C.2.i. Soils and Foundations

A geotechnical investigation was performed along the length of the project to obtain subsurface data, and the findings were presented in the January 2005 Geotechnical Report prepared by Iffland Kavanaugh Waterberry, P.C./Ewell W. Finley, P.C. The report includes a description of soil properties established through lab testing of twenty-three borings taken in 1998. The borings indicate that the soil along the length of the project is mostly medium dense to dense silty sand and gravel, with occasional boulders with deposits of fill, soft clay, and clayey silt, overlaying a dense layer of clay approximately 20 meters (66 feet) below the surface of Newtown Creek. The report also evaluated the potential for soil liquefaction, which occurs when the strength and stiffness of the soil is reduced due to rapid loading as may occur during an earthquake. The results of the investigation indicate that, in a few areas within the project limits, the fill material has the potential for liquefaction.

EXISTING FOUNDATIONS

The rehabilitation alternatives (RA-5 and RA-6) retain the existing foundations of the Brooklyn and Queens Approaches and the Main Span. The results show that an intense earthquake may cause soil liquefaction, resulting in small settlements of the existing structure, but these settlements would only be significant at piers 92 and 93 in Queens. The existing piers 85 through 87 (see Figures III-51 through III-54 for span locations) of the Brooklyn Approach are supported on pile foundations, as are piers 90 to 94 of the Queens Approach. The remaining Approach piers are founded on spread footings. The Main Span foundations (piers 88 and 89) are partially within Newtown Creek, with one face and two sides of each pier exposed to the waterway and the other face land bound. Pier 89 in Queens is founded on piles while pier 88 in Brooklyn is supported by a spread footing.

FIGURE III-51: ELEVATION OF SPANS 81 THROUGH 86 (BROOKLYN APPROACH)
The existing foundations were analyzed to determine their potential behavior during an intense earthquake. The results show that an intense earthquake may cause soil liquefaction, resulting in settlements of the existing structure, but these settlements would only be significant at piers 92 and 93 in Queens. Since these piers would be retained under Alternatives RA-5 and RA-6, it is recommended that additional borings be conducted if either rehabilitation alternative is selected for construction to confirm the soil properties at these piers, and that the soils in these areas be densified, if necessary. This densification can be accomplished through vibro-replacement stone columns or compaction grouting down to the tips of the piles.

NEW FOUNDATIONS

Every Build Alternative includes new foundations for the length of the project. The silty sand and clay conditions, as well as the potential for soil liquefaction in the fill, make pile foundations...
a favorable type of construction in this area for the larger Approach and Main Span piers. Concrete filled steel pipe pile foundations are proposed to support the Brooklyn Connector, Approaches and Main Span. This type of pile is beneficial because it reduces the volume of contaminated soil to be exposed and removed from the site, and can be driven through dense sand, gravel, and boulders.

All new foundations would be designed to support the maximum loads imposed by the applicable loading combinations including HL93 live load and seismic loads. The foundations at the Approaches and Main Span would also be designed to support the unbalanced loading imposed during cantilever construction.

The foundations of the Brooklyn Connector would be spread footings.

TEMPORARY FOUNDATIONS

All temporary structures constructed with this project would be founded on reinforced concrete spread footings. The foundation design would be confirmed based on additional borings and analyses during the final design phase. The temporary foundations would be designed to support HL93 live load and all other applicable loading combinations for a temporary structure.

C.2.j. Utilities

A variety of existing public and private utilities, located in the streets beneath and adjacent to the project, would be impacted by the Build Alternatives. These include:

- **Public Utilities**
  - Sewer and water mains maintained by NYCDEP;
  - Lighting and traffic signal systems maintained by NYCDOT;
  - Fire alarm facilities maintained by the FDNY;
  - Police alarm facilities maintained by the New York City Police Department; and
  - Variable message systems carried on the existing bridge, maintained by NYCDOT (proposed under all Build Alternatives).

- **Private Utilities**
  - Electric systems maintained by the Consolidated Edison Company of New York;
  - Gas mains and services maintained by Keyspan (formerly known as Brooklyn Union Gas Company);
  - Telephone systems maintained by Verizon;
  - Fuel oil pipes maintained by the Buckeye Pipe Line Company; and
  - Cable television facilities maintained by Cablevision.

Utilities would be relocated and/or reconstructed due to the need for reconstruction and construction of proposed bridge foundations and retaining walls, the realignment of Meeker
Avenue and Cherry Street, and the construction of a new drainage system for the bridge as described in Section III.C.2.f. The extent of these impacts, which would be identical for each of the Build Alternatives, is shown in Figures III-55, “Utility Relocation Areas (Brooklyn),” and III-56, “Utility Relocation Areas (Queens).”

Each of the Build Alternatives would require:

- Reconstruction of all utilities within the right-of-way of streets that cross beneath and adjacent to the Brooklyn and Queens Approaches (including Stewart Avenue, Gardner Avenue, Thomas Street, Scott Avenue, 56th Road, 55th Avenue, 54th Road and 54th Avenue) as required for construction of footings for the proposed structures and to construct the new storm sewers and outfalls to Newtown Creek.

