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**Federal Railroad
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North Carolina DOT Traffic Separation Studies Volume I - Assessment

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Washington, DC 20590

Next Generation High-Speed Rail Program

DOT/FRA/ORD-04/15.I

Final Report
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13. ABSTRACT (Maximum 200 words)

The Federal Railroad Administration requested the Volpe National Transportation Systems Center to assess ten sites in depth that used the Traffic Separation Study (TSS) process. The assessment involved a quantitative and qualitative analysis of the impact of the process used at each site and an evaluation of community involvement activities. Information was collected through a review of relevant documentation and interviews conducted with key stakeholders from each site. The sites were assessed over a five-year period during which time the process further evolved and improved.

The TSS is a collaborative partnership among NCDOT Rail Division; railroad engineers; engineering consulting firms; mayors and other municipal officials; police, fire, and other emergency services staff; and community residents, including abutters to the site, land developers, and motorists. It includes a comprehensive evaluation of traffic patterns at highway-rail grade crossings to assess existing safety conditions and determine the need for improvements and/or elimination of crossings based on specific criteria that, in effect, serve as state guidelines.

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Jane Saks, EG&G Technical Services, Inc., U.S. DOT Volpe Center, conducted the interviews, researched, and co-authored this report. Anya A. Carroll, Principal Investigator, Highway-Rail Grade Crossing Safety Research, U.S. DOT Volpe Center, provided overall direction, and was the co-author and Project Leader.

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Finally, Kathy Blythe, EG&G Technical Services, Inc., assisted in the layout and design and Cassandra Oxley, also of EG&G Technical Services, Inc., helped with the editing of this report.

METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in)	=	2.5 centimeters (cm)
1 foot (ft)	=	30 centimeters (cm)
1 yard (yd)	=	0.9 meter (m)
1 mile (mi)	=	1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in^2)	=	6.5 square centimeters (cm^2)
1 square foot (sq ft, ft^2)	=	0.09 square meter (m^2)
1 square yard (sq yd, yd^2)	=	0.8 square meter (m^2)
1 square mile (sq mi, mi^2)	=	2.6 square kilometers (km^2)
1 acre = 0.4 hectare (he)	=	4,000 square meters (m^2)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz)	=	28 grams (gm)
1 pound (lb)	=	0.45 kilogram (kg)
1 short ton = 2,000 pounds (lb)	=	0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp)	=	5 milliliters (ml)
1 tablespoon (tbsp)	=	15 milliliters (ml)
1 fluid ounce (fl oz)	=	30 milliliters (ml)
1 cup (c)	=	0.24 liter (l)
1 pint (pt)	=	0.47 liter (l)
1 quart (qt)	=	0.96 liter (l)
1 gallon (gal)	=	3.8 liters (l)
1 cubic foot (cu ft, ft^3)	=	0.03 cubic meter (m^3)
1 cubic yard (cu yd, yd^3)	=	0.76 cubic meter (m^3)

TEMPERATURE (EXACT)

[(x-32)(5/9)] °F = y °C

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm)	=	0.04 inch (in)
1 centimeter (cm)	=	0.4 inch (in)
1 meter (m)	=	3.3 feet (ft)
1 meter (m)	=	1.1 yards (yd)
1 kilometer (km)	=	0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm^2)	=	0.16 square inch (sq in, in^2)
1 square meter (m^2)	=	1.2 square yards (sq yd, yd^2)
1 square kilometer (km^2)	=	0.4 square mile (sq mi, mi^2)
10,000 square meters (m^2)	=	1 hectare (ha) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gm)	=	0.036 ounce (oz)
1 kilogram (kg)	=	2.2 pounds (lb)
1 tonne (t)	=	1,000 kilograms (kg)
	=	1.1 short tons

VOLUME (APPROXIMATE)

1 milliliter (ml)	=	0.03 fluid ounce (fl oz)
1 liter (l)	=	2.1 pints (pt)
1 liter (l)	=	1.06 quarts (qt)
1 liter (l)	=	0.26 gallon (gal)
1 cubic meter (m^3)	=	36 cubic feet (cu ft, ft^3)
1 cubic meter (m^3)	=	1.3 cubic yards (cu yd, yd^3)

TEMPERATURE (EXACT)

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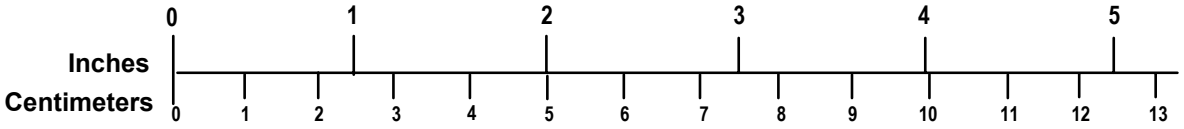
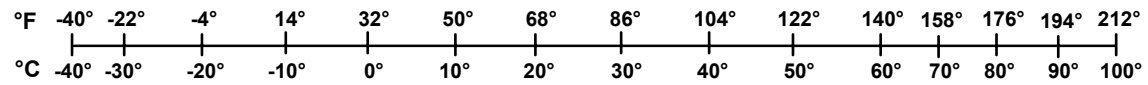


QUICK FAHRENHEIT - CELSIUS TEMPERATURE CONVERSION



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EXECUTIVE SUMMARY

Background

The Federal Railroad Administration requested the U.S. Department of Transportation's (DOT's) Volpe National Transportation Systems Center (Volpe Center) to assess the Traffic Separation Study (TSS) process developed by the North Carolina Department of Transportation's (NCDOT's) Rail Division, to determine the effectiveness of the program and its applicability to other states. Stakeholders from ten communities were interviewed to determine if the TSS process was effective, and if so, what best practices made the process successful.

In 1994, the U.S. DOT Grade Crossing Action Plan set a goal of closing 25 percent of public crossings to improve safety. In response, and based on their experience working with communities to close crossings, the NCDOT Rail Division developed a TSS process. In addition, the Rail Division was able to hire more staff with experience working with communities, increase the available data and statistics, and provide financial incentives to municipalities to close crossings.

Traffic Separation Study (TSS) Process

The TSS is a collaborative partnership among the NCDOT Rail Division; railroad engineers; engineering consulting firms; mayors and other municipal officials; police, fire, and other emergency services staff; and community residents, including abutters to the site, land developers, and motorists. It includes a comprehensive evaluation of traffic patterns at highway-rail grade crossings to assess existing safety conditions and determine the need for improvements and/or elimination of crossings based on specific criteria that, in effect, serve as state guidelines.

Crossings for an entire municipality or region are evaluated comprehensively, rationally, and equitably. The TSS proactively involves municipal officials and community residents in safety education, decisionmaking, and prioritization activities. Over time the TSS has improved in its sophistication, customization for specific local needs, and its use of community involvement tools. It has evolved into a set of best practices called, *The Three C's to Success: Improved **C**oordination, More Effective **C**ommunication, and Better Quality and **C**onsistency*.

Data Collection

FRA requested the Volpe Center to assess ten sites in depth that used the TSS. The assessment involved a quantitative and qualitative analysis of the impact of the process used at each site and an evaluation of community involvement activities. A review of relevant documentation and interviews with key stakeholders from each site were conducted. The sites were assessed over a five-year period, during which time the process further evolved and improved.

The public response to the TSS process was generally enthusiastic. Financial incentives were a strong motivator, especially in smaller towns with limited financial resources, where decisions tended to be a complex negotiation among diverse stakeholders with different perspectives. Larger cities had technical staff already focused on safety, but had a more time-consuming decisionmaking process.

Results

The TSS process clearly increased community enthusiasm for participating, reduced individual resistance, and improved stakeholder satisfaction with outcomes. Even with fewer, easy-to-close, redundant crossings and more initial community resistance, later sites had greater success as the TSS process improved. Although quantifying this data is not possible, over time the municipalities selected were more and more challenging. The three communities where the original process was used closed 33 percent of all crossings that could be eliminated. One community out of three (33 percent) showed initial resistance. For the seven later communities using a more mature process, five of seven (71 percent) communities closed all potential crossing closures with 100 percent showing resistance.

These results are based on a comparative analysis of the percent of the potential number of crossings that were recommended for closure to the number that were actually closed. NCDOT Rail Division ratings (on a scale of zero to ten) of the effectiveness of the TSS processes at these sites were also considered. The TSS would have helped communities earlier in the process that did not use the TSS.

