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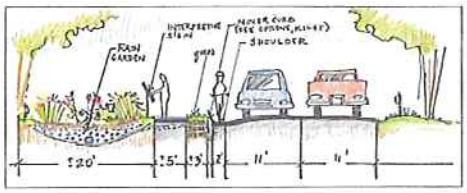
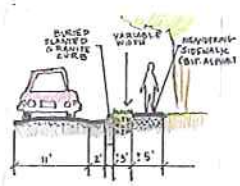
ORLEANS-BREWSTER
ROUTE 6A LIVING STREETS PROJECT

December 2012





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ROUTE 6A LIVING STREETS PROJECT

BACKGROUND:

Living Streets combine the tenets and best management practices of Complete Streets with those of Green Street design. In so doing, Living Streets accommodate a universal group of users, including bicyclists, pedestrians, disabled patrons and automobiles while also serving to help clean our air and water through Low Impact Development (LID). LID utilizes a natural systems approach to manage stormwater through on-site infiltration, either as part of new construction or as retrofits in tandem with traffic calming and pedestrian upgrades. Liveable streets help to increase safety, reduce flooding, improve downstream water quality and enhance quality of life. They are lined with vegetation, which improves aesthetics, facilitates bicycling and walking, reduces asthma rates by enhancing air quality, and mitigates the heat island effect.

The project team selected a limited area of Route 6A (identified on the map on the next page) as a study area to initiate a Living Street pilot project that includes a retrofit of a portion of the 6A corridor both to improve multi-modal transportation accommodations and provide enhanced stormwater management. In this report, the project team has identified a planning and design approach for Living Street implementation that can be applied to subsequent project areas along Route 6A.

The 1.7 mile length of road identified spans the town boundary of Brewster and Orleans, connecting Nickerson State Park and the adjacent Cape Cod Rail Trail with the retail and commercial services of Orleans village center while creating a safe passage across a busy highway interchange. This section of road was selected as a study area due to its manageable size and proximity to both State recreational land (Nickerson State Park) and community amenities (connectivity to Orleans village Center).

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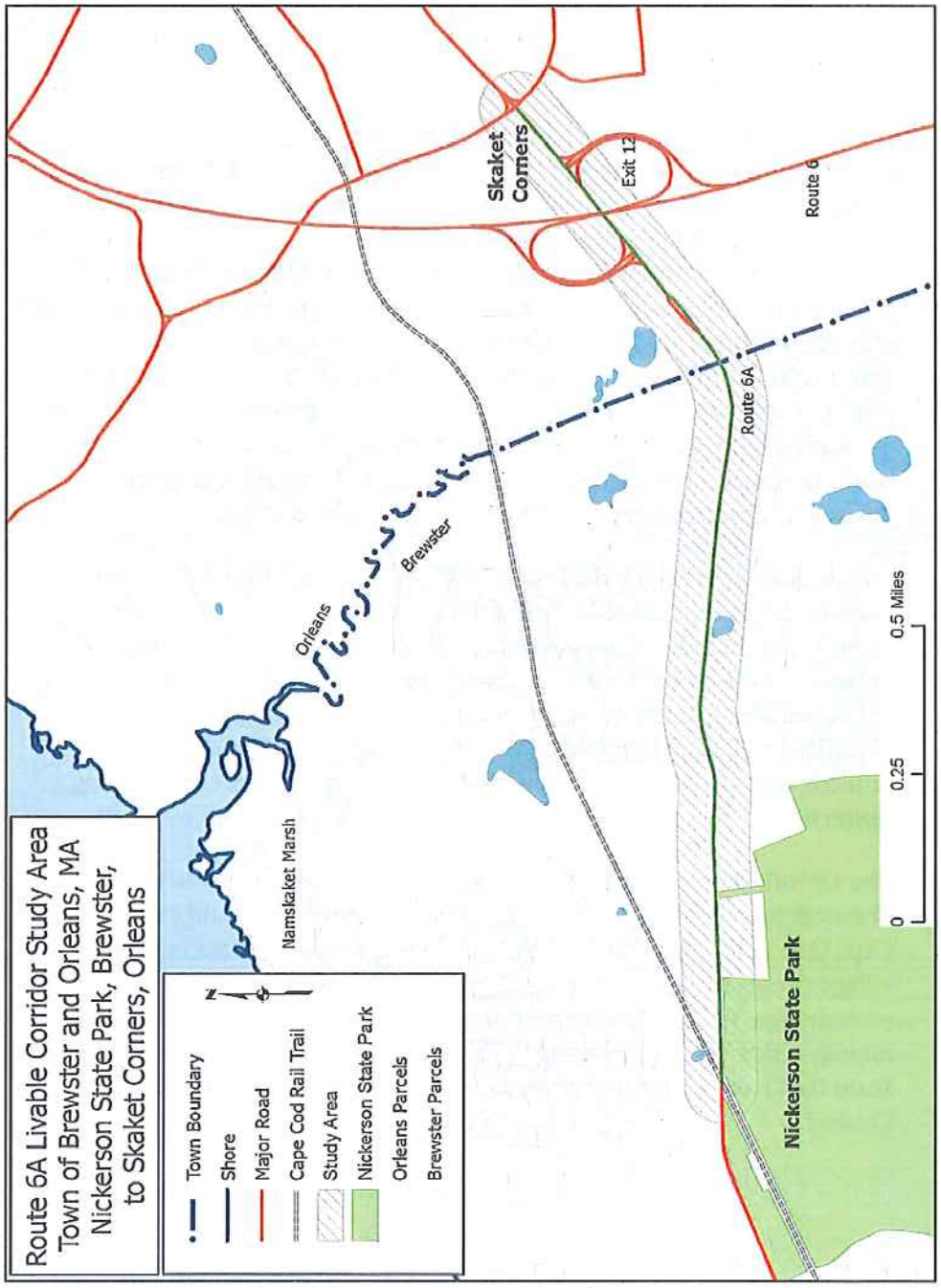
STUDY AREA MAP:



About Route 6A:

Route 6A, the "Old King's Highway," consists of approximately 34 miles of state highway that extends along Cape Cod Bay, traversing seven communities from the Cape Cod Canal in Bourne to the Orleans/Eastham rotary on U.S. Highway Route 6. The Massachusetts state legislature designated the roadway as a Scenic Byway in 1992, in recognition of its distinctive scenic and historic character. In 1995, the Cape Cod Commission (CCC) issued the Route 6A Corridor Management Plan (CMP), and issued an update to the plan in 2010. The focus of both documents is how to address the traffic and safety concerns along the roadway while preserving its scenic and historic character.

Cape Cod receives an annual precipitation of approximately 44", much of which comes in the form of rain. Frequent flooding along Route 6A, from heavy coastal precipitation and the region's high water table, is a primary concern. The flooded areas are difficult to maneuver, as they affect sight distance and navigatibility, impacting the safety of motorists, pedestrians and bicyclists.

Objectives of this Study:

The goal of this study is to create initial designs for a Living Street retrofit of Route 6A in Brewster/Orleans through a publically-vetted planning process in partnership with MassDOT for the proposed limit of work (previous 'study area' map). The proposed design draws on Complete Street guidelines to improve safety, provide amenities, increase multi-modal transportation connectivity, and also considers low impact development (LID) techniques to mitigate stormwater runoff.

As part of this study, tasks included the identification of areas of pedestrian disconnect inside the limit of work, impediments to safe bicycling, and problem stormwater flooding areas, as well as extensive public outreach. This provided guidance for the development of conceptual design plans, prioritizing sites that would best promote regional sustainability through the triple-bottom line achievement of economic, environmental and social benefits (ie: the siting of a

stormwater mitigation strategy and pedestrian upgrades in a highly used area to demonstrate the benefits of Liveable Street design).

Previous Work:

- ✓ Adoption of the 2009 Cape Cod Regional Policy Plan setting forth standards for low-impact development. See: http://www.capecodcommission.org/RPP
- ✓ Route 6A Corridor Management Plan Update (2010)

EXISTING CONDITIONS

Land Use

The 1.7 mile study area extends from Skaket Corners (i.e. the intersection of Route 6A, West Road and Eldredge Parkway) in Orleans to the Crosby Lane in Brewster. Route 6A between Skaket Corners and Bakers Pond Road/Bay Ridge Road intersection is a four-lane 41-50' roadway that intersects with two Route 6 interchanges. The most dense commercial use along the corridor is located in Orleans focused around Skaket Corners and the intersection of Route 6A at Bakers Pond Road/Bay Ridge Road including the Underground Mall. The road narrows to two lanes just east of the Brewster town line, with a mix of commercial, residential, and public recreation (Nickerson State Park) uses located along the corridor.

Complete Streets Considerations

None of the priority/focus sites within the study have sidewalks or bicycle accommodations. During site visits, the project team observed pedestrians walking in the roadway near the Underground Mall towards Skaket Corners, close to moving vehicles. The team also observed pedestrians walking on both sides of the road heading west towards Nickerson State Park. In some areas, narrow footpaths adjacent to the road indicate pedestrian use, but the brief paths end abruptly, interrupted by vegetation and topographic changes and lack of available space adjacent to the roadway.

The vehicle lane widths are 11-12 feet for much of the study area The additional turning lanes at Baker Pond Road/Bay Ridge Lane intersection are 13-14 feet wide. The shoulders are 1-2 feet wide for most of the study

area. With high traffic volumes and 40 miles per hour speed limit, the shoulders generally are not safe for bicycling . The Cape Cod Rail Trail is close to Route 6A, but much of the study area lacks direct connections and signage to it.

Given the existing pavement width on the Brewster portion of the study area, providing new bicycle facilities (e.g. a designated bicycle lane or sufficient shoulder space) would necessitate road widening in some areas. It may be possible to provide more shoulder space on the Orleans portion by lane reconfiguration, but this would require significant analysis due to the Route 6 interchanges. Enhancing connectivity from Route 6A to the rail trail and promoting that as the preferred route would help reduce bicycle/motorist conflicts in the area

Wet Weather Management

Cape Cod's annual rainfall of approximately 44" per year causes frequent flooding events, and evidence of sedimentation and pooling was noted throughout the study area. However, the need for heavily engineered stormwater solutions is minimal due to the sandy soils and amount of pervious surface. At key locations, this report recommends Low Impact Design Rain Gardens in place of turf areas at gateway intersections, to filter heavy metals, sediment and nutrients which could lead to downstream pollution. Additionally their location at highly visible areas allows for public demonstration.

SITE SELECTION

Methodology

The project team collected and mapped data on existing conditions within the study area to identify potential locations that might benefit from enhanced stormwater management and "Complete Street" (i.e. bicycle/pedestrian) accommodations. The team reviewed maps showing land use, topography, soils, impervious coverage, utility and catch basin locations, and high vehicle crash locations to guide initial site selection. (See Appendix- Crash location map) Consultation and a site visit with the Orleans and Brewster town planners helped determine selection of seven "focus" areas for further study and plan development The team developed a "Site Evaluation Matrix" that presents existing conditions

and characteristics within each focus area. Input from members of the public (see "Public Outreach" below) helped to identify two additional focus areas.

Following designation of the nine focus areas, the project team conducted several site visits to observe conditions, collect additional data, photograph the sites, and evaluate potential treatments and siting/plan options. The team prepared a summary sheet on various LID treatments and "Complete Streets" bicycle and pedestrian facilities and combined this information with site evaluation date into a "Design Siting Considerations Matrix." (see Appendix)

Public Outreach

The project team engaged public involvement early on, establishing a contact from MassDOT District 5 to take part in communications about the project development. This was followed up with an initial site visit with town planners from Brewster and Orleans to gather local knowledge and assist in the choice of initial study areas.

