EAST SIDE ACCESS PROJECT

ENVIRONMENTAL STATUS AND CONSTRUCTION PLAN for the QUEENS ALIGNMENT

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ES.0 EXECUTIVE SUMMARY

The East Side Access Project (the Project) will provide direct Long Island Rail Road (LIRR) commuter service to Grand Central Terminal (GCT) in Manhattan. When constructed, the Project will connect the LIRR Main Line and Port Washington Branch to GCT via the lower level of the existing 63rd Street Tunnel under the East River (see Figure 1). The Project will be built over a ten-year construction period.

The portion of the Project that comprises the Queens Alignment (see Figure 2) will be approximately 5,500 feet long, extending between the lower level of the 63rd Street Tunnel and the LIRR Main Line and Port Washington Branch tracks south of Sunnyside Yard. It will pass under the existing LIRR Main Line and Port Washington Branch, the Harold Interlocking, the existing Sunnyside Yard, and the Existing Rail Yard (formerly known as Yard A).

MTA has completed a substantial environmental sampling program in Sunnyside Yard and the Existing Rail Yard (see Figure 3) to characterize soil and groundwater conditions within areas that will be disturbed during construction of the Queens Alignment. Within the confines of Sunnyside Yard, the work effort will involve construction of bored tunnels using pressurized-face Tunnel Boring Machines (TBMs) to minimize surface disruption and the movement of groundwater. The majority of work that will disturb surface soils will occur in the Existing Rail Yard. Given the environmental conditions found in the project area and the status of Sunnyside Yard as a class "2" inactive hazardous waste disposal site[1], MTA understands its primary obligations and objectives in constructing the Queens Alignment to be as follows:

1. Excavating, characterizing, handling and disposing of contaminated materials in accordance with all applicable regulatory requirements;

2. Obtaining all permits and regulatory approvals required to construct and operate the Project including, but not limited to, the Long Island Well Permit for dewatering purposes, and adhering to conditions identified in the permits;

3. Preventing the movement of existing contaminated groundwater plumes that pose a significant threat to the environment; and

[1] A class "2" site is a site at which hazardous waste constitutes a significant threat to the environment as specified in 6 NYCRR 375-1.4, but unlike a class "1" site, the hazardous conditions found at a class "2" site do not constitute an imminent danger (see e.g. 375-1.8). An inactive hazardous waste disposal site means any area or structure used for the long-term storage or final placement of hazardous waste...as to which area or structure no permit or authorization issued by the New York State Department of Environmental Conservation [NYSDEC] or a federal agency for the disposal of hazardous waste was in effect after August 25, 1979.

4. Ensuring that the Project does not prevent or interfere significantly with any proposed, ongoing, or completed remedial program in Sunnyside Yard or expose the public health or the environment to a significantly increased threat of harm or damage in accordance Article 27, Title 13, of the Environmental Conservation Law of the State of New York (ECL)[2].

ES.1 Purpose of Report

The information in this status report is provided in support of environmental approvals from the New York State Department of Environmental Conservation (NYSDEC), which will be required to implement the Project.

This report summarizes:

- environmental findings of existing levels of soil and groundwater contamination along the Queens Alignment of the Project;
- anticipated construction activities that will be undertaken to construct the Queens Alignment, and assesses their potential effect on identified areas of contamination;
- measures that will be implemented to minimize groundwater drawdown outside of the construction area during open-cut excavation activities and safeguard against potential contaminated groundwater plume migration; and
- the program of soil and water quality management that will be applied to areas where exceedences of regulatory thresholds have been detected or where potential soil erosion may occur due to construction activity.

ES.2 Contaminant Levels in the Project Area

The project site and adjacent area have been the subject of a series of investigations to characterize the type, level and extent of contamination in the underlying soil and groundwater (relevant studies are listed in the Bibliography). The results of these studies indicate that the Queens Alignment will pass through, under, or nearby known or suspected soil and groundwater contamination in the Sunnyside and Existing Rail Yards and nearby areas. However, only a few samples collected during MTA's investigations of soil and structures within the footprint of the Queens Alignment contained contaminants that met or exceeded hazardous waste levels or displayed hazardous characteristics (see Table 1 and Figure 4). Contamination in the overwhelming majority of cases was limited to petroleum-impacted contaminated soil and ballast and structures with asbestos containing materials and lead-based paint. In addition, MTA's investigations confirmed the existence of contaminated groundwater plumes in Sunnyside Yard and identified a

[2] See the general provisions of Title 6 Part 375 of the New York Codes, Rules and Regulations (NYCRR) governing inactive hazardous waste disposal sites (6 NYCRR 375-1.2).

new plume to the north of Northern Boulevard in the Kinney Lot (see Figure 5). The site histories, prior investigations of the sites, and a summary of MTA's findings are presented below for Sunnyside Yard and the Existing Rail Yard, respectively.

ES.2.1 Sunnyside Yard

Railroad rolling stock has been maintained and operated on portions of Sunnyside Yard for nearly a century. As a result of a site investigation, NYSDEC determined that railroad operations in Sunnyside Yard resulted in the disposal of hazardous wastes in certain areas of the Sunnyside Yard, including various hydrocarbons and polychlorinated biphenyls (PCBs). NYSDEC also determined that operation of diesel fuel storage tanks at the site (prior to 1984) resulted in a leakage of petroleum hydrocarbons in and near the Diesel Fuel Storage Area located in the north-central portion of Sunnyside Yard. As a result of their findings, NYSDEC designated Sunnyside Yard as a class "2" inactive hazardous waste disposal site and entered into an Order on Consent with the National Railroad Passenger Corporation (Amtrak) and New Jersey Transit Corporation (NJTC)[3] concerning roles and responsibilities for Sunnyside Yard environmental conditions. The Order divides Sunnyside Yard into six operable units (OUs) for the purpose of investigating levels of contamination, as follows:

- OU-1 is designated as the soil above the water table within the footprint of Amtrak's recently constructed High Speed Train Facility (HSTF) Service and Inspection (S&I) Building (for the new Acela service);

- OU-2 is designated as the soil above the water table within the footprint of the ancillary structures (i.e., the access road and utilities route, the parking area, and the construction lay down area) to the HSTF S&I Building;

- OU-3 is designated as the soil and the separate-phase petroleum accumulation on top of the water table in the north-central portion of Sunnyside Yard (referred to in this report as the "PCB-contaminated separate phase oil plume", see Figure 5). This plume extends beyond the northern boundary of Sunnyside Yard into the Existing Rail Yard. The plume appears to have originated at the former fuel storage area in Sunnyside Yard, in the vicinity of a former Engine House, from where it migrated northward. Investigations indicate that the plume includes approximately 73,000 gallons of PCB-contaminated oil, of which approximately 25,000 gallons have been estimated as recoverable[4];

- OU-4 is designated as the soil above the water table in the remainder of Sunnyside Yard, excluding the areas of OU-1, OU-2 and OU-3;

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[3] Order on Consent, Index No. W2-0081-87-06, dated September 21, 1989 and its modification in August 1993 and February 1998 (collectively, the "Order").

[4] Roux Associates, Inc, 1995

- OU-5 is designated as the sewer system beneath Sunnyside Yard; and
- OU-6 is designated as the saturated soil and the groundwater beneath Sunnyside Yard.

In 1997, A Proposed Remedial Action Plan (PRAP)[5] and Record of Decision (ROD)[6] were issued by NYSDEC for OU-1. Subsequently, the clean-up of OU-1 and OU-2 was completed by Amtrak (prior to construction for their new Acela service). A "No-Action Alternative" was issued for OU-2 since none of the contaminants of concern were detected above the established cleanup levels. NYSDEC's 1997 ROD and letter dated March 27, 1998[7] established soil cleanup criteria for PCBs (25 parts per million (ppm)), total carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) (25 ppm), and lead (1000 ppm) -- recognizing the limited public exposure to the site and its continued use as a rail yard.

NYSDEC also approved a work plan developed by Amtrak in the Fall of 2000 for additional investigation at OU-3 to more precisely characterize site conditions. Amtrak submitted the OU-3 Remedial Investigation Report on March 29, 2001. Schedules for remedial activities within OU-3, OU-4, OU-5, and OU-6 have not been established.

Investigations by Amtrak of the groundwater (OU-6)[8] detected the presence of five groundwater plumes: three plumes of chlorinated VOCs (referred to in this report as the "Central Yard", "Skillman/39th Street", and the "Northern Boulevard/39th Street" plumes) and two BTEX plumes (referred to in this report as the "Loop Track" and "34th Street" plumes). No remedial actions with regard to these plumes have been proposed. While MTA is not a party to the Order, it nonetheless acknowledges its responsibilities and obligations to not significantly interfere with existing contamination and any future remedial actions.

MTA's Sunnyside Yard investigations[9] for the construction of the Queens Alignment confirmed the existence of the Central Yard and Skillman/39th Street plumes and further refined their boundaries (see Figure 5) -- detecting only low levels of chlorinated VOCs even in the deep aquifer beneath the Central Yard plume within Amtrak's right-of-way.

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[5] Proposed Remedial Action Plan (PRAP) for Amtrak Sunnyside Yard, Operable Unit 1, Proposed High Speed Trainset Facility (HSTF) Building, Queens, NY Site No. 241006, June 1997.

[6] Record of Decision, Amtrak Sunnyside Yard Operable Unit 1, Proposed HSTF Building, Queens, NY, Site No. 241006, August 1997.

[7] Letter from Hari O. Agrawal, P.E. to Joseph Duminuco regarding Amtrak, Sunnyside Yard, Queens, New York Work Plan Alternate Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs), March 27, 1998.

[8] Operable Unit 6 Remedial Investigation Report, Sunnyside Yard, Queens, New York. Prepared for the National Railroad Passenger Corporation by Roux Associates, Inc., May 1999.

[9] PB/STV, 2001a.

In addition, MTA investigations identified two areas in Sunnyside Yard where the soil may be contaminated with SVOCs. Pre-construction remedial action is not anticipated to be required for construction of the Queens Alignment within Sunnyside Yard.

ES.2.2 Existing Rail Yard and Surrounding Areas

Like Sunnyside Yard, the Existing Rail Yard has been used by railroads for nearly a century. Several spills have been reported at adjacent properties to the north of the yard, including one spill of gasoline at a filling station and one spill of creosote in the 1950s at the "Outlet City" site (also known as the QP site and the West Disinfecting Co.), located on Queens Plaza South. NYCT recently completed two spill closure investigations as a result of Underground Storage Tank (UST) test failures at the MTA-owned Superior Reed property at 29-60 Northern Boulevard. A third spill of an unknown quantity of diesel, kerosene, mineral spirits, and waste oil related to dumping in a lot behind 29-70 Northern Boulevard was reported in 1996. This spill is listed on the state spills database as "active" (as of October 2000).

MTA's investigations[10] in areas that will be affected by construction activities for the Queens Alignment in the Existing Rail Yard reveal 22 areas where soil contamination was at levels above regulatory thresholds, however, few soil samples met RCRA hazardous waste levels or displayed hazardous characteristics. Only TCLP lead was detected at levels that exceeded RCRA regulatory levels (i.e., 5 mg/l). In particular, samples collected from catch basins (AOC 6, AOC 18) and samples collected from soils in the general vicinity of the Honeywell Street Bridge (AOC 16, AOC 17) exceeded RCRA regulatory levels for TCLP lead. The contractor will be required to clean the catch basins and handle and dispose of the sediment from AOC 6 and AOC 18, as well as surface soil from AOC 16 and AOC 17, as hazardous material. Pre-construction remedial action for the cleanup of hazardous substances is not anticipated to be required for construction of the Queens Alignment within the Existing Rail Yard.

MTA's groundwater testing indicated a small plume of VOCs and SVOCs to the north of Northern Boulevard extending into the Kinney Lot (referred to as the "Kinney Lot plume"). Also, within the boundaries of the Central Yard plume identified by Roux Associates, in the portion that lies beneath LIRR property, MTA investigations detected sitewide maximum levels of chlorinated VOCs in the deep aquifer. The highest concentrations of chlorinated VOCs were detected at the northern-most wells, nearest to the property lines of buildings on Northern Boulevard. This area of contamination, located approximately 160 feet west of the Honeywell Street Bridge, is referred to in this report as the "Honeywell Street Bridge plume" (see Figure 6).

[10] PB/STV, 2000a, PB/STV, 2001c, and AKRF, Inc 1999a.

ES.3 Anticipated Construction

ES.3.1 Early Construction

Construction of the Queens Alignment will be initiated with the award of an early construction contract. Construction includes:

- Excavation of an **access shaft (open-cut excavation) for the Manhattan tunneling** at the existing 63rd Street Tunnel bellmouth in the Kinney Lot (Contract CQ026).

ES.3.2 Later Phases of Construction

The early action contract will be followed by five later phases of construction that, together, will complete the construction of the Queens Alignment. These later phases include:

- **Preparation of the Existing Rail Yard and demolition of the Superior Reed Building** (formerly Contract CQ025) and development of a new **Cut-and-Cover Tunnel Structure** linking the existing 63rd Street tunnel to the five soft ground bored tunnels identified below (Contract CQ028);
- The construction of the **Inbound/Outbound (IB/OB) approach structure** at the eastern terminus of the bored tunnels and the development of an additional Loop Track through the mainline embankment at 43rd Street to maintain Amtrak access into Sunnyside Yard and to accommodate yard access for LIRR service through Sunnyside Yard into the Existing Rail Yard (CQ030);
- **Reconfiguration of the Harold Interlocking**, including temporary and permanent reconfigurations of the mainline tracks, relocation of the sewers beneath Sunnyside Yard, underpinning of existing bridges, and construction of new bridges, retaining walls and structures to accommodate the reconfiguration (Contracts CH053 and CH054);
- Construction of five **Soft-Ground Bored Tunnels** connecting the 63rd Street tunnel with the mainline and the Port Washington tracks of the LIRR and a single soft-ground bored tunnel to provide MTA New York City Transit (NYCT) access to a planned future storage yard in Sunnyside Yard (Contract CQ031); and
- Construction of a **new Sunnyside LIRR passenger station** below and adjacent to the Queens Boulevard Bridge (Contract CQ034).

