

# STEPHENS FIELD

## PARK MASTER PLAN

PLYMOUTH, MASSACHUSETTS



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Spring 2009

# INTRODUCTION

Stephens Field is an active neighborhood park. For residents of Plymouth, Stephens Field is the place they learned to play ball, launch their canoe, play tennis, eat their lunch, walk their dog and enjoy access to the ocean views. In the last few years, with the introduction and success of the twice-a-week farmers market, residents come to the park to listen to music, visit with their neighbors and support local food and a local economy. The farmers market has brought new attention to the park and united a group of citizens, the Friends of Stephens Field, who are advocating for expanding and revitalizing the park.

The recent transfer of parcels adjacent to the park to recreation status makes this an ideal time to create a master plan for Stephens Field. The new land provides the opportunity to relocate existing active recreation and parking, moving it farther from the coast, allowing for the restoration of a coastal buffer to protect against erosion, improve water quality, wildlife habitat, and the overall beauty of the waterfront.

In the master planning process, two meetings provided opportunities for stockholders and community members and the client to form the vision and goals that guided the project and provide feedback on preliminary design alternatives. The final plan incorporates the feedback received in these meetings and strives to meet the needs of the community.



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# HISTORY AND CONTEXT

Plymouth is a fast growing town. It still retains small town charm even with a highly skilled workforce and a growing population of nearly 60,000. Over the last 30 years, the population has grown by over 60 percent. All this growth has led to new development and new impermeable surfaces, negatively influencing water quality. Stormwater and runoff are in part to blame for why Stephens Field is closed to swimming. The park, located just on the edge of Plymouth Harbor, is an ideal place to filter water before it enters the harbor.

Located on the shores of a protective harbor within Cape Cod Bay, Plymouth lies in densely populated eastern Massachusetts. Plymouth is about half-way between the state capital Boston, and the popular destination Cape Cod, about 40 miles from each. Route 3, a major state road, crosses the town from north to south.

Stephens Field has several special characteristics that make it stand out from other parks in the Plymouth system. It is one of only a few waterfront parks. It boasts the largest number of tennis courts and a long tradition of baseball and other active sports. The park lies close to downtown, making it very accessible to large numbers of people. It is also nestled in a residential neighborhood, which gives the park a distinct feeling.

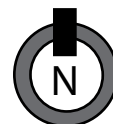
A proposed "Pilgrim Necklace" park system is slated to link several open spaces, parks and attractions in Plymouth. Stephens Field is the southern terminus for this project. The Pilgrim Necklace presents many opportunities for the attractive, well used, centrally located, waterfront park of Stephens Field.



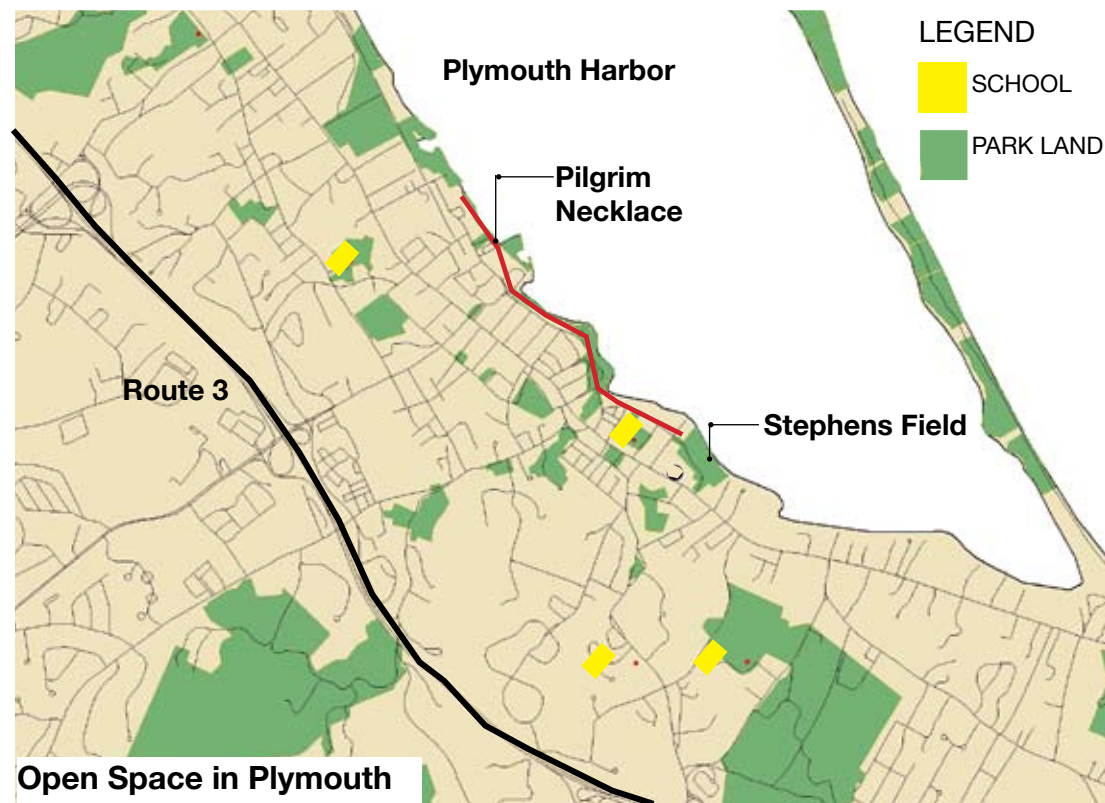
1889 USGS Map shows wetlands in the area of Stephens Field, shown in red.

In 1930, the Stephens family donated land to the town of Plymouth to be used for recreation. Stephens Field is characteristic of the era of standardized recreational parks that were built between 1930 and 1965. These parks were built to meet the needs of the community with little consideration given to site conditions or ecological function. As recently as 1889, the Stephens Field area was a coastal marsh. The area became a small landfill between 1915 and 1927, which was then capped in the process of leveling the land to build recreational facilities.

The adjacent parcels of land southwest of the park are contaminated as a result of nearly a century of commercial and industrial use. The site has been a bus depot and most recently a Department of Public Works facility. The town is awaiting assessment to determine the extent of the contamination and a strategy for its remediation. The expansion of the park is a unique opportunity to re-envision the park and balance the social and recreational needs of the community, while restoring ecological function and enhancing the natural features and beauty of this waterfront park.



NOT TO SCALE



Open Space in Plymouth



The original Stephens Field with adjacent town land, recently transferred to the parks department.

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*Southeast view from Stevens Field*

## VISION

Stephens Field is a vital neighborhood park that is well connected to the neighborhood and the proposed Pilgrim Necklace, and provides recreational opportunities and waterfront access to the community.

The park functions as a model for sustainable coastal parks and the restoration of heavily impacted areas. It educates the community about the ecology of its backyard.

## GOALS

Stephens Field and the newly acquired adjacent land...

### **Contribute to a healthy coastal ecosystem**

- treat stormwater generated on site in bioswales and rain gardens
- 30' of coastal buffer planted with native vegetation

### **Maintain active recreation and neighborhood character**

- baseball diamond 250 ft. x 250 ft. with northern orientation
- four tennis courts 22,000 sq. ft.
- one basketball court 84 ft. x 50 ft, cement

### **Enhance opportunities for passive recreation**

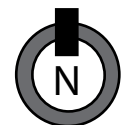
- picnic areas, table, grill, 15' x 15' for each
- walking trails and paths, 12' wide, asphalt
- indoor space for bathrooms, concession, storage, totaling 2,100 sq. ft.
- farmers market 3,000 sq. ft. outdoor space
- quiet reflective areas with benches

### **Improve Connectivity**

- sidewalks for pedestrian access
- parking for 100 cars

## EXISTING CONDITIONS

Stephens Field is a waterfront park set between residential neighborhoods to the north and south with the commercial strip of Sandwich Street to the southwest. A ten-foot legal setback from neighboring parcels is in place for all built structures. The park is quite flat, with an average slope of 2.5% down to the shore. There are two entry points into the park, connected by a road that bisects the property. Two unpaved parking areas accommodate approximately 100 cars if parking is done efficiently. The central parking lot connects to a boat launch that can accommodate small trailers. The boat launch is best suited to small craft as the launch area is very shallow. A centrally located bathroom and concession building serves snacks and drinks in the summer season. Active recreational facilities on site include tennis, baseball, and basketball. In the southern corner of the property there is a small constructed pond with a children's playground and picnic area. The former Department of Public Works (DPW) yard is undergoing cleanup. A number of buildings have been removed, with the largest slated for demolition in the near future. Utilities crisscross the property above and below ground. There is a parking area that is still used for town vehicles and a staging area with piles of dirt and materials awaiting removal.



0 40' 80' 160'

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# VEGETATION

Much of the vegetation at Stephens Field is turf, particularly around sports fields and the pond. A maple-dominated deciduous vegetated wetland exists in the northwestern finger of the property. A small wetland borders the far northern property line near the shore. A small patch of coastal shrubs, including the invasive multiflora rose, lies north of the basketball court. Tidal marsh grasses dot the edge of the property in the harbor. Large dense stands of invasive species such as multiflora rose, Japanese knotweed, and common reed grass have spread throughout the property.

## RECOMMENDATION

- Add a diverse range of vegetation for visual interest and to develop threatened shorebird habitat.
- Remove and replace invasive species where they prevent establishing native vegetation.
- Native, salt-tolerant plants will perform better along coastline.
- Protect and restore wetlands.
- Use vegetation to filter and clean water moving toward harbor.



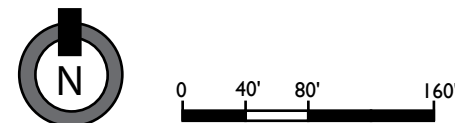
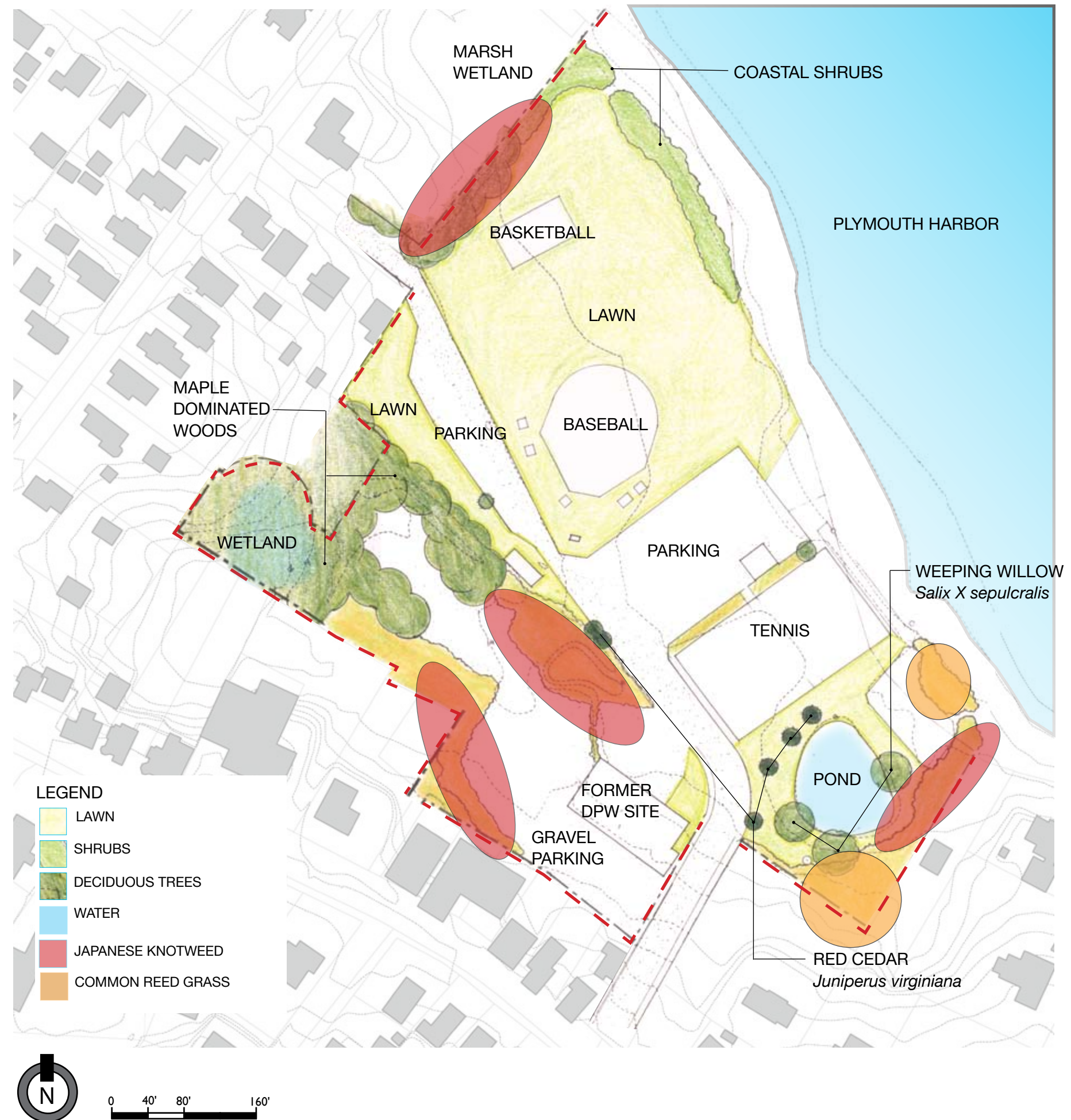
Common reed grass dominates the wet area by the pond. This plant is highly adapted to wet and disturbed sites. Left untreated it is likely to spread, making it difficult to establish a diversity of species in the area. Common reed grass filters water; however, other native plants could perform this water cleansing function.



