Transportation-related climate change projects in Clackamas County are funded through Metro's Regional Transportation Planning (RTP) process. There are federal, state, and local sources. Metro is a conduit for federal funds, so projects included in the RTP will receive the funding granted to Metro by the FHWA and ODOT. State funding sources include statewide gas taxes, vehicle registration fees; and weight mile taxes on trucks. Local funding sources include the County's System Development Charges (SDCs).

Recommendations for Clackamas County

1. Clackamas County should consider and begin to explore actions and programs it can implement to contribute to the region and state's GHG emissions reduction targets.

2. Clackamas County should gather information and consider implementing tools from state and regional resources such as ODOT's GHG Toolkit and Metro's documents related to its Climate Smart Scenarios initiative.

3. The County should identify and implement ITS and TDM strategies to serve the commuting workforce population.

4. The County should consider powering their vehicle fleet with alternative fuels and begin implementing the strategy in the mid-term as well. The County should also expand ITS options on County roads, particularly as the technology develops.

5. The County should complete land use changes to re-design facilities to incorporate alternative modes such as walking and bicycling and expanding transit infrastructure in the County (e.g., implementing Complete Streets).

5 Environmental Protection Agency (EPA). "Adaptation". 2011. http://www.epa.gov/climatechange/effects/adaptation.html

HEALTH

This section discusses the tools, policies, initiatives, trends and funding environment related to health issues and transportation. The section concludes with recommendations for the County to consider as they develop their TSP vision and goals.

Tools

Key tools in the public health sector that relate to transportation system planning include:

- Focus on policy and environmental change (including the built environment). Policy and environmental change is considered a public health priority. It is both cost-effective and has the potential to impact numerous risk factors associated with those chronic diseases such as heart disease, cancer, and obesity that comprise the most significant health problems facing Americans. Because physical inactivity is a primary risk factor for multiple diseases, research has demonstrated the ability of active transportation (including transit) to significantly raise activity levels. Increasing rates of active transportation has been a key focus of the public health sector's efforts to affect health-supportive policy and environmental changes.
- Health Impact Assessment (HIA) is a new tool for incorporating health considerations in public decisions, including transportation decisions, which typically haven't considered known health impacts during deliberation. Many HIAs focus on transportation policies, plans, and projects, including the Lake Oswego to Portland Transit Study. HIAs are currently not required in Oregon.
- Accreditation of state, territorial, and local health departments. There are currently no accreditation requirements for state and local health departments, but multiple organizations, including the US Centers for Disease Control and Prevention (CDC), the National Association of County and City Health Officials (NACCHO) the National Network of Public Health Institutes (sdc
-
-), and others, are developing and recommending an accreditation process for local and state health departments. A key component of accreditation is developing performance measures that can be used to demonstrate progress on responding to key community health challenges. Since active transportation has been identified as a key strategy for reducing multiple health risks, it is likely that performance metrics related to active transportation would be useful for receiving accreditation.

Policy

Public health policy and environmental change efforts helped produce the current health and equity goals, Goals 7 (Enhance Human Health) and 8 (Ensure Equity) in Metro's Regional Transportation

Plan. In addition to the similar draft policies for the Clackamas County TSP update, health and equity policies and measurable objectives are being developed by Portland and Gresham as they update their transportation and comprehensive plans. Both Portland's and Gresham's efforts are funded in part by Communities Putting Prevention to Work (CPPW) funds. Metro is currently working with numerous regional partners to translate the RTP health and equity goals into measurable objectives. There are currently no local or regional policies relating to HIA or accreditation.

Initiatives

The Oregon Health Improvement Plan (OHIP) was released in December 2010, and contains numerous recommendations for initiatives, strategies, and policies for state and local public health agencies to support over the next ten years, including recommendations to support and grow the three trends discussed here. The State of Oregon's 2006 Statewide Physical Activity and Nutrition Plan also lays a foundation for integrating transportation into public health frameworks.

Trends

Current research efforts have shown a direct correlation between health and the quality of the built environment, and policies that promote active transportation have the potential to be successful in raising community health outcomes. In the short term (1-2 years), trends that support these goals include developing performance-based metrics and assessment tools that focus on assessing multiple health and equity impacts of transportation decisions and investments by Metro and regional partners. Other feasible short term initiatives include the creating and disseminating a best-practices document to public agencies for using transportation planning to improve health and equity. In addition, local health departments may begin to apply for accreditation, integrating new performance-based metrics.

In the midterm (5-10 years), potential desirable trends include incorporating performance-based metrics and assessment tools into planning documents and accreditation-related activities, and tools like HIA would become required for certain funding decisions. Longer term (10-20 years), continued on-going refinement of metrics and best-practices and HIAs would become a common practice in the decision-making process in transportation, land use, and other sectors of public investment and planning.

Funding

State and local public health sector funding for policy and environmental change efforts in Oregon comes primarily from the CDC, but also from private funders such as the Robert Wood Johnson Foundation and Kaiser Permanente's Community Fund. Funds from both public and private sources are typically distributed through grant mechanisms. In 2009, CDC issued over $400 million in CPPW grants that focused on obesity and tobacco use related policy and environmental changes, which included efforts to improve active transportation rates. CDC recently (June, 2011) released a second

round of similarly-focused grants, called Community Transformation Grants, with an estimated total program funding amount of $900 million between 2012-2017. Oregon Health Authority (OHA) is applying for these funds on behalf of local health departments and will likely distribute much of them to local health departments if they are received. Grants from private funders often go to non-profit and community-based organizations, but have also been awarded to local agencies working with such organizations.

Similarly, funding for HIA comes through grants from CDC and private funders, primarily the Pew Charitable Trusts. OHA has had CDC funding to develop HIA capacity in Oregon since 2009, and just received an extension of this funding for three more years. OHA will likely be distributing some of these funds to local health departments through grants and technical assistance.

Funding mechanisms for accreditation are currently under development. National public health organizations such as CDC, NNPHI, and NACCHO will likely be making small amounts of technical assistance funds available this fall. While accreditation is currently voluntary, it is considered likely that it will begin to be required to receive certain pots of funding in the future.

Recommendations for Clackamas County

1. Participate in regional efforts to develop performance-based metrics for health and equity.
2. Identify opportunities to involve Clackamas County Community Health (CCCH) in developing the TSP, including possibly conducting an HIA on the final TSP alternatives.
3. Identify and pursue funding opportunities to conduct transportation-related HIAs.
4. Pursue accreditation for CCCH, highlighting transportation-related goals and evaluation metrics.

SUMMARY AND NEXT STEPS

The above discussions provide a high level overview of the current regional and statewide trends in policy, funding and initiatives related to transportation, land use, energy use, climate change and health. We look forward to discussing with you the recommendations made for Clackamas County's consideration on each of these topics and how they can inform the County's TSP update.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.2a
National Funding and Financing

Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Beth Wemple, Cambridge Systematics

cc: Larry Conrad, Clackamas County

This memorandum presents a Draft White Paper on National Funding Financing, a deliverable for Task 5.2.

Introduction

This paper provides an overview of national transportation funding and financing as it relates to Clackamas County, and how this may impact alternatives planning development during the County's Transportation System Plan (TSP) process. The paper identifies key initiatives, trends over the short-, mid- and long-term timeframes, and concludes with recommendations for the County to consider in creating its vision and goals for the TSP.

Initiatives

National initiatives are grouped below into funding sources and financing sources. Each is briefly described to convey generally how each source functions and what these functional characteristics mean for Clackamas County.

FUNDING SOURCES

Highway Trust Fund (HTF). The HTF is comprised of a combination of fuel taxes, truck and trailer sales taxes, truck tire tax, and heavy vehicle use tax sources. It is the mainstay of highway programs

and a major contributor to transit funding, and is expected to continue in this role over the next 20 years. Motor fuel taxes account for most of the Federal revenues used for Federal highway and transit programs and for almost half of the revenues used by States to fund highway needs. However, the HTF currently suffers from a significant funding gap. Starting off relatively balanced from its inception in 1957, revenues and expenditures diverged sharply in 2002, and since then the balance within the fund has declined to the lowest levels since the mid-1970s. Two key issues have contributed to the funding gap. First, Federal motor fuel taxes have lost about one-third of their purchasing power to inflation: the tax was last raised in 1993[1]. Second, increased fuel efficiency in motor vehicles has reduced fuel consumption in line with national environmental and energy-security goals. In addition, the recent economic recession has reduced driving nationally, adding to the general slowing in gasoline consumption.

Vehicle-related revenue. A broad range of driver and vehicle-related taxes, fees, and charges are used at state and local levels to generate significant shares of dedicated transportation revenue. These include vehicle registration and licensing fees; drivers' license fees and surcharges; and various vehicle-related sales taxes and fees. The revenue generated in this manner is substantial. As an example of the funding strength of this source, a Federal flat-rate annual vehicle registration fee of, say, $1 for light-duty vehicles and $2 for trucks would yield approximately $366 million per year[2]. It is important to note that this example is for illustrative purposes only, since a Federal flat-rate annual vehicle registration fee, as described, does not currently exist. In Oregon, as in most states, a weight-mile tax is already in place for heavy trucks, or those with a gross weight over 26,000 pounds. The tax is based on a combination of weight, number of miles traveled, and axle configuration. In 2010 weight-mile and flat fee revenues in Oregon were $204.2 million. Between 2012 and 2015, weight-mile taxes are projected to be $55 - $60 million higher (annually) than in previous years.[3]

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1 In 1993 the Federal motor fuel tax was raised by 4.3 cents per gallon.

2 Paying Our Way (February 2009) National Surface Transportation Infrastructure Financing Commission, accessed online August 2011 at http://financecommission.dot.gov/ Documents/NSTIF_Commission_Final_ Report_Mar09FNL.pdf

3 Summary of Transportation Economic and Revenue Forecasts (September 2011), accessed online October 2011 at http://www.oregon.gov/ODOT/CS/EA/reports/Sept_2011_Forecast.pdf

Current research and commentary identifies some important areas for increasing the revenue-generating potential of the funding sources identified above, including:

- *Indexing the motor fuel tax.* Indexing gasoline taxes is not currently done but has been researched by a number of organizations[4]. Indexing involves adjusting excise motor fuel tax rates to some measure of inflation, such as the consumer price index, retail gasoline prices, or to an inflation index gauging changes in the highway construction and maintenance costs.
- *Other motor fuel-related taxes*. Other ways that have been suggested to generate revenue through Federal taxes on motor fuels include a carbon tax (cap and trade programs), a tariff on imported oil, and/or a sales tax on motor fuel.
- *Truck-related taxes and fees*. Trucks and heavy vehicles could face additional Federal fees in the form of truck and trailer sales taxes, a truck tire tax and/or a heavy vehicle use tax. Increases in these taxes and fees are generally seen as strong revenue-generating options that reflect use of the system, but are typically met with popular opposition.
- *Freight-related Taxes & Fees*. Revenue options related to freight activity include new mechanisms such as a national container fee and a freight-related sales tax, as well as expansion or diversion of existing sources such as customs duties and the harbor maintenance tax. Some portion of the revenues from any or all of these sources would likely be dedicated to freight projects and programs.
- *Mileage-based user fee.* These fees are not currently charged for drivers on most highway networks. Under this system, fees can be charged in a number of ways based on the amount of individual roadway use. The charges have the potential to replace motor fuel taxes as a way to directly relate revenues to the use of the transportation network while also supporting goals of increased fuel efficiency, equity and reduced congestion. Mileage-based fees would also be an effective way to address the increasing number of hybrid and fully electric vehicles within the vehicle fleet, all of which pay little to no gas tax due to their fuel type. Mileage-based fees are often considered likely to be collected and spent at the state-level, and several trial phases have been studied. In 2006, the Oregon

[4] National Surface Transportation Infrastructure Financing Commission (2009) "Paying Our Way". Accessed online August 2011 at http://financecommission.dot.gov/Documents/NSTIF_Commission_Final_Report_Mar09FNL.pdf.

Department of Transportation (ODOT) conducted the Oregon Mileage Fee Concept as directed by the Road User Fee Task Force. The Oregon Mileage Fee Concept pilot project sought to explore replacement of the state gas tax with a mileage-based fee (on miles driven in Oregon) collected at fueling stations, and to explore collecting congestion fees. Findings showed that a mileage fee is viable and able to be paid at fueling stations; additionally, it is possible to establish different pricing zones electronically, so this system could be used for collecting local revenues in specific zones as well.[5] .

FINANCING SOURCES

Common transportation project financing tools for local communities include credit assistance and bonds. Credit assistance allows project sponsors to borrow money or access credit from the Federal government. Bonds are debt instruments issued by state and local governments, providing access to the capital markets. In recent years, there has been an increase in private equity investment in surface transportation through Public-Private Partnerships (P3), with financing packages that combine public and private debt, equity, and public funding. Some of the more important and frequently-used financing tools are described in more detail as follows:

- *Transportation Infrastructure Finance and Innovation Act*. The Transportation Infrastructure Finance and Innovation Act (TIFIA) enables the Federal government to provide loans, loan guarantees, and lines of credit directly to public and private sponsors[6] of major surface transportation projects. Any type of project eligible for Federal assistance through existing surface transportation programs (both highways and transit) is eligible for TIFIA assistance. The amount of Federal credit assistance may not exceed 33 percent of total eligible project cost, and the project cost should be no less than $50 million[7]. TIFIA project sponsors may be public or private entities, including state and local governments, special purpose authorities, transportation improvement districts, and private firms or consortia. Toll road projects have benefited from TIFIA credit assistance,

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[5] *Oregon's Mileage Fee Concept and Road User Fee Pilot Program* (November 2007), accessed online October 2011 at http://www.oregon.gov/ODOT/HWY/RUFPP/docs/RUFPP_finalreport.pdf?ga=t

[6] TIFIA project sponsors may be public or private entities, including state and local governments, special purpose authorities, transportation improvement districts, and private firms or consortia.

[7] For ITS projects, the minimum cost is $15 million.

due to the flexibility of TIFIA on repayment terms. TIFIA also has been instrumental in attracting private capital and advancing P3 projects, as well as transit projects.

- *Rail Rehabilitation and Improvement Financing*. The Rail Rehabilitation and Improvement Financing program provides direct loans and credit assistance to both public and private sponsors to acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings, and shops. Direct loans can fund up to 100 percent of a railroad project with repayment terms of up to 35 years and interest rates that are not marked-up by the government. Loan size has ranged from $2 million to $233 million.
- *Other Potential Tools.* The funding and financing tools described below have been proposed at the Federal level. While none of these currently exist, they are potential alternatives to finance transportation projects in the long-term timeframe.
    - National Infrastructure Innovation and Finance Fund, or "I-Fund" would provide grants, loans, or a combination in order to leverage non-Federal resources for high-value projects that have a regional or national impact. I-Fund resources would be allocated to projects across modes and build an outcome-oriented, performance-based program.
    - National Infrastructure Bank concepts have emerged to address large scale projects, of national and regional significance. The National Infrastructure Bank Act (introduced 2007) would establish an independent National Infrastructure Bank to issue general purpose and project-based infrastructure bonds for qualifying transit, public housing, water, highway, bridge, or road infrastructure projects. The National Infrastructure Development Bank Act (introduced in 2009) would issue bonds, make loans and offer loan guarantees, and purchase and sell infrastructure-related loans and securities on the global capital market.
    - Public-private partnerships (P3s) are contractual agreements between a public agency and a private entity. These agreements allow a sharing of responsibilities, risks, and revenue between public sector owners of transportation facilities and private sector partners. P3 agreements already exist nationwide, and Federal programs may further support P3 development, creating near- and long-term opportunities for local transportation agencies to leverage private investment.

Trends

The paragraphs above summarize key parts of today's national transportation funding and financing revenue sources. These sources are likely to change over the timeframe of the Clackamas County TSP, and the following section describes generally-expected trends in this regard. The information is culled from a variety of public and private sources and is presented below in short-, mid- and long-term timeframes.[8]

SHORT-TERM: 1-2 YEARS

Over the short-term, motor fuel taxes will continue to provide revenue as transportation funding is extended through the political process in the traditional manner. However, with a fixed tax rate, the purchasing power will continue to weaken even in the short-term. Increases in, or additions to any Federal taxes will be unpopular, as taxes continue to be subject to national debates with an uncertain future[9]. Thus, we expect the existing deficits in HTF expenditures to remain and even worsen over the short term.

Near-term Federal funding changes may include an oil tariff, although this will directly affect consumer prices as well. Further complicating such a tariff is that effects on international trade lessen it as a long-term revenue source. Vehicle-related taxes would be relatively simple to implement over the short term, but again face significant political hurdles. Within the one- to two-year horizon of this short-term assessment, therefore, we do not expect any significant changes to either the types of funding sources or to the amount of annual revenue they generate.

MID-TERM: 5-10 YEARS

In the mid-term, an increase in the Federal motor fuel tax is likely, covering at least part of the near- and mid-term funding gap in the HTF. While this option provides a strong short-term base for flexible transportation funding under existing funding programs, it does not address inflation, the short-term economic recession and the long-term need to shift away from a reliance on gasoline. New capital funding programs, tied more directly to performance measures, are likely to be presented as part of the new transportation authorization bill. Examples suggested are funding for combined

[8] For more information see a brief bibliography at the end of this paper.

[9] According to the National Surface Transportation Infrastructure Financing Commission, a $15 per-ton tax on carbon dioxide emissions would raise gasoline prices by 14 cents per gallon.

transportation and land use projects, high-speed rail and innovative technologies. However, the amount of Federal funding available for transportation is likely to be much less than the forecasted need. As a result, we expect the issue of identifying a sustainable transportation funding source to rise in visibility and become a significant part of the public debate during the mid-term period 5-10 years from now, with new funding systems ultimately implemented and revised over this period.

LONG-TERM: 10-20 YEARS

Over the long-term, increased fuel efficiency and new motor fuels will reduce potential proceeds to levels that won't sustain existing maintenance and operating activities. These trends will effectively force local, state, and federal governments to identify new and/or alternative revenue sources not tied to motor fuels. Sources discussed earlier as long-term sources include mileage-based fees, vehicle taxes, and road pricing or tolling. The political and technological requirements are expected to be high but there are no apparent and politically expedient alternatives that are as fair and sustainable as these options. In addition, P3s will likely increase in sophistication and reach as logistical issues are addressed, such as equity and accountability, including action by the Federal government to further develop policy that delineates government roles in P3s, and supports local regulations and restrictions to ensure transparency and accountability to the public.

Recommendations

Clackamas County will need to take an active role in participating in local and regional planning efforts to prepare for future funding and financing possibilities. Based on current expectations by national agencies, advisors and advocates, we believe the County will be best served by following the brief recommendations provided below.

- Do not assume significant decreases or increases in federal allocations, even if mechanisms for the funding changes. Reauthorization of the Federal transportation bill and economic stimulus spending may provide new opportunities for local agencies to access capital and operating funds in the near-term. However, it appears that the new legislation is expected to set funding levels similar to that of the last transportation authorization bill.
- Explore local measures to raise needed operating funds for roadways and public transportation (see Attachment "A" for local funding tools), paying special attention to use-based and performance-based fees wherever possible. Federal funding continues to focus on capital investments, pushing the need for operations spending to the states and

local communities. Although some Federal sources generally intended for capital expenditures have been used for operating expenses, operating funding has been increasingly covered by states and local communities. Analysis in 2010 by the Center for Transportation Excellence found an upward trend in the success rate of local ballot measures to raise funds for local transportation spending, with property taxes leading the way.[10]

- Continue to facilitate projects and plans to prepare for competitive funding opportunities at the Federal level (e.g., TIGER grants).
- Explore and research the application of public private partnerships. Examples of successful projects are available across the nation, and provide important information and improvements to ensure successful project delivery at the local level. The County can begin outreach to potential partners and the public now, to ensure participation and full consideration of costs and benefits.
- Develop and enhance performance-based investment decision-making processes at the local level, and participate in broad regional performance tracking programs. Building capacity on performance measures at the local level will serve the County well as Federal funding is tied more to performance measures.

[10] "Trends and Results from 2010 Transportation Ballot Measures" (2010) The Center for Transportation Excellence, Washington, DC. Accessed online September 5, 2010 at http://www.cfte.org/CFTE%20Post-Election%202010%20Webinar%20PPT.ppt.

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CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.2b
National Transportation Policy

Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Beth Wemple, Cambridge Systematics

cc: Larry Conrad, Clackamas County

Introduction

This paper provides an overview of national transportation policy with respect to how it might affect alternatives planning development activities during the County's Transportation System Plan (TSP) update process. The paper identifies key initiatives, trends over short-, mid- and long-term timeframes, and concludes with recommendations for the County to consider in creating its vision and goals for the TSP.

Initiatives

At the national level, transportation policy is in a state of flux as the next transportation authorization bill is being debated. The upcoming presidential and congressional elections in 2012 could further alter the policy direction. Federal policy is developed through a complex network of agencies and organizations, and includes hundreds of initiatives that provide guidance to local communities, States and other Federal offices. This section presents the current key issues in national transportation policy, drawing on material from Federal offices of transportation, as well as policy briefs prepared by national research, advocacy and other "think-tank" organizations.

ENVIRONMENT AND ENERGY

There is general scientific consensus that the earth is experiencing a long-term warming trend and that human-induced increases in atmospheric greenhouse gases (GHG) are the predominant cause. In the United States, transportation is the largest source of GHG emissions, after electricity generation. Within the transportation sector, cars and trucks account for a majority of emissions. Opportunities to reduce GHG emissions from transportation include switching to alternative fuels, using more fuel efficient vehicles, and reducing the total number of miles driven. Transportation planning activities, which influence how transportation systems are built and operated, can contribute to these strategies. In addition to contributing to climate change, transportation infrastructure is vulnerable to predicted changes in sea levels and increases in severe weather and extreme high temperatures. Long-term transportation planning will need to respond to these potential threats.

GOODS MOVEMENT

In the past century foreign trade has increased from just over 10 percent of the national gross domestic product to nearly 30 percent, a trend that is likely to accelerate in the years ahead.[1] Growth industries in the U.S. have shifted away from manufacturing to global services and trade. Federal policy is focused on facilitating safe, efficient and environmentally friendly movement of goods to and from international trade centers. The U.S. freight system faces significant capacity constraints at key gateways that will require effective policy solutions coordinated with both public and private parties. Long-term policy changes are likely to include facilitation of public private partnerships, improvements in freight infrastructure and coordination with regional passenger rail planning.

LIVABILITY

Livability represents the quality and location of transportation facilities and their relationship to job access, affordable housing, quality schools, active transportation and safe streets. This is a cross-cutting policy initiative that reaches beyond transportation to housing and environmental issues, blending many of the initiatives in this section such as safety, context sensitive solutions and public health. Livability can also include improvements in public transit access, safety and non-motorized travel for rural communities. Backed by national cooperation between the U.S. Departments of Transportation (DOT), Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA), livability is likely to continue as a key theme in transportation policy and funding.

[1] America 2050 (2010) "America 2050 Prospectus". Accessed online 2011 at http//:www.america2050.org.

Recent competitive grants through the partnership's sustainable communities[2] program demonstrated how a competitive, performance-based national program can be used to support local, regional, and national transportation goals.

PERFORMANCE MEASUREMENT AND MULTIMODAL TRANSPORTATION

The USDOT is working to assess and improve the use of performance measurement systems to encourage accountability, efficiency, and enhanced operations. Performance measures and related performance management systems are being increasingly used to monitor performance of transportation networks relative to a variety of key goals, evaluating projects to see what has been successful, and using these observed outcomes to plan for future improvements. Federal funding programs have begun to explore the use of performance measures in project and program development. National organizations have called for more robust performance measurement to prioritize key investments[3]. The FTA is also developing new performance measures to reflect interest in national environmental, social and economic goals. Performance categories will need to meet the unique demands of different travel modes, and could include measures such as reliable on-time performance, congestion mitigation, safety and environmental benefits, improved transportation choices, accessibility and mobility options for communities with limited options, and reduced energy use. Examples of project or program-level measures include distance from major destinations such as schools and employment centers or transit facilities, ability to provide a missing link within the bicycle and pedestrian network, and other measures that provide insight into whether a project or program enhances accessibility to major destinations and transportation facilities.

TRAFFIC CONGESTION

Federal policy continues to focus efforts on reducing traffic congestion on the nation's highways. Operational improvements include real-time traveler information, incident management, transportation demand management and road pricing. Moving vehicles, people and freight throughout the network is being furthered by the development and integration of performance measurement to reflect national priorities (see performance measurement paragraph above), data

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[2] http://www.sustainablecommunities.gov/

[3] National Surface Transportation Policy and Revenue Study Commission (2008), "Transportation for Tomorrow". Accessed online September 3, 2011 at http://transportationfortomorrow.com/final_report/index.htm

sharing and creating effective multimodal connections. National studies have explored policy and technical tools available to apply use-based highway pricing to relieve highway chokepoints and improve trade flows, commutes, reduce emissions and encourage use of public transportation.[4]

CONTEXT SENSITIVE SOLUTIONS

The objective of Context Sensitive Solutions is to improve environmental quality as a result of transportation decision making by incorporating context sensitive solutions principles. These principals include incorporating shared stakeholder visions, demonstrating a comprehensive understanding of contexts of decision making, fostering a collaborative process that achieves consensus, and shaping effective transportation solutions that preserve or improve community and natural environments.

PEDESTRIAN AND BICYCLE PLANNING

The USDOT continues policies for non-motorized travelers that emphasize pedestrians and cyclists in federally funded projects, enhance the safety of cyclists and pedestrians, and encourage investments that go beyond minimum requirements to provide facilities for cyclists and pedestrians of all ages and abilities. The department also supports policy that extends FTA funding to pedestrian and bicycle improvements around a transit stops.

SAFETY

National efforts to integrate safety into the transportation planning process continue at many levels. The USDOT works with states and regions to achieve short- and long-term goals of improved safety for motorists, transit riders, cyclists and pedestrians. Safety is expected to remain a key issue, bolstered by new partnerships in the public and private sectors, developments in data collection and analysis, and increased attention on integrating multimodal transportation networks that promote safe and efficient travel for all users. In the safety arena, the new Highway Safety Manual plays a key role in providing policy makers, planners, and engineers with tools to truly assess the safety tradeoffs between different approaches and strategies.

[4] Ibid.

MEGAREGIONS AND MULTISTATE PROJECTS

Developing and coordinating multi-state projects is an emerging national issue. Current research has touched on funding, planning, decision making and efficient management for projects crossing jurisdictions. Expediting the project delivery process could have enormous cost savings in both short- and long-term timeframes. Organizations such as America 2050 have stressed the importance of megaregions, which are metropolitan areas where the boundaries between cities, suburbs and towns have blurred together to create an expansive metropolitan network of economic, social and infrastructure links, which brings with it special considerations for regional planning. America 2050 suggested a "Cascadia" megaregion encompassing cities and communities near Vancouver, B.C., Seattle, Portland, Salem and Eugene, Oregon. Whether and how the region grows is to be seen, but the concept illustrates the infrastructure and travel links between these areas and the importance of aligning funding and policy for regionally supportive investments.[5]

Trends

The initiatives above summarize key parts of today's national transportation policy. These initiatives are likely to change somewhat over the timeframe of the Clackamas County TSP. While there is no crystal ball available, general assumptions about trends are collected below in short-, mid- and long-term timeframes.

SHORT TERM: 1-2 YEARS

The delay in passing the next transportation authorization bill will leave policies and programs largely unchanged. The development of national performance measures and standards for comparing investment choices have been discussed for inclusion in the legislation, and are likely to be included in the next transportation authorization bill. Understanding and applying these mode-neutral performance measures could be increasingly important for local communities.

MID TERM: 5-10 YEARS

After passing the transportation authorization bill, major initiative areas are unlikely to change, but economic recovery following the recession is expected to continue with a particular focus on linking transportation investments to performance measures related to jobs, productivity, trade and cost effectiveness. Policies important to improving the efficiency of existing systems such as safety, ITS

[5] America 2050 (2010) "America 2050 Prospectus". Accessed online 2011 at http//:www.america2050.org.

and goods movement will continue to play an important role. Environmental issues and relationship to land use development may be secondary to economic recovery, but will develop as the recovery takes place over the long-term.

LONG TERM: 10-20 YEARS

While the priorities in the mid-term period – jobs, output, productivity, goods movement and safety – will continue to play a key role in Federal transportation policy, other issues will also begin to emerge. New policy areas aside, the continued focus on vehicle emissions and other environmental issues, livability, and planning for megaregions may develop even more robust policy initiatives that guide the nation's adjustment to shifts in industry and trade, climate change and travel congestion.

Recommendations

With respect to national transportation policy, Clackamas County can both provide input regarding the process and prepare for these key policy initiatives and developments.

- Inform the debate over national priorities to emphasize local transportation goals and objectives. Continue to be actively involved with local, regional and State-level planning in Oregon to communicate local goals and needs, and leverage inter-agency cooperation to attract and prepare for future investment.
- Enhance and expand a performance-based planning process that corresponds to local and regional goals, identifies projects that meet these goals, and communicates project benefits at the national level.
- Explore the use of performance measures in project and program development. One approach is partnering with Metro to assess transportation performance through a variety of evaluation tools. Examples include dynamic transportation analysis models to measure travel time reliability, applying multimodal level of service measures, economic impact analysis, quantitative exposure-based safety analysis and accessibility performance measures. Performance measures that address the topic of accessibility may include travel times to schools, employment centers and transit facilities, and connections in the pedestrian and bicycle network.
- Plan for transportation investments that improve environmental quality from current trends. Clackamas County and other communities in Oregon are leaders in planning that steers the benefits of transportation and land use investments to environmental, social

and economic goals. These measures should clearly communicate reductions in greenhouse gas emissions and link with travel demand management, linking transportation and land use, comprehensive travel pricing policies, clean transit vehicles and non-motorized travel.

- Continue to pursue the early established goals of linking land use, transportation, public health, and safety into the assessment of transportation projects, programs, policies, studies, pilot projects, and implementation tools.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.3

State of the Practice of Modal Transportation Plans in Oregon and the US

Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Marc Butorac, P.E., P.T.O.E.; Susan Wright, P.E.; Kelly Laustsen, Kittelson & Associates

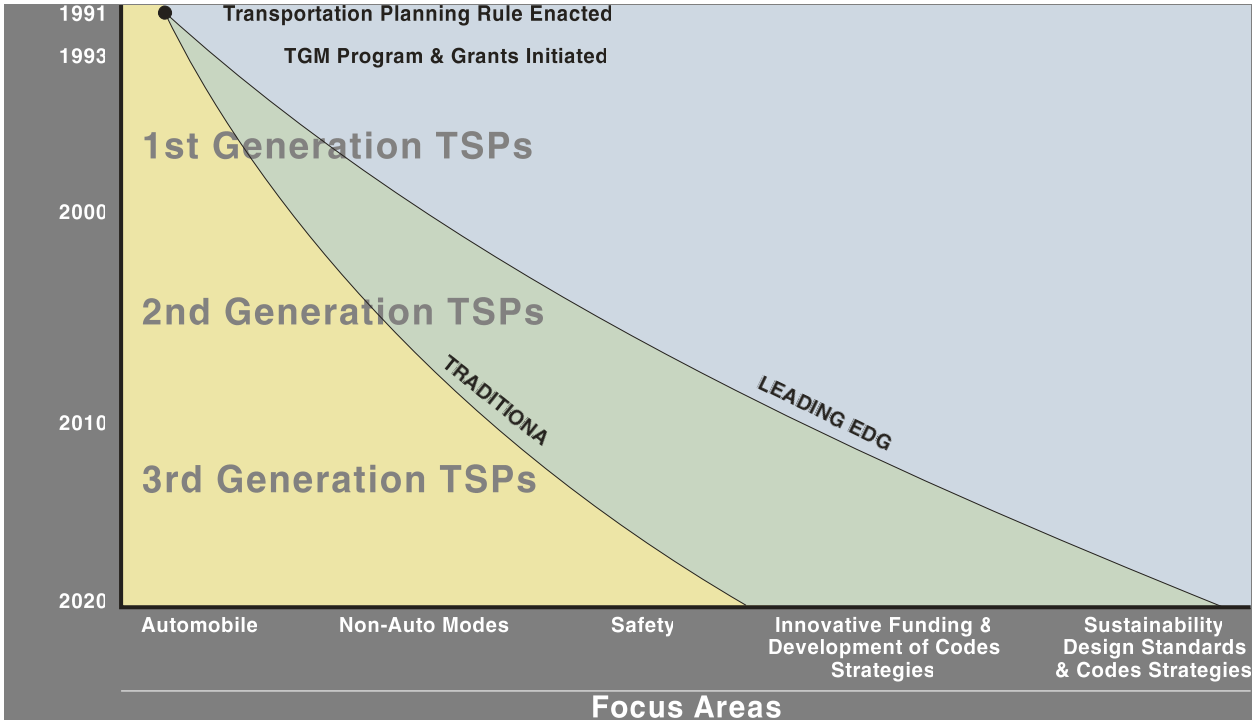
cc: Larry Conrad, Clackamas County

This memorandum provides an overview of the state of the practice in modal transportation plans in Oregon and in the United States. Six case studies that illustrate the state of the practice are included in the memorandum. Recommendations for Clackamas County's consideration are included in this memorandum as the County finalizes the vision, goals, and objectives for its Transportation System Plan (TSP) update.

BACKGROUND

Since adoption of the Transportation Planning Rule in 1991 (requiring coordinated land use and transportation planning) many local agencies have completed one or more updates since adopting their first TSP in the 1990s. Over the past twenty years TSPs have been evolving as agencies have done their updates. The first TSPs after the adoption of the Transportation Planning Rule are considered to be "1st Generation". **Exhibit 1** shows a history of how TSPs have been evolving in Oregon and how they have evolved to "3rd Generation" TSPs. While "1st Generation" TSPs were very automobile focused (laying out the future roadway network and identifying link and intersection capacity constraints and mitigations), "2nd Generation" TSPs began to identify future pedestrian, bicycle, and transit systems and documented existing safety issues. Now most TSP updates are incorporating elements considered to be "3rd Generation" by are looking at all modes as a combined transportation system rather than separate modal systems and incorporating innovative funding and code strategies. The leading edge of "3rd Generation" TSPs based on the current state of the practice includes incorporating sustainability (environmental, fiscal, economic and/or social) into the planning process as well as putting greater emphasis on system performance measurement. The following provides recommendations for Clackamas County to ensure that the current update to the TSP will

provide the County a "3rd Generation" TSP and put them on the leading edge with the state of the practice.



RECOMMENDATIONS FOR CLACKAMAS COUNTY

Several trends representing the state of the practice in transportation planning emerged from a review of transportation plans in the United States and Oregon. Based on these trends, the following recommendations are made with regard to the TSP Update process that Clackamas County is undertaking:

- **Performance based objectives should be used to assess the effectiveness of the updated plan**: multiple and quantifiable performance measures are important for developing, helping prioritize projects, and measuring progress overtime.
- **The TSP Update should employ a multi-modal mindset in all aspects of goal-setting, analysis, evaluation, and recommendations**: transportation plans are shifting away from their earlier focus on vehicle-centric, capacity-based performance measures (e.g., level of service and volume-to-capacity ratio) toward broader metrics that consider multiple modes of transportation, safety, and the environment. Some plans have moved away from discussing each mode separately and toward developing the plan around multimodal corridors so that the interaction between different transportation modes can be addressed and "Complete Streets" that provide mobility for all users can be developed.

- **Public Health and Equity should be part of the transportation/land use equation and integrated into the transportation planning process**. The linkage and benefits between transportation, land use and public health is well documented; however, proactively planning, funding, and implementing projects and programs is not at the level necessary to achieve these potential and lasting benefits.
- **Public involvement should receive special attention and take advantage of new presentation, education, and participation techniques**: Extensive public involvement has traditionally been an important part of the planning process in Oregon, but it continues to evolve and be refined in ways that coax more effective input and public education out of the process. In more recent public involvement processes, the public helps in significant ways to shape transportation goals and priorities. Additionally, interactive websites, visualization techniques, and public workshops are being used to help engage the public and gather meaningful input.
- **There should be a strong environmental focus throughout the TSP Update process**: transportation plans increasingly include an environmental element in their vision, goals, and objectives.
- **System performance measures that also support economic goals should be identified:** goals and objectives related to the economy are increasingly being used to help prioritize projects and support economic sustainability.
- **The Plan should be bold in exploring, proposing, and developing new and innovative funding sources:** faced with a challenging transportation funding environment, metropolitan regions and counties are looking to new, innovative sources of transportation funding, such as public-private partnerships and user fees. Oregon is currently among the national leaders in this important emerging area, but the field is still in its infancy and needs to go beyond conversation about concepts and opportunities to actual testing and implementation.

These trends should be considered as Clackamas County finalizes the vision, goals, and objectives for its TSP update.

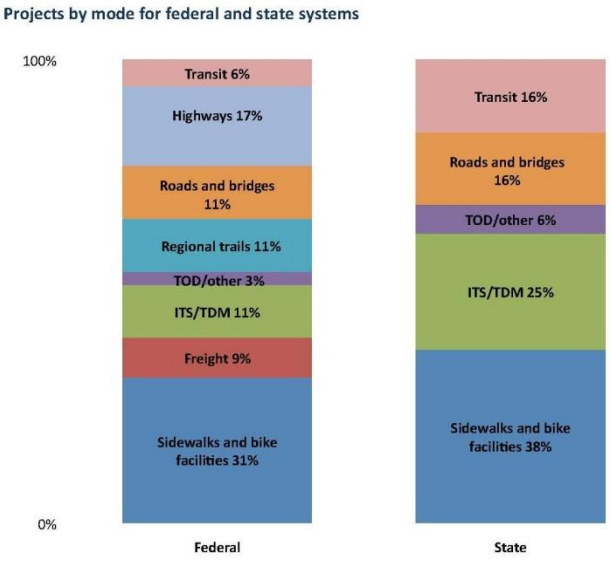
STATE OF THE PRACTICE IN MODAL PLANS

The following six case studies present a variety of transportation plans that illustrate the state of the practice in modal plans in Oregon and the United States. The plans are diverse, covering a range of geographic areas and levels of effort. As discussed in the recommendations above, certain trends appear in the plans, including a focus on multi-modalism, an emphasis on developing Measures of Effectiveness (MOE), and identifying new sources of transportation funding.

Case Study #1: 2035 Regional Transportation Plan (RTP) – Portland, OR

In May 2011, Metro adopted the 2035 RTP for the Portland metropolitan area. The planning document is organized in an intuitive manner and seeks to present information effectively. Each chapter begins with a statement or question, such as, "Chapter 3 Investment Strategy: What is our strategy for achieving our vision?" The first part of the plan establishes why a new transportation strategy is necessary. It then describes Metro's vision for the future, develops a strategy for achieving that vision, provides performance measures for evaluating progress, and finally creates an implementation plan. Rather than discussing each transportation mode in isolation, the plan divides the Portland metropolitan area into mobility corridors. Each mobility corridor represents a sub-area of the region and includes all regional transportation facilities within the sub-area as well as the land uses served by the regional transportation system. This framework "emphasizes the integration of land use and transportation" [1] and recognizes how different modes of transportation can work together to create mobility.

