

A stylized illustration of a high-speed train in a landscape. The train is blue and white with a red stripe and a white 'M' on the front. It is on a track that curves into the distance. The background features rolling hills and mountains in shades of blue and grey. A large, dark silhouette of a tree is on the left side. The sky is a light blue gradient.

# DORMANT TRANSIT

APPENDIX A.  
LINE SPEED AND TRIP TIME CALCULATIONS

## **Disclaimer**

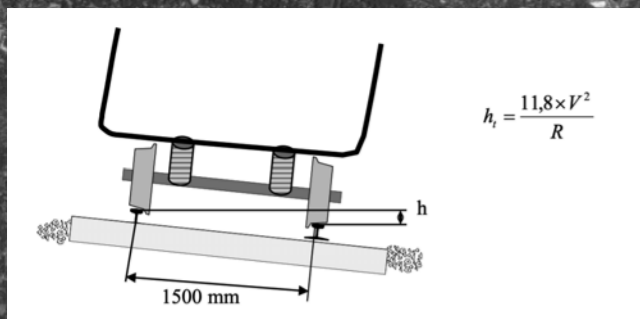
The proposed changes in this thesis serve to highlight issues and compare results between different similar railway systems. The findings aim to show what possibilities should be possible given the conditions of this rail line. The research is done in a structured way and use figures and data accessed in articles and official instructions. The results of this research will be approximates and in some cases based on assumptions when proper in-depth research couldn't be done in a subject outside this thesis area of expertise. This is an Urban design thesis and it wont answer all technical aspects associated with modernizing or reactivating rail lines. The result should however provide a good indicator as to what is possible and what effects this has on urban development.

## **Calculations**

The calculations that are presented in this report are based on The Swedish Traffic Administrations publishing for training of railway engineer called "Trafikverkets Järnvägsskola, Banteknik (2012)" and is used to analyse possible safe line speeds based on the geometry of the track.







Track geometry information have been attained by using public GIS data combined with other open map functions. The track geometry is then measured and every curve in the line has its maximum safe speed determined. The line is then divided in to blocks that are given a combined maximum speed based on the geometry of the track, the type of service operated and the driving input by the train driver. This can be seen in the same way as the speed limit on a regular road.

Trip times can then be calculated by determining the time it takes for a train to accelerate to the given block speed, travel the distance and reduce it speed again to either stop or adjust the speed to the next maximum block speed. Train performance data have been taken from modern EMU train sets that operate in Sweden, specifically the ER1 and the X40 train sets. Journey times have also been compared to similar journeys on Swedish railways and have been found to be conservative in nature. A good example is SJ Swedish railways service between Uppsala and Stockholm that is almost exactly the same length as Grand Central Terminal (GCT) - Beacon Station. It has a journey time of 37 minutes with two stops while a smilar service between GCT and Beacon with one stop is calculated to 44 minutes.



Safe track speeds are calculated by measuring every curves radius and by using this formula. Track elevation values (h) recommended for passenger traffic are applied (0-150mm).

These lines dose not operate freight trains today and it is assumed that these lines will not operate freight in the future.

-  185 Maximum safe speed of this specific curve
- 225 Maximum safe speed for this block
-  Station served by express and limited express services
-  Station only served by local trains
-  0-90 km/h max line speed
-  90-150 km/h max line speed
-  150-225 km/h max line speed





