APPENDICES

APPENDIX A: COMMUNITY MEETING SUMMARIES

Neponset River Reservation Master Plan Phase II
Community Meeting

March 8, 2006

Questions for Smaller Groups

1. What are your favorite areas?

2. Are there other important resources that should be added to the maps?

3. How do you use the river/reservation now?

4. What other activities would you like to see on the river/in the reservation?

5. What are your priorities?

   Water access

   Active recreation

   Passive recreation

   Continuous trail

   Conservation

6. Are there important connections to other resources/locations that we should make?

7. Do you have changes to the draft goals/objectives?

Summary Comments from Meeting

- Visual access to River from cars and paths
- Continuous path
- Views and bridges
- Bike paths
- Water uses
- Loop trails
- Blue Hills
- Neighborhood parks
- SOONER
- Project-wide implementation (all areas of the project area should see development at the same time)
- Continuous trail (again)
- Safety-lighting
- Seclusion/fences/shopping carts
- Removal of T&H Dams for boats
- Clean-up
- Passive recreation
- Enhanced view
- Martini Shell – programming and improvements
- Mostly seen from bridges
- Signage – and signage for trees/flowers, etc.
- Fowl Meadow
- Views from RR

- Picnic
- Benches
- Biking
- Vendors
- Conservation
- Connect to Blue Hills, Stony Brook, salt marsh, Curry College
- Gardens
- Dogs
- Too much fence
- Rice Islands
- Walk by Ryan Playground
- Fairmount – more accessible at T
- What's happening at the Paper Company?
- Steepness?
- Protection/security
- Access
- Protect natural areas
- Dana Avenue – view to Neponset and Mother Brook
- Martini – open view
- Bridge over Rice Island
- Neponset Valley Parkway Path – bridge upstream to see Paul's Bridge
- Partnership with police and neighborhood association for security
- Canoe/Kayak rental
- Clean up river for fishing
- Connection over Mother Brook for railroad tracks
- Connect to skateboard park
- Biking alone on Parkway
- Bathrooms
- Conservation
- Trail on Parkway
- How to merge recreational and conservational use?
- Partner with communities
- No more industry!
- Development should promote access
- No taking private property!
- Include pocket parks and dead ends so everyone can access the river from either side
- Include City of Boston property
- Connection with Pine Tree Brook
- Water quality – Class B – goal to be fishable and swim-able
- Coordinate with NRWA
- Poison Ivy!
- Take dam removal into consideration
- Early action is important!
- Address fence issue

Neponset River Reservation Master Plan Phase II Community Meeting

April 26, 2006

Questions for Small Groups

1. Do you agree with the recreational path locations as shown? Provide comments.

2. Are there additional conservation areas that you would like to see highlighted?

3. Do you agree with boat ramp locations? Are there other locations where you would like to see boat ramps?

4. Are there additional areas you would like cleared to enhance views to the river?

5. Are there other connections to the neighborhood that you would like to see improved?

6. Do you have a suggestion for the "Early Action Project"? Possible projects (subject to funding availability):

- Path from Central Avenue to Mattapan Square
- Path from Paul's Bridge to Fairmount Ave.
- Bank stabilization
- Improvements to specific park areas (e.g. Martini Shell)

7. Do you have recommendations for specific improvements at any of the existing recreation areas (e.g., Kennedy Playground, Ryan Park, Martini Shell)?

8. Are there specific areas where you think the fencing should come down or remain?

Other Comments

Summary Comments from Meeting

- Path on Eliot side of River – no bridge on Capen Street
- Are more access points available?
- Better connections to Paul's Bridge area
- Generally agree with trail
- Alignment – like off-road loops and connections
- Security is an issue at Capen Street, also parking
- Move bridge closer to Rice Islands
- No problem west of Mattapan Square
- Generally agree with placement of conservation areas
- Like conservation idea – keep trees, more wild
- Easier way to port canoes for transfers across dam
- Ramp closer to Central
- Clear near Mattapan Square / Ryan Playground
- Keep the vegetation to preserve the natural integrity of the area
- Can remove fences – access – signage
- Clearing should be limited to preserve ecology
- Clear trees near trolley tracks near river in Valley Rd – Central Ave. area
- Capen Street connection (move)
- Additional Truman Parkway crossways
- Route to Stony Brook, Mill Pond, Reservation Road Park
- Connections shown along Truman Parkway are potentially dangerous
- Clearer and better connections at Mattapan Square
- Martini Shell areas should be improved
- Clean up litter/trash
- Continue path from Central Ave. to Mattapan Square – as far as it can go
- Work on path as a priority
- Signage installations on Truman Parkway
- Improve the condition of bike routes in

anticipation of a formal bike lane
- Further improvements to Ryan Park
- Doyle Playground is in major need of improvements; Ryan Park as well
- River access at Martini Shell
- Improved canoe staging at Ryan Park
- Remove ALL fencing (and add restrooms)
- Want fence to REMAIN everywhere

Neponset River Reservation Master Plan Phase II Community Meeting

June 14, 2006

Questions for Small Groups

1. Do you have any comments on the location or the design of the path system?

2. Do you have any comments on the location or the design of the canoe landings?

3. Are there any places where we should add overlooks?

4. Do you have any comments on the park features or designs?

5. Do you have any comments on the conservation recommendations?

6. Do you have any other comments?

Summary Comments from Meeting

- Concern with fencing/safety
- Like looping on path
- Like reduction in secondary trails, we worry about erosion
- Canoe landings OKAY.
- Overlooks are good
- Like Truman Field Office plan
- Worry about parking – particularly not enough at Martini
- Like phytoremediation
- Fairmount – Dana problem area
- Blue Hills connection
- Like trails that don't interfere with residences
- Minimize tree cutting
- Not happy with study area
- We assume everything within the study area is speculative
- Safety and security study
- Chronic disease hospital?
- Fencing in steep areas
- Include restrooms at Stress House
- Fairmount Ave. Area
- Paint and repair Martini Shell
- Uniform signage
- Happy to see bridge at Kennedy
- English Ivy invasive in this area
- Want path at Lewis Chemical
- Noise control/hours/maintenance
- Rodents / pest control
- Poison ivy
- Canoe/overlooks are OKAY.
- More parking lots
- Lighting
- Emergency pull boxes on trail
- Concern with removal of mature trees
- Flood control and liability
- Parking at Paul's Bridge

Appendix B: Structural Considerations for Walkway at Riverway Plaza

The following recommendations for developing a walkway on the river side of Riverway Plaza are based on an initial site visit on June 26 and an initial review of existing building plans.

