FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CROTON WATER TREATMENT PLANT
METHODOLOGIES

4.9. TRAFFIC AND TRANSPORTATION

4.9.1. Introduction

Guidelines from the *City Environmental Quality Review (CEQR) Technical Manual* (October 2001) were used for specific technical methodologies, databases, and procedures required to perform traffic analysis at each of the project sites. This methodology was adopted because the established guidelines are recognized to be conservative and provide consistency in evaluating potential impacts at all project sites. Based on previous trip generation estimates and traffic assignment patterns for both construction and Future With the Project traffic generations, geographic study areas were identified and intersections were selected for detailed study and analysis. The study area size included the roadway network most likely to be used by traffic to and from each site to the closest high-volume interstate highway or roadway that would not be influenced by the proposed project. The most logical traffic routes for access to the site were traced on maps and used to identify potential analysis locations. Subsequently, “trip assignments” were allocated to each direction of travel based on preliminary field screening of routes and existing traffic conditions. The construction traffic governed the study area and selected intersections, as the anticipated traffic volume during construction would be substantially larger than when the proposed project is completed.

These traffic study areas extended to the full extent of the study areas used for the Land Use and Neighborhood Character analysis or until the influence of the proposed project would fall to background levels because the route extended to a major highway. For example, the construction traffic at the Eastview Site considered Route 9A to be the major north-south corridor that would be influenced by the proposed project, so the secondary traffic study area extended along its greatest extent to Rt. 119 and I287, 1.7 miles to the south. This analysis assumed that truck traffic would not be allowed to use the nearby Sprain Brook and Saw Mill Parkways.

The much more closely spaced highway networks in the Bronx logically resulted in smaller secondary study areas. Most of the traffic to and from the Mosholu Site was assigned to the nearby Major Deegan Expressway interchange, 0.5 miles to the north. The longest traffic corridor studied for the Mosholu Site extended to Napier Avenue and East 233rd Street, 0.7 miles northeast of the Site. Although only a fraction of the traffic would choose to travel south along the crowded Jerome Avenue corridor, this corridor was also studied to Gun Hill Road, west toward Mosholu Parkway and east to Bainbridge, a distance of 0.4 miles from the site. This network would effectively consider all the extra traffic generated by the proposed construction and operational traffic.

The Harlem River Site is adjacent to the Fordham Road interchange with the Major Deegan Expressway (I87), and the construction volumes would be low because of the extensive planned use of barges to haul construction materials to and from the site. However, the existing network of city streets is quite congested, so this traffic network extended 0.4 miles east on Fordham

Road to the Grand Concourse, north 0.8 miles to 230th Street, and across the Harlem River to 10th Avenue between 207th Street and 230th Street.

The traffic areas for the Shaft Sites and Jerome Park Reservoir were similarly sized and in all cases based on the logical proposed uses of streets until such distance that the project traffic would be indistinguishable from the background. These sites would have less than one-tenth the construction traffic what would go to the water treatment plant site, but the same level of analysis was applied to each of the off-site work areas that would be used for construction staging and worker access to the New Croton Aqueduct.

4.9.2. Baseline Conditions

4.9.2.1 Existing Conditions

4.9.2.1.1. Traffic

The collection of existing traffic volume data was performed for each water treatment plant site. The traffic data collection was developed to provide the necessary traffic information in the study area and also for the time periods that both the construction and operation traffic would occur. It has been assumed that construction would typically commence no later than 7 AM and finish at approximately 6 PM. This assumption follows the local ordinances regulating construction hours. The following is a description of the traffic count types that were performed:

Turning movement counts (TMCs) were performed at the study area intersections during the morning (AM Peak) and evening (PM Peak) time periods. To ensure that the peak hours were captured, the TMCs conducted at the identified intersections have been performed on weekdays from 7 AM to 10 AM for morning peak-hour traffic, and from 2 PM to 6 PM for the afternoon peak-hour traffic periods. The counts were performed utilizing 15-minute increments with automobile, truck, and bus vehicles classified.

Automatic Traffic Recorder (ATR) counts were performed for a 24-hour period for seven days. Vehicle classification counts were performed from 7 AM to 10 AM and 2 PM to 6 PM at selected ATR count locations to provide a representation of the study area roadways. These hours have been chosen as a representative of the periods of heaviest traffic volumes during the construction period. Vehicles would be classified as follows:

- Automobiles
- Taxis
- Motorcycles
- Buses
- Light-duty gas trucks
- Heavy-duty gas trucks
- Light-duty diesel vehicle
- Light-duty diesel truck
- Heavy-duty diesel vehicle
- Sports Utility Vehicles (SUV)

Light-duty tucks: Vans, ambulances, pickup trucks and all trucks with four (4) wheels.
Heavy-duty trucks: All vehicles with 6 or more wheels (6 wheels can be on 2 or 3-axle vehicles)

Each of the project sites is presented below for study area definition and intersection selection in the analysis. The Eastview, Mosholu and Harlem River Sites were studied as proposed plant locations. NCA Shaft No. 9, NCA Shaft No. 14, NCA Shaft No. 18, Gatehouse No. 1, and Jerome Park Reservoir sites were studied because of their proposed use for construction access during the possible pressurization of the NCA.

Eastview Site. The Eastview Site is located in the Town of Mount Pleasant, Westchester County, New York. The study area for the Eastview Site was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The study area is bounded by Dana Road to the north, Executive Boulevard to the south, Bradhurst Avenue (Route 100) and Knollwood Road (Route 100A) to the east, and Route 9A (Saw Mill River Road) to the west.

