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Forensic Engineering: Review of Causation of Multiple Accidents at a Railroad Grade Crossing

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This paper will describe a situation at a specific highway railroad grade crossing which has existed for over 25 years, during which time there have been twelve recorded accidents. Three governmental jurisdictions have claimed that these accidents were not their responsibility, and they concluded that nothing could be done to improve the safety of the intersection. Three of these twelve accidents will serve as examples to illustrate the problems that arose at this highway grade crossing, along with the resulting governmental finger pointing, which left the public facing a hazardous and unsafe situation.

Governmental Agencies and Companies Involved:

The location, known as the Tissall Road Railroad Grade Crossing, was located in the Town of Saugerties, County of Ulster, New York, and the following governmental jurisdictions were involved:

- The Town of Saugerties, which owned Tissall Road, a gravel road connecting a residential area and an active quarry.
- The County of Ulster, which owned Old Kings Highway (County Road 31) in the vicinity of Tissall Road, which ran parallel the railroad tracks.
- The New York State Department of Transportation Railroad Division, which had the responsibility of determining the type of grade crossing warning devices to be installed at each highway grade crossing.
- Northeast Solite Corporation, which owned the quarry. They had 55 to 60 foot long tractor trailers hauling gravel throughout the eastern states.
- CSX railroad, owner of the River Line [formerly Conrail and formerly New York Central Railroad (West Shore Division)] connecting Albany to Newark, NJ. The Railroad Right-Of-Way was 66 feet. There was a railroad Spur that led into the property of Solite Northeast Corp.

Accident History:

The history of recorded accidents involved four tractor trailers entering the site and eight tractor trailers exiting the site, as follows¹:

1. April 8, 1975 Tractor Trailer turning left from CR. 31 onto Tissall Road.

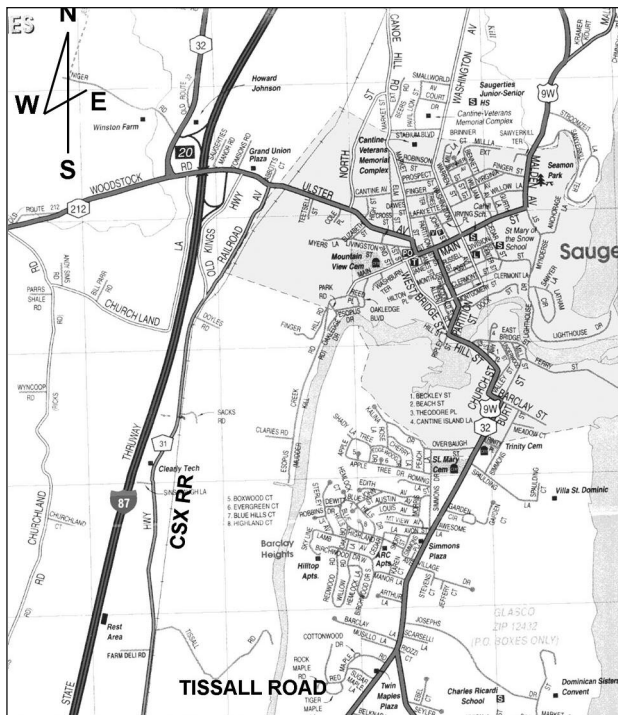
2. January 29, 1982 Tractor Trailer exiting Tissall Road onto CR. 31. **Ownership of the railroad Right-Of-Way was transferred from Conrail to CSX in the early 1990's. Note that the track speed was 10 MPH under Conrail and CSX upgraded the track speed to 50 MPH.**
3. November 15, 1996 Tractor Trailer turning left from CR. 31 onto Tissall Road, in which the truck driver was killed. The author of this paper conducted an Accident Site Investigation regarding this particular accident.
4. October 24, 1998 Tractor Trailer turning right from CR. 31 onto Tissall Road.
5. November 12, 1998 Tractor Trailer exiting Tissall Road onto CR. 31.
6. November 24, 1998 Tractor Trailer exiting Tissall Road onto CR. 31.
7. August 3, 2000 Tractor Trailer exiting Tissall Road onto CR. 31.
8. April 17, 2001 Tractor Trailer exiting Tissall Road onto CR. 31.
9. September 12, 2001 Tractor Trailer exiting Tissall Road onto CR. 31, in which the truck driver was severely injured. The author of this paper conducted an Accident Site Investigation regarding this particular accident.
10. April 26, 2002 Tractor Trailer turning left from CR. 31 onto Tissall Road, in which the truck driver was killed. The author of this paper conducted an Accident Site Investigation regarding this particular accident.
11. September 20, 2002 Tractor Trailer exiting Tissall Road onto CR. 31.
12. August 14, 2003 Tractor Trailer exiting Tissall Road onto CR. 31.

