

1 INTRODUCTION AND STUDY OBJECTIVE

1.1 INTRODUCTION

With a size of approximately 1,146 acres, Van Cortlandt Park is New York City's fourth largest park. As shown in Figure 1-1, "Location Map", the park is located in the Bronx and marks the northwestern New York City border to Westchester County and the City of Yonkers. Van Cortlandt Park is bounded by Caryl Avenue, Forest Avenue, and Parkway North to the north (Westchester County), Van Cortlandt Park East, East 233rd Street, and Jerome Avenue to the east, Gun Hill Road and Van Cortlandt Park South to the south, and Broadway to the west.

Geologically, Van Cortlandt Park was shaped approximately 20,000 years ago, when New York was buried beneath glaciers. The park's characteristic topographical features such as steep ridges, smooth hillsides, and open flat areas including distinct vegetation habitats, are a result of these early geological processes. Three specific types of rock components can be identified in Van Cortlandt Park: Fordham Gneiss, Inwood Dolomite, and Manhattan Schist.

Van Cortlandt Park was occupied by permanent settlements of the Lenape Woodland Indians before 1646. In this year, the Dutch Adriaen Van der Donck (1620-1655) became the owner of what is Van Cortlandt Park today. The property passed through several families that all gradually developed the property into valuable land for agriculture. In the early 1700s Tibbet's Brook River was dammed to power a gristmill, which resulted in the creation of the present Van Cortlandt Lake. In 1694, a man called Jacobus Van Cortlandt bought the property. His son built Van Cortlandt Mansion in 1748, which is a museum today, and his son's family occupied the land until the 1880s.

In the late nineteenth century, the Croton Aqueduct was built on the site, and two railroad lines, the Putnam railroad and the New York Central railroad, were laid across the site. The Croton Aqueduct was designated a national historic landmark in 1992. The New York Central railroad was removed in the late 1930s. Passenger service on the Putnam railroad was ceased in 1958, freight service continued into the 1970s, while the corridor still exists today as a path (Putnam Trail).

The City of New York acquired Van Cortlandt Park in 1888 and made it accessible to the public. The first municipal golf course opened in Van Cortlandt Park in 1895, the Mosholu Golf Course opened in 1914. Van Cortlandt Mansion was opened as a museum in 1897. The Parade Grounds existed since 1901 and was used by National Guard for training exercises until after World War I. In 1913, the Cross-Country Running Course opened. Until today Van Cortlandt Park is known for its several different cross-country and hiking trails. In 1983, a park administrator's office was created by the NYC Department of Parks and Recreation (NYC DPR). This office oversees all operations.

Figure 1-2, "Bronx and Van Cortlandt Park Area 1916", shows Van Cortlandt Park in 1916, twenty years before the construction of two parkways that penetrate through Van Cortlandt Park was completed in the Robert Moses era of the 1930s. Construction work on the Henry Hudson Parkway started in 1933 and was finished in 1937, and the Mosholu Parkway was

built between 1935 until 1937. Figure 1-3, “Bronx and Van Cortlandt Park Area 1941”, shows a Gousha Map from 1941, showing Henry Hudson Parkway and Mosholu Parkway in Van Cortlandt Park.

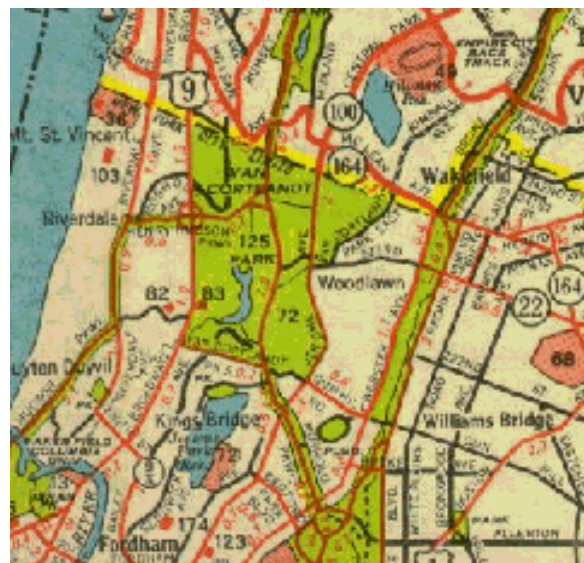
Henry Hudson Parkway begins at West 72nd Street in Manhattan and extends to the Bronx-Westchester border, traversing Van Cortlandt Park, eventually becoming the Saw Mill River Parkway. Henry Hudson Parkway is part of NY Route 9A in New York City. Mosholu Parkway begins just west of the intersection with Bronx Park East at the junction with the Bronx River Parkway and extends west via Bronx Park and Van Cortlandt Park South. Within Van Cortlandt Park, Mosholu Parkway is a four-lane highway, which is divided in some locations due to topography in the park. Mosholu Parkway and Henry Hudson Parkway share an interchange within Van Cortlandt Park.