The other positive long-term benefits of using the TSS process were:

- The introduction of a planning initiative and collaborative process for smaller towns;
- Decisions based more on the goals of community safety than individual driver's mobility;
- U.S. legislation changed over the period to include support for financial incentives for crossing consolidations. With the cumulative successes of the incentives within the TSS process, private stakeholders were more motivated to increase the financial incentives they offered;
- An improved NCDOT Rail Division image in the eyes of the community (including more positive press coverage), which now sees it as a professional organization, aligned with municipalities and committed to improving safety.

The TSS process has been well thought out, improved with use, and tested over time. It continues to serve North Carolina well and would be a good model for other states and other transportation modes to use. Other key lessons learned include:

- Use independent consultants.
- The better the process and more skilled the North Carolina DOT staff and engineering consultants involved, the better results. Continue to invest in the hiring and training of professionals with strong people skills.
- Continue to use independent engineering consultants
- The more proactive the effort the better. Involve the community early and often to educate them about crossing safety. Speak with citizens in

terms they understand (i.e., equate grade crossings to highway interchanges (controlled access).

- Seek out and support champions and change agents within the community.
- In any public process there is always resistance. It is important to allow all parties to be heard and not attempt to silence the opposition. Learn to take criticism.
- Build consensus around high-level community concerns and financial incentives to the municipality. Let the community prioritize their needs and concerns.
- Customize the process for each community. Open communication and consensus take time; do not attempt short cuts.

Future Directions

This document and other success stories can promote further enhancements to the crossing consolidation process.

- Future research could improve the TSS process even further.
- Collect best practices to determine how to improve the implementation/construction phase of the TSS process.
- Study other transportation modes and other industries to learn how to address the competition among communities in regional efforts such as the South End Studies.
- Continue to help with funding and issues that may not be directly related to railroad issues. Learn how to help municipalities become better at overall planning and address internal conflicts among members.
- Use this study as a new baseline for future crossing safety efforts.

1. BACKGROUND

1.1 Overview

Many North Carolina towns developed around railroad stations and crossings. This has not been ideal for either vehicle traffic flow or railroad safety.

In 1994, the United States Department of Transportation's (USDOT) Grade Crossing Action Plan set a goal of closing 25 percent of public crossings to improve safety. Most closures are completed on minor roads and they are usually redundant crossings. North Carolina Department of Transportation's (NCDOT) Rail Division considers a crossing redundant (and therefore a candidate for elimination) if it is within ¼ mile of another crossing connected to the same street network. Where possible, traffic is rerouted, or grade separations (bridges) or other enhanced warning devices are applied at the alternate crossings (such as flashers and gates, or enhanced devices, such as four quadrant gates or median separators).

To identify specific candidate crossings for closure, the NCDOT Rail Division conducted a series of Traffic Separation Studies (TSS). Traffic Separation Studies are part of a comprehensive evaluation of traffic patterns and road usage at highway-rail grade crossings for an entire municipality or region to assess existing safety conditions. Traffic Separation Studies determine the need for improvements and/or elimination of public grade crossings based on specific criteria, which can include:

- Accident history;
- Existing and projected vehicular and train traffic;
- Types of roadways and crossings;
- Types of property being served;
- Emergency routes;
- School bus routes;
- Types of warning devices present;
- Feasibility for improvements;
- Economic impact on the community if the crossing is closed.

As a prerequisite to conducting a Traffic Separation Study in a community, the Department (NCDOT) and municipality contractually agree to make a "best faith" effort to approve and implement the identified needs. Development of a scope of work, schedules, and deliverables is a joint effort. Should a municipality not make a "best faith" effort, they are required to pay the Department for the study cost. The municipality may also be subject to liability, in the event of a crash at a location where approval by the municipality for improvement(s) was withheld.

1.2 Traffic Separation Study Process (TSS)

NCDOT's goal is to close as many crossings statewide as feasible. NCDOT realized it needed to find a new and better approach for making decisions with the towns and completing crossing closures expeditiously as NCDOT has no legislative authority to close public crossings on a municipal street system without concurrence from the respective community.

A Traffic Separation Study educates the public on railroad crossing safety, prioritizes concerns, and builds consensus regarding closures in that community. Studies also examine other possible safety enhancements to local streets and crossings to further improve public safety while accommodating current and projected highways, school buses, and emergency response traffic routes. Since crossing closures can increase the number of motorists at the remaining crossings, justification for spending funds on those remaining crossings from a cost/benefit analysis is bolstered.

Ultimately, NCDOT Rail Division introduced four major improvements as part of the TSS process.

1.2.1 TSS Improvements

A process for conducting Traffic Separation Studies was documented and introduced by NCDOT Rail Division in 1995 to establish a series of thorough steps to improve coordination, communication, and consistency with all stakeholders across the state.

This process, consisting of three phases (Preliminary Planning, Study, and Implementation) is an approach to grade crossing safety that identifies and prioritizes existing safety concerns. The process specifies the sequence of decisions and activities starting with bringing in engineering consultants (as independent third parties) and relevant stakeholders, and goes through the planning and implementation phases.

At this phase of the process the community wanted a better sense of the range of "what could be done," but since this was a new process and NCDOT Rail Division was short staffed, they could not provide the information. In later years, the state offered more funding to do the following three activities.

Hiring Experienced Staff

NCDOT hired experienced staff to work on project coordination, including public involvement issues (i.e., dissemination of crossing safety newsletters and establishing cooperative relationships with local news media). Staffing increased starting in 1997; before that there were no engineers dedicated to this effort. They were fully staffed in 1999 with more experienced senior people. By late 1998 the crossing and safety staff were co-located under one roof.

Now staffing is again slowing the process. According to NCDOT, "In 2001 the success of the TSS approach and the length of waiting lists may make it difficult for current staff to complete and implement studies in a timely manner, while there is strong community interest. The wait currently extends well into 2003 for studies to be initiated."

Improving the Inventory Database

When the process was new, assessments were less detailed, more conceptual, and more evaluative (e.g., monitored traffic volume rather than assessing the feasibility of options, environmental impact and recommendations), as they needed to be in the future. NCDOT eventually set up an improved database to provide statistics and more successfully respond to community questions. By late 1999, NCDOT Rail Division was better able to answer community questions. Web access made data more available and staff is now able to query databases. Beginning at that time the Highway-Rail Grade Crossing Inventory was updated regularly, making accurate information readily available.

Providing Financial Incentives

U.S. legislation changed over the period to include support for financial incentives for crossing consolidations. With the cumulative successes of the incentives within the TSS process, private stakeholders were more motivated to increase the financial incentives they offered. NCDOT Rail Division provided financial incentives to towns to close crossings (USDOT matched up to $7,500 of railroad funding per crossing, to be used at the discretion of the municipality). The database enabled NCDOT to demonstrate its successes to the railroad, which in turn was willing to offer larger incentives to municipalities.

Matching incentive funds from NCDOT must be used for highway transportation safety improvements, since they are derived from a federal source. Through discussions with the Federal Highway Administration's (FHWA) Raleigh office, the Department's incentive funds could be allocated toward the cost of the following items:

- Radar guns;
- Guardrails;
- Traffic signals;
- Highway signs;
- Turn lanes;
- Pavement markings;
- Sidewalks;
- Emergency vehicles, primarily responding to highway incidents;
- Emergency equipment (i.e., "Jaws of Life");
- Highway sirens for emergency response vehicles;
- Sponsorship of a community drivers education class; and
- Educational seminars or workshops promoting rail/highway safety.

1.2.2 TSS Process in Detail

The Traffic Separation Study process consists of the following phases, listed in detail in Table 1.

- Preliminary Planning Phase;

- Study Phase; and
- Implementation Phase.

