TRAFFIC SEPARATION STUDY

FOR THE

TOWN OF HILLSBOROUGH

October 2014

Prepared by

ICA Engineering, Inc.

Prepared for the

North Carolina Department of Transportation

Rail Division

Engineering Coordination and Safety Branch

ICA Engineering

North Carolina Department of Transportation RAIL DIVISION

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The North Carolina Department of Transportation (NCDOT), the Town of Hillsborough, the North Carolina Railroad Company (NCRR), and the Norfolk Southern Railway (NS), have partnered to conduct a Traffic Separation Study (TSS) of rail crossings along the NCRR/NS corridor in Hillsborough. The purpose of the study is to determine how to separate rail and highway traffic and enhance the safety and mobility at railroad crossings in Hillsborough. The following crossings are being studied in detail:

- West Hill Avenue South (SR 1161)
- South Bellvue Avenue
- Dimmocks Mill Road (SR 1144) (grade-separated)

The Piedmont Drive/Faribault Lane (SR 1149) crossing was considered but is not proposed for improvement in this study. The Piedmont Drive/Faribault Lane (SR 1149) crossing has relatively low traffic volumes, adequate warning devices at the crossing, and accesses one industry. The Private Crossing at the Partin Property has been previously evaluated during studies for the Hillsborough Rail Station and NCDOT's Private Crossing Safety Initiative (PCSI). This TSS concurs with the recommendations for alternative access to the Partin property utilizing the roadway network proposed as part of the Hillsborough Rail Station.

The crossings that were considered are listed in Table ES.1 below and depicted on Figure 1.

Table ES.1 Study Crossings

Crossing Reference Number	Crossing Number	Street Name	Milepost	Type
1	735 151W	West Hill Avenue South (SR 1161)	40.36	At-grade
2	735 152D	South Bellvue Avenue	40.61	At-grade
3	735 154S	Dimmocks Mill Road (SR 1144)	40.79	Grade-separated
4	735 157M	Piedmont Drive/Faribault Lane (SR 1149) *No improvements proposed*	41.20	At-grade
5	735 160V	Partin Property (formerly Terrells Trailer Park) *Studied with the proposed Hillsborough Rail Station and the NCDOT Private Crossing Safety Initiative (PCSI)*	41.82	At-grade

Safety and Mobility Issues

Safety and mobility issues were considered at each crossing based on roadway geometry, existing warning devices, and behavior of users across the tracks. The following conditions were observed:

- West Hill Avenue South – This is a paved, humped crossing located between closely spaced intersections on each side of the tracks and has limited sight distance. The warning devices at the crossing include signs, flashing lights, and gates.
- South Bellvue Avenue – This is a paved crossing located between closely spaced intersections on each side of the tracks. It is across from the truck entrance to a distribution center and also has limited sight distance. The warning devices at the crossing include signs, flashing lights, and gates.
- Dimmocks Mill Road – The railroad bridge over the roadway has substandard horizontal and vertical clearance. Roadway curves and the close proximity to an intersection on each side of the bridge limit the sight distance.
- Piedmont Drive/ Faribault Lane – This is a paved, humped crossing with low traffic volumes that serves as an employee and vendor entrance to a mineral mining operation. The warning devices at the crossing include signs, flashing lights, and gates.
- Partin Property – This is an unpaved, humped crossing with substandard crossing geometry and limited sight distance. It is an entrance to a mobile home community. The warning devices at the crossing include signs, flashing lights, and gates.

Crash Data

Crash data from NCDOT and the Federal Railroad Administration (FRA) was analyzed for the 13-year period from 2000 to 2012. Three crashes involving train/vehicle collisions were reported at the at-grade crossings in the study area, as summarized in Table ES.2. The collisions occurred when vehicles were stopped on the tracks.

