Reconnecting Yarmouth Village to the Working Waterfront





BAKER DESIGN CONSULTANTS Civil, Marine, & Structural Engineering



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1. EXECUTIVE SUMMARY

Since the construction of Interstate 295 through Yarmouth in the early 1960's, Yarmouth's historic Lower Falls Village has been visually and physically cut off from the waterfront. The highway and its underpass, and the geometric design and speed of traffic on the adjacent Route 88 (Lafayette Street) combine to create a physical barrier to the movement and accessibility of people to and from the harbor. The Town's public waterfront, while physically located near the base of Main Street, is only accessed by Old Shipyard Road - a 1.4 mile walking distance from the village.

The village at the base of Main Street comprises a diverse mix of commercial businesses (including a hair salon, a machine shop, a real estate office, professional offices and an environmental laboratory) and residential properties (both rental and owner occupied dwellings). With many of the structures aging and multiple properties currently or recently for sale, the area is ripe for a revitalization initiative that will generate increased business activity and spur economic growth in this historic village area. This is further evidenced by recent inquiries received by the Town Planner from entrepreneurs looking to convert and improve properties to mixed use development as they come on the market.

Yarmouth's waterfront is recognized as one of the Town's most valuable assets. This study outlines the benefits of, and provides the catalyst for, a program that supports safe access, connectivity and sustainable growth. Response and feedback from Town staff, stakeholders, members of the public, and representatives of state and federal agencies has been overwhelmingly positive.

The study outlines comprehensive landscape enhancements, traffic control measures, and pedestrian access improvements that reconnect the waterfront and recaptures the economic interest and vitality of the harbor area to make it a destination that complements the working waterfront. This is achieved by redefining the streetscape along the Route 88 Corridor adjacent to the Head of Harbor, and with the addition of multi-use pathways and bridges that serve to provide a cross-harbor connection with the Town Landing and a direct link to Lafayette/Main Street along the river. The recommendations put forth by this study are as summarized below. An overview plan of the proposed improvements is provided on the next page.





Overview Plan of Proposed Improvements



Route 88 Improvements

- Eliminate perpendicular parking beneath I-295 bridges and adopt onstreet parallel parking to increase capacity and improve user safety.
- Reduce width of curb openings to create defined driveways/parking areas and improve pedestrian safety.
- Realign intersections between Route 88 and Marina Road, Pleasant Street, and Main Street to improve turning geometrics and roadway safety.
- Add signage and pavement markings in accordance with regional standards to support shared road use by bicyclists.
- Add/widen sidewalks to improve pedestrian accessibility. Provide safe cross walks. Increase green/public space to accommodate and promote an active community environment.
- Reduce the posted speed limit from 30mph to 25mph along the Route 88 Corridor from Gilman Road to Route 1 with the implementation of traffic calming measures and zoning amendments.

Shared-Use Pathway Connections

- Provide a cross harbor pedestrian bridge with at-grade approaches and harbor overlooks along the downstream side of I-295, beginning at Town Landing and ending at Route 88 near Yarmouth Boat Yard.
- Link the cross harbor bridge to the Walter Gendall Memorial park with a pedestrian bridge that passes below the I-295 bridges along the Royal River.
- Extend the pathway route to connect the east side marinas and businesses.
- Provide interpretive signage to capture the history and heritage of the harbor and Royal River corridor.

While the focus of this study has been to reconnect Yarmouth village with the Town's public and working waterfront, it is apparent from the widespread interest generated that the impact of the project extends well beyond the study area.

The pathways will be used and enjoyed by residents and visitors with an interest in harbor activities that include the history of the area, fishing, wildlife study, unique scenic views or healthy exercise. The improved access creates a



destination – providing users with a unique way to experience the waterfront, as well as a hub for an established and growing network of dedicated bike routes and pedestrian trails that extend from the Royal River Corridor, upper Village, Cousins Island and Bayview neighborhoods.

At the Regional level, the proposed improvements will influence commuter and recreational trail initiatives (particularly for bicyclists) between Freeport, Cumberland, and the neighboring communities.

"How will the project be funded?" is often asked. In its entirety, the project is ambitious and should not compete with critical harbor public works such as dredging to maintain navigable water depths. A section of the report is devoted to grant opportunities. It is likely that funding will require local, state and federal partners and be undertaken through several initiatives. What is certain is that once constructed, the improvements will refocus attention on the Yarmouth waterfront and provide the catalyst for revitalization of the area.

Next steps

Obtain the endorsement and backing of the Yarmouth Town Council for the broad recommendations outlined in this feasibility report and authorization to proceed with initial notices to state and federal agencies to request project consideration.

- Send letter to FHWA, Maine DOT, and PACTS requesting the project be included in future transportation initiatives.
- Continue dialog with Maine DOT toward design speed of 25 mph on Route 88 along with proposed roadway and pedestrian improvements.
- Petition the US Coast Guard for a reduction in navigational clearance on the Royal River created by the proposed cross harbor bridge.

At the Town staff and Committee level the study serves as a reference guide for future improvements to the harbor area. The following initiatives will support and complement the next phases of project development.

- Investigate zoning modifications to promote development and redevelopment in the area surrounding the harbor.
- Review private property impacts with respective landowners. While the work completed to date locates probable property impacts associated with the recommended improvements, a detailed



boundary survey has not been completed that would locate existing property lines adjacent to Rte. 88 and clarify ownership of the intertidal area impacted by the Walter Gendall bridge and Lower Falls Landing pathway connector.

• Seek State and Federal grant opportunities for project permitting, final design and construction.



2. BACKGROUND & INTRODUCTION

In the early 1960's Interstate 295 was constructed through the Town of Yarmouth, severing its historic Main Street and Village neighborhoods from its coastal harbor. The highway and its underpass, and the geometric design and speed of traffic on the adjacent Route 88 (Lafayette Street) combine to create a physical barrier to the movement and accessibility of people to and from the harbor.



Figure 1 – Aerial View of Yarmouth Harbor and Project Area from East (courtesy of Bing Maps)

The neighborhood at the base of Main Street and Marina Road on Route 88 that historically defined the head of harbor is a mix of land uses and businesses not easily accessed by pedestrians from the marinas or public waterfront.

If a person wanted to walk from the Village to the public waterfront (Town Landing) or if a visiting boater wanted to walk from the Town Landing to the Village, he or she would have to walk 1.4 additional miles (over half of those walking miles would be in the street) and yet the waterfront is *right at the base of Main Street* (see Figure 1). Similarly, if a person wanted to walk from the base



of Main Street to the marinas and the businesses at Lower Falls Landing, there are no pedestrian facilities to make this trip safe and welcoming.

Also impacting the historic neighborhood at the base of Main Street is the volume and speed of traffic along Route 88 and on Marina Road. The geometrics of these roads (wide turning radii, wide curb cut openings, parking in front of buildings and paved private frontages, and lack of defined on-street parking) has created an area that is hostile to pedestrian and bicycle traffic making it a strong candidate for traffic calming in conjunction with the redevelopment and renovation of bike and pedestrian friendly infrastructure.

Under traffic calmed conditions, the traffic flowing by the businesses on Route 88 will mean high visibility and potential customers. Similarly, adding pedestrian facilities to link origins to destinations moves those pedestrians about the waterfront and to/from the Village, supporting economic activity in the Town.

Efforts to reconnect the Village to its waterfront and enhance economic development activities through zoning amendments began with a planning initiative sponsored by the Town Council entitled the "Royal River Corridor Study" (Royal River Corridor Study Committee, 2009). The plan conceptualized locations for pedestrian facilities to make connections and identified barriers within the existing zoning ordinance that were prohibiting smart, well-designed, appropriately scaled infill and redevelopment from happening. The RRCS has been adopted as part of the Town's 2010 Comprehensive Plan.

2.A. PROJECT OBJECTIVES AND APPROACH

This study was funded by the Maine State Planning Office under a grant awarded to the Town of Yarmouth as part of the Maine Coastal Program.

As outlined in the grant proposal, the objective of the study is to investigate opportunities for reconnecting Yarmouth Village with the Harbor by designing improvements to area to reconnect the historic harbor to the downtown. The recommendations consider an active community environment that is friendly and safe for pedestrians and bicyclists and include improvements that promote and enhance the economic vitality of the area. Two project focus areas were considered:



- 1) Improvements to the Route 88 Corridor, and
- 2) A shared-use pathway connecting the Town Landing to the village and commercial activities on Route 88.