Japanese knotweed has developed into dense thickets in wetter areas that are not being mown. Removing this species could help to support biodiversity and the new plantings that this aggressive plant would out-compete.



The willow trees by the pond have reached maturity and begun to decline. These trees should be removed and replaced with appropriate wetland tree species.



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# ACCESS AND CIRCULATION

Stephens Field has two main entrance points connected by a two-way road that bisects the park. The southern entrance on commercial Sandwich Street announces your arrival and transition from the commercial street into the park. This entrance provides sidewalks for pedestrians and the street is wide enough to accommodate parallel parking. The northern entrance brings you into the park from the residential streets of Fremont and Union and is the logical pedestrian connection for neighborhood users, the elementary school, and people coming from the historic harbor and downtown. This entrance has no signs announcing arrival or sidewalks to accommodate pedestrians. The road bisecting the park and the lack of official crossings and sidewalks present a safety concern.

Parking is provided in two large unpaved parking lots, one adjacent to the northern entrance and the second in the center of the park and right on the water. This lot also provides access for launching small boats. The newly acquired parcel of land is still used for parking town vehicles and occasionally as overflow parking for the farmers market.

Aside from the sidewalks on the southern entrance there are very few designated pedestrian paths. The park is dominated by recreational facilities and lawn, with a small informal path that circles the pond and two access ways connecting to the beach at each end of the park.

## RECOMMENDATION

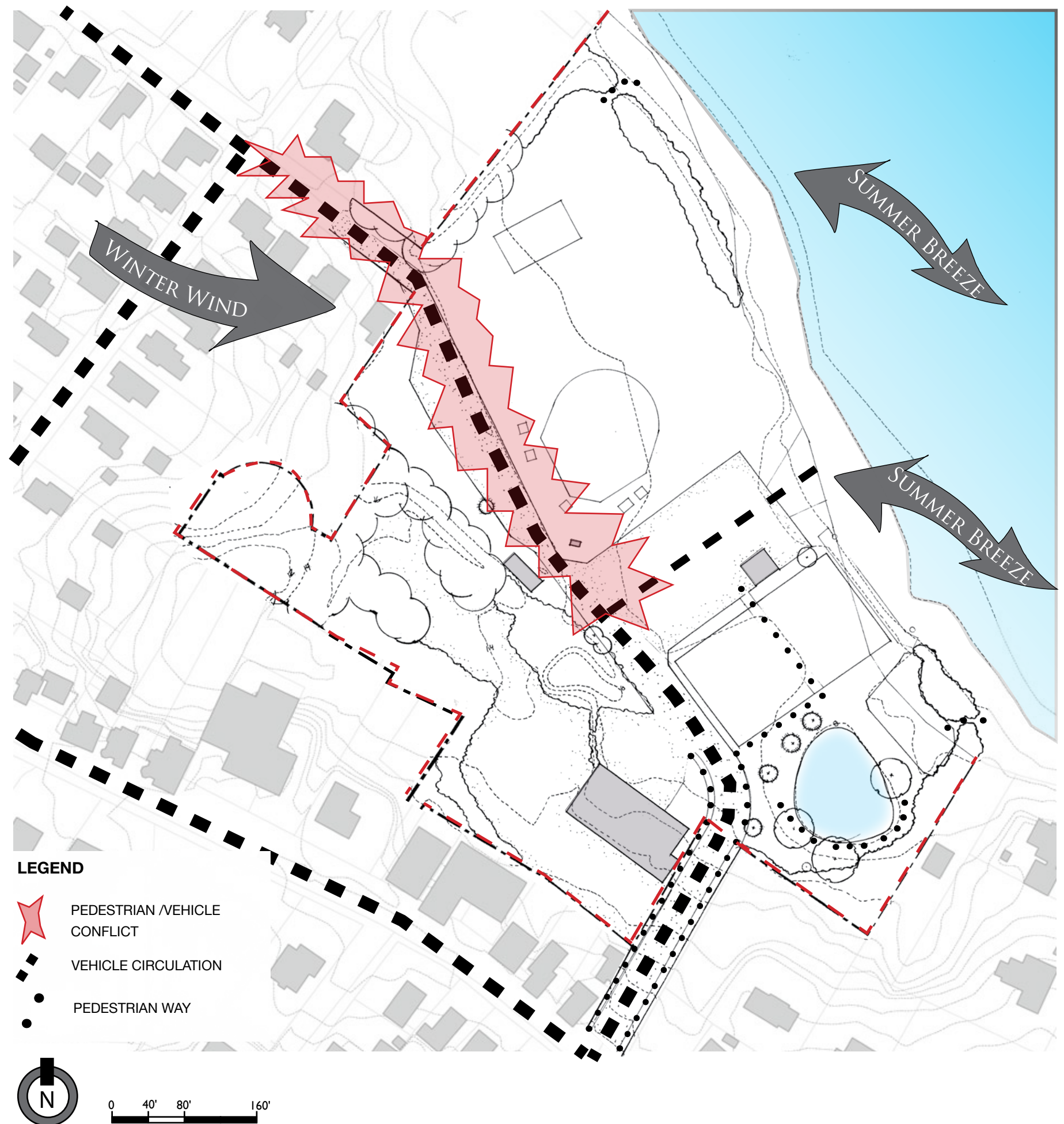
- Improve non-vehicular access from nearby elementary school and downtown to alleviate pedestrian vehicular conflict.
- Improve passive recreation and protect vegetation.
- Improve the legibility of parking.

## WIND

Summer breezes fluctuate between land and sea depending on the relative ocean and land temperatures. Dominant cold winter winds blow from the northeast and summer storms generate a southeasterly wind.

## RECOMMENDATIONS

- Provide shelter from northwest wind to extend the spring and fall enjoyment of the park.
- Maintain open areas to take advantage of the cooling effect of ocean breezes in the heat of summer.



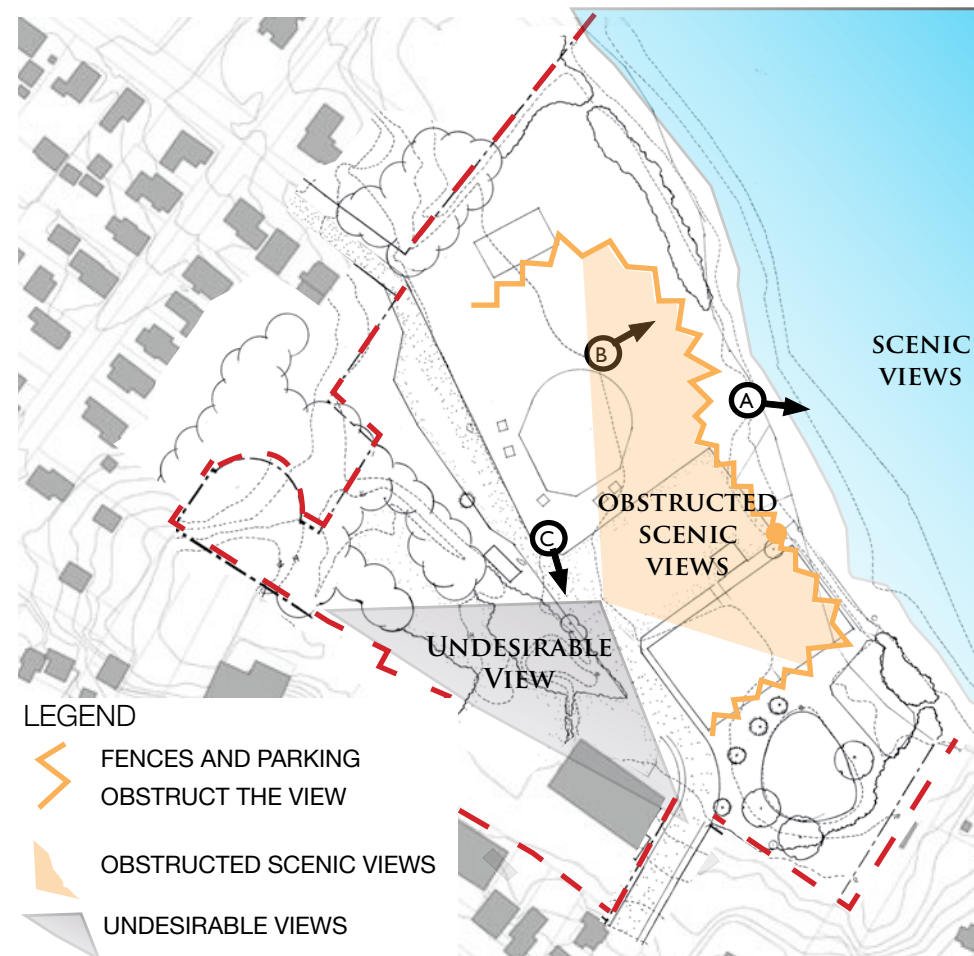
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# VIEWS

Beautiful harbor views attract visitors to the park; however, these views are obstructed from most vantage points by large fences associated with active recreation and parking lots. It is not until visitors are standing on the beach that they can fully take in the view. There are undesirable views looking west towards the new parcel. These are currently unsightly due to the demolition of structures and piles of debris. From the new parcel the back side of the apartment buildings and the commercial strip will be visible and will likely require screening to improve the visual experience of visitors as well as increase privacy for neighbors.

## RECOMMENDATION

- Frame and enhance scenic waterfront views.
- Screen commercial views to the west.
- Maintain neighbors' views into the park for their enjoyment and the added safety of eyes on the park.



**View A:** Stephens Field has a great waterfront location. Providing access to the water's edge for passive recreation and framing certain views will enhance visitors' experience.