Table ES.2 - Train-Related Crashes at Study Area Crossings (2000 – 2013)

Crossing Number.	Crossing Location	Motor Vehicle Incidents		
		PDO*	Injury	Fatality
735 151W	West Hill Avenue South (SR 1161)	1	0	0
735 152D	South Bellvue Avenue	1	0	0
735 157M	Piedmont Drive/ Faribault Lane (SR 1149)	0	0	0
735 160V	Partin Property	1	0	0
Total		**3**	**0**	**0**

*PDO – Property Damage Only

Capacity Analysis

Capacity analyses were performed to determine the operating characteristics of the adjacent road network and the impacts of proposed improvements considered at these crossings. All adjacent intersections studied adjacent to the at-grade crossings currently operate at acceptable levels of service and till continue to do so under future build and no-build scenarios. Therefore, it is anticipated that the crossing improvements at West Hill Avenue South, South Bellvue Avenue, and Dimmocks Mill Road will have little impact on the traffic operations in the area, and no additional roadway improvements are needed to mitigate traffic impacts.

Public Involvement

A public involvement program was established as part of this study. It consisted of:

- Funding partner meetings
- Stakeholder committee meetings
- A public meeting
- Mailings and press releases
- A public hearing

Stakeholders who met to provide input during the course of the study included:

- Town of Hillsborough, Town Manager
- Town of Hillsborough Planning Department
- Town of Hillsborough Police Department
- Orange County Rural Fire Department
- Orange County Emergency Services
- Orange County Schools Transportation Department
- Orange County Planning Department
- Piedmont Minerals Company
- North Carolina Railroad Company
- Norfolk Southern Railway
- NCDOT Rail Division
- NCDOT Division 7
- Interested Citizens

Recommendations

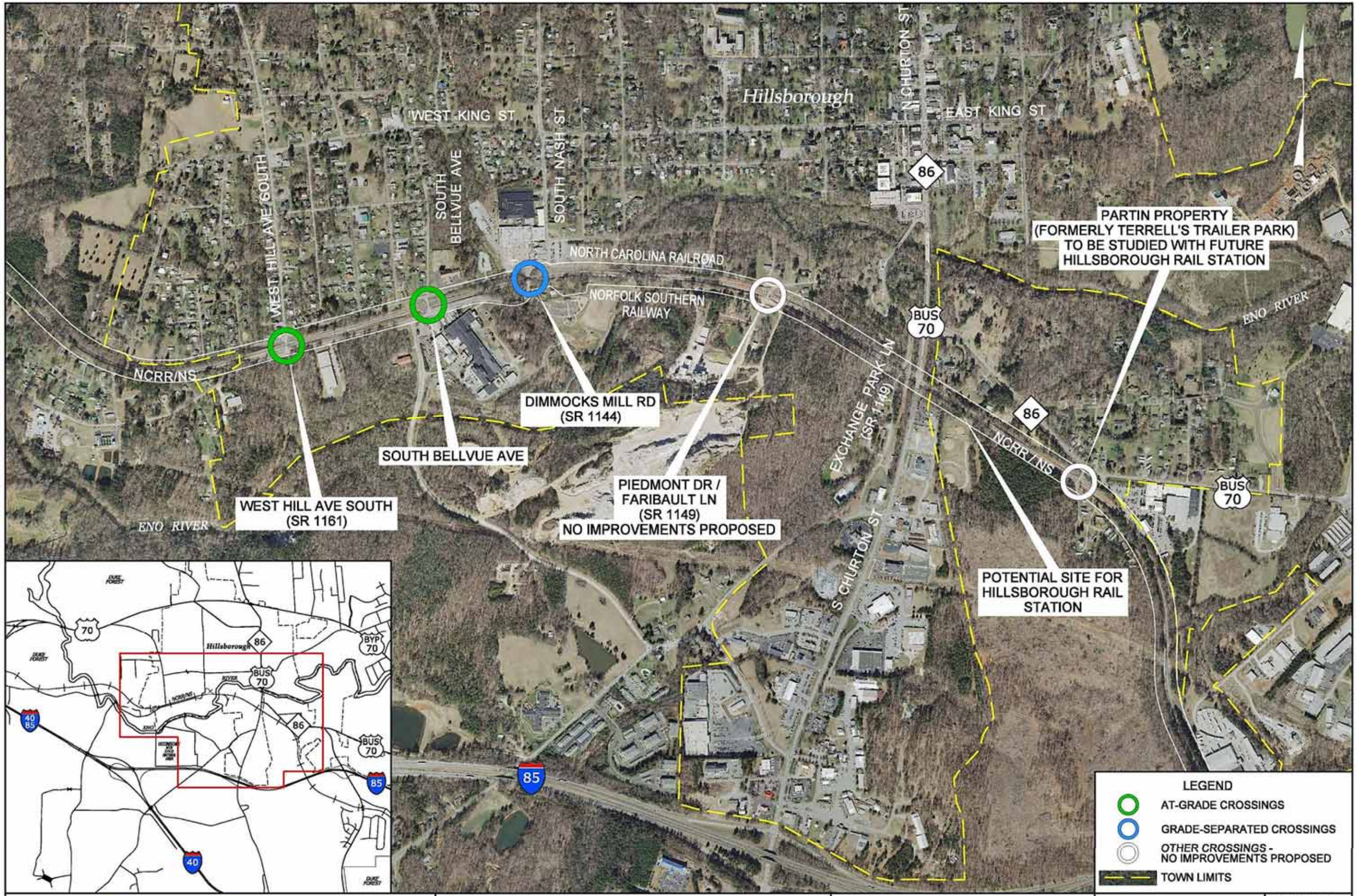
The West Hill Avenue South and South Bellvue Avenue crossings were considered for potential closure or improvement. The Dimmocks Mill Road grade separation was considered for replacement. Two improvement concepts were considered (see Figures 2 and 3):