Cortlandt

Croton-Harmon

Ossining

Scarborough

Philipse Manor

Tarrytown

Irvington

Ardsley-on-Hudson

Dobbs Ferry

185

196

110

190

140

175

200

175

160

140

200

170

225

140

193

190

190

225

309

120

120

197

180

178

179

204

209

242

176

171

234

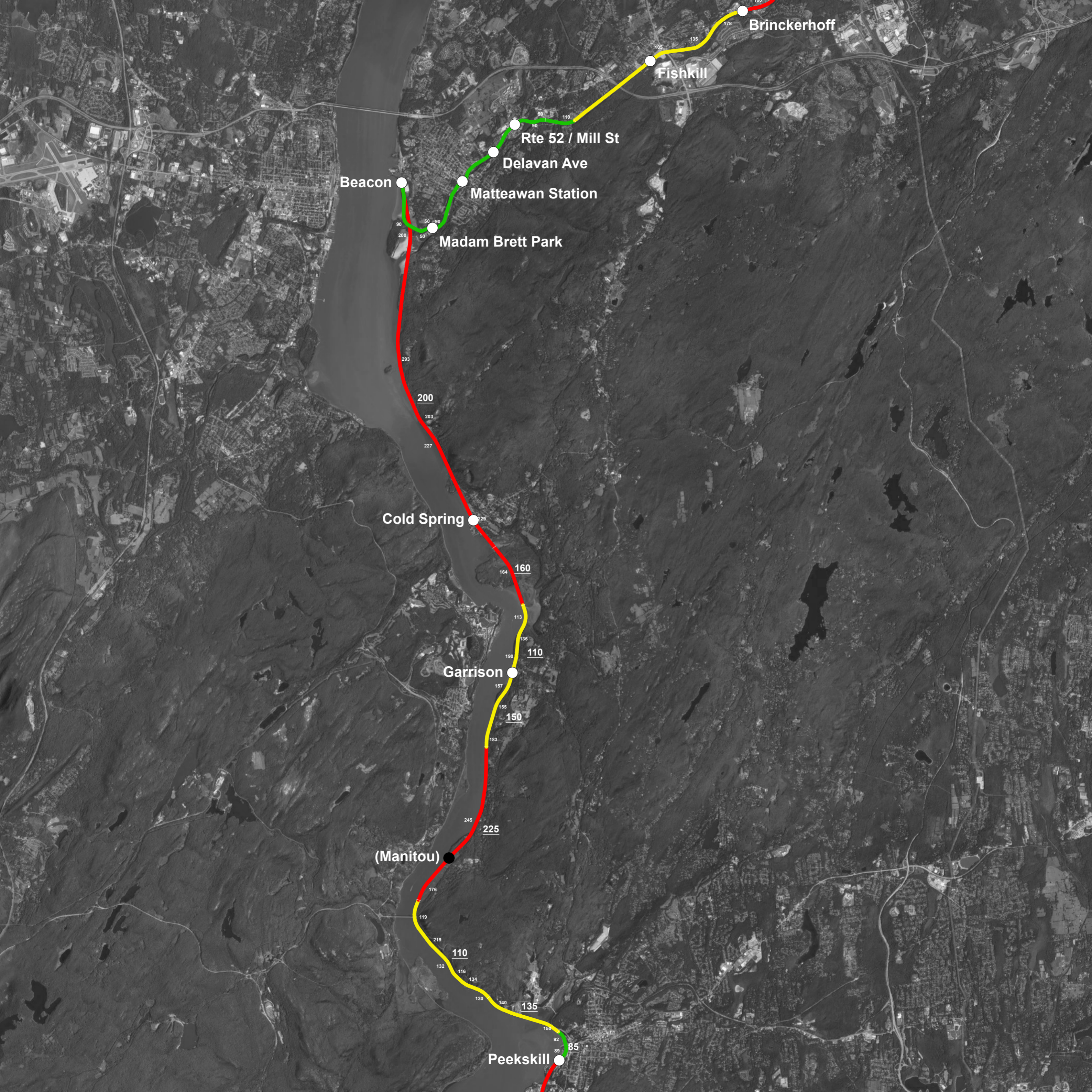
281

204

195

212

252



Brinckerhoff

Fishkill

Rte 52 / Mill St

Delavan Ave

Beacon

Matteawan Station

Madam Brett Park

Cold Spring

Garrison

(Manitou)

Peekskill

90

200

50

80

293

200

203

227

229

160

164

113

136

190

157

150

155

183

245

225

176

119

110

132

116

134

130

140

135

150

92

89

85

105

135

178

180



Hopewell Junction

Stormville

Sports KingDome

Brinckerhoff

Fishkill

Rte 52 / Mill St

Delavan Ave

Matteawan Station

Beacon

Madam Brett Park

Cold Spring

Garrison

(Manitou)

Appalachian Trail /  
Whaley lake

**Formulas used for calculations:**

Time to reach Target Speed from Starting Speed (s)

$$t = (Vt - Vs)/a$$

Distance travelled during acceleration (m)

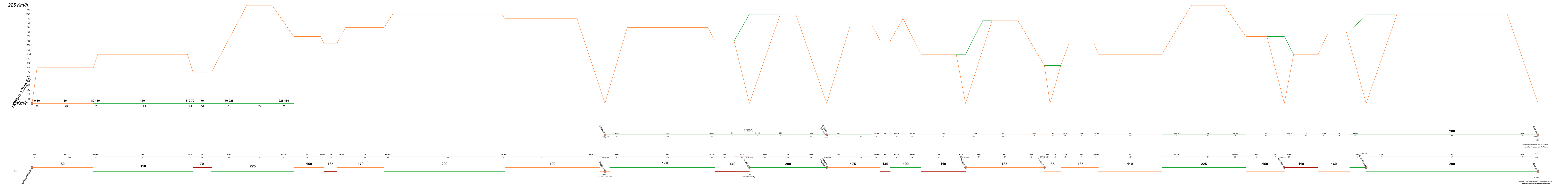
$$(Vs*t) + (a*t^2)/2$$

**Journey time results:**

GCT - Beacon station (Existing service):		Beacon - Hopewell Junction:	
Limited express (7 stop)	1h 24 min	Local (8 stop)	22 min
Express (1 stop)	1h 13 min		

GCT - Beacon station (New calculated):	
Limited express (7 stop)	51 min
Express (1 stop)	44 min

**Hudson Line calculations plotted graphically**



**Beacon Line calculations**