The Problem:

The intersection of Tissall Road intersected Old Kings Highway (County Road 31) about three miles south of Route 212 (NYS Thruway I-87) in Ulster County. **The railroad tracks paralleled Old Kings Highway from Route 212 south for about two miles. Old Kings Highway then curved to the west and away from the railroad tracks. Just before the Tissall Road intersection Old Kings Highway and the railroad tracks paralleled each other again for the next mile (see Map 1²).**

The roadway descriptions were as follows:

1. Old Kings Highway (County Route 31) was a north south, two lane roadway 22 feet in width. The east shoulder width was 9 feet south of Tissall Road, and 11 feet north of Tissall Road, which had a gravel surface shoulder (see Figure 1).



Map 1

Old Kings Highway (CR.31) at Tissall Road

2. Tissall Road was an east west roadway, with two lanes, totaling 34 feet in width. On various case documents there were spelling variations, including Tissall, Tissell, Tissol, etc. Tissall Road had an asphalt surface from Old Kings Highway to about 155 feet east of the entrance to the Northeast Solite Corporation facility (see Figure 2).
3. Tissall Road had a gravel roadway surface from the Northeast Solite Corporation facility eastward to the end of the roadway, for a distance of 1,200 feet.
4. Tissall Road was relocated and built by Hudson Valley Lightweight Aggregate Corporation, and it was dedicated to the Town of Saugerties in 1961. Tissall Road extended from the CSX east Right-Of-Way line to the original Tissall Road residential area.
5. Tissall Road also crossed the CSX Right-Of-Way at MP 96.76. The CSX Right-Of-Way extended 66 feet [33 feet on both sides of the center of the main track] west from the Northeast Solite Corporation property (as shown on the Railroad Right-Of-Way Map #130 392, dated Jan. 6, 1961).



Looking North on Old Kings Highway



Looking South on Old Kings Highway

Figure 1

6. CSX had one track within the CSX Right-Of-Way, and a Spur that went into the Northeast Solite Corporation Property north of Tissall Road. The spur started at MP 97.00, and it was 0.24 miles or 1,267 feet north of Tissall Road (see Figure 3).
7. Old Kings Highway (County Road 31) had a 50 foot Right-Of-Way which extended 25 feet from the center of CR. 31, as determined from the deposition of the Ulster County Assistant Engineer. The Ulster



View of Tissall Road from CR. 31

Figure 2



Looking North on Railroad Right of Way

Figure 3

County Department of Public Works had no survey or record drawings for Old Kings Highway (CR. 31).

8. Figure 4 shows the approximate location of the Rights-Of-Way Lines in relation to Tissall Road. The CSX Right-Of-Way and the County Road 31 Right-Of-Way overlapped each other by 9 feet, and the Town of

Saugerties Tissall Road Right-Of-Way started approximately 71 feet east of Old Kings Highway (County Road 31).

9. The distance between the CSX Railroad Right-Of-Way and the Old Kings Highway (CR. 31) travel way was about 5 feet. The distance between the tracks and the Old Kings Highway travel way was about 37 feet. Thus, the Old Kings Highway (CR. 31) Right-Of-Way overlapped the CSX Right of Way by 9 feet (see Figure 4³).
10. Crossbuck signs were installed 29 feet east of the tracks, between the Main tracks and the Spur tracks on the north side of Tissall Road, and at 11 feet west of the tracks on the south side of Tissall Road. These signs were installed within the Railroad's Right-Of-Way (see Figures 2 and 4).