Table 1: Traffic Separation Study Process

Phases
1. Preliminary Planning Phase
1. Municipal Planning Organization (MPO) requests NCDOT Rail Division conduct a TSS.
2. NCDOT Rail Division and Program Development Branch develop an agreement between the Department and municipality for conducting the study. Typically, MPOs are points of contact in smaller municipalities while larger cities have their own technical staff.
3. NCDOT Rail Division and municipality meet to discuss scope of work, schedule, and deliverables.
4. NCDOT Rail Division selects engineering consultant.
5. NCDOT Rail Division and municipality review scope of work, schedule. And deliverable, with consultant, and request submittal of cost estimate.
6. Negotiations are held between NCDOT Rail Division and consultant to finalize cost estimate.
2. Study Phase
1. NCDOT Rail Division provides notice to proceed to engineering consultant.
2. Engineering consultant begins crossing evaluation and collecting traffic data for the public rail crossings in the study area. Evaluation criteria include: accident history, present and future vehicle traffic, train traffic truck traffic/truck route, hazardous materials, type of roadway (thoroughfare, collector, local access, etc.), type of property being served (residential, industrial, commercial), school bus route, emergency route, type of warning device present, whether it is a redundant crossing, potential for grade separation (high, medium low), feasibility of implementing roadway improvements (high, medium, low), economic impact in crossing (high, medium, low).
3. Draft recommendations are submitted to NCDOT Rail Division for initial review and comment. Recommendations include near-term (0-2 years), mid-term (2-5 years), and long-term (5-10 years) improvements.
4. NCDOT Rail Division and consultant coordinate recommendations with Transportation Improvement Program projects: roadway, bridge, and "Sealed Corridor" improvements.
5. Draft recommendations presented to NCDOT Rail Division Engineer, NC Board of Transportation member (s) and municipal staff.
6. Consultant incorporates comments into draft recommendations.
7. NCDOT Rail Division develops and distributes crossing safety newsletters identifying and prioritizing proposed safety recommendations.
8. NCDOT Rail Division and consultant hold crossing safety workshops and/or public hearings to present proposed recommendations.
9. NCDOT Rail Division and consultant present any modified recommendations to municipal staff.

Phases
10. NCDOT Rail Division requests meeting with local governing bodies to ask for approval of study recommendations.
11. NCDOT Rail Division presents TSS to NC Board of Transportation in summary form.
3. Implementation Phase
1. NCDOT Rail Division, NC Board of Transportation members(s) and Division Engineers(s) determine funding sources for near-term improvements (typically, 90% federal with a 10% local match). Municipalities are typically responsible for right-of-way acquisition and utility relocations. Financial assistance and in-kind services from the railroads have proven to be an additional resource.
2. Receive concurrence for crossing closure(s) on the State-Maintained Highway System from the Division of Highway Chief Engineer for Operations, as per state policy.
3. NCDOT Program Development Branch sets up Preliminary Engineering funds for near-term projects. It discusses programming and feasibility studies for mid- and long-term projects and develops project municipal agreements and railroad crossing closure agreements using Enhancement and Highway contracts Unit planning documents if a Federal Aid project.
4. NCDOT Rail Division Planning Branch determines the approach to completing environmental documents if a Federal Aid project.
5. NCDOT Rail Division Engineers determine the approach to design and construction of projects and make the formal notification if crossing closure is part of a Division of Highway project.
6. NCDOT Rail Division coordinates design/construction of traffic control devices or crossing signalization improvement projects identified in TSS.
7. NCDOT Rail Division submits Plans, Specifications, and Estimates (PS&E) package to FHWA for construction authorization if federal funds are involved.
8. NCDOT Rail Division requests right-of-way (if necessary).
9. NCDOT Rail Division coordinates crossing closure with railroad(s) and NC Division of Highway staff.
10. NCDOT Rail Division reimburses the municipality for any work performed pertaining to crossing closure activities.
11. NCDOT Rail Division District Engineer to complete Secondary Road Abandonment Report and submit to NCDOT for approval.[1]
12. NCDOT Rail Division Secondary Road Office posts notification of long term crossing closures on state highway system.

[1] Secondary Road Abandonment Report is a NCDOT Rail Division of Highway checklist and sign-off form for closing secondary roads.

2. DATA COLLECTION

Information for this report was collected through a variety of documented sources and through telephone interviews with key stakeholders. Data collection included documentation review and interviews. Interview questions are included in Appendix A.

2.1 Documentation Review

Relevant documentation of how the traffic separation study process was conducted before and after 1995 was reviewed. This included NCDOT Rail Division documentation, public records, press releases, and newspaper articles. Available data were collected and analyzed, comparing the results of studies conducted both before and after 1995.

2.2 Interviews

Between 6 and 12 key stakeholders from each of 10 communities were interviewed by phone to assess the process used there. Since community involvement was the focus of this study, questions primarily related to relevant steps in the Study Phase were used. Stakeholders included:

- North Carolina Department of Transportation;
- District engineers and technical staff from larger cities;
- Mayor, town clerk, and other municipal administration officials;
- Police, fire department, and drivers of other emergency vehicles;
- Community residents, including adjacent property owners, land developers, and motorists – these interviews were conducted unless NCDOT Rail Division or the municipality felt this might disrupt current activities, such as when the closing process was ongoing and there was much resistance.

Many of these sources had moved on to other positions or had retired at the time they were interviewed. Several potential sources could not be contacted at all.

2.3 Data Quality Issues

Several issues may have had an impact on the data. The TSS often took place simultaneously with a High-Speed Rail Initiative. In that case it was impossible to determine if the two efforts facilitated or hindered each other.

Interviewees often spoke for their "department" or their "community." As with any interview process, there may have been more diversity in opinions than those presented by the interviewee.

People occasionally had different perceptions or interpretations of the same situation. For each municipality, the better the project success, the more consistent the interview results across

interviewees. At sites where there was a good degree of conflict, there was also a lot of disagreement on all aspects of the process. No attempt is made here to resolve inconsistencies.

2.4 Sites Assessed

Sites were assessed and TSS for prototype communities were completed 1995 to 1997.

The TSS process continues to evolve with every success or failure. The municipalities listed below were the first, and as such, were instrumental in developing the new process.

- Salisbury
- Benson, and
- Stanley.

Of these communities, only Stanley showed resistance to the process. A more developed TSS process may have helped.

The South End TSS was completed in 1997 as an integrated set and included the following sites:

- Charlotte
- Harrisburg,
- Concord
- Kannapolis
- Landis,
- Wake Forest, and
- China Grove.

At this point in time NCDOT Rail Division was now properly staffed to provide the TSS process with *The Three C's to Success: Improved **C**oordination, More Effective **C**ommunication, Better Quality and **C**onsistency*. The South End TSS was the first planned and integrated NCDOT Rail Division public involvement effort using "*The Three C's*" concept.

In this TSS, the NCDOT Rail Division worked together with six municipalities to evaluate existing safety conditions at 39 crossings. They were assessed through the MPO (Metropolitan Planning Organization) as an overall corridor. Since they are geographically close, it was clear that a closing in any one municipality would affect the others.

One downside of working with the six communities together was that the issue of competition surfaced. There was great concern for equity.

TSS for the final community was independently completed in 1999. The final site was Wake Forest. In the case of Wake Forest, the town initiated the process and all three crossings were closed. Communication of the successes in the South End TSS most probably supported the town's pre-emptive actions.

2.5 Current Status of Site

As of summer 2001, the first three sites had completed all near-term closures. See Table 2.

Table 2: Current Status of Sites

Municipality	Railroad	Current Phase	
		Completed	Near-Term Completed
Salisbury	NCRR/NS*		X
Benson	CSX**		X
Stanley	CSX		X
South End TSS			
Charlotte	CSRR/NS	X	
China Grove	CSRR/NS	X	
Concord	CSRR/NS	X	
Harrisburg	CSRR/NS	X	
Kannapolis	CSRR/NS	X	
Landis	CSRR/NS	X	
Wake Forest	CSX	X	

* North Carolina Railroad/Norfolk Southern
** CSX Transportation

3. FINDINGS ON THE TRAFFIC SEPARATION STUDY PROCESS

In this section, crossing consolidations that did not use the TSS process are studied and include lessons learned about the use of the TSS process in general, when to use it and when not to, how it was applied across communities, how it gradually improved over time, and what made it successful or unsuccessful. Some of these comments and suggestions came directly from those interviewed and appear in quotes. Others were implied indirectly by interviewees or expanded by the author.

3.1 Crossing Closures Before the TSS Process

Until the TSS process was instituted, community involvement was limited. NCDOT Rail Division would go before the town without the benefit of the specified evaluation criteria. In most cases, crossings were evaluated on a case-by-case basis. There were some successes and many failures. For example, in 1995 two closures in Mt. Olive were difficult. NCDOT believes that additional closures could have taken place if a TSS had been conducted. Also, the municipalities of Dunn and Garner had untrusting political climates. NCDOT believes these towns would have agreed to more closures if the TSS process with its greater public involvement had been implemented.

Even after the TSS process was introduced it was not used in all municipalities. In North Carolina, since crossings are evaluated on a routine basis as part of the NCDOT Rail Division's Crossing Hazard Elimination Program, it is not always feasible to conduct a TSS in a respective municipality. Therefore, evaluation criteria used in a TSS may be applied at crossings more informally. An example of this is reflected in the Newsome Street crossing consolidation in Lucama, North Carolina. The Lucama Board of Commissioners voted to close this crossing, since NCDOT Rail Division was able to quantify a low traffic volume, "humped" (excessive vertical alignment of the roadway over the tracks) crossing condition, and provide information of the dangers to motorists, rail passengers and train crews at unsignalized crossings.