Multi-modalism is a common theme throughout the RTP. It evaluates a variety of transportation modes and suggests streets should be evaluated on standards that go beyond the ones that only apply to motorized vehicles. When evaluating transportation needs, the RTP looks at transit, bike and pedestrian facilities, regional trails, throughways, arterials, rail crossings, regional bridges, safety, and regional freight. The RTP advocates creating "Complete Streets" that are designed with all users in mind. Elements of "Complete Streets" such as pedestrian crossings, landscaped buffers, lighting, and facilities for the hearing- and sight-impaired can help improve the performance of streets. The plan includes data on the number of bike trips in the city of Portland to quantify the increasing rates of bicycling. Sidewalks are evaluated by using metrics that determine the percentage of bus stops or light rail platforms that are connected by sidewalks. As indicated by the project breakdown shown in **Exhibit 2** (for mobility corridor #1 between the Portland Central City and Vancouver, Washington), multi-modalism is a high priority in the RTP.



Portland's RTP takes a new look at funding, suggesting innovative strategies for funding transportation projects. It suggests that "enhanced public and private collaborations and stronger public support for seeking new revenue sources must be developed to maintain existing transportation assets as well as to pay for major system investments" [1]. However, the plan does not specifically outline these alternative sources, as they will be the topic of additional policy discussions during the fall of 2011.

Case Study #2: Transportation 2040 – Puget Sound Regional Council

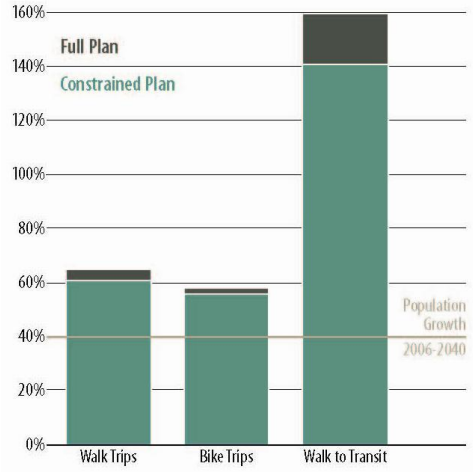
In 2010 the Puget Sound Regional Council (PSRC) adopted *Transportation 2040*, the long range transportation plan for the four-county central Puget Sound region of Washington State. The Puget Sound region encompasses approximately 6300 square miles, includes 82 cities, and is the largest metropolitan region in the Pacific Northwest.

FIGURE 10. Transportation 2040 Plan Framework

Transportation 2040 focuses on three key strategies: 1) improving mobility; 2) protecting and enhancing the environment; and 3) identifying sustainable funding sources. A diagram depicting the plan's framework can be seen in **Exhibit 3**.

Exhibit 4: Bike and Walk Activity [2]

FIGURE 19. Bike and Walk Activity



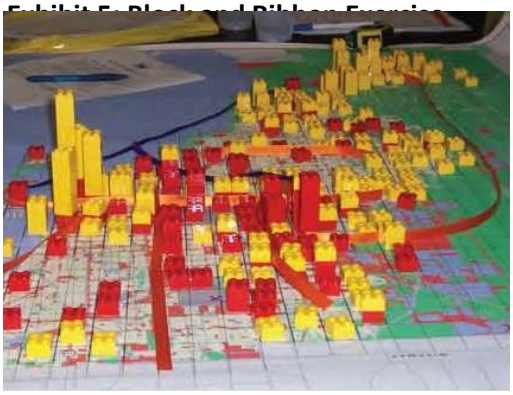
outcomes of transportation investments. *Transportation 2040* emphasizes measuring the the plan includes an "Outcome" section Each chapter of the qualitative and quantitative results of that estimates specific area. For example, **Exhibit 4** the plan in a shows the expected increase in biking and walking trips that would result from provisions in the plan that focus on encouraging physical activity. For other performance metrics, graphs showing vehicle miles traveled, freeway delay hours, and trips by travel mode are included in the plan.

PSRC uses Sustainable, Multimodal, Accessible, Reliable, Technology (SMART) corridors to monitor transportation system performance and mobility. Regional planners in Puget Sound are working to develop SMART corridors in 12 regional subareas. Data collected along these corridors includes land use and demographic data, travel information, transit congestion, and identification of priority freight routes. Regular SMART Corridor Reports are created to help monitor progress and identify transportation improvements.

Transportation 2040's approach to transportation funding is notable. The plan reflects the need to move towards a new, more stable funding structure based on user fees. PSRC created a Transportation Pricing Task Force in 1995 to contribute to public dialogue about transportation financing. The Task Force concluded that variable roadway charging is critical to financing transportation projects. *Transportation 2040* lays out a general funding scenario to phase in tolls and other user fees, and creates a "New Revenue General Scenario" incorporating highway system tolls.

Case Study #3: 2035 Long Range Transportation Plan (LRTP) – Miami-Dade, FL

The Miami-Dade 2035 LRTP was adopted in 2009 by the MPO for the Miami Urbanized Area. Two particular strengths of the plan are its emphasis on public involvement and Measures of Effectiveness (MOE).



A Public Involvement Program (PIP) was created for the LRTP to identify interested individuals and groups and involve them in the planning process. The MPO made every effort to make environmental justice part of its mission by producing publications in English, Spanish, and Creole, and to reach out to not-for-profit organizations that represent underserved populations. Miami-Dade held two public workshops, each with six sessions. Several innovative visualization techniques were used to engage the public. A block and ribbon exercise, shown in **Exhibit 5**, was conducted at six public workshops to help participants visualize population and employment growth. Participants used Legos®, ribbons, and a future land use map to identify corridors needing improvement. Miami-Dade implemented an audience response system at public workshops to ask questions relating to mobility issues and challenges. Participants used a remote control keypad to answer questions; their answers were immediately displayed to the audience in graphical form. This allowed data about public sentiment to be efficiently captured and viewed by the MPO and public. In addition, Miami-Dade created an interactive website to keep the public informed and to provide further public input. A project mapping element on the site allowed users to view Cost Feasible Plan projects and search for projects by proximity to a location or path, or by project type.

The LRTP stresses the importance of MOEs to assess the plan's performance on a system wide basis. The plan includes eight goals, each with specific objectives. Each objective has a least one measure of effectiveness that may be qualitative of qualitative. A table then lists the plan assessment by MOE and how/where the MOE is addressed. This helps to provide alignment between the LRTP's goals and projects. **Exhibit 6** is an excerpt from Table 4-5 in the plan that addresses MOEs.

Objective	Measure	Plan Assessment by Measure	How/Where Measure is Addressed
Objective 1.7: Improve transportation facilities' and services regional connectivity	Number of park-and-ride/multimodal facilities	17	Chapter 4 - Plan Development Process, Tables 4-9 and 4-10
Objective 1.8: Include provisions for non-motorized modes in new projects and in reconstructions	Does the plan consider non-motorized infrastructure in highway and transit improvements?	Yes	Chapter 6 - Intermodal Systems Planning; Bike/Pedestrian set-aside
	Percentage increase in number/mileage of non-motorized facilities	48% (miles)	Chapter 6 - Intermodal Systems Planning; Bike/Pedestrian set-aside

Case Study #4: Master Transportation Plan (MTP) – Arlington County, VA

Arlington County adopted the MTP for 2030 in 2007 to create a policy framework to guide development, advance the County's goals and objectives, and direct public investment. The plan outlines several general goals to provide broad direction for transportation programs. Strategies described in the plan focus the guidance into specific actions, and policies provide the formal statements of action to achieve these strategies. The plan includes strategies for the overall transportation system, as well as specific strategies for individual modes. Each policy is further broken down into implementation actions, each of which is accompanied with performance measures. Although this structure is detailed and multilayered, it helps create concrete MOEs that are related to the plan's goals. For example, one performance measure in the plan is: "Track the installation of new bicycle racks available for use by the public. Seek to install 250 new racks (500 parking spaces) over the next 10 years" [4]. This metric relates to the policies of completing the bicycle network and providing high-quality bicycle facilities.

The transportation performance measures in the plan represent a "shift from an emphasis on the traditional vehicle 'Level of Service' to an emphasis on multimodal 'Quality of Service'" [4]. This holistic view of transportation services supports multi-modalism and a balance between travel modes. Instead of focusing on vehicle-related MOEs, the Arlington MTP seeks to create "Complete Streets" that provide for transit, pedestrians, and bicyclists in addition to vehicles. The plan includes sections devoted to alternative modes of transportation and considers advice from a variety of stakeholders. For example, a citizen Pedestrian Advisory Committee (PAC) provides the county staff with advice on pedestrian policy and issues.

Project Prioritization Criteria

1. Importance to bikeway network connectivity.
2. Safety needs and implications.
3. Estimated demand for usage.
4. Potential to attract new bicyclists.
5. Community support.
6. Cost relative to capital budget.
7. Ease of implementation, including neighborhood, environmental clearance, and need for additional right-of-way.
8. Availability and quality of existing alternative routes/facilities.
9. Opportunity to achieve cost savings or easier implementation through combination with another project.

In order to prioritize recommended transportation projects, Arlington County developed a variety of project prioritization criteria. These criteria were developed through a formal process involving stakeholder groups. For example, the bicycling prioritization criteria, shown in **Exhibit 7**, were formulated by a group including the Bicycle Advisory Committee, Bike Arlington staff, and representatives of other agencies. These criteria help develop project priorities and support the county's transportation goals.

Case Study #5: Communities in Motion (CIM) 2030 Plan – Boise, Idaho

The Community Planning Association of Southwest Idaho (COMPASS) developed Communities in Motion (CIM) as the 2030 plan for Northern Ada County and the Nampa Urbanized Area. Although this region is the most populous in the state, parts of the region are rural and remote, which creates a diverse transportation system. The plan is sensitive to the variety of needs in the region and takes a holistic approach that covers all modes of transportation.

CIM is based on four community goals, which were developed in public workshops, open houses, and other opportunities for input throughout the planning process. The four goals are 1) Connections; 2) Coordination; 3) Environments; 4) Information. These four goals link to the two key elements of the plan, "Community Choices" and "Regional Corridors." "Community Choices" refers to an ideal growth scenario developed through input from public workshops, local governments, stakeholders, and elected officials. The scenario intends to create a transportation system that is cost-effective and multi-modal. The plan divides the county into "Regional Corridors" to assess the transportation system as a whole, instead of examining modes independently.

One strength of the plan is its emphasis on creating specific, measurable metrics to assess the success of the plan. Under each of the four goals in the plan are objectives, which provide a more detailed breakdown of specific areas of the goal. Tasks are given for each objective, which identify how the objectives are carried out. The tasks were created to be measurable and help prioritize and identify high priority projects that help achieve the "Community Choice" scenario. For example, the following objective and task are part of the CIM [5]:

> **Objective**: Develop and implement transportation alternatives and land use patterns to achieve an average mode split of 5% of all trips.
>
> **Task**: COMPASS and Valley Regional Transit will plan and implement – when dedicated funding is available – a transit system with travel times on bus routes no more than twice the travel times for comparable automobile travel times.

Although not explicitly outlined in the CIM, COMPASS has also created a variety of criteria to rank projects and measures the implementation of the LRTP (included in a technical document on their website). The primary criteria considered are efficiency and accessibility, followed by land use, economic development, environmental quality, urban amenity and livability, and distribution of impacts. Metrics were developed to measure progress towards achieving the county's goals and to prioritize projects. For example, some of the metrics for ranking capital projects are:

- Dollars per vehicle mile traveled
- Time savings
- Connections – fills gaps in system, ties to transit spine, or removes barriers
- Regionality – based on classification of roadway according to function

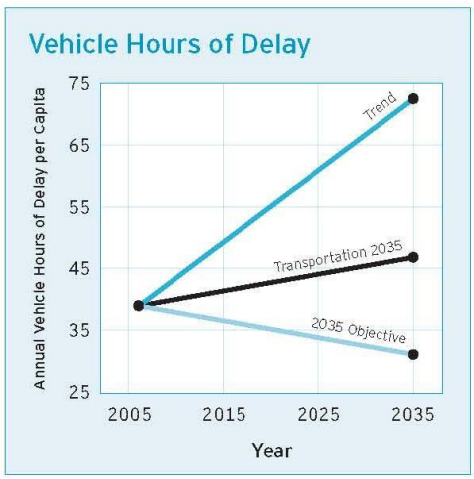
To further assess how the projects in the plan adhere to the community goals, the plan includes provisions to develop annual monitoring reports to summarize and track progress towards achieving the plan's goals. The reports are intended to link directly to the LRTP and use the goals, objectives, and tasks in the plan for the monitoring. The emphasis of the monitoring report is on growth patterns, land use and transportation options, and congestion.

Case Study #6: Change in Motion Transportation 2035 – San Francisco, CA

As indicated by its title, the 2035 long range transportation plan for the San Francisco Bay Area focuses on the necessary future changes in transportation systems caused by climate change, volatile oil prices, an aging Bay Area population, and dwindling funding for transportation projects. The plan is guided by three principals known as the Three Es: 1) "Support a prosperous and globally competitive **economy**;" 2) "provide a healthy and safe **environment**;" 3) "produce **equitable** opportunities for all Bay Area residents to share in the benefits of a well-maintained, efficient regional transportation system" [6]. The eight goals of the plan seek to achieve the Three Es. Measurable, time-based performance objectives under each goal help guide investment. The structure of the "E" Principles, Goals, and Performance Objectives is shown in **Exhibit 8**.

"E" Principle	Goal	Performance Objective
Economy	Maintenance and Safety	Improve Condition of Assets Reduce Collisions and Fatalities
	Reliability	Reduce Delay
	Efficient Freight Travel	
	Security and Emergency Management	Reduce Security Vulnerability Improve Emergency Preparedness
Environment	Clean Air	Reduce Vehicle Travel
	Climate Protection	Reduce Emissions
Equity	Equitable Access	Improve Affordability
	Livable Communities	

The Metropolitan Transportation Commission (MTC) assessed all projects considered in the plan using the stated performance objectives. The two-part assessments measured benefit/cost using the performance objectives and qualitatively assessed whether the projects reflect the plan's goals and "E" principles. In addition, MTC evaluated three robust, financially unconstrained infrastructure packages to see how close they could get to achieving the regional performance objectives. **Exhibit 9** shows one of a series of



graphs the MTC developed to compare the trend, plan, and objective using the performance objectives.

MTC uses a Freeway Performance Initiative (FPI) to address both recurrent congestion from daily peak hour traffic and non-recurrent congestion. This innovative approach uses technology to determine the highway's capacity and identify gaps that need to be filled. The key elements of the FPI include a Traffic Operations System (TOS), ramp metering, routine maintenance, arterial management, and performance monitoring. This is another example of how the plan stresses the importance of quantifying results to ensure transportation strategies are working.

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TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.4

Transportation and Public Health

Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Steve White, Oregon Public Health Institute

cc: Larry Conrad, Clackamas County

The following summarizes the primary ways in which transportation systems impact public health. A companion white paper will provide an overview of recommended strategies for addressing these primary issues and maximizing a transportation system's ability to improve community health.

OVERVIEW

Existing transportation systems in the US have been shaped by multiple policy inputs and decisions provided by planners, funding agencies and others at local, state, and national levels that have focused largely on building a system designed to move people and goods efficiently. An increasingly large body of research now shows that transportation decisions also directly and indirectly impact human health in multiple ways by influencing a wide range of physical, social, and environmental factors. According to the American Public health Association, "[f]ifty percent of the leading causes of death and illness in the United States—traffic injuries, heart disease, cancer, diabetes, and respiratory illness—are preventable" because "[t]hese diseases have several risk factors that can be mitigated by transportation policies."[i]

Much of this research has also highlighted the fact that the benefits and burdens of transportation decisions has fallen unequally on different sub-groups within a community. In particular, the negative health impacts stemming from transportation systems (discussed in greater detail below) have disproportionately fallen on low income and minority groups, as well as others who lack access to cars or the resources to choose where they live. As a result, many transportation decisions to date have often inadvertently supported or exacerbated health inequities. Health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other

health outcomes. For the public health sector, addressing equity means prioritizing the elimination of health inequities by addressing the root causes of inequity and related health outcomes.

As a result of the increasing awareness of the connections between transportation systems, health, and equity, more and more planners and policy-makers recognize transportation system plans as providing an opportunity not just to improve mobility, but also to improve the health and well-being of all the members of the communities they are designed to serve. An increasing number of state, regional, and local transportation plans are acknowledging these connections by including goals that mention both health and equity. Locally, this trend is evident in the inclusion of health and equity goals in Metro's Regional Transportation Plan and in the Draft Transportation Goals for Clackamas County. Other local jurisdictions, including the cities of Portland and Gresham, are working on including similar goals into their comprehensive plan and transportation system plan updates.

In order to help policy makers and planners develop a transportation system plan that matches these goals, this white paper provides a summary of the primary ways that researchers have identified transportation systems as impacting health and equity. A companion white paper will then provide an overview of possible strategies for addressing these issues in a transportation system plan.

TRANSPORTATION SYSTEMS AND HEALTH

There are five primary ways in which transportation system plans can directly and indirectly improve health and equity. They can:

- Reduce crash-related injuries and fatalities for bicyclists and pedestrians, as well as for motor vehicles
- Increase opportunities physical activity
- Decrease exposure to air pollutants
- Improve access to a wide variety of health supportive resources such as healthy food retail, employment, affordable housing, and parks and recreation facilities
- Reduce health inequities

The remainder of this paper will look at each of these issues in turn, identifying the related health issues and summarizing why they are priority issues for the public health sector.

Bicycle and Pedestrian Injuries and Fatalities

Traffic injuries and fatalities, including those involving bicyclists and pedestrians as well as motor vehicles, are the leading cause of death for Americans ages 5-34, and are among the top ten causes of death for Americans of all ages. When measured in terms of years of life lost, crashes rank third, trailing only cancer and heart disease, and cost Americans $99 billion annually in lost work and medical costs.[ii]

While crashes involving only motor vehicles remain a central concern, however, the public health profession, both locally and nationally, has recently been placing particular emphasis on addressing bicycle and pedestrian safety issues, and has been awarding grant funds to state and local health departments to work with transportation planners on strategies for making these modes safer and more attractive.

There are three main reasons that public health professionals are now particularly interested in addressing bicycle and pedestrian safety. First, recent research indicates that bicycling and walking have become less safe than driving. While the rate of motor vehicle crash fatalities not involving bicycles and pedestrians has dropped considerably over the past few decades—due to advances in right-of-way design, improved motor vehicle and transportation system technology, and changes in driver behavior—the rate of pedestrian and bicyclist fatalities has declined only about half as fast. Between 2000 and 2009, pedestrian fatalities decreased 14 percent compared to a 27 percent decrease for motor vehicle occupants.[iii] Over a similar period, 1998-2009, bicyclist fatalities declined 17 percent. As a result of these lower reduction rates, bicyclists and pedestrians now account for a disproportionate share of traffic fatalities when measured on a per trip basis. Whereas pedestrians accounted for 10 percent of trips taken in 2009, they accounted for 12 percent of fatalities, and bicyclists accounted for about 1 percent of trips taken, but about 2 percent of traffic fatalities.[iv] While there are many reasons for these differences, two reasons are that relatively few resources have been devoted to improving safety for bicycling and walking, and that transportation policies have not typically prioritized addressing safety issues for these two modes. The public health sector is interested in addressing this imbalance by calling attention to the public health benefits of safe walking and biking conditions.

Second, data on pedestrian crashes indicate that youth, seniors, low income and minority individuals suffer higher rates of injuries and deaths while walking, largely because these groups are less likely to own cars and more likely to rely on walking to meet their daily transportation needs.[v] As a result, pedestrian safety is an equity issue because the health of certain vulnerable populations is being adversely affected by the relative danger of walking.

Third, as will be discussed in more detail below, bicycling and walking are forms of physical activity, and most Americans currently get only a fraction of their recommended daily levels of physical activity, thus putting themselves at increased risk of numerous chronic diseases such as heart disease, diabetes, and stroke. Research has clearly demonstrated that communities with higher walking and biking rates are generally healthier than others. In order to encourage more people to walk and bike, public health professionals and their funders are focusing on removing barriers to walking and biking such as safety concerns.

Opportunities for Physical Activity

In a recent study that ranked the leading preventable causes of death in the United States[vi], physical inactivity ranked 5th on the list, and was estimated to have been responsible for 191,000 premature

deaths in 2005. A primary reason that physical inactivity has such a large impact is that fact it is a significant risk factor for numerous chronic diseases and other negative health outcomes. Our understanding of the relationships between physical activity and health has steadily improved since the early 1990s when researchers began expanding the focus of their work from assessing the impacts of intensive vigorous exercise to include a wider range of low or moderate intensity physical activities. In 1996, the US Surgeon General released its first report on physical activity and health which concluded that moderate physical activity—defined as activities that use large muscle groups and include walking and biking for transport—can substantially reduce the risk of developing or dying from coronary heart disease, colon cancer, high blood pressure, and diabetes.

Since the Surgeon General's report was issued, research has built on its conclusions and has also more conclusively demonstrated that for people who are inactive, even small increases in physical activity can yield numerous measurable health benefits. In addition, physical activity has been demonstrated to improve mental health, educational attainment, and, for people with joint or bone problems, improve muscle function, cardiovascular function, and physical performance. Finally, types of physical activity that bring people into contact with each other, including walking about one's neighborhood, have also been demonstrated to improve mental health and social cohesion. High levels of social cohesion can contribute to improved health outcomes by enabling the dissemination of health-related information such as care options, establishing, maintaining, and promoting social norms and practices associated with healthful behaviors.

Exposure to Air Toxics

Combustion engines produce many different types of outdoor air pollutants that are either known or strongly suspected to negatively impact human health in a wide variety of ways. In general, the adverse health effects of long-term exposure can include:

- Accelerated aging of the lungs and loss of lung capacity
- Decreased lung function
- Development of diseases such as asthma, bronchitis, emphysema and possibly cancer
- Shortened life span

These health issues have been known for quite a while. They served as the basis for the Federal Clean Air Act in 1970, and have helped spur advancements in fuel and engine technology that have effectively reduced the number and amount of toxics produced by combustion engines. However, the issue remains a primary area of concern for three main reasons. First, America's overall levels of vehicle use continue to increase, and are anticipated to eventually cancel out gains in pollution reduction achieved by current technological solutions. Second, increasingly sophisticated monitoring and modeling efforts are more clearly demonstrating the highly localized geographic dimensions of motor vehicle-related pollutant dispersion within cities and regions. While average ambient concentration levels of many pollutants have gone down in many such areas, neighborhoods close to

high-traffic roadways often still greatly exceed health-based benchmarks. This increased awareness has helped shift the public health focus on transportation pollutants from lowering ambient concentrations of pollutants to lowering exposure levels to pollutants, an issue that has received relatively little attention within the context of transportation planning.

Finally, respiratory health data raises equity concerns because low income and minority groups are more susceptible to severe health problems from transportation-related air pollutants in part because they are more likely to suffer from pre-existing cardiac or respiratory problems such as heart disease, asthma, or emphysema, but also because these groups are often more likely to live near high-traffic roadways. These equity concerns, along with the challenge of addressing highly variable localized exposure levels, have kept exposure to traffic-related air pollutants a primary concern for the public health sector.

Access to Health Supportive Resources

Good health requires access to resources such as healthy food retail, healthcare, employment, education, parks and recreation facilities, publicly accessible gathering spaces, and social services. Research has shown that a person's ability to conveniently access each of these resources can influence their health:

- Access to **healthy food** has been linked with rates of obesity and type-2 diabetes.
- **Clinical healthcare** access has been linked with a wide variety of health outcomes, and has been identified as a primary driver of health disparities between different socio-economic groups in America.
- **Employment** is the primary source of income for most people, and income levels are correlated with a wide variety of health outcomes, in large part because it determines a person's ability to access health-supportive resources. In addition, lower income levels contribute to higher levels of psychological stress that undermines physical health. Frequent or continuous exposure to stress can result in adverse effects on cardiovascular and immune systems leading to heart disease, diabetes, high blood pressure, strokes, depression, infections, and premature death. The stress and lack of opportunity associated with lower income levels also lead to the increased likelihood of engaging in unhealthful behaviors such as smoking, crime, substance abuse, and physical abuse.
- **Education** impacts health primarily through its influence on a person's income levels. In addition, education can impact health by providing access to information and by allowing a person the opportunity to develop cognitive skills useful for identifying, avoiding and/or changing unhealthful or risky behaviors. Schools also offer opportunities for social engagement. Social engagement influences social cohesion which can contribute to improved health outcomes by enabling the dissemination of health-related information about healthcare options and healthful behaviors, and by reinforcing social norms and practices associated with healthful behaviors

- **Parks, trails, and recreation facilities** offer opportunities for physical activity and social engagement with attendant health benefits. Access to greenspace has also been correlated with mental health benefits.
- Publicly accessible **gathering spaces**, including public spaces such as libraries, parks, plazas, schools, and community centers, as well as private spaces such as restaurants and neighborhood retail establishments that facilitate chance encounters with other community members, can increase social engagement and social cohesion.
- **Social services** encompass a broad set of services which directly and indirectly address numerous physical and mental health issues. Such services include helping people cope with issues stemming from aging, disability, substance abuse, domestic violence, social isolation, poverty, and mental illness. These services can be provided by both public and private sector organizations.

A person's ability to access such resources is influenced by a variety of factors including a resource's location and cost, as well as the transportation infrastructure and travel options that a person has access to. Numerous studies have demonstrated that, because of the auto-oriented nature of most transportation systems, people without access to cars often have more difficulty accessing health-supportive resources and suffer poorer health as a result. Where additional options such as transit, walking, and biking are present, safe, and convenient, people are more able and likely to access such resources and less likely to be in poor health. As with the other health issues discussed in this paper, the fact that low-income and minority households are less likely to own cars and less likely to live in areas with good transportation options, access to health-supportive resources raises equity concerns that have helped make it a public health priority.

Reduce Health Inequities

As noted in the Overview, health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other health outcomes. In Oregon, research shows that economically disadvantaged individuals have higher rates of most chronic diseases with risk factors related to transportation including, heart disease, diabetes, obesity, and high blood pressure. In addition, American Indians have elevated rates of asthma, heart disease, diabetes, obesity, and high blood pressure; African Americans have higher rates of diabetes, obesity, and high blood pressure; and Latinos have higher rates of obesity and diabetes. Also, members of all of these groups, except Latinos, are more likely than the general population to suffer heart attacks or strokes.[vii,viii]

All of these health outcomes have multiple causes, many of which have been traced to components of the social and natural environments in which people live, work, and play. Different environments contain different health risks and produce different health outcomes. In general, groups that have traditionally lacked economic and political resources, particularly low-income and minority groups have ended up living and working in environments that increase their risk for poor health outcomes

and help explain the disparities in the rates of chronic diseases among different socio-economic groups. As discussed above, transportation systems impact multiple risk factors for multiple health outcomes, and have, like other components of the social environment, tended to adversely impact the health of disadvantaged populations. As a result, transportation systems have helped exacerbate health inequities, but also offer the promise of reducing these inequities.

Because of the enduring and unjust nature of these inequities and because transportation system plans can address many of the risk factors associated with these health outcomes, including those discussed above, the public health sector has placed increasing focus on eliminating the causes of these inequities, including working with transportation planners to develop systems that improve transportation options for disadvantaged populations and reduce these groups' exposure to transportation-related health hazards.

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CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.5

Transportation Planning Strategies for Improving Health and Equity

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Date: October 5, 2011 Project #: 11732.5

To: Karen Buehrig, Clackamas County

From: Steve White, Oregon Public Health Institute

cc: Larry Conrad, Clackamas County

The following provides an overview of recommended strategies for maximizing a transportation system's ability to improve community health. A companion white paper describes in more detail the primary ways in which transportation systems impact health and what the associated health outcomes are.

Overview

Existing transportation systems in the US have been shaped by multiple policy inputs and decisions provided by planners, funding agencies and others at local, state, and national levels that have focused largely on building a system designed to move people and goods efficiently. An increasingly large body of research now shows that transportation decisions also directly and indirectly impact human health in multiple ways by influencing a wide range of physical, social, and environmental factors. According to the American Public health Association, "[f]ifty percent of the leading causes of death and illness in the United States—traffic injuries, heart disease, cancer, diabetes, and respiratory illness—are preventable" because "[t]hese diseases have several risk factors that can be mitigated by transportation policies."[i]

Much of this research has also highlighted the fact that the benefits and burdens of transportation decisions has fallen unequally on different sub-groups within a community. In particular, the

negative health impacts stemming from transportation systems have disproportionately fallen on low income and minority groups, as well as others who lack access to cars or the resources to choose where they live. As a result, many transportation decisions to date have often inadvertently supported or exacerbated health inequities. Health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other health outcomes. For the public health sector, addressing equity means prioritizing the elimination of health inequities by addressing the root causes of inequity and related health outcomes.

As a result of the increasing awareness of the connections between transportation systems, health, and equity, more and more planners and policy-makers recognize transportation system plans as providing an opportunity not just to improve mobility, but also to improve the health and well-being of all the members of the communities they are designed to serve. An increasing number of state, regional, and local transportation plans are acknowledging these connections by including goals that mention both health and equity. Locally, this trend is evident in the inclusion of health and equity goals in Metro's Regional Transportation Plan and in the Draft Transportation Goals for Clackamas County. Other local jurisdictions, including the cities of Portland and Gresham, are working on including similar goals into their comprehensive plan and transportation system plan updates.

In order to help policy makers and planners develop a transportation system plan that matches these goals, this white paper provides an overview of possible strategies for addressing these issues in a transportation system plan. A companion white paper also provides a summary of the primary ways that researchers have identified transportation systems as impacting health and equity.

Transportation Planning Strategies for Improving Health and Equity

There are five primary ways in which transportation system plans can directly and indirectly improve health and equity. They can:

- Reduce crash-related injuries and fatalities for bicyclists and pedestrians, as well as for motor vehicles
- Increase opportunities physical activity
- Decrease exposure to air pollutants
- Improve access to a wide variety of health supportive resources such as healthy food retail, employment, affordable housing, and parks and recreation facilities
- Reduce health inequities

The remainder of this paper will look at each of these issues in turn, summarizing strategies that public health and transportation experts have proposed for addressing them.

BICYCLE AND PEDESTRIAN INJURIES AND FATALITIES[1]

Bicycle and pedestrian injuries and fatalities are primarily the result of bicyclists and pedestrians being struck by motor vehicles. There are four main strategies for minimizing the likelihood and severity of such crashes.

1. Plan for and develop well-connected networks of bicycle and pedestrian infrastructure

Infrastructure intentionally designed for bicyclists and pedestrians can contribute to lower traffic crash and injury rates for bicyclists and pedestrians in two ways. First, it can reduce opportunities for collisions, either through the provision of separate facilities for different modes, or through improved coordination of shared spaces such as crosswalks. Second, if well-connected and well-designed, it can encourage higher rates of walking and biking which have been correlated with lower crash rates for both modes. Although increased bicycle and pedestrian activity would increase people's exposure to motor vehicle accidents, numerous studies have shown that increased numbers of cyclists and pedestrians actually produce lower rates of accidents with motor vehicles as cyclists, pedestrians, and drivers grow more accustomed to regularly interacting with each other in public rights-of-way.[ii]

2. Slow traffic down

Infrastructure designed to slow vehicular traffic has been shown reduce the severity of pedestrian and bicycle injuries resulting from crashes. When struck at speeds less than 20 mph, bicyclists and pedestrians are much less likely to die and less likely to suffer from permanent disabilities.[iii]

3. Support bicycling and pedestrian encouragement and education programs such as Safe Routes to School

By pairing encouragement and education efforts with enforcement and engineering improvements, the national Safe Routes to School program has provided a travel demand management program

[1] Transportation planners and engineers have been successfully improving safety for motor vehicle users for years. While motor vehicle-only crash rates remain a primary public health concern, this section addresses only bicycle and pedestrian safety because of their relative neglect by safety researchers and engineers.

model that has proven successful in increasing bicycling and pedestrian rates. As previously noted, increased rates of walking and biking typically lead to reduced rates of crashes for people who choose these modes.

4. **Establish performance-based benchmarks and goals, and collect necessary data for evaluating progress**

Measurable goals such as specific reductions in crash rates for all modes or miles of bicycle and pedestrian infrastructure built can help ensure that specific system plan elements and actions are improving crash safety for bicyclists and pedestrians, and identify where changes or additional improvements might be necessary. Possible metrics include mode splits, miles of infrastructure built, mode-specific crash rates, average speed limits, and participation levels in bicycle and pedestrian travel demand management programs.

OPPORTUNITIES FOR PHYSICAL ACTIVITY

Because of the increasing awareness of the importance of physical activity for reducing multiple health risks, and because of the ability of walking and biking to significantly increase physical activity levels, an increasing body of research has examined features of the built environment that encourage and support these activities. In addition to the four recommended strategies for improving bicycle and pedestrian safety listed above, the following transportation planning strategies are likely to improve bicycle and pedestrian rates and increase other opportunities for physical activity.

1. **Prioritize bicycle and pedestrian infrastructure networks that serve heavily used destinations such as schools, retail and employment centers, parks, transit centers, and relatively dense residential neighborhoods.**

Neighborhoods with well-connected bicycle and pedestrian infrastructure and attractive destinations typically have higher walking and biking rates than neighborhoods without these features. When transportation options for popular destinations are provided, some people will use them and get some physical exercise as a result. In addition, certain destinations such as parks and schools often offer additional opportunities for getting physical activity. Improving access to such places by increasing transportation options can also help boost physical activity levels in a community, particularly for people without access to cars such as low-income individuals, youth, and seniors.

2. **Design for transit**

Recent research has demonstrated that walking to and from transit provides a significant amount of physical activity. According to a recent analysis of the 2001 National Household Travel Survey 29% of all transit users got all of their recommended daily physical activity (≥ 30 minutes/weekday) solely by walking to and from transit, and the median amount of time spent walking for all transit users was 19 minutes. The median amount of time that non-transit users spend exercising is six minutes.[iv] Transit-specific infrastructure can help increase the level of service provided by transit agencies, and thus attract more riders.

3. **Coordinate transportation plans with land use plans to maximize the potential for people to reach their daily destinations by bike and foot.**

Communities with a mix of nearby uses typically have higher rates of walking and biking. While appropriate transportation infrastructure can facilitate this, it is also necessary to have zoning policies that encourage mixed uses and discourage excessive separation of uses such as residential and retail.

4. **Work with local public health agencies to collect data useful for assessing trends in physical activity levels, as well as active transportation's contributions to these trends**

Not only would such data be useful for determining a transportation systems plan's ability to improve public health, but it would also help strengthen applications for competitive funds that are targeted towards addressing public health through transportation planning, policies, and projects, and thus increase the potential for building additional bicycle, pedestrian, and transit infrastructure.

EXPOSURE TO AIR TOXICS

There are three main variables that help determine the impact of air pollutants on health: the types of pollutants present in the air, the concentrations levels of the particular pollutants, and the amount of time people are exposed to particular pollutants. Transportation planning impacts all three variables. Freight routes produce higher levels of pollutants produced by diesel engines; overall levels of vehicle use impact ambient levels of pollutants; the location of high traffic routes determines where pollutants are concentrated as well as who and now many people are exposed to them; and the location of walking and biking networks determines how many bicyclists and pedestrians are exposed to the concentrated pollutants associated with high-traffic roadways.

1. **Coordinate transportation and land use plans to minimize the proximity of high traffic roadways, particularly freight routes, to residential areas and land uses that serve vulnerable populations such as schools and retirement centers**

Recent research has demonstrated that areas near high traffic roadways—usually defined as areas within 300 meters of roads with more than 20,000 vehicles per day—have highly elevated levels of transportation-related air pollutants. Minimizing the number of people who live near such roads will lower the number of people who are exposed to elevated concentrations.

2. **Reduce overall automobile use by facilitating the use of other modes**

Overall vehicle use, or vehicle miles travelled (VMT), determines the ambient concentration levels of air pollutants that all members of a community are exposed to. Developing a transportation system that facilitates replacing driving trips with walking or biking can help reduce VMT.

3. **Develop bicycle and pedestrian networks that don't require travel on high traffic roadways**

In order to ensure that the health benefits of walking and biking aren't offset by increased exposure to high levels of transportation related air pollutants, bicycle and pedestrian networks should facilitate travel on low traffic roads.

4. **Design high traffic rights-of-way to accommodate vegetative buffers**

Trees and shrubs can filter out air pollutants, thus reducing the amount of pollutants that spread out from high traffic roadways.

ACCESS TO HEALTH SUPPORTIVE RESOURCES

Good health requires access to resources such as healthy food retail, healthcare, employment, education, parks and recreation facilities, publicly accessible gathering spaces, and social services. Research has shown that a person's ability to conveniently access each of these resources can influence their health. A person's ability to access such resources is influenced by a variety of factors including a resource's location and cost, as well as the transportation infrastructure and travel options that a person has access to.

1. **Coordinate land use and transportation planning to ensure that health supportive resources are served by multiple transportation options**

Numerous studies have demonstrated that, because of the auto-oriented nature of most transportation systems, people without access to cars often have more difficulty accessing health-supportive resources and suffer poorer health as a result. Where additional options such as transit, walking, and biking are present, safe, and convenient, people are more able and likely to access such resources and less likely to be in poor health.

REDUCE HEALTH INEQUITIES

Health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other health outcomes. In general, groups that have traditionally lacked economic and political resources, particularly low-income and minority groups, have experienced poorer health outcomes as result of living and working in environments that contain a disproportionate amount of health risks. As discussed in the companion white paper, transportation systems impact multiple risk factors for multiple health outcomes, and have, like other components of the social environment, adversely impacted the health of disadvantaged populations. As a result, transportation systems have helped exacerbate health inequities, but also offer the promise of reducing these inequities.

1. **Increase transportation options**

A primary issue facing many members of disadvantaged populations is the lack of vehicle ownership. Since most transportation systems were designed primarily for automobile use, not owning a car has meant restricted access to health supportive resources and increased exposure to unsafe conditions when travelling by bike or foot. Increased transportation options can help make travel by foot, bike, and transit more viable, safe, and attractive.

2. **Ensure participation of under-represented communities in transportation decision-making processes**

Participating in decision-making processes can help members of traditionally under-represented communities such as racial and ethnic groups ensure that transportation decisions benefit their constituents.

3. Collect data to ensure that transportation decisions are benefitting all communities

Tracking where investments are made and who benefits from particular investments or decisions can help ensure that the benefits of transportation decisions are being distributed equitably.

