DRAFT FINAL STUDY REPORT

PUBLIC REVIEW DRAFT

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Maine Department of Transportation

Maine Turnpike Authority

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TABLE OF CONTENTS

Appendices

FIGURES

TABLES

EXECUTIVE SUMMARY

Introduction

The Central York County Connections Study (CYCCS) is a long-range (through year 2035), multi-disciplinary planning study that provides the MaineDOT, Maine Turnpike Authority (MTA) and study area municipalities with strategic direction for preserving and enhancing transportation connections between central York County and the major transportation corridors along the coast; the Maine Turnpike and US Route 1. The study is guided by a Purpose and Need Statement, which articulates that the study is to identify transportation and related land use strategies that enhance economic development opportunities and preserve and improve the regional transportation system.

The CYCCS Study Area (Figure ES-1-1) includes all or some of the following ten communities:

- The entire Town of Sanford;
- Those areas of Ogunquit, Wells, Kennebunk and Arundel northwest of Route 1;
- Much of North Berwick, Alfred, and Lyman; and
- Portions of western Biddeford along Route 111 and southern Waterboro along US 202.

This report serves as final documentation of the CYCCS and presents the findings and recommendations of the study.

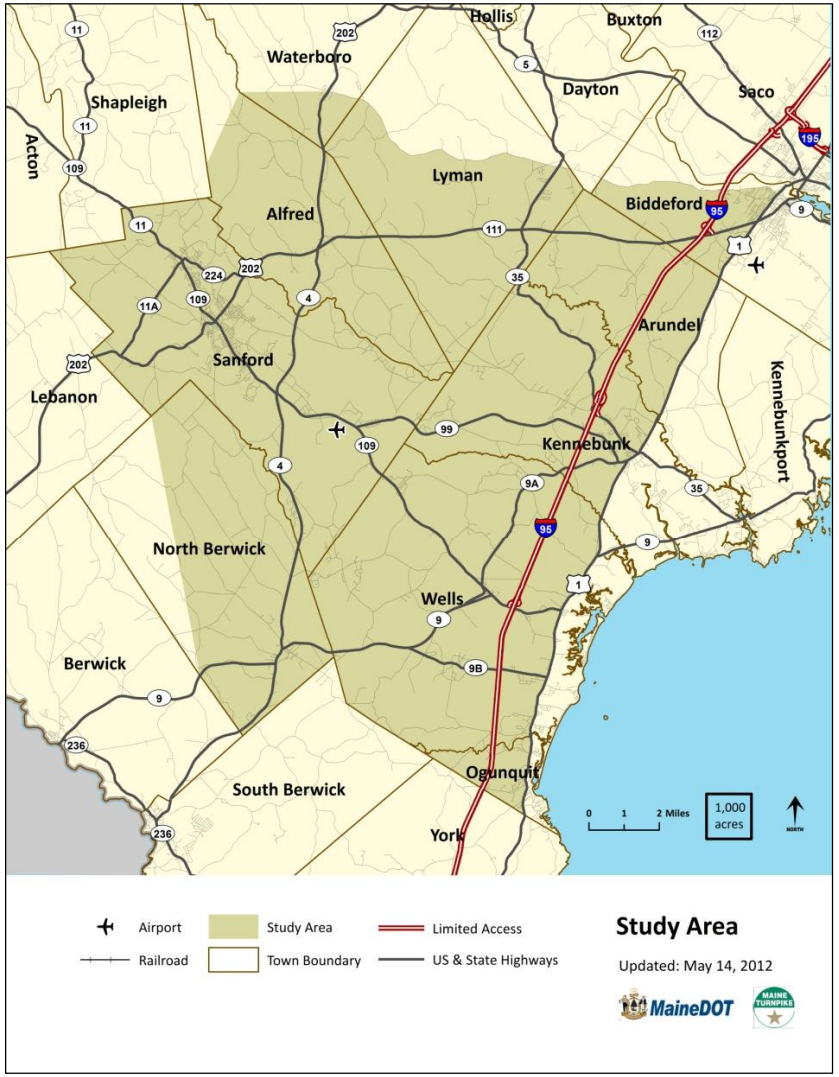


Figure ES-1-1: CYCCS Study Area

Overview of Work Conducted

The CYCCS is organized into four primary study phases:

I. Organization and Background Information
II. Initial Investigations and Analyses
III. Detailed Strategy Development and Assessment
IV. Study Documentation

Phase I focused on collecting and organizing information on the existing conditions in the study area, including transportation, land use, environmental and other relevant data.

In Phase II, the team began initial investigations and analyses and developed information about the range of strategies that could be considered for implementation in the study area. The development and assessment of candidate large-scale highway strategies was one of the primary efforts of Phase II. This effort tested the extent to which major expansions of the region's highway network could influence regional economic conditions, and investigated the costs, potential impacts, and benefit-to-cost ratios associated with these strategies. This initial round of testing allowed the team to both develop more specific, detailed strategies for evaluation in Phase III and eliminate from consideration concepts (or concept variations) that did not fare well in the Phase II evaluation.

Subsequent refinement and more detailed investigation of specific strategies occurred in Phase III. Other approaches to address transportation needs in the region, such as improvements to public transit and other modes of transportation, Transportation System Management (TSM), Travel Demand Management (TDM), land use approaches and access management strategies were also investigated and evaluated in Phase III.

Phase IV consisted of documentation of the CYCCS, including preparation of this final study report. This final report is organized into five chapters, plus this Executive Summary:

- Chapter 1: Study Overview, which provides a brief introduction to the study and summarizes the study process.
- Chapter 2: Study Context, which summarizes existing and projected future conditions in the study area.
- Chapter 3: Highways, which details investigations into study area highways and evaluation of potential strategies for improving highways.
- Chapter 4: Land Use and Access Management, which considers how these types of strategies could play a role in preserving mobility and addressing highway safety.
- Chapter 5: Public Transportation and Travel Demand Management, which investigates the potential to strengthen transit and transportation management programs.

The report also includes appendices with detailed technical information and supporting documentation.

Recommendations

The recommendations of the CYCCS, as they relate to highways, land use and access management, and public transportation and Travel Demand Management (TDM), are summarized below.

Highways

Evaluations conducted during Phase II of the study demonstrated that large-scale capacity expansion – either in the form of new highway corridors or corridor-wide expansion of existing highways – is not warranted given current or projected conditions through the year 2035. Phase III therefore focused on identifying improvements to the current highway network in response to specific issues identified by the study team with input from the project committees and public. Recommendations were selected based on potential effectiveness, alignment with the study's goals, benefits versus costs, and implementation feasibility. Highway improvements that would result in a benefit-to-cost ratio of 1.0 or less were considered to be not economically feasible and therefore are not recommended.

Recommendations, organized by corridor, are discussed in detail in Chapter 3 and summarized in the Table ES 1-1 on Page ES-5.

Recommendations for the Route 111/202 Corridor focus on addressing identified safety and mobility issues, as well as improving the pedestrian environment in-town in Sanford, where the corridor travels through established residential and commercial areas. Recommended actions on Route 111 and Route 202 (Alfred to Sanford segment) are:

- Traffic Signal Upgrades – Biddeford Area
- Lane Choice Sign Improvements (Biddeford approaching Maine Turnpike entrance at Exit 32)
- Passing Lanes (Lyman – Arundel Segment)
- Passing Lanes (Alfred – Lyman Segment)
- Longitudinal Rumble Strips
- Improve Lyman Route 111 U-Turn
- Improve Route 111 & Kennebunk Pond Rd/Day Rd Intersection (Lyman)
- Improve Route 111/202 intersection at Route 4/202 (Alfred)
- Rehabilitate and Improve Route 202 between June St and River St (Sanford)
- Improve Route 202 & River St intersection (Sanford)
- Improve Route 202 & Route 109 intersection (Sanford)
- Corridor-wide Signage Improvements

Recommendations for the Route 109 corridor in Sanford and Wells are:

- Expand the Route 109 & Exit 19 Intersection (Wells)
- Traffic Signal Upgrade – Route 109 & Exit 19 Intersection (Wells)
- Improve Route 109 & Route 9 Intersection (Wells)
- Traffic Signal Upgrades –Route 109 in Sanford (Sanford)

The only highway recommendation specific to the Route 4 corridor, other than access management approaches discussed in Chapter 4, is to continue to monitor crash occurrences at the Route 4 intersection at School Street/Gavel Road and implement further improvements if necessary.

Other highway recommendations in the study area are as follows:

- Detailed Study of a New Rte 99 to Rte 35 Connection (Kennebunk)
- Pave Shoulders on Route 224 (Sanford)
- Pave Shoulders on Route 35 (Kennebunk and Lyman)
- Pave Shoulders on Route 99 (Kennebunk and Sanford)
- Eliminate "Y" Intersections
- Pedestrian and Streetscape Improvements in Villages/Towns

Some potential actions that would help address long-term corridor needs would be the responsibility of local jurisdictions, rather than MaineDOT or the Maine Turnpike Authority. Recommendations that local jurisdictions would be responsible for advancing are:

- Develop Local Street Grid in Biddeford and Arundel
- Develop Local Street Grid in Sanford
- Pave Shoulders on Old Mill Road in Sanford
- Plan for Build-out of Route 109 in Sanford

In addition to the highway recommendations noted above, some strategies considered demonstrated merit, but are not fully or clearly justified based on existing or projected conditions, or require further deliberation, are therefore identified as *Other Potential Long-term Actions*. They are:

- Biddeford Route 111 to Exit 32 Interchange Connector
- Reconstruct Route 202 near Goodall Hospital (Sanford)
- Monitor and Improve Route 111/Limerick Road Intersection (Arundel)
- Construct passing lanes on Route 109 (Sanford and Wells)
- Longitudinal Rumble Strips (Route 109 and Route 4)
- Construct passing lanes on Route 4 (Sanford and Alfred)
- Paved Shoulder Improvements on Route 11A (Sanford)

Table ES 1-1: Summary of Highway Recommendations

Recommendation	Jurisdiction(s)	Estimated Cost			Benefit/Cost Ratio (BCR) Assessment	Implementation Timeframe		
		Low (<$50K)	Medium ($50K - $250K)	High (>250K)		Near-Term (1-2 Years)	Med-Term (2-5 years)	Long-term
H-1: Route 111 Traffic Signal Upgrades	Biddeford		✓		Not assessed	✓	✓	
H-2: Route 111 Lane Choice Sign Improvements	Biddeford	✓			Not assessed	✓		
H-3: Route 111 Passing Lanes (Lyman-Arundel)	Lyman, Arundel			✓	Medium (EB); High (WB)	✓	✓	
H-4: Route 111 Passing Lanes (Alfred-Lyman)	Alfred, Lyman			✓	Medium	✓	✓	
H-5: Route 111 Longitudinal Rumble Strips (40 mph or greater)	Various	✓			Not assessed	✓		
H-6: Improve Lyman Route 111 U-Turn	Lyman		✓		Not assessed	✓		
H-7: Improve Route 111 & Kennebunk Pond Road	Lyman	✓	✓		High	✓		
H-8: Improve Route 111.202 Intersection at Route 4/202	Sanford		✓	✓	Not assessed		✓	✓
H-9: Rehabilitate Route 202 (June St and River St)	Sanford			✓	Not assessed		✓	
H-10: Improve Route 202 & River Street Intersection	Sanford			✓	Medium		✓	✓
H-11: Improve Route 202 & Route 109 Intersection	Sanford			✓	High		✓	✓
H-12: Corridor-wide Signage Improvements	Various	✓			Not assessed	✓		
H-13: Expand the Route 109 & Exit 19 Intersection	Wells			✓	High		✓	
H-14: Traffic Signal Upgrade –Route 109 & Exit 19	Wells	✓			Not assessed		✓	
H-15: Improve Route 109 & Route 9 Intersection	Wells			✓	High		✓	
H-16: Traffic Signal Upgrades –Route 109 in Sanford	Sanford			✓	Not assessed	✓	✓	
H-17: Monitor and Improve School St/Gavel Rd Intersection	Sanford		✓	✓	Not assessed	✓		
H-18: Detailed Study of New Rte 99 to Rte 35 Connection	Kennebunk			✓	High			✓
H-19: Pave Shoulders on Route 224	Sanford			✓	Medium/High	✓		
H-20: Pave Shoulders on Route 35	Kennebunk, Lyman			✓	Medium		✓	✓
H-21: Pave Shoulders on Route 99	Sanford, Kennebunk			✓	Low/Medium		✓	
H-22: Eliminate "Y" Intersections	Various			✓	Not assessed		✓	✓
H-23: Pedestrian and Streetscape Improvements in Villages/Towns	Various		✓	✓	Not assessed	✓	✓	

Land Use and Access Management

The CYCCS identified a number of land use and access management techniques that towns in the CYCCS study area can consider as a means to direct future growth in ways that will reduce demand on the transportation system, support its efficient operation, and improve the viability of all travel choices. These are among the techniques that are often described as "Smart growth" approaches to land use planning.

Some strategies have widespread potential for applicability, and therefore are recommended for consideration by all of the study area towns. These strategies include:

- Require access plans for large developments.
- Extend subdivision streets to abutting parcels for future connection.
- Incorporate site features that support ridesharing and transit use.
- Encourage shared access for abutting lots.
- Require the interconnection of parking lots on adjacent parcels.

Developing an Official Map or Major Thoroughfare Plan is another strategy that is applied community-wide and is considered to be an overarching policy decision that needs to be tied to long range local planning, and could be considered for implementation by any of the towns.

The suitability of other specific access management strategies is dependent upon existing development patterns, zoning, each town's current access management provisions and level of regulatory sophistication, and the likelihood that the town will adopt and be able to administer the strategy.

The applicability of these location-specific strategies was described in the CYCCS on a segment-by-segment basis for three corridors:

- Route 111/202 in Biddeford, Lyman, Alfred and Sanford;
- Route 109 in Sanford and Wells; and
- Route 4/202 in Alfred and Sanford.

These corridors were selected because they are the primary travel corridors connecting central York County to the Maine Turnpike and Route 1 along the coast, and as such are the primary focus of the study. For each corridor segment, the location-specific strategies were designated as either; current (strategy already in effect); standard (the strategy would provide a basic or moderate level of access management in a particular location); enhanced (the strategy would provide greater levels of access management but are typically more complicated or difficult to implement in a particular location); or Not Applicable in the corridor segment.

These other recommended strategies include:

- Reduce the number of vehicle trips generated along highways.
  - Limit intensity of development abutting highways.
  - Transfer development rights.
  - Limit the use of land fronting highways to those that generate low levels of peak-hour traffic volumes.
  - Incorporate site features that support ridesharing and transit use.

- Encourage access from roads other than the highway.
  - Encourage access from streets other than the abutting highway.
  - Encourage wider frontages on highways than on other roadways.
- Improve street interconnectivity and local traffic circulation.
  - Include future connections on Official Map or Major Thoroughfare Plan.
  - Use rear lot access drives and/or backage roads.
  - Encourage interconnected parking lots on adjacent parcels.
  - Require off-highway frontage roads for new subdivision lots.
  - Extend subdivision streets to abutting parcels.
- Manage the frequency and operation of access points.
  - Encourage shared access for abutting lots.
  - Minimize the number of driveways per parcel on highway frontage.
  - Promote right turn only driveways.

Public Transportation and Travel Demand Management

Public transportation and TDM recommendations resulting from the CYCCS fall under four categories: facilities and access to transit, route-specific transit service improvements, public information/TDM, and fare policy. A summary of the CYCCS recommendations is outlined below.

Facilities and Access to Transit

- Create the Sanford Transportation Center in downtown Sanford, creating a centralized location for transit services that travel to, from, and within Sanford.
- Building on the service recommendations detailed below, create a new transit hub at the Biddeford park-and-ride, where the enhanced WAVE/Route 111 service, the ZOOM Turnpike Express, and the extended ShuttleBus Intercity/Portland service can interface.
- Along with creating a Transportation Center in downtown Sanford, there is a need for park-and-ride facilities to serve those traveling from surrounding communities who want to access transit in Sanford, particularly if there is an improved connection to Portland (as discussed in the next section of recommendations).
- There is a need for park-and-ride facilities along Route 111 west of Biddeford to help reduce congestion along that road during peak commute times.
- In addition to creating a central park-and-ride lot in Sanford, smaller park-and-ride facilities could be developed in the immediate vicinity, through leasing of parking facilities or shared parking arrangements with local shopping centers.

Potential locations for these types of facilities include Springvale, South Sanford (for access to the Sanford Transit/Sanford Ocean Shuttle), Alfred (potentially using the County Courthouse parking lot), and/or Lyman (both for access to the WAVE and any future services along Route 111).

- In many locations, there is a need for improved amenities at stops, including basic items such as a paved waiting area and sidewalks to safely access the stops, along with additional amenities such as shelters, benches, and trash cans.
- Provide bike racks and bike lockers at transportation centers and major park and ride lots.
- Provide additional bicycle racks on buses, so that customers can use their bikes on both ends of their transit trip.
- Preserve park-and-ride lots for commuter travel. Current enforcement activities have not been sufficient to discourage certain tour and airport shuttle operators from taking advantage of lots intended for short-term (less than 24 hours) parking use by commuters. Potential solutions include increased enforcement of parking duration rules (potentially using technological solutions that track license plates), improved signs and education, direct discussions with the operators of the bus services, or the installation of a gate/barrier at the eastern entrance of the Exit 32 Park and Ride in Biddeford that could only be actuated by ShuttleBus/ZOOM vehicles.

Route-Specific Service Improvements

- Improved Route 111 Service, either through expansion of the existing WAVE service or through extension of the ZOOM Turnpike Express along Route 111 to Sanford.
  - Under the first option, the WAVE would be expanded to better serve the Route 111 corridor and connect to ShuttleBus:
    - Increase service frequency on the WAVE to every hour and coordinate with the schedule for the ZOOM Turnpike Express at Biddeford.
    - Transition WAVE service from a demand response service to either a fixed route/demand response hybrid or a standard fixed route service running along the Route 111 corridor from Sanford to Biddeford and Saco. Under the fixed route/demand response hybrid, the WAVE would continue to provide some demand responsive and route deviation service, but would use real-time information to let passengers know when each run is expected to arrive at a limited number of fixed stops along the route. Alternatively, the WAVE could transition to a more traditional fixed-route service, stopping only at designated locations and running on a fixed schedule.
    - Create timed transfer to ZOOM Turnpike Express and ShuttleBus Intercity/Portland service so that WAVE riders can more easily access service to Portland.
  - Under the second option, select ShuttleBus ZOOM Turnpike Express peak period runs would be extended from the current terminal at Biddeford west to Sanford. This is likely the only option that could provide a time-

and convenience-competitive alternative to auto commuting for Sanford area to Portland trips. However, extending ZOOM service to Sanford would not likely be funded by MTA or be an express service, given ZOOM's purpose of serving Turnpike travelers.

  - Travel times from Sanford to Portland would be around an hour, and no transfers would be required. This would be a peak period only service, perhaps with two morning and two evening trips beginning and ending in Sanford.
  - Travel times for riders between Biddeford and Portland would not be adversely affected, but additional equipment would be needed to maintain or improve existing service frequencies.
  - Commuters between Sanford and Biddeford/Saco could also use this service, though they would need to transfer at the Biddeford (Exit 32) park-and-ride to Tri-City Local service (on the Biddeford end) or Sanford Transit/Sanford Ocean Shuttle (on the Sanford end).
  - WAVE would continue to provide all day service and could continue to focus on local connections.

- New service on I-95 South of Biddeford
  - Provide connecting service from the ZOOM Turnpike Express service to the Wells Transportation Center (Exit 19) and York County Community College in Wells, with an intermediate stop at the Kennebunk park-and-ride at Exit 25. Service could operate either as an extension of the existing ZOOM service, or as a timed-transfer shuttle connection.
- Sanford Transit
  - Coordinate with other services at the newly created Sanford Transit Center.
  - Consider targeted increases in service frequency, along with extending service to run later in the afternoon and early evening.
- Sanford Ocean Shuttle
  - Provide increased service frequency.
- ShuttleBus
  - Extend the hours of service of the ZOOM service, particularly to provide at least one additional run in the evening, for customers who need to stay in Portland past 5:00 PM.
  - Extend ShuttleBus Intercity/Portland service a short distance from the current terminal at Southern Maine Medical Center to the Biddeford park-and-ride at Exit 32 on the Maine Turnpike/I-95.
  - Ensure coordination of the Tri-City/Local service with other services within the CYCCS study area, particularly in the area of the Exit 32 park-and-ride lot in Biddeford.

Public Information/TDM

- Make greater use of real-time information throughout the Central York County transit network. Providing enhanced real-time information could also allow for the creation of a hybrid demand response/fixed-route version of the WAVE, as described earlier.
- Improve transit information for Central York County, to create a single clearing house for transit service information.

With multiple operators providing differing types of service (demand response, route deviation, fixed-route local, fixed-route express), the transit service options within York County can be somewhat difficult to understand.

- Encourage a continued regional approach and intercommunity cooperation to further optimize economic development, land use and transportation opportunities while maintaining and enhancing the region's environmental, historic and cultural values.

Fare Policy

- Consider implementing an integrated fare policy to make it easier and less costly for riders to transfer between YCCAC and ShuttleBus transit services. An integrated fare policy can encourage additional ridership and create more seamless transfers between the various transit services in the CYCCS study area.

Chapter 1: STUDY OVERVIEW

Introduction

The Central York County Connections Study (CYCCS) is a multi-disciplinary planning study that provides the MaineDOT, Maine Turnpike Authority (MTA) and study area municipalities with strategic direction for preserving and enhancing transportation connections between central York County and the major transportation corridors along the coast; the Maine Turnpike and US Route 1. The CYCCS study was authorized during the 123rd Maine State Legislature by Resolve Chapter 95 LD 1720, item 1, signed by the Governor on June 20, 2007. This legislation authorized the MaineDOT and MTA to conduct studies in York County and Cumberland County to investigate transportation and related economic issues and consider the need for transportation infrastructure and service improvements in the respective regions. As a result, the CYCCS and the separate Gorham East-West corridor feasibility studies were initiated. This report serves as final documentation of the CYCCS and presents the findings and recommendations of the study.

Study Area

The CYCCS Study Area includes all or some of the following ten communities (Figure 1-1):

- The entire Town of Sanford;
- Those areas of Ogunquit, Wells, Kennebunk and Arundel northwest of Route 1;
- Much of North Berwick, Alfred, and Lyman; and
- Portions of western Biddeford along Route 111 and southern Waterboro along US 202.

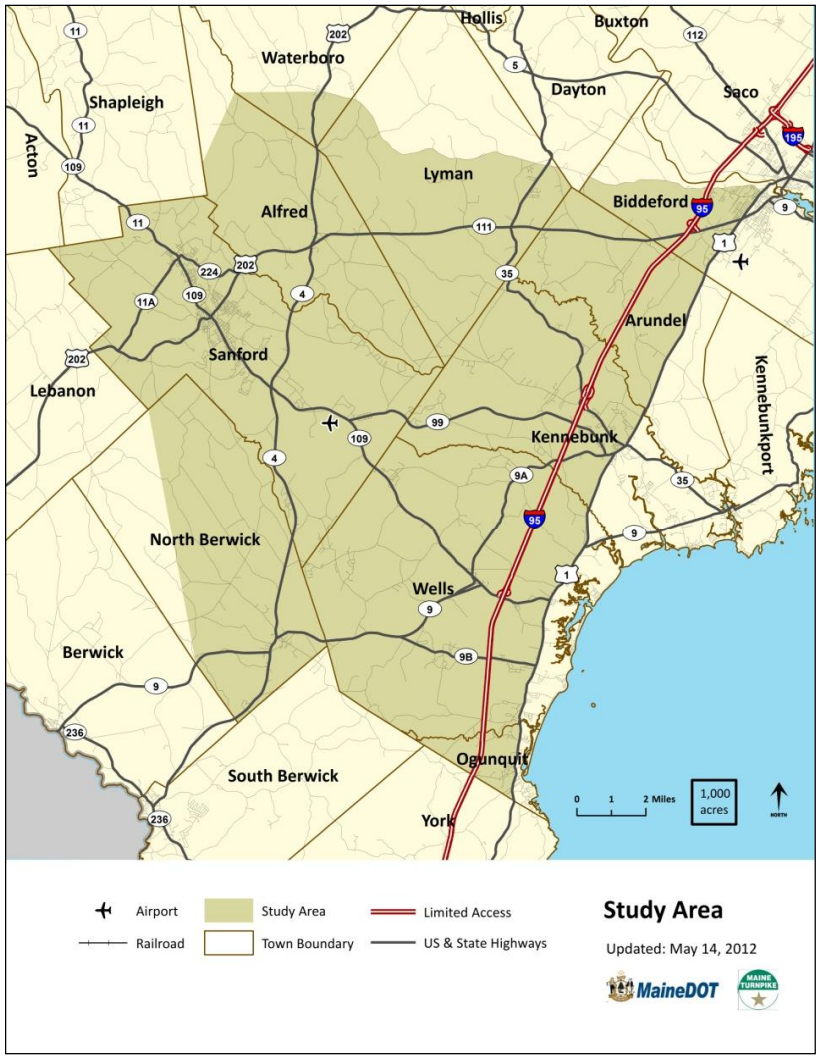


Figure 1-1: CYCCS Study Area

Arundel, Biddeford, Kennebunk, Ogunquit and Wells are located along the coast and are linked by Route 1. Access to the Maine Turnpike (1-95), the primary highway linking Maine to New Hampshire and the rest of New England, is provided in Biddeford (exit 32), Kennebunk (exit 25) and Wells (exit 19).

Alfred, Lyman, North Berwick, Sanford and Waterboro are located in York County's interior, and are not directly served by the Maine Turnpike or Route 1. Access to these municipalities is instead provided by Route 35, Route 99, Route 109 and Route 111. Route 111 is the primary highway connecting the Sanford area to the Maine Turnpike in Biddeford (exit 32), which provides access to the Portland metropolitan area. Route 109 connects to the Turnpike in Wells (exit 19). Both also provide access to US Route 1. In addition, US Route 202 and Routes 4 and 9 are other major regional highways that link central York County communities to New Hampshire to the west. The characteristics of the study are further examined in *Chapter 2: Study Context*.

In 2012, the Southern Maine Planning and Development Commission (SMPDC) initiated a separate review of the US Route 202 corridor between Sanford and the New Hampshire state line. Though outside of the CYCCS study area, this effort relates to the broader objective of improving connections to central York County, and is included as Appendix I to this report.

Report Organization

This final report is organized into five chapters:

Chapter 1: Study Overview, which provides a brief introduction to the study and summarizes the study process.

Chapter 2: Study Context, which summarizes existing and projected future conditions in the study area.

Chapter 3: Highways, which details investigations into study area highways and evaluation of potential strategies for improving highways.

Chapter 4: Land Use and Access Management, which considers how these types of strategies could play a role in preserving mobility and addressing highway safety.

Chapter 5: Public Transportation and Travel Demand Management, which investigates the potential to strengthen transit and transportation management programs.

The report also includes an Executive Summary that describes the study findings and recommendations in summary, and several appendices with detailed technical information and supporting documentation.

Study Team and Process

Study Team and Committees

The CYCCS study was conducted by the MaineDOT and MTA, with participation by the SMPDC, Federal Highway Administration (FHWA) and study area towns. Two committees were convened to participate in the study process. A broad range of residents, representatives from stakeholder and interest groups, and agency staff comprised the study's Advisory Committee.

CYCCS Participants

Study Team

Agencies

Maine Department of Transportation (MaineDOT)
Maine Turnpike Authority (MTA)
Southern Maine Regional Planning Commission (SMRPC)
Federal Highway Administration (FHWA)

Consultant Team

Parsons Brinckerhoff, lead consultant
Morris Communications, public outreach
Planning Decisions, land use planning
TY Lin, Inc., traffic and highway engineering
Hooper Associates, travel demand modeling
Dr. Charles Colgan, U. of Southern Maine, demographics and forecasting
Normandeau Associates, natural resources
Preservation Company, historic and cultural resources
Facet Decision Systems, web surveys

Steering Committee

Alfred: John Sylvester, Glenn Sochtermann
Arundel: Tad Redway, John Derkinderen
Biddeford: John Bubier, Greg Tansley
Kennebunk: Judy Bernstein, Michael Claus
Lyman: Maurice St. Clair
North Berwick: Dwayne Morin
Ogunquit: Tom Fortier
Sanford: Brad Littlefield, Charlie Andreson
Waterboro: Tom Ursia, Nancy Brandt
Wells: Mike Livingston, Jodine Adams, Shannon Belanger
SMRPC: Myranda McGowan, Tom Reinauer
MaineDOT: Gerry Audibert
Maine Turnpike Authority: Conrad Welzel, Sara Devlin

Advisory Committee

Don Allen, Wells Transportation Center
Jim Nimon, Sanford Regional Growth Council
Donna DerKinderen, Arundel Comp Plan Committee
Chad Gerrish, Pratt & Whitney
Ted Hissong, Hissong Development Corp.
Jonathan Mapes, Sanford
Geoff Titherington, Sanford
Leo Ruel, Lyman
Jason Cole, Lebanon
Mike Campbell, Waterboro, Lyman
Dana Knapp, Concord Coach
Connie Garber, Ken Creed, York County Community Action
Hazen Carpenter, Mousam Way Trails
John Andrews, Eastern Trails
Heidi Woolever, Alfred Conservation Commission
Dan Gobiel, Kennebunk Land Trust
David Joy, Sanford Downtown Legacy
Chris MacClinchey, Southern Maine Regional Planning Commission
Dennis Rioux, Biddeford Conservation Commission
Diane Robbins, Arundel

The Steering Committee consisted of Town and agency officials. Each group met regularly to review and comment on study progress. Their participation is described further in the *Public Outreach* section of this chapter, as well as in *Appendix A: Public Outreach*.

Study Process

The CYCCS is organized into four primary study phases. A unique aspect of the CYCCS was that questions regarding the potential regional economic benefits that might result from major upgrades to transportation infrastructure were a primary impetus for the study. The study was therefore organized to initially consider the benefits, impacts, costs, and benefit-to-cost ratios potentially associated with a varied range of major infrastructure upgrades, including construction of new highways or capacity expansion and improvements to increase travel speeds along existing highway corridors. These investigations were the central focus of work during the study's second phase, as described below.

The four CYCCS study phases were:

I. Organization and Background Information.
The study's first phase involved developing a purpose and need statement, collecting and synthesizing available transportation, land use, environmental and other relevant data, and initiating the public outreach process.

II. Initial Investigations and Analyses.
The second phase involved development and evaluation of a range of large-scale, conceptual highway corridor strategies. The intent of the Phase II effort was to test the extent to which major expansions of the region's highway network could influence regional economic conditions, and investigate the costs and potential impacts associated with these strategies. The results of Phase II identified the potential benefits and impacts of the strategies evaluated and informed the selection and further development of strategies considered during the next phase of the study (see Phase III discussion below).

III. Detailed Strategy Development and Assessment.
During Phase III, the study team investigated transportation issues at a more specific level of detail. These issues included safety and operation improvements to the region's highways and intersections, access management strategies, land use recommendations, transportation systems management improvements to make the current system operate more efficiently, and multimodal improvements to enhance the environment for walkers, bicyclists and transit users.

IV. Study Documentation.
The fourth, and final, phase involved completion and documentation of the CYCCS study.

The subsequent sections of this report discuss the study context and present the findings, analyses and recommendations of the CYCCS. As described previously, the chapters are organized by area of focus (e.g. – Highways, Public Transportation, etc.), which encompass work for all four phases of the study related to the particular subject area.

Study Purpose and Needs

The purpose and need statement serves as the core guiding document for the study. Using input from all study participants, the Study Team first developed a draft purpose and need statement that documented the mobility and access-related needs in the study area and identified intended economic, transportation and land use goals and objectives. Input and discussion on elements of a draft purpose and need statement was a major goal for the first set of Steering and Advisory Committee meetings (described further in the *Public Outreach* section).

The elements of the purpose and needs statement are:

- A statement detailing the purpose of the study.
- Identification of the needs to be addressed, and;
- Goals, which describe how the study intends to address the identified needs.

The study needs documented include transportation, land use, social, environmental, and economic factors. The draft statement was revisited and refined at key points of the study to ensure it continued to reflect study goals as new information became available. The study Purpose and Needs follow.

Purpose

The purpose of the Central York County Connections Study is to identify, evaluate and recommend feasible transportation and related land use strategies that will:

- Enhance regional economic growth;
- Increase regional transportation interconnectivity;
- Improve traffic safety;
- Direct expected travel demand through a strong mix of multimodal strategies, and;
- Preserve and improve existing infrastructure.

These purposes are to be achieved while striving to maintain the visual, cultural and historic character of village centers and rural areas and minimizing environmental impacts.

Needs

- Greater economic opportunities may result from improved travel routes between central York County and the Turnpike.
- An imbalance between jobs and housing results in long commutes and heavily directional use of area highways.
- Highway segments with narrow lanes, lack of shoulders, poor alignment and lack of access management are not well-suited for use by bicycles, pedestrian and truck traffic.
- Lack of transportation choice within the study region results in over-dependence on automobiles and limits mobility (especially for non-drivers).
- Locations within the study area are identified as high-crash locations. Rte 111, Rte 109 and US 202 all experience higher overall crash rates than the average rate for comparable corridors in Maine.
- As the region continues to grow, congestion will become more widespread and travel delays will increase.

Goals

In addition to assisting in developing the study's Purpose and Needs, the Steering and Advisory Committees also established the following goals:

- Promote economic development.
- Promote tourism development.
- Improve regional connectivity.
- Improve modal interconnectivity (ability to easily transfer between different travel modes such as motor vehicle, bus, rail, air, bicycle, or pedestrian).
- Improve accessibility between central York County and the Interstate Highway system.
- Promote consistency between study goals and municipal comprehensive plans.
- Address traffic safety issues (including those involving pedestrians and bicyclists).
- Maintain and enhance the visual, cultural, historical and environmental character of the region.
- Improve travel choices, including public transportation (bus, rail), biking and walking as well as Travel Demand Management opportunities (van pool, car pool, park and ride, telecommute).
- Improve access management along major corridors.
- Prioritize transportation improvements that serve and support existing and planned investments (public and private) in the community.
- Encourage cooperation and coordination among municipalities and agencies in developing, operating and maintaining transportation infrastructure and services.
- Coordinate study concepts and recommendations with other planning efforts in the study area.

Public Outreach

The credibility of any study requires understanding and acceptance by everyone involved that study outcomes and recommendations are not predetermined by any party, but are instead determined on a basis of technical findings and investigations that are conducted in support of the study's purpose and needs. This can often be a challenge, as people tend to want to move quickly towards solutions. For this, it was crucial that all involved adopted a wait-and-see attitude regarding study outcomes until sufficient evidence was accumulated to result in appropriate recommendations. Towards that end, a flexible, transparent and interactive public outreach process was adopted to help the public understand the study process and support its ultimate recommendations.

Study meetings were open to any member of the public who wanted to observe, and detailed minutes of each meeting were posted on the study website. The study website was intended to be easy to navigate and understand, informative and updated often. Regular updates on the study's progress were available through the media, the website, and direct emails to those who signed up.

The comprehensive public outreach program was designed to build a broad awareness of the study and its goals within the ten communities and beyond. This program and the various meetings are summarized on the following pages. Full meeting minutes for all committee and public meetings are provided in *Appendix A: Public Outreach*.

The Roles and Responsibilities of the Study Committees and the Public

Study Team

The Study Team consisted of the consultants, the Maine Department of Transportation (MaineDOT), Maine Turnpike Authority (MTA), and Southern Maine Planning and Development Commission (SMPDC). The Federal Highway Administration (FHWA) also participated by coordinating with the lead agencies and attending select study meetings.

The consultants' role was to manage and conduct the technical aspects of the study. MaineDOT and MTA administered the study. This included monitoring study progress, coordinating with the consultants to execute the work plan, reviewing draft work products, and approving study findings and recommendations. The SMPDC's primary role was to provide planning data and guidance, including an understanding of local and regional issues. The team's collective responsibility was to conduct the study objectively and transparently; use appropriate planning methods and processes and make recommendations that address the needs of the region as a whole. They conferred on a regular basis (typically biweekly, and as needed).

Steering Committee

The Steering Committee consisted of representatives of the ten communities in the study area (Alfred, Arundel, Biddeford, Kennebunk, Lyman, Ogunquit, North Berwick, Sanford, Waterboro and Wells). Their role was to inform the study process, provide advice and feedback from both a local and a regional perspective, and build local and regional understanding of the study goals in order to strive for general consensus for study recommendations. Towards that end, the Steering Committee made active use of comments and information from the Advisory Committee meetings. MaineDOT, MTA, the FHWA, and the SMPDC actively participated in Steering Committee meetings. The Steering Committee was responsible for disseminating clear messages about transportation choices and potential study outcomes to their constituents, including municipal boards and committees. The Study Team scheduled Steering Committee meetings several months in advance and provided pre-meeting materials at least a week before each scheduled meeting. The Committee met nine times over the course of the study.

Advisory Committee

The composition of the Advisory Committee was guided by the Steering Committee, who assisted in identifying potential committee members and ensuring that a broad range of perspectives were represented. An important role of the Advisory Committee was to provide a means to examine and resolve as much as possible the inevitable differences of opinion generated by a study of this breadth. The Advisory Committee was made up of representatives from business, municipal, environmental, transportation and other stakeholder groups throughout the study area. They represented the voice of key stakeholders, and provided diverse feedback and differing points of view. They were responsible both for providing the perspective of the stakeholder group they represented, as well as for considering solutions through which the diverse needs of different stakeholders could be best served. They also served as representatives of the study to their stakeholder constituents. The Advisory Committee met eight times during the study.

The Public

Participation by the general public was key to the study's success. Public meetings were invaluable in attracting all segments of the population and also in providing specific opportunities for the media to focus on the study. In order to make the most of these opportunities to meet the public face-to-face, the first two public meetings included a session in workshop format, allowing attendees to speak in smaller groups, interact and be heard more effectively and to reduce the polarization that can make a meeting less productive. Meetings were announced via local and regional media, the web site, and via email to an Interested Party List. Individuals could also make comments either publicly or privately on the study website. Three public meetings were held during the course of the study.

Media

The media was relied upon to help distribute information on the process and recommendations of the study throughout the study period. The Study Team was proactive in alerting reporters via phone calls and press releases as to upcoming public meetings and new study data, and made themselves readily available for explanations and to answer questions.

The media list for the study included:

- Sanford News
- Waterboro Reporter
- York County Coast Star
- Journal Tribune
- Portland Press Herald
- Maine Public Radio
- WCSH, WMTW, WGME television stations

Study Website

A study website was developed and maintained throughout the duration of the study. The study website included advance notice of all study meetings, offered the opportunity to have questions answered online, provided easy-to-understand explanations and graphics regarding the study progress, and posted minutes, handouts and presentations from every meeting. The study website (http://www.connectingyorkcounty.org) made it easy for people to explore and provide feedback on study options at their own pace. The web site included the following materials and information:

- Study Scope
- Study Area Map
- Participant Team
- Study Schedule
- What's New
- Purpose and Need Statement
- How To Get Involved/Public Involvement Plan
- Upcoming Meetings
- Meeting Minutes/Materials
- Tell Us What You Think! (Inviting Comments)
- Comments and Questions (Viewing Others' Comments)
- Study Data
- Contact Us
- FAQs

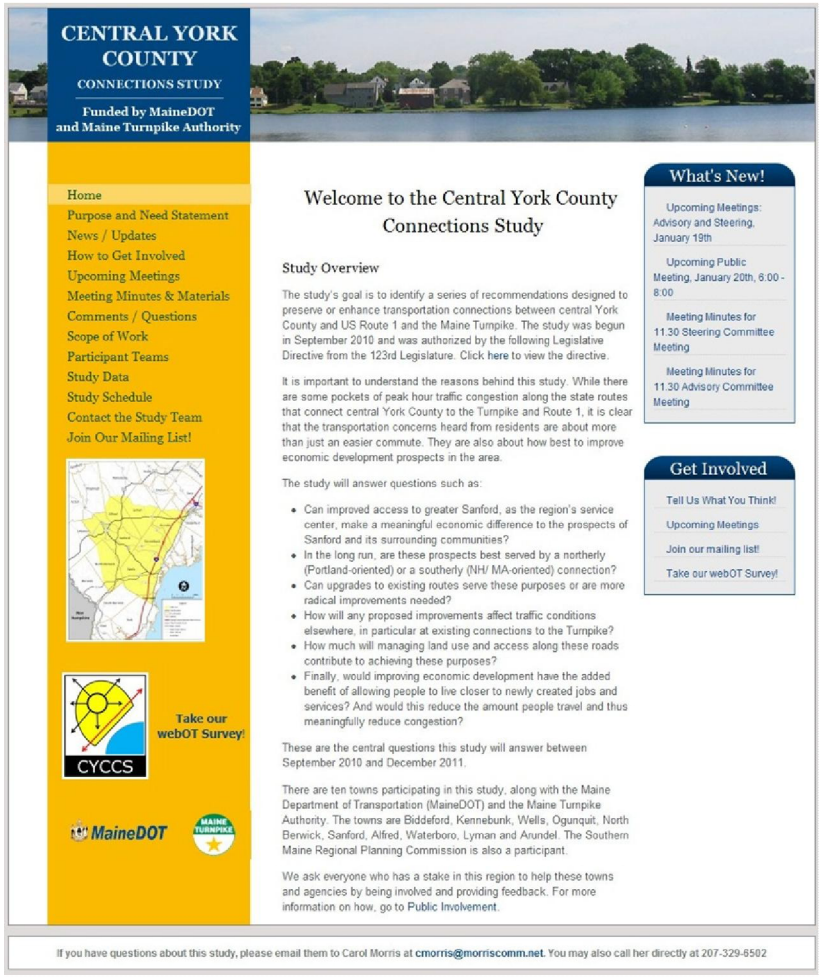


Figure 1-2: CYCCS Study Website

Meeting Agendas and Committee Input

Meeting Minutes

Detailed meeting minutes were posted on the study website following meeting dates. Minutes were given to MaineDOT and MTA for comment, after which they were posted to the website.

10/14/2010 – Steering Committee Meeting

Meeting Agenda

- Welcome and Introductions
- Study Overview
- Public Involvement Plan, Steering Committee's Role
- Purpose and Needs Statement
- Next Steps

Summary of Committee Input

- The Committee expressed a desire for the study to examine the funding components to ease future implementation.
- The Committee identified shared concerns for the following issues: multimodal transportation, safety, economic development, regional coordination, environmental protection, and improved connectivity.
- The Committee agreed to hold the meetings in a central location rather than moving them around the study area.
- 11/30/2010 | Advisory Committee Meeting

Meeting Agenda

- Welcome and Introductions
- Study overview
- Where we are now: Current Conditions
- Review Purpose and Needs Statement
- Review Sample Measures of Effectiveness

- Next Steps

Summary of Committee Input

- The Committee expressed a concern that the impacts of high fuel prices would not be considered in the study.
- The Committee expressed a concern that Route 1 was not included in the study area. However, Route 1 traffic issues are beyond the scope of this study.
- The Committee expressed concern about the necessity of another study vs. the need for implementation. It was noted that this study was an important step in the processes to bring together stakeholders and to implement study recommendations.

11/30/2010 – Steering Committee Meeting

Meeting Agenda

- Where we are in the Study
- Purpose and Need Statement Review
- Highlights of Baseline Conditions
- Potential Measures of Effectiveness
- Next Steps

Summary of Committee Input

- The Committee expressed a desire to include collaboration more explicitly in the purpose and need statement.
- The Committee expressed a preference for the following as measures of effectiveness: Economic impacts, Safety, Rural and Urban Character Impacts, and improved Transit Access.

1/19/2011 – Advisory Committee Meeting

Meeting Agenda

- Study Updates
- Revised Purpose and Needs Statement
- Draft Measures of Effectiveness: Phase II and III
- Draft Population Projections
- Draft Transportation Strategies/Corridors
- Next Steps

Summary of Committee Input

- The Committee expressed a concern that the state's environmental data was inaccurate and a desire to improve upon it for this study
- The Committee pointed out a need for better speed limit signage.
- The Committee expressed a desire that both positive and negative effects of tourism be considered.
- The Committee was concerned that population numbers for summer residents were not well known, particularly in how they affect transit.
- The Committee struck down the "B2" corridor option as unsuitable for high traffic volume and expressed a desire to keep the speed limit on Route 111 at 50 mph.

1/19/2011 – Steering Committee Meeting

Meeting Agenda

- Revised Purpose and Needs Statement
- Draft Measures of Effectiveness: Phase II and III
- Draft Population Projections
- Draft Transportation Strategies/Corridors
- Next Steps

Summary of Committee Input

- The Committee had a number of minor questions and recommendations on fine-tuning the transportation model.
- The Committee put forth the need for considering and mapping impacts on prime farmland.
- The Committee expressed concern that population projections for Sanford did not match up with previous projections.

1/20/2011 – Public Informational Meeting/Sanford Town Office

Total estimated attendance 15-20 people

Meeting Agenda

- Study Introduction and Approach
- Who is part of the study?
- What will the study accomplish?
- Public Involvement
- Initial Baseline Data
- Work Stations

Summary of Public Input

- Participants noted potential new corridors at the following locations:
  - Between Route 109/Route 99 and the Turnpike
  - A bypass on Route 4 around North Berwick Downtown
  - Improved linkages between south Sanford and New Hampshire/Route 202
  - Improvements to the Route 109 Corridor from south Sanford to the Turnpike
- Participants expressed a concern that improvements might divert truck traffic off the Turnpike.
- Participants asked that the study consider an expansion of specialty services such as commuter transit service to the Naval Shipyard in Portsmouth.
- Participants expressed a desire for transit to work with existing services, like the current Sanford to Wells bus that times service around the Amtrak schedule.
- Participants expressed concern of environmental issues including wetlands, deer winter habitats, rural conservation areas, and aquifers, all of which are located inside the study area.
- Participants also noted concern that businesses and a graveyard were located close to the Route 111 right of way.
- Participants expressed a preference for the following Measures of Effectiveness: Economic Benefit, Traffic Safety (all modes), and Roadway Capacity/Traffic.

3/31/2011 – Advisory Committee Meeting

Meeting Agenda

- Communications Update
- Review Population And Unemployment Projections
- Possible Land Use/Access Management Options
- Key Findings from Prior Transportation Studies

- Review Potential Phase II Corridor Concepts
- Next Steps

Summary of Committee Input

- The Committee brought up a plan for road improvements to Route 111 that the study should be aware of.
- The Committee Expressed concerns over farm tractor crossings on Route 111.

3/31/2011 | Steering Committee Meeting

Meeting Agenda

- Communications Update
- Review Population and Employment Projections
- Possible Land Use/Access Management Options
- Key Findings From Prior Transportation Studies
- Review Potential Phase II Corridor Concepts
- Next Steps

Summary of Committee Input

- The Committee made the study team aware of talk about making an economic corridor connecting the North West portion of the region to Route 16 in NH.
- The Committee warned of large cost and environmental challenges involved in a North Berwick bypass on Route 4.

6/16/2011 | Advisory Committee Meeting

Meeting Agenda

- Web Survey #2
- Phase II Strategies
- Review Phase II Measures of Effectiveness
- Results of Initial Measures of Effectiveness Assessment
- Next Steps

Summary of Committee Input

- The Committee raised the issue of the proposed casino and wondered how it would affect the plans proposed.
- The Committee raised a concern that a limited access road would divide Arundel in two.
- The Committee felt that an unfair burden might be placed on the rural communities in the region by some of the strategies, in particular the widening of Route 111 through Arundel.
- The Committee was concerned about impacts of road widening on structures and properties along the roads to be widened.

6/16/2011 | Steering Committee Meeting

Meeting Agenda

- Web Survey #2
- Phase II Strategies
- Review Phase II Measures of Effectiveness
- Results of Initial Measures of Effectiveness Assessment
- Next Steps

Summary of Committee Input

- The Committee expressed concern that the proposed strategies could create a new nexus in Kennebunk that would compete with Sanford for jobs and economic growth.
- The Committee noted that zoning does not fully characterize the types of development that are in place or likely to occur. Commercial zoning means different things to different towns.
- The Committee pointed out some data not reflected in the conservation lands map and volunteered to supply their own data to make a more robust map.

9/27/2011 | Advisory Committee Meeting

Meeting Agenda

- Study Update
- Timeline
- Phase II Measures of Effectiveness Results
- Additional Discussion
- Other Factors
- Phase III Tasks
- Next Steps

Summary of Committee Input

- The Committee expressed concern with using summer, peak traffic as a baseline for the model as it would show problems that did not exist most of the year.
- The Committee expressed the opinion that infrequent signage and low speed limits were a major factor in causing congestion on Route 111.
- The Committee expressed concern about the effects that widening Route 111 to four lanes would have on agriculture and homes.
- The Committee felt that the B5, B6, NB1, NB2, and NB3 options should be taken off the table.

9/27/2011 | Steering Committee Meeting

Meeting Agenda

- Study update
- Timeline
- Phase II Measures of Effectiveness Results
- Additional Discussion
- Other Factors
- Phase III Tasks

- Next Steps

Summary of Committee Input

- The Committee expressed concern that the potential new job benefits were low and was skeptical of the numbers.
- The Committee felt the strategies that involved new expressways were infeasible due to lack of public support, cost, and environmental impacts.
- The Committee felt that strategies B5, B6, K2, NB1, and NB2 should be taken off the table.

3/28/2012 | Advisory Committee Meeting

Meeting Agenda

- Study Overview To-Date
  - Refresher on Study Purpose and Context
  - Brief Review of Large-scale Transportation Strategies and Previous Comments
  - Additional Discussion
- Revisit Purpose and Needs Statement
- Potential Areas of Study for Phase III
- Phase III Timeframe and Meeting Format

Summary of Committee Input

- The Committee was surprised at the low level of return on investment on Route 109 and they felt that it still had potential despite its low ranking.
- The Committee expressed an opinion that passing lanes could improve travel times on the middle section of Route 111.
- The Committee felt there was untapped potential in the Sanford airport.
- The Committee expressed the potential need for a new park and ride facility west of Biddeford.

3/28/2012 | Steering Committee Meeting

Meeting Agenda

- Study Overview To-Date
  - Refresher on Study Purpose and Context
  - Brief Review of Large-scale Transportation Strategies and Previous Comments
  - Additional Discussion
- Revisit Purpose and Need Statement
- Potential Areas of Study for Phase III
- Phase III Timeframe and Meeting Format

Summary of Committee Input

- The Committee raised a concern over southern and western evacuation routes should the I-95 bridge be compromised.
- Some members of the Committee felt that the increase in jobs due to a better connection between Sanford and the Turnpike was being understated.
- The Committee recommended additional areas that needed improvements to address safety issues.

3/29/2012 | Public Informational Meeting/Kennebunk Town Office

Total Estimated Attendance: 50-60 people

Meeting Agenda

- Welcome
- Study Overview and Timeline
- Purpose and Need Statement
- Phase II Major Strategies and Evaluation

- Discussion
- Potential Phase III Locally Focused Strategies
- Next Steps

Summary of Public Input

- Participants expressed the concern that a bypass could be detrimental to the communities bypassed.
- Participants were concerned with the new road scenarios for environmental and cost reasons.
- Participants wondered to what extent post-car futures were considered in the analysis.
- Participants were concerned for habitat fragmentation.
- Participants were supportive of the study team's recommendation that the Major Strategies should be dismissed from further study.

5/22/2012 | Advisory Committee Workshop

Workshop Agenda

- Route 111 Safety Issues
- Route 111 Access Management
- Route 111 Transit Issues
- Route 202 and Route 4 Safety Issues
- Downtown Sanford Safety and Access Issues
- Sanford Transit Issues
- Route 109 Safety Issues
- Route 109 Access Management
- Route 109 Transit Issues

Summary of Committee Input

- The Committee discussed confusing lane markings and signage at the Route 111 Biddeford Park and Ride.
- The Committee pointed out areas of frequent icy road conditions on Route 111 that could benefit from signage.
- The Committee discussed issues with shared access regulations with particular focus on how to integrate shared access with existing businesses.
- The Committee discussed the problems for transit in terms of limited ridership and poor connections in existing transit.
- The Committee discussed problem intersections in downtown Sanford and the possibility for reworking them.
- The Committee brought up the fact that Sanford recently received a grant to build a Transportation Center.
- The Committee agreed that there was a need for access management on Route 109 west of I-95.

5/22/2012 | Steering Committee Workshop

Workshop Agenda

- Route 111 Safety Issues
- Route 111 Access Management
- Route 111 Transit Issues
- Route 202 and Route 4 Safety Issues
- Downtown Sanford Safety and Access Issues
- Sanford Transit Issues
- Route 109 Safety Issues
- Route 109 Access Management
- Route 109 Transit Issues

Summary of Committee Input

- The Committee discussed the possibility of moving the Route 111 / Turnpike interchange.
- The Committee recommended educating the municipalities and developers about the benefits of access management could ease implementation.
- The Committee noted an application has been filed for a grant to create a park and ride lot in Sanford.
- The Committee discussed the benefits and issues of realigning roads and intersections through downtown Sanford including the Route 202 / River St. intersection.
- The Committee discussed the possibility of connecting Route 99 and Route 35 by the West Kennebunk I-95 Interchange.
- The Committee talked about the potential for extending sewer beyond I-95 on Route 109 in Wells and what that would mean for development in the area.

8/8/2012 | Advisory Committee Meeting

Meeting Agenda

- Study Update
- Presentation of Proposed Strategies

Summary of Committee Input

- The Committee expressed concern about grade issues related to the potential new connection between exit 32 and Route 111.
- The Committee pointed out poor signage issues around the turn lane for Wal-Mart in Biddeford.
- Some members of the Committee were concerned about the noise caused by rumble strips.

8/8/2012 | Steering Committee Meeting

Meeting Agenda

- Study Update
- Presentation of Proposed Strategies

Summary of Committee Input

- The Committee expressed concern that constructing a new road between Route 35 and Route 99 could take money away from maintaining the current connections.
- The Committee noted that while it was not signed well, the first entrance headed into Sanford for the Hospital is an emergency vehicle-only entrance.
- The Committee expressed concern over the scope and cost of the proposed improvements to Route 202 in downtown Sanford. They worried that if the project was too ambitious it would become too expensive to fund and nothing would happen.

8/20/2012 | Public Informational Meeting/Sanford Town Office
Total Estimated Attendance: 8-10 people

Meeting Agenda

- Welcome
- Study Purpose and Overview
- Identified Issues and Strategies Under Consideration
- Next Steps

Summary of Public Input

- Participants expressed a desire for the Route 111 / Turnpike interchange to maintain its existing routing for access to the Park and Ride lot.
- Participants expressed concern about unsafe driving habits at the Route 111 and Route 224 intersection.
- Participants were generally approving of the recommendations.

Chapter 2: STUDY CONTEXT

Chapter Overview

This chapter describes the study setting, focusing on aspects that are in some way related to transportation. Travel demand and economic activity, which are both of interest to the CYCCS, are in part dependent upon how many people live and work in an area. Therefore, York County's population and employment levels and distribution are important considerations. Historic patterns are examined and projections of future conditions through the year 2035 are presented.

The natural and built environments can both be affected by activities associated with transportation. Construction of new facilities may require new or expanded rights-of-ways, and in that regard may impact natural, rural, or built areas (including sites or structures of historical nature). Transportation facilities and services can also indirectly affect areas by severing habitat, increasing emission of pollutants, increasing noise, and other effects.

Study Area Background

York County is located in the southwestern corner of Maine, and is the primary gateway into Maine for travelers from other states. The Portland metropolitan area is Maine's population and jobs center and is located to the east (Figure 2-1), approximately 20 miles from Biddeford via the Maine Turnpike.

According to data from the United States Census Bureau, almost half of the County's working residents commute to jobs outside the County. Conversely, relatively little in-commuting occurs—about 70 percent of York County's jobs are filled by County residents. While these commuting patterns are not as extreme as those typical of "bedroom communities," they are indicative of a local housing/jobs imbalance.

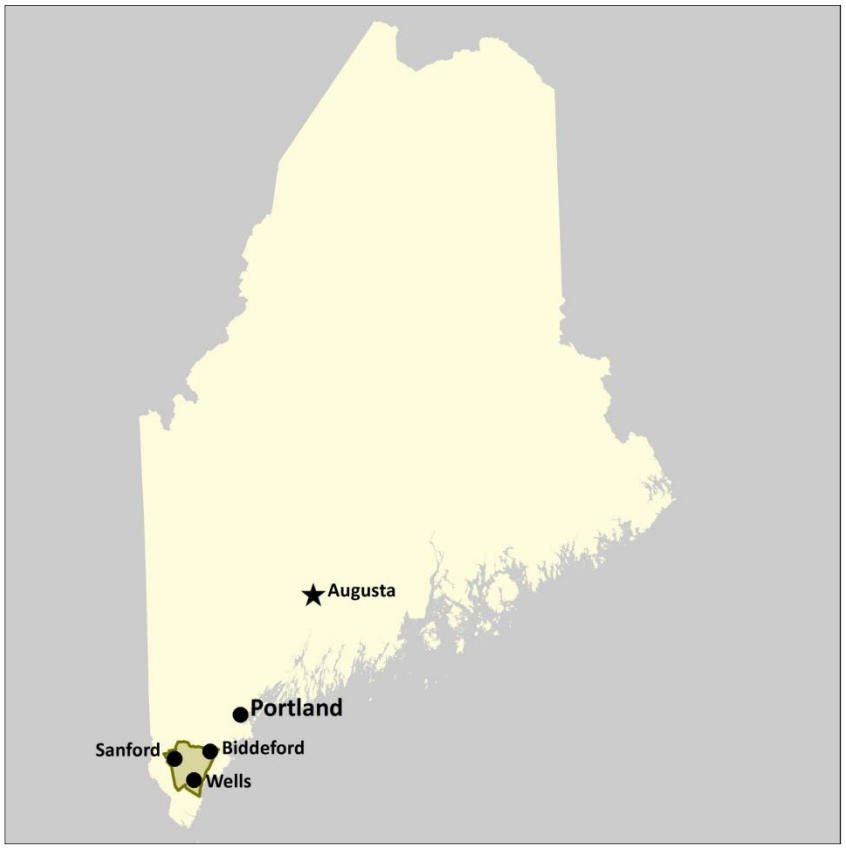


Figure 2-1: Location of CYCCS Study Area in Maine

Population and Employment

Current population and employment estimates (year 2010), as well as future projections for the year 2035, were developed to support the transportation and economic development analysis for the CYCCS. These projections were used to describe the baseline conditions (i.e. – conditions without any major transportation improvements or changes in regulatory policies) in year 2035 in terms of population, employment, and transportation network performance, and were used in comparison with alternative transportation scenarios examined in the study process.

The population and employment forecasts were prepared by the University of Southern Maine's (USM's) Center for Business and Economic Research (CBER) using econometric models developed by Regional Economic Model Inc. (REMI) of Amherst, MA and maintained by CBER. Refer to *Appendix E: Population and Employment Forecasts* for a detailed description of the population and employment forecast methodology.

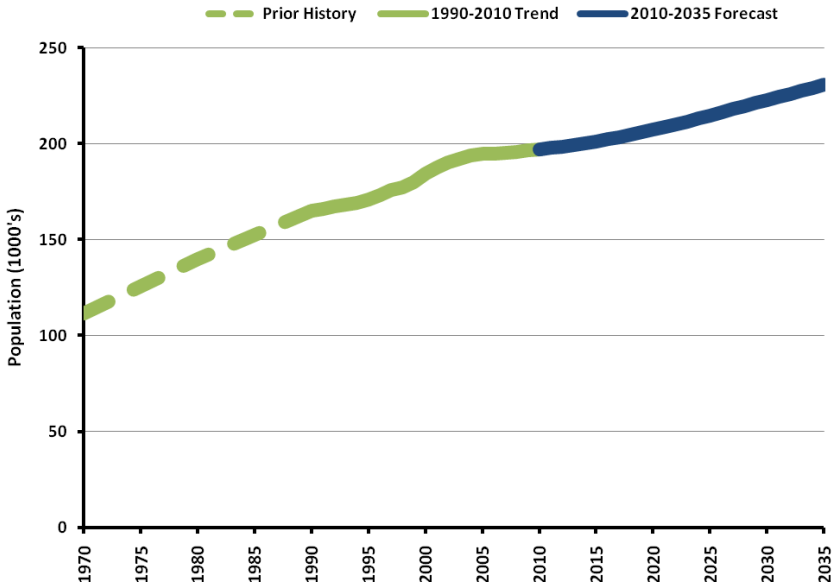
Population Projections

Countywide Population Forecasts

York County is one of Maine's fastest growing regions, though as with many locations in New England, growth slowed in recent years. Between 1990 and 2010, the County's population grew from 164,587 to an estimated 197,131 persons, an increase of 19.8 percent (equivalent to a 0.9 percent annual growth rate).

By 2035, the population of York County is forecast to grow to 230,703, a total increase of 33,572 over the estimated 2010 population, or 17 percent. This corresponds to an annual average growth rate of 0.6 percent, which is lower than the 1990-2010 average of 0.9 percent per year.

Figure 2-2 illustrates the population of York County since 1970 and forecast population for years 2010 – 2035. Growth trends since 1990 were considered in developing the 2010 – 2035 forecasts, whereas the historic population for 1970 – 1990 is shown for context only.



Source: University of Southern Maine Center for Business and Economic Research, 2011 and U.S. Census Bureau, 2011.

Figure 2-2: York County Population Estimates (Historical and Forecast), 1970 – 2035

Components of Population Change

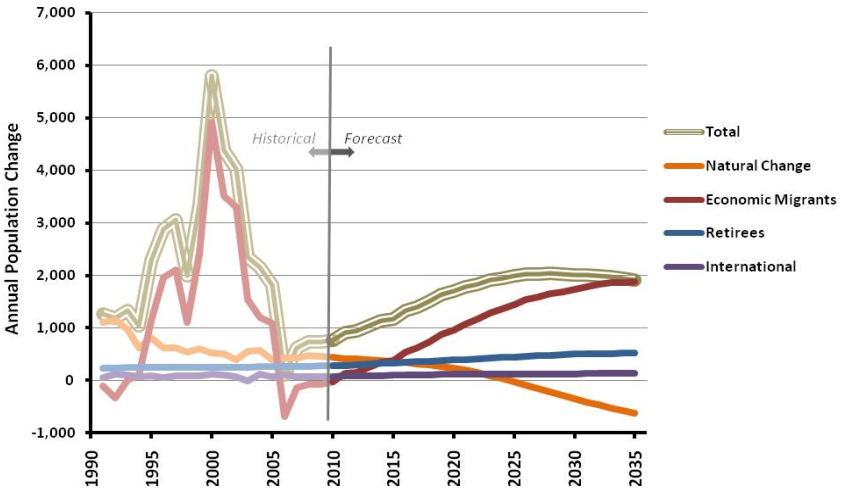
Population changes may be categorized by four components:

- Natural change – the change in population resulting from births and deaths only.
- Economic migrants – the net migration into the county from all other domestic regions for jobs.
- Retirees – the net migration into the county of retired persons.
- International – the net migration of foreign or immigrant persons into the county.

A fifth component, *Special populations* (such as military and prison populations), does not apply in York County and is therefore not accounted for in the forecasts.

Figure 2-3 shows the annual level of change associated with each of these components since 1990 and forecast through 2035. York County experienced a spike in economic migrants in 2000, which was associated with the end of the "tech boom" in the late 1990s. Other components have exhibited steadier trends; declining growth in natural population and consistent but small annual increases in retirees and international populations.

The rate of natural population growth is forecast to continue its decline, resulting in net decreases by 2024 as deaths exceed births in the county. This trend reflects the aging population in York County and the rest of Maine. From 2025 on, population growth in the county will be due entirely to net in-migration (economic, retiree and international). Net economic migration is expected to grow slowly through the next decade as the economy recovers from the recession. The national housing crisis is further restricting migration through this decade, though a recovery in the housing market is expected by the end of the decade. Net economic migration to York County is forecast to accelerate to between 1,000 and 2,000 per year in 2020–2030 and level out just under 2,000 per year from 2030 onward.



Source: University of Southern Maine Center for Business and Economic Research, 2011.

Figure 2-3: Historical and Projected Annual Population Change by Component

Over the entire 2010-2035 period, net economic migration to York County is forecast to average about 1,000 persons per year. This compares with an estimated average economic migration of about 1,200 persons per year over the 1990–2010 period. The lower forecast rate reflects the effects of the recession and housing market slump. The historical data also covers a period in 1998–2002 when

economic migration to York County averaged a very high 3,500 per year.

Retiree migration is forecast to grow steadily, increasing from an average rate of about 250 per year (1990-2008) to 400–500 persons per year after 2020. International migration is expected to slowly increase from 100 to about 150 persons per year based on long term population trends.

Town and TAZ Level Population Forecasts

The population projections at the county level were further distributed to the town level. Table 2-1 shows a summary of the projected population growth in each of the CYCCS towns. The projected annual population growth rate ranges from a low of -0.4 percent in Ogunquit to a high of 2.2 percent in Waterboro. Overall, there is an estimated 12,479 person increase in the population of the CYCCS communities between 2010 and 2035, a total increase over the 2010 population of 17 percent (corresponding to a 0.6 percent annual growth rate).

Traffic Analysis Zones (TAZ) are the smallest groupings of population and jobs estimates prepared for the study. TAZs are used by the travel demand model to estimate trip generation and assign trips to the transportation network at specific locations. Their size is based on the level of development and/or transportation network complexity, with smaller zones established for more developed areas, and larger zones for more sparsely populated areas. TAZ boundaries correspond to established census tract and town line boundaries.

Population forecasts were prepared as part of the study by converting population to households (also known as "occupied dwelling units") and then disaggregating the households to the TAZ level, taking into account underlying zoning and developable land. Figure 2-4 illustrates the distribution of the change in households by TAZ between years 2010 and 2035, ranging from less than 10 percent to greater than 50 percent. Darker shaded areas indicate locations with higher amounts of relative growth. Note that relative growth is dependent not only on the net amount of growth predicted, but on existing population as well. Therefore, a fairly small increase in net growth may result in a high degree of relative growth in a TAZ that is currently lightly populated.