Mosholu Site. The Mosholu Site is located at the Mosholu Golf Course in the Borough of the Bronx, New York. The study area for the Mosholu Site was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the water treatment plant site. The study area extends along Jerome Avenue and consists primarily of the Jerome Avenue and Bainbridge Avenue Corridors; it is bounded to the north and west by the Major Deegan Expressway (I-87) interchange at East 233rd Street, to the south by Gun Hill Road, and to the east by Bainbridge Avenue and Van Cortlandt East. The study area includes roadways and intersections that are anticipated to carry the majority of traffic to/from the project site. The main regional highway serving the study area and traversing adjacent to the project site is I-87.

Harlem River Site. The Harlem River Site is located along the Harlem River in the Borough of the Bronx, New York. The study area for the Harlem River Site was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The study area is bounded by Van Cortlandt Park South to the north, Washington Bridge to the south, Grand Concourse Boulevard to the east, and 10th Avenue in Manhattan to the west. The study area was selected to include major arterials that are anticipated to carry the major traffic to and from the site access.

In addition, barges would be utilized to transport construction materials to and excavated materials from the Harlem River Site. These barges would be routed to a high-traffic waterway, which includes the section of the Harlem River to the north of the site to Hudson River. Two bridges are located along the anticipated navigation route: the Spuyten Duyvil Bridge and the Broadway Bridge. These locations were also reviewed to determine if there would be an impact on traffic conditions.

NCA Shaft No. 9. The New Croton Aqueduct (NCA) Shaft No. 9 site is located in the Village of Sleepy Hollow, New York. The study area was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the Shaft Site.

The study area for Shaft Site is primarily bounded by Phelps Way/Route 117 to the north, Bedford Road/Route 448 to the south and east, and Sleepy Hollow Road to the west.

NCA Shaft No. 14. The NCA Shaft No. 14 site is located in the Village of Ardsley, New York. This study area was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The study area for the Shaft Site is primarily bounded by Dobbs Ferry Road to the north, Ashford Avenue/Ardsley Road to the south, Sprain Ridge Road to the east, and Saw Mill River Road to the west. Major arterial roadways adjacent to the study area are the New York State Thruway, Sprain Brook Parkway, and Saw Mill River Parkway.

NCA Shaft No. 18. The NCA Shaft No. 18 site is located in the City of Yonkers, New York. This study area was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The study area around the Shaft Site is primarily bounded by Palmer Road to the north, Yonkers Avenue and Midland Avenue to the south, the Saw Mill River Parkway to the west, and the New York State Thruway (I-87) to the east. Major arterial roadways adjacent to the study area are the Cross County Parkway, New York State Thruway (I-87), Sprain Brook Parkway, and Bronx River Parkway.

Gate House No. 1. The Gate House No. 1 site is located within Van Cortlandt Park, in the Borough of the Bronx, New York. The study area was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The study area is primarily bounded by the Major Deegan Expressway to the north, south, and east, and the Saw Mill River Parkway and the Henry Hudson Parkway to the west. The study area was selected to include major arterials that are anticipated to carry the major traffic to and from the site.

Gate House No. 1 itself is only accessible from the southbound side of the Major Deegan Expressway. During construction the site would be accessible by a temporary access road off the Major Deegan. The traffic analysis for this location would utilize existing New York State Department of Transportation (NYSDOT) traffic data to demonstrate the low volume of traffic generated at this site would not cause a significant impact on this major highway.

Jerome Park Reservoir Facilities. The Jerome Park Reservoir is located south of Van Cortlandt Park in the Borough of the Bronx, New York. The study area was selected to encompass those roadways most likely to be used by the majority of vehicular traffic traveling to and from the site. The primary traffic study area for Jerome Park Reservoir is bounded on the north by Van Cortlandt Park South, on the south by West Fordham Road, on the east by Jerome Avenue, and on the west by Broadway.

4.9.2.1.2. Highway Capacity Manual Procedure

The 2000 Highway Capacity Manual (HCM-2000) was used to analyze each of the project sites. The HCM-2000 model calculates the capacity and the level of service (LOS) at intersections. Capacity is evaluated in terms of the ratio of the demand flow rate to capacity (v/c ratio) whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle – sec/veh) for each approach. Control delay is the portion of the total delay attributed to the traffic signal operation for signalized intersections. The control delay includes initial deceleration delay, queue, move-up time, stopped delay, and final acceleration delay. Based upon these calculations the intersections are evaluated for an available LOS. Table 4.9-1 presents the LOS criteria for signalized intersections.

As part of the HCS analysis, a survey was conducted of the existing traffic volumes, intersection geometry, and intersection controls for the intersections potentially impacted. It was determined that a number of the intersections were being over utilized (i.e. vehicles were using the shoulder as an extra lane or were continuing through the intersection after the red signal). Because of this, the HCS model was adjusted to reflect the actual conditions in the intersection as opposed to the default values for the intersections.