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Federal-Aid Highway Systems 1997

FEDERAL-AID POLICY GUIDE December 19, 1997, 23 CFR 470A

Transmittal 20 OPI: HEP-11

SUBCHAPTER E - PLANNING

PART 470 - HIGHWAY SYSTEMS

Subpart A - Federal-Aid Highway Systems

Sec.

Authority: 23 U.S.C. 103(b)(2), 103 (e)(1), (e)(2), and (e)(3), 103(f), 134, 135, and 315; and 49 CFR 1.48(b)(2).

Source: 63 FR 33351, June 11, 1997, unless otherwise noted.

Sec. 470.101 Purpose.

This part sets forth policies and procedures relating to the identification of Federal-aid highways, the functional classification of roads and streets, the designation of urban area boundaries, and the designation of routes on the Federal-aid highway systems.

Sec. 470.103 Definitions.

(a) Except as otherwise provided in this part, terms defined in 23 U.S.C. 101(a) are used in this part as so defined.

(b) As used herein:

(1) "Consultation" means that one party confers with another identified party and, prior to taking action(s), considers that party's views.

(2) "Cooperation" means that the parties involved in carrying out the planning, programming and management systems processes work together to achieve a common goal or objective.

(3) "Coordination" means the comparison of the transportation plans, programs, and schedules of one agency with related plans, programs, and schedules of other agencies or entities with legal standing, and adjustment of plans, programs, and schedules to achieve general consistency.

(4) "Federal-aid highway systems" means the National Highway System and the Dwight D. Eisenhower National System of Interstate and Defense Highways (the "Interstate System").

(5) "Federal-aid highways" means highways on the Federal-aid highway systems and all other public roads **not classified as local roads or rural minor collectors**.

(6) "Governor" means the chief executive of the State and includes the Mayor of the District of Columbia.

(7) "Metropolitan planning organization" (MPO) means the forum for cooperative transportation decisionmaking for the metropolitan planning area in which the metropolitan transportation planning process required by 23 U.S.C. 134 and 49 U.S.C. 5303-5305 must be carried out.

(8) "Responsible local officials" means (a) In urbanized areas, principal elected officials of general purpose local governments acting through the Metropolitan Planning Organization designated by the Governor, or (b) In rural areas and urban areas not within any urbanized area, principal elected officials of general purpose local governments.

(9) "State" means any one of the fifty States, the District of Columbia, Puerto Rico, or, for purposes of functional classification of highways, the Virgin Islands, American Samoa, Guam, or the Commonwealth of the Northern Marianas.

Sec. 470.105 Urban area boundaries and highway functional classification.

(a) Urban area boundaries. Routes on the Federal-aid highway systems may be designated in both rural and urban areas. Guidance for determining the boundaries of urbanized and nonurbanized urban areas is provided in the "Federal-Aid Policy Guide," [The "Federal - Aid Policy Guide " is available for inspection and copying as prescribed in 49 CFR part 7, Appendix D.] Chapter 4 [G 4063.0], dated December 9, 1991.

(b) Highway Functional Classification. (1) The State transportation agency shall have the primary responsibility for developing and updating a statewide highway functional classification in rural and urban areas to determine functional usage of the existing roads and streets. Guidance criteria and procedures are provided in the FHWA publication "Highway Functional Classification--Concepts, Criteria and Procedures." [This publication, revised in March 1989, is available on request to the FHWA, Office of Environment and Planning, HEP - 10, 400 Seventh Street, SW., Washington, DC 20590. 3] The State shall cooperate with responsible local officials, or appropriate Federal agency in the case of areas under Federal jurisdiction, in developing and updating the functional classification. (2) The results of the functional classification shall be mapped and submitted to the Federal Highway Administration (FHWA) for approval and when approved shall serve as the official record for Federal-aid highways and the basis for designation of the National Highway System.

Sec. 470.107 Federal-aid highway systems.

(a) Interstate System.

(1) The Dwight D. Eisenhower National System of Interstate and Defense Highways (Interstate System) shall consist of routes of highest importance to the Nation, built to the uniform geometric and construction standards of 23 U.S.C. 109(h), which connect, as directly as practicable, the principal metropolitan areas, cities, and industrial centers, including important routes into, through, and around urban areas, serve the national defense and, to the greatest extent possible, connect at suitable border points with routes of continental importance in Canada and Mexico.

(2) The portion of the Interstate System designated under 23 U.S.C. 103 (e)(1), (e)(2), and (e)(3) shall not exceed 69,230 kilometers (43,000 miles). Additional Interstate System segments are permitted under the provisions of 23 U.S.C. 139 (a) and (c) and section 1105(e)(5)(A) of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Pub. L. 102-240, 105 Stat. 1914, as amended.

(b) National Highway System.

(1) The National Highway System shall consist of interconnected urban and rural principal arterials and highways (including toll facilities) which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal

transportation facilities and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. All routes on the Interstate System are a part of the National Highway System.

(2) The National Highway System shall not exceed 286,983 kilometers (178,250 miles).

(3) The National Highway System shall include the Strategic Highway Corridor Network (STRAHNET) and its highway connectors to major military installations, as designated by the Administrator in consultation with appropriate Federal agencies and the States. The STRAHNET includes highways which are important to the United States strategic defense policy and which provide defense access, continuity, and emergency capabilities for the movement of personnel, materials, and equipment in both peace time and war time.

(4) The National Highway System shall include all high priority corridors identified in section 1105(c) of the ISTEA.

Sec. 470.109 System procedures--General.

(a) The State transportation agency, in consultation with responsible local officials, shall have the responsibility for proposing to the Federal Highway Administration all official actions regarding the designation, or revision, of the Federal-aid highway systems.

(b) The routes of the Federal-aid highway systems shall be proposed by coordinated action of the State transportation agencies where the routes involve State-line connections.

(c) The designation of routes on the Federal-aid highway systems shall be in accordance with the planning process required, pursuant to the provisions at 23 U.S.C. 135, and, in urbanized areas, the provisions at 23 U.S.C. 134(a). The State shall cooperate with local and regional officials. In urbanized areas, the local officials shall act through the metropolitan planning organizations designated for such areas under 23 U.S.C. 134.

(d) In areas under Federal jurisdiction, the designation of routes on the Federal-aid highway systems shall be coordinated with the appropriate Federal agency.

Sec. 470.111 Interstate System procedures.

(a) Proposals for system actions on the Interstate System shall include a route description and a statement of justification. Proposals shall also include statements regarding coordination with adjoining States on State-line connections, with responsible local officials, and with officials of areas under Federal jurisdiction.

(b) Proposals for Interstate or future Interstate designation under 23 U.S.C. 139(a) or (b), as logical additions or connections, shall consider the criteria contained in appendix A of this subpart. For designation as a part of the Interstate system, 23 U.S.C. 139(a) requires that a

highway meet all the standards of a highway on the Interstate System, be a logical addition or connection to the Interstate System, and have the affirmative recommendation of the State or States involved. For designation as a future part of the Interstate System, 23 U.S.C. 139(b) requires that a highway be a logical addition or connection to the Interstate System, have the affirmative recommendation of the State or States involved, and have the written agreement of the State or States involved that such highway will be constructed to meet all the standards of a highway on the Interstate System within twelve years of the date of the agreement between the FHWA Administrator and the State or States involved. Such highways must also be on the National Highway System.

(c) Proposals for Interstate designation under 23 U.S.C. 139(c) shall pertain only to Alaska or Puerto Rico. For designation as parts of the Interstate System, 23 U.S.C. 139(c) requires that highway segments be in States which have no Interstate System; be logical components to a system serving the State's principal cities, national defense needs and military installations, and traffic generated by rail, water, and air transportation modes; and have been constructed to the geometric and construction standards adequate for current and probable future traffic demands and the needs of the locality of the segment. Such highways must also be on the National Highway System.

(d) Routes proposed for Interstate designation under section 332(a)(2) of the NHS Designation Act of 1995 (NHS Act) shall be constructed to Interstate standards and connect to the Interstate System. Proposals shall consider the criteria contained in appendix B of this subpart.

(e) Proposals for Interstate route numbering shall be submitted by the State transportation agency to the Route Numbering Committee of the American Association of State Highway and Transportation Officials.

(f) Signing of corridors federally designated as future Interstate routes can follow the criteria contained in appendix C of this subpart. No law, rule, regulation, map, document, or other record of the United States, or of any State or political subdivision thereof, shall refer to any highway under 23 U.S.C. 139, nor shall any such highway be signed or marked, as a highway on the Interstate System until such time as such highway is constructed to the geometric and construction standards for the Interstate System and has been designated as a part of the Interstate System.

Sec. 470.113 National Highway System procedures.

(a) Proposals for system actions on the National Highway System shall include a route description, a statement of justification, and statements of coordination with adjoining States on State-line connections, with responsible local officials, and with officials of areas under Federal jurisdiction.

(b) Proposed modifications to the National Highway System shall enhance the national transportation characteristics of the National Highway System and shall follow the criteria listed

in Sec. 470.107. Proposals shall also consider the criteria contained in appendix D of this subpart.

Sec. 470.115 Approval authority.

(a) The Federal Highway Administrator will approve Federal-aid highway system actions involving the designation, or revision, of routes on the Interstate System, including route numbers, future Interstate routes, and routes on the National Highway System.

(b) The Federal Highway Administrator will approve functional classification actions.

Appendix A

Guidance Criteria for Evaluating Requests for Interstate System Designations Under 23 U.S.C. 139 (a) and (b)

Section 139 (a) and (b), of title 23, U.S.C., permits States to request the designation of National Highway System routes as parts or future parts of the Interstate System. The FHWA Administrator may approve such a request if the route is a logical addition or connection to the Interstate System and has been, or will be, constructed to meet Interstate standards. The following are the general criteria to be used to evaluate 23 U.S.C. 139 requests for Interstate System designations.

1. The proposed route should be of sufficient length to serve long-distance Interstate travel, such as connecting routes between principal metropolitan cities or industrial centers important to national defense and economic development.
2. The proposed route should not duplicate other Interstate routes. It should serve Interstate traffic movement not provided by another Interstate route.
3. The proposed route should directly serve major highway traffic generators. The term "major highway traffic generator" means either an urbanized area with a population over 100,000 or a similar major concentrated land use activity that produces and attracts long-distance Interstate and statewide travel of persons and goods. Typical examples of similar major concentrated land use activities would include a principal industrial complex, government center, military installation, or transportation terminal.
4. The proposed route should connect to the Interstate System at each end, with the exception of Interstate routes that connect with continental routes at an international border, or terminate in a "major highway traffic generator" that is not served by another Interstate route. In the latter case, the terminus of the Interstate route should connect to routes of the National Highway System that will adequately handle the traffic. The proposed route also must be functionally classified as a principal arterial and be a part of the National Highway System system.
5. The proposed route must meet all the current geometric and safety standards criteria as set forth in 23 CFR part 625 for highways on the Interstate System, or a formal agreement to construct the route to such standards within 12 years must be executed between the State(s) and the Federal Highway Administration. Any proposed exceptions to the standards shall be approved at the time of designation.
6. A route being proposed for designation under 23 U.S.C. 139(b) must have an approved final environmental document (including, if required, a 49 U.S.C. 303(c) [Section 4(f)] approval) covering the route and project action must be ready to proceed with design at the time of designation. Routes constructed to Interstate standards are not necessarily logical additions to the Interstate System unless they clearly meet all of the above criteria.

Appendix B

Designation of Segments of Section 332(a)(2) Corridors as Parts of the Interstate System

The following guidance is comparable to current procedures for Interstate System designation requests under 23 U.S.C. 139(a). All Interstate System additions must be approved by the Federal Highway Administrator. The provisions of section 332(a)(2) of the NHS Act have also been incorporated into the ISTEA as section 1105(e)(5)(A).

1. The request must be submitted through the appropriate FHWA Division and Regional Offices to the Associate Administrator for Program Development (HEP-10). Comments and recommendations by the division and regional offices are requested.
2. The State DOT secretary (or equivalent) must request that the route segment be added to the Interstate System. The exact location and termini must be specified. If the route segment involves more than one State, each affected State must submit a separate request.
3. The request must provide information to support findings that the segment (a) is built to Interstate design standards and (b) connects to the existing Interstate System. The segment should be of sufficient length to provide substantial service to the travelling public.
4. The request must also identify and justify any design exceptions for which approval is requested.
5. Proposed Interstate route numbering for the segment must be submitted to FHWA and the American Association of State Highway and Transportation Officials Route Numbering Committee.

Appendix C

Policy for the Signing and Numbering of Future Interstate Corridors Designated by Section 332 of the NHS Designation Act of 1995 or Designated Under 23 U.S.C. 139(b)

Policy

State transportation agencies are permitted to erect informational Interstate signs along a federally designated future Interstate corridor only after the specific route location has been established for the route to be constructed to Interstate design standards.

Conditions

1. The corridor must have been designated a future part of the Interstate System under section 332(a)(2) of the NHS Designation Act of 1995 or 23 U.S.C. 139(b).
2. The specific route location to appropriate termini must have received Federal Highway (FHWA) environmental clearance. Where FHWA environmental clearance is not required or Interstate standards have been met, the route location must have been publicly announced by the State.
3. Numbering of future Interstate route segments must be coordinated with affected States and be approved by the American Association of State Highway and Transportation Officials and the FHWA at Headquarters. Short portions of a multistate corridor may require use of an interim 3-digit number.
4. The State shall coordinate the location and content of signing near the State line with the adjacent State.
5. Signing and other identification of a future Interstate route segment must not indicate, nor imply, that the route is on the Interstate System.
6. The FHWA Regional Office must confirm in advance that the above conditions have been met and approve the general locations of signs.

Sign Details

1. Signs may not be used to give directions and should be away from directional signs, particularly at interchanges.
2. An Interstate shield may be located on a green informational sign of a few words. For example: Future Interstate Corridor or Future I-00 Corridor.
3. The Interstate shield may not include the word "Interstate."
4. The FHWA Division Office must approve the signs as to design, wording, and detailed location.

Appendix D

Guidance Criteria for Evaluating Requests for Modifications to the National Highway System

Section 103(b), of title 23, U.S.C., allows the States to propose modifications to the National Highway System (NHS) and authorizes the Secretary to approve such modifications provided that they meet the criteria established for the NHS and enhance the characteristics of the NHS. In proposing modifications under 23 U.S.C. 103(b), the States must cooperate with local and regional officials. In urbanized areas, the local officials must act through the metropolitan planning organization (MPO) designated for such areas under 23 U.S.C. 134. The following guidance criteria should be used by the States to develop proposed modifications to the NHS.

1. Proposed additions to the NHS should be included in either an adopted State or metropolitan transportation plan or program.
2. Proposed additions should connect at each end with other routes on the NHS or serve a major traffic generator.
3. Proposals should be developed in consultation with local and regional officials.
4. Proposals to add routes to the NHS should include information on the type of traffic served (i.e., percent of trucks, average trip length, local, commuter, interregional, interstate) by the route, the population centers or major traffic generators served by the route, and how this service compares with existing NHS routes.
5. Proposals should include information on existing and anticipated needs and any planned improvements to the route.
6. Proposals should include information concerning the possible effects of adding or deleting a route to or from the NHS might have on other existing NHS routes that are in close proximity.
7. Proposals to add routes to the NHS should include an assessment of whether modifications (adjustments or deletions) to existing NHS routes, which provide similar service, may be appropriate.
8. Proposed modifications that might affect adjoining States should be developed in cooperation with those States.
9. Proposed modifications consisting of connections to major intermodal facilities should be developed using the criteria set forth below. These criteria were used for identifying initial NHS connections to major intermodal terminals. The primary criteria are based on annual passenger volumes, annual freight volumes, or daily vehicular traffic on one or more principal routes that serve the intermodal facility. The secondary criteria include factors which underscore the importance of an intermodal facility within a specific State.

<u>Primary Criteria</u>

<u>Commercial Aviation Airports</u>

1. Passengers--scheduled commercial service with more than 250,000 annual enplanements.
2. Cargo--100 trucks per day in each direction on the principal connecting route, or 100,000 tons per year arriving or departing by highway mode.

Ports

1. Terminals that handle more than 50,000 TEUs (a volumetric measure of containerized cargo which stands for twenty-foot equivalent units) per year, or other units measured that would convert to more than 100 trucks per day in each direction. (Trucks are defined as large single-unit trucks or combination vehicles handling freight.)
2. Bulk commodity terminals that handle more than 500,000 tons per year by highway or 100 trucks per day in each direction on the principal connecting route. (If no individual terminal handles this amount of freight, but a cluster of terminals in close proximity to each other does, then the cluster of terminals could be considered in meeting the criteria. In such cases, the connecting route might terminate at a point where the traffic to several terminals begins to separate.)
3. Passengers--terminals that handle more than 250,000 passengers per year or 1,000 passengers per day for at least 90 days during the year.

Truck/Rail

1. 50,000 TEUs per year, or 100 trucks per day, in each direction on the principal connecting route, or other units measured that would convert to more than 100 trucks per day in each direction. (Trucks are defined as large single-unit trucks or combination vehicles carrying freight.)

Pipelines

1. 100 trucks per day in each direction on the principal connecting route.

Amtrak

1. 100,000 passengers per year (entrainments and detrainments). Joint Amtrak, intercity bus and public transit terminals should be considered based on the combined passenger volumes. Likewise, two or more separate facilities in close proximity should be considered based on combined passenger volumes.

Intercity Bus

1. 100,000 passengers per year (boardings and deboardings).

Public Transit

1. Stations with park and ride lots with more than 500 vehicle parking spaces, or 5,000 daily bus or rail passengers, with significant highway access (i.e., a high percentage of the passengers arrive by cars and buses using a route that connects to another NHS route), or a major hub terminal that provides for the transfer of passengers among several bus routes. (These hubs should have a significant number of buses using a principal route connecting with the NHS.)

Ferries

1. Interstate/international--1,000 passengers per day for at least 90 days during the year. (A ferry which connects two terminals within the same metropolitan area should be considered as local, not interstate.)
2. Local--see public transit criteria above.

Secondary Criteria

Any of the following criteria could be used to justify an NHS connection to an intermodal terminal where there is a significant highway interface:

1. Intermodal terminals that handle more than 20 percent of passenger or freight volumes by mode within a State;
2. Intermodal terminals identified either in the Intermodal Management System or the State and metropolitan transportation plans as a major facility;
3. Significant investment in, or expansion of, an intermodal terminal; or
4. Connecting routes targeted by the State, MPO, or others for investment to address an existing, or anticipated, deficiency as a result of increased traffic.

Proximate Connections

Intermodal terminals, identified under the secondary criteria noted above, may not have sufficient highway traffic volumes to justify an NHS connection to the terminal. States and MPOs should fully consider whether a direct connection should be identified for such terminals, or whether being in the proximity (2 to 3 miles) of an NHS route is sufficient.

FHWA

Highway Functional Classification Concepts, Criteria and Procedures 2012 Edition

DRAFT

U.S. Department of Transportation
Federal Highway Administration

December 2012

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SECTION 1. INTRODUCTION

The *Highway Functional Classification: Concepts, Criteria and Procedures, 2012 Edition*, describes the procedures and processes for assigning functional classifications to roadways and adjusting urban area boundaries. This document builds upon and modifies prior guidance documents.

Our nation's roadway system is a vast network that connects places and people within and across national borders. Planners and engineers have developed elements of this network with particular travel objectives in mind. These objectives range from serving long-distance passenger and freight needs to serving neighborhood travel from residential developments to nearby shopping centers. The functional classification of roadways defines the role each element of the roadway network plays in serving these travel needs.

Over the years, functional classification has come to assume additional significance beyond its purpose as a framework for identifying the particular role of a roadway in moving vehicles through a network of highways. Functional classification carries with it expectations about roadway design, including its speed, capacity and relationship to existing and future land use development. Transportation agencies describe roadway system performance, benchmarks and targets by functional classification. As agencies continue to move towards a more performance-based management approach, functional classification will be an increasingly important consideration in setting expectations and measuring outcomes for preservation, mobility and safety. Additionally, MAP-21 continues to use functional classification in determining eligibility for funding under the Federal-aid program.

As a result of the decennial census, the US Census Bureau issues urban area boundary maps. Transportation agencies must review these census boundaries and either accept them as is or adjust them for transportation planning purposes.

This guidance document provides recommended practices for assigning functional classifications and adjusting urban area boundaries concerning roadways that Federal, State and local transportation entities own and operate. Assigning functional classifications and adjusting urban area boundaries requires work elements common to many large-scale business enterprises: there are technical methods and tools to create an efficient and cost-effective end product; there are also procedural elements that require coordination and negotiation across agencies and individuals. This guidance document encompasses both of these elements.

This guidance document also recognizes and describes the implications of how our roadway systems are configured, used and planned for today:

- The Federal-aid system has matured significantly. A significant proportion of new functional classification designations are likely to occur from improvements and modifications to existing roads and corridors, rather than from designations on new roadways and corridors.

- In conducting functional classification updates, State departments of transportation (DOTs) strive for consensus with potentially dozens of agencies, including metropolitan and rural planning agencies, local officials and FHWA division offices.
- Geospatial technologies and travel demand forecasting capabilities have advanced significantly, greatly lowering the cost of data storage and increasing analysis capabilities.
- Planners and engineers have expanded roadway design options significantly, especially in areas where providing for non-motorized travel is a priority. Transportation agencies have developed their own classification terms to describe these options.

1.1 Prior Guidance

This guidance document builds upon and updates the two most recent guidance documents circulated by FHWA, namely:

- Highway Functional Classification: Concepts, Criteria and Procedures, March 1989
- Updated Guidance for the Functional Classification of Highways Memorandum, October 14, 2008[1]

The majority of the concepts presented in the Highway Functional Classification document still hold true within this 2012 guidance document. However, it also incorporates changes specified in the *Updated Guidance for the Functional Classification of Highway Memorandum*. To summarize, the following changes took effect with the issuance of the 2008 memorandum:

1. While the original 1989 guidance document recommended "changing the functional classification when rural routes cross an urban boundary", a follow-up addendum in 1991 said, "Instead of automatically upgrading the functional classification of a rural route that crosses an urban boundary, the rural classification may be continued inside the urban boundary until there is a more logical and acceptable place for a change at a point inside the urban boundary." This 2012 guidance document reinforces the assertion of the 2008 memorandum which states that, "the practice of automatically upgrading the functional classification of a rural route that crosses an urban boundary should be phased out and eliminated. Upgrading the functional classification due to an actual change in function should be the operative criteria, rather than the location of the urban/rural boundary."
2. The original 1989 guidance document specified different functional classification categories within urban and rural areas. This 2012 guidance document carries forward the removal of these differences in the Highway Performance Monitoring System (HPMS) code values between urban and rural while still offering separate urban and rural guidance for determining which classification is appropriate. All functional classification categories will now exist in both urban and rural areas.

[1] http://www.fhwa.dot.gov/policy/ohpi/hpms/fchguidance.cfm

Specifically, all Principal Arterial sub-categories and all Collector sub-categories will be recognized in both urban and rural forms. The following revised functional classification categories should be used:

a. Principal Arterial
    i. Interstate
    ii. Other Freeways & Expressways (OF&E) (**Figure 1-1**)
    iii. Other (OPA)
b. Minor Arterial
c. Collector
    i. Major Collector
    ii. Minor Collector
d. Local

3. The October 2008 memorandum notes that the separation of rural and urban designations will create a need to update the guidance concerning the proportion of total centerline mileage and vehicle miles of travel (VMT) within which each functional class should fall. This 2012 guidance document provides updated guidance regarding the recommend distribution of both the extent and usage of the roadway network by functional classification categories.

Figure 1-1: Principal Arterial - Other Freeways & Expressways

Source: CDM Smith

4. This 2012 guidance document echoes the direction of the October 2008 memorandum by recommending that States assign functional classification according to how the roadway is functioning in the current year only. This will markedly improve the consistency of reporting across all States. With regard to future routes, roads should be functionally classified with the existing system if they are included in an approved Statewide Transportation Improvement Program (STIP) and are expected to be under construction within the STIP timeframe of 4 years or less. Where applicable, the same classification should be given to both the future route and the existing route it replaces until the future route is constructed. Mileage for any "future route" will not be included in public road miles or vehicle-miles traveled statistics for apportionment purposes until it is built and open to traffic.

Roadways that fall into the Principal Arterials-Other Freeways & Expressways category are limited-access roadways that serve travel in a similar way to the Interstates.

5. The October 2008 memorandum states that ramps and other non-mainline roadways are to be assigned the same functional classification as the highest functional classification among the connecting mainline roadways served by the ramp. (**Figure 1-2**)

Figure 1-2: HOV Lane on Interstate 95 in Woodbridge, VA

Source: www.roadstothefuture.com

6. Principal Arterial roadways (**Figure 1-3**) serve a large percentage of travel between cities and other activity centers, especially when minimizing travel time and distance is important. For this reason, Arterials typically are roadways with high traffic volumes and are frequently the route of choice for intercity buses and trucks. The spacing of Arterials in urban areas is closely related to the trip-end density characteristics of activity centers in urban areas. The spacing of these facilities (in larger urban areas) may vary from less than 1 mile in highly developed central business areas to 5 miles or more in the sparsely developed urban fringes.

Transportation agencies apply a variety of treatments to preserve mobility and increase the person throughput of Urban Arterials, including ramp metering, high-occupancy-vehicle (HOV) lanes and high-occupancy toll lanes.

Figure 1-3: Other Principal Arterial in California

Source: Wikipedia

Principal Arterials play a unique role in providing a high degree of mobility and carrying a high proportion of travel for long distance trips. These facilities carry the major portion of trips entering and leaving an activity center, as well as the majority of through movements that either go directly through or bypass the area.

SECTION 2. CONCEPTS

2.1 Introduction

This section of the guidance document presents the concepts underlying the functional classification of roadways. It first introduces the two primary transportation functions of roadways, namely mobility and access, and describes where different categories of roadways fall within a continuum of mobility-access. In addition to mobility and access, other factors that can help determine the proper category to which a particular roadway belongs — such as trip length, speed limit, volume, and vehicle mix — are discussed in this section.

While Arterials, Collectors and Locals span the full range of roadway functions, the Federal functional classification scheme uses additional classification categories to describe these functions more precisely. Distinctions between access- controlled and full-access roadways; the urban and rural development pattern; and subtleties between "major" and "minor" sub-classifications are key considerations when determining the Federal functional classification category to which a particular roadway belongs. The process of determining the correct functional classification of a particular roadway is as much art as it is science. Therefore, a real-world example is presented to help make the discussion of functional classification more readily understood.

The flow of traffic throughout a roadway network is similar to the flow of blood through the human circulatory system or the trunk and branch system of a tree. The units moving through the system (blood cells, nutrients, vehicles, etc.) move through progressively smaller network elements as they approach their destination.

2.2 Functional Classification Concepts

Most travel occurs through a network of interdependent roadways, with each roadway segment moving traffic through the system towards destinations. The concept of functional classification defines the role that a particular roadway segment plays in serving this flow of traffic through the network. Roadways are assigned to one of several possible functional classifications within a hierarchy according to the character of travel service each roadway provides. Planners and engineers use this hierarchy of roadways to properly channel transportation movements through a highway network efficiently and cost effectively.

2.2.1 Access versus Mobility

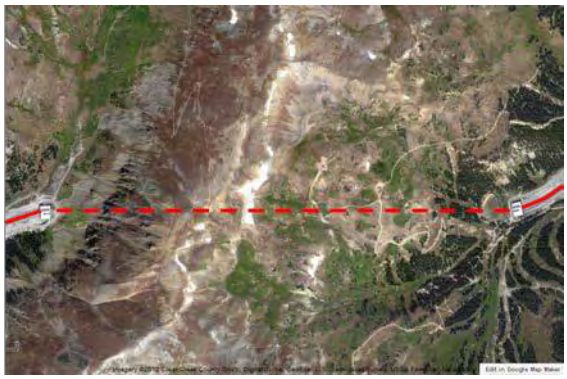
Roadways serve two primary travel needs: access to/egress from specific locations and travel mobility. While these two functions lie at opposite ends of the continuum of roadway function, most roads provide some combination of each.

- Roadway mobility function: Provides few opportunities for entry and exit and therefore low travel friction from vehicle access/egress
- Roadway accessibility function: Provides many opportunities for entry and exit, which creates potentially higher friction from vehicle access/egress

These two roles can be best understood by examining two extreme examples (**Figure 2-1** and **Figure 2-2**).

First, consider the Eisenhower Tunnel west of Denver, CO. Located along Interstate 70, the Eisenhower Tunnel runs under the Continental Divide in the Rocky Mountains and is one of the longest tunnels in the United States. Motorists that travel through the tunnel are en route to a distant location and are using the roadway completely to serve their "mobility" needs. There is no location that is immediately "accessible" to the roadway.

Figure 2-1: Aerial View of the Eisenhower (and Johnson) Tunnels along I-70, west of Denver, CO



Source: Google Earth Pro, June 27, 2012

Figure 2-2: View from Inside the Eisenhower Tunnel

Source: Creative Commons Attribution-Share Alike 2.0 generic license; Benjamin Clark

Next, consider the example of Eisenhower Court in North Platte, NE (**Figure 2-3**). This roadway is travelled almost exclusively by the individuals that live along the roadway. Hence, the roadway entirely provides "accessibility" and offers almost nothing in terms of mobility.

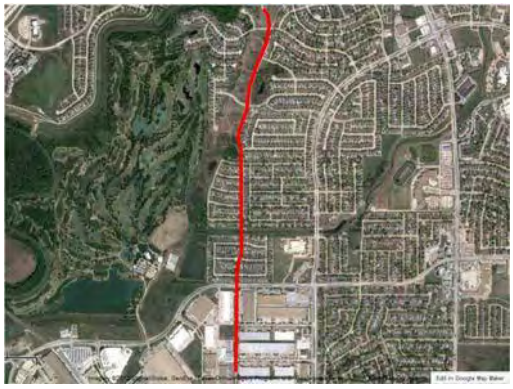
Figure 2-3: Aerial View of Eisenhower Court, North Platte, NE

Source: Google Earth Pro, June 27, 2012

Figure 2-4 depicts the neighborhood around Eisenhower Street in Carrollton, TX. This roadway serves both mobility needs (the residents that live along the side streets that intersect Eisenhower Street use it for some level of north/south mobility) and land access needs (there are both residential and commercial properties located along the roadway).

For nomenclature purposes, those roadways that provide a high level of mobility are called "Arterials"; those that provide a high level of accessibility are called "Locals"; and those that provide a more balanced blend of mobility and access are called "Collectors."

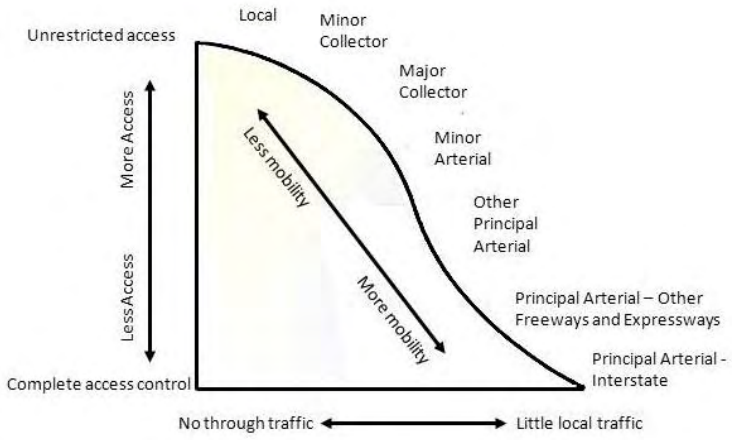
Figure 2-4: Aerial View of Eisenhower Street in Carrollton, TX



Source: Google Earth Pro, June 28, 2012

This relationship between mobility and land access, as well as how Principal Arterials, Collectors and Local Roads proportionally serve these two functions, is illustrated in **Figure 2-5.** Arterials provide mostly mobility; Locals provide mostly land access; and Collectors strike a balance between the two.

Figure 2-5: Illustration of Access-Mobility Continuum



Source: FHWA and CDM Smith

While most roadways offer both "access to property" and "travel mobility" services, it is the roadway's primary purpose that defines the classification category to which a given roadway belongs.[2]

[2] The use of the term "Local" roadway in the context of functional classification is separate from the use of the term in a jurisdictional context. While it is true that roadways functionally classified as "Local" are often under the jurisdiction of a "local" entity (i.e., incorporated city), Local Roads are not always under local jurisdiction. Other roadway classifications, including Arterials, may also be under the jurisdiction of a local (i.e., non-state) entity.

2.3 Other Important Factors Related to Functional Classification

The distinction between "mobility and accessibility" is important in assigning functional classifications to roadways. There are a few additional factors to consider, and these are discussed here.

Efficiency of Travel: Trip makers will typically seek out roadways that allow them to travel to their destinations with as little delay as possible and by the shortest travel time. Arterial roadways provide this kind of service, often in the form of fully or partially controlled access highways, with no or very few intersecting roadways to hinder traffic flow. Therefore, a high percentage of the length of a long-distance trip will be made on Arterials. In contrast, travelers making shorter trips tend to use Local and/or Collector roadways for a much higher proportion of the trip length than Arterial roads.

Collectors: As their name implies, Collectors "collect" traffic from Local Roads and connect traffic to Arterial roadways. Collector routes are typically shorter than Arterial routes but longer than Local Roads. Collectors often provide traffic circulation within residential neighborhoods as well as commercial, industrial or civic districts (see **Figure 2-6**).

Figure 2-6: Collector Example

Source: CDM Smith

Access Points: Arterials primarily serve long-distance travel and are typically designed as either access controlled or partially access controlled facilities with limited locations at which vehicles can enter or exit the roadway (typically via on- or off-ramps). In instances where limited or partial access control is not provided, signalized intersections are used to control traffic flow, with the Arterial given the majority of the green time.

In growing urban areas, Arterial roadways often experience an ever-increasing number of driveway access points. This high degree of accessibility decreases mobility. To address this issue and restore the carrying capacity of through traffic on these roadways, transportation agencies apply access management principles, such as driveway consolidation and median installations (see **Figure 2-7**).

Figure 2-7: Example of Access Points

Source: Ohio DOT, http://www.ahtd.info/basic_bike-f

In contrast, roadways classified as "Local" provide direct access to multiple properties.

A route is a linear path of connected roadway segments, all with the same functional classification designation. For example, the roadways along a given Arterial route may — and often do — comprise multiple named roadways or state numbered facilities. Similarly, different segments of a given named roadway, or even more likely a given state numbered route, may belong to different functional classification categories, depending on the character of travel service that each segment provides. In the example to the right, the minor Arterial "route" consists of a portion of Tyler Street and a portion of Dalton Avenue (shown in green). East of Dalton Avenue, Tyler Street (shown in brown) is a Minor Collector.

Speed Limit: In general, there is a direct relationship between posted speed limits and functional classification. Arterials typically have higher posted speed limits as vehicles encounter few or no at-grade intersections. The absence of cross-traffic and driveways allows for higher rates of speed, which provides mobility, especially for long-distance travel. In contrast, because their primary role is to provide access, Locals are lined with intersecting access points in the form of driveways, intersecting roadways, cross walks and transfer points for buses and other modes. Due to the frequency of traffic turns, speed limits are kept low to promote safe traffic operations. Speed limits on any non-access controlled roadways are also influenced by the mix of vehicles and modes that use them.

Route Spacing: Directly related to the concept of channelization of traffic throughout a network is the concept of distance (or spacing) between routes. For a variety of reasons, it is not feasible to provide Arterial facilities to accommodate every possible trip in the most direct manner possible or in the shortest amount of time. Ideally, regular and logical spacing between routes of different classifications exists. Arterials are typically spaced at greater intervals than Collectors, which are spaced at much greater intervals than Locals. This spacing varies considerably for different areas; in densely populated urban areas, spacing of all routes types is smaller and generally more consistent than the spacing in sparsely developed rural areas. Geographic barriers greatly influence the layout and spacing of roadways.

Usage (Annual Average Daily Traffic [AADT] Volumes and Vehicle Miles of Travel [VMT]): Arterials serve a high share of longer distance trips and daily vehicle miles of travel. In rural areas, Arterials typically account for approximately half of the daily vehicle miles of travel; in urban areas, this percentage is often higher. Collectors account for the next largest percentage of travel. Urban Area Collectors account for somewhat less (5 to 15 percent), while the percentage for Rural Area Collectors is typically in the 20 to 30 percent range. Lastly, by definition, Local Roads in rural areas typically serve very low density, dispersed developments with relatively low traffic volume. In contrast, the Urban Local Road network, with higher centerline miles and higher density spacing, serves denser land uses and therefore accounts for a larger proportion of travel than its rural counterpart.

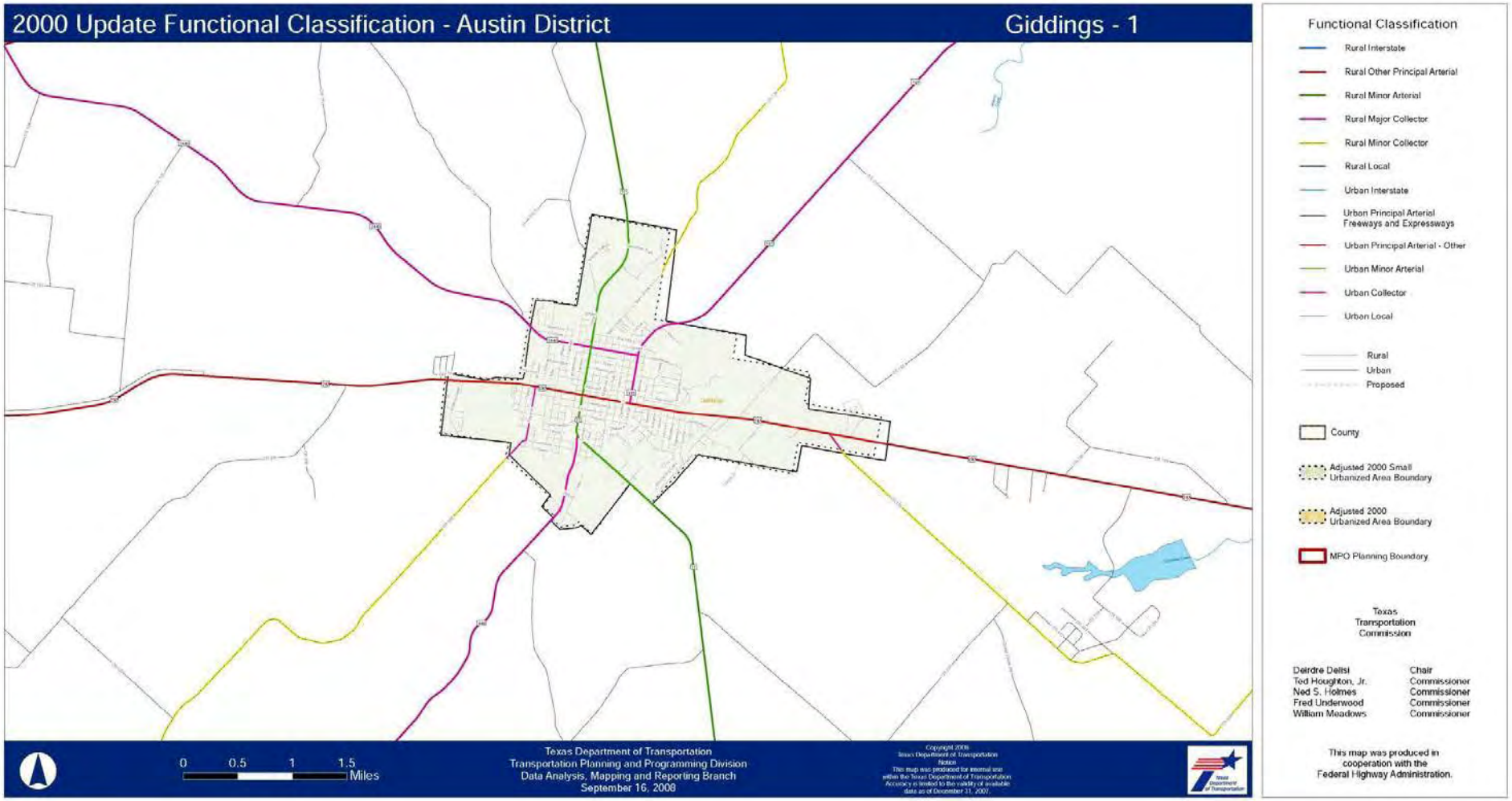
While there is a general relationship between the functional classification of a roadway and its annual average daily traffic volume, two roads that carry the same traffic volume may actually serve very different purposes and therefore have different functional classifications. Conversely, two roadways in different parts of a State may have the same functional classification but carry very different traffic volumes. This is particularly applicable among urban areas with very different populations — an Arterial within a remote city with a population of 50,000 is likely to have a much lower traffic volume than an Arterial within a city of 1 million people.