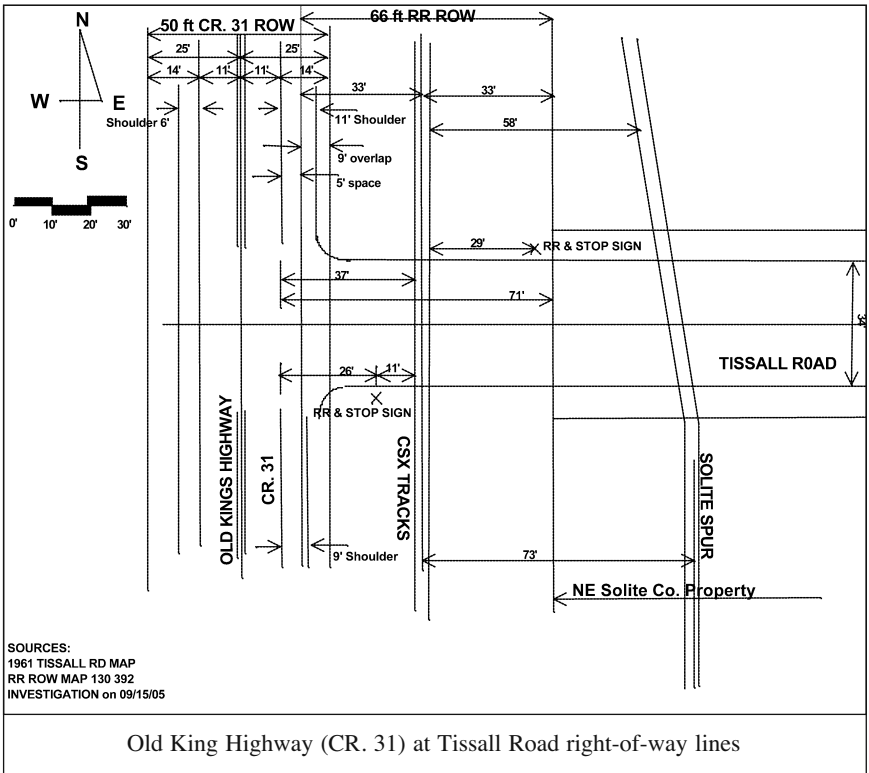


Figure 4

11. The grade of Tissall Road from the grass shoulder of Old Kings Highway (CR. 31) to the Railroad Tracks was 13.2% upward to the tracks, for a distance of 30 feet. A wood Utility Pole was located 16 feet from the tracks and 21 feet from the west edge line of Old Kings

Highway (CR. 31). Advance Railroad Crossing signs were installed along the east and west sides of Old Kings Highway (CR. 31) after the above accidents.

12. Tractor trailers had to first cross the tracks and then had to stop and wait for a gap in the flow of traffic before entering Old Kings Highway (CR. 31). These tractor trailers were heavily loaded with gravel and took time to turn and build up speed on a 55 MPH roadway.
13. A train headed south could see a tractor trailer waiting on the tracks for at least one mile north of Tissall Road, and in at least eight of the above accidents the train operator did not slow the train down. They placed the train into emergency braking between 300 to 400 feet north of the subject grade crossing. Since the train was traveling at a track speed of 50 MPH, the truck drivers had no idea that a train was coming at them until the moment of impact. While a tractor trailer waited to enter Old Kings Highway, a train would be out of the driver's visual range. Train operators involved in accidents at the subject grade crossing stated that they could see heavy vehicular traffic on Old Kings Highway (CR. 31), and thus they knew that a tractor trailer could be waiting to enter Old Kings Highway (CR. 31), but they did not slow the train down to give a truck driver more time to enter the highway.
14. Four other accidents occurred at the subject grade crossing when tractor trailers made a left turn from southbound Old Kings Highway onto Tissall Road, and they were struck by southbound trains. The sight distance for a truck driver between Old Kings Highway and the railroad tracks was about 200 feet from the left turn position on Old Kings

Highway at Tissall Road. However, the sight distance for a Train Operator was about a mile, because a Train Operator sat on the right side of the engine with no visual interference along the straight track. However, a truck driver had to maneuver along a curvaceous roadway with opposing traffic and driveways.



Tractor trailers between Old Kings Highway and Railroad tracks

Figure 5

History of Tissall Road

The original location for Tissall Road was 500 feet to the south, and the distance between the tracks and Old Kings Highway was about 37 feet with at least a 20 percent grade. In 1961 Tissall Road was relocated 500 feet north to the northern edge of the Solite property. The distance between tracks and Old Kings Highway was then about 37 feet with a 13.2 percent grade. In November 1987 Conrail, concerned with the safety of the Tissall Road crossing, requested that New York State install a flashing light and gates. However, the NYS DOT Railroad Division denied the request because the gates and flashing lights would be only 20 feet from Old Kings Highway, thus creating an unsafe condition.