Other municipalities have chosen not to use a TSS to identify crossing consolidation candidates, but rather agreed to crossing closures for other reasons. If a town needed cash, it might agree up front to closures and/or other safety improvements which otherwise might be very difficult to obtain. In such a case a TSS would not be necessary.

For example, the town of Selma, which had experienced many highway-rail grade crossing incidents, did not initiate the crossing consolidation process, but accepted cash incentives to close crossings. The city of Thomasville was receptive after a former mayor was fatally injured at a crossing. NCDOT completed the diagnostic evaluation as part of a joint DOT-City Corridor Study. The town was motivated to close six crossings by a commitment to build two grade separations. Finally, NCDOT approached the city of Lexington on two or three crossing closures. Since the town was already receptive, they did not need an elaborate process.

Recently, in Morehead City, the railroads, hoping for quick closures, did not support the TSS process. They believed the closures would proceed with fewer delays if they made immediate closures before an upcoming tie replacement and surfacing project. As a result, the community

initially resisted the effort. NCDOT has been working with all of the stakeholders to facilitate roadway and crossing improvements for 16 crossings since this occurrence. Of the crossings being evaluated, seven have been proposed for closure after installation of turn lanes and traffic signals along the major thoroughfare. Had the TSS approach been chosen at the outset, several more crossings within the corporate limits of Morehead City could have been permanently closed, according to NCDOT.

3.2 Value of the TSS Process

An unintended value of the TSS process was that it helped towns begin to formalize a planning process. This may be either by providing an external (TSS) process for the community to follow or by providing an external incentive for the community to engage in the process. According to stakeholders, "The TSS process often helps municipalities begin to do long term planning around traffic issues." "The TSS gave municipalities a long-range plan to present to the community. It was a structure for promoting rail safety in North Carolina."

3.3 When to Use the TSS Process

The TSS process is best used under specific circumstances. These factors were common across communities. The TSS is only useful in situations where the community's opinions are integrated and where there is some openness to discussion and negotiation. The municipality needs to strive to be open-minded about all issues. "Safety is the major issue. Too often critics of the TSS are thinking only about mobility, not safety." There is a need to "look outside-the-box." If a municipality has already made up its mind opposing crossing consolidations, the TSS process alone is not likely to change the community's mind. The TSS process then becomes one of "educating and convincing the small number of undecided."

"The process works best if the community drives the process, has as much control as it can handle, understands the current crossing problems, and has a future local vision with bigger goals and innovative solutions. "When the town led the effort, DOT and (more importantly) the railroad were not perceived as forcing the process on the community."

"If the town does not initiate the process, the process needs another advocate or champion." Whether the champion was an individual administrator or a town council, the presence of such an influence greatly enhanced and abbreviated the TSS communication and decisionmaking process. Sometimes the champion(s) provided a compelling vision, sometimes the individual(s) sent out a newsletter and sometimes they worked one-on-one with community members. Whatever the role, the champion provided the leadership, set the pace, and created a momentum.

If the municipality approaches NCDOT with a few selected crossings for closure, NCDOT does not need another advocate and may not necessarily need to use the TSS process, although it would help in looking at the regional perspective. If the municipality does not initiate the process, and the process does not have an advocate, involve the community as much as possible. NCDOT needs to start with a consensus process. The process works best when community agreement is achieved.

NCDOT expects that the municipality will make a best effort to implement the study to improve safety. The community assumes a shared liability and will have a financial stake in the effort.

3.4 How the TSS Process Was Applied Across Communities

NCDOT Rail Division realized it was important not to start the initiative from scratch; it was better to build on the municipality's existing safety concerns and initiatives. Each TSS is highly customized. "One size does not fit all. Each community needs to look at options for its own situation." It also became clear that the process cannot be shortened – all steps are critical in managing the relationship with the community.

Aside from ongoing improvements to the TSS process and some customization for unique circumstances, the TSS process was applied relatively consistently in each of the recent communities. This is especially true of the ten municipalities assessed in this report. The South End Study included six of them together as a group.

The major differences among municipalities conducting the TSS were based on their size. Bigger cities had more staff available. Interfaces were generally with the city's engineering departments, who were already quite knowledgeable and committed to safety issues. The decisionmaking process was typically more laborious and NCDOT often had no contact with the high-level political officials. Cities were also often easier because they had many more crossings that could be targeted for trade-offs and closings negotiated.

By contrast, in smaller towns it was generally easier to gain the town's approval, although that decision was often swayed more by residents' sentiments than overall safety issues. NCDOT had to be more active and very proactive in these communities.

Some communities, especially in the South End Studies, were concerned with equity and thought small towns were less powerful when grouped with other larger towns. Some in the smaller communities said, "Each town should have looked at how closures would impact them on an individual basis. The town had issues that it believes should have been addressed before the other five communities were involved." These towns believed their issues were minimized in contrast to those of the larger municipalities.

3.5 TSS Best Practices: The Three C's to Success

The TSS process itself has undergone continual improvements. The process itself, as well as iterative changes to the process over time, were all aimed at creating a partnership with communities, creating a compelling case for safety, and reducing local resistance.

The NCDOT Division of Highways did not initially share its knowledge and its resources. The TSS process has dramatically changed into a more collaborative process. Over time, as NCDOT Rail Division used the process, it moved quickly along the learning curve. Through trial-and-error it found ways to work around obstacles and integrate "best practice" successes in what it later called, *The Three **C**'s to Success: Improved **C**oordination, More Effective **C**ommunication, Better Quality and **C**onsistency*.

3.5.1 Improved Coordination

Coordination and follow-through were critical in the establishment and maintenance of a personal relationship with the communities.

To improve the coordination in completing crossing closures, NCDOT Rail Division developed Crossing Closure Agreements. These agreements, entered into by NCDOT Rail Division and the operating railroad, provide closure responsibilities for removal of all warning devices, grass seeding, physical barricading, landscaping, and extension of drainage ditches in the railroad right-of-ways.

The ability of the railroad and NCDOT Rail Division to remove and landscape a crossing within a reasonable amount of time has reduced the negative impacts on the community.

3.5.2 More Effective Communication

NCDOT Rail Division introduced community involvement as a planned part of the process. NCDOT continually increased the baseline level of community involvement activities, especially by seeking the community's input. As time progressed, NCDOT proactively brought the community into the process earlier and earlier.

It was important to get information out to the community as early as possible. After the first three communities (Salisbury, Benson, and Stanley) continued to have problems, it was clear that introducing information earlier in the process would be helpful. Getting information to the community early provided facts and data up front; this reduced misinformation and rumors by approximately one-half.

NCDOT learned that it needed to help communities accept the realities of their situation, rather than telling them what they wanted to hear.

Newsletters were used to communicate recommendations. During the South End Study the crossing safety newsletter was developed. The newsletter includes, at a minimum, a description of all the public rail crossings involved, the evaluation criteria used, the proposed near-, mid-, and long-term recommendations and any other pertinent information. These newsletters were distributed to the North Carolina Board of Transportation member(s), Division of Highways (District Engineer, Division Engineer), municipal officials/staff, Operation Lifesaver (an educational railroad safety nonprofit organization) and local news media. Newsletters were also distributed to local churches, schools, post offices, grocery stores, and civic groups.

NCDOT is now better able to anticipate how communities will react, so it can address concerns more successfully.

3.5.3 Better Quality and Consistency

Improvements in the TSS process were intertwined with the increase in skills and experience of the staff and their ability to provide targeted statistics and rapidly respond to community questions.

Consistency was particularly an issue in small towns receiving financial assistance. The amounts of money and types of improvements each town received were widely known and equity was essential from town to town. NCDOT Rail Division managed this directly. For example, each municipality needed to meet the same threshold of closing two or three crossings to get a grade-separated crossing. If smaller towns did not have enough crossings to close, they could not argue with the numbers or think they were not being treated fairly. Mayors and city managers across municipalities were encouraged to talk to each other about the TSS process.

When coordination was possible, closings in several towns were undertaken at the same time, starting with the crossing with the highest traffic volume.

Initially, communities were reluctant to trust NCDOT and the railroads. Many communities shared a distrust of the railroads (which was seen as "big business" wanting to push its high-speed rail interests) and a history of conflicts with NCDOT Division of Highways. When NCDOT began partnering with an independent third party (engineering consultants), it added objectivity and credibility to the process.