The study areas and adjacent land use are shown in Figure 2.



Figure 2 – Project Areas

The scope of survey, engineering and landscape architectural services undertaken included topographic field survey, preliminary design development, cost analysis, and research into permitting requirements.

In addition to these Consultant services, in-kind services provided by the Town Planner included the appointment of a stakeholder committee, facilitation of



informational meetings and preliminary consideration of necessary easement requirements.

2.B. REPORT FORMAT

This report summarizes the work completed by the consultant team in each of the project focus areas. The work is supplemented by engineering plans located in the appendices or provided by reference. Recommendations are provided in each of the respective sections to assist the Town in planning the next phases for this project. The final section of the report provides a record of meetings and presentations held throughout the duration of the project.

2.C. PUBLIC INVOLVEMENT & AWARENESS

The proposed facilities are intended to serve the Town of Yarmouth's residents, visitors to the Town, and local businesses. In order to best serve these parties it is important to first understand their needs and desires for this project. Involvement of the public and stakeholders has been an important and valued aspect to this project, and its success is in small part due to the assistance of all involved.

The consultant team was assisted by an initial group of stakeholders consisting of Town staff, committee members, business and residential property owners, and local conservation groups. As the study moved forward the list of stakeholders was extended to include regional planners and state and federal transportation officials. The stakeholders were involved in periodic meetings throughout the project, and provided valuable feedback, design review, and recommendations. Project stakeholders are listed below:

PROJECT STAKEHOLDERS

Town of Yarmouth Yarmouth Harbor & Waterfront Committee Yarmouth Pedestrian & Bikeway Committee PACTS Yarmouth Boat Yard Yankee Marina F.M. Beck Yarmouth Chamber of Commerce Royal River Conservation Trust Maine Department of Transportation Maine Rivers Lower Falls Landing Residential Property Owners Celadon Salon







In an additional effort to obtain public input and raise awareness, the project team partnered with Maine Rivers to display at the Yarmouth Clam Festival on July 20-22, 2012. During this time representatives were available to speak with the public, informational handouts were provided, and visitors were asked to fill out a survey ranking various design factors. Survey results are presented in Appendix D, and will be presented in a later section of this report. The summary poster used in the Clam Festival booth is provided in Appendix B.

Informational posters were placed at businesses and organizations around Yarmouth to increase awareness within the community. Posting locations include: Town Office, Chamber of Commerce, Merrill Memorial Library, Yarmouth Boat Yard, Lower Falls Landing, Yankee Marina, F.M. Beck, Celadon Salon, and Rosemont Market.

The project was covered in an August 3, 2012 article in the Portland Press Herald titled "Yarmouth is looking to reconnect itself" (Bouchard, 2012). A copy of this article is provided in Appendix C.



2.D. LOCATION HISTORY

Yarmouth Harbor and the Lower Falls Village area have a history rich with significant events and industrial and commercial use that is still visible throughout the area today.

Captain Walter Gendall, once known as the "Hero of Westcustogo," was the owner of a sawmill that was sited at the lower falls that can be seen upstream of the Route 88 bridge. He was killed by natives while delivering ammunition to his fellow settlers (Merrill, 1898), an event that is memorialized today by the plaque in the town park adjacent Route 88 and bridge crossing.



Figure 4 – Map of Lower Falls Village, 1871 (Image Courtesy of Yarmouth Historical Society, Shading, Annotation by BDC)



Shipbuilding in the Harbor was at the height of its activity from the mid 1700's until the last locally-constructed ship left the harbor in 1890. During this time approximately 300 vessels were built. The shipbuilding occurred on both sides of the river and included what is now the small basin upstream of I-295 (Figure 5).

The harbor commerce fostered a community of homes and businesses, the occupants relying on the facilities of Main Street, Marina Road, Pleasant Street (see Figure 4) for transportation of people and goods by land.



Figure 5 – Giles Loring Yard at Head of Yarmouth Harbor, c. 1884 (image courtesy of Yarmouth Historical Society)

Previously a portion of Route 1, the segment of Route 88 of interest in this study (see Figure 6) was an important transportation corridor to Yarmouth and the surrounding communities. With the relocation of Route 1 to its present location in the late 1940's and the construction of Interstate 95 (now I-295) in the early 1960's, alternate transportation routes became available for the growing volume of traffic.



With the construction of I-295 and changes in regional demographics, the coastal hamlets of Lower Falls Village and Grantville were cut off from the harbor, and traditional marine businesses and commerce declined. Downstream of I-295 today, shipbuilding and sardine processing have been replaced with a public landing, marinas, boatyards and service industries that serve recreational boating and a small commercial fishing fleet. Further business activity in this region includes a restaurant, shops, and offices that serve the Town of Yarmouth and the region.



Figure 6 – Route 88 (Previously Route 1) "Falls Bridge" over Royal River c. 1940 (Image Courtesy of Reggie Parker)



3. ROUTE 88 IMPROVEMENTS



The first of the two project focus areas involves improvements to Route 88 in the harbor region. Route 88 (Lafayette Street) runs directly through the region at the base of Main Street and Marina Road, and as such it is central to the connectivity of Yarmouth Village and the Harbor.

The section of road serves two distinct and important functions to the region. First, as a transportation link it provides connectivity between the businesses and communities on the southern side of the Royal River, the Village/Main Street district, the commercial district along Route 1, and beyond. Second, as a local facility it provides motorist, bicycle, and pedestrian

access to a large number of residences, parks and recreational areas, businesses, and harbor resources including the marinas and town landing.

The section of Route 88 considered in this study begins at Lower Falls Landing and ends at Grist Mill Park on the Royal River, for a total length of approximately 0.30 miles, and includes the intersections with Marina Road, Main Street, and Pleasant Street (see Figure 2).

Prior to the relocation of Route 1 (c. 1948), and the construction of I-295 (c. 1960), the usage of this segment of Route 88 was more heavily weighted towards its transportation function. I-295 and Route 1 now serve as the primary routes for transportation through the region, and the role of Route 88 has shifted more towards a local access function whereby traffic serves the local businesses and residences instead of 'passing through' the area. This change in traffic characteristics has generated an interest in the adjacent property for shops, offices, and small businesses and a commitment from the Town to consider changes in the area zoning to promote increased commercial development, slower traffic and safer pedestrian access.



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Figure 7 – Proposed Route 88 Improvements



Through a cooperative effort of the design team, the Town of Yarmouth, the project Stakeholders, and the relevant regulatory agencies, a plan of proposed improvements to the Route 88 corridor has been prepared. The proposed improvements are summarized below and discussed in detail in the following sections. A plan view of Route 88 with the proposed improvements is shown in Figure 7.

The plan is intended to create a corridor that is safe and welcoming to its full range of users, including motorists, pedestrians, and bicyclists, with transportation, parking and pedestrian facilities that are supportive of the current and expected future usage of the region. This plan is based on a design speed on Route 88 of 25 mph, and consists of the following features and improvements:

• Speed limit modification

The proposed roadway improvements on Route 88 are based on a design speed of 25 mph, a reduction from the current posted speed limit of 30 mph. The lower design speed is a key component to the proposed improvements, as it allows for the proposed geometric design. The 25 mph design speed is appropriate given the proposed traffic calming measures. The Town will need to petition Maine DOT for a speed limit modification along with implementing of the proposed improvements.

• Addition of on-street parking

On-street, parallel parking spaces are proposed along both sides of Route 88. Parking spaces are 8-ft wide, layout is based on lengths of 24-ft for interior parking spaces and 20-ft for end spaces.

• Improvement and/or addition of sidewalks

Existing sidewalks along the west side of Route 88 will be widened to 8-ft and receive new curbing and surfacing. New 8-ft sidewalks will be added along the east (harbor side) of Route 88.

• Traffic calming measures

Traffic calming measures include the addition of on-street parking, visual "choke-points" in the roadway cross section, the use of minimum travel lane



widths based on Maine DOT standards and the proposed 25 mph design speed, and the use of 20-ft wide crosswalks at key pedestrian crossing locations.

• Realignment of the Marina Road and Pleasant Street intersections

The intersections of Marina Road/Route 88, Pleasant Street/Route 88, and Main Street/Route 88 will be realigned closer to 90 degrees to improve stop control and sight lines, and to reduce the necessary crossing length for pedestrians.

• Signage and pavement marking recommendations

Recommendations are made for signage and pavement markings that will support safe use by motorists, bicyclists, and pedestrians.