After these early actions, the project team created a public website to track the projects progress, available as a link of http://www.capecodcommission.org, and held an initial public meeting to gather design ideas in April 2012. As a progress update, the team met with a group of the town planners in June 2012 with the MassDOT District 5 representative participating via conference call.

From this feedback, the team utilized the remainder of the planning period to create conceptual design plans and final reporting materials, which were presented in a public meeting in Orleans in September 2012. The meeting invitation was sent to all abutters 3 weeks prior to the meeting and publicly posted. Feedback from this September meeting is compiled in subsequent sections of this report.

CONCEPTUAL DESIGN PLANS

A base plan was rendered from Geographic Information Systems (GIS) parcel boundaries following the completion of GIS mapping for the study area, with existing roadway layout and building footprints. A survey including tree locations and utility poles was unavailable; conceptual design plans were drafted to illustrate the intent of the design. For the

project to move forward a survey would need to be completed and engineered plans rendered.

Conceptual design plans including standard details and plant lists can be found in the appendix.

NEXT STEPS

This document is an advisory document of conceptual design principles to assist in implementation of Living Street design throughout Cape Cod. It represents a collection of preferred alternatives for the Route 6A Right of Way which may serve as an example to other communities wishing to push forward Living Street designs. It may be used as a reference for further study and as a point of discussion in future construction projects along regional roadways.

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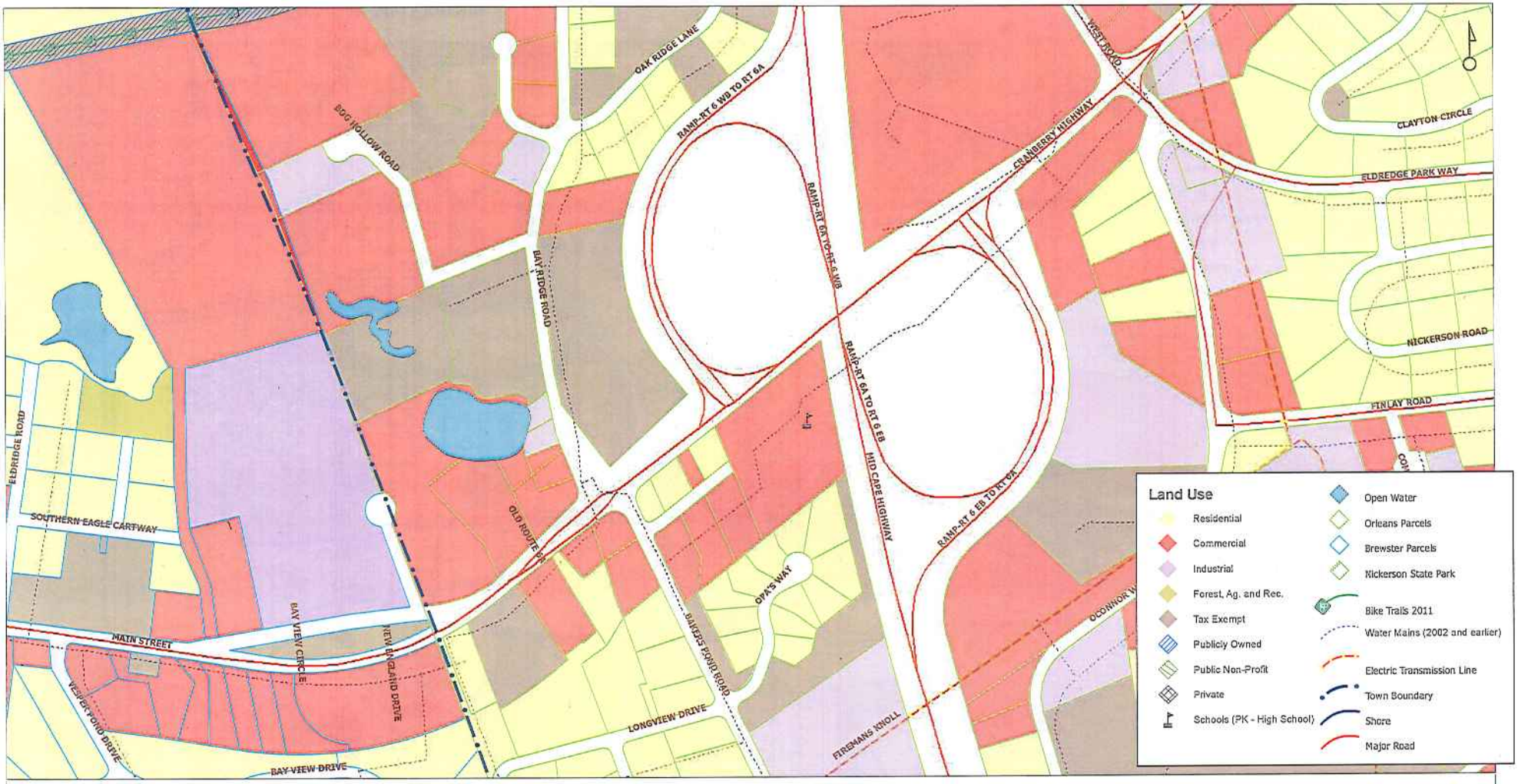
APPENDIX

GIS MAPPING ANALYSIS:
LAND USE
HYDROLOGY & SOILS
CRASH LOCATIONS

SITE EVALUATION MATRIX
CONCEPT PLANS
DETAILS
PLANT LIST



Livable Streets, Route 6A Brewster and Orleans
Land Use, East End of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.

User: gpm/hm Date: 4/12/2012

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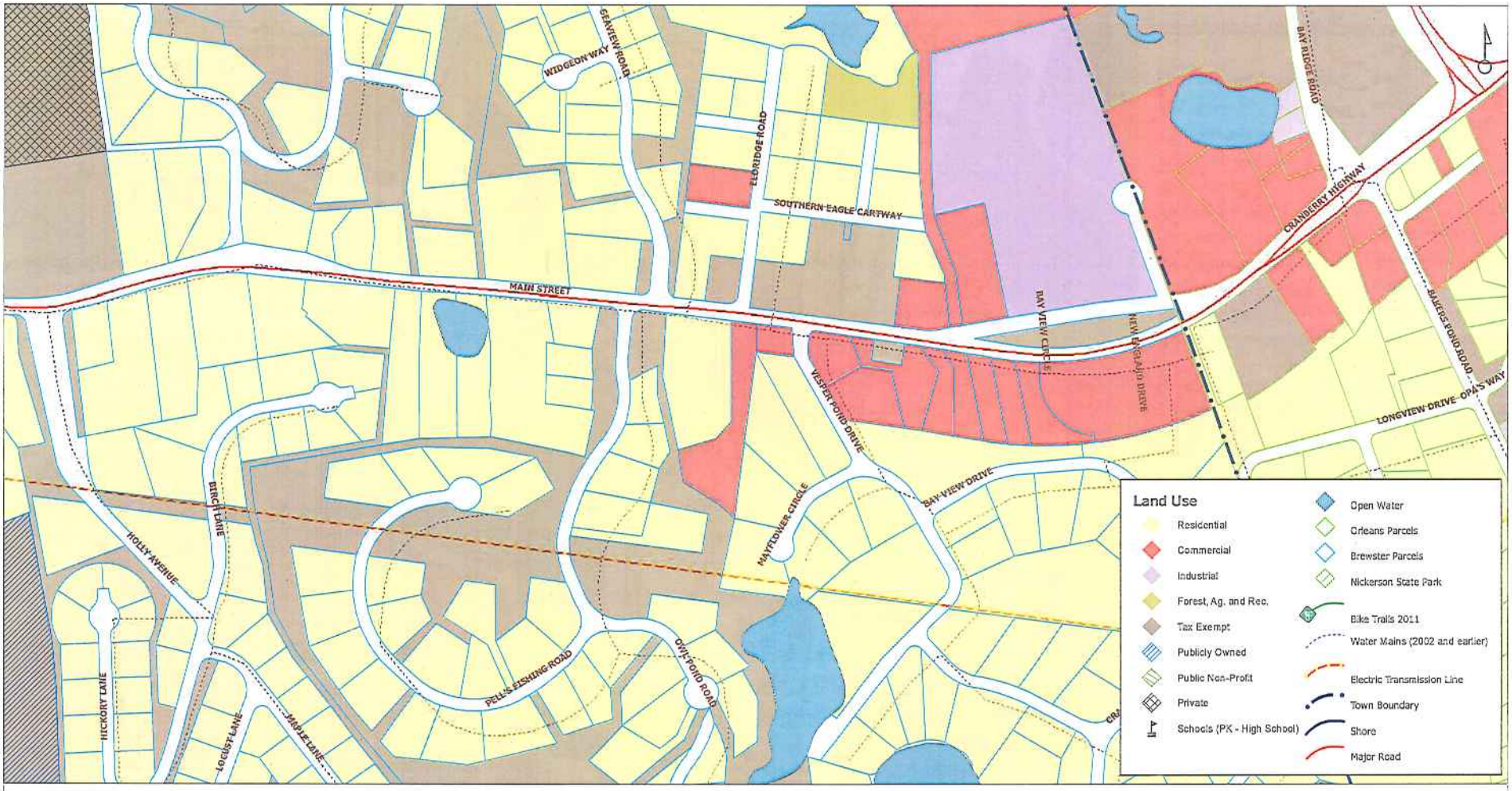

Livable Streets, Route 6A Brewster and Orleans
Land Use, Mid Section of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