- Concept 1 replaces the Dimmocks Mill Road grade separation, closes the South Bellvue Avenue crossing, and improves the West Hill Avenue South crossing.
- Concept 2 replaces the Dimmocks Mill Road grade separation and closes both the South Bellvue Avenue and the West Hill Avenue South crossings.

Mid-term (three to seven years) recommendations are to conduct environmental and design studies for replacing the Dimmocks Mill Road grade separation and minor resurfacing of West Hill Avenue South roadway approaches to flatten the roadway crossing surface. Long-term recommendations (more than seven years) include replacing the Dimmocks Mill Road grade separation, improving adjacent intersections, extending sidewalk and bicycle improvements between Nash Street and Gold Park, closing the South Bellvue Avenue crossing, and improving safety at the West Hill Avenue crossing. As described in a September 8, 2014 resolution, the Town of Hillsborough prefers Concept 1 but remains open to other options that may be developed upon further study. Concept 2 offers the highest level of railroad crossing safety and the highest benefit-cost ratio by closing both at-grade crossings. Table ES.3 below summarizes the recommended alternatives.

Table ES.3 Alternative Concepts

Crossing Reference Number	Crossing Number	Street Name	Near Term (0 to 3 years)	Construction Cost	Mid-Term (3 to 7 years)	Construction Cost	Long Term (More than 7 years)	Construction Cost	Comments
1	735 151W	West Hill Avenue South	None	$0	Minor resurfacing of roadway approaches to flatten the roadway crossing surface.	$20,000	Concept 1 – Improve the crossing by raising roadway grades on West Hill Avenue South, Eno Street, and Dimmocks Mill Road. Concept 2 - Close the crossing, remove pavement, and remove railroad crossing signals and equipment.	$870,000 $25,000	The long term West Hill Avenue South recommendation would occur after the Dimmocks Mill Road grade separation is replaced.
2	735 152D	South Bellvue Avenue	None	$0	None	$0	Close the crossing, remove pavement, and remove railroad crossing signals and equipment.	$25,000	The South Bellvue Avenue crossing closure would occur after the Dimmocks Mill Road grade separation is replaced.
3	735 154S	Dimmocks Mill Road	None	$0	Environmental and design studies for replacing the Dimmocks Mill Road grade separation and improving adjacent intersections.	$0	Replace the Dimmocks Mill Road grade separation, improve adjacent intersections, and extend sidewalk and bicycle improvements between Nash Street and Gold Park.	$3,200,000	Improvements to Dimmocks Mill Road crossing are a primary recommendation in conjunction with the closing of both the South Bellvue Avenue and West Hill Avenue South crossings.