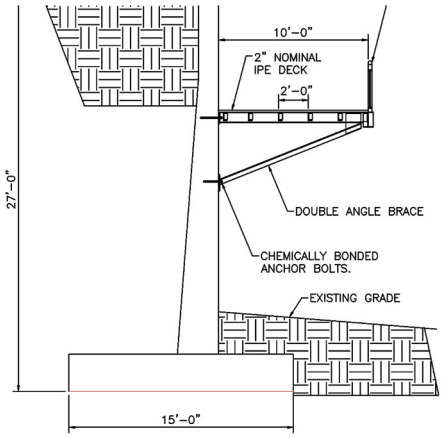
Cantilever Walkway Options:

In order to cantilever the proposed Riverwalk off of the existing wall/foundation along the Neponset River, a thorough examination of the condition of the existing concrete, should be performed. A representative materials testing program would be needed to determine concrete strength. Cores and physical measurements should to be taken to determine the actual wall thickness and size and reinforcement present in the existing wall and slab.

To reduce the weight of the walkway, an IPE timber deck should be used instead of reinforced concrete. Framing should be galvanized steel beams, channels and angles. Wood members should be isolated from the steel members to minimize corrosion. Rail members should be the standard pedestrian rail for the project.

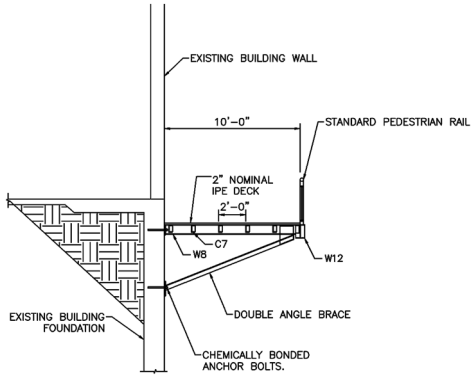
Retaining Wall Section:

The existing reinforced concrete retaining was constructed at the same time as the plaza and is in good condition. The configuration is adequate to support a cantilever retaining wall as shown in the above sketch. Stainless steel anchors should be used at all embedded connections for longevity, and should be tested during installation to ensure capacity.



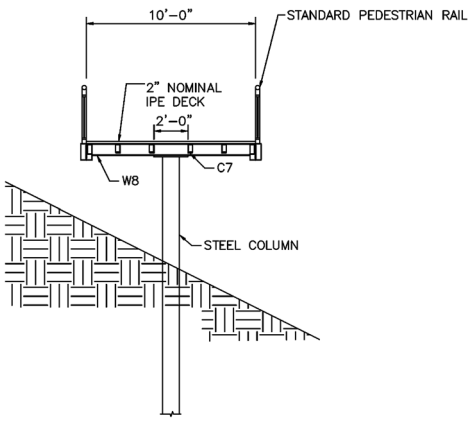
Building Section:

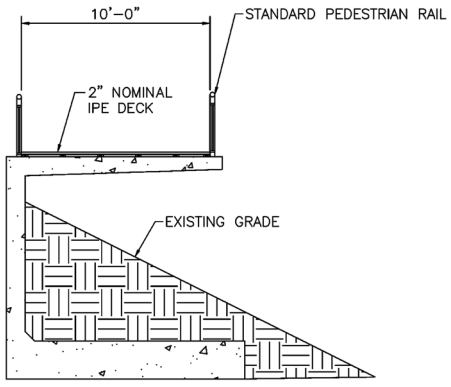
Cantilevering from the existing wall will transmit lateral loads into the existing building floors. The floors must be tied into the foundation walls and any interior walls to support this load. Existing plans indicate adequate reinforcement, however a full analysis and reinforcement verification will be required during final design. From the existing plans there appear to be 12" and 18" thick exterior reinforced concrete walls along the riverbank. These walls are substantial enough to support a cantilever walkway as shown in the sketch below.



Elevated Walkway:

Beyond the limits of the building structure an elevated walkway should be considered. (See sketches below for two elevated deck type options).





At Grade Walkway:

At grade sections of the walkway may utilize mechanically stabilized earth type abutment walls where side slopes are not permitted.

APPENDIX C: INVASIVE SPECIES MANAGEMENT

The goal of invasive species management is to maintain or restore the health of an ecosystem and the native species of the natural area. Complete eradication of an invasive plant can be difficult to achieve and often controlling an invasive species by reducing density and population size is a more practical goal.

The following control methods include both chemical and mechanical methods. The appropriate control method depends on the population size of the invasive species and the particular site on which they are found. The risk of a control method to the health of the ecosystem and native flora and fauna should be considered.

Non-chemical management techniques should be considered before chemical techniques. If herbicides are used, proper safety precautions must be followed. Herbicides should be applied in accordance with the label instructions. The specific health hazards and precautions will be identified on the label. The minimum effective concentration of the herbicide should always be used. Only herbicides approved for use near water should be used in the Neponset River Reservation. Any required permits should be obtained before applying herbicides.

Common Reed (*Phragmites australis*)

RECOMMENDED METHODS FOR RECREATION AREAS

- Cutting or mowing

  Mowing may be useful for eliminating any fire hazard potential, but is typically not successful in eradicating *Phragmites*. In areas where mowing is difficult or native vegetation exists, hand cutting should be used. See Tiner (1995) and Marks et al. (1993) for more information.

- Covering with plastic

  Plastic covers placed after cutting or mowing create high temperatures that have lead to *Phragmites* die-off in 3-4 days. See Mark et al. (1993) for details on this technique. Plastic covering typically limits the growth of all species covered and is therefore not recommended in proposed conservation areas.

- Herbicides

  Herbicidal application may be affective in eradicating *Phragmites*. Glyphosate (Rodeo™) is commonly used for *Phragmites* control. Rodeo™ is a nonselective herbicide and will kill grasses and broad-leaved plants. Glyphosate biodegrades quickly and completely into natural products, and is virtually non-toxic to all aquatic animals tested.

See Mark et al. (1993) and the Invasive Plant Management Guide (2001) for more information on herbicide treatment for *Phragmites*. Instructions for application are provided on the product label.

· Planting of competitive species

Planting of competitive species after removal of *Phragmites* may reduce the potential for *Phragmites* to regrow and dominate. Disturbances that remove competitors (e.g., mowing, plastic covering) may also promote the spread of *Phragmites* (Minchinton and Bertness, 2003); therefore, any native species removed should be replanted after disturbances to the area.