Table 2-1: Population Summary for CYCCS Communities

Study Area Town	2010 Population	Projected 2035 Population	Projected Change 2010-2035	Projected Annual Growth Rate 2010-2035	Share of Study Area Growth
Alfred	2,238	3,019	781	1.2%	6.3%
Arundel	2,669	4,022	1,353	1.7%	10.8%
Biddeford	20,710	21,277	567	0.1%	4.5%
Kennebunk	8,004	10,798	2,794	1.2%	22.4%
Lyman	3,390	4,344	954	1.0%	7.6%
North Berwick	3,793	4,576	783	0.8%	6.3%
Ogunquit	974	892	-82	-0.4%	-0.7%
Sanford	20,463	20,798	335	0.1%	2.7%
Waterboro	4,510	7,693	3,183	2.2%	25.5%
Wells	7,778	9,589	1,811	0.8%	14.5%
TOTAL	74,529	87,008	12,479	0.6%	

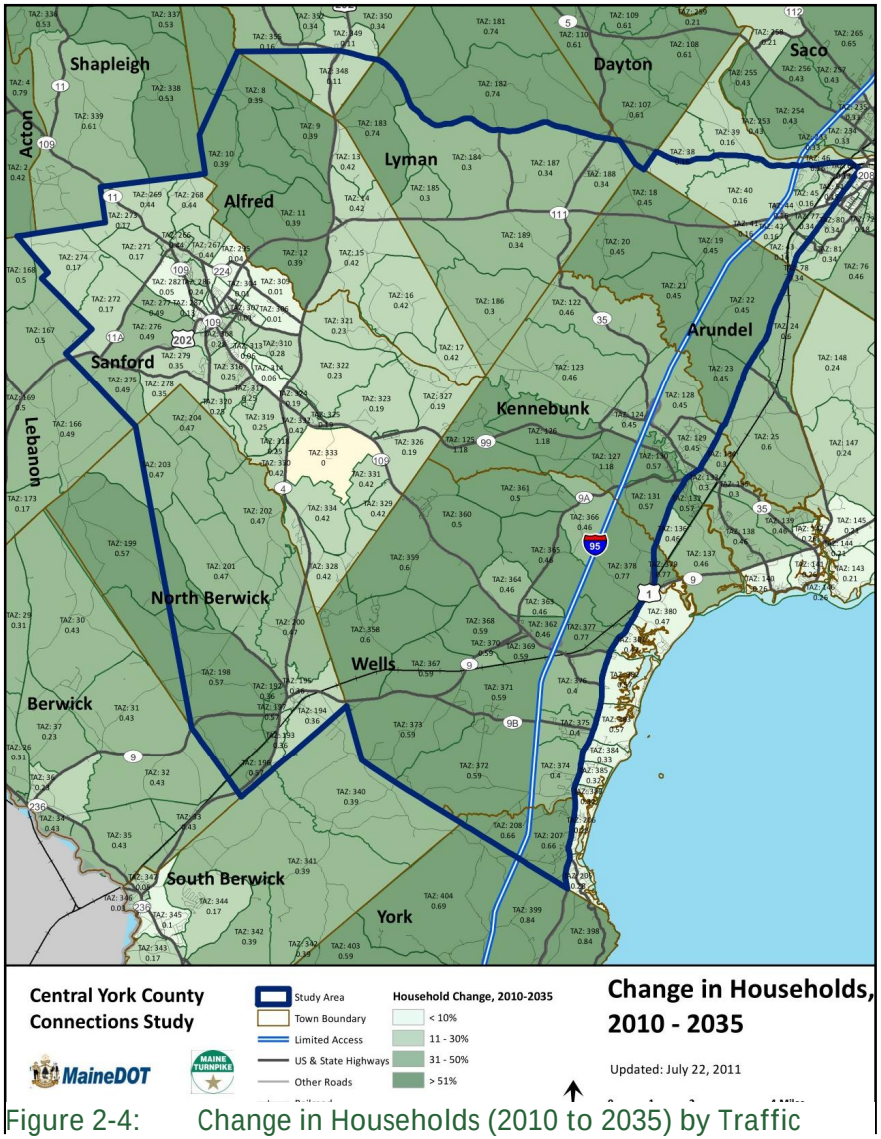


Figure 2-4: Change in Households (2010 to 2035) by Traffic Analysis Zone (TAZ)

Employment Projections

The other key demographic projection prepared for the study is an estimate of employment by labor category for each TAZ. Employment forecasts are also derived by the REMI model described in detail in *Appendix E: Population and Employment Forecasts*. Since much of the employment data is confidential and cannot be publically distributed, only summary data is presented.

Countywide Employment Forecasts

Table 2-2 shows the REMI forecast change in employment in York County from 2010-2035 grouped by the five sectors used in the transportation model. Manufacturing employment is forecast to decline by 779 jobs over the time period, while all other sectors are forecast to experience growth. The total net growth is an increase in employment of 20,534 in 2035.

Table 2-2: York County Forecast Change in Employment by Sector, 2010–2035

Employment Sector	Projected Job Growth (2010 – 2035)
Manufacturing	-779
Recreation	341
Residual[1]	2,346
Retail	3,253
Services	15,373
TOTAL	20,534

1. Residual employment refers to all job types not represented by the other sectors shown (for example, agriculture or fishing).

Town and TAZ Level Employment Forecasts

Existing employment in each sector was allocated to the town and TAZ level based on data from the 2010 Quarterly Census of Employment.

Summary employment data is shown in Table 2-3 for those communities in the CYCCS study area.[1] The projected annual employment growth rate ranges from a low of 0.6 percent in Ogunquit to a high of 1.5 percent in Kennebunk. Overall, there is an estimated employment increase of 10,954 jobs in the CYCCS communities between 2010 and 2035.

Table 2-3: Employment Summary for CYCCS Communities

Study Area Town	2010 Jobs	Projected 2035 Jobs	Change 2010-2035	Annual Growth Rate 2010-2035	Share of Study Area Growth
Alfred	649	918	269	1.4%	2.5%
Arundel	967	1,323	356	1.3%	3.2%
Biddeford	8,810	12,075	3,265	1.3%	29.8%
Kennebunk	4,324	6,207	1,883	1.5%	17.2%
Lyman	326	439	113	1.2%	1.0%
North Berwick	880	1,225	345	1.3%	3.1%
Ogunquit	2,358	2,743	385	0.6%	3.5%
Sanford	6,672	9,217	2,545	1.3%	23.2%
Waterboro	2,108	2,706	598	1.0%	5.5%
Wells	4,210	5,405	1,195	1.0%	10.9%
TOTAL	31,304	42,258	10,954	1.2%	

Historic and Archaeological Resources

The following provides an overview of the historic and archaeological resources documented within the Study Area. A discussion of the data sources and methodology used for this assessment can be found in *Appendix F: Historic and Archaeological Resources.*

Methodology

Historic resource identification for the CYCCS involved mapping historic buildings, structures, and historic districts currently listed in the National Register of Historic Places (National Register), as well as those previously determined to be eligible for the National Register by the Maine Historic Preservation Commission (MPHC), which is the State Historic Preservation Office (SHPO). For the purposes of project review, "listed" and "determined eligible" are equivalent. Identified archaeological sites were mapped separately.

Only properties previously identified as listed or eligible are presented in this chapter; other properties with the potential for National Register eligibility also exist within the study area. Further field investigation and documentation performed to assess potential historic resources in specific study area locations as they relate to the proposed recommendations of the CYCCS are discussed in the context of the proposed recommendations in Chapter 3 of this report.

National Register of Historic Places and Determinations of Eligibility

The National Register of Historic Places (National Register) is composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and/or culture. Properties are nominated to the Register, or determined eligible, under one or more criteria of

[1] The employment levels for any given year are for third quarter employment (Jul-Aug-Sep), not annual average.

significance. They can be related to local contexts, or in some cases to subjects of statewide or national importance. The four general criteria are:

- Association with important events or historic trends
- Significance by way of association with important persons
- Significance for architecture and design
- Potential to yield important information in history or prehistory (usually through archaeology)

Nomination forms for the National Register listed properties in the Central York County region were prepared by Maine Historic Preservation Commission staff in conjunction with local organizations such as the historical societies or historic preservation commissions. The National Register documentation is on file at MHPC and at the National Park Service, National Register of Historic Places in Washington, DC.

Pursuant to Section 106 of the National Historic Preservation Act of 1966 (Section 106), agencies are required to consult with the Maine Historic Preservation Commission (the SHPO) to assess the effects of any federally funded, permitted, or licensed undertaking on "historic properties." These are defined as cultural resources listed in or eligible for listing in the National Register of Historic Places. The goal of this consultation process is to identify the presence of significant historic buildings, structures, districts, and archaeological sites and take steps to avoid, minimize, or mitigate adverse effects (Maine Historic Preservation Plan, MHPC 2005). The process by which the Maine Department of Transportation (MaineDOT) meets their responsibilities for undertakings pursuant to Section 106 is set forth in the 2004 Programmatic Agreement between the Federal Highway Administration, Federal Transit Administration, the Advisory Council on Historic Preservation, MHPC and the MaineDOT. MaineDOT is responsible for defining the area of potential effect (APE) for each undertaking, identifying historic properties within the APE using MHPC Historic Buildings/Structures survey forms, and evaluating the eligibility of any historic properties for inclusion in the National Register. Documentation is forwarded to the SHPO (MHPC) for concurrence and entered in the MHPC survey files.

Limits of Available Information

Because existing determinations of National Register eligibility were made only for properties immediately within earlier projects' APEs, the status of the majority of historic buildings in the CYCCS study area remains undetermined. These properties are not assumed to be ineligible and official determinations would need to be made by MHPC and MaineDOT should a future project potentially affect such properties.

Similarly, archaeological excavations are conducted when disturbance is threatened, but other currently unknown archaeological sites may exist within the study area.

In addition to the architectural survey forms that record determinations of eligibility, the MHPC survey files contain large numbers of reconnaissance-level architectural survey forms. Most were locally generated by historic preservation commissions for identification and planning purposes. In central York County towns, the focus of most earlier historic building surveys was on the coastal zone, just east of the study area. These surveys record basic information about the property type, architectural data, approximate age, and location, but do not include historical information or

National Register evaluation. The level of documentation may be sufficient to determine National Register eligibility, but the earliest of these surveys are now nearly twenty-five years old and likely out of date. These records are not included in the listings identified in the following sections.

Overview of Study Area

The CYCCS Study Area is anchored by the Maine Turnpike (I-95)/US Route 1 corridor which parallels the coastline (Figure 2-5). US Route 1 still follows mainly the same path as the original Post Road, and was the focus of all early settlement in the region. US Route 1 was the first numbered federal highway in the country. US Route 1 is the main road in Wells, Kennebunk, and Arundel with development all along it. Many historic buildings remain, though overall much of Route 1 is characterized by modern commercial properties. Locally, the road is identified as Main Street in Ogunquit, Post Road in Wells, York Street in southern Kennebunk, Main Street in downtown Kennebunk, and Portland Road to the north and through Arundel, becoming Elm Street in Biddeford.

The Maine Turnpike was opened in 1947, just inland from and parallel to US Route 1 through a rural area. The Turnpike became part of Interstate 95 (I-95) in 1956. There are interchanges at Exit 19 in Wells (Routes 9 and 109), Exit 25 in West Kennebunk (Route 35), and Exit 32 in Biddeford (Route 111).

The western part of the study area is defined by Route 4. It is a south-north road from Dover, New Hampshire and South Berwick, through North Berwick, southern Sanford, Alfred, and Waterboro to points north, continuing all the way to Rangeley. In Alfred and Waterboro, the highway carries both Route 4 and Route 202 designation (north of Route 111).

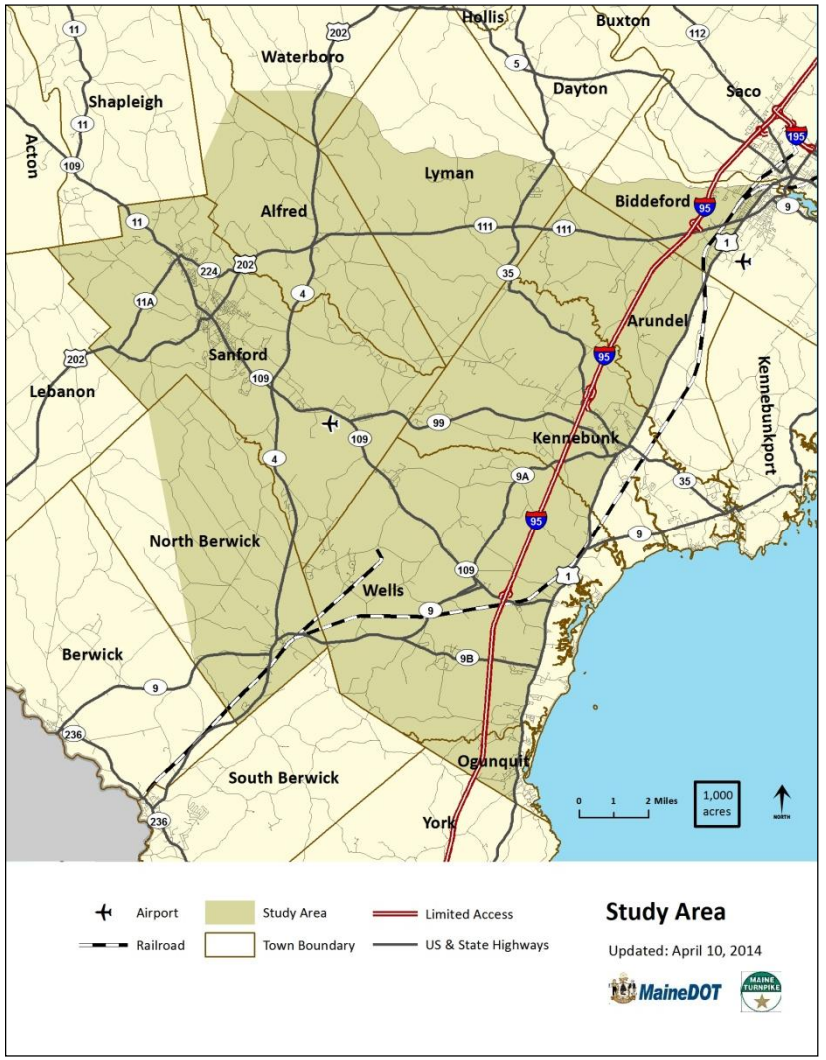


Figure 2-5: CYCCS Study Area

Route 109 (Sanford Road) is the direct route between Wells and Sanford. Wells is the eastern terminus of the 24-mile route across to Acton at the New Hampshire state line. Route 109 passes through the Highpine neighborhood of Wells and past the Sanford Regional Airport. The northern highway in the study area, Route 111 is an east-west road (Alfred Road) from Biddeford to Alfred, where it continues east to Sanford and beyond to New Hampshire as US Route 202. In the south, Routes 9, 9A and 9B connect coastal Wells with North Berwick.

Historically, three railroads passed through southern and central York County, all in a generally south-north direction, connecting Boston and Portland. The one remaining rail line, formerly the Boston and Maine, is the route of the Downeaster passenger train operated by Amtrak on Pan Am Railways track. From Dover, New Hampshire, it passes through South Berwick, North Berwick, Wells, Kennebunk, and Biddeford. This section of the Boston and Maine was built in 1873 to compete with the earlier Boston to Portland line, the Portland, Saco & Portsmouth (PSP), then controlled by the Eastern Railroad. Built in 1842, it passed through Kittery, Eliot, North Berwick, Wells Depot, Wells Branch, and Kennebunk. The two roughly parallel routes intersect in North Berwick. The Boston and Maine prevailed and was able to take over the Eastern Railroad in the 1880s. The PSP line was abandoned in the 1940s, but parts of the right-of-way still remain evident in segmented ownership. The most inland of the three railroads in the study area was the 1871 Portland & Rochester Railroad, which went southwest-northeast from Rochester, through Springvale and Alfred and north through Waterboro toward Portland. Passenger service ended in 1932 and much of the line was abandoned in the 1950s. The right-of-way remains evident in places under various ownerships.

Not including the major south-north routes, most of the local roads in the area run east-west or more commonly southeast-northwest, connecting the seacoast and inland towns. These local roads follow the topography, particularly the valleys and interval areas of numerous rivers and streams that flow from northwest to southeast into the Atlantic. These rivers provide water-power upriver and salt marshes and sheltered harbors at their outlets on the coast. Outside of the town centers, the roads in this region pass through rural areas. There are many scattered historic houses and farms, a number of distinct neighborhoods, and late 20th century development interspersed.

Identified Historic and Archaeological Resources

Summary of Findings

In the study area, there are currently thirty-nine (39) individual properties and five (5) historic districts listed in the National Register of Historic Places (Figure 2-6 and Table 2-4). Two additional districts in Biddeford are immediately adjacent to the study area. In addition, seventy-two (72) individual properties, six (6) bridges and one (1) rural historic district in the study area have previously been determined eligible for the National Register of Historic Places. There are no National Historic Landmarks in this part of York County. If no determination of National Register eligibility has been made for a resource, its status is not ineligible, but “undetermined” (i.e., pending further study).

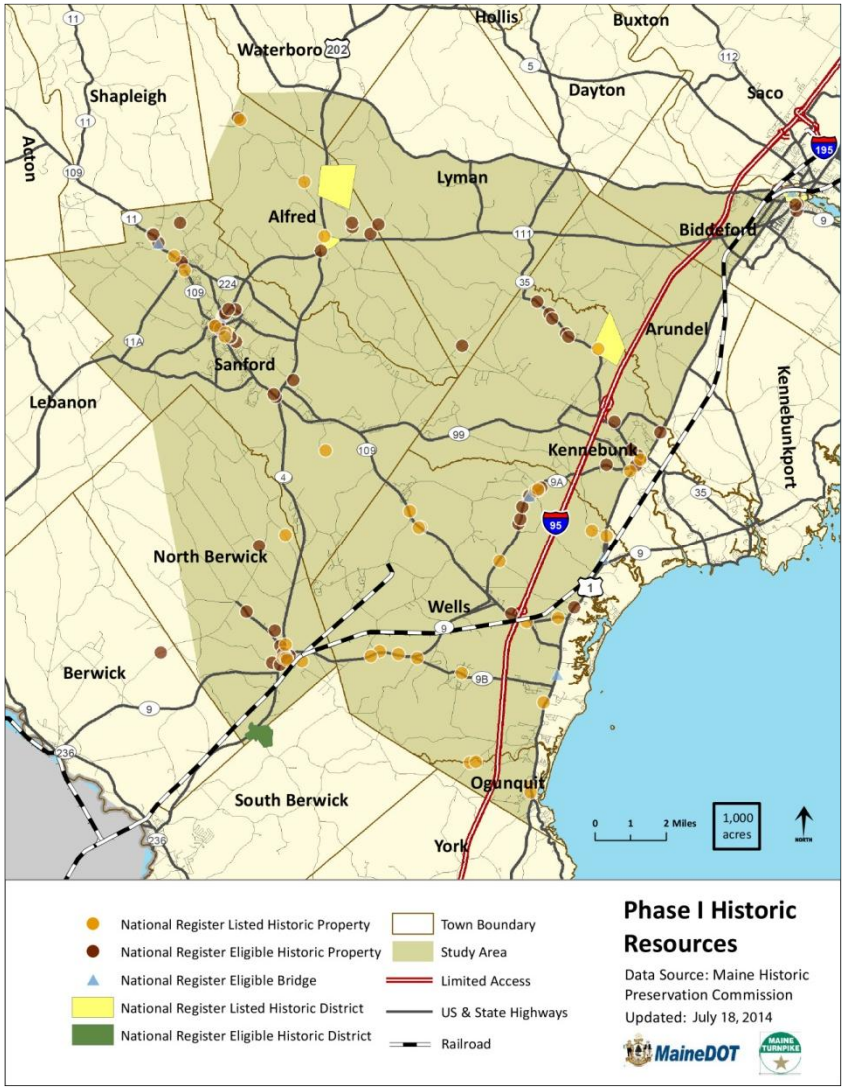


Figure 2-6: Historic Resources Documented within Study Area

Table 2-4: National Register Listed or Identified Eligible Properties in the CYCCS Study Area

	Registered		Determined Eligible		
Town	Districts	Properties	Districts	Properties	Bridges
Alfred	2	3	—	6	—
Arundel	—	—	—	—	—
Biddeford	—	—	—	—	1
Kennebunk	2	3	—	13	—
Lyman	—	—	—	1	—
North Berwick	—	6	1	15	—
Ogunquit	—	3	—	—	—
Sanford	1	7	—	30	3
Waterboro	—	—	—	—	—
Wells		17		7	2
Total	5	39	1	72	6

Source: Maine Historic Preservation Commission, 2011
Note: Only includes those properties within the CYCCS study area

There are 46 known archaeological sites, either prehistoric (dating from before recorded history) or historic, in the study area (Figure 2-7 and Table 2-5).

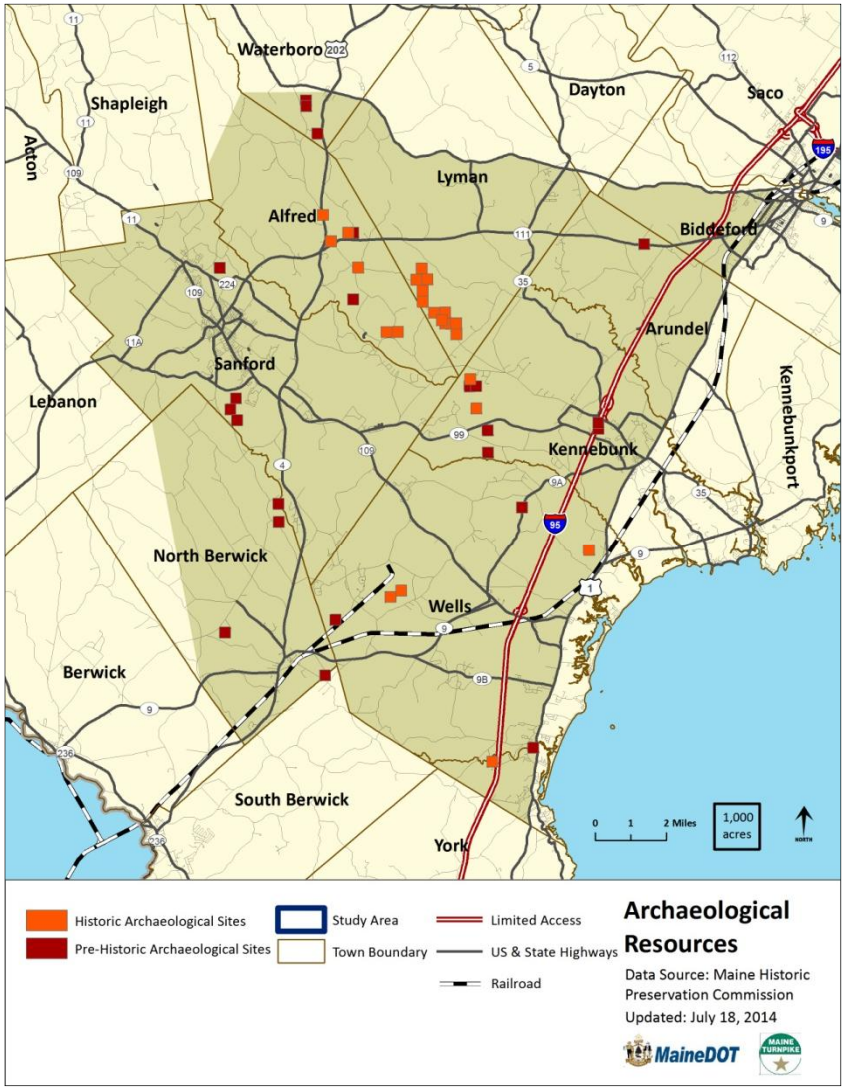


Figure 2-7: Archaeological Resources within Study Area

Table 2-5: Identified Archaeological Sites in the CYCCS Study Area

Town	Historic Archaeological Sites	Prehistoric Archaeological Sites	Total
Alfred	6	2	8
Arundel	—	1	1
Biddeford	—	—	0
Kennebunk	2	6	8
Lyman	11	—	13
North Berwick	—	4	4
Ogunquit	1	1	2
Sanford	—	4	4
Waterboro	—	3	3
Wells	3	2	5
Total	25	23	46

Source: Maine Historic Preservation Commission, 2011

Several Central York County towns have local Historic Preservation Commissions. However, there are no Local Historic Districts or Local Landmarks designated by Town ordinances within the CYCCS area. Maine State legislation requires each town to include historic preservation planning as one of ten stated goals in its comprehensive plan. The level of detail on historic and architectural resources varies, but the towns have not identified any locally significant historic resources within the study area.

Resources Identified in CYCCS Towns

The towns in Central York County are listed (alphabetically) below with a summary of identified National Register listed and identified eligible historic resources, as well as archaeological resources. These sites are shown on the Historic and Archaeological Resources maps (Figures 2-6 and 2-7), and National Register sites are additionally tabulated in Appendix B.

Alfred

Alfred, in the geographical center of the county, has been the seat of York County since the early 1800s. It remains a small town with distinctive historic buildings, including the old courthouse. The intersection of US Route 202 and Route 111 is near the middle of the town.

Alfred has two (2) National Register listed historic districts and three (3) individually listed houses. The town center (Saco and Kennebunk Roads) was listed in the National Register of Historic Places as a historic district in 1983. The 150-acre district contains forty-six (46) buildings, most from the early 1800s. The Alfred Shaker Village Historic District on US Route 202/Route 4 (Shaker Hill Road) in the northern part of town was listed in 2001. Individual National Register listed properties are the Senator John Holmes House on US Route 202 (listed 1975), the Lord-Dane House on Federal Street north of US Route 202 (listed 1992), and the District No. 5 Schoolhouse on Gore Road (listed 2009).

Determinations of National Register eligibility have been made for six (6) additional properties on Back Road, Blueberry Hill Road, and Oak Street. Alfred contains six (6) identified historic archaeological sites and two (2) prehistoric.

The Town of Alfred has a local Alfred Historical Museum and Historical Committee, established in 1981. The Alfred Village Museum is located in the old firehouse in the National Register historic district. The town's Comprehensive Plan does not identify any local historic districts or landmarks.

Arundel

The study area includes portions of Arundel on and west of US Route 1. Therefore, the eastern and southeastern coastal parts of Arundel are not included. Arundel was formerly known as North Kennebunk until it was set off as a separate town in 1915 with the Kennebunk River as the dividing line. Settlement is focused on Route 1 (Portland Road), and the town is primarily rural in outlying areas. Route 111 crosses the northern edge of Arundel, west of Biddeford and the Maine Turnpike exit 32 interchange.

There are no properties in the study area listed in or determined eligible for the National Register of Historic Places. There is one (1) prehistoric archaeological site. The Arundel Comprehensive Plan adopted in 2007 recommended future survey of historical sites and buildings, but this has not been conducted. Arundel does not have a local historic preservation commission or ordinance.

Biddeford

The City of Biddeford began as a factory town on the Saco River near its mouth at the ocean. With a population of 22,000, Biddeford is Maine's sixth largest city. The northeast tip of the CYCCS study area is defined by the "Five Points" intersection at the southwest corner of downtown Biddeford at the junction of US Route 1 and Route 111. Directly to the north and east of (but external to) the study area are the southern edges of two (2) National Register listed historic

districts, the Biddeford Main Street Historic District and the Biddeford-Saco Mills Historic District.

Within the study area, there is one (1) National Register eligible property in Biddeford, the Elm Street/Hooper Street Bridge (built in 1929). Elsewhere in Biddeford, several individual buildings have been determined eligible for the National Register, but all are outside the study area. In 2009, properties on Elm Street/US Route 1 in the vicinity of St. Mary's Cemetery were surveyed but none were determined eligible. There are no surveyed archaeological sites in Biddeford that are located within the study area.

The Biddeford Main Street Historic District listed on the National Register of Historic Places in 2009 lies external, but immediately adjacent to the northeast corner of the study area. The Main Street Historic District includes 29 to 316 Main Street and portions of Elm, Jefferson, Adams, Washington, Franklin, Alfred, and Water Streets. To the east, on the Saco River, the Biddeford-Saco Mills Historic District listed on the National Register in 2008 is bounded by Pearl, Lincoln, York and Main, Biddeford, Gooch and Saco Streets.

Archaeological sites have not been identified within the small area of Biddeford that lies within the CYCCS study area.

Kennebunk

Kennebunk developed as an independent village of Wells until set off as a separate town in 1820. The downtown was centered near the present-day Kennebunk Bridge over the Mousam River and adjacent industrial sites. The commercial center lines US Route 1 at the junction of US Route 1, Route 9A, Route 99, and Route 35. Route 99 runs east-west out of Kennebunk toward Sanford on the south side of the Mousam River. Route 35 passes through the village of West Kennebunk (also Kennebunk Depot) and Alfred to the northwest. East of US Route 1, Route 35 continues toward the shore along the south side of the Kennebunk River.

Within the study area, Kennebunk contains two (2) National Register listed historic districts and three (3) individually listed properties. The Kennebunk Historic District listed in the National Register of Historic Places in 1974 includes both sides of Route 35 (Summer Street) from US Route 1 eastward along the south side of the Kennebunk River. The "Upper Square" in downtown Kennebunk at the intersection of US Route 1 and Route 35 falls within the current study area, though most of the historic district is to the east. Individual National Register listed properties on the west side of US Route 1 are the Bourne Mansion at 8 Bourne Street (listed 1980) and Wallingford Hall (added 2004) at 21 York Street, as well as the James Smith Homestead on Route 35 (listed in 1982). Other individually listed National Register properties are in the coastal part of town east of US Route 1. In the study area, the Lower Alewive Historic District, listed on the National Register of Historic Places in 1994, is a rural district of farms and open fields west of the Maine Turnpike on the northern edge of Kennebunk. It is located on Emmons Road, east of Route 35/Alewive Road.

Thirteen (13) buildings in the study area have determinations of National Register eligibility. They are primarily on Fletcher Street and Alewife Road, which are Route 35.

Kennebunk is the only Central York County town that is a Certified Local Government (CLG). The CLG Program was created in the early 1980s by an amendment to the National Historic Preservation Act to promote preservation planning and cultural resource protection efforts at the local level, consistent with State and Federal standards.

The key requirement for participation is the adoption of a historic preservation ordinance that creates a local historic preservation commission. CLGs are eligible to apply for dedicated annual grants. A Kennebunk survey was conducted in 1991–93 and 1999–2000 primarily in the historic district east of Route 1. The intersection of US Route 1 and Ross Road was surveyed in 2001 but no determinations of individual eligibility resulted. A reconnaissance-level historic buildings survey has not been conducted in the study area, west of US Route 1.

There are six (6) identified prehistoric archaeological sites in Kennebunk and two (2) historic archaeological sites.

Lyman

Inland from Biddeford is the small town of Lyman, the southern half of which is included in the study area. The main road through Lyman is Route 111, Alfred Road, a straight east-west highway from the coast to the county seat crossing the southern part of town. Settled in the late 18th century, Lyman was originally incorporated as Coxhall until being renamed in 1803. Farming and forestry were the primary industries. Lyman's town center is at "Goodwin's Mills" a small hamlet in the east corner of town, north of Route 111 on Route 35 (Goodwin's Mills Road). This area was formerly home to saw and grist mills dating from the 18th century. The village of Goodwin's Mills, which overlaps the Dayton town line, is located along South Waterboro Road and South Street, which form a west-east route north of and parallel to Route 111 and define the north edge of the study area. Goodwin Mills is not presently identified as eligible for listing.

Within the study area, there are no National Register listings but there is a single determination of eligibility for the former Congregational Church on Old Kennebunk Road. Eleven (11) archaeological sites are recorded on the Phase I map. Nearby to the north of the study area is the National Register listed Levi Foss House on Route 35. The Alfred Shaker Historic District, described previously, abuts Lyman's western town line.

North Berwick

North Berwick, settled in the late 18th century and part of Berwick until 1831, was mainly a farming town. The town center developed as a mill village in the southeast corner of town on the Great Works River. This was the junction of the Portland, Saco and Portsmouth Railroad (1842) and the Boston and Maine Railroad (1873). The woolen mill operated from 1834 to 1955, and the Hussey Manufacturing Company established in the mid 1800s remains in business. North Berwick (village) is the junction of south-north Route 4 (Elm and High Streets) and east-west Route 9. Outside the town center, North Berwick is largely rural and sparsely settled. The irregular intersecting roads run in an overall southeast-northwest direction toward Sanford and Alfred. For the North Berwick Comprehensive Plan of 1990, a list of historic houses more than fifty years old was compiled, though determination of eligibility for National Register listing was not made. The North Berwick Historical Society was founded in 1958, though the town does not have a local heritage commission or historic preservation ordinance.

About 75 percent of eastern North Berwick's land area is included in the study area. There are six (6) properties listed in the National Register of Historic Places and another fifteen (15) properties and one (1) historic district determined to be eligible. Listed properties include: the North Berwick Woolen Mill on Canal Street (listed 1983), the Thomas Hobbs Jr. House on Wells Street (listed 1982), the Mary

R. Hurd House on Elm Street (listed 1979), the Hussey Plow Company Building on Dyer Street (listed 1979), the J.L. Prescott House on High Street (listed 1985), and the Old Morrell House on Bauneg Beg Pond Road (listed 1976).

The Knights Pond Road Historic District is a small rural area determined to be eligible as a historic district. It contains several farm properties on the North Berwick-South Berwick town line including land in the latter town. Fifteen individually eligible properties are located in the downtown and elsewhere in North Berwick. There are no eligible historic bridges. Four (4) prehistoric archaeological sites are identified in town, including one (1) on the South Berwick town line.

Ogunquit

Ogunquit is a small oceanfront town, part of Wells for much of its history. The Town of Ogunquit was incorporated in 1980. It is located on the southern edge of the study area, north of the town of York. US Route 1 is the main road. East of US Route 1 on the waterfront is the focus of this summer resort community. The western part of town, which is bisected by the Maine Turnpike, is largely rural.

Ogunquit has three (3) properties in the CYCCS area listed on the National Register of Historic Places. No other determinations of National Register eligibility have been made. The Goodale/Stevens Farm and the Goodale/Bourne Farm on North Village Road were listed on the National Register in 1979, as was the Charles Perkins House on Scotch Hill. Outside the study area, National Register listed properties east of US Route 1 include the Ogunquit Playhouse and the Winn House, one of the early Wells capes (see section on Wells) moved to its present site in 2001. One (1) historic archaeological site and one (1) prehistoric archaeological site are located near the Ogunquit/Wells town line.

Ogunquit conducted an intensive architectural survey for potential National Register Eligibility in 1990, focusing on Route 1 and eastward. No determinations of National Register eligibility were made. Ogunquit has a Historic Preservation Committee and local preservation ordinance in place. The two locally designated sites in the ordinance are both east of Route 1 outside the study area: Perkins Cove Bridge and the Winn House on Obed's Lane.

Sanford

The entire city of Sanford falls within the CYCCS study area. With a population of more than 20,000, Sanford is the eighth largest municipality in the state. It was an important factory town, densely settled on both sides of the Mousam River. The distinct village of Springvale had its own factories from the 1820s and was the town's original commercial center. Thomas Goodall established the Goodall Mills woolen mill in the 1860s. The large company manufactured blankets, carriage robes, upholstery and drapery fabric and later woolen cloth for clothing. The company prospered and local growth continued in the early twentieth century. The mills operated until 1954.

The main road through Sanford and Springvale is Main Street, which is also designated Route 109. The highway parallels the south side of the Mousam River. Local roads converge in the downtown. Route 4 bypasses the downtown, passing through South Sanford where it intersects with Route 109. US Route 202 passes southwest-northeast through Sanford on Lebanon Road and Cottage Street. The outlying

areas were historically rural, but residential subdivisions have been built in the late 20th century.

Sanford does not have a local historic preservation ordinance. The Sanford Historical Committee was formed by the Town in 1927 to acquire, preserve, and display items of historical significance. In 2005, the Sanford-Springvale Historical Society was formed as a non-profit corporation to create a historical museum in the former Town Hall in Springvale for the collections of the Sanford Historical Committee. Portions of Sanford were surveyed at a reconnaissance level in 1984 and the survey forms are on file at MHPC.

Sanford has seven (7) individual properties and one (1) historic district listed in the National Register of Historic Places. Determinations of National Register eligibility have been made for thirty (30) Sanford properties and additionally three (3) historic bridges.

The Sanford Mills Historic District, listed in the National Register in 2009, is a 7½-acre district of industrial buildings on the Mousam River in downtown Sanford. National Register listed individual properties include The Sanford Naval Air Station Administration Building and Control Tower (listed 1997) off Route 109 in the southern part of town. In the downtown, National Register listed properties include: the Thomas Goodall House at 232 Main Street (listed 1975), the Smith-Emery House at 253 Main Street (listed 1998), the Emery Homestead at 1-3 Lebanon Street (listed 1980), the U.S. Post Office at 28 School Street (listed 1986), the Old Sanford Town Hall at 505 Main Street (listed 2007), and the Goodall Memorial Library at 953 Main Street (listed 2008).

Properties with determinations of National Register eligibility include: the Goodall Hospital buildings at 25 and 27 June Street, the Unitarian-Universalist Church at 5 Lebanon Street, the Charles Frost House at 226 Main Street, the Brown Hall-Nasson Institute at 457 Main Street, the Wentworth-Bradford Block on Main Street in Springvale, and the First Baptist Church at 905 Main Street. The group of twelve (12) individually eligible houses on Cottage Street/US Route 202 (26 to 64 Cottage Street) is mill worker housing that forms a potential historic district. Outside the downtown, historic properties determined eligible include Pickett Homestead at 1410 Main Street, the Hawthorne School at 1431 Main Street and the J. Moulton House/Farm on Gavel Road in South Sanford and 82 Littlefield Road on the outskirts of Springvale. The three National Register eligible historic bridges are the Bridge Street Bridge on Route 224 (built in 1901), the Washington Street Bridge (built in 1920), and the Jellison Bridge on South Curve Lane (built in 1920).

The Sanford Comprehensive Plan of 2002 identified the town's high likelihood of undiscovered archaeological sites in addition to the four (4) prehistoric sites recorded in MHPC files.

Waterboro

The southern corner of Waterboro lies within the CYCCS study area. Located due north of Alfred, Waterboro was historically an agricultural town with some lumbering and industry in the town center and at South Waterboro. The latter developed in the post Civil War period and was the local station on the Portland and Rochester Railroad, which opened in 1868. Route 4 and US Route 202 follow south-north as Main Street. West Road and South Waterboro Road (running northwest and southeast) intersect and form the northern edge of the study area. South Waterboro Road is a major route

toward the coast, becoming South Street and continuing east into Biddeford on the south side of the Saco River.

South Waterboro along Main Street retains some integrity as a historic village center with many nineteenth century buildings, though none of these have determinations of eligibility. Large areas of the town, including northern Main Street, were destroyed by fires in 1911 and 1947. The bulk of the town and its other village centers are north of the study area, which is defined by the intersection of Main Street and South Waterboro Road,

There are no properties currently listed in or previously determined eligible for the National Register of Historic Places in the southern part of Waterboro that is within the CYCCS study area. MHPC identified locations of three (3) prehistoric archaeological sites.

The 1990 Waterboro Comprehensive Plan with 2003 updates included extensive discussion of historical resources in town. The Plan identified South Waterboro, which partially resides within the CYCCS study area, as a historic area worthy of future architectural survey.

Wells

Wells is an oceanfront community with an extensive coastline of beaches and tidal inlets. Incorporated as Webhannet in 1653, it was the third town in Maine. Farming was the focus with small local mills and shipbuilding. Settlement was concentrated on Post Road (US Route 1). The eastern coastal part of town became dominated by summer tourism later in the 19th century. Inland Wells has an irregular pattern of interconnecting rural roads. Several form east-west state highways. The intersection of Route 109 and Route 9 is near the Maine Turnpike exit 19 interchange. Route 9 (North Berwick Road) is an east-west road on the north side of the Webhannet River. Route 9B (Littlefield Road) is a smaller road parallel to the south side of the river. Across the southern edge of town, Tatnic Road is the route to South Berwick. Route 109, Sanford Road, is the main road toward Sanford and Alfred. Toward the northwest edge of Wells, the "Highpine" neighborhood was a center of settlement and a railroad station on the Eastern Railroad.

Within the study area in Wells, seventeen (17) buildings are currently listed in the National Register. Seven (7) buildings and two (2) bridges have been determined eligible.

National Register listed properties include: the Wells Baptist Church Parsonage on Branch Road (Route 9A), the Wells Homestead on Sanford Road, the Emery House on Highpine Loop, the Austin-Hennessey Homestead on Burnt Mill, the Dorfield Farm off Harriseckett Road, the Early Post Office at Bragdon's Crossing, the Littlefield Homestead on Branch Road, the Littlefield Tavern on Route 9B, Littlefield-Chase Farmstead on Route 9/North Berwick Road, the Littlefield-Dustin Farm on Dodge Road, and the Littlefield-Keeping House on Route 9B. A number of the above were nominated in 1979 as part of a multiple property nomination listing fifteen (15) separate houses (many in the study area) that were listed as a thematic grouping known as the "Early Capes of Wells, Maine." National Register listed sites also include: the First Church, now the Meeting House Museum of the Historical Society of Wells & Ogunquit on Post Road/US Route 1, and the Division 9 Schoolhouse on North Berwick Road. Libby's Colonial Tea Room, part of Johnson's American Museum, is located on the corner of Post Road/US Route 1 and Harriseckett Road.

The Boston & Maine Railroad Underpass Bridge (circa 1920) on Bypass Road and the Old Buffum Bridge (circa 1931) on Post Road were determined eligible by the MaineDOT survey. Properties with determinations of National Register eligibility include the Wells Branch Community Building at 1411 Branch Road, the Fire Association Building at 1291 Branch Road and dwellings and farms on Branch Road located at 936, 1010, 1140 and 1285 Branch Road.

According to the Wells Comprehensive Plan, the Town had a local Historic Preservation Committee as early as 1978 and a Historic Preservation Commission since 1985. The local commission conducted a survey of significant properties and sites in Wells between 1999 and 2004. A report on the locations of the many small family cemeteries was produced with the assistance of the Department of Public Works in 1997. At the time of the Comprehensive Plan, the Wells Preservation Commission had placed nine (9) properties on the local historic register. Of these, four (4) are also on the National Register of Historic Places (Littlefield-Keeping House, Littlefield-Dustin Farm, Former First Congregational Church, and Division 9 School). The other five locally identified properties are the Moulton Homestead (61 Post Road), the Rankin School (1817 Post Road), the Eldridge Tavern (6 Eldridge Road), the Oliver West Farm (359 Bald Hill Road), and the Rose Cottage (224 Sanford Road).

Wells, as with much of the study area, may potentially have additional prehistoric sites that have yet to be identified. Two (2) prehistoric archaeological sites and three (3) historic archaeological sites are identified by MPHC.

Natural Resources

Much of the CYCCS study area is rural or undeveloped, and a variety of habitats, environmentally sensitive areas, and other natural resources are found throughout. This section provides an overview of identified natural resources regulated by Federal and State agencies as well as non-regulated resources that are considered important to the environment and character of the Study Area. Refer to *Appendix C: Natural Resources Technical Memo* for complete documentation of natural resource information for the CYCCS.

Regulatory Background

The following is an overview of Federal and State regulations regarding natural resources that are evaluated during the National Environmental Policy Act (NEPA) process. The US Army Corps of Engineers (USACE) regulates the placement of dredged or fill material in waters of the United States, which includes wetlands and surface waters, under Section 404 of the Clean Water Act (33 U.S.C. 1344). The USACE also regulates under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) certain structures or work in or affecting navigable waters of the United States. Maine Department of Environmental Protection (MaineDEP) has jurisdiction over impacts to wetlands and surface waters under the Natural Resources Protection Act (NRPA, M.R.S.A §480-A to 480-HH). US Fish and Wildlife Service (USFWS) has primary responsibility for listed terrestrial and freshwater organisms and their habitats under the Endangered Species Act (ESA) as well as bald eagle management under the Bald and Golden Eagle Protection Act (BGEPA, 16 U.S.C. 668-668c). The ESA directs all Federal agencies to conserve threatened and endangered species and, in consultation with the USFWS, ensure that their actions do not jeopardize the continued existence of a listed

species or destroy or adversely affect designated critical habitat. The BGEPA prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald eagles, including their parts, nests, or eggs.

National Marine Fisheries Service (NMFS) is responsible under the ESA, as well as the Marine Mammal Protection Act (MMPA), for protecting marine mammals and threatened and endangered marine species. Maine Department of Inland Fisheries and Wildlife (MDIFW) oversees the Maine Endangered Species Act, which includes listed species and Essential Habitats (EH). EH are identified and mapped by MDIFW and include roseate tern, least term and piping plover nest sites. Additionally, USFWS regulates wildlife habitat under the Fish and Wildlife Coordination Act, which involves evaluation of impacts to fish and wildlife from water resource development projects. Federal Emergency Management Agency (FEMA) and Maine Emergency Management Agency (MEMA) regulate floodplains.

Study Area Natural Resource Findings

The Study Area has extensive areas of wetlands and hydric soils. Wetlands, which include vernal pools, and stream crossings are the most highly protected and highly analyzed resources by the agencies (Figure 2-8). In addition, undeveloped habitat blocks, important for wildlife, are present throughout the Study Area. There are a number of imperiled natural communities (as defined by Maine Natural Areas Program, MNAP), some of which support threatened or endangered species or species of concern (Figure 2-9). Concentrations of endangered, threatened and species of concern have been documented along the southern boundary and within the central to northwest portion of the Study Area. These include the Massabesic Experimental Forest, Kennebunk Plains Wildlife Management Area and Wells Barrens.

Regulated and Otherwise Protected Resources

Wetlands

Construction of a new transportation corridor or reconstruction of an existing corridor would require an assessment of the extent of wetlands and surface waters under existing Federal and State regulations in compliance with the NEPA process. The USACE has jurisdiction over rivers, streams, waterbodies and wetlands within the Study Area. Section 404 of the Clean Water Act (33 U.S.C. 1344), administered by the USACE, requires that projects that impact wetlands follow the sequential process of first avoiding adverse wetland and surface water impacts, then minimizing impacts that cannot be practicably avoided and finally compensating for those impacts that cannot be further minimized. The USACE Highway Methodology details a process to systematically evaluate alternatives in a timely yet thorough manner (USACE 1993).

MaineDEP has jurisdiction over wetlands and water bodies under the Natural Resources Protection Act (NRPA, 38 M.R.S.A §480-A to 480-HH). The NRPA identifies sensitive wetland areas as Wetlands of Special Significance (WSS), which include:

- Peatlands (including heaths);
- Critically imperiled or imperiled communities;
- Significant wildlife habitat;
- Locations near coastal wetland;
- Locations near GPA great ponds (GPA defined as water quality suitable for drinking water, recreation, etc., 38

M.R.S.A. §465-A. All great ponds in Maine are classified as GPA);

- At least 20,000 square feet of aquatic vegetation, emergent marsh vegetation or open water;
- Wetlands subject to flooding; and
- Wetlands located within 25-feet of a river, stream or brook.

Impacts to WSS require more rigorous review and permitting than non-WSS wetlands and frequently require compensation through restoration, enhancement or preservation.

National Wetland Inventory (NWI) wetlands and hydric soils are shown in overview in Figure 2-8. The wetland boundaries are approximate and likely to change when wetlands are formally delineated. As indicated in the map, there are numerous NWI wetlands and hydric soils throughout the Study Area.

Surface Waters

Rivers, brooks, streams and waterbodies are under the jurisdiction of the USACE and DEP. NWI wetlands also include several ponds and streams.

Rivers within the Study Area include:

- Mousam River, which begins at Mousam Lake in York County, flows for approximately 30 miles through the towns of Sanford and Kennebunk and into the Gulf of Maine just west of the Kennebunk River;
- Kennebunk River, approximately 15 miles long, begins at Kennebunk Pond and generally flows southeast emptying into the Gulf of Maine;
- Merriland River, approximately 4 miles long, which flows southeast through Wells to the Gulf of Maine; and
- Great Works River, approximately 27 miles long, flows south past North Berwick and meets with the tidal part of the Salmon Falls River in South Berwick.

A total of 23 Great Ponds occur within the Study Area. Great Ponds are defined by the NRPA as inland water bodies in a natural state that have a surface area in excess of 10 acres plus any inland bodies of water artificially formed or increased that have a surface area in excess of 30 acres. Great ponds are public waters under the jurisdiction of the State of Maine. A summary table listing the great ponds is provided in Table 2-6.

Vernal Pools

Federal and State regulations provide additional protection to certain types of wetlands referred to as vernal pools. Federal criteria define a vernal pool as "a temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer. Vernal pools have no permanent inlet or outlet and no viable populations of predatory fish (USACE 2010). Vernal pools may offer habitat to obligate vernal pool species such as wood frogs, spotted salamanders, blue spotted salamanders, and fairy shrimp. The Federal definition is similar to Maine's except that non-natural (i.e., human-created) pools are included in the federal definition and would include vernal pools considered non-significant by MDIFW. The Federal regulations require that impacts to vernal pools and the vernal pool management area (the area within a 750 foot radius from the pool edge) be minimized to the maximum extent practicable. Federal regulations consider all vernal pool types in a similar manner.

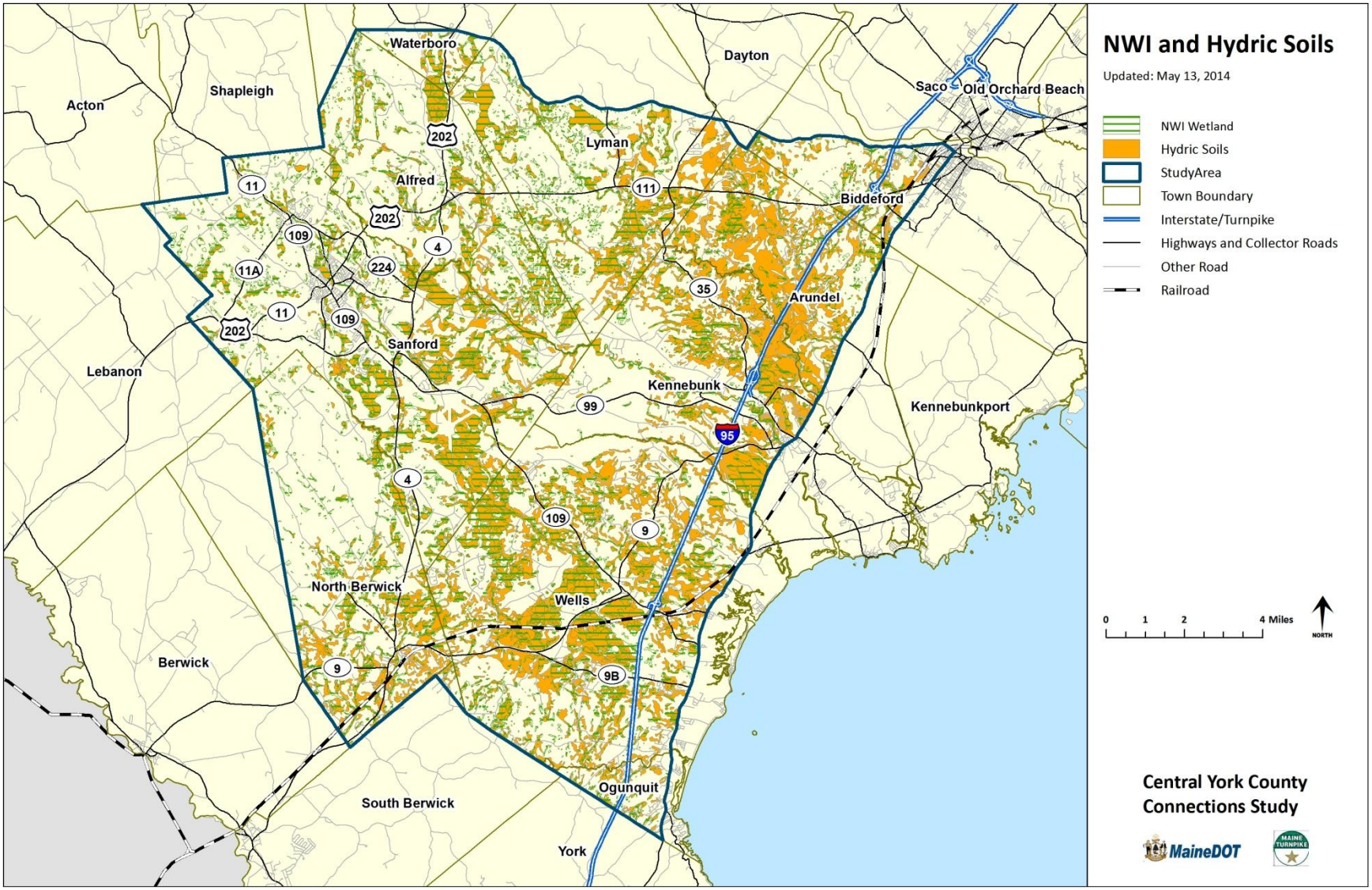


Figure 2-8: Overview of Wetlands and Hydric Soils in the Study Area

Table 2-6: Great Ponds within the Study Area

Name	Acres
Bunganut Pond	296.29
Kennebunk Pond	191.65
Unnamed	185.37
Bauneg Beg Pond	183.45
Estes Lake	174.75
Shaker Pond	109.17
Old Falls Pond	85.77
Alewife Pond	45.68
Number One Pond	41.97
Little Pond	33.41
Unnamed	31.46
Sand Pond	31.06
Unnamed	26.96
Stump Pond	26.12
Deering Pond	23.71
Littlefield Pond	21.02
Unnamed	18.90
Hobbs Pond	17.93
Old Fishing Pond	17.90
Unnamed	17.10
Unnamed	16.48
Curtis Pond	11.93

Source: U.S. Geological Survey (USGS), MEGIS, 1993, hydrop_04202006.shp

The USACE reviews vernal pools on a case-by-case basis and has the discretionary authority to give higher consideration for protection to natural, undisturbed vernal pools compared to manmade vernal pools (e.g., skidder ruts) based on the presence of conditions allowing for breeding success.

Maine NRPA Chapter 335, Significant Wildlife Habitat, defines a vernal pool as a "natural, temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer." Significant vernal pools are vernal pools that have been identified by MDIFW as meeting specific criteria for the presence of breeding obligate vernal pool species and are more highly protected. The Chapter 335 definition includes critical terrestrial habitat within a 250-foot radius of a significant vernal pool.

Figure 2-9 includes significant and non-significant vernal pools with 250-foot buffers, as mapped by MDIFW, as of July 2011. A limited number of significant and non-significant vernal pools have been identified to date by other projects in Ogunquit, Kennebunk, North Berwick, and Wells.

Threatened and Endangered Species

Section 7 of the Endangered Species Act (ESA) requires that for any project in which there is a federal action that "may affect" listed species or their critical habitat, the action agency must consult with either the USFWS or NMFS. One federally-listed species, Atlantic salmon Gulf of Maine (GOM) Distinct Population Segment (DPS), has no critical habitat within the Study Area (NOAA 2010, Colligan 2012). The USFWS indicates that there are "no federally threatened or endangered species under the jurisdiction" of the USFWS. Other

protected species noted by the USFWS include New England cottontail rabbit (*Sylvilagus transitionalis*), which is a candidate for federal listing. New England cottontail is listed as an endangered species by MDIFW. USFWS also notes that occasional, transient bald eagles may occur in the general Study Area. The bald eagle was removed from the federal threatened list on August 9, 2008 and is now protected under the BGEPA and the Migratory Bird Treaty Act and reviewed under the 2007 National Bald Eagle Management Guidelines. No bald eagle nest sites have been mapped within the Study Area based on MDIFW Essential Habitat (EH) 2009 mapping and USFWS review.

The NMFS indicates that migrating shortnose sturgeon may utilize the Kennebunk and Mousam Rivers within the study area (Colligan 2012). It is unlikely that shortnose sturgeon will pass through the lower-most dam of the Mousam River. The dams on the Great Works River make it unlikely that shortnose sturgeon could move upstream of North Berwick. A dam on Branch Brook makes it unlikely that shortnose sturgeon could migrate west of US Route 1 past Drakes Island. The dam at Hobbs Pond probably prevents shortnose sturgeon movement upstream of the Merriland River beyond Maine Route 9A. In summary, it is unlikely that shortnose sturgeon will occur west of US Route 1 in York County.

On February 6, 2012, NMFS published new rules in the Federal Register listing Atlantic Sturgeon as threatened in the Gulf of Maine (GOM) Distinct Population Segment (DPS). Based on currently available information, Atlantic sturgeon may be present in the lower reaches of any of the rivers within the Study Area. It is likely that Critical Habitat will be designated for Atlantic Sturgeon in the future in tidal waters of the Study Area.

The Maine Endangered Species Act designates mapped Essential Habitats for species listed as endangered or threatened. A review of the data layers determined that there are no mapped Essential Habitats for least terns, roseate terns, or piping plovers within the Study Area.

A summary of state-listed Rare, Threatened and Endangered (RTE) animal and plant species that have the potential to occur within the Study Area based on data layers provided by Beginning with Habitat is provided in Table 2-7. A total of 14 state-listed threatened and endangered animal species have been documented within the Study Area. These include three reptiles (Northern black Racer, ribbon snake, and Blanding's Turtle); two butterflies (Hessell's Hairstreak and Spicebush Swallowtail); two dragonflies (Ringed Boghaunter and Arrowhead Spiketail); two moths (Barrens Chaetaglaea and Broad Sallow); five birds (Common Moorhen, Least Bittern, Saltmarsh Sharp-Tailed Sparrow, Upland Sandpiper and Grasshopper Sparrow) and one mammal, New England Cottontail. Some of the occurrences are clustered in the Kennebunk Plains Wildlife Management Area and Massabesic Experimental Forest as well as the Sanford Airport. Blanding's Turtle, wood turtle and spotted turtle have been listed by Beginning with Habitat within either the Mt. Agamenticus or Kennebunk Plains/Wells Focus Areas. A total of thirty-two endangered, threatened, and rare plant species occur throughout the Study Area, along with fourteen imperiled natural communities.

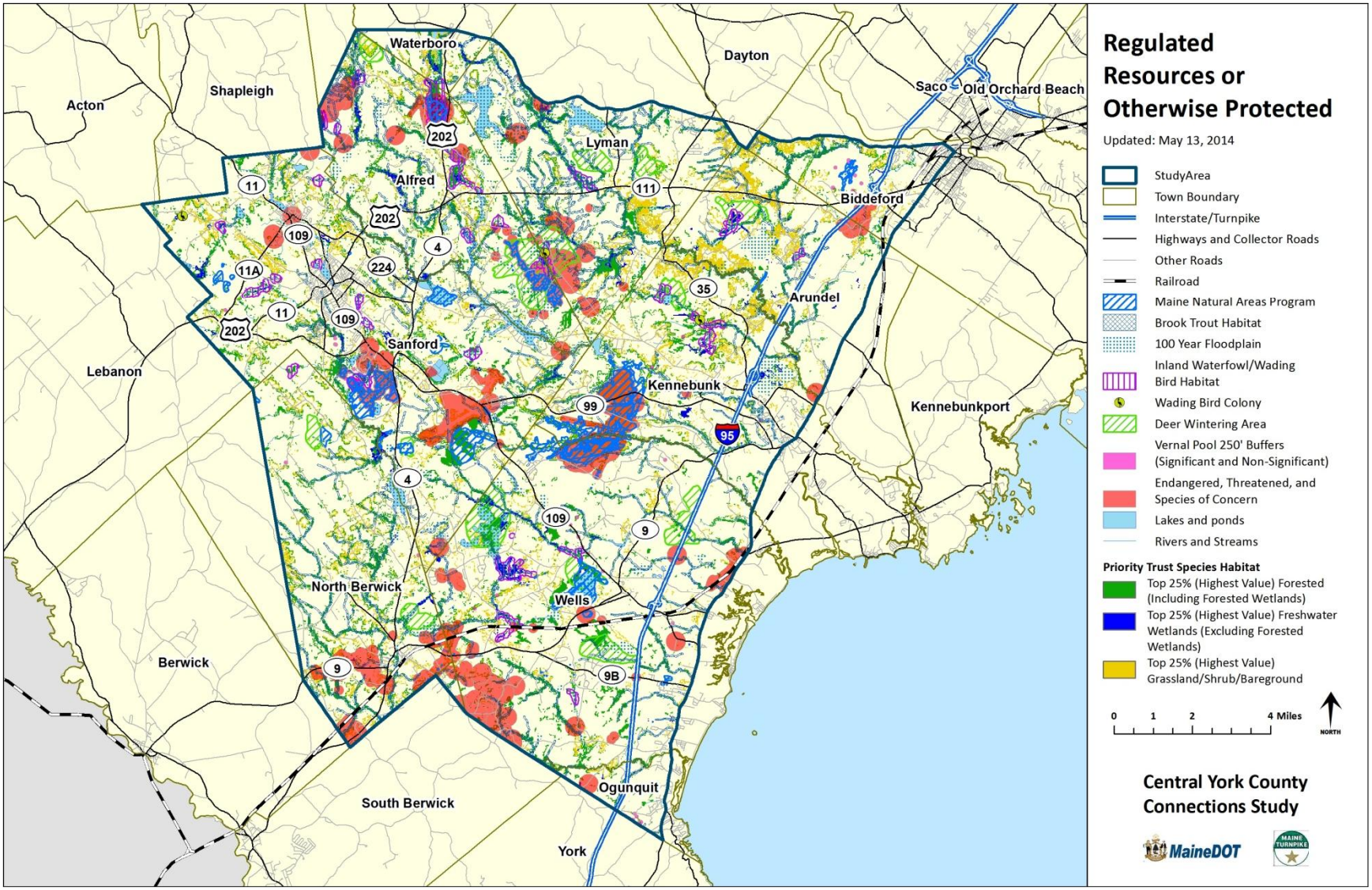


Figure 2-9: Overview of Regulated and Otherwise Protected Resources in the Study Area

Table 2-7: Rare, Threatened and Endangered Species within Study Area (Beginning with Habitat)

Common Name	Scientific Name	State Protection Status[1]
Arrowhead Spiketail	*Cordulegaster obliqua*	SC
Barrens Chaetaglaea	*Chaetaglaea tremula*	SC
Blanding's Turtle	*Emys blandingii*	E
Broad Sallow	*Xylotype capax*	SC
Common Moorhen	*Gallinula chloropus*	T
Grasshopper Sparrow	*Ammodramus savannarum*	E
Hessel's Hairstreak	*Callophrys hesseli*	E
Least Bittern	*Ixobrychus exilis*	E
New England Cottontail	*Sylvilagus transitionalis*	E
Northern Black Racer	*Coluber constrictor constrictor*	E
Ribbon Snake	*Thamnophis sauritus*	SC
Ringed Boghaunter	*Williamsonia lintneri*	T
Saltmarsh Sharp-tailed Sparrow	*Ammodramus caudacutus*	SC
Spicebush Swallowtail	*Papilio troilus*	SC
Upland Sandpiper	*Bartramia longicauda*	T

1. State Protection Status: E=Endangered. T=Threatened. SC=Special Concern.

Wildlife Habitat

Under NRPA Chapter 335, Significant Wildlife Habitat includes: endangered or threatened species habitats; high and moderate valued deer wintering areas (DWA) and travel corridors; critical spawning and nursery areas for Atlantic salmon; vernal pools; MDIFW-mapped moderate and high-value inland waterfowl/wading bird habitats and MDIFW-mapped shorebird nesting, feeding and staging areas. Figure 2-9 shows significant habitats within the Study Area. Inland Waterfowl/Wading Bird habitats are scattered throughout the Study Area. Generally, these areas are associated with brooks or rivers. One wading bird colony has been identified in the Town of Arundel along Ward Brook, which feeds into the Kennebunk River.

DWA are found throughout the area, including several large DWAs located in Lyman and Sanford just north of the Mousam River. All of the DWA have been rated as indeterminate, requiring a review by MDIFW.

There are no MDIFW mapped shorebird nesting, feeding, staging areas, or tidal wading bird habitats within the Study Area.

A number of areas designated for endangered, threatened and species of concern occur through the Study Area, including high value habitat for USFWS Priority Trust Species. Figure 2-9 shows the top 25% forested, freshwater and grassland high value habitats mapped by the USFWS Gulf of Maine Coastal Program (GMCP). All the species included in the GMCP habitat analysis regularly inhabit the Gulf of Maine watershed and meet one or more of the following criteria (USFWS 2007):

- Federally endangered, threatened and candidate species;
- Migratory birds, diadromous and estuarine fish that are declining nationwide;
- Migratory birds, diadromous and estuarine fish that are threatened or endangered in two of the three states in the Gulf of Maine watershed; or

- Other birds that have been identified as species of concern by the North American Waterfowl Management Plan, the U.S. Shorebird Conservation Plan, the Colonial Waterbird Plan and Partners in Flight.

Fisheries

In 2006, Legislative protection (Maine Legislature 2006) was extended to native brook trout populations (Bonney 2009). Any proposal to stock waters containing native brook trout requires review and consent from the Maine Legislature's Fish and Wildlife Committee. Two wild brook trout (*Salvelinus fontinalis*) waters were identified by MDIFW within the project area, Coldwater Pond and Kennebunk Plains Pond (See Figure 2-9). A wild brook trout fishery is defined by MDIFW as a body of water that has not been directly stocked with brook trout in the previous 25 years. Stream stocking is practiced most intensively within the MDIFW region that encompasses the Study Area. Of the 337 mapped streams within the Study Area, 278 (82%) are mapped as brook trout habitat by MDIFW. In comparison, data noted in the MDIFW 2009 *Not Stocked Since 1983 Brook Trout List,* indicates that there are 250 wild brook trout lakes and ponds within the entire state (GKG Projects 2010). Brook trout habitat losses accelerate with increased rates of development and often are permanent (Bonney 2009). Loss of habitat connectivity occurs from improperly placed/sized culverts at road crossings that limit fish passage.

There are no anadromous/catadromous fish runs identified by MDIFW in the Study Area. DMR indicated that there are likely American eel, alewife, blueback herring, American shad, sea lamprey and possibly striped bass within the Study Area, with a low likelihood for Atlantic sturgeon, shortnose sturgeon and Atlantic salmon. These species are likely to occur in the Ogunquit, Wehannet, Merriland, Mousam and Kennebunk rivers (Wipplehauser 2011).

There are no Essential Fish Habitat (EFH) species in freshwater habitats within the Study Area (Chiarella 2011). EFH Species within tidally influenced areas (Wells Harbor) are listed in Table 2-8.

Table 2-8: List of Essential Fish Habitat Species Within Study Area Tidally Influenced Areas

Species
White hake *(Urophycis tenuis)*
Redfish *(Sebastes fasciatus)*
Winter flounder *(Pleuronectes americanus)*
Yellowtail flounder *(Pleuronectes ferruginea)*
Windowpane flounder *(Scopthalmus aquosus)*
Atlantic halibut *(Hippoglossus hippoglossus)*
Atlantic sea herring *(Clupea harengus)*
Bluefish *(Pomatomus saltatrix)*
Long finned squid *(Loligo pealei)*
Short finned squid *(Illex illecebrosus)*
Surf clam *(Spisula solidissima)*
Ocean quahog *(Artica islandica)*
Spiny dogfish *(Squalus acanthias)*

Source: NOAA Fisheries Service: Northeast Regional Office, http://www.nero.noaa.gov/hcd/me13.html, views on January 6, 2012.

Floodplains

Executive Order 11988, Floodplain Management, requires that all federally funded projects determine whether a proposed project will occur in a floodplain and to consider alternatives to avoid adverse effects and incompatible development in floodplains. The 100-year

floodplains of streams and rivers were identified within the Study Area based on Flood Insurance Rate Mapping (FIRM) completed by the FEMA. The 100-year floodplains are generally associated with areas directly adjacent to rivers and some of the larger brooks. Floodplains are shown on Figure 2-9.

Other Resources

Other resources that could be adversely affected include water resources, designated conservation areas, Section 6(f) resources, and undeveloped habitat blocks. Other resources in the Study Area are identified in Figures 2-10 to 2-12.

Water Resources

A number of aquifers are found throughout the Study Area. Public water supply areas and public water supply wells, found throughout the Study Area, are protected by the MaineDEP State Drinking Water Program, as part of the Federal Safe Drinking Water Act (42 U.S.C. 300 f et seq.; 6939b; 15 U.S.C. 1261 et seq.). Some locations within the Study Area have been identified for historic hazardous oil spills and remediation sites, which fall under the jurisdiction of MaineDEP Bureau of Remediation and Waste Management. Two wastewater treatment facilities are located in North Berwick, whose operation is governed by MaineDEP Bureau of Land and Water Quality. One closed landfill is located in the Town of Wells, which falls under Maine's Landfill Closure and Remediation Program 38 MRSA §1310-C et. seq., implemented by MaineDEP Bureau of Remediation and Waste Management.