Figure 1-2
Bronx and Van Cortlandt Park Area 1916



Source: http://www.lib.utexas.edu/maps/historic_us_cities.html

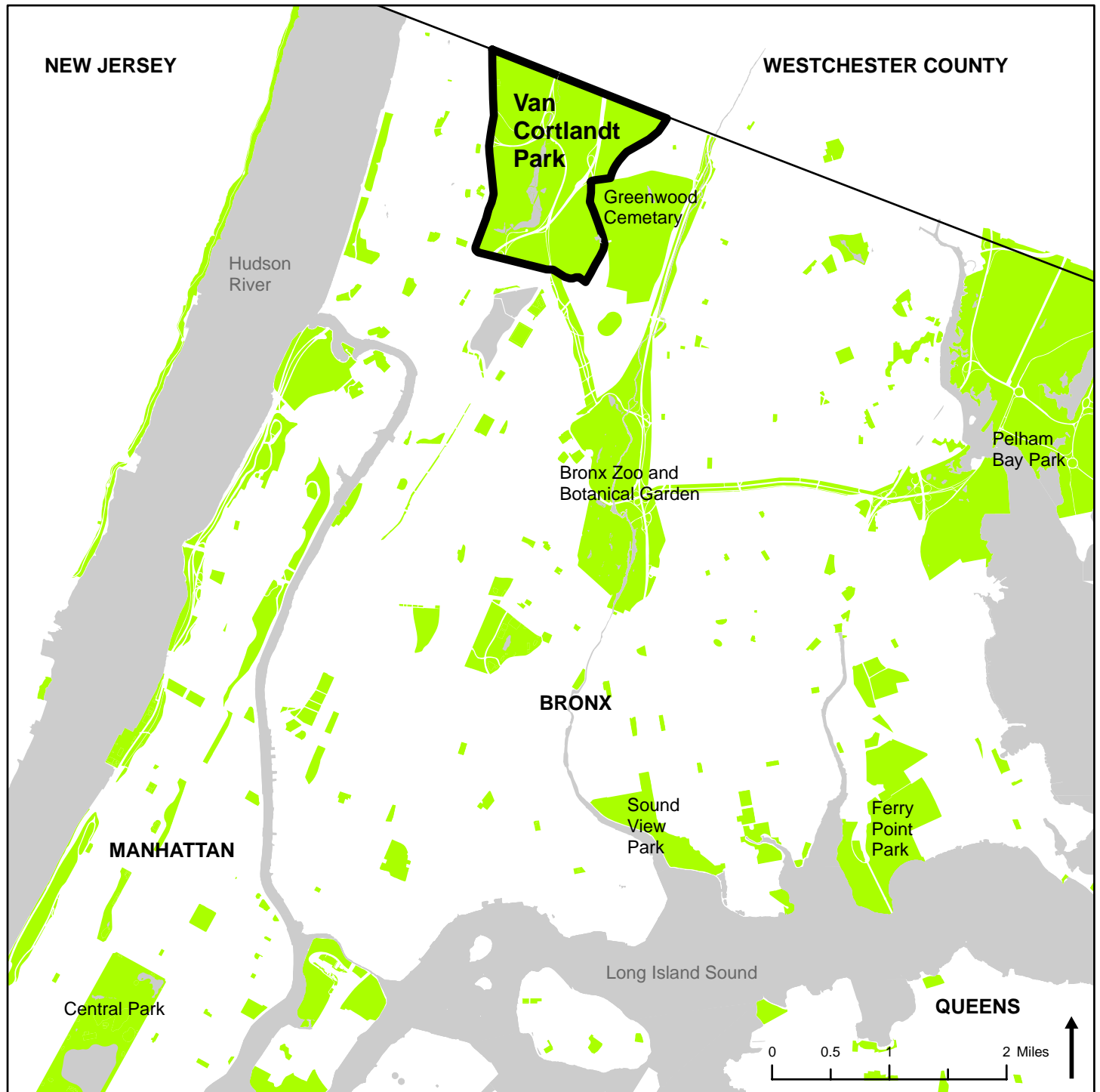
Figure 1-3
Bronx and Van Cortlandt Park Area 1941





Source: <http://www.nycroads.com/history/>

In addition to the two parkways, in 1935 Robert Moses started work on the initial section of the Major Deegan Expressway, which is the third highway traversing Van Cortlandt Park. The initial section of the Major Deegan connected the Triborough Bridge with Grand Concourse and was completed in 1939 for the World's Fair. It was only after WW II, in 1945, when Moses presented a plan to extend the Major Deegan Expressway north to Westchester County in order to connect it to the proposed NY State Thruway in Yonkers. The goal of this extension was to bring relief to the crowded Henry Hudson Parkway. The construction of the Major Deegan Expressway extension started in 1950 and was completed in 1956. Within Van Cortlandt Park, the northbound Major Deegan Expressway has connections to the Henry Hudson Parkway and to the Saw Mill River Parkway (Exit 12).

As shown in Figure 1-4, “Highways in Van Cortlandt Park”, Van Cortlandt Park is presently fragmented by the three highways described above. As a result, the park is divided into six segments: Northwest Forest, Croton Woods, Northeast Forest, Parade Grounds/Van Cortlandt Lake, Van Cortlandt Golf Course, and Shandler Recreation Area/Mosholu Golf Center.



Legend

-  Van Cortlandt Park
-  NYC Open Spaces and Parks

Currently, there are five existing pedestrian and bike connections over and under these highways, in an effort to knit Van Cortlandt Park back together (refer to Figure 1-5, “Existing Pedestrian and Bike Connections in Van Cortlandt Park”). However, there is no connection between Croton Woods and the Shandler Recreation area/Mosholu Golf Center. In addition, in the southern part of the park there is no connection between the Parade Grounds/Van Cortlandt Lake area and Croton Woods. As a result, the southern parts of the park, the Parade Grounds/Van Cortlandt Lake area, Croton Woods, and Shandler Recreation Area/Mosholu Golf Center are disconnected from each other. Hence, user flexibility is very limited as they have to stay in the part of the park in which they entered, or walk/bike a prohibitive distance, along highways and streets outside the park, to reach another adjacent part of the park.

Figure 1-4
Highways in Van Cortlandt Park

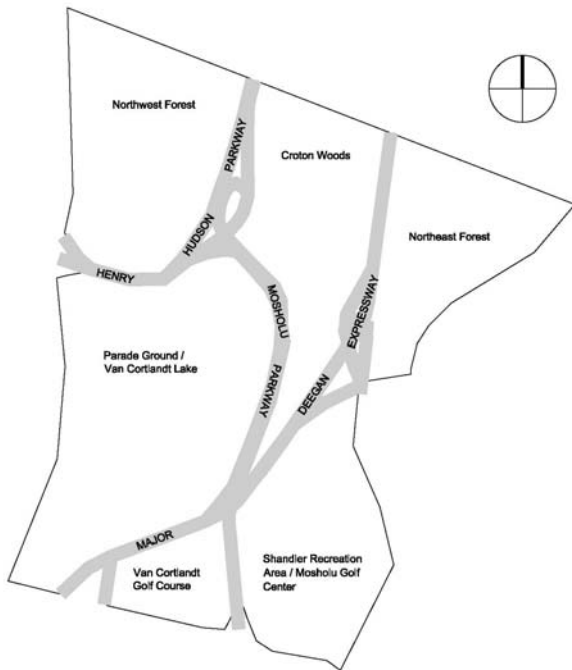
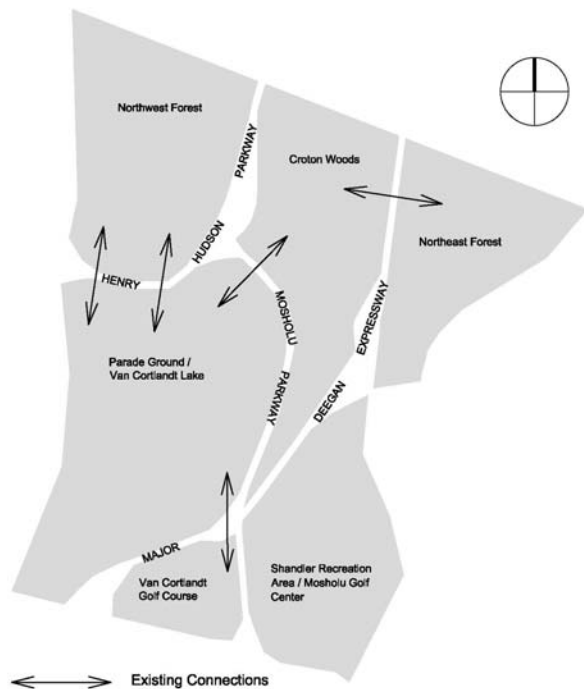