ES.4 Anticipated Effects and Mitigative Measures

Impacts of site construction activities for both the early construction contracts and later phases of construction will include disturbance of some contaminated soil and ballast (primarily contaminated with petroleum products and their derivatives), disturbance of contaminated sediments in existing sewers, and demolition of structures containing asbestos and lead-based paint.

In addition, the Central Yard, Skillman/39th Street and the Kinney Lot plumes will be directly affected by open-cut excavation required to construct the tunnels in Queens (see Figure 5). In general, while existing levels of contaminants in these plumes exceed NYSDEC Class GA Groundwater Standards and Guidance Values, they are within (i.e., below) New York City Department of Environmental Protection (NYCDEP) Bureau of Wastewater Treatment effluent limitations and, with minimal treatment, can be discharged to the sewer. Soil and water quality management techniques will be implemented by the contractor, with an MTA quality assurance (QA) program enforced by the construction manager, to ensure proper handling, storage and disposal of excavated material and dewatered groundwater.

The contaminant plumes located outside the footprint of the Project are also of concern during construction activities in open-cut excavation areas of the Queens Alignment. This report focuses on two of these "external" plumes -- the PCB-contaminated free phase petroleum plume and the Honeywell Street Bridge plume -- due to their proximity to dewatering activities and the levels of contaminants found in these areas.

To avoid impacting these external plumes, the Project was designed to prevent the migration of contaminated plumes by minimizing drawdown and groundwater movement outside of the construction area. This will be accomplished with the use of slurry and jet-grout walls (minimum thickness of 2.5 feet), keyed into bedrock. These walls will enclose the excavation area and will generally provide a watertight excavation and support wall system. The success of the slurry wall "bathtub" in preventing significant groundwater flow and resulting plume movement depends primarily on the location, orientation, and size of rock discontinuities. Where adequate connections have not been achieved between the slurry and jet-grout walls and the surface of the bedrock additional measures may be required. A QA program will be implemented during construction, which will include packer permeability testing[11] at regular intervals along the slurry wall and cement and chemical grouting where permeability is high. Regardless of actual wall permeability, contractors will not be permitted to lower the water table below normal seasonal variations, as measured directly outside the slurry wall at NYSDEC-approved peizometer locations. Groundwater recharge will be applied, if necessary, in order to comply with the water table drawdown limitations outside of the wall and permit requirements.

Groundwater model predictions and construction observations made during the NYCT 63rd Street Tunnel Connector Project[12] (which used the same bathtub construction technique), indicate that drawdown outside the slurry walls can be kept to within normal seasonal variations and the resultant groundwater gradient changes at contaminant plume locations are expected to be negligible. In particular, the impact on the PCB-

[11] Packer permeability testing includes inserting a sealed tube into a bored hole to calculate the quantity of water flowing through the tube to estimate the permeability of the wall.

[12] See Fanning, Phillips and Mohnar Consulting Engineers, 1992 and PB/STV, 2001e.

contaminated separate phase oil plume, which is located at least 1,000 feet from any of the open-cut excavation areas, is expected to be negligible. Since the Honeywell Street Bridge plume is located in the deep aquifer, it is assumed to be outside the cone of influence of the dewatering activities, as well. Additional analyses will be completed prior to construction of the open-cut excavation area in the Existing Rail Yard to confirm this assumption.

A water quality sampling and water elevation measurement plan will be implemented to monitor potential environmental and hydrogeologic impacts of the proposed dewatering scheme immediately adjacent to, and in the vicinity of, each open-cut excavation area. The monitoring plans will be submitted to, and approved by, NYSDEC in conjunction with the applications for the Long Island Well Permit, prior to commencing any dewatering activities. Monitoring reports will be submitted to NYSDEC as required during the course of dewatering operations.

1.0 INTRODUCTION AND PURPOSE OF THIS REPORT

1.1 Purpose

The purpose of this report is to:

- Provide a summary of findings concerning existing levels of soil and groundwater contamination along the Queens Alignment of the East Side Access Project;
- Provide an overview of anticipated construction activities that will be undertaken to construct the Queens Alignment and assess the potential effect on identified areas of contamination;
- Summarize the measures that will be implemented to minimize groundwater drawdown during open-cut excavation activities, and safeguard against potential contaminated groundwater plume migration; and
- Summarize the program of soil and water quality management that will be applied to areas where exceedences of regulatory thresholds have been detected.

The information in this status report is provided in support of environmental approvals from the NYSDEC needed to implement the Project, including approval:

- of a Long Island Well Permit by demonstrating that the Project will not result in significant effects on groundwater, and
- to construct the Queens tunnels within (i.e., under) Sunnyside Yard, which is classified by the State as a class "2" inactive hazardous waste disposal site[13], by demonstrating that: (1) the Project will not prevent or interfere significantly with any proposed, ongoing, or completed program to cleanup conditions in Sunnyside Yard and (2) the Project will not expose the public health or the environment to a significantly increased threat of harm.

1.2 Background

A Final Environmental Impact Statement (FEIS)[14] was issued by the Federal Transit Administration (FTA) for the Project on March 6, 2001, and provides a general description of soils and ground water conditions along the Queens Alignment. The FEIS

[13] A class "2" site is a site at which hazardous waste constitutes a significant threat to the environment as specified in 6 NYCRR 375-1.4, but unlike a class "1" site, the hazardous conditions found at a class "2" site do not constitute an imminent danger (see e.g. 375-1.8). An inactive hazardous waste disposal site means any area or structure used for the long-term storage or final placement of hazardous waste...as to which area or structure no permit or authorization issued by the New York State Department of Environmental Conservation [NYSDEC] or a federal agency for the disposal of hazardous waste was in effect after August 25, 1979.

[14] FTA/MTA, 2001.

also details steps to be taken to mitigate project effects and safeguard against groundwater drawdown and contamination. The construction phase impact mitigation plan presented in the FEIS was based on information describing site conditions obtained from:

- An Order on Consent between Amtrak, New Jersey Transit Corporation (NJTC) and NYSDEC for the investigation of conditions within Sunnyside Yard, under which the alignment will pass[15];
- Direct sampling of soil and groundwater completed as part of the FEIS and preliminary design effort[16];
- Simulation of groundwater flow at Sunnyside Yard using a two-dimensional steady state model to evaluate the potential impacts of anticipated construction activities; and
- Data from nearby projects, including the recently completed nearby 63rd Street Tunnel Connector Project.

A number of additional initiatives and sampling programs have been completed that:

- Characterize more completely environmental conditions within the Queens Alignment (see Attachment A: Bibliography);
- Detail the methods to be applied to mitigate Project impacts, protect worker safety and health, safeguard against excessive groundwater drawdown, and prevent the movement of contaminated groundwater plumes during Project construction activities;
- Estimate the overall impact of construction activities on groundwater quality and flows; and
- Describe the types, phasing and extent of construction activities.

Supplemental environmental investigations are planned to finalize the soil and water quality management program to be applied during subsequent Project development phases.

1.3 Structure of this Report

This report is structured as follows:

[15] Order on Consent, Index No. W2-0081-87-06, dated September 21, 1989 and its modification in August 1993 and February 1998 (collectively, the "Order").

[16] AKRF, Inc 1999a and AKRF, Inc 1999b.

- Section 2.0 summarizes the major construction activities that will be required to construct the Queens Alignment;
- Sections 3.0 identifies prior environmental investigations that have been completed in the project area, briefly describes MTA's recent initiatives, and reviews regulatory requirement applicable to the Project's construction and operation;
- Section 4.0 presents a description of contaminant levels along the Queens Alignment, based on the MTA's environmental site investigations and prior studies outlined in Section 3.0;
- Section 5.0 summarizes project effects and describes mitigation measures that will be implemented to prevent contaminant plume migration and other potential adverse effects; and
- Section 6.0 provides a report summary.

2.0 PROJECT DESCRIPTION

The purpose of the East Side Access Project (the Project) is to provide direct Long Island Rail Road (LIRR) commuter service to Grand Central Terminal (GCT) in Manhattan. When constructed, the Project will connect the LIRR Main Line and Port Washington Branch to GCT via the lower level of the existing 63rd Street Tunnel under the East River (see Figure 1). The Project will be built over a ten-year construction period.

The Queens Alignment portion of the Project (see Figure 2) will be approximately 5,500 feet long, and extend between the lower level of the 63rd Street Tunnel and the LIRR Main Line and Port Washington Branch tracks south of Sunnyside Yard. It will pass under the existing LIRR Main Line and Port Washington Branch, the Harold Interlocking, the existing Sunnyside Yard, and the Existing Rail Yard (formerly known as Yard A).

Construction of the Queens Alignment will be initiated with the award of one early construction contract and followed by a number of other contracts. Provided below are descriptions of each major project component. Included are descriptions of the activities that will be completed to construct each component, and the techniques to be employed to minimize groundwater drawdown and prevent induced movement of contaminant plumes.

2.1 Early Phase Construction - Queens Open-Cut Excavation at Bellmouth - Manhattan Access Shaft (Contract CQ026)

An open-cut excavation for Manhattan tunneling access will be constructed at the end of the existing bellmouth structure of the 63rd Street tunnel and extend to the north side of Northern Boulevard.

Initial construction activities will include placement of slurry walls socketed into bedrock around the excavation area to limit the drawdown of groundwater outside the excavation area and to provide temporary support of excavation. Slurry walls are structural cast-in-place concrete walls, constructed by placing "tremie" concrete in a pre-excavated, slurry-filled trenches. The walls consist of a series of steel-reinforced interlocking panels at least 2.5 feet thick and 8 to 20 feet in length. The walls will enclose the perimeter of the excavation area and serve as a continuous retaining structure, temporary excavation support, and groundwater cutoff during dewatering, thus forming a "bathtub" structure.

The bathtub structure will be constructed in glacial deposits with variable layers of predominantly granular soil, occasionally fine-grained soils, and weathered and sound rock. The water table varies from about 15 to 20 feet below the ground surface. To develop an effective cutoff below the wall and to extend the flow path, the rock around and below the wall bottom will be grouted, if necessary. Existing slurry walls, which were constructed during NYCT's 63rd Street Tunnel Connector Project, will be utilized to complete the bathtub structure.

Once the slurry walls are in place, dewatering inside the bathtub structure will be required at pumping rates of approximately 30 to 70 gallons per minute (gpm), based on a 10 hour per day, 5 day per week schedule. This initial dewatering will occur over a three to six month period. Thereafter, maintenance dewatering will continue for a period of approximately eight years, removing seepage groundwater and rainwater from the excavation area at an estimated dewatering rate of 27 gpm[17].

The same construction methods and dewatering activities were effectively used for the NYCT 63rd Street Tunnel Connector project at the same site.

These early phase construction activities are scheduled to begin in the Spring of 2002.

2.2 Later Phase Construction

2.2.1 Queens Open-Cut Excavation and Structure - Northern Boulevard to Existing Rail Yard (Contract CQ028)

The majority of the Existing Rail Yard is unpaved and contains numerous ballasted tracks. Approximately 11 feet above mean sea level, the site is flat and generally lower than adjacent areas of Sunnyside Yard to the southeast, and properties along Northern Boulevard bordering the yard to the northwest. The water table is shallow throughout the site. The Existing Rail Yard must be cleared and existing structures demolished prior to the initiation of other construction activities on the site.

Site preparatory work will include clearing the Existing Rail Yard, demolishing the two-story former Superior Reed building complex located between the Existing Rail Yard and

[17] Estimation of Pumping Rates (CQ026) Memo to Nasri Munfah from Sung Choi and Subal Sarkar, PB/STV, June 2001.

Northern Boulevard, and removal and disposal of track and ballast, some of which is contaminated with petroleum products. This work is not expected to intercept the water table, therefore, no dewatering activities are anticipated.

Once cleared, the Existing Rail Yard will be used as a construction staging area since it is relatively well buffered from the surrounding Long Island City community, and is a convenient location for storing construction equipment and materials, and stockpiling tunnel spoil.

A new two-track cut-and-cover tunnel will be constructed, extending from the Manhattan access shaft bellmouth of the existing 63rd Street Tunnel, beneath Northern Boulevard to the Existing Rail Yard, where it would connect with the new soft-ground bored tunnels described in Section 2.2.4.

The CQ028 cut-and-cover tunnel will be constructed in four main parts:

- Relocation of a storm sewer which cuts across the open-cut excavation area;
- Excavation under Northern Boulevard into the Existing Rail Yard;
- Excavation in the Existing Rail Yard for use as a launch pad for the Tunnel Boring Machines (TBMs) for the Queens soft-ground bored tunnels and for removal of spoil from Manhattan and Queens tunneling work;
- Construction of a portion of the cut-and-cover tunnel structure, including traction power substation, located between Northern Boulevard and the north limit of the Existing Rail Yard;

The final cut-and-cover structure will be approximately 800 feet long and range in width between 70 feet at its western limit and 240 feet at its eastern limit. Bottom invert elevations will vary between approximately 40 and 50 feet below mean sea level (approximately 45 and 60 feet below the existing groundwater table). Construction of the structure will require the excavation of approximately 300,000 cubic yards of material comprising the largest open-cut excavation area for the Queens Alignment.

Construction activities will include use of slurry walls socketed into bedrock to limit the drawdown of groundwater from outside the excavation area and to provide temporary support of excavation activities, as described above.