The capacity analysis calculates the control delay (in seconds per vehicle), which are categorized in LOS A to LOS F. LOS A describes operation with very low delay. This occurs when signal progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. LOS B generally occurs with good progression and/or short cycle lengths, and most vehicles do not stop at the intersection. LOS C occurs when higher delays result from fair progression and or longer cycle lengths. The number of vehicles stopping at the intersection is significant at this level, although many pass through the intersection without stopping. LOS D occurs when the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths or high volume-to-capacity (v/c) ratio. Vehicles stop, and the proportion of vehicles not stopping declines. LOS E occurs when there are high delay values indicating poor progressions, long cycle lengths and high v/c ratio. This is considered to be a limit of acceptable delay. LOS F occurs with oversaturation, when arrival rates exceed the capacity of the intersection. LOS F may also occur at high v/c ratio with cycle failures. Poor progression and long cycle lengths may also be contributing to such delays. This condition is considered to be unacceptable to most drivers.

TABLE 4.9-1. LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Control Delay per Vehicle (sec/veh)
A	<=10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

The criteria for un-signalized intersections, as shown in Table 4.9-2 and Table 4.9-3, are slightly different than those for signalized intersections. These are based upon the type of control for the intersection, e.g. Two Way Stop Control (TWSC) and All Way Stop Control (AWSC).

TABLE 4.9-2. LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED TWO WAY STOP CONTROL INTERSECTIONS

Level of Service	Average Control Delay (sec/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

TABLE 4.9-3. LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED ALL WAY STOP CONTROL INTERSECTIONS

Level of Service	Average Control Delay (sec/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

4.9.2.1.3. Safety

In order to perform the safety analysis at each of the project sites, accident records were reviewed. The accident reports for a three-year period were collected from New York State Department of Traffic and Safety, New York State Department of Motor Vehicles (NYSDMV), and local Police Departments. The purpose of reviewing accident reports was to determine whether any location in the study area was a High Accident Location (HAL). The types of accidents involving property damage, injury, fatalities, and pedestrian-related accidents have been reviewed to determine whether any high-accident locations would be affected by the project.

4.9.2.1.4. Parking

Use of public transportation or staging areas would be provided during construction for all of the project sites and an employee site parking lot would be provided with the proposed plant. Since the proposed plant would incorporate parking spaces for employees, a parking analysis was not necessary for the plant operation. The construction traffic was analyzed to determine if the available staging areas provide enough spaces to meet the parking demand.

The parking availability on-site and off-site for each project site was determined based upon the individual site and area characteristics. For the construction parking analysis, each project site was reviewed to determine what staging area was available to provide temporary parking facilities on-site. The parking demand generated during the construction was reviewed in light of the on-site parking availability to determine potential impacts. If off-site parking demand was necessary, the availability of this in the vicinity of the project site was reviewed to determine if significant impacts occurred.

4.9.2.1.5. Transit

For the purpose of transit facilities, the lines and the stations within reasonable walking distance to the project site delineated the study area. For the subway system, the closest station to the project site was studied for each line serving the site, provided that the station was within one mile of the site. Bus lines within one-half mile of the project site were also addressed. A bus transit analysis was conducted for the project site at which more than 100 bus trips were generated.

For those project sites requiring analyses of rail transit facilities, the existing volumes, passenger flow patterns, and level of service were determined to provide a baseline from which the future conditions could be predicted. Counts conducted at the subway stations analyzed included street stairs and turnstiles. Levels of service for stairways were based on guidelines listed in the *CEQR Technical Manual.* Analyses of the stations were conducted using the Fruin pedestrian level of service methodology, which equates pedestrian flow per minute per foot of stairway width with qualitative measures of pedestrian comfort. Table 4.9-4 presents the level of service criteria for stairways.

TABLE 4.9-4. LEVEL OF SERVICE CRITERIA FOR STAIRWAYS

Level of Service	Pedestrian/Foot/Minute	Comments
A	7 or less	Unrestricted
B	7-10	Slightly restricted
C	10-15	Restricted but fluid
D	15-20	Restricted, necessary to continually alter walking
E	20-25	Severely Restricted
F	25 or more	Forward progress only by shuffling, no reverse movement possible

4.9.2.2 Future Without the Project

The Future Without the Project conditions were analyzed for the anticipated year of peak construction, and the anticipated year of operation. For the proposed project at the Eastview Site the anticipated year of peak construction would be 2008, and the anticipated year of operation would be 2010. For the proposed project at the Mosholu Site, the anticipated year of peak construction would be 2010, and the anticipated year of operation would be 2011. For the proposed project at the Harlem River Site the anticipated year of peak construction would be 2009, and the anticipated year of operation would be 2011. For the NCA Shaft Sites the anticipated year of peak pressurization construction would be 2013. For the Jerome Park Reservoir the anticipated year of peak pressurization construction would be 2010. The Future Without the Project condition accounts for general background traffic growth within the study area. It also includes trip making anticipated to be generated by major proposed projects that are likely to be in place by the future analysis years. Since the NCA Shaft Sites would not require additional maintenance traffic beyond the current levels once construction is complete, Future Without the Project analysis was not performed for these locations during the operation years.

For the Eastview Site, as described in Section 4.1, Data Collection and Impact Methodologies, Introduction, each of the Future Without the Project Analyses consider scenarios with and without the Cat/Del UV Facility. In the scenario where the Cat/Del UV Facility would be under construction (in the peak construction year, 2008), several off-site construction worker parking locations were considered. (Although the Eastview Site could accommodate the Cat/Del UV Facility's parking demand if the facility were built on the site without the proposed Croton project, the off-site parking locations were examined in order to allow for an assessment of the incremental impact associated with the proposed Croton project's construction.)