**View B:** Beautiful harbor views are interrupted by placement of man-made structures. Structures and facilities could be moved to areas of the park without such scenic value.



**View C:** Fences, old buildings, and unmaintained areas here are less pleasing to look at. Such areas should be screened with vegetation.



# WETLAND AND OCEAN BUFFERS

Four distinct types of wetlands and waterbodies—coastal wetland, oceanfront land, surface waterbody, and a vegetated wetland—are in or adjacent to Stephens Field. These valuable areas require protection and restoration. Historically, much of Stephens Field has been a coastal wetland. Any construction that may disturb soil within a hundred feet of wetlands will require a special permit per Article 27 of the town Conservation Commission.

## RECOMMENDATIONS

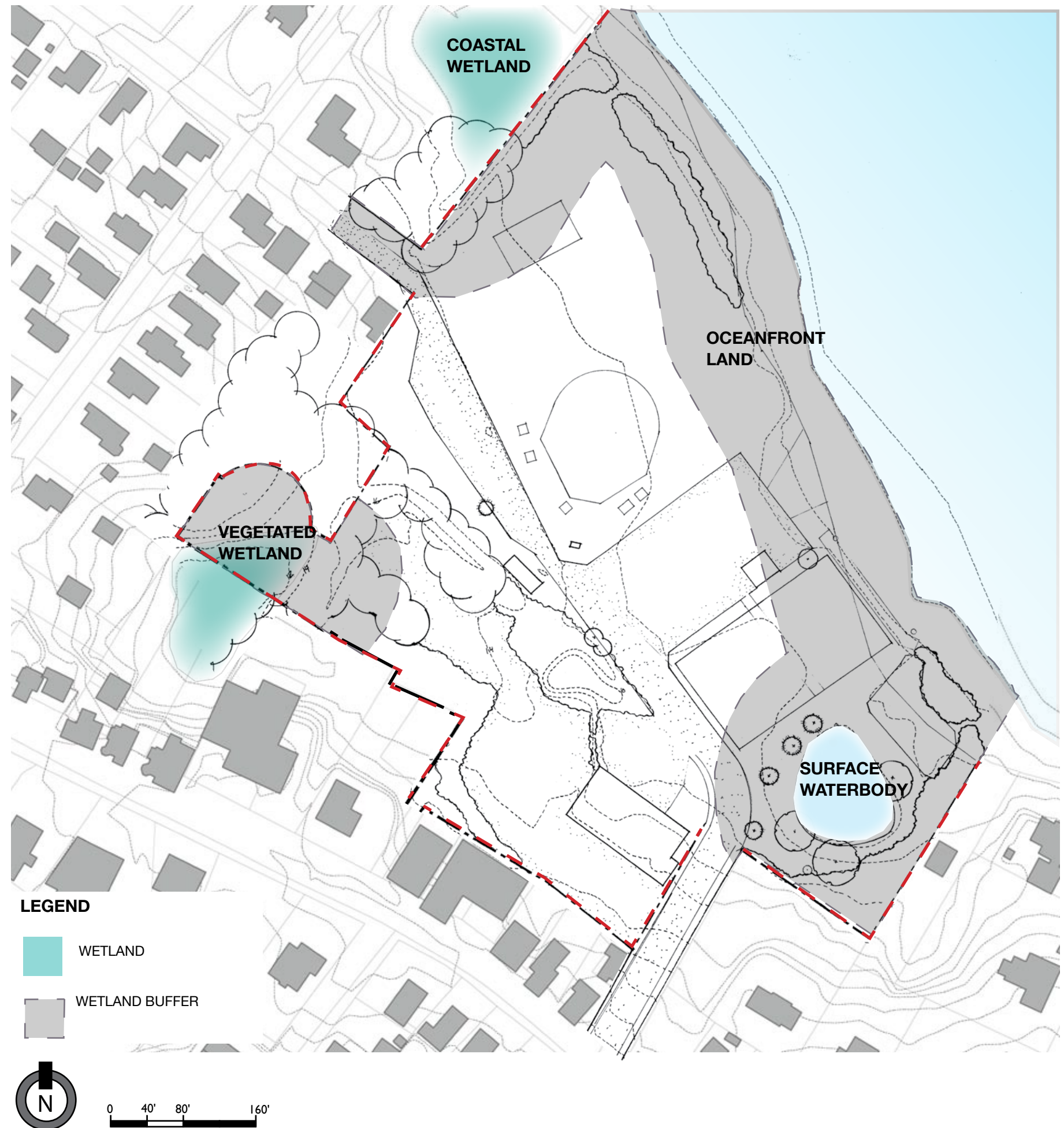
- Avoid locating buildings and parking in the wetland buffer.
- Minimize disturbance and access to valuable and fragile areas.
- Increase vegetative buffer to protect area and filter water.
- Add diversity to existing vegetation to increase system health.

## SOILS

Carver soil series, which is found in undisturbed areas of Stephens Field, is slightly weathered glacial out-wash from mixed igneous, metamorphic and sedimentary rock. Carver soils are particularly well drained, coarse grained sandy soils that rapidly leach nutrients. A private dump was operated in what is now Stephens Field. Urban fill, common around disturbed sites after construction, lies in several areas of the park, most notably near former and existing buildings. Soils are likely to be compacted in parking areas and beneath paths and playing fields.

## RECOMMENDATIONS

- Use vegetation that can be established without artificial fertilizers.
- Limit use of fertilizers because of proximity to ocean.
- Establish plants adapted to sandy, low nutrient soils.
- Employ infiltration basins that will work well in Carver soils.
- Remediate and aerate compacted soils.



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STEPHENS FIELD  
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WETLAND & OCEAN  
BUFFERS AND SOIL

# DRAINAGE

Soil compaction and poor grading in the parking lot and parts of the road cause sheet-flow runoff to enter the harbor. An engineered infiltration basin and swale have been installed to handle sheet flow runoff; however, the surrounding topography is not graded toward these features, limiting their function. A storm drain funnels stormwater from higher land into the harbor. The pipe passes under but is unconnected to the bioswale. This has caused considerable erosion along the shoreline. A second outflow directs overflow from the small pond in the southern area of the park to the harbor.

## RECOMMENDATIONS

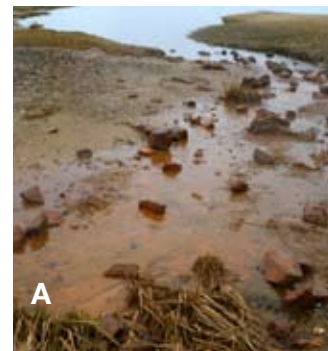
- Aerate compacted soils to increase infiltration.
- Regrade to control water flow in order to limit erosion.
- Install water management systems: swales, rain gardens and infiltration basins.

## STORMWATER

When rain falls on the wooded areas of Stephens Field much of it is absorbed by the vegetation and soils. However, when it falls on the compacted gravel and asphalt of the roadway and parking lot, the rain is not absorbed. The water sheets off these surfaces and onto nearby areas. This stormwater runoff has a powerful negative influence on the water quality of Plymouth Harbor.

There are about 1.25 acres of impermeable surface on Stephens Field, including basketball and tennis courts, as well as roads and parking. In a typical one-hour duration “five-year storm” event (a storm that has the probability of occurrence once every five years) the amount of runoff would exceed 1.5 cubic feet per second. This can and does cause serious erosion if not managed carefully. Over the entire one-hour storm, approximately 45,000 gallons of water would be displaced. This water flow will cause severe erosion, and carry sediments, pollution and debris into the harbor if left untreated.

Several methods can be employed to limit the damage of such storm events. Limiting impermeable surfaces and using comparable permeable surfaces when appropriate can help. Directing stormwater runoff to detention and infiltration basins can help clean and store the water instead of allowing it to enter untreated into the harbor.



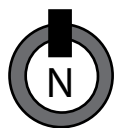
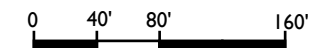
A: Storm drain outfall cuts a channel in the beach.



B: Puddling due to poor grading and maintenance.



C: Storm drain outfall into harbor.



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# ALTERNATIVE I ROAD RUNS THROUGH IT

The harbor side of the park has become the center of passive recreation with the road acting as a spine and providing access to both the active and passive sides of the park. By moving active recreation, the waterfront can be restored and highlighted as a model for erosion control and water quality protection.

## Features

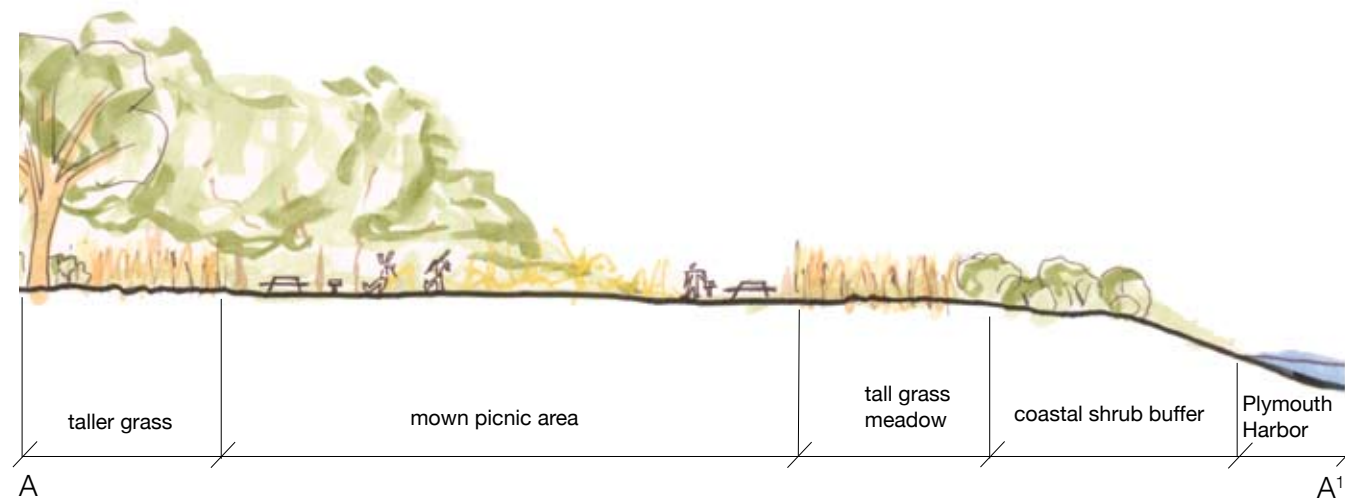
1. Vehicular spine lined with parking
2. Infiltration garden for stormwater management
3. Concession and bathroom building
4. Flat mown area for farmers market or lawn games
5. Central area for spectators to gather, providing opportunities for sun or shade and easy access to storage shed
6. Canoe launch and beach access
7. Secluded sitting area with ocean views

## Advantages

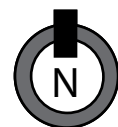
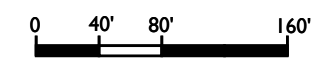
- Tennis and basketball surfaces act as a cap for brownfield soils.
- Native vegetation surrounds wetlands and increases biodiversity.
- Parking is convenient to all destinations.
- Separating noisy active recreation creates a quieter atmosphere for those seeking quiet passive recreation.

## Disadvantages

- Moving all active recreation will be costly.
- Conflict between the road and pedestrian circulation.
- Dominated by vehicle circulation.