RECOMMENDED METHODS FOR CONSERVATION AREAS

· Cutting or disking

In order to preserve desirable species, hand cutting is preferred over mowing in conservation areas. See Tiner (1995) and Marks et al. (1993) for details.

Disking of rhizomes is a labor-intensive method which may enhance restoration. However, disking could possibly result in an increase in *Phragmites* if pieces of the rhizome, which can produce new plants, are not entirely removed (Tiner, 1995; Marks et al., 1993).

· Cut-stump herbicide treatment

In areas where it is desirable to eradicate *Phragmites* but save desirable species, a combination of cutting and herbicidal treatment has been successful. See Mark et al. (1993) for more information on this technique and Martin (2001) for an example of implementing the technique in Massachusetts.

· Planting of competitive species

Planting of competitive species after removal of *Phragmites* in conservation areas is also important to prevent the regrowth or spread of *Phragmites*.

METHODS NOT RECOMMENDED FOR THE NEPONSET RIVER RESERVATION

· Biological Control

At this time, no effective biological control agent has been identified for North America.

· Site modifications

Disturbances that alter hydrology, increase stormwater discharge, and increased water pollution have created environmental conditions that favor the growth of *Phragmites*. Site modifications to restore a site to its pre-disturbance condition, such as dredging or excavation

and increased flooding and salinity may therefore be effective at eliminating *Phragmites*. See Tiner (1995) and Marks et al. (1993) for more information on site modification techniques.

Site modifications can destroy an existing community that was to be restored and therefore are not recommended for the Neponset River Reservation. Dredging or excavation are also not a desirable options for the Neponset River Reservation due to historic Polychlorinated Biphenyls (PCB) contamination. Increasing salinity in the Master Plan area may not be possible due to existing downstream dams.

- Burning

Burning is an effective strategy of *Phragmites* control when burning penetrates the roots of the plant. However, root burn can be difficult to achieve because a layer of soil, mud, and/or water usually covers the rhizomes. See Marks et al. (1993) for recommendations on burning.

Purple Loosestrife (*Lythrum salicaria*)

RECOMMENDED METHODS FOR RECREATION AREAS

- Herbicides

Glyophosate (Rodeo™) has been commonly used to eradicate Purple Loosestrife. See Bender and Rendall (1987), Heidorn (1990), and the Invasive Plant Management Guide (2001) for more information on herbicide treatment. Instructions for application are provided on the product label.

- Biological Control

Biological control is an excellent option for Purple Loosestrife control. Several insect species have been identified that are very specific to Purple Loosestrife and cause significant damage to the plant. Populations of *Galerucella calmariensis* and *G. pusilla*, small beetles which feed on Purple Loosestrife, have been established in Massachusetts. At high densities, these species have been successful at defoliating entire Purple Loosestrife populations. *G. calmariensis* appears to be more successful than *G. pusilla*. Research and monitoring of the ability of native species to regrow in these areas is still required.

See Blossey (2003) for more information on biological control of Purple Loosestrife.

- Cutting or mowing

Mowing of Purple Loosestrife can weaken plants and make other control techniques more effective. Hand cutting should be substituted for mowing in these areas or in areas where native vegetation is to be preserved. See the Invasive Plant Management Guide (2001) and the Integrated Pest Management Plan (2004) for more details on these methods.

· Covering

Covering plants in the early spring with black plastic or shade cloth can help eradicate small loosestrife stands by preventing photosynthesis and creating high temperatures. See the Integrated Pest Management Plan (2004) for details on implementing this technique.

RECOMMENDED METHODS FOR CONSERVATION AREAS

· Hand removal

Hand removal is most effective for young plants and small or isolated populations. See Bender and Randall (1987), the Integrated Pest Management Plan (2004), and the Invasive Plant Management Guide (2001) for more information.

· Cutting

Hand cutting of Purple Loosestrife can weaken plants and make other control techniques more effective. In natural areas, cutting is preferred to mowing to preserve nontarget species (Invasive Plant Management Guide, 2001; Integrated Pest Management Plan, 2004).

· Spot application of herbicides

Application of Rodeo™ to individual loosestrife plants is recommended in areas where avoiding contact of the herbicide with nontarget plants is desired. See Heidorn (1990) and Bender and Randall (1987) for more information.

· Planting of competitive species

Planting of competitive species may decrease the density of Purple Loosestrife. See Bender and Randall (1987) for more information.

METHODS NOT RECOMMENDED FOR THE NEPONSET RIVER RESERVATION

· Burning

Burning is not an effective method for eradication of Purple Loosestrife (Heidorn, 1990). Burning will reduce dry biomass and may make the area more accessible for mowing or herbicide treatment (Integrated Pest Management Plan, 2004).

· Site modifications

Purple Loosestrife may be removed through excavation or dredging, however the wetland contours and existing plant community will also be altered in the process. Monitoring is necessary after mechanical removal to control small areas of loosestrife regrowth along the waters edge. See the Integrated Pest Management Plan (2004) for more information on site modifications.

Site modifications can destroy an existing community that was to be restored and therefore are not recommended for the Neponset River Reservation. Dredging or excavation is also not a desirable option for the Neponset River Reservation due to historic Polychlorinated Biphenyls (PCB) contamination.

Japanese Knotweed (*Polygonum cuspidatum*)

RECOMMENDED METHODS FOR RECREATION AREAS

· Herbicides

Glyphosate (Rodeo™), Triclopyr (Renovate3®), Imazapyr (Habitat®), and 2,4-D herbicides can be an effective method of Japanese Knotweed control. See Seiger (1991), the Integrated Pest Management Plan (2004), and the Invasive Species Management Guide (2001) for more details on herbicide application.

· Planting of competitive species

Introduction or reintroduction of competitive species may help control Japanese Knotweed populations. More research is needed to determine which species are effective competitors and how they should be introduced (Seiger, 1991).

· Covering with plastic

Japanese Knotweed requires high light environments and therefore shading may be an effective control measure for small stands. Shading may be more effective when knotweed is cut before covering (Seiger, 1991).

RECOMMENDED METHODS FOR CONSERVATION AREAS

· Digging

Digging is an appropriate control method for small populations or in areas where herbicides cannot be used. The entire plant, including all roots and runners, should be removed. All rhizome fragments should be removed because new plants can sprout from these fragments (Seiger, 1991; Invasive Plant Management Guide, 2001).