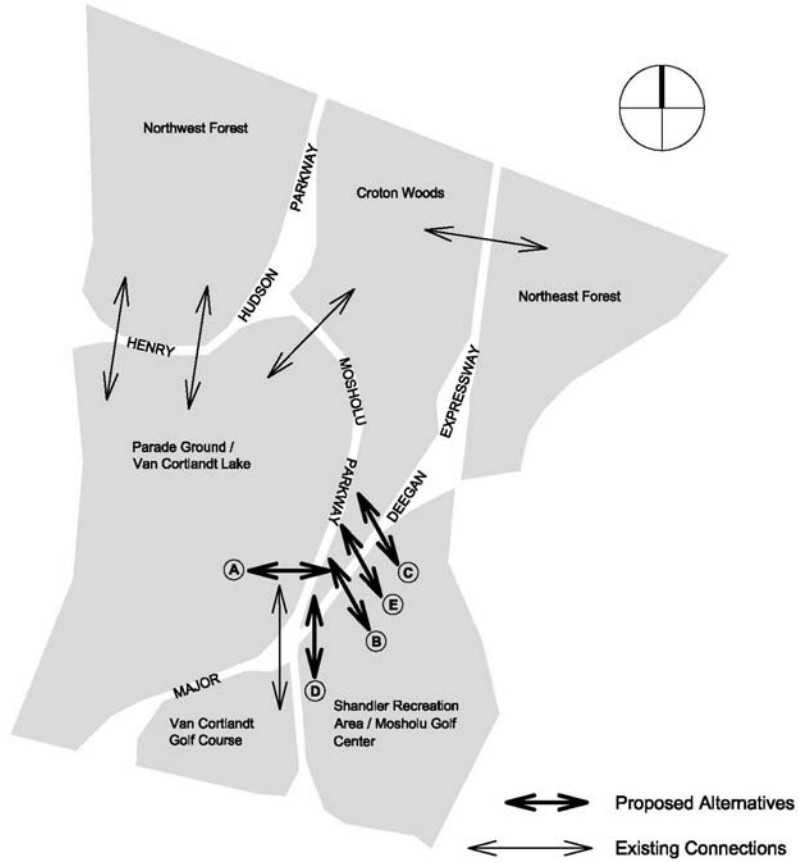
Figure 1-5
Existing Pedestrian and Bike Connections in Van Cortlandt Park



1.2 STUDY OBJECTIVE

The purpose of this feasibility study is to develop and evaluate alternatives which would connect the Croton Woods and the Shandler Recreation Area/Mosholu Golf Center park segments. Where possible, both pedestrians and bicyclists would be accommodated, and also where topography allows, the connections would be handicapped accessible. Five preliminary Alternatives A, B, C, D, and the recommended Alternative E are presented below (refer to Figure 1-6, “Proposed Alternatives”). The remaining sections of this report expand on existing conditions, describe the alternatives, and present an environmental screening analysis of the selected option.

Figure 1-6
Proposed Alternatives



2 EXISTING CONDITIONS

2.1 CONSTRUCTION OF NYC DEP WATER FILTRATION PLANT

In the southeast corner of the Shandler Recreation Area, under the Mosholu Golf Course, the NYC Department of Environmental Protection (NYC DEP) is currently constructing a new Water Filtration Plant. The City of New York agreed in 1992 under a consent order to filter the water supply that comes from the Croton watershed in a new facility to meet federal drinking-water standards. The new Water Filtration Plant will be located below grade, so that the Mosholu Golf Course driving range and the affected park sections can be restored upon completion of the construction work.

In 1998, after different potential locations for the Water Filtration Plant were analyzed as part of an Environmental Impact Statement (EIS), the NYC DEP decided that the Van Cortlandt Park location was the most ideal. Mainly because of engineering, security, and cost advantages, NYC DEP argued for the site located within the Shandler Recreation Area. According to NYC DEP, the site is closer to existing tunnels and other water infrastructure than the alternative locations analyzed in the EIS. Also, since the Van Cortlandt Park location is closer to the distribution system than any alternative, filtered water can be released without further chlorination.

The location of the new Water Filtration Plant within Van Cortlandt Park was highly contested by residents and several opposition groups. These groups argued that the location of an industrial facility in a public park and in vicinity to a residential neighborhood is not acceptable. They were concerned about increased traffic and the destruction of greenery due to construction. After opposition groups sued, NY State's highest court ruled in 2001 that the City could not use parkland as the location for the Water Filtration Plant without the approval of the State Legislature. As a consequence, the City promised over \$200 million in additional funding for Bronx Parks and received support in the State Legislature. The construction of the plant started in 2005.

As part of the mitigation actions for the construction of the Water Filtration Plant within Van Cortlandt Park, NYC DEP agreed to conduct the Van Cortlandt Park Pedestrian Bridge Feasibility Study, as described in this document.