From a legal and a safety standpoint, NCDOT carefully explained the rationale for closing crossings within its public meeting process. The public responded well when they saw that NCDOT had objective criteria for assessing safety and was not being indiscriminant.

Once it was decided to close a crossing, NCDOT and the railroad signed a crossing closure agreement. NCDOT then received $4,000 from the railroad for physical barricading, cleanup, and landscaping and quickly closed the crossing to reduce the municipality's liability. Based on the number of crossings being closed, the aesthetic treatment at closure sites is now better, with a better value for the money.

Success is most likely assured when there is a supportive municipality; when strong skills are resident in the municipality and when safety concerns already exist in the community. Positive and negative supporting quotes from interviews are in Appendix B.

3.6 Use of Incentives to Close Crossings

Proposals are more likely to be favorably received when the community sees that it benefits from the consolidation and closure of crossings. The mobility associated with multiple crossings, even if they are redundant, is not readily surrendered. Residents tend to become very attached to their driving habits. If a proposal to close a crossing is submitted without a financial incentive or other community improvement being offered as part of the package, then the perception often is that there is a private gain (the railroad's) at public expense (the closing of a street).

The closing of the crossing itself is often not viewed as benefiting the community, because the crossing may not be seen as a significant public safety hazard. Frequently, there is the perception that motorists who are involved in crossing incidents, either were not driving attentively or took an unacceptable risk on their own accord. In many cases, the perception is accurate.

A proposal to close one or more grade crossings is often favorably received if the effect of the overall project is viewed as a community improvement. That is, there is a tangible community benefit in addition to the enhancement of crossing safety. Therefore, incentives are a critical part of successful proposals.

Once municipalities, especially the smaller ones, saw that NCDOT would seriously assist them in obtaining financial incentives there was a great deal more trust. "The town was more willing to work with NCDOT Rail Division after it saw NCDOT Rail Division helping it with other non-rail safety initiatives." "This community received a great deal of attention and support from State government."

Offer the community improvements and/or financial incentives; however, make sure to present it in a way that the incentive is perceived as a reward and not a threat. One comment was that

"The process would work better with more timely enhancements. Make Phase 1 more than just closings. Don't give them all the 'carrots' at the end and just the 'stick' up front." A few in one town believe they were "held hostage" and pressured by the offering of an industrial track spur, rather than seeing it as an enticement. "If we don't go along with the closings we won't get [what we want]."

The railroads have more flexibility than the states in offering incentives. For example, railroads have provided parcels of railroad-owned land; they have reimbursed communities for the local share of improvements at adjacent crossings; and they have provided cash incentive payments for closing crossings. It is important to be creative and flexible in developing incentives.

Incentives that have been offered have included the following:

- Street improvements;
- A traffic control system to improve the efficiency of street traffic flow;
- A connector road;
- Grade separation;
- Crossing improvements;
- Cash settlements;
- Transfer of land parcels from the railroad to the town;
- An industrial track spur through the Rail Division's program for industrial rail development to provide shipping access between a manufacturing facility and freight railroad cargo lines;
- Receiving highway funds (Section 1103(c): Crossing Hazard Elimination Funds);
- Grants available to states for the next generation of trains along the Raleigh to Charlotte portion of the Southeast High Speed Rail Corridor; and
- Training for school and local public safety officials to give Operation Lifesaver presentations.

Indirect benefits to closings have included:

- Opening up new property;
- Closing access to a site used for drug trafficking and other crime;
- Community noise reduction from railroad operations because trains blow their horns less often; and
- Helping a municipality with other initiatives.

4. RESULTS

In this section, the effect on communities using the TSS process compared to those not using it is assessed.

4.1 Success Rate

At the beginning of the process, crossing closures were sporadic (See Table 3 for NCDOT Rail Division assessments).

Table 3: Success Rate Using Original TSS Process

Variables	Closures Attempted before Introduction of TSS Process	Municipalities Using the TSS Process
Descriptions of Closings	Difficult; usually fewer sites were closed than recommended Closings were only successful in situations where there were external motivating factors for the town	Total crossings closed approximated the potential number recommended. Closings were more reliable.
Accuracy of the Media Reports	50%	90%
Resistance Rate: Towns showing resistance as percent of total sites	60%	80%
Success Rate: Crossings closed as percent of closures proposed	40%	60%

This is despite the fact that NCDOT Rail Division chose municipalities carefully, starting with the easiest ones. It is not unusual for communities to initially resist a process like TSS. NCDOT began by selecting communities that were the most cooperative. It started with the easiest near-term closures, ones that were clearly redundant crossings, and not part of the major traffic flow or in central business or residential areas. Although it is not possible to quantify this data, over time the municipalities selected later were seen as more and more challenging. There was initial resistance shown in only 60 percent of the studies completed before the TSS process was instituted, as compared to 80 percent of the communities using the TSS process that showed at least initial resistance. Clearly, the TSS process helped reduce community resistance and increased the likelihood of achieving successful crossing closures for those communities assessed in this report.

In the South End TSS, only one municipality out of six did not have a recommended crossing closure. If we break down the ten TSS communities studied in this report based on the maturity of the TSS process at the time it was used, the results are more dramatic (see Table 4 for

comparisons over time). The three communities using the initial process closed 33 percent of all potential crossings with 33 percent (one in three) communities showing initial resistance. For the seven communities using a more mature process, 71 percent (five of seven) closed all potential closings even though all showed resistance.

Table 4: Success Rate Using Improved TSS Process

Variables	Closures Attempted before Introduction of TSS Process	First 3 Municipalities Prototyping the TSS Process	Last 7 Municipalities Using the TSS Process
Resistance Rate: Percent of towns showing resistance as percent of total towns	60%	33%	100%
Success Rate: Percent of crossings closed as percent of closures proposed	40%	33%	71%

At the beginning of the studies, approximately 50 percent of news stories the local media discussed were inaccurate. NCDOT has now adopted a proactive approach. Project engineers are responsible for developing local news media contacts. They approach the local media with the facts before rumors begin and citizens become irate. Currently 90 percent of the local media call the respective project engineer to confirm the accuracy of a news story before publication. A comparison of the newspaper reports and editorials over time suggest that they have become less alarmist and more factual, with a new focus on "Trading Convenience for Safety."

4.2 Effect of Use of TSS on Communities

There were a variety of qualitative differences between communities using and not using the TSS process. Table 5 presents detailed results by community.

Table 5: Effect of Use of TSS by Community

SITE		MEASURES OF SUCCESS			SUCCESS FACTORS			FAILURE FACTORS	
Location in Chronological Order	**Date of Closure**	**NCDOT Rail Score ***	**# of Crossing Closures**	**Potential # of Crossing Closures**	**Who initiated study**	**TSS Process used**	**Other Incentives -- Direct and indirect**	**Town resisted to TSS Process**	**TSS would have helped**
Selma	3/93		3	3	NCDOT	No	Used cash incentives	No	No
Mount Olive	1995		2	More	NCDOT	No	Pave parallel connector streets, concrete crossings	Yes	Yes
Garner	1995		1	More	NCDOT	No	Railroad allowed them to wire for Christmas lights	Yes	Yes
Thomasville	1995		4	6		No	Former mayor killed at crossing; 2 grade separations were incentive	No	No
Dunn	1996		3	More	NCDOT	No	Promise of eventual grade separation, now under PE, concrete crossing surface at main crossing (US-421)	Yes	Yes
Salisbury	6/94	7.5 effort; 10 for outcome	10	10 or 11	Town	Yes	Incentives not really needed; mayor was champion & town ran process. Grade separations, street improvements, new connector road improved traffic flow, and fewer train horns. There had been several fatalities.	No	NA
Benson	9/96	7	2	3	NCDOT	Yes	Incentives not really needed. CSX offered to rebuild existing crossings to improve the downtown area. NCDOT Rail Division paved dirt connector streets	No	NA
Stanley	1996	4	1	2-3	NCDOT	Yes	Grade separations would have helped, NCDOT offered variety of signal and roadway safety improvements.	Yes	**
South End TSS China Grove	6/97	9	3	4	MPO	Yes	Mayor facilitated process; 1103C money, federal grants; road realigned	Initially yes	NA
Concord	6/97	8	2-3	3	MPO	Yes	4-quadrant gate, concrete crossing surface; Crossing Safety state funds. Closing reduced drug traffic and crime.	Initially yes	NA
Landis	8/97	8	2	2	MPO	Yes	Evaluated overpass, realigned crossing, helped get money for industrial, concrete crossing surface at main crossing	Initially yes	NA
Kannapolis	8/97	9.5	3	3	MPO	Yes	Evaluated overpass, reviewed relocated spur crossing – did 4 quadrant gate instead	Yes	NA
Harrisburg	8/97	10	1	1	MPO	Yes	Connector road (later bought out people instead), widened state route, newsletter	Initially yes	NA
Charlotte	1/01	8.5	2	2	MPO	Yes	Left turn lanes, traffic signal, widen a crossing	Initially yes	NA
Wake Forest	11/99	8.5	3	3	Town	Yes	Rogers Rd. Extension, more durable crossing surface, developer built new crossing	Yes	NA

* *A score of 10 is very good/ideal; a score of 0 is very poor.*

** *A more developed TSS process might have helped.*

Table 6 summarizes this information.