Traffic volumes, however, can come into play when determining the proper functional classification of a roadway "on the border" of a functional classification group (for example, trying to determine whether a roadway should be classified as a Collector or Local). Furthermore, AADT can often be used as a "tie-breaker" when trying to determine which of two (or more) similar and roughly parallel roadways should be classified with a higher (or lower) classification than the other.

When determining the functional classification of a given roadway, no single factor should be considered alone. For example, US 290 runs through the heart of Giddings, TX. Within the city, the roadway has many intersecting roadways, provides direct access to a number of densely developed commercial and residential properties and has speed limits as low as 35 mph. However, because the roadway is one of the two most direct routes of travel between Austin and Houston and a large percentage of its traffic consists of longer distance trips, the roadway is best classified as an Arterial.

For example, suppose that two parallel roadways appear to serve the function of a Collector. Classifying both of them as a Collector could lead to undesirable redundancy in the functional classification network. All other things being equal, the roadway with the higher AADT would generally be given the Collector classification, while its companion would be given a Local classification (Figure 2-8).

Figure 2-8: Functional Classification Map of Giddings, TX and Surrounding Unincorporated Territory



Source: Texas DOT, Transportation Planning and Programming Division, Data Analysis, Mapping and Reporting Branch, September 16, 2008

*Exceptions to the "connectivity" guideline exist. There are locations where an Arterial can "dead end" and not connect to another Arterial. A common example is when an Arterial terminates at a regionally significant land use (such as an airport or military installation). Another example is a Collector that serves a major residential community and, for topological or other constraining reasons, does not connect at one end to another similarly or higher classified roadway. Many other examples can also be found within coastal communities. Wings Neck Road in Bourne, MA (**Figure 2-10**) is a good example. Other obvious examples are Interstate spur routes (the highest type of Arterial, to be discussed in the following section) that terminate at a city street in the downtown of an urban area.*

Number of Travel Lanes: Roadways are designed and constructed according to their expected function. If a roadway is expected to function as an Arterial, it is designed for high capacity, with multiple travel lanes. In general, Arterials are more likely to have a greater number of travel lanes than Collectors, and Collectors are more likely to have a greater number of travel lanes than Locals. It should also be noted that the relationship between functional classification and number of lanes is stronger in urban areas than it is in rural areas.

Regional and Statewide Significance: Highly significant roadways connect large activity centers and carry longer-distance travel between and through regions and States. Arterials carry the vast majority of trips that travel through a given State, while Local Roads do not easily facilitate statewide travel.

Table 2-1 summarizes the relationship between the factors previously described and the three broad categories of functional classification.

Table 2-1: Relationship between Functional Classification and Travel Characteristics

Functional Classification	Distance Served (and Length of Route)	Access Points	Speed Limit	Distance between Routes	Usage (AADT and DVMT)	Significance	Number of Travel Lanes
Arterial	Longest	Few	Highest	Longest	Highest	Statewide	More
Collector	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Local	Shortest	Many	Lowest	Shortest	Lowest	Local	Fewer

2.4 System Continuity

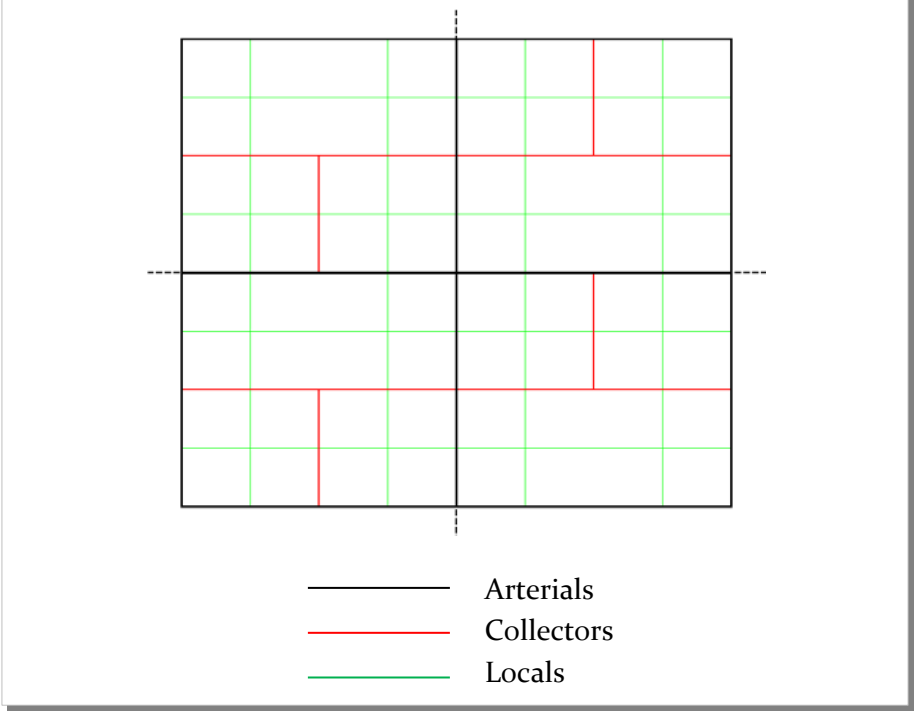
Because the roadway system is an interconnected network of facilities channeling traffic in both directions from Arterials to Collectors, then to Locals and back again, the concept of continuity of routes is important to recognize. A basic tenet of the functional classification network is continuity — a roadway of a higher classification should not terminate at a single roadway of a lower classification.[3] Generally speaking, Arterials should only terminate at other Arterials. However, there are exceptions to this guideline. Arterials can terminate at very large regional traffic generators or can connect to multiple parallel roads of lower functional classification that, together, provide the same function and capacity as an Arterial.

In **Figure 2-9**, the Arterials (represented by black lines) only connect to other Arterials. Collectors (represented by the red lines), only terminate at Arterials or other Collectors. Lastly, Local Roads (represented by the green lines) can terminate at any type of roadway.

Exceptions to the "connectivity" guideline exist. A Collector can serve a major residential community and — for topological or other constraining reasons —not connect at one end to another similar or higher classified roadway. Other examples can also be found, especially within coastal communities. Wings Neck Road in Bourne, MA (**Figure 2-10**) is a good example. **Figure 2-11** is an example of an Interstate spur terminating at a city street in Holyoke, MA.

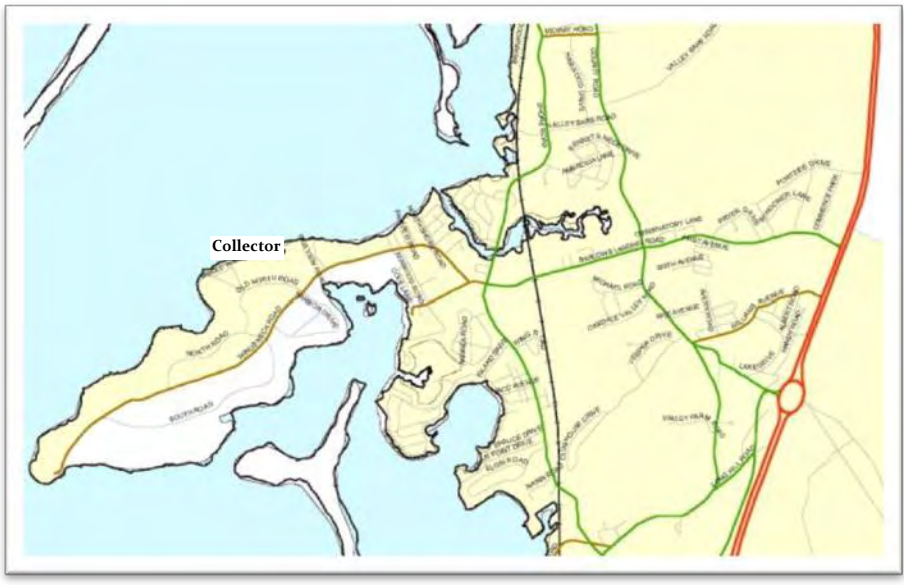
[3] A higher functionally-classified road can "split" its traffic between two lower-level roads, with different levels of access and mobility.

Figure 2-9: Schematic Illustrating the Concept of Continuity



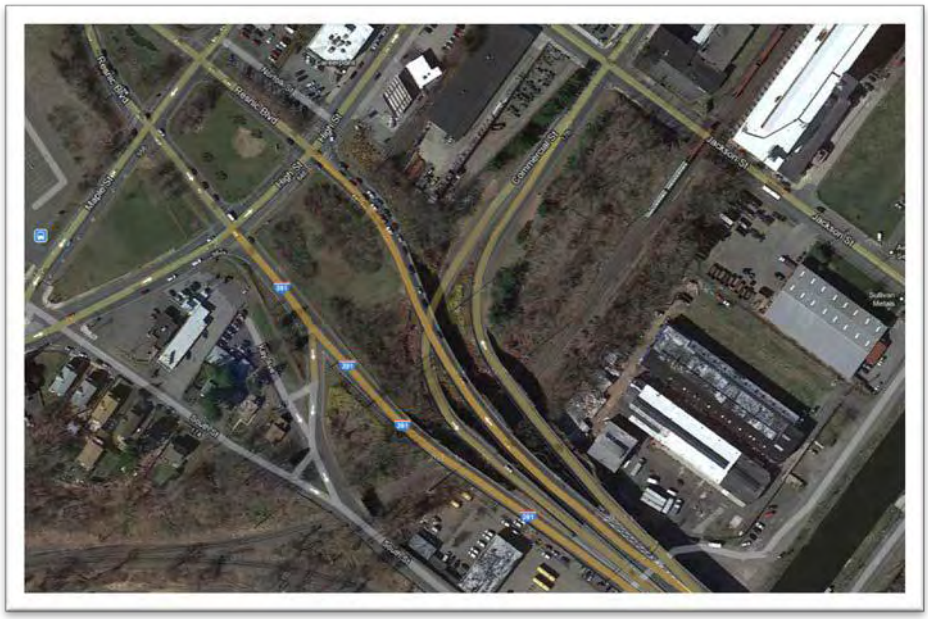
Source: CDM Smith

Figure 2-10: Wings Neck Road, Bourne, MA



Source: MassDOT, Office of Transportation Planning, Functional Classification Map

Figure 2-11: Example of an Interstate Spur Terminating at a City Street in Holyoke, MA



Source: Google Earth Pro, June 29, 2012

SECTION 3. CRITERIA

3.1 Definitions and Characteristics

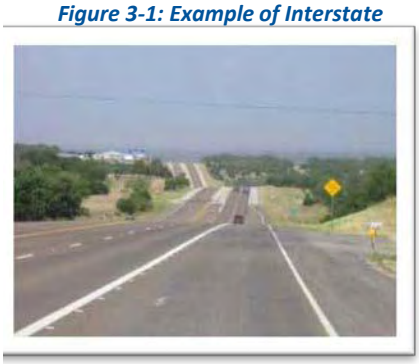
The previous section provided a general overview of the functional classification categories of Arterial, Collector and Local. For Federal functional classification purposes, this section breaks these categories down further to stratify the range of mobility and access functions that roadways serve. Additionally, the physical layout and the official designation of some roadways dictate the classification of certain roadways.

Access control is a key factor in the realm of functional classification. All Interstates are "limited access" or "controlled access" roadways. The use of the word "access" in this context refers to the ability to access the roadway and not the abutting land use—these roadways provide no "access" to abutting land uses. Access to these roadways is controlled or limited to maximize mobility by eliminating conflicts with driveways and at-grade intersections that would otherwise hinder travel speed. Access to these roadways is limited to a set of controlled locations at entrance and exit ramps. Travelers use a much lower functionally classified roadway to reach their destination.

3.1.1 Interstates

Interstates are the highest classification of Arterials and were designed and constructed with mobility and long-distance travel in mind. (**Figure 3-1**) Since their inception in the 1950's, the Interstate System has provided a superior network of limited access, divided highways offering high levels of mobility while linking the major urban areas of the United States.

Figure 3-1: Example of Interstate



Source: CDM Smith

Determining the functional classification designation of many roadways can be somewhat subjective, but with the Interstate category of Arterials, there is no ambiguity. Roadways in this functional classification category are officially designated as Interstates by the Secretary of Transportation, and all routes that comprise the Dwight D. Eisenhower National System of Interstate and Defense Highways belong to the Interstate functional classification category and are considered Principal Arterials.

3.1.2 Other Freeways & Expressways

Roadways in this functional classification category look very similar to Interstates; their directional travel lanes are separated by some type of physical barrier, and their access and egress points are limited to on- and off-ramp locations or a very limited number of at-grade intersections. Like Interstates, these roadways are designed and constructed to maximize their mobility function, and abutting land uses are not directly served by them.

3.1.3 Other Principal Arterials

These roadways serve major centers of metropolitan areas, provide a high degree of mobility and can also provide mobility through rural areas. Unlike their access-controlled counterparts, abutting land uses can be served directly. Forms of access for Other Principal Arterial roadways include driveways to specific parcels and at-grade intersections with other roadways. (**Figure 3-2**) For the most part, roadways that fall into the top three functional classification categories (Interstate, Other Freeways & Expressways and Other Principal Arterials) provide similar service in both urban and rural areas. The primary difference is that there are usually multiple Arterial routes serving a particular urban area, radiating out from the urban center to serve the surrounding region. In contrast, an expanse of a rural area of equal size would be served by a single Arterial.

Figure 3-2: Example of Other Principal Arterial

Source: CDM Smith

Table 3-1 presents a few key differences between the character of service that urban and rural Arterials provide.

Table 3-1: Characteristics of Urban and Rural Arterials

Urban	Rural
• Serve major activity centers, highest traffic volume corridors and longest trip demands • Carry high proportion of total urban travel on minimum of mileage • Interconnect and provide continuity for major rural corridors to accommodate trips entering and leaving urban area and movements through the urban area • Serve demand for intra-area travel between the central business district and outlying residential areas	• Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel • Connect all or nearly all Urbanized Areas and a large majority of Urban Clusters with 25,000 and over population • Provide an integrated network of continuous routes without stub connections (dead ends)

Figure 3-3: Example of Urban Minor Arterial

Source: Unsourced photo

3.1.4 Minor Arterials

Minor Arterials provide service for trips of moderate length, serve geographic areas that are smaller than their higher Arterial counterparts and offer connectivity to the higher Arterial system. In an urban context, they interconnect and augment the higher Arterial system, provide intra-community continuity and may carry local bus routes. (**Figure 3-3**) In rural settings, Minor Arterials should be identified and spaced at intervals consistent with population density, so that all developed areas are within a reasonable distance of a higher level Arterial. Additionally, Minor Arterials in rural areas are typically designed to provide

relatively high overall travel speeds, with minimum interference to through movement. The spacing of Minor Arterial streets may typically vary from 1/8- to 1/2-mile in the central business district (CBD) and 2 to 3 miles in the suburban fringes. Normally, the spacing should not exceed 1 mile in fully developed areas (see **Table 3-2**).

Table 3-2: Characteristics of Urban and Rural Minor Arterials

Urban	Rural
• Interconnect and augment the higher-level Arterials • Serve trips of moderate length at a somewhat lower level of travel mobility than Principal Arterials • Distribute traffic to smaller geographic areas than those served by higher-level Arterials • Provide more land access than Principal Arterials without penetrating identifiable neighborhoods • Provide urban connections for Rural Collectors	• Link cities and larger towns (and other major destinations such as resorts capable of attracting travel over long distances) and form an integrated network providing interstate and inter-county service • Be spaced at intervals, consistent with population density, so that all developed areas within the State are within a reasonable distance of an Arterial roadway • Provide service to corridors with trip lengths and travel density greater than those served by Rural Collectors and Local Roads and with relatively high travel speeds and minimum interference to through movement

3.1.5 Major and Minor Collectors

Collectors serve a critical role in the roadway network by gathering traffic from Local Roads and funneling them to the Arterial network. Within the context of functional classification, Collectors are broken down into two categories: Major Collectors and Minor Collectors. Until recently, this division was considered only in the rural environment. Currently, all Collectors, regardless of whether they are within a rural area or an urban area, must be sub-stratified into *major* and *minor* categories. The determination of whether a given Collector is a Major or a Minor Collector is frequently one of the biggest challenges in functionally classifying a roadway network.

In the rural environment, Collectors generally serve primarily intra-county travel (rather than statewide) and constitute those routes on which (independent of traffic volume) predominant travel distances are shorter than on Arterial routes. Consequently, more moderate speeds may be posted.

The distinctions between Major Collectors and Minor Collectors are often subtle. Generally, Major Collector routes are longer in length; have lower connecting driveway densities; have higher speed limits; are spaced at greater intervals; have higher annual average traffic volumes; and may have more travel lanes than their Minor Collector counterparts. Careful consideration should be given to these factors when assigning a Major or Minor Collector designation. In rural areas, AADT and spacing may be the most significant designation factors. Since Major Collectors offer more mobility and Minor Collectors offer more access, it is

beneficial to reexamine these two fundamental concepts of functional classification. Overall, the total mileage of Major Collectors is typically lower than the total mileage of Minor Collectors, while the total Collector mileage is typically one-third of the Local roadway network (see **Table 3-3**).

Table 3-3: Characteristics of Urban and Rural Major Collectors

MAJOR COLLECTORS	
Urban	**Rural**
• Serve both land access and traffic circulation in higher density residential, and commercial/industrial areas • Penetrate residential neighborhoods, often for significant distances • Distribute and channel trips between Local Roads and Arterials, usually over a distance of greater than three-quarters of a mile • Operating characteristics include higher speeds and more signalized intersections	• Provide service to any county seat not on an Arterial route, to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intra-county importance such as consolidated schools, shipping points, county parks and important mining and agricultural areas • Link these places with nearby larger towns and cities or with Arterial routes • Serve the most important intra-county travel corridors
MINOR COLLECTORS	
Urban	**Rural**
• Serve both land access and traffic circulation in lower density residential and commercial/industrial areas • Penetrate residential neighborhoods, often only for a short distance • Distribute and channel trips between Local Roads and Arterials, usually over a distance of less than three-quarters of a mile • Operating characteristics include lower speeds and fewer signalized intersections	• Be spaced at intervals, consistent with population density, to collect traffic from Local Roads and bring all developed areas within reasonable distance of a Collector • Provide service to smaller communities not served by a higher class facility • Link locally important traffic generators with their rural hinterlands

3.1.6 Local Roads

Locally classified roads account for the largest percentage of all roadways in terms of mileage. They are not intended for use in long distance travel, except at the origin or destination end of the trip, due to their provision of direct access to abutting land. Bus routes generally do not run on Local Roads. They are often designed to discourage through traffic. As public roads, they should be accessible for public use throughout the year.

Local Roads are often classified by default. In other words, once all Arterial and Collector roadways have been identified, all remaining roadways are classified as Local Roads (see **Table 3-4**).

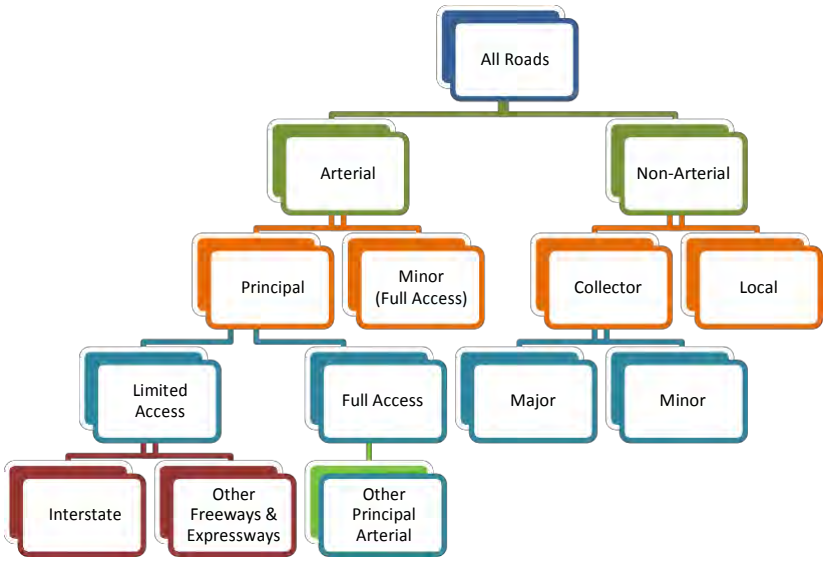
Table 3-4: Characteristics of Urban and Rural Local Roads

Urban	Rural
• Provide direct access to adjacent land • Provide access to higher systems • Carry no through traffic movement • Constitute the mileage not classified as part of the Arterial and Collector systems	• Serve primarily to provide access to adjacent land • Provide service to travel over short distances as compared to higher classification categories • Constitute the mileage not classified as part of the Arterial and Collector systems

3.2 Putting it all Together

The functional classification system groups roadways into a logical series of decisions based upon the character of travel service they provide. **Figure 3-4** presents this process, starting from assigning the function of an Arterial by its level of access (limited or full) or Non-Arterial (full access).

Figure 3-4: Federal Functional Classification Decision Tree



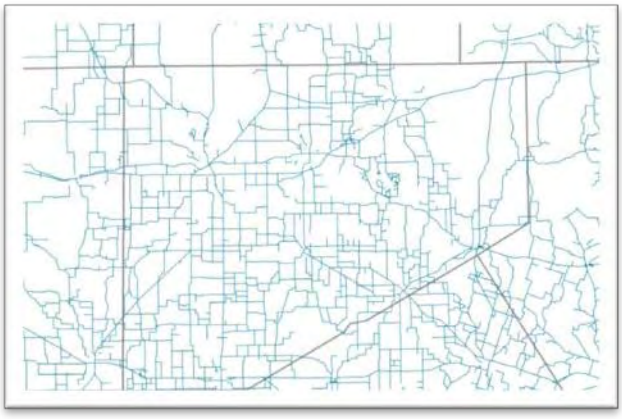
Source: FHWA and CDM Smith

While this document emphasizes the importance of function and service over the urban/rural distinction when classifying roads, the classification process is still influenced by the intensity and distribution of land development patterns. Classification of roadways in urban areas is typically guided by the local comprehensive planning and design process, or the fundamental principles of roadway functional classification. In comparison, rural development patterns are often more diverse, if not less orderly, thereby making the functional classification determination of some rural roadways more challenging (see **Figure 3-5** and **Figure 3-6**).

Figure 3-5: Map of an Urban Area's Roadway Network (Functional Classification more evident)

Source: CDM Smith

Figure 3-6: Map of a Rural Area's Roadway Network (Functional Classification less evident)



Source: CDM Smith

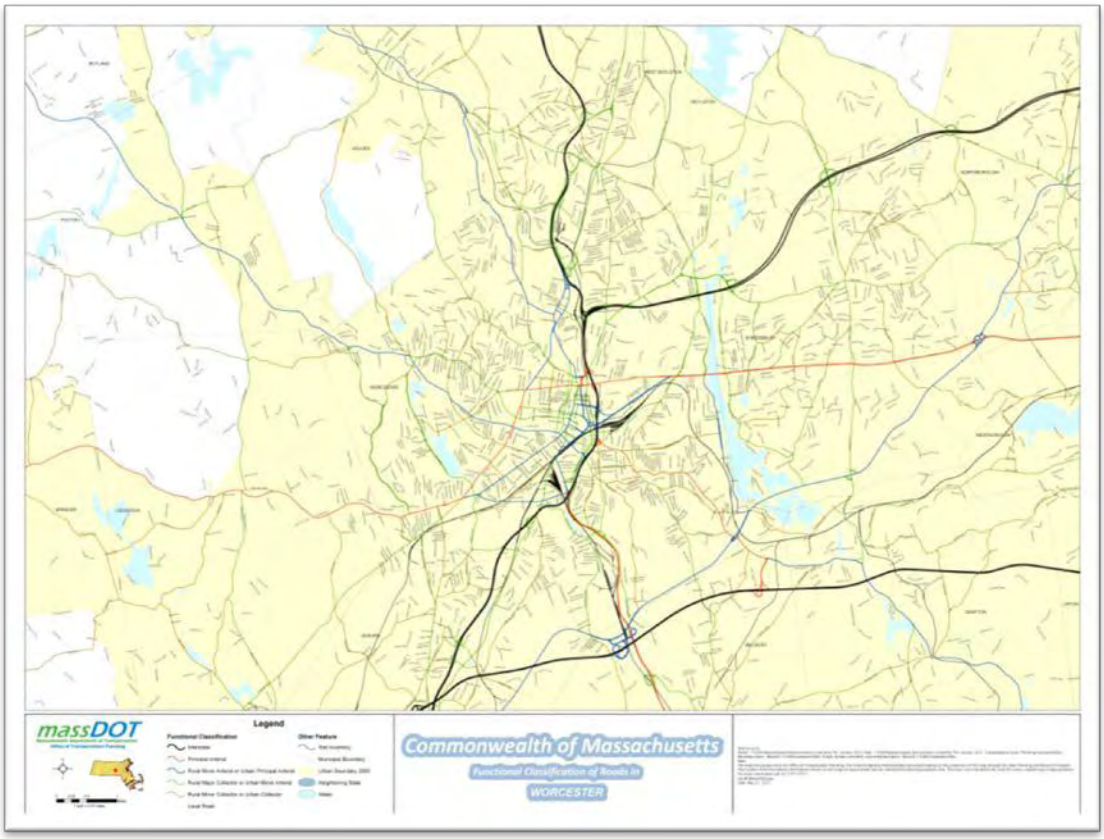
When comparing urban and rural areas, perhaps the most relevant characteristic is the density of the roadway network. Even with a cursory view of a map of an urban area's roadway network, the functional classification of many roadways can be discerned due the differences in roadway size. In contrast, the functional classification of the roadway network in many rural areas is less readily apparent, primarily due to the relatively consistent roadway spacing.

Nevertheless, functional classifications should be assigned based on actual functional criteria, rather than the location of the roadway within an urban or rural context.

3.3 A Real World Example

At this point, the concepts, criteria and definitions of all Federal functional classification categories have been presented. However, to strengthen the functional classification practitioner's understanding of these topics, the real world example of the city of Worcester, MA is presented below (**Figure 3-7**).

Figure 3-7: Worcester, MA Roadway System



Source: Massachusetts DOT

1. The city of Worcester is served by two interstate routes, Interstate 190 and Interstate 290 (shown in black). These Interstates provide high mobility service to residential communities to the north, northeast and south sides of the city.
2. A handful of Other Freeways & Expressways and Other Principal Arterials (shown in red and blue) radiate out from the central core of the city and provide direct service into, out of and through the city, offering connections to the surrounding areas not served by the Interstates.
3. An even larger number of Minor Arterials (shown in green) provide connectivity between the Interstate, Other Freeways & Expressways and Other Principal Arterials and are rather evenly spaced. Note that only a few of these Minor Arterial routes actually extend outside of the city border, as most of them terminate at Arterials within the city limits.
4. The Collector roadway system (shown in brown) consists of relatively shorter routes that mainly connect to Minor Arterials.
5. All other roadways (shown in gray) are Local Roads and comprise the vast majority of the mileage of the city's roadway network.

3.4 Final Considerations

In many instances, assigning a functional classification to a roadway is straightforward, especially for Interstates and Locals. However, there is flexibility

when deciding between adjacent classifications. For example, deciding whether a given roadway acts as a Minor Arterial or Major Collector can be subject to debate. Deciding between a Major Collector and Minor Collector assignment can be even more challenging.

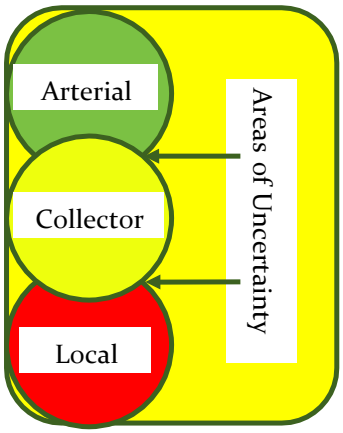
To assist transportation planners responsible for determining the functional classification of roadways, this guidebook offers a helpful tool that can make the classification process of classifying "borderline" roadways a bit easier. **Table 3-5** illustrates the range of lane width, shoulder width, AADTs, divided/undivided status, access control and access points per mile by functional classification categories.

Table 3-5 also presents guidelines for mileage and VMT ranges for Federal functional classifications of roads. These guidelines are based on an analysis of 2008 HPMS data and are adjusted to represent reasonable ranges. The table presents mileage and VMT extents for rural states, urban states and all states. Rural states are defined as having less than 76 percent of their population in urban areas.

As expected, Interstates account for the lowest portion of total system miles, but the greatest portion of travel. Conversely, Local Roads comprise the greatest portion of system mileage with Collectors carrying the lowest percentage of travel volume. Therefore, as a primary consideration in functional classification, planners and engineers can use mileage as a guideline. Where roadway systems significantly deviate from these ranges, State DOTs should consider adjusting their roadway assignments during the functional classification review process and at least every 10 years. FHWA intends to review these guideline ranges for mileage and VMT periodically.

Lastly, as a result of variances within the functional classification system, the guidelines have overlapping ranges of values. This allows greater flexibility in determining functional classification (see **Figure 3-8**).

Figure 3-8: Classification Overlap



Source: FHWA

Table 3-5: VMT and Mileage Guidelines by Functional Classifications - Arterials

	Arterials			
	Interstate	**Other Freeways & Expressway**	**Other Principal Arterial**	**Minor Arterial**
Qualitative Description (Urban)	• Serve major activity centers, highest traffic volume corridors, and longest trip demands • Carry high proportion of total urban travel on minimum of mileage • Interconnect and provide continuity for major rural corridors to accommodate trips entering and leaving urban area and movements through the urban area • Serve demand for intra-area travel between the central business district and outlying residential areas			• Interconnect with and augment the principal arterials • Serve trips of moderate length at a somewhat lower level of travel mobility than principal arterials • Distribute traffic to smaller geographic areas than those served by principal arterials • Provide more land access than principal arterials without penetrating identifiable neighborhoods • Provide urban connections for rural collectors
Qualitative Description (Rural)	• Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel • Serve all or nearly all urbanized areas and a large majority of urban clusters areas with 25,000 and over population • Provide an integrated network of continuous routes without stub connections (dead ends)			• Link cities and larger towns (and other major destinations such as resorts capable of attracting travel over long distances) and form an integrated network providing interstate and inter-county service • Spaced at intervals, consistent with population density, so that all developed areas within the State are within a reasonable distance of an arterial roadway Provide service to corridors with trip lengths and travel density greater than those served by rural collectors and local roads and with relatively high travel speeds and minimum interference to through movement
Typical Characteristics				
Lane Width	12 feet	11 - 12 feet	11 - 12 feet	10 feet - 12 feet
Inside Shoulder Width	4 feet - 12 feet	0 feet - 6 feet	0 feet	0 feet
Outside Shoulder Width	10 feet - 12 feet	8 feet - 12 feet	8 feet - 12 feet	4 feet - 8 feet
AADT[1] (Rural)	12,000 - 34,000	4,000 - 18,500[2]	2,000 - 8,500[2]	1,500 - 6,000
AADT[1] (Urban)	35,000 - 129,000	13,000 - 55,000[2]	7,000 – 27,000[2]	3,000 - 14,000
Divided/Undivided	Divided	Undivided/Divided	Undivided/Divided	Undivided
Access	Fully Controlled	Partially/Fully Controlled	Uncontrolled	Uncontrolled
Mileage/VMT Extent (Percentage Ranges)[3]				
Rural System				
Mileage Extent for Rural States	0% - 3%	1% - 14%	19% - 38%	3% - 5%
Mileage Extent for Urban States	1% - 2%	0% - 15%	15% - 35%	3% - 8%
Mileage Extent for All States	0% - 2%	0% - 14%"	17% - 36%	3% - 7%
VMT Extent for Rural States	19% - 29%	2% - 19%	11% - 31%	11% - 18%
VMT Extent for Urban States	16% - 36%	1% - 19%	6% - 31%	11% - 19%
VMT Extent for All States	17% - 33%	2% - 18%	9% - 31%	11% - 18%
Urban System				
Mileage Extent for Rural States	1% - 3%	6% - 19%	14% - 27%	8% - 13%
Mileage Extent for Urban States	1% - 2%	8% - 16%	17% - 26%	7% - 12%
Mileage Extent for All States	1% - 2%	17% - 18%	15% - 27%	8% - 12%
VMT Extent for Rural States	17% - 28%	9% - 28%	10% - 27%	17% - 26%
VMT Extent for Urban States	20% - 30%	12% - 28%	11% - 23%	15% - 22%
VMT Extent for All States	19% - 29%	10% - 28%	10% - 25%	15% - 25%

1 - AADT Ranges are the actual 20th and 80th Percentile AADTs reported in the HPMS 2008 Universe database by/for the functional classifications in place at that time. Note: AADT values of 0 were filtered out of this analysis as these represent values not coded.

2 - These values were obtained from the 2008 HPMS sample dataset since Access Control is not available in the Universe database.

3 - Mileage/VMT Extent Percentage Ranges were developed using FHWA Highway Statistics Tables (based on HPMS 2008) for mileage and VMT and a +/- 1 standard deviation.

Table 3-6: VMT and Mileage Guidelines by Functional Classifications – Collectors and Locals

	Collectors		Local
	Major Collector	**Minor Collector**	
Qualitative Description (Urban)	• Serve both land access and traffic circulation in higher density residential, and commercial/industrial areas • Penetrate residential neighborhoods, often for significant distances • Distribute and channel trips between local streets and arterials, usually over a distance of greater than three-quarters of a mile	• Serve both land access and traffic circulation in lower density residential, and commercial/industrial areas • Penetrate residential neighborhoods, often only for a short distance • Distribute and channel trips between local streets and arterials, usually over a distance of less than three-quarters of a mile	• Provide direct access to adjacent land • Provide access to higher systems • Carry no through traffic movement
Qualitative Description (Rural)	• Provide service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems, and to other traffic generators of equivalent intra-county importance such as consolidated schools, shipping points, county parks, important mining and agricultural areas • Link these places with nearby larger towns and cities or with arterial routes • Serve the most important intra-county travel corridors	• Be spaced at intervals, consistent with population density, to collect traffic from local roads and bring all developed areas within reasonable distance of a minor collector • Provide service to smaller communities not served by a higher class facility • Link locally important traffic generators with their rural hinterlands	• Serve primarily to provide access to adjacent land • Provide service to travel over short distances as compared to higher classification categories • Constitute the mileage not classified as part of the arterial and collectors systems
Typical Characteristics			
Lane Width	10 feet - 12 feet	10 - 11 feet	8 feet - 10 feet
Inside Shoulder Width	0 feet	0 feet	0 feet
Outside Shoulder Width	1 feet - 6 feet	1 feet - 4 feet	0 feet - 2 feet
AADT[1] (Rural)	300 - 2,600	150 - 1,110	15 - 400
AADT[1] (Urban)	1,100 - 6,300[2]		80 - 700
Divided/Undivided	Undivided	Undivided	Undivided
Access	Uncontrolled	Uncontrolled	Uncontrolled
Mileage/VMT Extent (Percentage Ranges)[3]			
Rural System			
Mileage Extent for Rural States	11% - 18%	4% - 15%	61% - 74%
Mileage Extent for Urban States	9% - 16%	6% - 12%	63% - 74%
Mileage Extent for All States	10% - 17%	4% - 14%	62% - 74%
VMT Extent for Rural States	14% - 26%	2% - 8%	8% - 19%
VMT Extent for Urban States	12% - 22%	2% - 9%	7% - 21%
VMT Extent for All States	13% - 24%	1% - 9%	8% - 20%
Urban System			
Mileage Extent for Rural States	8% - 15%[3]		65% - 73%
Mileage Extent for Urban States	8% - 14%[3]		65% - 74%
Mileage Extent for All States	8% - 14%[3]		65% - 74%
VMT Extent for Rural States	6% - 14%[3]		10% - 21%
VMT Extent for Urban States	7% - 11%[3]		8% - 19%
VMT Extent for All States	6% - 13%[3]		9% - 20%

1 - AADT Ranges are the actual 20th and 80th Percentile AADTs reported in the HPMS 2008 Universe database by/for the functional classifications in place at that time. Note: AADT values of 0 were filtered out of this analysis as these represent values not coded.

2 - The typical AADT range and Mileage/VMT extents shown for Urban Collectors were derived from HPMS 2008 Universe Database information for Urban Major Collectors. There was no Urban Minor Collector category at that time.

3 - Mileage/VMT Extent Percentage Ranges were developed using FHWA Highway Statistics Tables (based on HPMS 2008) for mileage and VMT and a +/- 1 standard deviation.

State DOTs are required to collect, analyze and publish traffic data on the roadways within their borders. Specifically, through the Highway Performance Monitoring System, each roadway segment on the Federal-aid highway (e.g., urban roadways classified as Minor Collectors and above and rural roadways classified as Major Collectors and above) is required to have an AADT value that is based on an actual traffic count within the last3 years. Therefore, AADT is a readily available and objective metric that can be brought into the functional classification determination process.