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Date: 4/12/2012

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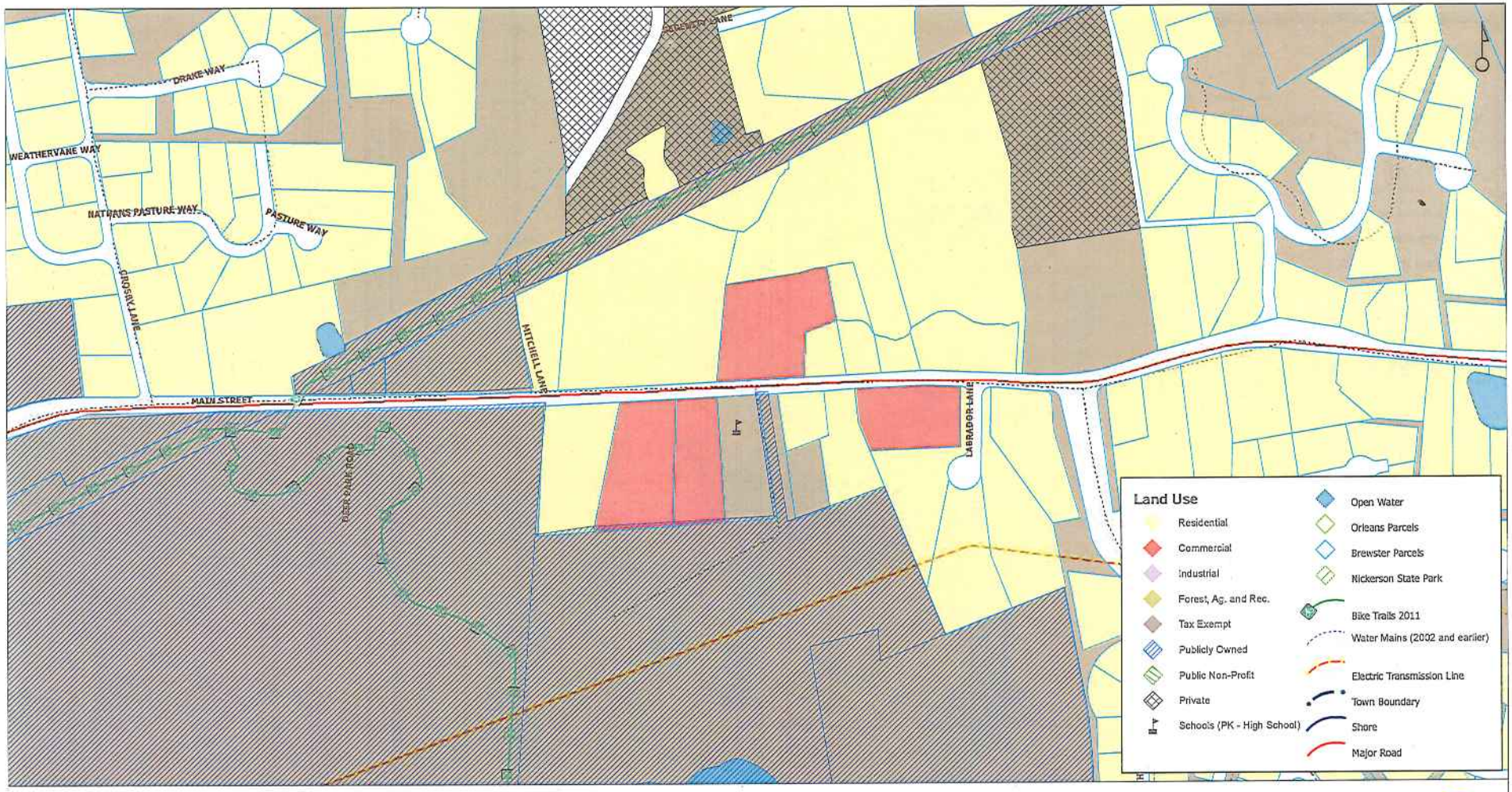

Livable Streets, Route 6A Brewster and Orleans
Land Use, Mid Section of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.

User: jgrahm Date: 4/12/2012

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Livable Streets, Route 6A Brewster and Orleans
Hydrology and Soils, West End of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.

User: jprahm

Date: 2/10/2012

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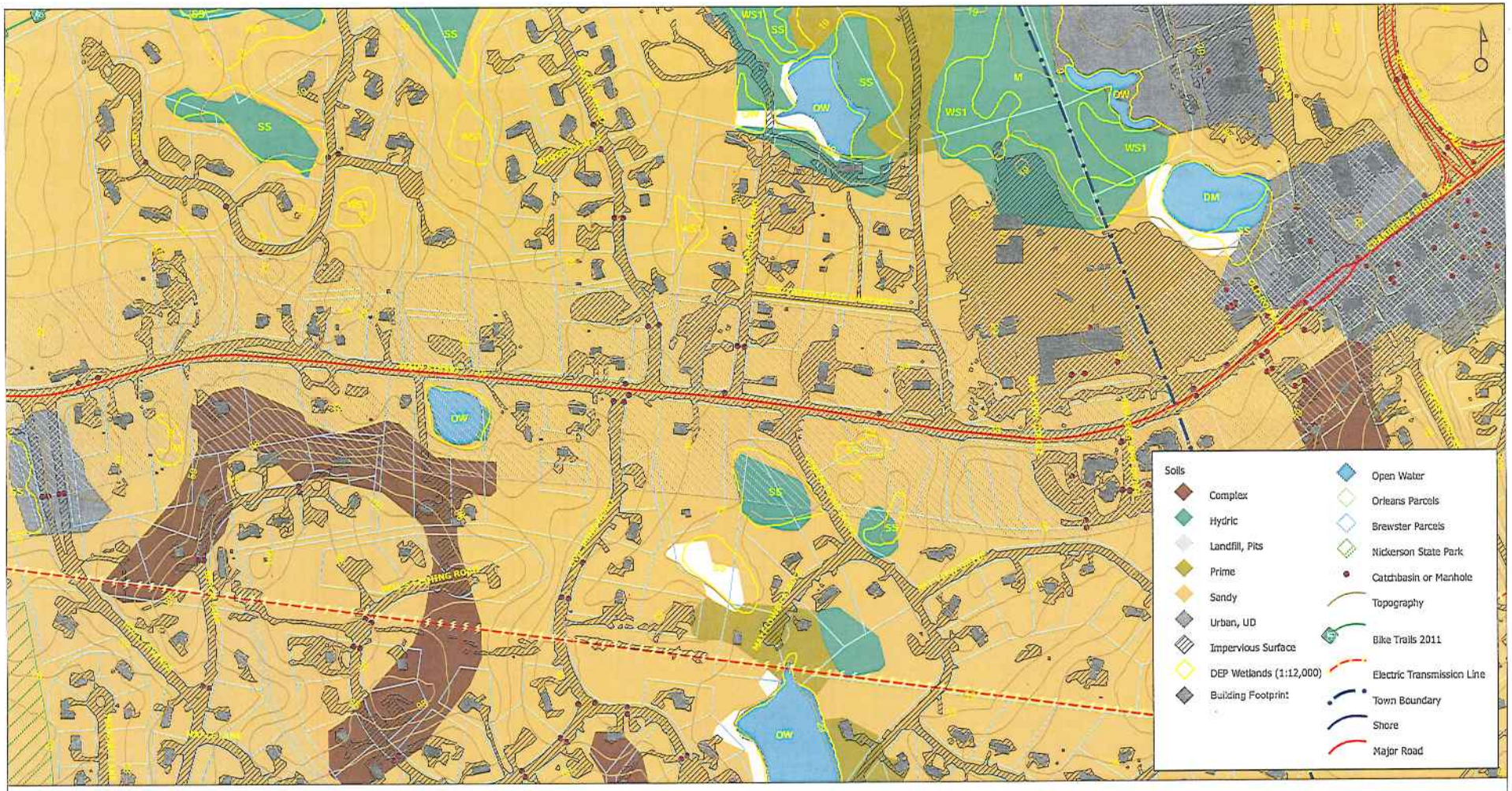

Livable Streets, Route 6A Brewster and Orleans
Hydrology and Soils, Mid Section of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

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The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.

User: gpraim Date: 4/12/2012

Livable Streets, Route 6A Brewster and Orleans
Hydrology and Soils, East End of Study Area

Scale - 1 inch represents 300 feet

300 0 300 600 900
Feet

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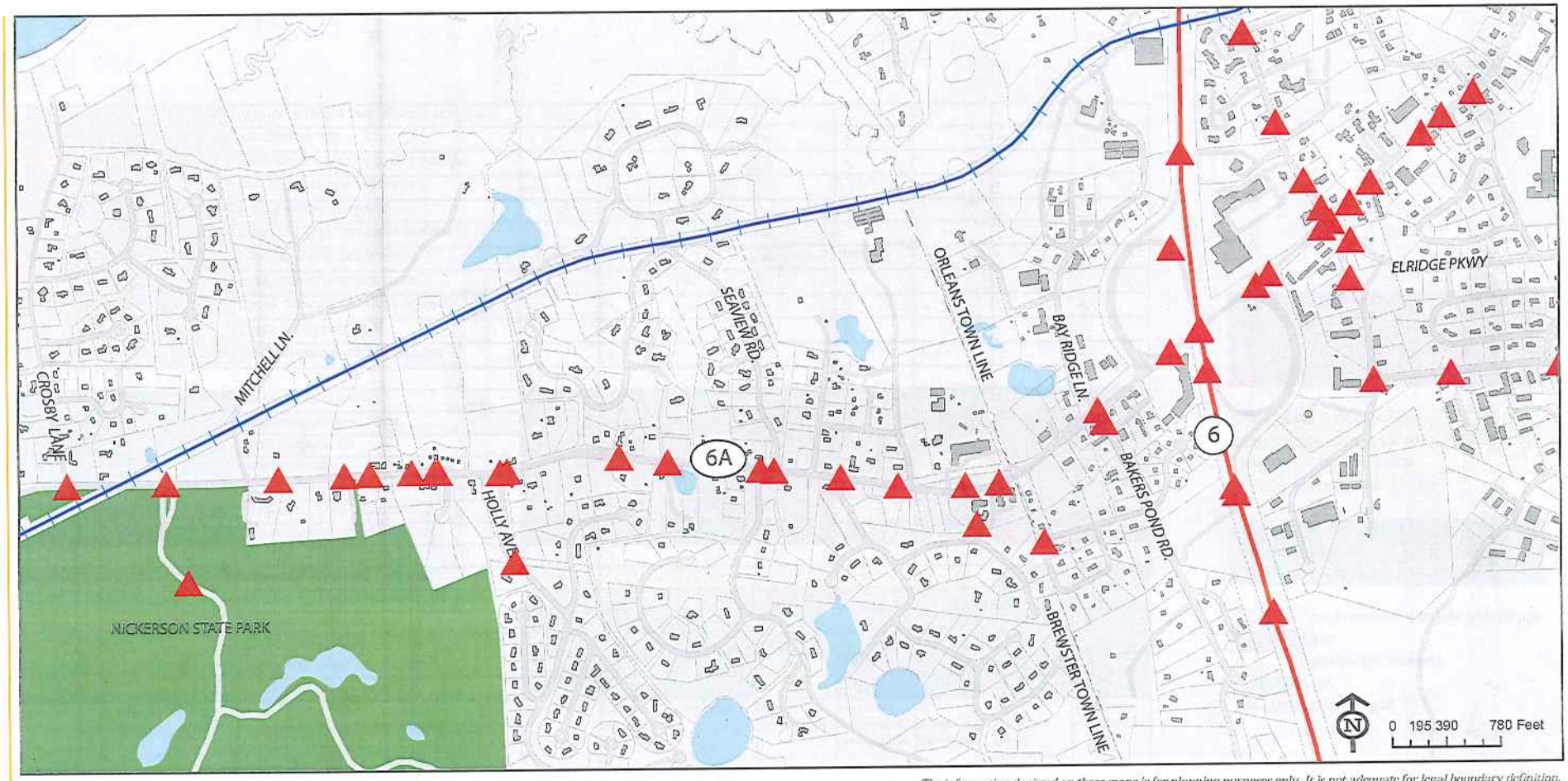
The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.