Table 4.9-5 shows the anticipated background annual growth rates used for the project sites. For traffic and parking analysis purposes in the Bronx, an annual growth factor of 0.5 percent was applied to the existing traffic network to estimate future traffic volumes without the proposed project, as recommended in the *CEQR Technical Manual*. For the project sites in Westchester County, a growth factor of 1.5 percent per year was used. This Westchester County background growth factor of 1.5 percent was based upon a 1.3 percent average annual growth rate for Westchester County obtained from the New York Metropolitan Transportation Council's traffic model developed for the years of 1997 and 2020.

In addition to the annual growth rate noted above, trips due to major development projects that were not assumed to be part of the area's general growth were also considered and added to each study area network. These projects would be determined based on existing proposals, pending site plans, expectations of owners and developers, and discussions with agencies and planning boards. Lastly, any changes to the roadway network anticipated by the analyses years have been also incorporated in the Future Without the Project conditions.

TABLE 4.9-5. BACKGROUND GROWTH RATES FOR FUTURE WITHOUT THE PROJECT CONDITIONS

Project Work Sites	Growth Rate (%)
Eastview Site (Westchester)	1.5
Mosholu Site (Bronx)	0.5
Harlem River Site (Bronx)	0.5
NCA Shaft No. 9 (Westchester)	1.5
NCA Shaft No. 14 (Westchester)	1.5
NCA Shaft No. 18 (Westchester)	1.5
Gate House No. 1 (Bronx)	0.5
Jerome Park Reservoir (Bronx)	0.5

Pavement Infrastructure. In general, highways can have design loads of 10,000,000 to 80,000,000 Equivalent Single Axle Loads (ESAL), arterials between 2,000,000 to 5,000,000 ESAL, and low-volume roadways from 50,000 to 500,000 ESAL. Depending on the types and functions, construction trucks generated by the proposed project over the entire construction period were represented by an equivalent 18,000-pound ESAL. Because trucks bringing in construction materials (e.g. concrete trucks) and those taking out excavated materials have different weights, they would generate different ESAL values. Those ESAL values were, therefore, calculated based on American Association of State Highway and Transportation Officials (AASHTO) guidelines for trucks entering and exiting a project site. Using the assignment pattern for construction trucks, the ESAL values were applied to the roadways in the study area. Total ESAL values along the roadways in the study area of each project site can be obtained by summing those inbound and outbound ESAL values on the same roadways.

4.9.3. Potential Impacts

Project impacts on the area traffic networks were evaluated under two impact conditions. The first condition was for traffic generated by the facility once complete and in full operation. The second was for traffic generated by the construction of the facilities. Each of these impact conditions is described below.

4.9.3.1. Project Impacts Review Criteria

Traffic. Criteria for potential traffic impacts at the different signalized locations throughout the network were determined according to the thresholds established in the *CEQR Technical Manual*.

Based on the thresholds established in the *CEQR Technical Manual*, if a Future Without the Project intersection LOS A, B, or C deteriorates to a marginally unacceptable mid-LOS D or an unacceptable LOS E or F in the (2010 for the Eastview Site, 2011 for the Mosholu Site, 2011 for the Harlem River Site) Future With the Project condition, then a significant traffic impact would occur. The *CEQR Technical Manual* further states that a Future Without the lane group Project LOS A, B, or C that becomes LOS D, requires mitigation to mid-LOS D. Therefore, any such Future With the Project LOS change with a (2010 or 2011) Future With the Project delay of mid-LOS D or less is not considered an impact for the purpose of this analysis. For a Future Without the Project lane group LOS E, the threshold is a four (4) second increase in Future With the Project delay. For a Future Without the Project lane group LOS F, the threshold is a three (3) second increase in Future With the Project delay. However, for a Future Without the Project LOS F condition that already has delays in excess of 120 seconds, an increase in Future With the Project delay of more than one (1) second is considered significant, unless the proposed project would generate fewer than five vehicles through that lane group in the peak hour.

These impact criteria are also applicable to unsignalized intersections. However, as a mid-LOS D equates to a delay of 30 seconds for an unsignalized intersection, any Future With the Project LOS change with a Future Without the Project delay of 30 seconds or less would not be considered a significant impact. In addition, for the minor street to trigger significant impacts, 90 passenger car equivalents must be identified in the Future With the Project condition in any peak hour.

Transit. According to the *CEQR Technical Manual*, if the proposed project is likely to result in fewer than 100 peak hour rail or bus transit riders, further transit analyses typically are not required. Further transit analyses were not included for those instances where projected transit ridership was deemed clearly unlikely to produce significant adverse impacts.

According to the *CEQR Technical Manual*, the Metropolitan Transit Authority has defined significant stairway impacts in terms of the number of inches of effective width needed to restore to Future Without the Project conditions. For a Build LOS D condition, a required widening of six inches or more is considered significant. For a Build LOS E condition, three to six inches is considered significant. For build LOS F, a one to three inch widening is considered significant. To determine the amount of widening required, the following formula should be used:

$$\frac{X}{W_e} = \frac{V_p}{V_{na}}$$

where X = required inches of widening
W_e = effective width in the no action condition
V_p = project-induced pedestrian volume
V_{na} = no action pedestrian volume

The Future with the Project evaluations provide an analysis of projected load levels per bus at the bus stop closest to the project site and determine whether this future load level would be within a typical bus's seated capacity, within its total capacity, or above its total capacity. According to current New York Metropolitan Transportation Council/New York City Transit Authority (NYMTC/NYCTA) guidelines, increases in bus load levels to above their maximum capacity at any load point is defined as a significant impact since it necessitates the NYCTA's adding more bus service along that route.