• Reduced curb openings

Curb openings will be reduced in a number of locations to better define driveway entrances and parking areas for adjacent businesses and residences, and to reduce crossing distance for pedestrians.

Increased green space

The proposed improvements provide opportunities for additional green space at three locations throughout the project area, allowing for incorporation of landscape architectural improvements, narrative signage, sculpture, etc. that enhance the community for residents and visitors. The spaces might be used to promote local artists, Town Fathers/Mothers, the history of the area or the role of the harbor and river on the development of local industries that shaped the development of Yarmouth.



3.A. SUMMARY OF EXISTING CONDITIONS

The existing condition of Route 88 within the study area is characterized by the following:

- Moderate traffic volumes (see Section 3.c)
- High speeds of motorists on Route 88 and Marina Road
- Poor geometric design and ineffective stop control at the Route 88/Marina Road intersection (see Figure 10)
- Poor geometric design at Route 88/Pleasant Street and Route 88/Main Street intersections
- Limited parking throughout the area, resulting in users parking in an uncontrolled manner in makeshift spaces under the I-295 bridges (see Figure 8)
- Limited sight distance around corner for northbound motorists and cyclists on Route 88 due to parking mentioned above
- Wide curb openings (See Figure 9) and limited sidewalks
- General lack of adequate pedestrian facilities/amenities.



Figure 8 – Vehicles Parked Perpendicular to Route 88 under I-295 Bridges



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Figure 9 – Large Driveway Openings and No Curbs/Sidewalks along East Side of Route 88



Figure 10 – Intersection of Marina Road and Route 88



3.B. ROADWAY CLASSIFICATION DATA

There are a number of classifications and rankings used by Maine DOT to describe roadways contained in the state highway system (MDOT, 2012). Each of these has a part in describing the function, condition, funding, and geometric parameters for the roadway.

The **Functional Classification** system groups state highways based on the character of service provided considering two primary factors: access to property and travel mobility. For example: freeways provide a high level of mobility with fully controlled access, local roads have many points of access with a minor role in mobility, collectors serve to provide both access and mobility with the relative importance of each function more closely balanced. The Functional Classification and speed limit are the major factors in geometric design of a roadway.

Each roadway is given a **Highway Corridor Priority (HCP)** rating from 1 (highest - Maine Turnpike, Route 1, Route 302), to 6 (lowest - local roads) based on its priority in the state highway system.

Roadways with an HCP of 5 or less are also rated on **Customer Service Level (CSL)**. The CSL ranking assigns a "report card" grade (A-F) in each of three areas: Safety (crash history, geometry), Condition (ride quality, pavement and bridge condition), and Service (congestion, posted roads/bridges).

The combination of HCP and CSL make of the framework through which Maine DOT prioritizes programs and projects.

Classification data for the roadways of interest in this study is provided in Table 1.



Table 1 – MDOT Roadway Classification Data

		ROUTE 88 (From Lower Falls Landing to Grist Mill Park)	MARINA ROAD (From Route 88 to Main Street)	MAIN STREET (From Route 88 to Marina Road)	PLEASANT STREET (From Route 88 to Smith Street)
FUNCTIONAL CLASSIFICATION		URBAN COLLECTOR	URBAN LOCAL COLLECTOR ROAD		LOCAL ROAD
JURISDICTIO	N	STATE AID	STATE AID	TOWN WAY	TOWN WAY
SPEED LIMIT		30 MPH	25 MPH	25 MPH*	25 MPH
HIGHWAY CO PRIORITY (HO	ORRIDOR CP)	5	4	6	6
CUSTOMER	SAFETY	A	A		
SERVICE LEVEL	CONDITION	B/C	A		
(CSL)	SERVICE	В	В		

*Also posted with recommended "15 mph congested"



3.C. TRAFFIC DATA

Conducting a detailed traffic count was outside of the scope of this study, so historical data from Maine DOT was the basis of roadway design. The available data relevant to the project area is described and presented below.

Maine DOT's annual traffic count report (MDOT, 2011) includes Average Annual Daily Traffic (AADT) volumes for three locations that bound the project region: Route 88 NW of Pleasant Street, Route 88 S of Yankee Drive, and Main Street NW of Marina Road. 2007 AADT ranges from 5,360 to 7,130 for these locations. This data is presented in Table 2. (For comparison, 2007 AADT data for Route 1 ranges from 7,550 to 14,220, and on I-295 ranges from 27,290 to 28,070.)

A detailed traffic count was conducted in September of 2010 on Route 88 at a location southwest of Gilman Road. Although the count was conducted approximately 1.0 miles from the location considered in this study, and the variation in total AADT between the locations is significant, the data is expected to be reasonably representative of the project site in terms of distribution of vehicle classes.

The distribution of vehicle classes on Route 88 from the 2010 study is presented in Table 3. From this data it is clear that the usage is predominantly by light vehicles (96.2%). Vehicles considered "heavy" make up the remainder (3.78%). The critical vehicles for the geometric design of the roadway and intersections are believed to be those vehicles larger than a 3-axle single unit (Class 6). These make up a very small percentage (0.16%) of the total use.

While limited data was available specific to the project region, the data used is believed to be adequate for the purposes of the present study. A detailed traffic study is recommended prior to implementation of the proposed improvements.

Another important characteristic to the usage of Route 88 is the volume of bicycle traffic. While no data has been identified to quantify the volume of cyclists using Route 88, the route is known to be used commonly by bicyclists and is on the PACTS bicycle route for the region.



Table 2 – Maine DOT 2011 Traffic Volume Data

ROAD	LOCATION	2007 AADT
ROUTE 88	NW OF PLEASANT STREET	7,130
ROUTE 88	s of yankee drive	5,360
MAIN STREET	NW OF MARINA ROAD	5,560

Table 3 – Distribution of Vehicle Types on Route 88 (SW of Gilman Road), 2010 Study

FHWA VEHICLE CLASS	DESCRIPTION	PERCENT OF 2010 AADT			
1	MOTORCYCLE	0.88%			
2	PASSENGER VEHICLE	75.62%			
3	PICK-UP OR PANEL	19.72%			
4	BUSES	0.88%			
5	2 AXLE, 6 TIRED SINGLE UNIT	2.53%			
6	3 AXLE SINGLE UNIT	0.20%			
7	4 OR MORE AXLE SINGLE UNIT	0.00%			
8	4 OR LESS AXLE SINGLE TRAILER	0.12%			
9	5 AXLE SINGLE TRAILER	0.04%			
10	6 OR MORE AXLE SINGLE TRAILER	0.00%			
11	5 OR LESS AXLE MULTI-TRAILER	0.00%			
12	6 AXLE MULTI-TRAILER	0.00%			
13	7 OR MORE AXLE MULTI TRAILER	0.00%			
	TOTAL LIGHT VEHICLES	96.22%			
	3.78%				
TOTAL CLASS 7 OR HIGHER 0.16%					



3.D. PROPOSED IMPROVEMENTS

3.D.1. ON-STREET PARKING

On-street, parallel parking spaces are proposed along both sides of Route 88. The parking lane on the outside of the curve (west side of Route 88) is 8-ft wide. On the inside of the curve a wider parking lane is necessary to provide the required sight distances for motorists traveling northbound on Route 88. In this location an 8.5-ft parking lane has been incorporated. Parking space layout is based on lengths of 24-ft for interior parking spaces and 20-ft for end spaces.

30 on-street parking spaces are included in the proposed layout. It is estimated that 10 spaces are currently being used in an uncontrolled manner under I-295. These spaces will be eliminated along with existing 4 spaces located in a small off-street lot adjacent the intersection of Route 88 and Marina Road. Accounting for the existing spaces that are eliminated, the total number of new parking spaces created is 16.

3.D.2. SIDEWALKS

The proposed improvements add new 8-ft sidewalks along the east side of Route 88, and widen the existing ~5-ft sidewalks on the west side of Route 88 to 8-ft. The sidewalk width was selected based on a balance of capacity to serve pedestrians, and the goal of minimizing impacts to private properties adjacent to the improvements.

In order to meet ADA requirements, sidewalks must have a maximum grade of 5%, and maximum cross slope of 2% (with grade up to 8.3% and cross slope up to 4% allowed in limited localized areas as necessary). Truncated domes should be installed at all driveway and road crossings.

3.D.3. TRAFFIC CALMING

Traffic calming is "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users" (Lockwood, July 1997). The proposed measures to accomplish traffic calmed conditions for Route 88 include:



roadway narrowing, accomplished through the use of minimum standard travel lane widths, the addition of on-street parking, and incorporation of physical "choke-points" at three locations along the roadway.