User: gpratim Date: 4/12/2012



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Legend

- Crash Locations 2006-2008
- Cape Cod Rail Trail
- Ponds
- Route 6: Mid Cape Hwy
- Nickerson State Park

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Created by: TH
Source CCC GIS ArcMap 9.3.1; modified with CS4

Site Evaluation Matrix

Category	Site Characteristics	Focus Areas: Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7A	Area 7B
		Crosby Lane	Nickerson driveway	Holly Ave.	Brewster Old Layout	Brewster/Orleans Industrial Old Layout	Bakers Pond Rd./Bay Ridge Rd.	Undergrnd Mall to underpass east	Underpass to Skaket west
Complete Streets	Adequate bicycle access								
	Adequate pedestrian access								
	Adequate elderly/ADA access								
	Safe/no-crash location								
	Beyond 200' of designated bus stop								
	Adequate Route 6A crossing								
Vegetation Management	Has vegetative ground cover								
	Moderate - high tree density								
	High proportion pervious surface								
	Good drainage								
	Lacks stormdrain								
	Minimal/no soil erosion								
	No wetland adjacent								
Additional Considerations	Steep grades adjacent to road	-	✓	-	-	-	✓	-	✓
	Trees in right-of-way	-	✓	-	✓	✓	-	-	-
	Utility pole/box in right-of-way	✓	✓	✓	✓	✓	✓	-	✓
	Wetland resources present	-	-	✓	-	-	-	-	-
	Historic resources present	✓	-	-	✓	marker	-	-	-
	Specimen/historic trees present	-	-	-	✓	-	-	-	-
	Scenic vista in vicinity	-	-	-	-	-	-	-	-
	Recreational use adjacent	✓	✓	-	-	-	-	-	-
	Appropriate for passive recreation	-	✓	-	✓	✓	-	-	-
	Permeable soil	✓	✓	-	✓	✓	-	✓	✓
	Within mapped rare species habitat								

Site Characteristics Key

- No
- Maybe/Somewhat
- Yes
- Undetermined or Not Applicable

A GREEN/NO entry in Site Characteristics = high NEED/OPPORTUNITY for implementation of Living Street

A YELLOW/MAYBE entry in Site Characteristics = moderate NEED/OPPORTUNITY for implementation of Living Street improvements.

A RED/YES entry in Site Characteristics means lower NEED/OPPORTUNITY for implementation of Living Street improvements.

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Design Siting Considerations Matrix

	Facility/Application Type	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7A	Area 7B	Area 8	Area 9	Location of Facility		
		Crosby Lane/ Nickerson	Nickerson driveway	Holly Ave. (Robinwood entry)	Brewster Old Layout	Orleans Industrial Old Layout (northside)	Bakers Pond Rd./Bay Ridge Rd.	Undergrnd Mall to Underpass southside	Underpass to Skaket/north	Owl Pond/6A	Vesper Pond/6A	Private yards	Travel lane	Right of Way
Best fit for complete streets facilities by type	Sidewalks	X	X	X	X	X	X	X	-	X	-	-	-	X
	Textured/striped pavement	X	X	X	-	X	X	-	X	X	X	-	X	X
	Bike lane	-	-	-	-	-	-	-	-	-	-	-	X	X
	Bike shoulder	X (guardrail in places)	X	X	X	X	-	-	-	X	X	-	X	X
	Sharrows	-	-	-	-	-	-	-	-	-	-	-	X	-
	Crosswalk improvements	X	X	X	-	-	X	X	X	X	X	-	X	X
	Colored "conflict zones"	-	-	-	-	-	X	X	X	-	-			
	Bicycle safety signage	X	-	-	-	X	X	X	X	X	-			
	Improved wayfinding signage	X	-	-	-	X	X	-	-	-	-	X	-	X

		Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7A	Area 7B	Area 8	Area 9	Location of Facility						
		Crosby Lane/ Nickerson	Nickerson driveway	Holly Ave. (Robinwood entry)	Brewster Old Layout	Brewster/ Orleans Industrial Old Layout (wb)	Bakers Pond Rd./Bay Ridge Rd.	Undergrnd Mall to underpass south	Underpass to Skaket north	Owl Pond/6A	Vesper Pond/6A	Private yards	Sidewalk	extension	Gutter Bike Lane	Median	strip	
Best fit for Low Impact Development (LID) facilities by type	**BIORETENTION**																	
	Rain Garden	X	X	X	X	X	P	X	X	X	X	X	-	X	-	-	X	X
	Tree planting	-	-	-	X	X	-	X	-	-	X	X	-	X	-	-	-	X
	PAVING																	
	Permeable paving/Pavers	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	-	X
	CONVEYANCE																	
	Runnels/channels	-	X	X	X	X	P	P	P	X	P	-	X	-	X	-	-	X
	Bioswales	-	X	-	X	X	-	P	P	X	X	-	-	-	-	-	-	X
	OTHER																	
	Vegetated buffer strip	-	X	X	X	X	P	P		X		X	-	X X	X	-	X	X

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		Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7A	Area 7B	Area 8	Area 9
		Crosby Lane/ Nickerson	Nickerson driveway (west of entrance)	Holly Ave. (Robinwood entry)	Brewster Old Layout	Brewster/ Orleans Industrial Old Layout (wb)	Bakers Pond Rd./Bay Ridge Rd.	Undergrnd Mall to underpass	Underpass to Skaket	Owl Pond/Seaview	Vesper Pond/6A
	Right of Way width (feet)	55	50	65	52- 0 9	+ 0 9		1-50 8 6	41-50	52	50
	Lane Width (EB/WB) (feet)	12/12	11/11	11/11	11/11	12/11-12	see note**	11(2)/11(2)	11(2)/12(2)	11/12	
	Shoulder width	3/3	2/1-5	1/16*	1/1	1/1	2/2'	2/2	1/1	1/1	
	Existing pavement width	30	28	39-40	24	23-24	63-34	48	48	25	
	Curb	-	-	-	-	-	X	X	X	-	-
	Guardrail	EB/ east of Crosby Lane	WB/west of entrance	EB&WB	-	-	X NE	X	X	-	-
	h t a p t o o F	X	B E	EB	X	-	-	X	X	X	X
Existing Conditions & Special Considerations	Fog e n i L	x	X	X	X	X	X	X	X	X	-
	Steep grades adjacent to road	-	WB	-	-	-	X NE	-	X	-	-
	Trees in right-of-way	-	X	-	X	- (1)	-	-	-	X	X
	Utility pole/box in right-of-way	X	X	X	X	- (eb)	X	-	X	X	X
	Wetland resources present	-	-	X	-	-	-	-	-	-	X (nearby)
	Historic resources present	X	-	-	X	marker	-	-	-	?	?
	Specimen/historic trees present	-	-	-	X	-	-	-	-	?	X
	Recreational use adjacent	X	X	-	-	-	-	-	-	-	-
	Appropriate for passive recreation	-	X	-	X	x	-	-	-	X	-
	Permeable soil	X	X	-	X	X	X	X	X	X	-
	Within rare species habitat	X	X	X	X	-	-	-	-	X	

*16' frm edge of pavement to fog line EB at driveway
**West side of intrsctn:(4) 12' thru lanes, (1) 14' turn lane. East side of intrsctn:(4) 12' thru lanes, (1) 13' turn lane.

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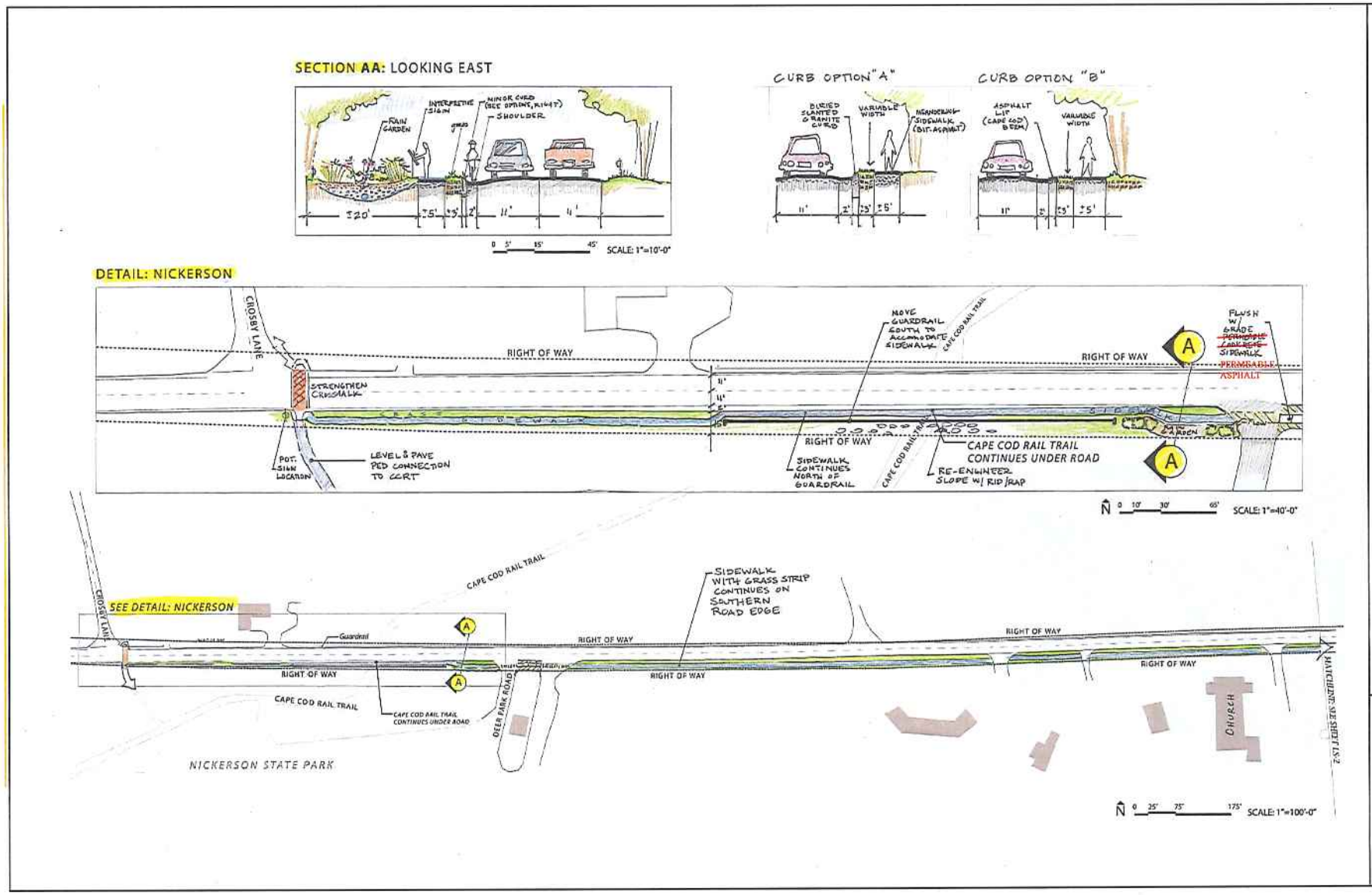

Living Streets Alternatives: Rt 6A Brewster to Orleans
Sheet L1:Nickerson to Church

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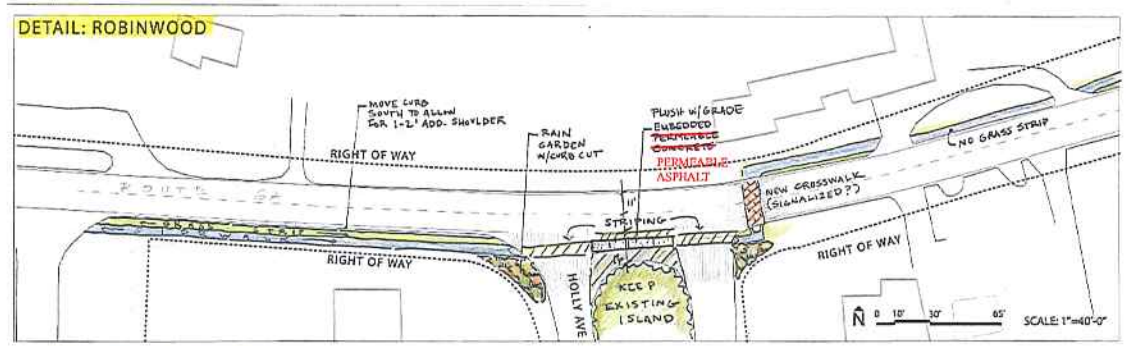

