The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Cross Harbor Freight Tunnel: Add Subway To Staten Island and More!

The Brooklyn Historic Railway Association (BHRA) applauds the Port Authority's endeavour to build a rail tunnel under New York Harbor. This idea has dates back to the 1920's when the City of New York, and later Port Authority, first devised plans to connect Long Island with the mainland U.S. via a cross harbor rail tunnel. The Port Authority's current plan calls for a rail tunnel alignment from 65th street yards in Brooklyn to Greenville Yards in New Jersey. However, this alignment was developed as a result of a political schism with then Mayor Hylan and his plan to connect Brooklyn with Staten Island, via a 4 track freight, passenger, and subway tunnel from Bay Ridge in Brooklyn, to St George in Staten Island.

Similar to the Port Authority's earlier plan, the Port Authority's current proposal lacks a passenger rail component and a link to Staten Island. Because such a large construction project is a once in a lifetime opportunity, the BHRA believes that the Port Authority's plan should be revised to include a passenger rail link to Staten Island. Our alternative calls for a revival of the City's plan, hybridized with the Port Authority's plan, with two freight tunnel portals on the Brooklyn side. The first portal would surface near Brooklyn's 1st Ave, at the old Cross Harbor rail yard. This would permit freight rail access to the Sunset Park waterfront, including, but not limited to, Bush Terminal and the Sims Recycling facility. The second Brooklyn freight portal would emerge in the LIRR Bay Ridge cut near 6th Ave. *(Fig. 1).* An underground connection to the 4th Ave BMT subway would be made just south of the 59th Street station in Brooklyn.

The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

(Fig.2).

The subway component could utilize already existing tunnel shafts built in 1925, which cost the city about $1 million in 1925 dollars. The 4 tracks would meet in either of two configurations; the first, a double level "trench tunnel" similar in design to the MTA's 63rd street tunnel, which is currently being used in the East Side Access project (*Fig.3*); or in a single level horizontal arrangement, as per the City's circa 1925 design (*Fig.4*). The proposed tunnel would consist of 4 tracks to St. George, and then 2 freight tracks continuing to New Jersey. This would keep subway trains on a separate right of way away from freight trains and ameliorate the Port Authority's concerns with a shared tunnel (see *Table 4-2*, *Alternative 17*). Our tunnel proposal would not exceed a 2% grade in order to conform to existing rail infrastructure across the United States.

The tunnels' freight tracks could then be routed onto existing industrial tracks in Bayonne (*Fig. 5*). The tunnel's subway tracks would emerge in St. George, connecting with the Staten Island Railway. They could even continue along the old North Shore branch of the Staten Island Railway. Much of the necessary engineering work and legal approvals for such a project were completed in the 1920's and would save the Port Authority both time and money (*Fig. 6*). The City generated nearly 150 pages of detailed engineering drawings, which together with other voluminous planning documents are herewith attached as a DVD.

The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

The Port Authority has indicated that this tunnel could cost between $7-11 billion. If the Port Authority can keep the cost per 2 track mile closer the $1.2 billion end of the scale, we believe our proposal would not result in a significant departure from the Port Authority's current upper figure of $11 billion.

In addition, we also propose that the Port Authority and MTA consider decking over the open cut portions of the Bay Ridge Branch and selling and/or leasing the air rights,to raise additional funds for the construction of the tunnel.