A summary of watersheds and lakes most at risk from development and watersheds identified by MaineDEP as nonpoint source priority watersheds are summarized in Table 2-9. These watersheds and lakes fall under the jurisdiction of the Stormwater Management statute (38 M.R.S.A §420-D), which requires projects to manage stormwater to protect surface waters. A stormwater analysis and storm water management plan are also required when major additions of impervious surface are proposed. The Maine Department of Transportation (MaineDOT) and Maine Turnpike Authority (MTA) are obligated under the MaineDOT/DEP/FHWA Cooperative Agreement for Stromwater Management to comply with NRPA Chapter 500, Stormwater Management, standards, which includes a written plan.

Designated Conservation Areas

The Study Area overlaps two Biophysical Regions, Gulf of Maine Coastal Plain and Gulf of Maine Coastal Lowland (McMahon 1998). The Gulf of Maine Coastal Plain contains the largest concentration of glaciofluvial deposits in the state (McMahon 1990). This region includes a transition zone from warm temperate to cool temperate and boreal vegetation. The Gulf of Maine Coastal Lowland parallels the Gulf of Maine in a 20-mile-wide band. The Atlantic coastal plain reaches its eastern extent just north of the Study Area. Ecosystems that reach their northern limit include the sandplain grasslands and oak hickory forests. The largest coastal pitch pine community in Maine occurs in Kennebunk and Wells.

Designated Conservation Areas within the Study Area include areas under federal, state, town or non-profit ownership. These areas are depicted along with other resources on Figure 2-10 and additionally called out separately in Figure 2-11. The two largest are the Kennebunk Plains Wildlife Management Area (WMA) and the Massabesic Experimental Forest. The Kennebunk Plains WMA, which is managed by MDIFW, is a 3,200-acre protected sandplain grassland community, a state-listed critically-imperiled natural community and

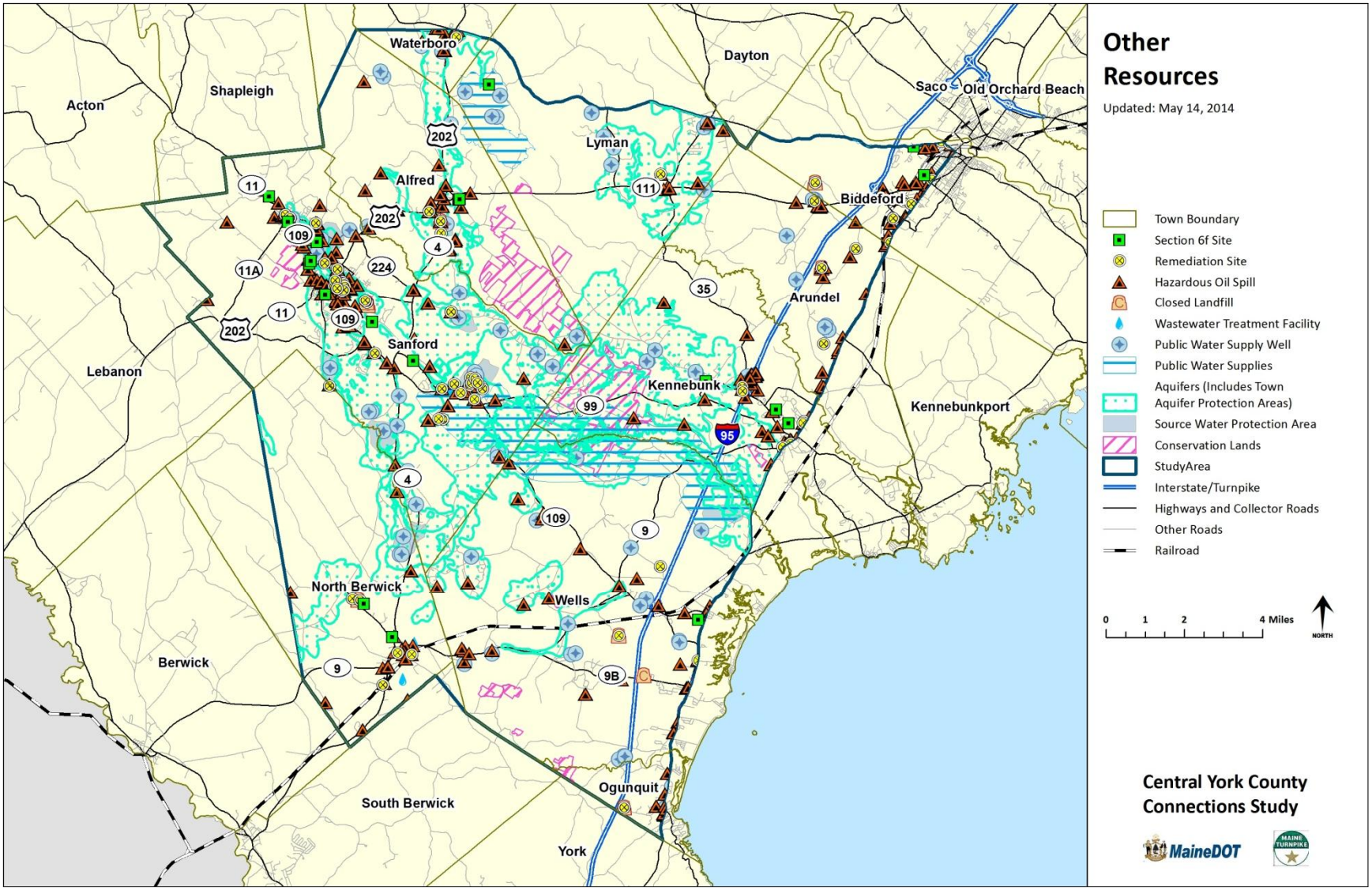


Figure 2-10: Overview of Other Resources in the Study Area

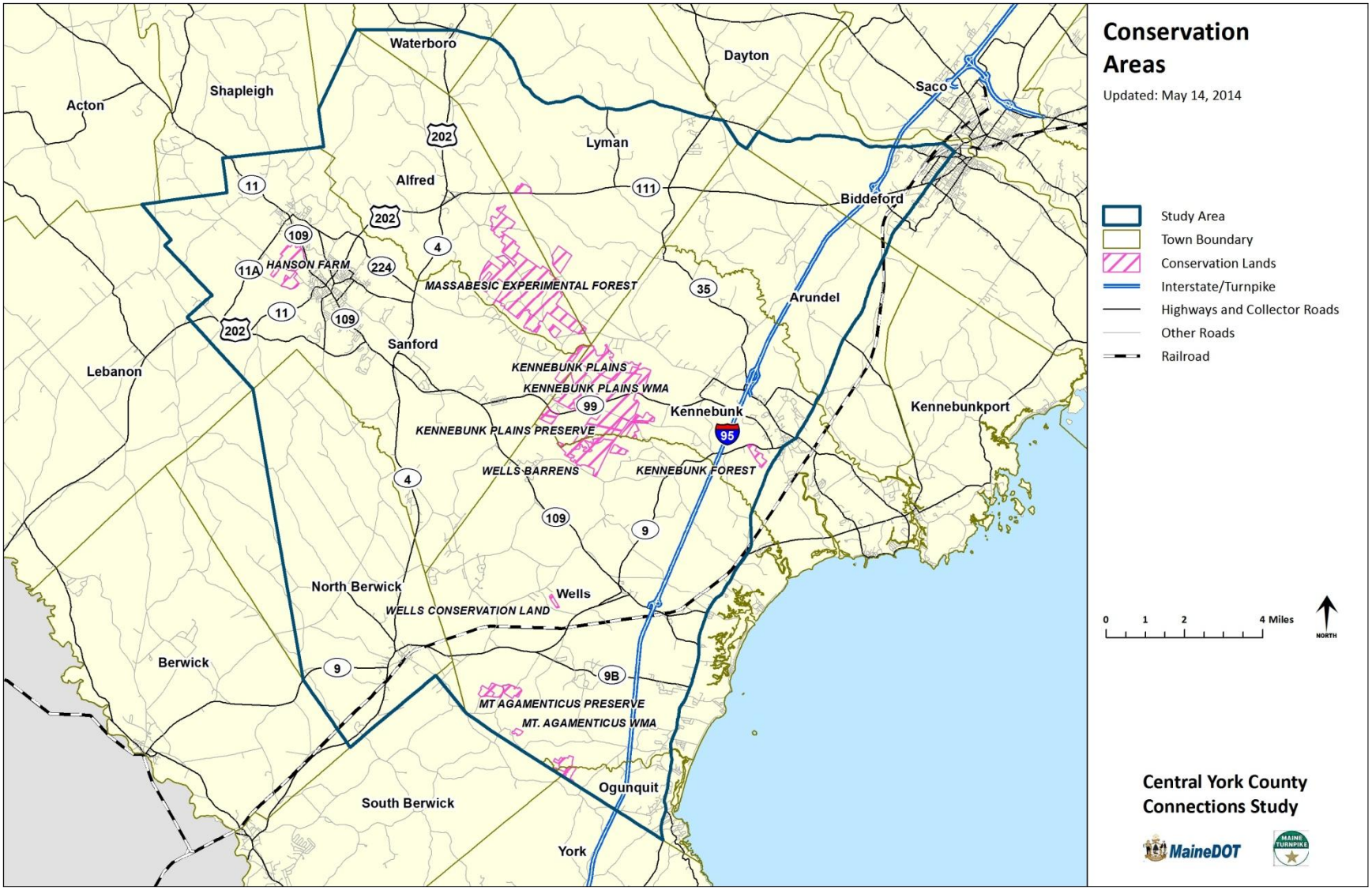


Figure 2-11: Conservation Areas in the Study Area

home to rare animals, (including reptiles such as the black racer, a state-listed species) and plants. It is the largest example of this type of ecosystem in the New England Region (SPO 2010) and combined with the Wells Barrens is one of the top-priority conservation areas in the state of Maine. Other critically-imperiled natural communities (pitch pine-heath barrens and pitch pine-scrub oak barrens) also occur in the area (MNAP 2010a). The Massabesic Experimental Forest, a 3,700-acre area located in Alfred and Lyman, is owned by the U.S. Forest Service (USFS). Tree stands within the forest consist of a mixture of pine and hardwoods, including northern red oak (USFS 2010). An imperiled natural community, Atlantic White Cedar Swamp, is found in the area. The Forest provides habitats for several state-listed endangered species such as Blanding's and spotted turtles (MNAP 2010 b,c).

Other designated Conservation Areas include:

- Mt. Agamenticus Hilton Easement;
- Mt. Agamenticus Wildlife Management Area;
- Mt. Agamenticus Preserve;
- The Heath in Wells;
- Kennebunk Forest;
- Wells Barren, which is home to the state-listed Black Racer; and
- Hansen Farm.

The Sanford Ponds area, while not a Conservation Area, is a designated focus area by the Maine Natural Areas program (MNAP 2010d).

Table 2-9: Watersheds and Lakes Most at Risk and Nonpoint Source Priority Watersheds

Watersheds and Lakes Most at Risk	City
Bauneg Beg Pond	Sanford
Deering Pond	Sanford
Ell Pond	Sanford
Estes Lake	Sanford

Nonpoint Source Priority Watersheds (Town)	Type Of Impairment Or Public Water Supply
Branch Brook (Sanford, Arundel, Kennebunk)	Public water supply
Great Works River (Sanford, North Berwick, Berwick)	Low dissolved oxygen
Kennebunk River (Kennebunk, Arundel, Kennebunkport)	Sediment, nutrients, bacteria
Mousam River (Sanford, Arundel, Kennebunk)	Sediment, nutrients, bacteria

Source: MaineDEP Nonpoint Source Priority watersheds List, 10-15-98 and Chapter 502, Direct Watersheds of waterbodies most at risk from development.

Section 6(f) Resources

Section 6(f) of the Federal Land and Water Conservation Fund (LWCF) Act of 1964 provides financial assistance for the acquisition and development of public lands to create parks and open spaces; protect wilderness, wetlands and refuges; preserve wildlife habitat; and enhance recreational opportunities. Lands acquired or improved with these funds are subject to Federal regulations administered by the US Department of the Interior (USDOI). Pursuant to these regulations, any land subject to Section 6(f) cannot be "converted" to another use for purposes inconsistent with the Act without the approval of the USDOI and without being replaced with other land that is of equal use and value to the land proposed for conversion.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users (SAFETEA-LU), the successor to the Intermodal Surface Transportation Efficiency Act (ISTEA), transfers a percentage of gasoline taxes paid on non-highway recreational use in off-highway vehicles from the Highway Trust Fund into the Recreational Trails Program for trail development, improvement and maintenance. The State of Maine has agreed to take part in the Recreational Trails Program (RTP) under the Federal Highway Administration (FHWA), the federal agency that administers at the national level.

The Bureau of Public Lands database identified 17 sites under the LWCF and 3 sites under the RTP. These sites are shown on Figure 2-10. A summary of the sites is provided in Table 2-10.

Table 2-10: Section 6(f) Properties

Recreation Project	Project	State/Local Project
LWCF	Alfred Ballfield	Local
LWCF	Alfred Recreation Park	Local
LWCF	Ballfield Lighting	Local
LWCF	Ballfield, Park & Playground	Local
LWCF	Bunganunt Pond	State
LWCF	Gowen Park Field	Local
LWCF	Memorial Field Recreation Facility	Local
LWCF	Multi-Purpose Field	Local
LWCF	Park	Local
LWCF	School Park	Local
LWCF	Skateboard Park	Local
LWCF	Soccer Field	Local
LWCF	Springvale Playground Renovation	Local
LWCF	Springvale Swim Area	Local
LWCF	Tennis Courts	Local
LWCF	West Kennebunk Recreation Area	Local
LWCF	Wiggan Pond Park	Local
RTP	Rehab Trails	Local
RTP	Rehab Trails	Local
RTP	Sanford	Not noted

Source: Department of Conservation, March 9, 2012

Undeveloped Habitat Blocks

Undeveloped habitat blocks within the region based on 2003 to 2006 aerial imagery are mapped in Figure 2-12. These blocks are at least 100 acres in size and are considered to offer the best opportunity for conservation of relatively undisturbed blocks of habitat. These areas have not been broken by roads and contain relatively little development. The general land use/landcover is provided for use in initial assessments of these areas. Landcover categories include forest areas and other areas, which include agricultural lands, exposed rock, gravel pits, etc. Large blocks of undeveloped land may provide habitat for animals with large home ranges such as black bear, bobcat, fisher and moose as well as species that are sensitive to human disturbance such as upland sandpipers and wood thrushes.

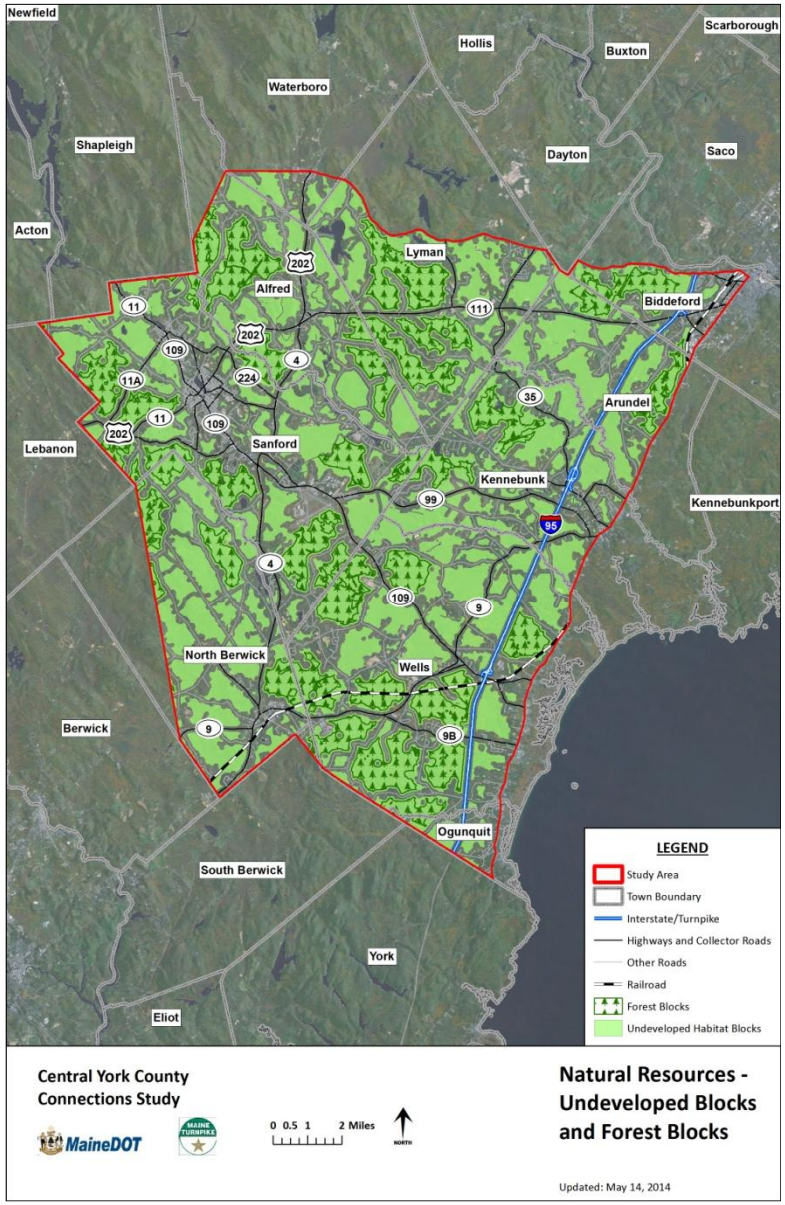


Figure 2-12: Undeveloped Habitat and Forest Blocks

Chapter 3: HIGHWAYS

Chapter Overview

Highways play a critical role in providing both regional and local accessibility to communities in the CYCCS study area. On the regional scale, state highways connect the towns of central York County with the rest of Maine, New England, and points beyond. They provide access to the Interstate Highway system (Maine Turnpike), the Amtrak passenger rail network (in Wells and Saco), and commercial airline service at the Portland Jetport, Sanford Seacoast Regional Airport, and intercity bus service. At the local level, highways provide access between and within the central York County communities.

Automobiles are the predominate means of travel within the CYCCS study area, but highways also facilitate the movement of goods by truck, provide routes for local and regional bus services, are used by bicyclists, and accommodate pedestrians in towns and villages.

This chapter focuses on the CYCCS's assessment of highways within the study area, and is organized as follows:

The Regional Highway Network

The first section of this chapter examines the existing characteristics and operating conditions of highways within the CYCCS study area, followed by a review of future traffic conditions given projected changes in regional population and employment by the year 2035. An overview of how the highway network affects bicycling and walking is provided as well.

Considering Regional Highway System Expansion

Early in the study process, the possibility of expanding the existing highway network by constructing new corridors or increasing the capacity and travel speeds on existing highways was considered. The purpose behind this exercise was threefold:

- To determine how new or expanded highway facilities could change travel patterns and the extent to which such changes would improve mobility in the region;
- To consider how large-scale transportation investments might affect the regional economy over the long-term; and
- To consider the potential adverse effects of highway expansion, such as impacts to natural resources and community character.

Following discussion of the evaluation results with the public, the study Steering and Advisory Committees decided to eliminate large-scale highway expansion strategies from further consideration.

Recommendations - Improving the Current Highway System

During the latter portion of the study, the focus shifted to investigating smaller-scale improvements to address identified issues on the current highway network. These are the basis for the highway-related recommendations of the study.

The Regional Highway Network

Coastal Routes

The regional highway network (Figure 3-1) is anchored by the Maine Turnpike (I-95), which links the state's most populous areas and is the primary transportation corridor connecting Maine with neighboring New Hampshire and other New England states beyond. The Turnpike runs roughly parallel to the coastline in the CYCCS study area, passing through Ogunquit, Wells, Kennebunk, Arundel and Biddeford. Access to the Turnpike is provided at interchanges in Wells (Exit 19), Kennebunk (Exit 25) and Biddeford (Exit 32). Originally two lanes in each direction, the Turnpike was modernized and expanded in the late 1990s to provide a third travel lane in both directions.

Route 1 runs roughly parallel to the Maine Turnpike and is the original Post Road in Maine. Route 1 is the historic commercial "Main" street in Ogunquit, Wells, Kennebunk, and Arundel, passing through the town centers of each community. The highway is named Main Street in Ogunquit, Post Road in Wells, York Street in southern Kennebunk, Main Street in downtown Kennebunk, Portland Road in northern Kennebunk and Arundel, and Elm Street in Biddeford. Route 1 is a two-lane highway, with a two-way left turn lane provided throughout most of Ogunquit and Wells. Elsewhere, left turn pockets are commonly provided at major intersections. In Biddeford, the roadway expands to four travel lanes with left turn pockets approaching the intersection with Precourt Street and expands to four travel lanes approaching the intersection with Route 111 (Alfred Road).

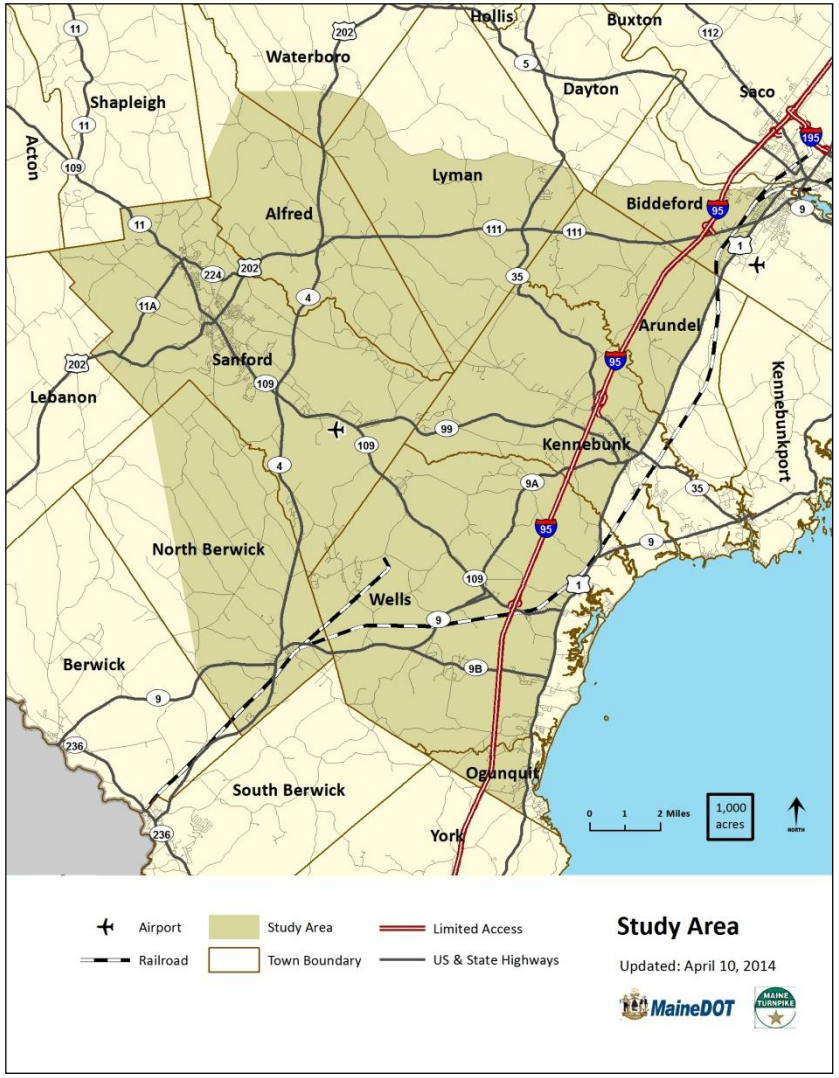


Figure 3-1: CYCCS Study Area and Highway Network

Central York County Connecting Routes

Sanford is the primary employment and residential center in central York County. Several state highways connect Sanford and the other interior communities of central York County—North Berwick, Alfred, Lyman and Waterboro—with the rest of the region and beyond. For purposes of the CYCCS, these highways are consolidated into continuous corridors linking central York County with the rest of the region:

- Routes 111/202, connecting Sanford to Biddeford
- Routes 4/202, connecting Alfred, South Sanford and North Berwick
- Route 109, connecting Sanford with Wells
- Route 9, connecting North Berwick with Wells
- Route 99, connecting South Sanford with Kennebunk

These corridors are the primary focus of the evaluations in this chapter.

Route 111/202 Corridor

Route 111 and Route 202 together comprise a key east-west highway corridor connecting Sanford, Alfred, Lyman and Arundel with the Maine Turnpike in Biddeford (Exit 32). The corridor is the primary route for traffic traveling from central York County to the Portland metropolitan area and points beyond. The corridor comprises Route 111 between Biddeford and Alfred, and Route 202 from Alfred through Sanford (Figure 3-2). Route 202 also travels west from Sanford, through Lebanon to Rochester, New Hampshire where it connects to the Spaulding Turnpike (NH Route 16). The section of Route 202 extending north from Alfred into Waterboro is described later as part of the combined Route 4/202 corridor.

Figure 3-2: Route 111/202 Corridor

The Route 111/202 corridor is classified as a principal arterial. Travel lanes with wide shoulders (typically 8 feet) are provided on rural segments (Figure 3-4), though shoulder width on Route 202 in Sanford varies. Left turn pockets are provided at Route 109 in Sanford (westbound only), Route 224, Route 4/202 in Alfred, and Route 35 in Lyman, all of which are signalized.

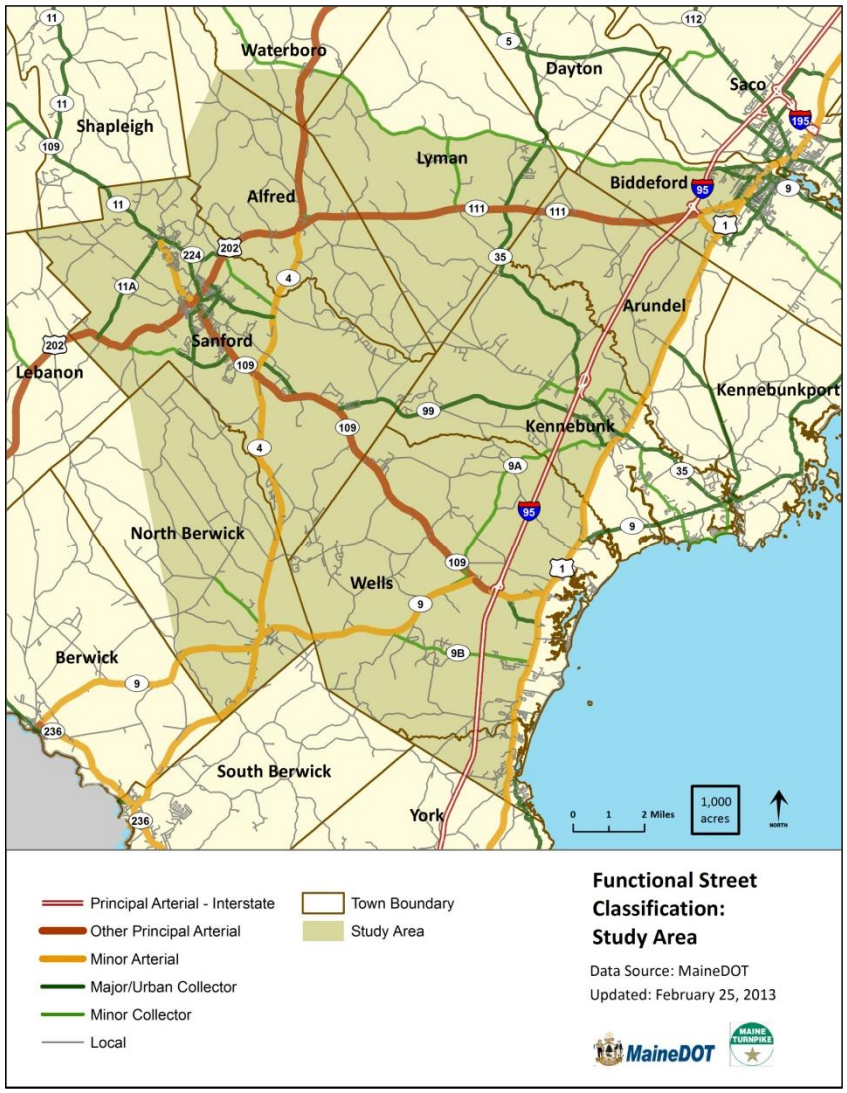


Figure 3-3: CYCCS Functional Street Classification

Figure 3-4: Route 111 Typical Rural Segment

Figure 3-5: Route 111 Entering Biddeford (looking east)

In Biddeford, the corridor expands to a four-lane, divided highway lined with commercial shopping centers just east of the Arundel town line (Figure 3-5). Four signalized intersections provide access to adjacent commercial uses, the Biddeford Park and Ride lot, and the Maine Turnpike entrance at Exit 32. The corridor continues east to Route 1 and into downtown Biddeford.

The speed limit (Figure 3-6) on the corridor is 55 mph between Route 4/202 in Alfred and Route 35 in Lyman, with slower speed zones approaching these major crossroads. East of Lyman, the speed limit is 50 mph, eventually transitioning to 35 mph on the multilane section in Biddeford. West of Alfred, the speed limit is initially 50 mph, but slows to 25 mph through downtown Sanford.

Route 109 Corridor

Route 109 is a principal arterial connecting the Sanford region to the Maine Turnpike (Exit 19) and Route 1 in Wells (Figure 3-7). Route 109 is the most direct route to southbound I-95 for traffic from Sanford, including trips destined for Portsmouth, New Hampshire or the Boston, MA metropolitan area. Alternatively, some westbound/southbound travelers use Route 202 to Rochester, NH or Route 4 to Dover, NH.

Route 109 functions as Sanford's main street (Figure 3-8). It is a two-lane highway in downtown Sanford and further north in Springvale, with turn lanes at major intersections. The speed limit in downtown is 30 mph. In South Sanford, the cross section varies from two to as many as five lanes (including intermittent left turn lanes). The speed limit increases to 35 mph near Old Mill Road, and eventually 45 mph approaching Route 99. Segments with wider cross sections were developed concurrent with major developments, such as Wal-Mart and the Center for Shopping.

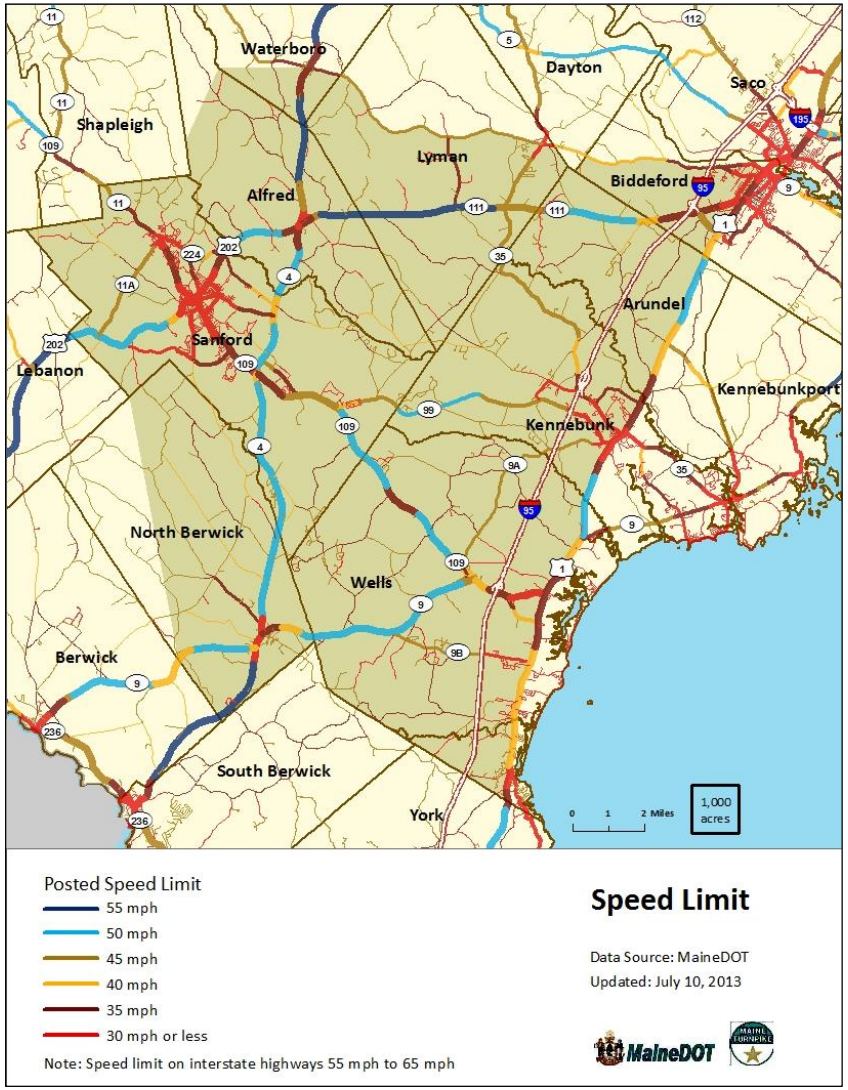


Figure 3-6: CYCCS Speed Limits

Figure 3-7: Route 109 Corridor

East/south of Route 99, Route 109 is a two-lane highway. Route 109 passes through the High Pine neighborhood of Wells, but otherwise the segment is predominately rural with scattered residential development. The speed limit is 50 mph between Route 99 and Route 9B, except for a 35 mph speed zone in High Pine. MaineDOT is completing reconstruction of the highway from the Maine Turnpike to the Sanford Town line, which will widen the paved surface cross section to provide 12-foot travel lanes with 8-foot shoulders (Figure 3-9).

Figure 3-8: Route 109 in Downtown Sanford

Figure 3-9: Recently Improved Section of Route 109 in Wells

Route 4/202 Corridor

Traveling generally north-south through the CYCCS study area, the Route 4/202 corridor links Waterboro, Alfred, South Sanford and North Berwick with South Berwick and Dover, NH to the west (connecting to Route 16, the Spaulding Turnpike in New Hampshire) (Figure 3-10). North of Alfred, the corridor is a principal arterial and is jointly designated Route 4/Route 202. This segment of the Route 4/202 corridor has a 55 mph speed limit in rural areas, with speed zones in Waterboro and the Alfred village center (Figure 3-11). In Alfred, Route 202 turns west toward Sanford, and that segment is described as part of the Route 111/202 corridor.

Figure 3-10: Route 4/202 Corridor

South of Route 111/202 in Alfred, the corridor continues as Route 4, a minor arterial that extends to the New Hampshire state line. The corridor is a two-lane highway, with turn lanes provided at major intersections, including right turn lanes at Route 111, and left turn lanes at Grammar Road/New Dam Road, Jagger Mill Road, and Route 9. Route 4 crosses Route 109 at a roundabout, installed in 2007. The speed limit is generally 50 mph, with a 40 mph speed zone in the vicinity of Grammar Road and High Street near the Alfred/Sanford town line, and 25 mph in North Berwick's village center.

Figure 3-11: Route 202 in Alfred Village Center

Route 9 Corridor

Route 9 connects North Berwick with Wells, intersecting Route 109 just north of the Maine Turnpike entrance at Exit 19 (Figure 3-12). The corridor is a two-lane highway generally with 11- to 12-foot travel lanes and wide shoulders, typically 6 to 8 feet. The speed limit is 50 mph along most of the corridor, with reduced speed zones approaching Route 4 in the North Berwick town center, and Route 109 in Wells.

Figure 3-12: Route 9 Corridor

In Wells, the corridor includes two branch routes. Route 9B connects to Route 1 in Ogunquit, while Route 9A extends into Kennebunk (connecting to Route 99 north of Route 1). These roads are both classified as minor collectors with 45 mph speed limits in rural areas, and lower speed limits approaching Route 1 in both Wells and Kennebunk. Travel lanes are 10 to 11 feet with gravel shoulders.

Figure 3-13: Route 9 Connecting North Berwick and Wells

Route 99 Corridor

Route 99 is a two-lane major collector connecting Route 109 in South Sanford with Route 1 in Kennebunk. Route 99 does not directly connect to the Maine Turnpike, though as shown in Figure 3-14, Exit 25 can be accessed by way of a 1.8-mile connecting route following Mill Street and Alfred Street (both minor collectors) and Route 35 (a major collector). Speed limits on these connecting routes are 30 mph or lower.

Figure 3-14: Route 99 Corridor

Travel lanes are approximately 11 feet wide, with gravel shoulders. The speed limit is predominately 45 or 50 mph.

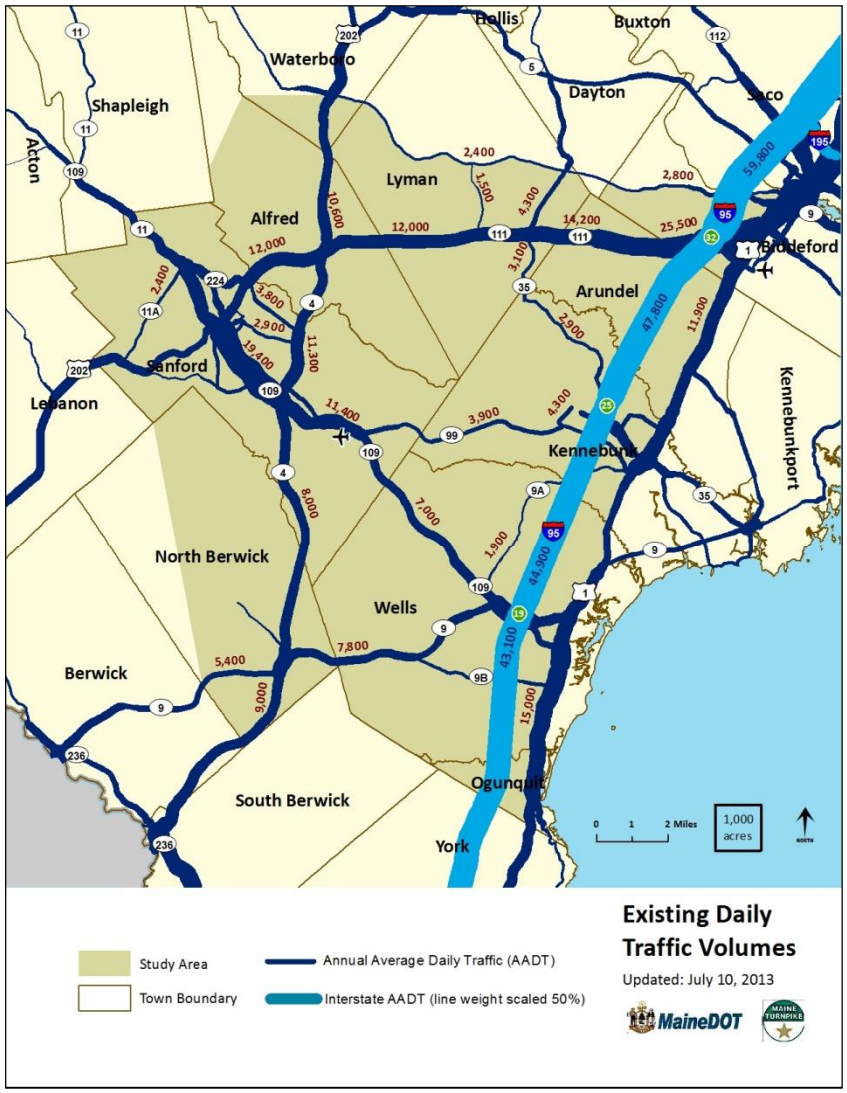
Current and Projected Operating Conditions

Existing Traffic Volumes

Figure 3-15 summarizes current Annual Average Daily Traffic volumes (AADT) for the CYCCS study area highways (AADT is the total volume of vehicle traffic of a highway or road for a year divided by 365 days; it is a useful and simple measurement of how busy the road is). The busiest highways in the CYCCS study are, as expected, the major highway corridors.

Average daily traffic volumes on the Maine Turnpike range from approximately 43,100 vehicles in Ogunquit and Wells to nearly 60,000 vehicles per day north of the Exit 32 interchange in Biddeford. The interchange at Exit 32 (Biddeford) is the busiest in the study area, with a total volume of 22,300 vehicles entering or exiting daily. Exit 25, which connects to Route 35 in Kennebunk, carries 9,000 vehicles daily, while 13,400 vehicles enter or exit the Turnpike at Exit 19, which connects to Route 109 in Wells.

Route 1, which parallels the Maine Turnpike, is busiest in the village center areas of Ogunquit, Wells, and Kennebunk, where AADT ranges from 13,000 to over 16,000 vehicles per day.



Data source: MaineDOT (2010)

Figure 3-15: Existing Annual Average Daily Traffic Volumes

Route 111/202 is the busiest of the highway corridors that connect central York County to the region. Table 3-1 further summarizes daily traffic volumes, showing the range of AADT occurring over major corridor segments. West of Sanford, the corridor volumes are relatively light, ranging from 6,000 vehicles daily near the Lebanon line to 12,100 in downtown Sanford. To the east, the segment between Sanford and Alfred averages between 11,300 and 12,200 vehicles per day. Traffic increases sharply approaching Biddeford, where ultimately a four-lane section carries from 19,100 near the Arundel town line to 29,000 vehicles daily near the Exit 32 interchange with the Maine Turnpike.

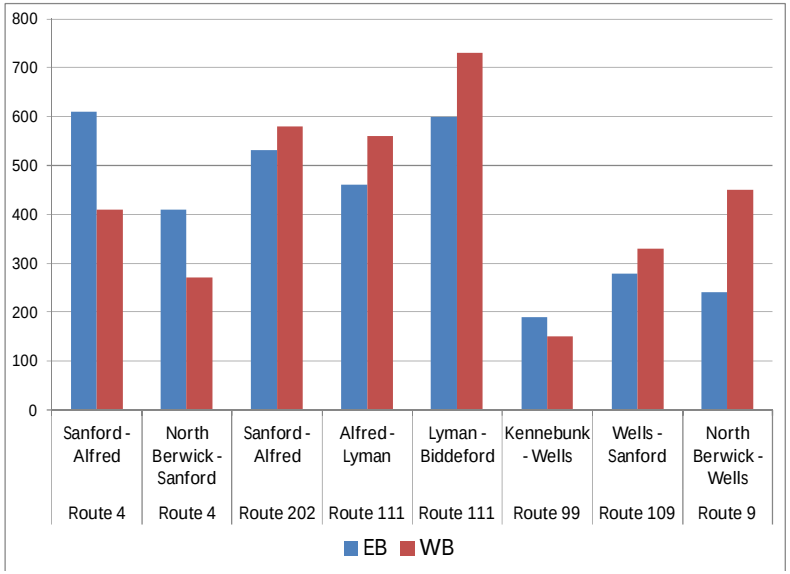
Table 3-1: Route 111/202 Existing Daily Traffic Volume by Segment

Route 111/202 Corridor Segment	Annual Average Daily Traffic (AADT)
Route 202, Sanford *Lebanon/Sanford line to Route 109*	6,000 – 8,700
Route 202, Sanford/Alfred *Route 109 to Route 4/202*	7,800 – 12,100
Route 111, Alfred/Lyman *Route 4/202 to Route 35*	11,300 – 12,200
Route 111, Lyman/Arundel *Route 35 to Arundel/Biddeford line*	13,700 – 18,800
Route 111, Biddeford *Arundel/Biddeford line to Exit 32/ Precourt St.*	19,100 – 29,000

Source: MaineDOT (2010)

Traffic on area corridors reaches its highest concentrations during the afternoon commute, with volumes typically peaking between 4:00 and 6:00 PM. Figure 3-16 compares hourly traffic volumes during the PM peak. Route 111 exhibits strong directionality

between Biddeford and Alfred, with higher traffic volumes westbound than eastbound as a result of commute traffic returning from employment centers in the Portland metropolitan area (including Biddeford, Saco and Scarborough). Westbound and eastbound traffic volumes are more balanced on Route 202 between Sanford and Alfred, reflecting an outbound commute from job sites (as well as shopping and schools) in Sanford as well as the inbound commute of those returning home.



EB = eastbound; WB = Westbound

Figure 3-16: Directional PM Peak Hour Volumes

The Route 109 corridor is busiest in central Sanford, where it carries both longer-distance regional trips and local, in-town trips (Table 3-2). Daily traffic volumes range from 15,500 to 22,500 between Route 4 (the roundabout) and Route 202 in downtown.

Traffic volumes between Sanford and Wells are comparatively light, ranging from 6,800 to 8,600 vehicles daily through the High Pine area. Volumes increase again between Route 9 and Route 1, with the highest volumes encountered near Exit 19 of the Maine Turnpike. Route 109 exhibits slightly higher westbound (toward Sanford) volumes during the PM peak, again reflecting a net in-migration of workers returning home to residences in Sanford from jobs elsewhere during the evening (Figure 3-16).

Table 3-2: Route 109 Existing Daily Traffic Volume by Segment

Route 109 Corridor Segment	Annual Average Daily Traffic (AADT)
Route 109, Sanford *Route 224/11A to Route 202*	11,700 – 13,800
Route 109, Sanford (Downtown) *Route 202 to Route 4*	15,500 – 22,500
Route 109, Sanford (South) *Route 4 to Route 99*	10,600 – 13,300
Route 109, Sanford/Wells *Route 99 to Route 9*	6,800 – 8,600
Route 109, Wells *Route 9 to Route 1.*	9,100 – 16,900

Source: MaineDOT (2010)

Traffic volumes on Route 4 between Sanford and North Berwick (Route 109 to Route 9) range from 7,600 to 9,700 vehicles per day (Table 3-3). Higher volumes are present to the north, ranging from 8,700 to 11,600 vehicles daily between Sanford and Alfred (Route 109 to Route 111/202), and 8,300 to 10,100 north to Waterboro. A comparison of afternoon peak volumes on Route 4 shows a strong directional bias in the eastbound direction (towards

Alfred/Waterboro), indicative of a large number of commuters from the Kittery/Portsmouth areas returning home to residences in central York County communities (Figure 3-16).

Table 3-3: Route 4/202 Existing Daily Traffic Volume by Segment

Route 4/202 Corridor Segment	Annual Average Daily Traffic (AADT)
Route 202, Waterboro/Alfred *Route 4/202 to Route 111/202*	8,300 – 10,100
Route 4, Alfred/Sanford *Route 111/202 to Route 109*	8,700 – 11,600
Route 4, Sanford/North Berwick *Route 109 to Route 9*	7,600 – 9,700

Source: MaineDOT (2010)

Route 224, which is a popular route for travels from Springvale avoiding downtown Sanford, carries 6,000 to 10,000 vehicles per day, with higher volumes occurring near the intersection with Route 109 in Springvale. Other area highways carry fewer than 5,000 daily users:

- Route 11A carries 2,400 to 2,800 vehicles per day.
- Route 99 carries 3,600 to 5,300 vehicles per day.
- Route 35 carries 9,000 vehicles per day entering Kennebunk and 2,700 to 3,800 vehicles per day north of the Maine Turnpike.

Seasonal Variation

Annual variation in traffic volumes is influenced by tourism in some areas, particularly along the coast. This is especially true for the Maine Turnpike and Route 1 along the coast, as well as the connecting interchange at Exit 19 in Wells.

Traffic data is collected continuously along the Maine Turnpike, which allows investigation of how traffic volumes change over time. Figure 3-17 illustrates seasonal variation in average daily traffic volumes for the three interchanges located within the CYCCS study area. All three interchanges carry more traffic during summer months when tourist and vacation travel peaks. This is particularly pronounced at Exit 19 in Wells, which provides access to nearby beaches and coastal communities. July and August traffic volumes at Exit 19 are nearly 40 percent higher than the average volume for the entire year. Conversely, daily traffic volumes at Exit 32 vary less over the course of the year, with summer traffic volumes about 10 percent higher than the AADT.

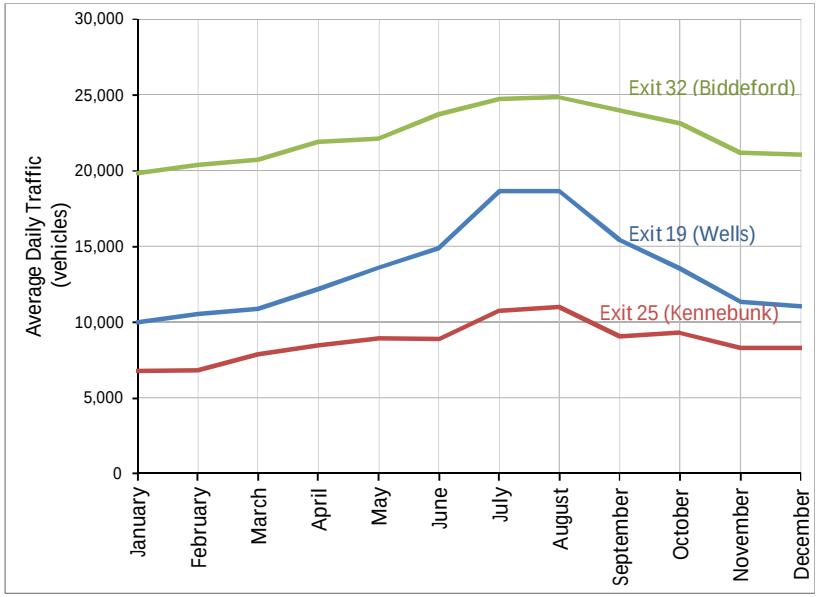


Figure 3-17: Seasonal Variation in Daily Traffic Volumes at Maine Turnpike Interchanges

Inland routes experience less variation in traffic levels over the course of the year, as typified in Figure 3-18 for Route 109 in Sanford, where MaineDOT maintains a permanent count station.

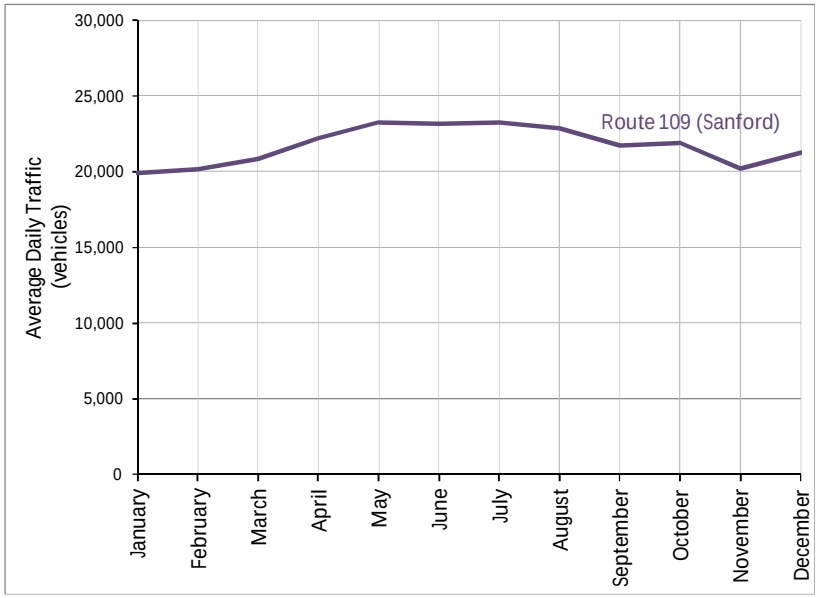


Figure 3-18: Seasonal Variation in Daily Traffic Volumes on Route 109 in Sanford

Route 111 is susceptible to congestion caused by peak hour volumes mixing with seasonal tourist traffic from Maine Turnpike Exit 32 in Biddeford and activity associated with various shopping centers in the vicinity of the interchange. Existing AM and PM peak period level of service along the Route 111 between Sanford and Exit 32 is LOS D/E, which indicates that the segment is experiencing unstable flow. Additional summertime traffic is likely to exacerbate unstable flow on Route 111 during the PM peak.

Projected Future Growth

The study also considered how transportation needs may differ in the future as a result of population and job growth in the region. As described in *Chapter 2: Study Context*, an additional 33,572 people and 20,534 jobs are forecast in York County by 2035.

Growth in population and employment is expected to translate into increased traffic on study area roadways. Traffic modeling conducted for the study forecasts that total vehicle miles traveled in York County will increase by 29.4 percent between 2010 and 2035 (Table 3-4). Larger increases are expected on the Maine Turnpike and collector/local roadways than on the other principal and minor arterials.

Table 3-4: Modeled Vehicle Miles Traveled (VMT)

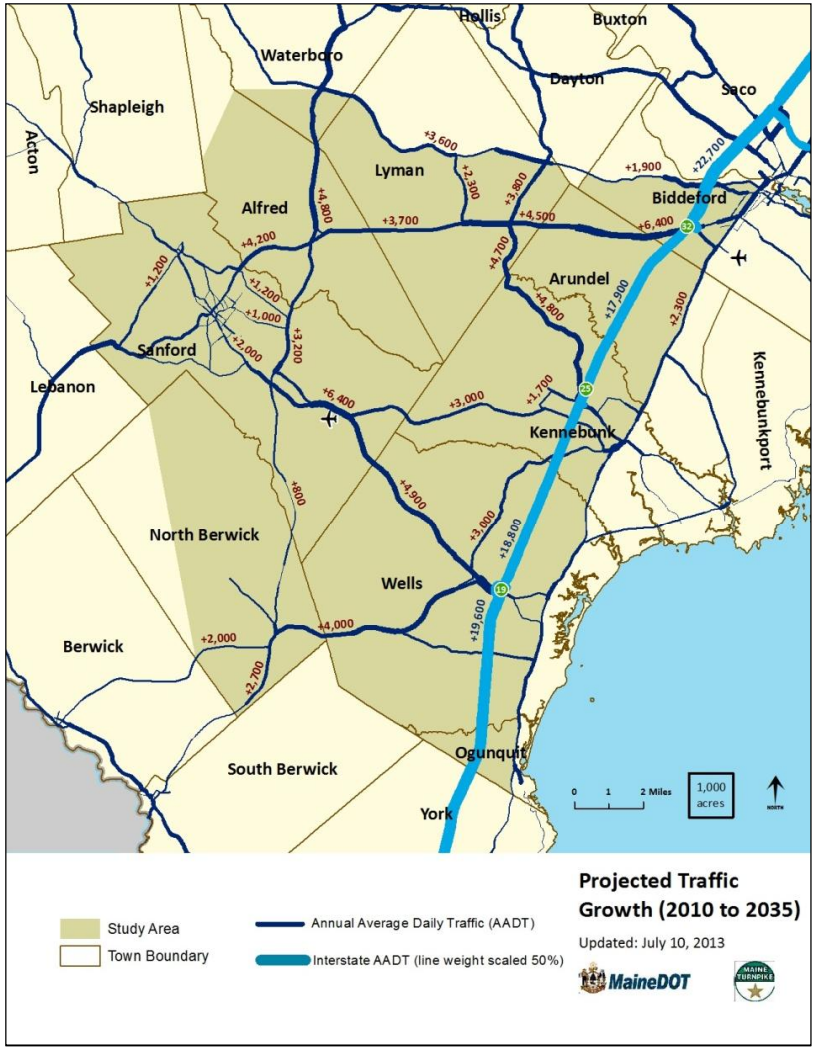
Roadway Classifications	2010	2035	Net Change	Percent
Maine Turnpike and Other Expressways	2,520,000	3,330,000	810,000	32.0%
Other Principal and Minor Arterials	2,710,000	3,200,000	490,000	18.2%
Collector and Local Roads	3,180,000	4,350,000	1,170,000	36.9%
TOTAL	8,410,000	10,880,000	2,470,000	29.4%

Source: MaineDOT (2010)

Data source: MaineDOT (2010)

Figure 3-19 illustrates how the projected increase in travel translates to changes in daily traffic on the corridors in the CYCCS network. Outside of the Maine Turnpike, the major highway corridors are expected to experience the most growth, particularly on rural segments and near interchanges with the Maine Turnpike. Projected growth relative to existing volumes (shown previously in Figure 3-15) is especially high on the rural segment of Route 109 between Route 99 in Sanford and Route 9A in Wells, as well as on Route 35 and Route 99, which are collector roadways that carry much less traffic than the region's primary corridors (Routes 111, 202, 4 and 109). This may be indicative of both the projected locations of future growth and/or higher proportions of traffic using alternate routes due to peak period congestion on the primary arterial highway corridors.

As with any forecasting process, actual changes in traffic volumes over time could be higher or lower, depending on a wide range of factors or unforeseen trends. For planning purposes, factors such as the real (inflation adjusted) cost of vehicle operation and mode share are presumed to hold steady over the 25 year timeframe.



Data source: MaineDOT (2010)

Figure 3-19: Projected Change in Daily Traffic Volumes (2010 to 2035)

Traffic Operating Conditions

Highway connections between central York County and the coastal transportation corridors primarily involve rural highway segments with occasional intersections at major crossroads. To better understand and evaluate travel conditions on these corridors, a detailed Level of Service (LOS) analysis was conducted for the major highway segments and selected intersections identified by the study team (Figure 3-20 and Figure 3-21).

Level of Service (LOS)

LOS is a standard measure of operational effectiveness for transportation facilities defined by the Highway Capacity Manual. LOS is graded from LOS A (best conditions) to LOS F (very poor conditions). LOS A represents little to no delay, or uncongested conditions, whereas LOS F indicates very congested conditions with long delays. LOS conditions of D or better are generally considered satisfactory during peak periods.

Source: Transportation Research Board

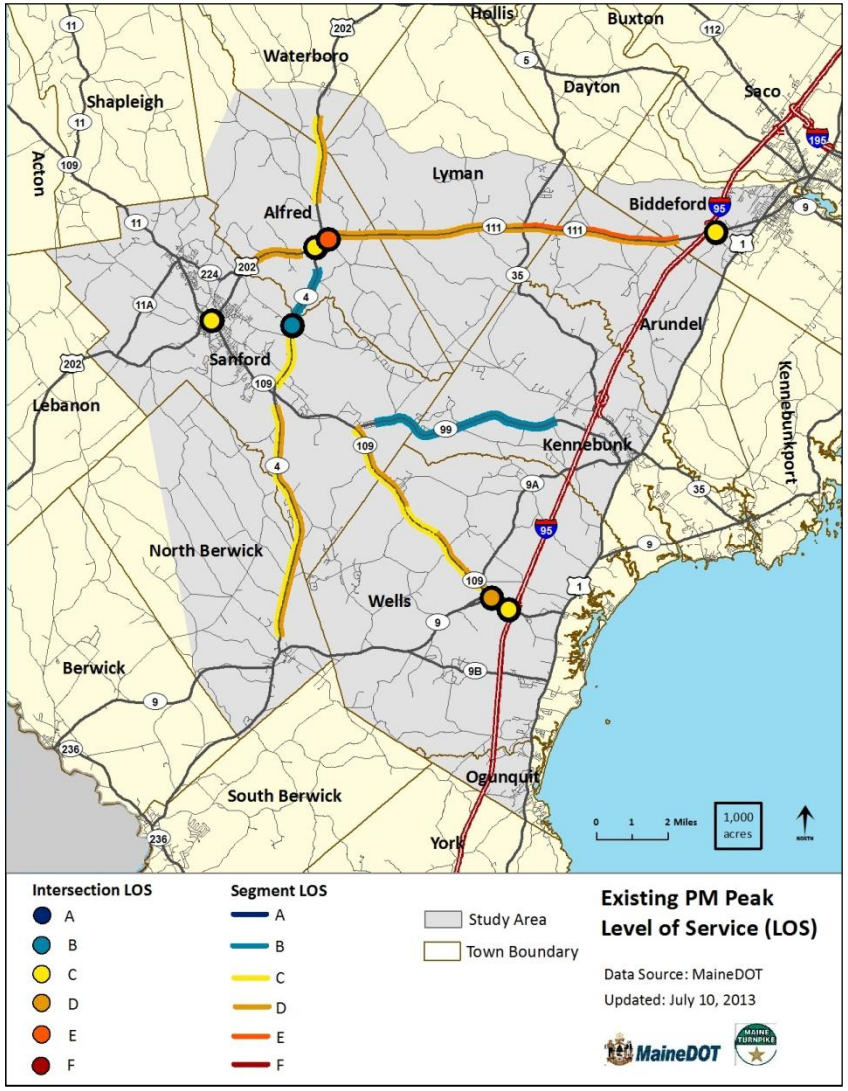


Figure 3-20: Existing PM Peak Level of Service (LOS)

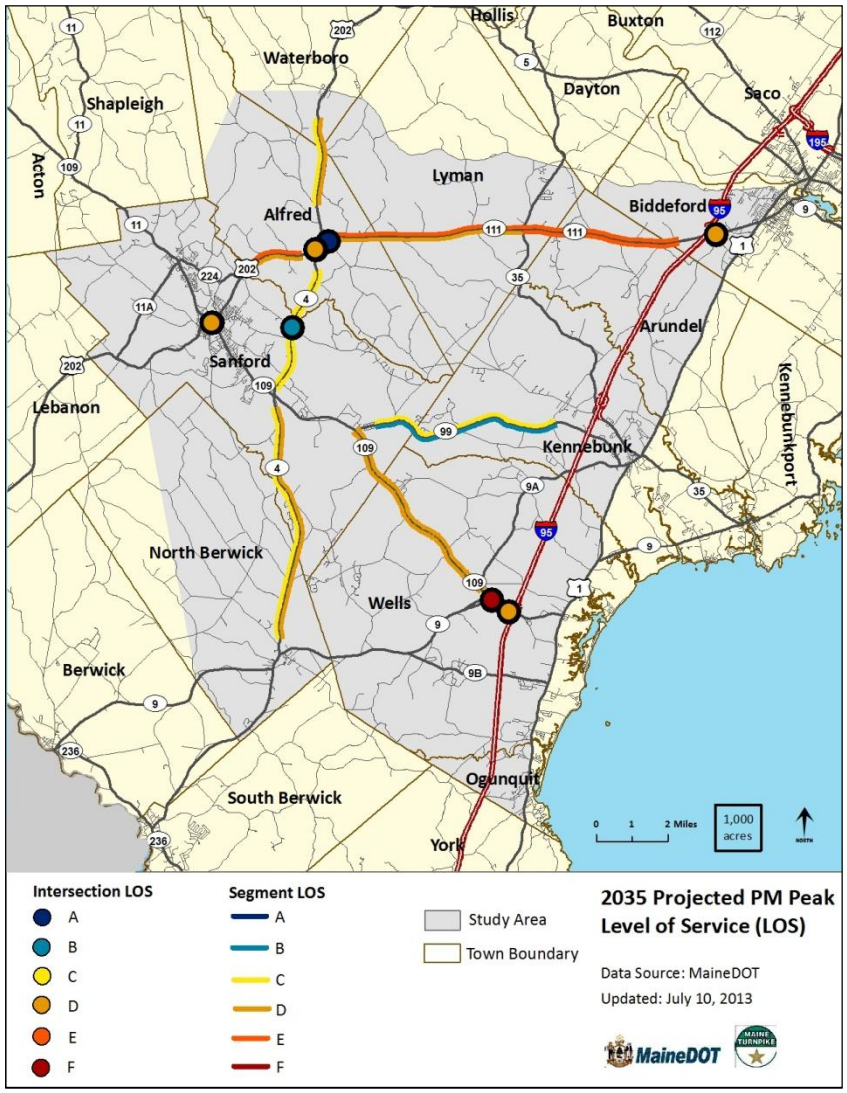


Figure 3-21: Projected 2035 PM Peak Level of Service (LOS)

Rural highway segments on the Route 4/202, Route 99, Route 109, and Route 111/202 corridors were assessed using HCS 2010 software[2], which implements the methodologies described in the Transportation Research Board's *Highway Capacity Manual*, 2010 edition. These are the primary highway corridors linking central York County with the Maine Turnpike and Route 1. Traffic volumes are highest during the afternoon peak, so the PM peak hour was selected as the analysis period.

In addition, LOS was assessed at seven study area intersections using Synchro (v8), a traffic analysis and signal optimization software package developed by Trafficware. Seven intersections were selected for evaluation based on review of traffic volumes, field observation of current operations, and input from the study committees and public:

- Route 111/Exit 32/Precourt Street, Biddeford: The busiest intersection in the study area accommodates heavy traffic volumes on Route 111 as well as all traffic entering or exiting the Maine Turnpike at Exit 32. It is a controlled, signalized intersection.
- Route 111/Kennebunk Road, Alfred: This controlled intersection was newly signalized in 2012.
- Route 4/Route 202/Route 111, Alfred: The major crossroads in Alfred, this controlled, signalized intersection was observed to experience congestion in the northbound direction during the afternoon peak.

[2] HCS 2010 is a product of McTrans, an organization affiliated with the University of Florida that was created by the Federal Highway Administration (FHWA) in 1986 to distribute and support microcomputer software in the highway transportation field.

- Route 109/Route 202, Sanford: This is the major crossroads in downtown Sanford and affects traffic movements both east-west along the Route 202 corridor, as well as north-south along Route 109. It is a controlled, signalized intersection.
- Route 4 at Grammar Road/New Dam Road, Sanford: This signalized intersection is a key access point from the Route 4 corridor into Sanford. It is a controlled, signalized intersection.
- Route 9/Route 109, Wells: A major crossroad in Wells, this controlled, unsignalized intersection provides access to North Berwick.
- Route 109/Exit 19/Wells Transportation Center, Wells: A busy access point to the Maine Turnpike, congestion at this controlled, signalized intersection has been noted westbound turning left onto the Maine Turnpike as well as on the Turnpike off-ramp during peak periods.

The roundabout at Route 4/Route 109 in Sanford and the signalized intersection of Route 35/Route 111 in Lyman are other intersections at major crossroads within central York County. LOS at these intersections was not analyzed because both have been improved in recent years and were confirmed to operate effectively through field observation. Future improvements are not expected to be necessary over the study timeframe.

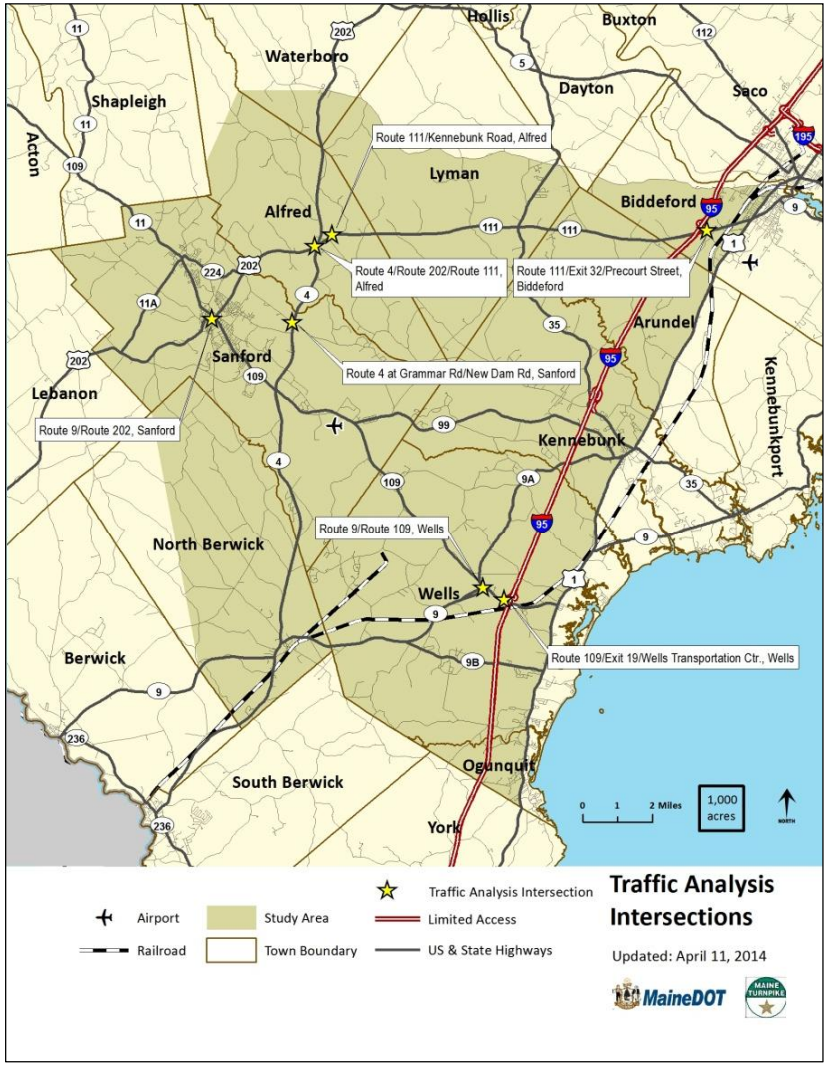


Figure 3-22: Traffic Analysis Intersections

Rural Highway Segments

The Highway Capacity Manual categorizes LOS on two-lane rural highway segments based on travel speeds and the percent of time spent following other vehicles. As traffic volumes increase, average speeds drop and passing opportunities decrease.

