

Many of the questions associated with increased rail traffic on Springfield's 3rd and 10th Street rail corridors relate to the maximum number of trains a rail line and corridor might support. One might think of this as a question of capacity similar to road capacity and level of service. A road can only support a certain number of cars and trucks before roadway efficiency suffers and back-ups and accidents begin to occur more frequently.

The Springfield-Sangamon County Regional Planning Commission (SSCRPC) believes that a study¹ conducted for the Association of American Railroads (AAR) may be useful in understanding the answer to this question.

Applying the results found in the AAR report, the SSCRPC found:

- That a single rail corridor similar to Springfield's 3rd Street corridor would have a "practical maximum capacity" of 30 train trips per day. This capacity would not be sufficient to efficiently support the number of new high speed passenger trains using the line unless there is a reduction in current freight and passenger rail (Amtrak) usage.
- Increasing the 3rd Street corridor from one to two tracks more than doubles the practical maximum capacity of that corridor, increasing its capacity from 30 train trips per day to 75. That increase in capacity would allow the railroad to retain the current level of use plus the 16 high speed rail trips, while generating enough increased capacity for an additional 42 freight trains per day.
- Should the railroad exceed capacity limits on its current single-track line, as has been threatened, inefficiencies would most likely result along the entire rail line, resulting in a loss in level of service.
- Providing the railroad with an additional line on another corridor (e.g. 10th Street corridor, as has been proposed), would only provide the railroad with enough capacity to support 60, rather than 75, train trips per day. However additional efficiency would be gained for passenger traffic if one track were limited to passenger trains only.
- The maximum capacity figures indicated in the AAR report are similar to those used previously for planning purposes by the SSCRPC and helps confirm its impact assessments.

¹ Cambridge Systematics, Inc. (Sept., 2007). *National Rail Freight Infrastructure Capacity and Investment Study*. Association of American Railroads: Washington, DC.

The AAR Study

The AAR commissioned the study in order to assess the long-term expansion needs of the freight railroad system in the continental U.S.², and this required an assessment of both train volumes and rail corridor capacity. Capacity along corridors was found to be a function of three dominate factors: the number of tracks; the control system used to maintain safe spacing between trains meeting and passing on the same track; and the types of trains operating on a track.³

While the first two variables seem intuitive, the last item is of particular note. The mix of train types operating on a line can affect both train speed and spacing, affecting the efficiency of the route. As the AAR reports:

Different types of trains operate at different speeds and have different braking capabilities. A corridor that serves a single type of train will usually accommodate more trains per day than a corridor that serves a mix of train types. Trains of the single type can be operated at similar speeds and with more uniform spacing between the trains because they have similar braking capabilities. This increases the total number of trains that can traverse the corridor per day. When trains of different types – each with different length, speed, and braking characteristics – use a corridor, greater spacing is required to ensure safe breaking distances. As a result, the average speed drops, reducing the total number of trains that can traverse the corridor per day.⁴

Based upon the three variables identified (number of tracks, type of controls, and mix of trains), the study then assessed the maximum number of trains that can typically be accommodated if multiple train types use a corridor compared to a single train type using a corridor. This number of trains was termed the “practical maximum” in the AAR report.

Identifying the Practical Maximum for Springfield’s 3rd Street Corridor

Since the bulk of the debate in the Springfield area has centered on the city’s 3rd Street corridor, Table 1, below, is relevant to the question of capacity. The table is taken from the AAR study⁵ and provides the practical maximum for:

- **A multiple train type use corridor**, since this is the current use on the 3rd St. corridor and it is our understanding that it would remain such a corridor after implementation of high speed rail;
- **One and two track systems**, since this corridor currently has one track and is proposed to be increased to two; and

² Ibid, p. ES-1.

³ Ibid, pp. 4-5 and 4-6.

⁴ Ibid, p. 4-6.

⁵ Ibid, p. 4-7.

- **Three different types of controls**, but focusing on the type of control currently being used on the 3rd Street line.

The control types as presented in the report are: No Signal/Track Warrant Control, N/S-TWC; Automatic Block Signaling, ABS; and, Centralized Traffic Control/Traffic Control System, CTC-TCS.⁶ It is the SSCRPC's understanding that Centralized Traffic Control (CTC) is currently used on the 3rd St. corridor.