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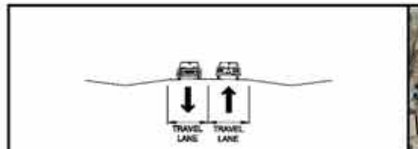
HILLSBOROUGH TRAFFIC SEPARATION STUDY

STUDY AREA CROSSINGS

WEST HILL AVE S., S. BELLVUE AVE AND DIMMOCKS MILL RD CROSSING IMPROVEMENT CONCEPTS

0' 300' 600' 900'

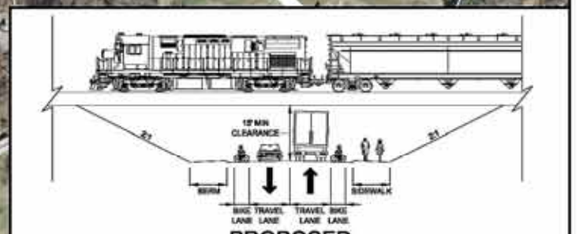
FIGURE NO.
1



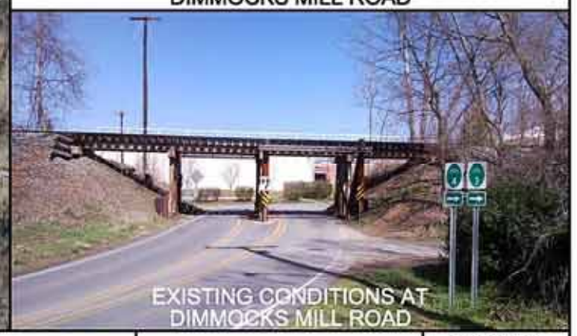
PROPOSED
WEST HILL AVENUE

LEGEND
- PROPOSED DETOUR TRACK
- STUDIED ALTERNATIVE
- PROPOSED ALTERNATIVE CORRIDOR
- PROPOSED STRUCTURE
- PROPOSED CROSSING CLOSURE

WEST HILL AVE SOUTH (SR 1161)
ALLEN RUFFIN AVE
JONES AVE
COLLINS AVE
SOUTH BELLVUE AVE
SOUTH NASH ST
FORMER BELLEVUE MILL
CALVIN ST
A SOUTHERN SEASON
FIRST COMMUNITY BAPTIST CHURCH
NORTH CAROLINA RAILROAD CORRIDOR
ENO ST
NCRR/NS
NORTH CAROLINA RAILROAD / NORFOLK SOUTHERN RAILWAY
GOLD PARK
DIMMOCKS MILL RD (SR 1144)
ALLISON ST
HILLSBOROUGH BUSINESS CENTER
KAYE PRODUCTS
ENO MOUNTAIN ROAD (SR 1148)



PROPOSED
DIMMOCKS MILL ROAD



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HILLSBOROUGH TRAFFIC SEPARATION STUDY

STUDY AREA CROSSINGS

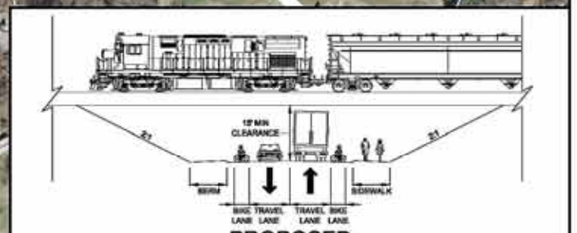
WEST HILL AVE S., S. BELLVUE AVE AND
DIMMOCKS MILL RD
CROSSING IMPROVEMENT
CONCEPT 1

0' 100' 200' 300'