· Cutting

Cutting may be an effective method of controlling Japanese Knotweed by reducing rhizome reserves. See Seiger (1991) and the Invasive Plant Management Guide (2001) for more information.

· Applying selective herbicides directly to plant

Cutting of Japanese Knotweed in late June may weaken the plant and make herbicide treatment more effective. Herbicides can be directly applied to individual knotweed plants to decrease the chance of impacting nontarget species. See Seiger (1991) and the Invasive Species Management Guide (2001) for more details on herbicide application.

Multiflora Rose (*Rosa mutliflora*)

RECOMMENDED METHODS FOR RECREATION AREAS

· Herbicides

Glyphosate (Rodeo™), 2,4-D, and Fosamine have been successful in controlling multiflora rose. See Szafoni (1990) and Eckardt and Martin (2001) for more information on herbicide application.

· Cutting or Mowing

On large or more disturbed sites, mowing can be used to control Multiflora Rose. Mowing along edges can prevent the spread of Multiflora Rose. In areas where mowing is difficult or native vegetation exists, hand cutting should be used. See Szafoni (1990) and Eckardt and Martin (2001) for recommendations for these methods.

RECOMMENDED METHODS FOR CONSERVATION AREAS

· Hand pulling

Hand pulling may be an effective strategy for small plants. The entire plant, including the root system, must be removed to prevent resprouting (Szafoni, 1990).

· Cutting

Cutting can effectively control multiflora rose, but will not eradicate it from a site. In areas of high habitat quality, cutting is preferred over mowing in order to leave native vegetation undisturbed (Szafoni, 1990; Eckardt and Martin, 2001).

· Cut-stump herbicide treatment

Cutting can be an effective control method when combined with the use of an herbicide. This method allows the herbicide to be applied to Multiflora Rose without killing non-target species. See Szafoni (1990) for more details on this method.

METHODS NOT RECOMMENDED FOR THE NEPONSET RIVER RESERVATION

· Burning

Burning has not been tested as a control method for Multiflora Rose (Eckardt and Martin, 2001).

· Biological Control

Potential biological control agents for Multiflora Rose are known, however the feasibility of these methods in natural communities is unknown. See Amrine Jr. (2002) for more information on biological control of Multiflora Rose.

References:

Amrine Jr, J.W. "Multiflora Rose" in Van Driesche, R., *et al*. 2002. "Multiflora Rose" in Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, p. 413. http://www.invasive.org/eastern/biocontrol/22MultifloraRose.html

Blossey, Bernd. 2003. "Phragmites: Common Reed" http://www.invasiveplants.net/Phragmites/Default.htm

Blossey, B., Schwarzländer, M., Häfliger, P., Casagrande, R., and L. Tewksbury. "Common Reed" in Van Driesche, R., *et al*. 2002. "Multiflora Rose" in Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, p. 413. http://www.invasive.org/eastern/biocontrol/9CommonReed.html

Eckardt, Nancy and TunyaLee Martin. 2001. "Element Stewardship Abstract for *Rosa multiflora*." The Nature Conservancy. http://tncweeds.ucdavis.edu/esadocs/documnts/rosamul.html

Marks, Marianne. 1993. "Element Stewardship Abstract for *Phragmites australis*." The Nature Conservancy. http://tncweeds.ucdavis.edu/esadocs/documnts/lythsal.html

Heidorn, Randy. 1990. "Vegetation Management Guideline Purple Loosestrife (*Lythrum salicaria* L.)." http://www.inhs.uiuc.edu/chf/outreach/VMG/ploosestrife.html

Minchinton, Todd E. and Bertness, Mark D. 2003. Disturbance-Mediated Competition and the Spread of *Phragmites australis* in a Coastal Marsh. *Ecological Applications* 13 (5): 1400-1416.

Seiger, Leslie. 1991. "Element Stewardship Abstract for *Polygonum cuspidatum*." The Nature Conservancy. http://tncweeds.ucdavis.edu/esadocs/documnts/polycus.html

Shaw, R.H. and Seiger, L.A. "Japanese Knotweed" in Van Driesche, R., *et al*. 2002. "Multiflora Rose" in Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service

Publication FHTET-2002-04, p. 413. http://www.invasive.org/eastern/biocontrol/12Knotweed.html

Steardship Subcomiittee of the Connecticut Invasive Plant Working Group. 2001. "Invasive Plant Management Guide." http://www.hort.uconn.edu/cipwg/art_pubs/GUIDE/guideframe.htm

Szafoni, Bob. 1990. "Vegetation Mangement Guideline Multiflora Rose (*Rosa multiflora* Thunb.)" http://www.inhs.uiuc.edu/chf/outreach/VMG/mrose.html

Tiner, Ralph. 1995. "*Phragmites*: Controlling the All-Too-Common Common Reed." Massachusetts Executive Office of Environmental Affairs, Technical Note Number 1.

http://www.massaudubon.org/Kids/Lively_Lessons/Saltmarsh/restoration.html

Washington State Deparmtnet of Agriculture and Ecology. 2004. "Integrated Pest Management Plan for Freshwater Emergent Noxious and Quarantine Listed Weeds" http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/noxious/Noxious%20Emergent%20IPM.pdf

APPENDIX D: BANK STABILIZATION TECHNIQUES

Introduction

The techniques presented in this appendix are examples of some of the many techniques being used to stabilize streambanks. The best technique for a site will depend on the cause and severity of the erosion, the size and location of the stream, site-specific factors, and the desired goal of stabilization. Typically a combination of techniques is used to meet the project goals. Bank stabilization projects require careful planning to achieve a successful result. Any required local, state, and federal permits should be obtained before beginning a bank stabilization project.

Stabilization techniques are summarized below and illustrated on page A-20. The candidate bank stabilization areas and recommendations are:

Area 2 - There is an undercut bank in the area by the J.G. Grant Company. This is the most eroded bank observed in the study area. Further study of this undercut bank prior to any stabilization is recommended. The undercut portion looks like a naturally occurring overhang. Whether it is natural or has been caused by nearby manmade disturbances, is less important than how it functions. A naturally occurring bank often contains"..undercuts which are favorite hidings spots for important game species such as Largemouth Bass (Micropterus salmoides), 310 CMR 10.54 (1). This function needs to be weighed against the upland uses. Consideration for the location of the trail and potential for collapse should be factored, as well as the potential loss or preservation of the large diameter trees on top of the bank. This bank stabilization is likely to occur at the same time as the remediation of the J.G. Grant Co. parcel.