Detailed LOS analysis found that the Route 4/202 and Route 109 corridors operate at LOS D or better conditions during the afternoon commute, with many segments operating at LOS B or C conditions (Table 3-5). This indicates that travel speeds are near posted levels, and passing opportunities are generally available.

The Route 111/202 corridor is more congested. Most segments operate at LOS D, but the westbound segment between Biddeford and Lyman is LOS E, reflecting heavy traffic and limited passing opportunities.

In 2035, conditions on the Route 109 and Route 4/202 corridors are expected to remain in the LOS C-D range. All westbound segments of Route 111 are forecast to degrade to LOS E conditions during the afternoon peak by 2035, as is the eastbound segment between Lyman and Biddeford.

Because it provides an alternate route from the South Sanford area to the Maine Turnpike and Route 1, LOS was also assessed on Route 99. Lightly traveled today and in the future, conditions are LOS B today and projected to remain in the LOS B-C range in 2035.

Table 3-5: Level of Service (LOS) – Rural Highway Segments (PM Peak)

Segment	2010 LOS		Projected 2035 LOS	
Route 4/202 Corridor	NB	SB	NB	SB
RR Dr (Waterboro) – Gore Rd (Alfred)	D	C	D	C
Rte 111/202 (Alfred) – Grammar Rd (Sanford)	B	B	C	C
Grammar Rd (Sanford) – Rte 109 (Sanford)	C	C	C	C
Rte 109 (Sanford) – Rte 9 (North Berwick)	D	C	D	C
Route 109 Corridor	NB	SB	NB	SB
Route 99 (Sanford) – Bald Hill Rd (Wells)	D	C	D	D
Bald Hill Rd (Wells) – Pool Rd (Wells)	C	C	D	D
Pool Rd (Wells) – Route 9 (Wells)	D	C	D	D
Route 111/202 Corridor	NB	SB	NB	SB
Biddeford/Arundel line – Rte 35 (Lyman)	E	D	E	E
Rte 35 (Lyman) – Rte 4/202 (Alfred)	D	D	E	D
Rte 4/202 (Alfred) – Rte 224 (Sanford)	D	D	E	D
Route 99	NB	SB	NB	SB
Whitten Rd (Kennebunk) – Rte 109 (Sanford)	B	B	C	B

Major Intersections

Level of Service was assessed for both the morning and evening peak periods for study area intersections, since specific movements may peak at different times of day. Intersections analyzed were those most likely to experience congestion due to high traffic volumes, geometric constraints, or method of traffic control (stop control, traffic signal, etc). The intersections of Route 111 at Route 35 (Lyman) and Route 109 at Route 4 (Sanford) have been upgraded

in recent years and were confirmed to operate effectively through field observation. These were therefore not assessed further.

Five (5) signalized intersections evaluated were found to operate at LOS C or better conditions today. With forecast traffic growth through the year 2035, the intersections of 1) Route 202 & Route 109 in Sanford; 2) Route 111/202 & Route 4/202 in Alfred; 3) Route 111 & Exit 32/Precourt Street in Biddeford and 4) Route 109 & Exit 19/Wells Transit Center in Wells are forecast to degrade to LOS D conditions. The latter two are especially of concern because queuing at these locations can back onto the off-ramps from the Maine Turnpike.

Table 3-6). At the two intersections controlled by stop signs, delay on the stop controlled side street resulted in LOS D or E conditions at times:

- Side street movements on Kennebunk Road onto Route 111 in Alfred, which were formerly controlled by stop signs, were LOS E during the PM peak. This issue was resolved by installation of a traffic signal by MaineDOT in October 2012.
- Eastbound traffic on Route 9, which stops at the intersection of Route 109 in Wells, is subject to LOS D conditions during both the AM and PM peaks.

Specific movements at the signalized intersections were generally found to operate well (LOS D or better) today. The one exception is:

- Westbound through movements on Route 111 at the Maine Turnpike Exit 32/Precourt Street intersection are LOS E during the PM peak.

With forecast traffic growth through the year 2035, the intersections of 1) Route 202 & Route 109 in Sanford; 2) Route 111/202 & Route 4/202 in Alfred; 3) Route 111 & Exit 32/Precourt Street in Biddeford and 4) Route 109 & Exit 19/Wells Transit Center in Wells are forecast to degrade to LOS D conditions. The latter two are especially of concern because queuing at these locations can back onto the off-ramps from the Maine Turnpike.

Table 3-6: Intersection Level of Service (LOS)

Intersection	2010 LOS		Projected 2035 LOS		Issues (see notes)
	AM	PM	AM	PM	
Rte 111 & MTA Exit 32/Precourt St (Biddeford)	C	C	D	D	1, 2
Rte 111 & Kennebunk Rd (Alfred)*	C	E	A	A	2
Rte 111/202 & Rte 4/202 (Alfred)	B	C	C	D	2
Rte 202 & Rte 109 (Sanford)	B	C	C	D	2
Rte 4 & Grammar Rd/New Dam Rd (Sanford)	B	B	B	B	None
Rte 109 & Rte 9 (Wells)**	D	D	F	F	2
Rte 109 & MTA Exit 19/Transit Center (Wells)	B	C	C	D	1, 2

*Unsignalized, two-way stop intersection in 2010. LOS reported for Kennebunk Road stoop controlled movement
** Unsignalized, two-way stop intersection in 2010 and 2035. LOS reported for Route 9 stop controlled movement.
1. Traffic queues are subject to backing up onto Maine Turnpike off-ramps
2 . Specific movements concerns by year 2035
Source: MaineDOT (2010)

Analysis of specific movements indicates the following concerns in 2035:

- Several movements at the Route 111/202 & Route 4/202 intersection are forecast to degrade to LOS E conditions in the future during the PM peak. Depending on how signal timing is allocated, both the westbound through and eastbound left movements on Route 111/202, or the northbound through/left turn movement on Route 4, is expected to degrade to LOS E. The northbound movement is impacted by left turns blocking the higher volume through movement.
- At the intersection of Route 202 and Route 109 in downtown Sanford, the shared eastbound left/through movement on Route 202 is expected to degrade to LOS F during the PM peak by 2035.
- During both the AM and PM peaks, both westbound and eastbound left turning movements on Route 111 at the Maine Turnpike Exit 32/Precourt Street intersection are forecast to degrade to LOS E during the AM peak.
- Several movements at the Route 109 & Exit 32/Wells Transit Center intersection are forecast to degrade to LOS F during the PM peak by 2035: Eastbound left turns from Route 109 onto the Maine Turnpike (LOS F), left turns exiting the Wells Transportation Center, and the shared left/through movement from the Maine Turnpike Exit 19 off-ramp.
- All movements on Route 9 at the unsignalized (stop sign controlled) intersection with Route 109 are forecast to degrade sharply to LOS F conditions during the AM and PM peaks. Left turning traffic from Route 9 onto 109, though a fairly light movement, is expected to block the heavy right turning traffic movement, causing considerable delays for all eastbound traffic on Route 9 at the intersection.

Crash History and Safety

MaineDOT maintains a comprehensive database of information regarding vehicle crashes occurring in Maine. Crashes for the three year period of 2008-2010, the most recently available data, were analyzed to identify locations with higher than expected crash histories.

Figure 3-23 summarizes the crash rates on CYCCS area highways, separating those crashes that occur at intersections from other crashes. Routes through developed areas typically have higher incidence of crashes occurring at intersections. This is somewhat reflected in the data by the higher incidence of intersection crashes on Route 109, much of which travels through urbanized portions of Sanford, compared to Routes 99, 111 or 202. Lightly traveled rural corridors also showed a high number of intersection crashes as well, and closer inspection reveals that these are predominately related to intersection connections at busier, major crossroads (Route 35 at Route 111, and Route 11A at Route 109 are two examples).

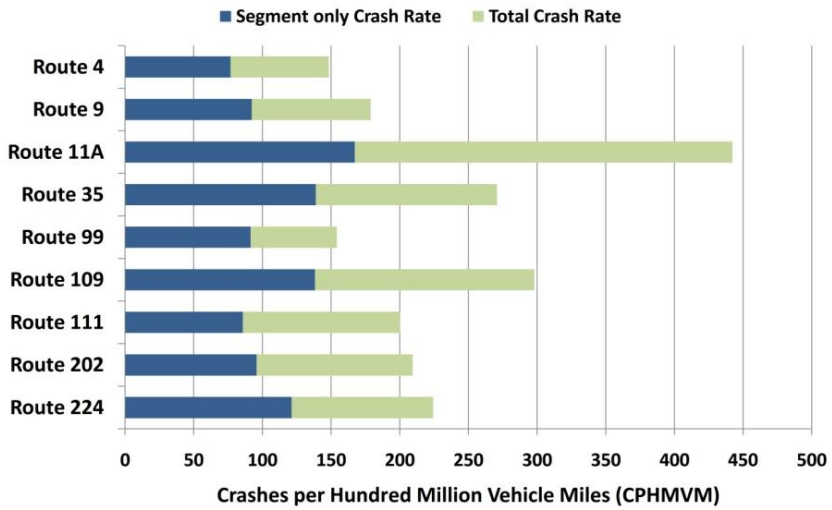


Figure 3-23: Crash Rates for CYCCS Highways (2008-2010)

The expected crash rate for a facility is related to its functional classification (i.e. – the type of roadway), rural/urban area, and traffic characteristics. MaineDOT calculates critical crash rates for specific facility types that allow comparison of crash experience across different facility types. A facility's actual crash rate is compared to the critical rate for facilities with similar urban/rural rating, physical characteristics and traffic, producing a ratio known as the critical rate factor (CRF). CRFs over 1.0 indicate that crashes occur at a higher than expected rate.

Figure 3-24 summarizes total CRF as well as non-intersection (segment only) CRF. Considering only non-intersection crashes, all study area highways exhibit CRFs under 1.0. Some intersection crashes, however, occur at higher frequencies. On a corridor-wide basis, the overall crash rates exceed the corresponding critical rate on Routes 202, 111, 109 and 11A, and the CRF on Route 35 is 1.0. As mentioned previously, the high rate of intersection crashes on Route 35 and Route 11A is mostly related to their intersections with Route 111 and 109, respectively.

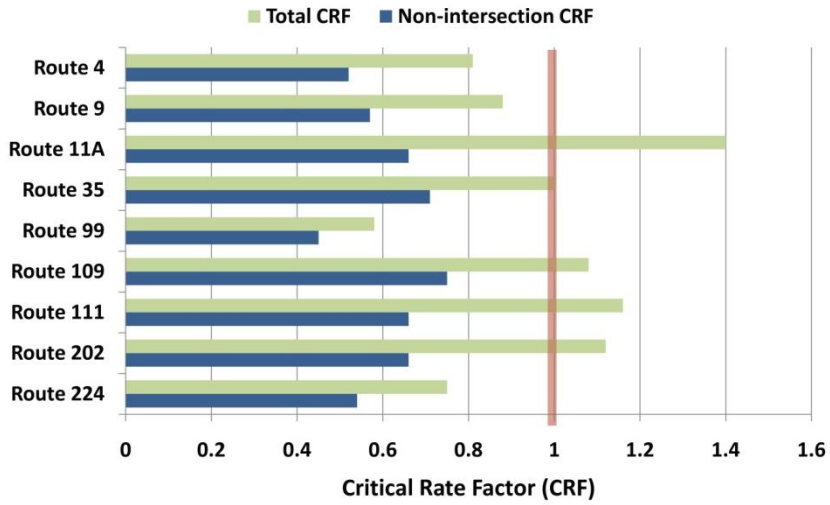


Figure 3-24: Crash Critical Rate Factors for CYCCS Highways (2008-2010)

Table 3-7 identifies the frequency of crashes by type of crash.

Table 3-7: Share of Crashes by Type (2008-10)

	Rear End	Head-on	Intersection	Pedestrian	Bicycle	Went off Road	Animal	Other
Route 4	41%	4%	20%	0%	1%	14%	16%	5%
Route 9	40%	6%	18%	1%	0%	14%	11%	9%
Route 11A	32%	3%	43%	0%	0%	16%	5%	0%
Route 35	50%	2%	18%	0%	0%	23%	6%	2%
Route 99	31%	2%	22%	0%	0%	39%	6%	0%
Route 109	58%	3%	22%	1%	2%	9%	2%	3%
Route 111	55%	5%	17%	0%	0%	13%	4%	6%
Route 202	37%	6%	27%	1%	3%	13%	7%	5%
Route 224	35%	5%	24%	0%	5%	24%	5%	0%

Source: MaineDOT (2010)

Of particular note:

- Rear-end crashes occur most frequently on Route 109 and Route 111, both of which have segments with frequent intersections and/or driveways, where rear-end crashes are more common.
- Head-on crashes, while infrequent, occur more often on the Route 111/202, Route 224 and Route 9 corridors than on other corridors. Head-on crashes are of particular concern due to their severity.
- Crashes involving vehicles running off the road are most common on Route 99, which has narrow shoulders.
- Crashes involving pedestrians and bicycles are infrequent, but occur most frequently on Route 109 and Route 202, which include segments in the built up portions of Sanford where pedestrian and bicycle activity is more prevalent.
- Bike crashes are highest on Route 224, which may be in part caused by a lack of paved shoulders in the eastern section (Shaws Ridge Road), and numerous driveways and street intersections along the Pleasant Street section in Sanford.

To more specifically identify locations with the highest rate of crashes, MaineDOT maintains a list of High Crash Locations (HCLs). HCLs are defined as those locations with CRFs > 1.0 and more than 8 crashes occurring in a 3-year period. Table 3-8 and Table 3-9 identify HCL segments and intersections, respectively. HCLs are also mapped in Figure 3-25, Figure 3-26 and Figure 3-27.

A number of projects have been implemented since 2008 that are expected to improve safety at locations on the 2008-2012 HCL list:

- Route 4/202 Corridor
  - An automated warning system that indicates when vehicles are approaching was installed at Route 4 & High Street (2011).
  - A left turn lane was installed on Route 4 at Jagger Mill Road.
  - The roundabout at the Route 4 & Route 109 intersection in South Sanford was installed in 2009 at the beginning of the analysis period. Crash rates may have been elevated in the months following installation. However, fewer than 20 percent of crashes involved injuries.

- Route 109 Corridor
  - Widened shoulders and improved sight lines along the Route 109 Corridor were constructed in Wells (2012).
  - Intersection improvements and a flashing beacon were installed at the Route 9A intersection in Wells (2012).
- Route 111/202 Corridor
  - A flashing beacon was installed at the Route 202 & Riverside Drive intersection in Sanford.
  - A new traffic signal was installed at Route 111 & Kennebunk Road in Alfred (2012).

Several additional projects that will address current HCLs once constructed are identified in MaineDOT's 2012-13 Capital Work Program:

- Intersection improvements at Route 111 & Hill Road, including a westbound right turn lane from Route 111.
- Intersection improvements at Route 111 & Old Alfred Road/New Road that will realign and consolidate the intersections.
- Route 111 westbound passing lane starting at the New Road/Old Alfred Road intersection and extending west 0.56 miles.
- Intersection improvements and new traffic signal at the Route 109 & Chapel Road intersection.

Table 3-8: High Crash Location (HCL) Segments (2008-2010)

Map ID	Town	Location	Crashes	CRF
Al-s1	Alfred	Gore Rd, west of Federal St	8	1.56
Ar-s1	Arundel	Irving Rd, Brimstone Rd, between Curtis Rd and Limerick Rd	8	3.18
B-s1	Biddeford	MTA Exit 32 at Rte 111 intersection	9	1.70
B-s2	Biddeford	Rte 111, between May St and 5 Points	10	1.15
B-s3	Biddeford	WB cutoff from Rte 1 to Rte 111	22	5.55
B-s4	Biddeford	West Street, between Rte 111/Rte 1 intersection and Burger King	28	3.59
K-s1	Kennebunk	Rte 35, between Perkins Ln and Walker Rd	10	1.18
K-s2	Kennebunk	Rte 35 (Alewive Rd) between I-95 SB off ramp and Fletcher St	9	2.54
K-s3	Kennebunk	Rte 1 between Rte 35 and Dane St	8	1.86
O-s1	Ogunquit	Rte 1, east of Beach St & Shore Rd int	9	2.36
O-s2	Ogunquit	Rte 1, west of Beach St & Shore Rd int	10	1.45
S-s1	Sanford	Rte 109, north of Rte 11A (Oak St)	9	1.39
S-s2	Sanford	Rte 109, south of Rte 11A (Oak St)	9	1.69
S-s3	Sanford	Rte 109, Rte 202 to Twombley Rd	10	3.07
S-s4	Sanford	Rte 109, south of Twombley Rd	9	1.79
S-s5	Sanford	Rte 202 at Welch Ln	8	1.26
S-s6	Sanford	Mt Hope Rd, east of Bauneg Beg Hill Rd	12	1.40
S-s7	Sanford	Rte 109, Gerrish Dr to Old Mill Rd	10	1.76
W-s1	Wells	Rte 109, south of Route 9A*	14	1.80
W-s2	Wells	Rte 1, at Rte 109	11	1.57
W-s3	Wells	Rte 1, south of Chapel Rd	13	1.11

* Denotes location that has since been improved.
Source: MaineDOT (2010)

Table 3-9: High Crash Location (HCL) Intersections (2008–2010)

Map ID	Town	Intersection	Crashes	CRF
Al-i1	Alfred	Rte 111, Kennebunk Rd *	14	3.76
Al-i2	Alfred	Rte 111, Rte 4, Rte 202	25	1.06
Ar-i1	Arundel	Rte 111 (Alfred Rd), Hill Rd	10	2.19
Ar-i2	Arundel	Rte 111, New Rd, Old Alfred Rd	12	2.44
B-i1	Biddeford	Rte 111, entrance to Shaws & Irvings	31	1.10
B-i2	Biddeford	Rte 111, entrance to Five Points Center	13	1.57
B-i3	Biddeford	Rte 111, May St	12	1.52
B-i4	Biddeford	Rte 111, Elm St, entrance to Burger King	17	1.86
B-i5	Biddeford	Rte 111, Alfred St cut-off	11	2.15
B-i6	Biddeford	May St, Dartmouth St	10	1.40
B-i7	Biddeford	South St, May St	11	2.95
L-i1	Lyman	Rte 35, South St	12	5.08
L-i2	Lyman	South St, Hill Rd, Church St	8	2.92
L-i3	Lyman	Rte 111, Rte 35	23	1.13
L-i4	Lyman	Rte 111, Day Rd, Kennebunk Pond Rd	10	2.62
S-i1	Sanford	Rte 202, Brooke St	8	1.86
S-i2	Sanford	Rte 202, Riverside Ave *	8	1.97
S-i3	Sanford	Rte 109, Rte 202	26	1.15
S-i4	Sanford	Washington St & Riverside/Pioneer Ave	8	2.07
S-i5	Sanford	Rte 109, Roberts St	9	1.11
S-i6	Sanford	Rte 109, Old Mill Rd	8	1.12
S-i7	Sanford	Rte 4 (Alfred Rd), School St *	8	1.93
S-i8	Sanford	Rte 4 (Alfred Rd), Jagger Mill Rd *	14	2.64
S-i9	Sanford	Rte 109, Rte 4 roundabout **	60	3.68
W-i1	Wells	Rte 109, Rte 9A *	11	2.61
W-i2	Wells	Rte 109, Chapel Rd	11	1.91
W-i3	Wells	Rte 1, Chapel Rd	27	3.70

* Denotes location that has since been improved.

** MaineDOT reports the HCL for all 4 legs of the roundabout separately. Each leg had the following number of crashes and CRF's between 2008 and 2010: northbound – 19 crashes, CRF 4.22; eastbound – 13 crashes, CRF 2.83; southbound – 18 crashes, CRF 4.56; westbound – 10 crashes, CRF 2.19. The roundabout was completed in 2009, which was during the HCL period. As such, there may have been a temporary increase in crash rates while drivers adjusted to the new roundabout. Source: MaineDOT (2010)

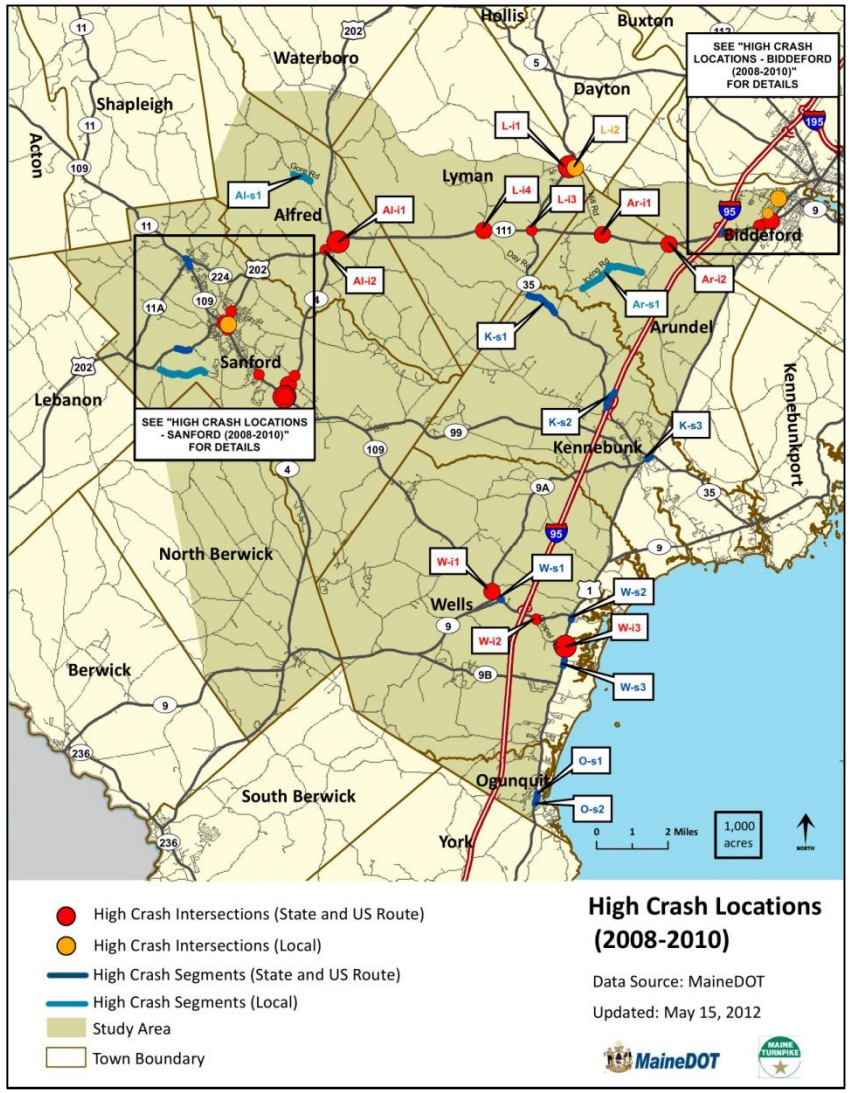


Figure 3-25: High Crash Locations (2008-2010)

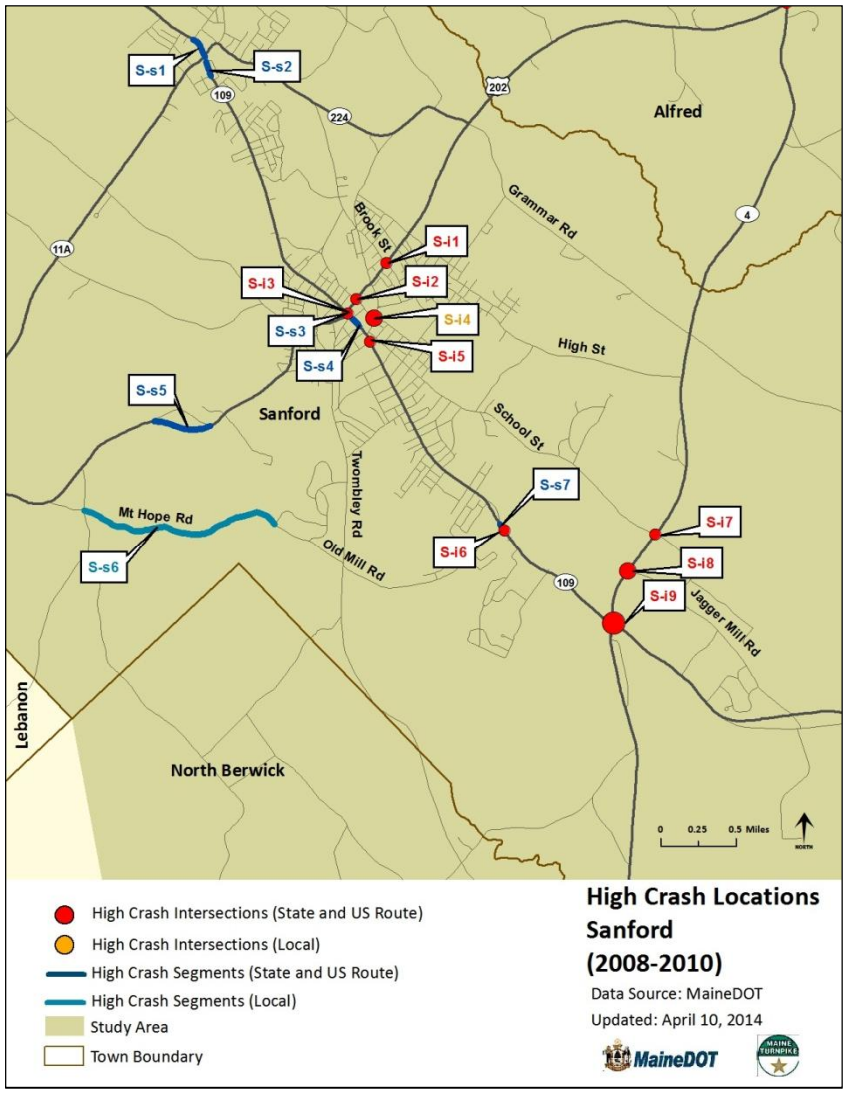


Figure 3-26: High Crash Locations – Sanford (2008-2010)

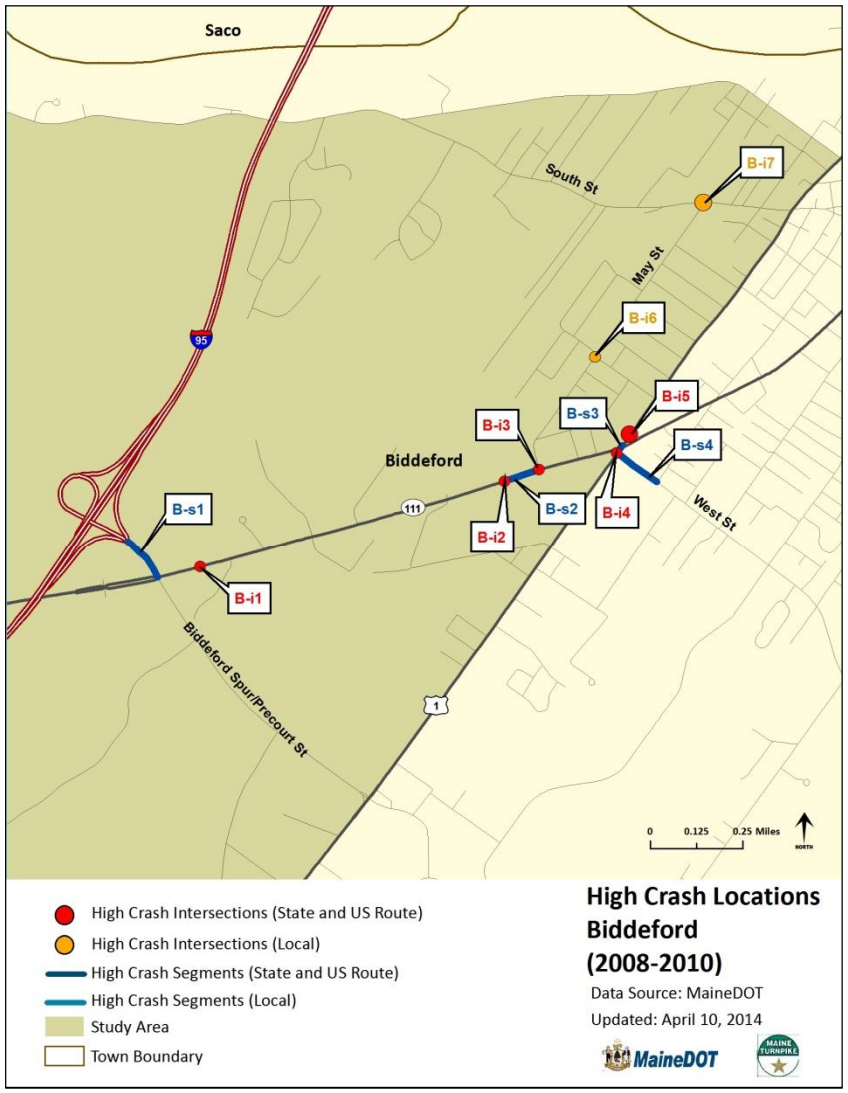


Figure 3-27: High Crash Locations – Biddeford (2008-2010)

Considering Regional Highway System Expansion

As described in *Chapter 1: Study Overview*, the CYCCS was conducted in four phases:

I. Organization and Background Information
II. Initial Investigations and Analyses
III. Detailed Strategy Development and Assessment
IV. Study Documentation

A central focus of Phase II of the CYCCS was to explore how expansion of the highway network could potentially improve mobility and increase economic productivity in the region, and weigh these benefits relative to potential community or natural resource impacts and costs. Nine conceptual regional highway strategies were developed with the participation of the study committees and by incorporating input from the first public meeting (January 2011). These Phase II highway strategies involved capital-intensive, major improvements to existing highways or construction of new highway corridors with the intent of creating additional capacity and reducing travel times. The strategies considered in Phase II of the study were only conceptual representations. Details such as corridor alignments, interchange locations and other defining features were only roughly defined.

Strategies were organized into three general corridors – Biddeford, Kennebunk/Wells, and North Berwick/Ogunquit – that link the Sanford region of central York County to the major highway corridors along Maine's coast (the Maine Turnpike and Route 1). These strategies are summarized below and are further detailed in the *Phase II Highway Corridor Strategy Descriptions Technical Memorandum* (August 2011), which is incorporated into this report as part of *Appendix F: Phase II Evaluation Summary*.

Interim Strategies for Route 202 Corridor West of Sanford

During discussions with the CYCCS Advisory Committee and Steering Committee, concerns about the CYCSS not evaluating east-west travel along Route 202 between Sanford and New Hampshire were raised. A Bill expanding the CYCCS to include Route 202 to New Hampshire was introduced in the state legislature but tabled with the understating that the SMPDC (then the SMRPC) would conduct a separate corridor study.[3] Noteworthy interim recommendations for the Route 202 corridor west of Sanford (in Lebanon) addressed in the June 2012 *Route 202 Corridor Report* include:[4]

- Possible expansion of WAVE service into Lebanon.
- Possibilities for pedestrian amenities near the intersection of Depot Road.
- Eliminate or reduce passing zone between Maple Street and Spruce Street.
- Review of access management regulations.
- Traffic signal improvements for Route 202 at Hubbard/West Lebanon Road and Depot/Little River Road.
- Possible land use ordinance guidance for Lebanon if desired.
- Development of a Corridor Management Plan with MaineDOT.
- Conduct future build-out analysis to assess potential effects of future growth in the corridor.

[3] A scope of work of the Route 202 corridor study is included in Appendix B of the SMRPC *Route 202 Corridor Report* (June 18, 2012)
[4] SMRPC *Route 202 Corridor Report* (June 18, 2012). pp 27-28.

Biddeford Corridor Strategies

These strategies focus on east-west connections linking Sanford, Alfred, Lyman, Arundel and Biddeford; they are depicted graphically in pairs on the following pages.

- Strategy B-1 is an upgrade to the existing Route 111/202 highway between Sanford and Biddeford to increase speed and capacity.
- Strategy B-2 is a locally focused improvement involving construction of new roads in Biddeford connecting Route 111 south to Route 1 (west of the Biddeford Spur) and north to South Street (South Waterboro Road).
- Strategy B-3 includes the upgrades of B-1, plus additional connections from Route 111 to other highways in the Biddeford area and to the Exit 32 Maine Turnpike interchange.
- Strategy B-4 is a new two-lane roadway connecting Route 202 (west of Sanford), Route 109 in South Sanford, and Route 4 near the Alfred/Sanford town line.
- Strategy B-5 is a new four-lane, access controlled expressway. It would be located south of Route 111, extending from a new interchange with the Maine Turnpike (south of Exit 32), Route 111 and Route 1 in Arundel to Route 4 near the Sanford/Alfred town line. Additional interchanges would provide access to Route 35 near the Arundel/Kennebunk/ Lyman town line and to Route 4 and the local street network near the Alfred/Sanford town line.
- Strategy B-6 is a new four-lane, access controlled expressway. It would run north of Route 111, connecting to Route 202 with a new interchange west of Sanford near the Sanford/Lebanon town line and to the Maine Turnpike north of Exit 32. Additional interchanges would provide connections to Route 109 in Sanford (Springvale), Route 202 in Alfred, Route 35 in Lyman, and Routes 1 and 111 near the Arundel/Biddeford town line.

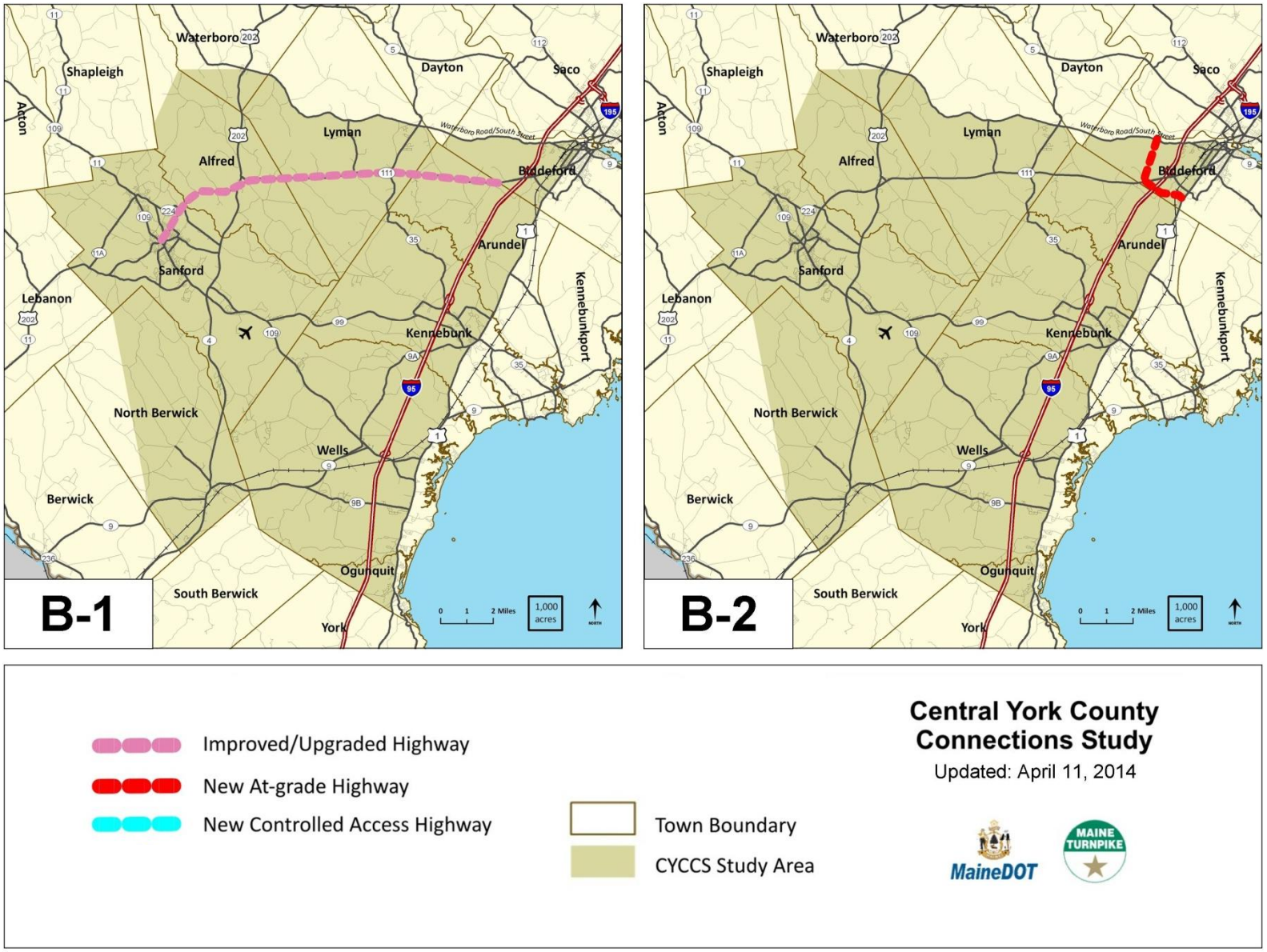


Figure 3-28: Biddeford Conceptual Highway Strategies B-1 and B-2

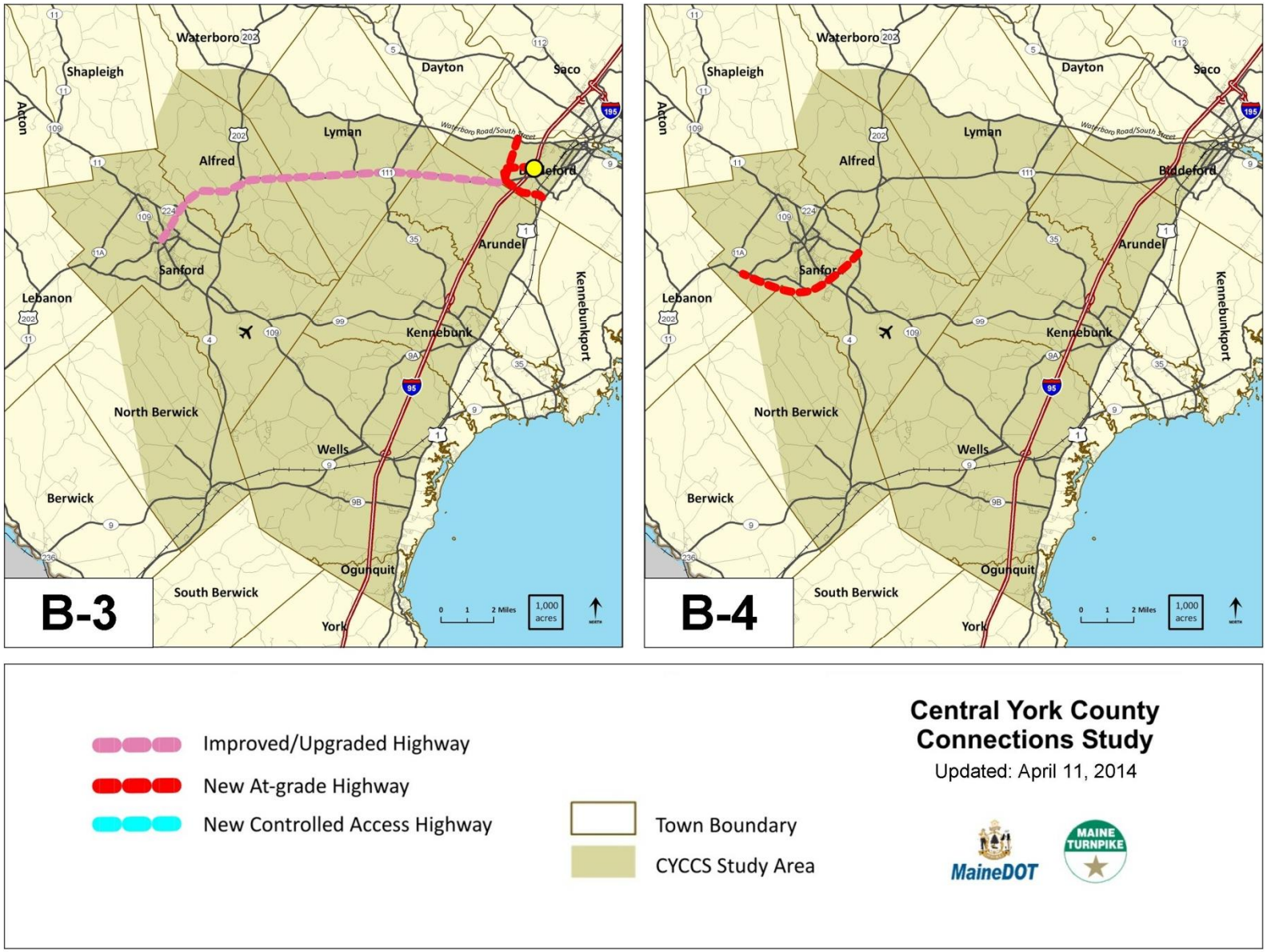


Figure 3-29: Biddeford Conceptual Highway Strategies B-3 and B-4

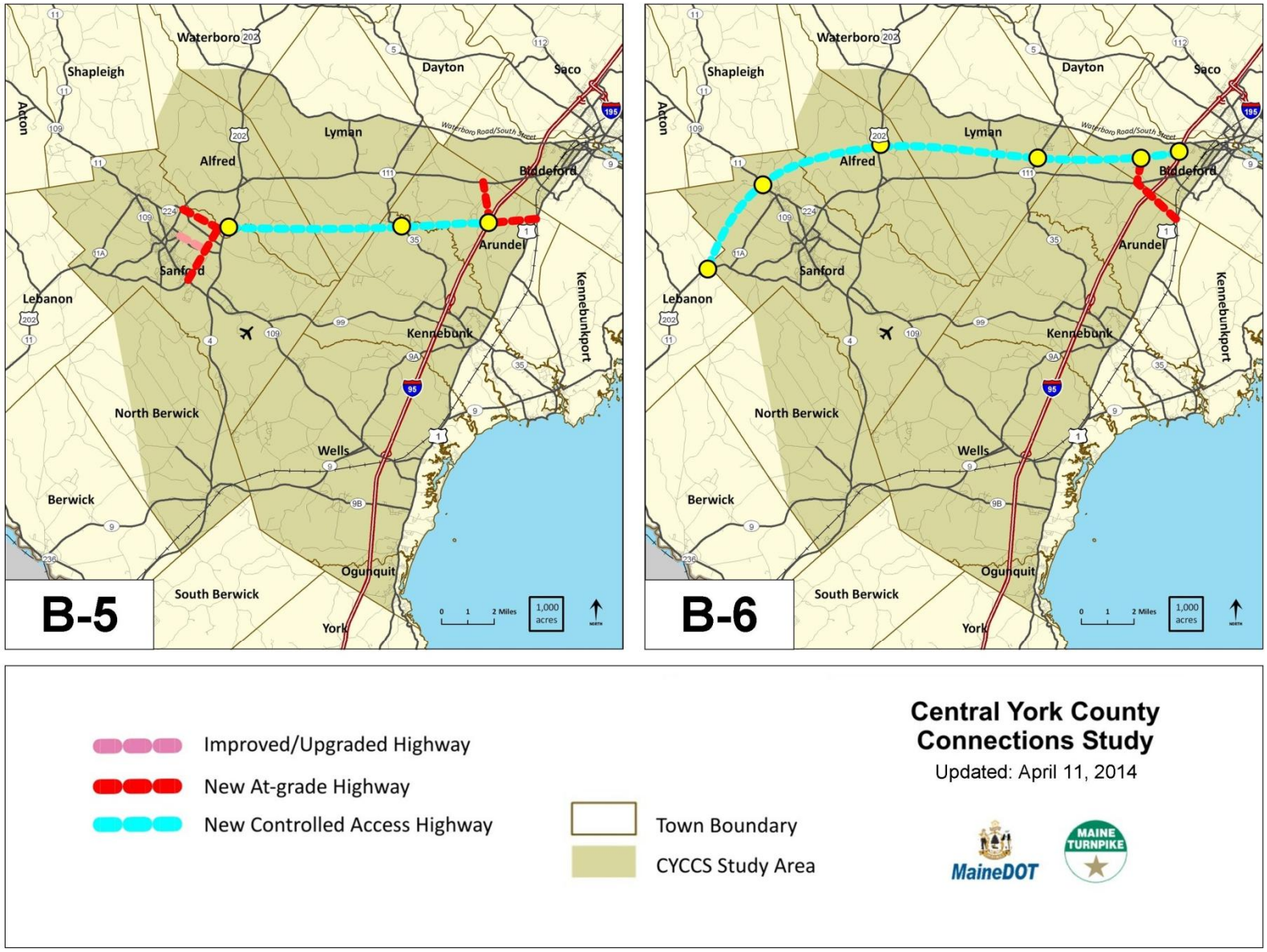


Figure 3-30: Biddeford Conceptual Highway Strategies B-5 and B-6

Kennebunk/Wells Corridor Regional Strategies

These strategies link Sanford with the Maine Turnpike and Route 1 in Kennebunk or Wells.

- Strategy K-1 is a new, more direct two-lane highway connection linking Route 99, Alfred Road, Route 35 and Exit 25 of the Maine Turnpike in Kennebunk. This strategy would involve constructing a new bridge over the Mousam River just north of the Maine Turnpike.
- Strategy K-2 is an upgrade to the existing Route 109 in Sanford and Wells to increase speed and capacity.
- Strategy K-3 is a new four-lane, access-controlled expressway. It would extend from the Maine Turnpike in Kennebunk (south of Exit 25) to Route 4 near the Sanford/Alfred town line, with interchanges providing access to the Maine Turnpike, Route 1 and Route 9A in the vicinity of the Kennebunk/Wells town line; Route 99 in Sanford (east of Route 109); and Route 4 and the local street network in Sanford (east of Route 109 near School Street).

North Berwick/Ogunquit Corridor Strategies

These strategies link Sanford to communities to the southwest, including North Berwick and/or Ogunquit.

- Strategy NB-1 is an upgrade to the existing Route 4 in Alfred, Sanford and North Berwick, including a bypass of North Berwick's town center.
- Strategy NB-2 is a new two-lane highway connecting Route 4 with the Maine Turnpike at a new interchange in Ogunquit, coupled with improvements to Route 4.
- Strategy NB-3 is a new four-lane, access controlled expressway. It would extend from a new interchange with the Maine Turnpike in Ogunquit to Sanford, ending at a new interchange near Route 202 west of downtown. Other interchanges would be provided to Route 9 in Wells (near the South Berwick town line), and to Route 4 near the Sanford Airport.

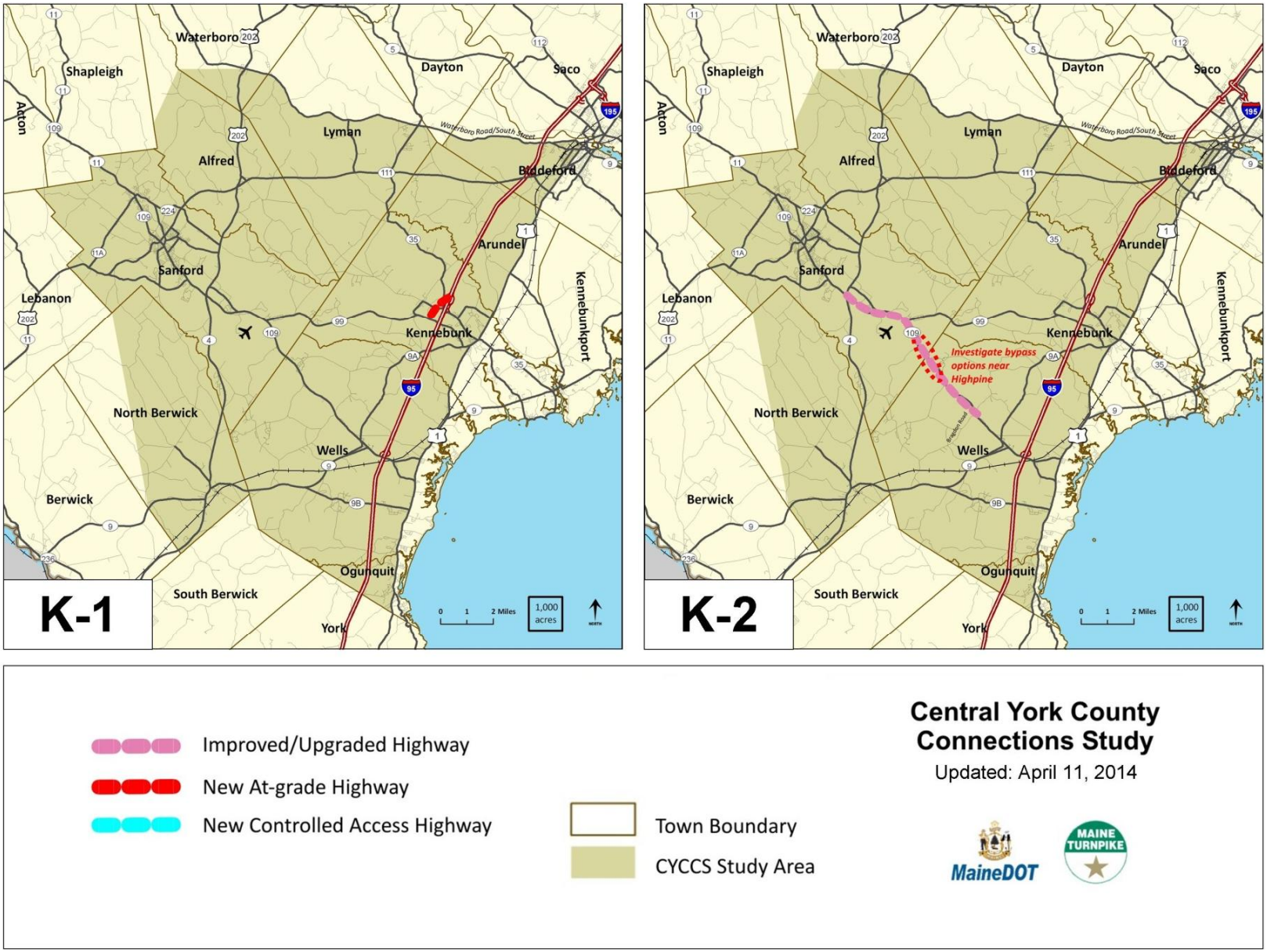


Figure 3-31: Kennebunk/Wells Conceptual Highway Strategies K-1 and K-2

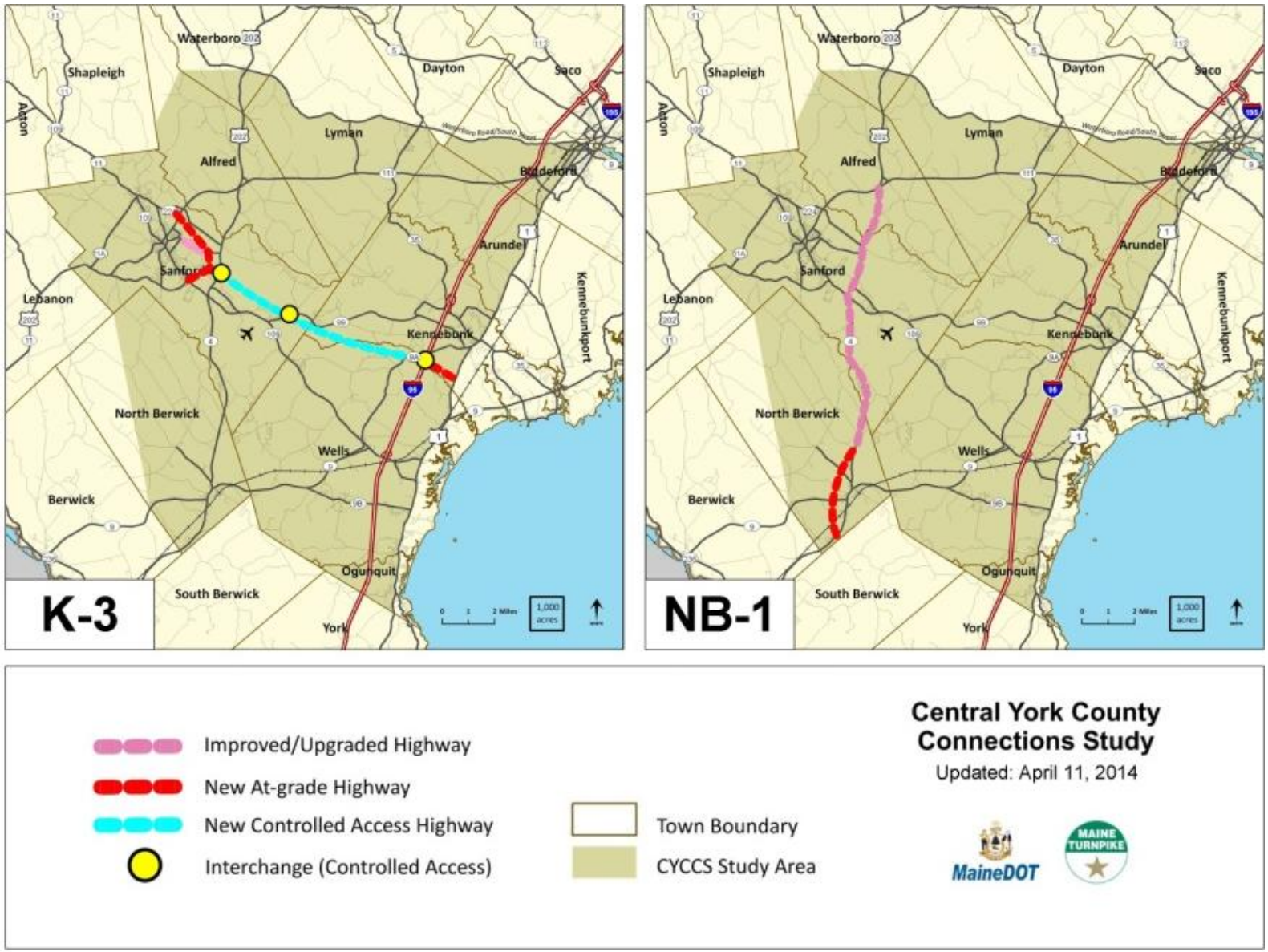


Figure 3-32: Kennebunk/Wells and North Berwick Conceptual Highway Alternatives K-3 and NB-1

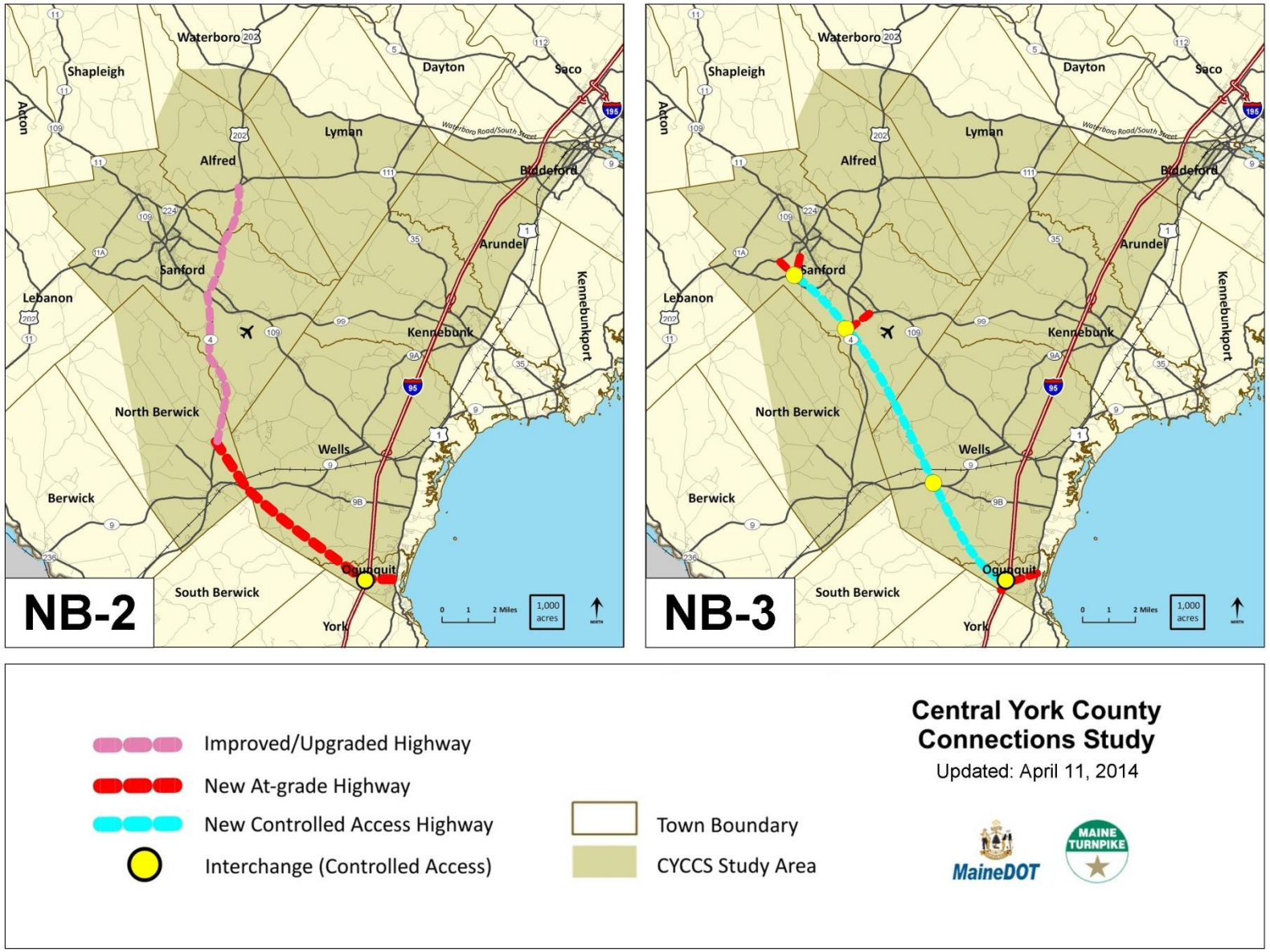


Figure 3-33: North Berwick/Ogunquit Conceptual Highway Alternatives

Evaluation Process

Measures of Effectiveness

The Phase II highway strategies were evaluated based on nine Measures of Effectiveness (MOEs), which were collectively developed by the study team with input from the study's Steering Committee and Advisory Committee. Each MOE is based on the Study Purpose and Need Statement and is comprised of one or more specific measures, as summarized in Table 3-10.

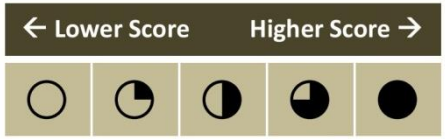
Detailed economic modeling was conducted to support the Phase II evaluation. PRISM, an economic evaluation tool developed by Parsons Brinckerhoff, was utilized to conduct both a traditional benefit-cost evaluation consistent with FHWA guidelines, as well as an evaluation of the potential for increased economic activity in the region resulting from improved mobility. This latter analysis considered the extent to which improved mobility would be expected to increase employment and the Gross Regional Product (GRP), a measure of economic activity, including effects of monies recirculating in the economy. Economic analyses conducted for the CYCCS are summarized in *Appendix H: Economic Analysis*.

Evaluation Results

A summary of the evaluation results is presented in Figure 3-34. Each strategy received a relative score, ranging from worst to best, for each of the MOEs. The five-tier scoring system is illustrated in a graphical manner, with an empty circle representing the worst possible score and a completely filled circle representing the best possible score. Detailed data and rationale for assigning scores is presented in *Appendix F: Phase II Evaluation Summary*.

Table 3-10: Measures of Effectiveness (MOEs)

MOE Name	Measure
Economic Benefit	Potential job creation Change in regional economic activity (dollars)
Cost	Approximate (planning-level) cost of strategy
Benefit-Cost Ratio	Ratio of projected benefits to costs
Daily Traffic Volumes	Changes in corridor traffic volumes VMT (vehicle miles traveled) Effect on traffic at congested locations
Travel Times and Delay	Projected travel times between key origins and destinations VHT (vehicle hours of travel)
Traffic Safety	High Crash locations addressed Potential change in crash frequency
Transit Operations and Access	Potential to benefit/impact existing transit services
Rural and Urban Character	Rural lands in the corridor Town centers and historic sites in the corridor
Environmental Constraints	Miles of wetlands and environmental features along the corridor



		Capital Cost	Benefit/ Cost	Economic Benefit	Daily Traffic Volumes	Travel Times and Delay	Traffic Safety	Transit	Rural and Urban Character	Environ-mental Constraints
Regional Strategies										
B-1	Upgrade Rte 111/202	◔	●	◑	◔	◑	◑	◔	◔	●
B-3	Upgrade Route 111/202 with add'l Turnpike access and connections	○	●	●	◑	◑	◑	◕	○	◕
B-5	Biddeford Expressway (South)	○	◔	●	●	◕	◕	◕	◔	○
B-6	Biddeford Expressway (North)	○	◔	●	●	●	●	◕	○	○
K-2	Upgrade Rte 109	◕	◔	○	◔	◔	◔	◕	◕	●
K-3	Kennebunk Expressway	○	◕	●	●	◕	●	◕	◑	◑
NB-1	Upgrade Rte 4 and New North Berwick Bypass	◕	○	○	◔	○	○	◑	◑	◕
NB-2	Upgrade Rte 4 and New North Berwick – Maine Tpk/Ogunquit Hwy	○	○	○	◑	◔	◔	◕	◔	◑
NB-3	Ogunquit Expressway	○	○	◑	◕	◔	◑	◕	◔	◔
Local Strategies										
B-2	New Biddeford Highway Connections	●	●	○	◔	◔	◔	◕	●	◕
B-4	Southern Sanford Bypass	◕	●	○	◔	◔	○	◕	●	◕
K-1	Rte 99 – Rte 35 Connection	●	●	○	◔	◔	◔	◑	●	◕

Figure 3-34: Phase II Evaluation Results

Figure 3-35 provides further detail on the benefit-cost evaluation. The primary benefits considered are related to reductions in travel time between York County and other population and employment centers, changes in fuel consumption and operating costs, potential for crash reduction, and environmental factors such as changes in vehicle emissions. In some circumstances, benefits can actually be negative, or "disbenefits." In these cases, costs associated with increased miles traveled outweigh the net value of travel time reductions.

Benefit/Cost Analysis		Total Net Benefits	Total Net Costs (Construction + R&R)	Benefit/Cost Ratio
Regional Corridors				
B-1	Upgrade Rte 111/202	$ 114 M	$83 M	1.4
B-3	Upgrade Route 111/202 with Add'l or Turnpike access and connections	$ 171 M	$135 M	1.3
B-5	Biddeford Expressway (South)	$ 152 M	$256 M	0.6
B-6	Biddeford Expressway (North)	$ 233 M	$365 M	0.6
K-2	Upgrade Rte 109	$ 15 M	$32 M	0.5
K-3	Kennebunk Expressway	$ 206 M	$199 M	1.0
NB-1	Upgrade Rte 4 and New North Berwick Bypass	Negative Net Benefits	$33 M	N/A
NB-2	Upgrade Rte 4 and New North Berwick – Maine Turnpike/Ogunquit Highway	Negative Net Benefits	$97 M	N/A
NB-3	Ogunquit Expressway	Negative Net Benefits	$293 M	N/A
Local Strategies				
B-2	New Biddeford Highway Connections	$ 40 M	$21 M	1.8
B-4	Southern Sanford Bypass	$ 31 M	$26 M	1.3
K-1	Rte 99 – Rte 35 Connection	$ 30 M	$11 M	2.7

Note: "R&R" in this context stands for "rehabilitation and replacement"

Figure 3-35: Phase II Benefit-Cost Details

Expressway strategies (B-5, B-6, K-3 and NB-3) tend to show the greatest regional benefit in terms of economic and traffic related benefits (including travel times and safety). However, these strategies also have greater potential to impact the environment and rural/urban character, and are considerably more expensive to construct and maintain. Of the expressway strategies, only the Kennebunk Expressway (K-3) strategy achieved a benefit-cost ratio of 1.0 or higher.

Corridor upgrades to Route 111 in the Biddeford corridor (B-1, B-3) scored better overall than the other regional highway strategies. They achieved positive economic and traffic-related benefits, and would have fewer environmental impacts. Rural/urban character impacts are of concern for these corridor upgrades, which could potentially impact areas adjacent to the highway. Overall, the benefit-cost ratio of corridor upgrades to Route 111 proved highest of the regional strategies evaluated.

Corridor-wide upgrades in the Route 109 (K-2) and Route 4 (NB-1 and NB-2) corridors were found to have modest benefits as measured by the range of MOEs, which is likely a reflection, in-part, of sufficient capacity and relatively delay-free travel in those corridors today. Specific improvements to address safety issues or spot congestion issues in these corridors were considered during Phase III of the study, though much of Route 109 was upgraded in 2011.

The benefit-cost assessment for the North Berwick/Ogunquit corridor (NB-1, NB-2, NB-3) strategies found that the modest benefits in terms of travel time savings for strategies in this corridor were outweighed by impacts associated with increases in vehicle

miles traveled (e.g. – travel costs, safety impacts associated with more travel, etc.). As a result, the net benefits associated with large-scale improvements in this corridor were negative.

The localized strategies fared relatively well in the Phase II evaluation in terms of benefit-cost ratio, though the methodology used for the Phase II analysis is intended to evaluate larger-scale strategies based on region-wide benefits rather than such local strategies. Further work in Phase III was performed to confirm the benefits for these and other smaller scale strategies, as well as to consider the role these strategies might have in conjunction with other improvements, and is described in detail in the *Recommendations* section of this chapter. Both the benefits and impacts associated with the local strategies tend to be relatively modest and localized.

Study Committee and Public Comments on the Phase II Evaluation

The Advisory and Steering Committees met in September 2011 and March 2012 to review results of the Phase II analysis. The study team subsequently presented Phase II results at a public meeting in Kennebunk on March 27, 2012. Presentation materials and meeting summaries are compiled in *Appendix A: Public Outreach*. An overview of the stakeholder feedback is presented in the following sections.