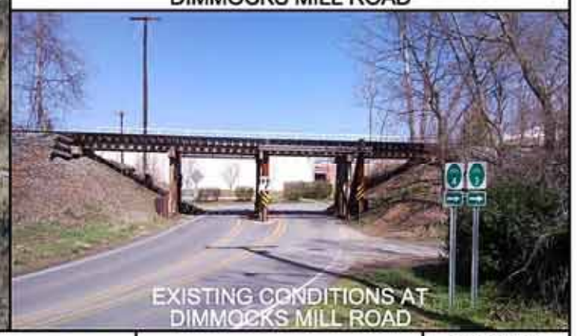
FIGURE NO.
2

LEGEND
PROPOSED DETOUR TRACK
STUDIED ALTERNATIVE
PROPOSED ALTERNATIVE CORRIDOR
PROPOSED STRUCTURE
PROPOSED CROSSING CLOSURE

WEST HILL AVE SOUTH (SR 1161)
ALLEN RUFFIN AVE
JONES AVE
COLLINS AVE
SOUTH BELLVUE AVE
SOUTH NASH ST
FORMER BELLEVUE MILL
CALVIN ST
A SOUTHERN SEASON
FIRST COMMUNITY BAPTIST CHURCH
NORTH CAROLINA RAILROAD CORRIDOR
ENO ST
NCRR/NS
NORTH CAROLINA RAILROAD / NORFOLK SOUTHERN RAILWAY
GOLD PARK
DIMMOCKS MILL RD (SR 1144)
ALLISON ST
HILLSBOROUGH BUSINESS CENTER
KAYE PRODUCTS
ENO MOUNTAIN ROAD (SR 1148)



PROPOSED
DIMMOCKS MILL ROAD


EXISTING CONDITIONS AT
DIMMOCKS MILL ROAD

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HILLSBOROUGH TRAFFIC SEPARATION STUDY

STUDY AREA CROSSINGS

WEST HILL AVE S., S. BELLVUE AVE AND DIMMOCKS MILL RD CROSSING IMPROVEMENT CONCEPT 2

0' 100' 200' 300'

FIGURE NO.
3

SECTION A – Introduction

A. INTRODUCTION

The NCDOT has developed the Traffic Separation Study (TSS) as an effort to pursue a more systematic approach to crossing safety. Traffic Separation Studies are a comprehensive evaluation of traffic patterns and road usage for an entire municipality or region that determines the need for improving and/or eliminating public grade crossings.

In 2001 and 2002, NCDOT evaluated closing the rail/highway crossing at either South Bellvue Avenue or West Hill Avenue. A public meeting held to discuss these options made it apparent that the community wanted the rail/highway crossings to remain open. As a result, the Town of Hillsborough formally requested that the crossings remain open, so no further action was taken. Since the earlier evaluation, however, many local plans and development changes have occurred, including the adoption of the Hillsborough Rail Station Small Area Plan in 2010.

The NCDOT entered into a municipal agreement with the Town of Hillsborough to complete a TSS. This study examined at-grade highway/railroad grade crossings along the North Carolina Railroad Company/ Norfolk Southern Railway (NCRR/NS) corridor in Hillsborough. The following crossings are being studied in detail:

- West Hill Avenue South (SR 1161)
- South Bellvue Avenue
- Dimmocks Mill Road (SR 1144) (grade-separated)

The Piedmont Drive/ Faribault Lane (SR 1149) crossing was considered but not proposed for improvement in this study. The private crossing at the Partin Property (formerly Terrell's Trailer Park) was previously studied as part of the Private Crossing Safety Initiative (PCSI) and the Hillsborough Station Plan.

The Traffic Separation Study process has three phases:

A1. Preliminary Phase

The NCDOT and the Town of Hillsborough have agreed to study and implement improvements that will be identified by the TSS and an engineering consultant was selected by NCDOT.

A2. Study Phase

The engineering consultant evaluates the existing crossing conditions, average daily traffic (both trains and vehicles) and socioeconomic impact of potential closings for all public crossings within the study area and prepares recommendations for NCDOT and local officials to review. Recommendations are divided into three categories of improvements Near-term, Mid-term, and Long-term. These categories are described below:

Near-term recommendations (within three years) may include installation of flashing lights and gates, enhanced devices such as four-quadrant gates and longer gate arms, installation of concrete or rubber crossings, crossing closures, median barrier installation, pavement markings, roadway approach modifications and crossings realignments.