Slurry wall construction is feasible for use in all CQ028 areas, except for a short segment beneath the NYCT subway tunnel under Northern Boulevard, where available surface space is limited. In that segment, a jet-grout wall will be used to support excavation and to provide a water cut-off wall to minimize groundwater infiltration. The jet grouting process consists of injecting a high-pressure fluid into the ground using horizontal nozzles lowered through small-diameter stabilized boreholes. Rotating beneath the surface, these high-pressure jets cut existing soil and mix it with cement and water. This

procedure results in the replacement of fine soil particles with a mixture of soil and cement grout, which hardens to a moderate-strength concrete-like mass substantially impermeable to water. Cylindrical columns of this impermeable material are formed by rotating the high-pressure jets as they are withdrawn from the ground. Multiple rows of overlapping columns drilled into the underlying bedrock will be used to reduce the potential risk of groundwater leakage through the jet-grout walls.

As in Contract CQ026, existing slurry walls that were constructed during NYCT's 63rd Street Tunnel Connector Project will be utilized to achieve the completed bathtub structure. Once the slurry wall construction is complete, initial dewatering of the bathtub will be accomplished within a four- to six-month period at an estimated rate of between 130 and 300 gpm, assuming a 5-day per week, 10 hour per day operation. Maintenance dewatering will occur over a five-year period at an estimated rate of 46 gpm[18].

These construction activities are expected to begin in the Summer of 2002. Dewatering of the bathtub is expected to commence in the Spring of 2003.

2.2.2 Approach Structures and Amtrak Loop Track (Contract CQ030)

Access between all LIRR branches and GCT will be provided by constructing three "revenue" tunnels between the LIRR mainline tracks and the 63rd Street tunnel (Track A: Inbound service to GCT, Track B/C: Single track operated bi-directionally, and Track D: Outbound service from GCT). Two additional "non-revenue" tunnels will be constructed to operate as separate inbound (IB) and outbound (OB) leads between GCT and the Existing Storage Yard. Cut-and-cover tunnels and open approach structures will be constructed to provide the necessary transition of the soft-ground bored tunnels to grade. The transition segments of the three revenue tunnels (i.e., A, B/C and D) will extend approximately 700 to 850 feet east of the eastern portals of the bored tunnels. The transition structures for the Inbound (IB)/Outbound (OB) tunnels will similarly extend outward from the eastern terminus of the bored tunnels.

Tunnel Boring Machine (TBM) exit portals define the limit of the bored tunnels and the start of transition structures. The approach structures begin as cut-and-cover transition structures and become open approach structures as they penetrate the ground surface. Maximum excavation depths at the TBM portal will typically be 30 feet below grade. The revenue tunnel approach structures are located within the mainline embankment. As a result, this excavation will occur principally above groundwater.

The IB/OB tunnel exit portals will be located within the corridor of the existing yard lead tracks, which is a depressed section below surrounding ground of the mainline embankment and adjacent properties. These portals will be placed such that excavation below groundwater is minimized. An impermeable slurry wall system will be used to prevent groundwater inflow to this structure. Pumping rates have not been established

[18] Ibid.

but are expected to be significantly less than those required for Contract CQ028, described above.

The location of the exit portals of the three revenue tunnels is dictated by the minimum vertical cover requirements for TBM operation. The depth of cover over the revenue tunnel will range between approximately 30 feet at the launch shaft to less than 5 feet at the eastern exit portal. The resulting excavation depths for the exit portal structures will be approximately two feet above groundwater elevation.

The IB lead must pass under the three revenue tunnels before it merges with the OB lead on the south side of the Harold Interlocking. Consequently, it will be the deepest of the five tunnels. The location of the exit portal for the merged IB/OB lead is dictated by the minimum lateral clearance requirements for TBM operation. The bottom of excavation for the IB/OB lead exit portal will be about 40 feet below groundwater elevation, based on the location shown on Figure 2. The IB/OB lead exit portal may be shifted approximately 600 feet east of its current location, or at about 20 feet below groundwater elevation.

The addition of the IB/OB tracks will require the relocation of the existing Amtrak Loop Tracks. The Amtrak Loop Tracks (ALT) construction area will begin approximately 600 feet west of the 39th Street Bridge, directly north of the OB Lead Track and continues east along the southern perimeter of Sunnyside Yard. The ALT will follow the yard perimeter north, inside the IB/OB tracks. The ALT construction area will terminate in the northeast corner of the yard, in the vicinity of the 39th Street Bridge. The ALT relocation is required to provide adequate space for construction of the IB/OB tracks and the associated ESA loop track. Work will occur above the groundwater table in this area and control of groundwater infiltration is not anticipated.

These construction elements are scheduled to begin early in the year of 2004.

2.2.3 Harold Interlocking Reconfiguration (Contract CH053)

Temporary relocation of the LIRR mainline tracks will be required to maintain rail operations through the Harold Interlocking during construction of bored tunnels and associated work elements, while permanent reconfiguration of the LIRR mainline tracks will be required to provide service to GCT. This work will include:

- Relocation of line 4 and the Westbound Bypass (WBBP) track;
- Development of main lines 2 & 4 Viaduct and rail structures over 43rd and 48th Streets; and
- Relocation of an existing storm and combined flow sewers.

Line 4 and the WBBP track must be relocated to accommodate construction of the Track A (inbound service to GCT) approach structures. Main line tracks 2 and 4 must be relocated to accommodate construction of the Track D (outbound service from GCT)

approach structures (see Section 2.2.2). The existing rail bridges over 43rd and 48th Streets must be widened and a new viaduct structure constructed adjacent to the existing mainline embankment east of 43rd Street to achieve the required track relocations. These structures are necessary for both the temporary and permanent reconfigurations of the mainline tracks.

Excavation required for the modifications to the existing rail bridges at 43rd and 48th Streets and for the new viaduct structures will not extend below the groundwater table, therefore, dewatering is not anticipated.

This contract will include utility work, with the main utility relocation of an existing 42-inch diameter gravity sewer that drains the portion of Sunnyside Yard between Honeywell and 39th Streets. The sewer must be relocated prior to the start of tunneling work since it is located within the alignment of the bored tunnel to be excavated in the vicinity of Honeywell Street.

The replacement sewer will be constructed at least 20 feet below the mainline tracks using micro-tunneling techniques to avoid disruptions to LIRR operations. Invert elevations of the sewer as it passes through the mainline embankment will be approximately 12 feet above mean sea level (i.e., substantially above groundwater table level).

This contract is expected to be awarded in the year 2003.

2.2.4 Soft-Ground Bored Tunnels (CQ031)

Three "revenue" tunnels between the LIRR mainline tracks and the 63rd Street tunnel (Tracks A, B/C and D) and two "non-revenue" tunnels (IB/OB leads) will be constructed beneath Sunnyside Yard. A sixth bored tunnel may also be constructed to provide NYCT access to a future rail storage facility in Sunnyside Yard. Each tunnel will be approximately 19'6" in finished diameter. The excavated diameter will be approximately 22'6". Construction activities in this contract also include the development of ancillary structures for emergency access.

Based on a detailed assessment of site conditions, the use of pressurized-face TBMs was selected as the preferred means to construct the soft ground-bored tunnels, since their use will result in less surface disruption to critical areas of the Harold Interlocking and Sunnyside Yard, will limit the movement of groundwater by controlling in-situ stress imbalances in the ground, and will minimize ground settlement and potential risk to railroad operations.

Pressurized-face TBMs provide their own resistance to soil and groundwater inflow by use of a sealed, pressurized chamber at the TBM's cutting head. This chamber is filled with either a bentonite slurry (slurry shield TBM), or a portion of the excavated earth itself (earth-pressure-balance TBM). The TBM cutting mechanism rotates within a large steel shield. The front part of the shield is sealed and pressurized to stabilize the face. Both TBM technologies can handle the mixed soil and rock conditions within

groundwater that are prevalent at the Project site. The final selection of TBM type will be left to the contractor. Additives in the form of polymer mixes and foams may be added during the tunneling process to condition the soil and help balance the groundwater and soil pressures.

Construction of each of the tunnels will begin from a common launch shaft at the southern end of the cut-and-cover tunnels described in Section 2.2.1. The launch shaft will be located at the southern edge of the Existing Rail Yard, approximately 700 feet west of the Honeywell Street Bridge at a depth of 80 feet below grade. The three revenue tunnels will continue eastward from the launch site under Amtrak's Sunnyside Yard Main Body area, under the mainline embankment, and emerge as tunnel transition structures approximately 100 feet west of the 39th Street Bridge. The IB and OB leads will emerge into a common structure that will parallel the existing Amtrak Loop Track to gain access to the Existing Storage Yard (see Section 2.2.2). Four emergency exit structures, approximately 20' by 10', will be constructed from the tunnels surfacing near Honeywell Street Bridge.

Excavated soil and muck will consist primarily of glacial deposits. It is estimated that a total of 150,000 bank cubic yards of excavated material requiring disposal will be generated during construction of the soft-ground bored tunnels.

Construction of the bored tunnels is expected to begin in the year 2005.

2.2.5 At-Grade Tracks (CH054)

Tracks A, B/C, and D will reach surface grade approximately 600 to 800 feet east of the 39th Street Bridge, where they will connect with the LIRR Mainline tracks. Tracks A and B/C will continue east to 43rd Street, while Track D will continue an additional 1,200 feet to 48th Street. The IB/OB tracks will reach surface grade approximately 1,100 feet east of the 39th Street Bridge, continuing east-southeast along the southern perimeter of the yard. The track will follow the outer perimeter of the yard north along 43rd Street, leading to the Existing Rail Yard. The construction of the at-grade tracks will require minor excavation, to a maximum depth of 4 feet below grade. Work will occur above the groundwater table in this area and the need for groundwater infiltration controls is not anticipated.

This contract is expected to be awarded in 2006.

2.2.6 Queens Cut-and-Cover Structure in Existing Rail Yard (CQ032)

This contract consists of construction of the permanent tunnel segment and ventilation facility in the Existing Rail Yard. The completed structure, combined with the Contract CQ028 structure, comprise the Plaza Interlocking for the LIRR tracks, and the entire Existing Rail Yard power substation and ventilation facility.

This contract is expected to be awarded in the year 2006.

2.2.7 Mid-Day Storage Yard Facility (Contract CQ033)

The Existing Rail Yard will be reconfigured to provide for the storage, washing and maintenance of LIRR cars. Included will be the development of new rail sidings, paved access roads, utility and drainage systems, and other infrastructure improvements. Final reconfiguration of the Existing Rail Yard will be one of the last construction activities to be completed for the Queens Alignment, to allow for its use as a construction staging area during most of the construction period.

Site construction will generally involve minor excavation and regrading. Trenching to establish building foundations, manholes, light pole foundations and other site infrastructure may penetrate into groundwater and, if so, would require limited dewatering. However, pumping rates would be less than 45 gallons per minute[19] and the need for a Long Island Well Permit is, therefore, not anticipated.

Two Mid-Day storage yard tracks will be constructed above the northern portion of estimated boundary of the PCB-contaminated separate phase oil plume in the Existing Rail Yard. These tracks will be raised to avoid intercepting the water table and disturbing the soil and floating product, which lies on top of the water table. The proposed location of the trainwash facility is approximately 30 feet northeast of the estimated edge of the plume. Shallow foundations will be used for this building and excavation is not expected to intercept the water table.

Surface water drainage from the Existing Rail Yard will continue to be directed to the existing drainage outfall to the Dutch Kills basin. Potential changes in site hydrology will be analyzed during final design to determine the extent of any changes in the quantity and quality of site runoff, and whether modifications will be required to the existing State Pollutant Discharge Elimination System (SPDES) permit for the drainage system.

This contract is expected to be awarded in the year 2007.

2.2.8 Sunnyside Station (CQ034)

A new LIRR Sunnyside Station will be constructed below and adjacent to the Queens Boulevard Bridge, which crosses over the LIRR Main Line and Sunnyside Yard lead track. The station will include three platforms approximately 1,000 feet in length and a main station area perpendicular to the Queens Boulevard Bridge. Work will occur above the groundwater table in this area and the need for groundwater infiltration controls are not anticipated.

This contract is expected to be awarded in the year 2008.

[19] 6 NYCRR Part 602 Section 602.1.

3.0 ENVIRONMENTAL INVESTIGATIONS AND REGULATORY SETTING

3.1 Background Studies

The project site and adjacent area have been the subject of a series of investigations to characterize the type, degree and extent of contamination in the underlying soils and groundwater (see Attachment A: Bibliography). These studies indicate that the Queens Alignment will pass through, under or nearby known or suspected areas of soils and groundwater contamination in Sunnyside Yard and the Existing Rail Yard, as summarized below.

3.1.1 Sunnyside Yard

Railroad rolling stock has been maintained and operated on portions of Sunnyside Yard for over 80 years. Following a site investigation, NYSDEC determined that railroad operations in Sunnyside Yard had resulted in the disposal of hazardous wastes in certain areas of the Yard, including various hydrocarbons and polychlorinated biphenyls (PCBs). Furthermore, NYSDEC determined that operation of diesel fuel storage tanks at the site prior to 1984 had resulted in a leakage of petroleum hydrocarbons in and near the Diesel Fuel Storage Area in the north-central portion of the Yard. As a result of the contamination, NYSDEC designated Sunnyside Yard a class "2" inactive hazardous waste disposal site and entered into an Order on Consent with Amtrak and NJTC[20] concerning roles and responsibilities for Sunnyside Yard environmental conditions. The Order divides Sunnyside Yard into six operable units (OUs) for the purposes of investigating levels of contamination, as follows:

- OU-1 is designated as the soil above the water table within the footprint of Amtrak's recently constructed High Speed Train Facility (HSTF) Service and Inspection (S&I) Building (for the new Acela service);

- OU-2 is designated as the soil above the water table with the footprint of the ancillary structures (i.e., the access road and utilities route, the parking area, and the construction lay down are) to the HSTF S&I Building;

- OU-3 is designated as the soil and the separate-phase petroleum accumulation above the water table in the north central portion of Sunnyside Yard (referred to in this report as the "PCB-contaminated separate phase oil plume", see Figure 5). This plume extends beyond the northern boundary of Sunnyside Yard into the Existing Rail Yard. The plume appears to have originated at the former fuel storage area of Sunnyside Yard, in the vicinity of a former Engine House, from where it migrated northward. Investigations indicate that the plume includes approximately 73,000

[20] Order on Consent, Index No. W2-0081-87-06, dated September 21, 1989 and its modification in August 1993 and February 1998 (collectively, the "Order").

gallons of PCB-contaminated oil, of which approximately 25,000 gallons have been estimated as recoverable;[21]

- OU-4 is designated as the soil above the water table in the remainder of Sunnyside Yard, excluding the areas of OU-1, OU-2 and OU-3;
- OU-5 is designated as the sewer system beneath Sunnyside Yard; and
- OU-6 is designated as the saturated soil and the groundwater beneath Sunnyside Yard.