SECTION A-A1  
SECTION NOT TO SCALE



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STEPHENS FIELD  
STEPHENS COURT  
PLYMOUTH, MASSACHUSETTS

ROAD RUNS  
THROUGH IT

# ALTERNATIVE II BIKE AND PEDESTRIAN CONNECTION

A curving path for bicycles and pedestrians runs along the shore, rewarding visitors with harbor views and bringing them to the heart of Stephens Field. This path connects to a proposed bike path linking all the waterfront parks in the town of Plymouth. The highest impact activities have been located in areas already impacted by prior use, potentially serving as one of several mitigation strategies. Community gathering space is centrally located and in close proximity to play and picnic areas.

## Features

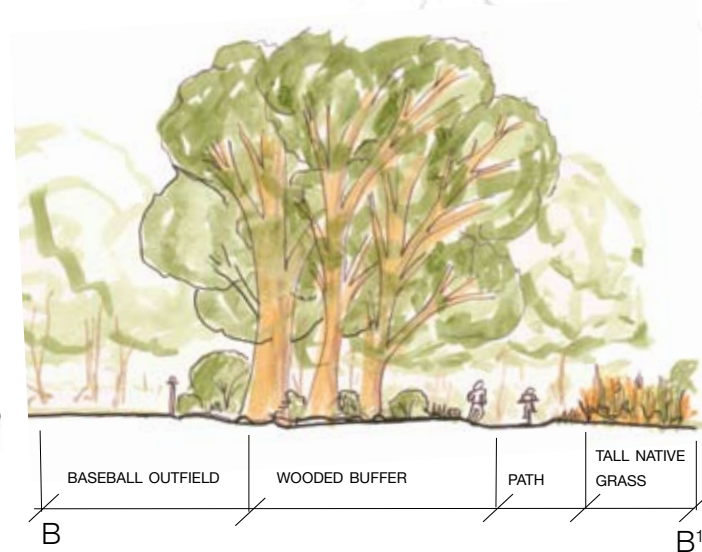
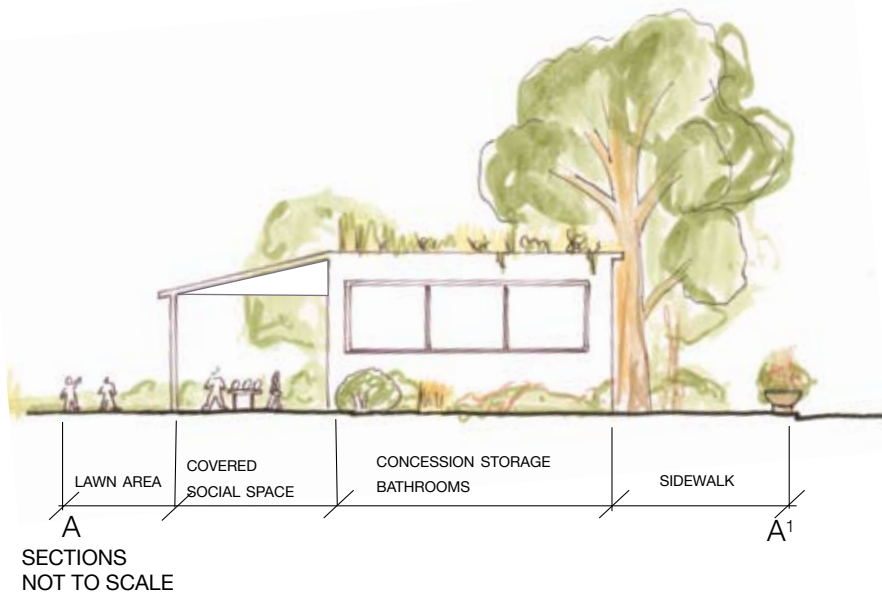
1. Bike path featuring ocean views
2. Shaded lawn for spectators
3. Pavilion with concessions and bathrooms that opens out to become an open air structure for large gatherings
4. Vegetated infiltration gardens manage stormwater
5. Seating areas enclosed with vegetation and small berms to create sense of enclosure with views
6. Canoe launch

## Advantages

- Impermeable surfaces—courts and parking—farther from water bodies.
- Safer pedestrian and bike connections to downtown, school, and neighborhood.
- Parking is easily accessible to all active and passive recreational destinations.
- Bike path and passive social centers have good views of water.

## Disadvantages

- Children play and picnic areas are far from active recreation.
- Parking only available at Sandwich Street entrance.
- Congestion on Union Street caused by lack of parking spaces.



# ALTERNATIVE III PEDESTRIAN PROMENADE

This alternative showcases sustainable landscape practices with vegetated infiltration systems, permeable paving, and native plants. Active and passive recreation are balanced with paths and seating areas providing destinations throughout the park.

## Features

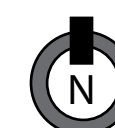
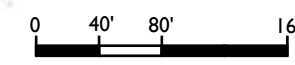
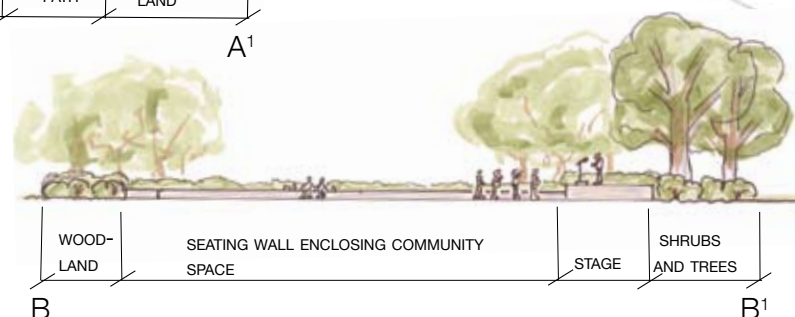
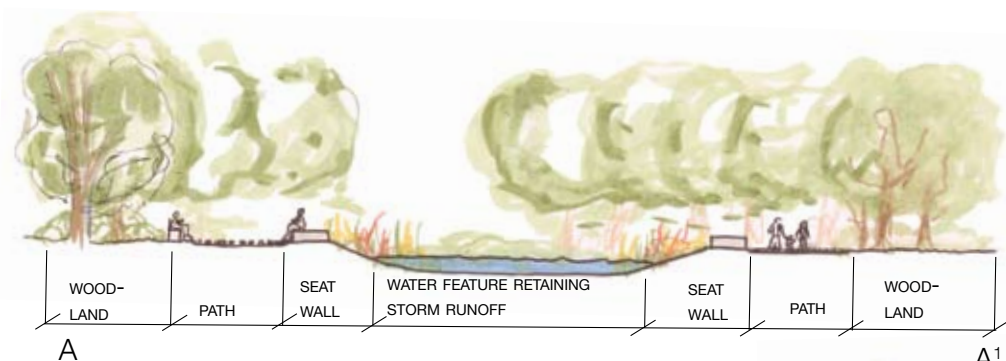
1. Pedestrian hub with showcase rain garden
2. Community gathering
  - Open market featuring a seating wall and raised stage
  - Building for concession, bathrooms and storage
3. Vegetated infiltration basin
4. Seating area
5. Small beach
6. Canoe launch
7. Walking paths through native plant buffer provide access to the beach

## Advantages

- Parking and active recreation set back from waterfront.
- Parking and tennis courts are located on former DPW site, as part of potential solution to capping brownfield.
- Vegetated buffers protect wetland resources.
- Prominent walkway through center of park.
- Passive and active recreation are balanced and enhanced.
- Baseball field remains in the same location.

## Disadvantages

- Boat access brings vehicles into the central pedestrian area.
- Impacts are spread across whole property.
- Children's playground close to waterbodies, which may be a hazard, and far from active recreation.



SECTIONS  
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PEDESTRIAN  
PROMENADE

11/21

# ALTERNATIVE IV COMMUNITY SUSTENANCE

This alternative emphasizes habitat restoration and stewardship while providing passive recreation and supporting community and the local economy. A greenhouse can be leased to a local nursery to provide the community with native plants appropriate for coastal landscapes. A bike and canoe rental provides tourists and community members equipment needed to explore the newly connected Pilgrim Necklace by boat or bike.

## Features

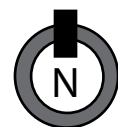
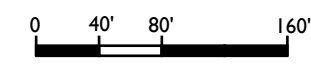
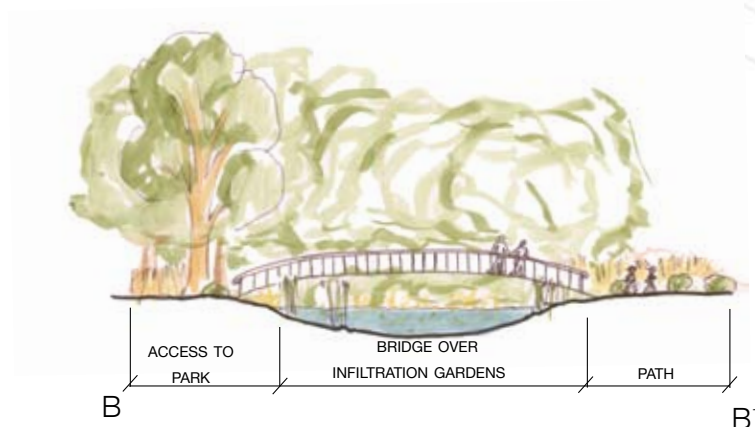
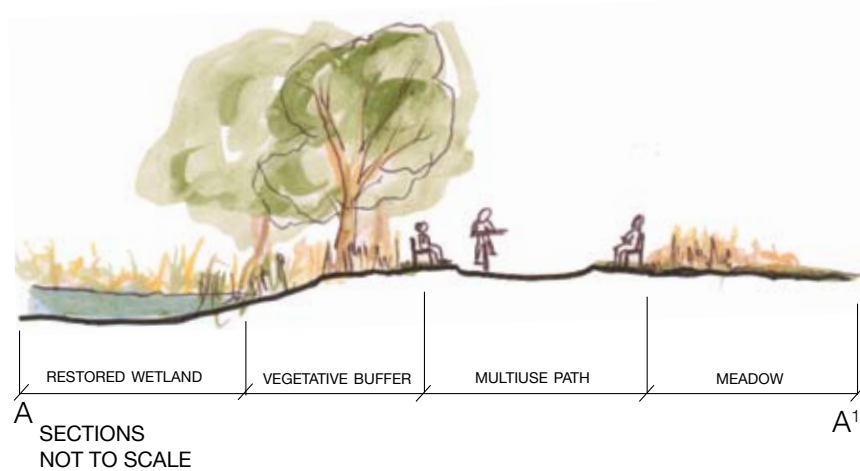
1. Bike and pedestrian gateway
2. Native plant nursery
3. Service parking for the nursery
4. Community center
  - Bike and boat rental
  - Open courtyard for events
  - Greenhouse nursery office
5. Pedestrian bridge over vegetated infiltration gardens that feature natural processes and native plants
6. Canoe launch
7. Marsh boardwalk

## Advantages

- Parking lot surface acts as a cap for contaminated soils.
- Historic wetland is restored and all existing trees are preserved.
- Coastal buffer is enhanced.
- Safe pedestrian and bike connectivity with downtown, school and neighborhood.
- Views and focal destinations guide visitors as they explore a variety of pathways through the park.
- Many varied passive recreational opportunities.
- Low construction cost by not replacing recreational facilities.
- Revenue generation from nursery, concession, and rentals.

## Disadvantages

- Moving the canoe/kayak launch disturbs new land.
- Parking only available at Sandwich Street entrance.
- No active recreation facilities.



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COMMUNITY  
SUSTENANCE

12/21

# PREFERRED PLAN

## ENTRY EXPERIENCE

The Union Street entrance to Stephens Field features a bike and pedestrian path separated from vehicle traffic, and a small parking area. The larger Sandwich Street parking lot has over 100 parking spaces, two of which are universally accessible, as are all primary paths in the park. Vegetated infiltration basins featuring large rocks, grasses, and wildflowers infiltrate runoff from the tennis courts, basketball court, and parking areas. In the Sandwich Street lot, two interior swales filter additional run-off. Maples and honey locusts grow in these infiltration swales.