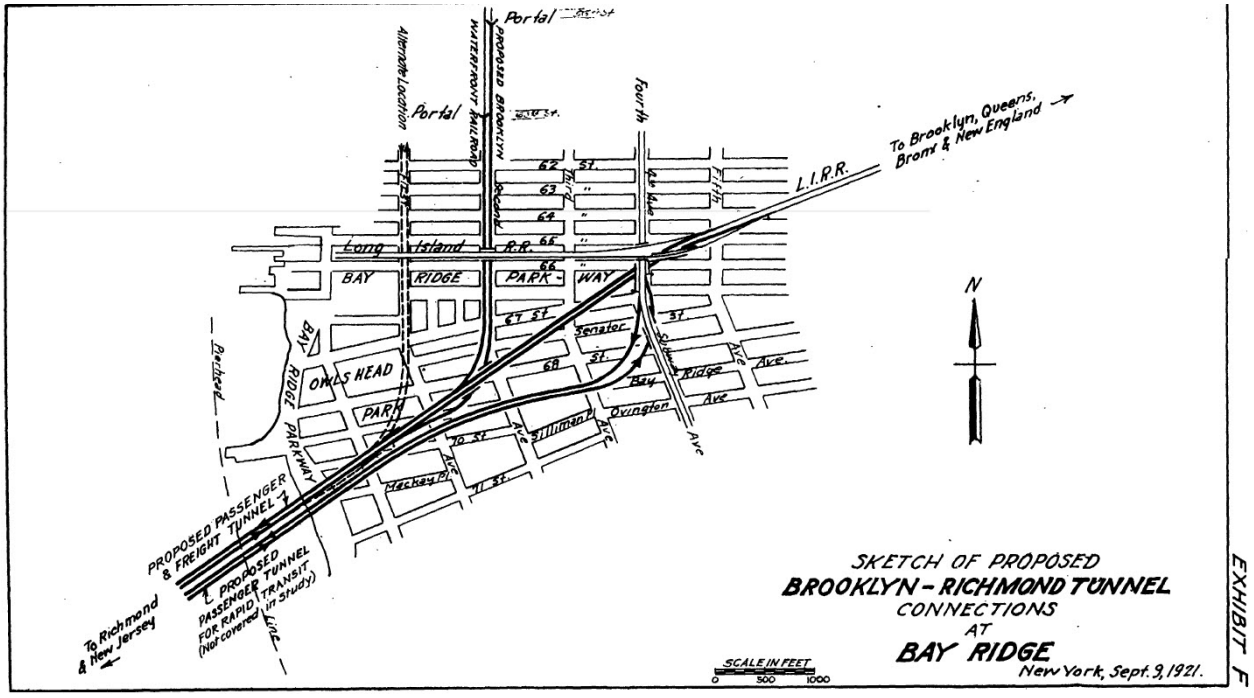
In conclusion, the City spent roughly $10 million in 1922 dollars ($135,277,714 in todays dollars) on construction and land acquisition for this project. We feel the cap on the Brooklyn shaft off Shore Road be opened, and the extant tunnel examined, and its already built length determined, for possible future use.

Sincerely,

The Brooklyn Historic Railway Association

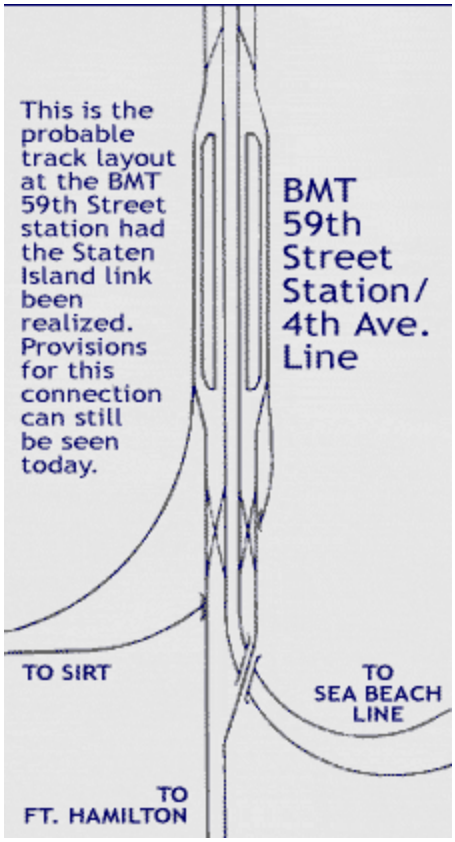
The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Figure 1