Mileage and Daily Vehicle - Miles of Travel (DVMT) Ranges: While these guidelines should be considered general rules of thumb, FHWA encourages State DOTs to generate similar statistics for their roadway network and evaluate whether they fall within the normal ranges presented here. States should also apply the urban and rural guidelines as appropriate to their urban and rural areas.

Annual Average Daily Traffic: Roadway traffic volumes are typically expressed as annual average daily traffic (AADT) and represent one of the most objective characteristics of a roadway's usage, providing a standard, easy to understand and simple metric for comparing the relative importance of roadways. In general, the higher the traffic volume is, the higher the functional classification will be (relative to the norms in the surrounding area). Therefore, examining the AADT with other roadways in both the immediate vicinity (and in the region as a whole) is helpful when deciding a "borderline" roadway classification. If, for example, when trying to determine whether a given roadway with an AADT of 3,500 should be classified as a Minor Arterial or Major Collector, most of the Minor Arterials (in the immediate area and the region at large) fall within the 4,000 to 10,000 range, and the Major Collectors fall within the 2,000 to 4,000 range, the roadway should be classified as a Major Collector.

The Big Picture: If there still remains some ambiguity surrounding what classification should be applied to a given roadway, it is often helpful to examine the roadways in close proximity to it and to consider the spacing. For example, if trying to determine whether a roadway should be classified as a Minor Arterial or Major Collector, it is useful to take a "step back" and determine whether any functional classification is under- or over-represented. If the area has a significant number of Minor Arterials, then the roadway could very well be best classified as a Major Collector. Alternatively, if there is not another Minor Arterial within a few mile radius of the roadway (assuming an urban context), then the roadway may best be designated as a Minor Arterial.

Even after careful review of a given roadway's attributes, a small set of roadway segments that are difficult to classify can remain. For this reason, the set of mileage guidelines in Tables 3-5 and 3-6 can help provide high-level guidance regarding both the extent (mileage) and usage (daily vehicle miles of travel [DVMT]) of the roadway system that should fall into the different functional classification categories. While these guidelines have been developed for application at the State level, they can also be applied within regions.

SECTION 4. PROCEDURES

4.1 Introduction

This section of the guidance outlines procedures for assigning functional classifications to highways, including a discussion of the specific technical tasks that describe the detailed technical "how to" tasks, as well as the collaborative efforts with partner agencies to ensure the functional classification of the roadway network considers State, regional and local needs. Currently, each State maintains a categorized roadway network consistent with the Federal functional classification system. While functional classifications of some roadways can and do change over time, the functional classification of the vast majority of roadways remains stable. Consequently, the focus of each State's efforts should be to identify roadways where the functionality has changed. These changes can take the form of newly constructed, re-aligned, extended, widened or otherwise reconfigured roadways. Equally important are changing land use and development patterns — growing residential areas, newly developed commercial or industrial centers and construction of isolated traffic generators can all have a profound impact on the roadway network serving these developments. State DOTs should establish, with local planning partners, a collaborative process of monitoring development and roadway usage patterns to ensure that the functional classification system is kept current.

While the nation's roadway system is mature in comparison to the 1960's-era highway system, the concepts and processes pertaining to the original Federal functional classification system are still relevant. The following section briefly presents an adaptation of the key recommendations of the 1989 guidance document, which is based on an earlier 1960's era document.

Many State DOTs have generated their own functional classification guidance documents. For the most part, these State-specific documents are based upon FHWA's 1989 document, augmented with additional details as necessary. To obtain a complete understanding of functional classification procedures in a particular State, these supporting documents should be reviewed as well.

4.2 Identifying the Functional Classification of a Roadway Network

A primary objective of the functional classification system is to connect traffic generators (population centers, schools, shopping areas, etc.) with a roadway network that channelizes trips logically and efficiently. As classification proceeds from identifying Arterials to Collectors to Locals, the perspective (and size) of traffic generators also moves from a larger to a smaller scale (or from a smaller to a larger scale, if starting from the local development).

When developing a functional classification network in a given area, the same basic procedures should be followed, whether the functional classification is applied in a rural or an urban area. However, due to the differences in population and land development intensity between rural and urban areas, the process and considerations used to classify roadways may be different. Because functional classification is part art and part science, these procedures are a blend of detailed, task-oriented steps and qualitative guidelines. These procedures do not eliminate judgment from the classification process, but when used as a guide, they help to apply judgment in a sound and orderly fashion.

Agencies can use travel demand models to validate or update their functional classification assignments. These models and the software they use produce estimates of the number of trips that travel between activity centers as well as the flows of travel on roadway segments. A particularly useful feature is "select link analysis" that shows the origin and destination location of travel from a roadway segment, and select zone analysis, which shows the path of trips from or to an activity center. Travel demand model "activity centers" represent collections of smaller areas such as block groups, census tracts or even counties, so their ability to track the path of travel from smaller areas is often limited.

1. **Identify traffic generators.** In rural areas, traffic generators may be population centers (cities and towns); recreational areas such as lakes, national and State parks; military facilities; consolidated schools; and shipping points. In urban areas, traffic generators may be business districts; air, rail, bus and truck terminals; regional shopping centers; colleges and universities; hospital complexes; military bases; industrial and commercial centers; stadiums; fairgrounds; and parks. Regional traffic generators adjacent, but outside of the area of interest, should also be identified.

2. **Rank traffic generators.** Traffic generators should be categorized based on their relative ability to generate trips and be first stratified into urban and rural groupings. Traffic generators thought to be significant enough to be served by a Major Collector or higher should be categorized into five to eight groups (it is better to have too many groups than to have too few, especially toward the lower end of the scale). Traffic generators with similar significance should be placed in the same group. These groups will be used to identify the functional classification of connecting roadways. Population, sales tax receipts, retail trade, visitation and employment are some examples of factors to consider when ranking traffic generations according to their significance.

3. **Map traffic generators.** Traffic generators should be mapped using graduated symbols of varying sizes and/or colors according to the group to which the generator belongs. This will produce a visual representation of the ranking. For example, the group of generators ranked highest should all be symbolized with the largest symbol.

4. **Determine the appropriate functional classification to connect traffic generators.** To determine the functional classification of roadways, work from the highest mobility facilities first by identifying Interstates, Other Freeways & Expressways, Other Principal Arterials, then Minor Arterials and Collectors (Major, then Minor). Then, by definition, Local Roads will be all of the roadways that were not classified as Arterials or Collectors. In other words, begin with a wide, regional perspective to identify Principal Arterials, then gradually move to smaller, more localized perspectives as Minor Arterials, Major Collectors and Minor Collectors are identified. In this process, consider the size of the

traffic generators connected and the predominant travel distances and "travel shed"[4] served.

4.2.1 Arterial Considerations

Arterials serve a wide range of functions across the access-mobility spectrum. Some considerations and rules of thumb for designating roads as Arterials include:

- Start with Interstates and Other Freeways & Expressways. Control of access is perhaps the easiest criterion to apply, since roadways with full or partial control of access will most always be in the Arterial classification category. It is therefore advantageous to identify these roadways first, providing a convenient starting point in defining the Arterial system.
- Preserve the continuity of Principal Arterials (Interstates, Other Freeways & Expressways and Other Principal Arterials). Continuity of Principal Arterial routes traveling from rural areas, then into and through urban areas, should be preserved.
- Arterials should avoid neighborhoods. They often serve as buffers between incompatible land uses and should avoid penetration of residential neighborhoods.
- Most high volume roadways in urban areas function as Arterials. Notable exceptions to this rule in intensely developed area exist in cases where high volume roadways actually function as Collectors that serve traffic movements between Locals and Arterials or provide a high degree of direct access service to abutting land uses. For example, roadways that border on high-activity, low-land area generators may carry proportionally high volumes of traffic while functioning as Collectors.
- The network of Minor Arterial roadways will usually intersect roadways in all other classifications.
- In urban areas, guidance for distinguishing between Principal and Minor Arterials includes:
  - *Principal Arterials typically serve:*
    - *Activity centers, from CBDs to larger town centers*
    - *Important air, rail, bus and truck terminals*
    - *Regional shopping centers*
    - *Large colleges, medical complexes, military bases and other institutional facilities*
    - *Major industrial and commerce centers*
    - *Important recreational areas*
  - Principal Arterials provide more mobility; Minor Arterials provide more access. The land access function of Principal Arterials is subordinate to their primary function of providing mobility for traffic not destined to land adjacent to the roadway. Minor Arterials, on the other hand, have a

[4] "Travel shed" refers to the general area from which most travelers originate.

slightly more important land access function (although even for this classification category, this is a secondary consideration).

- In general, the spacing between Principal Arterials should be greater than the spacing between Minor Arterials. In most cases, Minor Arterials will be located between Principal Arterials.
- Minor Arterials in urban areas should provide service to all remaining major traffic generators not served by a Principal Arterial, and they provide adequate area-wide circulation.
- Location matters when assigning functional classification. Because traffic volumes in the outlying portions of an urban area are generally lower than in the more densely populated central areas, the traffic volume on a Minor Arterial in the central city may be greater than the volume on a Principal Arterial in a suburban area.

4.2.2 Collector Considerations

Collectors, which may have an important land access function, serve primarily to funnel traffic between Local to Arterial roadways. In order to bridge this gap, Collectors must and do provide access to residential neighborhoods.

When deciding between Major and Minor Collectors, the following guidelines should be considered:

- A road that is not designated as an Arterial but that connects larger generators to the Arterial network can be classified as a Major Collector. Major Collectors generally are busier, have more signal-controlled intersections and serve more commercial development.
- Identify Minor Collectors for under-served residential areas. After Major Collectors have been identified, Minor Collectors should be identified for clustered residential areas that have yet to be served by a roadway within higher classification categories.
- In rural areas, Minor Collectors should have approximately equal distance between Arterial or Major Collector routes for equal population densities, such that equitable service is provided to all rural areas of the State. The population density within each area bounded by an Arterial and/or Major Collector route can be determined, and the existing spacing of routes already selected can be measured. Areas with poor service can then be identified by comparing the data with a table of desirable Collector spacing (mileage between routes) versus population density. Additional routes can be added to the system as necessary.

4.2.3 General Rules of Thumb for All Categories and the System as a Whole

While working down through the functional classification system of roadway classifications, the following additional considerations should be kept in mind:

- Roadways that connect to and allow for the interchange of traffic with Principal Arterials are most likely to be Other Principal Arterials, Minor Arterials or Collectors.

- Avoid, if possible, assigning the same functional classification to parallel routes. In the event that parallel routes are determined to provide identical functions, a determination should be made as to which of the routes is more important (as perhaps indicated by traffic volumes); the other parallel route(s) will be assigned the next lower functional classification.
- For the most part, a single connection between two generators is all that is required. However, in some instances, an additional alternative route might be included where:
  - *Two apparently alternative routes are separated by geographic barriers and each is needed for connection to another intermediate generator or another intersecting route within the same classification category*
  - *One roadway excludes commercial vehicles*
  - *Total traffic volume is not adequately handled by one of the roadways*
  - *One roadway is tolled*
- Ensure that each route terminates at a route of the same or higher functional classification. As each subsequent category in the functional classification hierarchy is identified and added to the system, the continuity of the system must be maintained.
- In rural, sparsely developed areas, the spacing of various functional classification categories is often not a helpful criterion in determining functional classification.
- In most cases, the most direct, most improved and most heavily traveled route should be chosen for connecting medium and small size traffic generators.
- In general, the more intense the development, the closer the spacing of roadways within the same functional classification category. In less dense suburban locations within an urban area, neighborhoods tend to be larger than in the more dense central parts of cities. These less dense areas generally do not require the same close spacing of facilities to serve traffic as the areas closer to the central business district.

FHWA encourages States to develop their own more detailed and more quantifiable guidelines. The state of Wisconsin has developed robust algorithms taking into account factors of the population of the areas connected by a roadway, land use, spacing and current AADT volumes.

4.3 Good Practices

The following section discusses and recommends a series of good practices that State DOTs should follow to keep the functional classification of its roadways as accurate as possible.

4.3.1 Ongoing Maintenance of the Functional Classification System

State DOTs are charged with ensuring that the functional classification of their roadways is kept up-to-date. In addition, FHWA recommends that Sates update their functional classification system continually as the roadway system and land use developments change. States should also consider reviewing their systems every 10 years to coincide with the decennial census and the adjusted urban area boundary update cycle.

This maintenance process involves ongoing coordination with local planning partners to identify roadways that require changes to their functional classification, due to changes in transportation network and/or land use patterns.

These changes can involve:

- Adding newly constructed or extended roadways to the network, which can in turn affect the functional classification of connecting or nearby roadways
- Upgrading the functional classification of an existing roadway due to land use changes or an improvement made to the roadway
- Downgrading the functional classification of an existing roadway due to land use changes, traffic controls that discourage through traffic or other controls that limit the speed and capacity of a road

Actively maintaining the functional classification attributes of roadways will reduce the level of effort needed for the periodic updates. As State DOTs work with their local transportation planning partners on various initiatives such as long-range planning activities and project programming and development, issues related to the functional classification should be kept in mind. Useful questions to ask are the following:

- Have new significant roadways been constructed that may warrant Arterial or Collector status?
- Has any previously non-divided Principal Arterial roadway been reconstructed as a divided facility?
- Has any new major development (such as an airport, regional shopping center major medical facility) been built in a location that has caused traffic patterns to change?
- Has there been significant overall growth that may have caused some roadways to serve more access or mobility needs than they have previously?
- Have any Arterial or Collector roadways been extended or realigned in such a way to attract more through trip movements?
- Has a particular roadway experienced a significant growth in daily traffic volumes?

A key success factor for State DOTs is to have a well-documented process for changing the functional classification of an existing roadway. This process, along with a description of what the functional classification is and why it is important, should be readily accessible on the internet.

Many State DOTs have developed a functional classification change request form (see **Figure 4-1**). These forms ensure that consistent information and evidence supporting such a change are provided. Typically, information — such as the roadway location, the justification for the change and letters or signatures expressing local support — is required.

Figure 4-1: Minnesota DOT Functional Classification Change Request Form

Functional Class Change Request Form

Date Request Initiated	**Route Name**	**Route Number**
Total Miles to be Re-classified	**Begin Point**	**End Point**
Current Classification	**Proposed Classification**	
County	**State Project Number** if applicable	**Proposed or Existing Road** (specify which)
Description of the Road Segment		
Reason for Change in Classification		
Impact on Classification Percentages in the Jurisdiction and Plan for Maintaining Balance		
City/County Engineer Signature	**Date**	
RDC/MPO Board Review Signatures	**Date**	
District Planner/District State Aid Engineer Signature	**Date**	

Next Steps for the District:

1. Scan signed document to PDF format
2. Email PDF file to:
   - City/County and RDC/MPO who initiated the request and any others as appropriate
   - Mn/DOT Functional Classification Change contact
     (As of July 2010, Kim DeLaRosa: kimberlie.delarosa@state.mn.us)

The Mn/DOT contact should also receive a copy of the map (paper or electronic) showing the classification change.

2/4/11

Source: Minnesota DOT, Functional Classification, Request to Change Classification; http://www.dot.state.mn.us/roadway/data/html/roadwaydata.html

As new Local Roads get added to the State's roadway inventory databases, and while the functional classification of roadways are updated, State DOTs should evaluate how closely their roadways fit within each functional classification category based on the percentage guidelines found in Tables 3-5 and 3-6. If any significant differences are found, steps should be taken to either correct or explain them. However, this refinement process should not be conducted simply to keep adding or removing roadways until certain percentage guidelines are met. Bearing in mind that the classification process is as much art and science, it should still be as systematic, reproducible and logical as possible. Additionally, states and their

planning partners (to be discussed later) should document their methodology and attempt to follow it as consistently as possible.

4.4 Geographic Information Systems

Transportation agencies rely on a variety of up-to-date spatial data to carry out their planning, maintenance and operations responsibilities. The most important element of this, for functional classification purposes, is an accurate GIS-based inventory of all roadways for a given area. This inventory contains the current functional classification of all roadways and AADT estimates to calculate daily VMT.[5] Total mileage and total DMVT can then be calculated for the entire network, independent of functional classification, thereby providing the denominator for the mileage and DVMT percentages by functional classification.

State DOTs identify new roadways and roadway improvements in their State Transportation Programs (STIPs). DOTs should maintain basic information such as mileage, functional classification, lanes and traffic forecasts in a Linear Referencing System/GIS format. A variety of other GIS data can be useful in the functional classification evaluation process — this includes land use, major traffic generators and digital ortho-photography.

As DOTs move toward integrated, enterprise-wide GIS-based asset management systems, it is becoming increasingly important to ensure consistency between traditional tabular roadway inventory data and geospatial databases representing the physical roadway network. Some State DOTs have been maintaining tabular databases that contain information on the numerous attributes of a roadway (e.g., number of lanes, speed limit and functional classification).

Figure 4-2 illustrates the potential consequences of an inconsistency between databases. The example shows the merging of a GIS network and an underlying database containing functional class information. Because the network, as represented in the GIS system, does not correlate completely with the roadway section representation of the non-GIS database, the displayed non-GIS database information appears to be inaccurate.

Figure 4-2: Example of Shifting due to Inconsistency between Tabular Event Data and Geospatial Data

Source: CDM Smith

[5] Vehicle miles of travel can be calculated as: DVMT = length in miles * annual average daily traffic volume.

Today's geospatial technologies allow this data to be easily "viewed" in the context of a spatially accurate map display. Therefore, it is important that the linearly referenced tabular data, when integrated into a state DOT's traditionally separated databases, be dynamically segmented on a routed roadway network and be spatially correct.

This issue may become apparent when roadways are mapped and symbolized according to their functional classification. The mapped functional classification designations often stop short or slightly overshoot their proper terminal location.

As shown above, GIS systems enable roadway segment color coding for validation and public display. An example of a color coding scheme for roadways by functional classification is shown in **Figure 4-3**.

Figure 4-3 Sample Roadway Color Scheme

Functional Classification Codes	
Interstate	1
Other Freeway & Expressway	2
Other Principal Arterial	3
Minor Arterial	4
Major Collector	5
Minor Collector	6
Local	7

Source: CDM Smith

4.4.1 Proactive Communication and Accessibility of Information

State DOTs should create a 2-way communication network with internal and external users of functional classification information. The unit within the State DOT responsible for maintaining the official functional classification network should keep a list of internal and external users of functional classification information and provide them with guidance and a mechanism for updating functional classifications. Increasingly, enterprise-wide databases and information provided over the internet (either with static PDF maps or more sophisticated interactive, dynamic online mapping applications) allow end-users quick and convenient access to roadway attribute information, including functional classification. Additionally, internal linkages and strong lines of communication with the DOT offices responsible for asset management, system inventories and operations can ensure that updates and changes to their roadway databases are transferred to a master GIS inventory that to which the functional classification process has access.

4.5 Partners in the Functional Classification Process

Whether processing a single functional classification change request or conducting a comprehensive statewide functional classification review in response to the establishment of the updated Adjusted Census Urban Boundaries, a variety of planning partners should be involved to ensure informed consent of the functional classification designation for a State's roadways.

4.5.1 Metropolitan Planning Organizations

MPOs are the primary local contact for the DOTs in Urbanized Areas. MPOs may initiate requests for revising the functional classification of a roadway within their planning area, either on their own initiative or on behalf of member jurisdictions. For requests originating from a member jurisdiction, the MPO may conduct an initial review to ensure compliance with functional classification criteria. Typically, MPOs will forward requests along with their recommendation for approval or disapproval to the State DOT unit responsible for maintaining the functional classification information. In some cases, local governments work directly with the State DOT, with concurrence from the MPO.

State DOTs should complete the adjusted urban area boundary process within 2 years of the boundary release date.

The functional classification update should be completed within 3 years following the approval of the adjusted urban area boundaries.

4.5.2 State DOTs

For the sake of efficiency, a single specific unit with the DOT should be responsible for maintaining the official functional classification designation of all roads within the State. This unit should also be in charge of coordinating with FHWA on matters related to functional classification and be the final State decision-maker for all functional classification issues. The unit should also ensure that all submissions for changes to the functional classification of a roadway have followed the appropriate documented procedures. If the State DOT approves a change, the unit should submit the change, along with supporting information, to the FHWA division office for their review and approval. Upon receipt of FHWA approval (or disapproval), the DOT should notify the affected local jurisdiction of the decision.

DOT regional or district offices may be responsible for submitting system revisions for all State highways outside an MPO's planning area and coordinating proposed system revisions for areas within the planning jurisdiction of an MPO.

Once a change has been approved by the FHWA district office, the State DOT may revise the official repository of functional classification information and update ancillary systems and work products to reflect the change.

4.5.3 Counties and Other Agencies

Counties may be responsible for initiating functional classification changes on roadways under their jurisdiction but outside of an MPO planning area. Counties within an MPO's planning area should coordinate proposed system revisions with the MPO and submit any proposed changes to the State DOT.

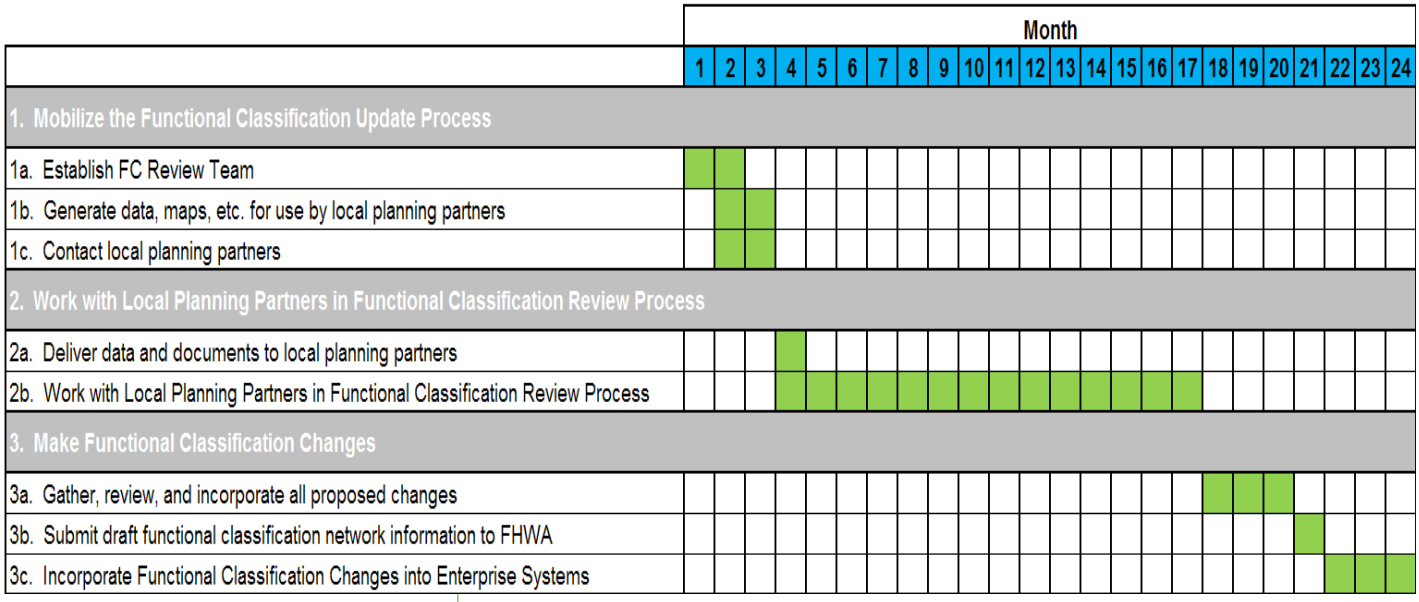
In addition to MPOs, counties and State DOTs, other local government and regional entities — such as cities, rural transportation planning organizations, regional development commissions, councils of government, etc. — may also submit changes and participate in the update process.

4.6 Suggested Procedural Tasks

This section of the guidance outlines a series of recommended technical and procedural steps to review the functional classification of a State's roadway network. These tasks should be conducted through a collaborative effort between each State DOT and its local planning partners. In an ideal setting, the State and its partners should assess whether its roadways are properly classified on a continuous basis. Because new roads and major land development projects take years of advance planning, State DOTs should anticipate and respond to functional class adjustments in tandem with development activity. Additionally, the entire network of roadways should be reviewed after the development of the adjusted urban area boundaries. For those State DOTs that actively maintain and update the functional classifications of their roadway system, this formal process should be rather straightforward.

The following suggested procedures offer the most robust and detailed steps in the update process (**Figure 4-4**). Even for the most challenging of circumstances, the process of official review and submittal of the updated functional classification system should take between 12 and 36 months to complete from the time of FHWA approval of the adjusted urban area boundaries.

Figure 4-4: Good-Practice Timeframe in Months



Source: CDM Smith

States and their partners should re-evaluate the functional classification of the road system at least every 10 years, coinciding with the decennial census. FHWA highly recommends that this process be completed within 3 years of the formal approval of the adjusted urban area boundaries. FHWA considers the State DOT to be the authority during this process and relies upon it to take an active leadership role.

FHWA division offices will correspond with State DOTs to formally launch the functional classification system review. This notice, which will accompany the approval of the adjusted urban area boundaries, will remind the State DOTs of their responsibilities and provide information regarding how and when the functional classification information should be submitted.

The following listing presents a good practice level functional classification review process with a 24 month completion timeframe, following approval of the adjusted urban area boundaries.

1. **Mobilize the Functional Classification Update Process**

    a. **Form a team to specifically guide the functional classification review and update process.** Establish a functional classification review team composed of State and regional planners that have a vested interest in the final delineation of the functional classification designations. Individuals with experience in Federal transportation funding, highway design, traffic operations and the metropolitan transportation planning process should have a seat on the committee. This review team should be responsible for reviewing proposed changes to the functional classification network from local planning partners.

b. **Generate data, maps, etc. for use by local planning partners.** Incorporate approved adjusted urban area boundaries in the enterprise GIS system and produce functional classification maps at a variety of scales that are relevant to local planning partners. These may include statewide, district, county and municipal scales.

c. **Contact local planning partners.** Contact various local planning partners to explain the task at hand and request their participation. MPO staff should be key partners, and other regional planning agencies, counties and/or local municipalities should be consulted as necessary. For many areas in which engaging local partners can be difficult, it is appropriate for State DOTs to be responsible for reviewing the functional classification of roadways.

2. **Work with Local Planning Partners in the Functional Classification Review Process**

a. **Deliver data and documents to local planning partners.** Transmit the maps described in #1b (and/or GIS data used to make such maps) to local planning partners. This transmittal should include specific instructions in terms of data formats, spatial accuracy, update processes and expected completion dates. The functional classification guidance document should also be shared with everyone involved in this process. A strong emphasis should be placed on transmitting the data in a timely fashion. In- person or video conference meetings can be extremely valuable to ensure proper communication and mutual understanding.

b. **Work with Local Planning Partners.** As necessary, a State DOT will work with the local planning partners to ensure that the functional classification review and update process meets their expectations. In urban areas, close collaboration with MPOs is extremely important. Regional workshops hosted by MPOs can be valuable in ensuring that there is a common understanding of the process and the schedule for delivery. While the exact details surrounding information exchange may vary from state to state, the local planning partners are generally expected to review the current functional classification network, in the context of the newly revised adjusted urban area boundaries, and submit a set of proposed changes to the functional classification of roadways in their area. Whether a large or minimal number of changes, sufficient explanation should be provided to justify each recommended functional classification change (see Table 3-1: Characteristics of Urban and Rural Arterials for examples). In many areas, proposed functional classification changes require formal MPO approval.

3. **Make Functional Classification Changes**

a. **Gather, review and incorporate all proposed changes.** The State DOT must review a local or regional transportation agency's

proposed changes to ensure that they are reasonable. Special attention should be paid to the consistency of classifications at regional boundaries, overall route continuity, spacing and mileage and DVMT percentage guidelines. In addition, DOTs should coordinate with neighboring States to ensure consistency at State boundaries. If possible, potential system-wide changes should be made in a "test" environment to avoid affecting the official enterprise system during the analysis of proposed changes. Follow-up meetings may be necessary to resolve issues discovered by the DOT.

b. **Submit draft functional classification network information to FHWA.** Once the State DOT has successfully reviewed and concurred with all recommend functional classification changes, it should submit the draft final functional classification network to its FHWA division office for final approval. The specific format of data delivery should be worked out between the State DOT and its FHWA division office — acceptable formats include ArcGIS or TransCAD geographic files, as well as hard copy maps at a scale sufficiently small to evaluate the functional classification network. Should the division office have any issues with functional classification network, the State DOT and the affected local planning entities should meet to decide upon a mutually agreeable solution. *Note: Any changes to the National Highway System (NHS) will need to be coordinated with FHWA HQ Office of Planning, Environment and Realty. Approval of changes to the NHS happens in FHWA HQ, and the procedures for modifications are detailed in 23 CFR 470.*

c. **Incorporate Functional Classification Changes into Enterprise Systems** Once FHWA approval has been received, any proposed functional classification changes should be made into the enterprise database systems that house the official records of roadway functional classification. These functional classification changes should be forwarded to FHWA HEPP for inclusion into the HEPGIS database and also be incorporated into the June 15th HPMS data transmittal.

An example functional classification table from Massachusetts can be found in **Table 4-1**.

Table 4-1: Example Massaschusetts Roadway Functional Classification Table

Ref #	City/Town	Roadway	From	To	Existing Classification	Proposed Classification	Distance (Miles)	Map
1	Blandford	Huntington Rd	Chester Rd / North St	Huntington Town Line	Rural Major Collector	Local Road	3.80	1
	Huntington	Blandford Hill Rd	Route 20	Blandford Town Line	Rural Major Collector	Local Road	0.83	
2	Blandford	Cobble Mountain Rd	Russell Town Line	Birch Hill Rd	Rural Major Collector	Local Road	2.80	
	Blandford	Birch Hill Rd	Route 23	Cobble Mountain Rd	Rural Major Collector	Local Road	0.24	
	Granville	Wildcat Rd	Cobble Mountain Rd	Old Westfield Rd	Rural Major Collector	Local Road	1.94	
	Granville	Phelon Rd	North Lane #2	Cobble Mountain Rd	Rural Minor Collector	Local Road	1.78	
	Granville	Cobble Mountain Rd	Phelon Rd	Russell Town Line	Rural Minor Collector	Local Road	1.30	
	Russell	Cobble Mountain Rd	Blandford Town Line	Granville Town Line	Rural Major Collector	Local Road	0.33	
3	Chester	Bromley Rd	Huntington Town Line	Skyline Trail	Local Road	Rural Minor Collector	3.14	
	Huntington	Bromley Rd	Chester Town Line	Route 112	Local Road	Rural Minor Collector	1.79	
4	Huntington	Country Rd	Route 112	Route 66	Local Road	Rural Major Collector	3.04	
5	Holyoke	Bobala Rd	Whitney Ave	West Springfield Town Line	Local Road	Urban Minor Collector	0.83	2
	West Springfield	Interstate Dr	Holyoke Town Line	Prospect Ave	Local Road	Urban Minor Collector	0.53	
6	West Springfield	Prospect Ave	Westfield Town Line	Bernie Ave	Urban Minor Collector	Local Road	2.18	
	West Springfield	Morgan Rd	Prospect Ave	Amostown Rd	Urban Minor Collector	Local Road	1.24	
	West Springfield	Amostown Rd	Morgan Rd	Pease Ave	Urban Minor Collector	Local Road	0.65	
	Westfield	Old Holyoke Rd	East Mountain Rd	West Springfield Town Line	Urban Minor Collector	Local Road	0.60	

Description of Changes

1. *Huntington Road in the Town of Blandford and Blandford Hill Road in the Town of Huntington no longer provide access to through traffic. Additionally, portions of this roadway are unsurfaced. For this reason, it is recommended that this roadway be downgraded from a Rural Major Collector to a Local Road.*

2. *The Department of Homeland Security recently closed access to Cobble Mountain Road in the Town of Blandford in order to increase security of the Cobble Mountain Reservoir. Consequently, it is recommended that all roadways discussed in Reference #2 in Table 1 be downgraded to Local Roads due to the inaccessibility and lack of continuity of the roadway functional classification system.*

Sample functional classification changes listed, with examples of supporting justification

Table 4-2 presents good practice milestones for the overall development and submittal process.

Table 4-2: Key Milestones for Development and Submittal of the Functional Classification Network

Event	Month Following FHWA Adjusted Urban Area Boundary Approval
State DOT launches the formal functional classification update process after FHWA approves the State's adjusted urban area boundaries	Month 1
State DOT works with planning partners to review and propose changes to the functional classification of its roadways	Months 2-17
State DOT gathers and processes all proposed function classification changes and submits draft final data and/or maps to FHWA division office for review	Months 18-20
DOT incorporates updates into planning process and related databases to ensure submittal of updated functional classification in upcoming June 15th HPMS submittal	Months 22-24

SECTION 5. APPLICATIONS

5.1 Performance

This section of the guidance document details a variety of ways functional classification data may be used by Federal, State, local and other entities. Transportation agencies organize many of their administrative, budgetary, operations and maintenance activities around functional classification. Functional classification is also an important organizing element in data management and highway statistics reporting.

Currently, Federal and State funding programs assign a substantial share of capital and operating resources to the Principal Arterial system, in comparison to lower functional classifications. Likewise, expectations for condition and performance tend to be higher for the higher functional classifications. There is risk associated with not investing in and maintaining the system that carries the most people and goods.

5.2 Data Needs and Reporting

Statistics derived from the Federal roadway databases are organized around functional classification. This data are used in a number of ways, including reporting on the condition of the nation's roadways to Congress and in other highway statistics reports and studies.

5.2.1 Impact of Functional Classification Changes

The changes brought about in the functional classification categories with this updated guidance document will lead to more uniform and more accurate classification of roadways across the country. This will improve the tracking, monitoring and reporting on the performance of the system and specific system elements at a national and State level.

5.3 Secondary Functional Classification Uses

Functional classification is used by transportation agencies in a number of ways, from design to maintenance. The hierarchal system correlates the purpose of a roadway with all the external factors transportation agencies handle. The functional classification of a roadway is often a factor in decision-making by transportation agencies.

- **Program and Project Prioritization** – In a climate of constrained resources, functional classification often plays a role in the prioritization of expenditures. Several transportation agencies have developed separate funding programs to support the roadway systems that serve their longest distance travel, a large proportion of which comprises the Principal Arterial system.
- **Asset Management** – Functional classification plays a role in transportation agencies' asset management programs, as agencies generally work to preserve

and protect their most important assets — those that serve the most people and goods.

- **Safety Programs** – Functional classification is used by transportation agencies to evaluate the safety of their roadways and implement safety improvement programs. Agencies consider the type of roadway in evaluating the significance of crash rates. The typical safety improvement may also vary widely depending on the functional classification of a roadway. For example, speed reduction or signage improvements may be more effective in reducing crashes on a Local Road than on an Arterial.
- **Highway Design** – There is a correlation between functional classification and design. As an illustration, lower class roadways have lower speed limits, narrower lanes, steeper curves, etc., while higher class roadways have higher speed limits, wider lanes and fewer sharp curves. The relationship between functional classification and highway design is discussed in the following section (Subsection 5.4.1).
- **Bridge programs** – Functional classification often plays a key role in a States' bridge program. For example, some States have set thresholds, such as a functional classification of Local with low traffic volume, at which 1-lane bridges are acceptable.
- **Traffic control** – Some transportation agencies may look to functional class to determine the most appropriate intersection control measure to use.
- **Maintenance** – Functional classification often plays a role in resurfacing cycles, which is related to asset management and project prioritization. The classification of a roadway also impacts general maintenance and snow/ice removal in inclement weather.

5.4 Highway Design

5.4.1 The Relationship between Functional Classification and Design

Functional class does not dictate design; however, the two influence one another. There is a great deal of latitude in the design of a roadway relative to its functional classification.

Transportation agencies may maintain their own roadway typology. But it is also important that the Federal functional classification system (e.g., FHWA reporting guidelines) be followed. Secondary roadway typologies developed by transportation agencies can be descriptive of how an agency wants vehicles to interact in different settings. Some States, for example, allow for local control over design standards in roadway-dense areas. This is essentially a form of context sensitive solutions (CSS).[6]

The following presents a summary of key resources available on how functional classification can work in concert with livable and walkable communities.

[6] Context sensitive design describes a process and practice that considers the both the immediate environment of the roadway and the transportation needs of the communities it serves. For more information, see http://contextsensitivesolutions.org.

5.4.1.1 AASHTO Green Book and *Flexibility in Highway Design*

Although States' design standards are often based on the AASHTO Green Book, FHWA's *Flexibility in Highway Design* document illustrates flexibility options for States to tailor their designs to incorporate community values while safely and efficiently moving people and goods.

The AASHTO Green Book and other design manuals recognize the relationship between highway functional classification and design criteria. The AASHTO Green Book states that, "The first step in the design process is to define the function that the facility is to serve. The level of service required to fulfill this function for the anticipated volume and composition of traffic provides a rational and cost effective basis for the selection of design speed and geometric criteria within the range of values available to the designer (for the specified functional classification). The use of functional classification as a design type should appropriately integrate the highway planning and design process."

Once the functional classification of a particular roadway has been established, so has the allowable range of design elements. It establishes the basic roadway cross section, as well as speed and the principal limiting design parameters associated with the horizontal and vertical alignment.

The Green Book explains that functional classification decisions are made well before an individual project is selected to move into the design phase. This decision is made on a system-wide basis by cities, counties or State DOTS or MPOs as part of their transportation planning process. Because these decisions require considerable lead time, the functional classification of a roadway often represents a decision made years before the road is built. After a functional classification has been assigned to a roadway, however, there is still a degree of flexibility in the major controlling factor of design speed. There are no "cookie-cutter" designs for roadways. Instead, there is a range of geometric design options available.

5.4.1.2 Livability

By FHWA definition, "Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safe streets." The term captures and recognizes the pervasive influence of transportation in our daily lives and provides a justification for transportation investments that address broader social goals such as quality of life. Specific investments include expanding the use of Intelligent Transportation System (ITS) technologies, quiet pavements and Travel Demand Management approaches in system planning and operations.

FHWA's *Livability in Transportation Guidebook* cautions that functional classification designs may not be responsive to context. The report notes the traditional association of functional classification with the movement of vehicles, but it also notes the historical lack of recognition regarding the influence of land use density and mix on the feasibility and desirability of walking, as well as the influence of land use density and mix on setting operating speeds that are appropriate for the level of pedestrian activity present. The report describes corridor re-design initiatives that have preserved mobility for vehicles and enhanced access for travel by foot. These initiatives have produced, when considering all modes, including bicyclists, pedestrians, transit users, a more optimal outcome on the mobility-access continuum.