Additional traffic calming measure proposed is the use of 20-ft wide crosswalks. The proposed striping pattern for crosswalks is "continental striping." The visual effect of a wide crosswalk is expected to slow drivers through the appearance of a larger pedestrian area.

A visual component to traffic calming that may be incorporated into the project landscaping improvements is the use of street trees spaced at regular intervals. Street trees help to frame the street, providing a defined edge. The regular spacing of street trees provides motorists with a basis for judging their speed, and can further help to control the movement of motorists on the roadway.

Suggestions have been made throughout the project to include raised speed tables to further accomplish traffic calming. While feedback from the stakeholders group regarding the use of speed tables has generally been negative, citing issues with snow removal and damage to emergency vehicles, these are an effective option that the town may want to consider in the solution that is ultimately adopted. If speed tables are used, signage should also be installed to inform users of their presence.

3.D.4. SPEED LIMIT MODIFICATION

The proposed roadway improvements are based on a design speed on Route 88 of 25 mph within the project area. The proposed 25 mph design speed is appropriate for the roadway when considered in combination with the other traffic calming measures proposed, the increased pedestrian exposure expected to result from addition of sidewalks and other pedestrian facilities, and anticipated future land use along the section of roadway.

The current posted speed limit on Route 88 is 35 mph south of Pleasant Street, and 30 mph from Pleasant Street to Route 1. The proposed design speed represents a reduction in posted speed limit of 5 mph for the area between Pleasant Street and Route 1.

The proposed design at 25 mph should be reviewed with Maine DOT in context with implementation of the proposed Route 88 improvements.



The design speed of 25 mph serves several important functions in the design:

- 1. Along with traffic calming measures, the posted speed limit should contribute to lower motorist speeds on Route 88.
- 2. The 25 mph speed limit allows for narrower travel lanes (contributing to increased traffic calming), and requires lower stopping sight distance and horizontal sightline offset for motorists, increasing safety around the horizontal curve that continues throughout most of the project length.
- 3. The narrower lane widths allow for a narrower overall roadway section, which minimizes impacts to private property, and will ultimately reduce project cost and ease approval.

Based on Maine State law (29-A § 2075, §-3), speed limits on state highways are established by Maine DOT and approved by the Chief of the State Police. The process for changing a speed limit requires that a municipal officer send a written request to the Maine DOT traffic engineer. Maine DOT may then conduct a study of the area. If a change in speed limit is supported, the recommendation will be made to the DOT Commissioner and Chief of State Police. If approved, the DOT will notify the town and make the signage changes for any roads under state jurisdiction (MDOT, 2012). For roads under local jurisdiction, the municipality is responsible for signage changes.

Because the speed limit modification may not be warranted by existing conditions, it is imperative that modifications be considered along with the modifications to area zoning and proposed roadway improvements for the corridor. The proposed roadway geometry does not meet all Maine DOT standards for a 30 mph roadway, therefore the geometric design will be a "design exception" until the speed limit modifications are made, and will require documented justification. Two factors that may be used as quantifiable justification for the design exception include:

- 1. Impact to private property
- 2. Impact to travel time

Each of these factors will be described in greater detail in later sections of this report.

Historically, speed limit modifications were only possible in rare instances with substantial justification (Baker Design Consultants, 2012). In fall 2011, Maine DOT adopted a new "Practical Design" policy allowing for greater consideration of



such changes based on the HCP of the roadway and the engineer's opinion of the best solution for the users (Baker Design Consultants, 2012).

3.D.5. INTERSECTION REALIGNMENTS

The proposed improvements include realignment of the intersections between Marina Road/Route 88, Pleasant Street/Route 88, and Main Street/Route 88.

The intersection designs are based on a WB-67 design vehicle (semi-trailer with an overall wheelbase of 67 feet). All three intersections were designed allowing for encroachment of the turning vehicle into the oncoming lane. This encroachment is permitted on Main Street and Pleasant Street, due to their classification as local roads. The allowance for encroachment on Marina Road is justified by the very low volume of heavy trucks using the roadway (see Section 3.c).

Marina Road/Route 88 – The intersection of Marina Road and Route 88 suffers from two issues: (1) poor geometric design, and (2) ineffective stop control for vehicles entering Route 88 southbound from Marina Road.

Marina Road and Route 88 intersect at an angle of approximately 140-degrees (See Figure 10). Whenever possible, intersections should be designed at right angles, and always between 60 and 120-degrees (MDOT, 2004). Alignments outside of this range increase pedestrian crossing distance across the highway, negatively affect intersection sight distance, and complicate the design of turning movements.

The intersection also suffers from ineffective stop control for vehicles leaving Marina Road and entering Route 88 southbound. One local business owner noted that she regularly witnesses motorists "...slide through the stop sign at the bottom of Marina Road" and "We are very afraid there will be a serious accident someday" (Email Communication with Lisa Weickert, Owner of Celadon Salon, 2012).

The proposed solution realigns the end portion of Marina Road to create a rightangle intersection with Route 88, and narrow the intersection width to the minimum necessary to accommodate the turning movements of the design vehicle. The proposed realignment will also contribute to a safer pedestrian environment by reducing pedestrian crossing distance.



Pleasant Street/Route 88 – The intersection of Pleasant Street and Route 88 has a poor geometric design, with the two roads intersecting at an angle of approximately 150-degrees. Further, the geometry results in pedestrian crossing distance that is excessively large.

The proposed solution realigns the end portion of Pleasant Street to create a right-angle intersection with Route 88 and narrow the intersection width. The existing island at the end of Pleasant Street is eliminated providing one straight-through crosswalk for pedestrians. The new intersection alignment also relocates the end of Pleasant Street opposite the entrance of Yarmouth Boat Yard, providing a large area for oversized turning vehicles.

Main Street/Route 88 – The intersection of Main Street and Route 88 has an angle of approximately 120-degrees. This angle is at the limit of the recommended range specified by Maine DOT, and although realignment is not necessary, the intersections could stand to be improved by realignment closer to 90-degrees.

The proposed solution realigns the end portion of Main Street to create a rightangle intersection with Route 88 and narrow the intersection width. The new intersection alignment eliminates the island at the middle of Main Street, and shortens the crossing distance for pedestrians.

3.D.6. SIGNAGE AND PAVEMENT MARKING RECOMMENDATIONS

The section of Route 88 will continue to see mixed use by motorists, bicyclists, and pedestrians. The proposed improvements should incorporate signage and pavement markings that will promote safe use by all of the varied users. All signage and pavement marking recommendations contained in this section reference the Manual on Uniform Traffic Control Devices (MUTCD) (FHWA, 2009), however local standards should also be referenced. Portland Area Comprehensive Transportation System (PACTS) is the local Transportation Management Area (TMA) and should be contacted for regarding local standards, and the regional Bicycle & Pedestrian plan should be consulted.

The first necessary change to the area signage will be to post for the reduced speed limit of 25 mph along Route 88 after traffic calming has been implemented. New speed limit signs will be erected by Maine DOT if the proposed speed limit recommendation is adopted.



In order to alert motorists to the presence of bicycles within the travel lanes, it is recommended that R4-11 "[Bicycles] May Use Full Lane" signs (see Figure 11) be posted at locations bounding and throughout the project length.



Figure 11 – R4-11 – "Bicycles May Use Full Lane" Figure 12 – Shared Lane Pavement Markings

In order to guide bicyclists to a safe location within the travel lanes and to further alert motorists to their presence, it is recommended that Shared Lane Arrows (a.k.a. "sharrows") be applied in the travel lanes (see Figure 12). The sharrows should be sized according to regional standards (example shown is Figure 9C-9 of the MUTCD), and should be located in each travel lane a minimum of 5-ft from the nearest edge of the adjacent parking lane. The specific layout & spacing of sharrows should be determined based on use and context in accordance with Town and/or regional standards. Sharrows are currently in use in several locations in Yarmouth; examples may be found on Rogers Road and Elm Street.

3.D.7. CURB OPENINGS

Many of the properties along Route 88 have very wide or undefined driveway entrances. This negatively impacts both drivers and pedestrians. From a motorist standpoint, entrance and exit locations are unclear and are used inconsistently. From a pedestrian standpoint, crossing distances are increased



and pedestrian corridors are often unclear or confusing. The ultimate result is reduced safety to both types of users.