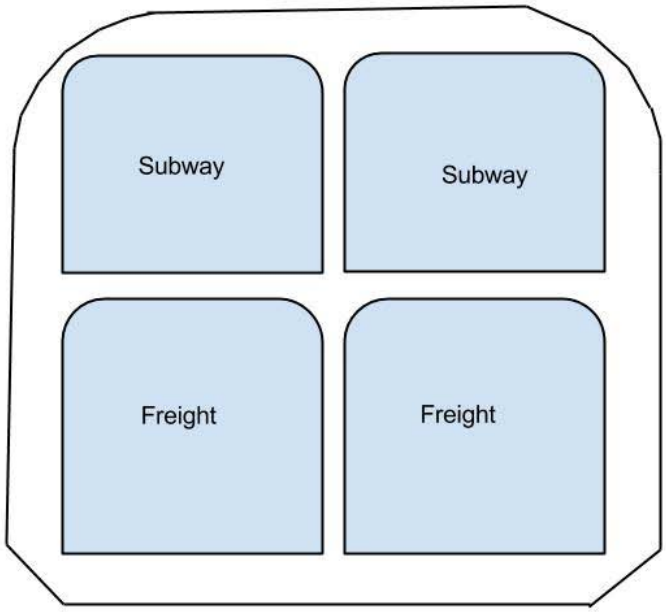
The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Figure 2