- Reconstruction of all utilities within the right-of-way of Cherry Street/Meeker Avenue between Kingsland Avenue and Gardner Avenue as required for the re-alignment of Cherry Street and construction of footings for the proposed bridge and temporary bridges. The affected utilities include sewer, water, gas and electric facilities.

- Reconstruction of all utilities within the right-of-way of Meeker Avenue between Van Dam Street and Hausman Street and Vandervoort Avenue between Meeker Avenue and Cherry Street as required for the realignment of Meeker Avenue and Vandervoort Avenue. The affected utilities include sewer, water, gas and electric facilities.

- Reconstruction of all utilities within the right-of-way of Laurel Hill Boulevard between the LIE Interchange and 56th Road as required for construction of footings for the proposed temporary and/or permanent structures and for the project drainage system. The affected utilities include sewer, water, and electric facilities.

Utility relocations would be coordinated with the utility owners and users during final design so that disruptions of service to adjacent properties are minimized. New utilities would be constructed and placed in service prior to demolition of existing facilities. The project would also present opportunities for utility owners to replace and/or upgrade old or insufficient utilities during the construction phase. NYSDOT, as a matter of public policy and in accordance with standard practice, would include any such work within the project contract as a utility financial share to avoid future disruption to areas constructed as part of the project. If requested, utility betterments would be coordinated with representative utility owners during final design and paid for by the owner of the facility.

C.2.k. Railroads

Each of the Build Alternatives would maintain a minimum vertical clearance of 6.7 m (22 ft) over the existing Long Island Rail Road (LIRR) tracks in Queens. The existing horizontal clearance would be maintained for the two Rehabilitation Alternatives (RA-5 and RA-6) and the clearance would be increased for all three of the Bridge Replacement Alternatives (BR-2, BR-3, and BR-5). Thus, the railroad’s horizontal clearance and right-of-way would be maintained under all of the Build Alternatives. Table III-37 summarizes the horizontal and vertical clearances between proposed new structures and the existing LIRR tracks.
### TABLE III-37: HORIZONTAL AND VERTICAL CLEARANCES TO EXISTING RAIL LINE

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Horizontal Clearance</th>
<th>Vertical Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing Columns to Track Centerline</td>
<td>Proposed Columns to Track Centerline</td>
</tr>
<tr>
<td>RA-5</td>
<td>6.1 m (20' -0&quot;)</td>
<td>33.2 m (109' -0&quot;)</td>
</tr>
<tr>
<td>RA-6</td>
<td>6.1 m (20' -0&quot;)</td>
<td>10.5 m (34' -5&quot;)</td>
</tr>
<tr>
<td>BR-2</td>
<td>Not Applicable</td>
<td>15.8 m (51' -11&quot;)</td>
</tr>
<tr>
<td>BR-3</td>
<td>Not Applicable</td>
<td>12.6 m (41' -4&quot;)</td>
</tr>
<tr>
<td>BR-5</td>
<td>Not Applicable</td>
<td>21.2 m (69' -7&quot;)</td>
</tr>
</tbody>
</table>

Alternatives RA-5 and RA-6 would re-use the existing bridge approaches including the Main Span, steel piers, columns and deck truss. Therefore, the horizontal and vertical clearance from the LIRR tracks to these structural elements would remain. A new Queens Approach would be constructed parallel to the existing approach, at a lower elevation. New Main Span piers would be constructed upland of the existing steel pier and new columns would be constructed north of the LIRR tracks.

Alternatives BR-2, BR-3 and BR-5 include demolition of the existing bridge, and construction of new bridges at a lower elevation. New Main Span piers would be constructed upland of the existing steel pier and new columns would be constructed north of the LIRR tracks.

Limited coordination with LIRR and New York & Atlantic Railway would be required during any rehabilitation work or new construction at the Kosciuszko Bridge. However, since there is limited railroad service on this line, disruption to service during construction should be minimal.

### C.2.l. Right-of-Way

Each of the proposed Build Alternatives would include construction of new structures beyond the right-of-way currently established for the existing bridge. Right-of-way acquisitions occur in three manners: (1) fee acquisition, which acquires title and all rights associated with ownership of the property; (2) permanent easement, which acquires only certain rights (e.g. limits on height or size of new buildings), most frequently to provide for maintenance of the facility; and (3) temporary easement, which acquires only certain rights for a specified period of time (e.g. during construction).

Right-of-way acquisitions were estimated based on guidelines provided by NYSDOT’s Real Estate Group, which are intended to minimize the amount of private property that must be acquired. Property would be acquired by fee based on the following guidelines:

- When a new structure (including foundations and columns) or realigned street (i.e. Cherry Street) physically conflicts with a building structure on the property, the entire property would be acquired; or

- When a new structure or realigned street requires the use of a portion of a commercial property, but does not conflict with a building on the property, only that portion of the property would be acquired; or

- When a new structure requires the use of a portion of a residential property, resulting in the structure being inappropriately close to a dwelling, the entire property is acquired.