Tunnel Possibilities for the Interborough Express

By John B. Pegram

This article discusses some of the possibilities for using a tunnel under All Faiths Cemetery for subway-like trains on the Interborough Express (IBX) line to avoid running Light Rail Vehicles (LRVs) in the streets of Middle Village, Queens. I have discussed defects of that Light Rail idea in my article "Street-Running LRVs on the Interborough Express Line is a Bad Idea."

The most sensible and economic solution would be to have the few freight trains each day share the existing tunnel with transit, as suggested in my article "'Subway' Cars Could Share the Interborough Express Line with Freight Trains." In this article, I will discuss All Faiths Cemetery tunnel alternatives that do not appear to have been adequately considered by the MTA, including sharing or widening the existing tunnel, and a short, shallow new tunnel.

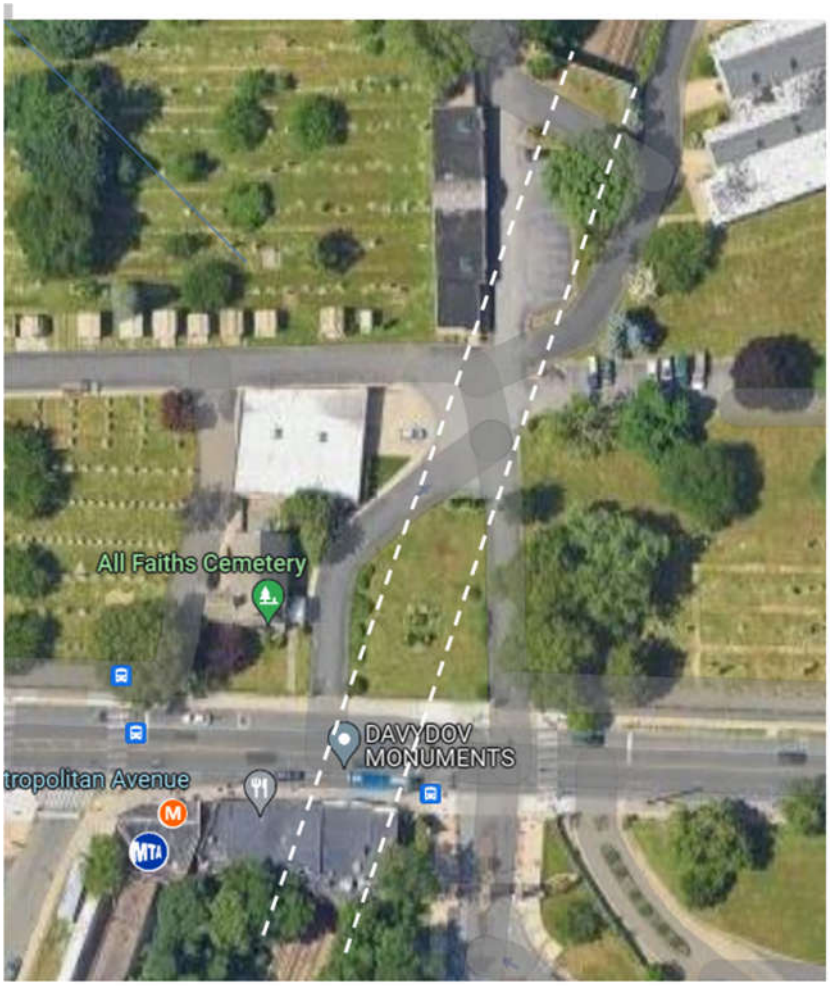
1. Background

The proposed IBX line would run along the right-of-way of the former New York Connecting Railroad, which connected the Hell Gate Bridge in northern Queens with Bay Ridge in Brooklyn. The part north of Fresh Pond Yard in Queens, including the portion at Metropolitan Avenue discussed here, is known as the Fremont Secondary. It is currently owned by the CSX railroad. A few freights operate there each day.

In the early 20th century, the City of New York and the Long Island Railroad removed grade crossings where train tracks intersect with streets. Most parts of the right-of-way now being proposed for the IBX line were moved from street level to either a cut beneath street level or elevated viaducts. At Metropolitan Avenue, the line was placed in a 520-foot long tunnel, built by the inexpensive cut-and-cover technique, just below that street and a portion of All Faiths cemetery.

The location of the existing tunnel is indicated by white dashed lines in the aerial view shown below. Two large community mausoleum buildings in the cemetery are located in the North (top) part of the view, on either side of the tunnel. South of those mausoleums, a garage and office are located West (left) of the tunnel. The tunnel is about 30 feet wide and contains two tracks. It is

not wide enough to add two more tracks, which the MTA considers necessary for transit on the IBX line.