Curbed sidewalks are proposed along both sides of Route 88 throughout the project length. The curbs and sidewalks will provide defined areas for motorists and pedestrians, and defined entrances and off-street parking areas for businesses and residences.

3.D.8. GREEN SPACE

The proposed improvements have created new opportunities for green space throughout the region where landscaping, lighting, benches, and public art, and other features can be incorporated. The design of such features is outside of the scope of this study, and should ultimately involve landscape architects, artists, the public, and groups such as Yarmouth Historical Society and Yarmouth Village Improvement Society. The locations of opportunity for open space are described below.

The proposed intersection realignments have created new open spaces at the corners of Pleasant Street/Route 88, Marina Road/Route 88, and Main Street/Route 88. These spaces provide an opportunity to incorporate features that will create a gateway entrance to the proposed Shared-Use pathway.

Additional open space will result next to Celadon Salon by closing off the existing parking space. Although previously used as parking space for the nearby businesses, this area is substantially within the I-295 and Route 88 right-of-way and could likely be repurposed as green space.

3.E. TRAVEL TIME STUDY

In order to quantify the impact of the proposed speed limit modification on the travelling public, a simple travel time study was conducted. The study considered the time to travel north on Route 88 from Gilman Road to Route 1 at the current posted, and proposed speed limits. The results of the study are presented in Table 4. While this study is acknowledged to be simplistic, it demonstrates that impact to travel time resulting from the proposed speed limit reduction is minimal.



Another factor impacting travel time is the queuing of turning vehicles at the three intersections contained within the project length. While the proposed improvements may result in greater queuing times because there are no accommodations for passing of vehicles waiting to turn, this factor has not been investigated in detail within this study. It is recommended that a detailed traffic study be conducted prior to implementation of any of the proposed improvements.

	-	 	 		

Table 4 – Route 88 Travel Time Estimates

			SPEED LIMIT (MPH)		TRAVEL TIME (MIN)		TIME	
START POINT	END POINT	DIST (MI)	CURRENT	PROPOSED	CURRENT	PROPOSED	DIFFERENCE (SEC)	
	PLEASANT ST.	0.87	35	35	1.5	1.5	0	
	MARINA RD.	0.93	30	25	1.6	1.6	1	
	main st.	1.02	30	25	1.8	1.9	4	
GILMAN Road	GRIST MILL PK.	1.07	30	25	1.9	2.0	5	
	SPRING ST.	1.28	30	25	2.3	2.5	10	
	BAYVIEW ST.	1.56	30	25	2.9	3.2	17	
	RT. 1	1.78	30	25	3.3	3.7	22	

3.F. PROPERTY IMPACTS

Right of way limits for Route 88 and I-295 were identified through a land survey conducted by Royal River Survey Company as a part of this study. Project design and layout was conducted with a goal of minimizing impacts to adjacent properties, however some minor impacts are expected with the proposed layout. A summary of the impacted properties is given below:

40 Lafayette Street

The property at 40 Lafayette Street (Lot 28-29, Tax Map 28(B)) is currently occupied by Bay Properties Realty. The proposed sidewalks require a taking of approximately 1,000-ft² (0.023-acre) of land in a strip approximately 180-ft long along the front of the property. This area is currently used for parking and landscaping.



Walter Gendall Memorial Site

The Walter Gendall Memorial Site is a Town owned property (Lot 28-27, Tax Map 28(B)). The property is the location of a memorial to Captain Walter Gendall who was killed near the location. Note that the designation as a public park will require Section 4(f) property review. The proposed sidewalks require the use of approximately 112-ft² (0.003-acre) of this property where a corner of the property boundary protrudes into the Route 88 Right of Way. This area is currently a gravel parking area.

3.G. ROADWAY CROSS SECTION

The parameters governing design of the proposed roadway cross section are provided in Table 5, along with those relevant to the existing conditions. Typical roadway cross sections at locations with and without on-street parking are shown in Figure 13.

Table 5 – Roadway Geometry Standards

GEOMETRIC PARAMETER	EXISTING	PROPOSED
SPEED LIMIT	30 MPH	25 MPH
LANE WIDTH	MINIMUM – 11 FT DESIRABLE – 12 FT EXISTING – 11.5 FT	MINIMUM – 10 FT DESIRABLE – 11 FT DESIGN – 10 FT
PARKING LANE WIDTH	MINIMUM – 7 FT DESIRABLE – 10 FT EXISTING – NONE	MINIMUM – 7 FT DESIRABLE – 9 FT DESIGN – 8 FT
SHOULDER/CURB OFFSET	MINIMUM – 2.5 FT Existing – 2.9 FT	MINIMUM – 2.5 FT Design – 2.5 FT
MINIMUM STOPPING SIGHT DISTANCE	MINIMUM – 200 FT EXISTING – VARIES	MINIMUM – 155 FT Design – 155 FT
HORIZONTAL SIGHTLINE OFFSET (CL INSIDE LANE TO NEAREST OBSTRUCTION)	MINIMUM – 10.5 FT EXISTING – VARIES	MINIMUM – 6.5 FT DESIGN – 6.5 FT
SIDEWALK WIDTH	MINIMUM – 5 FT Existing – 5.5 FT	MINIMUM – 5 FT DESIGN – 8 FT





Figure 13 – Typical Roadway Cross Sections

Note that the roadway cross sections shown in Figure 13 demonstrate geometry (travel lane widths, parking lanes, curb offsets, etc.) and are not intended to represent all aspects of the applicable roadway cross section (e.g. superelevation, existing concrete base beneath asphalt pavement, etc.).

3.H. LANDSCAPE ARCHITECTURAL OVERLAYS

With the assistance of Terrence J. DeWan & Associates, the consultant team has prepared graphics demonstrating concepts for landscape architectural improvements to the Route 88 area. Improvements include street trees, green spaces, and other landscape features designed to improve the appearance and usability of the area (see Figure 14).

An additional graphic has been prepared to demonstrate a concept for additional infill of the property surrounding Route 88. With future changes to zoning, additional development of private property, and incorporation of the previous landscape improvements, a vision for what the future of this region could be begins to emerge (see Figure 15).



<u>Reconnecting Yarmouth Village to the Working Waterfront</u> Baker Design Consultants – Civil, Marine, & Structural Engineering



Figure 14 – Proposed Route 88 Improvements (Graphic by TJD&A)



<u>Reconnecting Yarmouth Village to the Working Waterfront</u> Baker Design Consultants – Civil, Marine, & Structural Engineering



Figure 15 – Proposed Route 88 Improvements with Possible Infill Concept (Graphic by TJD&A)



3.I. ROUTE 88 ALIGNMENT ALTERNATIVES

Alternative designs have been prepared and considered at various stages throughout the design development. In the event that some of the proposed improvements are not approved by the regulatory agencies or funding availability necessitates pursuing a reduced scope, the following alternatives may be considered:

Maintain 30 mph speed limit – Parking both sides

If the proposed speed limit modification is not completed, an alternative design may be considered including all of the proposed improvements, but keeping the speed limit at the current 30 mph. This alternative will require a wider travel lanes, greater horizontal sightline offset on the inside lane. The result will be greater impact to properties along Route 88, particularly those along the East side, as well as less effective traffic calming. The same number of on-street parking spaces could be created, and the same sidewalk widths could be used with the exception of one area under the I-295 bridges where a narrower sidewalk would be required.

Maintain 30 mph speed limit – Parking west side only

Another alternative that may be considered if the proposed speed limit modification is not completed is to eliminate the proposed parking from the east side of Route 88, and perform all other proposed improvements. This would reduce the number of new on-street parking spaces to 14, exactly offsetting the spaces eliminated between the parking next to Celadon Salon and under the I-295 bridges. This design could be constructed with a similar total roadway width to the 25 mph option with parking on both sides, and similar impacts would occur.



4. SHARED-USE PATHWAYS

The second of the two project focus areas involves the design of shared-use pathways that reestablish a connection between the two sides of the harbor and links with the Village. Key features of each pathway are presented in the next section. Sections that follow outline the Alternatives Analysis undertaken and the design development of key walkway parameters.



Figure 16 – Overview Plan of Pathway Routes



4.A. PATHWAY ROUTES SELECTED

The process for designing the pathway included an initial investigation of route alternatives based on topographical constraints and land use impacts. The merits of each route were evaluated with the help of stakeholder discussion and public input regarding destination preferences and user experience. Property and environmental impacts were also considered. The final routes selected for an engineering evaluation to determine regulatory impacts and an opinion of probable costs are listed below.