Technique	Description	Cost	Stabilization purposes			Comments
			Toe protection	Upper bank protection	Runoff control	
LIVE PLANTINGS						
Vegetation	Use of trees, shrubs, other vegetation to stabilize banks	Low	x	x	x	Provides habitat; aesthetic values; Shrubs generally provide better protection than trees
Vegetated riprap/Joint planting	Layer of stone armoring that is vegetated using live stakes	Moderate to high	x	x	x	Approprate where there is a lack of desired vegetation on the face or existing or required riprap; Root system prevents erosion of fine sediment and improves drainage in the soil base; Survival rates can be low
Live stakes	Cut stem or branch of rootable plant is inserted into the bank and develops into a bushy riparian plant	Low		x		Appropriate for repair of small slips and slumps; Rapidly restores riparian vegetation and habitat; Can be combined with many other techniques
Rootwad revetments	Consists of interlocking tree material placed in and on streambanks	Moderate to high	x			Suited to streams where fish habitat deficiencies exist; Limited life; Site must be accessible to heavy equipment; Can create local scour and erosion
Branch packing	Alternating layers of live branches and soil	Moderate		x	x	Suitable for repairing patches of bank that have been scoured out or have slumped; Appropriate after stresses causing slump have been removed
Live fascines	Rolls of live branch cuttings that are placed in shallow trenches on the bank and staked in place	Moderate		x	x	Creates series of short slopes separated by rows of fascines; Can be combined with other techniques

Area 2a - The pavement that comes down from the Stop and Shop parking lot should be removed. It is recommended that either a vegetated rip rap or a root wad technique be used.

Lewis Chemicals - The bank which is currently stabilized by rags should be cleaned up and the rags removed. Vegetated rip rap is recommended for this area. This may likely occur through the Department of Neighborhood Development's remiediation of the site.

Area 7 View Corridor - Should trees be removed along the bank, a combination of the coconut roll and the brush mattress is recommended. Note that the live stake technique can be used with all of the other techniques, and this technique is recommended.

Canoe Launches - whether new or existing, this use poses bank stabilization issues. The stabilization technique utilized should be based on the site specific needs. Hard armoring solutions that include rip rap should be limited to steeper slopes for the study area. The hard armoring solutions are not recommended for any of the existing canoe launches. Brush mattress with live stakes should work. If the water's edge of the bank is to be disturbed, the coconut fiber rolls are recommended.

Technique	Description	Cost	Stabilization purposes			Comments
			Toe protection	Upper bank protection	Runoff control	
BIOENGINEERING						
Vegetated geogrids	Alternating layers of live cuttings and geotextile fabric to rebuild and vegetate eroded banks	High	x	x	x	Can be installed on steeper and higher slopes; Useful in restoring outside bends where erosion occurs
Brush mattress	Thick blanket of live branch cuttings and soil	High		x	x	Provides immediate cover and restores vegetation and habitat; Limited to slope above base flow levels; Excellent candidate for combining with structural techniques
Tree revetments	Row of cut trees anchored to the toe of the bank	Low	x			Recommended for small to medium stream bends that are unstable due to removal of orginal tree cover; Often used in combination with other techniques; Site may need to be accessible to heavy equipment
Coconut fiber roll	Rolls of coconut husk fibers bound together and staked to the toe of the bank	Moderate	x			Native plants and live stakes usually inserted into rolls; Flexible to allow for molding to bank contours
HARD ARMORING						
Rock riprap	Stones placed along the slope	Moderate to high	x	x	x	Provides long term durability; Can be vegetated; Site must be accessible to heavy equipment

References:

FISRWG (10/1998, rev. 08/2001). Stream Corridor Restoration: Principles, Processes, and Practices. By the Federal Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US gov't). GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.

Gough, Steve. 2004. "Tree Revetments for Streambank Stabilization." Missouri Department of Conservation. http://mdc.mo.gov/fish/streams/revetmen/

Iowa Department of Natural Resources. 2006. "How to Control Streambank Erosion." http://www.iowadnr.gov/water/stormwater/forms.html

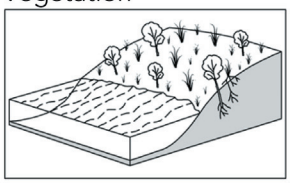
Portland Water District. "Vegetated Streambank Stabilization." http://www.pwd.org/pdf/water%20resources/04-streambank.pdf

Tennessee Valley Authority. "Using Stabilization Techniques to Control Erosion and Protect Property." http://www.tva.gov/river/landandshore/stabilization/stabilization.htm

Tjaden, Bob and Glenda M. Weber. 1999. "Riparian Buffer Management: Soil Bioengineering or Streambank Restoration for Riparian Forest Buffers." http://www.riparianbuffers.umd.edu/fact/FS729.html

McCullah, John and Donald Gray. 2005. "Environmentally Sensitive Channel- and Bank-Protection Measures." Transportation Research Board, Washington, DC.

Vegetation



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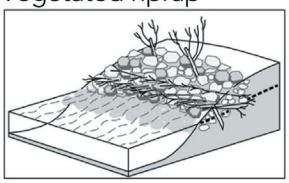

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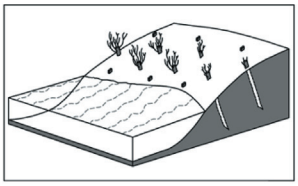

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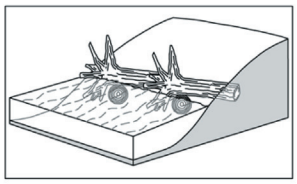

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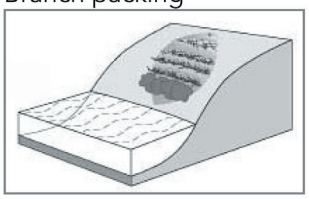

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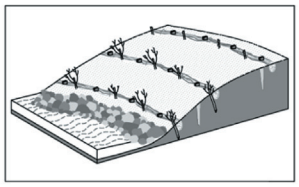

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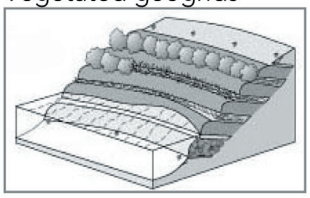

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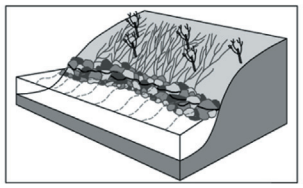

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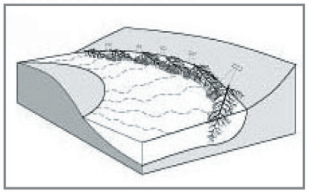

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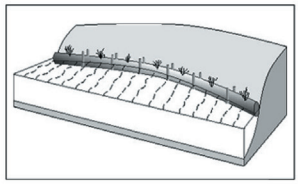

Bank Stabilization Techniques

SOURCE: "Environmentally Sensitive Channel- and Bank-Protection Measures." Transportation Research Board of the National Academies, TRB Publication" NCHRP Reports #544 (CRP-CD-58).