Advisory Committee

The study's Advisory Committee expressed concern over the magnitude of upgrades (4-lane cross section) proposed under the Biddeford Corridor Upgrade strategies (B-1 and B-3), but supported further study of corridor upgrade strategies on Route 111. Of the Expressway strategies, the Advisory Committee felt that the Kennebunk Expressway (K-3) showed the best potential, but expressed strong concerns about environmental and rural character impacts, as well as costs, associated with any of the new corridors. Several Advisory Committee members noted that the benefits of the Expressway strategies—both travel and economic benefits—were modest. As a result, the group recommended dropping B-5, B-6 and NB-3.

The group also noted that the major corridor upgrades, except those on Route 111, were not expected to greatly change travel conditions, and therefore didn't recommend further study of K-2, NB-1 or NB-2.

The Advisory Committee did express support for further study of the local strategies in Phase III, but with some reservation about potential environmental and community impacts associated with these strategies, especially those around the Route 111/Maine Turnpike intersection.

At the March meeting, the Advisory Committee generally concurred with MaineDOT and MTA's recommendations to drop all the Expressway strategies, including K-3; however it was noted that York County is one of the largest growing workforces in the state and the need to efficiently move people in, out and around the county is key to strong employment.

Steering Committee

The study's Steering Committee responded similarly to the Advisory Committee. They also supported further study of the Biddeford Corridor Upgrade strategies (B-1 and B-3). They noted that these appear to provide travel benefits with lower cost and fewer impacts

than the new corridor strategies would. The majority of the group expressed the opinion that the Biddeford Expressway strategies (B-5 and B-6) were too costly, had considerable potential for environmental and rural character impacts, and would not result in benefits sufficient to justify their considerable cost.

The Steering Committee was split on the Kennebunk Expressway (K-3) strategy. While expressing strong concerns over environmental impacts, there was general agreement that it was the most promising of the new expressway strategies considered. If any of the expressway strategies were to be carried forward, some Steering Committee members felt K-3 was the best candidate.

The Steering Committee did not express the opinion that the other major highway strategies (K-2, NB-1, NB-2, and NB-3) warranted further consideration due to limited travel and economic benefits. They did concur with further study of the local strategies in Phase III.

At the March meeting, most of the committee members concurred with MaineDOT and MTA's recommendation to drop all the expressway strategies. However, a few committee members did express concerns that economic benefits may not have been fully captured in the analysis. One member also expressed the opinion that strategies should not be eliminated due to current financial constraints, contending that they could at some point become more financially viable.

Public Meeting

Those members of the public who spoke at the meeting expressed a number of concerns regarding the Phase II regional highway strategies; particularly those that involved construction of new corridors. Environmental concerns, costs, and limited benefits were cited by many as reasons to not carry these strategies forward.

Audience members also noted that even the smaller, local strategies that involve new corridors have the potential for impacts to sensitive areas. In Biddeford, the land north of Route 111 and west of the Maine Turnpike includes wetlands and habitats that community members have been working to preserve. They expressed concern that Strategies B-2 and B-3, which include a new connection between Route 111 and South Street (Waterboro Road) would impact these areas.

Some attendees spoke in favor of greater consideration of non-highway strategies, including transit improvements and corridor management strategies, such as interconnecting commercial properties with a central access point. A representative of the Sanford Regional Growth Council expressed support for more detailed study of the existing corridors given the unfavorable findings associated with new corridors.

Phase II Recommendations

Based on the results of Phase II analysis, as well as committee and public feedback, the MaineDOT and MTA decided to eliminate major new corridors (B-5, B-6, K-3, NB-2, and NB-3) or corridor-wide capacity expansion (B-1, B-3, K-2, NB-1 and NB-2) from further consideration. Instead, the study shifted focus to continuing study of targeted, smaller scale highway improvements, as well as non-highway strategies, during Phase III of the CYCCS. Highway-related recommendations are described in the next section, *Recommendations – Improving the Current Highway System*, while non-highway recommendations are presented in other chapters.

Recommendations – Improving the Current Highway System

As a result of the Phase II evaluations, the study during Phase III focused on identifying targeted improvements to existing transportation infrastructure and services. Highway recommendations were developed in response to specific issues identified by the study team with input from the project committees and pubic. Recommendations (Table 3-11) were selected based on potential effectiveness, alignment with the study's goals, benefit-to-cost ratios and implementation feasibility. In addition to recommendations, those actions that demonstrated some degree of merit, but are not fully or clearly justified based on existing or projected conditions, or require further deliberation, are also identified as Other Potential Long-term Actions.

For recommendations, information presented includes:

- Description: Elements included in the recommendation.
- Location: Town(s) and roadways.
- Benefits: Summary of expected benefits, such as congestion reduction or safety improvements.
- Cost: A planning level estimation of cost to construct or implement the recommendation. Project definitions are at an early stage of development and in many cases will evolve and grow more detailed through subsequent design work. Where costs could not be reasonably estimated, they are instead categorized as low (typically under $50,000), medium ($50,000 to $250,000) or high (over $250,000).
- Benefit/Cost: A benefit-cost assessment (BCA) (separate from the more detailed PRISM regional economic impact analysis for the conceptual highway strategies presented earlier in this chapter) was conducted for cases where cost effectiveness was not known and the proposed action is conceptually developed sufficiently to enable a planning-level BCA.[5] The PRISM tool was also used to calculate BCA, which assigns economic value to benefits associated with a potential strategy (such as travel time savings or reduction in crashed) and compared to the costs to implement the strategy. BCA analysis attempts to determine whether the investment needed to implement a strategy produces direct benefits of equal or greater value. A benefit-cost ratio of 1.0 or higher indicates that the expected benefits outweigh the expected costs. For more details on the BCA methodology

[5] PRISM is a custom economic analysis tool developed by Parsons Brinckerhoff and applied in many projects throughout the country.

and calculations, see *Appendix H: Economic Assessment*. Many recommendations (e.g., safety and signage improvements, traffic signal upgrades, and streetscape/aesthetic enhancements) were not given benefit-cost assessments because capital costs were less than $50,000, or the benefits were intangible and difficult to quantify. All unassessed recommendations presented in this chapter are assumed to have a positive BCA and are consistent with best practices.

- Potential Impacts: Identified potential impacts to natural or built environment features.
- Timeframe: Indicates when the action could *potentially* be advanced based on the degree of additional design/concept development work needed, funding commitments that would need to be secured, and whether the need is a current or anticipated future need. Actual project timeframes will be subject to further planning and work programming efforts by the MaineDOT and MTA.
  - Near-term recommendations could be implemented relatively quickly and without considerable additional work to develop.
  - Mid-term recommendations require additional design work and/or identification of funding, but could conceivably be implemented within a 5 to 10 year timeframe.
  - Longer-term recommendations would require considerable additional planning, design and coordination before implementing, and are unlikely to more forward to implementation for some time.
- Notes: Highlights any other important aspects of the recommendation.

Table 3-11: CYCCS Recommendations

Recommendation	Jurisdiction(s)	Estimated Cost			Benefit/Cost Ratio (BCR) Assessment*	Implementation Timeframe		
		Low (<$50K)	Medium ($50K - $250K)	High (>250K)		Near-Term (1-2 Years)	Med-Term (2-5 years)	Long-term
H-1: Route 111 Traffic Signal Upgrades	Biddeford		✓		Not assessed	✓	✓	
H-2: Route 111 Lane Choice Sign Improvements	Biddeford	✓			Not assessed	✓		
H-3: Route 111 Passing Lanes (Lyman-Arundel)	Lyman, Arundel			✓	Medium (EB); High (WB)	✓	✓	
H-4: Route 111 Passing Lanes (Alfred-Lyman)	Alfred, Lyman			✓	Medium	✓	✓	
H-5: Route 111 Longitudinal Rumble Strips (40 mph or greater)	Various	✓			Not assessed	✓		
H-6: Improve Lyman Route 111 U-Turn	Lyman		✓		Not assessed	✓		
H-7: Improve Route 111 & Kennebunk Pond Road	Lyman	✓	✓		High	✓		
H-8: Improve Route 111.202 Intersection at Route 4/202	Sanford		✓	✓	Not assessed		✓	✓
H-9: Rehabilitate Route 202 (June St and River St)	Sanford			✓	Not assessed		✓	
H-10: Improve Route 202 & River Street Intersection	Sanford			✓	Medium		✓	✓
H-11: Improve Route 202 & Route 109 Intersection	Sanford			✓	High		✓	✓
H-12: Corridor-wide Signage Improvements	Various	✓			Not assessed	✓		
H-13: Expand the Route 109 & Exit 19 Intersection	Wells			✓	High		✓	
H-14: Traffic Signal Upgrade –Route 109 & Exit 19	Wells	✓			Not assessed		✓	
H-15: Improve Route 109 & Route 9 Intersection	Wells			✓	High		✓	
H-16: Traffic Signal Upgrades –Route 109 in Sanford	Sanford			✓	Not assessed	✓	✓	
H-17: Monitor and Improve School St/Gavel Rd Intersection	Sanford		✓	✓	Not assessed	✓		
H-18: Detailed Study of New Rte 99 to Rte 35 Connection	Kennebunk			✓	High			✓
H-19: Pave Shoulders on Route 224	Sanford			✓	Medium/High	✓		
H-20: Pave Shoulders on Route 35	Kennebunk, Lyman			✓	Medium		✓	✓
H-21: Pave Shoulders on Route 99	Sanford, Kennebunk			✓	Low/Medium		✓	
H-22: Eliminate "Y" Intersections	Various			✓	Not assessed		✓	✓
H-23: Pedestrian and Streetscape Improvements in Villages/Towns	Various		✓	✓	Not assessed	✓	✓	

* High BCR is >1.5; Medium BCR is 1–1.5; Low BCR is <1. Not assessed recommendations are all assumed to be positive.

Route 111/202 Corridor Recommendations

The travel and economic analyses conducted during Phase II highlighted the importance of east-west linkages between central York County and Biddeford, Saco and the Portland metro area. Improving the Route 111/202 corridor, which is the primary corridor linking these areas, is therefore a top priority.

Recommendations for the Route 111/202 Corridor focus on addressing identified safety and mobility issues, as well as improving the pedestrian environment in-town in Sanford, where the corridor travels through established residential and commercial areas. The locations and a summary of the recommendations are provided in Figure 3-36 and Table 3-12, respectively.

In addition to the CYCCS recommendations, those actions currently programmed by MaineDOT in their *Biennial Capital Work Plan (FY 2012-2013)* are also recommended for implementation. These include:

- Improve intersection of Route 111 at Old Alfred Road/New Road in Arundel (WIN# 019002.00).
- Improve intersection of Route 111 at Hill Road in Arundel (WIN# 017239.00).
- Construct westbound 0.56-mile passing lane beginning at Old Alfred Road/New Road in Arundel (WIN# 019007.00). This project is part of the CYCCS recommendation H-3.
- Improve intersection of Route 111 & Route 1 in Biddeford (WIN# 019004.00).

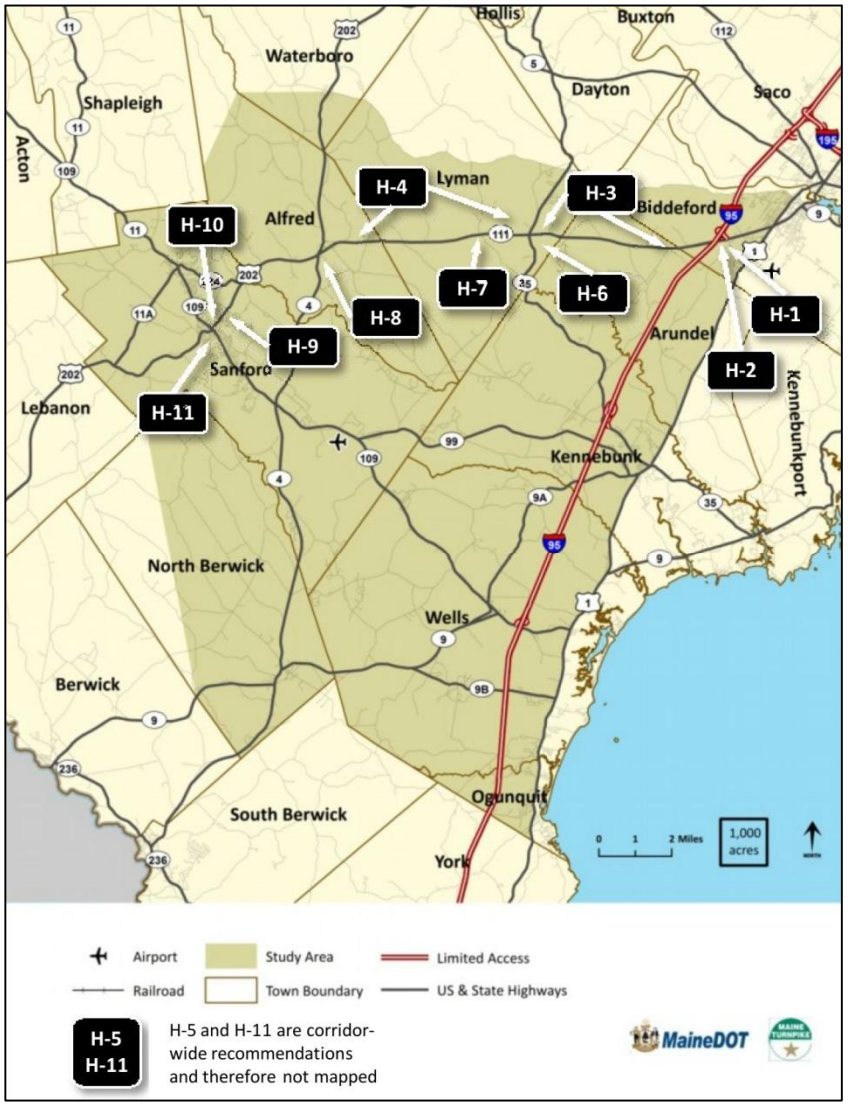


Figure 3-36: Location Map for Route 111/202 Corridor Recommendations

Table 3-12: Route 111/202 Corridor Recommendations

Recommendation		Estimated Cost	Benefit/Cost Ratio (BCR) Assessment	Priority
H-1	Traffic Signal Upgrades – Biddeford Area	$150,000	Assumed to be positive	High
H-2	Lane Choice Sign Improvements	<$20,000	Assumed to be positive	High
H-3	Passing Lanes (Lyman – Arundel Segment)	$1.5 million per mile	1.2 EB; 1.5 WB	High
H-4	Passing Lanes (Alfred – Lyman Segment)	$1.5 million per mile	1.0 EB; 1.2 WB	High
H-5	Longitudinal Rumble Strips	<$3,000 per mile	Assumed to be positive	Low
H-6	Improve Lyman Route 111 U-Turn	$50,000 – $100,000	Assumed to be positive	High
H-7	Improve Route 111 & Kennebunk Pond Rd/Day Rd Intersection	$65,000	16.2	High
H-8	Improve Route 111/202 intersection at Route 4/202	$250,000	Assumed to be positive	Low
H-9	Rehabilitate and Improve Route 202 between June St and River St	$1.25 million	Assumed to be positive	Medium
H-10	Improve Route 202 & River St intersection	$870,000	1.0	Low
H-11	Improve Route 202 & Route 109 intersection	$710,000	3.2	Low
H-12	Corridor-wide Signage Improvements	<$50,000	Assumed to be positive	High

The MaineDOT *Multimodal Six-Year Transportation Capital Plan (2010-2015)* also includes several additional projects, which are incorporated into CYCCS recommendations as noted:

- Westbound passing lane on Route 111, beginning at Route 35 in Lyman (included as part of CYCCS recommendation H-4).
- Eastbound passing lane on Route 111, beginning at Blueberry Road in Alfred and extending to approximately Graves Road in Lyman (included as part of CYCCS recommendation H-4).
- Highway Reconstruction on Route 202 in Sanford (River Street to June Street). This segment corresponds to CYCCS recommendation H-9.

Recommendations presented in the *Recommended Local Jurisdiction Actions* section toward the end of this chapter regarding development of the local street grid would also benefit the Route 111/202 corridor, as would access management and transit improvements described in other chapters. Access management is especially important in preventing degradation of mobility and safety in the Route 111/202 corridor.

H-1: Traffic Signal Upgrades – Biddeford Area

Description	Near- to Mid-term: Upgrade signal controllers and detection to implement Adaptive Signal Control (ASC). On-going: Regular retiming of traffic signals if ASC is not implemented.
Location	Biddeford. Route 111 (Biddeford Crossing to Shaw's Entrance)
Benefits	Maximizes operating efficiency of existing highway capacity, reduces travel delay/congestion, reduces stops at signalized intersections, and responds to changing traffic conditions. Some Adaptive Signal Control (ASC) systems can also positively affect intersection safety by extending green time to avoid changing from green to yellow while a vehicle is entering the intersection.
Cost	Moderate. Varies according to application and system selected, but estimated at around $150,000 for upgrading five intersections (assumes existing signals retained with controller and detection upgrades).
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None expected.
Timeframe	Near-term to mid-term.
Notes	None.

The Route 111 corridor in Biddeford was previously expanded to four travel lanes with additional turn lanes at intersections. Further capacity expansion is not practical. The busiest location on the corridor—the intersection of Route 111 and Exit 32/Precourt Street—operates at LOS C today and is forecast to operate at LOS D in 2035, which is an acceptable overall LOS. Specific movements are more congested, however, including left turns from Route 111. Further, limiting queue lengths on the north leg of the intersection (Exit 32 off-ramp) is important to prevent traffic from backing into the interchange area.

Intersections west of Precourt Street/Exit 32 have sufficient capacity and operate with relatively little congestion. However, progression of traffic through this segment was noted as a problem by the study committees and public.

Traffic signals on Route 111 in Biddeford (Figure 3-37) have detection, actuation capabilities, and are interconnected, meaning that they already have some ability to respond to traffic conditions and operate in coordination with one another. An option to further improve the operation of signals on this segment is to upgrade to more advanced signal traffic controller equipment in conjunction with expanding vehicle detection capabilities.

MaineDOT is currently considering initial implementation of Adaptive Signal Control (ASC) technologies elsewhere. Should these technologies prove effective, they should be considered for implementation on these Route 111 corridor intersections. An advantage of an ASC system at this location would be that it could quickly adapt to changing traffic conditions throughout the course

of the day/week/year and could be programmed to monitor and aggressively respond to queuing on the Exit 32 off-ramp.

Figure 3-37: Route 111 Traffic Signals near the Exit 32 Interchange

Upgrading to ASC would likely require additional video and loop traffic detection, upgrading traffic signal controllers and software, and developing and testing signal timing parameters.

Short of upgrading to an ASC system, current signal timing plans should be evaluated regularly (every 3 to 5 years is recommended, depending on traffic growth or development in the corridor). This process involves collecting a field inventory of equipment and road geometry, collecting new traffic counts at all intersections in the coordinated system, analyzing traffic signal timing plans, and modifying signal timing. This process would not need to be conducted with most ASC systems, since they monitor and respond to traffic conditions in real-time.

H-2: Lane Choice Sign Improvements

Description	Supplement current signing on eastbound Route 111 approaching the Exit 32 interchange to clarify lane choice.
Location	Biddeford. Route 111 (West of Exit 32/Precourt St)
Benefits	Reduces driver confusion; potentially reduces collisions approaching the Exit 32/Precourt Street intersection.
Cost	Low. Likely under $20,000 unless a design requiring additional overhead sign supports is selected.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None expected.
Timeframe	Near-term.
Notes	Next step would be for MaineDOT to design and implement signing plan.

The left lane on eastbound Route 111 becomes a left-turn only lane at the Exit 32 Maine Turnpike entrance. To help drivers select the appropriate lane while approaching the entrance to the Maine Turnpike at Exit 32, additional signing should be added designating the left lane for Turnpike and Park-and-Ride traffic, and the right lane for Biddeford/Route 111 traffic. Signs to clarify that the Turnpike entrance is the second left, after the Biddeford Park-and-Ride, are recommended as well. A concept plan is illustrated in Figure 3-38.

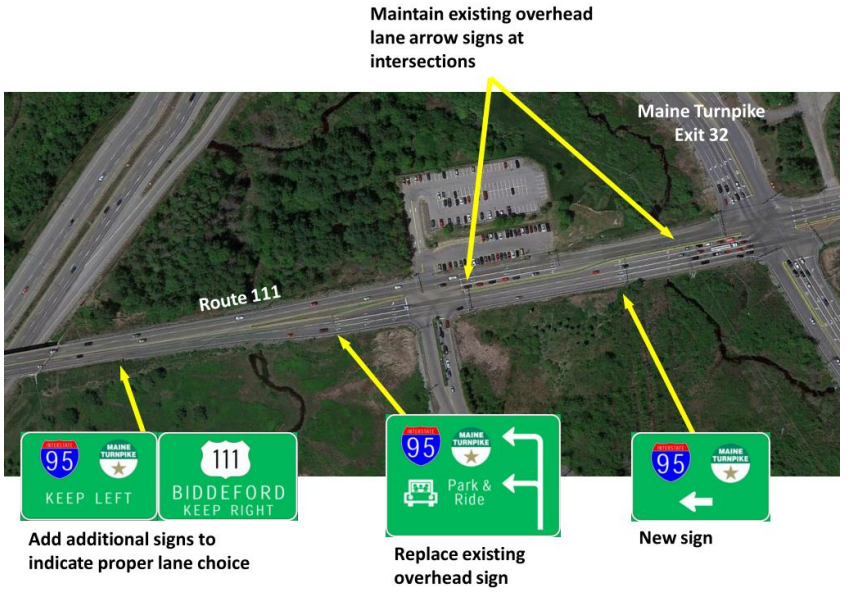


Figure 3-38: Eastbound Route 111 Signage Concept Plan

H-3: Passing Lanes (Lyman – Arundel Segment)

Description	Construct passing lanes.
Location	Arundel, Lyman. Eastbound Route 111 (Route 35 to Thompson Rd/Trout Brook Rd) Westbound Route 111 (New Rd/Old Alfred Rd to Drew's Mill Rd)
Benefits	Allows traffic to pass slower moving vehicles, reduces delay and improves travel reliability; improves peak level of service to LOS C/D (from projected LOS E in 2035); reduces incidence of head-on collisions.
Cost	Typically $1.5 million per mile.
Benefit/Cost	1.2 eastbound 1.5 westbound (1/2 mile) 1.2 westbound (1/2 mile)
Potential Impacts	Could be accommodated within existing right-of-way, but may require modification of access at some locations (e.g. driveway relocations or adjustments).
Timeframe	Near-term to mid-term.
Notes	1-mile long eastbound lane recommended based on traffic volumes. ½-mile westbound passing lane is included in MaineDOT 2012-13 Capital Work Program.

Traffic volumes on the Route 111 corridor are highest to the east in Arundel and Biddeford. In Arundel, the two-lane highway section operates at LOS E conditions in the peak direction of travel (westbound) and LOS D eastbound during the PM peak period today. By 2035, both directions in Arundel are projected to degrade to LOS E conditions. The level of service is largely driven by a lack of passing opportunities during peak periods. Passing lanes provide opportunities to pass slower moving traffic and could maintain LOS C/D conditions through 2035 on the corridor.

A passing lane segment is recommended in each direction between Lyman and Arundel. Preferred passing lane locations have relatively few driveways and cross streets (especially those requiring left turns) and are a minimum of ½-mile in length (one-mile is preferred for busy segments such as this). As practical, they should be located following built up areas or reduced speed zones. AASHTO advises that rural arterials, except freeways, should be designed for speeds of 40 to 75 mph for flat terrain, and 50 to 60 mph for rolling terrain (the terrain along Route 111 in Lyman and Arundel varies between flat and rolling).. Typically, the speed limit is set to the 85th percentile speed (i.e., the speed at which 85 percent of traffic moves) of a sizable sample of vehicles.[6] To determine the speed limit of the passing lane segment, it will be necessary to conduct an engineering study that accounts for sight distances, roadway geometry, and other factors. Based on the Maine speed laws, the posted speed limit cannot exceed 60 mph for an undivided highway if the engineering study allows an increase in the speed limit.

[6] Source: AASHTO. *A Policy on Geometric Design of Highways and Streets.* 2001. p. 71.

Prior study of the Route 111 corridor recommended that two 0.5 mile westbound passing lanes be established east of Route 35. One of these would be located between New Road/Old Alfred Road (Arundel) and Drew's Mill Road, and is identified in the MaineDOT *Biennial Capital Work Plan (FY 2012-2013)*, while the other is no longer needed since that segment has since been updated to a four-lane segment. Eastbound, the recommended location remains from Route 35 extending 1-mile to near Thompson/Trout Brook Road, as recommended in the prior Route 111 study. Should any of the segments between Route 35 and Biddeford prove infeasible in the future, other potential viable passing lane options are Thompson/Trout Brook Road to Hill Road and Hill Road to Limerick Road.

While full shoulders (8 feet) do not need to be provided in the direction of the passing lane, adequate paved shoulders should be maintained for safety purposes and to allow for bicycle use. Five-foot minimum shoulders are therefore recommended adjacent to passing lanes.

H-4: Passing Lanes (Alfred – Lyman Segment)

Description	Construct passing lanes.
Location	Alfred, Lyman. Eastbound Route 111 (Either Down/Clark/Blueberry Ln to Graves Rd, or Howitt Rd extending west 1-mile) Westbound Route 111 (Route 35 extending west 1-mile)
Benefits	Allows traffic to pass slower moving vehicles, reduces delay and improves travel reliability; improves peak level of service to LOS C/D (from projected LOS E in 2035); reduces incidence of head-on collisions.
Cost	Typically $1.5 million per mile.
Benefit/Cost	1.0 eastbound 1.2 westbound
Potential Impacts	Could be accommodated within existing right-of-way, but may require modification of access at some locations (e.g. driveway relocations or adjustments).
Timeframe	Near-term to mid-term.
Notes	Eastbound passing lane is included in MaineDOT 2012-13 Capital Work Program. 1-mile long passing lanes recommended based on traffic volumes.

Between Alfred and Lyman, Route 111 operates at LOS D conditions in the peak direction of travel during the PM peak period today, and is expected to degrade to LOS E conditions in 2035. Passing lanes provide opportunities to pass slower moving traffic and could maintain LOS C/D conditions through 2035 on the corridor.

One passing lane is recommended in each direction on this segment:

- Westbound starting at Route 35 (Lyman) and extending 1-mile to the west (currently identified in the MaineDOT 6-Year Plan).
- Eastbound *either* starting near Down/Clark/Blueberry Lane (Alfred) and extending 1-mile east to near Graves Road (Lyman), as recommended in prior Route 111 study, *or* alternatively starting at Howitt Road (Lyman) and extending 1-mile east to beyond Boulder Lane.

H-5: Longitudinal Rumble Strips

Description	Add center and shoulder rumble strips.
Location	Arundel, Lyman, Alfred, Sanford. Route 111, locations posted 40 mph or higher.
Benefits	Reduces incidence of head-on collisions (center rumble strip) and run off the road crashes or crashes related to over-correction (edge line).
Cost	Low.
Benefit/Cost	Not assessed. Known to be cost effective and assumed to be positive.
Potential Impacts	Increased noise for abutters when vehicles cross center or edge line, which can be minimized by temporarily interrupting rumble strips at intersections and in front of residential properties that are located near the roadway.
Timeframe	Near-term.
Notes	Center rumble strips are a higher priority than shoulder rumble strips, but both in combination have proven most effective. Consider an initial pilot program. Work with residents to finalize design details and monitor effectiveness as well as noise complaints.

The share of head-on crashes on the Route 111/202 corridor is 6 percent, which is the highest rate among major highways within the CYCCS study area. Centerline rumble strips are a low cost improvement that has proven very effective at reducing head-on and opposite direction sideswipe crashes.

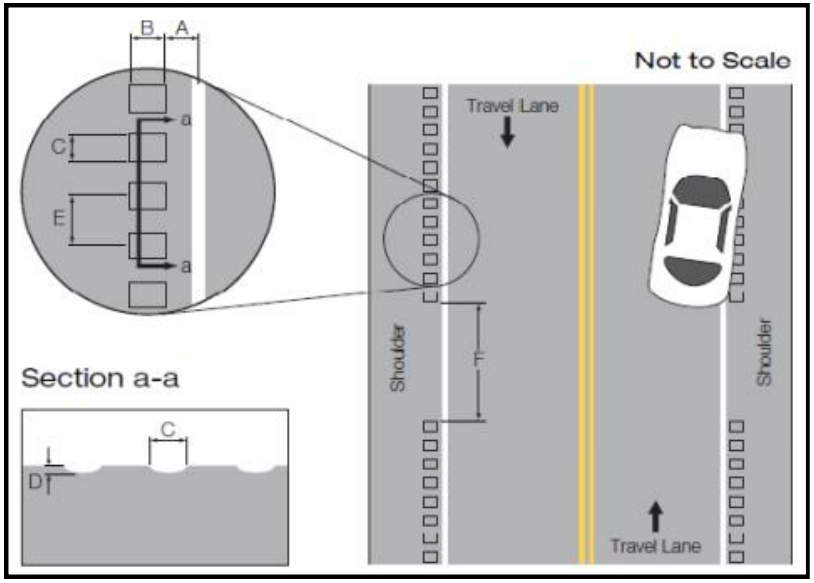
Current FHWA guidance on center line rumble strips (Technical Advisory 5040.40, revision 1) provides guidance on installation details. The FHWA recommends placement on a corridor-wide basis, rather than at selected locations, except for certain design modifications such as breaks for cross streets and driveways. Though initially typically only installed in no passing zones (double yellow lines), the current FHWA guidance notes that the treatment is more effective when continued through passing zones.

Noise to abutters is the primary concern regarding installation of rumble strips. If installed continuously (including in passing zones), the frequency of contact with rumble strips would be higher than if discontinued in passing zones.

Center line rumble strips are recommended for all segments of the Route 111/202 corridor having speed limits of 40 mph or higher, with design provisions to discontinue rumble strips at intersections, driveways or locations where residences closely abut the highway. Given the presence of abutters throughout the corridor, an initial implementation only in no passing zones could be considered and evaluated for effectiveness.

Shoulder rumble strips are effective at reducing run off the road crashes, which constitute 14 percent of crashes on the Route 111/202 corridor. FHWA Technical Advisory 5040.39, revision 1 provides current guidance on implementing shoulder or edge line

rumble strips. Because center line rumble strips will tend to cause vehicles to drive closer to the edge line, placement of shoulder rumble strips to the outside of the edge line is recommended (Figure 3-39). To preserve the shoulder for use by bicyclists, the rumble strip should be placed close to the edge line and periodic breaks should be provided to allow bicyclists to transition from roadway to shoulder riding.



Source: FHWA Technical Advisory 5040.39, revision 1

Figure 3-39: Shoulder Rumble Strip Placement

H-6: Improve Lyman Route 111 U-Turn

Description	Improve left turn lane and lengthen paved shoulder area to better accommodate U-turns.
Location	Lyman. Route 111 (east of Route 35)
Benefits	Reduces potential for crashes compared to existing configuration. Maintains necessary U-turn route for developments on the corridor where left turn egress is prohibited.
Cost	Approximately $50,000 to $100,000 (depending on extent of widening).
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None expected.
Timeframe	Near-term.
Notes	Longer-term, replacing the U-turn route with backage roads or interconnected parking lots is preferable.

An informal U-turn space has been constructed for eastbound traffic that wishes to reverse direction east of Route 35 (Figure 3-40). U-turns are currently prohibited at the intersection itself, and traffic exiting adjacent developments is restricted to right-out exit maneuvers today, necessitating a U-turn opportunity.

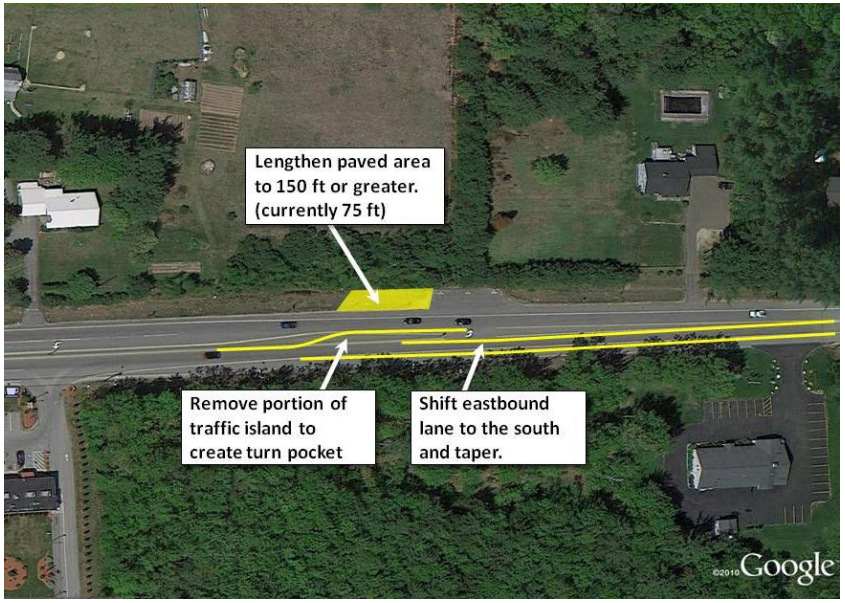
Figure 3-40: Current U-Turn on Route 111 in Lyman

Ideally, backage roads, side streets or interconnected parking lots would provide the necessary additional access to accommodate these movements. Establishment of a local roadway bordering the rear of existing developments and connecting to either Route 35 or Route 111 further from the intersection would provide this access and potentially open other land near the highway to development. The backage road recommendation for this location is specifically called out in the section on *Other Potential Longer-term Route 111/202 Corridor Actions* (page 3-66). Ultimately the responsibility

of the town, this and other access management strategies are also discussed in Chapter 4.

Short of constructing a local backage road to eliminate the need for a U-turn, modification of the existing informal U-turn is recommended. This would involve shifting the eastbound travel lane approximately 4 feet to the south (at the widest point of displacement) to maintain and remove a portion of the existing center island to create space for a standard left turn pocket (see Figure 3-41). The paved receiving area on the north side of the roadway is limited in depth by the highway right-of-way, but could be lengthened to provide more turn around space for vehicles (currently 75 feet, 150 feet or more is recommended). A sign prohibiting trucks from using the U-turn should be included.

The eastbound lane shift could be accommodated without roadway widening by narrowing the shoulder, which currently ranges from approximately 8 to 10 feet in the improvement area. Alternatively, the roadway could be widened by 4 feet to maintain 8 foot minimum shoulders through the improvement area.



Concept Plan Only – Not to Scale

Figure 3-41: Recommended U-Turn Concept

H-7: Improve Route 111 & Kennebunk Pond Road/Day Road Intersection

Description	Improve signing, lane markings at intersection. Install overhead flashing beacon. Restrict access from adjacent property in the intersection zone.
Location	Lyman. Route 111 (Kennebunk Pond/Day Rd intersection)
Benefits	Reduces potential for crashes at current HCL.
Cost	Low to moderate. Up to $65,000 depending on selected treatments.
Benefit/Cost	16.3
Potential Impacts	Reconfigures access to parcel on the northeast corner of the intersection.
Timeframe	Near-term.
Notes	Barrier options could include establishing a landscaped area or other barrier on the abutting property, or a guardrail on public right-of-way. Coordinate with property owner to design and implement. Kennebunk Pond Road is an access route to Lyman Elementary School.

The Route 111 intersection with Kennebunk Pond Road/Day Road in Lyman is a high crash location, with a critical rate factor of 2.62. The intersection is poorly defined today, with an adjacent parking area on the northwest corner (Figure 3-42).

Figure 3-42: Current Kennebunk Pond Intersection with Route 111

Recommended improvements include the following (see Figure 3-43):

- Repaint lane striping and add stop bars on Kennebunk Pond Road and Day Road.
- Relocate the stop sign on Kennebunk Road to a more visible location closer to the roadway and intersection.
- Develop a barrier on the northwest side of the intersection to prevent vehicle access to/from the parking area within the intersection. Two potential options are:
  - Work with property owners to construct a landscaped area or other buffer that would restrict vehicle movements at the intersection and formalize entry points away from the intersection.
  - Install a guardrail within the right-of-way.
- Install an overhead flashing beacon (red for side streets, yellow for Route 111) to improve awareness when approaching the intersection. A lower cost alternative would be installation of "stop ahead" signs on the cross street (MUTCD WB-3) in advance of the intersection, but the flashing beacon is preferred in this location given that the intersection is not easily seen when approaching and is fairly dark at night despite the presence of a single streetlight on the southeast corner.

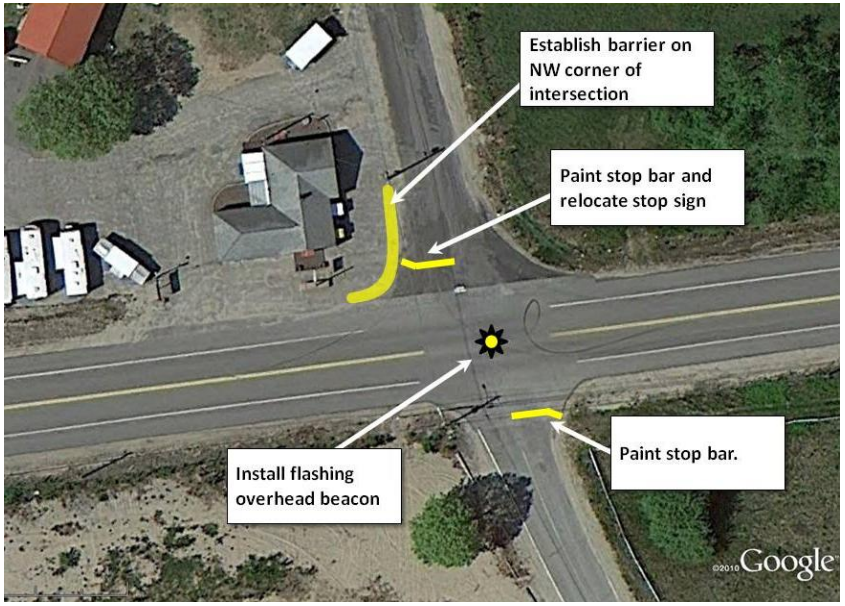


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Figure 3-43: Recommended Kennebunk Pond Intersection Improvements

H-8: Improve Route 111/202 Intersection at Route 4/202

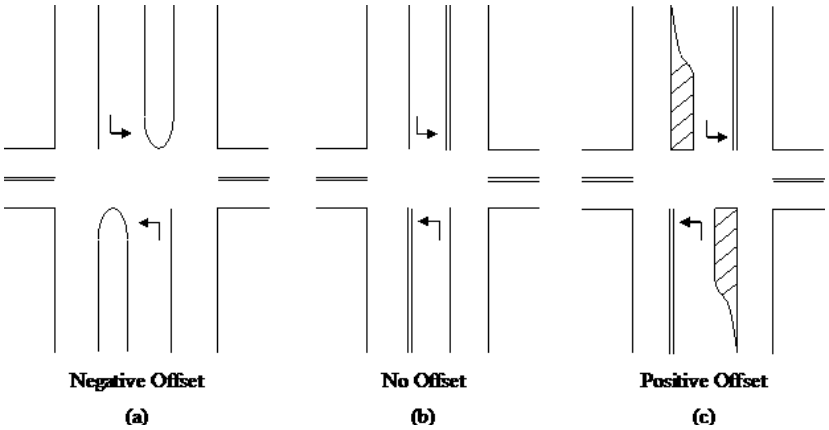
Description	Operational improvements to the Route 4/202 and Route 111/202 intersection. Capacity expansion could be considered over the longer-term should future conditions merit their consideration.
Location	Alfred Route 111/202 intersection with Route 4/202.
Benefits	Congestion reduction. May also have some positive impact on crash rates at current HCL due to congestion reduction.
Cost	Moderate to high, depending on action taken.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	Protected+permissive phasing could potentially increase crash rates, although this is not always the case with that type of phasing. Capacity expansion options would require small sections of additional right-of-way.
Timeframe	Mid-term to long-term
Notes	Recommend first consideration of protected+permissive phasing and/or Adaptive Signal Control, which are lower cost (<$50,000).

The intersection of Routes 4, 111, and 202 in Alfred is a busy crossroads. Traffic analysis of existing conditions indicates that the intersection operates well today, though occasional occurrences of short-duration congestion northbound on Route 4 during the PM peak were observed by the study team. By 2035, several movements are expected to degrade to LOS E conditions during peak periods as travel demand is expected to approach the capacity of the intersection. One factor affecting operations is that northbound and southbound through movements on the Route 4/202 corridor share a lane with left turns. While left turning volumes are relatively low, they do block through movements when waiting for a gap in oncoming traffic.

Several options have been identified for further consideration at this location, as described below. The first two, which are largely operational improvements and do not involve significant expansion of the intersection, could be considered for implementation in the near- to mid-term, whereas the latter two options are more intensive capacity expansion options that could be considered should future conditions warrant.

- Implement protected+permissive left turns on Route 111/202. This option would provide additional opportunities for westbound and eastbound left turns, and with optimization of signal timing could improve all movements to LOS D or better, and overall intersection LOS to C, under projected 2035 conditions. A concern with protected+ permissive phasing is safety. In this case, opposing traffic is confined to a single lane and the posted speed limit is 35 mph, which are favorable conditions for protected+permissive phasing. One concern is sight distance, as traffic in the opposing turn lane can limit the ability to see oncoming traffic. Further engineering study of sight distance and vehicle speeds is recommended prior to

deciding to implement protected+permissive phasing. Minor reconstruction of the intersection to provide positive offset left turn lanes could be implemented if sight distance proves to be insufficient given the current turn lane configuration (Figure 3-44).



Source: FHWA

Figure 3-44: Positive Offset Left Turn Lane (Relative to Other Configurations)

- Upgrade signal controllers to Adaptive Signal Control (ASC). ASC would allow signals to respond instantaneously to variations in traffic levels, potentially responding better to brief periods of heavy traffic which have been observed on northbound Route 4. However, its effectiveness during peak periods may decrease in the future without further improvements as the intersection approaches capacity.
- Add an additional through lane on the east and west legs of the Route 111/202 corridor approaching the intersection. Sufficient right-of-way exists to create a five-lane section in the vicinity of the intersection (two through lanes in each direction and a center left turn lane). The additional capacity would allow some green time to be reallocated to left turn and/or north-south movements. This would improve the intersection to LOS C, and all movements to LOS D or higher. Allocating green time from the east-west movements to other movements would increase the frequency of stops on east-west movements, however.
- Add left turn pockets on the north and south legs of the intersection. Though these are low volume movements, separating left turns from right turns would reduce blocking of the heavier northbound and southbound through movements. Doing so, in conjunction with signal timing optimization, would improve all movements to LOS D or better. The intersection as a whole would continue to operate at LOS D during the PM peak. Neighboring residential developments to the north and the proximity of the Bridge over the Mousam River to the south constrain the ability to widen Route 4, so an alignment study would need to be conducted to determine the viability of adding northbound and southbound turn pockets.

H-9: Rehabilitate and Improve Route 202 between June Street and River Street

Description	Full-depth paving and rehabilitation of highway. Reconstruct and improve pedestrian facilities and streetscaping. Consider relocating utilities underground.
Location	Sanford. Route 202 (June St to River St)
Benefits	Improves condition of road surface and pedestrian facilities. Separates walking surface from roadway. Improves visual character of gateway into downtown.
Cost	High. $1.25 million is a representative cost estimate at this stage of planning. Undergrounding utilities could add up to an additional $500,000, depending on the extent of the installation.
Benefit/Cost	Not assessed; assumed to be positive
Potential Impacts	Construction period impacts to traffic and abutters and potential impacts to historic properties.
Timeframe	Mid-term.
Notes	Ideally conducted in coordination with H-10: Improve Route 202 & River Street Intersection.

This segment of Route 202 is the eastern gateway into Sanford, descending toward the west into downtown (Figure 3-45). The total distance from back-of-sidewalk to back-of-sidewalk (the apparent right-of-way) is approximately 50 feet for the blocks between June Street, North Street and Brook Street. The paved roadway cross section is 40 feet, with on-street parking allowed except in front of Saint Thomas School.

Figure 3-45: Looking West on Route 202 between June Street and River Street

Between Brook Street and River Street, the corridor is particularly constrained. The apparent right-of-way is 40 feet, with two 5-foot sidewalks and two 15-foot lanes (equivalent to two 11-foot lanes with 4-foot shoulders, though a painted edge line is not present). Abutting houses are located close to the roadway, and many are of historical significance.

MaineDOT's current Customer Service Level (CSL) for condition, which factors in pavement condition, ride quality, and roadway strength, is graded "F", or unacceptable for the entire segment. In addition to the road surface condition, sidewalks are in poor condition, lack curbs and sit nearly flush with the roadway paving.

Utility poles are located on the south side of the roadway, within the paved roadway rather than behind a curb. The corridor is an important walking route, providing access to the adjoining residential neighborhoods, Saint Thomas School, Goodall Hospital and nearby Lafayette School. Bicycling is also an important consideration; Route 202 in Sanford has the highest share of bicycle crashes in the study area (3 percent of crashes involved bicyclists).

A full rehabilitation of this segment of the corridor is needed, and the following elements are recommended:

- In general, the existing cross section dimensions are recommended to be retained, with one exception; if overhead utilities are not relocated underground, then widen the south-side sidewalk by one additional foot (6 foot total width) to accommodate utility poles. Other changes to the cross section were considered but deemed too costly and had adverse impacts on abutting residences, as described later.
- Pedestrian accommodations should be improved by reconstructing sidewalks with curbing that provides physical separation from the roadway surface. Curbing would also better channel drainage, though existing storm drainage capabilities will need to be reviewed during the design process to adjust the location of catch basins and drains, and to determine where additional capacity is needed.
- Curb ramps that are compliant with current Americans with Disability Act (ADA) regulations should be constructed at all intersections and crosswalk locations.
- Clarify where on-street parking is allowed through signing and design. Where on-street parking is allowed between Brook Street and June Street, curb extensions (commonly referred to as "bulb outs") are recommended at crosswalk locations to improve pedestrian safety and to act as a traffic calming element to slow vehicles entering town.
- Consideration should be given to relocating the midblock crossing that provides access to Saint Thomas School to the nearby intersection with Lafayette Street.
- Relocation of overhead utilities is recommended given the limited cross section width and gateway characteristics of the corridor. This is especially applicable for the block between River Street and Brook Street, which has a very constrained cross section.

The study considered the possibility of widening the cross section between River Street and Brook Street to provide additional shoulder width, sidewalk width, and potentially introduce the opportunity for landscaping. Doing so would adversely affect abutting properties, however, which are located close to the roadway. Many of these properties are historically significant, and most have walls, walks, stairs and other structures in their front yards that would be impacted if the cross section were increased. Further, the cost to widen the cross section would be substantial, especially given the potential costs associated with mitigating impacts to abutters.

H-10: Improve Route 202 & River Street Intersection

Description	Improve alignment and add left turn lanes on Route 202 at the intersection with River Street.
Location	Sanford. Route 202 (at River St)
Benefits	Eliminates blocking caused by left turning traffic on Route 202 at the River Street intersection. Simplifies traffic movements at the intersection. Reduces potential for crashes by separating left turning traffic and improving alignment. Creates safer, more comfortable pedestrian environment.
Cost	Approximately $870,000 including property acquisition.
Benefit/Cost	1.0
Potential Impacts	Would require 52-foot right-of-way. This would necessitate taking of the property on the northeast corner of the intersection (37 River Street). This building could potentially have characteristics that make it eligible for listing on the National Register of Historic Places. Other minor partial takes of undeveloped parcels (landscaping and/or paved lots) may be necessary too.
Timeframe	Mid-term to long-term.
Notes	Ideally conducted in coordination with reconstruction and streetscape improvements for Route 202 east of River Street (H-9)

The Route 202 intersection with River Street is the second busiest intersection on Route 202 in Sanford, but is physically constrained to a single lane in each direction by adjacent development. The constrained right-of-way also limits pedestrian accommodations, particularly on the north side of the highway where a narrow sidewalk is confined between the highway and the abutting building (Figure 3-46). Route 202 bends at the intersection, which is difficult for traffic traveling westbound to see in advance of the intersection. While not currently a High Crash Location, 10 crashes (including a fatality) have occurred here over the 2008-2010 time period.

Figure 3-46: Route 202 approaching River Street (Looking West)

Recommended improvements are to widen the intersection to create left turn pockets on Route 202, improve intersection alignment, and upgrade sidewalks and crosswalks (Figure 3-47). This would necessitate acquisition and demolition of the building on the northwest corner of the intersection (37 River Street). Constructed during the early 1900's, the building is currently vacant and in disrepair. However, it does maintain some architectural features of distinction, including rusticated concrete block walls (as of May 2013, the building was still standing). MaineDOT and the Maine Historic Preservation Commission would need to make a determination of eligibility for listing on the National Register of Historic places prior to initiating the project. If the property were determined to be eligible for listing, Section 106 and Section 4(f) regulations regarding evaluation, avoidance and minimization of harm to the historic property would apply.

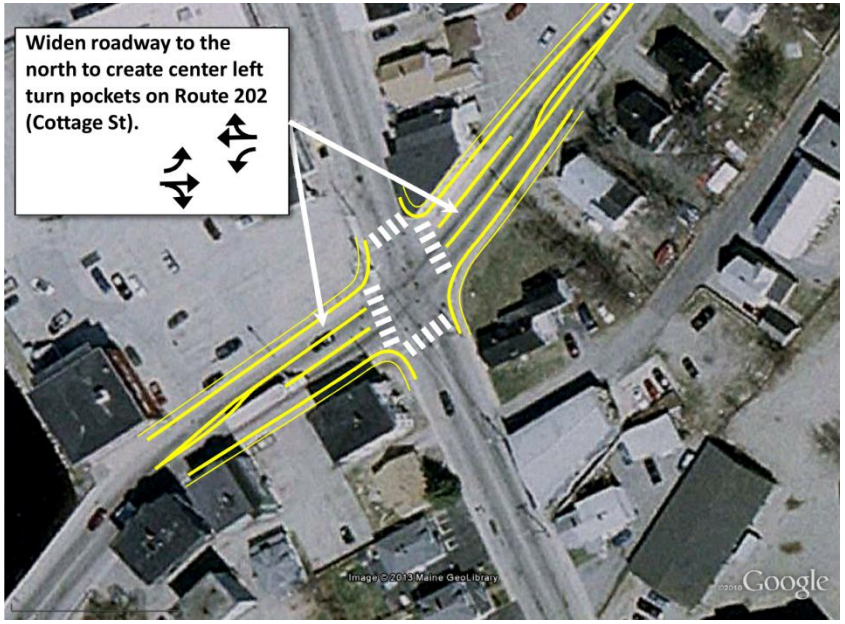


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Figure 3-47: Recommended Intersection Widening to Provide Left Turn Pockets on Route 202 at River Street.

H-11: Improve Route 202 & Route 109 Intersection

Description	Improve alignment and add eastbound left turn lane on Route 202 at the intersection with Route 109. Install center median on Route 109 to prevent left turns from Twombley Rd.
Location	Sanford. Route 202 & Route 109 intersection
Benefits	Reduces congestion and improves LOS. All intersection movements improved to LOS D or better though 2035. Reduces potential for crashes on Route 202 due to separation of left turning traffic. Reduces incidence of collisions on Route 109 near Twombley Road (current high crash location).
Cost	Approximately $710,000, including property acquisition.
Benefit/Cost	3.2
Potential Impacts	Would require acquisition of right-of-way to the south of Route 202. The vacant building at 6 Lebanon Street would need to be demolished. Other partial takes consist of narrow strips of landscaping or paved areas (typically two feet or less). On-street parking (approximately four spaces) on the north side of Route 202 in front of the Sanford Unitarian Universalist Church.
Timeframe	Mid-term to long-term.
Notes	Elimination of the separate short westbound right-turn pocket could be considered during the design process to lessen right-of-way impacts.

The Route 202 intersection with Route 109 is the main crossroads in downtown Sanford (Figure 3-48). The west leg of the intersection on Route 202 is especially constrained by adjacent development. While left turn lanes are provided on all other legs, through traffic and left turns share a lane on eastbound Route 202. As a result, left turning traffic blocks through movements when waiting for opposing traffic before turning. This movement is forecast to degrade to LOS F by 2035. A short right turn pocket is provided in the eastbound direction, but its short length (40 feet) limits its effectiveness. The intersection, as well as the adjacent Route 109 segment and intersection at Twombley Road, are High Crash Locations.

Figure 3-48: Route 202 approaching Route 109 (Looking East)

Recommended improvements are:

- Widen and realign the west leg of Route 202 to improve intersection alignment to add an eastbound left turn pocket.
- Construct a narrow median island on the south leg of the intersection to prevent vehicles from Twombley Road from turning left onto Route 109 (a prohibited movement).
- Provide crosswalks on all sides of the intersection, with ADA compliant curb ramps (Figure 3-49).

Realignment and widening of the west leg of the intersection would require demolition of the former Jerry's Diner building (6 Lebanon Street). This building is currently vacant. It does not appear to have sufficient historical integrity to be considered for eligibility on the National Register of Historic places, though this would need to be verified by MaineDOT and MHPC.

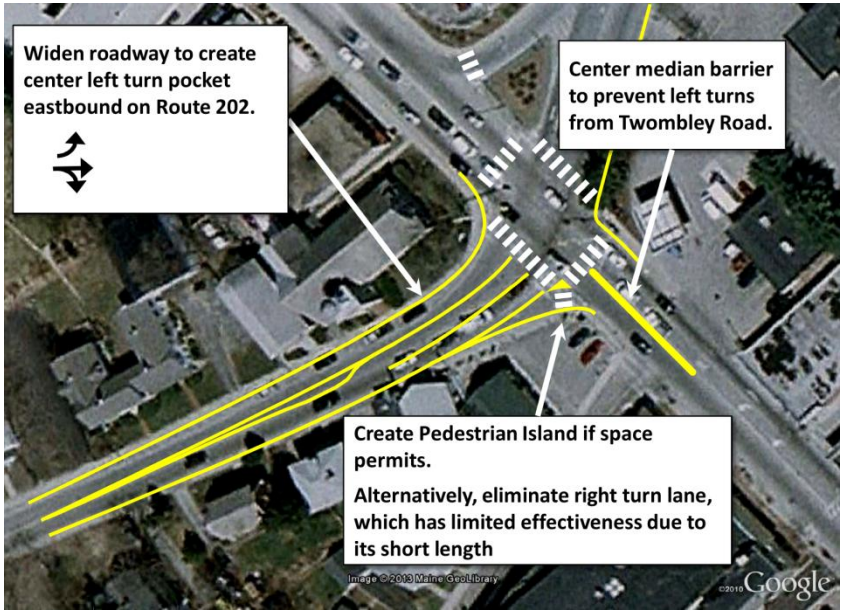

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Figure 3-49: Recommended Intersection Widening to Provide Eastbound Left Turn Pocket on Route 202 at Route 109.

H-12: Corridor-wide Signage Improvements

Description	Inventory and supplement posted speed limit signs. Assess need for "Ice" warning signs.
Location	Biddeford, Arundel, Lyman, Alfred, Sanford. Routes 111 and 202, corridor-wide
Benefits	Improves driver awareness of conditions, potentially improving safety.
Cost	Low.
Benefit/Cost	Not assessed; assumed to be positive
Potential Impacts	No adverse impacts.
Timeframe	Near-term.
Notes	Next step would be MaineDOT inventory and field assessment, followed by placement of signs as appropriate.

Advisory and Steering Committee members noted that speed limits vary on the Route 111/202 corridor, and depending on where one enters the corridor, the applicable speed limit is not always identified (posted). Committee members also noted that some sections of roadway are prone to icing. The bridge near the Biddeford Park-and-Ride was one example noted.

In response, the CYCCS recommends that MaineDOT inventory speed limit signs along the corridor, and supplement as necessary so that signs are present at (1) all locations where speed limits change, and (2) following junctions with arterial or collector roads that provide access to the corridor.

Also recommended is a field assessment of potentially icy locations during a time when conditions are favorable for ice formation on the highway. Potential icy locations include bridges, low areas, hills and shaded curved segments. As necessary, such locations should be identified through placement of MUTDC W8-5 with W8-5aP ("Ice") signs (Figure 3-50).

Figure 3-50: MUTCD W8-5 with W8-5aP

Other Potential Longer-term Route 111/202 Corridor Actions

These approaches demonstrated merit and sufficient feasibility for further consideration, but the projected benefits did not warrant implementation for the given timeframe. They are documented here to serve as a basis for future consideration should conditions change in ways that make their applicability warranted.

Biddeford Route 111 to Exit 32 Interchange Connector

As described earlier, options for expanding the capacity of Route 111 in the Biddeford Crossing to Exit 32 area are limited. The study team therefore looked to the potential for creating new road segments in the interchange area to reduce the amount of traffic on the Route 111 corridor itself, particularly at the intersection with Exit 32/Precourt Street. Expansion of the local street grid, described later under *Recommended Local Jurisdiction Actions (page 3-89)*, is one approach to reduce the concentration of traffic on highway corridors and provide redundant routing options.

Two options were identified for expanding the Exit 32 interchange and constructing a short bypass roadway north of Route 111 connecting directly to the interchange. This would allow traffic destined for Sanford, Alfred, Lyman and other points west of I-95 to avoid the Route 111/Precourt intersection. The *Partial Exit 32 Connection* option would involve construction of the new bypass roadway north of Route 111 in the Biddeford Crossing area, which would have only a connection from the southbound off-ramp at the Exit 32 interchange (Figure 3-51). A second option – *Full Exit 32 Connection* – would reconfigure the interchange to include access from the new connecting highway to the southbound on-ramp and northbound on-ramp as well (Figure 3-52). This second option may not be feasible unless MTA toll collection systems evolve to not require toll booths at ramps (e.g. – all electronic tolling or mainline only tolling). The options could potentially be phased (partially implemented initially, and the full connection at a later time).

Figure 3-51: Partial Exit 32 Connection (southbound off only)

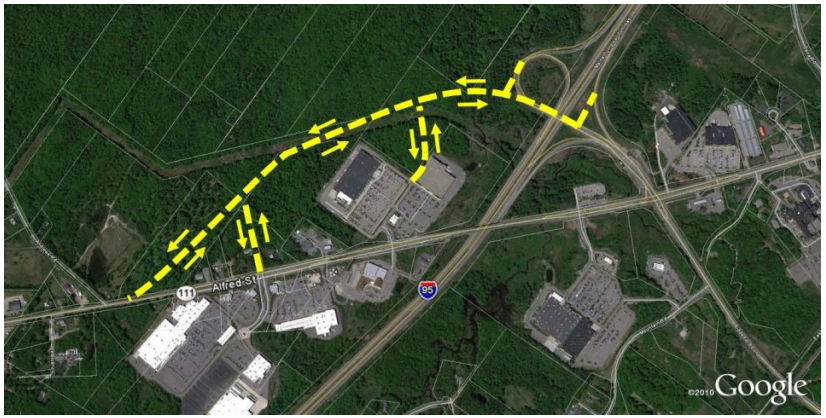

Figure 3-52: Full Exit 32 Connection (southbound off, northbound and southbound on)

The Partial Exit 32 option would primarily divert right-turns from Exit 32 onto westbound Route 111 to the new route. This movement is not a key driver of congestion today, but reducing the volume of traffic making the right turn would allow the Exit 32 leg of the intersection to be restriped to include two dedicated left turn lanes, two through lanes, and a single right turn lane. An estimated 14 percent of daily traffic on Route 111 in the Biddeford Crossing area would shift to the new connecting route. This configuration would reduce overall delay at the Route 111 & Exit 32/Precourt St intersection by about 12 percent during the PM peak period, and allow signal timing to be adjusted to preserve LOS D or better operations for all movements under projected year-2035 demand. Only minor reductions in delay at other times of the day (including the AM peak) are expected.

Under the Full Exit 32 Connection, as much as 28 percent of daily traffic on Route 111 would shift to the new connecting route. Delay at the Route 111 & Exit 32/Precourt Street intersection would decrease by 28 percent and 24 percent during the AM and PM peak periods, respectively. All intersection movements would operate at LOS D throughout the day under projected year-2035 demand.

While effective at reducing congestion, the cost of these improvements is estimated at approximately $8.8 million for the Partial Exit 32 Connector and $10.5 million for the Full Exit 32 Connector, resulting in benefit-cost ratios of 0.4 and 0.7, respectively. As a result, they are not recommended at this time. Instead, approaches to better manage traffic flow on the corridor, as proposed by recommendations H-1 and H-2 should be implemented first. Should traffic conditions worsen beyond projected conditions, the Full Exit 32 Connector could become a more viable strategy.

Reconstruct Route 202 near Goodall Hospital

The existing crest on Route 202 at the “emergency vehicles only” entrance to the Sanford Hospital impacts sight distance for westbound vehicles turning into or exiting the hospital. This is compounded by the lack of a left turn pocket, which means turning traffic must slow or come to a stop in the through travel lane. Reconstruction of the roadway to create a left turn pocket and minor regrading of the vertical profile to improve sight distance and separate turning traffic would address these issues.

MaineDOT has considered improvements at this intersection previously, but they were not implemented due to the high costs associated with regrading the roadway profile. Benefit-cost assessment conducted for this study also did not demonstrate benefits sufficient to justify expected costs, largely because the location has historically had a low rate of crashes and regarding work would be expensive (cost of improvement is estimated at $650,000 or higher, depending on the extent of the vertical profile regarding).

While not justified on a stand-alone basis, some degree of improvement of the intersection is recommended for consideration during the next major overhaul of this section of highway. Widening the roadway to provide a left turn lane (or bypass lane) in the westbound direction would separate turning traffic from through traffic, and should be considered even if major vertical re-profiling is not part of the rehabilitation effort. Widening should occur on the

south (hospital) side to the extent possible to limit the need for ledge removal on the north side of the roadway.

Monitor and Improve Route 111/Limerick Road Intersection

Limerick Road intersects Route 111 at a "T intersection", with a stop sign controlling traffic movements from Limerick Road. Long queues were observed on Limerick Road caused by left turning traffic waiting for gaps in cross traffic sufficient to turn left onto Route 111 during the PM peak. Observed queuing is consistent with LOS E/F conditions for the stopped movement (Limerick Road traffic).

Route 111 is posted at 50 mph at this location, so the potential for severe crashes is of some concern. However, only one crash has occurred at the intersection from 2008-2010, resulting in a critical rate factor of 0.24, which is well below the expected rate for roadways of similar classification, urban/rural setting, and traffic volumes.

Given that Limerick Road is not heavily traveled (1,720 AADT in 2010), and has exhibited low crash rates in recent years, improvements are not a high priority at this time. Conditions at the intersection could deteriorate if traffic volumes increase, however. In particular, traffic growth on Route 111 will reduce the frequency of acceptable gaps for traffic attempting to turn left onto the highway.

The CYCCS recommends that MaineDOT monitor this location periodically and consider improvements should traffic conditions worsen or the occurrence of crashes increase. Installation of a traffic signal is not a preferred option due to the high posted speed limit (50 mph) on Route 111 and distance from other signalized intersections. As such, a new traffic signal would interrupt the flow of traffic on Route 111 and could potentially increase crash rates. Instead, other options that could be considered include:

- A rural high speed roundabout
- Alternative intersection designs:
  - Divided highway with a center acceleration lane to accept left turns
  - Restricted Crossing U-turn
  - Continuous Green T-intersection

Route 109 Corridor Recommendations

Recommendations for the Route 109 intersection with Route 202 were described previously (Recommendation H-11). Other Route 109 Recommendations are described below.

Recommendations for the Route 109 corridor are summarized in Table 3-13 and Figure 3-53.

Table 3-13: Route 109 Corridor Recommendations

Recommendation		Estimated Cost	Benefit/Cost Ratio (BCR) Assessment	Priority
H-13	Expand the Route 109 & Exit 19 Intersection	$710,000	1.6	Medium
H-14	Traffic Signal Upgrade – Route 109 & Exit 19 Intersection	<$50,000	Assumed to be positive	Medium
H-15	Improve Route 109 & Route 9 Intersection	$300,000	4.8	Medium
H-16	Traffic Signal Upgrades –Route 109 in Sanford	$30,000 – $60,000	Assumed to be positive	High

MaineDOT recently completed a program of upgrades to the Route 109 corridor in Wells that rehabilitated the roadway and added paved shoulders (six to eight feet wide), while also improving the intersection of Route 109 at Route 9A. No additional projects are listed in the *Biennial Capital Work Plan (FY 2012-2013)* or *Multimodal Six-Year Transportation Capital Plan (2010-2015)*.

Recommendations presented in the *Recommended Local Jurisdiction Actions* section toward the end of this chapter (page 3-3-89) regarding development of the local street grid would also benefit the Route 109 corridor, particularly in Sanford, as would access management and transit improvements described in other chapters.

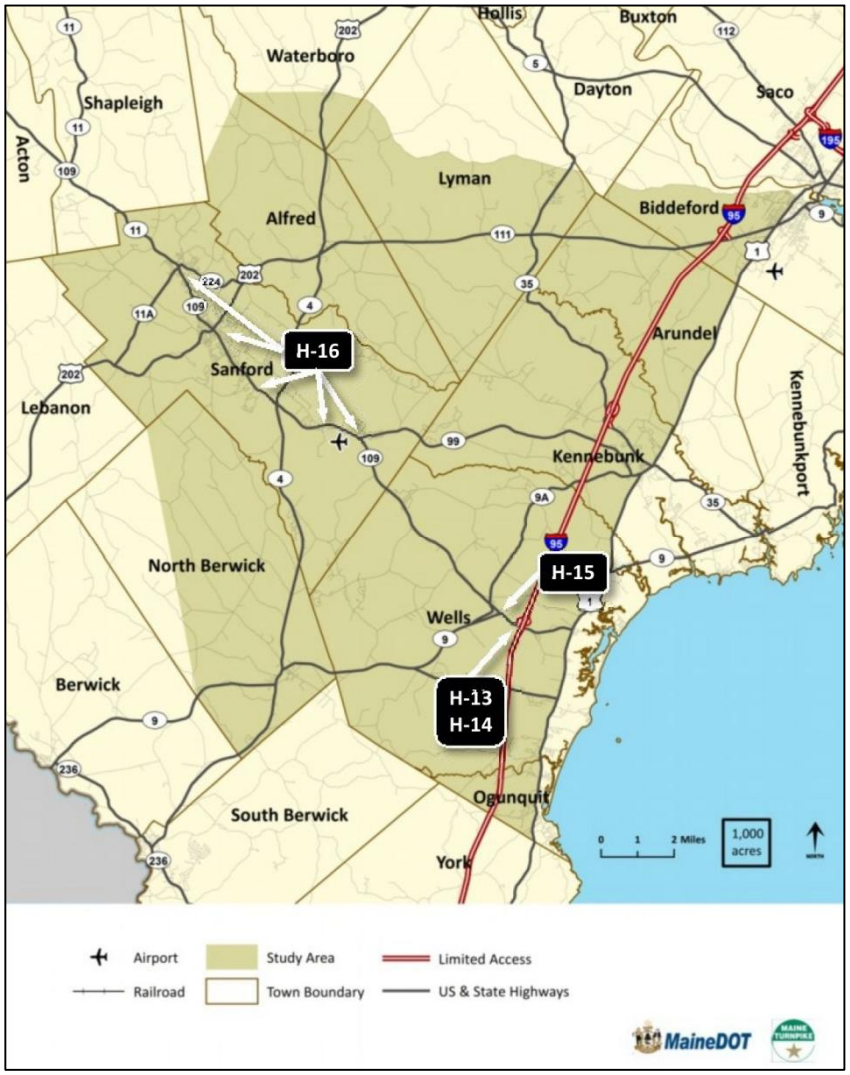

Figure 3-53: Location Map for Route 109 Corridor Recommendations

H-13: Expand the Route 109 & Exit 19 Intersection

Description	Add a second left turn lane from Exit 19 to westbound Route 109. Extend the second westbound lane on Route 109 beyond the Maine Turnpike overpass.
Location	Wells. Route 109 at the Exit 19 interchange/Wells Transportation Center intersection.
Benefits	Reduces congestion and queuing on the exit ramp. Overall intersection LOS improved from LOS D to LOS C. Eliminates projected LOS E and LOS F movements in 2035. Allows some green time to be reallocated to the left turn from Route 109 to the Exit 19 toll booth.
Cost	Approximately $710,000
Benefit/Cost	1.6
Potential Impacts	No adverse impacts other than a minor increase in impervious areas.
Timeframe	Mid-term.
Notes	Consider in conjunction with H-14.