- 1. Harbor-Crossing Pathway
- 2. Walter Gendall Park Connection
- 3. Lower Falls Landing Pathway Link

4.a.1.HARBOR-CROSSING PATHWAY



Connects:	Town Landing to Route 88
(near Pleas	ant Street)

Length: 1,125-ft

- 3 160-ft Span Bridges
- 3 12-ft Harbor Overlooks

1 – 96-ft Span Bridge

500-ft at-grade pathway

Property: Entirely within I-295 Right-of-Way

Regulatory: USCG, NRPA, ACOE, and Yarmouth permit application required

Opinion of Cost: \$2.05M (\$1,800/I.f.)

The main segment of the proposed pathway – provides convenient connection to Town Landing, Lower Village, and Marinas, Harbor overlook opportunities, and points of access for fishing, birdwatching, and other recreational uses.



4.a.2.WALTER GENDALL PATHWAY SEGMENT



Connects: Walter Gendall Park to Harbor Crossing Segment (south of Royal River)

Length: 356-ft

2 – 105-ft Span Bridges 1 – 26-ft Span Bridge 120-ft at-grade pathway

Property: I-295 and Route 88 Right-of-Way, Walter Gendall Park, ownership of tidal-flats uncertain

Regulatory: USCG, NRPA, ACOE, and Yarmouth permit application required

Opinion of Cost: \$600,000 (\$1,700/l.f.)

An offshoot of the Harbor Crossing Segment – provides a more direct connection to northern end of the project area, including the Walter Gendall Memorial Park, the base of Main Street, and Grist Mill Park.

4.A.3. LOWER FALLS LANDING PATHWAY SEGMENT



Connects: Lower Falls Landing to proposed new sidewalks along Route 88

Length: 210-ft

1 – 80-ft Span Bridge 130-ft at-grade pathway

Property: Route 88 Right-of-Way, Yarmouth Boat Yard, Lower Falls Landing

Regulatory: NRPA, ACOE, and Yarmouth permit application required

Opinion of Cost: \$210,000 (\$1,000/l.f.)

Entrance to pathway system from southern

end, provides new pedestrian connection from village to Lower Falls Landing.



4.B. PATHWAY ROUTE ALTERNATIVES CONSIDERED

Initially, eight (8) route alternatives were identified to create the pathway connection between the Town Landing and Route 88. A system of Nodes and Segments was laid out to serve as a means for identifying key locations along the routes (see Figure 17). The route combinations were designated A-H, with specific segments identified by their starting and ending nodes. Descriptions of each of the route alternatives are presented in Table 6 together with a summary notes that indicate why a route was eliminated from consideration.



Figure 17 – Pathway Nodes and Segments considered



NODE DESCRIPTIONS

- 1 TOWN LANDING
- 2 NE CORNER, I-295 BRIDGE
- 3 NW CORNER, I-295 BRIDGE
- 4 GRIST MILL PARK
- 5 WALTER GENDALL MEMORIAL

6 – SW CORNER, I-295 BRIDGE 7 – SE CORNER, I-295 BRIDGE 8 – MARINA ROAD 9 – YARMOUTH BOAT YARD 10 – LOWER FALLS LANDING

ROUTE	NODES	NOTES
A		"Do nothing" option must be considered, but does nothing to remedy current lack of connectivity
В	1-2-7-9	Consider Route B and Route D concurrently
e	1-2-7-6-8	Eliminated due to redundancy with Route D, and because compared to Route D, this route has more adjacency to traffic, is less direct to the destination, and is less appealing to users.
D	1-2-7-6-5	Consider Route B and Route D concurrently
E	1-2-3-4	Eliminated primarily due to private property impacts
F	1-2-3-6-5	Eliminated due to location of bridge over Royal River upstream of I-295
G	1-2-3-6-8	Eliminated due to location of bridge over Royal River upstream of I-295
Ħ	1-4	Eliminated primarily due to private property impacts

Table 6 – Route Alternatives

4.C. PATHWAY DESIGN CONSIDERATIONS

4.C.1. PATHWAY USERS

Design of the pathway is based on satisfying the physical and operational characteristics of its users. In order to gain insight into the potential usage of the pathway, a survey was developed and given to the project stakeholders and the public. Through the survey, it was determined that interest in the pathway is for a wide range of uses. These include pedestrians (walkers, runners, people using wheelchairs, people walking dogs, etc.), bicyclists, and other recreational users (birdwatchers, fishermen, sightseers, etc.). Results of the survey are provided in Appendix D. Based on the survey findings, the pathway has been designed as "shared-use" and the appropriate geometric parameters have been applied based on AASHTO recommendations (AASHTO, 2012).



4.C.2. HORIZONTAL ALIGNMENT

The horizontal alignment of the pathway is based on the preferred routes, B and D, discussed in Section 4.b. The alignments were refined to consider distance from adjacent vehicular traffic, right-of-way location, angle of pathway intersections, type of construction (elevated vs. at-grade), and cost of construction. The proposed horizontal alignments are shown in Sheet C-2 of the project plans, which are included in APPENDIX F – PRELIMINARY DESIGN PLAN SET.

4.C.3. ELEVATION & VERTICAL ALIGNMENT

Elevation of the pathway is determined based on constraints both above and below the pathway. From below, elevation is governed by 100-year flood elevation freeboard and navigation clearance above Mean High Water. From above, elevation is governed by clearance under the I-295 bridges for the atgrade portion of Route D. In addition to these regulatory clearances, a primary design development goal has been to maximize the distance between pathway users and motorists on I-295 to optimize the pedestrian experience.

The base flood elevation at the project location is 10.3 (NAVD88). Maine DOT recommends a minimum freeboard of 1-ft from the base flood elevation to the lowest superstructure element for hydraulic capacity, with additional clearance as necessary for navigation (MDOT, 2003).

The Royal River is a navigable waterway, and although use is minimal above the I-295 bridges, access of appropriately sized vessels must be considered. Input on navigation requirements for the Royal River above I-295 was obtained from the project stakeholders, Town Harbor & Waterfront Committee, and Harbormaster. The feedback received indicates that the basin above I-295 only sees minimal boat traffic by small vessels. The Harbormaster also indicated that he would like to have access to the basin for emergency situations. His boat is currently a center console outboard.

The US Coast Guard has jurisdiction over navigable waters in the US. The Division 1 Bridge Office was contacted regarding the project. While USCG recognized the assessment of navigation requirements in the Royal River above I-295, specific guidance on bridge clearance was not able to be provided. USCG



indicated that because the Royal River is a navigable waterway, a full bridge permit will be required.

Route D includes a segment that passes under the I-295 bridges. Minimum overhead clearance for a shared-use pathway is 8-ft, with greater clearance preferred to increase distance from overhead obstructions.

The location of the pathway adjacent I-295 exposes users to both visual impacts and road noise. In order to minimize these impacts, it is desirable to distance the pathway from I-295 as much as practicable.

Considering these factors, a nominal pathway elevation of 15.0 (NAVD88) was selected. Pathway profiles are shown for each of the various segments in the drawings included in Appendix F.

4.C.4. PATHWAY CROSS-SECTION

The pathway cross-section geometry is based on its designation as "Shared Use". General cross-sectional parameters include: 10-ft pathway width, 54-in tall bicycle rails in all elevated sections, locations adjacent water, or segments with side slopes greater than 1V:3H.

The pathway cross section varies throughout the length as varying conditions require a variety of construction methods. Sections can be categorized by their construction type as follows:

- At-Grade Sections
- Elevated Walkway Sections
- Bridges

Each of these sections will be discussed further in the following sections. Cross sections for each of the sections are shown in Appendix F. Locations of each of the applicable sections are indicated in Figure 16.

4.C.5. ELEVATED STRUCTURES – DESIGN LOADING

Design loading for the elevated walkway and bridge structures has been determined in accordance with the AASHTO LRFD Bridge Design Specifications. Dead loads are based on actual weights of structural components and attachments. Pedestrian live load is 85 psf. Vehicular live load is based on the



Town's snow removal equipment, a Trackless MT6 with a total weight of 5,400 lb. Loading due to larger vehicles need not be considered as the pathway will include bollards to prevent access by vehicles.

4.D. AT-GRADE PATHWAY SECTIONS

In locations where the existing grade is at or above the minimum pathway profile grade, the proposed construction is an at-grade paved pathway. Locations of at-grade pathway include a segment along the embankment of I-295 in Route B, and a segment crossing under the I-295 bridges in Route D.