2.2 EXISTING USAGE

Van Cortlandt Park has a long tradition of municipal golf course activity. The City of New York bought the property, which is Van Cortlandt Park today, in 1888. As early as in 1895, the first municipal golf course was opened, and in 1914 Mosholu Golf Course was opened. Since then, Van Cortlandt Park has been a location for golfing. The golf courses are in all three southern segments of the park, northeast of the Van Cortlandt Lake Area, in the segment between the Major Deegan Expressway and the Mosholu Parkway, and in the Shandler Recreation Area.

Since the opening of the Cross-Country Running Course in 1913, Van Cortlandt Park is well known for its numerous paths and trails. The Cross-Country Running Course extends from Northwest Forest to the Van Cortlandt Lake Area. Because of its size and diverse topographical features, Van Cortlandt Park is frequently used by runners from schools and universities throughout the region, and is also the home to national cross-country races.

Over half of the park's area is a protected nature preserve ("Forever Wild" Preserve), which offers scenic views for hikers. As shown in Figure 2-1, "Van Cortlandt Park Trail Map", the park includes several Nature Trails such as the Cass Gallagher Nature Trail in the Northwest Forest, the John Kieran Nature Trail in the Van Cortlandt Park Area, and the John Muir Nature Trail, which extends from Northwest Forest to Van Cortlandt Lake Area, to the northern Croton Woods Area, to Northeast Forest.

The park also includes facilities for football, baseball, softball, soccer, cricket, tennis, swimming, and horseback riding in the different park segments. Residents from surrounding neighborhoods use sections of the park for jogging, biking, hiking, and other forms of outdoor recreation.

2.3 TOPOGRAPHY

Data Sources

Three secondary topographic surveys were used in this feasibility study. The first was a topographical survey conducted by NYC DEP in preparation of the construction of the new DEP Water Filtration Plant. This survey, which only included the Shandler Recreation Area (east of the Major Deegan Expressway), was used as a basis for topographical analysis east of the Major Deegan Expressway. The second, for the west side of the Major Deegan Expressway, was a downloadable USGS map from the internet. The third survey was a 2-foot contour and spot elevation topographic map by the NYC Department of Information Technology and Telecommunications (DoITT) from their GIS system. The three various sources were combined and used in the documentation presented in this study.

Topography Analysis Methods

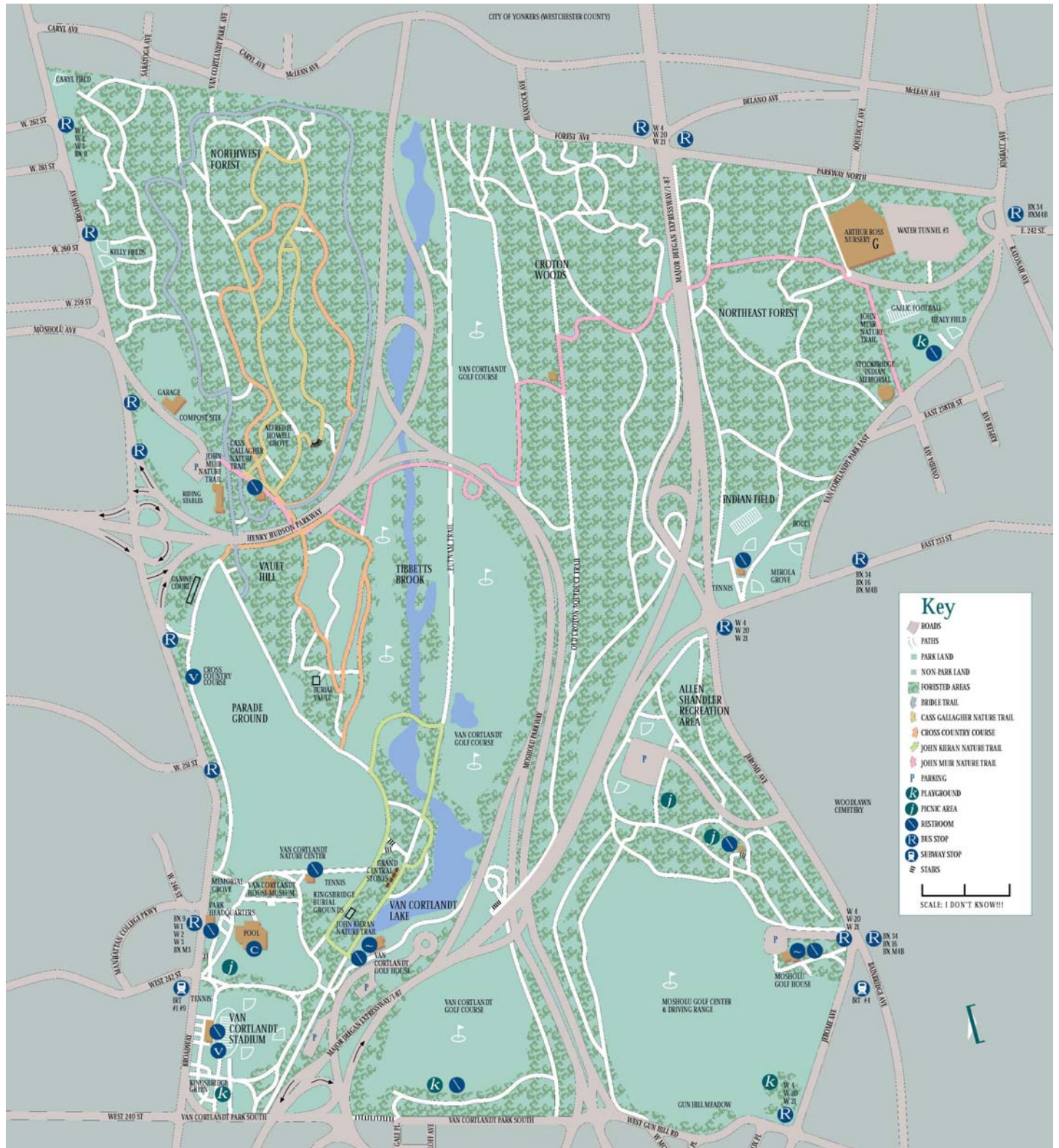
Along a station line located in the middle of the Major Deegan Expressway, 9 stations (200 feet apart) for Major Deegan Cross Sections and adjacent topography were established (refer to Major Deegan Expressway Sections Station 100 and 102, Station 103 and 104, Station 106 and 108, Station 110 and 112, and Station 114 in Appendix A "Major Deegan Expressway Sections").