## PAVILION

The centrally located pavilion, planted for four season interest, hosts corporate, church and family picnics, a concession operation, bathrooms and the farmers market. The usable area expands out from the pavilion onto the mown lawn and children's play area. This secondary picnic area is surrounded by meadow with larger trees on the edge. Tables are conveniently available in both sun and shade around the pavilion and the pond. The lawn around the pavilion is mown grass and low meadow, preserving views to the harbor.

## PLAYGROUND

The special playground incorporates traditional design with an innovative free play space. Plants, water and the earth are all treated as malleable features intended for children's interaction. These plants have qualities making them suitable for children to use as play tools. The existing play equipment has been integrated into this space, which is close to the pavilion and social center of the park.



## SPORTS AREAS

Tennis and basketball have been relocated to the newly acquired Department of Public Works land. This land has been heavily impacted by its previous use and may have been contaminated. The activities that require impermeable surfaces are located where the contaminated area will be capped. A stand of maple trees provide shade for spectators watching baseball, basketball and tennis. Mown paths through low meadow and lawn connect the pedestrian/bike path to the sports fields and courts.

An evergreen hedge runs along back fence of the tennis courts blocking views into the commercial area outside the park. Beautiful harbor views from the baseball diamond have been maintained while vines growing along the left outfield fence further reinforce the unique character of this field.

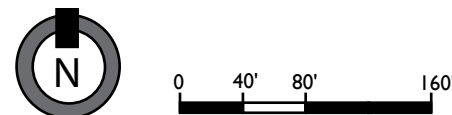
## MEADOW & BUFFER

The coastal buffer along the harbor edge has been restored and enhanced. Small paths through the buffer provide access to the beach at the north and south ends of the park. The height of vegetation undulates, framing and slightly obscuring views, enhancing the mystery and drawing people to explore the waterfront. The current coastal shrubs have been supplemented with a range of diverse native plants. An open meadow with a few benches provides a sense of enclosure and privacy between the coastal shrub buffer and the restored and expanded wetland.

The canoe and kayak launch area is accessible via a road. Shrubs on either side of the launch area offset this space, minimizing the overall impact for other users.

## POND PICNIC AREA

A boardwalk path loops around the edge of the restored pond. The naturalized pond edge with wildflowers and wetland trees softens the border, increases plant diversity, and expands habitat for birds and wildlife. Local citizen groups are caretakers of this habitat, and school groups use the pond as an outdoor laboratory for studying water quality and biology.





Coastal buffers serve important ecological functions and enhance views.



Grasses and seaside goldenrod thrive in the rocky sandy soil.

## COASTAL BUFFER

Strengthening the marginalized coastal buffer at Stephens Field will help prevent erosion and improve water quality by slowing and filtering stormwater that flows from the commercial zone through the park and into the harbor. Native plants are well adapted to the harsh coastal conditions and serve many important functions. Their roots stabilize the soil and plants such as beach pea fix nitrogen, making it available to other plants. The flowers, fruits and seeds of beach plum and milkweed are important sources of food for insects, birds, and other wildlife. In addition, dense thickets provide cover and shelter wildlife of all kinds. The coastal buffer also provides beauty and an ever-changing seasonal display of color and texture for park visitors. Those who visit often can watch plants change with the seasons. Tourists can learn about the ecology of the coastal zone.

Enhancing the buffer is an ideal volunteer stewardship project that could engage the community and foster greater awareness of coastal ecosystems and the role of vegetated buffers in the protection of water quality. A well organized stewardship project could greatly reduce the labor costs associated with removing invasive vegetation and planting projects.

Restoration scientists and experts in ecology and hydrology should be involved in restoring the coastal buffers and wetlands. Careful study of existing vegetation and hydrology will be important to ensure the success of the project.



The view of the harbor framed by native shrubs and grasses leads park visitors through the coastal buffer to the beach.



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## PLAYGROUND

A bridge across a vegetated wetland garden introduces children to wetland plants and the natural ebb and flow of water. Play structures have been relocated and opportunities for less structured exploration of natural features are provided. Logs define the space and can serve as climbing structures or additional seating. A mound of soil invites children to survey the view imagining pirate or pilgrim ships on the harbor. The mixture of traditional play equipment and site-specific natural elements offers children a wide variety of opportunities for imagination and engagement. The playground is in close proximity to the community pavilion, allowing children to play while adults socialize nearby. A vegetated buffer separates the play area from the pond; however, young children will need to be closely watched as the pond could be a hazard. For supervised children, the pond provides endless opportunities for education and entertainment.



www.earthartist.com



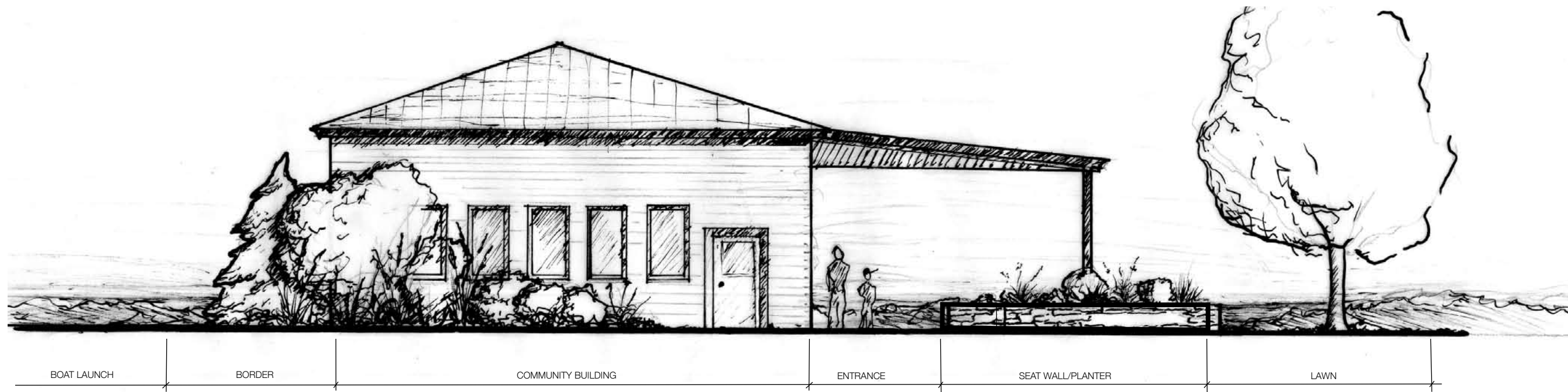
www.baykidsmuseum.org



www.baykidsmuseum.org

Natural materials integrated into outdoor play areas. These offer a wealth of opportunity for imagination and creative play. Children can also manipulate plants, stones, branches, and flowers to create their own environments.

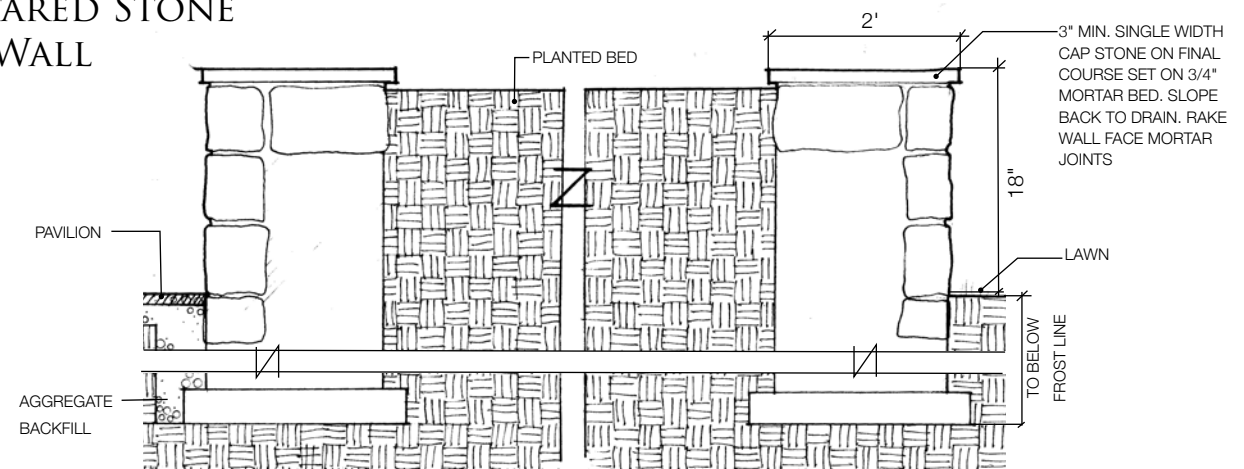




## PAVILION

The community building with attached pavilion will accommodate larger community gatherings and events. There is space for concessions, bathrooms, and storage with the outdoor pavilion providing shade and cover. Seat wall planter boxes create a defined outdoor space with waterfront views. Planting in this area is more formal and ordered with plants chosen for their durability and beauty. Evergreen and deciduous shrubs as well as perennials are recommended to maintain four-season color, texture, and interest. While all recommended plants are low maintenance and well suited to the conditions, this area will need to be weeded, mulched, and pruned. This would be an ideal area for the Friends of Stephens Field and members of the farmers market to adopt and help with establishment and maintenance.

## MORTARED STONE SEAT WALL



NOT TO SCALE

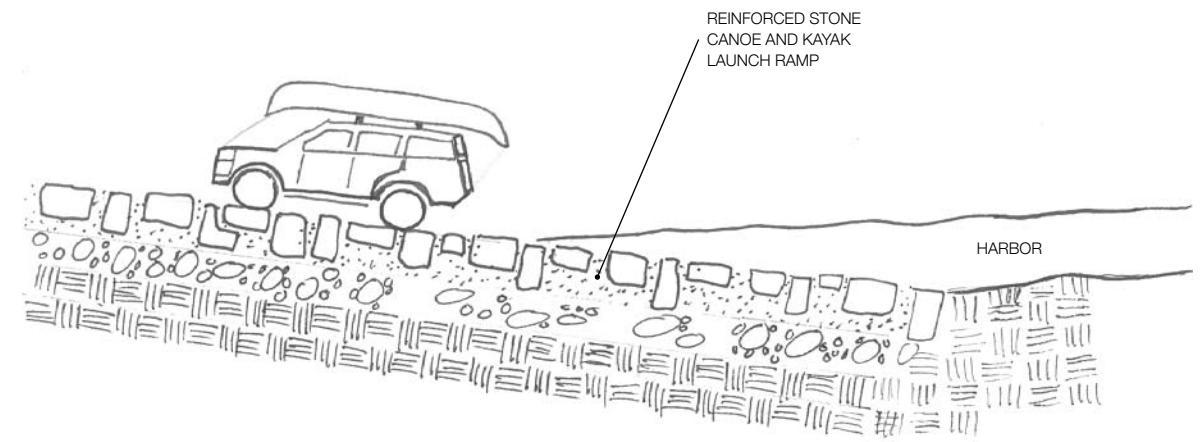
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## CANOE AND KAYAK LAUNCH

### MEADOW

The expanded meadow of Stephens Field has become a beautiful, healthy ecosystem. Throughout the year different flowering and sweet-smelling plants will be on full display. This abundance of vegetation will also attract a myriad of butterflies and birds.

The meadow can be explored along several mown paths or along its edges. Small openings mown into the meadow create relaxing picnic spots surrounded by wildflowers and beautiful views of the harbor. The meadow functions as a gradual transition between lawn and coastal shrub buffer. It is a transition zone between the formal and heavily used pavilion areas and the less frequented and more wild zones near the edges of the park, in the wetlands and coastal shrubs.