Table 6: Comparison of Closures Using or Not Using TSS Process

VARIABLES	CLOSURES ATTEMPTED BEFORE INTRODUCTION OF TSS PROCESS	MUNICIPALITIES USING THE TSS PROCESS
Evaluation of Crossings	Crossings were evaluated one at a time within a municipality Each tended to be a struggle	Crossings were assessed conceptually within a municipality Municipality helps prioritize closings
Availability of Data	Limited and of poor quality	More focused and useful
Community Involvement Aspects	Not organized or systematic Hard to get players to "come to the table"	More planned and consistent Community more curious and motivated
Community Decision Focus	Politics and mobility	Safety
NCDOT Rail Division Goal	Get municipality's agreement	Get best effort from municipality

Before 1995, crossings were evaluated one at a time within a municipality, and each evaluation tended to be a struggle. Since the introduction of the new process, multiple crossings are assessed conceptually within a municipality. Now, decisions are more complex and rational as they take into account the larger issues and traffic patterns. The municipality has key input into the prioritization of crossings. The TSS looks at the traffic picture in a comprehensive manner and provides better data to the municipalities, such as current traffic counts and increases in train frequencies.

Initially it was hard for all stakeholders to meet with NCDOT Rail Division. Having different stakeholders suggests that different functional areas of the municipality need to come together to make decisions. By definition, each brings different perspectives and competing goals. Conflict is inevitable. However, the more conflict is expected and managed, the more successful the process and outcome.

As it became clear that there was much antagonism directed at the railroads, NCDOT Rail Division found it useful to enter the communities alone. They would bring the railroads into the process after the relationship with the community had been solidified.

Before the introduction of the TSS, the process for the crossing consolidation was not organized or systematic. It was often difficult to get players to "come to the table" and meet with NCDOT Rail Division. By their own account, NCDOT Rail Division did not have the skills or tools to make it happen.

With the added publicity and an organized, planned, and consistent TSS process, communities became more trusting and curious about the process, and motivated to engage in it. Since the TSS approach has yielded results, there is now a list of municipalities willing to work with

NCDOT Rail Division to evaluate crossing safety in their community. NCDOT Rail Division now actually has a backlog of areas to implement the TSS approach.

As compared to the beginning of the studies, more residents now attend NCDOT Rail Division's public involvement meetings as well. There also has been a great decrease in the negative feedback NCDOT Rail Division receives. Feedback from municipalities and residents now is, "you did a good job." They do not hear bad feedback.

Before 1995 municipal administrators tended to be easily swayed by political pressures of their constituents — the residents' concerns for mobility and their wish to avoid making changes in their driving habits. The TSS structure was based on data as well as the fact that decisions were made public from community to community. This made it easier to have conceptualized goals and supportive statements to keep discussions on a higher level and focus on safety. It also gave municipal administrators a value to unite behind and champion.

Initially, NCDOT Rail Division's goal focused on the concrete, singular goal of "Get the municipality's agreement," which was somewhat confrontational. With the TSS process, the broader, more abstract goal of "Get the best possible effort from the municipality," NCDOT Rail Division had a harder task. Yet this created a more collaborative effort with stakeholders operating as partners. The final outcome was less clear up front, but enabled more creative solutions and results that everyone could support.

4.3 General Assessment of Process

Parts of the process that went well in communities are best practices that should be included in future traffic separation studies. Steps and activities that could have worked better in each community are weaknesses in the process that can be used to improve future traffic separation studies. Some issues are beyond NCDOT Rail Division's control, such as the railroad's delays in making improvements at sites.

More supporting interview quotes for this section are found in Appendix B.

NCDOT Rail Division assessed the process. For each of the ten communities, NCDOT Rail Division staff were asked to rate the overall process on a scale from 0 to 10, with 0 being very poor and 10 being very good or ideal.

NCDOT Rail Division gave 9 of the 10 communities ratings that ranged from 7 to 10. Positive ratings by NCDOT Rail Division were based on sample comments, such as: "We closed all crossings proposed," or "Even if someone did not want a crossing closed, they felt everything worked out." Negative ratings were based on comments such as: "The project took up too much staff time and financial resources compared to the number of closings that resulted."

Most stakeholders thought the process was good and worked well, except for when they were not prepared for the time required for a consensus process. The towns and other stakeholders almost always gave positive, but slightly lower ratings than NCDOT Rail Division. These were often based on comments, such as: "The process worked well. It was the best way to handle it," or "Good package of recommendations."

4.4 Measures of TSS Success

There were several TSS process variables that influenced its success. They included: the level of community consensus on the decisions, the quality of the NCDOT Rail Division partnership with the community, the perceived openness of the process to community input, the success of community meetings, the level of education received by partners, the communication process, attention to technical areas, issues related to resources, funding, and timing.

In an ideal process, all parties are heard and consensus is achieved among all parties, although "You always have some opposition," according to one city representative. Sometimes, "the process was more contentious and was longer than it needed to be. There was conflict between the council and the mayor." The better the partnership the better the success ratings. For example, according to one mayor, "It was a real collaborative effort – a team approach." "NCDOT Rail Division and the railroad showed that they were working well together."

The more people who perceive that their input has been heard, the better they will assess the process. Suggestions included, "Bring the community into the process earlier. The residents thought the decision was already made when they were brought in. Also, they had a lot of good ideas that had not been considered." "Most people do not care about closings. The only residents who speak out about closings are the ones opposed to them." "The process was good and I felt listened to." Some issues raised were more systemic criticisms of municipal government than of the TSS.

People need to feel free to speak at meetings, without any one party dominating the discussion. Key suggestions included: "The person who talks to the community residents needs charisma, a good relationship with the community, and needs to be above board in all their communications," and "structure community meetings to allow time to handle the psychological impact of the recommendations on citizens."

It is unlikely that a process can include too much education. According to one city manager, "There was much public concern about mobility, but once they got used to the new driving patterns they realized it wasn't so bad. The challenge is the educational factor – how to change people's perceptions. For that you need an aggressive educational plan that takes into account the long learning curve."

Most thought, "Presentations were well thought out, well-prepared and well-presented." Especially for the first few communities NCDOT Rail Division thought, "We could have better explained what we were doing and "why" up front, before proposing a solution."

There also cannot be too much communicating of information. In most cases, "NCDOT Rail Division was aggressive in providing information and notifying residents." "Continually communicate and keep the community involved."

The state and railroad need to be aware of local community goals. "DOT does not know the local concerns." "With the TSS, the state government is willing to listen to the thoughts of the community."

In hindsight, some recommendations fell short, especially thinking ahead about pedestrian access to cross the tracks.

NCDOT Rail Division's role in helping most municipalities gain resources brought tremendous allegiance. "DOT was a strong funding partner in the implementation phase." "DOT was able to get the town in contact with the railroad and obtain resources for us. It had more clout than the town did."

In some communities questions remain. Some communities were concerned that they never received the final word regarding who would pay for improvements. "The railroads and the Federal Highway Administration never agreed on who would provide the funding." "Towns were told that they would have to "live with it" when they asked for a promise that the railroad would pay, or requested options or help in mitigating the decisions. That issue was the deal breaker in the negotiations with many towns, especially the smaller ones with no funding. In the future, the process should include funding strategies."

Timing was an issue in some communities. In at least one case, "the delays [in the process] caused problems with the new people moving into neighborhoods who did not know about the study. They had not been part of the process and then had to be brought up to speed and on board."

There was a great deal of frustration with issues over which NCDOT Rail Division had no control. For example, "construction is taking forever, but I know it is not the State's fault. Finishing that overpass will improve credibility."

NCDOT Rail Division's personal connections and partnership skills were valued. "DOT did a good job -- very supportive and attentive -- provided lots of assistance. Kept us updated and informed." "DOT provided moral support when the town was worn out." The NCDOT Rail Division role is that of a change agent. It has to be a real "people person." In cases where there is extensive internal conflict within a community, an outside facilitator might be helpful.