Similar design concepts to the at-grade pathways proposed here have been used in the Back Cove Trail in Portland near Tukey's Bridge, including both the at-grade path along the embankment of I-295, and an under-bridge crossing. Photos of the Back Cove Trail in the vicinity of Tukey's Bridge are shown in Figure 18.

For the pathway segment crossing under I-295, vertical clearance below the existing bridge girders was a major factor in determining pathway elevation. Minimum recommended overhead clearance for a shared-use path is 8-ft. For the proposed path, a clearance of 10-ft has been provided. This allows for greater headspace and distance from vehicular traffic crossing the bridges on I-295. The additional clearance is also provided to plan ahead for the addition of a future wearing surface, or any new overhead obstructions which would reduce the overhead clearance.



Figure 18 – Back Cove Trail Approaching and Under Tukey's Bridge, Portland, ME



Typical cross sections for at grade portions of the proposed walkway are shown in Sheet S-1 of the drawings provided in Appendix F.

4.E. ELEVATED PATHWAY SECTIONS

The areas considered "elevated pathway" are those that require the pathway to be elevated above grade or over water, but not crossing a river or navigable channel. These include the approach spans for Route B and D. In these areas, the proposed construction is a timber-deck on steel-girder structure supported by pile foundations.

Elevated sections are designed with a rail-to-rail width of 10-ft. 54-in tall rails are included at all elevated locations.

4.F. BRIDGES

The pathway network includes, in total, 6 bridge structures. For all of the bridges, the proposed structure type is a steel, through-truss design similar to the bridge used in the Beth-Condon walkway in Yarmouth (see Figure 19). Locations and spans for the proposed bridges are as follows:

- Harbor Crossing 160-ft span, 10-ft wide, 3 bridges
- Walter Gendall Park Segment 105-ft span, 10-ft wide, 2 bridges
- Lower Falls Landing Segment 80-ft span, 10-ft wide, 1 bridge

Initial investigation into structure types included consideration of three material options, as listed below. Typical cross sections and

- Steel through-trusses and deck-on-girder sections
- Precast concrete double T-beam with integral slab
- Timber glulam and dimensional lumber construction

Several factors drove the selection of the steel through-truss design as the recommended option for the bridge structures. First, onsite geotechnical conditions favor a design consisting of long spans with few abutments. Second, the spans that can be achieved with a through-truss design (up to 200-ft) are beyond those practical for other structure types investigated (60 to 80-ft). Third,



the through-truss design places the majority of the superstructure above the deck elevation, allowing for the greatest clearance under the bridge.



Figure 19 – Beth Condon Pathway Bridge (Image Courtesy of TJD&A)

The use of a standardized bridge design should provide overall cost savings to allow for development of the overlooks and other pathway features. Also, because the pedestrian experience features a rich landscape, the bridge does not need to be an architectural statement.

A profile of the proposed Royal River crossing on Pathway Route B, utilizing a through-truss bridge is shown in Figure 20 with the existing I-295 crossing shown behind.



Figure 20 – Proposed Royal River Crossing Profile





4.F.1. BRIDGE CONCEPTS

While the recommended structure type is expected to provide a safe, functional, and cost-effective design, it may be desirable to incorporate a more extravagant bridge design to create a landmark structure for the community. One particular location where this may be desirable is for Pathway Route D, which connects to the Walter Gendall site. This bridge would be visible from both Route 88 and I-295 and could create a visual attraction for the area. One stakeholder noted that a cable-stayed structure would evoke the maritime history of the area due to cable geometry resembling sails of a ship.

While the cost of such a structure will be higher, the attraction that comes from it has the potential to bring value to the surrounding area, and should be considered. An example of a potential structure type is shown in the Figure 21.



Figure 21 – Charles City, Iowa Pedestrian Bridge

4.G. LANDINGS & OVERLOOKS

At the entrances to the pathway, "gateway" landings are recommended to provide an inviting entrance to the pathway system, as well as a location for landscaping and pedestrian facilities such as bike racks, seating, trash receptacles, and instructive and/or interpretive signage. An example of one such landing at the Riverwalk in Auburn is shown in Figure 22.

Pathway Route B, which crosses the harbor and the Royal River, includes three overlooks along the route, providing opportunities for viewing the harbor, fishing, bird watching, and other recreational activities. An example of an overlook concept from the Auburn Riverwalk is shown in Figure 23. A view from the approximate height and location of the proposed overlook at the center of the harbor is shown in Figure 24.



<u>Reconnecting Yarmouth Village to the Working Waterfront</u> Baker Design Consultants – Civil, Marine, & Structural Engineering



Figure 22 – Pathway Landing Area Concept



Figure 23 – Overlook or Auburn Riverwalk overlooking Androscoggin River





Figure 24 – View of Yarmouth Harbor from Location of Proposed Overlook

It has further been suggested that the landing areas could be used as locations for public art pieces or monuments. Suggestions have been made to incorporate pieces that tie into the area's maritime heritage. These pieces could be commissioned through professional artists through a bidding process or design competition.

4.H. PROPERTY IMPACTS

The majority of the proposed pathway route is located on Town property or within the I-295 right of way. An agreement will need to be reached with Yarmouth Boatyard and Lower Falls Landing for the small impact to accommodate the Lower Falls Landing pathway.

Maine DOT and Federal Highway Administration have been contacted regarding the proposed location of the pathway within the I-295 right-of-way. According to FHWA, locating the pathway within the I-295 right-of-way can be permitted, as long as it is outside of the controlled-access limit line (i.e. fence line). Furthermore, if the pathway does encroach into the controlled access limit line, it may be possible to relocate the fence.

Further investigation will be required into the ownership of the intertidal area between I-295 and Route 88 which is crossed by pathway Route D. Typically, tidal properties in Maine extend to Low Water not to exceed 100-rods (1650-ft). The deed to the property at 40 Lafayette Street indicates that this property extends to the high water mark. The ownership of the land between the high water mark and low water mark is unclear, and will need to be determined prior



to construction of pathway Route D in order to determine what acquisitions and/or easements may be necessary.

5. **REGULATORY REQUIREMENTS**

5.A. FEDERAL PERMITTING

5.A.1. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

The National Environmental Policy Act was signed into law by President Richard Nixon in 1970 in an effort to "foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."

The core purpose of NEPA is to require agency decision makers to make informed decisions in regard to the environmental consequences of their proposed actions. The NEPA process can vary depending on the scope of the project and anticipated environmental effects, but typically requires either an Environmental Assessment or Environmental Impact Statement to be completed prior to undertaking the project. NEPA does not necessarily require that the minimum impact alternative is selected, or that environmental impacts are completely mitigated, however it does require that the environmental effects be investigated in the decision-making process.

The proposed pile supported pedestrian bridges will impact navigable waters and with require evaluation in accordance with NEPA regulatory requirements. The design does not include any fill below the high water mark. No dredging is required. Baker Design Consultants discussed the project with the Maine Project Office of the Army Corps of Engineers and the Regional Coast Guard Bridge Office. As the project is currently configured, the Coast Guard will have the role as federal decision-makers role and will be responsible for ensuring NEPA compliance. The Army Corps of Engineers will likely act in an advisory role.

The project sponsor (likely the Town of Yarmouth, although federal grants may require that MDOT of FHWA take a lead) and their agents will be required to



demonstrate practicable design that includes an alternatives analysis with demonstrated avoidance and minimization of resource impacts.

5.B. COAST GUARD BRIDGE PERMIT

Based on communications with the US Coast Guard First District Bridge Office, the project will require a full bridge permit because the proposed bridge crossing will reduce the navigational clearance upstream. This application should be started in an early phase of project development because of the impact the clearance has on final design. The permit application will need to include an alternatives analysis to justify the proposed navigational clearance of the preferred alternative. As the lead Federal Agency, the Coast Guard will consider any requests for NEPA categorical exclusions and will ultimately determine the extent of the Environmental Assessment for the project.

5.C. DEPARTMENT OF THE ARMY PERMIT

Unless the project is changed to include substantial filling of the coastal wetland at the bridge approaches, the Army Corps of engineers will not require a separate permit from that issued by the Coast Guard.

5.D. MAINE NRPA PERMIT

A Natural Resource Protection Act (NRPA) Individual Permit will be required from Maine Department of Environmental Protection (DEP) for the project because of impacts on and over the coastal wetland. DEP has been contacted regarding the proposed improvements and no significant items of concern were identified.