APPENDIX E: SAFETY AND SECURITY PLAN

1.0 INTRODUCTION

1.1 Purpose of Security/Safety Plan

The purpose of this plan is to set a framework for addressing potential security issues on the DCR Neponset River Trail. While the basic principles of this plan will apply to all DCR facilities developed under the Master Plan Phase I (December 1996) and the Master Plan Phase II (June 2006) many aspects of this security plan may apply primarily to the Trail due to its linear design and anticipated level of use. The DCR anticipates that this framework will be the basis for assuring safe public use and enjoyment of the Trail and its associated parks. It is recommended that this plan be reviewed and updated in the next phase of planning for the implementation of the Master Plan Phase II.

1.2 DCR – Agency Description

The Department of Conservation and Recreation (DCR) is a multi-disciplinary environmental agency responsible for the management and stewardship of nearly 20,000 acres of conservation land within the Metropolitan Boston region. The Urban Parks System of the DCR was the first metropolitan parks system in America and this system of reservations, parkways and beaches is an interconnected network of scenic and recreational open space. The DCR also manages a 120,000-acre watershed and reservoir system that provides pure water for 2.5 million people and a state park system of 429,000 outside of Metropolitan Boston. Since 1893, the DCR, has preserved, protected and enhanced the region's unique landscapes, sensitive environmental areas, river corridors and historic sites.

1.3 Project Summary

One of the main goals of the *Phase I and II Neponset River Master Plans* are to bring people "back" to the river to experience the majesty of the river estuary, the salt marshes, and the Neponset's scenic upstream reaches. Another important goal is to provide new links in the network of bikeways and openspace linking cities and towns across metropolitan Boston.

The Neponset River Trail opened to the public in 2003 and is a linear, multi-use recreational facility. In the early 1990s, community members began urging the former MDC to purchase the old Conrail right-of-way which runs along the Neponset River from Mattapan to the Port Norfolk neighborhood of Dorchester. On June 4, 1992, the MDC purchased the railroad right-of-way and accelerated its planning of the Neponset River Trail and a series of parks along the river that would be linked by the Trail. *A Master Plan for the Lower Neponset River Reservation* was completed in December of 1996.

The trail and parks will create opportunities for people to discover the river's beauty, its interesting history, its abundant wildlife, and its vital neighborhoods. The Trail will also serve as an important connector in the DCR's regional park system. The Trail will allow pedestrians, bicyclists, skaters, and other trail-users to travel to an extraordinary range of places and parks, from Frederick Law Olmsted's seaside walk along Pleasure Bay in South Boston to the heights of Great Blue Hill in Milton.

A phased approach is planned for the improvement (i.e. paving and landscaping) of the Trail. Due to project funding and implementation issues, Trail phasing as described in this plan has been modified from the phasing described in the Phase I Master Plan. The initial phase of the Trail which was constructed encompasses the portion of the Trail between Central Avenue in Milton and Commercial Point (adjacent to the Boston Gas tank at Morrissey Boulevard) in Dorchester. This initial phase is approximately 5 miles long, with 0.6 miles in Milton and 1.6 miles in Boston as a paved off road multi-use path and the remaining 2.8 miles in Boston as an on-road bikeway. The next phase in the planning stage is a 7 mile section for Central Avenue to Paul's Bridge.

The Trail from Central Avenue to Mattapan Square has been to be deemed a "Special Study Area" in both Master Plans, requiring further community outreach, site analysis and environmental review before this section can be designed and built. Security and Safety concerns continue to be unresolved for this section of trail.

1.4 Security/Safety at Area Greenways

Security at Boston area greenways is addressed in a variety of ways. At some greenways, local or state police are solely responsible for security. At others, community groups assist in trail security and maintenance. Several studies have been conducted to determine the effect of recreational trails such as bike paths on crime and property values in trailside neighborhoods. The property owners surveyed for these studies encountered far fewer trail-related problems than anticipated. Homes immediately adjacent to trails did not experience an increase in burglaries and vandalism as a result of the trails, and property values near the trails studied increased as a result of proximity to trails. In general, residents viewed the trail as a positive factor that increased the value of their homes.

The concerns raised by area residents about the Neponset River Trail are similar to those once expressed by residents along the Minuteman Bikeway, which runs through Cambridge, Arlington, Lexington, and Bedford. According to Alan McClennen, a project planner for Arlington and the Minuteman Bikeway:

During the conceptual and design phase, there were many concerns raised about the bikeway's effect on the value of adjoining real estate and the potential safety of users and abutters. In order

to respond to those concerns, I conducted extensive research into the experience of similar bikeway projects across the United States. I discovered that numerous studies have been done by people responsible for bikeway construction and management. Those studies showed that as abandoned railroad corridors were converted to bikeway use, crime decreased and real estate values tended to increase. Our experience with the Minuteman is consistent with those findings. The abandoned railroad corridor was a great place for kids to congregate and people to dump trash. It was inaccessible to community safety personnel. The creation of the Minuteman Bikeway has resulted in thousands of people using the same land for positive recreational purposes. It became their bikeway, and has become self policing (letter to Marjorie Jeffries, February 28, 1996).

The Minuteman Bikeway – which runs through Cambridge, Arlington, Lexington, and Bedford is patrolled by local police on motorcycles between 8:00 a.m. and 12:00 p.m. These patrols are not dedicated to the trail, but patrol the trail as part of regular neighborhood routes. High school students patrol the trail, offering assistance to users (e.g. fixing flat tires, giving directions, and answering questions). According to local police, the bikeway "polices itself" during weekends and other periods of heavy use.

The East Bay Bike Trail – which runs through East Providence, Warren, Barrington, and Bristol Rhode Island – also relies on local police who patrol the trail as part of regular neighborhood patrols. No special or additional funding is set aside for this purpose.