5.4.1.3 Smart Transportation Guidebook

The *Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities, New Jersey and Pennsylvania Departments of Transportation, March 2008*, recommends an approach to roadway planning and design that tailors transportation investments to the specific needs of each project. The ultimate goal of the guidebook is to integrate the planning and design of streets and highways in a manner that fosters development of sustainable and livable communities. The guidebook proposes a new roadway typology to design roadways that better reflect their role in the community and the larger transportation network. The typology (Table 5.1 in the Smart Transportation Guidebook) is shown below as **Figure 5-1**. This scheme focuses more narrowly on the characteristics of access, mobility and speed. And, the guidebook emphasizes that this typology should be used only as a planning and design "overlay" for individual projects and should not replace the traditional functional classification system.

Figure 5-1: "Table 5.1 Roadway Categories" from the Smart Transportation Guidebook, March 2008

Roadway Class	Roadway Type	Desired Operating Speed (mph)	Average Trip Length (mi)	Volume	Intersection Spacing (ft)	Comments
Arterial	Regional	30-55	15-35	10,000-40,000	660-1,320	Roadways in this category would be considered "Principal Arterial" in traditional functional classification.
Arterial	Community	25-55	7-25	5,000-25,000	300-1,320	Often classified as "Minor Arterial" in traditional classification but may include road segments classified as "Principal Arterial."
Collector	Community	25-55	5-10	5,000-15,000	300-660	Often similar in appearance to a community arterial. Typically classified as "Major Collector."
Collector	Neighborhood	25-35	<7	<6,000	300-660	Similar in appearance to local roadways. Typically classified as "Minor Collector."
Local	Local	20-30	<5	<3,000	200-660	

Source: Pennsylvania Department of Transportation

The guide addresses design options for roadway attributes such as:

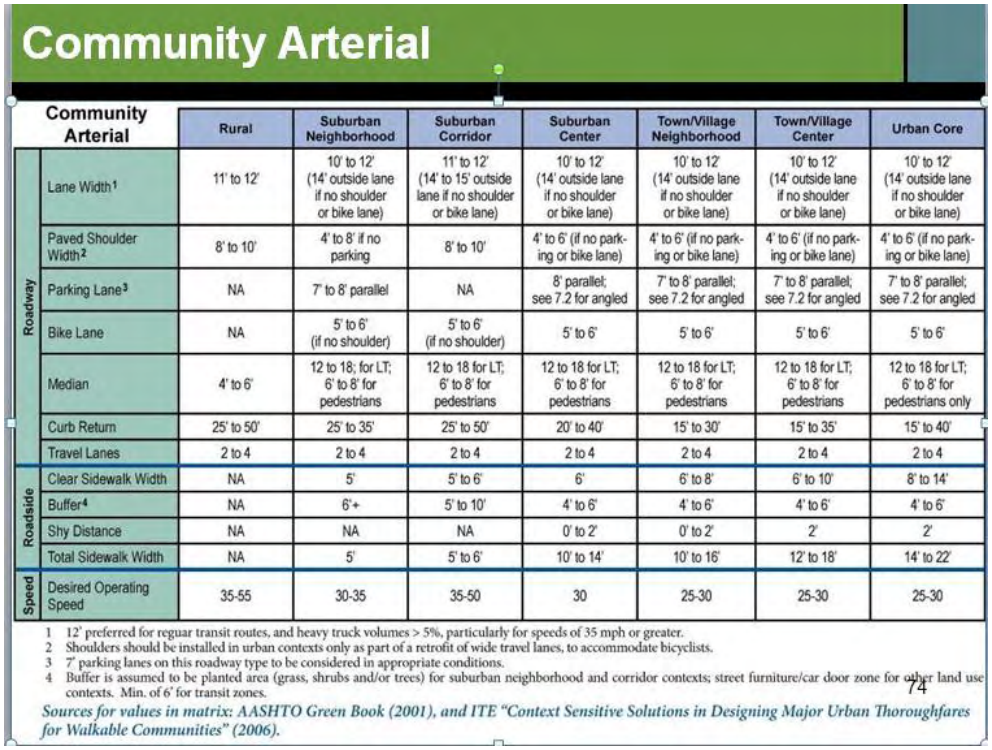
- Travel lane width
- A shift to designing for desirable operating speed versus design speed
- Shoulder width
- On-street parking
- Bicycle facilities
- Medians
- Intersections (including turn radii)
- Pedestrian facilities
- Landscaping
- Access and spacing

The guidebook describes seven prototypical development types and the design attributes appropriate for each, by roadway classification. The design options for a Community Arterial (row 2 from Figure 5-1 above) are shown in **Figure 5-2.**

Many States and localities have adopted policies that aim to consider the needs of all roadway users. Such policies have been referred to as 'Complete Streets' policies. The PennDOT Smart Transportation Guide has been identified as a good example of addressing Complete Streets issues in the American Planning Association Report #559, "Complete Streets: Best Policy and Implementation Practices."

This guidance document can be found at: http://www.smart-transportation.com/assets/download/Smart%20Transportation%20Guidebook.pdf

Figure 5-2: Community Arterial Roadway Design Guidelines in Smart Transportation Guidebook



Community Arterial

	Community Arterial	Rural	Suburban Neighborhood	Suburban Corridor	Suburban Center	Town/Village Neighborhood	Town/Village Center	Urban Core
Roadway	Lane Width[1]	11' to 12'	10' to 12' (14' outside lane if no shoulder or bike lane)	11' to 12' (14' to 15' outside lane if no shoulder or bike lane)	10' to 12' (14' outside lane if no shoulder or bike lane)	10' to 12' (14' outside lane if no shoulder or bike lane)	10' to 12' (14' outside lane if no shoulder or bike lane)	10' to 12' (14' outside lane if no shoulder or bike lane)
	Paved Shoulder Width[2]	8' to 10'	4' to 8' if no parking	8' to 10'	4' to 6' (if no parking or bike lane)	4' to 6' (if no parking or bike lane)	4' to 6' (if no parking or bike lane)	4' to 6' (if no parking or bike lane)
	Parking Lane[3]	NA	7' to 8' parallel	NA	8' parallel; see 7.2 for angled	7' to 8' parallel; see 7.2 for angled	7' to 8' parallel; see 7.2 for angled	7' to 8' parallel; see 7.2 for angled
	Bike Lane	NA	5' to 6' (if no shoulder)	5' to 6' (if no shoulder)	5' to 6'	5' to 6'	5' to 6'	5' to 6'
	Median	4' to 6'	12 to 18; for LT; 6' to 8' for pedestrians	12 to 18 for LT; 6' to 8' for pedestrians	12 to 18 for LT; 6' to 8' for pedestrians	12 to 18 for LT; 6' to 8' for pedestrians	12 to 18 for LT; 6' to 8' for pedestrians	12 to 18 for LT; 6' to 8' for pedestrians only
	Curb Return	25' to 50'	25' to 35'	25' to 50'	20' to 40'	15' to 30'	15' to 35'	15' to 40'
	Travel Lanes	2 to 4	2 to 4	2 to 4	2 to 4	2 to 4	2 to 4	2 to 4
Roadside	Clear Sidewalk Width	NA	5'	5' to 6'	6'	6' to 8'	6' to 10'	8' to 14'
	Buffer[4]	NA	6'+	5' to 10'	4' to 6'	4' to 6'	4' to 6'	4' to 6'
	Shy Distance	NA	NA	NA	0' to 2'	0' to 2'	2'	2'
	Total Sidewalk Width	NA	5'	5' to 6'	10' to 14'	10' to 16'	12' to 18'	14' to 22'
Speed	Desired Operating Speed	35-55	30-35	35-50	30	25-30	25-30	25-30

1 12' preferred for reguar transit routes, and heavy truck volumes > 5%, particularly for speeds of 35 mph or greater.
2 Shoulders should be installed in urban contexts only as part of a retrofit of wide travel lanes, to accommodate bicyclists.
3 7' parking lanes on this roadway type to be considered in appropriate conditions.
4 Buffer is assumed to be planted area (grass, shrubs and/or trees) for suburban neighborhood and corridor contexts; street furniture/car door zone for other land use contexts. Min. of 6' for transit zones.

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Sources for values in matrix: AASHTO Green Book (2001), and ITE "Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities" (2006).

Source: Pennsylvania Department of Transportation

5.4.1.4 CSS in Designing Major Urban Thoroughfares for Walkable Communities

ITE's Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, 2006 is another valuable resource for practitioners. This report advances the successful use of context sensitive solutions in the planning and design of major urban thoroughfares for walkable communities. The document, which can be found at http://www.ite.org/bookstore/RP036.pdf, provides guidance on how to apply CSS concepts and principles to create roadway improvement projects consistent with their physical settings.

Specifically, this work describes the principles, benefits and importance of CSS in transportation projects; identifies how CSS principles can be applied in the planning and development of improvements to major urban thoroughfares; describes the relationship, compatibility and tradeoffs that may be appropriate when balancing the needs of users, adjoining land uses, environment and community interests; presents guidance on how to identify and select appropriate thoroughfare types and corresponding design parameters to best meet the needs of a particular context; and provides criteria for specific roadway elements along

with guidance on balancing stakeholder, community and environmental needs and constraints.

5.5 Assessment of Functional Classification Systems

While the Federal functional classification categories play an important role in Federal, State, regional and local transportation planning, there is an emerging trend in transportation to develop new classification categories with which to group and describe roadways. At the heart of this trend is the recognition that roadways do more than move traffic. Roadways are the basic skeleton of a community and are travelways for other modes of transportation, including walking, bicycling and public transportation. The following section describes other functional classification systems in use and touches upon emerging concepts in the realm of roadway functional classification.

5.6 Emerging/Other Functional Classification Systems

While most States only use the FHWA functional classification scheme, several States have developed additional or alternative classification systems to suit their planning and engineering needs. Reasons for developing alternative functional systems include the need to incorporate unique roadway types or roadways that are not part of the Federal-aid system and the need to develop a system to meet the unique administrative or jurisdictional requirements of a State.

Oregon DOT is one State to employ a separate functional classification system. This alternate system has only four categories (Interstate, Statewide, Regional and District). While there is not a single translation to convert the Federal functional classification categories to the four State categories, **Table 5-1** represents a general "rule of thumb" that Oregon DOT uses for the translation between the two systems.[7]

Table 5-1: Oregon DOT's Functional Classification System

State Classification System (SCS)	Description	Corresponding Functional Classifications
Interstate Highways	Provide connections to major cities, regions or other states; regional trips within metro areas.	• Urban or Rural Interstate
Statewide Highways	Provide connection to larger urban areas, ports and recreational areas that are not directly served by interstate highways	• Principal Arterial – Other • Urban Principal Arterial – Other Freeway Expressway • Urban or Rural Other Principal Arterial
Regional Highways	Provide links to regional centers, statewide or interstate highways or economic or activity centers of	• Urban or Rural Minor Arterial

[7] Department of Transportation, Guidelines for Updating Federal Aid Urban Boundaries and Functional Classification, July 2003
http://www.oregon.gov/ODOT/TD/TDATA/rics/docs/InstructionsForFCReview.pdf?ga=t

	regional significance	
District Highways	Facilities of county-wide significance function largely as county and city Arterials or Collectors	• Urban or Rural Minor Arterial • Urban or Rural Major Collector • Rural Minor Collector

With the institutionalization of new concepts such as sustainability, smart growth, new urbanism and complete streets comes a different perspective on transportation as a whole and on roadways in particular. These movements have shifted the dialogue from the movement of automobiles to the mobility of persons. Some States have begun to move towards new functional classification systems. For example, the Montana DOT has introduced the concept of "multimodal" street classifications in which streets are categorized "into a hierarchy of classifications organized by function and community context, taking into account all road users, not just automobiles." These principles have also made their way into important statewide policy documents in Montana including "MDT Road Design and Traffic Engineering Manuals," "Management Memorandum ENG-03-01," and "Roadway Design Manuals and Guidelines." In this system, determining which category a road falls in looks at a host of issues: *Does this road serve mostly local or through traffic, or a mix of both? Should trucks be permitted? Is this road suitable for transit service? Are there adequate bicycle and pedestrian facilities? How do the current conditions of this street fit into the context of local area planning? What could the future of this street look like?*

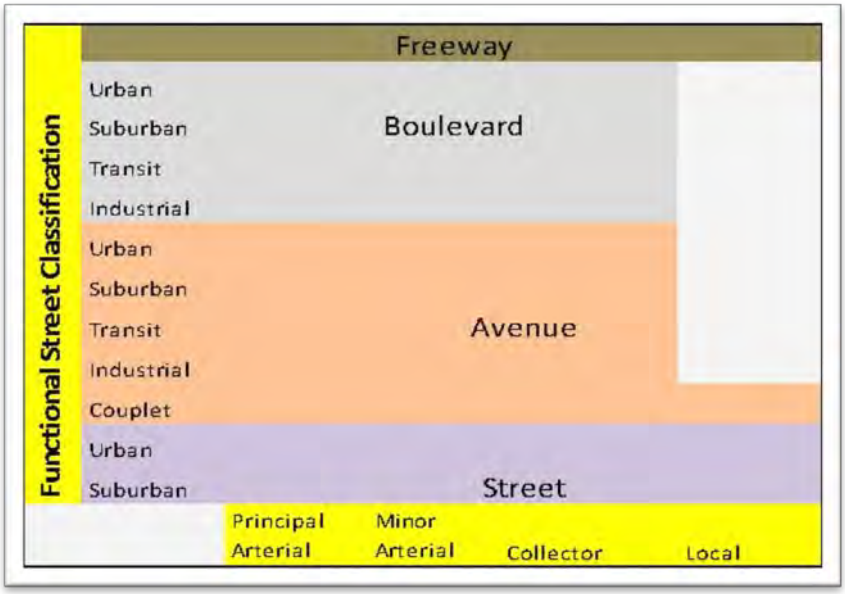
The Idaho DOT also embraces this new concept. The DOT's August 2009 Technical Report 5 entitled "Highway System Classification (Functional Classification)"[8] states that the department has come to a new understanding that *"streets should connect to their surrounding environment through adjustments in highway/street elements and functions."* This approach bucks the traditional 'one size fits all' approach to roadway design that has been effective in supporting vehicular mobility.

The new approach of multimodal street design encompasses four distinct elements or zones (the travelway zone, the pedestrian zone, the context zone and the intersection zone). Each element works with the others to accommodate the needs of multiple modes in harmony their abutting land uses, taking into account environmental, historical preservation and economic development objectives. Idaho's new functional street classification system is consistent with other national good practices which recognize the importance of the different transportation functions that are accommodated within the roadway's right of way. Increasingly, municipal thoroughfare plans are breaking the traditional "Arterial, Collector, Local" mold and using alternate typology. These typologies expand the rural/urban construct into more granular categories that recognize aesthetic and neighborhood-level concerns and explicitly account for all modes of transportation.

[8] Technical Report 5, Highway System Classification, August 12, 2009, http://itd.idaho.gov/planning/lrtp/reports/Tech%20Rept%205-Highway%20Systems%20Classification.pdf

Idaho's new functional street classification system is consistent with other national practices, which are often found at the local level. **Figure 5-3** illustrates the proposed multimodal functional street classification system (which includes the categories of Freeways, Boulevards, Avenues and Streets) and relates it to the conventional street classification system.

Figure 5-3: Idaho DOT's Proposed Redefinition of Functional Street Classifications

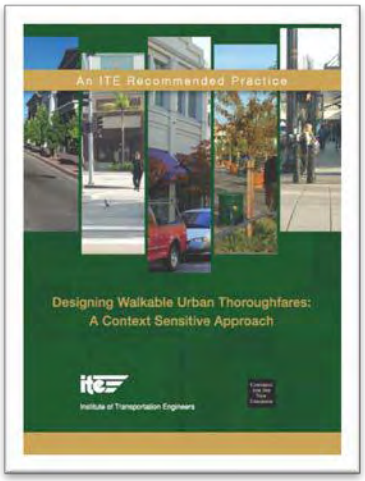


Source: Idaho Department of Transportation

Idaho Department of Transportation Statewide Transportation Systems Plan

The broadening of road typologies and design options within the context of functional classification is not limited to a few DOTs. The Institute of Traffic Engineers' *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities* [9] supports and extends this way of thinking. (**Figure 5-4**) In addition, the ARTIST (Arterial Streets Toward Sustainability)[10] concept and the United Kingdom's *Manual for Streets* [11] offer new ways of categorizing roadways that support short-distance mobility and access with design options to accommodate a variety of modes and roadway treatment options.

Figure 5-4: Referenced Report



Source: Institute of Transportation Engineers

9 Institute of Traffic Engineers, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, March, 2010.
10 Lund University, Department of Technology and Society, Arterial Streets Toward Sustainability, Sweden, http://www.lutr.net/cluster.asp?id_cluster=2)
11 Department for Transport, Manual for Streets, March 29, 2007 http://www.dft.gov.uk/publications/manual-forstreets)

5.7 Future Trends

Additionally, a significant change is occurring in the transportation industry related to the development of improvement projects focusing on the performance of the facility. Roadway performance can be measured in a number of ways, including mobility, speed, safety and surface condition, as well as by person throughput and the accommodation of multiple transportation modes. Increasingly, the character and context of the environment within which the roadway is located, as well as the expectation of its performance on a number of measures, are driving the design of roadway improvement projects. Gone are the days of simply verifying a roadway's functional classification and applying a "one-size-fits-all" approach to the application of design standards of a roadway improvement project.

This movement in transportation planning to categorize roadways beyond the traditional "Arterial, Collector, Local" spectrum will continue to evolve. Continuing research and dialogue among transportation practitioners will deepen the understanding of what these alternatives can offer to a functional classification system that is relevant and meaningful at the national level.

SECTION 6. URBAN BOUNDARIES

6.1 Introduction

Many Federal transportation programs and policies rely upon a clear and well-documented distinction between urban and rural areas. Urban and rural areas are explicitly defined by the Census Bureau according to specific population, density and related criteria. From these technical definitions, irregularities and boundaries that are separated from or inconsistent with transportation features may result. For transportation purposes, States have the option of using census- defined urban boundaries exclusively, or they may adjust the census-defined boundaries to be more consistent with transportation needs. States, in coordination with local planning partners, may adjust the urban area boundaries so fringe areas having *"...residential, commercial, industrial, and/or national defense significance"* (as noted in the December 9, 1991 Federal-Aid Policy Guide), are included.

The authority to establish the geographic definitions is set forth in Section 101(a) of Title 23 U.S.C. and subsequent guidance has been provided in 23 CFR 470 and in FHWA policy documents.

Reasons for adjusting urban area boundaries for transportation planning purposes often relate to a need for consistency or geographic continuity. For example, it may be logical to include, as part of an urban area, a roadway that is used by urban residents but is located just outside the official Census Bureau urban area boundary. Or, it may make sense to designate as urban a rural pocket in the middle of an urban area (or to address alternating patterns of rural and urban-designated areas). Additionally, large, low density land uses on the urban fringe that serve the urban population such as airports, industrial parks, regional shopping centers and other urban attractions may also be included in an urban area.

On October 14, 2008, FHWA issued the memorandum "Updated Guidance for the Functional Classification of Highways" which stated, "Functional classification should not automatically change at the rural/urban boundary." This extended the 1991 Addendum to the 1989 guidance *Highway Functional Classification: Concepts, Criteria and Procedures,* which provided "greater flexibility for deciding on an appropriate place for changing the functional classification when rural routes cross an urban boundary." The 2008 memorandum proposed further study of functional classification and urban area boundary adjustment which led to this document.

This section is intended to assemble and complete all previous policy given by FHWA for establishing urban area boundaries. It has three main objectives:

1. To provide a clear definition of adjusted urban area boundaries and other related boundaries
2. To define a set of technical and administrative processes by which States, working in conjunction with local planning partners, could develop adjusted urban areas based upon urban areas as defined by the US decennial census
3. To establish data delivery protocols from the States to FHWA

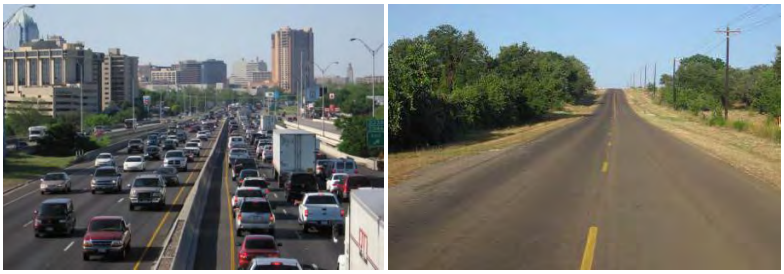
6.2 Defining Urban and Rural – Then and Now

The concept of adjusted urban areas has evolved since the issuance of the Federal guidance on the topic in Chapter 4 of FHWA's Federal-Aid Policy issued in December 1991.

The terms "urban" and "rural" mean different things to different people, and in many cases, their definitions differ depending upon the context in which they are used. At their core, the concepts of urban and rural are clear; urban areas are considered to have *dense* development patterns, while rural areas are considered to have *sparse* development patterns (see **Figure 6-1**). What has changed over the years, however, is the terminology used and the technical definitions of "dense" and "sparse".

Figure 6-1: Prototypical Urban and Rural Areas

Urban **Rural**



Source: CDM Smith

6.2.1 Past Guidance

FHWA's 1989 *Highway Functional Classification: Concepts, Criteria and Procedures* guidance document (**Figure 6-2**), used the following terminology to define rural and urban, which at the time was consistent with the definitions presented in Section 1.1 of Title 23, US Code:

Figure 6-2: FHWA Referenced Report

- The term "urban area" simply means an urbanized area, or in the case of an urbanized area encompassing more than one State, that part of the urbanized area in each such State. It also may refer to an urban place as designated by the Census Bureau as having a population of 5,000 or more and not within any urbanized area, within boundaries to be fixed by responsible State and local officials in cooperation with each other, subject to approval of the Secretary. Such boundaries should, at a minimum, encompass the entire urban place designated by the Census Bureau.
- Small urban areas are those urban places, as designated by the Census Bureau, having a population of 5,000 or more and not within any urbanized area.
- Urbanized Areas are designated as such by the Census Bureau.
- Rural areas comprise the areas outside the boundaries of small urban and Urbanized Areas, as defined above.

6.2.2 Current Guidance

6.2.2.1 Census Bureau Area Definitions

For the 2010 census, the Census Bureau defines an urban area as an area that comprises a "densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. To qualify as an urban area on its own, the territory identified according to the criteria must encompass at least 2,500 people, at least 1,500 of which reside outside of institutional group quarters."[12] The urban area criteria for the 2010 census are fully explained in Federal Register Vol. 76, No. 164, dated Wednesday, August 24, 2011.

For classification purposes, the Census Bureau identified two types of urban areas for 2010:

- Urban Clusters (UCs) of at least 2,500 and less than 50,000 people
- Urbanized Areas (UZAs) of 50,000 or more people

Rural areas are simply defined as the area that encompasses all territory **not included** within either an Urban Cluster or Urbanized Area.

6.2.2.2 Federal Highway Administration Area Definitions

There are differences in the way FHWA and the Census Bureau define and describe urban and rural areas. The Census Bureau defines urban areas solely for the purpose of tabulating and presenting Census Bureau statistical data. A number of Federal agency programs use the census definitions as the starting point (if not the basis) for implementing and determining eligibility for a variety of their funding programs.

According to FHWA's definitions, based on 23 U.S.C. 101(a), areas of population greater than 5,000 and above can qualify as urban, in contrast to the Census Bureau's threshold of 2,500. There are also differences in the terminology used to describe sub-categories of urban areas. FHWA refers to the smallest urban area as a *Small Urban Area*, while the Census Bureau refers to *Urban Clusters*. This and other differences are presented in **Table 6-1** and **Table 6- 2**.

[12] Group quarters describe non-household group living arrangements and include institutions such as include correctional facilities and military barracks.

Table 6-1: US Census Bureau Urban Area Types Defined by Population Range

Census Bureau Area Definition	Population Range
Urban Area	2,500+
Urban Clusters	2,500-49,999
Urbanized Area	50,000+

Table 6-2: FHWA Urban Area Types Defined by Population Range

FHWA Area Definition	Population Range	Allowed Urban Area Boundary Adjustments
Urban Area	5,000+	Yes
Small Urban Area (From Clusters)	5,000-49,999	Yes
Urbanized Area	50,000+	Yes

Federal transportation legislation allows for the outward adjustment of Census Bureau defined urban boundaries (of population 5,000 and above) as the basis for development of adjusted urban area boundaries for transportation planning purposes, through the cooperative efforts of State and local officials. By Federal rule, these adjusted urban area boundaries must encompass the entire census-designated urban area (of population 5,000 and above) and are subject to approval by the Secretary of Transportation (23 USC 101(a) (36) - (37) and 49 USC 5302(a) (16) - (17)).

For the purposes of the boundary adjustment process, the term "adjusted urban area boundaries" refers to the FHWA boundary adjustment process in all areas of 5,000 population and above.

During the time between the release of the Census Bureau boundaries and the formal approval of the new adjusted boundaries, the previously-developed and approved adjusted urban area boundaries remain in effect. For FHWA and State DOT planning purposes, if a State DOT chooses not to adjust the urban area boundaries (or is otherwise unable to do so within 2 years of the release of the Census Bureau boundaries), the most recent unadjusted census boundaries will take effect, and the appropriate modifications to the HPMS roadway database will need to be made to reflect the new urban/rural boundaries. This could cause a roadway previously considered to be urban to now be considered rural, which may affect Federal aid funding eligibility.

To avoid this situation, States are encouraged to work with their FHWA division office and their local planning partners to go through the process of developing the adjusted urban area boundaries within the recommended timeframe.

6.3 Relationship to Functional Classification

While the urban/rural designation is independent of the functional classification, it is important to recognize that the adjusted urban area boundary is a significant factor in developing the functional classification of a road in an urban/rural context.

Recent changes to FHWA policy have normalized the concepts of urban boundaries and functional classification to improve consistency. The seven

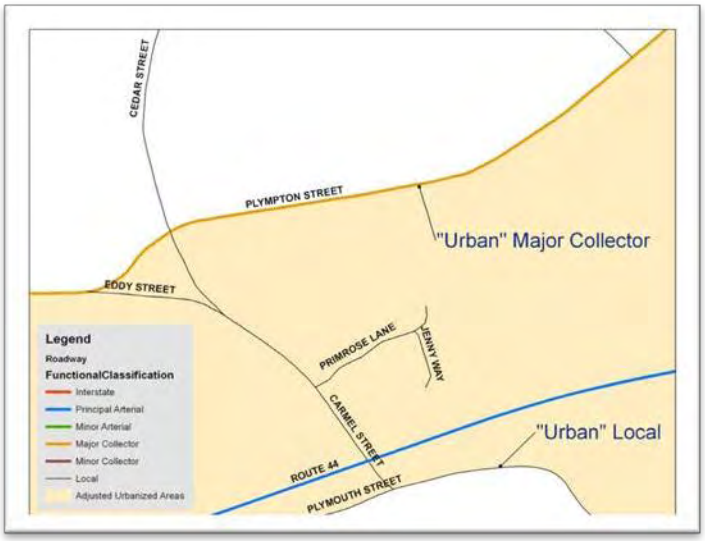
functional classifications each for urban and rural areas create 14 possible combinations of functional class and area type. In the HPMS, the combined classification of a given roadway will now come from two separate attributes -- functional system and area type. As an example, a roadway classified as a Minor Arterial that happens to be in an urban area has a combined classification of Urban Minor Arterial. There is no change in the definitions of the functionally classified roads; nor does this in any way change the eligibility of rural and urban-classified roads for Federal programs and policies, or how highway statistics are reported.

This change in policy provides an opportunity to clarify how functional classifications at the boundaries of urban/rural areas should be treated. The previous practice (in some States of automatically changing the functional classification of a route that crosses into or out of an adjusted urban area boundary can be phased out and eliminated. Upgrading due to an actual change in function should be the operative criterion.

Special attention should be paid to locations at which roadways and boundaries are in close proximity. The adjusted urban area boundary should be designed to eliminate or minimize a roadway's snaking in and out of the boundary. In these cases, as the boundary is adjusted, it needs to be clearly defined that the road is either in or out. This adjustment serves to maintain consistent designation of these peripheral routes and avoids the situation of a roadway alternating between urban and rural designations. Special care should be taken when developing the boundary so that spatial consistency is maintained with the roadways and associated attributes.

Roads that define a boundary should be considered consistently urban or rural, and it is strongly recommended that these roadways be carefully evaluated before they are included in or out of the adjusted urban area boundary. For example, in **Figure 6-3**, Plympton Street (a Major Collector) defines the adjusted urban area boundary and is considered to be an Urban Major Collector, while Plymouth Street (a Local Road) is considered to be an Urban Local Road.

Figure 6-3: Example of Roadway Coinciding with Adjusted Urban Area



Source: CDM Smith 2012; Data provided by Massachusetts DOT

6.4 Developing Adjusted Urban Area Boundaries

This section outlines a series of recommended technical and procedural steps to develop adjusted urban area boundaries. These tasks are typically conducted through a collaborative effort between State DOTs and local planning partners. The process begins with the release of the urban area boundaries by the Census Bureau and concludes with the approval of the appropriate FHWA division office. Overall, the process typically takes between six months and a year to complete from the time that the census boundaries are released.

As described previously, there is no requirement to adjust the census urban boundaries. States may adopt the census boundaries as is, or they may adjust them for transportation planning purposes. The only official requirement is that an adjusted boundary includes the original urban area boundary defined by the Census Bureau in its entirety. In other words, any adjustment must expand, not contract, the Census Bureau urban area boundary.

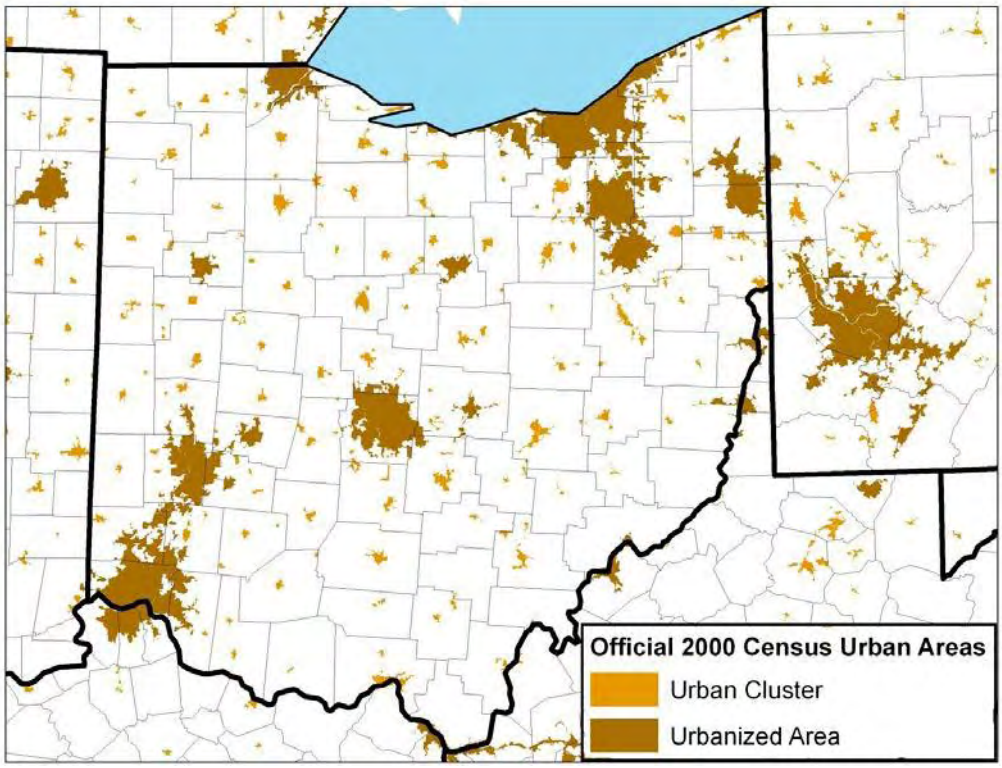
6.4.1 Adjusted Urban Area Boundaries – Technical Tasks

The first step in defining adjusted urban area boundaries is to obtain the census urban area geospatial boundary files from the Census Bureau. These files are available from FHWA's HEPGIS website www.hepgis.fhwa.dot.gov or from the Census Bureau in a variety of GIS-compatible formats, including Arc/Info export, Arc View shape file and Arc/Info format. Historical cartographic boundary files from previous censuses are available for download at: www.census.gov/geo/www/cob/bdy_files.html.

These urban area boundary files should be edited in GIS. Additional GIS layers should also be gathered from the same year as the decennial census (e.g., 2010) or of similar vintage (see **Figure 6-4**). Potentially useful GIS layers include:

- Land use, including areas of recent growth
- Roadway network
- Railroads
- Transit routes
- Ports (e.g., airports, seaports)
- Military installations
- Other significant traffic generators
- Hydrography
- Municipal boundaries (i.e., incorporated areas)
- Digital ortho-photography

Figure 6-4: 2000 Census Urban Cluster and Urbanized Areas (Ohio and Vicinity)



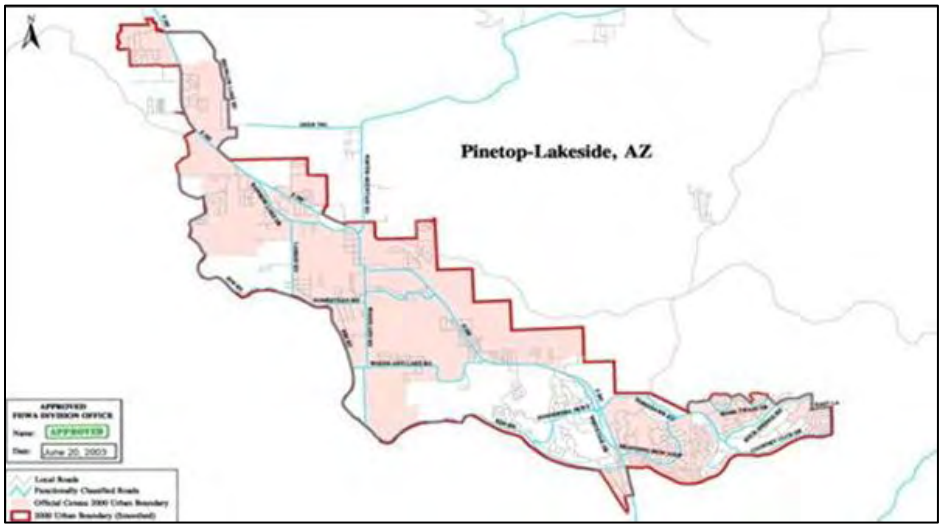
Source: 2000 US Census

6.4.2 Consideration Factors for Adjusting Urban Areas

When adjusting the urban areas, a variety of factors should be considered. The list below describes these factors and includes an example for each. All examples are courtesy of the Arizona or Massachusetts departments of transportation.

- The adjusted urban area boundary will encompass the entire urban area (of population 5,000 or greater) as designated by the Census Bureau. In **Figure 6-5**, no part of the original urban area was removed.

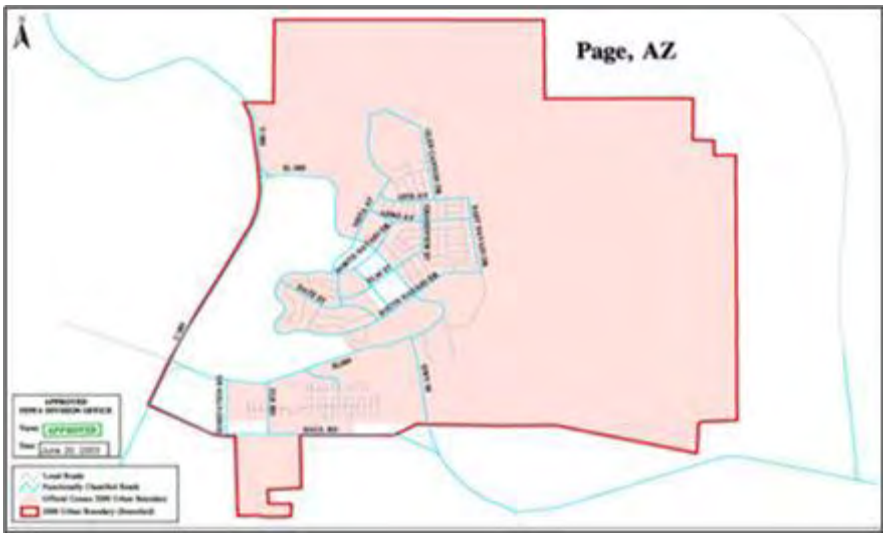
Figure 6-5: Example Original Urban Area



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp

- The adjusted urban area boundary will be one, single contiguous area. In **Figure 6-6**, the new boundary, like the original census boundary, is a single contiguous area without any holes or discontinuities, such that there is no rural area contained within the outer urban boundary.

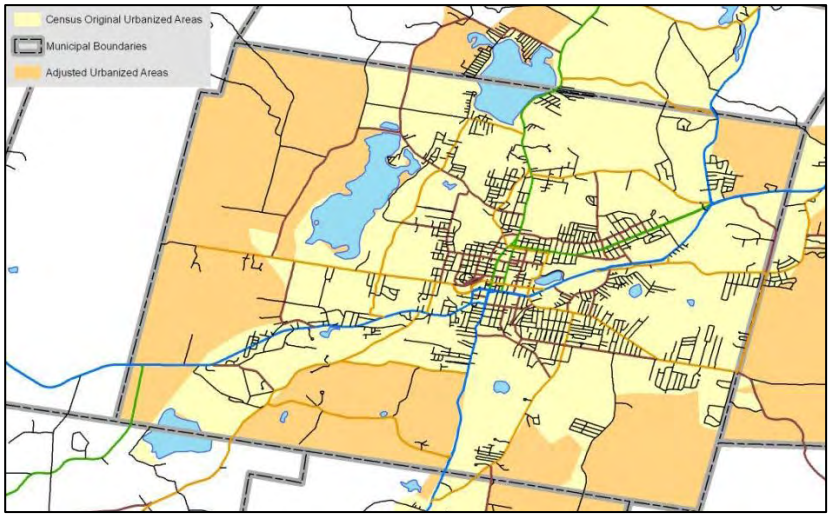
Figure 6-6: Example Single Contiguous Area



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp

- The adjusted urban area boundary may seek to include entire municipalities (such as incorporated areas) if the municipality has not extended its limits well beyond the census urban area and is likely to become part of the urban area in the next decade. ***Note:*** *This situation may arise when a city has annexed a narrow buffered area along a roadway that extends for several miles outside of the urban area or has a very aggressive annexation policy. In these situations, the urban area should not be extended to include the annexed territory.* In **Figure 6-7**, the urban area was extended to encompass the entire core municipality.

Figure 6-7: Example Entire Core Municipality



Source: Map created by CDM Smith, using data provided by Massachusetts DOT and US 2000 Census.