In 1997, a Proposed Remedial Action Plan (PRAP)[22] and Record of Decision (ROD)[23] were issued by NYSDEC for OU-1. Subsequently, the clean-up of OU-1 and OU-2 was completed by Amtrak (prior to construction for their new Acela service). A "No-Action Alternative" was issued for OU-2 since none of the contaminants of concern were detected above established cleanup levels. The ROD and NYSDEC letter dated March 27, 1998[24] established cleanup criteria for PCBs (25 parts per million (ppm)), total carcinogenic polycyclic Aromatic Hydrocarbons (cPAHs) (25 ppm), and lead (1000 ppm) -- recognizing the limited public exposure to the site and its continued use as a rail yard. NYSDEC also approved a work plan by Amtrak in the Fall of 2000 for additional investigation at OU-3 to more precisely characterize site conditions. Amtrak submitted the OU-3 Remedial Investigation Report on March 29, 2001 Schedules for remedial activities within OU-3, OU-4, OU-5 and OU-6 have not been established.

Amtrak investigations of the groundwater (OU-6)[25] detected the presence of five groundwater plumes: three plumes of chlorinated VOCs (referred to in this report as the "Central Yard", "Skillman/39th Street", and the "Northern Boulevard/39th Street" plumes) and two BTEX plumes (referred to in this report as the "Loop Track" and "34th Street" plumes). No remedial actions with regard to these plumes have been proposed.

3.1.2 NYCT 63rd Street Tunnel Connector Project

The NYCT 63rd Street Tunnel Connector project was constructed to connect the 63rd Street subway line to the Queens Boulevard line in Long Island City. The tunnel was constructed between the bellmouth of the existing 63rd Street Tunnel beneath the Kinney

[21] Roux Associates, Inc. 1995.

[22] Proposed Remedial Action Plan (PRAP) for Amtrak Sunnyside Yard, Operable Unit 1, Proposed High Speed Trainset Facility (HSTF) Building, Queens, NY Site No. 241006, June 1997.

[23] Record of Decision, Amtrak Sunnyside Yard Operable Unit 1, Proposed HSTF Building, Queens, NY, Site No. 241006, August 1997.

[24] Letter from Hari O. Agrawal, P.E. to Joseph Duminuco regarding Amtrak, Sunnyside Yard, Queens, New York Work Plan Alternate Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs), March 27, 1998.

[25] Operable Unit 6 Remedial Investigation Report, Sunnyside Yard, Queens, New York. Prepared for the National Railroad Passenger Corporation by Roux Associates, Inc., May 1999.

Lot and 34th Street at Northern Boulevard. The access shaft for Manhattan tunneling operations, one of two early construction contracts for the Queens Alignment (see Section 2.1.2), will be located at the same site used for construction of the 63rd Street Tunnel Connector. The projects, therefore, share common geographic and hydrologic characteristics. In addition, open-cut excavations for the 63rd Street Tunnel Connector extended to within 200 feet of the PCB-contaminated separate phase oil plume in Sunnyside Yard. For these reasons, modeling data and other "lessons learned" from the 63rd Street project have been applied to the planning and engineering processes of the Queens Alignment. What follows is a summary of methods used to construct the 63rd Street Tunnel Connector and groundwater monitoring activities performed by NYCT for compliance with NYSDEC Long Island Well permit conditions.

A continuous perimeter cut-off wall was built to prevent flow of groundwater into the "bathtub" and to minimize groundwater drawdown outside of the cofferdam. Construction dewatering was conducted in accordance with two separate, approved NYSDEC Long Island Well permits.[26] A drawdown level of two feet immediately behind the perimeter cut-off wall was established as an "action limit". Dewatering activities for this project occurred within 200 feet of the 73,000-gallon PCB-contaminated separate phase oil plume, contained in OU-3 as described above.

Four NYCT-established groundwater sampling wells (P-9, P-26, P-37, and P-50), two Amtrak established groundwater sampling wells (MW-19 and MW-35), and discharge waters from the construction area were sampled in December 1996, January 1997, February 1997, March 1997, September 1997, November 1997, April 1998, August 1998, November 1998, February 1999, June 1999, September 1999, and December 1999 in accordance with permitting requirements (see Figure 5 for the location of the wells). Samples were analyzed for PCBs, semivolatile organic compounds, and a number of other contaminants for which groundwater standards or guideline values have been established.

During the course of dewatering activities, there were no reports to NYSDEC indicating the presence of floating product or PCB contamination in any of the groundwater wells. The analysis of the samples collected indicated that contaminant levels generally complied with NYSDEC Class GA groundwater standards and guidance values with the exception of benzene (at MW-35) and some chlorinated solvents (at P-37 and P-50), which are unrelated to the PCB-contaminated separate phase oil plume. Given the close proximity of the wells to the estimated boundaries of the plume, and their juxtaposition between the construction site and the plume, it can be concluded that the dewatering activities for the NYCT project did not cause the PCB-contaminated separate phase oil plume to migrate.

[26] NYSDEC Permit No. 2-6304-00394/00001 effective between 2/6/97 and 12/31/00 and NYSDEC Permit No. 2-6304-00394/00002 effective between 4/1/98 and 12/31/03.

3.2 East Side Access Environmental Site Investigations (ESIs)

In order to fully understand site contamination characteristics specific to the Queens Alignment, ESIs were conducted by MTA to further quantify the level and extent of soil and groundwater contamination within the footprint of the Queens Alignment as part of the environmental studies for the East Side Access Project (see Attachment A: Bibliography). The ESIs were completed in accordance with applicable environmental regulations and protocols established in coordination with NYSDEC, and included detailed sampling and analysis of soil and groundwater in both the Existing Rail Yard and Sunnyside Yard (see Figure 3).

In addition to the ESIs, a two-dimensional steady state groundwater flow model was used to simulate groundwater and contaminant flows from the cut-and-cover work area along the Queens Alignment.[27]

Summaries of the ESI findings and groundwater flow model results are provided in subsequent sections of this report.

3.3 Regulatory Setting and MTA's Obligations

3.3.1 New York State Requirements

Environmental permits and regulatory approvals from NYSDEC are required to construct the Queens Alignment and operate the Project are described below.

Article 27, Title 13, of the Environmental Conservation Law (ECL) - Inactive Hazardous Waste Disposal Sites

Because Sunnyside Yard has been placed on the New York State Registry of Inactive Hazardous Waste Disposal Sites, as a class "2" site, the project is subject to specific restrictions under this regulation. Section 375-1.2 of the NYCRR governing class "2" inactive hazardous waste sites states, in pertinent part:

(1) no person shall undertake at a site listed in the Registry as a class "1" or "2" any physical alteration that constitutes storage, treatment, or disposal of the hazardous waste the presence of which served as the basis for such listing, unless

(i) such conduct is exempted under section 373-1.1 (d) of this Title; or

(ii) such conduct is done with the express written approval of the Department [NYSDEC] granted either by a consent order or in such other manner as the Commissioner shall direct.

(2) (i) no person shall engage in any activity:

[27] PB/STV, 2001e.

(a) that will, or that reasonably is anticipated to, prevent or interfere significantly with any proposed, ongoing, or completed program at any site listed in the Registry; or

(b) that will, or is reasonably foreseeable to, expose the public health or the environment to a significantly increased threat of harm or damage at any site listed in the Registry.

(ii) The proponent of the activity may demonstrate to the Department that such activity will not have such effect by such demonstration as the Department may find acceptable.

(f) No person shall make a substantial change of use at a site listed in the Registry without having given 60 days advance notice thereof as described in [6 NYCRR] section 375-1.6.

(g) No person shall make a substantial change of use at a site for which a declaration has been issued by the Commissioner of Health pursuant to subdivision 8 of section 1389-b of the Public Health Law without having given 60 days advance notice thereof as described in section 375-1.6...and received the Commissioner's written approval thereof.

Environmental Permits

Construction of the Queens Alignment will require the following permits from NYSDEC:

- Demonstration that work performed in floodplains meets necessary criteria mandated by state law (6 NYCRR Part 502, Floodplain Management Criteria for State Projects);
- State Pollutant Discharge Elimination System (SPDES) permits for stormwater discharges of industrial activity (ECL Article 17 Section 0808);
- SPDES Permit for construction activities to minimize stormwater runoff effects at all surface construction sites (ECL Part 17-0801 et seq.);
- Long Island Well Permit for operation of well to withdraw water for dewatering of tunnel excavation area (6 NYCRR Part 602); and
- Registration of chemical storage tanks (6 NYCRR Part 596.2).

In addition to NYSDEC-issued permits, the construction of the Queens Alignment will require coordination with the New York City Department of Environmental Protection (NYCDEP) for sewer connections and discharges and the New York State Department of Labor prior to the removal of asbestos.

3.3.2 MTA's Obligations

MTA is under obligation to obtain approvals and permits as described above and to comply with the New York State Navigation Law (spill reporting and other requirements) relating to oil contamination during construction of the Project.

Specifically, MTA understands its primary obligations and objectives, as they relate to State requirements, in constructing the Queens Alignment are as follows:

1. Excavating, characterizing, handling and disposing of contaminated materials in accordance with all applicable regulatory requirements;

2. Obtaining all permits and regulatory approvals required to construct and operate the Project and adhering to conditions identified in the permits;

3. Preventing the movement of existing contaminated groundwater plumes that pose a significant threat to the environment;

4. Ensuring that the Project does not prevent or interfere significantly with any proposed, ongoing, or completed remedial program in Sunnyside Yard or expose the public health or the environment to a significantly increased threat of harm or damage.

4.0 ENVIRONMENTAL FINDINGS

MTA has completed a substantial environmental sampling program in Sunnyside Yard and the Existing Rail Yard (see Figure 3) to characterize soil and groundwater conditions within areas that will be disturbed during construction of the Queens Alignment. This section provides a summary of the investigations completed to date by the MTA for the Queens Alignment. The results of these investigations indicate that there are a number of locations where soil disturbance and excavation will require industry-accepted procedures for testing, handling and disposal of contaminated materials and may require measures to protect worker safety. While levels in some soil samples exceeded certain regulatory thresholds, they were generally below RCRA hazardous waste classifications (with the exception of four locations where RCRA regulatory levels for TCLP lead (5 mg/l were exceeded). Pre-construction remedial action is not anticipated for construction of the Queens Alignment. In addition, contaminant groundwater plumes were confirmed within and near the footprint of the Queens Alignment. Although construction activities could potentially affect these plumes, the Project has been designed to prevent contaminant plume migration by minimizing groundwater drawdown during dewatering activities.

4.1 Regulatory Thresholds Used to Characterize Soil and Groundwater

Areas of Concern (AOCs) were defined for soil and structures within proposed construction areas if samples taken in these areas detected substances above regulatory thresholds (as defined below), or if site reconnaissance indicated the potential for

contamination. An AOC indicates an area that will require specific testing, handling and disposal protocols during construction and for which contaminant controls may be required to safeguard against potential impacts to the construction work force. The following criteria were used to identify AOCs for soil and structures within the Queens Alignment based on observed levels of contamination:

- **Primary Soil Characterization Criteria for total cPAHs, PCBs, and lead.** Primary soil characterization criteria for cPAHs, PCBs, and total lead are based on the soil cleanup levels that were specified for Amtrak's Sunnyside Yard.[28] These soil characterization criteria for surface and subsurface soils are 25 ppm for total carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)-- specifically, Indeno(1,2,3-cd)pyrene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene and Dibenzo(a,h,)anthracene; 25 ppm for total PCBs; and 1000 ppm for total lead.
- **Primary Soil Characterization Criteria for VOCs and SVOCs.** Toxicity Characteristic Leaching Procedure (TCLP) Alternative Guidance Values provided in the "NYSDEC STARS Memo #1, Petroleum-Contaminated Soil Guidance Policy, August, 1992" were used as the primary soil characterization criteria for VOCs and SVOCs. Note that the SVOCs anthracene, acenaphthene, benzo(g,h,i)perylene, fluoranthene, fluoreneall have STARS guidance values which are well below the detection level for these compounds. As such, other criteria such as field observation, other detected SVOCs (such as phenanthrene and pyrene), and suspect sources were also used in assessing whether a location was of concern or not for VOCs and SVOCs.
- **Secondary Soil Characterization Criteria.** If TCLP Alternative Guidance Values were not provided in the STARS Memo for a VOC or SVOC compound, then the recommended soil cleanup standards described in "NYSDEC TAGM HWR-92-4046, Determination of Soil Cleanup Objectives and Cleanup Levels, January 24, 1994" were used. The soil characterization criteria for pesticides in soil from this source are considered primary.
- Petroleum-type odors are considered "Objectionable Nuisance Characteristics" by the NYSDEC (1992, NYSDEC) and must not be present in order for the soil to be considered for reuse options. Other suspect field observations such as presence of product, staining, discoloration, etc. were counted in several areas even if analytical results did not indicate exceedance of regulatory criteria.