Using these sections, ideal locations for bridge crossings were determined. Particularly, three locations were identified: Alternative B located at Station 103, Alternative C located at Station 112, and Alternative E located slightly south of Station 108. These three bridge alternatives are shown in Figure 2-2, "Major Deegan Expressway Bridge Alternatives". In addition to these, two non-bridge options were also developed.

Bridge Alternatives B and C were chosen because they are conceptually distinct. In Alternative B the bridge is located within a hillside, whereas in Alternative C the bridge is located in a plateau. In the former case, the existing hillside would enable an at-grade path to the bridge (east side) and only on the other side (west) would a ramp be necessary. In the latter case, ramps are needed on both sides of the Major Deegan Expressway. However, since the Major Deegan Expressway slopes downhill to the south, the ramps start further north than the bridge location and therefore, the elevation change is less.

Alternative E is conceptually close to Alternative C. In Alternative E, the bridge is located in a plateau, particularly in the area of the Old Croton Aqueduct. Since the bridge does not cross

Van Cortlandt Park Trail Map



Major Deegan Expressway Bridge Alternatives B, C, and E



perpendicularly, and the Major Deegan Expressway is sloped to the south, the ramp on the east side is a little shorter than the one on the west side. For Alternatives B, C, and E cross-sections and profiles of the bridges, ramps, and paths were developed (refer to Appendices C, D, and F).

Through topographic analysis of the Major Deegan Expressway Sections, the two additional non-bridge Alternatives A (Major Deegan Expressway Overpass Rehabilitation) and D (Mosholu Underpass) were developed. These alternatives are also discussed in more detail below (refer to Appendices B and E).

3 DESCRIPTIONS OF ALTERNATIVES

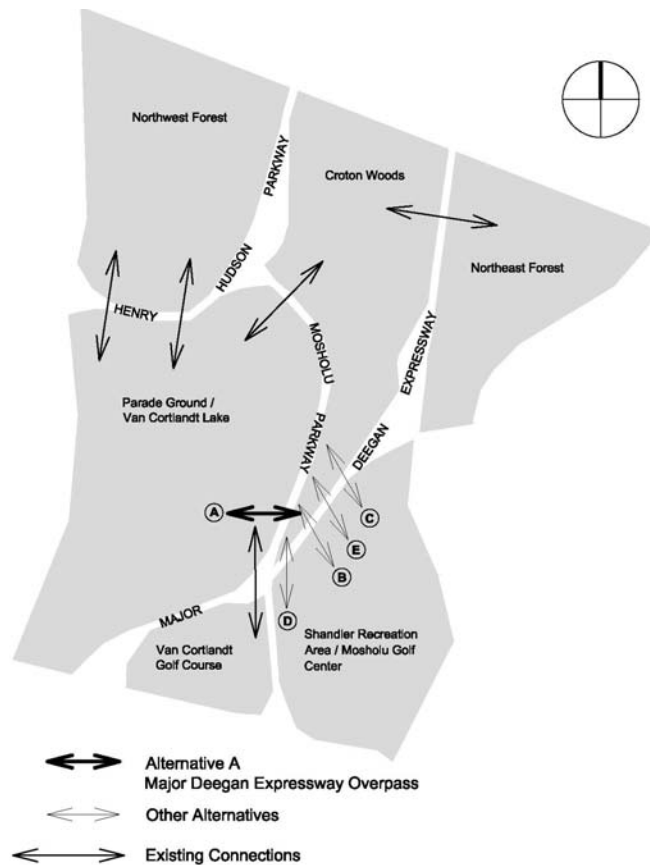
The following provides a description of each preliminary alternative developed in this feasibility study. Alternative A includes the rehabilitation of an existing overpass (Major Deegan Overpass), Alternatives B, C, and E include different locations for a new pedestrian bridge over the Major Deegan Expressway, and Alternative D includes the use of an existing underpass (Mosholu Underpass) as a pedestrian connection between Croton Woods and Shandler Recreation Area/Mosholu Golf Center. These alternatives were developed after several field trips to Van Cortlandt Park, and detailed study of topography in the focused section of the park. The review and refinement of the alternatives was coordinated with NYC DPR in several working meetings. The status of each alternative is presented below.

3.1 ALTERNATIVE A MAJOR DEEGAN EXPRESSWAY OVERPASS REHABILITATION

Description

Alternative A connects the area west of both the Major Deegan Expressway and the Mosholu Parkway (Parade Grounds/Van Cortlandt Lake area) with the Old Croton Aqueduct Trail (Croton Woods area). Figure 3-1 shows the functional connection being provided in the southern section of the park.

Figure 3-1
Alternative A



Alternative A proposes that the existing, but currently closed, pedestrian overpass on the Major Deegan Expressway bridge crossing the Mosholu Parkway (southbound side) would be re-opened, rehabilitated, and extended south to connect to already existing routes in the park. This existing pedestrian portion of the bridge leads into the Old Croton Aqueduct Trail to the north (Croton Woods Area) and was formerly connected through stairs (which are now broken and fenced off) and then to a trail, which leads to an underpass and the Van Cortlandt Lake area.

This alternative would demolish the stairs and instead create a sloped path that enables both pedestrians and bicyclists to use that connection. The ramp would start where the existing stairs end (at the south end of the bridge) and finish by the bridge over the underpass that leads to the Van Cortlandt Lake area. The new trail would have a slope of approximately 8 percent and would be constructed with a new barrier on the highway side of the trail. The landscape side would have to be regraded (refer to "Conceptual Sections" in Appendix B).

Through the demolition of the stairs it might be possible to take away a part of the existing stonewall (if structurally possible) in order to gain more width on the bridge. The pedestrian trail on the bridge is 9 feet from barrier curb to the wall (see Figure 3-2, "Pictures Alternative A"). The four different types of existing vehicle barriers along this connection would have to be adjusted for safe pedestrian and bicycle use. In addition, a new fence would be placed either on or in front of the vehicle barriers. Figure 3-3, "Rendering Alternative A", shows how Alternative A would look after implementation.