The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

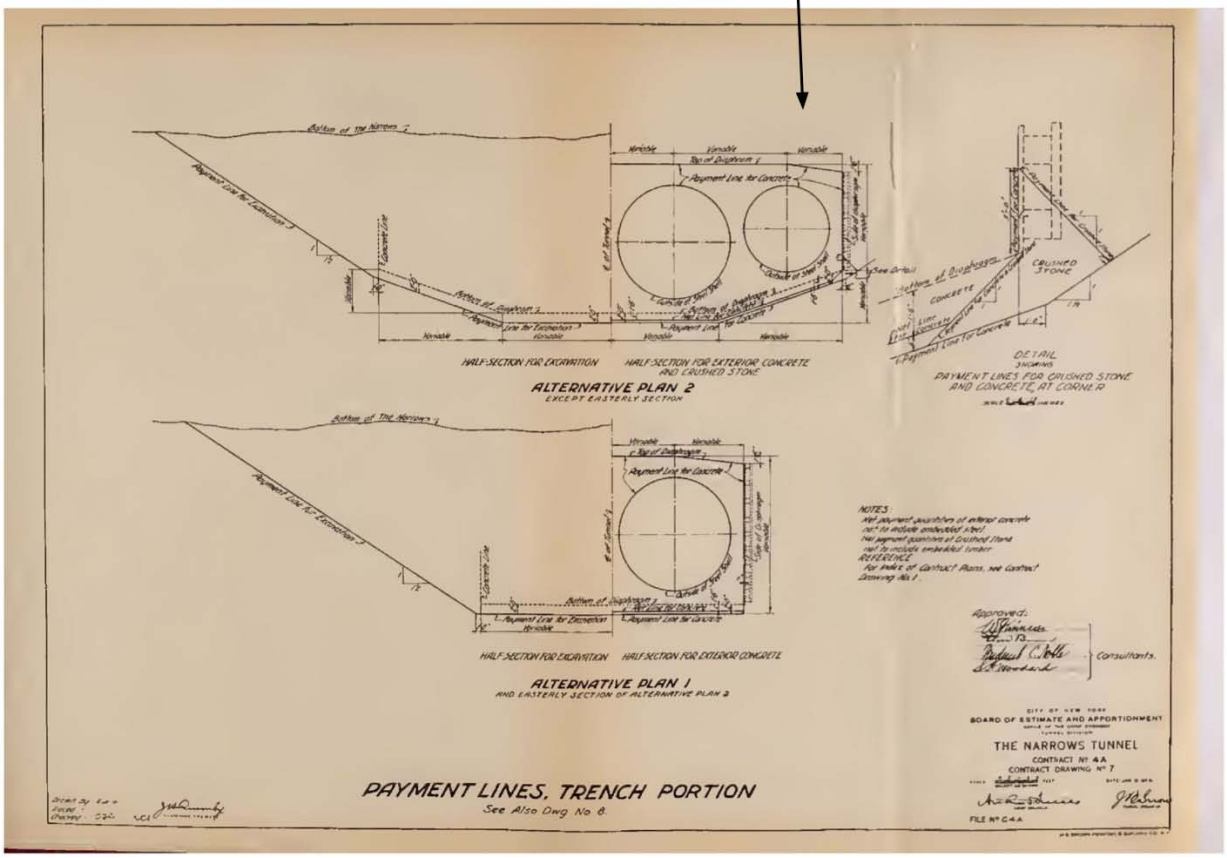
Figure 3



The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

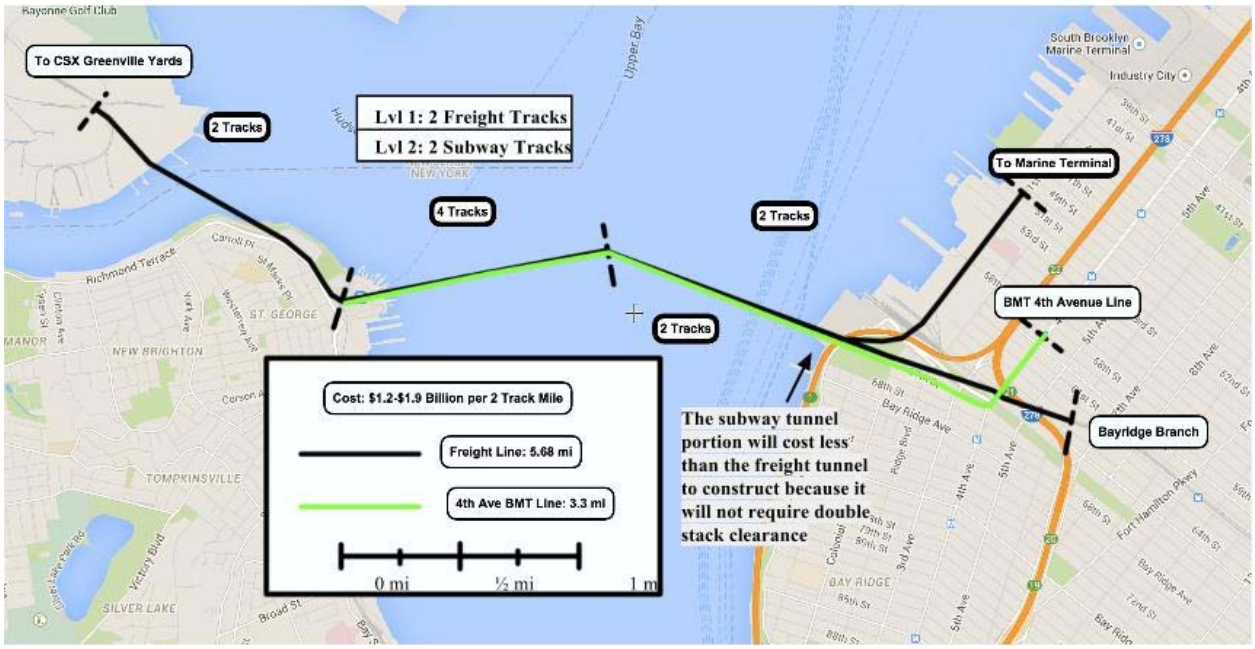
Figure 4

Editors Note: Only half of the tunnel cross section is shown. The large tube is for double stack freight and the small tube is for subway