Left turning movements onto and from Exit 19 are problematic at times today, and are expected to degrade to LOS F during peak periods by 2035. The proximity of the toll plaza to the intersection makes the prospect of creating a dual left turn lane from Route 109 to Exit 19 impractical. A second left turn lane for traffic exiting from the Maine Turnpike could be created by widening the roadway by approximately eight to ten feet (Figure 3-54). The adjacent parking area would need to be widened by a corresponding amount as well. Route 109 already has two lanes to receive traffic from the dual left turn lanes, but these should ideally be extended beyond the Maine Turnpike overpass to give traffic ample distance to merge into a single lane. Sufficient room exists to widen Route 109 under the overpass.

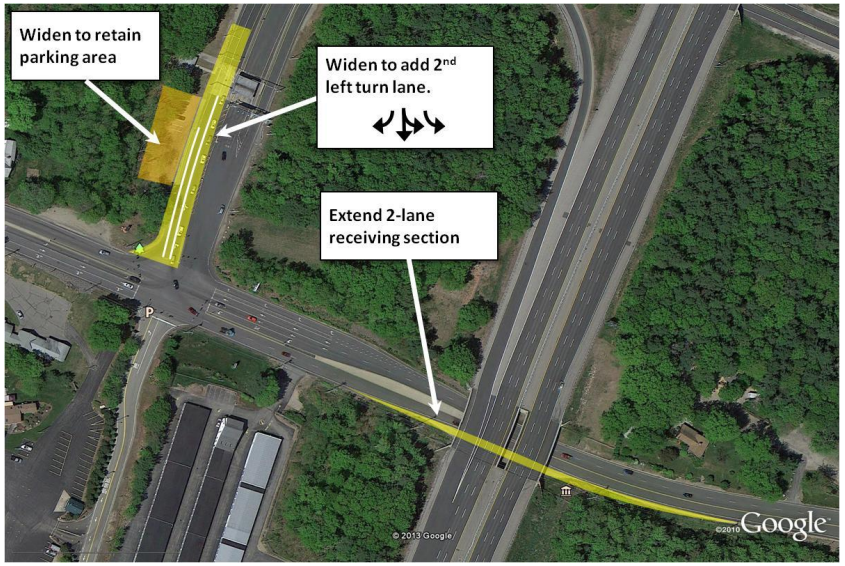

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Figure 3-54: Recommended Route 109 & Exit 19 Improvements

H-14: Traffic Signal Upgrade –Route 109 & Exit 19

Description	Near- to Mid-term: Upgrade signal controllers and detection to implement Adaptive Signal Control (ASC). On-going: Regular retiming of traffic signals if ASC is not implemented.
Location	Wells. Route 109 at the Exit 19 interchange/Wells Transportation Center intersection.
Benefits	Maximizes operating efficiency, reduces travel delay/congestion, and responds to changing traffic conditions (including seasonal variability). Some ASC systems can also positively affect intersection safety by extending green time to avoid changing from green to yellow while a vehicle is entering the intersection.
Cost	Less than $50,000, especially if implemented jointly with H-13.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None expected.
Timeframe	Mid-term.
Notes	Ideally implemented in conjunction with H-13.

Adaptive Signal Control (ASC), described previously for recommendation H-1 in the Route 111/202 corridor, could also be applied to the Route 109 intersection with Exit 19. In this case, the primary advantage of ASC is that it could respond in real-time to changing traffic conditions throughout the day, as well as to accommodate fluctuation in traffic from day to day and seasonally. As a key access point to coastal areas, Exit 19 experiences considerable variation in demand. The ASC controller could potentially also be programmed to recognize and give some degree of priority to buses entering and departing from the Wells Transportation Center. Because it is not coordinated with other signals, the ASC system would have great flexibility to adjust cycle length and phase timing to adjust to current traffic conditions.

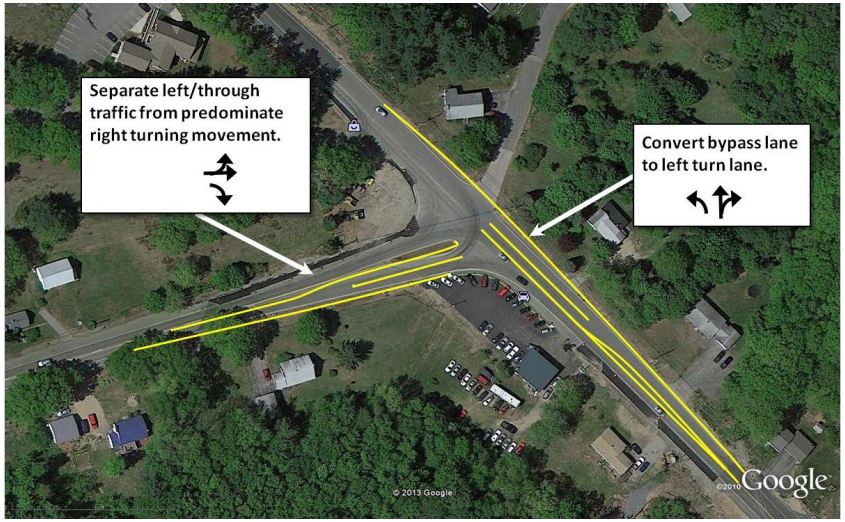
Upgrading to ASC would likely require additional video and loop traffic detection, upgrading traffic signal controllers and software, and developing and testing signal timing parameters.

Short of upgrading to an ASC system, current signal timing plans should be evaluated regularly (every 3 to 5 years is recommended, depending on traffic growth). This process involves field inventory of equipment and road geometry, collecting new traffic counts at all intersections in the coordinated system, analyzing traffic signal timing plans, and modifying signal timing. This process would not need to be conducted with most ASC systems, since they monitor and respond to traffic conditions in real-time.

H-15: Improve Route 109 & Route 9 Intersection

Description	Construct separate left/through and right turn lanes on eastbound Route 9. Convert existing bypass lane to left turn lane on westbound Route 109.
Location	Wells. Route 109 at Route 9 intersection.
Benefits	Improves safety by separating turning traffic from through traffic. Reduces blocking of the predominate eastbound right turn movement by left turning traffic.
Cost	Approximately $300,000.
Benefit/Cost	4.8
Potential Impacts	None expected.
Timeframe	Mid-term.
Notes	—

The intersection of Route 109 and Route 9 is a High Crash Location, with a CRF of 1.04. Eastbound traffic on Route 109 predominately turns right at the intersection with Route 109. While the paved lane width is wide enough to allow right turning vehicles to bypass queued left turning vehicles, the roadway actually consists of a wide, single lane. To better accommodate these turning movements, the CYCCS recommends formalizing separate left/through and right turn lanes. This could be accomplished by reducing the width of the center median island on Route 9 and selectively widening within the existing right-of-way for approximately 400 feet west of the Route 109 intersection (Figure 3-55).



Concept Plan Only – Not to Scale

Figure 3-55: Recommended Route 109 & Exit 19 Improvements

On Route 109, nearly 50 percent of westbound Route 109 traffic turns left onto Route 9 during the AM peak, while nearly 40 percent turns left onto Route 9 during the PM peak. A bypass lane is provided on westbound Route 109, allowing through traffic to pass left turning traffic. Given the very high proportion of left turning traffic, current HCL status, and high volume of traffic on this segment, conversion from the bypass lane configuration on northbound Route 109 to a dedicated left turn lane and separate through lane is recommended. While the bypass lane provides most of the width required, selective additional widening within the right-of-way would be needed to establish appropriate taper and storage length for left turning vehicles.

H-16: Traffic Signal Upgrades –Route 109 in Sanford

Description	Improvements to traffic signal detection, controller and interconnect, to be defined and prioritized through a Systems Engineering process.
Location	Sanford. Signalized intersections on Route 109.
Benefits	Maximizes operating efficiency, reduces travel delay/congestion, and responds to changing traffic conditions (including seasonal variability). Some ASC systems can also positively affect intersection safety by extending green time to avoid changing from green to yellow while a vehicle is entering the intersection.
Cost	Costs depend on system components. Upgrade costs commonly range from $30,000 to $60,000 per intersection, but can vary considerably.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None expected.
Timeframe	Near- to Mid-term.
Notes	Completion of a Systems Engineering process recommended to identify, design and procure preferred ITS solutions.

In many cases, implementing Intelligent Transportation Technologies (ITS), such as Adaptive Signal Control (ASC) is a cost effective, low impact way of improving system performance and safety. The FHWA, through its *Everyday Counts* program, is encouraging agencies to adapt innovative technologies – and ASC specifically – to improve system performance and increase the efficiency of the existing transportation network.

Nine intersections on Route 109 in Sanford are controlled by traffic signals. A detailed traffic engineering study will be required to select and design specific improvements that should be implemented.

Systems Engineering is a process defined by the FHWA that provides a structured approach to evaluating, selecting and procuring ITS technologies. A Systems Engineering process is required for ITS projects with federal funding, and is recommended to select and advance improvements to traffic signals on the Route 109 corridor.

Potential ITS improvements for Route 109 intersections in Sanford are summarized in Table 3-14. These options serve as a starting point for more detailed study and consideration of needs following the Systems Engineering process, beginning with development of a *Concept of Operations Plan*. The FHWA's *Model Systems Engineering Documents for Adaptive Signal Control Technology (ASCT) Systems* (May 2012) provides detailed information on utilizing a Systems Engineering process to implement ITS improvements.

Table 3-14: Route 109 Traffic Signal Upgrade Priorities – Sanford

Intersection	Priority	Options
Rte 11A/ Rte 224	Medium	• Consider protected + permitted phasing • Consider signalizing right turns • Evaluate ASC
Rte 202	High	• Interconnect with Washington St • Evaluate ASC
Washington St	High	• Interconnect with Route 202 • Evaluate ASC
Emery St	Low	• Evaluate ASC
Marden's Plaza (Old Mill Rd)	High	• Relocate signal • Interconnect with Westfield and Center for Shopping • Evaluate ASC
Westview Dr	Medium	• Interconnect with Westfield and Center for Shopping • Evaluate ASC
Center for Shopping	Medium	• Interconnect with Westfield and Center for Shopping • Evaluate ASC
Jagger Mill	Medium	• Evaluate ASC
Wal-Mart	Low	• Evaluate ASC

The Systems Engineering process to develop ITS improvements should consider all signalized intersections in Sanford to ensure compatibility of ITS architectures moving forward. However, system-wide implementation of improvements is unlikely (and may not be warranted); rather, discrete projects that address higher priority locations are expected. The CYCCS has initially identified priorities as follows:

- High priority: Key intersection(s) with identified congestion or safety issues. Initiation of detailed engineering evaluation is recommended in the near-term.
- Medium priority: These are locations with less critical needs, but where ITS enhancements nonetheless could improve traffic conditions.
- Low priority: Intersections that currently operate well, but could potentially realize some modest benefits from ITS improvements. Improvements at these locations are only recommended for consideration after other, higher priority locations have been addressed, unless conditions change markedly from those experienced today.

Other Potential Longer-term Route 109 Corridor Actions

LOS analysis and review of crash records do not indicate a pressing need for improvements to the rural section of Route 109 between Route 99 in Sanford and Route 9A in Wells. This is especially the case given the recent improvements to the corridor, which established paved shoulders and improved sight distance in those areas that were in greatest need of improvement.

In Sanford's downtown core, recommendations regarding long-term planning for the ultimate build out of the corridor are described under *Local Jurisdiction Led Actions* later in this chapter (page 3-89).

Construct passing lanes on Route 109

LOS and crash analyses do not demonstrate a need for passing lanes on Route 109. Despite this, benefit-cost analysis demonstrated cost effectiveness of constructing passing lanes on the corridor (1.4 benefit-cost ratio). Passing lanes may be an effective way to address future crash or travel reliability problems, should they develop. Given current and projected traffic volumes on Route 109, passing lanes approximately 0.75 mile long are recommended. Passing lane placement is complicated by intersections and driveways on the Route 109 corridor, but two segments were identified as being potentially feasible:

- Northbound starting near Route 9A and extending approximately 0.75 mile
- Southbound starting near Route 99 and extending approximately 0.75 mile

The segment between Meetinghouse Road and Bragdon Road is another option for a shorter (0.5 mile) southbound passing lane (benefit-to-cost ratio of <1.0).

Longitudinal Rumble Strips

Given relatively low crash rates along the rural portions of the Route 109 corridor and the recent improvements that established paved shoulders throughout the corridor, neither center line nor shoulder rumble strips are recommended at this time.

Should arterial application of longitudinal rumble strips prove successful elsewhere, such as on the Route 111/202 corridor, and future crash conditions demonstrate a need to reduce head-on or run off the road crashes, application of longitudinal rumble strips could be considered. More heavily populated areas such as Highpine are not well suited for this application, however.

Route 4/Route 202 Corridor Recommendations

The Route 4 corridor is, in many regards, the best performing highway corridor in the CYCCS study area. No traffic operation issues of note were identified, and crash rates are among the lowest in the study area. Access management recommendations described in Chapter 4 are applicable to the corridor, and would help preserve performance and safety over the long term.

The only specific corridor recommendation is to continue to monitor crash occurrences at the Route 4 intersection at School Street/Gavel Road and implement further improvements if necessary (Table 3-15, Figure 3-56).

Route 4 is tied in with the Route 202 corridor to New Hampshire, which will be studied independently. Interim recommendations for Route 202 west of Sanford were presented earlier is this chapter (page 3-26).

Table 3-15: Route 4 Corridor Recommendations

Recommendation		Estimated Cost	Benefit/Cost Ratio (BCR) Assessment	Priority
H-17	Monitor and Improve School Street/Gavel Road Intersection	>$50,000	Assumed to be positive	High

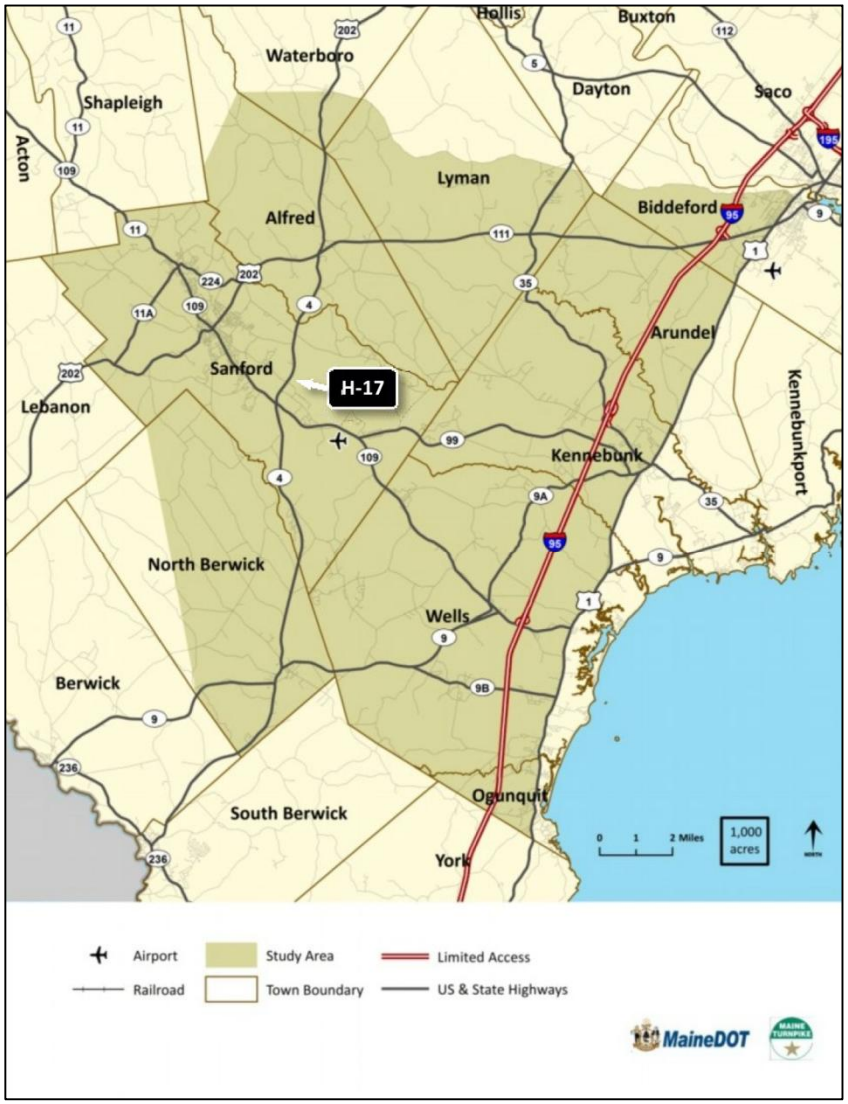


Figure 3-56: Location Map for Route 4 Corridor Recommendations

H-17: Monitor and Improve School Street/Gavel Road Intersection

Benefits	Improve reliability of the current system. Clear vegetation and minor slope flattening to improve sight distance.
Cost	Depends on need for further improvements. Could be substantial if crashes remain a problem.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None.
Timeframe	Near-term.
Notes	Continue to monitor crash rates and reevaluate need for more substantial reconstruction.

Sight distance is limited by a crest vertical curve and side embankments at the Route 4 intersection with School Street/Gavel Road. In 2011, MaineDOT installed an automated vehicle detection system that activates to warn vehicles stopped on either School Street or Gavel Road when traffic on Route 4 is approaching the intersection. The system relies on loop detectors on the side streets and additional detection on the mainline to determine when to display the warning.

The intersection is listed on the current HCL list, but the analysis period primarily covers time prior to implementation of the warning system.

Should ongoing monitoring indicate that crashes remain a problem at this location, further improvements may be warranted. Options to be considered include (listed in increasing magnitude of potential costs):

- Expand the coverage of loop detectors on School Street and Gavel Road to ensure that vehicles still activate the system even if they stop in front of, or to the side of, the current loop detectors.
- If left turning crashes from Route 4 occur at higher than expected frequency, a left turn lane on Route 4 could be considered.
- Regrade the side embankments to improve the sight distance triangle for vehicles entering Route 4 from either School Street or Gavel Road. This would necessitate reconfiguring the driveway to the northwest of the intersection.
- If safety or volume warrants are met, a traffic signal could be installed. Sight distance studies would be needed to confirm that the signal would be visible from both approaches of Route 4.
- Undertake major reconstruction of Route 4 to reduce the vertical crest curve.

Other Potential Longer-term Route 4 Corridor Actions

Construct passing lanes on Route 4

As with Route 109, LOS and crash analyses do not demonstrate a need for passing lanes on Route 4. Despite this, benefit-cost analysis demonstrated cost effectiveness of constructing passing lanes on the corridor (2.0 northbound, 1.8 southbound benefit-cost ratio). Passing lanes may be an effective way to address future crash or travel reliability problems, should they develop. Given current and projected traffic volumes on Route 4, passing lanes approximately 0.75 mile long are recommended. Passing lane placement is complicated by intersections, driveways and the signalized intersection at Grammar Road. Two segments were identified as being potentially feasible passing lane locations:

- Northbound starting north of School Street and extending approximately 0.75 mile (benefit-to-cost ratio of 1.0).
- Southbound starting south of Route 111/202 and extending approximately 0.75 mile (benefit-to-cost ratio of 1.0).

Longitudinal Rumble Strips

Given low crash rates along the Route 4 corridor, neither center line nor shoulder rumble strips are recommended at this time. Should arterial application of longitudinal rumble strips prove successful elsewhere, such as on the Route 111/202 corridor, and future crash conditions demonstrate a need to reduce head-on or run off the road crashes, application of longitudinal rumble strips could be considered.

Other CYCCS Highway Recommendations

This section details highway recommendations that are either regional in nature, or pertain to corridors other than Route 4, Route 109, Route 111 and Route 202 (Table 3-16, Figure 3-57).

Table 3-16: Other Highway Corridor Recommendations

Recommendation		Estimated Cost	Benefit/Cost Ratio (BCR) Assessment	Priority
H-18	Detailed Study of New Rte 99 to Rte 35 Connection	$7.6 – $7.9 million	1.8	Low
H-19	Pave Shoulders on Route 224	$310,000 – $670,000	1.4 – 2.3	High
H-20	Pave Shoulders on Route 35	$780,000	1.4	Low
H-21	Pave Shoulders on Route 99	$2.2 – $5.6 million	0.6 – 1.1	Medium
H-22	Eliminate "Y" Intersections	>$250,000	Assumed to be positive	Low
H-23	Pedestrian and Streetscape Improvements in Villages/Towns	>$50,000	Assumed to be positive	Medium

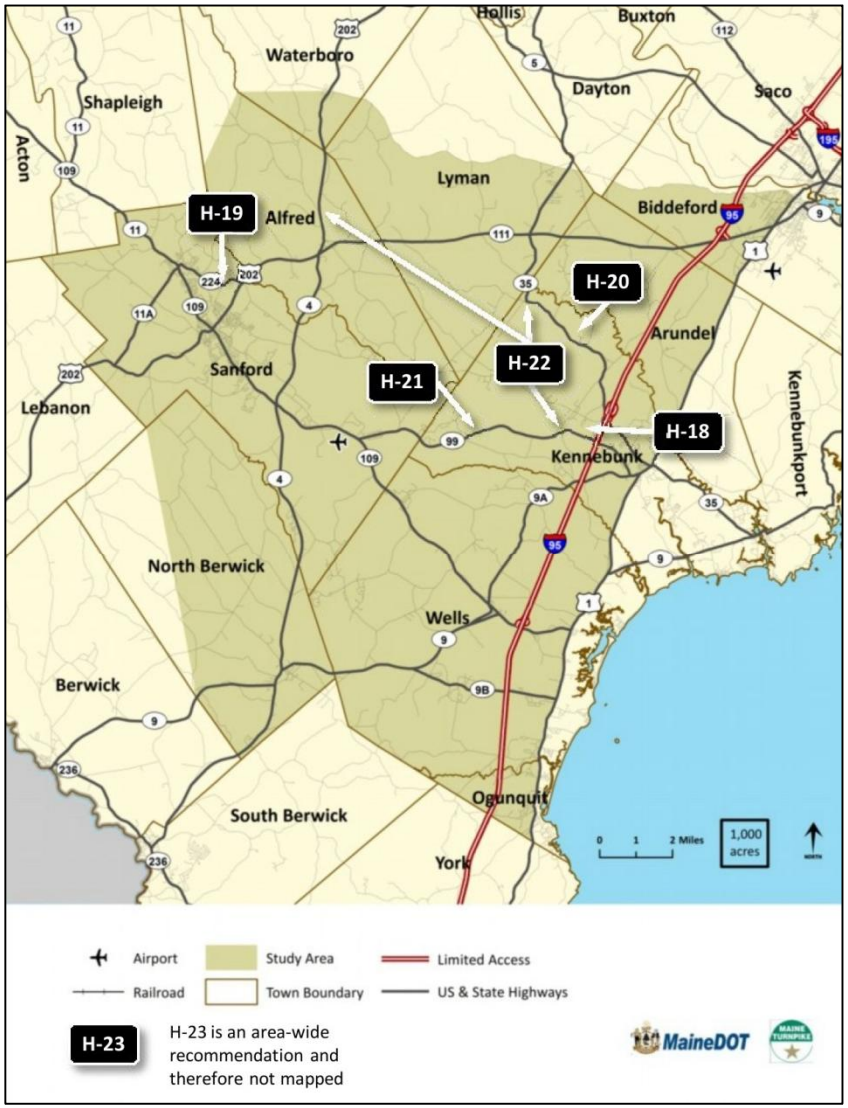


Figure 3-57: Location Map for Highway Other Corridor Recommendations

H-18: Detailed Study of New Connection between Route 99 and Route 35

Benefits	Improves access between South Sanford and the Maine Turnpike. Creates a more direct connection between Rte 99, Rte 35, and Maine Turnpike Exit 25. Reduces traffic through West Kennebunk. Reduces traffic on Route 1 in downtown Kennebunk. Additional river crossing improves local circulation in Kennebunk.
Cost	Construction cost estimated at $7.6M to $7.9M.
Benefit/Cost	1.8
Potential Impacts	Option 1 would require reconfiguration of the access and parking area at Corning. Option 2 passes adjacent to a recreational field. Both options would introduce a new river crossing and pass through undeveloped habitat areas. The improved route would attract an additional 1,100 daily trips from the Sanford area.
Timeframe	Long-term.
Notes	More detailed study and community engagement needed to advance this project.

The CYCCS considered a new corridor connecting Route 99 in Kennebunk with Route 35 in the vicinity of Exit 25 on the Maine Turnpike (Figure 3-58). Two potential alignments were identified:

- Option 1 intersects Route 35 at the current Alewive Rd/Alfred Road intersection and crosses the Mousam River just north of the I-95 bridge. Note that this option is physically constrained due to limited width between the Corning property and Maine Turnpike.
- Option 2 extends Alewive Park Rd to Alfred Road, and continues across the Mousam River to Route 99.

Figure 3-58: New Route Connecting Route 99 and Route 35

The intent of this strategy is to provide a more direct linkage between these two state highways, and in doing so improve the functionality of this route in terms of connecting South Sanford to the Maine Turnpike. Today, this connection is made indirectly by way of Mill Street, which is a local roadway, and Alfred Road, a collector. Both travel through residential areas in the village center of West Kennebunk.

The proposed connector would more directly link Route 99 to Route 35 while avoiding the most populated areas of West Kennebunk. While the Route 111/202 corridor would remain the primary connection to the Maine Turnpike for most trips between the Sanford area and points east, this improved route created by this strategy would be competitive for trips from South Sanford.

Travel forecast modeling comparing projected year-2035 conditions with and without the new connecting roadway estimated that the new road segment would carry 9,200 daily trips. Most of these are trips that would divert from the current Route 99 – Route 35 connecting route – Alfred Road/Mill St (about 4,500) – or from Main Street in downtown Kennebunk (3,600). An estimated 1,100 additionally daily trips are attracted from the Sanford area.

Benefits of the new connection would include:

- Increased utility of the Route 99 corridor as an access route between South Sanford and the Maine Turnpike, increasing accessibility to the area.
- Reduced traffic on Mill Street and Alfred Road in West Kennebunk.
- An additional crossing of the Mousam River in Kennebunk, reducing out of direction travel and decreasing dependence on Main Street.

Potential Impacts include:

- Increased traffic on Route 99.
- Need for a new traffic signal on Alfred Road (Option 2), or modification of an existing signal (Option 1).
- Property acquisition and need to reconfigure the Corning plant parking lot (Option 1).
- Increased maintenance costs over the long term if both the new route and the current Mill Street bridge are retained (alternatively, Mill Street bridge could be closed at the end of its useful lifespan).
- New roadway corridor crossing the Mousam River.
- New roadway would be adjacent to a recreational field west of Alfred Road (Option 2).

Benefit-cost analysis indicates that travel benefits would outweigh construction and recurring maintenance costs (benefit-cost ratio of 1.8). Travel benefits are in part a result of travel time reductions for trips between Sanford and the Maine Turnpike, as well as for trips diverted from Main Street in downtown Kennebunk. However, the majority of projected travel benefits are associated with longer-term changes in travel patterns; that is, people making different trip choices in the future.

Benefits of the project would be shared by travelers in both Sanford and Kennebunk, though potential impacts would largely occur in Kennebunk. Further public discussion of these trade-offs and detailed investigation of environmental, design and traffic conditions would be necessary before the project could advance. A logical trigger for consideration of the project may be the long term viability of the existing Mill Street bridge. Eventually, this bridge will require costly maintenance or reconstruction. The existing bridge is in fair condition, with an expected rehabilitation cost of approximately $1.5 million. Prior to this occurring, a decision should be made as to whether to instead construct a new route as proposed by this strategy.

H-19: Pave Shoulders on Route 224

Benefits	Improved accommodation of traffic. Improved safety. Shoulders provide space for bicycle use.
Cost	$310,000 (11 ft lanes + 4 ft shoulders) $670,000 (12 ft lanes + 6 ft shoulders)
Benefit/Cost	2.3 (11 ft lanes + 4 ft shoulders) 1.4 (12 ft lanes + 6 ft shoulders)
Potential Impacts	None - work to be conducted in right-of-way.
Timeframe	Near-term
Notes	Pedestrian aspects may be eligible for Safe Routes to Schools funding programs.

Route 224 directly links Routes 11/109 in Springvale with Route 202 east of downtown Sanford, allowing trips to avoid Route 109 and Route 202 in downtown Sanford. The most direct route between Springvale and the Route 111/202 corridor, Route 224 is heavily traveled, carrying between 6,600 to 8,800 vehicles daily. South of River Street, the corridor typically consists of 11-foot lanes and unpaved shoulders. North of River Street, a sidewalk and paved shoulder are provided on the west side of the street only. Carl Lamb Elementary School is located at the intersection with River Street.

The current MaineDOT Customer Service Level (CSL) for condition, which factors in pavement condition, ride quality, and roadway strength, is "D" roughly from River Street to Route 202 and "B" elsewhere (except at the intersection with Route 109 in Springvale, where a short segment is rated "F"). The segment between Route 202 and River Street is included in MaineDOT's *Biennial Capital Work Plan (FY 2012-2013)* as a full depth reclamation (WIN# 019325.00). MaineDOT's shoulder surface policy (updated 2003) recommends paving gravel shoulders for preservation projects when summer ADT exceeds 4000, as is the case with Route 224.

Given high traffic volumes and the importance of the corridor in providing an alternative route to Route 202 in downtown Sanford, improving the roadway to add paved shoulders is recommended. While 12-foot lanes with 6-foot shoulders is preferred given the high traffic volumes served, maintaining the current 11-foot lanes and adding 4-foot paved shoulders may prove more feasible given field conditions, and would still considerably improve current conditions. Extending the shoulder widening to Railroad Avenue (east side of roadway) is recommended.

Expected costs to widen the highway to provide 12-foot lanes with 6-foot shoulders would be approximately $670,000, though the condition of the existing aggregate shoulder could drive costs higher. This would be in addition to costs to rehabilitate the existing roadway. Alternatively, less intensive widening (and lower cost) would be required to instead retain 11-foot lanes and only add 4-foot paved shoulders.

Pedestrian improvements are also recommended for Route 224, extending north from the intersection with River Street to provide better access to the Carl Lamb Elementary School. These are discussed under H-23. While pedestrian improvements could be constructed separately from the recommended shoulder paving, constructing them concurrently would reduce disruption due to construction and potentially result in some cost savings.

H-20: Pave Shoulders on Route 35

Benefits	Improved accommodation of traffic. Improved safety. Shoulders provide space for bicycle use.
Cost	$780,000
Benefit/Cost	1.4
Potential Impacts	None
Timeframe	Mid-term to Longer-term
Notes	Missing gap. Corridor has segment HCL.

The cross section of Route 35 has previously been widened to include paved shoulders north of Bittersweet Drive, and more recently south of Kimball Lane. The southern section includes additional pavement width to accommodate pedestrians since the corridor provides access to the Eastern Trail in Kennebunk.

The segment of Route 35 between Kimball Lane and Bittersweet Drive retains narrow travel lanes (10 to 11 feet) and does not have paved shoulders. An HCL segment is located along this portion of the highway, with a CRF of 1.18. With a current MaineDOT CSL condition rating of "A", pavement maintenance is unlikely for some time. When it is needed, widening the cross section to establish 11-foot lanes and 4-foot shoulders, consistent with the rest of the corridor, is recommended.

The estimated cost to pave shoulders on this segment of Route 35 is $780,000. The benefit-cost ratio for this project is 1.4, and it is consistent with MaineDOT's shoulder surface policy in that it completes gaps in a highway segment where shoulders exist elsewhere. The corridor also provides bicycle access to the Eastern Trail and is expected to cross the 4,000 summer ADT threshold in coming years.

H-21: Pave Shoulders on Route 99

Benefits	Improved accommodation of traffic. Improved safety. Shoulders provide space for bicycle use.
Cost	$2.22 million (11 ft lanes + 4 ft shoulders) $5.60 million (12 ft lanes + 6 ft shoulders)
Benefit/Cost	1.1 (11 ft lanes + 4 ft shoulders) 0.6 (12 ft lanes + 6 ft shoulders)
Potential Impacts	None
Timeframe	Mid-term
Notes	Pedestrian aspects may be eligible for Safe Routes to Schools funding programs.

North of its crossing over the Maine Turnpike, Route 99 generally has 11-foot lanes with gravel aggregate shoulders that vary in width. South toward Route 1, a curbed pedestrian sidewalk is provided on the west side of the road, while a gravel aggregate shoulder is maintained on the east side. While crash rates on Route 99 are low, 39 percent of crashes are classified as "run off the road", the highest share of such crashes in the CYCCS study area. The current MaineDOT CSL condition rating is predominately "D" and "F", with a few sections rated "C".

Adding 4-foot-wide paved shoulders to Route 99 is recommended. South of the Maine Turnpike overcrossing, paved shoulders are needed on the east side of the roadway only. The estimated cost to pave 4-foot shoulders for the entire length of Route 99 is $2.22 million, with a resulting benefit-cost ratio of 1.1. Portions of the corridor exceed MaineDOT's 4,000 summer ADT threshold for paving shoulders during rehabilitation projects, and the entire corridor is expected to exceed 4,000 ADT in the future. Further widening to provide 12-foot lanes with 6-foot shoulders was also considered, but scored poorly in the benefit-cost assessment due to the added cost of further widening the roadway.

H-22: Eliminate "Y" Intersections

Benefits	Improved accommodation of traffic. Improved safety. Shoulders provide space for bicycle use.
Cost	High.
Benefit/Cost	Not assessed; assumed to be positive.
Potential Impacts	None. Work to be conducted in right-of-way.
Timeframe	Mid-term to long-term.
Notes	Pedestrian aspects may be eligible for Safe Routes to Schools funding programs.

Several intersections in the study area are configured as "Y" intersections, which allow vehicles to turn at high speed from either direction of travel. As traffic volumes are not very low, this configuration presents safety challenges because of the speed at which turning traffic negotiates the intersection and the conflict points that occur at the beginning and again at the end of the turn (where the two branches of the Y meet). Three intersections were noted by the study on state highways:

- Route 35 at Walker/Cole Road. Route 35 is an HCL at this location, with a CRF of 1.18. The intersection is also problematic in that the main road, Route 35, sharply curves at the intersection and sight distance is limited by vegetation.
- Route 4 at Gore Road. Gore Road is an HCL with a CRF of 1.56 at this location.
- Route 99 at Whitten Road/Mill St, Kennenbunk. This intersection is part of the current route linking Route 99 to Route 35 via Mill Street. Route 99 curves sharply through the intersection.

These locations should be reconfigured to eliminate the "Y" turn. This would typically involve closing one leg of the "Y" while realigning the second leg to meet the main road as a "T" intersection. Where turning traffic volumes are high, a turn pocket or bypass lane on the main highway may be warranted. Removal of "Y" intersections has been shown to have a crash reduction factor of up to 85 percent.

H-23: Pedestrian and Streetscape Improvements in Villages/Towns

Benefits	Improved accommodation of traffic. Improved safety. Shoulders provide space for bicycle use.
Cost	Moderate to High, depending on improvements.
Benefit/Cost	Not assessed. Creating walkable communities is considered a best practice.
Potential Impacts	None. Work typically conducted in right-of-way.
Timeframe	Near-term to mid-term.
Notes	Some pedestrian improvements may be eligible for Safe Routes to Schools funding programs.

While the CYCCS study focused primarily on regional-scale mobility needs, creating safe and comfortable conditions for pedestrians at the local level is an important aspect of a highly functioning transportation system. Pedestrian networks provide access to businesses, schools, parks and residences. Many transit riders depend on the ability to walk to or from the bus stop. Within towns, an established pedestrian network that allows people to safely travel between nearby origins and destinations can even help reduce short distance vehicular trips.

Current roadway design standards, as well as federal and MaineDOT policies, recommended that when a roadway is improved paved shoulders and sidewalks are considered where warranted. Particularly in rural areas, as roads are brought up to modern day standards, paved shoulders are built to improve vehicular safety, drainage, roadbed stability, and bicycle and pedestrian safety. These shoulders provide space for bicyclists and the occasional walker. A number of the recommendations of the CYCCS involve expanding the prevalence of paved shoulders on the study area's major highways.

In villages, downtowns, business areas and other higher density locations, sidewalks and walking paths should be considered where warranted as part of roadway reconstruction projects or developed as stand-alone projects.[7] Crossing busy highways is often a challenge in developed areas as well. Well-marked crosswalks, curb extensions, raised center medians, and improved street lighting are features that can be considered to improve the safety of crossing locations.

Towns should evaluate pedestrian and bicycle deficiencies in village areas and work towards improvements in addition to the specific recommendations identified in the CYCCS. There are federally funded sources for standalone bicycle and pedestrian improvements in village areas that communities can apply to the MaineDOT for assistance.

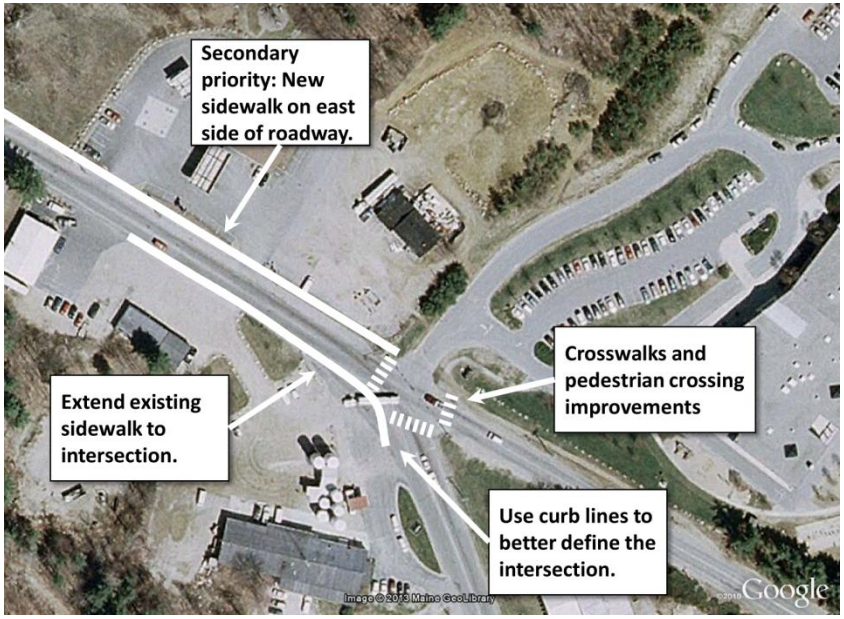
Some of the areas that could particularly benefit from pedestrian improvements are discussed below.

- The village area of Alfred, including Route 4/202 (Main Street), Kennebunk Road, and Saco Road, lacks pedestrian accommodations. Sidewalks or walking paths appropriate

[7] MaineDOT generally shares the cost of sidewalk construction with municipalities. Further discussion of MaineDOT's cost sharing policy is provided in the last section of this chapter.

given the village character should be established along these roadways; particularly Main Street. Improvements to facilitate pedestrian crossings of Main Street are needed as well, including crosswalks and street lighting. These should be considered at the intersections with Kennebunk Road, Saco Road and Depot Road.

- In North Berwick, crosswalks and associated crossing improvements should be considered along Route 4 (Elm Street) to provide access to the sidewalk on the southeast side of the highway. Over the longer term, the various disconnected sidewalk segments on the north side of the corridor should be connected to complete a continuous walking route. Similarly, continuous sidewalk should over time be established on both sides of Route 9 (Wells Street) in the developed village area.
- Sidewalks are well established along much of Route 109 (Maine Street) in downtown Sanford, though some segments still need upgrading to provide an elevated curb, wider walking surfaces, ADA accessible accommodation, and attractive streetscaping. Opportunities also exist to shorten pedestrian crossing distances by constructing pedestrian curb extensions at crosswalk locations where on-street parking is provided. In South Sanford, the development pattern is more suburban in nature, but pedestrian pathways and crosswalks at major crossroads should still be provided. Route 109 currently lacks pedestrian accommodation for much of the corridor south of Farview Drive (near the Sanford Plaza Shopping Center), but well worn footpaths along the side of the road demonstrate the need for pedestrian accommodations anywhere there is urban development.
- Route 202 is an important urban corridor where sidewalks are in poor condition. Upgrades to this segment were recommended and discussed earlier as part of H-9.
- Walk access to the Carl J. Lamb Elementary School, located at the Route 224 intersection with River Street, is hampered by a lack of walkway on the west side of the road, the geometric alignment of the intersection, and a lack of crosswalks. A pedestrian improvement program that includes the elements listed below is recommended (Figure 3-59). The resulting project could be a candidate for Safe Routes to Schools funding.
  - Add crosswalks and pedestrian signal heads at the signalized intersection of Route 224 at River Street. Ensure that crosswalks are adequately lit and add additional streetlights if necessary.
  - Extend the sidewalk on the west side of Route 224 to the River Street intersection. Reconfigure the Route 224 intersection at River Street to define the curb line (northwest side), reduce the skew angle of the intersection to slow turning traffic, and reduce the paved width of the roadway through the intersection.
  - Consider establishing a sidewalk on the east side of Route 224 north of River Street as well.



Concept Plan Only – Not to Scale

Figure 3-59: Recommended Pedestrian Improvement Components near Carl J. Lamb Elementary School

Other Potential Longer-term Actions

Paved Shoulder Improvements on Route 11A

Route 11A (Oak Street) connects Route 202 west of downtown Sanford with Routes 11/109 in Springvale, allowing traffic traveling north to bypass downtown Sanford. Average daily traffic on Route 11A is about 2,500 vehicles; it is not as heavily used as the Route 224 connection described earlier. The current paved cross section is relatively narrow, with travel lanes that vary between 10 and 11 feet in width and no paved shoulders. As the highway enters Springvale near Whipple Street, the cross section widens and incorporates sidewalks. The highway has a high rate of crashes, though most of these are intersection related.

The current MaineDOT Customer Service Level (CSL) for condition ranges from "B" to "D". MaineDOT shoulder policy specifies maintaining unpaved shoulders on low volume segments (under 4,000 summer ADT), rather than upgrading to paved shoulders. Benefit-cost assessment yielded a ratio of 0.8, further supporting maintaining the current configuration.

Given the highway's role in complementing Route 202 and relieving traffic at the Route 202/Route 109 intersection, and considering that benefit-cost assessment is highly sensitive to recent crash history, paving shoulders on Route 11A could become warranted in the future. The cost of widening the paved roadway to provide consistent 11-foot travel lanes and 4-foot paved shoulders (4-ft minimum is recommended for bicycling) is estimated to be approximately $750,000 in added cost, if performed as part of a future scheduled rehabilitation of the highway.

Recommended Local Jurisdiction Led Actions

Some potential actions that would help address long-term corridor needs would be the responsibility of local jurisdictions.

Develop Local Street Grid in Biddeford and Arundel

Develop additional local roadways connecting Route 111 to Route 1 to improve local circulation and access, and reduce traffic at key highway intersections (). These could be developed concurrent with future development, as local roads projects, or some combination of the two. Potential routes would need to be selected and determined by jurisdictions, but could include:

1. Connect West Cole Road to Cole Road (requires grade separated crossing of railroad track). This connection has the potential to greatly improve local circulation and reduce traffic on the heavily traveled portion of Route 111 between Exit 32/Precourt Street and Route 1.
2. Realign Edwards Road to avoid St Demetrios Cemetery and extend to connect to Route 1 or Precourt Street. This would have similar benefits to the Cole Road extension described above.
3. Extend Mariner Way (Biddeford Crossing) to Old Alfred Road to provide additional access to the Shopping centers along Route 111.
4. Connect Old Alfred Road/Mountain Road to Route 1. This would relieve traffic that currently travels circuitously along Route 111 to Precourt Street and on to Route 1.
5. Connect Route 111 with South Street to bypass Route 1 and enhance local connectivity and circulation.

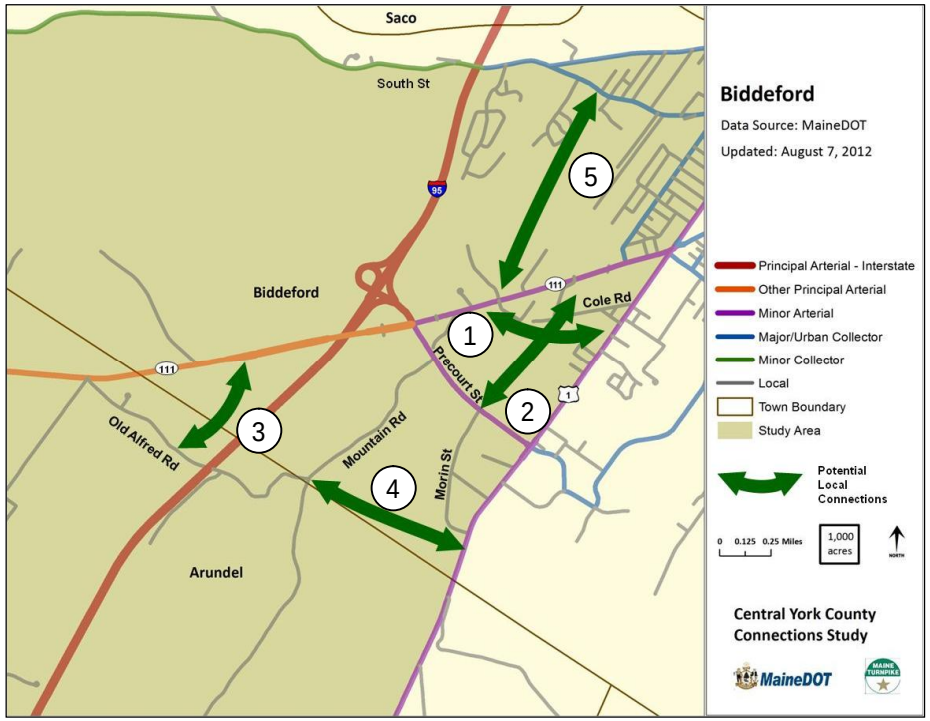


Figure 3-60: Potential New Local Connecting Roadways in Biddeford and Arundel

Develop Local Street Grid in Sanford

The capacity of Route 109 though downtown is constrained by existing development. Therefore, further development of the local street grid is recommended needed to provide additional route choices for local circulation and traffic relief for the Route 109 corridor. Corridor development would be a town-led action; the links shown (Figure 3-61) are suggestions for further consideration by the town. They include:

1. New road linking Jagger Mill Rd to Route 109 at Old Mill Road, possibly extending to School Street.
2. New road linking Route 109/Old Mill Rd to School Street and possibly High Street (access to Route 4).
3. Other new streets parallel to Route 109.
4. Emphasize River Street for access to Route 202 eastbound and eastern areas of the town.

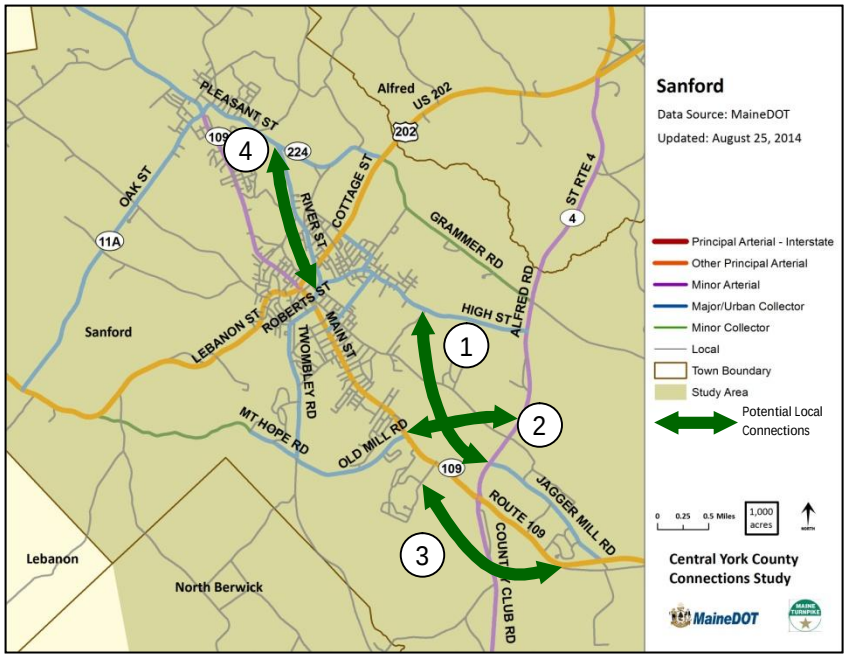


Figure 3-61: Potential New Local Connecting Roadways in Sanford

Pave Shoulder on Old Mill Road

Similar to Route 11A and Route 224, this corridor provides a supplemental route for trips between Route 202 (west of Sanford) and the 109 corridor in South Sanford. The demand for this movement is fairly low, which is reflected in the existing traffic volumes (1,800 to 3,700 vehicles daily, depending on location). Mt Hope Road has a High Crash Location segment east of its intersection with Route 202. These roads were recently repaved. Nonetheless, expanding the existing cross section (generally 20 feet today) to provide 11 foot minimum lanes with 4-foot shoulders (30 foot cross section) is recommended over the longer-term. Additionally, the intersections of these roads with Twombley Road should be realigned to create a four-way intersection.

Plan for Build-out of Route 109 in Sanford

The cross section of Route 109 varies as it travels through Sanford. In downtown, there's little opportunity to consider different cross sections because existing development limits the available right-of-way. Further to the south, however, the highway cross section is less constrained. The Town should establish a plan that defines the ultimate cross section elements for the entire corridor, so that the highway can be improved as developments occur.

1. Downtown Sanford to Old Mill Road (#1 in Figure 3-62)

North of Old Mill Road, existing development essentially constrains the highway to a 2-lane cross section, with turn lanes provided at some intersections and on-street parking allowed in most locations. Sufficient space exists to add additional turn lanes as needed, either at intersections or major driveway entrances. Where left turn lanes are not needed, raised medians could be established at crosswalk locations to provide pedestrians with safe refuge when crossing the highway. Candidate locations include Route 109 intersections with Park St/Jackson St, Avon St/Berwick Rd, Schuler St, and other intersection locations where new crosswalks are merited.

2. Old Mill Road to Route 4 (#2 in Figure 3-62)

Two northbound lanes and one southbound lane are provided from approximately Old Mill Road to Westview Drive, in addition to a left turn lane. Ultimately, a second southbound lane could be constructed to create a continuous 5-lane section between Old Mill Road and Route 4. The existing traffic signal at Marden's may be relocated to the Old Mill Road intersection, and the performance of this intersection over time would determine the need for an additional southbound lane. Should congestion in the future here

warrant a second southbound lane at the Old Mill Road intersection, it should continue to Westview Drive.

The existing cross section between Westview Drive and Route 4 is four lanes, with left turn lanes provided north of the Sanford Center for Shopping. Right-of-way should be preserved to accommodate a left turn lane (5-lane cross section) between the Center for Shopping and Route 4 as well, which could be constructed when needed as adjacent parcels develop. Inclusion of sidewalks and shoulders (or bike lane) is recommended as these segments are improved.

3. Route 4 to Route 99 (#3 in Figure 3-62)

A 3-lane section (with center turn lane) should be developed over time between Route 4 and Airport Road to reduce conflicts with turning vehicles on this segment, and right-of-way preserved to extend to the current 3-lane section near Route 99 should future development warrant it. Roadway widening can be completed concurrent with future development projects, with missing segments ultimately constructed with developer participation to complete a continuous 3-lane segment. Inclusion of sidewalks and shoulders (or bike lanes) is recommended as these segments are improved.

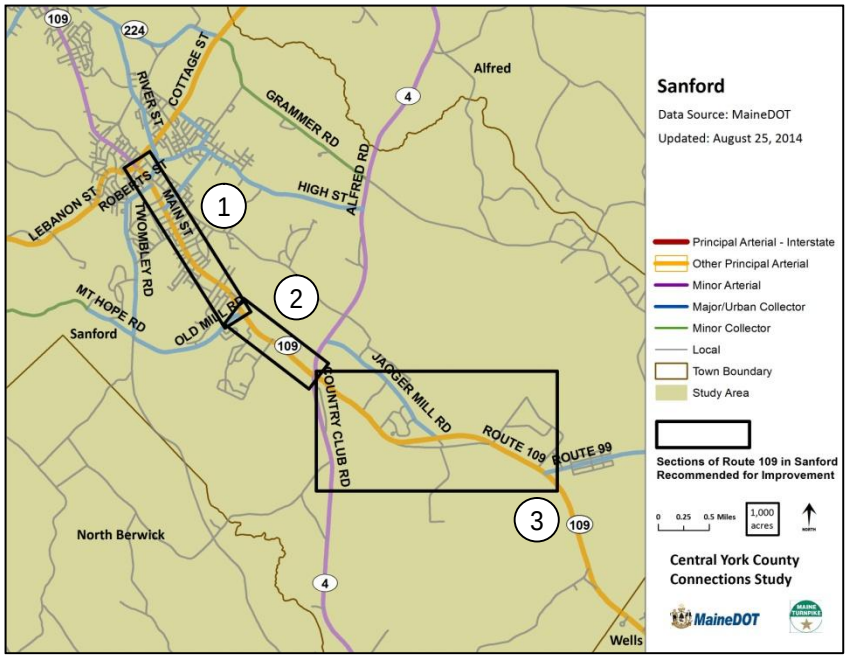


Figure 3-62: Sections of Route 109 in Sanford Recommended for Planned Build-Out

Funding

Improvements to State Highways in Maine are mostly funded by FHWA and MaineDOT, generally at 80 perecent and 20 percent, respectively. For FY2014-FY2015, approximately $700 million, or 61 percent of the MaineDOT budget, is allocated for highway and bridge capital projects and improvements. In addition, modest funding is allocated for the Local Road Assistance Program (LRAP), which aids municipalities in capital improvements to and maintenance of key roads not included in the state highway system. For FY 2014-2015, approximately $43 million, or 4 percent of the overall MaineDOT budget, is allocated for the LRAP. Such funds could be used to undertake smaller scale spot improvements to town roads and intersections in the CYCCS study that are facing capacity constraints.

Generally, State Highways in Maine are maintained by the MaineDOT, with the exception of those located within "compact areas" of "Urban Compact" municipalities, which are maintained by the town. Urban compact municipalities in the CYCC study area include Biddeford, Kennebunk, Sanford, Waterboro, Wells, and Waterboro. Generally, town maintenance responsibilities in Urban Compact municipalities apply to "Compact" or "Built-up sections" of State Highways where buildings are nearer than 200 feet apart for distances of ¼ a mile, unless otherwise defined.[8]

The MaineDOT also provides funding for non-highway projects. The Multimodal Capital Improvements Program could be used to fund many of the projects discussed throughout this chapter and Chapter 5: Transit. The Multimodal Capital Improvements Program, which is budgeted for $99 million of FY 2014-2015 (and receives the majority of its funds from federal sources), could be used to fund critical rail, public transit, and bicycle/pedestrian trail projects in the CYCC study area.

MaineDOT has a systematic approach to prioritizing highway corridors and quantifying their customer service levels. Corridors are ranked according to factors like economic importance, functional classification, truck use, and traffic volume, and assigned a Highway Corridor Priority level (or HCP) of HCP 1 through HCP 6. HCP 1 roads receive greater precedence. Approximately one-third of the HCP ranked roads in York County are designated HCP 1. HCP 1 roads in the study area include Route 4, Route 109, Route 111, and Route 202.

More details on MaineDOT funding can be found in the MaineDOT Work Plan, which is available online at: http://maine.gov/mdot/projects/workplan/docs/WorkPlan2014-2015-2016Final.pdf

Local Cost Sharing Policy

MaineDOT has a local cost-sharing policy whose purpose is to create a consistent and fair policy for sharing the cost of major investments to the state highway system in urban and village areas in all municipalities. According to the policy, MaineDOT will pay for 100 percent of the highway portion of the project as determined by MaineDOT. New sidewalks or replacement/rehabilitation of existing ones requires a 20 percent contribution from municipalities. Municipalities are responsible for year-round maintenance of new and replaced/rehabilitated pedestrian facilities. Sidewalks and multi-use shoulders located on bridges in compact and qualifying

[8] "Urban Compact" sections of State Highway are defined specifically at http://www.maine.gov/mdot/csd/mts/stateurbancompact.htm.

pedestrian areas will be 100 percent funded by MaineDOT using state and/or federal funds.

Chapter 4: LAND USE AND ACCESS MANAGEMENT

Role of Land Use and Access Management in Managing the Transportation System

Towns' land use and development regulations influence the need for, and ultimate performance of, the transportation system in a number of different ways. Over the long term, the intensity and mix of uses allowed by town zoning regulations can influence the demand for travel and help to establish areas that are better suited for service by transit. Development regulations can shape how buildings are oriented on a parcel and aspects of their design in ways that make accessing them by walking, biking or bus more convenient.

Zoning

Zoning is a powerful tool available to jurisdictions to address the where and what of development, usually based on more general mapping in the Comprehensive Plan. Much of the study area is zoned via conventional zoning districts that are mapped with defined boundaries. Figure 4-13 (page 4-13) shows these districts in a generalized way, combining the specific zoning districts of each municipality into broader categories to produce an overall picture of the study area's future land use potential.

Within each of the districts mapped, the codes specify lists of which uses are permitted "as of right" (i.e. without any special review or discretionary permission) and which require special approvals in the form of Special Exceptions or Conditional Uses or Special Permits. Standards for setbacks (i.e. distances from the parcel boundaries to structures), building heights and other features of building bulk are specified. Any deviations from these standards are subject to requests for Variances. These kinds of straightforward zoning districts are known as Euclidean districts. Several other kinds of districts are available, however, which give municipalities more discretion and flexibility in obtaining the desired outcomes.

Overlay Districts are districts that have standards tuned to specific locations and are added to or overlay the existing regulations. A good example of an overlay district that is very relevant to this study is Sanford's Corridor Overlay District. Such a district can be used to regulate access, landscaping, signage and setbacks along a specified corridor to achieve stated purposes.

Incentive zoning is a tool that provides development bonuses, such as greater flexibility or increased development allowances (i.e., density), in return for some other consideration. For example, incentive zoning might reduce parking requirements for developments located near existing transit services or those that construct certain public amenities. It is important that the benefits offset the implications of the allowances, and that goals of the incentive zoning be clearly articulated.

Short of regulatory change on this scale, local municipalities can modify their zoning regulations by updating the Permitted Use lists so that they are consistent with the recommendations of this study, or convert less compatible Permitted Uses into Special Exceptions or Conditional Uses so that they are subject to more rigorous review.

The reason for this emphasis on zoning is evident from looking at the zoning map (Figure 4-13). The concentrations of commercial and industrial zoning are along Routes 111 and 109. While it is logical that such uses would be located along arterial routes, since they provide direct access and higher visibility, the large amount of such zoning and the wide range of uses it allows raises concerns about the relationship of the highways to the future intensity of the abutting land uses. The more intensive residential zoning districts are also found along these two corridors. For these reasons, this section provides a number of recommendations aimed at both moderating this land use pattern and mitigating its impacts to the abutting highways.

While it is true that the current commercial and industrial markets are slow and this potential land use pattern is not likely to be realized anytime soon, it is still appropriate to think long term here to protect the future capacity of the roadways in place. Coordinated and proactive planning for land use, access and roadways can avert the complications and costs of retrofitting after the fact.

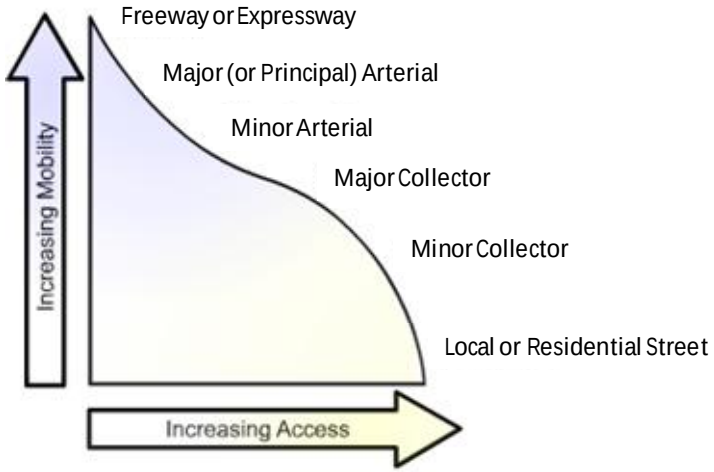
It is important to note that zoning must be consistent with and based on the Comprehensive Plan of a municipality. As appropriate, changes to zoning should be preceded by supporting changes to the Comprehensive Plans that provide the policy rationale for the changes proposed. Any recommendations on the timing of development (for example that development of a certain scale or at a certain location be allowed or initiated only when adequate road capacity exists off-site at given intersections) depend on analysis and language in the Comprehensive Plan if they are to survive legal challenge. Zoning codes and maps address location and use and type of development but not timing, sequencing and relationships to infrastructure. These must be addressed by the Comprehensive Plan.

Access Management

Highways are principal transportation routes that accommodate many different types of trips, including longer distance trips between distant towns and cities. Because they are the primary travel corridors for regional auto and truck travel, highways are typically designed to prioritize the fast movement of through traffic.

Except for Interstate Highways, the Maine Turnpike, and other fully access-controlled routes, highways also provide access to abutting parcels. The frequency, location and configuration of access points (i.e., driveways or entrance roads) influence many aspects of a highway's performance and character. Generally, the balance between mobility and degree of access provided is inverse; increased frequency of access leads to decreased mobility. Roads and highways are therefore typically classified based on their intended functions, with arterials emphasizing mobility and local streets emphasizing access (Figure 4-1). Within the CYCCS study area, the major regional highways (Routes 1, 4, 109, 111, 202) are classified as Principal or Minor Arterials.

Each location where vehicles turn on or off of the highway can disrupt traffic flow and increase the potential for crashes. Locations where left turns are allowed across a two-way highway are particularly disruptive, resulting in seven potential points of conflict between turning and through traffic, compared to only two for right-turn only situations (Figure 4-2). The Federal Highway Administration (FHWA) found that at a typical driveway or minor intersection, 72% of crashes involve left turns (Figure 4-3).



Source: Adapted from FHWA Office of Operations

Figure 4-1: Balance of mobility and access emphasis for various classifications of roadways.

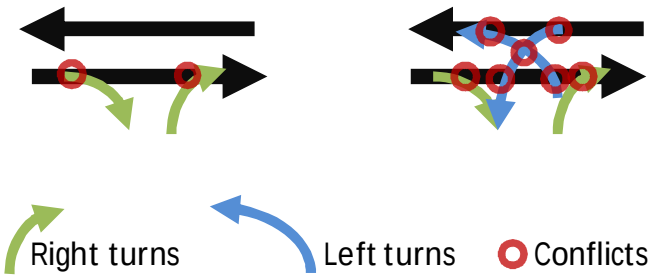


Figure 4-2: Potential conflicts at right-turn only intersections compared to intersections where left-turns are allowed

Source: FHWA Office of Safety

Figure 4-3: Share of intersection crashes involving left turns

Typically, frequent access points in more densely developed areas can both worsen congestion and increase crash frequencies. In less developed areas where posted speed limits are high, occasional turning vehicles can be unexpected, which can result in severe crashes.

Access management techniques govern how access to abutting parcels is provided. They can include both highway design aspects and development standards that, ideally, work together to maintain the efficient and safe operation of streets and highways. This is especially important for regionally significant highways, as a lack of access management over time will lead to increased congestion and more frequent crashes. Management of how access is provided can address these safety and congestion issues, and also help communities preserve rural or historic character where appropriate.

A concern sometimes expressed by businesses is that access management approaches might decrease the ability of customers to

access their business. A well designed access management program implements consistent access approaches through a corridor and ensures that all uses have reasonable access provisions can help allay these fears. In fact, a lack of access management over time is likely to discourage business patronage if a corridor degrades to a point where potential customers view it as too congested or dangerous.

While the MaineDOT administers an access management program outside of a municipality's urban compact area, ultimate responsibility and authority for the implementation of land use and access management in Maine lies primarily with the municipalities. This section identifies a menu of land use and access management techniques that may be appropriate for consideration by municipalities along the major highways in the study area. These techniques could also be applied to other roadways that the towns deem important for mobility.

Land Use and Access Management Techniques

This chapter describes techniques that towns in the CYCCS study area could consider as means to direct future growth in ways that will reduce demand on the transportation system, support its efficient operation, and improve the viability of all travel choices. These are among the techniques that are often described as "Smart growth" approaches to land use planning.

The applicability of techniques is not universal, but appropriate contexts for their use are described. MaineDOT's *Sensible Transportation Handbook*[9] is a good reference source for solutions to transportation/land use challenges.

The approaches are organized by the primary objective they address, as described in the following sections.

Approaches that reduce the number of vehicle trips generated along highways

This set of techniques looks at approaches for reducing or limiting the growth in vehicle trips entering the highway specifically by managing the intensity and/or type of new development for parcels that abut the highway corridor. They are most appropriate in rural, less developed areas or other locations where highways function predominately in the role of high-speed, high-capacity routes (rather than balancing access and mobility needs), particularly where future intensification of development is allowed by local plans and zoning. In these locations, managing future development along the highway corridor can help maintain the efficient and safe operation of the highway, and can further help to preserve the rural characteristics of the corridor where desired.

Limit intensity of development abutting highways

Stretches of undeveloped land along highways create the potential for strip development and the attendant turning movements. Zoning the land along the highway for low-density residential development (e.g., one dwelling unit per 5-acre lot), agricultural, and other less intensive uses can help limit the growth of development along the highway and limit the introduction of driveways.

[9] http://www.maine.gov/mdot/planning-documents/stpa/sensibleTrans-handbook.html

LAND USE AND ACCESS MANAGEMENT
Objectives and Approaches

Reduce the number of vehicle trips generated along highways.

- Limit intensity of development abutting highways.
- Transfer development rights.
- Limit the use of land fronting highways to those that generate low levels of peak-hour traffic volumes.
- Incorporate site features that support ridesharing and transit use.

Encourage access from roads other than the highway.

- Require access from streets other than the abutting highway.
- Require wider frontages on highways than on other roadways.

Improve street interconnectivity and local traffic circulation.

- Include future connections on Official Map or Major Thoroughfare Plan.
- Use rear lot access drives and/or backage roads.
- Encourage interconnected parking lots on adjacent parcels.
- Require off-highway frontage for new subdivision lots.
- Extend subdivision streets to abutting parcels.

Manage the frequency and operation of access points.

- Encourage shared access for abutting lots.
- Minimize the number of driveways per parcel on highway frontage.
- Promote right turn only driveways.
- Require access plans for large developments.