Table 1: Practical Maximum Number of Trains

For 1-Track Corridor		For 2-Track Corridor		
Type of Controls	Practical Maximum	Type of Controls	Practical Maximum	Difference
CTC or TCS	30	CTC or TCS	75	+45 Trains
ABS	18	ABS	53	+35 Trains
N/S or TWC	16	N/S or TWC	28	+12 Trains

Since the 3rd Street line currently uses CTC, the results of the AAR report would indicate that, at least in general terms, the 3rd St. corridor could handle a "practical maximum" of 30 train trips each day with its current single line.

It is reasonable to ask how much increased capacity, up to the practical maximum offered by the AAR study, might one expect? Since this one line currently supports 10 passenger train trips each day – five Amtrak trains going round-trip including the Texas Eagle trains – and it is our understanding that current non-passenger use is approximately 7 freight and commodity trains each day⁷, 13 additional train trips would put the line at its practical maximum capacity.

This would mean that remaining capacity would not be sufficient to efficiently support the 16 high speed rail trips proposed for the corridor unless there would be a reduction in either the number of existing passenger trains (i.e., the high-speed rail trains replace some or all of the lower-speed Amtrak trains), or the freight trains. It is unlikely that freight trains would be reduced given statements by the railroad that it needs to operate more freight trains on the line to support the intermodal shipping facility it is building south of Joliet. Some of the Amtrak trains could be reduced, but that would potentially reduce train service to communities that will not be served by high speed passenger rail.

Of course this would not mean that the railroad could not increase the number of trains above the 30-train maximum capacity, as the railroad has threatened. It would only

⁶ Ibid, p. 4.5 for explanation of control types.

⁷ It is our understanding that the current non-passenger demand on the 3rd St. line is 6 freight and 1 coal train. A 2005 study of railroad consolidation commissioned by the City of Springfield found the railroad self-reporting average rail traffic of 8-9 trains per day. In a recent newspaper article (Springfield State Journal-Register, Sept. 17, 2009, p. 4) the railroad reported only 4 freights daily, with 3-5 more freights running south from the railroad's new Joliet facility, growing to 8-12.

mean that doing so would reduce line efficiency and therefore reduce level of service, which is currently judged as “below capacity” by the AAR report.⁸ Should the railroad increase use of this corridor beyond its capacity, we would anticipate losses in rail efficiency, and therefore level of service, along the entire corridor. The SSCRPC cannot judge the magnitude of this loss or the marginal point at which the loss becomes significant without a modeling of the line, which is beyond the SSCRPC’s current capabilities.

However the addition of another rail line on a corridor increases capacity, particularly for freight, significantly. One might expect that if a single-line corridor using CTC can provide capacity for 30 train trips, a dual line system would simply double this capacity; moving from 30 trains per day to 60. However the AAR report indicates that the second track would more than double practical maximum capacity, increasing capacity to 75 train trips each day, or 45 more than a single line. This 75 train capacity is similar to figures given to the SSCRPC previously.⁹

If a double track were available, the 3rd Street corridor could support the current 10 Amtrak trips, the existing 7 freight and commodity trains, and the proposed 16 high speed rail trips, and still retain enough capacity to support 42 additional freight train trips. These additional 42 trips alone would represent about 6 times the current freight use of the line.

This same capacity would not be available to the railroad if the lines were split, however. If the railroad were to continue to use the 3rd Street line for passenger traffic only, as has been recently proposed by the railroad, and provided an additional rail line on the 10th Street corridor for freight, the metrics would change. The practical maximum capacity for a single rail line corridor, using CTC controls and hosting a single type of train (in this case, passenger), increases from 30 to 48 trains. This capacity would be more than enough to host the existing 10 Amtrak trips plus the 16 proposed high speed rail trips.

However, the second rail line on another corridor would only host 30 trains rather than the 75 that would be available on a two-track single corridor¹⁰. This would effectively reduce the total amount of freight capacity available to the railroad. If, however, two tracks for freight were provided to the railroad on a second corridor along with passenger capacity on a single line corridor, its capacity to run freight grows immensely. The single line passenger corridor could support 48 train trips per day while the double-line corridor could support 75, for a total of 123 train trips per day. This is well beyond the freight and passenger capacity that the railroad states it will need in the near future.