The independent outside consultants were seen as "bringing real objectivity to the process." The consulting engineer was perceived as "a local, who knew the politics and was competent and likeable."

5. CONCLUSIONS

The TSS process has been well thought out, improved, and tested over time. With continued funding and the possible addition of occasional mediation services for municipalities already in conflict, it continues to serve North Carolina well. It would also be a good model for other states and other transportation modes.

5.1 Best Practices

Table 7: TSS Process

Phases
1. Preliminary Planning Phase
1. Municipal Planning Organization (MPO) requests State DOT Rail Division conduct a TSS.
2. State DOT Rail Division and Program Development Branch develop an agreement between the Department and municipality for conducting the study. Typically, MPOs are points of contact in smaller municipalities while larger cities have their own technical staff.
3. State DOT Rail Division and municipality meet to discuss scope of work, schedule, and deliverables.
4. State DOT Rail Division selects engineering consultant.
5. State DOT Rail Division and municipality review scope of work, schedule. And deliverable, with consultant, and request submittal of cost estimate.
6. Negotiations are held between State DOT Rail Division and consultant to finalize cost estimate.
2. Study Phase
1. State DOT Rail Division provides notice to proceed to engineering consultant.
2. Engineering consultant begins crossing evaluation and collecting traffic data for the public rail crossings in the study area. Evaluation criteria include: accident history, present and future vehicle traffic, train traffic truck traffic/truck route, hazardous materials, type of roadway (thoroughfare, collector, local access, etc.), type of property being served (residential, industrial, commercial), school bus route, emergency route, type of warning device present, whether it is a redundant crossing, potential for grade separation (high, medium low), feasibility of implementing roadway improvements (high, medium, low), economic impact in crossing (high, medium, low).
3. Draft recommendations are submitted to State DOT Rail Division for initial review and comment. Recommendations include near-term (0-2 years), mid-term (2-5 years), and long-term (5-10 years) improvements.

4. State DOT Rail Division and consultant coordinate recommendations with Transportation Improvement Program projects: roadway, bridge, and "Sealed Corridor" improvements.
5. Draft recommendations presented to State DOT Rail Division Engineer, State Board of Transportation member (s), and municipal staff.
6. Consultant incorporates comments into draft recommendations.
7. State DOT Rail Division develops and distributes crossing safety newsletters identifying and prioritizing proposed safety recommendations.
8. State DOT Rail Division and consultant hold crossing safety workshops and/or public hearings to present proposed recommendations.
9. State DOT Rail Division and consultant present any modified recommendations to municipal staff.
10. State DOT Rail Division requests meeting with local governing bodies to ask for approval of study recommendations.
11. State DOT Rail Division presents TSS to State Board of Transportation in summary form.
3. Implementation Phase
1. State Rail Division, State Board of Transportation members(s) and Division Engineers(s) determine funding sources for near-term improvements (typically, 90% federal with a 10% local match). Municipalities are typically responsible for right-of-way acquisition and utility relocations. Financial assistance and in-kind services from the railroads have proven to be an additional resource.
2. Receive concurrence for crossing closure(s) on the State-Maintained Highway System from the Division of Highway Chief Engineer for Operations, as per state policy.
3. State DOT Program Development Branch sets up Preliminary Engineering funds for near-term projects. It discusses programming and feasibility studies for mid- and long-term projects and develops project municipal agreements and railroad crossing closure agreements using Enhancement and Highway contracts Unit planning documents if a Federal Aid project.
4. State Rail Division Planning Branch determines the approach to completing environmental documents if a Federal Aid project.
5. State DOT Rail. Division Engineers determine the approach to design and construction of projects and make the formal notification if crossing closure is part of a Division of Highway project.
6. State DOT Rail Division coordinates design/construction of traffic control devices or crossing signalization improvement projects identified in TSS.
7. State DOT Rail Division submits Plans, Specifications, and Estimates (PS&E) package to FHWA for construction authorization if federal funds are involved.
8. State DOT Rail Division requests right-of-way (if necessary).
9. State DOT Rail Division coordinates crossing closure with railroad(s) and Division of Highway staff.
10. State DOT Rail Division reimburses the municipality for any work performed pertaining to crossing closure activities.
11. State DOT Rail Division District Engineer to complete Secondary Road Abandonment Report and submit to

State DOT for approval.[2]
12. State DOT Rail Division Secondary Road Office posts notification of long term crossing closures on state highway system.

- Use independent consultants.
- The better the process and the more skilled the staff and consultants involved, the better the results. As states move on to increasingly difficult crossings to close, this will become even more the case. Continue to invest in the hiring and training of professionals with strong people skills.
- The more proactive the effort the better. Involve the community early and educate them about safety.
- Seek out and support champions and change agents within the community.
- In any public process there is always resistance. It is important to allow all parties to be heard and not silence the opposition.
- Attempt to build consensus around high-level community concerns and financial incentives to the municipality. Let the community prioritize their needs and concerns.
- Customize the process for each community. Open communication and consensus take time; do not attempt short cuts.
- Use this document and other success stories to gain cooperation from other communities in conducting TSSs.
- Work with railroads more directly to assist them to improve their image and gain cooperation in the TSS process.

5.2 Future Research that Would Improve the TSS Process Further

- Collect best practices to determine how to improve the implementation/construction phase of the TSS process.
- Study other transportation modes and other industries to learn how to address the competition among communities in regional efforts such as the South End Studies.
- Learn how to help municipalities become better at overall planning and address internal conflicts among members.
- Use this study as the new baseline for future TSS efforts.

[2] Secondary Road Abandonment Report is a NCDOT Rail Division of Highway checklist and sign-off form for closing secondary roads

APPENDIX A
INTERVIEW QUESTIONS

Interview Questions

1. What was the Traffic Separation Study process as you remember it?
2. What are the critical success factors for you for a project like this?
3. What was the importance of each of the following factors for this project?
   - The process used.
   - The experience of the staff.
   - Being able to provide statistics and rapidly respond to community questions.
   - Providing financial incentives to the town to close crossings.
4. How well did NCDOT Rail Division do in each of these areas?
   - How would you rate the overall process (0 to 10 with 0 being poor and 10 being ideal)? Why?
   - Was the process fair and open to your input?
   - What parts of the process went well?
   - What steps or activities could have worked better?
   - How would you rate the experience of the NCDOT Rail Division staff?
   - How well did NCDOT Rail Division do providing statistics, and rapidly responding to community questions?
   - How would you rate the size of the financial incentive to the town to close the crossing?
   - Did your opinion about the decision on how to address the traffic separation problem change over the life of the project?
5. What would you say to other towns and cities that are about to embark on a traffic separation study?

APPENDIX B
SUPPORTING QUOTATIONS FROM INTERVIEWS

General Assessment of Process

Throughout the remainder of this document, strengths of the process are presented (shown as +) so they can be expanded upon in future studies. They reflect parts of the process that went well at each site. These are best practices across sites that should be included in future traffic separation studies.

Quotes from interviews (shown as -) reflect issues, steps, and activities that could have worked better at each site. These are weaknesses in the process, identified in this report are changes that can be made to improve future traffic separation studies.

Stakeholders' Assessment

Process

+ "Great process." "The process was satisfactory -- there were no problems"; "It was a smooth process – there were no complaints"; "The process worked well. It was the best way to handle it," according to the town.

+ "The approach was good." "There was little negative feedback on the process or closings."

+ "The Council was happy. We wanted to close unsafe crossings. We supported the railroad's attitude and the cost sharing: they saved us money on equipment and maintenance."

– "It was a cumbersome process," according to a town representative.

– "The process was long and bureaucratic."

Outcome

+ "Good package of recommendations," according to the city. "I liked having short, medium, and long-term recommendations."

+ "Some of the things the community worried about never happened," according to the city.

– A community activist, who was not able to get his view accepted, remains extremely frustrated with the outcomes. He feels that closing the crossings made abutters feel cut off from the town, to which they had easy access previously.

– "There was a rush to close crossings, with promises of other things to follow, and much of that never happened" (traffic separations).

Community Consensus on Decisions

+ "Overwhelming support. You always have some opposition," according to the city.
+ "Different opinions were handled well."
+ "All sides were weighed."
– "The process was more contentious and was longer than it needed to be. There was conflict between the Council and the Mayor."
– It was hard to know how to involve out-of-towners in the process.