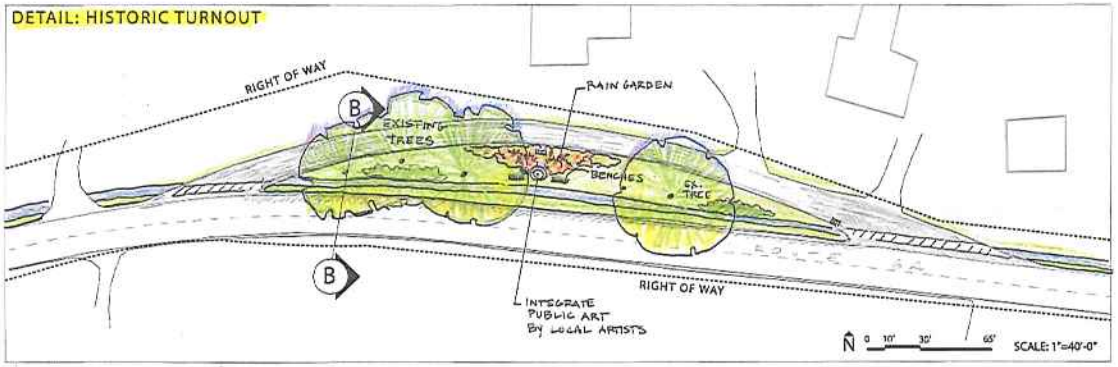

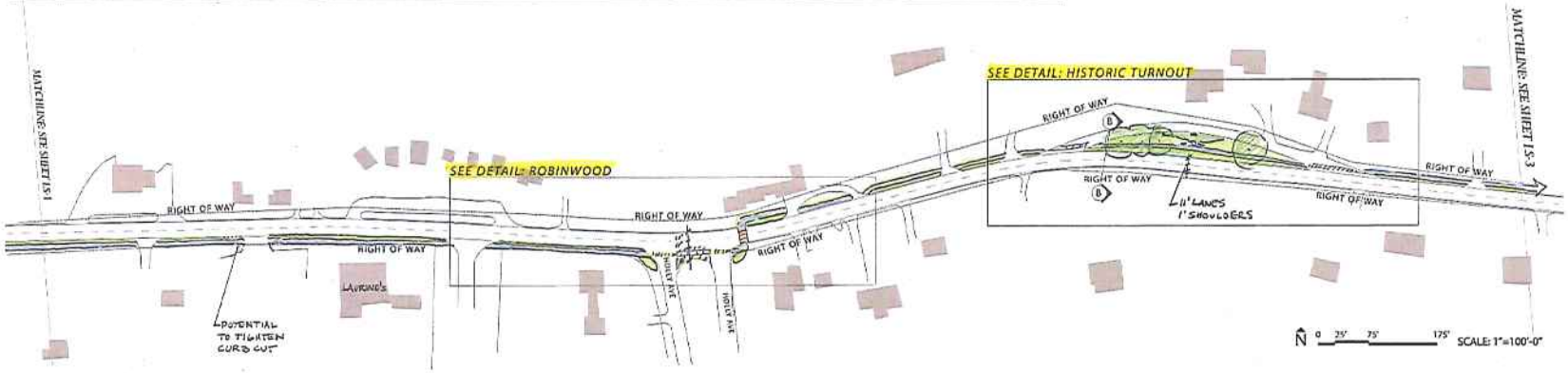

Living Streets Alternatives: Rt 6A Brewster to Orleans
Sheet L2: Laurinos to Historic Turnout

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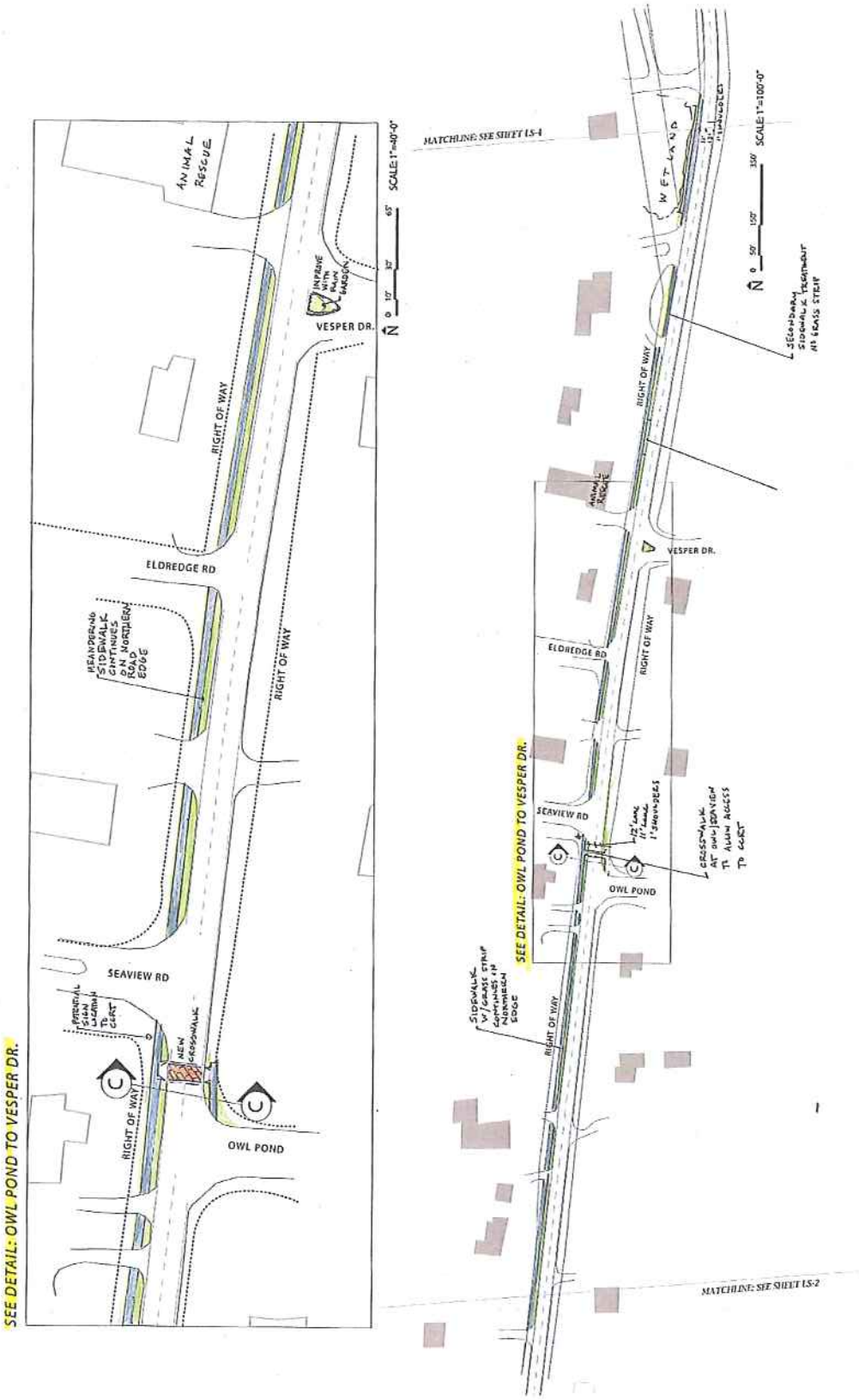
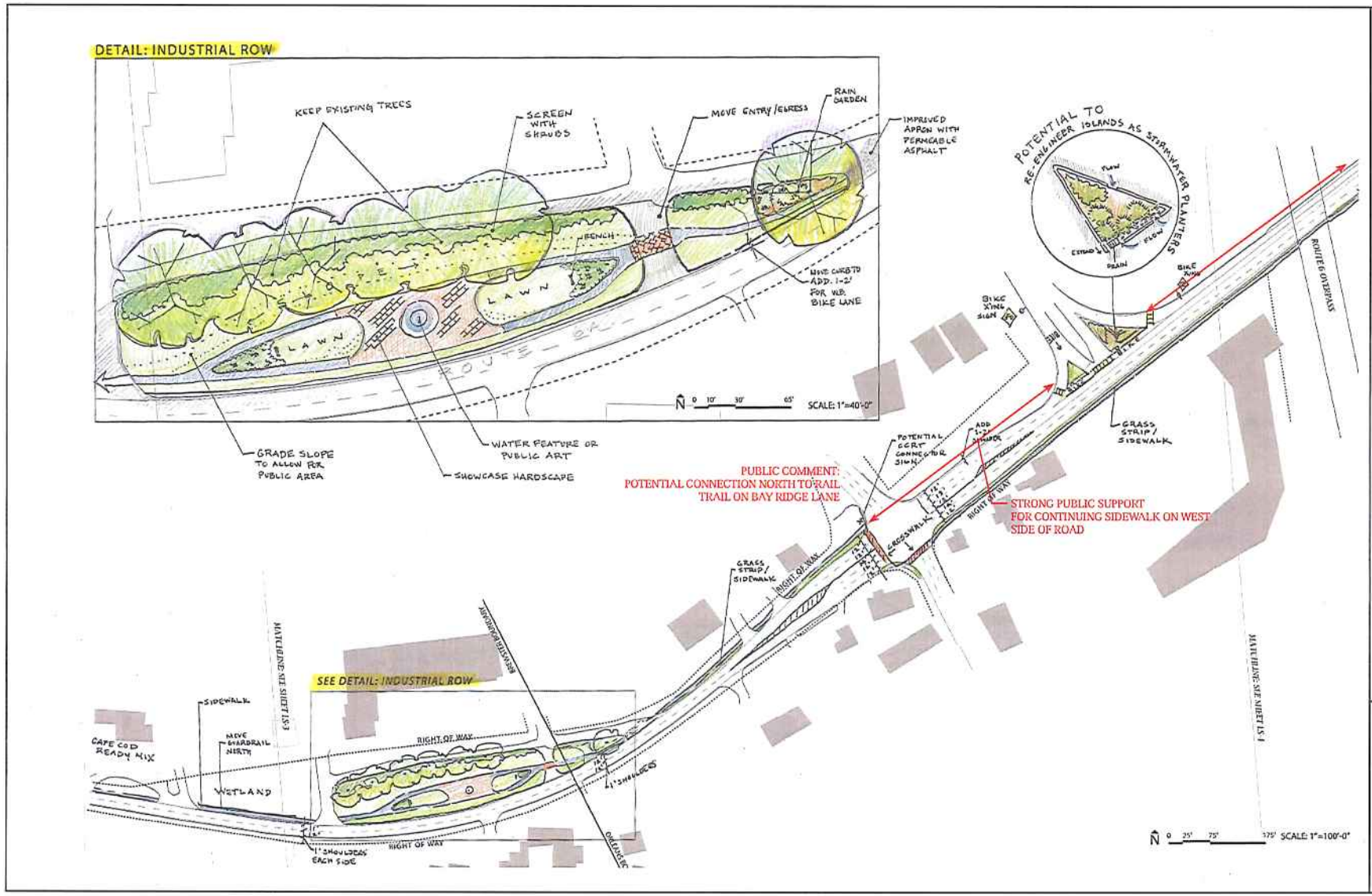
Living Streets Alternatives: Rt 6A Brewster to Orleans
Sheet L3: Historic turnout to Cape Cod Ready Mix