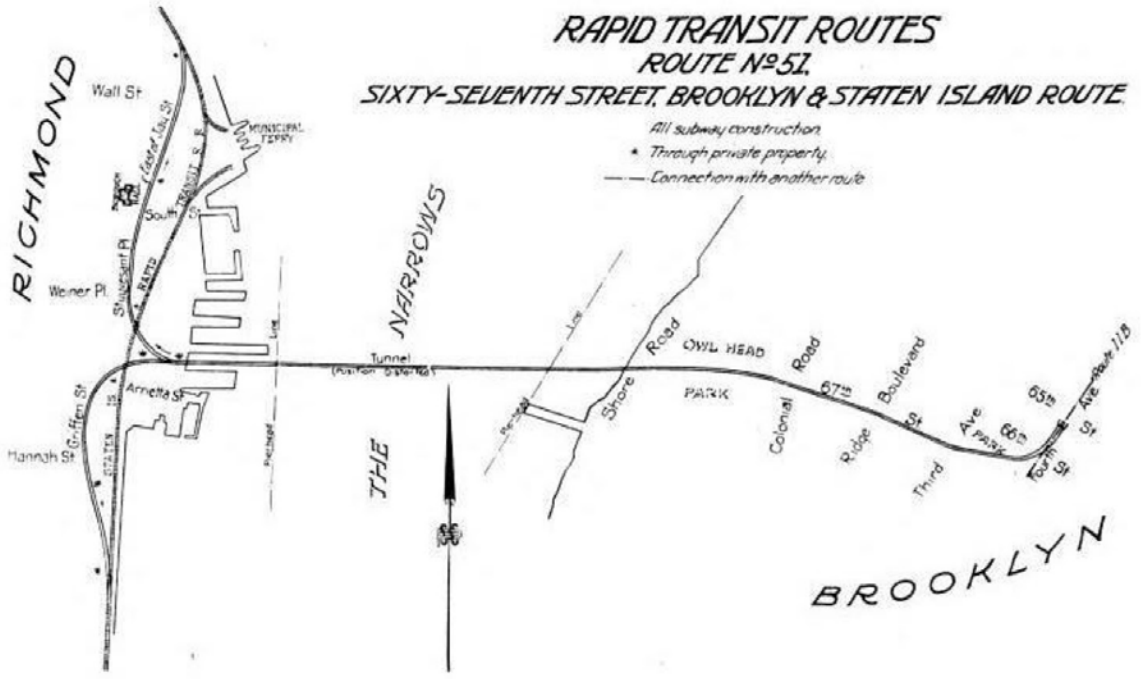
The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Figure 5



The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Figure 6



The Brooklyn Historic Railway Association
599 East 7 Street, Suite 5A
Brooklyn, N.Y. 11218
(718) 552-7048

Table 4-2

Table 4-2 (cont'd)
Initial Screening / Fatal Flaw Evaluation

Alternative Class	No.	Alternative	Fatal Flaw Screening Criteria				Reasons for Elimination
			A	b	c	d	
Rail Tunnel	16	Access to the Region's Core with Freight Rail and/or Amtrak's Gateway Project	√			√	Potential operational and scheduling constraints on rail freight imposed by sharing track with passenger service along the nation's most heavily used passenger corridor would result in minimal windows for freight, at best.
	17	Staten Island to Brooklyn Shared Passenger and Freight Rail Tunnel				√	Previous studies have found freight and subway service to be incompatible in the project area. Incompatibility includes safety concerns and the incompatibility of double stack trains with the third rail used by passenger trains. The Bay Ridge Branch, which is a vital east-of-Hudson rail line for freight would not have the capacity to accommodate passenger service.
	18	Staten Island to Brooklyn Rail Tunnel				√	The Staten Island alignment was eliminated in favor of the New Jersey rail tunnel alignment in previous studies due to the more direct routing with the New Jersey alignment and several significant environmental and neighborhood character impacts exclusive to the Staten Island alignment.
	23	Rail Tunnel from New Jersey to Brooklyn Waterfront, near Owl's Head Park			√		Previous studies eliminated this alternative in favor of the connection to the Bay Ridge Branch, which is much less costly and provides comparable benefit. Therefore, this alternative is eliminated from further study in this EIS.
	25	Rail Tunnel with Continuous Truck Access			√		To provide continuous truck access, the rail tunnel would need to be more than twice the size of the tunnel needed for 12/7 truck access, and extensive property beyond the rail right-of-way would be required in Brooklyn. The costs and socioeconomic effects would be prohibitive. Therefore, this alternative was eliminated.
Other Rail	26	Rail Freight Connection to the Brooklyn Navy Yard			√		This alternative was eliminated in prior studies because it was determined that there was no feasible way for a rail connection to the east-of-Hudson rail network. As these circumstances have not changed and non-freight uses have been proposed and approved at the Brooklyn Navy Yard, the alternative was eliminated.