Quality of the Partnership

+ According to NCDOT Rail Division, "this was the first time NCDOT worked in true partnership with a municipality and the railroad." This became their model for future working relationships.
+ According to the Mayor, "It was a real collaborative effort – a team approach." NCDOT Rail Division teamed with the town and learned a lot from them.
+ "NCDOT worked well with the Planning Department and the landowners."
+ "NCDOT and railroad crews were well-coordinated."
+ "NCDOT and the railroad showed that they were working well together."
+ "A good relationship existed among the professionals."

Openness of Process to Community Input

+ "Everyone had their say." "Everyone was heard."
+ "The process was good and I felt listened to."
+ Good level of community input. Stakeholders, like drivers of emergency vehicles, appreciated being able to complete a questionnaire and NOT have to take time out from their work to attend meetings.
+ "Everyone had input into the process." "Everyone was listened to." "Everyone was involved early – before the evaluation began."
+ "NCDOT listened well to the input."
+ "Most people do not care about closings. The only residents who speak out about closings are the ones opposed to them."

- "Everyone was nice and they let us talk, but may not have listened."
- "Adequate involvement -- some had more input than others."
- "There was limited participation from citizens" (by their choice).
- "Get more public input up front."
- "Bring the community into the process earlier." The residents thought the decision was already made when they were brought in. Also, they had a lot of good ideas that had not been considered.
- "It would have helped to meet more with the full Council."
- The Public Works Department would have liked to be involved earlier and more thoroughly in the process.
- According to Fire and Rescue, "It was a typical process. Because we were a volunteer fire department, we are always the last to know. As in all issues, communications with us were poor. We had little input. We never get dates of closings with enough (lead) time to plan."
- "In hindsight, it would have helped to have a public meeting early on."

Community Meetings

+ "People were generally amiable and the meetings went well."
+ "NCDOT was helpful in public meetings and in responding to questions."
+ The person who talks to the community residents needs charisma, a good relationship with the community and needs to be above board in all their communications.
+ The municipality may prefer to sell the project themselves and asks that DOT not attend some public meetings.
+ "Structure community meetings to allow time to handle the psychological impact of the recommendations on citizens."
- "At community meetings, do not overwhelm the community with 8 to 12 professionals when 3 are sufficient" (one host to present the big picture, one technical expert, and one person as recorder).

Education of Partners

+ "NCDOT, the railroad, and the federal government did an effective job in laying out the issues."

+ "Presentations were well thought out, well-prepared and well-presented." "Presentations were good"; "Engineering reports were good." "Good presentations and good hearings." "The study was done well and presented well."

+ "Good information was presented on safety." "High quality publications."

+ "The charts and maps really are helpful in simplifying the presentation of accident statistics."

– "The presentations to the Council were more detailed than they needed to be, especially given the limited resistance to the closings."

– "I wish safety were more important to people."

– "The public was not informed enough in the beginning. People never understood that railroad crossings are dangerous."

– Town officials report "Operation Lifesaver could have done more to interest the community in safety."

– The Emergency Medical Services suggested, "Give the community lots of statistics to address the safety issue. Citizens Against Closings have concerns about getting to the other side of tracks in an emergency. There are lots of railway accidents and train wrecks. People are always trying to beat the train. The risk of an emergency vehicle carrying a resident's family member to a hospital and being substantially delayed due to a crossing being closed is tiny compared to the risk of being killed by a train."

– "We could have better explained what we were doing and "why" up front, before proposing a solution."

– The community involvement part could have been more extensive; there was limited education of citizens. According to the City Manager, "There was much public concern about convenience, but once they got used to the new driving patterns they realized it wasn't so bad. The challenge is the educational factor – how to change people's perceptions. For that you need an aggressive educational plan that takes into account the long learning curve."

– "It was a long learning curve on everyone's part."

– The railroad needs to become more aware of community standards. "The railroad is the only agency that cares less about attractiveness than DOT." The task is not complete until the site is cleared of debris and restored.

– It might have been useful to describe the decisionmaking process up front, including the criteria for making decisions and the authority of each stakeholder group to make and veto decisions.

- – It might have been helpful to have some commonly agreed on definitions up front of terms such as "major crossing."
- – Temporary closings to "see what the closing might be like" do not work. This is partly because the residents have not yet been sufficiently educated on the safety issues. Also, there is always the expectation that they will open again.
- – "I don't understand the role of the railroad."
- – "I don't understand the roles or the money trail between DOT and DOT Rail."

Communication

- + "NCDOT was aggressive in providing information and notifying residents."
- + "Continually communicate and keep the community involved." "We were kept well-informed – by letter, contact or email."
- + "Although the law (unlike rezoning situations) does not require the notification of crossings considered for closings to impacted businesses and residents, this might be a useful activity."
- + When the municipality takes over the communication process, it may continue to reflect institutional problems (e.g., communication hierarchy).
- + The state and railroad need to be aware of local community goals. "DOT does not know the local concerns." "With the TSS, the state government is willing to listen to the thoughts of the community."
- + "Always make sure professionals (emergency vehicles, bus drivers) have plenty of lead-time to prepare for meetings and closings."
- – Many in his community had trouble understanding the decisions that were being made and that communications should have taken place by letter, not in the newspaper, that many never read."
- – NCDOT Rail Division thought they could have been a little more proactive by writing letters to the newspaper.
- – "Notification of the public is hard. We put notices in the paper, sent information out in water bills and had newsletters, but maybe we should have also sent a direct mailer out to all the people involved as well. We should inundate people."

Technical Issues

- – "Little attention was given to pedestrian access. When a crossing is closed, if no legitimate crossing is provided, pedestrians will still walk across the tracks."
- – "We have still not resolved with the railroad what to do about bikes and pedestrians crossing the tracks. It has been three to four years. The railroad is opposed to a walk area. But people are going to cross."
- – "In hindsight, we should have widened the roads more."

Resources/Funding

- + "NCDOT really came through." "Real creative on collaborative funding." "DOT was a strong funding partner in the implementation phase."
- + "The city administered the construction. DOT reimbursed them."
- + "DOT was able to get the town in contact with the railroad and obtain resources for us. It had more clout than the town did."
- – "It would have helped to have a better funding mechanism state-wide."
- – "There was much concern about when grade separations would be built and who would pay for what."
- – Communities were concerned that they never received the final word regarding who would pay for improvements. The railroads and the Federal Highway Administration never agreed on who would provide the funding. "Towns were told that they would have to "live with it" when they asked for a promise that the railroad would pay, or requested options or help in mitigating the decisions. That issue was the deal breaker in the negotiations with many towns, especially the smaller ones with no funding. In the future, the process should include funding strategies."

Timing

- + "The overall process was generally thorough and well-paced. "
- – "It took longer than we planned." "The implementation took six years and was bogged down by the political nature of government."
- – "The only negative was the amount of time it took for the railroad to finish its improvements to close the second crossing, which it said was a scheduling issue. That was very disappointing. It should have been completed within a couple of months."

– "Citizens are now unhappy with the level of commitment to Phase 3 (construction of separated grade crossings), which seems weak and slow moving."

– "Construction is taking forever, but I know it is not the State's fault. Finishing that overpass will improve credibility."

– "The delays caused problems with the new people moving into neighborhoods who did not know about the study. They had not been part of the process and then had to be brought up to speed and on board."

– "I wish everything (all closings and construction) could have been done at once."

NCDOT Rail Division Performance

+ "NCDOT was involved from the beginning."

+ "The meeting was not fun, but it was good to have Mike Shumsky (Engineer, NCDOT Rail Division) there to listen."

+ "DOT provided moral support when the town was worn out."

+ "State role was positive"; "Michael Shumsky did a good job and stayed on top of everything he could control. He maintained weekly contact."

+ "Shumsky was tuned in to all the issues," according to a town representative."

+ "DOT did a good job." "Michael Shumsky did an excellent job. Very supportive and attentive. Provided lots of assistance. Kept us updated and informed. He continues to be involved."

+ "NCDOT is good to work with"; "NCDOT was always available to answer questions and was helpful." "Both NCDOT and the railroad were very helpful. They were available to the town and answered questions."

+ The NCDOT Rail Division role is that of a change agent. It has to be a real "people person."

– "NCDOT had good technical experience, but an experienced, trained facilitator or mediator would have been helpful."

– "Mike provided helpful information, but he had no power."

Consulting Engineer

+ The consulting engineer was perceived as "a local, who knew the politics and was competent and likeable."
+ The outside consultants were seen as "bringing real objectivity to the process."
+ "He was really good with public involvement. He listened well and communicated well," according to the city.
+ "They did an excellent job; they were good technically," according to the city.
– There was a perception that they were inflexible and as a result there were many criticisms of the firm.