Living Streets Alternatives: Rt 6A Brewster to Orleans
Sheet L4: Cape Cod Ready Mix to Underground Mall

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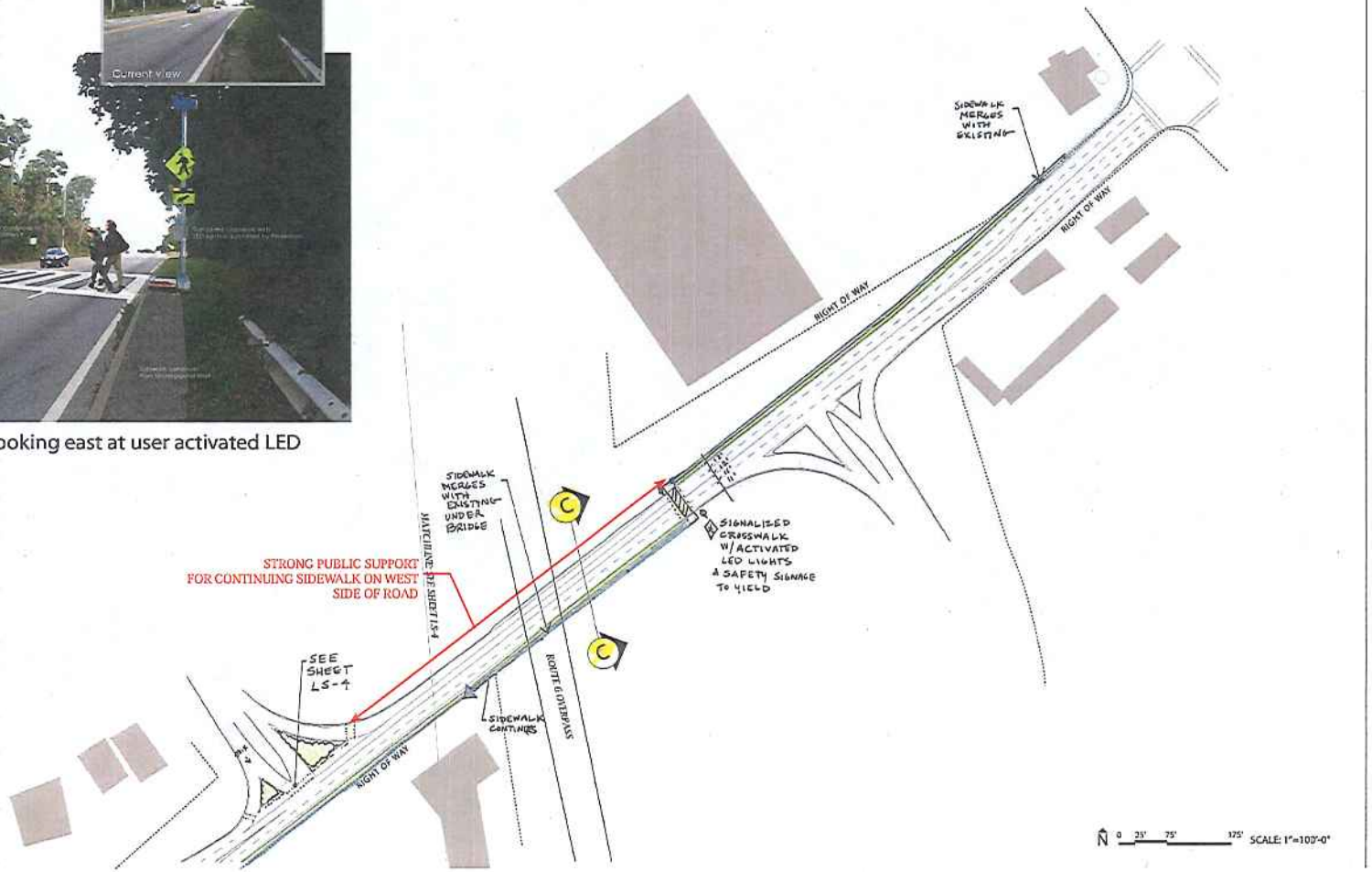
Living Streets Alternatives: Rendering of proposed pocket park at industrial frontage

Rendering CC looking east at user activated LED crosswalk



Living Streets Alternatives: Rt 6A Brewster to Orleans
Sheet L5: Route 6 Interchange

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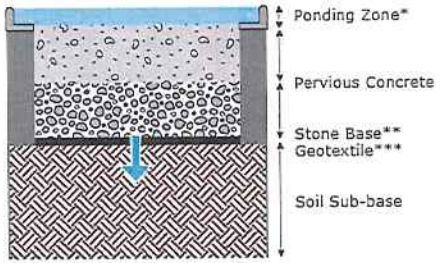
Porous Concrete (Typ.)

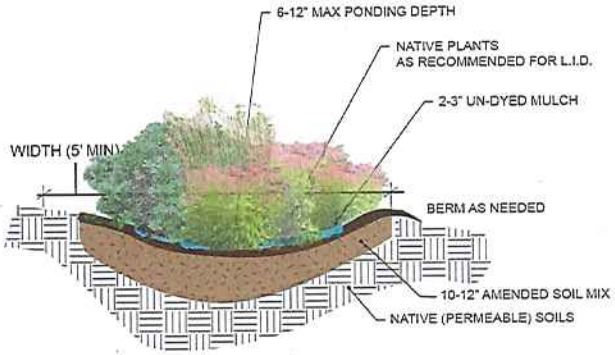


*Optional **Typically included ***Depending on soil

Fig. 7 Example cross section of a pervious concrete pavement system. Curbs (on both sides) will increase the storage capacity.

POROUS CONCRETE GENERAL NOTES

See Vendor specifications for installation notes.



BIOINFILTRATION RAIN GARDEN
For stormwater

INFILTRATION RAIN GARDEN NOTES

DESIGN NOTES:

1. PLANT WITH PLANTS PER LANDSCAPE ARCHITECT DWGS. NATIVE PLANTS ARE PREFERRED, BECAUSE NON-NATIVE AND INVASIVE SPECIES CAN REPRODUCE DOWNSTREAM TO DAMAGE HABITAT AND CHANGE HYDROLOGY. IF NON-NATIVES ARE CHOSEN, BE SURE THAT THEY WILL NOT DAMAGE DOWNSTREAM WATERWAYS.

CONSTRUCTION NOTES:

2. BUILD AND VEGETATE RAIN GARDEN AS EARLY AS POSSIBLE TO ESTABLISH PLANTINGS BEFORE DIRECTING STORMWATER RUNOFF TO IT OR DIVERT STORMWATER AROUND FACILITY. PREFERABLY, THIS PERIOD WOULD LAST A MINIMUM OF 3 MONTHS OR PER LANDSCAPE ARCHITECT/DESIGNER GUIDELINES.
3. INFILTRATION AREAS (THE AREA OF THE RAIN GARDEN AS DEFINED BY THE TOP ELEVATION OF THE FACILITY) SHALL BE FENCED OFF FROM THE FIRST DAY OF EARTH MOVING UNTIL PROJECT COMPLETION TO PREVENT COMPACTION OF THE SUBGRADE, DIRT TRACKING ONTO ANY LAYER OF THE FACILITY, AND STOCKPILING OF CONSTRUCTION MATERIALS THAT MAY CLOG THE SURFACE.
4. DURING EXCAVATION OF NATIVE SOILS TO THE BOTTOM OF THE FACILITY, RAINFALL MAY CAUSE FINES TO CLOG THE SURFACE OF THE FACILITY. IF THIS OCCURS DURING CONSTRUCTION, HAND RAKE THE SURFACE TO A DEPTH OF 3" TO RESTORE INFILTRATION CAPACITY.
5. CALL THE CIVIL ENGINEER, [ENTER NAME HERE] AT [ENTER PHONE NUMBER HERE] 24 HOURS IN ADVANCE OF CONSTRUCTING THIS FACILITY SO CONSTRUCTION OBSERVATION MAY BE PERFORMED TO IDENTIFY VARIATIONS IN THE FIELD THAT MAY AFFECT DESIGN AND VERIFY PROPER CONSTRUCTION.

CAPE COD COMMISSION

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Upland and wetland plants that may be suitable for use in LID. Plant selection should be based on the volume and frequency of water expected to be present. Using the area's natural wetlands as a reference, species should be selected based on their tolerance of the site's microclimate and habitat. Garden design should include tree, shrub, and herbaceous species as FAC or wetter in the US Fish and Wildlife Service 1988 National List of Wetland Plants, excluding FAC- species and invasive species (including but not limited to *Phragmites australis, Lythrum salicaria, Typha spp.,* and *Phalaris arundinacea*). Please refer to the Invasive Plant Atlas of New England (IPANE), http://nbii-nin.ciesin.columbia.edu/ipane/ for a current listing of invasive species.

Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Acorus americanus	Sweetflag	A hardy perennial swamp or bog plant with sweet, spicy-scented leaves. Edges of ponds and moist soils, marshes, shallow waters. Native to North America. Drought tolerant, not a rapid colonizer, tolerant of acidic conditions. The (ITIS lists the accepted name of North American Sweet Flag as Acorus americanus (TSN182561). Because all Sweet Flag in North American has long been lumped together as Acorus calamus, especially in the popular, non-professional realm, expect the confusion to continue. Acorus calamus, a non-native, is considered to be invasive.	3 to 10	2-4'	OBL	intolerant		x
herbaceous	Andropogon gerardii	Big Bluestem	Big bluestem is a perennial bunch grass that forms large clumps which expand slowly on short, scaly rhizomes. It prefers dry sunny sites. Once established, it is very drought-tolerant. However, best growth occurs with regular watering. Big bluestem can withstand short periods of waterlogged soils in summer, but not in winter. Foliage starts blue-green and turns coppery in the fall. The stems and leaves are blue-green in early summer, developing reddish tinges as they mature. The plants turn a rich copper or orange-brown in autumn and develop an overall reddish or burgundy cast after frost.	3 to 9	to 6'	FACW+	intolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Aquilegia canadensis	Wild Columbine	Delicate woodland or shade perennial with lobed leaves and nodding red flowers in spring. Attracts hummingbirds. Easily grown in average, medium wet, well-drained soil in full sun to part shade. Wide range of soil tolerance as long as drainage is good. Prefers rich, moist soils in light to moderate shade. Freely self-seeds and will naturalize to form large colonies in optimum growing conditions.	3 to 8	18"	FAC	full to part shade		x
herbaceous	Aster divaricatus	White Wood Aster	Perennial ground-covering aster blooming white in late August and September. Attracts butterflies. Easily grown in average, medium wet, well-drained soil in part shade to full shade. Thrives in shade and tolerates dry conditions. No serious insect or disease problems.	3 to 8	2'		full sun to part shade		x