A principal reason given by the MTA for selecting Light Rail for the Interborough Express (IBX) line was to avoid the need for a very expensive new tunnel under Metropolitan Avenue and All Faiths Cemetery. That tunnel was the main reason why the estimated construction cost of using subway-type Conventional Rail was estimated to cost far more than the proposed use of Light Rail vehicles (LRVs)), which could run on the streets of Middle Village to bypass the cemetery.[1]

[1] Another major reason for the greater estimated cost of the Conventional Rail proposal was that the stations were to be twice the size of Light Rail stations. I will discuss that and other comparative cost issues in a future article.

Specifically, the MTA's Interborough Express, Planning and Linkages Study report (PEL Report) in January 2023 said:

- The fact that Light Rail "can run on the street allows it to avoid construction of a complex and costly tunnel at a key pinch point, as would be required by Conventional Rail." (Page 3).
- "Does the alternative avoid construction of a new tunnel under All Faiths Cemetery?" (Page 17).
- "CR would operate in a newly constructed tunnel that runs parallel to the existing freight tunnel. The tunnel must be designed and constructed to be deep enough to avoid any surface or subsurface disturbance to the cemetery and its structures." (Page 18).
- "LRT can be operated in existing tunnels with no special operations and no new tunnel under All Faiths Cemetery would be required." (Page 22),
- Light Rail "Construction Costs (2027 Dollars) (billions) $5.54"
- Light Rail Transit Alternative Evaluation rated positively on "Capital cost estimate," "Avoids construction of new tunnel under All Faiths Cemetery" and "Avoids or minimizes environmental issues." (Page 23).
- "Challenges: CR is the only alternative that would require a new tunnel under All Faiths Cemetery. The existing tunnel under All Faiths Cemetery could not be utilized for CR because four track operations cannot be accommodated in the tunnel. As a result, the capital cost for CR would be higher than the capital cost for LRT and BRT, and would add significant risk and complexity to the project. The additional capital cost results in a substantially higher annualized capital cost per rider for CR compared to LRT and BRT." (Page 24).
- Conventional Rail "Construction Costs (2027 Dollars) (billions) $8.44." (Page 24).
- Conventional Rail Alternative Evaluation rated negatively on "Capital cost estimate" and "Avoids construction of new tunnel under All Faiths Cemetery," and moderate on "Avoids or minimizes environmental issues." (Page 25).
- "Construction Risk … CR requires construction of a new tunnel under All Faiths Cemetery because the existing freight tunnel is not wide enough to accommodate IBX

tracks. These components increase the construction complexity and risk of CR compared with LRT and BRT." (Page 28).

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- In a "Comparison of IBX Alternatives," the table rated Light Rail positively and Conventional Rail negatively for "Constructability" and "Cost Per Rider." (Page 29).
- "While CR would also meet the project purpose and need, it would require a new tunnel under All Faiths Cemetery. The need for his new tunnel would add construction and maintenance complexity to the project, and substantially increase the capital cost without providing significantly greater benefit to the public." (Page 30).

2. Share the Existing Tunnel

The first, most obvious solution would be to have freight and transit share the existing tunnel. Because the freight trains are regulated by the Federal Railway Administration (FRA), transit operations would have to comply with FRA regulations or a waiver would be required.[2] Nevertheless, such shared use of tracks has been successful elsewhere, for example, on the NJ Transit River Line between Camden and Trenton, New Jersey. I have suggested one way in which such sharing could be accomplished in my article, "'Subway' Cars Could Share the Interborough Express Line with Freight Trains". The MTA, however, has told me, "In light of current and future of freight mobility needs in New York City and the region, operationally sharing CSX's trackage with through the Metropolitan Avenue tunnel in Queens is not an option for the MTA." The "future" in this statement is an allusion to rail traffic from a Cross Harbor Freight Tunnel, which was first proposed over 100 years ago and which many of us believe is unlikely to ever be built. Should construction of such a tunnel ever begin,

[2] There is no evidence in the publicly available MTA IBX reports and appendices indicating that there has been any discussion with the FRA of this or any other topic. That is disappointing.