[28] Record of Decision, Amtrak Sunnyside Yard Operable Unit 1, Proposed HSTF Building, Queens, NY, Site No. 241006, August 1997and letter from Hari O.Agrawal to Joseph Duminuco regarding Amtrak, Sunnyside Yard, Queens, New York Work Plan Alternate Carcinogenic Polycyclic Aromatic Hydrocarbons (CPAHs), March 27, 1998.

- Soil samples for TCLP metals and herbicides were assessed to determine whether a solid waste (e.g. soil, construction debris, ballast) exhibited hazardous waste characterization as defined by USEPA in RCRA under 40 CFR 261 Subpart C and 6 NYCRR Part 371. Generally, a solid waste is considered a RCRA characteristic hazardous waste if it exhibits the characteristics of corrosivity, ignitability, reactivity, or toxicity. The characteristic of toxicity was evaluated for the site soils using the TCLP testing procedure.

Criteria used to characterize groundwater in the project area based on observed levels of contamination in groundwater were:

- NYSDEC Class GA Groundwater Standards and Guidance Values as provided in NYSDEC TOGS 1.1.1, "Ambient Water Quality Standards and Guidance Values", June 1998, and;

- New York City Department of Environmental Protection (NYCDEP) thresholds for effluent limitations for storm, combined or sanitary sewers as found in Title 15, Chapter 19 of the Rules of the City of New York.

4.2 Observed Levels of Contamination in Soil

The extensive sampling completed for the Queens Alignment (summarized in Section 3.2) confirmed the presence of areas of soil contamination identified in previous studies (described in Section 3.1), and also identified new AOCs. These investigations identified few areas in which the level of contamination is considered to be hazardous based on regulatory definitions for the contaminant of concern. Table 1 presents a summary of the AOCs for soils and structures in the project area. For each AOC the table identifies its location, the affected environmental media (i.e., soil, sediment, ballast, or building material), compounds of concern, and the proposed construction activity planned for that area (e.g., track replacement, excavation, building demolition, etc.). Figure 4 depicts the locations of the AOCs.

Contamination in the overwhelming majority of the AOCs was limited to soil and ballast contaminated with petroleum products (refer to AOCs 1, 1A, 3, 3A, 7, 7A, 8, 9, 11, 11A, 14, and 15), or to structures in which asbestos containing materials or lead-based paint was observed to be present (AOCs 3, 4, 6, 9, and 12)[29]. TCLP lead exceeded RCRA regulatory levels in sediment from catch basins in the Superior Reed parking lot (AOC 6) and west of the northernmost concrete pier of the Queens Boulevard Bridge (AOC 18), and surface soil from the western portion of the proposed Open-Cut excavation area

[29] PB/STV, 2000a and PB/STV 2001a

(AOC 16 and AOC 17)[30]. The contractor will be required to clean the catch basins and handle and dispose of the sediment and surface soil as hazardous waste.

While TCLP lead was detected above the RCRA regulatory levels at two sampling locations (within AOC 3 and in the Kinney Lot), subsequent delineation testing indicated no TCLP lead above the regulatory level. Since the reported TCLP lead exceedances could not be reproduced at either location by further soil analyses, the observed exceedances of the RCRA regulatory level for TCLP lead is believed to be anomalous and not indicative of actual levels of contamination or RCRA toxicity.

Exceedances of the total lead threshold of 1000 ppm were detected in three locations (AOC 19, 20, and 21)[31].

SVOCs of concern were detected at samples collected along the northern property boundary in the western (AOC 1) and eastern (AOC 13) parts of the Existing Rail Yard and in an area near a wooden rail tie pile under the Thomson Avenue overpass (AOC 2). Toulene, a VOC of concern, was also detected near the tie pile. Pesticide-impacted soil (aldrin) was encountered in the area of the proposed car wash facility in the eastern portion of the Existing Rail Yard (AOC 10).

In addition, sampling results from portions of the sewer beneath the Existing Rail Yard indicated the presence of petroleum-impacted sediments. Additional sampling will be conducted by MTA for portions of the combined sewer in Sunnyside Yard (OU-5, see Section 3.1.1) prior to its relocation.

4.3 Observed Levels of Contamination in Groundwater

A total of seven groundwater plumes and one plume of PCB-contaminated product floating on the water table have been identified in and nearby the Queens Alignment project footprint (Figure 5). MTA investigations identified a small VOC/SVOC plume beneath the Kinney Lot and generally confirmed the contaminant levels detected in prior studies at several other locations, with the exception groundwater samples collected from the deep aquifer along the northern border of LIRR property. MTA's investigations provide further refinement to the inferred plume boundaries of prior studies,[32] as shown on Figure 5. Of the eight identified plumes only three (Kinney Lot, Central Yard, and the Skillman/39th Street plumes) will actually transect the Queens Alignment and be directly affected by construction work. The remaining five plumes, while not directly involved, would potentially be disturbed as a result of groundwater movement in the area (e.g. from dewatering activities) if measures were not implemented to minimize their migration. A description of these two subsets of plumes is provided below and the management

[30] PB/STV, 2001c and PB/STV, 2001d

[31] AKRF, Inc. 1999a

[32] Roux Associates, 1999.

techniques that will be employed to minimize the environmental impact of these plumes are described in Section 5.

4.3.1 Directly Affected Plumes

Kinney Lot plume. The MTA supplemental ESI for the open-cut excavation at the existing bellmouth identifies a dissolved-phase plume of VOCs (acetone, chloroform, toluene), SVOCs (phenol, pentachlorophenol, bis-2-ethylhexyl phthalate), and TAL Metals (iron, arsenic, lead, zinc) in deep groundwater on NYCT property north of the Existing Rail Yard and extending into the proposed open-cut excavation area in the Kinney Lot[33]. Chloroform and pentachlorophenol, a common wood preservative, were detected in groundwater at concentrations of 9.9 ppb and 22 ppb, respectively, above NYSDEC Class GA groundwater standards and guidance values but within NYCDEP thresholds for discharge to the sewer.

Central Yard plume. The presence of a large chlorinated VOC (trichloroethene (TCE), tetrachloroethene (PCE)), SVOC (bis-2-ethylhexl phthalate), and TAL Metals (chromium, iron, sodium) plume originally identified by Roux Associates was confirmed beneath the Amtrak Main Body Track area -- extending from the Honeywell Street Bridge on the west, to the Queens Boulevard Bridge on the east, the Existing Rail Yard to the north, and Skillman Avenue to the south. In accordance with a NYSDEC request, MTA investigated the middle and deeper portions of the aquifer and refined the down gradient edge of the plume. Contaminant levels in the deep aquifer were not significantly higher than those reported by Roux (for the shallower portion of the plume) within and near the proposed tunnel alignment, although a pocket containing high concentrations of chlorinated VOCs was detected in the deep aquifer near the property line of buildings on Northern Boulevard. For purposes of clarity, this report refers to the contamination in the deep aquifer as the Honeywell Street Bridge plume (see Section 4.3.2, below). Concentrations of total chlorinated VOCs in the deep aquifer ranged from between 47 and 459 ppb under the Amtrak Main Body Track area while concentrations diminish to non-detectable levels southeast toward Honeywell Street Bridge and decrease to less than 50 ppb at the southern edge of the Existing Rail Yard. These levels indicate minor exceedences of the Class GA standards and guidance values but do not exceed NYCDEP thresholds for regulated compounds discharge to combined or sanitary sewers.

Skillman/39th Street plume. MTA environmental investigations confirmed the existence of another dissolved phase chlorinated solvent plume identified by Roux Associates, located along the southern perimeter of Sunnyside Yard in the vicinity of the 39th Street Bridge. Limited monitoring conducted in this area indicated that NYSDEC groundwater criteria were exceeded for four SVOCs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene). These SVOCs were detected at concentrations less than 1 ppb. However, the groundwater characterization criterion for all four SVOCs is 0.002 ppb. The boundaries of this plume, shown on Figure 5, are inferred due to limited

[33] ibid

groundwater data in this area. Supplemental sampling will be performed in subsequent phases of the project, prior to construction in or near this area.

4.3.2 Other Plumes

Honeywell Street Bridge plume. Site-wide maximum levels of total chlorinated VOCs (cis-1,2-dichloroethene (DCE), trans-1,2-DCE, TCE, PCE, vinyl chloride) were detected in several deep groundwater locations at concentrations of 4,476 ppb approximately 160 feet west of the Honeywell Street Bridge along the northern perimeter of the Existing Rail Yard. Chlorinated solvents detected exceed NYSDEC and NYCDEP thresholds and included 4100 ppb of PCE and 340 ppb of cis-1, 2-DCE. Supplemental sampling revealed trichloroethene at levels of 5,800 ppb, which is above the groundwater characterization criteria of 5 ppb. The highest concentrations of chlorinated VOCs in this area were detected in the northern-most wells within the LIRR's right-of-way, at the property line of buildings on Northern Boulevard (see Figure 5). The plume has been partially mapped using isoconcentration lines for total chlorinated VOCs from the data collected. Additional wells will be installed to further delineate the boundary of this plume. Supplemental sampling will be completed in this area including:

- Installation of three monitoring wells at the property line of the Existing Rail Yard to investigate impacted soil or chlorinated VOC groundwater from possible off-site sources; and

- Installation of three monitoring wells to the west and two to the east to better delineate the limits of the chlorinated VOC impact.

PCB-contaminated separate phase oil plume. MTA investigations detected floating petroleum product in several wells screened in shallow groundwater (within or near OU-3, see section 3.1.1) situated east and west of the former crew quarter's building on LIRR property in the East Existing Rail Yard. The separate-phase petroleum product plume with PCBs has been documented in this area in previous investigations. Groundwater samples were not collected for analysis in this area since the wells had product in them.

Northern Boulevard/39th Street plume. A dissolved chlorinated VOC plume in shallow groundwater near the 39th Street Bridge and Northern Boulevard, adjacent to a NYS Inactive Hazardous Waste site at 37-18 Northern Boulevard (Standard Motors). The Standard Motor Products facility, located at 37-18 Northern Boulevard, was reported as having a 1,000-gallon aboveground storage tank closed in place containing 1,1,1-TCE;

Loop Track plume. A BTEX plume beneath the far northeastern edge of Sunnyside Yard, just west of 43rd Street. The highest recorded concentration was 1 ppb; and

34th Street plume. A BTEX plume just north of the Existing Rail Yard near 34th Street.

5.0 PROJECT EFFECTS AND MITIGATION MEASURES

A summary of the environmental concerns and mitigation measures that will be employed during construction of the Queens Alignment is provided in Table 2. The Project will have beneficial effects in that site conditions will be partially remediated through the removal and proper disposal of contaminated materials found within the footprint of the Queens Alignment in Sunnyside Yard and the Existing Rail Yard. Groundwater model predictions for this project and construction observations made during the NYCT 63rd Street Tunnel Connector Project indicate that groundwater drawdown outside the slurry walls can be kept to within normal seasonal variations and the resultant groundwater gradient changes at contaminant plume locations outside the construction areas will be negligible.

5.1 Soil and Structures

During construction of the Queens Alignment, disturbance and disposal of soils, including tunnel spoil, will be required. A total of 24 AOCs in soils and structures were identified (Table 1). Site excavation for the removal of rail, ties and ballast within the Existing Storage Yard, Sunnyside Yard, and Harold Interlocking will be completed in accordance with NYSDEC requirements. Soil erosion controls will include the use of silt fencing, hay bales, and other measures acceptable to NYSDEC.

The contractor will be required to test materials in accordance with applicable regulatory requirements[34] to determine appropriate storage and disposal requirements or opportunities for potential reuse of material on- or off-site. A QA program will be implemented by MTA to verify the contractor's proper handling and disposal of contaminated materials. Excavated soil, muck, ballast and sediment will be disposed of in conformance with NYSDEC requirements, depending on its classification as described below.

- Construction and demolition debris removed during the site preparation work will be handled as construction and demolition debris as defined by NYSDEC TAGM SW-89-2002, if not visibly contaminated (i.e., no discernible petroleum-type odors or

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[34] Analytical parameters for solid waste classification will include: TCLP VOCs by EPA Methods 624/8260B, TCLP SVOCs by EPA Methods 625/8270B, TCLP Metals by EPA Method 6000, PCBs by EPA Method 8082, TCLP Pesticides by EPA Methods 8081, TCLP herbicides by EPA Method 515.1, Ignitability, Corrosivity, Reactivity, and others that may be required by the disposal facility. RCRA Hazardous Waste regulatory levels will be used for hazardous characteristics and compounds and testing procedures found in NYSDEC's Spill Response Program "Sampling Guidance and Protocols - Technological Background and Quality Control/Quality Assurance", 1992 and NYSDEC's STARS Memo #1, Petroleum-Contaminated Soil Guidance Policy, August 1992 will be followed.

staining based on professional judgment). Timber ties and concrete that are not visually contaminated, will be disposed as construction and demolition debris as defined in 6 NYCRR Part 360.

- Non-contaminated materials include soil, muck, and sediment that do not exceed threshold concentrations for total PCBs, total cPAHs, and total lead specified in the Record of Decision for OU-1 in Sunnyside Yard (see Section 3.1.1), or limits for other contaminants specified in NYSDEC TAGM #4046. Neither disposal or treatment of non-contaminated materials is needed. Instead, non-contaminated materials will be reused either on-site or off-site. The material could be reused as backfill for other cut-and-cover sections, site grading, and other engineering purposes (such as building fill, cover fill for landfills, fill and railroad embankment).