The proposed canoe and kayak launch is easier to use and reduces erosion. Large field stones form the top layer of the road bed. The spaces between the stones are filled with sand. Below that lies compacted aggregate. The road will be partially submerged by water during high tide.

The access road from the parking lot off of Sandwich Street to the launch is discreet and functional. Most of the time, this crushed gravel road will serve as a path for pedestrians to move from the pavilion to the shore and beach. Canoe and kayak enthusiasts can also safely travel the path in their vehicles from the parking lot. The change in grade, sightlines, and materials from parking lot to road will discourage other vehicles from using the road.



*A cleared lawn in the center of meadow just to south of the pavilion area. From the picnic tables visitors can enjoy the restored meadow edge and views of the harbor framed by coastal shrubs and smaller trees.*

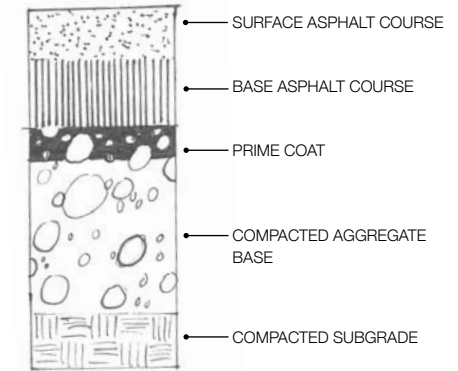
## PATHS

Several types of paths now link Stephens Field to the community. The Pilgrim Necklace reaches its southern terminus in Stephens Field at the pavilion. Coming from the north on the Necklace bikers enter the park on a separate off-street path separated from cars by bollards. Once in the park, the smooth twelve-foot-wide path allows for both cyclists and pedestrians. This is the main artery of the park. There is also a sidewalk entrance from Sandwich Street. Many of the secondary paths, such as around the pond and to the canoe and kayak launch, are crushed stone gravel. The tertiary paths connecting other destinations are simply lawn which is mown low throughout the growing season.



Bike path connects destinations within park. The thirteen-foot-wide asphalt path has a one-foot gravel edge on either side.

*Detail of main cyclist / pedestrian path in Stephens Field*



## POND

The pond at Stephens Field becomes a popular destination. People enjoy walking around the naturalized pond edge. They pass under healthy wetland trees, through patches of low shrubs, and along side wildflower meadows. The path eventually expands into an open area along the shore. From here people can connect to the beach, boat launch, meadows and all other parts of Stephens Field.

The path around the pond is quieter than the asphalt bike and walking path in other parts of the park. Here, the natural surroundings lend themselves to a more reflective and quiet experience. A naturalized pond edge has increased visual interest, beauty and habitat for many species. The restored habitat attracts small amphibians, birds and plenty of people who love to watch and study them. School groups often stop by the pond during field trips for science classes.



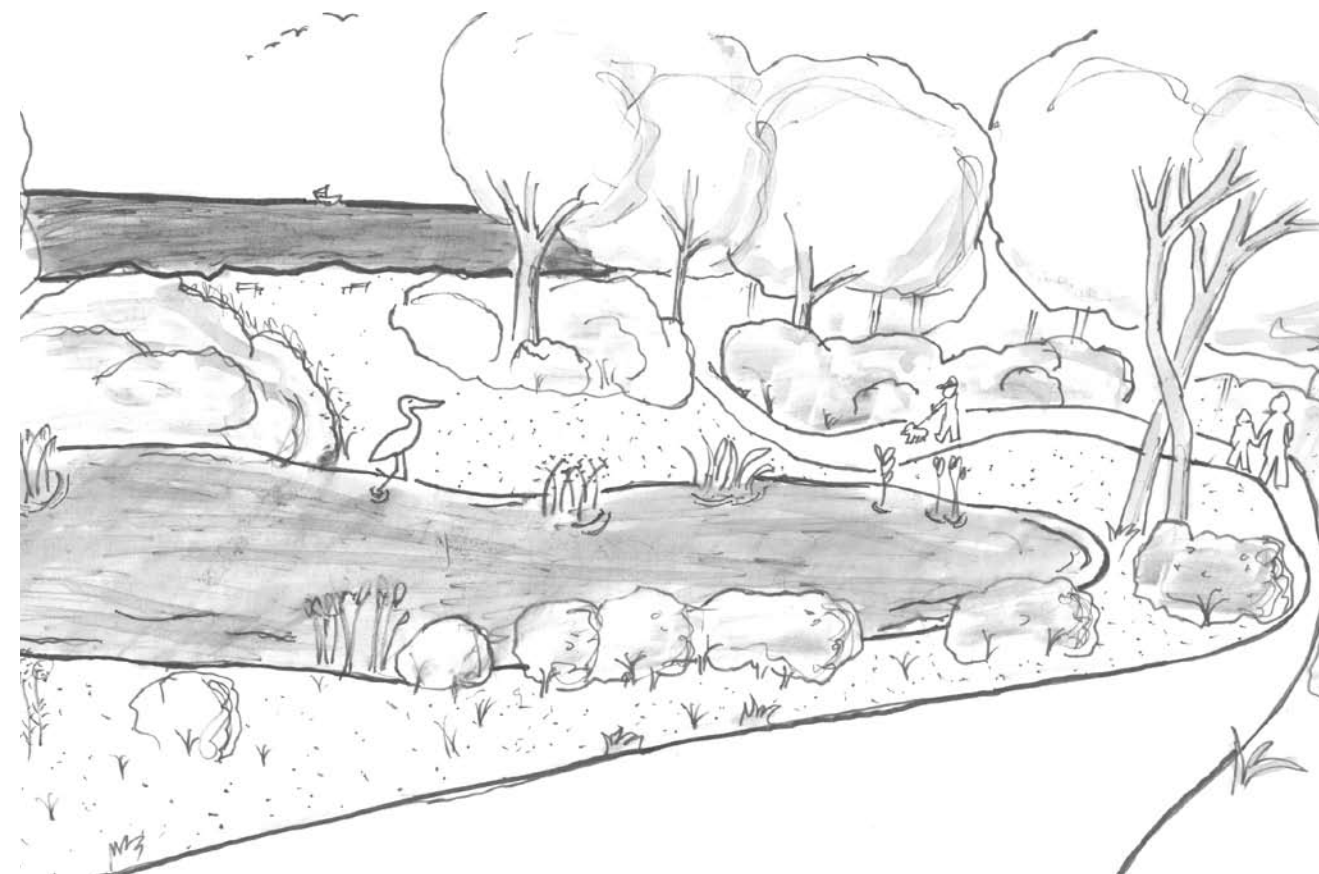
[www.whitegatefarm.net](http://www.whitegatefarm.net)



[www.cedarcreekconsulting.com](http://www.cedarcreekconsulting.com)



[www.brevardcounty.us](http://www.brevardcounty.us)



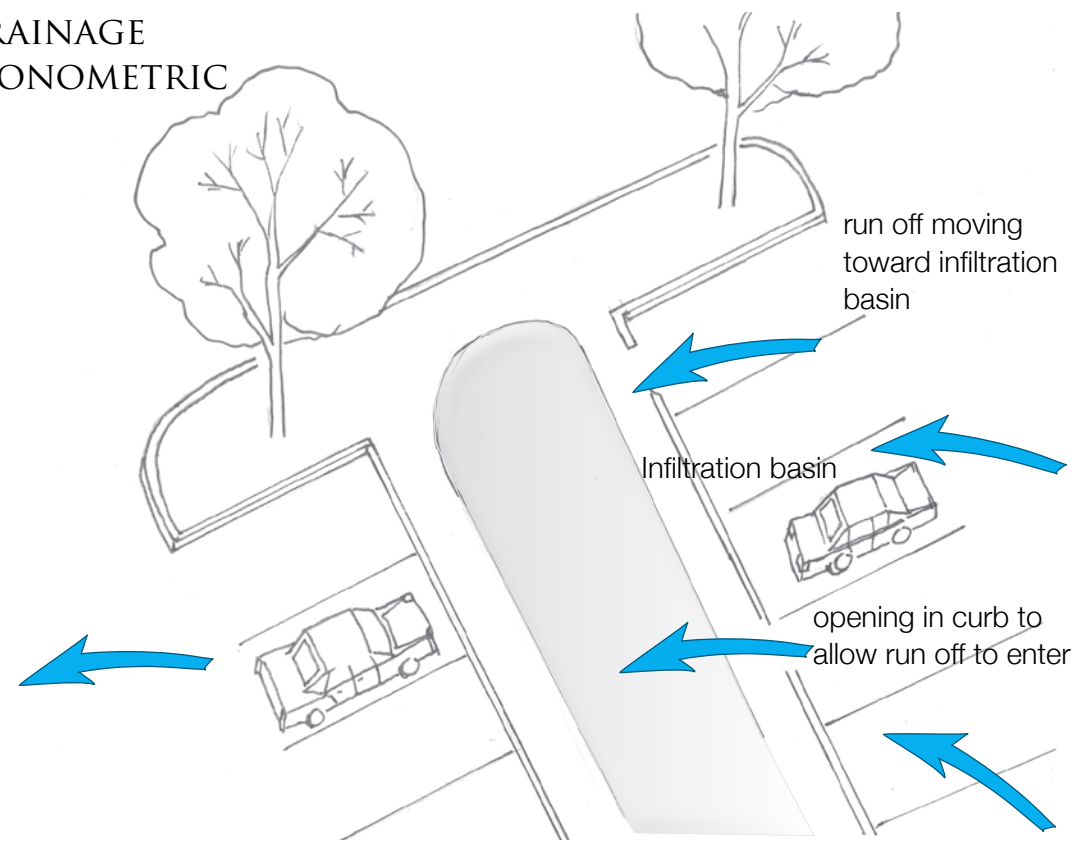
*Walking path loops around naturalized pond and to the coast.*

# DRAINAGE

On Stephens Field, water is managed and treated using sustainable best management practices.

- Wherever possible, alternatives to impermeable concrete, such as gravel and grass pavers, are used (1).
- Stormwater runoff is treated and infiltrated close to its source (2).
- Sports fields are graded according to industry standard (3).
  - The baseball field is graded away from home plate with a slope between 1% and 2.25%.
  - The basketball court is graded to one side, between 0.8% and 1.0%.
  - The tennis court is graded to one side, between 0.8% and 1.0%.
- The property is rough-graded from high point (HP+) in the south to low point along shoreline.
- Infiltration basins and rain gardens can hold 45,000 gallons of water, the approximate amount of runoff from impervious surface on-site during an hour-long five-year storm event.
- Erosion is limited, sediments settled, and pollution flowing into the harbor minimized.
- Ground water is recharged through infiltration basins.