4.9.3.2. Potential Project Impacts

Trip Generation. The travel demand for the operation of the proposed plant was determined for the weekday AM, PM, and peak hours for the years 2010 (Eastview Site) and 2011 (Harlem River Site and Mosholu Site). When fully constructed and operational, the future peak hour trips would almost entirely be employee-related. During a typical day, it is anticipated that there would be a small number of visitor trips as well as delivery trucks. At the off-site facilities, there would be negligible trip making, except for the periodic sampling and maintenance vehicles; therefore, no traffic analyses need to be conducted at these project sites.

According to standards for conducting traffic analyses in New York City, the need for a detailed traffic analysis would be unlikely if a proposed project is anticipated to result in fewer than 50 peak hour vehicle trips. For this analysis, all project sites would generate fewer than 50 peak hour vehicle trips when the proposed water treatment plant becomes operational. Traffic analyses have been performed at selected locations to demonstrate that the small additional traffic would not create additional impacts.

Modes of Transportation. Based upon the availability of different modes of transportation at each project site, each project site would have different traffic demands. Modal split information was obtained through studies performed for the New York Metropolitan Transportation Council. The reverse journey-to-work information would provide information on how people travel to a workplace in a location. The modal split percentages, shown in Table 4.9-6, were then applied to the trip generation estimates to determine the volume of persons traveling to and from the project site by each mode. To determine the volume of vehicles that the project would generate, an average vehicle occupancy factor of 1.2 persons per vehicle for permanent employees was applied to the number of persons using autos.

Traffic Assignment. The assignment of traffic was based on the anticipated origin-destination patterns for employees. The patterns were determined according to the density of population in census tracts within a 5-mile radius as reported in the 2000 Census. The population percentages in the census tracts were obtained to determine the major trip origin and destination points of workers to and from the project sites. The major highway routes available to approach or depart the study area from each of the major trip origins or destinations were identified. This information was utilized to develop the anticipated percentages of the project's trip generation vehicles that would utilize the various study area roadways. These percentages constituted the anticipated trip generation roadway assignment patterns.

TABLE 4.9-6. MODE CHOICE ASSUMPTIONS

Mode	Percentage of Workers Using Each Mode							
	Harlem River	Eastview	Mosholu	NCA Shaft No.9	NCA Shaft No.14	NCA Shaft No.18	Gate House No.1	Jerome Park Reservoir
Auto	34	100	55	100	100	100	100	34
Mass Transit	55	---	39	---	---	---	---	55
Walk/ Other	11	---	6	---	---	---	---	11

With the anticipated trip generation assignment patterns established, vehicular and construction/delivery truck trips were assigned to specific streets and through specific intersections. Vehicles were then assigned to the project sites via different travel corridors, using the most direct routes as determined. Project-generated truck trips were assigned to each project site through designated truck routes and local routes adjacent to the project site as described below in Section 4.9.3.4. None of the trucks were assigned to the parkways where trucks are restricted.

Eastview Site. The primary routes for the Eastview Site are the Saw Mill River Parkway, Route 9A, Route 9, Sprain Brook Parkway, Grasslands Road/Route 100C, Knollwood Road, Old Saw Mill River Road and Saw Mill River Road. Due to the presence of the accesses for the project site on Grasslands Road/Route 100C, and off Saw Mill River Road (Route 9A) at Dana Road, these roads would be anticipated to serve as major connections between the project site and the major highways in the vicinity of the site. Approximately 58 percent of the total vehicular trips would be anticipated to be using a section of Route 100C to the east of Beeline Boulevard, and approximately 42 percent of the total vehicular trips would be using a section of Route 100C to the west of Beeline Boulevard. Approximately 56 percent of the total vehicular trips would be using Sprain Brook Parkway. Approximately 21 percent of traffic would utilize Old Saw Mill River Road traveling to and from the Saw Mill River Parkway and Nepperan Road and approximately 15 percent to the south of Route 100C on Saw Mill River Road. Only 5 percent of the total vehicular trips would use Route 9A north of Route 100C.

Mosholu Site. The transportation network of the Mosholu Golf Course Site study area includes highways, collectors and local street systems. I-87 (the Major Deegan Expressway) serves as the main regional highway for the study area; Van Cortlandt Park East, East 233rd Street, Jerome Avenue, and Gun Hill Road serve as collectors for the study area; the remaining roadways primarily act as part of the local, primarily residential, street network. Based upon the above-referenced analysis, the Major Deegan Expressway would be anticipated to contribute 60 percent of the vehicular traffic, with the remaining 40 percent being contributed along local roads.

Harlem River Site. The primary routes for the Harlem River Site are the Major Deegan Expressway (I-87), Route 9/Broadway, 10th Avenue, Bailey Avenue, Jerome Avenue West Fordham Road, West 225th Street, West 207th Street, and Kingsbridge Avenue. Based upon the above-referenced analysis, the Major Deegan Expressway would be anticipated to contribute 60 percent of the vehicular traffic, with the remaining 40 percent being contributed along local roads. The 40 percent of overall contributed by local roads would be divided as follows: West 207th Street would contribute approximately 10 percent of the total vehicular trips Sedgwick via Avenue; West Fordham Road would contribute approximately 26 percent of the vehicular trips to and from Dr. Martin Luther King Jr. Boulevard, Jerome Avenue, and the Grand Concourse.