As part of the NRPA permit review, The Maine Historic Preservation Commission (MHPC) is responsible for reviewing projects to assess impacts to historically significant properties, buildings, and other structures.

5.E. MAINE SUBMERGED LANDS LEASE

The Department of Conservation will need to issue a Submerged Lands Lease to the Town for any components of the project that extend into deep water



beyond the Mean Low Water mark. The majority of the bridge footprint is over an intertidal area, so only the bridge section that crosses the Royal River will likely apply.

5.F. MAINE DOT AND FEDERAL HIGHWAY ADMINISTRATION (FHWA) APPROVAL

Route 88 is a state highway, so the Maine DOT approval will be required for any changes to the corridor. Notwithstanding ROW impacts, both Maine DOT and FHWA approval will be required for project positioning within the Interstate 295 corridor.

5.G. LOCAL PERMIT REQUIREMENTS

The Town of Yarmouth will require a permit from the Planning Board in accordance with Site Plan Review and Shoreland Zoning Ordinances. This will provide an opportunity for Public input and comment.

Any zoning changes to complement and foster area development will need to be considered by the Planning Board and sent to the Town Council for approval.



6. PROJECT COST ESTIMATES AND FUNDING SOURCES

6.A. COST ESTIMATES

Preliminary cost estimates for each segment of the project are provided in Table 7. Further detail is provided in Appendix E for reference.

Table 7 – Cost Estimates for Proposed Improvements

ITEM	ESTIMATED COST
ROADWAY IMPROVEMENTS	\$180,000
SIDEWALK CONSTRUCTION	\$260,000
LANDSCAPING, SIGNAGE, AND PEDESTRIAN FACILITIES	\$90,000
TOTAL ROUTE 88 IMPROVEMENTS	\$530,000
HARBOR CROSSING PATHWAY – ELEVATED PORTION	\$1,900,000
HARBOR CROSSING PATHWAY – AT-GRADE PORTION	\$150,000
WALTER GENDALL PATHWAY	\$600,000
LFL PATHWAY	\$210,000
GATEWAY LANDINGS	\$120,000
ΤΟΤΑΙ ΡΑΤΗΨΑΥ	\$2,980,000
TOTAL COST OF IMPROVEMENTS	\$3,510,000

6.B. PROJECT PHASING

Phasing of the various project elements provides an opportunity to take advantage of multiple funding sources, to spread the necessary investment by the Town over a longer period of time, and provides an opportunity to stage early improvements to create the momentum for later elements of the project.



There are many ways in which the project could by broken down in phases, the following recommendations include design team input as well as input from the Maine DOT Planning Department:

PROJECT PHASE	DESCRIPTION	POSSIBLE FUNDING SOURCE
1	Intersection Realignments	MDOT Municipal Partnerships Initiative
2	Roadway Improvements	PACTS Corridor Improvement Program
3	Sidewalk Improvements (Option to combine with Phase 2)	Transportation Alternatives Program
4	Pathway Construction – Harbor Crossing Segment	Federal, State and Regional Multiuse/Path/Trail Initiatives. Opportunity as a crossing of I-295 corridor utilities, i.e. gas
5	Pathway Construction – Walter Gendall Segment	Federal, State and Regional Multiuse/Path/Trail Initiatives.

Table 8 – Project Phasing Recommendation

6.C. FUNDING OPPORTUNITIES

The following section summarizes possible funding opportunities for the proposed Route 88 Improvements and Shared-Use Pathway. The listing is based on guidance requested throughout the project from state and federal agencies, but is by no means a complete list. All sources need to be explored including State and Federal Grants, Economic Development Programs, and others as deemed applicable.

6.C.1. TOWN MATCHING FUNDS

Many grants require some form of match to be provided by the Town. Taxpayers should be encouraged to recognize that match funding these projects on the basis of their contribution to economic development within the project area. The construction of the pedestrian pathway and improvements to Route 88 provide an opportunity to transform the economic vitality of the area



at the base of Main Street and adjacent the harbor, providing potential for increased in the number of businesses and the associated community spinoff in increased jobs and the number of visitors that spend money in Town.

6.C.2. MAINE DOT COST SHARING POLICIES

The relevant policies regarding cost sharing have been summarized below, for a complete reference; see the Maine DOT – Local Cost Sharing Policy (MDOT, 2010).

Highway Portions

Maine DOT will pay 100% of the project cost for necessary (as determined by Maine DOT) highway improvements.

Sidewalks

The town will be responsible for 20% of the cost of replacing or rehabilitating existing sidewalks.

New sidewalks in Compact or Qualifying Pedestrian Areas will require a 20% local match. In areas not designated as Compact or Qualifying Pedestrian Areas, the Town will be responsible for 100% of the cost of new sidewalks.

The entire project area is within the Yarmouth Compact area (MDOT, 2002).

Local Interest Elements

Maine DOT may share up to 50% of the cost of local interest elements, subject to the availability of funding and extent of contributions from local sources.

6.C.3. MAINE DOT MUNICIPAL PARTNERSHIPS INITIATIVE

Maine DOT's Municipal Partnerships Initiative (MPI) is a program that allows for the development, funding, and construction of projects of municipal interest on the state infrastructure system through partnership with Maine DOT. The program is intended to be a simple, flexible, and fast-moving vehicle for facilitating these projects. Funding under this is up to \$500,000 per project, with up to 50% of the project funding coming from Maine DOT. Further information on the MPI Program is available from Maine DOT (MDOT, 2011).



6.C.4. PORTLAND AREA COMPREHENSIVE TRANSPORTATION SYSTEM (PACTS)

The Town of Yarmouth is contained within the Portland Area Comprehensive Transportation System (PACTS) funding area. As the local Transportation Management Area (TMA), PACTS has a role in both planning of transportation projects and programs, and identifying/providing funding for these programs. PACTS involvement is particularly important because all federally funded programs require agreement between PACTS and MDOT.

The section of Route 88 contained within this study was identified by PACTS as requiring rehabilitation in the 2009 Collector Road Study (PACTS, 2009). At the time of rehabilitation, the opportunity to include some or all of the proposed Route 88 improvements should be explored. PACTS also maintains an active interest in area bike/ped programs and may be helpful in identifying funding for both the Route 88 and shared-use pathway portions of the project.

6.C.5. GRANT OPPORTUNITIES

Additional opportunities for funding may exist through state and federal grants. Grants that may be relevant to this project include:

- Maine DOT Small Harbor Improvement Program (SHIP)
- Federal Boating Infrastructure Grant (BIG) grant program.

These grants support harbor development and waterfront access for which portions of the pathway that connects the public Town Landing to the other side of the harbor and downtown may qualify. The BIG grant is specifically to promote facilities that serve transient vessels (boating visitors to the harbor) that are greater than 26-ft in length.

Another grant opportunity that may apply to this project is the Healthy Maine Streets program through Maine Development Foundation. Both the improvements to pedestrian facilities along the Route 88 corridor, and the proposed shared-use pathway are supportive of an active community environment and may fit with the goals of the Healthy Maine Streets program.



6.C.6. FEDERAL TRANSPORTATION FUNDING

The latest federal transportation funding program is known as Moving America Ahead for Progress in the 21st Century, or MAP-21, and provides funding for the years 2013 and 2014. With the newly adopted MAP-21 highway provisions many previous funding programs have been reorganized or replaced with new funding programs may apply to the proposed improvements.

Funding for a variety of bicycle and pedestrian oriented programs is available through the Transportation Alternatives Program. The Program provides funding for projects in six eligible categories: on-road and off-road trail facilities, safe routes for non-drivers, abandoned railroad corridors for trails, turnouts, overlooks, and viewing areas, community improvement activities, and environmental mitigation. Several of these areas may apply to the proposed improvements.

6.C.7. ECONOMIC DEVELOPMENT GRANTS

Opportunities that could be explored include the following programs from the Maine Department of Economic and Community Development:

- Downtown Revitalization Grant Program
- Public Infrastructure Grant Program



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APPENDICES

APPENDIX A – MEETING RECORD

APPENDIX B – YARMOUTH CLAM FESTIVAL POSTER

APPENDIX C – PORTLAND PRESS HERALD ARTICLE

APPENDIX D - PATHWAY USAGE SURVEY RESULTS

APPENDIX E – PRELIMINARY OPINION OF CONSTRUCTION COST

APPENDIX F – PRELIMINARY DESIGN PLAN SET