- Petroleum contaminated materials include soil, muck, sediment, ballast, concrete, or timber ties that exhibit objectionable nuisance characteristics identified in NYSDEC STARS Memo #1, August 1992. These include discernible petroleum-type odors or other indications of the presence of petroleum product. This material would be disposed of in accordance with STARS or, if it meets NYSDEC's Beneficial Use Determination (BUD) criteria (6 NYCRR Part 360), potentially re-used on- or off-site.

- Contaminated materials include soil, muck, ballast and sediment that exceed threshold concentrations specified in NYSDEC TAGM #4046 or the site-specific criteria developed for Sunnyside Yard, but do not exceed hazardous waste criteria (toxicity, reactivity, corrosivity, flammability) as defined by 6 NYCRR 371 and 40 CFR 257. This material could potentially be re-used as backfill or will require disposal at a regulated treatment, storage, disposal facility (TSDF).

- Hazardous materials include soil, muck, ballast or sediment that exceeds specific concentrations above the hazardous waste criteria (toxicity, reactivity, corrosivity, flammability) as defined by 6 NYCRR 371 and 40 CFR 257. On-site re-use of hazardous material is not permitted. Re-use of hazardous materials off-site is feasible with appropriate treatment methods and permits. Disposal of hazardous material must occur at a regulated hazardous waste TSDF.

Stockpiled material storage areas will be designed to prevent leakage from stockpiled materials from entering surrounding surface soils and waters. Stockpiled material will be covered to prevent wind erosion and precipitation from affecting the stockpile. An impermeable bottom layer with berms, sumps, or ditches surrounding the location will be constructed to prevent surface water runoff from contacting the stockpiles and infiltrating water from discharging off the stockpiled area. A drainage system will be used to collect accumulated liquids for all stockpile areas and divert the liquids to an appropriate water collection, storage, and/or treatment system. A "Stormwater Pollution Prevention Plan" and "Erosion and Sediment Control Plan" will be prepared and submitted to NYSDEC in conjunction with the application for the SPDES Permit for stormwater discharges during construction activities.

The disposal options described above will also be used for the handling of soil and muck removed from the bored tunnels. Soil and muck from a slurry-face TBM, if used, will be separated on-site prior to disposal or re-use. Spoil may be suitable for re-use on-site as fill. Slurry spoil could be used on its own as cover material but not as structural fill unless mixed with other soil material. Earth pressure balance tunneling, if used, includes injection of additives such as polymer mixes and foams during tunneling operations to help balance the groundwater and soil pressures at the face of the boring machine. The methods to be applied for disposal or re-use of these materials will be determined when specific foaming agents or polymers are identified.

5.2 Contaminant Groundwater Plumes

Project excavation for the construction of the Queens Alignment will directly affect three areas of contaminated groundwater: the two chlorinated VOC plumes of low-concentration (i.e., the Central Yard and Skillman/39th Street plumes) and the VOC/SVOC plume beneath the Kinney Lot. Because of the direct contact with these plumes, seepage and other extracted materials will require specific handling protocols for sampling, treatment, and disposal. The groundwater management measures that will be implemented during open-cut excavation activities are described below in Section 5.2.2 for each contract where the water table will be intercepted or disturbed.

For the plumes that are not directly affected by construction activities, dewatering activities on contaminant groundwater plumes outside the footprint of the Project were assessed. The analysis focused on two plumes -- the PCB-contaminated separate phase oil plume (petroleum product floating on the water table) and the Honeywell Street Bridge plume -- due to their proximity to the proposed dewatering activities and also the levels of contaminants detected in these areas. The use of slurry and jet-grout walls (minimum thickness of 2.5 feet) to enclose the excavation areas will generally provide a watertight excavation and support wall system. The success of the slurry or jet-grout wall bathtub in preventing significant groundwater flow and resulting plume movement depends primarily on the location, orientation, and size of rock discontinuities. Where adequate connections have not been achieved between the walls and the surface of the bedrock additional measures may be required. A quality assurance program will be implemented during construction, which will include packer permeability testing[35] at regular intervals along the slurry wall. Grouting will be done where permeability is greater than specified. Regardless of actual wall permeability, contractors will not be permitted to lower the water table below normal seasonal variations (in the case of Contract CQ026) or two feet (in the case of Contract CQ028), as measured directly outside the slurry wall at NYSDEC-approved peizometer locations. Cement and chemical grouting and groundwater recharge will be applied, as necessary, in order to

[35] Packer permeability testing includes inserting a sealed tube into a bored hole to calculate the quantity of water flowing through the tube to estimate the permeability of the wall.

comply with the water table drawdown limitations. Given these construction methods, a two-dimensional steady state groundwater flow model[36] was applied to assess the potential effect of the dewatering activities on two contaminant plumes of concern -- the PCB-contaminated separate phase oil plume (i.e., OU-3, see Section 3.1.1) and the chlorinated VOC plume located 160 feet west of the Honeywell Street Bridge. Based on this model and upon observations made during the 63rd Street Tunnel Connector project, it is possible to estimate potential effects on the plumes, which are described in the next section.

5.2.1 Potential for Contaminant Plume Migration

Queens Open-Cut Excavation at the Bellmouth/Kinney Lot (Contract CQ026)

The excavation area for the Manhattan tunneling access shaft is located approximately 800 feet away from the Honeywell Street Bridge plume of chlorinated VOC's in the deep aquifer and 1,600 feet from the PCB-contaminated separate phase oil plume. The two dimensional model has shown these plumes lie outside the cone of influence of the specified dewatering activities for this contract. As a result, the Project is not expected to cause the contaminated plumes to migrate.

Nevertheless, a water quality sampling and water level measurement plan will be implemented to monitor the environmental and hydrogeologic effects of dewatering at the construction area. The monitoring plans will be submitted to, and approved by, NYSDEC in conjunction with the applications for the Long Island Well Permit, prior to commencing any dewatering activities. Follow-up monitoring reports will be submitted to NYSDEC during the course of dewatering operations in accordance with permit conditions.

Queens Open-Cut Excavation and Structure - Northern Boulevard to Existing Rail Yard (Contract CQ028)

The excavation area for the Cut-and-Cover structures is located approximately 500 feet west of the Honeywell Street Bridge plume and 1,000 feet west of the PCB-contaminated separate phase oil plume. At a distance of 1,000 feet, the hydraulic gradient change at the PCB-contaminated separate phase oil plume location due to dewatering within the bathtub will be negligible. Based on recent groundwater observation data, which confirms data from the 1995 Roux Associates report, the measured average hydraulic gradient within the project site is 0.004. The estimated hydraulic gradient at the contaminant plume during the dewatering for Contract CQ028 is 0.0005 -- an order of magnitude less than the observed average hydraulic gradient. Such a gradient change is not expected to cause movement of the separate phase petroleum plume, which itself

[36] PB/STV, 2001e.

causes a depression in the water table and, by convention, remains localized due to its viscosity and adsorptive properties.

Since the Honeywell Street Bridge plume is located in the deep aquifer, it is probably outside the effective cone of influence of the dewatering activities. The two-dimensional steady state flow model is effective in predicting the hydraulic response of the aquifer. However, the model is based on a steady-state flow and considers only the flow regime parallel to the cross-section, ignoring the flow regime perpendicular to the cross-section. Given that this plume of chlorinated VOCs lies in the deep aquifer, and vertical gradients exist beneath the west and northwest portions of the yard (influenced by filling activities of the Dutch Kills), further investigation into the potential for the upward migration of this plume is warranted. To confirm the results of the two-dimensional modeling effort, additional analyses are ongoing.

A ground water sampling and water elevation measurement plan will be implemented to monitor the environmental and hydrogeologic effects of dewatering at this site. The monitoring plans will be submitted to, and approved by, NYSDEC in conjunction with the applications for the Long Island Well Permit, prior to commencing any dewatering activities. Follow-up monitoring reports will be submitted to NYSDEC during the course of dewatering operations, in accordance with permit conditions.

IB/OB Approach Structures (Contract CQ030)

Dewatering rates have not yet been estimated for the CQ030 contract but they are expected to be significantly less than those estimated for the Open-Cut Excavation and Structure, based on the smaller size and shallower depth of this excavation area. This open cut excavation area is located approximately 1,200 feet southeast of the PCB-contaminated separate phase oil plume and 2,000 feet southeast of the Honeywell Street Bridge. Given that groundwater flow within the saturated Upper Pleistocene deposits, comprising the Upper Glacial aquifer, is predominantly west at an average rate of 5.7 to 6.6 feet per day, dewatering at this site inside the slurry walls is not expected to influence either of the known contaminant plumes. Nevertheless, a sampling and water elevation measurement plan will be implemented to monitor the environmental and hydrogeologic effects of dewatering at this site. The monitoring plans will be submitted to, and approved by, NYSDEC in conjunction with the applications for the Long Island Well Permit, prior to commencing the dewatering activities. Monitoring reports will be submitted to NYSDEC during the course of dewatering operations, in accordance with permit conditions.

Queens Soft-Ground Bored Tunnels (CQ031)

Supplemental groundwater controls beyond those provided by the pressurized-face TBM will generally not be required during construction of the bored tunnels since groundwater inflow will be controlled by maintaining adequate face pressure during TBM excavation to prevent infiltration. Groundwater inflow to the launch shaft will be controlled through the use of a grout block, or similar zone of treated soil, at the tunnel-shaft interface. Any

groundwater incursion along the tunnel will be impeded by the grout that is injected behind the tunnel liner, which effectively "seals" the lining into the ground.

Each tunnel will be approximately 22'6" in diameter and will be lined throughout using fully bolted and elastomeric gasketted pre-cast concrete segmental linings erected within the TBM shield as it advances. These linings are designed to be completely and immediately watertight as they emerge from the rear of the TBM, with any residual leaks through the elastomeric gaskets dealt with by further pressure contact grouting through the lining and, if necessary, internal caulking in a caulking groove provided for that purpose.

Slurry or jet-grout walls will be used during construction of the emergency exits.

5.2.2 Groundwater Management

As described in Section 4.3, on-site sampling of the Central Yard, Skillman/39th Street, and Kinney Lot plumes indicated that groundwater that is likely to be intercepted by construction activities is contaminated with VOCs, SVOCs and TAL metals at levels that exceed NYSDEC Class GA Groundwater standards and guidance values. However, these levels do not exceed NYCDEP effluent limitations for storm drains and sanitary or combined sewers and discharge to the sewer is a feasible option with limited treatment. Groundwater from the excavation areas will be removed, sampled, treated, and disposed of properly. Water within the bathtub will be collected in a sump system and piped to a sedimentation and oil/water separation system prior to discharge to the sanitary/combined sewer system available at the site. Sampling ports along the entire system will enable detailed monitoring and analyses of the groundwater.

The groundwater treatment system for the Open-Cut Excavation Area and Structure (CQ028) will be equipped with gravity settling tanks, oil/water separators, filtration, flocculation, carbon absorption or dissolved air flotation treatment system components necessary to meet discharge limits as identified in applicable discharge permits from the NYCDEP. This treatment system would be effective in treating even the site-wide maximum levels of SVOCs recorded. Seepage water will be pumped through the on-site treatment system and sampled prior to discharge to the NYCDEP combined sewer. Two sump pits at the base of the cut-and-cover structure will serve as collection points, pumping the water to the above ground treatment system. The first phase of treatment consists of two 21,000-gallon settling tanks for removal of solids. The tanks are fitted with weirs that will enable the separation and removal of product, in the unlikely event that free-phase product is encountered. Next, transfer pumps will pump the water through bag filters for removal of suspended solids. Finally, four 10,000-lb carbon units, operating in series and in parallel, will be used to remove hydrocarbons in the water prior to discharge.

5.3 Sewer Relocations (CQ028 and CH053)

The results of sewer sampling in the Existing Rail Yard indicate the presence of petroleum-impacted sediments and a small quantity of hazardous waste (TCLP lead

exceedances), which will require proper handling and disposal. Additional sampling will be conducted for portions of the combined sewer in the Existing Rail Yard and Sunnyside Yard (OU-5, see Section 3.1.1) prior to relocation.

The contractor will be required to perform a television inspection to determine the condition of each sewer (including the storm sewer draining to Dutch Kills Basin), and clean the sewer using a combination of methods depending on the diameter of the pipe. For pipes of up to 48-inches in diameter, a pressurized jet will be used to mobilize the sediments and liquid, trap them at a downstream manhole, sample the sediments and properly dispose of them. For larger pipes and box sewers, drag buckets, high-capacity vacuum trucks or physical removal by manual labor will be used depending on site conditions and access. All contaminated water and sediments will be collected, characterized and properly disposed in accordance with regulatory requirements

6.0 CONCLUSIONS

The Queens Alignment of the East Side Access project will be constructed over a ten-year period beginning in the Spring of 2002. The construction will include:

- three open-cut excavation areas located on property owned by MTA (Open-Cut Excavation at the Bellmouth and the Open-Cut Excavation and Structure in the Existing Rail Yard) and Amtrak (IB/OB Approach Structure);
- bored tunnels beneath Sunnyside Yard and Harold Interlocking;
- site clearing and building demolition in the Existing Rail Yard;
- trackwork and signals for a new Mid-Day Storage Yard; and
- a new station beneath the Queens Boulevard Bridge.

Sunnyside Yard has been designated by the NYSDEC as a class "2" inactive hazardous waste disposal site. A plume of PCB-contaminated petroleum product in the north-central portion of Sunnyside Yard, and extending into the Existing Rail Yard, was the basis for the listing. Since that time, seven plumes of contaminated groundwater have been identified in or near Sunnyside Yard. In addition, MTA investigations have identified 24 AOCs within the footprint of the Queens Alignment where soils or structures contain levels of contaminated materials above regulatory limits. With the exception of four areas where exceedances of RCRA hazardous waste regulatory levels for TCLP lead were detected, none of the samples collected detected contamination at levels above RCRA hazardous waste regulatory levels and pre-construction remedial action is not proposed.