NCA Shaft No. 9. The major routes present in the vicinity of the Shaft Site are Sleepy Hollow Road, Old Sleepy Hollow Road, Old Saw Mill Road, Bedford Road/Route 448, County House Road, Nepperan Road, Saw Mill River Parkway, and Route 117. Sleepy Hollow Road is anticipated to be the primary access to the Shaft Site. Approximately 37 percent of the total vehicular trips are anticipated to use County House Road, which connects Sleepy Hollow Road to Saw Mill River Parkway. Approximately 31 percent of the vehicular trips would use Sleepy Hollow Road (east-west section). To the north of the Shaft Site, approximately 13 percent of the total vehicular trips would use Old Sleepy Hollow Road and approximately 6 percent of the total vehicular trips would use a section of Sleepy Hollow Road parallel to Route 117. To the south of the Shaft Site, approximately 10 percent of the vehicular trips would use Bedford Road south of County House Road and approximately 3 percent of the vehicular trips would use Bedford Road (Route 448) north of County House Road.

NCA Shaft No. 14. The primary routes for the Shaft Site are Saw Mill River Parkway, Sprain Brook/Bronx River Parkway, New York State Thruway (I-87), Cross County Parkway, Route 9A, Dobbs Ferry Road, Ashford Avenue, and Saw Mill River Road. Approximately 77 percent of total vehicular trips traveling to the project from the east and west would use Ashford Avenue to and from the Saw Mill River Parkway and the NYS Thruway (I-87). Approximately 20 percent of the total vehicular trips traveling to the Shaft Site from the north and south would use the Saw Mill River Road to and from I-287 and Dobbs Ferry Road to the north.

NCA Shaft No. 18. The major routes in the vicinity of the Shaft Site are Yonkers Avenue and Midland Avenue (running east-west), providing an access to Saw Mill River Parkway, and the Sprain Brook/Bronx River Parkway. Other major routes are New York State Thruway (I-87), Cross County Parkway, Route 9A, Nepperan Road, and Central Park Avenue. The Cross County Parkway would contribute approximately 72 percent of total vehicular traffic. Approximately 22 percent of the total vehicular trips would travel to the Shaft Site via Yonkers Avenue. South of Cross County Parkway, Yonkers Avenue is anticipated to contribute approximately 4 percent of the total vehicular trips. Midland Avenue is anticipated to contribute about 3 percent of the total vehicular trips.

Gate House No. 1. Due to Shaft Site access limitations, Gate House No.1 would only be accessed to and from the southbound Major Deegan Expressway (I-87). The access would be through the adjacent service station entrance/exit points or a temporary construction ramp access.

Jerome Park Reservoir Sites. The primary routes in the vicinity of Jerome Park Reservoir are the Major Deegan Expressway (I-87), Route 9/Broadway, Bailey Avenue, Jerome Avenue, West Fordham Road, West 225th Street, Goulden Avenue, Sedgwick Avenue, Kingsbridge Avenue, Paul Avenue and Grand Concourse Boulevard. Just over 60 percent of project-generated autos would arrive or depart via I-87 and be routed to Jerome Park Reservoir via Van Cortlandt Avenue and Sedgwick Avenue to the north and west Fordham road and Goulden Avenue to the south. Project traffic would be concentrated in these corridors. About 12 percent of the project-generated vehicular traffic would use Route 9. Approximately 20 percent and 16 percent of traffic would utilize Goulden Avenue and Paul Avenue respectively. These roadways would have contributing traffic from I-87 northbound.

4.9.3.3. Potential Construction Impacts

Trip Generation. The construction of the proposed project would require a period of approximately five to six and one half years. The construction associated with the possible pressurization of the NCA as part of the Eastview Site alternative would require a period of four years. Due to the extended construction period of the project, the transportation demands at each project site were determined for the peak construction year. This methodology is the same as that used for determining future long-term potential transportation demands.

To determine the volume of vehicles that the construction would generate, an average vehicle occupancy factor of 1.2 persons per vehicle was applied to the number of persons using autos. Construction workers would follow the same traffic assignments as those for the project workers as discussed above.

Because the construction period would generate a high number of construction trucks, the effect of these trucks on traffic operating conditions would be included in the analysis. Typically, a passenger car equivalent (PCE) factor is used for trucks to account for the lower speed and maneuverability. The passenger car equivalent is typically 1.5 for 2-axle trucks and 2.0 for 3-axle trucks. To obtain traffic analysis results that are conservative, it was assumed that all construction trucks would be 3-axle trucks, or equivalent to 2.0 passenger cars.

These construction/delivery trucks would be able to use only limited routes in the vicinity of the project sites, since these would be oversized vehicles. These routes are described later in the Traffic Assignment Section of the report for each project site. These routes and intersections would be analyzed to learn the traffic condition and capacity in existing and future periods.

The typical construction day for employees is between 7 AM to 6 PM, with trucks arriving and departing throughout the day during peak construction periods. However, it is anticipated that the construction workforce would be on-site by 7:30 AM, and departed by 6:30 PM. Therefore, the AM and PM peak hours are anticipated to account for all worker travel during the peak construction. Construction at the off-site facilities would be restricted to a 7 AM to 6 PM workday. The construction traffic peaks for these project sites are still anticipated to fall within the above AM and PM peak time periods. To be more conservative, where the construction peak hours overlapped with near peak traffic background volumes, the potential impact analysis assumes the construction traffic peak hours match the adjacent roadway AM and PM peaks.