The DCR Southwest Corridor Park has had a dedicated line item for security within the annual budget of the park. The line item is used to supplement the State Police budget, thus allowing troopers to be available for regular patrols scheduled by the park supervisor. Because of this funding mechanism, the park supervisor has great flexibility in the assignment of patrols and can determine where and when patrols are most needed. The downside of this line item-based budget is that it must be reallocated annually and is subject to elimination by the Legislature. The Southwest Corridor is patrolled predominantly by State Police motorcycle units during heavy use times in spring, summer, and fall. A plain-clothes drug abuse unit also patrols the park.

The Neponset River Reservation has had a dedicated line item in the state budget for state police patrols since the trail opened in 2003.

The Cape Cod Trail and the Norwottuck Trail, in Hadley are also patrolled by State Police. In Hadley, as in other Massachusetts communities with greenways, initial skepticism gave way to widespread acceptance of the trail after the trail was completed and in active use, according to trail managers.

2.0 EXISTING SITE CONDITIONS

This section describes the existing conditions on the Neponset River Trail, including both physical and security/safety conditions. Physical conditions and security/safety measures planned for the Trail as it is improved are discussed in section 3.0 below.

2.1 Physical Conditions

The Neponset River Trail for 2.2 miles between Taylor Street in Port Norfolk and Central Avenue in Milton is presently used by local community members for walking, running, cycling, bird watching, cross0country skiing, fishing access, and other recreational activities associated with the the Neponset River and its estuary. The proposed extension of the trail is seven miles long. The surface of the trail the existing trail and proposed trail is bituminous concrete and soil stabilized pavement. This surface can be easily negotiated by foot and/or bicycle. The existing trail and its seven mile extension is presently accessible via the following entrances:

Mattapan

- River Street/Ryan Playground

Milton

- Central Avenue
- Milton MBTA trolley station
- Mattapan MBTA trolley station (pending negotiations with the MBTA)
- DCR Special Services Building
- DCR Fowl Meadow parking lot

Boston (Dorchester)

- Butler Street MBTA trolley station
- Granite Avenue
- Hallet Street
- Neponset Circle/Neponset Bridge
- Port Norfolk

Boston/Hyde Park

- Fairmount Avenue

The Trail alignment is crossed by seven (7) bridges owned by the MBTA, Mass Highway Department, and others. These bridges are:

- the MBTA-owned bridge located at Adams Street in Milton,
- the Medway Street bridge in Dorchester,
- the bridge over the river from Dorchester to Quincy and Route 3A,
- the MBTA rail bridge located in the salt marsh in Dorchester, and
- three Southeast Expressway bridges owned by Mass Highway; one (1) near Hallet Street where the Trail enters Pope John Paul II Park, one (1) at Tenean Beach, and one (1) at Victory Road.

The existing MBTA owned Adams and Medway Street bridges are constructed of concrete. These two bridges are in good condition and the Adams Street bridge has three tunnel chambers under the bridge, one each for the in-bound and out-bound trolleys, and one for the Trail. The view to the Trail from above on Adams Street is obstructed by high concrete walls on both sides of the bridge. The Neponset river Trail includes three (3) bridged water body crossings. These crossings are:

- the bridge crossing Pine Tree Brook in Milton
- the bridge crossing the Neponset River just downstream of Lower Mills, and
- the bridge crossing Davenport Creek between Hallet Street and the Southeast Expressway.

The Pine Tree Brook and Davenport Creek bridges were improved under the Neponset River Trail construction contract and the railroad bridge over the Neponset River was re-decked. All three bridges are designed to support emergency vehicles.

The MBTA's Mattapan trolley line parallels the Trail from Central Avenue to just east of the Butler Street T-station in the Neponset salt marshes. The Trail is in clear view from the trolley along this segment of the Trail. The Trolley also runs along a potential section of trail from Central Avenue to the Valley Road T- Station. Trolleys run approximately every 10minutes along this line. Drivers are in direct radio contact with MBTA police and are instructed to survey the MBTA corridor and report any suspicious activities they see during their runs.

The Mattapan section of the Trail has been improved as a nature trail for walking, bird watching and canoe access. Two canoe launches were established on the Trail behind Ryan Playground in 1996 and Trail improvements such as clearing, stabilization, and the application of wood chips were completed in 1997. Trail indicator signs are now posted along the Mattapan portion of the Trail. A canoe portage has also been established on the Trail at the Lower Mills dam.

2.2 Existing Security/Safety on the Trail

According to Boston police, the neighborhoods bordering the Neponset River Trail are among the safest in Boston. Very few criminal incidents have been reported on the existing Trail. The incidents reported were minor in nature, generally related to underage drinking and illegal fires set by youths and posting of graffiti. Milton Police reported one robbery the first summer that the Trail was open to the public. An individual as followed after using an ATM on River Street and robbed after he entered the trail off of Central Avenue Graffiti has decreased along the Trail as murals have been painted in areas where graffiti was prolific before the opening of the Trail in 2003.

State and local police have joint jurisdiction over the Trail and other DCR properties. MBTA police are responsible for security on all MBTA properties, including trolley stations and rights-of-way. State, local, and MBTA police have toured the Trail with DCR staff and are familiar with trail conditions and access/egress points in their jurisdictions.

State Police responsibility for covering the Trail is split between the Milton and South Boston barracks. On the existing Trail, State Police respond to calls but do not patrol regularly. Milton Police Chief Kevin Mearn said his officers respond to all calls related to the Milton portion of the existing Trail.

Boston Police responsibility for covering the Trail is divided between District B-3, with offices at Morton Street in Mattapan/Dorchester, and District C-11. With offices at Gibson Street in Dorchester, District B-3 covers the Boston side of the Neponset River from Mattapan to Lower Mills (Sector #C431). The remainder of the Trail is covered by District C-11.

Mattapan is now one of the safest squares in the city. As part of the District B-3 community policing program generally the same officer is assigned to the same neighborhood on a regular basis. This district has mountain bikes and conducts regular foot patrols. In the neighborhoods that border the Trail along River Street the number of reported incidents ("Part 1" incidents) of a serious nature was relatively low. Over a two year period, only 11 Part 1 incidents were reported in Reporting Area #406, which runs between River Street and the Neponset River from Mattapan to Lower Mills. No incidents were reported on the walking trails along the Neponset River adjacent to Ryan Playground.