Backup Calculations

Curve Compensation

Where curve compensation is needed, grades on curved track will be reduced by the following:

G_r= 0.04 × D

G_r = Amount of grade reduction (percent)

D = Degree of curvature (decimal degrees)

The original design of the Narrows tunnel called for a 3.00 degree of curvature.

This gives us the following, where $G_r = 0.12$ and our grade is 2%

Uncompensated Grade		Compensated Grade	
Actual	Effective	Actual	Effective
2.00	2.12	1.88	2.00

Note: Degree of Curvature: $D = \frac{5{,}730}{R}$

D = Degree of curve (decimal degrees).

R = Radius of curve (feet)

In our case, the circular curve radius leading from the Narrows tunnel into the proposed 1st Ave portal would be **1,910 ft**

$$arc\ length = 2\pi R(\frac{C}{360})$$

C = the central angle of the arc in degrees (in our example, about 90 deg)

R = the radius of the arc

π = approximately 3.142

So, the length of the circular curve between the Narrows tunnel and the 1st Ave portal would be about:

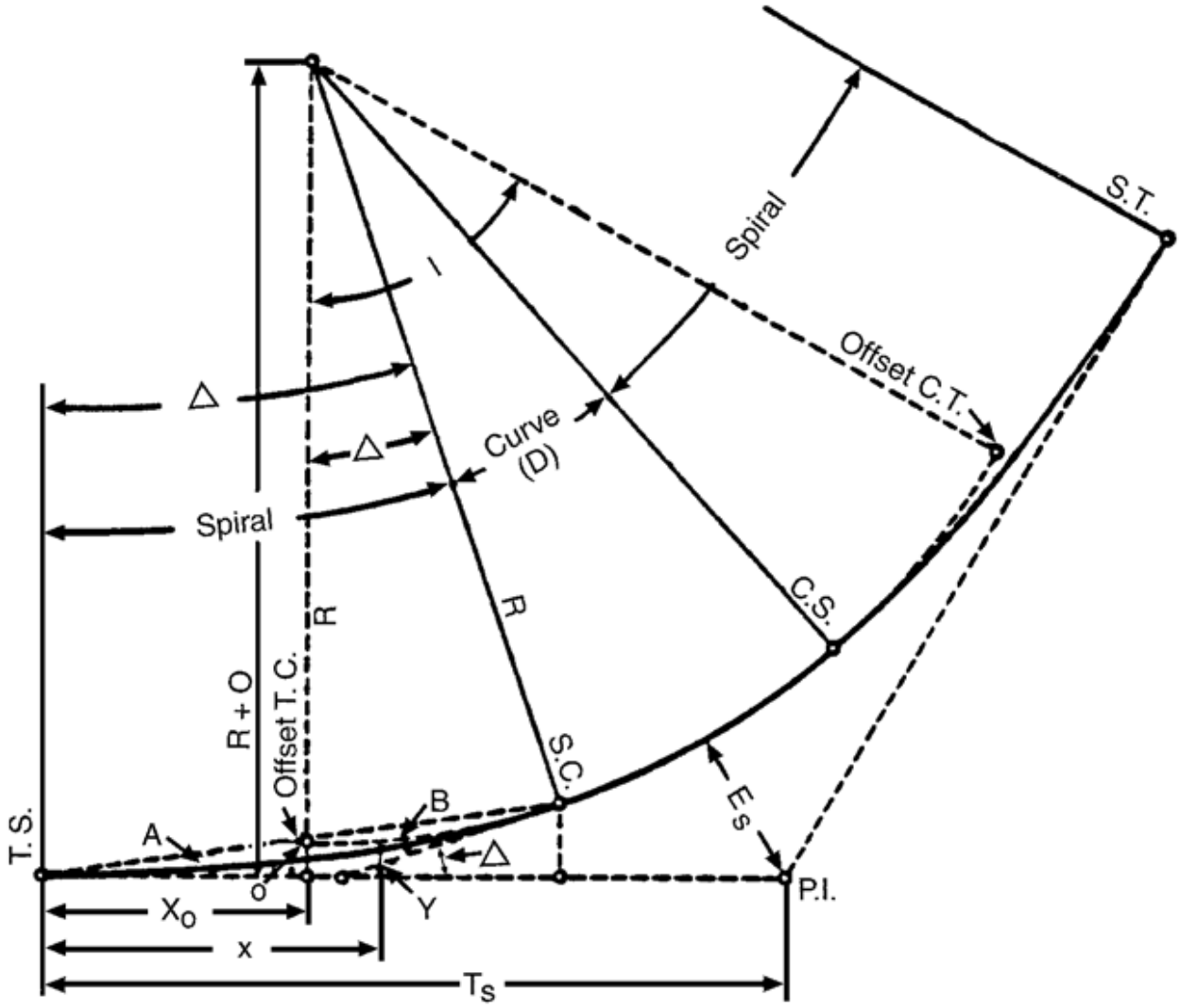
$$2\pi(1{,}910)\left(\frac{90}{360}\right) = 3{,}001\ \boldsymbol{ft}$$

Spirals

When used, spiral transition curves will be designed as shown in chapter 5, part 3 of the AREMA Manual.

$$d = ks$$

Where:
d = degree of curvature of the spiral at any point