Their conclusion and recommendation were that nothing could be done except for the installation of Crossbucks with Stop Signs⁴.

Starting in 1994, the Town of Saugerties had numerous meetings and public hearings concerning the relocation of Tissall Road, which resulted in preliminary design plans and an Environmental Site Assessment Report in August 2002. The Town obtained a donation of land from an adjacent property owner for a 50 foot right-of-way about 1,000 feet further north of the subject grade crossing, but they did not have the funds to build the roadway. The County of Ulster did not seek funding from New York State, and no further action was taken on the proposed relocation of Tissall Road.

Old Kings Highway (CR. 31) was a County Road, and had a Right-Of-Way of 50 feet which extended up to and into the Railroad Right-Of-Way. The Railroad Right-Of-Way was 66 feet in width and it bounded the Northeast Solite Corporation Property Line. The railroad track Spur was located on the Northeast Solite Corporation Property and the Tissall Road Right-Of-Way started at a distance south of the start of the Spur. Therefore, Tissall Road was a Town Road starting at approximately 71 feet east of Old Kings Highway (County Road 31), as shown in Figure 4.

The Town of Saugerties had tried to reduce the accidents at the intersection of Tissall Road and Old Kings Highway, although it was not under their jurisdiction. Both the Town of Saugerties and the railroad paid out substantial amounts as a result of accidents at the subject grade crossing. The County of Ulster had pleaded in County Court that they had no responsibility, and successfully insisted that it was a Town of Saugerties intersection, even though the County of Ulster did actually had complete jurisdiction over the entire intersection, which was on a County Road. The Town of Saugerties only had the responsibility to bring to the County's attention any problems, and to suggest possible solutions. It was up to the County of Ulster to improve the intersection, and to provide for the safety to the vehicles using the Tissall Road Railroad Grade Crossing when entering or exiting Old Kings Highway (CR. 31). The County of Ulster was responsible for providing a traffic engineering study to determine if a temporary traffic signal and/or roadway improvements could reduce the number of train-truck accidents. To date, the County of Ulster has not hired a consulting engineer or a traffic engineer to study the intersection, and their position remains that it is not their problem.

Providing a Traffic Control Device

A temporary solution could have been provided at the subject intersection until Tissall Road was relocated. In his Accident Site Investigation Reports⁵, the author analyzed and evaluated the subject intersection and suggested that a tem-