⁸ Op cit., pp. 4-8 – 4-10.

⁹ Sims, E.N. (Aug. 2009). *Counting Trains: Estimating Rail Traffic on Springfield’s 3rd Street Rail Corridor for Planning Purposes*, p. 4. SSCRPC: Springfield: IL.

¹⁰ Based upon our reading of the AAR report, there appears to be little difference in the maximum line capacity for a railroad using a single-line corridor compared to that same railroad using a single line on a multi-line corridor that is shared. We assume that when multiple railroads use the same corridor, their lines act independently, as though they were on separate corridors.

Conclusions

No generalized results can provide the same level of detail that the actual modeling of a system might, and the AAR report notes that there are multiple factors that affect rail line capacity.¹¹ However the AAR report termed the three variables addressed in this paper (number of tracks, control system, and train mix) the dominate factors. This being the case, the SSCRPC believes that some conclusions are pertinent.

Based upon the results provided in the AAR report, it appears that if the 3rd Street corridor were to remain a single line system it could support up to 30 train trips per day before it exceeded practical maximum capacity. Absent the high speed passenger rail project (16 proposed trips per day), and assuming that the 10 Amtrak train trips remained on this line, the corridor could support 20 freight trains. This represents 13 more freights per day than are moving along this corridor at the present time, or about twice the current demand. Should the 16 high speed train trips be added to this single line corridor, the total number of trips would exceed the corridor's practical maximum capacity unless there is a reduction in Amtrak trains, freight trains, or both.

However, if a double track were added to the corridor, it could absorb its current traffic of Amtrak passenger trains and freight trains, add the high speed rail trips, and still retain capacity for an additional 42 freight trips. These extra 42 trips would be:

- 35 more freights than are on average using the corridor today; and
- 20 more freight trips than the railroad has indicated publicly that it contemplates.¹²

The separation of the single passenger line from a single freight line would appear to increase passenger capacity but decrease freight capacity, when compared to having both of these lines on the same corridor. Providing the railroad with a single passenger line on one corridor along with a two-track line on another appears to provide a freight capacity to the railroad far in excess of any needs stated publicly or considered in the SSCRPC's previous impact analysis, and may further complicate mitigation.

Our analysis leads us to believe that a two track system operated by the railroad on a single corridor, be it 3rd Street or 10th Street, would be preferable from an efficiency standpoint to single tracks operated on two corridors. We also believe that providing the railroad with a single track for passenger on one corridor and two tracks for freight on a different corridor, would provide the railroad with train capacity far beyond what will be reasonably needed over any usefully foreseeable timeframe.

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¹¹ Cambridge Systematics, Inc. (Sept., 2007). *National Rail Freight Infrastructure Capacity and Investment Study*, p. 4-5 (footnote). Association of American Railroads: Washington, DC.

¹² Landis, T. (Sept. 17, 2009). City's rail issue part of a bigger program, *Springfield State Journal-Register*. Pp. 1 & 4. Springfield: IL.

The Springfield-Sangamon County Regional Planning Commission (SCRPC) serves as the joint planning body for Sangamon County and the City of Springfield, as well as the Metropolitan Planning Organization for transportation planning in the region.

The Commission has 17 members including representatives from the Sangamon County Board, Springfield City Council, special units of government, and six appointed citizens from the city and county. The Executive Director is appointed by the Executive Board of the Commission.

The Commission works with other public and semi-public agencies throughout the area to promote orderly growth and redevelopment, and assists other Sangamon County communities with their planning needs. Through its professional staff, the SSCRPC provides overall planning services related to land use, housing, recreation, transportation, economics, environment, and special projects. It also houses the Sangamon County Department of Zoning and Building Safety which oversees zoning, building permits and code, and liquor licensing for the County.

The Commission prepares area-wide planning documents and assists the County, cities, and villages, as well as special districts, with planning activities. The staff reviews all proposed subdivisions and makes recommendations on all Springfield and Sangamon County zoning and variance requests. The agency serves as the county's Plat Officer, Floodplain Administrator, Census coordinator, and local A-95 review clearinghouse to process and review all federally funded applications for the county. The agency also maintains existing base maps, census tract maps, township and zoning maps and the road name map for the county.

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