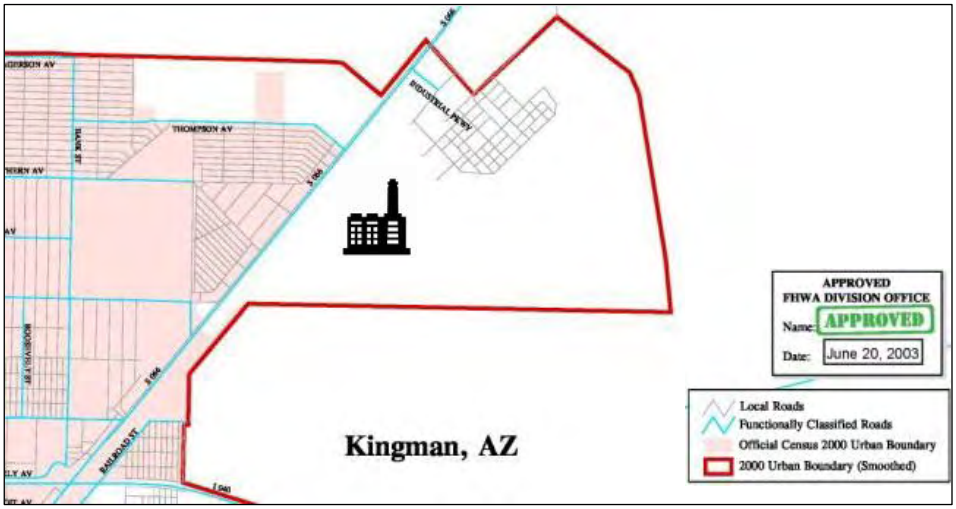
- The adjusted urban area boundary should encompass areas outside of municipal boundaries that have urban characteristics with residential, commercial, industrial or national defense land uses that are consistent with or related to the development patterns with the boundary. In **Figure 6-8**, the urban area was expanded to cover the nearby Air Force base.

Figure 6-8: Example Area Expanded to Cover Air Force Base

Source: Map created by CDM Smith, using data provided by Massachusetts DOT and US 2000 Census.

- The adjusted urban area boundary should encompass all large traffic generators that are within a reasonable distance from the urban area (e.g., fringe area public parks, large places of assembly, large industrial plants, etc.). In **Figure 6-9**, the urban area was expanded to include the industrial area east of the census urban area boundary.

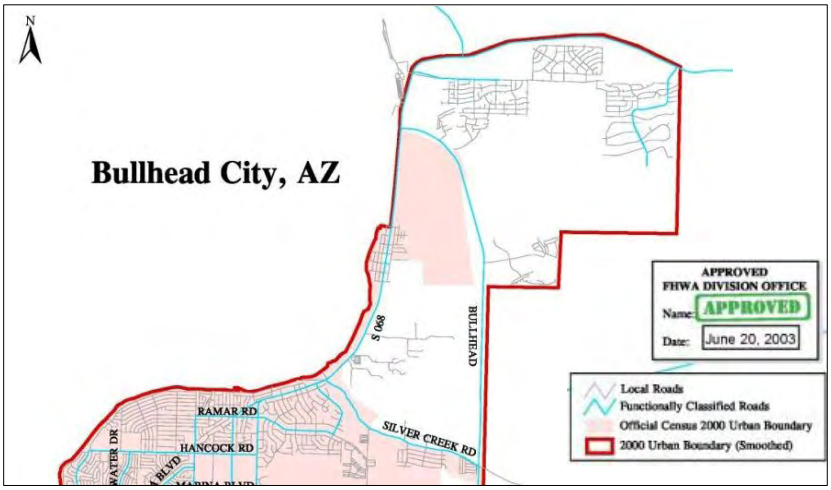
Figure 6-9: Example Area Expanded to Include Industrial Area



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp with overlay graphic by CDM Smith to identify industrial plant.

- The adjusted urban area boundary should include areas of rapidly developing urbanization that lie within a reasonable distance from the urban area. A review of local and regional plans should be conducted so that the boundary reflects expectations for the upcoming decade (i.e., until the next census urban area boundary release), accounting for anticipated development, roadway construction and city annexations. In **Figure 6-10**, the urban area was expanded to include the rapidly developing urbanization to the northeast of the census urban area boundary.

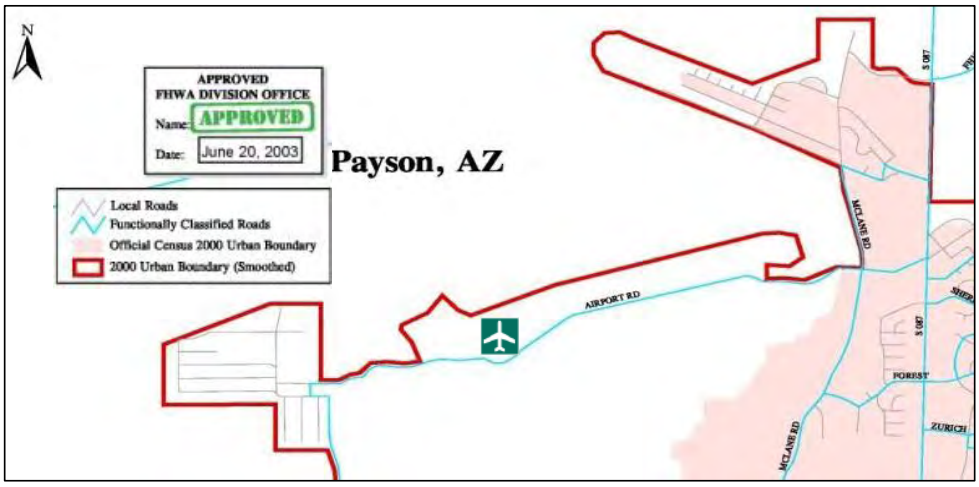
Figure 6-10: Example Area Expanded to Include Developing Urbanization



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp

- The adjusted urban area boundary should include transportation terminals and their access roads, if such terminals lie within a reasonable distance of the urban area (e.g., airports, seaports). In **Figure 6-11**, the urban area was expanded to include the airport to the west of the census urban area boundary.

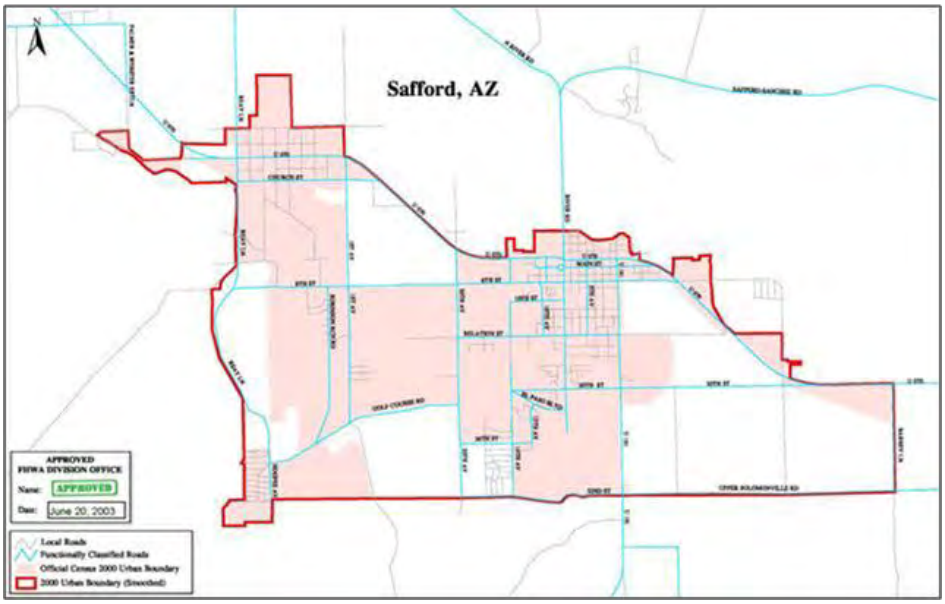
Figure 6-11: Example Area Expanded to Include Airport



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp with overlay graphic by CDM Smith to identify airport.

- The adjusted urban area boundary should consider transit service routes (e.g., bus route, passenger rail line) in the placement of a boundary location. However, their inclusion should not unduly distort the shape or composition of the original census-defined urban area boundary.
- The adjusted urban area boundary should be defined so that its physical location is easy to discern in the field from data shown on the map. Whenever possible, if the boundary is going to deviate from political jurisdictional boundaries, it should follow physical features (e.g., rivers, streams, irrigation canals, transmission lines, railroads, streets or highways). In instances where physical features are lacking, the boundary should cross at roadway intersections which are readily identifiable in the field. In **Figure 6-12**, the boundary was adjusted to align with the major east-west roadway to the south.

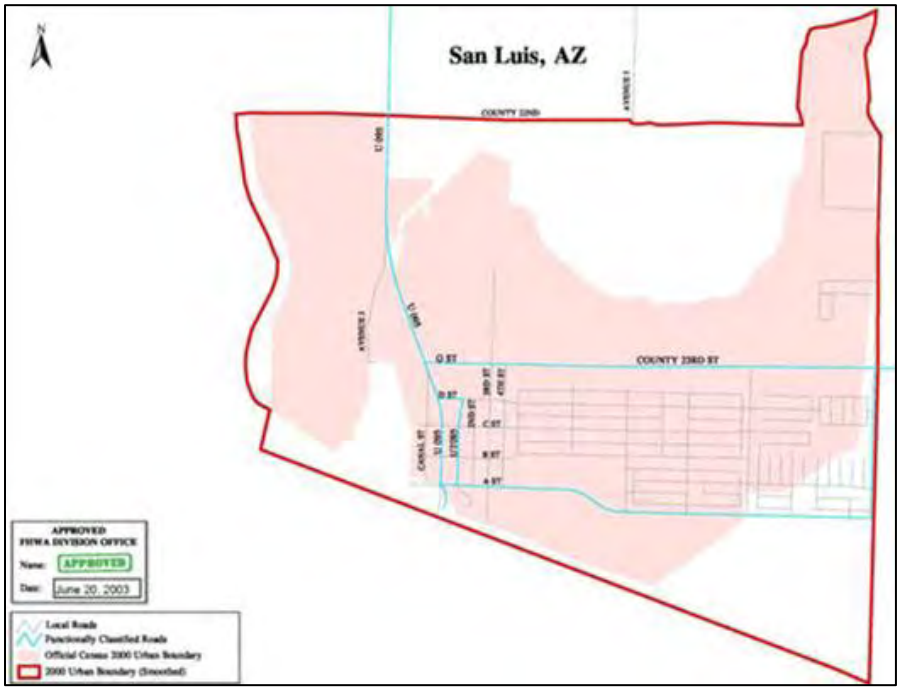
Figure 6-12: Example Boundary Adjusted to Align with Major Roadway



Source: Arizona DOT

- After the adjusted urban area boundary has been defined using all the factors previously listed, remaining boundary irregularities should be minimized to avoid the confusion that irregular boundaries can create. In **Figure 6-13**, the boundary was adjusted to be considerably less complex than the original irregular census boundary.

Figure 6-13: Example Boundary Adjusted for Simplicity



Source: Arizona DOT; http://azdot.gov/mpd/gis/fclass/urban.asp

Additional recommendations regarding the adjustment of the urban area boundaries include:

- Adjusted urban area boundaries should be defined so that confusion or ambiguity is minimized. For example, a boundary should not be drawn in the middle of a divided highway. The divided highway should be either completely in or completely out of the urban area boundary.
- In instances where a roadway defines the boundary between two urban areas, the roadway should be clearly assigned to the urban area it primarily serves. If the roadway serves each urban area equally, a business rule should be developed that assigns the roadway appropriately.
- If access controlled roadways are used to define the adjusted urban area boundary, all ramps and interchanges should be either included or excluded concerning the adjusted urban area boundary and interchanges should not be divided by the boundary.
- For coastal areas, if the intent of the adjusted urban area boundaries is to be reflective of the shoreline, then the generally accepted coastal boundaries most commonly used for geospatial processes, such as spatial analysis or map-making, should be used.

6.5 Adjusted Urban Area Boundaries – Procedural Tasks

If States and their local partners choose to adjust the urban area boundaries, then they must be reviewed, at a minimum, in conjunction with the census urban area boundary release.[13] FHWA recommends that this process be completed within 1 year of the release of the census urban area GIS datasets. FHWA considers a State's DOT, working with the appropriate local government entities, to be the authority during this process and relies upon State DOTs to take an active leadership role.

6.5.1 Risk Factors to Urban Area Adjustment Schedule

There are several risk factors that could potentially arise and impact the amount of time it takes to complete the adjustment process. Therefore each State should develop a carefully planned approach for addressing these potential risk factors, which include:

- A large number of urban areas within a State
- Newly created urban areas
- Merging of previously separate urban areas
- Urban areas that cross State boundaries
- A large number of local planning partners with which to coordinate
- Inconsistency in the application of adjustment criteria across the State
- Inconsistent interim data submittal formats
- Lack of active engagement by local planning partners
- Lack of DOT resources to complete the process in a timely fashion

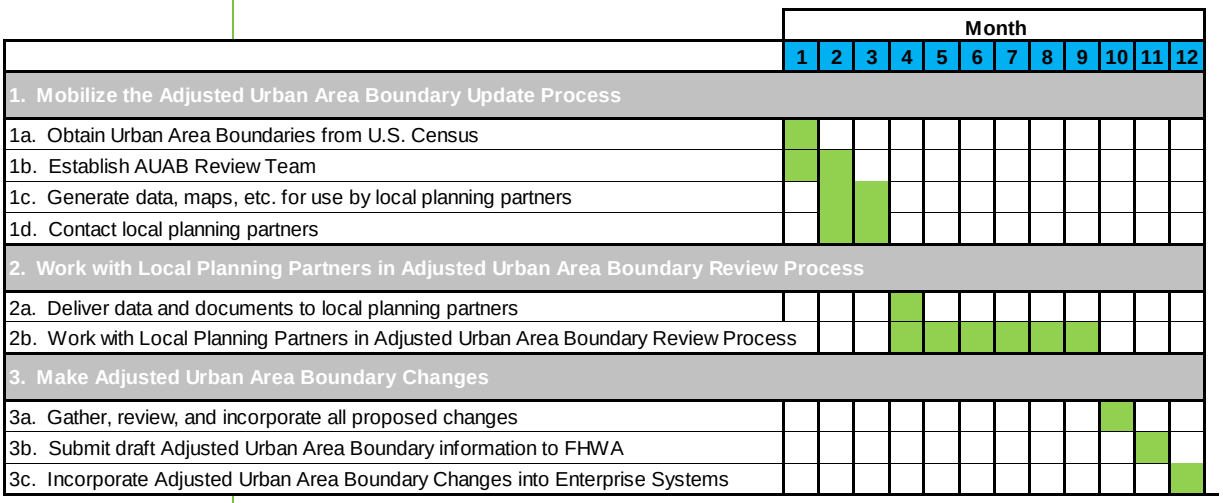
6.5.2 Urban Area Adjustment Schedule

FHWA division offices will correspond with State DOTs to launch the effort of developing the adjusted urban area boundaries. This transmittal is expected to be delivered soon after the Census Bureau releases its urban area boundaries, which typically occurs about 12 to 18 months following the decennial census. FHWA's transmittal will remind the State DOTs of their responsibilities; include notification of the availability of the Census Bureau's urban area boundary files; and provide information regarding how and when the updated boundary data should be submitted.

Figure 6-14 and the list that follows present a good practice level of procedural steps that should be completed within 12 months of the release of the Census Bureau's urban area boundary files.

[13] Although there is no specific FHWA policy on how often adjustments to urban area boundaries can be made, states are encouraged to make such adjustments as infrequently as possible and only when deemed absolutely necessary.

Figure 6-14: Good Practice Level of Procedural Steps



1. **Mobilize the Urban Area Boundary Adjustment Process**

   a. **Acquire newly developed urban area boundaries from US Census.** Obtain the latest decennial census urban area boundaries from the Census Bureau.

   b. **Form a team to guide the urban area boundary update process.** Staff the team with FHWA division personnel, along with State and regional transportation planners who have a vested interest in the final delineation of the boundaries. Individuals with experience in functional classification, Federal transportation funding, highway design, traffic operations and the metropolitan transportation planning process should have a role in this process. This review team should be responsible for reviewing draft adjusted urban area boundary submittals from local planning partners.

   c. **Generate data, maps, etc. for use by local planning partners.** Incorporate urban area boundaries from the census into data and maps that that are relevant to local planning partners. These may include statewide, district, county and municipal scales.

   d. **Contact local planning partners.** Contact the impacted local planning partners to explain the task at hand and request their participation. For Urbanized Areas contained and/or very proximate to metropolitan planning areas, the MPO should be a key partner. For Urban Clusters, regional planning agencies, counties and/or local municipalities should be consulted. However, for many of these urban areas, additional effort may be required to properly engage these partners. In these instances, it is appropriate for State DOTs to make urban area adjustments in these areas. Finally, in some instances, regional transit service providers should also be consulted to understand their short-term routing plans.

2. **Work with Local Planning Partners in the Adjusted Urban Area Boundary Update Process**

    a. **Deliver data and documents to local planning partners.** Share the original decennial census-based urban boundary maps and/or GIS data (including both Urbanized Areas and Small Urban Areas) with the local planning partners. In addition, to inform the partners and the process more completely, it helps if maps and/or GIS data representing both the previous unadjusted and adjusted urban area boundary are shared in a timely manner. This transmittal should include specific instructions in terms of data formats, spatial accuracy, update processes and expected completion dates, as well as this guidance document. In-person or video conference meetings are encouraged to enhance communication and mutual understanding. Creation of adjusted urban area boundaries should follow each State's GIS data editing and quality control procedures (e.g., issues of scale) and performed by qualified GIS users.

    b. **Work with local planning partners.** As necessary, each State DOT will need to work with the local planning partners to ensure that the urban area adjustment process is meeting their expectations. Close collaboration with MPOs is extremely important, and regional workshops hosted by MPOs can be very valuable in ensuring there is a common understanding of the process and schedule. While the exact details surrounding information exchange may vary from state to state, the expectation is that local planning partners will review the US census urban area boundaries in the context of the existing adjusted urban area boundaries (based upon the previous census) and determine the extent to which the boundaries should be adjusted for transportation planning purposes. The local planning partners should submit a set of proposed adjustments to the current US Census urban area boundaries in their area to their State DOT.

3. **Make Adjusted Urban Area Boundary Changes**

   a. **Gather, review and incorporate proposed changes from local planning partners.** As local planning partners submit their recommendations for adjusted urban area boundaries, the State DOT must review the proposed adjustments to ensure that they are reasonable. At the very least, the DOT must ensure that no territory considered urban by the Census Bureau be left out of the adjusted urban area boundary. In addition, the State DOT should review all proposed adjusted urban area boundaries paying particular attention to locations where the adjusted urban area boundaries are co-located with another feature such as a roadway, a municipal boundary or a hydrographic feature. Some follow-up meetings may be necessary to resolve issues discovered by the DOT. The updated GIS adjusted urban area boundaries need to be incorporated into the master urban boundary layer and subjected to the DOT's GIS quality control checks with the metadata for the layer updated.

   b. **Submit draft adjusted urban area boundary information to FHWA Division office.** Once the State DOT has successfully reviewed and concurred with all recommend adjusted urban area boundaries, the State DOT should submit the draft final adjusted urban area boundaries to its FHWA division office for final approval. The specific format of data delivery should be worked out between the State DOT and their FHWA division office. Various geospatial formats will be acceptable, and as developed, FHWA systems such as HPMS or HEPGIS may be used. As a final resort, hard copy maps at a scale sufficient to identify the adjusted urban area boundaries can be submitted.

   c. **Incorporate adjusted urban area boundary changes into Enterprise Systems.** Once FHWA has approved the adjusted urban areas, the State DOT should incorporate the adjusted urban area boundary changes into the enterprise geospatial database systems that house the official record of the adjusted urban area boundaries. States are required to submit their adjusted urban area boundaries to FHWA when changes are made to the boundaries. In most cases, this submittal should only occur once after the State has completed its adjustment process.

Table 6-3 presents key milestones for the overall development and submittal process (for example, using submitted data based upon the 2010 US Census data.

Table 6-3: Key Milestones for Development and Submittal of Adjusted Urban Area Boundaries

Event	Months Following Decennial Census Data Release (CDR)
Census releases urban area boundaries and FHWA issues transmittal letter	Month 24
Begin adjusted urban area boundary update process	Month 24
DOT works with planning partners to define adjusted urban area boundaries	Month 27-Month 33
Provide draft final data and/or maps to FHWA Division Office for review	Month 34
DOT incorporates updates	Month 35
DOT submits adjusted urban area boundaries via annual HPMS submittal	Month 36

Each State should submit only boundaries for the HPMS submittal that have been approved by their FHWA division office. **Table 6-4** lists the attributes that are required within the FHWA geospatial database.

Table 6-4: Geospatial Database Required Attributes

Field Name	Description
Year_Record	Year for which the data apply
Urban_Code	Census urban code
Urban_Name	Urban name
Census_Pop	Census population ("recalculated" based upon the adjusted urban area boundary)
Census_Land_Area	Census land area (in square miles)
Shape	Polygon feature

6.6 Adjusted Urban Area Boundaries – Data Transmittal Process

Each State DOT should coordinate with its local FHWA Division Office to discuss the data transmittal process. To the extent possible, all draft final boundaries should be submitted electronically in the form of GIS data and/or PDF maps. If GIS data are provided, appropriate metadata delineating the spatial accuracy, projection and definition/domain of all attributes should also be provided, as well as supporting documentation that briefly describes the process by which the boundaries were adjusted. In addition, each adjusted urban area boundary should be a single (multi-part, if necessary) polygon GIS feature. Feature names and codes should follow Federal Information Processing Standards (FIPS) conventions as well as any applicable State naming and coding standards.

SECTION 7. GRAPHICS SOURCES

Arizona DOT

CDM Smith

Creative Commons Attribution-Share Alike 2.0 generic license; Benjamin Clark

Department for Transport, United Kingdom

FHWA

Google Earth Pro

Lund University, Department of Technology and Society

Idaho DOT

Institute of Transportation Engineers

Idaho DOT

Massachusetts DOT

Minnesota DOT

Ohio DOT

Oregon DOT

Smart Transportation Guidebook

Texas DOT

US Census (2000)

Wikipedia

Memorandum

U.S. Department
of Transportation
Federal Highway Administration

SENT BY ELECTRONIC MAIL

Subject: **ACTION:** Review of Principal Arterial Routes - Due by September 20, 2012

Date: September 5, 2012

Gloria M. Shepherd

From: Gloria M. Shepherd
Associate Administrator for
Planning, Environment, and Realty

In Reply
Refer to: HEPP-10/HEPH-20

To: Division Administrators
Division Planners

This memorandum is to request that each Division Office work with their respective State to review roads classified as principal arterial within the State and identify any functional classification changes needed to the principal arterial system. A listing of any changes to the classification of principal arterials and the subsequent Division Office approval of any changes your State may request should be submitted by September 20, 2012.

Section 1104 of the Moving Ahead for Progress in the 21st Century Act (MAP-21) requires the expansion of the National Highway System (NHS) and eliminates the statutory mileage cap. The expanded NHS System will become effective on October 1, 2012. The bulk of the NHS expansion is a result of the inclusion of all principal arterials that are not a part of the current NHS, but will be added to the NHS on October 1, 2012. The FHWA will use the 2011 Highway Performance Monitoring Submittal (HPMS) to identify these non-NHS principal arterials for inclusion into the System (when the 2011 HPMS is not available, FHWA will use the 2010 HPMS in the interim).

Because October 1 is quickly approaching, we request that the State provide you with any needed changes to the existing classification of principal arterials now so they can be incorporated into the expanded NHS maps that are currently being prepared by HEP. The State needs to coordinate with the Division Office to review the existing principal arterial highways to determine whether there is a need to reclassify any of the routes. In reviewing and proposing any changes to the principal arterial system in non-urbanized areas, the State shall cooperate with responsible local officials affected by the change prior to submitting the proposed changes to the Division Office. In the case of urbanized areas, the State shall cooperate with the MPO responsible for the area affected by the change. The Division Office needs to approve these functional classification changes by September 20, 2012. Any highway functional classification changes requested by the State should be consistent with the concepts, criteria and procedures for highway functional classification described in the FHWA Highway Functional Classification Manual. It is expected that there should not be major changes to the principal arterial system within a given State as a

result of this review. Also, because of the short timeframe Divisions may make a conditional approval of the States' submittals subject to the expected MPO coordination for changes in the urbanized areas.

By September 20, 2012, please provide the Office of Planning, Environment, and Realty a list of Division Office approvals of functional classification changes to principal arterials (including from/to termini, beginning and ending mile points, and any associated maps). Please transmit the Division Office's feedback and documentation pertaining to principal arterials to Mike Neathery. For additional information, please contact Harlan Miller at 202-366-0847 harlan.miller@dot.gov or Mike Neathery at 202-366-1257 or mike.neathery@dot.gov.

References:

- Functional Classification Manual, http://www.fhwa.dot.gov/planning/processes/statewide/related/functional_classification/
- MAP-21, http://www.fhwa.dot.gov/map21/legislation.cfm

Implications of Expanding the National Highway System

Background

MAP-21 attempts to standardize the National Highway System (NHS) across states by expanding the NHS to include all urban and rural principal arterials, the main thoroughfares that carry most traffic. This expansion, which will add approximately 600 miles of routes to the NHS in Oregon, goes into effect October 1st without further action by ODOT or the Federal Highway Administration (FHWA). Many of the routes that will be added to the NHS are local roads that function as main streets for communities and serve commercial areas and central business districts. Local communities differ significantly in the extent of their principal arterial network. For example, the City of Salem has an extensive network of principal arterials that covers virtually all major roads within the city; most communities have smaller networks of principal arterials. For an interactive map showing the routes that will be added to the NHS, visit https://gis.odot.state.or.us/nhs_review/.

MAP-21 also requires that "Other connector highways that were not previously included but serve a major intermodal facility" be added to the NHS. FHWA is working on guidance for how to select these roads and also how and whether the NHS must continue to be a closed network in which all NHS routes connect to one another. This could require additional expansion of the NHS.

Implications

The NHS is designated primarily to focus federal investment on a set of high priority routes. Under MAP-21, most federal highway funding flows through the National Highway Performance Program, which funds projects on the NHS. The NHS designation is less important in other areas of federal transportation policy, such as regulating the movement of freight, which is primarily determined by the National Network designation—an overlapping but separate designation that is not directly tied to the NHS.

The expansion of the NHS has implications across a number of areas, including design standards and performance measures. The potential impacts are very manageable, and ODOT will work with FHWA and local governments to ensure that this transition to the expanded NHS proceeds smoothly and minimizes impacts on communities.

Design standards: Inclusion in the NHS has important implications for design standards for roads.

- NHS roadways must use AASHTO Green Book standards for all new construction and reconstruction projects.
- FHWA is responsible for NHS design standards and project oversight on NHS roadways. This requires FHWA to review and approve Design Exceptions on the expanded NHS system for all Interstate projects and when FHWA has Full Federal Oversight (FFO), which occurs on only a portion of projects. For projects on which ODOT has primary oversight responsibility, ODOT can review Design Exception requests.
- Under Oregon's Highway Design Manual, NHS roadways must have at least 11 foot lanes, and in some cases 12 foot lanes are required. Ten foot lanes are not allowed, though a design exception can be sought from FHWA.
- There may be other areas of highway design that could be affected by roadway segments being classified as NHS facilities. ODOT will work closely with FHWA to better define any additional design requirements other than AASHTO standards, if there are any. However, even where additional design expectations are required as part of the NHS classification, design exceptions are still an available mechanism to balance roadway design, function, context, community values, and cost. More guidance regarding design will be forthcoming.

Mobility Standards: ODOT has been working with FHWA to develop alternative mobility targets that can be used in the planning and project development process. While there are no specific state or federal mobility standards tied directly to NHS routes, FHWA has indicated that they may place additional scrutiny on applying alternative mobility targets to NHS routes on the state highway system compared to other state highways. It is not clear if this would apply to NHS routes not on the state system. Again additional guidance in this area will be forthcoming.

Performance and Asset Management: The federal performance and asset management system created under MAP-21 is heavily focused on preserving and improving the condition and performance of the NHS. Performance measures states will have to address include:

- the condition of pavements on the NHS (excluding the Interstate);
- the condition of bridges on the NHS; and
- the performance of the NHS (excluding the Interstate System).

For all of these measures, ODOT will have to set targets and report outcomes. In addition, MAP-21 sets a minimum condition threshold for bridges on the NHS: if more than 10 percent of the total deck area of bridges on the National Highway System is located on bridges that have been classified as structurally deficient, the state will face a minimum spending requirement for NHS bridges. States will also be required to develop an asset management plan for the NHS that addresses risk-based asset management and performance-based management. States are encouraged to include all infrastructure assets within the NHS corridor right of way. This may include such features as bike facilities, culverts, retaining walls, sidewalks and traffic barriers.

Data and Reporting: ODOT will be required to collect and report a variety of data on the expanded NHS. In addition to pavement conditions and truck traffic volumes, MAP-21 will require element-level data on all bridges on the NHS, and the NHS-focused performance management system will likely require additional collection and reporting of data.

Signs: New NHS routes that are not currently regulated under the federal Highway Beautification Act will become "controlled" routes. All signs on these NHS routes, including outdoor advertising signs (mainly billboards), will be subject to requirements of the Oregon Motorist Information Act (OMIA). Outdoor advertising signs are regulated for size, spacing, zoning and require a state sign permit.

Project Selection: Federal law gives states the authority for selecting projects on the NHS in consultation with local officials. This potentially gives ODOT a larger role in selecting projects on local roads, though this will likely not require an onerous process.

Motor Carriers and Freight: Truck size and weight regulations and requirements of reasonable access for trucks are both tied to the National Network rather than the NHS. Oregon's designated freight routes overlap the NHS significantly, but adding routes to the NHS will not automatically add to the freight routes. ODOT does not currently use the NHS system as a part of the implementation of ORS 366.215 regarding the reduction of freight carrying capacity.

Project Funding and Eligibility: NHS mileage in a state does not affect the total amount of federal funding the state receives nor the distribution of funding among programs; for example, more NHS mileage will not increase the amount of the state's funding dedicated to the National Highway Performance Program. Inclusion of a route on the NHS will not provide local governments additional funding opportunities for newly-designated NHS routes, as ODOT does not allocate funding in the STIP according to a road's classification.

National Highway System Expansion Working Group Report

April 2013

Government Relations Section
355 Capitol Street NE MS 11
Salem, OR 97301

Oregon Department of Transportation

Executive Summary

The most recent federal surface transportation act, Moving Ahead for Progress in the 21st Century (MAP-21), expanded the National Highway System (NHS)—the network of major highways linking most parts of the United States—to include all principal arterials. This change added 632 miles of Oregon roads to the NHS on October 1st, 2012, including 412.7 miles of state highways and 219.3 miles of local agency roads. In response to concerns from local governments and other stakeholders about the potential impacts of this expansion, the Oregon Department of Transportation (ODOT) formed an NHS Expansion Working Group consisting of technical experts within ODOT, representatives from the Federal Highway Administration (FHWA), metropolitan planning organizations (MPOs) and local governments to assess impacts, work through issues and develop solutions.

ODOT will work with local governments to review the functional classification of principal arterials as part of the decennial federal aid urban area boundary and statewide functional classification review, which will kick off in 2013 and be completed by 2015. Through this process, some routes that do not meet the criteria to be a principal arterial may be reclassified as minor arterials and may be removed from the NHS with the approval of FHWA.

The main impacts of expanding the NHS relate to federal design and project oversight requirements. Projects on NHS routes must follow AASHTO or Oregon Highway Design Manual standards, or must seek a design exception. However, AASHTO standards have a significant amount of flexibility to tailor solutions to each project's local context. What's more, flexible approaches developed by ODOT and FHWA through the working group's efforts will allow local governments to exercise their engineering judgment and approve design exceptions on many projects on the NHS. This will ensure that local governments retain significant control over their own roads and limit to an appropriate level the oversight role played by ODOT and the FHWA.

New federal performance management requirements included in MAP-21 are focused on the NHS, which will require ODOT to work closely with local owners of NHS routes on collecting and reporting data. However, these performance management requirements are unlikely to directly impose additional requirements on local governments to invest in NHS routes or penalize them if the condition of these routes slips (at least in the short term). Since the federal Highway Beautification Act requires states to control outdoor advertising signs (mainly billboards) on all NHS routes, signs on new NHS routes that were not previously regulated have become subject to regulation, and ODOT's Sign Program will be issuing permits through a streamlined application process.

The NHS is not tied to truck size and weight or truck access requirements, nor do NHS routes come with any special mobility standards, nor are they directly tied to route classifications in the Oregon Highway Plan.

Background

The most recent federal surface transportation act, Moving Ahead for Progress in the 21st Century (MAP-21), expanded the National Highway System (NHS)—the network of major highways linking most parts of the United States—to include all principal arterials, the main thoroughfares that carry heavy volumes of traffic. This change was proposed by the U.S. Department of Transportation as a means of standardizing the NHS across states, as some states included more or less of their principal arterial network in the NHS than others when it was originally designated.

This change added 632 miles of roads in Oregon to the NHS on October 1st, 2012. Of these miles added to the NHS, 412.7 miles (65 percent) were on state highways owned and operated by ODOT, while the remaining 219.3 (35 percent) were local agency roads. Some communities—particularly the City of Salem—have a much more extensive network of principal arterials than other areas of the state.

Expanding the NHS comes with some implications. Projects on NHS routes face a higher level of interest from the federal government and must process a design exception with the Federal Highway Administration (FHWA) or ODOT if they do not meet AASHTO design standards or the Oregon Highway Design Manual. In addition, because MAP-21's performance management system is strongly focused on the NHS, conditions on local agency roads will factor into whether Oregon meets its targets for the condition and performance of the NHS. However, the NHS is not tied to truck size and weight or truck access requirements; these are based on the National Network, a separate but frequently overlapping network. NHS designations do not come with any special mobility standards, nor are they directly tied to route classifications in the Oregon Highway Plan.

To respond to concerns from local governments and other stakeholders about the potential implications of this expansion, ODOT formed an NHS Expansion Working Group consisting of technical experts within ODOT, representatives from FHWA, MPOs and local governments to work through potential issues and find solutions. This brief report lays out the conclusions of this group and steps that need to be taken to ensure smooth implementation.

Making Modifications to the Expanded NHS

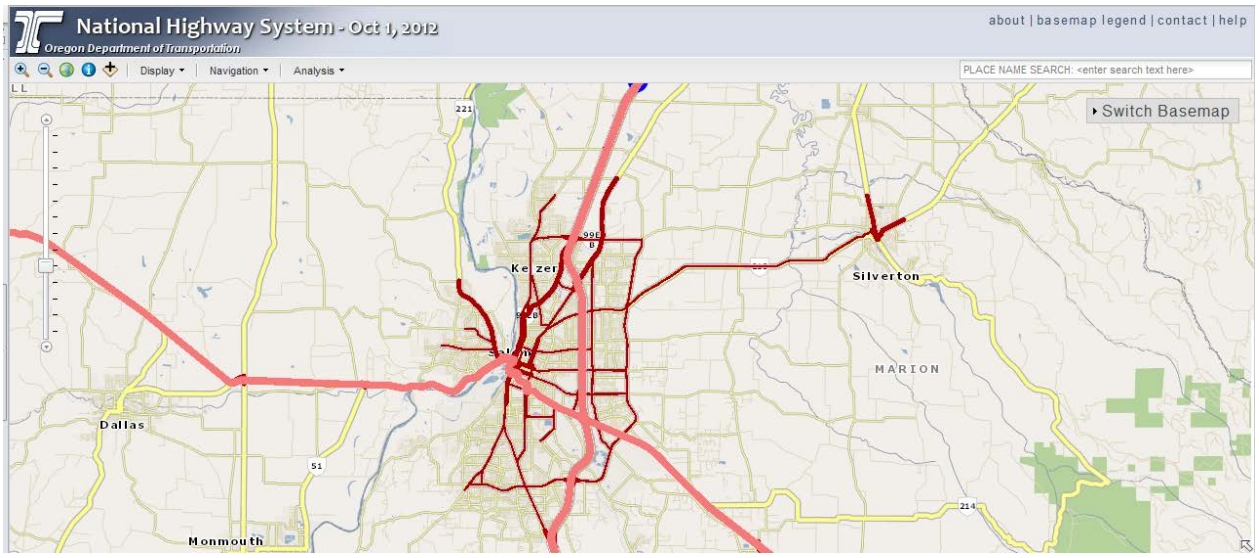
Local governments that would like to see a street removed from the NHS will have an opportunity to have the classification of the street reviewed as part of the upcoming federal aid urban area boundary and statewide functional classification review. The review takes place on a decennial basis to redraw the federal aid urban boundaries after each Census and review the functional classification of roads. Local governments may contact ODOT's Road Inventory and Classification Services Unit at any time to request a change to a road's federal functional classification or NHS status. However, because this major addition to the NHS system occurred in close proximity to the upcoming statewide FC review, the FHWA Oregon Division Office has asked that requests for functional classification and NHS

updates generally take place as part of the statewide functional classification review. This allows for a comprehensive system review rather than an ad hoc, road by road review. The FHWA Oregon Division Office will need to approve all functional classification changes.

While all principal arterials as of October 1, 2012 were added to the NHS, the two designations are not inherently linked going forward. As a result, simply downgrading a road from a principal arterial to a minor arterial will not automatically remove it from the NHS. Nonetheless, the FHWA Oregon Division Office has asked that principal arterials and the NHS generally remain closely aligned, though the Division Office may approve decoupling the two designations where it can be justified.

As a result, removing a local road from the NHS will be a two step process. First, through the federal functional classification review, local governments will need to show that the road does not fit the federal definition of a principal arterial, not just that they do not wish to have the road remain on the NHS because of the potential impacts. Second, a separate request to remove the route from the NHS must be submitted by the local agency to ODOT with concurrence from the affected local jurisdictions (including the MPO in an urbanized area). After an ODOT and FHWA Oregon Division Office review, the Division Office will submit the request to FHWA headquarters for final approval.

The functional classification review will begin in 2013, though the exact timing of the initiation of the review will depend on when the FHWA functional classification manual and guidance on functional classification reviews is finalized. The review will be facilitated by ODOT's region planning staff, who will work with local governments and metropolitan planning organizations. The review is expected to be completed by mid-2015.



ODOT's GIS unit has developed an interactive online map showing the routes added to the NHS, including local streets. A link to the application is available on ODOT's NHS Expansion webpage.

Oversight of Local Projects on the NHS

Some local governments have expressed concern about loss of local control of their roads that have been added to the NHS. While local agency roads on the NHS will face some additional requirements, local governments will retain significant local control, particularly given flexibility in design standards and flexible approaches to design exceptions that ODOT and FHWA have developed. Though projects on the NHS need to meet AASHTO or ODOT design standards, the expansion of the NHS is not anticipated to significantly increase the role of ODOT and FHWA in local transportation projects.