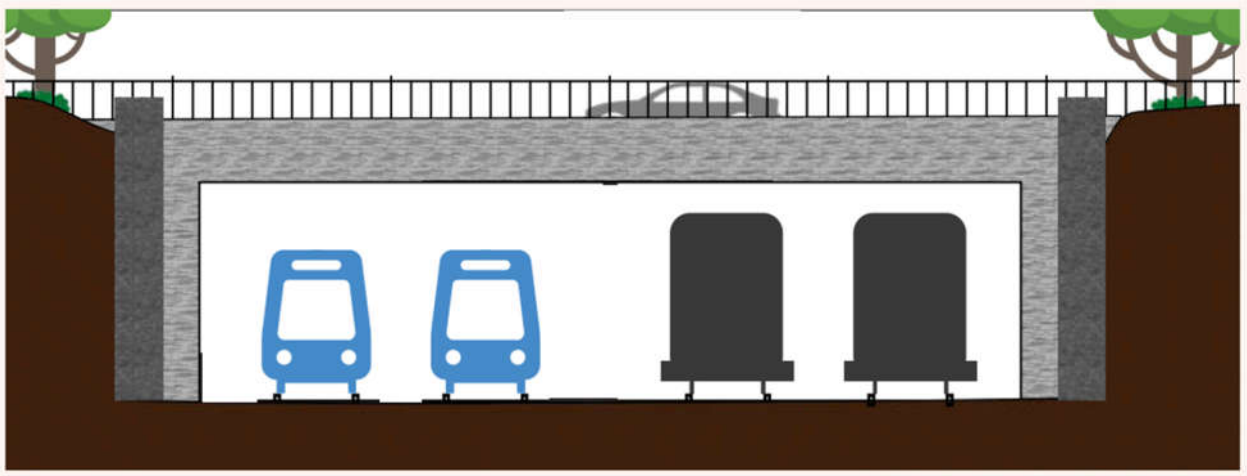
there will be more than enough time to build a new or expanded tunnel under All Faiths Cemetery to allow for additional tracks.

Because track-sharing is the least expensive alternative, because other alternatives could cost many millions or billions of dollars, and because street-running LRVs are undesirable, it would be worth spending a reasonable sum to further, objectively consider how sharing the tracks in the existing tunnel could be made practical, at least until there are real indications of significantly increased freight traffic.[3]

3. Widening the Existing Tunnel

The second most obvious idea to consider when an existing cut-and-cover tunnel is too small is to expand it, either horizontally or vertically, or both. There is no indication in any of the publicly disclosed MTA IBX reports and appendices that this idea has been considered.

Example of a Widened Tunnel



Widening the tunnel from 30 to 50 feet should provide sufficient room for four tracks. It appears from the aerial view at the beginning of this article that the tunnel could be widened 20 feet by the cut-and-cover technique on the East (right) side with a minimum of disturbance to existing

[3] A future article will discuss reasons why significantly increased freight traffic on the IBX right-of-way and the construction of a Cross Harbor Freight Tunnel are very unlikely. I touched on this subject in early comments to the MTA. I have been awaiting information requested from the Port Authority, but may proceed with a more detailed discussion without receiving that.

structures. The construction work could be analogous to the replacements of bridges and abutments in the Long Island Railroad's Third Track Project. The MTA has been rightly proud of its ability to handle that work by constructing bridges off-site and then putting them into place over the course of a weekend with minimal disruption to service and traffic.[4] Similarly, the widened tunnel roof could be constructed in sections off-site.

In a project as big as the IBX line, sufficient funds should be available to pay reasonable compensation to the cemetery for the inconveniences of tunnel construction, which in my opinion—would be less in the long run for the cemetery and surrounding community than running long Light Rail trains past the cemetery entrances and through Middle Village as frequently as every 2-1/2 minutes.

4. A Short, Shallow New Tunnel

During the IBX Planning and Environmental Linkages (PEL) study, the MTA's consultants considered the possibilities of either a long, deep and very expensive tunnel, or a short, shallow and much less expensive tunnel, alongside the existing tunnel. The possibility of a short tunnel is not mentioned in the PEL Report, and its far lower cost than the long, deep tunnel concept is not reflected there. Concern was expressed an Appendix 1.5 about a high risk of surface impacts to the cemetery, in the case of the shallow tunnel. The consultants envisioned that tunnel running to the West of the existing tunnel, directly beneath almost all of a large, community mausoleum. The risk of disturbing structures could be alleviated by placing the new, short, shallow tunnel to the East of the existing tunnel where—as shown in the aerial view above—most of the surface is lawns, roads and parking lots.