The Boston Police said the neighborhoods bordering the Trail in District C-11 are among the safest in Dorcester. He said the Cedar Grove area has one of the highest owner-occupancy rates in Boston, which helps to maintain a sense of neighborhood pride and responsibility. On average, 10-12 crimes per month are reported in District C-11 in the neighborhoods along the

Trail. These incidents are primarily domestic abuse calls and the occasional stolen car. The Boston Police regularly patrol the Cedar Grove cemetery (which is adjacent to the Trail) and other areas by foot and mountain bike. He said there is very little crime associated with the existing Trail in this district.

MBTA Special Operations Supervisor Roger Ford said the Mattapan trolley line is among the safest in the entire MBTA system. He said MBTA Police officers would continue patrolling MBTA facilities along the Mattapan Line. He said MBTA Police officers maintain a 24-hour presence along that line, both riding the trolleys and in patrol cars.

The DCR Reservation Manager and seasonal employees regularly patrol the existing Trail. The Mattapan portion of the Trail is patrolled by members of the Lower River Street Neighborhood Association as well as the Boston Police. Issues of concern are reported to the Neponset Reservation Manager. While DCR rangers and managers do not have the authority to make arrests, they do have the authority to issue non-criminal citations. DCR rangers and staff report crimes to police via remote radio and cell phones.

State, local and MBTA police; DCR rangers and the Reservation Manager, and local fire/emergency departments all respond to calls along the Trail.

3.0 PROPOSED TRAIL SECURITY/SAFETY

This section describes security/safety plans for the trail which was completed in 2003 and also will cover future extensions of the trail through Boston and Milton after they are improved (i.e. paved and landscaped). In addition, a **Trail Security/Safety Handbook,** including emergency response contacts, a detailed map of the Trail showing all access/egress points, and a list of DCR rules and regulations will need to be developed when this plan is updated.

3.1 Intensive Trail Use

As has been found on many bike paths and greenways in the Boston area and elsewhere, the more use these facilities get, the safer they are. Every effort has been made to encourage the use of the Neponset River Trail as a year-round, multi-use community resource. As Trail use increased after it opened to the public the need for policing and Trail patrols leveled off and went down.

3.2 DCR Policies, Rules and Regulations

DCR rules and regulations prohibit use of DCR facilities between dusk and dawn (i.e., the Trail will be closed at night). For this reason, the Neponset River Trail will not be lit, except in areas that

are determined to require safety lighting. DCR rules and regulations will be posted at major entry points to the Trail. Trail maps will also be posted and available in Trail brochures. The Trail will be clearly signed, with information stations at major access points. Vehicular access, other than by emergency vehicle, is prohibited on the Trail and will be controlled through placement of gates, bollards, and other obstructions. Police and emergency response officials will be given keys to access gates and detailed maps of the trail including all access/egress points.

3.3 Designing for Security/Safety

The DCR worked with its design consultant, police, and the community to produce a design for the Trail that meets all safety and accessibility standards and provides additional levels of safety at portions of the Trail which are potentially problematic. Anti-graffiti sealer and the painting of murals on areas of high potential for graffiti are all a part of this safe design effort. The DCR and the Boston and Milton fire Departments are examining whether dry hydrants should be installed at certain locations along the trail.

The improved Trail will enhance Trail visibility by opening sight lines, thus allowing greater police and community supervision. This is especially true at Central Avenue (Milton/and or Boston) to Mattapan Square section of the Trail. After the Trail is improved, police and community members will need to be able to clearly see the Trail while standing at Central Avenue. Police and emergency access will also be significantly improved after Trail construction.

3.4 Reservation Management/Coordination

Integral to the security of the Neponset Trail was the assignment of a Reservation Manager to oversee Trail operations and coordinate security/safety and emergency response activities for the Trail and its associated parks and open spaces. The manager should have a staff of two to four rangers to patrol the Trail and direct security/safety, maintenance, and interpretive programs. The manager and rangers should be based at an office located on the Trail. The DCR manager should be equipped with proper communication, transportation (i.e. mountain bikes) and emergency response equipment.

3.5 Police, Fire and EMS Involvement

Before the existing Trail opened a meeting was held to formally discuss emergency response protocols for the Trail, Trail patrol coordination, and community participation in Trail security/safety. Attending this meeting were representatives for the MDC, Massachusetts State Police, MBTA Police/Special Operation, Boston Police Department, Boston Fire Department, Boston EMS, Milton Police Department, Milton Fire Department, and Milton EMC. The Milton Police and Fire Chiefs attended this meeting. Before further study and the design documents are finalized

for the Trail from Central Avenue to Paul's Bridge a similar meeting should be held to review the past ten years of working with this Security/Safey Plan and to evaluate its effectiveness. At that time, representatives of these agencies should make recommendations to insure that a high level of security and safety are maintained on the Trail.

Regular meetings should be held between police, fire and EMS response units, DCR staff, and the community to identify and address ongoing security/safety and maintenance concerns. These meetings should be coordinated by the DCR Reservation Manager.

3.6 Community Partnership/Patrol

The Neponset River Trail has benefited from the continued strong community support and involvement since it opened to the public. Community patrols and watches have been an important component of the overall security/safety program. Several groups have adopted portions of the Trail and assist the DCR in patrolling the Trail and keeping it clean.

These groups are:

- Lower River Street Neighborhood Association (Mattapan)
- Milton Advocates for the Neponset Greenway (Milton)
- Cedar Grove Civic Association (Dorchester)
- Boston Natural Areas Network

3.7 Emergency Medical Services (EMS)

Boston EMS has been operating bicycle EMT units in the DCR's Old Harbor Reservation in South Boston with great success. Milton EMS (Fallon) also has bicycle EMT units and has committed to using them to service the Trail upon request of the Milton Police Chief. The DCR has requested bicycle EMT staffing on the Neponset River Trail. Such coverage would provide an additional layer of protection for Trail users.

4.0 MAINTENANCE

The prompt and consistent response to acts of vandalism and other maintenance issues is a major factor in promoting safety in parks and other public spaces. Acts of vandalism gone unchecked may lead to further vandalism. On the other hand, rapid cleanup of graffiti and repair of broken lights and benches sends a message of intolerance to potential perpetrators. A key component in the DCR's effort to create a safe, well-used Trail is the inclusion in the Trail construction specifications provisions for anti-graffiti to be easily washed off with soap and water. In

addition, the Trail is designed to simplify regular maintenance. There are no lawns to be mowed, and plantations are composed primarily of easy-to-maintain native species. The materials selected for the Trail, its signs and its interpretive features were chosen because they are highly durable.