The Project's design incorporates measures to prevent movement of groundwater contamination and movement of the PCB-contaminated plume of floating product by minimizing drawdown of the water table. Similar measures were successfully used in

NYCT's 63rd Street Tunnel Connector project where dewatering was performed in open-cut excavation areas located within 200 feet of the contamination. Open-cut excavation areas required to construct the Queens Alignment are located at least 1000 feet from the PCB-contaminated separate phase oil plume.

Dewatering activities within slurry/jet-grout walls at each open-cut excavation area will be conducted in accordance with NYSDEC requirements as specified in Long Island Well permits obtained for each contract. The initial dewatering activities for these contracts will not be conducted at the same time; only maintenance dewatering will occur concurrently. Ongoing monitoring and treatment of water removed during excavation, water quality testing in the vicinity of the contaminated plumes and, if necessary, contingency activity such as groundwater recharging will be conducted to verify that the contaminated plumes remain unaffected throughout groundwater dewatering operations.

Based on NYCT's experience, the construction techniques proposed to be utilized, and results from a two-dimensional steady state model, the Project is not expected to cause contaminant plume migration, nor will it prevent or interfere significantly with any proposed, ongoing or completed remedial program in Sunnyside Yard. Further, construction activities will not expose the public health or the environment to a significantly increase threat of harm or damage.

This report presents an overview of MTA's proposed construction activities and environmental findings in the vicinity of the Queens Alignment. Environmental findings in areas affected by early construction activities have been completed and reports are available for review. Supplemental sampling will be performed as final design progresses for the later-phase construction activities. This report represents the first step in an ongoing coordination effort with the NYSDEC regarding the construction of the Queens Alignment.

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TABLES

Table 1
Areas of Concern in Soil and Structures

AOC	Location	Affected Media	Compounds of Concern*	Proposed Construction Activity
AOC 1	West Existing Rail Yard - adjacent to Queens Street buildings	Soil	SVOCs (2)	Surface site work and track replacement
AOC1A	West Existing Rail Yard - near West Street	Soil, stained ballast	SVOCs (2), petroleum odors (4)	Surface site work and track replacement
AOC 2	West Existing Rail Yard - wood tie pile area	Soil, suspect concrete layer at 4.5 ft-bg	VOCs, SVOCs (2 - soil),	Surface site work and track replacement
AOC 3	West Existing Rail Yard - NY & AR Maintenance Shop and Parking Lot	Soil, ballast, building materials	VOCs (2, 6), SVOCs (2), TCLP Lead (5 - one sample location), odors (4), staining, high PID, sheen observed in one hole, ACMs and LBP in Maintenance building	Track replacement and demolition of Maintenance building
AOC 3A	West Existing Rail Yard - north of NY & AR	Soil	SVOCs (2)	Surface site work and track replacement
AOC 4	West Existing Rail Yard - Yardmaster's Building	Building materials	ACM and LBP in Yardmaster's building	Demolition of Yardmaster's building
AOC 6	Superior Reed Building (NYCT property)	Building Materials, Catch Basin in Parking Lot	ACM/LBP in Superior Reed building; TCLP lead excedance in sediment	Demolition of Superior Reed building and site preparation
AOC 7	Central Existing Rail Yard (at Amtrak boundary)	Soil	SVOCs (2)	Surface site work and track replacement
AOC7A	Central Existing Rail Yard (at Northern Boulevard building boundary)	Soil	SVOCs (2)	Surface site work and track replacement
AOC 8	East Existing Rail Yard - near Honeywell Bridge	Soil	VOCs (2) and SVOCs (2)	Surface site work and track replacement
AOC 9	East Existing Rail Yard - north part of Amtrak separate-phase petroleum plume	Soil and building materials	Total cPAHs (1), Petroleum VOCs and SVOCs (2), product, odor (4), and ACM in abandoned locker building	Track replacement; excavation; demolition of abandoned crew quarters building
AOC 10	East Existing Rail Yard	Soil	SVOCs (2) and pesticide (Aldrin) (3)	Surface site work and track replacement
AOC 11	East Existing Rail Yard - west of 39th St.	Soil	SVOCs (2)	Track replacement
AOC 11A	East Existing Rail Yard - east of 39th St.	Soil	SVOCs (2)	Track replacement

Table 1
Areas of Concern in Soil and Structures

AOC	Location	Affected Media	Compounds of Concern*	Proposed Construction Activity
AOC 12	West Existing Rail Yard - abandoned substation near Queens Street	Building materials	ACM and LBP	Building demolition
AOC 13	Central Existing Rail Yard (north boundary east of cut and cover)	Soil	SVOCs (2 – soil)	Track replacement
AOC 14	Sunnyside Yard - Transition Tunnel D	Soil	SVOCs (2)	Excavation
AOC 15	Amtrak Loop Track - South of Mainline Embankment	Soil	Total cPAHs (1), and SVOCs (2)	Track replacement and approach structure construction using slurry walls and excavation
AOC 16	Existing Rail Yard - west of Honeywell Street Bridge	Soil	TCLP (5)	Surface site work
AOC 17	Existing Rail Yard - west of Honeywell Street Bridge	Soil	TCLP (5)	Surface site work
AOC 18	Existing Rail Yard – Catch Basin west of Queens Boulevard Bridge	Sediment	TCLP (5)	Sewer Replacement
AOC 19	Existing Rail Yard – east/adjacent to Honeywell Street Bridge	Soil	TAL Metals - Lead (1)	Surface site work and track replacement
AOC 20	Existing Rail Yard – north of Maintenance Building	Soil	TAL Metals - Lead (1)	Surface site work and track replacement
AOC 21	Existing Rail Yard – west of Queens Boulevard Bridge	Soil	TAL Metals - Lead (1)	Surface site work and track replacement

Notes:

ACM: Asbestos Containing Material
C1-VOCs: Chlorinated Volatile Organic Compounds
cPAHs: Carcinogenic Polynuclear Aromatic Hydrocarbons
LBP: Lead-Based Paint
SVOCs: Semi-Volatile Organic Compounds
TAL Metals: Target Analyte List Metals
TCLP Metals: Toxicity Characteristic Leaching Procedure Metals
VOCs: Volatile Organic Compounds

* Concentrations of Identified Compounds of Concern exceed one or more of the following soil or groundwater characterization criteria:

(1) NYSDEC ROD for Sunnyside Yard - Soil Cleanup Levels
(2) NYSDEC STARS Memo #1 Guidance Values for Contaminated Soil.
(3) NYSDEC TAGM #4046 Soil Cleanup Levels
(4) NYSDEC "Objectionable Nuisance" for petroleum odors
(5) RCRA TCLP Regulatory Levels for soil

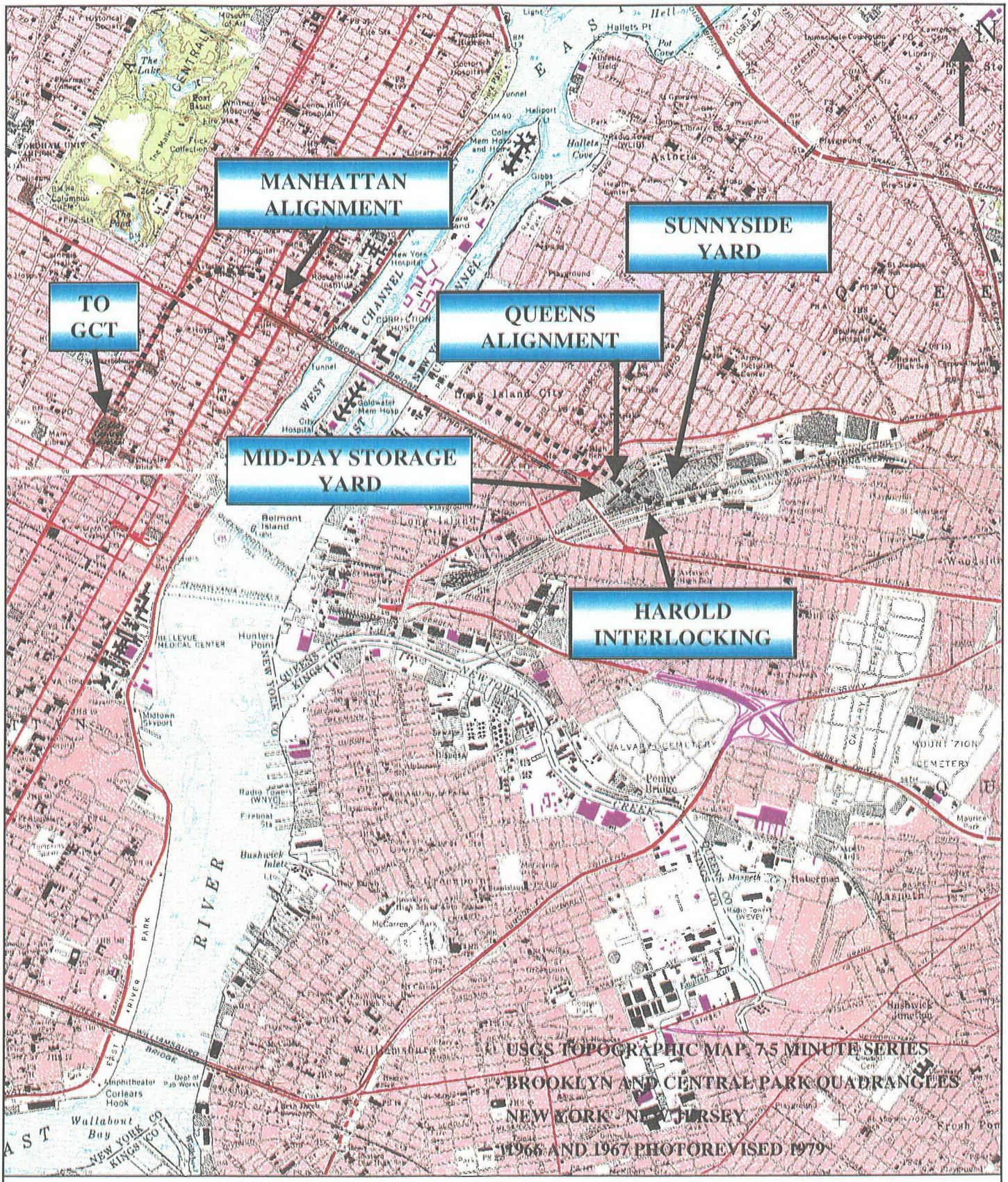
Table 2
Construction Mitigation Measures

Construction Activity/Location	Environmental Concern	Mitigation Measures
The Existing Rail Yard Preparation and Manhattan Access Shaft	Petroleum-Contaminated Ballast	Excavate, segregate & dispose
	Petroleum-Contaminated Concrete	Excavate, segregate & dispose
	Petroleum-Contaminated Soil	Excavate, segregate & dispose; End sampling
	PAH-Contaminated Soil	Excavate, segregate & dispose; End sampling
	Lead-Contaminated Soil exceeding ROD Values	Excavate, segregate & dispose; End sampling
	Lead-Contaminated Sediments at Hazardous Levels	Excavate, segregate & dispose; End sampling
	Lead-Contaminated Soil at Hazardous Levels	Excavate, segregate & dispose; End sampling
	Storm Drain Sediments *a) Superior Reed Building* *b) The Existing Storage Yard Storm Sewer*	Excavate & segregate & dispose
	Lead Based Paint and ACM *a) Superior Reed Building* *b) Yardmaster Building* *c) Abandoned Locker Room* *d) Condemned Substation* *e) Abandoned Covered Platform* *f) One-story hut*	Abate prior to, or during, demolition
	Chlorinated VOC groundwater plume	On-site groundwater treatment system
Cut & Cover Tunnel	Dissolved-phase chlorinated-VOC and PCB-contaminated petroleum plumes migration	1) Slurry wall construction 2) Maintain drawdown limitation 3) Packer permeability testing 4) cement and chemical grouting to seal leaks 5) Recharge to groundwater with approval by NYSDEC, if necessary 6) Water quality monitoring
	Chlorinated VOC groundwater plume	On-site groundwater treatment system
	Petroleum-contaminated soil	Excavate, segregate & dispose
	Carcinogenic-PAH Soil	Excavate, segregate & dispose
	Petroleum-Contaminated Ballast	Excavate, segregate & dispose

Table 2
Construction Mitigation Measures

Construction Activity/Location	Environmental Concern	Mitigation Measures
Harold Interlocking Reconfiguration	Petroleum-Contaminated Soil	Excavate, segregate & dispose
	Lead Based Paint *a) 43rd and 48th Street Bridges* *b) Catenary Towers* *c) Signal Bridges* *d) Signal Control Boxes*	Abate prior to demolition
Soft -Ground Bored Tunnels	Carcinogenic-PAH Soil	Excavate, segregate & dispose
	Petroleum-Contaminated Ballast	Excavate, segregate & dispose
	Contaminant Plumes	TBM areas sealed; groundwater controls not required
Amtrak Loop Track and Approach Structures	Petroleum-Contaminated Soil	Excavate, segregate & dispose
	Carcinogenic-PAHs Soil	Excavate, segregate & dispose
	Lead Based Paint *a) Catenary Towers* *b) Signal Bridges*	Abate prior to demolition
	PCB-contaminated soil	Excavate, segregate & dispose
	Chlorinated VOC plume	On-site groundwater treatment system
Sunnyside Station	None identified at this time	None anticipated