During the AM peak hour, it was assumed that 95 percent of the trips generated by construction workers would be arriving and 5 percent departing the project site. During the PM peak hour, it was assumed that 5 percent of those trips would be arriving at the project site and 95 percent departing from it.

The year of peak construction activity for each project site was compared with the baseline conditions modeled in 2008, 2009, or 2013 to determine potential impacts. The peak construction year varied from project site to project site in accordance with the construction schedule. As mentioned above, the traffic generated during the peak construction period is substantially greater than after the proposed project is built and fully operational. The traffic assignment methodology followed the same steps as presented above for the built facility.

Traffic Assignment. The traffic assignment for construction-generated traffic was based upon the two types of construction traffic. The first type of construction traffic is vehicles used by construction personnel going to and from the work site. The second type of construction traffic is the truck traffic for the material deliveries and/or removals. Each of these construction traffic types has different origin-destination patterns and roadway restrictions that make for separate traffic assignment patterns.

The construction personnel traffic would have similar traffic assignment patterns as the workers at the facility once they are in operation. Therefore, the traffic assignment utilized for this portion of the construction-generated traffic was the same as that described under Section 4.9.3.2 above.

The construction truck traffic assignment patterns would differ from that of the construction personnel traffic. The first difference is the origins and destinations for the construction traffic were determined based upon the location of major industrial areas where construction supplies, equipment and material would be obtained. Secondly, the construction vehicle traffic would be limited by commercial vehicle bans on adjacent parkways in the vicinity of some of the project sites. Since construction trucks are banned from these parkways, the construction truck traffic was routed along different roadways than the construction personnel vehicles as applicable. These truck routes are described below for the individual sites:

Eastview Site. Grasslands Road (Route 100C) and Dana Road via Walker Road would serve as the major access to the Eastview Site. Twenty (20) percent of the truck traffic would utilize Saw Mill River Road (Route 9A) from the north. Sixty (60) percent of the truck traffic would utilize Saw Mill River Road (Route 9A) from the south. Twenty (20) percent of the truck traffic would utilize Knollwood Road and Grasslands road from the east.

For the 2008 scenario with the Cat/Del UV Facility under construction, four different construction worker parking Options are considered, resulting in four distinct 2008 Construction with Cat/Del UV Facility conditions (Options A, B, C, and D). This is because with both the Cat/Del UV Facility and the proposed Croton project under construction at the Eastview Site at the same time, there would not be enough space on-site for all of the workers for both projects to park, as most of the available land area would be under construction. Each of the four construction worker parking Options also includes an additional assignment for shuttle buses that would transport the workers between the Eastview Site and the parking areas. The four construction worker parking Options are described below:

- *Option A:* All of the construction workers for both the Cat/Del UV Facility and the proposed Croton project would park at the Landmark property, west of the project site, and would be shuttled to the site in buses or vans.

- *Option B:* All of the construction workers for both the Cat/Del UV Facility and the proposed Croton project would park at the Westchester Community College (WCC) Campus, east of the project site, and would be shuttled to the site in buses or vans.

- *Option C:* Parking for all of the construction workers for both the Cat/Del UV Facility and the proposed Croton project would be split evenly between the Landmark property and WCC, and would be shuttled to the site in buses or vans.

- *Option D:* All of the construction workers for the proposed Croton project would park at the Landmark property, west of the project site, while all of the construction workers for the Cat/Del UV Facility would park in the Home Depot parking lot, located off Saw Mill River Road (Route 9A) and Dana Road, and would be shuttled to the site in buses or vans.

The construction truck traffic assignment patterns would differ from that of the construction personnel traffic. The first difference is the origins and destinations for the construction traffic were determined based upon the location of major industrial areas where construction supplies, equipment and material would be obtained. Secondly, the construction vehicle traffic would be limited by commercial vehicle bans on adjacent parkways in the vicinity of some of the project sites. Since construction trucks are banned from these parkways, the construction truck traffic was routed along different roadways than the construction personnel vehicles as applicable. Route 100C and Dana Road via Walker Road would serve as the major access to the Eastview Site. It was assumed that 20 percent of the truck traffic would utilize Saw Mill River Road (Route 9A) from the north and 60 percent of the truck traffic would utilize Saw Mill River Road (Route 9A) from the south. Twenty percent of the truck traffic would utilize Knollwood Road (Route 100A) and Route 100C from the east.

<u>Mosholu Site</u>. The majority of project-generated truck trips (95 percent) would enter the water treatment plant site from the Major Deegan Expressway (I-87) via the Jerome Avenue intersection. Limited project generated truck trips (5 percent) would access the site from East 233rd Street and Jerome Avenue.

<u>Harlem River Site</u>. The project-generated truck trips would enter the water treatment plant site from the Major Deegan Expressway (I-87) via the Fordham Road intersection. Forty five (45) percent of the truck traffic would utilize the Major Deegan Expressway (I-87) from the north and the south. Ten (10) percent of the truck traffic would utilize West Fordham Road.

NCA Shaft No. 9. For the project generated truck trips, Sleepy Hollow Road/Bedford Road would serve as the major access with eighty (80) percent and twenty (20) percent from the south and north, respectively. In the east-west direction, the major access for construction workers would be the County House Road/Nepperan Road.