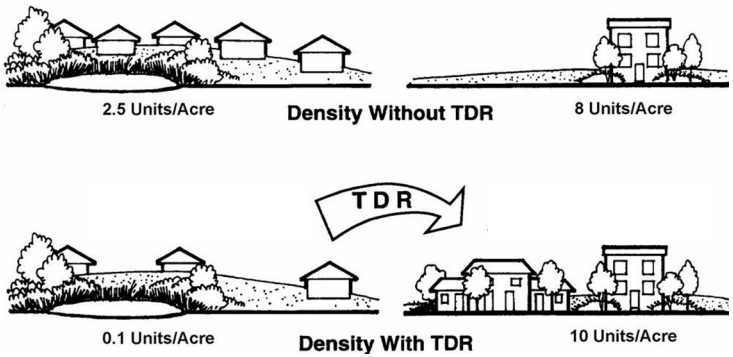
Such actions are best accompanied by identification of locations elsewhere in the community where denser growth can be better accommodated. Figure 4-13 shows generalized zoning in the study area. To truly preserve access throughout a highway, it will be important to ensure that the communities along the roadway have similar visions for the corridor and have minimized potential zoning conflicts between the communities.

Transfer of development rights

Transfer of development rights (TDR) is a mechanism by which development allowed by current zoning in one area may instead be transferred or "added" to what could be developed at another location identified by the community as better suited for development. In consideration for this transfer of rights, the original land must remain undeveloped. Often, a density bonus is included that allows development to occur more intensely on another property than would otherwise be allowed. For example, if a parcel was zoned to allow 10 units, the municipality could allow 12 units to be transferred to another parcel elsewhere in the community.

TDR is a relatively sophisticated approach that requires initial planning and ongoing administration, but may be appropriate for locations where, for instance, a community wishes to discourage development along an undeveloped rural highway and encourage it in the town center. TDR is a useful conservation tool in rural areas because it enables landowners with valuable farmland (and other natural and cultural resources) to be financially compensated for choosing not to develop some or all of their lands. These landowners are given an option under municipal zoning to legally cede the right to development their land in exchange for the ability to sell these rights to another landowner or a real estate developer for use at another

location more suitable for development—often, with new or special uses, and greater intensity and/or density. A TDR program can be voluntary (typically with incentives such as increases in permitted density on the receiving land—e.g., "density bonuses") or mandatory. There are over 150 such programs across the United States, including the Land for Maine's Future program.



Source: Michigan Department of Environmental Quality

Figure 4-4: Transfer of development rights

Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes

Certain types of uses generate high volumes of peak hour traffic (e.g., schools and drive-through restaurants). Limiting uses on parcels abutting the highway to those that generate less traffic can reduce the number of turning movements that need to be accommodated by the highway. This can be accomplished by allowing only uses that generate lower volumes of peak hour traffic, limiting the allowed density or intensity of allowed uses and establishing standards for maximum peak hour trip generation per acre or land parcel.

Incorporate site features that support ridesharing and transit use

Encouraging people to use alternative means of transportation other than single-occupant automobiles can reduce the number of trips generated by new development. These can include techniques such as providing preferential parking for van poolers and carpoolers, incorporating site design requirements that result in convenient and comfortable pedestrian, bicycle and transit access or participation in regional travel demand management (TDM) programs. These techniques are discussed in more detail in Chapter 5 of this report.

Source: City of Cambridge, MA

Figure 4-5: Covered bicycle parking

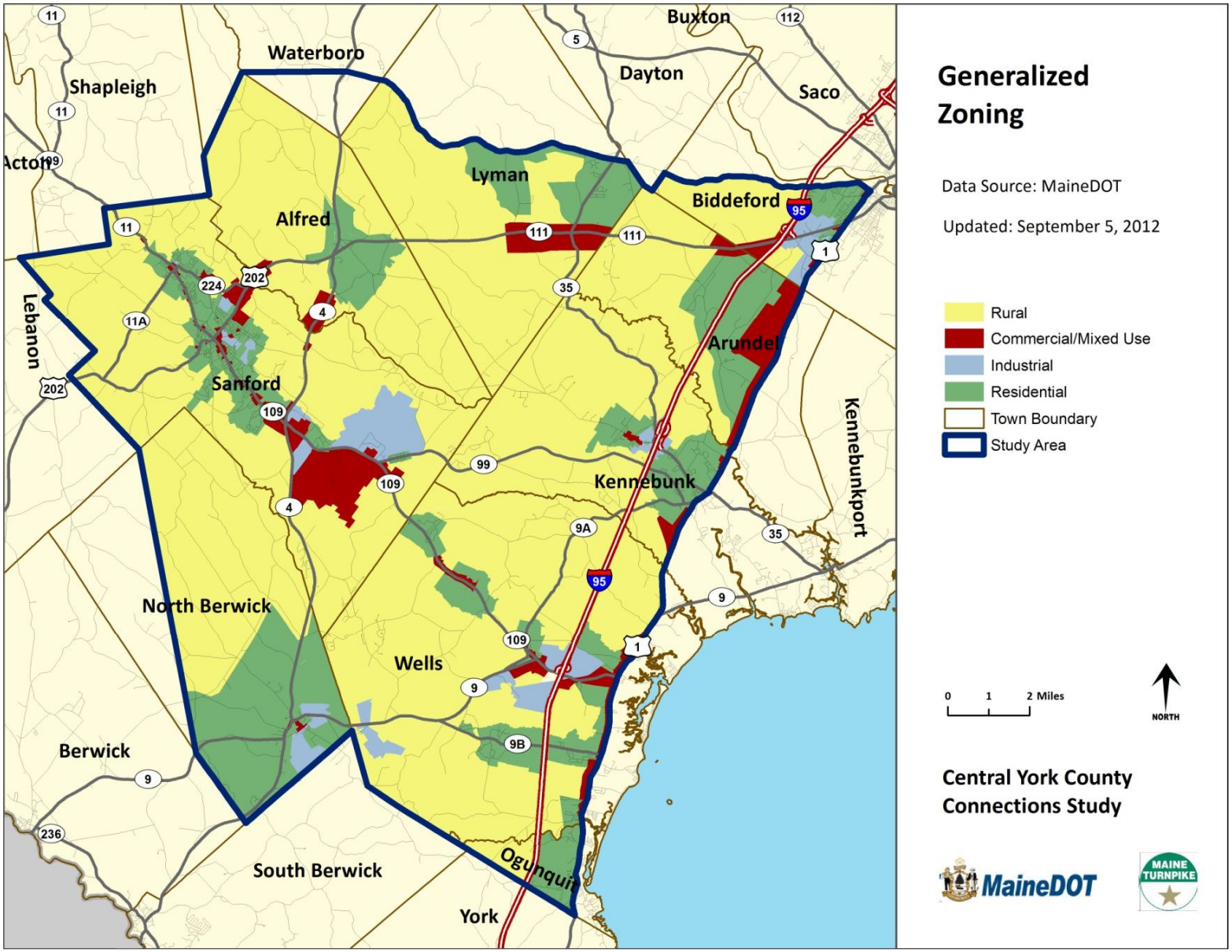


Figure 4-6: Generalized Zoning

Approaches that encourage access from roads other than the highway

The impact of new development along a highway is in part related to how trips generated by that development access the highway. The following approaches suggest ways to manage new trips by requiring access be provided from other streets. Require access from streets other than the abutting highway

Development requirements established in subdivision and site plan regulations can stipulate that access be provided from side streets or other accessible collector streets when a parcel has access frontage to both a highway and another street. Regulations can be applied when a lot is subdivided or as part of site review requirements for development. Figure 4-6 shows an example of parcel access from streets other than the primary highway.

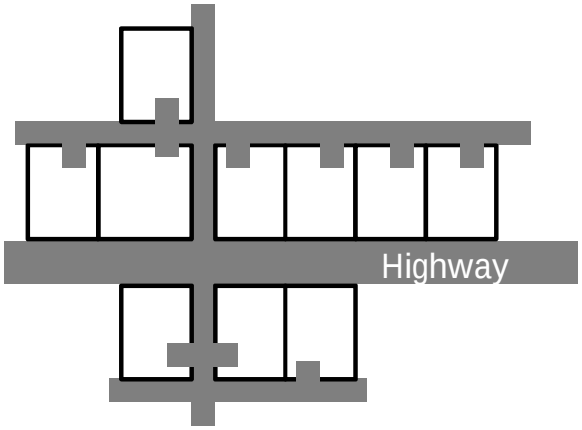


Figure 4-7: Example of access from streets other than the abutting highway

Require wider frontages on highways than on other roadways

A less direct means of encouraging access from streets other than a highway is to establish wider frontage requirements for lots that front highways than those that front other streets. For example, zoning or subdivision regulations could require 250 or 300 feet of highway frontage, but only 100 or 125 feet on a street other than a highway. As shown in Figure 4-7, this limits the frequency of access drives to the primary highway.

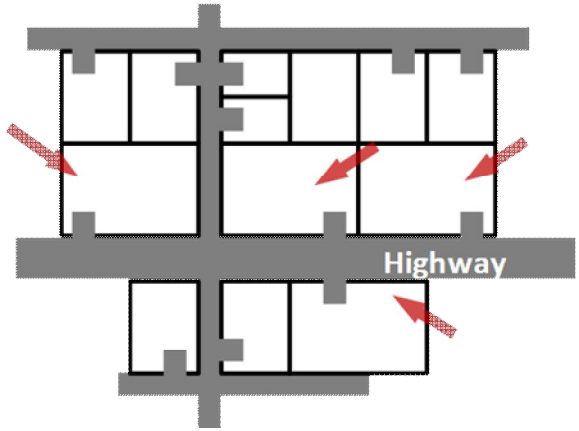


Figure 4-8: Example of wider frontages required on the abutting highway

Approaches to improve street interconnectivity and local traffic circulation

Several methods to improve local traffic circulation and increase interconnectivity can be applied during the development process to divert local traffic away from primary highways. These methods can also help ensure that the street system develops sufficiently to accommodate growth.

Include future connections on Official Map or Major Thoroughfare Plan

An Official Map or Major Thoroughfare Plan is an official document that identifies the location of future roads. These future roads are needed to increase the capacity of the road network, provide for local traffic circulation or provide appropriate coordinated access to developable land. Typically, a community's Comprehensive Plan identifies areas where future roads are needed to accommodate future traffic. The Official Map or Major Thoroughfare Plan then identifies the potential location and functional classification for the new roads. Often general corridors are identified, rather than specific rights-of-way, to provide for flexibility in the actual layout and design of the roadway.

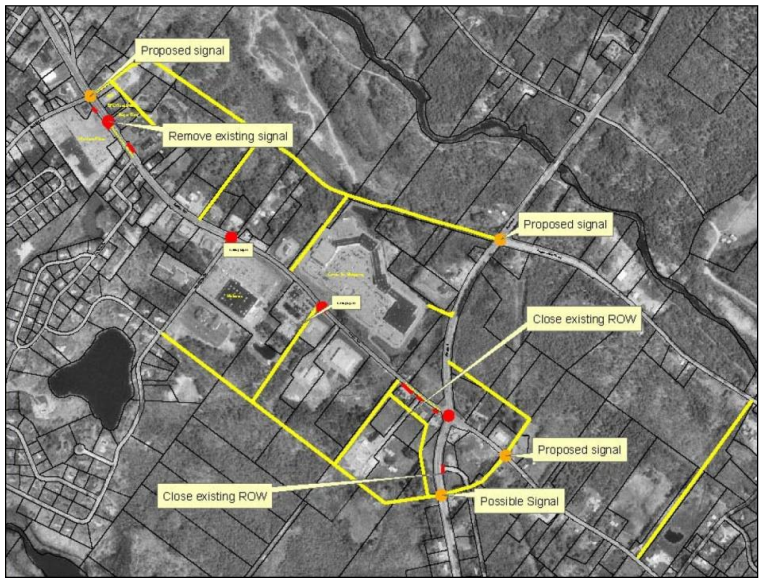


Figure 4-9: Sanford's comprehensive plan includes identification of future major corridors

An Official Map typically designates the design standards for the future roads. However, these standards may be placed in the subdivision regulations. The community's development regulations then require that access to properties be accomplished in a manner that reflects the Official Map, including the reservation or dedication of the corridor for future road construction or the construction of the road segment by individual subdivisions or developments subject to site plan review.

The Official Map or Major Thoroughfare Plan establishes a comprehensive approach to developing interconnected street networks to accommodate new traffic resulting from development. This approach requires the community invest in up-front planning to identify where new roads will be needed and engage in ongoing efforts to coordinate and ensure implementation as development occurs. In most areas, some preliminary work to identify and minimize the impacts to resources such as wetlands is necessary as well.

The Official Map or Major Thoroughfare Plan approach relies on segments of the right-of-way being protected and/or the road constructed on a piece-by-piece basis as individual parcels are developed. Therefore, to be successful the technique needs to be applied in those situations where there are a reasonable number of individual parcels and an expectation that development will occur within a reasonable period so that the individual segments or pieces can be connected to create the new road.

Within the CYCCS study area, there may be areas where the construction of a new road(s) could facilitate desired development while preserving capacity on major highways. Application of an Official Map or Major Thoroughfare Plan could be a powerful means of establishing, protecting and building these roads.

Encourage interconnected parking lots on adjacent parcels

Development regulations can require complementary uses along a highway to have interconnected parking lots. This can reduce the amount of traffic traveling on the highway because patrons can move from business to business (or multi-unit residential complex to business) without having to use the fronting highway.

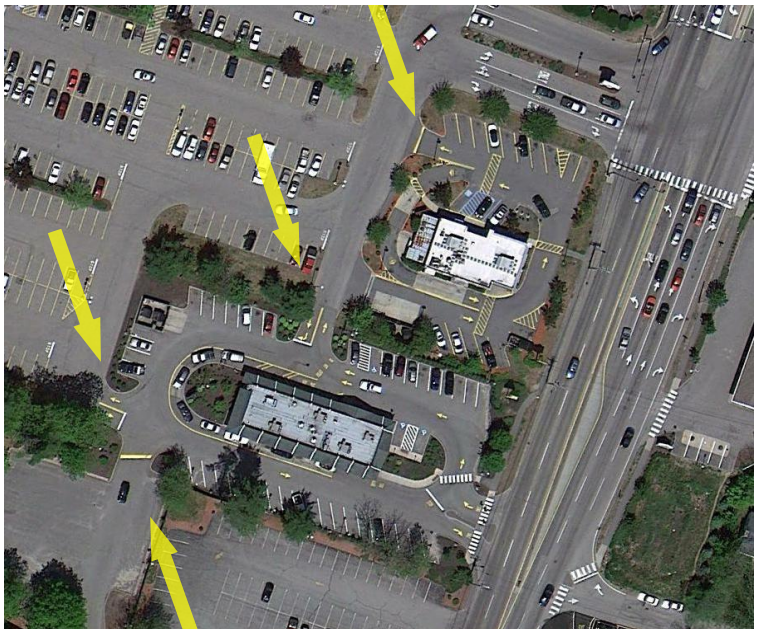


Figure 4-10: Interconnected parking lots in Saco, Maine

Use rear lot or mid-lot access drives and/or backage roads

Rear or mid-lot (for very deep lots) access drives and backage roads accommodate entering and exiting traffic at the back of parcels that front highways and direct this traffic to side streets or major intersections that provide access to the fronting highway.

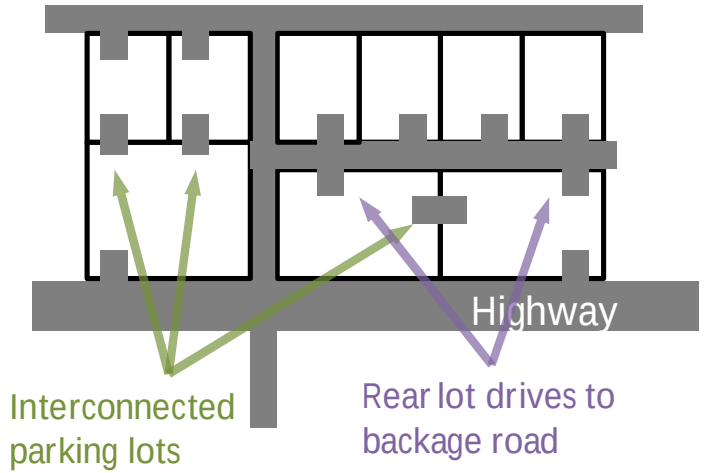


Figure 4-11: Example of interconnected parking lots and rear lot access

Require off-highway frontage for new subdivision lots

Subdivision regulations can specify that parcels created during the subdivision process have frontage on roads (existing or newly constructed) other than an adjacent highway corridor. For example, developments over a certain number of lots may be required to provide a public road.

Extend subdivision streets to abutting parcels

Subdivisions are often developed with dead end streets or cul-de-sacs. This limits interconnectivity of the street system over time. Development regulations can require that provisions be made for extending the street right-of-way to the boundary of the subdivision to allow for the future extension of the street into adjacent parcels. Similarly, provisions can be added to require connections to streets in adjacent parcels that have previously been extended to the subdivision boundary. Over time, this approach will result in an interconnected street network that reduces trips on the highway and a network that has more coordinated access points.

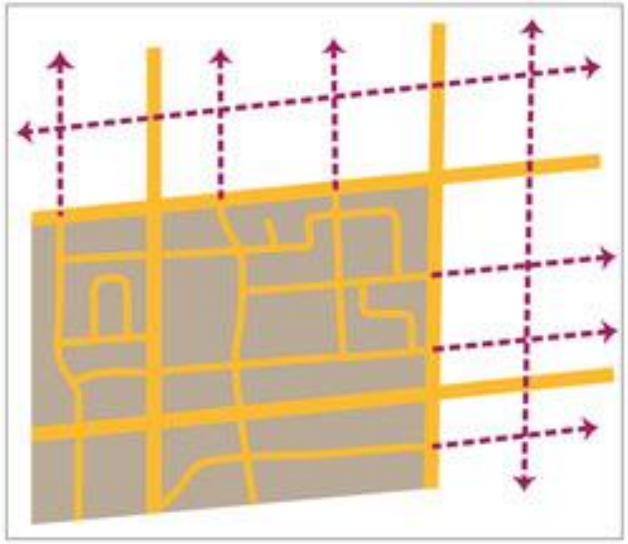


Figure 4-12: Example of extending subdivision streets

Approaches that manage the frequency and operation of Access Points

These approaches focus on regulations pertaining to access points (e.g., driveways) from parcels abutting highways.

Encourage shared access for abutting lots

Where feasible, requiring or offering development incentives for establishing a shared driveway or private access road for abutting lots can reduce the number of access points required. Shared driveways require an easement to establish access rights for all parcels.

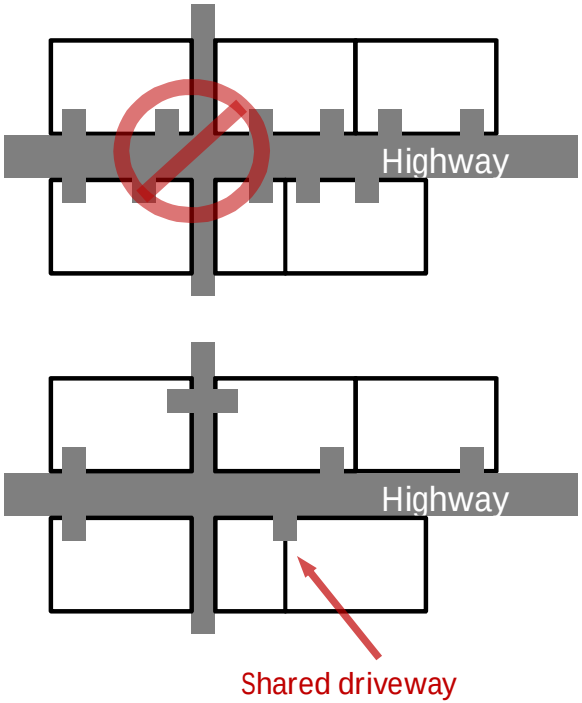


Figure 4-13: Example of shared access driveways

Minimize the number of driveways per parcel on highway frontage

Subdivision and site plan regulations can specify the number and spacing of driveways or new streets allowed per parcel. Many regulations tie the maximum number of driveways to the length of frontage along the highway (for example, not more than one curb cut for every 500 feet of frontage). These requirements typically also establish a minimum distance from a new driveway to an existing driveway or intersection. Minimum stopping distances for various posted speed limits can also be used to manage the frequency of driveways and entering side streets.

MaineDOT has rules for spacing between driveways that apply to Mobility Corridors and Retrograde arterials, as well as other highways regulated under the MaineDOT Access Management Program.[10] Minimum driveway spacing standards are summarized in Table 4-1.

Table 4-1: MaineDOT Minimum Driveway Spacing Standards

Posted Speed (mph)	Driveway Separation (feet)
25 or less	N/A
30	N/A
35	N/A
40	175
45	265
50	350
55 or more	525

Source: MaineDOT. Highway Driveway and Entrance Rules: Part A. p. 6.

[10] Mobility Corridors and Retrograde Arterials in the CYCSS study area include Route 4, Route 9, Route 11, Route 109, Route 111, and Route 202.

Promote right turn only driveways

Left turns are typically more disruptive to traffic flow and inherently involve greater safety risks than right turns due to conflicts with opposing traffic. Restricting new driveways to right turns only (often termed "right in – right out") does not necessarily reduce the number of driveways, but instead reduces or eliminates left turns. This approach must be coordinated with the design of the highway to allow vehicles to reverse direction through left turn lanes, jug handles, or driving around the block to access uses on the far side of the highway. A physical barrier to prevent left turns such as a raised center median is also often constructed.

Require access plans for large developments

In cases where a subdivision or large commercial development will occur in phases, development regulations stipulating approval of an access plan for the full, ultimate build out of the site can help ensure that access is provided in a coordinated manner. Alternatively, setting standards for how many units or square feet can be built with only one entrance point can serve a similar purpose.

Application of Access Management Strategies

This section identifies the potential applicability of the land use and access management strategies to three corridors:

- Route 111/202 in Biddeford, Lyman, Alfred and Sanford
- Route 109 in Sanford and Wells
- Route 4/202 in Alfred and Sanford

These corridors were selected because they are the primary travel corridors connecting central York County to the Maine Turnpike and Route 1 along the coast, and as such are the primary focus of the study. Segments are numbered consecutively along the entirety of each of the three corridors as defined above.

The suitability of specific access management strategies is dependent upon existing development patterns, zoning, each town's current access management provisions and level of regulatory sophistication, and the likelihood that the town will adopt and be able to administer the strategy. Generalized zoning for the study area is shown in Figure 4-13, with more specific zoning designations mapped in subsequent figures.

The applicability of strategies is described on a segment-by-segment basis. Some strategies have widespread potential for applicability, and could be considered by any of the towns:

- Require access plans for large developments
- Extend subdivision streets to abutting parcels
- Incorporate site features that support ridesharing and transit use
- Encourage shared access for abutting lots
- Require the interconnection of parking lots on adjacent parcels

Developing an Official Map or Major Thoroughfare Plan is another strategy that is applied community-wide, and is therefore not evaluated on a segment-by-segment basis. Rather, this powerful strategy is considered to be an overarching policy decision that needs to be tied to long range local planning, and could be considered for implementation by any of the towns.

Town-Specific Recommendations

The potential applicability of strategies is summarized in a series of matrices, organized by town and corridor segment (Tables 4-2 through 4-6). The first step in developing the matrices was to review each town's access management, land use and zoning regulations to determine which strategies are already being used. These are indicated in the matrices by a C (for Current). The matrices show two levels of action – Standard (S) and Enhanced (E). A blank cell means that the strategy is not applicable in the corridor.

The Standard strategies provide a basic or moderate level of access management. They generally include requirements that are frequently incorporated in subdivision ordinances and similar guidance documents, or can be achieved through minor adjustments in current land use and zoning requirements. In some cases, strategies that encourage certain actions but do not mandate them are given the Standard designation. As a general rule, municipalities should compare their codes to encourage cross-jurisdictional uniformity.

The Enhanced strategies are typically more complicated or difficult to implement. They provide higher levels of access management and typically greater effectiveness if implemented successfully. In a few cases, the same strategy is designated as Standard in one town and Enhanced in another. This is because of the differences in the relative sophistication of towns' existing land use and access management requirements. In a town with limited access management requirements in place, the adoption of a particular strategy may be a major change (thus the Enhanced designation), while in another town with extensive access management requirements already in place, adoption of a particular strategy may be a relatively minor change (thus the Standard designation).

The designations in the matrices are not intended to be requirements; rather they should be seen as a guide for maintaining the efficiency and safety of travel in the Route 111/202, Route 109, and Route 4/202 corridors. Each town should evaluate its zoning and access management provisions against the matrices to identify methods to preserve efficiency in the corridors. For example, a town that does not currently require the interconnection of parking lots should review its site plan review ordinance and consider adding such a provision. In many cases, sample language is available in the Southern Maine Planning and Development Commission Model Subdivision Ordinance.[11] However, the town should review the model language to ensure that it is appropriate to the actual situations in the town, and if not, revise the model language accordingly.

The three corridors have been divided into 27 road segments: 14 segments along the Route 111 corridor, 6 road segments along the Route 109 Corridor, and 7 road segments along Route 202/4. Maps of the corridors and the segments are presented by town. The maps indicate the level of development in the corridor. Red indicates that the area is mostly developed. Blue indicates that the segment is moderately developed. Black indicates that the segment is lightly developed. The maps also show the zoning designations, which vary by town.

11 http://smrpc.org/images/Municipal_Reg_Planning/Model_Subdivision_Regulations_2006.pdf

Alfred

Intensive development of much of the Route 4/202 and Route 111/202 corridors outside of the village area is limited by the large frontage requirements in both rural residential and commercial zones. The commercial zones along both Route 202 and Route 4 adjacent to the Sanford line allow a wide range of nonresidential activity that creates the potential for large volumes of peak hour traffic and/or turning movements.

Table 4-2 summarizes those measures with potential applicability in Alfred. These measures include:

- In the Commercial District, the Town could consider revising the allowed uses to limit retail, office, and service uses to those that have limited peak hour trip generation.
- In the Commercial District, the Town could consider requiring new uses to have their vehicular access from streets other than Route 111/202 and Route 4/202 where that is feasible.
- The Town could consider requiring new lots that front on Route 111/202 and Route 4/202 that are not part of a subdivision to use shared access where feasible and to remove/revise ordinance provisions that prohibit shared or common driveways along the property line.
- The Town could consider a transfer of development rights (TDR) program for parcels along Route 111/202 in western Alfred (Segments 11 and 12 in Figure 4-14), as well as those along Route 4/202 in the Critical Rural zone (Segment 1 in Figure 4-15), that locates new development in areas nearer the town center such as the Village and Village Growth Districts.

Figures 4-14 and 4-15 show corridor segments and adjacent zoning districts, which are:

- Center Village District
- Commercial District
- Critical Rural
- Resource Protection District
- Rural Residential District
- Village District

Table 4-2: Alfred – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 111/202				Routes 4/202				Notes
	9	10	11	12	1	2	3	4	
Reduce the number of vehicle trips generated along highways									
Limit intensity of development abutting highways	S	—	E	S	S	—	—	S	Segments 2, 3, and 10 are located in zoning districts where limiting the intensity of highway development would be difficult because development is already relatively intense for the area.
Transfer development rights	—	—	S	E	—	—	—	—	Transfer of development rights is appropriate for residential and commercial zones in rural areas away from the town center that are lightly developed.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	—	—	—	S	—	S	—	S	This is an appropriate technique for roadway segments that are moderately developed.
Incorporate site features that support ridesharing and transit use	—	—	—	—	—	—	—	—	Alfred currently lacks public transit service.
Encourage access from roads other than the highway									
Require access from streets other than the abutting highway	S	S	S	S	S	S	—	S	Segment 3 and the adjacent Center Village district have alternate local street access.
Require wider frontages on highways than on other roadways	C	—	C	—	C	C	—	C	Wider frontages would not be appropriate for segments located in a traditional town center.
Improve street interconnectivity and local traffic circulation									
Require the construction of rear lot access drives and/or backage roads	—	—	—	E	—	—	—	E	This technique is generally appropriate for areas zoned commercial.
Encourage interconnected parking lots on adjacent parcels	—	—	—	S	—	S	—	S	This technique is generally appropriate for areas zoned commercial or zones where commercial uses are allowed.
Require off-highway frontage for new subdivision lots or a limited number of highway lots	C/S	C	C/S	C/S	C/S	C/S	C	C/S	This technique applies to all segments.
Extend subdivision streets to abutting parcels	S	—	S	S	S	S	—	S	Subdivisions are not applicable to segments in the Center Village district.

C= Current, S=Standard, E=Enhanced, — =Not Applicable

Road Segment #:	Route 111/202				Routes 4/202				Notes
	9	10	11	12	1	2	3	4	
Manage the frequency and operation of access points									
Encourage shared access for abutting lots	S	S	S	S	S	S	—	S	Shared access would not apply to the already built up Center Village district.
Minimize the number of driveways per parcel on highway frontage	C	C	C	C	—	—	—	—	This technique is most appropriate for the more heavily used Route 111 corridor.
Promote right turn only driveways	S	S	S	S	S	S	—	S	Right turn only driveways are generally not an appropriate technique for traditional town centers.
Require access plans for large developments	S	—	S	S	—	S	—	S	Large developments are not encouraged or allowed in zoning districts adjacent to segments 1, 3, and 10.

C= Current, S=Standard, E=Enhanced, — =Not Applicable

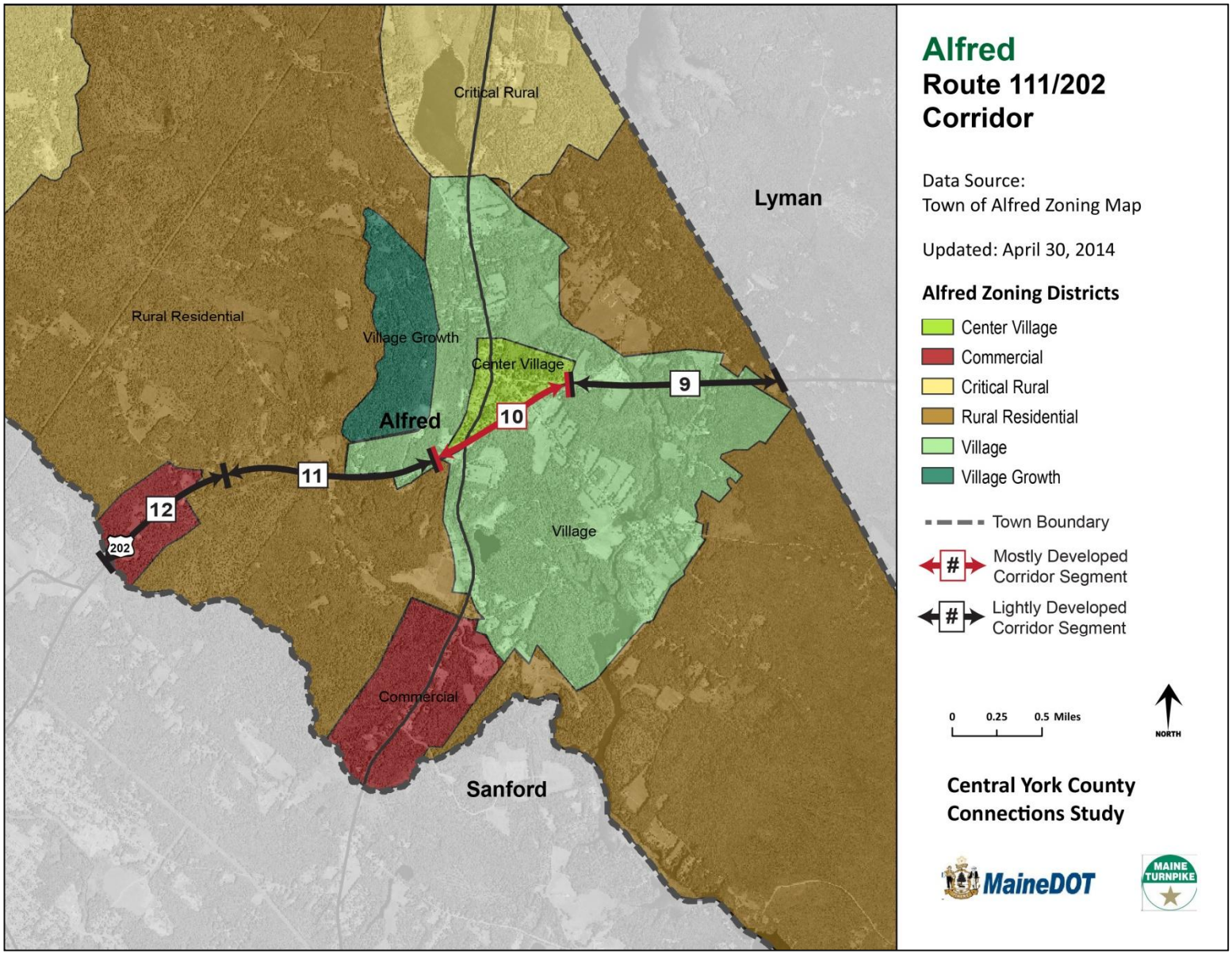


Figure 4-14: Alfred Route 111/202 Corridor Segments

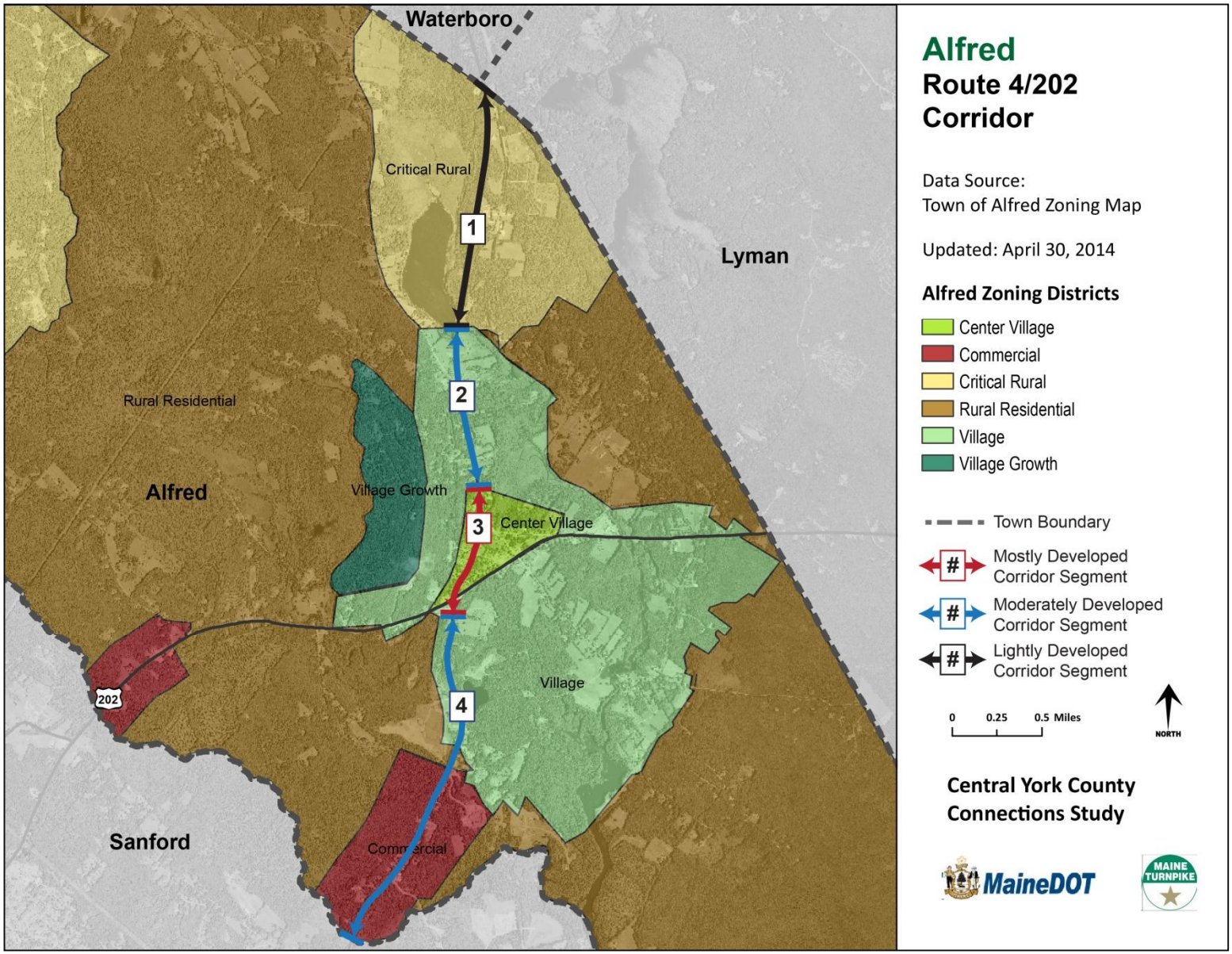


Figure 4-15: Alfred Route 4/202 Corridor Segments

Arundel

Most of the Route 111 corridor through Arundel is zoned Rural R-4. This district has large frontage requirements for lots along Route 111 (250-foot minimum). In addition, the Town requires lots in a subdivision to have the required frontage on an internal street rather than on an arterial. This provides a substantial amount of access control in most of the Arundel portion of the corridor. The portion of the corridor from the Biddeford line westerly through the New Road/Old Alfred Road intersection is zoned CCN. The CCN allows a wide range of non-residential uses and has few access controls.

Table 4-3 summarizes those measures that could have applicability in Arundel. These include:

- In the CCN District, the Town could consider revising the allowed uses to limit retail, office, and service uses to those that have limited peak hour trip generation.
- In the CCN District, the Town could consider requiring new uses to have their vehicular access from streets other than Route 111 where that is feasible.
- The Town could consider requiring new lots that front on Route 111 that are not part of a subdivision to use shared access where feasible and to remove/revise ordinance provisions that prohibit shared or common driveways along the property line.

Figure 4-16 shows Route 111 corridor segments and adjacent zoning districts, which are:

- BI: Business/Office Park/Industrial District
- CCN: Community Commercial North District
- CCS: Community Commercial South District
- HC: Highway Commercial District
- NRC: Natural Resource Conservation District
- R-1: Urban Residential District
- R-2: Suburban Residential District
- R-4: Rural Conservation District

Table 4-3: Arundel – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 111		Notes
	3	4	
Reduce the number of vehicle trips generated along highways			
Limit intensity of development abutting highways	—	—	Limiting the intensity of development along Route 111 is not being sought by the town.
Transfer development rights	E	E	TDR is an appropriate technique for both segments.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	E	—	Only land in the Community Commercial North zone (CCN) would likely generate enough traffic to warrant use of this technique.
Incorporate site features that support ridesharing and transit use	S	—	Development that supports ridesharing and transit use is not likely in the R-4 Rural Conservation District.
Encourage access from roads other than the highway			
Require access from streets other than the abutting highway	S	S	Appropriate for both segments.
Require wider frontages on highways than on other roadways	C/S	C/S	Appropriate for both segments.
Improve street interconnectivity and local traffic circulation			
Require the construction of rear lot access drives and/or backage roads	E	—	Only appropriate for segments where land is zoned for more intensive development (CCN).
Encourage interconnected parking lots on adjacent parcels	S	—	Only appropriate for segments where land is zoned for more intensive development (CCN).
Require off-highway frontage for new subdivision lots or a limited number of highway lots	S	S	Appropriate for both segments.
Extend subdivision streets to abutting parcels	S	S	Appropriate for both segments.
Manage the frequency and operation of access points			
Encourage shared access for abutting lots	S	S	Appropriate for both segments.
Minimize the number of driveways per parcel on highway frontage	C	C	Appropriate for both segments.
Promote right turn only driveways	S	S	Appropriate for both segments.
Require access plans for large developments	—	S	Only applicable for segments where land is zoned for more intensive development (CCN).

C= Current, S=Standard, E=Enhanced, — =Not Applicable

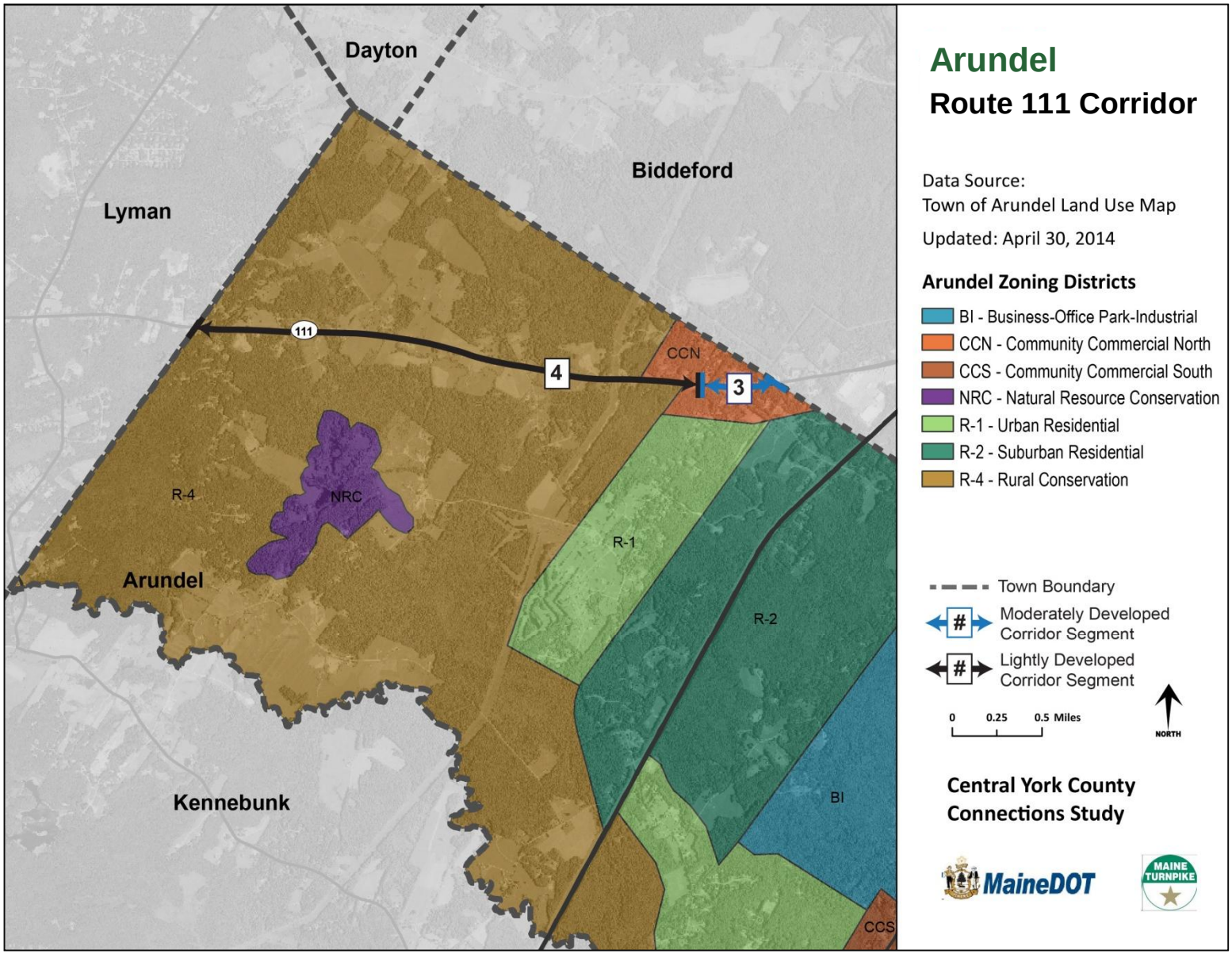


Figure 4-16: Arundel Route 111 Corridor Segments

Biddeford

The City of Biddeford has access management provisions and development review procedures in place that address the Route 111/202 corridor. Table 4-4 summarizes those measures that could have applicability in Biddeford. These include:

- In the portion of the corridor west of the Shops at Biddeford Crossing development (Segment 1 on Figure 4-17), the City could consider limiting the establishment of new uses that generate large volumes of peak hour traffic to control peak hour traffic volume and turning movements.
- The City could consider requiring new commercial uses along the corridor to have their access from an existing street or common access to avoid new curb cuts on Route 111.
- The City could also consider requiring the development of backage roads to allow access to and from multiple commercial sites to be concentrated at an existing street or common access road.

Figure 4-17 shows Route 111 corridor segments and nearby zoning districts in Biddeford, which are:

- B1: General Business
- B2: Highway Business
- CR: Coastal Residential
- I1: General Industrial
- I2: Airport Industrial
- I3: Commercial Industrial
- LRF: Limited Rural Farm
- M: Medical
- MSRD1: Commercial Core
- MSRD2: Residential Conservation
- MSRD3: High Density/Mixed Use
- OR: Office Residential
- R1A: Single Family Residential
- R2: Multi-Family
- R3: Mixed Residential
- RF: Rural Farm
- SR1: Suburban Residential

Table 4-4: Biddeford – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 111		Notes
	1	2	
Reduce the number of vehicle trips generated along highways			
Limit intensity of development abutting highways	—	—	Limiting the intensity of development abutting highways would not be applicable in the B2 Highway Business zoning district.
Transfer development rights	—	—	TDR is not applicable, since the area is already zoned for higher intensity Highway Business uses.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	—	E	Segment 2 is farther from I-95 and more lightly developed than Segment 1, so uses that generate less peak hour traffic would be appropriate there.
Incorporate site features that support ridesharing and transit use	S	S	Appropriate for both segments.
Encourage access from roads other than the highway			
Require access from streets other than the abutting highway	—	E	Land along Segment 1 is already developed (Shops at Biddeford) and future side streets in the area are unlikely in the near future.
Require wider frontages on highways than on other roadways	—	—	Frontages along Segments 1 and 2 are already wider (or zoned to be wider) than average for Biddeford.
Improve street interconnectivity and local traffic circulation			
Require the construction of rear lot access drives and/or backage roads	—	E	Land along Segment 1 is already developed (Shops at Biddeford). Retrofitting the Shops at Biddeford with backage roads is possible but unlikely in the near future.
Encourage interconnected parking lots on adjacent parcels	S	S	Appropriate for both segments.
Require off-highway frontage for new subdivision lots or a limited number of highway lots	—	—	Off-highway frontage would not apply in an area zoned B2 Highway Business.
Extend subdivision streets to abutting parcels	—	—	Subdivisions do not apply to the B2 Highway Business zone.
Manage the frequency and operation of access points			
Encourage shared access for abutting lots	—	—	Development along Segment 1 already has shared access (Shops at Biddeford). Development along Segment 2 has a mix of low-density residential and commercial uses not intense or close together enough for shared access.
Minimize the number of driveways per parcel on highway frontage	—	S	The number of driveways along Segment 1 has already been minimized.
Promote right turn only driveways	S	S	Appropriate for both segments.
Require access plans for large developments	S	S	Appropriate for both segments.

C= Current, S=Standard, E=Enhanced, — =Not Applicable

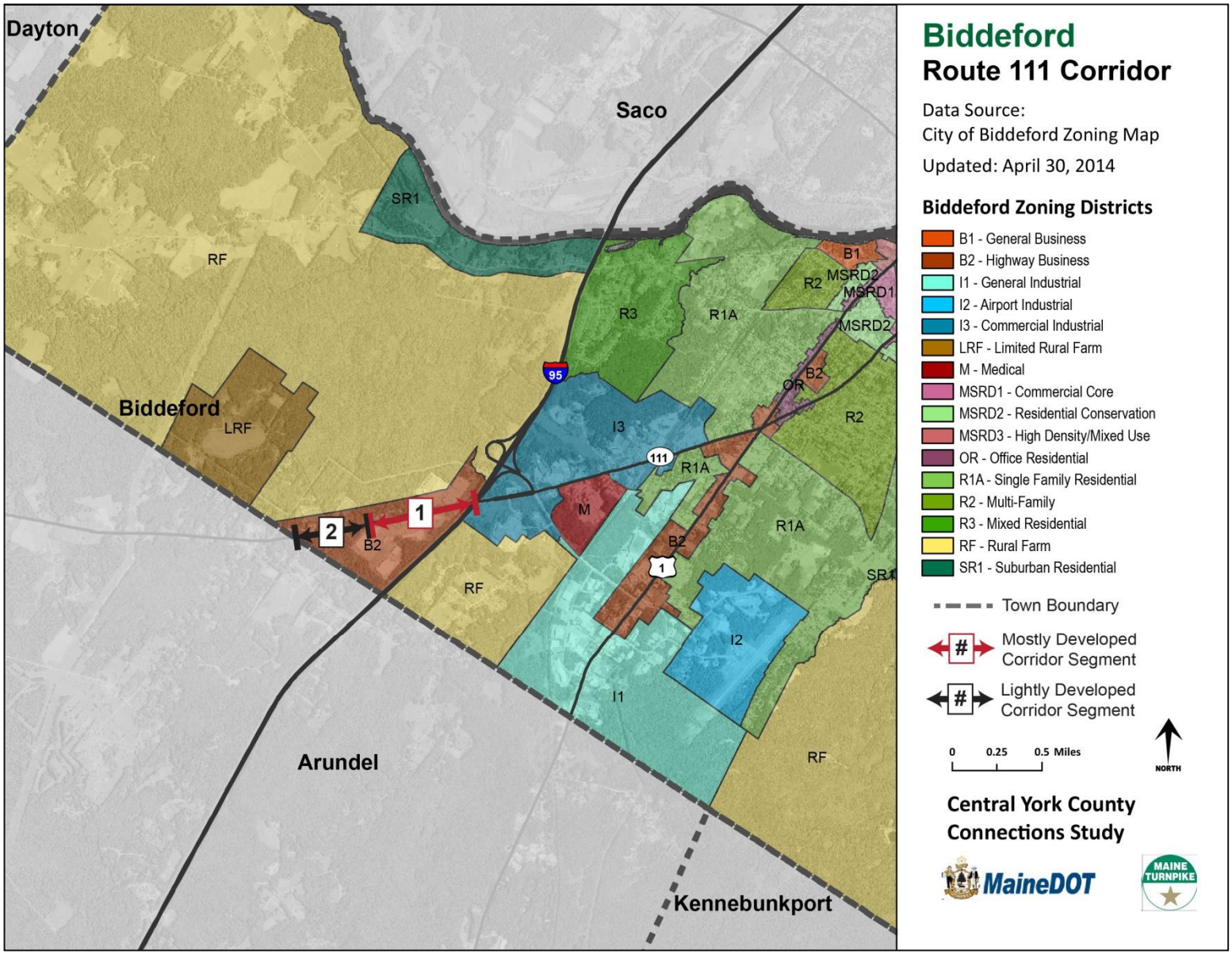


Figure 4-17: Biddeford Route 111 Corridor Segments

Lyman

The Town's large frontage requirement (minimum of 300') for lots along Route 111 minimizes the potential for the creation of new lots. However, a substantial portion of the corridor allows a wide range of non-residential uses that creates the potential for large volumes of peak hour traffic and/or turning movements. Table 4-5 summarizes those measures that could have applicability in Lyman, including:

- In the General Purpose District that covers the western portion of the Route 111 corridor, the Town could consider revising the allowed uses to limit retail, and service uses to those that have limited peak-hour trip generation. This may translate into uses that generate fewer than five trip ends per 1,000 square feet of gross floor area during either the AM or PM peak (estimated per the Institute of Traffic Engineers Trip Generation Manual). This would allow small specialty retail, offices, some services, used car sales, etc. but prohibit the high trip generators like fast food, banks with drive-thrus, convenience stores, as well as other uses like office and business parks.
- The Town could reconsider the creation of the Commercial District. While this district was intended to allow limited commercial development with access controls, it is not clear that it will achieve that purpose.
- If the Commercial District is retained unchanged, the Town could revisit its earlier attempt to implement the backage road with revised standards (e.g. a 400' distance from Route 111 rather than the longer distance previously proposed). If this is not achievable, then allowing commercial uses but adopting regulations that ensure a high level of access management (including pre-planning for access points, shared/common access, interconnected parking lots, etc.) is recommended.

Figure 4-18 shows Route 111 corridor segments and nearby zoning districts in Lyman, which are:

- Commercial District
- General Purpose District
- Residential District
- Shoreland District

Table 4-5: Lyman – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 111				Notes
	5	6	7	8	
Reduce the number of vehicle trips generated along highways					
Limit intensity of development abutting highways	—	—	—	—	Limiting the intensity of development abutting highways is not specified for the General Purpose and Commercial zoning districts.
Transfer development rights	S	S	E	E	TDR is appropriate for zones all segments given the generally open and rural character of the town.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	S	S	S	S	Appropriate for all segments.
Incorporate site features that support ridesharing and transit use	S	—	S	—	Segment 6 is already developed, while Segment 8 will likely continue to have land uses that are too low in density to support ridesharing or transit as currently zoned.
Encourage access from roads other than the highway					
Require access from streets other than the abutting highway	S	S	S	S	Appropriate for all segments.
Require wider frontages on highways than on other roadways	—	—	—	—	Segment 6 is developed. Segments 5 and 7 have existing low intensity commercial uses where larger minimum frontages would not yield a worthwhile traffic benefit (already 200 feet for the Commercial zone). The General Purpose zoning district along Segment 8 already has largest minimum frontage in the Town of Lyman Zoning Ordinance (375 feet).
Improve street interconnectivity and local traffic circulation					
Require the construction of rear lot access drives and/or backage roads	—	E	—	—	Rear lot backage roads would only be beneficial where intensive commercial development is anticipated or planned.
Encourage interconnected parking lots on adjacent parcels	S	—	S	—	Segment 6 is already developed, while Segment 8 in the General Purpose district is unlikely to attract levels of commercial development that would warrant interconnected parking lots for access management.
Require off-highway frontage for new subdivision lots or a limited number of highway lots	S	—	S	S	Segment 6 is already developed.
Extend subdivision streets to abutting parcels	S	S	S	S	Appropriate for all segments.

Road Segment #:	Route 111				Notes
	5	6	7	8	
Manage the frequency and operation of access points					
Encourage shared access for abutting lots	S	S	S	S	Appropriate for all segments.
Minimize the number of driveways per parcel on highway frontage	S	—	S	—	Not appropriate for Segments 6 and 8 because of existing development and low intensity of development on Segment 8, respectively.
Promote right turn only driveways	S	S	S	S	Appropriate for all segments.
Require access plans for large developments	S	—	S	S	Segment 6 is already developed.

C= Current, S=Standard, E=Enhanced, — = Not Applicable

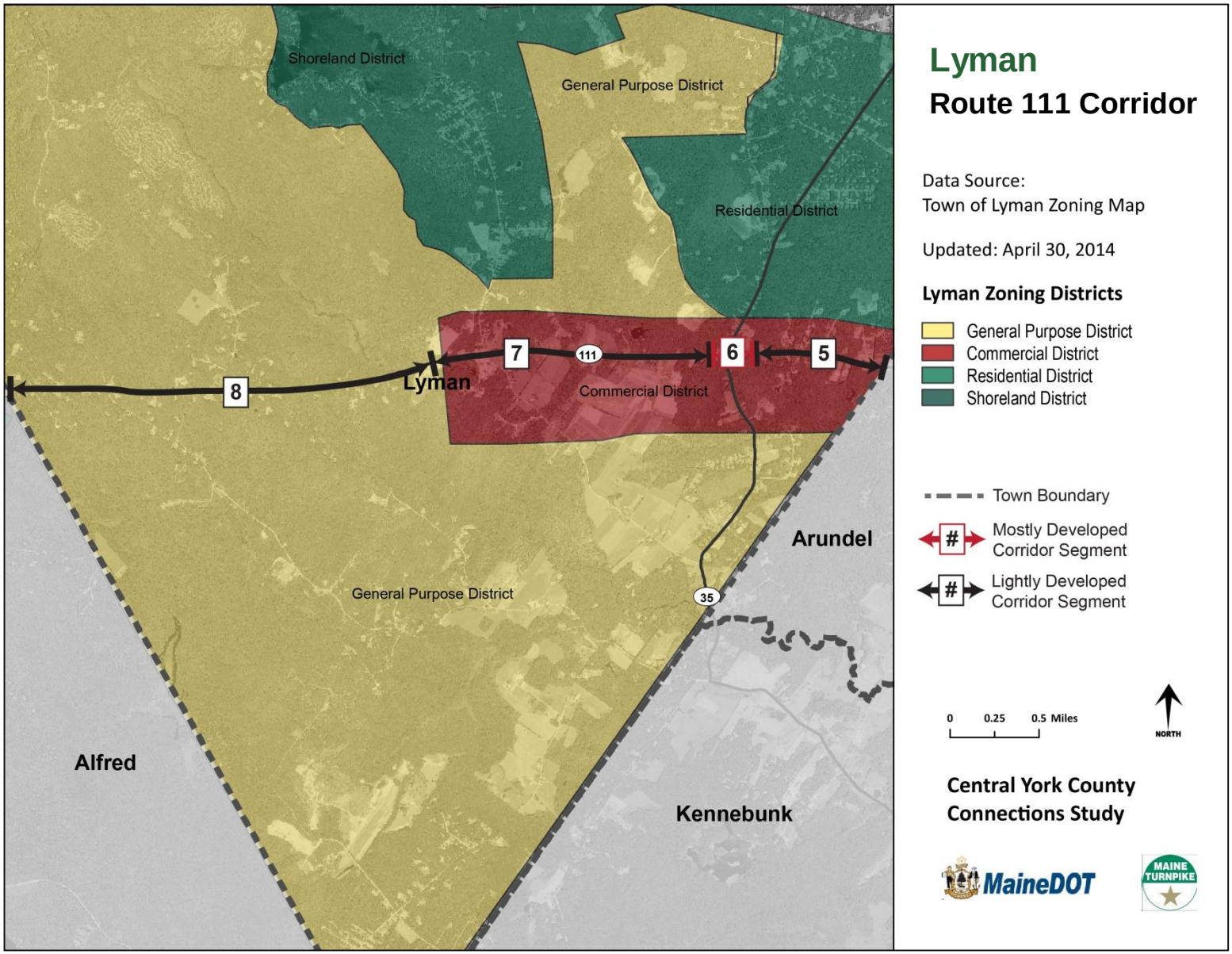


Figure 4-18: Lyman Route 111 Corridor Segments

Sanford

Sanford has a wide range of access management approaches in place and is actively using them to manage the impact of new development/redevelopment on the various arterial corridors. This includes requiring access from backage roads or means other than the abutting highway, implementation of a future thoroughfare plan concept, and shared driveway provisions.

The downtown area exhibits typical town center development patterns and access is already fairly well established. Redevelopment activity may create the opportunity to improve access provisions on a case by case basis, however. This analysis focused on the outlying segments which are currently less intensely developed. Table 4-6 summarizes those measures that could have applicability in Sanford. Considerations specific to Sanford include:

- Requirement of features in larger site developments to encourage or simplify use of ridesharing, bus, walking or transit are particularly applicable given the higher intensity of development in Sanford and access to transit services.
- Requiring extension of subdivision streets and interconnection of parcels could help further develop the street grid.
- On busy segments of highway, particularly those with more than one-lane in each direction or near major intersections, restricting turning movements to right-turn only could be considered.

Figures 4-19 through 4-21 show Route 111, Route 109 and Route 202/4 corridor segments and nearby Sanford zoning districts, which are:

- AD: Airport Development
- CC: Commercial Center
- CZ: Contract Zone
- DB: Downtown Business
- GR: General Residential
- IB: Industry and Business
- IR: Industrial Reuse
- OR: Office Residential
- ORBP: Office, Research and Business Park
- RD: Residential Development
- RMU: Rural Mixed Use
- RR: Rural Residential
- SB: Suburban Business
- SFR: Single Family Residential
- UB: Urban Business

Table 4-6: Sanford – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 202		Routes 4			Route 109				Notes
	13	14	5	6	7	1	2	3	4	
Reduce the number of vehicle trips generated along highways										
Limit intensity of development abutting highways	—	—	E	S	E	S	S	S	E	Land along Segments 13 and 14 is zoned for high intensity development.
Transfer development rights	—	—	S	—	S	—	—	—	S	TDR is not appropriate for Segments 13 and 14 because land there is fairly close to the city center and zoned for commercial and office/research/business uses; segment 6 is already moderately developed; segments 1, 2, and 3 are zoned for commercial, business, industrial, and airport uses.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	E	—	E	—	E	—	—	—	E	Land along segments 1, 2, 3, 6, and 14 is already zoned for higher intensity uses.
Incorporate site features that support ridesharing and transit use	S	S	S	S	S	S	S	S	S	Appropriate for all segments.
Encourage access from roads other than the highway										
Require access from streets other than the abutting highway	C/S	C/S	C/S	C	C/S	C	C	C	C/S	Appropriate for all segments.
Require wider frontages on highways than on other roadways	—	—	—	—	—	—	—	—	—	Wider frontages on highways would not be appropriate due to current zoning and small parcels with diverse land ownership along the segments.
Improve street interconnectivity and local traffic circulation										
Require the construction of rear lot access drives and/or backage roads	E	E	E/C	E/C	E/C	E/C	E/C	E/C	E	Appropriate for all segments.
Encourage interconnected parking lots on adjacent parcels	S	S	S	C/S	S	C	C/S	C/S	S	Appropriate for all segments.
Require off-highway frontage for new subdivision lots or a limited number of highway lots	C	C	C	C	C	C	C	C	C	Appropriate for all segments.
Extend subdivision streets to abutting parcels	S	S	S	S	S	S	S	S	S	Appropriate for all segments.

Road Segment #:	Route 202		Routes 4			Route 109				Notes
	13	14	5	6	7	1	2	3	4	
Manage the frequency and operation of access points										
Encourage shared access for abutting lots	S	S	C/S	C	C/S	C	C	C	S	Appropriate for all segments.
Minimize the number of driveways per parcel on highway frontage	C/S	C/S	C/S	—	C/S	—	—	—	—	Segment 6 is moderately developed with a diversity of land ownership; Segments 1, 2, 3, and 4 would not be appropriate for minimizing the number of driveways because of current zoning and small parcels with diverse ownership.
Promote right turn only driveways	S	S	S	S	S	S	S	S	S	Appropriate for all segments.
Require access plans for large developments	S	S	S	S	S	S	S	S	S	Appropriate for all segments.