Status

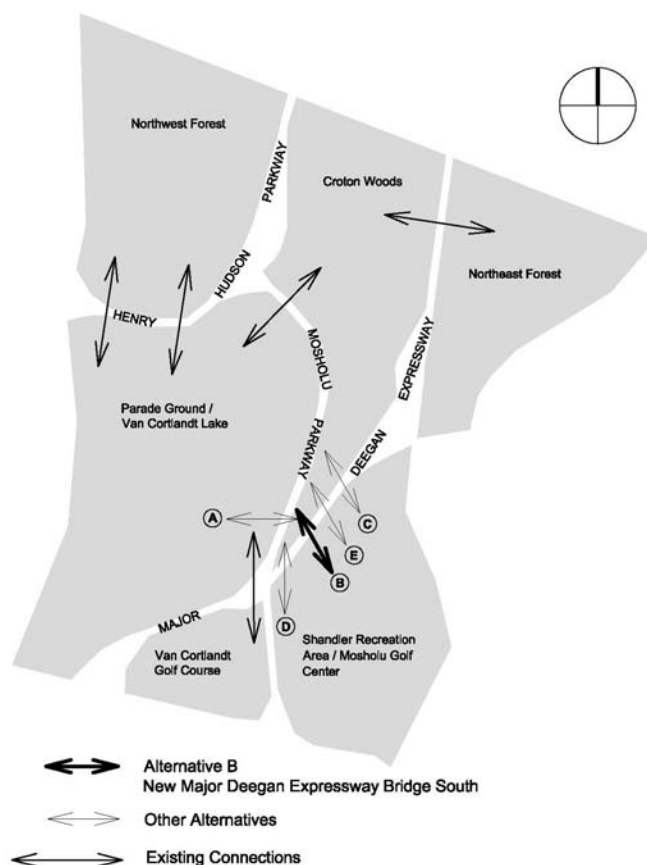
Alternative A was presented at a meeting with NYC DPR. After the presentation it was brought to PHA's attention that the NYC Department of Transportation (NYC DOT) already has a plan to implement pedestrian pathway improvements similar to Alternative A. According to DPR, NYC DOT's plan includes renovation of the pedestrian section of the Major Deegan Expressway overpass bridge, reconstruction of derelict stairs, and construction of a handicap accessible ramp that connects the existing trail system to the bridge. Renovation and construction is expected to take place in 2011. As these improvements would be planned and conducted by NYC DOT, it was agreed that Alternative A would not be advanced further by this effort.

3.2 ALTERNATIVE B NEW MAJOR DEEGAN EXPRESSWAY BRIDGE - SOUTH

Description

Alternative B, which is shown in Figure 3-4, connects Croton Woods area with the southern area of Shandler Recreation area/Mosholu Golf Course via a new bridge over the Major Deegan Expressway. The minimum bridge clearance of 16.5 feet would be maintained over the expressway and a trail surface to highway pavement minimum clearance of 18 feet is assumed in this study. Figure 3-5, "Pictures Alternative B", shows the park areas and existing paths that would be affected by the construction of the pedestrian bridge.

Figure 3-4
Alternative B



Alternative B proposes a new bridge, which would connect two parts of the park that have very different elevations (at Station 103). As a result, the paths to either side of the bridge would be different in length and slope. On the east side, the ground is slightly higher than the bridge and the path would slope down. On the west side, the ground falls off very steeply (see Figure 2-2). As a result, the difference in elevation between the bridge and the ground is approximately 21 feet. This would lead to a long “ramp” (approximately 420 feet) with a maximum slope of 5 percent. This new path would be connected to the existing trail coming from the pedestrian bridge described above in Alternative A. Alternatives A and B are very complementary. Figure 3-6, “Rendering Alternative B”, shows how Alternative B would look after implementation.

Status

Alternative B was presented to NYC DPR. After a discussion that included topics such as ramp and trail lengths, and resulting retaining walls required for Alternative B on the west side of the expressway, NYC DPR expressed concern about the aesthetics of this pedestrian connection over the Major Deegan Expressway. NYC DPR questioned if the trails leading to the bridge on the west side would have to be ramps built either on structure or with high retaining walls, and were concerned about the costs. As a result, this alternative was eliminated from consideration.

Pictures Alternative A



Pedestrian Overpass looking north



Pedestrian Overpass looking south



View from the Overpass to the Underpass (connection to Van Cortlandt Lake Area, looking west)



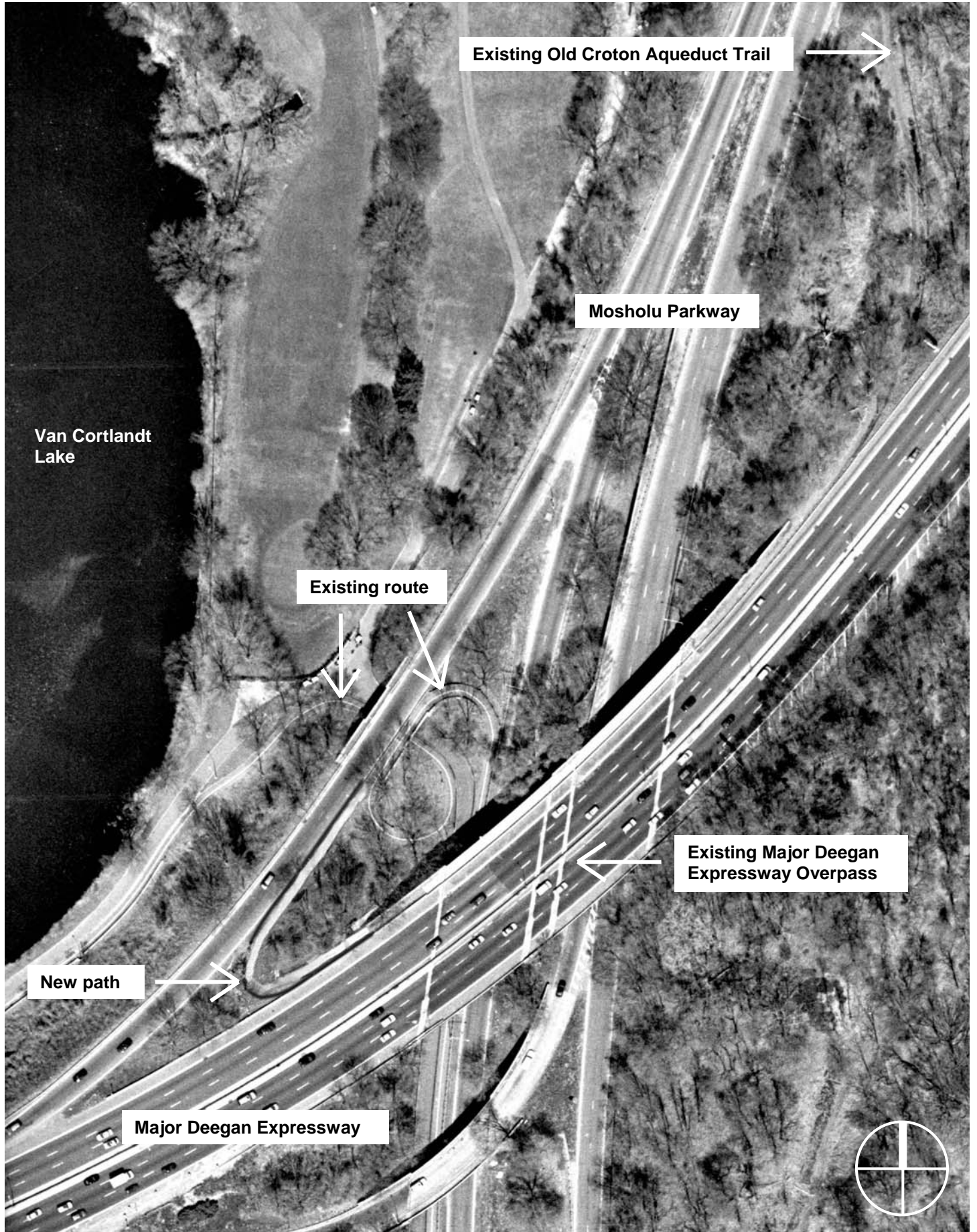
Area in which the new path would be constructed, top of the hill (looking south)