NCA Shaft No.14. Saw Mill River Road, Ashford Avenue, Center Street, and American Legion Drive would be used as the truck routes for project-generated truck trips. All project-generated truck trips would utilize the NYS Thruway (I-87).

NCA Shaft No. 18. Yonkers Avenue would be the major roadway used by the trucks during the construction phase of the project. Cook Road, Rumsey Avenue, and Summerfield Street would provide the access from the Shaft Site to Yonkers Avenue. For the project generated truck trips, Broadway (Rt. 9) would serve as the major access with fifty (50) percent and thirty (30) percent from the south and north, respectively. Twenty (20) percent of the truck traffic would utilize the Cross County Expressway.

Gate House No. 1. Due to Shaft Site access limitations, Gate House No. 1 would only be accessed to and from southbound Major Deegan Expressway (I-87). The access would be through the adjacent service station entrance/exit points.

Jerome Park Reservoir. Van Cortlandt Park South, Van Cortlandt Avenue would be the major access in the east-west direction with fifty (50) percent of the project-generated truck trips. In the north-south direction, the remaining fifty (50) percent of the project-generated truck trips would utilize Sedgwick Avenue, Goulden Avenue, and Jerome Avenue, and Bedford Park Boulevard. Trucks would access these roads from West Fordham Road.

Construction times and durations for the individual sites were reviewed to determine if cumulative impacts would occur at adjacent locations. Where adjacent locations had construction traffic at the same times, the distribution and volumes were reviewed to determine if these significantly exceeded the generated volumes for the individual sites peak periods.

Construction Material Barging. Due to the constraints at the Harlem River Site, the barging of excavated material off the site and material deliveries to the site will be utilized. This construction methodology would reduce the necessary truck volumes that need to access the site from West Fordham Road. This reduced truck traffic at the West Fordham Road location was reviewed in conjunction with potential impacts that the barge operation might have on traffic operations elsewhere.

The barging operation would require the transport of material along the Harlem River from the site to the Hudson River. Two moveable bridges that would require opening to allow the barges through are the Spuyten Duyvil Bridge and the Broadway Bridge.

The Spuyten Duyvil Bridge is located by the mouth of the Harlem River and the Hudson River. This bridge is a swing span bridge that carries a double Amtrak rail line. The Broadway Bridge is located between West 220th Street in Manhattan and West 225th Street in The Bronx. This bridge carries three tracks of the Interborough Rapid Transit (IRT) subway on its upper deck and a four-lane two-way roadway on its lower deck.

Each of these bridges was reviewed to determine the impacts on rail and vehicular traffic the barge opening would create. Additionally, the United States Coast Guard regulations limiting time periods in which the bridges may be opened were reviewed to determine constraints on the barging operation.

In addition to the navigation route impacts, the potential offloading impacts were reviewed. The potential off-loading facilities reviewed were the Red Hook Terminal, Brooklyn, NY; Claremont Terminal, Jersey City, NJ; and Port Newark, NJ. Since these facilities are full port transport facilities, each has set operating parameters within their development plans. These incorporate both port side as well as landside operating parameters. The barging operations would be developed such that the facilities would not exceed any operational parameters, thus requiring no additional impact analysis for these offloading points.

Pavement Infrastructure. The Equivalent Single Axle Load (ESAL) calculated along roadways for each project site were distributed according to the number of lanes of roadways and compared to estimate design loads of the roadways adjacent to the project sites. When the calculated ESAL value along a roadway approaches 10 percent of the estimated design load of that roadway, then a significant pavement impact is identified.

4.9.4 Mitigation

The identification of significant impacts leads to the need to identify and evaluate suitable mitigation measures. These measures would be developed to mitigate the impact or return Future With the Project conditions to the Future Without the Project condition, or to acceptable levels.

Traffic. For impacted locations with Future Without the Project LOS A, B or C, mitigation measures should return Future With the Project conditions to mid-LOS D, with a delay of 45 seconds or less. For potentially impacted locations with Future Without the Project LOS D, E, or F, mitigation measures should return project Future With the Project conditions to the same level of service as Future Without the Project conditions. Traffic mitigation measures include low-cost, readily implementable measures; moderate-cost, fairly readily implementable measures; higher capital cost measures; enforcement measures; and trip reduction or travel demand management measures.

Low-cost, readily implementable measures are signal phasing and timing modifications, parking regulation modifications, lane restriping and pavement marking changes; turn prohibitions, street direction changes, and other traffic-signage-oriented changes. Moderate-cost, fairly readily implementable measures are intersection channelization improvements and traffic signal installations. Higher-cost mitigation measures include street widening, reconstruction of existing streets, construction of new streets, construction of new highway ramps, and computerized traffic control systems. Enforcement measures include deployment of traffic enforcement agents or parking enforcement agents.

Parking. The range of measures that could generally be considered to mitigate significant parking impacts includes the following: Provision of additional parking spaces either on-site or off-site, modification of on-street parking regulations, or implementation of new transit services.

Transit. Potential impacts that require transit mitigations, typically affect either the transit facility, i.e. station, or the capacity of the transit routes. Therefore, mitigation measures would either be developed to improve the transit facility or the implementation of new or revised transit services.

Roadway Pavement Conditions. Resurfacing the roadway to increase its useful life can generally mitigate significant impacts on pavement infrastructure due to heavy construction trucks. Some roadways that were designed for local traffic would undergo a large amount of truck traffic due to construction of the proposed project and result in more severe damage. Those roadways would need reconstruction after the construction period.