Design Standards

New construction, reconstruction and preservation projects on NHS roadways must use AASHTO standards or ODOT design standards if on an ODOT facility. This requirement applies to projects on the NHS, regardless of whether they are funded by the federal government or by state and local resources. FHWA has agreed to allow for two sets of standards on the NHS: while projects on state highways on the NHS are required to follow the ODOT Highway Design Manual, which is more prescriptive than the AASHTO manual in some areas, projects on local government NHS roads can follow AASHTO standards, this may pose challenges for some local governments that may not currently follow AASHTO standards. ODOT has consulted the Motor Carrier Transportation Advisory Committee (MCTAC) about this dual treatment of design standards on NHS roads, particularly related to vertical clearance and lane widths, and MCTAC did not express any concerns on impacts on the trucking industry.

Two areas of particular interest to local governments are vertical clearance and lane width standards. ODOT has put in place a 17 foot vertical clearance standard for the NHS, which is higher than AASHTO standards of 16 feet for most routes. Local governments will not be subject to this ODOT standard, however, and can use the AASHTO standard instead. AASHTO standards provide a range of lane widths based upon roadway culture and characteristics such as functional classification, volumes, speeds, and large vehicle traffic. For urban arterials, AASHTO standards allow for 10 foot lanes in constrained areas for arterials that have low truck and bus volumes and are low speed routes. AASHTO notes that 11 foot lanes are used quite extensively in urban arterial street design.

Guard rails and other roadside safety features are also a potential issue, as AASHTO standards require upgrading roadside safety features that don't meet safety standards when undertaking highway projects, including pavement preservation projects. Local agencies are concerned that this requirement could add significant cost to some pavement preservation projects, reducing the number of miles that can be resurfaced, particularly if there are no funding sources available to help pay for the additional costs.

Some local agencies have also expressed a concern about requirements for shoulders in urban areas given the prevalence of bicycle lanes and on-street parking. While AASHTO guidelines consider shoulders desirable, the standards look at total roadway width, which

can be used for shoulders, bicycles, or parking as deemed appropriate. Similarly, some advocates for non-motorized transportation have expressed concern about whether inclusion in the NHS would preclude designing streets to facilitate active transportation or encourage mobility of vehicles at the expense of bicyclists and pedestrians. However, AASHTO standards have significant flexibility to design features for non-motorized users, and inclusion in the NHS does not come with any special vehicle mobility standards.

Design Exceptions

Projects on local agency NHS roads that fall outside the AASHTO standards can process a design exception with ODOT and FHWA. In many cases, a formal design exception is not needed because the AASHTO standards offer a range of options depending on traffic volumes and other conditions. ODOT plans to update the state's highway design manual to clarify the standards and design exception procedures given the inclusion of these local agency roads. ODOT staff reviewing these requests will be educated about this process and will be able to provide guidance about when projects do not require a formal design exception request. For example, as noted above 10 foot lanes may be acceptable in appropriate locations without requiring a design exception.

For most projects on the NHS (including federally-funded projects), ODOT will be able to approve design exceptions, though FHWA will need to review and approve design exceptions for all projects subject to Full Federal Oversight (see below). ODOT and FHWA have developed a streamlined procedure for non-federally funded projects on local agency roadways. For these projects, local governments will be able to process and approve design exceptions. Local agencies will need to maintain a list of these design exceptions

Authority to Approve Design Exceptions

Type of Agency	Funding Source: Federal	Funding Source: Non-Federal
Certified Local Public Agencies on a local agency facility	Local Government	Local Government
Non-Certified Local Public Agencies	ODOT	Local Government

*For local agency roadway projects not subject to Full Federal Oversight. FHWA will review and approve design exceptions for all FFO projects. ODOT will review and approve design exceptions for all projects on an ODOT facility and on bridges on the ODOT inventory list.

and provide ODOT contract plans and design exceptions either on a project by project or annual basis. ODOT will act as an auditor, periodically reviewing design exceptions approved by local governments to ensure that local governments are meeting requirements and working with local governments to correct any issues. As is the usual procedure, certified local agencies will be able to take on ODOT's role of approving design exceptions on federally-funded projects, except those on bridges and state highways.

For more information on these design standards and processes, see the document *NHS Design Standards for ODOT and Local Agencies* posted on ODOT's NHS Expansion webpage.

Full Federal Oversight

FHWA applies Full Federal Oversight (FFO), a heightened level of federal review, on specific projects that are complex and/or high risk. Under FFO, FHWA reviews design exception requests and directly oversees other aspects of the project. While some local projects on the NHS will be selected for FFO, this determination is based on a project's risk and complexity, not based on whether it is on the NHS, so the addition of local agency roads to the NHS should not increase the number of FFO projects.

Certified Local Public Agencies

Certified local public agencies (CLPAs) are local governments that have gone through an extensive process to demonstrate their capability to administer federal-aid highway projects. FHWA has agreed to extend typical authorities of CLPAs to the NHS.

CLPA projects that are on locally owned and maintained NHS facilities may be administered by the CLPA using AASHTO standards subject to the Stewardship Agreement between FHWA and ODOT. This applies to both federally funded certified projects and state/locally funded projects. While ODOT will retain responsibility for work on state highways that are NHS facilities, local agencies may perform work on an ODOT-owned NHS route if ODOT and the local agency agree and ODOT provides written approval authorizing such work. The written approval is in the form of an intergovernmental agreement and a permit which includes language that details the roles and responsibilities of the local agency and the state.

Funding for Projects on the NHS

Under MAP-21, nearly two-thirds of the federal highway funding flowing to Oregon is focused on the National Highway System, leading some local governments to question whether it might be financially advantageous to have their roads included in the NHS. However, the expansion of the NHS brings no additional resources to Oregon for the NHS, as funding levels under the National Highway Performance Program (NHPP) are not based on a state's NHS mileage. What's more, ODOT makes use of the flexibility of the federal-aid highway program to make federal funds fit the projects selected by the state in various programs, rather than selecting projects on the NHS specifically to match the amount

provided under the NHPP. ODOT combines NHPP money with other state and federal funding sources in the Statewide Transportation Improvement Program, with projects selected based on their priority for the transportation system as a whole rather than on whether they are on an NHS route. As a result, there is currently no mechanism in ODOT's project selection processes that would increase the likelihood of an NHS facility receiving additional federal resources. However, local governments may be able to secure funding for NHS routes through the Enhance program in the 2015-2018 STIP.

Performance and Asset Management Requirements

MAP-21 creates a federal performance and asset management framework that is heavily focused on preserving and improving the condition and performance of the NHS. Under this framework, the U.S. Department of Transportation (US DOT) will create performance measures in the following areas related to the NHS:

- condition of pavements on the NHS (excluding the Interstate);
- condition of bridges on the NHS; and
- performance of the NHS (excluding the Interstate System).

Once US DOT has set specific measures in these areas, ODOT will be required to set targets for Oregon's NHS network and report outcomes. In addition, MAP-21 sets a minimum condition threshold for bridges on the NHS: if more than 10 percent of the total deck area of bridges on the National Highway System is located on bridges that have been classified as structurally deficient, the state will face a minimum spending requirement for NHS bridges.

States will also be required to develop an asset management plan for the NHS that addresses risk-based asset management and performance-based management. States are encouraged to include in their plan all infrastructure assets within the NHS corridor right of way. Guidance from FHWA on development of the NHS asset management plan will be needed.

Given the focus of the federal performance management system on the NHS, ODOT will have to work extensively with local governments to collect and report data on the condition and performance of local agency roads on the NHS. ODOT will also need to work with local governments on the development of the NHS asset management plan. While there are limited penalties and spending requirements associated with the performance management system, the requirement for states to set targets for the conditions and performance of NHS routes could push states and local governments to invest more resources in NHS facilities, potentially at the expense of other transportation needs. ODOT will monitor these requirements closely and work with local governments to implement the performance and asset management system.

Outdoor Advertising Signs

Under the federal Highway Beautification Act, states are required to have effective control of Outdoor Advertising Signs (mainly billboards) on all NHS routes or face loss of significant federal highway funding. As a result, new NHS routes that were not previously regulated have become subject to the federal law and the Oregon Motorist Information Act. Outdoor Advertising Signs require a state permit, are regulated for size, spacing and zoning, and must meet local codes. Since all state highways are already regulated, the expansion of the NHS only adds local agency roads to the list of controlled routes.

ODOT's Sign Program has inventoried signs on the newly controlled routes and has engaged the industry in the permitting process. Sign companies will be able to apply for a permit for signs on new NHS routes and at a reduced fee. Given the timing of the functional classification review, the Sign Program will need to move forward with permitting before decisions may be made that take some routes off the NHS. For any signs on routes that are removed from the NHS and are no longer subject to state sign regulation, ODOT will cancel those permits and refund any application fee paid.

For Additional Information

ODOT has developed an NHS Expansion webpage that includes resources, including:

- An interactive map of the expanded NHS
- A list of local road and bridges now included in the NHS
- Information on design standards for state and local NHS routes
- Links to ODOT resources on federal functional classification
- Links to FHWA resources on the NHS expansion

This webpage is available at www.oregon.gov/ODOT/GOVREL/Pages/ODOT's-National-Highway-System-Expansion-webpage.aspx.

Key Contacts

The following contacts in ODOT and FHWA are available to answer questions about the expanded NHS.

Heather King, ODOT Road Inventory and Classification Services Unit Manager, heather.l.king@odot.state.or.us, for questions about NHS designation and the functional classification review process

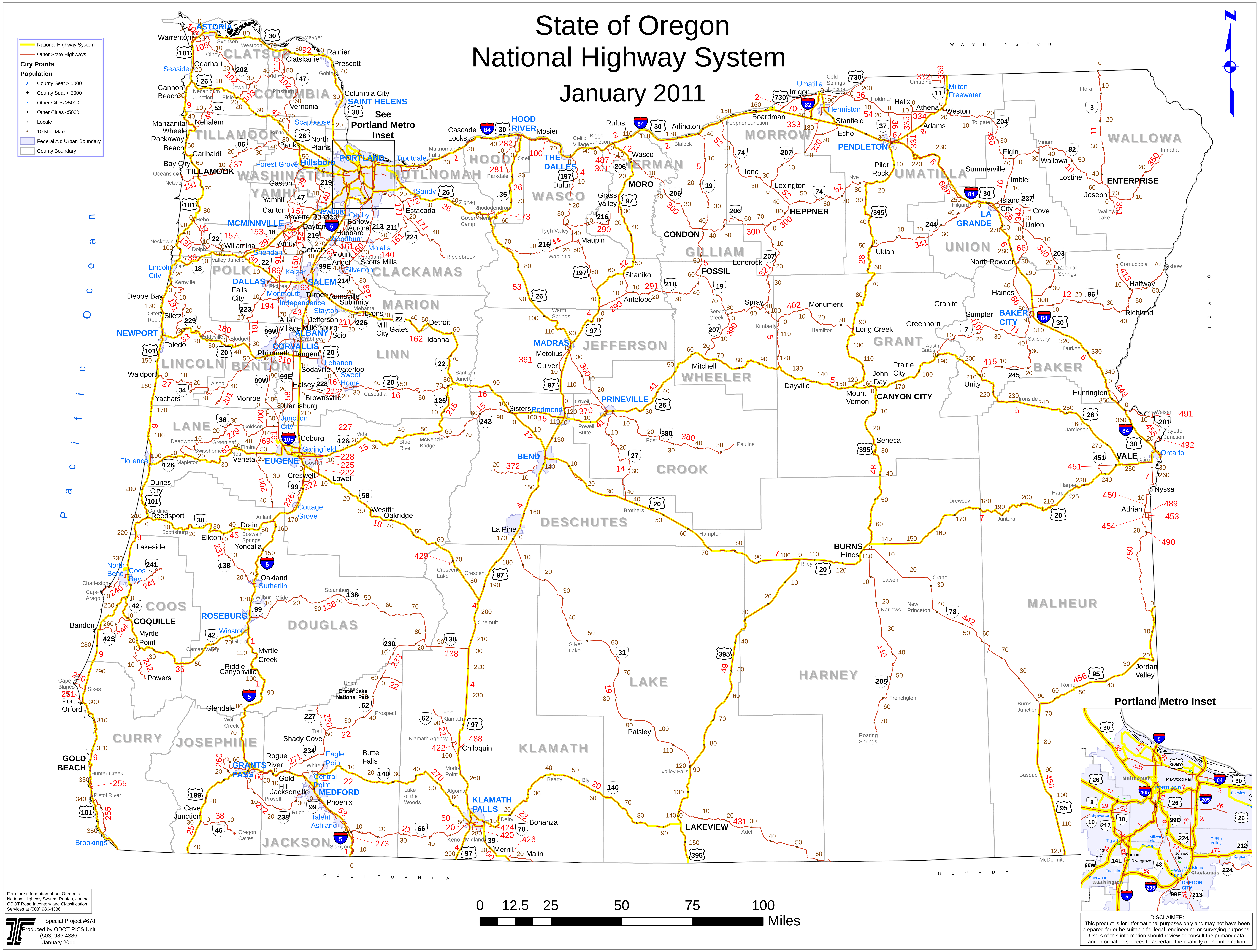
Satvinder Sandhu, FHWA Oregon Division Office, **satvinder.sandhu@dot.gov,** for questions about FHWA's approach to NHS adjustments and the functional classification review

Steve Lindland, ODOT Roadway Engineering Unit Manager, steven.r.lindland@odot.state.or.us, for questions about design standards

Mark Foster, ODOT Certification Program, mark.a.foster@odot.state.or.us, for questions about the role of certified local public agencies in administering projects

Wendy Elstun, ODOT Sign Program, wendy.s.elstun@odot.state.or.us, for questions about regulation of outdoor advertising signs

Travis Brouwer, ODOT Federal Affairs Advisor, travis.brouwer@odot.state.or.us, for general questions about MAP-21 and expansion of the NHS


State of Oregon
National Highway System
January 2011
National Highway System
Other State Highways
City Points
Population
County Seat > 5000
County Seat < 5000
Other Cities >5000
Other Cities <5000
Locale
10 Mile Mark
Federal Aid Urban Boundary
County Boundary
See Portland Metro Inset
Portland Metro Inset
W A S H I N G T O N
C A L I F O R N I A
N E V A D A
I D A H O
P a c i f i c O c e a n
CLATSOP
COLUMBIA
TILLAMOOK
WASHINGTON
MULTNOMAH
HOOD
WASCO
SHERMAN
GILLIAM
MORROW
UMATILLA
UNION
WALLOWA
YAMHILL
POLK
MARION
CLACKAMAS
LINCOLN
BENTON
LINN
JEFFERSON
WHEELER
GRANT
BAKER
LANE
DESCHUTES
CROOK
HARNEY
MALHEUR
COOS
DOUGLAS
CURRY
JOSEPHINE
JACKSON
KLAMATH
LAKE
ASTORIA
ST. HELENS
HILLSBORO
PORTLAND
OREGON CITY
TILLAMOOK
MCMINNVILLE
DALLAS
SALEM
NEWPORT
CORVALLIS
ALBANY
EUGENE
HOOD RIVER
THE DALLES
MORO
CONDON
HEPPNER
PENDLETON
LA GRANDE
ENTERPRISE
FOSSIL
MADRAS
PRINEVILLE
BEND
CANYON CITY
BAKER CITY
VALE
BURNS
LAKEVIEW
KLAMATH FALLS
MEDFORD
GRANTS PASS
ROSEBURG
COQUILLE
GOLD BEACH
0 12.5 25 50 75 100
Miles
For more information about Oregon's National Highway System Routes, contact ODOT Road Inventory and Classification Services at (503) 986-4386.
Special Project #678
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(503) 986-4386
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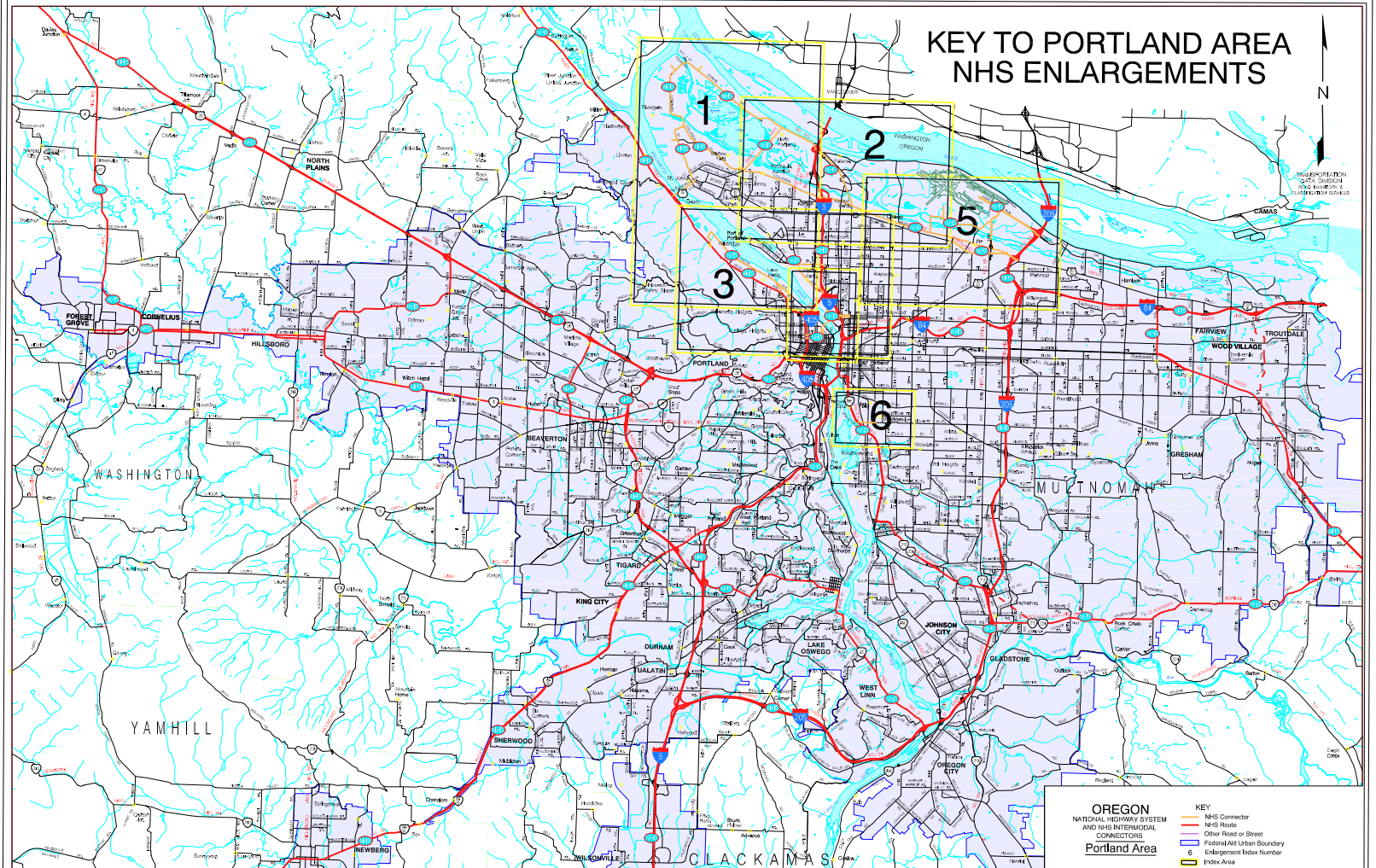

REVISED AUGUST 2005

MAP-21 - Moving Ahead for Progress in the 21st Century

National Highway System Questions & Answers

Posted 9/25/2012, *Updated 1/15/2013*

General Information

Question 1: Will all principal arterials that are not currently on the NHS be automatically added to the NHS, effective October 1, 2012?

Answer 1: Yes, principal arterial routes that are not currently on the NHS before October 1, 2012, will automatically be added to the NHS provided the principal arterials connect to the NHS. [23 USC 103(b) (2)(1)(B) as amended by Section 1104 of MAP-21] The automatic addition of the identified principal arterial routes to the NHS will be a onetime occurrence. Future additions to the NHS of eligible principal arterial routes after October 1, 2012, will follow procedures currently outlined in 23 CFR Part 470.

Question 2: How will the States be notified about the updated NHS?

Answer 2: The FHWA, through our Division Offices, will notify the States of the updated NHS via a memorandum and will post new NHS maps online by October 1, 2012. http://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/

Question 3: Should States work with Division Offices to make any desired changes to the existing classification of principal arterials prior to October 1, 2012?

Answer 3: Yes. Pursuant to the FHWA's September 5, 2012, memorandum, States were advised to work with their respective Division Offices to review roads classified as principal arterial within the State and identify any functional classification changes needed to the principal arterial system. A listing of any changes to the classification of principal arterials and the subsequent Division Office approval of any changes your State may request was due to the Office of Planning, Environment, and Realty by September 20, 2012.

Question 4: What criteria will be used to determine which principal arterials will be automatically added on the NHS?

Answer 4: The FHWA will determine which principal arterials will be automatically added to the NHS by following current criteria for adding a route to the NHS under 23 CFR 470.113. Under this regulation, the route must meet the criteria in 23 CFR 470.107(b), which provides that the NHS shall consist of interconnected urban and rural principal arterials and highways which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel.

The criteria under 23 CFR 470.113 also require proposals for additions to the NHS to consider the guidance contained in Appendix D to 23 CFR Part 470. The FHWA will follow the guidelines of Appendix D, except that the FHWA will not require the route to connect at both ends to other routes on the NHS. Rather, the FHWA will add a principal arterial to the NHS if it connects only at one end. Requiring a connection at one end will continue to meet the regulatory requirement that the NHS be interconnected. The FHWA will initiate a rulemaking to update the guidance contained in Appendix D to 23 CFR Part 470 at some future date.

Question 5: Before October 1, 2012, what do States need to submit to FHWA?

Answer 5: States are not required to submit any documentation, such as formal letters, principal arterial maps, or route listings, prior to October 1, 2012 in order for facilities that are currently classified as principal arterials to be included on the NHS. For facilities that are not currently classified as principal arterials, FHWA Divisions will work with States to make the necessary classification changes (see Q&A #12 below).

Question 6: What information will FHWA use to update the NHS maps?

Answer 6: The FHWA will use the principal arterial coding from the 2011 Highway Performance Monitoring System (HPMS) to update the NHS maps. For those States where the 2011 data year is not currently available, in the interim, FHWA will use the principal arterial coding from the 2010 HPMS data submission. However, after October 1, 2012, when the updated NHS maps are

officially released, the State should follow procedures under 23 CFR 470.113 to make further/future modifications to the System (except that principal arterials will only need to connect at one end). At that time, a formal submittal with supporting documentation will be required.

Question 7: Will the Divisions have to screen the additions?

Answer 7: No, the automatic addition of the identified principal arterial routes to the NHS, effective October 1, 2012, will be a one-time occurrence (based on the data contained in the 2011/2010 HPMS submission) and will occur without Division Office screening. After October 1, 2012, the Divisions will need to screen any proposed modifications to the NHS.

Question 8: Should Division Offices encourage the States to start designating all principal arterials as part of the NHS?

Answer 8: No, FHWA will use State-submitted 2011 HPMS data to identify principal arterials to include in the updated NHS. For some States where the 2011 data year is not currently available, in the interim, FHWA will use the principal arterial coding from 2010 HPMS data submission.

Question 9: Will principal arterials connected to the NHS be eligible for National Highway Performance Program (NHPP) funding? [23 USC 119(c) as amended by Section 1106 of MAP-21]

Answer 9: Yes, as of October 1, 2012, principal arterials that are on the NHS and that connect to the NHS will be eligible for NHPP funding.

Question 10: Is there a restriction on mileage under the updated NHS?

Answer 10: No, effective October 1, 2012, there will no longer be restrictions on maximum NHS mileage.

Intermodal Connectors

Question 11: Will new NHS Intermodal connector miles that meet the Federal intermodal connector designation criteria, outlined in Appendix D to 23 CFR Part 470, be automatically added to the NHS (that becomes effective on October 1, 2012)? [23 USC 103(b)(2)(1)(C) as amended by Section 1104 of MAP-21]

Answer 11: No. To add intermodal connectors to the system, the State will follow procedures outlined in Appendix D of 23 CFR Part 470 to identify connectors to qualifying intermodal terminals. The State will submit a request to (through the FHWA Division Office) FHWA HQ for review and approval.

Strategic Highway Network (STRAHNET)

Question 12: Will new STRAHNET route/connector miles that meet the Federal STRAHNET route designation criteria, outlined in 23 CFR Part 470, be automatically added to the NHS (that becomes effective on October 1, 2012)? [23 USC 103(b)(2)(1)(D) and 23 USC 103(b)(2)(1)(E) as amended by Section 1104 of MAP-21]

Answer 12: No, additional STRAHNET route/connector miles will not be automatically added to the NHS. The State will follow procedures outlined in 23 CFR Part 470 to add STRAHNET routes/connectors. Requests for STRAHNET modifications (including additions/deletions) require coordination among FHWA, the Surface Deployment Distribution Command (Department of Defense), and the impacted State(s).

Functional Classification

Question 13: Will the Division Offices' current authority to approve functional classification changes extend to approving NHS changes?

Answer 13: No, the Division Offices' role in the determination and approval of functional classification will remain the same. The FHWA HQ retains approval authority for NHS changes. After October 1, 2012, all further modifications to the NHS will follow the procedures outlined in 23 CFR 470.113 with approval by the Associate Administrator for Planning, Environment, and Realty (via HEPH-20).

Question 14: Will the request to change functional classification occurring after October 1, 2012 be automatically treated as a request to add to the NHS?

Answer 14: No, typically, the approvals for functional classification changes and NHS changes require two separate approval actions. The Division Office approves the functional classification change and FHWA HQ approves the NHS change. The FHWA HQ reviews a route modification request (with respect to criteria outlined in 23 CFR Part 470) to determine whether the proposed segment "enhances the national transportation characteristics of the NHS." The State should coordinate with the Division Office to submit a concurrent functional classification change and NHS change request. However, Division Office approval of the upgrade to a principal arterial must occur before FHWA HQ can approve an NHS addition.

Question 15: Will the functional classification changes that occur prior to October 1, 2012 but are not reflected in the 2011 HPMS data, be automatically considered a part of the NHS?

Answer 15: Yes, these approved principal arterials will become part of the NHS without an approval action by FHWA. However, the State should coordinate with FHWA HQ (through its Division Office) to identify these additional principal arterials approved after the 2011 HPMS data submission to be included into the NHS. For principal arterial approvals that occurred before October 1, 2012, but are not reflected in the updated NHS (effective October 1, 2012), the State should coordinate with FHWA HQ (through its Division Office) to identify and include

these additional principal arterials to the NHS. Any approved changes submitted by the States to the FHWA by September 20, 2012, are reflected in the maps released on October 1, 2012.

Outdoor Advertising and Junkyards

Question 16: How will the new definition of the National Highway System affect a State's responsibility to provide control of outdoor advertising? [23 USC 131 as amended by MAP-21]

Answer 16: MAP-21 Section 1104 results in the addition of road segments to the National Highway System. Because these new segments are now part of the National Highway System, States will be responsible for control of outdoor advertising along these new segments. The penalty for not providing effective control of outdoor advertising remains at 10 percent of the funds that would otherwise be apportioned to the State under section 104.

Question 17: How has MAP-21 changed a State's duty to control junkyards? [23 USC 136 as amended by MAP-21]

Answer 17: A State must now control junkyards located along highways on the National Highway System. Section 1404(b) amends section 136 of title 23 to include effective control of junkyards along all highways on the NHS, including the Interstate Highway System. Effective control, as defined by 23 U.S.C. 136(c), means that junkyards must be screened by natural objects, plantings, fences, or other appropriate means so that it is not visible from the main travel way of the system or must be removed from sight. The penalty for not providing effective control of junkyards, however, has been reduced by section 1404 from 10 percent to 7% of the funds in section 104(b)(1) through (5).

Interstate System

Question 18: Can segments of congressionally designated future Interstate routes be included in the Interstate System without a connection to the existing Interstate System?

Answer 18: Yes, if a segment of a congressionally designated future Interstate route identified in Section 1105(e)((5)(A) of ISTEA, as amended, meets Interstate design standards and is planned to connect to an existing Interstate System segment by 25 years of the enactment of MAP-21 on October 1, 2012, it can be included on the Interstate System. Request for addition of these routes will follow procedures outlined in 23 CFR Part 470.

Design Standards

Question 19: Do National Highway System (NHS) design standards apply to highways added to the NHS by MAP-21? (*added 1/15/2013*)

Answer 19: Yes. The design requirements of 23 CFR Part 625 apply to projects on the NHS. Accordingly, the NHS standards adopted by FHWA (currently the 2004 AASHTO Green Book)

apply to new and reconstruction projects on the NHS, including NHS routes added by MAP-21. Design standards for resurfacing, restoration, and rehabilitation (3R) projects that have been agreed to by the State DOT and FHWA Division Administrator will apply to 3R projects on these routes.

Question 20: For highways that have been added to the National Highway System (NHS) under MAP-21, what is the effective date that projects are required to comply with the NHS design standards? (*added 1/15/2013*)

Answer 20: The effective date was October 1, 2012. If the applicable Federal or State environmental finding, determination, or decision (under 23 CFR 771.105 or equivalent State legislation) was completed prior to October 1, 2012, the project will not need to comply with NHS design standards. If a Federal or State environmental review is not required for the project, the project will not need to comply with NHS design standards if the final design was complete prior to October 1, 2012. All other projects must comply with NHS standards or receive approval for design exceptions.

NHS Design Standards: ODOT and Local Agencies

With the addition of approximately 600 miles of State, County, and City roads to the National Highway System (NHS) as a result of MAP-21, a working group made up of City, County, State, and FHWA representatives was formed to discuss the added NHS mileage and to determine the impact on City, County, and State design standards. From FHWA guidance, any NHS route has to be designed in accordance with AASHTO's *"A Policy on Geometric Design of Highways and Streets")*. Discussions with local agency representative indicated that not all local agencies current design practices meet AASHTO standards. ODOT's Highway Design Manual (HDM) is in general agreement with AASHTO's Green Book; therefore, it can be used for NHS routes. Below is the proposed design standard guidance for City, County, and State for those roadways part of the NHS.

- **Design Standards Selection Matrix (HDM Table 1-1) –Table 1-1 provides design requirements for projects based upon project type, roadway jurisdiction (State or Local) and whether the project is urban or rural. In an effort to provide design flexibility, the following changes to HDM Table 1-1 establish the standards for local agencies while complying with FHWA guidance regarding the added NHS routes.**
  - No change for ODOT facilities. ODOT will continue to use the Standards outlined in Table 1-1 of the Highway Design Manual.
  - For local Facilities- Footnote will be added to Table 1-1 that notes local agencies can use AASHTO standards for all types of projects. Modernization projects will not change (AASHTO standards will be used). For those local agencies that use their own standards and may not currently meet AASHTO standards- those projects will be required to meet AASHTO standards.
  - Additional footnote with be added to HDM Table 1-1 that allows maximum flexibility for locals to use either AASHTO or ODOT 3R for Preservation projects.
  - See attached HDM Table 1-1 revisions.

- **Vertical Clearance - ODOT requirements for vertical clearance are different than those vertical clearance requirements outlined in AASHTO standards. The following outlines the vertical clearance requirements for ODOT and Local Agency facilities for NHS routes.**
  - No change for ODOT facilities- NHS routes added to the State Highway system will follow current HDM guidance. Oregon Vertical Clearance Standard will have NHS routes added and note that the map is specific to ODOT jurisdiction highways.
  - For Local Facilities- Local Agencies will use AASHTO vertical clearance for both Modernization and Preservation projects.

- **Lane Widths - ODOT's HDM lane width requirements are specific to type of project (modernization or preservation), location (urban or rural) and highway**

segment designation (similar to functional class). Local Agencies have been given the flexibility to use AASHTO or the HDM. The following outlines the lane width requirements for State and Local Agency facilities for NHS routes.

- No change for ODOT facilities. ODOT projects will continue to use HDM guidance.
- For Local Facilities- Local Agencies can use AASHTO for lane width. 3R Tables 6-6 & 7-3 will be revised to note that minimum 11' lanes for NHS Routes and 12' lane for nationally recognized truck routes only apply to ODOT jurisdiction highways.
- See attached HDM Table 6-6 and Table 7-3.

- **Shoulder and Clear Zone/Guardrails - As with lane width, ODOT HDM shoulder widths are specific based on certain parameters. For local agencies, flexibility has been given to use either ODOT or AASHTO standards regarding shoulder width and clear zone. The following outlines guidance for ODOT and Local Agencies.**
  - No change for ODOT facilities
  - For Local Agencies- Local agencies will need to follow ODOT 3R or AASHTO guidance, including safety features.

- **Design Exceptions, Certified Agencies**
  - For Local Agencies- Design Exceptions will continue to be processed through ODOT Local Agency office.

- **Design Exceptions - The following outlines the direction regarding design exceptions that meets FHWA's expectation concerning oversight responsibilities for the existing and added NHS routes on both State and Local jurisdiction facilities.**
  - For Local Agencies-
    - Local Agency projects on the NHS **with** Federal Dollars involved:
      - Follow current process- Design exceptions are processed through ODOT.
    - Local Agency project on the NHS **with no** Federal Dollars involved and on **State** jurisdiction roadway:
      - Design exceptions are processed through ODOT.
    - Local Agency projects on the NHS **with no** Federal Dollars involved on **Local** jurisdiction roadway:
      - Local Agency process and approve design exceptions, maintain a list of those Design Exceptions.
      - Local Agency provides ODOT with a list of projects, contract plans, and list of design exceptions approved by the Local Agency on a project by project basis or yearly basis for audit purposes.

- **Plan Reviews - As with the Design Exception guidance, the following outlines the process to be used for project plan reviews in order to meet FHWA's expectation regarding oversight responsibilities.**

- Local Agency projects on the NHS **with** Federal Dollars involved:
  - Design Exceptions and Plan Review through ODOT.
- Local Agency projects on the NHS with no Federal Dollars involved on **State** jurisdiction roadway:
  - Design exceptions and Plan Review are processed through ODOT.
- Local Agency projects on the NHS **with no** Federal Dollars involved on **Local** jurisdiction roadway-
  - Local Agency provides ODOT with a list of projects and contract plans on a project by project basis or yearly basis for audit purposes.

The following HDM tables outline the changes to be made as a result of the FHWA, ODOT, City, and County MAP21- NHS impact working group meetings. In additional to the changes to the HDM tables, other text in the HDM may need to be revised to fulfill the intent of the HDM design standard changes.

Table 1-1: Design Standards Selection Matrix

Project Type	Roadway Jurisdiction				
	State Highways			Local Agency Roads [1]	
	Interstate	Urban State Highways	Rural State Highways	Urban	Rural
Modernization/ Bridge New/Replacement	ODOT 4R/New Freeway	ODOT 4R/New Urban	ODOT 4R/New Rural	AASHTO	
Preservation/ Bridge Rehabilitation	ODOT 3R Freeway	ODOT 3R Urban	ODOT 3R Rural	AASHTO [2]	ODOT 3R Rural [2]
Preventive Maintenance [3]	1R	1R	1R	NA	NA
Safety-Operations-Miscellaneous/ Special Programs	ODOT Freeway [4]	ODOT Urban [4]	ODOT Rural [4]	AASHTO	ODOT 3R Rural [2]

[1] For projects on a local jurisdiction route, the local authority may, at its option, use either the appropriate AASHTO's "A Policy On Geometric Design Of Highways And Streets - 2011" standard or select a standard of their own choice. This discretion is given by ORS 368.036. (ORS 368.036 applies to counties only, not cities.). **AASHTO standards shall be used for all local agency jurisdiction roadway projects on the National Highway System (NHS).**

[2] The local agency has the choice to use AASHTO's *"A Policy On Geometric Design Of Highways And Streets - 2011"* or ODOT 3R Urban design standards. Local Agencies may use AASHTO for Vertical Clearance requirements.

[3] Federally funded Preventive Maintenance work, which includes Chip Seals and Thin Overlays, will be required to follow 1R standards.

[4] The appropriate ODOT 3R standard may be used for some projects. Selection is case by case. Designer to confirm appropriate standard with Region Roadway Manager

Table 6-6: ODOT 3R Urban Non-Freeway Design Standards

Highway Feature	Highway Average Daily Traffic (ADT)			
	< 750	750 - 2000	2001 - 4000	> 4000
Travel Lane [1] <10% Trucks [2] >10% Trucks [2]	 10′ 10′	 10′ 11′	 11′ 12′	 11′ 12′
Left Turn Lane [3]	12′	13′	13′	14′
Right Side Shoulder [4]	2′	3′	4′	6′
On Street Parking (Where Applicable)	7′	8′	8′	8′
Left Side Clearance (Shy Distance) [5] posted speed ≤ 35 mph posted speed ≥ 40 mph	 1′ 2′	 1′ 2′	 1′ 2′	 1′ 2′
Curbside Sidewalk	6′	6′	6′	6′
Cross Slope (crown) [6]	2%	2%	2%	2%
Maximum Superelevation [7] design speed ≤ 40 mph design speed ≥ 45 mph	 4% 6%	 4% 6%	 4% 6%	 4% 6%
Vertical Clearance	See Section 6.4.6 and Section 4.5.1			

[1] A minimum 12 foot travel lane is required on nationally recognized truck routes (see current Route Map 7) and a minimum 11 foot lane is required on all NHS Routes on State jurisdiction roadways only. Local Agencies may use AASHTO standards for lane width.

[2] Trucks are defined as heavy vehicles, single unit configuration or larger (six or more tires).

[3] Left turn lane widths include 2 foot medial separator.

[4] Where a right side shoulder is not used, a right side shy distance from curb or on-street parking is required. This shy distance is 2 feet for posted speeds up to 35 mph and 3 feet for 40 mph and above.

[5] Left side clearance (shy distance) required from curb or on street parking and is only applicable to one way roadways.

[6] See Table 6-9 and Table 6-10 for improvement criteria and corrective measures.

[7] Numbers shown are for new design. See Section 6.4.4, Horizontal Curvature and Superelevation correction

Table 7-3: Minimum 3R Lane and Shoulder Widths
Rural Non-Freeway (Arterials, Collectors, Local Streets)

Design Yr Volume (ADT)	Average Running Speed	Lane Width	Shoulder Width
Less Than 750 Vehicles	All Speeds	10′	2′
750 to 2000 Vehicles	Under 50 mph	11′	2′
	50 mph or Over	11′	3′
Over 2000 Vehicles	All Speeds	11′	4′

NOTE: A minimum 11 foot lane is required on all NHS Routes on ODOT jurisdiction roadways only. Local Agencies may use AASHTO standards for lane width.