The concept and details of the shorter, shallow tunnel were revealed in Appendix 1.5 to the PEL Report, which was made available in July 2023, after Freedom of Information litigation. (Copy attached).[5]

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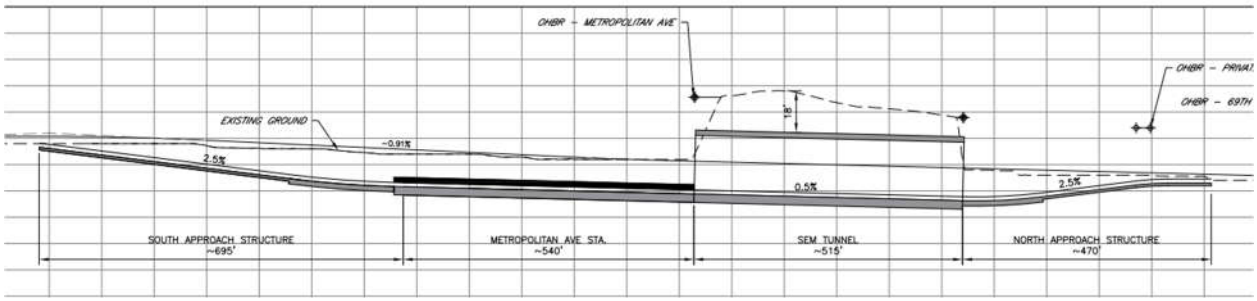
[4] IBX Town Hall, August 16, 2023 at ~43:40, available at https://www.youtube.com/watch?v=zbUe3LNzuIU.

[5] Available at https://new.mta.info/document/114891.

Profile of Short, Shallow Tunnel from PEL Report Appendix 1.5



The underground tunnel would be about 520 feet long, with adjoining, approximately 1,700 feet of open excavated cut, as indicated in the diagram above. In contrast, the long, deep tunnel would have a 4,400-foot-long bore and approximately 2,790 feet of deeper excavated cut, some of which would be covered. The Metropolitan Avenue station in the short tunnel concept would be open, in the cut. The deep tunnel concept requires an expensive, underground station, estimated by the MTA consultants to cost many hundreds of millions of dollars.[6]

Summary of Tunnel Segment Lengths

	Short, shallow tunnel	**Long, deep tunnel**
South open cut approach	700 feet long	890 feet long
South cut-and-cover	--	400 feet long
Metropolitan Avenue Station	540 feet long (In open cut)	(Included in bored tunnel)
Sequentially Excavated (SEM) tunnel	515 feet long	--
Bored tunnel	--	4,400 feet long (including station)
North cut-and-cover	--	330 feet long
North open cut approach	470 feet long	1,170 feet long
Total length of tunnel and approaches	2,225 feet long	7,190 feet long[7]

6 I will discuss comparative cost issues in a future article.

7 Table 2: "Length of components for Long, Deep Concept Tunnel" in Appendix 1.5 to the PEL Report states that the total length of the long tunnel and cuts is 7,730 feet; however, that erroneously double counts the length of the station, as is clear from the accompanying Track Plan and Profile drawings.

The short tunnel would be constructed by the Sequential Excavation Method (SEM). The principles behind that method are sequential excavation in small segments and continuous monitoring for any ground movement caused by the underground construction. Pre-excavation support may be provided by pipe roofing, known as "forepoling." For excavation, the proposed tunnel is divided into multiple segments. Each segment is mined using an excavator in a sequential manner. As soil from each segment is removed, sprayed concrete known as shotcrete is applied around the excavation. The shotcrete stabilizes the earth and the result is surprisingly strong. Additional excavation support is provided by installing lattice girders. Together, the shotcrete, lattice girders and forepoling provide temporary support. The tunnel is completed by installing a permanent concrete liner.[8]

In contrast, according to the MTA's consultants, construction of the long, deeper tunnel would require use of a pressurized shielded Tunnel Boring Machine (TBM), because of the expected soft ground conditions.[9]

Building the long, deeper tunnel would be far more expensive than the short, shallow tunnel, for example, because the tunnel bore section would be approximately 8 times as long, the TBM has high rental and operating costs, and the costs of approach cuts on either side of the tunnel section would be 3 to 4 times greater than for the shallow tunnel.[10]

For minimum adverse affects on All Faiths Cemetery, both in the construction stage and in the future, a short, shallow SEM tunnel, located East of the existing tunnel, might be the best solution.

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[8] *See* Appendix 1.5, page 4/14 and Wikipedia, "New Austrian tunneling method," available at https://en.wikipedia.org/wiki/New_Austrian_tunneling_method.

[9] *Id.* at pages 6/14 – 7/14.

[10] I will discuss comparative cost issues in a future article.