## DRAINAGE AXONOMETRIC

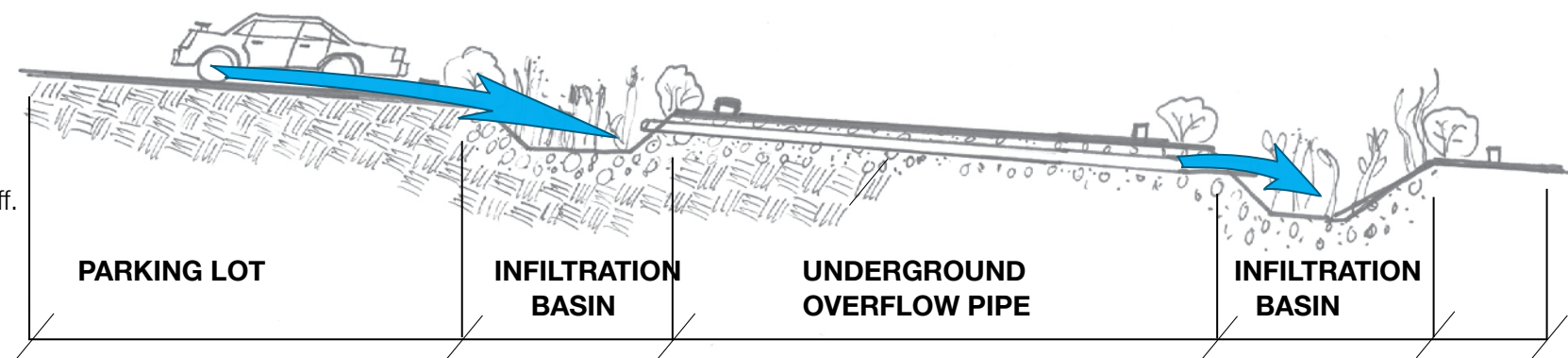


Runoff from the parking lot is directed to the nearest downhill infiltration basin. A curb surrounding the edges of the parking lot is broken in key locations in order to allow water to enter the infiltration basin.

Infiltration basins within the parking lot accept runoff. If one basin fills up, the excess water is moved via underground pipe to the next lower basin. The vegetated basins are attractive and functional. The sandy soils will quickly infiltrate runoff.

**LEGEND**

- SWALES & INFILTRATION BASINS
- DIRECTION OF WATER FLOW



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# PLANTING PALETTES

These planting palettes provide a basic guide for planting in the distinctive zones defined by both conditions' intended use and desired function. Detailed planting plans can be determined from these palettes.

## PAVILION

Planting around the pavilion provides shade and frames the view of the harbor. Trees will need to be limbed-up to maintain sight lines. A shrub border integrates the building into the landscape and reflects the vegetation in other areas. A mix of evergreen and deciduous shrubs provide four-season color and texture and are well adapted to coastal conditions and potentially poor dry soil. A seat wall planter features low-growing shrubs and perennials, allowing for views of the harbor.

## SEAT WALL/PLANTER

Daylily	<i>Hemerocallis spp.</i>
Coral Bells	<i>Heuchera 'Chocolate Ruffles'</i>
Blue Fescue	<i>Festuca glauca 'Elijah Blue'</i>
Lady's Mantle	<i>Alchemilla mollis</i>
Daffodil	<i>Narcissus spp.</i>
Sedum	<i>Sedum spp.</i>

## Evergreen Shrubs

	<i>H</i>	<i>W</i>
Eastern White Pine	1-3'	1-3'
White Spruce	18"-2'	1.5-2'

## BORDER

### Low Shrub

	<i>H</i>	<i>W</i>
Coast Leucothoe	2-4'	3-5'
Bearberry	6"-1'	3-4'
Sweetfern	2-5'	4-8'

### Medium Shrubs

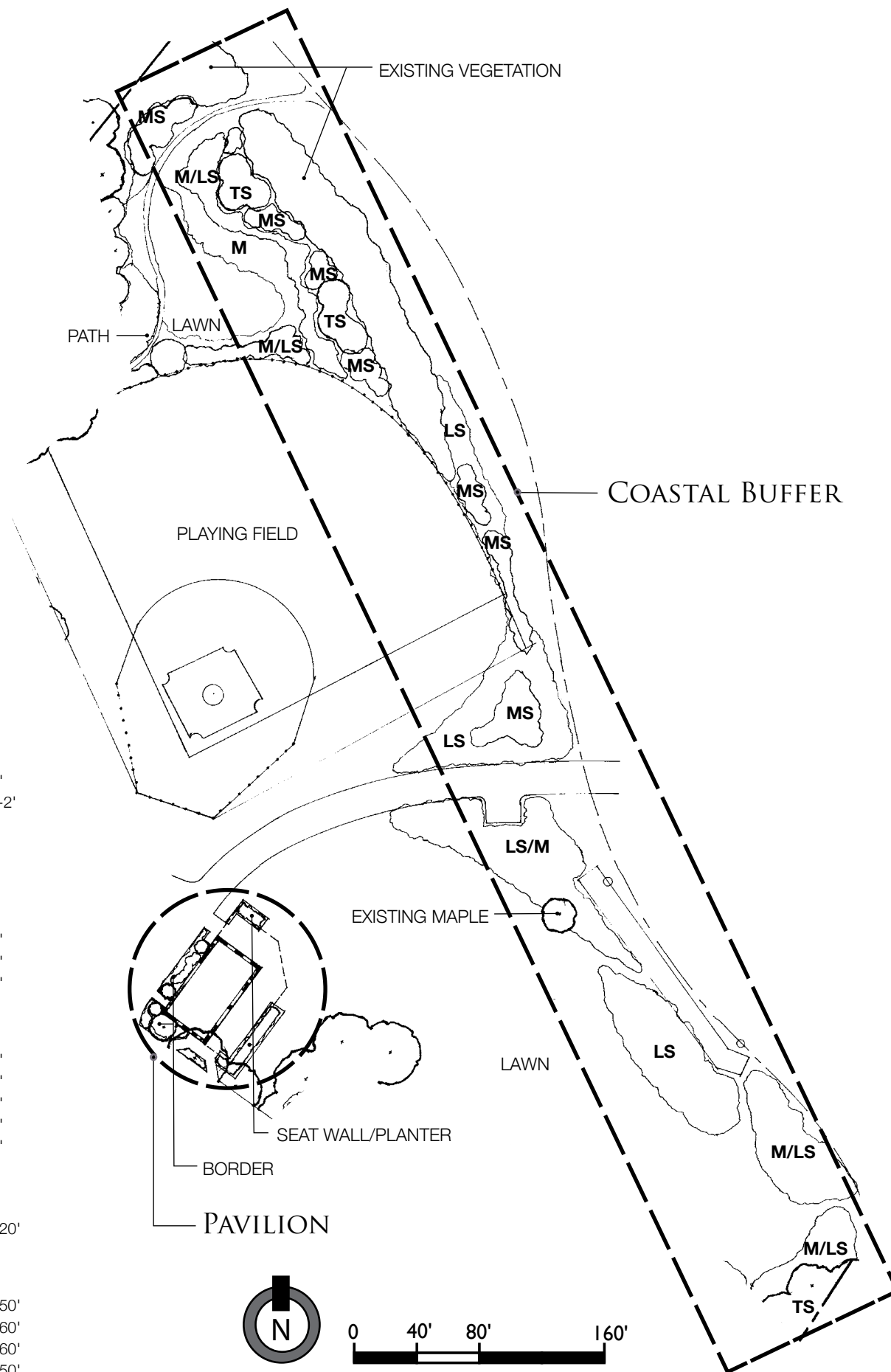
	<i>H</i>	<i>W</i>
Eastern Ninebark	5-8'	4-6'
Inkberry	3-4'	4-6'
Withered Viburnum	5-6'	5-6'
Sweet Pepperbush	3-8'	4-6'
Eastern White Pine	2-4'	2-4'

### Tall Shrubs

	<i>H</i>	<i>W</i>
Shadbush	15-20'	15-20'

### Trees

	<i>H</i>	<i>W</i>
Black Birch	40-50'	40-50'
Black Cherry	50-80'	30-60'
Black Oak	50-60'	50-60'
Scarlet Oak	50-70'	40-50'
White Oak	50-80'	50-80'



# COASTAL BUFFER

A coastal buffer of native plants frames views of the waterfront and provides brilliant fall color and seasonal wildflowers. The planting palette has been organized by height and the groupings are specified on the plan with the goal of preserving views. Enhancing the coastal buffer will stabilize and protect the shoreline from erosion and improve water quality by filtering stormwater before it reaches the harbor. Native plants provide food and cover for wildlife of all kinds that may take refuge at Stephens Field. All existing shrubs should be preserved and new vegetation added to extend and widen the existing buffer. Experts in coastal habitat should be included in the detailed design of the buffer. Work within the 100' coastal buffer requires permitting.

## Meadow (M)

- Tufted Hairgrass
- Pennsylvania Sedge
- Little Bluestem
- Swichgrass
- Tussock Sedge
- Beach Pea
- Black Eyed Susan
- Butterfly Weed
- Dusty Miller
- Lance leaf Coreopsis
- Lupine
- Marsh Hibiscus
- Sea Lavender
- Seashore Mallow
- Seaside Goldenrod
- Thread leaf Coreopsis

- Deschampsia cespitosa*
- Carex pennsylvanica*
- Schizachyrium scoparium*
- Panicum virgatum*
- Carex stricta*
- Lathyrus japonicus*
- Rudbeckia hirta*
- Asclepias tuberosa*
- Artemisia stelleriana*
- Coreopsis lanceolata*
- Lupinus perennis*
- Hibiscus moscheutos*
- Limonium nashii*
- Kosteletzkya virginica*
- Solidago sempervirens*
- Coreopsis verticillata*

## Low Shrubs (LS)

	<i>H</i>	<i>W</i>
Creeping Juniper	1-2'	4-8'
Beach Heather	3-8"	mat
Bearberry	6"-1'	3-4'

- Juniperus horizontalis*
- Hudsonia tomentosa*
- Arctostaphylos uva-ursi*

## Medium Shrubs (MS)

	<i>H</i>	<i>W</i>
Bayberry	5-10'	5-10'
Northern Bayberry	3-12'	spreading
Chokeberry, Black	3-6'	3-6'
Chokeberry, Red	4-8'	3-4'
Beach plum	4-6'	4-6'
Wild Rose	4-6'	4-6'

- Myrica pennsylvanicum*
- Morella pensylvanica*
- Aronia melanocarpa*
- Aronia arbutifolia*
- Prunus maritima*
- Rosa virginiana*

## Tall Shrubs (TS)

	<i>H</i>	<i>W</i>
Staghorn Sumac	15-25'	spreading
Shining Sumac	20-30'	20-30'
Smooth Sumac	10-15'	10-15'
Shadbush	15-20'	15-20'

- Rhus typhina*
- Rhus copallina*
- Rhus glabra*
- Amelanchier canadensis*

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# WETLAND, POND, VEGETATED INFILTRATION AREAS

The historic wetland is restored and planted with native vegetation adapted to wet coastal conditions. Tupelo, red maple and willow provide over-story canopy and fall color. Understory shrubs, ferns, grasses and flowering perennials create an ideal habitat for wildlife and help to filter stormwater before it reaches the bay.

In the pond area, grasses and wildflowers create a natural wetland edge and improve water quality. Wetland trees and shrubs on the northern side of the pond restore biodiversity and help to absorb water. Invasive and non-native Phragmites and Japanese knotweed should be removed before re-vegetation of the area can occur. Unhealthy existing trees will need to be removed and replaced in the near future.

Vegetated infiltration basins and swales are planted with native grasses, perennials, and shrubs tolerant of extreme moisture fluctuation. This vegetation slows and cleans stormwater, allowing it to be infiltrated and treated on site.