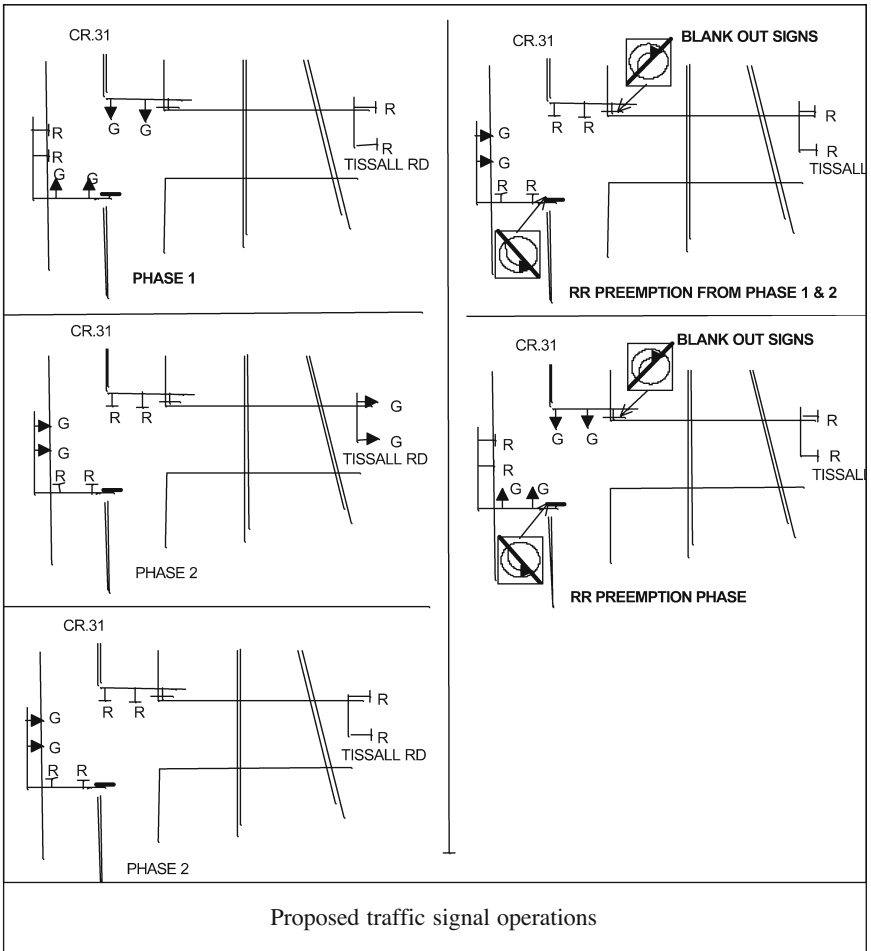


Figure 6

porary or permanent traffic signal be designed to improve the safety of the intersection of Old Kings Highway (CR. 31) at Tissall Road. The proposed traffic control device would have to conform to CSX operational standards, and to the requirements of the New York State Department of Transportation Railroad Division⁶. A traffic signal would provide safe ingress and egress from Tissall Road. The author's proposed installation of a traffic signal and railroad preemption operational plan is shown in Figure 6.

The above proposed traffic signal operational plan would keep the existing roadway widths, and it would stop all traffic on Old Kings Highway to permit traffic to cross the tracks and enter onto Old Kings Highway. It would also pro-

vide extra clearance time for trucks to clear the tracks when entering to Old Kings Highway. During railroad preemption, the area between the tracks and Old Kings Highway would be cleared and all entering traffic would be prohibited with blank out (lighted signs). Through traffic on Old Kings Highway would be permitted during railroad preemption.

The ideal solution would be to improve the subject intersection by widening Old Kings Highway to accommodate an additional southbound left turn lane and an additional northbound right turn lane to store the tractor trailers while they are waiting to make a turn during a railroad preemption operation. The proposed plan would stop tractor trailers and other vehicles from crossing the tracks when a train is approaching. Old Kings Highway (CR. 31) northbound should have two 11 foot lanes, one for through traffic and one for right turning vehicles, and the southbound direction should have two 11 foot lanes, one for left turning vehicles and one for through traffic. The four lanes should all be eleven feet wide. This would require 44 feet of roadway to be provided within the existing 50 foot Right-Of-Way. Special utility easements would have to be obtained along the adjacent properties. Ideally, the County of Ulster should take 20 feet of Right-Of-Way from the west side (southbound side) to meet the current County of Ulster roadway design standards.

Conclusion

A Professional Engineer's ethical obligation is to try to protect the safety of the public when the Engineer is aware of a recurring hazardous condition⁷. However, a Professional Engineer is not in a position to compel the parties involved to take action. When the parties involved each claim it is not their problem, the Professional Engineer is stymied in getting a hazardous situation made safer. As discussed above, multiple accidents have occurred for several years at the subject railroad grade crossing due to its unique roadway configuration, confusion of right-of-way boundaries, and disputes over jurisdictional responsibilities. Multiple accidents at any intersection require diligent follow up by all levels of local, county and state governmental jurisdictions in order for them to fulfill their obligations to the motoring public.

References:

1. *Federal Railroad Administration (FRA) Highway-Rail Grade Crossing Accident/Incident Reports* [U. S. DOT-AAR Grade Crossing ID No. 842681E].
2. Ulster County Map by Jimapco 2095 Route 9, Round Lake, NY 12151 (518) 899-5091 www.jimapco.com.
3. From 1961 Tissall Road Map/RR ROW Map 130 392 and site investigation conducted and measurements were taken on 09/15/05.
4. From depositions taken during each case.
5. Robert Hintersteiner, P.E. Traffic Accident Report dated 6/21/06.
6. *The New York State Department of Transportation Railroad Division and the US Manual on Uniform Traffic Control Devices, 2003 Edition, Part 8 Traffic Controls for Highway-Rail Grade Crossings*.
7. *National Society of Professional Engineers "Code of Ethics for Engineers revision date January 2006, Publication #1102*.