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herbaceous	Aster noviae angliae	New England Aster	A fast growing perennial forming a large mass of violet-pink flowers in September. Late summer nectar source for butterflies.	3 to 9	2-6'	FACW-	intolerant		x
herbaceous	Boltonia asteroides	False Aster	Easily grown in average, medium wet, well-drained soils in full sun. Tolerates a wide range of soils including moderately dry ones. Plants grown in part shade or in rich, moist soils tend to flop and need support. Plants grown in drier soils will grow shorter, but often less vigorously with inferior flowering. Species plants are somewhat weedy and several varieties and cultivars might be better selections -- see e.g., B. a. var. latisquama 'Snowbank' (H440). Showy white/pink aster-like flowers in August/September. Attracts butterflies. No serious insect or disease problems.	3 t 10	to 5'	FACW	intolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Calamagrostis canadensis	Blue Joint Grass, Reed Grass	A typical upright attractive grass. Spreads slowly to form clumps. Does well in wet soils, bogs and swamps, and is a good soil stabilizer.	3	2-4'	FCW+	intolerant		x
herbaceous	Carex sp.	Various Sedge Species (check individual species and habitat types)	Wetland plant that may be suitable for use in LID. Plant selection should be based on the volume and frequency of water expected to be present. Species should be chosen after survey of natural local reference wetlands in the area to ensure that selected plants are tolerant of the site's microclimate and habitat.		2-4'	OBL/FACW+/ FACW	sun to light shade		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Dryopteris erythrosora	Autumn Fern, Japanese Shield Fern	Japanese shield fern is a deciduous, clump-forming, slowly spreading (rhizomatous) fern that typically grows 1.5-2.5' (infrequently to 3') tall and features glossy, deeply cut fronds (20-30" long). Easily grown in average, medium wet, well-drained soil in part shade to full shade. Prefers moist, humusy, acidic soils with protection from wind. Very intolerant of drought. No serious disease/insect pests.	5 to 8	to 2'		required		x
herbaceous	Echinacea purpurea	Purple Coneflower	Purple, pink or white long-lasting blooms on tall stems from June through August. Loved by birds and butterflies, especially Monarchs. Easily grown in average, medium wet, well-drained soil in full sun to part shade. Best in full sun. An adaptable plant that is tolerant of drought, heat, humidity and poor soil. Divide clumps when they become overcrowded (about every 4 years). Plants usually rebloom without deadheading, however prompt removal of spent flowers improves general appearance. Freely self-seeds if at least some of the seed heads are left in place.	3 to 8	to 4'		sun to part shade		x

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herbaceous	Eupatorium purpureum subsp. maculatum 'Gateway'	Joe-Pye Weed	Tall perennial of moist places that blooms from July to September with small purplish-pink flowers clustered together at the top of the stem. Easily grown in average, medium wet to wet soils in full sun. Prefers moist, fertile, humusy soils which do not dry out. Attracts butterflies and bees.	4 to 8	4-5'	FACW/FAC	intolerant		x
herbaceous	Geranium maculatum	Wild Geranium	This is a clump-forming, woodland perennial that typically occurs in woods, thickets and shaded roadside areas. Spreading, bushy perennial with lobed leaves. Blooms April and May with pale pink, deep pink or lilac flowers. Easily grown in average, medium wet, well-drained soil in full sun to part shade. Prefers moist, humusy soils, but tolerates poor soils. Will naturalize in optimum growing conditions. Foliage may yellow in hot summers if soil is allowed to dry out. No serious insect or disease problems. Attracts butterflies.	3 t 8	to 2'	FACU	Full sun to part shade		x

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herbaceous	Hemerocallis sp.	Daylily	Tolerant of many landscape conditions, early summer blooms found in many colors and styles. Needs 6 or more hours of full sun per day. Protection from mid and late afternoon sunwill help flower color to remain more consistent. Plant in well-drained soil with organic matter. Drought tolerant. Tolerant of short-term flooding.	4 to 9	to 3'		full sun to light shade		x
herbaceous	Hosta sp.	Hosta	Clumping, leafy lush-foliaged plants in many colors, heights and textures ranging from single solid colors of green, blue and gold, to variegations of these colors and also white. Leaf size can range from thumbnail to as large as a serving platter. Individual plants come in an array of sizes: from fist-size to mounds three feet tall and five feet across. Hosta flowers are borne on scapes, bloom between June and October and last for several weeks. Some are fragrant. Soil requirements range from sand to clay loam, but is best supplemented with organic material. While hostas are regarded as shade plants, they	4 to 9	to 3'		required, some sun tolerated		x

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herbaceous	Iris versicolor	Blue flag iris	A clump-forming iris that is native to marshes, swamps, wet meadows, ditches and shorelines. Grow in full sun to part shade in medium to wet soils; can take periods of dryness. This iris may be grown in up to 2-4" of shallow standing water, or in moist shoreline soils or in constantly moist humusy soils of a border. Clumps spread slowly and naturalize by tough, creeping rhizomes. Violet blue flowers in late spring. No serious insect or disease problems.	3 to 9	2-2.5'	OBL	full sun to part shade		x
herbaceous	Liatris sp.	Blazing Star	Most of the species have stiff, erect, two- to five-foot stems and grasslike leaves. The flowers are generally wispy purple, sometimes white, and they cover the top third of the stems in dense clusters from early summer to late fall, depending on the species. They prefer well-drained soil of moderate to lean fertility. Drought tolerant. No disease/insect pests. Attractive to bees and butterflies.	5 to 9	to 5'	FAC+	intolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Lobelia cardinalis	Cardinal flower	Cardinal flower is a native perennial which typically grows in moist locations along streams, sloughs, springs, swamps and in low wooded areas. Easily grown in rich, humusy, medium wet to wet soils in full sun to part shade. Needs constant moisture. Will tolerate full sun in cool, northern climates, but otherwise appreciates part shade. Short-lived, requires regular replanting. Late summer bloom period. Flowers are very attractive to butterflies and hummingbirds, but not cardinals. No serious disease or insect problems.	3 to 9	2-4'	OBL	tolerant		x
herbaceous	Lobelia siphilitica	Great Blue Lobelia	A native that typically grows in moist to wet locations along streams, sloughs, springs, swamps, meadows and in low wooded areas. A clump-forming perennial that features light to dark blue, flowers in late summer to early fall. Easily grown in rich, humusy, medium wet to wet soils in full sun to light shade. Needs constant moisture. Will tolerate full sun in cool, northern climates, but otherwise appreciates part shade. No serious disease or pest problems.	4 to 9	2-3'	FACW+	intolerant		x

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herbaceous	Onoclea sensibilis	Sensitive fern	A large, somewhat coarse, native, deciduous fern that occurs in wet woods and thickets and in moist soils along streams and springs. Sensitive to drought. Best grown in organically rich, wet to almost wet, well-drained soil in part shade to full shade. Needs consistent moisture. Although native to swampy and marshy areas, it grows quite well in average garden soil as long as soil is not allowed to dry out.	4 to 8	3-4'	FACW	required		x
herbaceous	Osmunda regalis	Royal Fern	Vigorous, spreading to form large, vase-shaped clumps. Very hardy. Moist, acid, highly organic soil best. Wet soils but not submerged; tolerant of drying for short periods. Only tolerates full sun if plenty of moisture.	3	3'	OBL	tolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
herbaceous	Panicum virgatum	Switchgrass	Several species. Forms thick spreading clumps. A tall grass often found in drier sandy soils and along the upland edge of salt marshes. Holds shape throughout winter. Needs 1 or 2 years to become established. Tolerates poor, acid, sandy, dry soil. Drought and heat tolerant.	3 to 5	4-7'	FAC	intolerant		x
herbaceous	Tiarella cordifolia	Foamflower	A clump-forming perennial which spreads rapidly by stolons to form dense, 1-2' wide clumps of foliage. Small white flowers blooming on the ends of spikes. Easily grown in average, medium wet, well-drained soil in part shade to full shade. Prefers organically rich, moisture-retentive soils. Wet soils, particularly in winter, can be fatal, however. Soil should not be allowed to dry out. No serious insect or disease problems.	4 to 9	to 12"	FAC-	required		x

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shrub	Aesculus pavia	Red Buckeye	No serious disease/insect pests. Intermediate drought/heat resistance. Deep descending roots; difficult to transplant, use container or B&B from nursery.	6	12-20'	FAC	tolerant	x	intermediate
shrub	Amelanchier canadensis, Amelanchier arborea	Shadblow/ Serviceberry	Upright, tall shrub. Moist, acid soils, good for wet or naturalized areas. Newer cultivars are reported to be less subject to pest and disease pressure.	4 to 9	18'+	FAC, FAC-	sun/shade		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
shrub	Aronia arbutifolia	Red Chokeberry	Adaptable to various soils, tolerates both wet and dry soils. No serious insect/disease problems; good for massing or naturalizing. Intermediate drought/heat tolerance. Transplants well. Profuse suckering.	4 to 9	6-10'	FACW	intolerant	x	x
shrub	Aronia melanocarpa	Black Chokeberry	Adaptable to various soils, tolerates both wet and dry soils. No serious insect/disease problems; good for massing or naturalizing. Resistent to heat and drought. Transplants easily. Suckers profusely.	4 to 9	3-6'	FAC	sun/light shade	x	x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
shrub	Aronia prunifolia	Purplefruit Chokeberry	Adaptable to various soils, tolerates both wet and dry soils. No serious insect/disease problems; good for massing or naturalizing. Intermediate drought/heat tolerance. Transplants well.	4 to 9	6-10'		sun/light shade	x	x
shrub	Calycanthus floridus	Carolina Allspice, Common Sweetshrub	Adaptable to many soil conditions, prefers wet to average soil moisture. Sensitive to drought/heat. Easily transplanted; prolific suckering habit forming thickets.	5 to 9	6-9'	FACU+	tolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
shrub	Clethra alnifolia	Sweet Pepperbush	Dry to moist acidic soil supplemented with organic matter. Found in coastal and inland wetlands. Tolerates drier sites. Generally pest free; mites may be a problem in hot, dry locations. Stoloniferous stems form extensive clumps; difficult to transplant.	3 to 9	3-8'	FAC+	full sun to light shade	x	x
shrub	Cornus racemosa	Gray Dogwood			6-10'		shade tolerance		

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shrub	Cornus sericea	Red Osier Dogwood			20'		drought intolerant		
shrub	Cornus amomum	Silky Dogwood	A fast growing, clump forming, medium shrub found along lakes and streams and in moist thickets. Some diseases, few insect pests. Tolerates poorly-drained soil. Intermediate drought/heat tolerance. Transplants easily.	4	5-8'	FACW	intolerant		x

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shrub	Fothergilla gardeni	Witch Alder	Prefers a moist, acid soil supplemented with organic matter. Useful for naturalizing, for the border or as a specimen. Small, dense, upright shrub with crooked branch appearance. Intermediate drought/heat tolerance. Tremendously pest/disease free.	5	3'	FACW	tolerant		intolerant
shrub	Gaultheria procumbens	Wintergreen	Prostrate herb-like small shrub spreading by stolons. Intermediate drought/heat tolerance. Tremendously pest/disease free. Difficult to transplant, start from potted plants.	3	2-6"	FACU	demands shade		x

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shrub	Hamamelis virginiana	Witch Hazel	Generally prefers moist, acid soils high in organic matter. Grows in moist woods. No serious insect/disease problems.	6 to 8	15-20'	FAC-	full sun to light shade		x
shrub	Hypericum densiflorum	Dense Hypericum, Dense St. John's Wort	Found in boggy places, seepage slopes, borders of ponds and lakes, wet meadows, stream banks, roadside ditches and moist pinelands. Intermediate drought/heat tolerance. Infrequent disease and insect pests. Shallow root system that transplants well.	6	4'	FAC+	intolerant	x	x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
shrub	Ilex glabra	Inkberry	Moist to wet soils, grows in moist sandy coastal Southern New England woodlands. Drought/heat sensitive. Transplants well.	5 to 9	6-8'	FACW-	tolerant	x	x
shrub	Ilex verticillata	Winterberry Holly	Tolerates a variety of soil types. Found in damp clearings, swamps and moist thickets. Moist, acidic soils supplemented with organic matter, does well under wet conditions, also in lighter soils, but is considered drought intolerant. No serious insect/disease problems. Transplants well.	3 to 9	6-10'	FACW+	sun/light shade		x