C= Current, S=Standard, E=Enhanced, — =Not Applicable

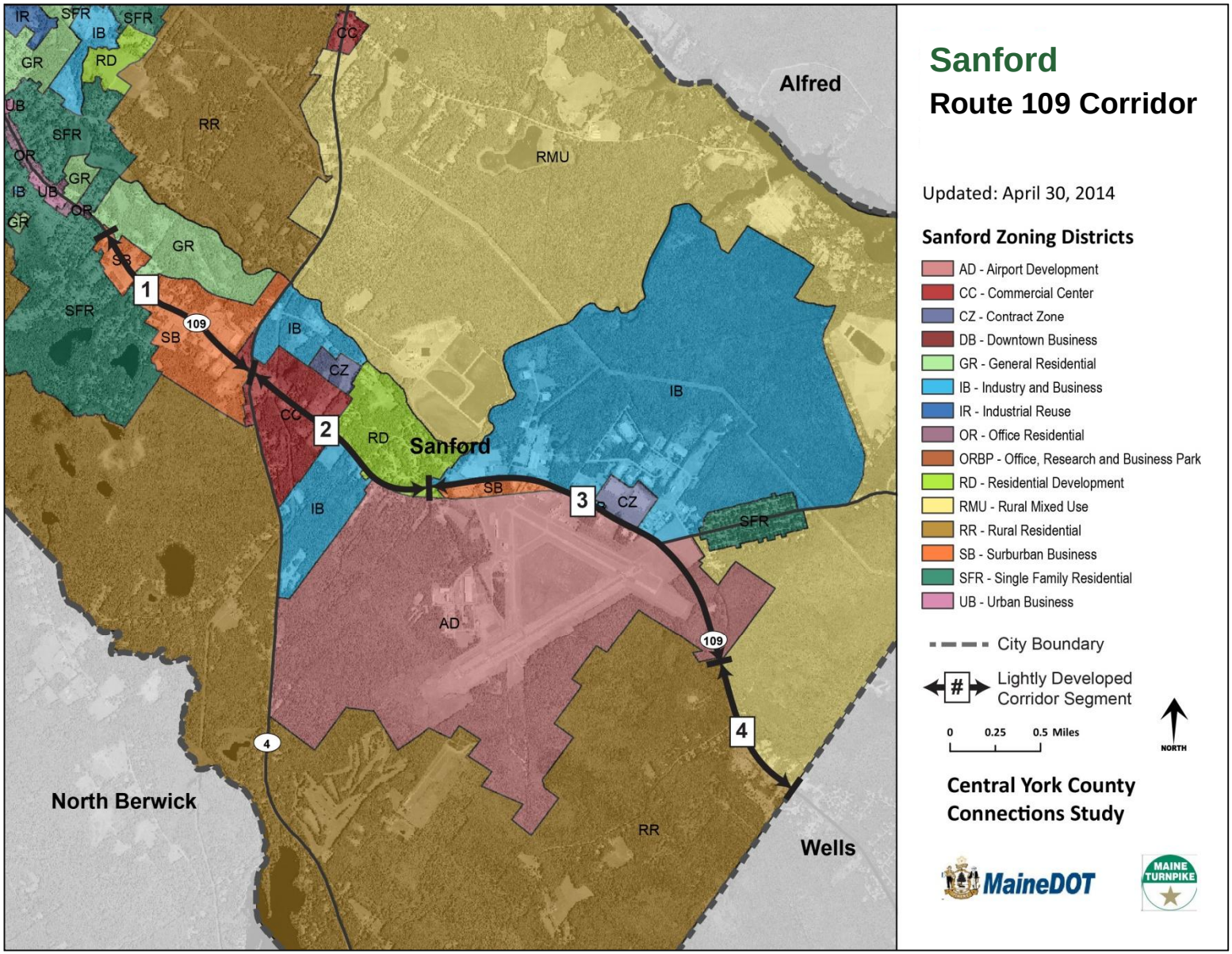


Figure 4-19: Sanford Route 109 Corridor Segments

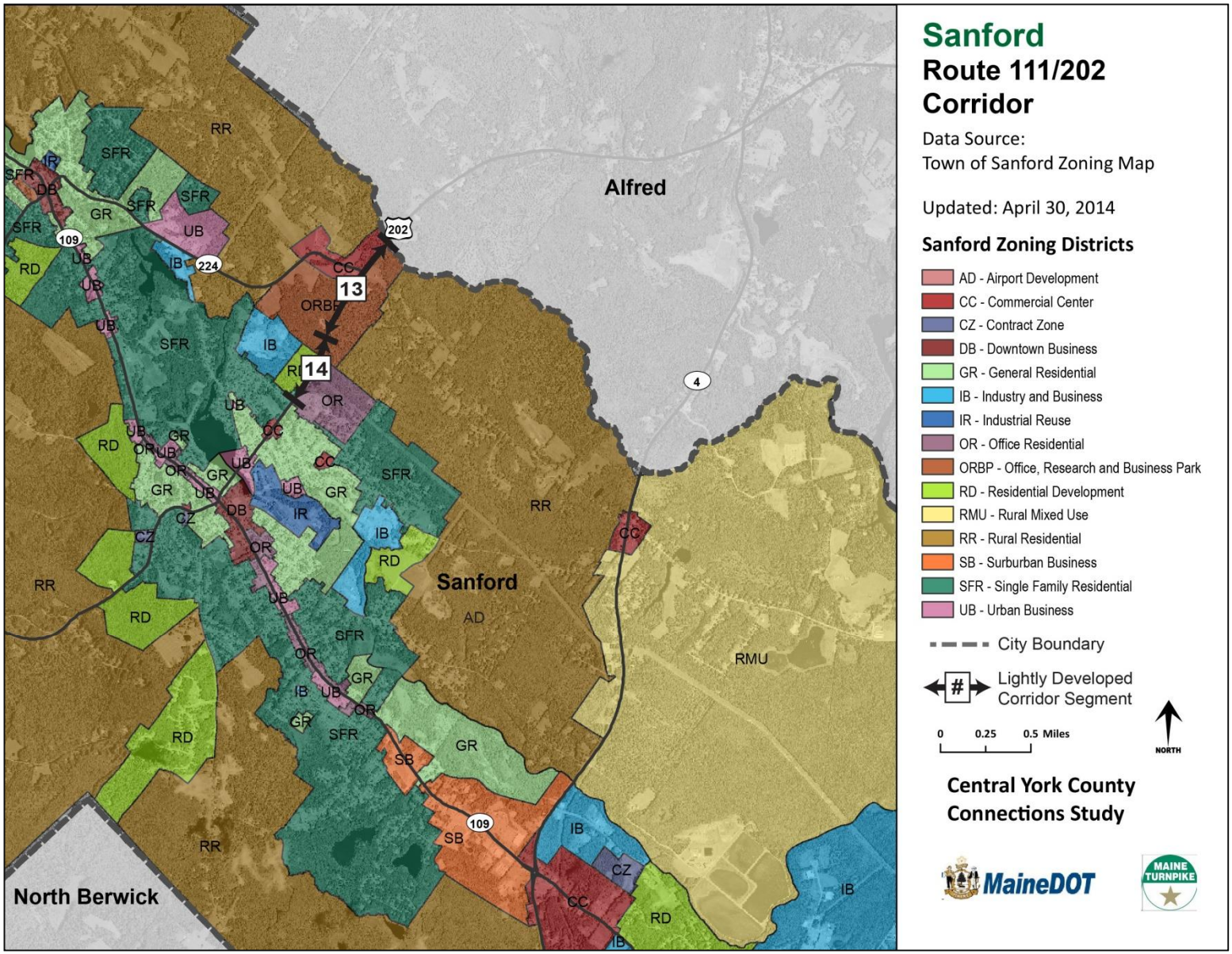


Figure 4-20: Sanford Route 202 Corridor Segments

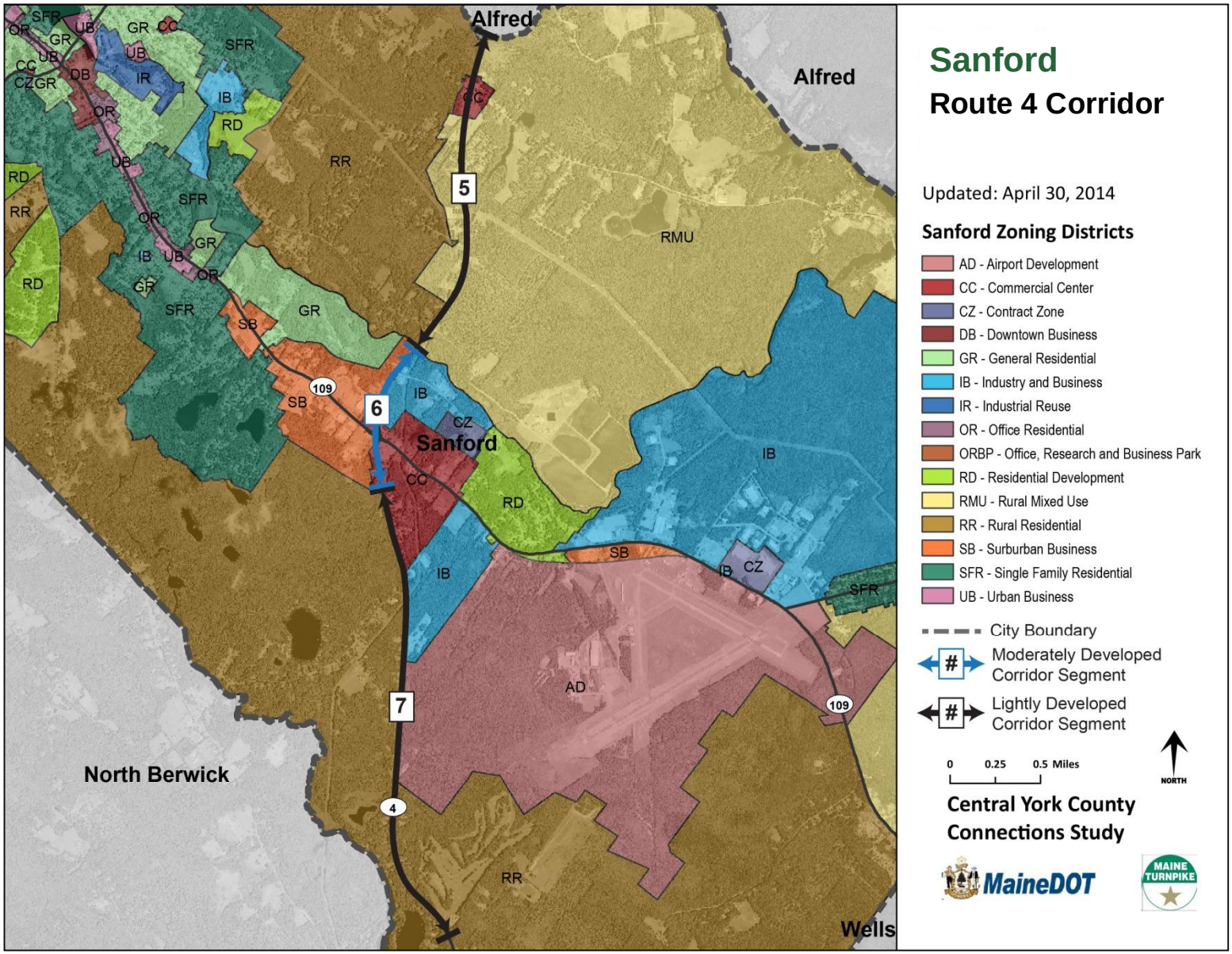


Figure 4-21: Sanford Route 202/4 Corridor Segments

Wells

The Town of Wells has a number of access management and land use techniques in place. Table 4-7 summarizes those measures that could have applicability in Wells. Pertinent to these recommendations are the following observations:

- A portion of the Route 109 Corridor is zoned Rural. This district allows convenience stores and modest-scale restaurants both of which have the potential for generating significant amounts of peak hour turning movements. The Town should consider reviewing the appropriateness of these uses on lots that have their vehicular access on Route 109.
- Other portions of the Route 109 corridor are zoned RA. The RA District currently allows lots fronting on Route 109 with a minimum of 125' of frontage. While there are currently limited areas with development potential that are zoned RA, the Town could consider increasing the lot frontage requirement for lots that front on Route 109 to be at least twice what is required on interior streets.
- In the Residential-Commercial District (RC), non-residential uses are generally limited to a maximum of 5,000 square feet of floor area. To minimize the traffic impact of additional development, the Town could consider revising the allowed uses to limit retail, office, and service uses to those that have limited peak hour trip generation.
- In addition, the Town could consider limiting lots in the Residential-Commercial District (RC) to one curb cut (or one two-way entrance) unless the lot has significant frontage (more than 400'). MaineDOT Access Management rules state that except for forestry management and farming activities, lots on Mobility Corridors (including Route 109 in Wells) will be limited to one two-way or two one-way entrances, unless a waiver is granted. Two-way entrances are recommended for the Residential-Commercial District in order to minimize the number of driveway crossings by pedestrians and bicyclists in the neighborhood.
- The Town currently has a provision for the interconnection of streets in subdivisions but this does not apply in rural areas. The Town could consider applying this requirement to rural subdivisions along the Route 109 corridor.

Figure 4-22 shows Route 109 corridor segments and nearby zoning districts in Wells, which are:

- AP: Aquifer Protection District
- GB: General Business District
- LI: Light Industrial District
- QM: Quarry Manufacturing District
- R: Rural
- RA: Residential A District
- RC: Residential Commercial District
- RP: Resource Protection
- TC: Transportation Center

Table 4-7: Wells – Land Use and Access Management Applicability Matrix

Road Segment #:	Route 109		Notes
	5	6	
Reduce the number of vehicle trips generated along highways			
Limit intensity of development abutting highways	E	S	Appropriate for both segments.
Transfer development rights	S	S	Appropriate for both segments.
Limit the use of land fronting highways to those that generate low levels of peak hour traffic volumes	S	S	Appropriate for both segments.
Incorporate site features that support ridesharing and transit use	S	S	Appropriate for both segments.
Encourage access from roads other than the highway			
Require access from streets other than the abutting highway	S	S	Appropriate for all segments.
Require wider frontages on highways than on other roadways	S	—	Segment 6 is already moderately developed.
Improve street interconnectivity and local traffic circulation			
Require the construction of rear lot access drives and/or backage roads	E	E	Appropriate for both segments.
Encourage interconnected parking lots on adjacent parcels	S	S	Appropriate for both segments.
Require off-highway frontage for new subdivision lots or a limited number of highway lots	C	—	Segment 6 is already moderately developed.
Extend subdivision streets to abutting parcels	S	S	Appropriate for both segments.
Manage the frequency and operation of access points			
Encourage shared access for abutting lots	—	—	Shared access between lots would not apply since Segment 6 is already moderately developed and Segment 5 is zoned for lower intensity rural and residential uses that would not benefit from shared access.
Minimize the number of driveways per parcel on highway frontage	S	S	Appropriate for both segments.
Promote right turn only driveways	S	S	Appropriate for both segments.
Require access plans for large developments	S	S	Appropriate for both segments.

C= Current, S=Standard, E=Enhanced, — = Not Applicable

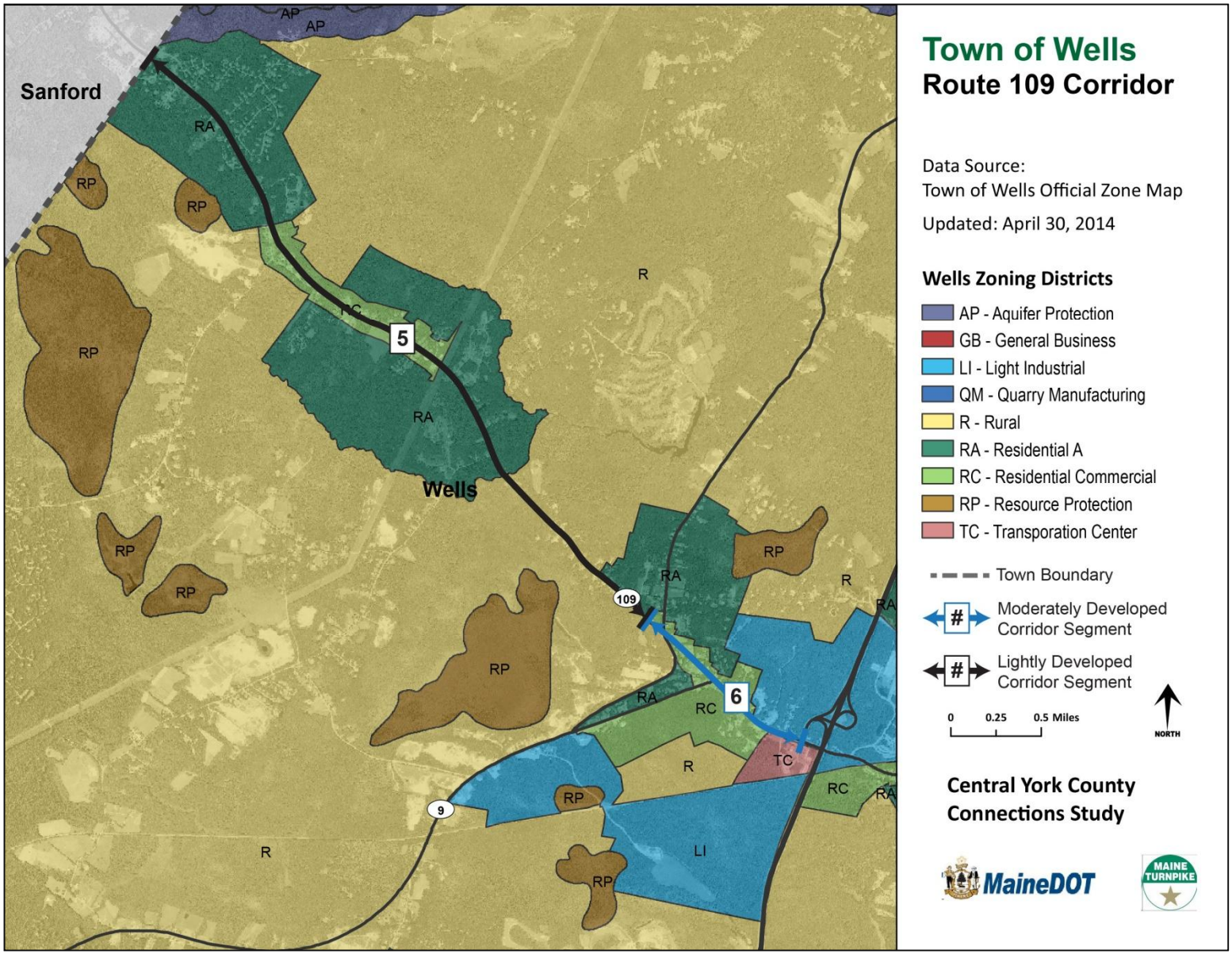


Figure 4-22: Wells Route 109 Corridor Segments

Chapter 5: PUBLIC TRANSPORTATION AND TRAVEL DEMAND MANAGEMENT

Background

This chapter considers the role that public transportation fills in providing access to and mobility within the CYCCS study area. Currently, public transportation in the CYCCS study area consists of transit systems operated by the York County Community Action Corporation (YCCAC) and ShuttleBus, as well as Amtrak Downeaster passenger rail service. Intercity bus service does not currently operate in York County. Potential improvements to existing services and facilities could include strategies to expand service to new areas, increase the frequency of service, improve the operating characteristics of services or improve access to services. Existing public transportation services in York County are summarized in Table 5-1.

Transportation Demand Management (TDM) strategies, which involve strengthening programs that are designed to encourage use of alternatives to Single Occupant Vehicle (SOV) travel (i.e., driving alone), are also reviewed. These can include actions such as improving information available to travelers about carpooling or developing programs that provide commuters with incentives to travel by non-SOV modes.

Another category of potential actions—Transportation Systems Management (TSM)—involves strategies designed to get the most out of the existing transportation system by improving operating efficiency. Improved traffic signal operations, programs to more quickly clear crashes and obstructions and highway traveler information systems are examples of TSM strategies. In some cases, TSM strategies can improve the operating efficiency of transit services, or make transit easier and more convenient to use.

These strategies share the common objective of providing travel accessibility and managing the transportation system without expanding highway capacity. Instead, their focus is on reducing the number of vehicle trips made and/or improving the efficiency of the transportation system. TDM and TSM strategies are also typically lower cost and have fewer adverse impacts than capacity expansion options. Public transportation and TDM strategies provide travel choices other than driving alone. These are particularly important options for those who cannot or choose not to drive or do not have access to a personal automobile.

Existing Conditions

Existing public transportation services in the CYCCS study area include programs operated by the York County Community Action Corporation (YCCAC) and services operated by ShuttleBus, which operates locally in the Biddeford area and connects Biddeford to Portland. In addition, intercity passenger rail service is provided by Amtrak's Downeaster service, which travels between Boston and Portland and has stops in Wells and just east of the study area in Saco. Figure 5-1 provides an overview of the transit and other public transportation services available in the study area.

Table 5-1: Public Transportation in the CYCSS Study Area

Service Name	Provider	Type of Service	Key Destinations	Frequency
Downeaster[1]	Amtrak	Intercity Passenger Rail	Brunswick, Portland, Boston (North Station)	5 Round Trips, Daily
Sanford Ocean Shuttle	YCCAC	Fixed Route Local Bus	Sanford, Wells Amtrak Station, Wells Beach (summer only)	6 Round Trips, Daily
WAVE	YCCAC	Fixed Route, Reservation-only Van*	Sanford and Wells (Schools, Shopping, and Medical)	Every 1–2 Hours, Daily
Sanford Transit	YCCAC	Fixed Route Bus	Springvale, Sanford, Goodall Hospital	Hourly, Weekdays
YCCAC Bus and Van Program	YCCAC	Fixed Route, Reservation-only Van*	N/A[2]	Rotating Schedule
Shoreline Explorer and Shuttles	YCCAC	Fixed Route Shuttle Bus (multi-line system)	York, Ogunquit, Wells, Kennebunk, Kennebunkport, Sanford	Every 20–60 Minutes, Summer-only
Zoom Turnpike Express	YCCAC	Fixed Route Commuter Bus	Downtown Portland, Saco, Biddeford	5 Round Trips, Weekdays
ShuttleBus Intercity / Portland Service	ShuttleBus for MaineDOT and MTA	Fixed Route, Limited Stop Bus	Biddeford and Saco (limited service), Old Orchard Beach, Scarborough, Maine Mall, Downtown Portland	7 Round Trips Weekdays 5 Round Trips Weekends
Tri-City / Local Service (ShuttleBus Local)	ShuttleBus for MaineDOT and MTA	Fixed Route Local Bus	Shops at Biddeford, Saco Amtrak Station, Old Orchard Beach	6 Round Trips Weekdays 4 Round Trips Saturdays
UNE Shuttle	ShuttleBus for MaineDOT and MTA	Fixed Route, Limited Stop Bus	Shops at Biddeford, Saco Amtrak Station, University of New England	Every 30-90 Minutes, Weekdays 8 Round Trips Saturdays 5 Round Trips Sundays

1. Amtrak trains stop in downtown Saco (adjacent to Biddeford in the CYCSS Study Area) and at the Wells Transportation Center
2. Serves all of York County

*Principally intended for social service use, including transportation to/from shopping centers and medical offices

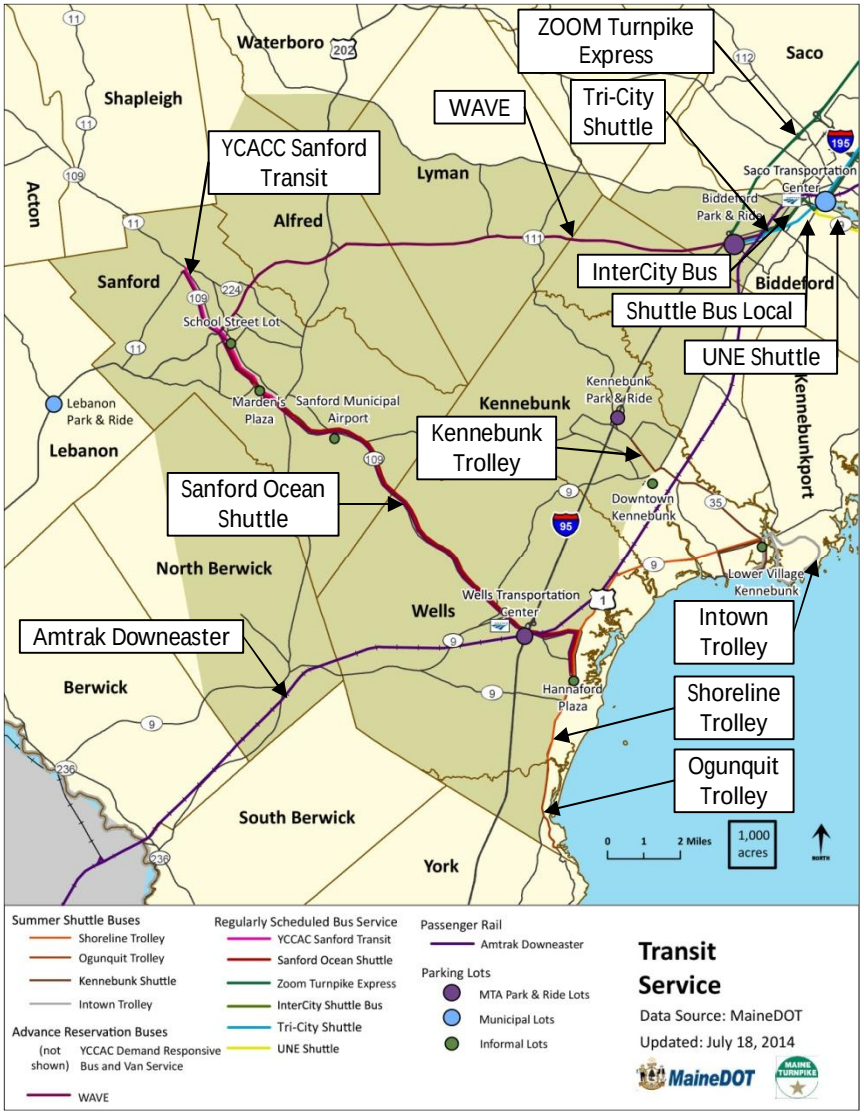


Figure 5-1: Public Transportation in the CYCCS Study Area

Public Transit

York County Community Action Corporation (YCCAC)

York County Community Action Corporation (YCCAC) is a non-profit organization that provides a broad range of social services in York County. YCCAC operates several public transportation services within the CYCCS study area. The Sanford Ocean Shuttle and WAVE services are the primary routes connecting central York County with the coastal region. YCCAC services include:

- Sanford Ocean Shuttle: The Sanford Ocean Shuttle is part of the Shoreline Explorer (described below) and is the only route that operates daily year-round on a fixed route that generally follows the Route 109 corridor between Sanford and Wells. Six trips are scheduled on weekdays with service staring at 6:00 AM. Six return trips from Wells operate until 7:00 PM (last departure). The Sanford Ocean Shuttle serves the Wells Transportation Center and is scheduled to meet most Amtrak Downeaster trains and also connects to Sanford Transit at the Shaw's Shopping Center in Sanford (South of Marden's Plaza in Figure 5-1). During summer months, Sanford Ocean Shuttle riders may also connect to the Shoreline Explorer (described below) at Hannaford's in Wells. Fares are $3 one-way and $5 round-trip, with a variety of passes, discounts and transfers available.
- WAVE: The Wheels to Access Vocation and Education (WAVE) service is a daily service that requires a reservation 24 hours in advance. The WAVE operates between Sanford and Wells (6:00 AM to 9:00 PM) and Sanford and Biddeford (7:00 AM to 10:00 PM), providing access to major shopping areas, employment centers, schools, and medical facilities.

Fares are $3 one-way and $5 round-trip, with a variety of passes, discounts and transfers available.

- Sanford Transit: Local bus service in Sanford—including Springvale and South Sanford—is provided by the YCCAC's Sanford Transit service. Sanford Transit operates generally along the Route 109 corridor and can be flagged down anywhere along the route (provided it is safe to do so). Service runs at one-hour intervals weekdays between 8:00 AM and 3:00 PM. Fares are $1.00 for the general public, and $0.50 for children under 8, the elderly or those with disabilities. Multi-passes are available at discounted cost.
- YCCAC Bus and Van Program: YCCAC operates a reservation-based system aimed primarily at serving medical and shopping trips. This service operates throughout York County on a rotating schedule. Fares are based on the type of trip and the rider's ability to pay.
- Shoreline Explorer and Shuttles: YCCAC operates several trolley and shuttle services in coastal communities. These operate during summer months only (typically end of June through Labor Day), except for the Sanford Ocean Shuttle described previously. Summer shuttles that operate within some portion of the CYCCS study area are:
  - The Shoreline Explorer, which links Ogunquit, Wells and Kennebunk with transfers to the Ogunquit Trolley, Sanford Ocean Shuttle and Kennebunk Shuttle.
  - The Ogunquit Trolley, which operates in Ogunquit, connecting to the Shoreline Trolley (operated by the Ogunquit Trolley Company) and the York Trolley (operated by the York Trolley Company).
  - The Kennebunk Shuttle, which operates in Kennebunk, connecting to the Shoreline Trolley and Intown Trolley (another private trolley company) at the Lower Village near Kennebunk Beach.

Other connecting shuttles outside of the study area are the Intown Trolley in Kennebunkport and Kennebunk (primarily a sightseeing service) and the York Trolley connecting Wells to York.

Hours of operation, frequency and fares vary by service. The trolleys and shuttles provide a valuable service to tourists and locals in summer months by providing transportation options along the crowded Route 1 corridor during the peak season.

ShuttleBus

ShuttleBus operates four bus services serving Biddeford:

- Zoom Turnpike Express is a commuter service operating on the Maine Turnpike between Biddeford and Portland. Five round-trips operate during the morning commute, as well as the afternoon commutes. The one-way fare is $5 and free transfers to other ShuttleBus and Portland area bus routes are allowed. 10 ride and monthly fares are also available.
- Intercity Shuttle also connects Biddeford with Portland, making intermediate stops in Saco, Old Orchard Beach, Scarborough and South Portland. The Intercity Shuttle operates during commute periods on weekdays and with limited service on weekends (five trips per day with fewer stops). Fares vary by distance.

- Tri-city Shuttle (ShuttleBus Local) provides bus service within Biddeford, Saco and Old Orchard Beach.
- UNE Nor'easter provides public transit bus service from the University of New England to downtown Biddeford and the Saco Amtrak station with frequencies of generally one hour or less on weekdays. Weekend service generally runs every 90 minutes.

Amtrak Downeaster Passenger Rail

Amtrak's Downeaster passenger rail service operates five roundtrips daily between Portland and Boston with intermediate stops in Old Orchard Beach (summer only), Saco, and Wells, Maine; Dover, Durham, and Exeter, New Hampshire; and Haverhill and Woburn, Massachusetts. Service was extended east of Portland to Freeport and Brunswick in 2012.

During weekdays, the first southbound train (from Portland to Boston) departs the Wells Transportation Center at 5:59 AM and the last southbound train departs at 7:29 PM. The first northbound train (Boston to Portland) departs Wells at 10:53 AM and the last at 1:08 AM. Weekend schedules are similar.

The Wells Transportation Center includes an indoor station building and covered platforms. It has 186 general-purpose parking spaces, 7 handicapped spaces and 6 large spaces for oversize vehicles and buses. In 2012, the station accommodated 55,503 passenger boardings and alightings (16 percent of Amtrak passengers boarding or alighting in Maine).[12] Just east of the study area, the Saco Transportation Center includes an indoor station building and 192 parking spaces. Saco-Biddeford had 50,112 boardings and alightings in 2012 (15 percent of Maine Amtrak passengers).

Commute Patterns and Other Potential Travel Markets

In more rural settings such as York County, commuters typically make up a smaller share of transit patrons than in more developed, urbanized areas. Within the CYCCS study area, only the ShuttleBus ZOOM Express service is geared toward addressing the commuter market, offering fast connections between Biddeford and Portland. Other bus services, while carrying some commuters, are more generally focused on providing accessibility options for a broad range of users, including those who do not have a means of personal transportation.

To attract commuter trips, transit services usually need to be reasonably priced and time competitive with auto trips, provide for access to bus services by way of a network of bus stops and/or park and ride lots, have sufficient route coverage to provide access to job locations, and operate a schedule that accommodates riders' work day schedules (which can vary).

Improving transit as a commuter option would support many of the study's goals, including those related to economic development, expanding travel choices, and improving regional connections. This analysis looks at the potential for growing transit's share of the CYCCS commute market by considering existing commute patterns to gauge demand, as well as potential service characteristics to assess whether transit could compete with the automobile for a share of commute trips. Figure 5-2 illustrates the commute patterns from the Greater

[12] Amtrak Fact Sheet Fiscal Year 2012, State of Maine.

Sanford area[13] to other destinations both inside and outside the study area, taken from current US Census Bureau and Department of Labor data available at the OnTheMap website (http://onthemap.ces.census.gov/). Figure 5-3 shows the reverse commute; that is, workers who work in Sanford but live elsewhere. A number of conclusions can be drawn from this data, as described below.

The analysis also identifies other potential transit markets, such as medical institutions, schools, and other large trip generators. Riders who are using transit services for non-commuting purposes may have greater schedule flexibility and tolerance for longer travel times, but also in some cases may require door-to-door service due to personal mobility limitations or lack of auto access.

Sanford-Portland Commuters

Portland is the largest metropolitan area and jobs center in Maine. According to US Census and Department of Labor data, there are a significant number of commuters (1,108) who live in the Greater Sanford area and work in Portland. This includes residents of Acton and Shapleigh, who could potentially access bus service in Sanford, and Alfred and Lyman, or could access the WAVE as an on-demand service. By car, these travelers would typically take Route 111 to I-95 (Exit 32) and then continue on I-95 to Portland. Depending on their starting and ending location, a typical commute might cover 35-40 miles and take between 45 minutes to 55 minutes.

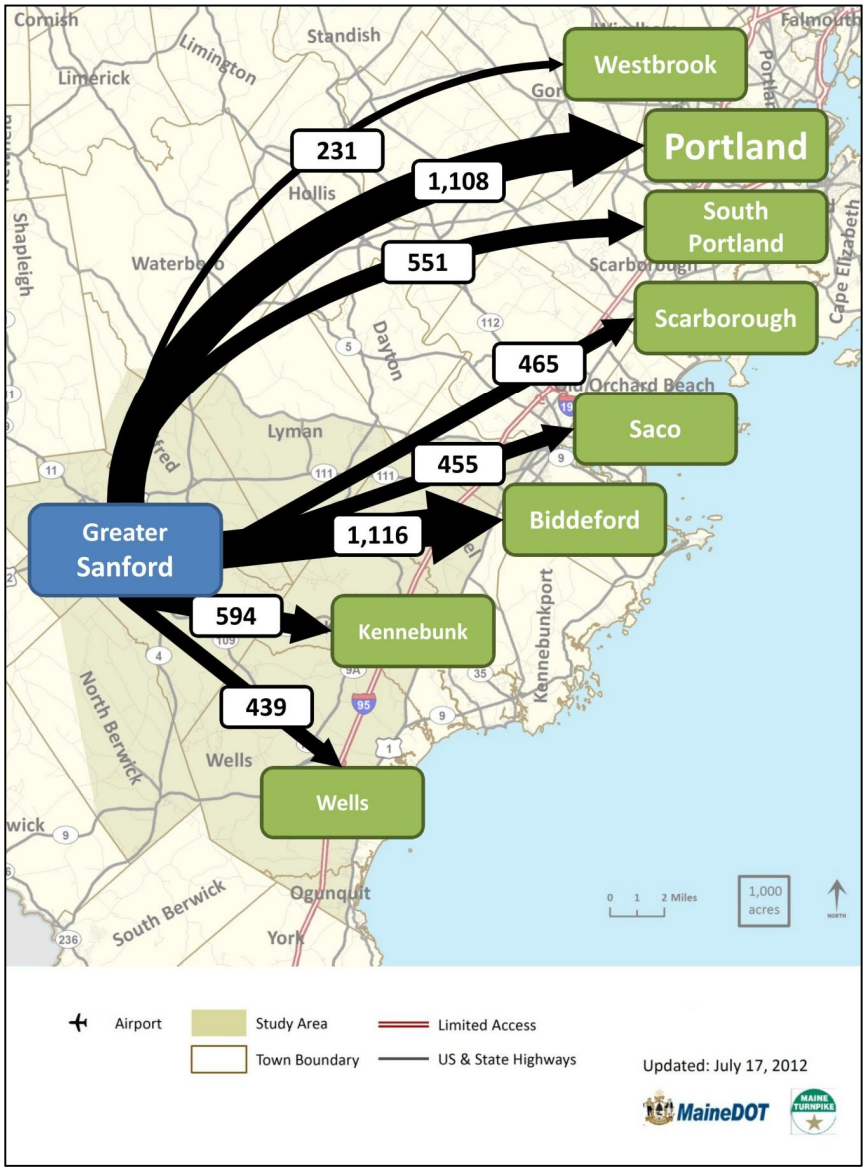


Figure 5-2: Commute Trips Originating in the Greater Sanford Area

[13] "Greater Sanford" in this case includes the communities of Sanford, Alfred, Lyman, Shapleigh, Lebanon, and Acton. These were presumed to be the potential catchment area for people accessing transit originating from Sanford.

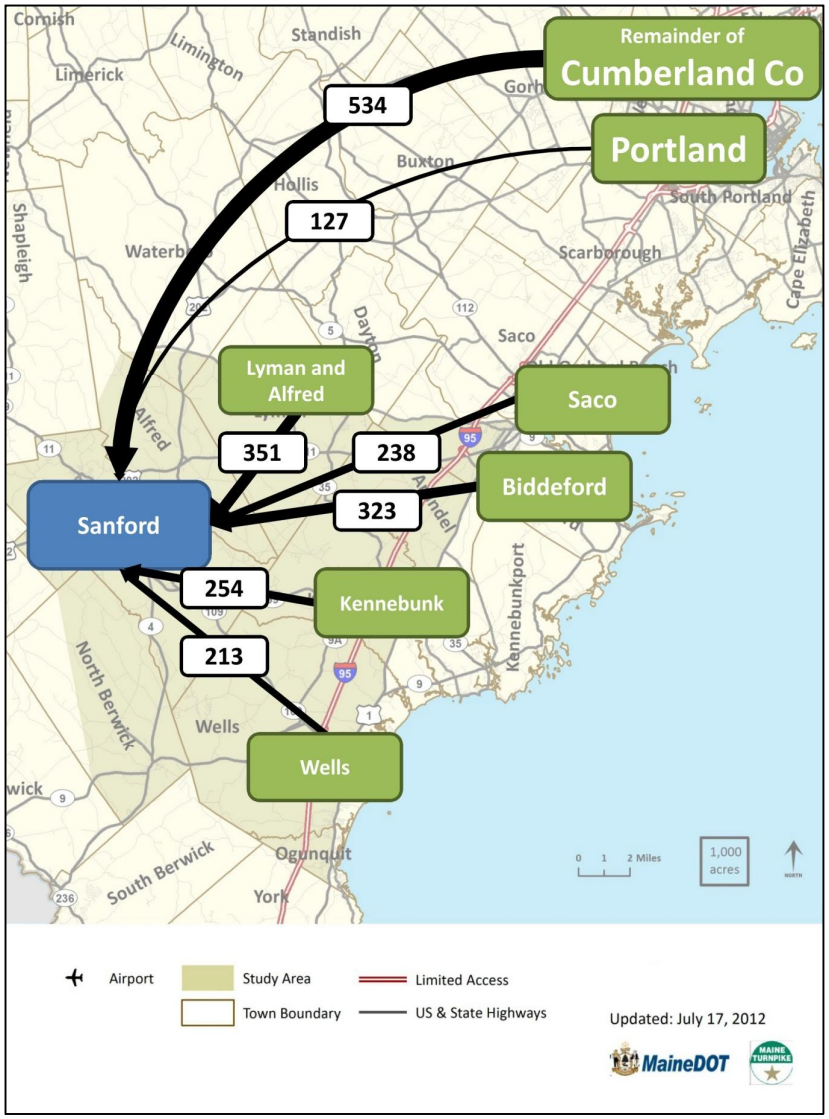


Figure 5-3: Reverse Commute – Trips Destined to Sanford

This commute can be accomplished by transit today, though choices are limited and travel times are not especially competitive with automobiles. As summarized in Table 5-2, during the morning, the 7:00 AM WAVE may reach Biddeford in time to allow riders to catch the 7:40 AM ZOOM, which arrives in Portland at 8:17 AM (Monument Square). If the 7:40 ZOOM has departed, the 8:17 ZOOM reaches Portland at 8:52 AM. Resulting travel times are therefore about one hour and 17 minutes if the first connection is made, and one hour 52 minutes if not. Depending on their destination, commuters may also need to transfer to local service in Portland, which would further increase the duration of their trip.

Table 5-2: Sanford – Portland Current Bus Service Options (Commute Periods)

Start	Transfer	Arrive	Duration
Commute to Portland			
Morning -Sanford to Portland			
7:00 AM WAVE	7:40 AM ZOOM, or 8:17 AM ZOOM	8:17 AM 8:52 AM	1 hr 17 min. 1 hr 52 min.
Evening - Portland to Sanford			
5:15 PM ZOOM	6:00 PM WAVE	7:00 PM	1 hr 45 min.
Reverse Commute (Portland to Sanford)			
Morning - Portland to Sanford			
7:04 AM ZOOM	8:00 AM WAVE	9:00 AM	1 hr 56 min.
Evening - Sanford to Portland			
4:00 PM WAVE 5:00 PM WAVE	5:35 ZOOM	6:06 PM	2 hr 06 min. 1 hr 06 min.

Returning ZOOM service in the afternoon leaves Portland at 5:15 PM (earlier trips are also available), enabling a transfer to WAVE service departing Biddeford at 6:00 PM.

The reverse commute—Portland residents who work in Sanford—is not large. 127 Portland residents work in Sanford. An additional 45 Westbrook and 54 South Portland residents work in Sanford as well. Current bus schedules generally preclude commuting from Portland to Sanford by transit as an option except for people who work less than 8 hours per day.[14]

Existing transit service in Sanford is poorly suited for weekday commuting to and from Portland by full-time workers. While the WAVE does also connect to ShuttleBus Intercity/Portland service (at the Exit 32 Park and Ride lot in Biddeford), connections are not coordinated and service on both routes is infrequent. Only one bus from Sanford—the 7:00 AM WAVE—allows commuters to reach Portland by 9:00 AM. This itinerary requires a transfer to either the 7:40 AM or 8:17 AM ZOOM bus at the Exit 32 Park and Ride, which may be perceived as inconvenient for so-called "choice" riders (i.e., those who have their own cars but choose to use transit).

In addition to limited schedule choices and long duration commutes, other factors may limit use of bus service for commuting purposes today:

- Need to transfer to local service in Portland to reach many destinations, or lack of suitable connections on the Portland end (depending on work location).
- Requirement to pay fares for use of each service (WAVE and ZOOM).
- WAVE service is 24-hour advance reservation service only.
- Short window between the earliest morning trip and latest evening return trip, which does not accommodate users who work longer than 7.5 to 8 hour days.

Other travel markets

Portland is also a key shopping, medical, and entertainment center. Travel to the Maine Medical Center or other medical offices, trips for shopping and entertainment purposes, and access to the University of Southern Maine are examples of the types of trips that some may desire to make using transit services. Currently, service schedules limit bus riders to daytime activities only.

Sanford – Biddeford/Saco

Commuters

There are close to 1,600 daily commuters from Greater Sanford to the Saco/Biddeford region. These commuters typically use Route 111 and local streets. Again, depending on the exact destination, a typical commute covering 20 miles would take from 25 to 35 minutes, depending on traffic.

[14] Six hours (on weekdays only) is the maximum amount of time a person using transit to travel between Portland (Monument Square) and Sanford could spend in Sanford. This is based on a passenger leaving Portland on the 7:36 AM ZOOM bus, transferring to the 8:00 AM WAVE bus (from Biddeford) at the Exit 32 Park and Ride, and arriving in Sanford at 9:00 AM. For the return trip, the same passenger would depart Sanford on the 3:00 PM WAVE bus, transfer to the 4:09 PM ZOOM bus at the Exit 32 Park and Ride, and arrive in Portland at 4:47 PM.

By transit, this trip can also be made via the WAVE. Because of the demand response nature of the WAVE, travel times between Sanford and Biddeford are between 40 to 60 minutes based on the number of riders and service is less predictable than regular, scheduled service would be. Connections to ShuttleBus Local services are available in Biddeford. The 7:00 AM WAVE can transfer to the 8:10 Local 2 at SMMC, extending their reach into Saco and Old Orchard Beach along Route 111 and US 1. The 9:00 AM WAVE riders can transfer to the 10:10 AM Local 2 at SMMC. Return connections are possible throughout the day via the 4:05 PM, 6:05 PM, 8:05 PM and 10:05 PM WAVE trips.

Connections to the ShuttleBus Intercity service, which extends the reach of service into Scarborough, are more difficult. A limited number of Intercity trips serve Biddeford; most service begins and ends in Old Orchard Beach. Hence, a bus trip between Sanford and Scarborough would require two transfers (WAVE to ShuttleBus Local to ShuttleBus Intercity in Old Orchard Beach).

ShuttleBus also operates all-day service between Biddeford and the University of New England campus. Transfers between WAVE service and the UNE service can only be made at Biddeford Crossing or the 5 Points Shopping area, and the UNE service only goes to those locations two to three times a day, evenings only. On Mondays through Thursdays, the UNE service departs 5 Points at 5:25 PM and 7:00 PM and departs Biddeford Crossing at 5:35 PM, 7:10 PM and 8:35 PM. On Fridays, the UNE service departs 5 Points at 6:30 PM, 8:00 PM and 9:30 PM and departs Biddeford Crossing at 6:40 PM, 8:10 PM and 9:40 PM. Multiple options are available on weekends, with service to 5 Points and Biddeford Crossing operating between 12:35 PM and 9:40 PM on Saturdays and between 12:35 PM and 6:40 PM on Sundays.

The reverse commute involves 323 Biddeford residents and 238 Saco residents who travel to Sanford for work. These could potentially use the same services described above, as all operate in two directions. To access job sites in Sanford, workers may need to transfer to Sanford Transit service, which operates along the Route 109 corridor.

WAVE also connects to the ZOOM Turnpike Express at the Biddeford Park and Ride, but just for the 8:17 AM and 4:09 PM departures to Portland on weekdays. For a return trip to Sanford, riders arriving on the ZOOM into Biddeford at 9:33 AM, 4:00 PM, and 5:50 PM can connect with the WAVE.

Other travel markets

Similar to Portland but at a smaller scale, the Biddeford area includes a number of potential transit destinations, including the Southern Maine Medical Center and other medical offices, shopping, the University of New England, and Amtrak (Saco Station).

Sanford – Kennebunk/Wells

Commuters

Commuting between the Sanford area and both Kennebunk and Wells is more limited than to the Biddeford/Saco and Portland markets to the east. Approximately 594 people commute from the Greater Sanford area to Kennebunk, and 439 to Wells. Reverse commute numbers are lower, mirroring the trend elsewhere; 254 Kennebunk residents and 213 Wells residents work in Sanford.

Route 109 is the primary corridor linking Sanford and Wells. A 14-mile trip from central Sanford to the Route 1 corridor might typically takes

20 to 25 minutes during the commute period by auto. By transit, YCCAC's Sanford Ocean Shuttle makes six trips daily (each direction), departing from Sanford at 6:00 AM, 7:40 AM, Noon, 2:20 PM and 5:55 PM. The full (one-way) trip takes about 50 minutes to an hour, depending on time of day and whether the trip is coordinated to meet Amtrak Downeaster service in Wells. Return trips depart Wells at 6:59 AM, 8:44 AM, 10:44 AM, 1:11 PM, 3:30 PM, and 7:00 PM.

Trips between Sanford and Kennebunk are made by Route 109 to Route 99, or alternatively by a variety of local roads. A 15-mile trip typically takes 30 minutes or so. No transit service links these communities today.

Other travel markets

There are fewer trip attractors linking Sanford to Wells or Kennebunk, though recreational trips to the coast are a likely draw for some current (and potential) transit riders. York County Community College and the Wells Transportation Center (Amtrak) are two regional draws in Wells that are currently served by YCCAC's Sanford Ocean Shuttle.

A similar analysis was conducted of "reverse commute" travel into Sanford itself, and those volumes are presented in Figure 5-3. In this case, the full list of Greater Sanford communities was not considered, since someone arriving in Sanford by transit would have great difficulty accessing these communities without a private vehicle. As this data shows, commuter travel into Sanford is relatively limited, and does not in and of itself appear to justify transit service, although these users could also potentially take advantage of improved transit services principally directed at travel to Portland, Saco, and Biddeford.

Wells/Kennebunk to Biddeford/Portland

Commute

In addition to travel patterns to and from Greater Sanford, travel data for the coastal communities along the Maine Turnpike (I-95) corridor was reviewed. Figure 5-4 summarizes commute patterns for residents of the greater Wells and Kennebunk areas.[15] The reverse commute to these communities is relatively small, and therefore not illustrated. Though secondary to the study's primary objective of improving connections between central York County and external centers, any changes to transit services and facilities for coastal communities would comprise part of the overall regional system and provide secondary accessibility benefits to central York County communities.

This data shows that there is significant demand for travel from south of Biddeford (the current southern limit of transit service along the Maine Turnpike) to Biddeford, Saco, and Portland. This indicates a need for transit service that continues south of Biddeford, to serve Kennebunk, Kennebunkport, and Wells. Although this market is served to some extent by the Downeaster rail service, this is not competitive in terms of fares or service frequency for shorter trips within York County and Southern Maine.

Other travel markets

York County Community College and the Wells Transportation Center are two major destinations that could potentially be served by transit.

[15] "Greater Wells" in this case includes the communities of Wells, Ogunquit and North Berwick. "Greater Kennebunk" includes both Kennebunk and Kennebunkport when considering longer trips to the Portland area only. These were presumed to be the potential catchment area for people accessing transit services at these locations.

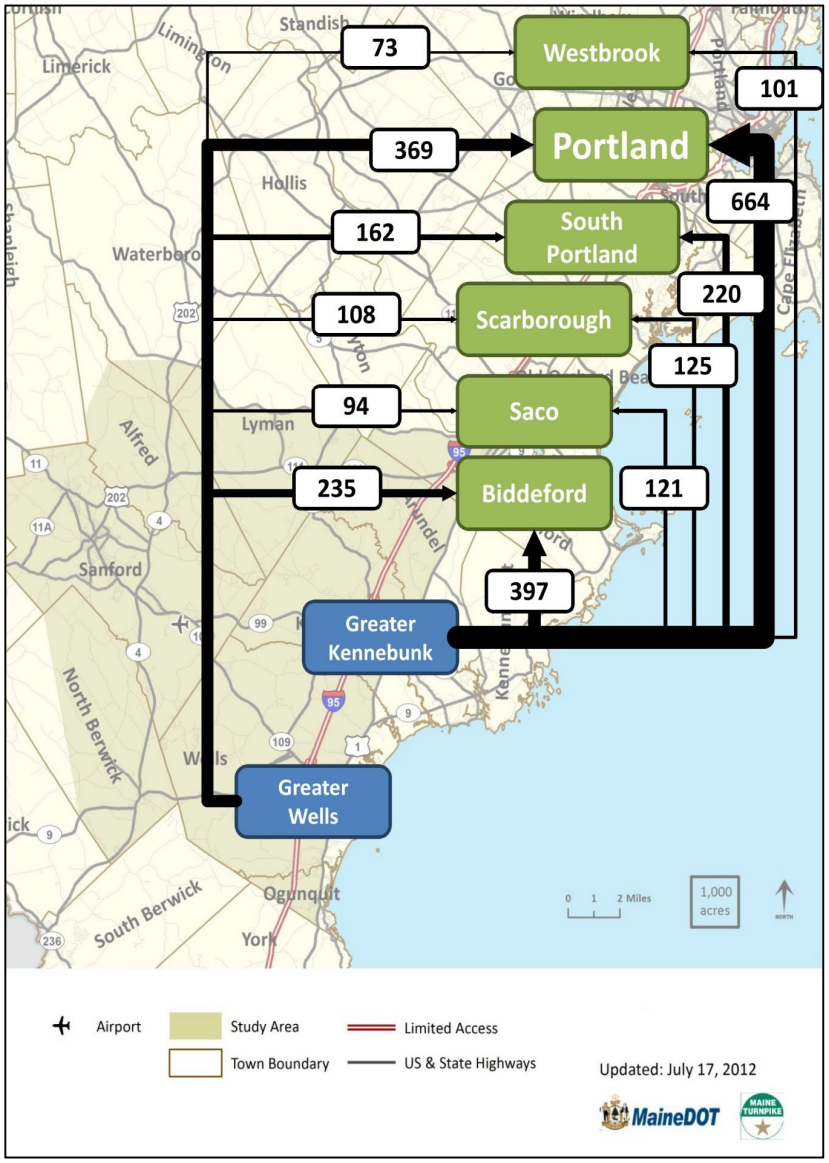


Figure 5-4: Commute Trips Originating in Wells and Kennebunk

GO MAINE TDM Program

Maine's comprehensive travel demand management program, GO MAINE, is sponsored by MaineDOT and the Maine Turnpike Authority (MTA) and is administered by the MTA. GO MAINE works throughout the state to reduce travel demand on the roadways by working with employers and the public to provide the following services:

- Carpool and van pool information and ride-matching services are provided through the internet at the GO MAINE website (http://www.gomaine.org/carpools), as well as through outreach programs including fairs, conferences and employer outreach;
- Ride-Matching System including technology that accesses Google Earth, enables travel alerts and allows for automatic matching services;
- Emergency Ride Home Guarantee Program available for registered commuters;
- Information and service links to more than 40 local and regional bus, ferry and rail services including commercial shuttles;
- Information on Park and Ride lot locations;
- Information provided by email to registered commuters on relevant media releases and commuter e-news (for example, travel alerts for major construction disruptions).

Transportation Centers and Park and Ride Lots

There are three publically owned Park and Ride facilities within the CYCCS study area (Table 5-3 and Figure 5-1); all are operated by the Maine Turnpike Authority. The Wells Transportation Center, where the Town of Wells and the MTA own the building and parking areas, respectively, provides parking for Amtrak service, YCCAC bus and shuttle service, and carpoolers. The parking lot closest to the train station is designated for Amtrak users, while a second lot is identified as commuter parking and is the official MTA Park and Ride lot. The Kennebunk Park and Ride lot (Exit 25) is not serviced by public transportation and is intended for ridershare (carpool) use. The Biddeford Park and Ride (Exit 32) is served by the ShuttleBus ZOOM Turnpike Express service and is also available for ridershare use. The MTA's 2012 Safety and Capacity Study reports 34 percent average occupancy at the Wells Transportation Center (commuter lot portion only, not including Amtrak parking area), 60 percent occupancy at Kennebunk, and 58 percent at Biddeford. Usage of the Biddeford park and ride peaked at 89 percent occupancy in 2001, and averaged 72 percent between 2001 and 2012.

Other publicly owned Park and Ride lots outside of the study area but in central York County include the Town of Lebanon's lot off of US Route 202 (approximately 50 parking spaces) and MaineDOT's two small lots in Shapleigh. East of the CYCCS study area in Saco, the Saco Transportation Center provides parking for Amtrak riders, and MaineDOT's Park and Ride lot on Industrial Road off of I-195 is another major commuter lot in the Biddeford/Saco area.

Table 5-3: Public Park and Ride Lots in CYCCS Study Area

Town/ Name	Location	Parking Capacity	Services	Amenities
Biddeford Biddeford P&R	Route 111 at Maine Turnpike Exit 32	155 general purpose; 6 handicap	ShuttleBus ZOOM Turnpike Express	Lighting; shelter; benches
Kennebunk Kennebunk P&R	Route 35 at Maine Turnpike Exit 25 (southbound)	52 general purpose	None (Carpool lot)	Lighting
Wells Wells Transportation Center	Maine Turnpike Exit 19	94 commuter lot; 4 commuter lot handicap; 91 Amtrak lot; 4 Amtrak lot handicap; 6 RV/bus	Amtrak Downeaster; YCCAC Sanford Ocean Shuttle; YCCAC Shoreline Explorer	Bike rack; lighting; shelter; benches

The Federal Transit Administration (FTA) recently awarded a $1.2 million grant to establish a transportation center in Sanford. The center will be linked to a Park and Ride lot and serve as a hub for bus services in Sanford. Amenities including indoor waiting areas, restrooms and bicycle parking will be provided. It is envisioned that the center will serve as a centerpiece for redevelopment of the Mid-town/Mill Yard area over time. This project will address a long-standing need to improve access to transit in the Sanford area.

In addition to public Park and Ride lots, there are shopping centers, schools, and other locations in the study area that are used informally as Park and Ride lots. YCCAC schedules and maps indicate that the School Street parking lot, Marden's Plaza, the Sanford Regional

Airport in Sanford and the Hannaford Plaza in Wells are used as parking locations.

MaineDOT's Long Range Plan (July 2010) identifies a need for a Park and Ride in Sanford. The plan notes that Sanford is Maine's seventh largest city and is connected by a number of highway corridors, yet does not have a public Park and Ride lot available to motorists. With the recent award of an FTA grant to construct the Sanford Transportation Center (described previously), this issue will be addressed.

Transit and TDM Enhancement Opportunities

Public Transportation

The overarching purpose of the CYCCS is to improve transportation connections between central York County and the transportation networks along the coast. In that context, enhancement or expansion of transit services linking the Sanford region to the coastal communities or even directly to major destinations outside of the study area would be in keeping with the study's purpose. Improvements in transit service within the study area should build upon the existing services and facilities that are in place.

Bus and shuttle services in central York County are largely focused on providing mobility options for those who cannot drive, do not have access to a personal automobile, or are a specific niche market such as tourists. These types of services are likely to remain the cornerstone of public transportation in York County in the future. At the same time, enhancing or complementing these existing services to provide better service for commuters, either within the study area or to areas beyond the study area, is an appropriate medium-term goal, as a means to better manage mobility and provide travelers with improved transportation options.

Amtrak's Downeaster service provides a valuable regional and interstate transportation option for York County. To leverage the benefits of this service, bus and shuttle services in the region could be reorganized to emphasize connections at the Saco Transportation Center and Wells Transportation Center. This would involve consideration of both routing and schedule to integrate services and allow transfers with short wait time. YCCAC's Sanford Ocean Shuttle and Shoreline Explorer already do so in Wells. Further, every effort should be made to ensure that all Downeaster service continues to stop in Wells and Saco.

Infrastructure improvements can also improve the quality of public transportation services by improving access, rider comfort/ convenience and operating efficiency. These can include upgrades to facilities, vehicles, and the right-of-way used by transit.

The Recommendations section at the end of this chapter details more specific actions that will help to improve transit service to, from, and within the study area.

Potential Opportunities to Enhance TDM Programs

GO MAINE is a well-established means of providing TDM services throughout the state and in the CYCCS study area. Expanded implementation of TDM programs could potentially help address CYCCS goals primarily by expanding travel options for central York County residents and workers. More aggressive implementation of

TDM would likely require dedicating additional funding to expand the existing GO MAINE programs described previously.

Specifically targeting travel information and incentives to central York County travelers is a potential means of expanding these programs in a manner supportive of the CYCCS's goal of improving accessibility to central York County. This could involve packaging and branding existing GO MAINE, YCCAC, and ShuttleBus programs and travel information under a unique program name, including a website specific to York County. This parallels an effort now underway in the Portland area Metropolitan Planning Organization to accomplish regional branding and marketing of all public transportation services. A targeted TDM program would allow program elements to be tailored to the local community as well as enable residents and employees to more easily find travel information related to their needs.

Other ideas for possible consideration that could address access to central York County are:

- Expand or implement additional fare subsidy programs. YCCAC already implements an income-based fare structure for some services. Additional fare subsidy programs could be considered that target commuters to or from central York County.
- Develop a network of small Park and Ride lots using existing parking lots that have excess capacity during commute periods. Church parking lots are often used for such programs.
- Improve coordination and scheduling for interconnecting service providers.
- Expand employer-implemented TDM efforts to encourage flextime, telecommuting, carpooling and vanpooling. This could be accomplished by requiring or providing incentives for more employers to register to work with GO MAINE.

Role of Town Planning in Reducing Travel Demand

The adoption of compact development principles in land use planning by towns would over time also help manage travel demand and increase travel choice by concentrating development in a manner that encourages people to walk, bicycle or use transit more often. In addition to reducing automobile trips, coordinated planning can help create healthier communities with well-defined neighborhoods that are supported by sustainable transportation investments. This in turn can help preserve rural areas and improve the vibrancy of town centers.

Towns would be responsible for determining which compact development principles are appropriate for their community. Generally, these could include revisions to development standards, zoning regulations and comprehensive plan policies, such as the following:

- Allow mixed-use development in town centers and other targeted areas.
- Emphasize establishment of walkable communities by planning for and requiring during development the establishment of well-connected pedestrian facilities (including sidewalks, crosswalks, and trail systems). Review development standards for impediments to walkability and refine as necessary.

- Plan land uses in coordination with transportation to concentrate growth in areas that are best served by transit services and are walkable.
- Adopt "Complete Streets" policies and design standards that consider the needs of a broad range of roadway users of all ages and abilities (e.g., pedestrians, autos, bikes, elderly and school children) when planning and designing roads. The National Complete Streets Coalition provides information and resources regarding complete streets at their website: http://www.completestreets.org/
- Prioritize improving existing infrastructure in developed areas over developing new infrastructure in undeveloped areas.

Towns can also directly implement good growth principles through projects such as streetscape improvements to improve walkability and the character of town centers and other targeted growth areas or smaller scale roads projects to improve circulation within towns.

Additional information is presented in Chapter 4. Land Use and Access Management.

Potential TSM Enhancements

TSM enhancements that improve the traffic operations on study area highways could also aide the reliability of transit services operating on those corridors. These are described in Chapter 3: Highways.

Additionally, some TSM strategies are more directly related to public transportation. One key TSM enhancement that can positively impact public transportation is the use of signal priority, which makes minor adjustment to signal timing and phasing to move buses more quickly through the roadway network. This could be deployed broadly throughout the study area, or only at key locations where there is congestion, such as the intersection at Exit 32/Route 111/Precourt Street in Biddeford. As signal technology has improved and improved traffic signal controllers have been deployed more broadly, implementation of signal priority for transit has become more straightforward.

Another technique that can be directly applicable to transit and ridesharing is implementation of automated SMS text messages to cell phone subscribers to provide travelers with information regarding parking availability at Park and Ride lots and transportation centers. Similarly, automated SMS texts could provide travelers with information about travel time to local and regional destinations (such as downtown Portland), so that travelers could make more informed decisions about their travel route, mode, and timing, potentially generating additional transit use. SMS texts can also be deployed to provide information to public transportation users, such as the status of trains and buses at key stations.

Conclusions

Based on the analysis of existing travel patterns, the Sanford to Portland commute—particularly if considered jointly with trips from Sanford to the Biddeford/Saco markets—is the largest external market for commute trips from the CYCCS study area. A smaller reverse commute exists also. As the state's major medical, business and shopping destination, Portland is an attractive market for other potential transit patrons as well, including both transit dependent and transit choice riders.

This travel need is not particularly well served by the current transit services within the CYCCS study area. Commuting from the Sanford

area to Portland today may be feasible for some using the WAVE and ShuttleBus ZOOM services, but the length of the commute, limited schedule options, and existing service structures generally preclude use of these services for this commute. Even with improvements, the duration of the commute relative to by automobile would likely limit transit's market share. Nonetheless, a high priority should be given to improving transit travel from the Sanford area to Portland, with the opportunity to also travel to Biddeford and Saco, given the importance of these travel markets and the other trip purposes that could be served.

There is a somewhat lower, but still noteworthy commute demand along the I-95 corridor, from Wells and Kennebunk to points north, including Biddeford, Saco, Portland, and locations in between. Other than the Downeaster train service, there is no public transit service within this corridor south of the ShuttleBus ZOOM terminal at the Exit 32 park-and-ride in Biddeford. Some form of service extension south of this point could draw transit users from these communities, as well as giving drivers the opportunity to park at one of the park-and-ride lots located farther south, which are not as heavily used as the lot at Exit 32.

Travel between Sanford and Wells is currently served by the Sanford Ocean Shuttle, and it may be desirable to consider ways to improve the frequency and/or span of service along this route. There is also some demand for service between Kennebunk and Sanford; the roadway network does not lend itself to creating a connection in this corridor, particularly for larger transit vehicles, but smaller vans could be feasible.

Beyond the potential service improvements and expansions, there is also a clear need to improve facilities for transit users, to help retain existing riders and attract new riders. Improvements could include new transportation centers, additional stand-alone park-and-ride lots, and improved amenities at bus stops.

TDM and TSM both have a role to play in improving travel options and performance within the CYCCS study area. Given the relatively low levels of congestion and the somewhat limited alternatives available, these tools would generally be expected to support other transportation improvements, rather than playing a central role.

Recommendations

Facilities and Access to Transit

- Create the Sanford Transportation Center: Planning for a Transportation Center in downtown Sanford is underway, with a site identified and a funding plan being developed. This will create a centralized location for transit services that travel to, from, and within Sanford, as well as a location to distribute information about transit and other transportation modes.
- Building on the service recommendations detailed below, create a new transit hub at the Biddeford park-and-ride, where the enhanced WAVE/Route 111 service, the ZOOM Turnpike Express, and the extended ShuttleBus Intercity/Portland service can interface. This would involve adding additional shelters or a permanent building for waiting transit patrons, and ensuring adequate space exists to accommodate service coordination and transfers among different routes. This facility is likely to become a critical link

in the transit network within the study area, with a variety of transfers available to different destinations, and this activity should be supported by an appropriate facility.

- Park-and-Ride in Sanford: Along with creating a Transportation Center in downtown Sanford, there is a need for park-and-ride facilities to serve those traveling from surrounding communities who want to access transit in Sanford, particularly if there is an improved connection to Portland (as discussed in the next section of recommendations). Locations for these lots would need to be determined, taking into account both ease of access for car drivers and the routing of existing and proposed routes.
- Lease-lot arrangements in other locations: In addition to creating a central park-and-ride lot in Sanford, smaller park-and-ride facilities could be developed in the immediate vicinity, through leasing of parking facilities or shared parking arrangements with local shopping centers. Potential locations for these types of facilities include Springvale, South Sanford (for access to the Sanford Transit/Sanford Ocean Shuttle), Alfred (potentially using the County Courthouse parking lot), and/or Lyman (both for access to the WAVE and any future services along Route 111).
- Improvements at stops: In many locations, there is a need for improved amenities at stops, including basic items such as a paved waiting area and sidewalks to safely access the stops, along with additional amenities such as lighting, shelters, benches, and trash cans. These simple enhancements are particularly important to ensure that transit services are fully accessible and meet the requirements of the Americans with Disabilities Act.
- Provide bike racks and bike lockers at transportation centers and major park and ride lots. This would help expand the geographic reach of the transit network by providing additional options for accessing transit.
- Provide additional bicycle racks on buses, so that customers can use their bikes on both ends of their transit trip.
- Preserve park-and-ride lots for commute travel: The park-and-ride lots operated by the Maine Turnpike Authority are officially intended for use by commuters for periods of less than 24 hours. However, certain tour and airport shuttle operators have taken advantage of these lots for longer-term parking, with the facilities serving as originating points for buses to casinos in southern New England, Logan International Airport, or Manchester-Boston Regional Airport. While this is not the intended use of these lots, current enforcement activities have not been sufficient to discourage this activity. Potential solutions to this would include increased enforcement of parking duration rules (potentially using technological solutions that track license plates), improved signs and education, direct discussions with the operators of the bus services, or the installation of a gate/barrier at the entrances that could only be actuated by ShuttleBus/ZOOM vehicles. Ideally, this would result in developing alternative locations for this non-commuter park-and-ride activity, rather than simply trying to eliminate those bus services.

Route-Specific Service Improvements

- Improved Route 111 Service, either through expansion of the existing WAVE service or through extension of the ZOOM Turnpike Express along Route 111 to Sanford.
  - Under the first option, the WAVE would be expanded to better serve the Route 111 corridor and connect to ShuttleBus:
  - Increase service frequency on the WAVE to every hour and coordinate with the schedule for the ZOOM Turnpike Express at Biddeford.
  - Transition WAVE service from a demand response service to either a fixed route/demand response hybrid or a standard fixed route service running along the Route 111 corridor from Sanford to Biddeford and Saco. Under the fixed route/demand response hybrid, the WAVE would continue to provide some demand responsive and route deviation service, but would use real-time information to let passengers know when each run is expected to arrive at a limited number of fixed stops along the route. In this way, the WAVE could continue to provide door-to-door service on a reservation basis, but would also be available to riders who have not made reservations but who can board the service at designated stops. Alternatively, the WAVE could transition to a more traditional fixed-route service, stopping only at designated locations and running on a fixed schedule.
  - Create timed transfer to ZOOM Turnpike Express and ShuttleBus Intercity/Portland service so that WAVE riders can more easily access service to Portland. This could be difficult to implement if some form of demand responsive component is retained by the service.
  - Under the second option, select ShuttleBus ZOOM Turnpike Express peak period runs would be extended from the current terminal at Biddeford west to Sanford. This is likely the only option that could provide a time- and convenience-competitive alternative to auto commuting for Sanford area to Portland trips.
  - Travel times from Sanford to Portland would be around an hour, and no transfers would be required. This would be a peak period only service, perhaps with two morning and two evening trips beginning and ending in Sanford.
  - Travel times for riders between Biddeford and Portland would not be adversely affected, but additional equipment would be needed to maintain or improve existing service frequencies.
  - Commuters between Sanford and Biddeford/Saco could also use this service, through they would need to transfer at the Biddeford (Exit 32) park-and-ride to Tri-City Local service (on the Biddeford end) or Sanford Transit/Sanford Ocean Shuttle (on the Sanford end).
  - WAVE would continue to provide all day service and could continue to focus more on local connections.

- New service on I-95 South of Biddeford
  - Provide connecting service from the ZOOM Turnpike Express service to the Wells Transportation Center (Exit 19) and York County Community College in Wells, with an intermediate stop at the Kennebunk park-and-ride at Exit 25. This would provide a link to Portland from those

communities, and potentially intercept Portland-bound travelers farther south, at park-and-ride lots in Biddeford or Wells. Service could operate either as an extension of the existing ZOOM service, or as a timed-transfer shuttle connection. Capacity at the Kennebunk park-and-ride could become an issue should regular transit service be implemented, requiring expansion or relocation. Also, northbound transit trips will experience some added travel time accessing the park-and-ride, which is located on the north side of I-95.

- Sanford Transit
  - Coordinate with other services at the future Sanford Transit Center
  - Consider targeted increases in service frequency, along with extending service to run later in the afternoon and early evening.
- Sanford Ocean Shuttle
  - Provide increased service frequency.
- ShuttleBus
  - Extend the hours of service of the ZOOM service, particularly to provide at least one additional run in the evening, for customers who need to stay in Portland past 5:00 PM.
  - Extend ShuttleBus Intercity/Portland service a short distance from the current terminal at Southern Maine Medical Center to the Biddeford park-and-ride at Exit 32 on the Maine Turnpike/I-95. This will create an interface with the extended ZOOM Turnpike Express services from York County Community College, Wells, and Kennebunk and with the enhanced WAVE service.
  - Ensure coordination of the Tri-City/Local service with other services within the CYCCS study area, particularly in the area of the Exit 32 park-and-ride lot in Biddeford.

Public Information/TDM

- Make greater use of real-time information throughout the Central York County transit network. Availability of real-time information is increasingly becoming an expectation for transit passengers, particularly with the growth of smartphone and text message based tools for distributing information. In an environment such as Central York County, where transit services operate on a relatively limited schedule and long headways, having access to real-time information is critical, since missing the bus could result in a two hour wait in some cases. Providing enhanced real-time information could also allow for the creation of a hybrid demand response/fixed-route version of the WAVE, as described earlier.
- Improve transit information for Central York County, to create a single clearinghouse for transit service information. With multiple operators providing differing types of service (demand response, route deviation, fixed-route local, fixed-route express), the transit service options within York County can be somewhat difficult to understand. Creating a single source for transit information and coordinating service connections between service providers will make the services more legible, particularly for new or occasional users.

Fare Policy

- Consider implementing an integrated fare policy to make it easier and less costly for riders to transfer between YCCAC, ShuttleBus and other connecting transit services. The requirement to pay fares for use of each service, such as for transfers between WAVE and ZOOM, may present barriers to increasing transit ridership. An integrated fare policy can encourage additional ridership and create more seamless transfers between the various transit services in the CYCCS study area.