FIGURES



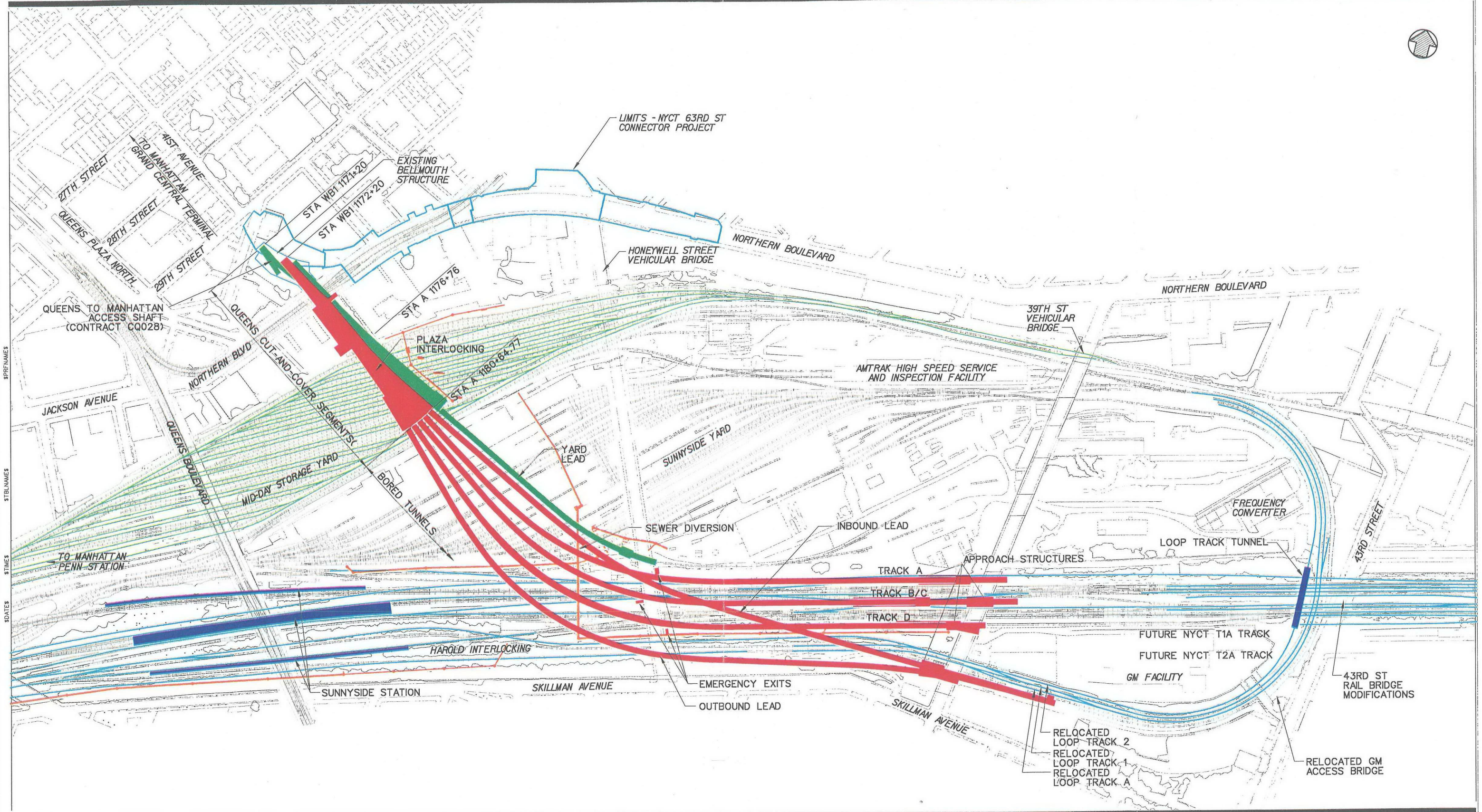
EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

SITE LOCATION
EAST SIDE ACCESS PROJECT

Parsons Brinckerhoff Quade & Douglas Inc./STV Incorporated

PB STV

FIGURE 1



EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

QUEENS ALIGNMENT
FIGURE 2

Parsons Brinckerhoff Quade & Douglas, Inc./STV Incorporated

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QUEENS CUT-AND-COVER TUNNEL STRUCTURE
(CONTRACT CQ028)

QUEENS TO MANHATTAN
ACCESS SHAFT
(CONTRACT CQ026)

QUEENS OPEN-CUT EXCAVATION
FOR THE IB/OB EXIT PORTAL
(CONTRACT CQ031)

- SOIL SAMPLING LOCATION
- GROUNDWATER SAMPLING LOCATION
- SEWER SEDIMENT SAMPLING LOCATION
- EC LEAD EXCEEDANCE SOIL SAMPLE LOCATIONS

SCALE IN FEET
200' 100' 0 200' 400'

$PRFNAME$
$TBLNAME$
$TIME$
$DATE$
$DGNNAME$

EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

SOIL AND GROUNDWATER SAMPLING LOCATIONS FOR QUEENS ALIGNMENT FIGURE 3

Parsons Brinckerhoff Quade & Douglas, Inc./STV Incorporated

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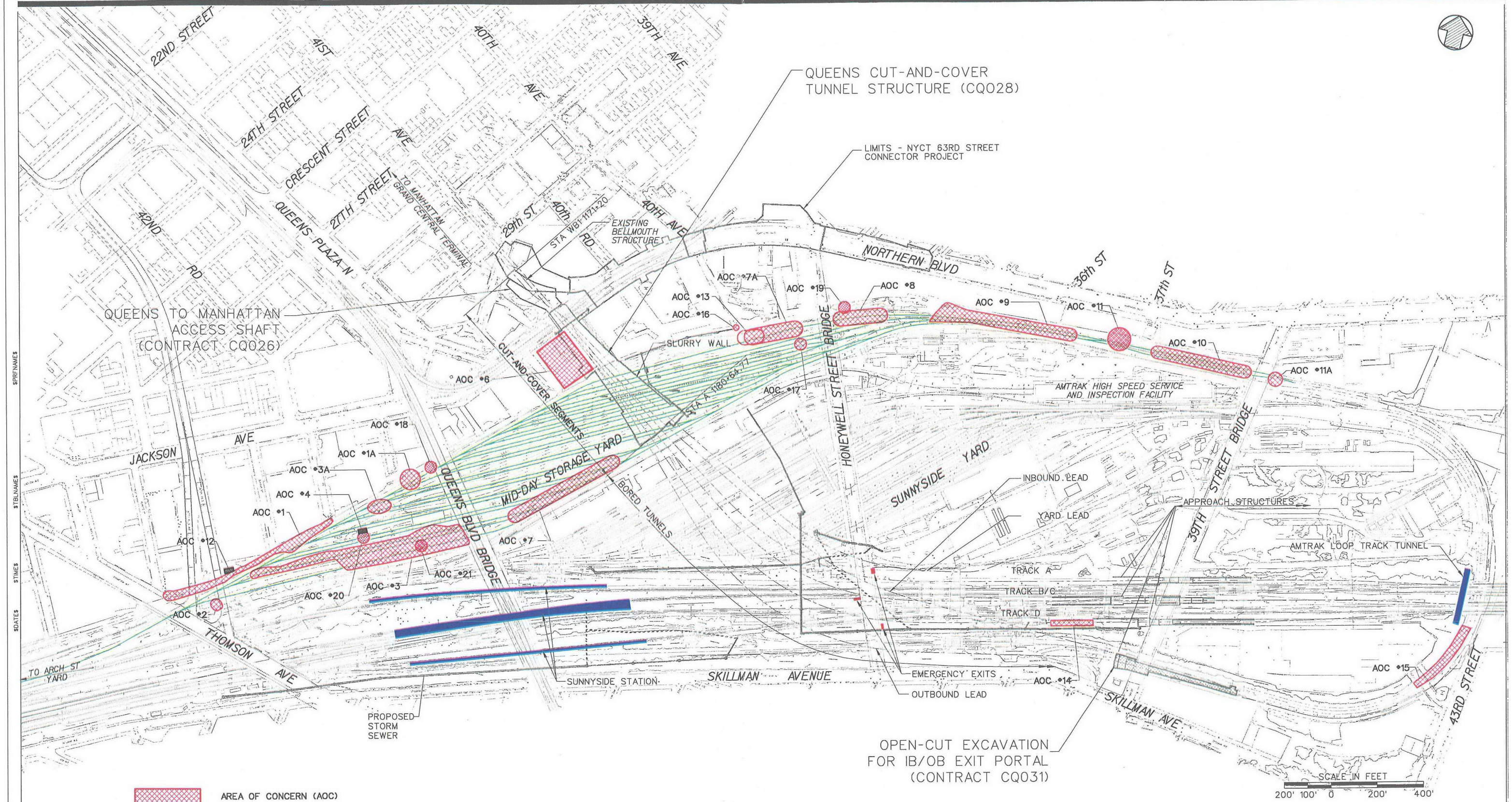

EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

QUEENS SEGMENT, AREAS OF CONCERN IN SOIL AND STRUCTURES FIGURE 4

Parsons Brinckerhoff Quade & Douglas, Inc./STV Incorporated

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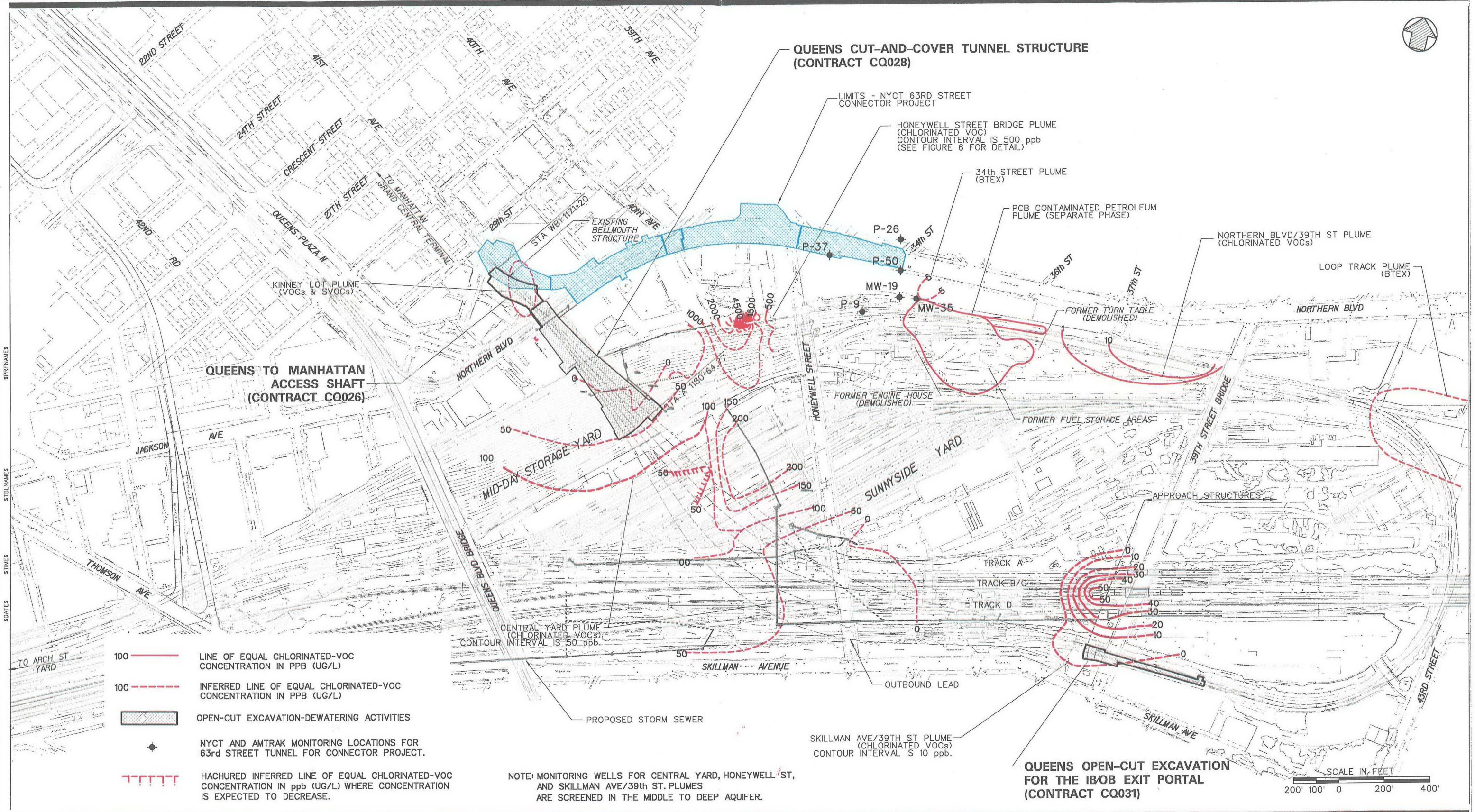

EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

CONTAMINATED GROUNDWATER PLUMES
FIGURE 5

Parsons Brinckerhoff Quade & Douglas, Inc./STV Incorporated

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $DGNNAME$

/Advocacy Report/5 Plumes.dgn 01/16/02 09:12:34 AM

TE-MW-2-18
TE-2-L2
TE-2-L3
TE-2-L4
TE-2-L1
TE-MW-1A-11
TE-MW-1A-9
TE-MW-QA4
TE-MW-2-18B
TE-MW-2-19
TE-YA-24
TE-YA-23
TE-MW-1A-12
TE-MW-2-L9
TE-MW-2-L6
TE-MW-2-L8
TE-MW-2-L7
TE-MW-2-20
TE-MW-1A-10
TE-MW-2-15
TE-YA-22
TE-MW-2-16
TE-MW-1A-13
TE-YA-14
TE-MW-2-17
MW-42

500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
0

SCALE IN FEET
20' 10' 0 20' 40'

EAST SIDE ACCESS
LONG ISLAND RAIL ROAD
GRAND CENTRAL CONNECTION

HONEYWELL STREET BRIDGE PLUME
FIGURE 6

Parsons Brinckerhoff Quade & Douglas, Inc./STV Incorporated

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