Area in which the new path would be constructed, foot of the hill (looking south)



Area in which the new path would merge with the existing path (looking north)



Pictures Alternative B



Area west of the Major Deegan Expressway where the bridge would cross (looking south)



Path west of the Major Deegan Expressway to which the bridge would connect (looking south)



Steep hillside between the path and Mosholu Parkway (west of the Major Deegan Expressway (looking south)



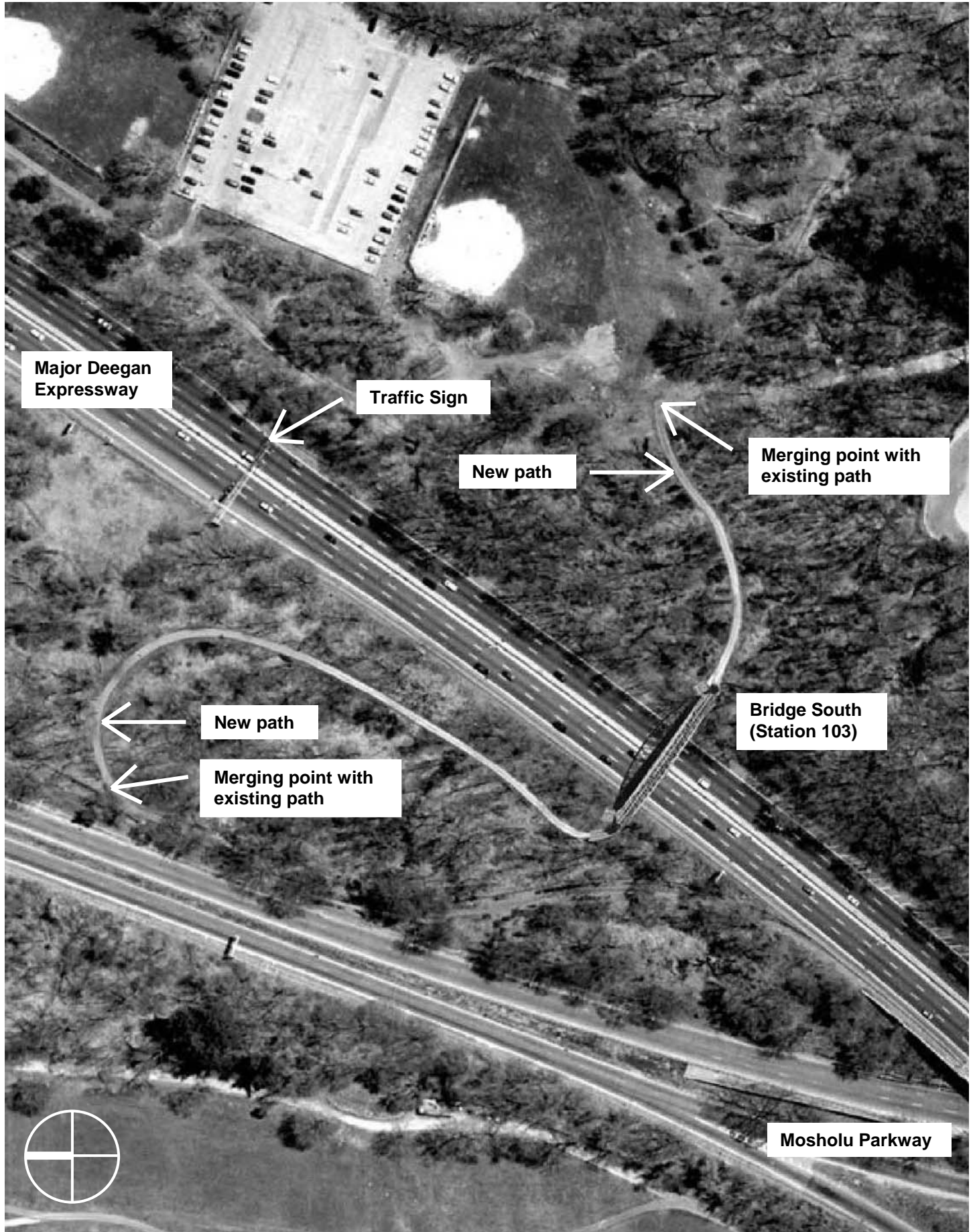
Fenced off "Forever Wild" preserve west of the Major Deegan Expressway in the area of the bridge location



Fenced off "Forever Wild" preserve west of the Major Deegan Expressway where the ramp would meet grade