k = increase in degree of curvature per 100-foot station along the spiral
s = length along spiral in 100-foot stations



Super-elevation will uniformly increase from zero at the beginning of the spiral (at the tangent) to the full elevation at the end of the spiral (where full curvature is reached).

Backup Calculations

From Source 1, Table 6-2:

Degree of Curvature	Design Operating Speed		
	20 mph	25 mph	30mph
3	1 inch	1.5 inch	2 inch

Spiral length will be determined from equation 6-3.

$$L_s = 40 \times s$$

$L_s =$ Length of spiral (feet).

$S =$ Full super-elevation (inches)

Let's pick a 3 degree curve, design speed of 25mph, a super elevation of 1.5 inch.

$$L_s = 40 \times 1.5$$

$$L_s = \mathbf{60}\boldsymbol{ft}$$

Sources:

4-860-01Fa, Ufc, and 16 January 2004. "Railroad Design and Rehabiliation." (n.d.): n. pag. Whole Building Design Guide. Web. 12 Feb. 215. <http://www.wbdg.org/ccb/DOD/UFC/ufc_4_860_01fa.pdf>.

Brown, Halsey G., P.E. THE HISTORY OF THE DERIVATION OF THE AREMA SPIRAL (n.d.): n. pag. AREMA. Web. 12 Feb. 2015. <https://www.arema.org/files/library/2008_Conference_Proceedings/The_History_of_the_Derivation_of_the_AREMA_Spiral_2008.pdf>.

"Spiral Curve." Creative Computing 4 Windows. N.p., n.d. Web. 12 Feb. 2015. <http://www.cc4w.net/spiral/index.aspx>.