## Grasses

Creeping Bentgrass	<i>Agrostis stolonifera</i>
Tussock Sedge	<i>Carex stricta</i>
Tufted Hair Grass	<i>Deschampsia caespitosa</i>
Northern Sea Oats	<i>Chasmanthium latifolium</i>
Soft Rush	<i>Juncus effusus</i>
Switch Grass	<i>Panicum virgatum</i>
Ribbon Grass	<i>Phalaris arundinacea</i>

## Herbaceous

Swamp Milkweed	<i>Aesclepias incarnata</i>
White Wood Aster	<i>Aster divaricatus</i>
New England Aster	<i>Aster novae-angliae</i>
Pink Coreopsis	<i>Coreopsis rosea</i>
Joe Pye Weed	<i>Eupatorium maculatum</i>
Cardinal Flower	<i>Lobelia cardinalis</i>
Wild Geranium	<i>Geranium maculatum</i>

## Fern

Ostrich Fern	<i>Matteuccia struthiopteris</i>
Sensitive Fern	<i>Onoclea sensibilis</i>
Cinnamon Fern	<i>Osmunda cinnamomea</i>
Royal Fern	<i>Osmunda regalis</i>

## Medium Shrubs

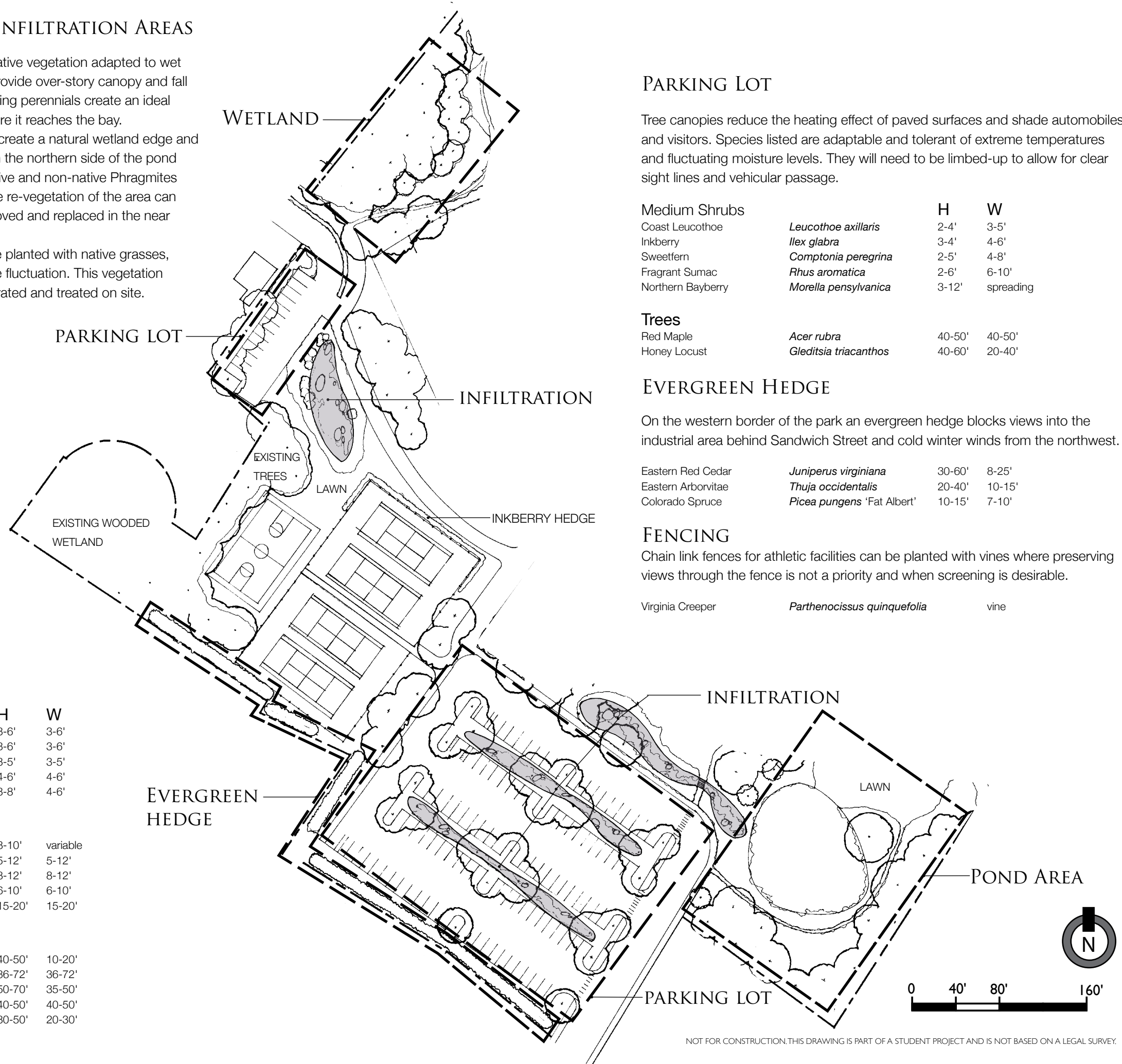
	H	W
Chokeberry, Black	3-6'	3-6'
Hobblebush	3-6'	3-6'
Sweetspire	3-5'	3-5'
Red-osier Dogwood	4-6'	4-6'
Sweet Pepperbush	3-8'	4-6'

## Tall Shrubs

Arrowwood	<i>Viburnum dentatum</i>	8-10'	variable
Elderberry	<i>Sambucus canadensis</i>	5-12'	5-12'
Highbush Cranberry	<i>Viburnum trilobum</i>	8-12'	8-12'
Silky Dogwood	<i>Cornus amomum</i>	6-10'	6-10'
Sweet Bay Magnolia	<i>Magnolia virginiana</i>	15-20'	15-20'

## Trees

Atlantic White Cedar	<i>Chamaecyparis thyoides</i>	40-50'	10-20'
Black Willow	<i>Salix niger</i>	36-72'	36-72'
Green Ash	<i>Fraxinus pennsylvanica</i>	50-70'	35-50'
Red Maple	<i>Acer rubra</i>	40-50'	40-50'
Tupelo	<i>Nyssa sylvatica</i>	30-50'	20-30'



## PARKING LOT

Tree canopies reduce the heating effect of paved surfaces and shade automobiles and visitors. Species listed are adaptable and tolerant of extreme temperatures and fluctuating moisture levels. They will need to be limbed-up to allow for clear sight lines and vehicular passage.

### Medium Shrubs

	H	W	
Coast Leucothoe	<i>Leucothoe axillaris</i>	2-4'	3-5'
Inkberry	<i>Ilex glabra</i>	3-4'	4-6'
Sweetfern	<i>Comptonia peregrina</i>	2-5'	4-8'
Fragrant Sumac	<i>Rhus aromatica</i>	2-6'	6-10'
Northern Bayberry	<i>Morella pensylvanica</i>	3-12'	spreading

### Trees

Red Maple	<i>Acer rubra</i>	40-50'	40-50'
Honey Locust	<i>Gleditsia triacanthos</i>	40-60'	20-40'

## EVERGREEN HEDGE

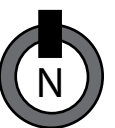
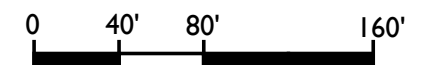
On the western border of the park an evergreen hedge blocks views into the industrial area behind Sandwich Street and cold winter winds from the northwest.

Eastern Red Cedar	<i>Juniperus virginiana</i>	30-60'	8-25'
Eastern Arborvitae	<i>Thuja occidentalis</i>	20-40'	10-15'
Colorado Spruce	<i>Picea pungens</i> 'Fat Albert'	10-15'	7-10'

## FENCING

Chain link fences for athletic facilities can be planted with vines where preserving views through the fence is not a priority and when screening is desirable.

Virginia Creeper	<i>Parthenocissus quinquefolia</i>	vine
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# COST

These cost estimates are provided for general planning uses only. Detailed construction documents are needed before a reliable estimate of costs can be developed.

Because the extent of the pollution on the DPW site is not known, the cost of clean-up is unknown. Excavating in the parcel of land which was a landfill may also cause complications.

## PHASING

In order to spread the cost of the project over a longer time period and also keep portions of Stephens Field open during renovation and construction, it is possible to phase the project. Implementing a redesign piece by piece allows money to be raised and used on an ongoing basis, lowering the initial output.

## SUSTAINABILITY AND COST SAVINGS

Several opportunities exist to lower project costs and pursue environmentally and socially sustainable measures.

- Volunteers from the community, like the Stephens Field Friends Group, could help plant shrubs and trees.
- Asphalt from the road could be salvaged, stored and reused on the new parking lot.
- Excavated soil from below the tennis courts, gravel from the parking lot and cement from the tennis courts may be used as a cap and fill over the brownfield.
- Gravel from the old road and parking area may be reused as a crushed surface base course under new parking lot or bike paths.

### Other costs to consider

Mobilization, bonds and construction survey, etc at 8% of total.  
Contingency at 10% of total.  
Taxes at 5% of total.  
Design Administration at 15%-20% of total.  
Permitting and fees to be determined.

**Grand total project expense of \$1,093,000-\$1,525,000**

### Athletic Facilities

Little League and Softball Diamond:

Solar lighting

Tennis:

Demolish four existing courts, remove existing fencing, excavate crushed surface base course, store on site and reuse.

Add clean fill to a depth of 1.5 feet.

Relocate four proposed courts, and proposed fencing

Basketball:

Demolish court, excavate crushed surface base course, store on site and reuse.

Relocate proposed court.

Remove trees by proposed court

Add clean fill to a depth of 1.5 feet.

### Hard Surfaces

Existing parking lot: Excavate gravel and crushed surface base course, store on site and reuse.

Add clean fill to a depth of 1.5 feet.

Existing road: Demolish, excavate asphalt, crushed surface base course, and gravel. Store and reuse.

Add clean fill to a depth of 1.5 feet

Sandwich Street parking (includes reused gravel)

Union Street parking (includes reused gravel)

Canoe / kayak access (at 20 feet wide)

Bike / walking path (at 12 feet wide)

Crushed gravel walking path (at 18 feet wide)

### Landscape Improvements

Planting plugs (installed 6" on center)

Hydroseed meadow mix

Coastal shrubs (installed 2' on center)

Trees

### Site Improvements

Rough grading

Fine grading

Remove dying trees by pond

Relocate play structure

### Site Features

Building and porch

Trash receptacles

Benches

Benches with concrete base (ADA)

Picnic table

Picnic table with concrete base (ADA)

	unit	unit cost (\$)	quantity	total (\$)
	each	4,000	8	24,000
	lump sum	35,000-40,000	1	40,000
	cubic yard	35	1600	56,000
	lump sum	15,000-20,000	4	60,000-80,000
	lump sum	6,000-8,000	1	6,000-8,000
	lump sum	15,000-20,000	1	15,000-20,000
	each	750-1,000	10	7,500-10,000
	cubic yard	35	325	11,500
				<b>\$220,000-\$250,000</b>
	lump sum	18,000-20,000	1	18,000-20,000
	cubic yard	35	2,000	70,000
	lump sum	20,000-22,000	1	20,000-22,000
	cubic yards	35	225	8,000
	square foot	1.75-2.00	57,500	100,500-115,000
	square foot	1.25-1.50	5,250	6,750-8,000
	linear foot	5.00 - 7.00	60	6,000 - 8,400
	linear foot	3.50	600	25,250
	linear foot	35	225	8,000
				<b>\$262,000-\$283,000</b>
	100 sq ft	8.00-20.00	43	350-850
	acre	3,000 - 5,000	3	9,000 - 15,000
	each	20 - 30	4,000	80,000-120,000
	each	250	55	13,750
				<b>\$103,000-\$150,000</b>
	square foot	0.05-0.10	480,000	24,000-48,000
	square foot	0.15-0.20	175,000	26,250-35,000
	each	1000	3	3,000
	lump sum	10,000-15,000	1	10,000-15,000
				<b>\$63,000-\$101,000</b>
	lump sum	200,000	1	200,000
	each	500-800	10	5,000-8,000
	each	800-12,000	10	8,000-12,000
	lump sum	1,500	2	3,000
	each	1,000-1,200	8	9,600
	each	1,600 - 2,000	2	3,200 - 4,000
				<b>\$230,000-\$237,000</b>
				<b>Total construction expense: \$878,000-\$1,020,000</b>