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shrub	Itea virginica	Virginia Sweetspire	Wet to moist soil conditions. Drought/heat resistant; can tolerate some drying but does not grow as well. No serious disease/insect pests. Transplants easily, best moved B&B.	5	6-12'	OBL	tolerant	x	x
shrub	Kalmia latifolia	Mountain Laurel	Spreading evergreen shrub. Intermediate drought/heat tolerance. Occasional disease/insect pests. Transplants well, but site carefully to avoid full hot sun. Requires acid, moist soil supplemented with organic matter, good drainage.	5	7-15'	FACU	tolerant	intermediate	x

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shrub/small tree	Lindera benzoin	Spicebush			12'				
shrub	Magnolia virginiana	Sweetbay Magnolia	Does well in wet soils. Drought/heat intolerant. No serious insect/disease problems. Difficult to transplant, slow to re-establish.	5 to 9	10-20'	FACW+	tolerant	x	x

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shrub	Myrica gale	Sweet Gale			6'				
shrub	Myrica pensylvanica	Northern Bayberry	Does extremely well in poor sandy soils, adaptable to heavy soils. Drought resistant. Rarely susceptible to insects and disease. Transplants well.	3 to 6	5-12'	FAC	intolerant	x	x

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shrub	Nemopanthus mucronata	Mountain Holly			9'				
shrub	Prunus maritima	Beach Plum	Adaptable to most soil conditions except wet. Drought tolerant once established. Relativey pest free but susceptible to some insect pests and diseases.	6-Mar	1-8'		sun to part shade	x	x

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shrub	Rhododendron maximum	Rosebay Rhododendron	Moist to average soil conditions. Drought/heat sensitive. Frrequent disease/insect pests. Transplants readily B&B as a small plant in early spring. Can form thickets in moist, shady and protected places.	3	15'	FAC	tolerant	intolerant	x
shrub	Rosa palustris	Swamp Rose	A native rose with attactive pink flowers that prefers moist, acidic habitats such as bogs, wet conifer swamps, and the edges of ponds and lakes.	5 to 8	6-8'	OBL	tolerant		x

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shrub	Sambucus canadensis	Common Elderberry	Fast-growing, stoloniferous. Found growing in wet meadows and marshes. Tolerates various soil conditions. Transplants well, culture easy. Suckers freely, forming thickets. Drought/heat resistant.	3	6-8'	FACW-	tolerant	sensitive	x
shrub	Skimmia japonica	Japanese Skimmia	Small, mounding, densely branched evergreen shrub. Requires shade and a moist, well-drained, organic soil.	6 to 8	4'		required		x

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shrub	Sorbaria sorbifolia	Ural Falsespirea	Multi-stemmed, deciduous shrub. Fast-growing, white flowers; prefers moist, well-drained soil, full sun to part shade.	2	5-10'		partial shade		
shrub	Spiraea latifolia	Meadowsweet	Low shrub that grows in moist fields and uplands. Root suckers. Generally hardy and easy to care for. Native species can be found in open, wet meadows and along lakes and ditches.	2	2-4'	FAC+	intolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Root Tolerance
shrub	Spiraea tomentosa	Steeplebush	A small shrub common to wet fields and pastures. Drought resistent. Occasional disease/insect pests. Root suckers, transplants easily. Native species can be found in open, wet meadows and along lakes and ditches.	4	2-4'	FACW	intolerant		x
shrub	Vaccinium angustifolium	Lowbush Blueberry	Prefers moist to droughty soils. Drought/heat resistant. Transplants well, spreads by stolons. Occasional disease/insect pests.	2	2'	FACU-	tolerant	x	x

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shrub	Vaccinium corymbosum	Highbush Blueberry	Native to swamps but does well in dry, acid, poor and sandy soils in fullsun or partial shade. Intermediate drought tolerance. Occasional disease and insect pests. Transplants well, B&B or container grown.	3 to 8	6-12'	FACW-	tolerant	x	x
shrub	Viburnum cassinoides	Wild Raisin, Arrowwood	Found in shrub swamps and forested wetlands. Infrequent insect/disease pests. Intermediate drought/heat resistance. Transplants well.	3	6-12'	FACW-	tolerant	x	x

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shrub	Viburnum dentatum	Arrowwood Viburnum	Wet to average soils. Drought/heat resistant. Infrequent disease/insect pests. Transplants well.	3	6-12'	FAC	tolerant	x	x
shrub	Viburnum lentago	Nannyberry	A large, upright, multi-stemmed, suckering, deciduous shrub which typically grows to 10-18' tall with a spread of 6-12', but may also be grown as a small, single trunk tree which may reach a height of 30'. Non-fragrant white flowers appear in spring. Easily grown in average, medium wet, well-drained soil. Remove root suckers to control spread unless naturalization is desired. Attracts birds and butterflies. No serious insect or disease problems.	2 t 8	14-16'	FAC	full sun to part shade		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
shrub	Viburnum trilobum	American Cranberrybush	Adaptable to soil conditions. An easy to grow native. Drought/heat resistant. Transplants easily.	3 to 8	8-12'	FACW	full sun to light shade		x
tree	Acer rubrum	Red Maple	Tolerates most soils but prefers moist, acid conditions, excellent for wet conditions. Fast growing, One of the best common trees in NE wetlands. Easily transplanted in early spring B&B or BR if small. Intermediate heat/drought tolerance.	3 to 9	60-75'	FAC	sun to shade		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Aesculus glabra	Ohio Buckeye	Prefers wet soils, tolerates dry. Intermediate drought/heat tolerance. Infrequent insect problems, but frequent disease problems. Taproot, moderately difficult, transplant in early spring B&B.	4	35-50'	FACU+	intermediate		intermediate
tree	Betula nigra	River Birch	Fast growing, found on stream banks, prefers moist well drained soils but tolerates dry conditions once established. Rapid grower. Infrequent disease/pests. Heat/drought resistent. Transplants easily B&B in early spring or late autumn.	4 to 9	50-70'	FACW	intolerant		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Carpinus caroliniana	American Hornbeam	Drought/heat sensitive. Demands moist to average soil moisture. Infrequent disease/insect pests. Difficult to transplant, move root pruned trees B&B in early spring. Useful as an understory tree.	3 to 9	20-30'	FAC	tolerant		x
tree	Chionanthus virginicus	White Fringetree	Very adaptable to soil types, prefers moist to average soil moisture. Sensitive to drought/heat. Infrequent disease/insect pests. Somewhat difficult to transplant, move as small tree B&B in early spring. Grows very wide so careful siting is important.	4 to 9	12-20'	FAC+	intolerant		intolerant

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Cladrastis lutea	American Yellowood	Prefers wet to average soil moisture. Sensitive to drought/heat. No serious disease/insect pests. Transplants well as small tree B&B in early spring.	4 to 8	30-50'		intolerant		intolerant
tree	Cornus alternifolia	Pagoda Dogwood	Small understory, white flowering, deciduous tree, often multistemmed. Shallow, fibrous roots, easily transplanted B&B in early spring. Drought/heat sensitive, but can tolerate periods of dryness once established. Few disease/insect pests.	3	20-35'		tolerant		intermediate

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Fraxinus quadrangulata	Blue Ash	Drought/heat resistant. Wet to droughty soils. No serious diseases, but frequently susceptible to insect pests. Readily transplanted B&B or BR in spring or autumn with care.	5	50-75'		intermediate	intermediate	intolerant
tree	Ginkgo biloba	Ginkgo	High tolerance to difficult growing conditions. Good heat tolerance, no insect or disease problems. Must use male cultivars as decomosing fruit on female trees in fall are malodorous. Slow to establish.	4	50-80'		intolerant	x	x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Gynmocladus dioicus	Kentucky Coffeetree	Adaptable to various soil conditions, but prefers wet to average soils. Tolerates drought/heat. No serious insect/disease problems. Somewhat difficult to transplant, B&B in early spring.	3 to 8	60-75'		intolerant	x	intolerant
tree	Larix laricina	Eastern Larch/Tamarack	Deciduous conifer. Easily transplanted B&B when dormant. No serious disease problems, but susceptible to insects. Drought/heat sensitive. Readily transplants B&B when dormant.	2	40-80'	FACW	intolerant	x	x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Nyssa sylvatica	Black Gum/Tupelo	Tree of forested wetlands and moist woods. Moist, well drained soils, will also grow on upland areas. No serious insects/disease problems. Heat/drought resistent. Difficult to transplant, should be grown as a container plant, or move B&B in early spring.	3 to 9	30-50'	FAC	intolerant	x	x
tree	Quercus alba	White Oak	Wide moisture tolerance. Adaptable to soil types, prefers moist, acid conditions, full sun. White oaks are more likely to die from gypsy moth attack than other oak species. Intermediate drought/heat tolerance. Deep taproot, difficult to transplant, move as small tree B&B in early spring.	3 to 9	50-80'	FACU	intermediate		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Quercus bicolor	Swamp White Oak	The preferred choice of the oaks. Moist, acid soils but very drought tolerant once established. Several pests and diseases attack this plant but cause no significant damage. Transplants readily B&B in early spring or late autumn.	3 to 8	60-80'	FACW+	intermediate	x	x
tree	Quercus imbricaria	Shingle Oak	Prefers moist soil moisture, tolerates dry. Drought/heat tolerant. No serious disease/insect pests. Taproot, transplants with some difficulty, move B&B in early spring.	5	30-45'	FAC	intermediate	x	intermediate

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Quercus macrocarpa	Bur Oak	Prefers wet to droughty soils. Drought/heat tolerant. Infrequent insect pests, but frequent disease problems. Taproot, difficult to transplant, move B&B in early spring.	2	79-100'	FAC-	intolerant	x	intolerant
tree	Quercus palustris	Pin Oak	Moist, acid soils, intolerant of high pH, tolerates wet soils and urban conditions. Heat/drought resistant. Easily transplanted B&B in early spring or autumn.	4 to 8	50-60'	FACW	intolerant	x	x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Quercus phellos	Willow Oak	Adaptable to soil conditions, fibrous root system allows ease of transplanting, no serious insect or disease problems. Tolerant of heat/drought. It is a good species to plant along margins of fluctuating-level reservoirs, but is not tolerant of permanent standing water.	5 to 9	40-60'	FAC+	intolerant		x
tree	Quercus rubra	Red Oak	Moist, acid soils, tolerates urban conditions. Easily transplanted.	4 to 8	60-70'	FACU-	intermediate		x

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Plant Type	Plant	Common Name	Description	Zone	Mature Height	Wetland Indicator	Shade Tolerance	Salt Tolerance	Brief Flood Tolerance
tree	Salix discolor	Pussywillow			20-40'				

References:

ASH	Ashumet Nitrogen Plume Offset Program (http://geocities.com/ashumet2001/capecodplants.html)
NTSV	Native Trees, Shrubs and Vines for Urban and Rural America by Gary L. Hightshoe, 1988.
NEWP	New England Wetland Plants, Inc. (www.newp.com)
COOP	Sustainable Trees and Shrubs for Southern New England, Umass and URI Cooperative Extension Systems Internet websites as indicated.
USDA	USDA