Path east of the Major Deegan Expressway in the area where the bridge would be located (looking south)

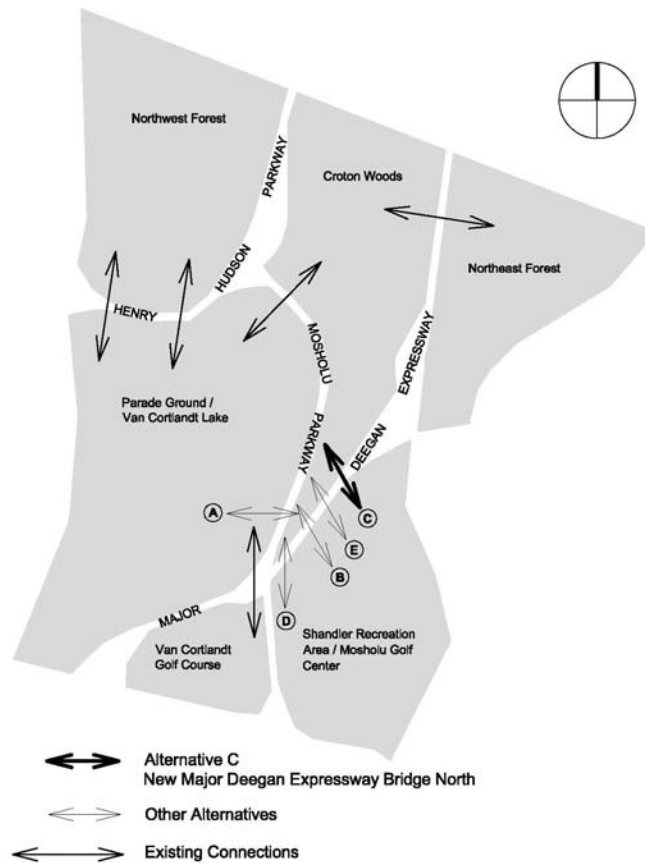


**3.3 ALTERNATIVE C
NEW MAJOR DEEGAN EXPRESSWAY BRIDGE NORTH**

Description

Alternative C connects the Croton Woods area with the northern area of Shandler Recreation area/Mosholu Golf Course (area close to the gas stations) as shown in Figure 3-7 below. Figure 3-8, "Pictures Alternative C", shows the context of the areas that would be affected by the construction of the pedestrian bridge.

**Figure 3-7
Alternative C**



Alternative C also proposes a new bridge over the Major Deegan Expressway, which would connect two parts of the park that are of similar elevation (at Station 112). As a result, the paths to the bridge on either side of the highway would be of similar length and slope (see Figure 2-2). To the east, a ramp of approximately 4 percent would connect to the existing trail system within the Shandler Recreation Area / Mosholu Golf Center. To the west, the ramp would be directed to connect with the existing trail system of the Croton Woods area. The west path would be approximately 200 feet long before reaching existing contours. The path connections would continue as at grade trails until they merge with existing trails. Figure 3-9, "Rendering Alternative C", shows how Alternative C would look after implementation.

Status

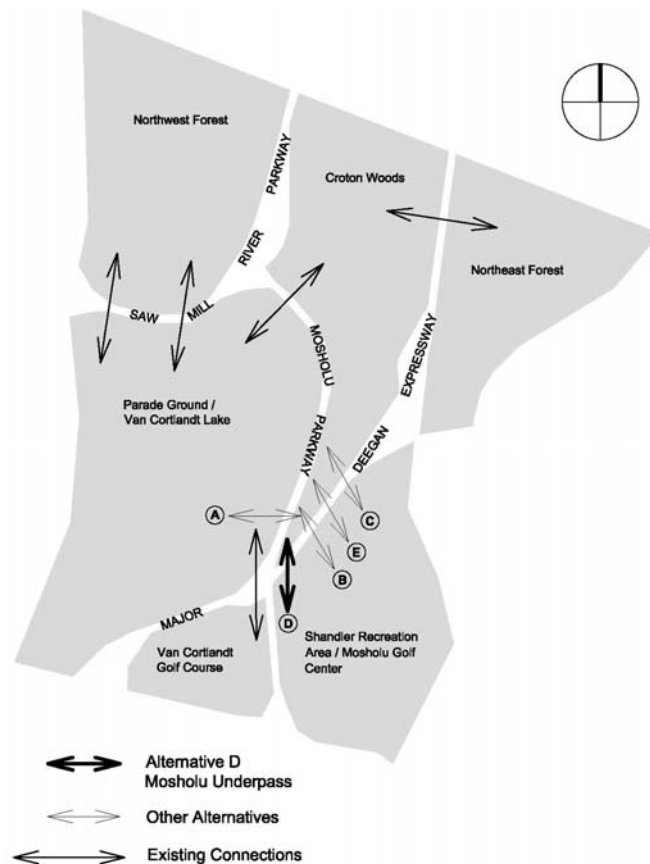
Alternative C was presented at a meeting with NYC DPR. After a comparison of two bridge Alternatives B and C, their elevations, ramp slopes and lengths, etc. it was decided that Alternative C should be developed in more detail, including a preliminary cost estimate.

3.4 ALTERNATIVE D MOSHOLU UNDERPASS

Description

Alternative D connects the Croton Woods area with the Shandler Recreation Area / Mosholu Golf Center and is the southern-most alternative considered. Figure 3-10 shows the connection. Figure 3-11, "Pictures Alternative D", provides information about the areas which would be affected by the implementation of the underpass pedestrian connection.

**Figure 3-10
Alternative D**



Alternative D proposes to make use of the existing Mosholu Parkway ramp underpass (northbound side) to provide a pedestrian/bicycle connection between the park segments. At the underpass, the shoulder is 14.5 feet wide between the roadway curb and the retaining wall

Pictures Alternative C



Area east of the Major Deegan Expressway where the bridge would cross



Path within the Shandler Recreation Area to which the bridge would connect (east of the Major Deegan Expressway)



View of the sloped Major Deegan Expressway in the area where the bridge ramp would meet grade (looking west)



View of the gas station (southbound), looking west



Path in the area west of the Major Deegan Expressway to which the bridge would connect (looking south)



Fenced off "Forever Wild" preserve west of the Expressway in which the bridge ramp would meet grade (looking east)