Mid-term recommendations (within three to seven years) may include connector roads, roadway realignments, crossing closures, relocations of existing crossings to safer locations and feasibility studies to evaluate potential grade separation locations.

Long-term recommendations (more than seven years) may include grade separation, connector roads and crossing closures. Recommendations are presented to the public for comment.

A3. Implementation Process

In order for recommendations to be implemented NCDOT officials will identify funding sources for improvements, develop project agreements with the Town of Hillsborough, coordinate project design, coordinate crossing closures with railroad and state highway officials, and oversee project implementation. Town staff assists with project development and right of way acquisition, if needed.

SECTION B – Data Collection

B. DATA COLLECTION

B.1 Existing Conditions

The information included in Table B.1 was gathered for each grade crossing in order to evaluate the crossing conditions in terms of traffic and safety. Photographs along with data summary sheets for each crossing are included in Appendix A.

Table B.1 Data Sources

Date Item	Source
Crossing Number	NCDOT Rail Division
Street or Route	NCDOT Rail Division
Railroad Company	NCDOT Rail Division
Railroad Milepost	NCDOT Rail Division
Existing Warning Devices	Site Inspection and FRA Inventory Forms
Vehicle Traffic	NCDOT Transportation Planning Branch and Hillsborough TSS Traffic Impact Assessment
24 hour Train Volumes	FRA Inventory Forms
Accident History	Accident Reports (NCDOT & FRA)
Street Classification	DCHC MPO/NCDOT Functional Classification Maps*
Truck Route	DCHC MPO/NCDOT Functional Classification Maps*
Transit Route	DCHC MPO/NCDOT Functional Classification Maps*
School Bus Route (Yes/No)	Orange County Schools
Crossing Surface and Condition	Site Inspection
Land Use	Site Inspection
Redundant Crossing (Yes/No)	Site Inspection
Potential for Grade Separation	Exposure Index**
Humped Crossing	Site Inspection
Crossing Geometry	Site Inspection
Need for Enhanced Warning Devices	Site Inspection & Accident History
Feasibility of Roadway Improvements	Site Inspection & Engineering Judgment

*DCHC MPO - Durham Chapel Hill Carrboro Metropolitan Planning Organization
**Exposure Index = Number of trains per day x Average Daily Traffic at highway/rail crossing (See Section C)

B.1.1 Traffic Counts

Average Daily Traffic (ADT) was collected on May 29 and 30, 2013. For turning movement counts, the times of counts were from 7am to 9am and from 2pm to 6pm. Sampled intersections included:

- Dimmocks Mill Road (SR 1144) @ West Hill Avenue South (SR 1161)
- Dimmocks Mill Road (SR 1144) @ South Bellvue Avenue
- Dimmocks Mill Road (SR 1144) @ Eno Street
- West Hill Avenue South (SR 1161) @ Eno Street
- West Hill Avenue South (SR 1161) @ West King Street
- West King Street (SR 1150) @ South Bellvue Avenue
- West King Street (SR 1150) @ South Nash Street (SR 1156)
- South Bellvue Avenue @ Eno Street
- South Nash Street (SR 1156) @ Calvin Street

24 hour counts were also collected May 29 and 30, 2013 on:

- West Hill Avenue South (SR 1116)
- South Bellvue Avenue
- Dimmocks Mill Road (SR 1144)
- Eno Street
- Allison Street (South of Dimmocks Mill Road)
- South Nash Street (SR 1156)

B.1.2 Redundant Crossings

If a low-volume crossing has alternate access across the tracks available within a reasonable distance, it is often considered redundant. Table B.2 lists the distance between redundant crossings in the study area.

Table B.2 Redundant Crossings

Crossing	Parallel Crossing	Distance Between Redundant Crossings	Distance to Dimmocks Mill Road Grade Separation
West Hill Avenue South	South Bellvue Avenue	0.25 miles	0.45 miles
South Bellvue Avenue	West Hill Avenue South	0.25 miles	0.20 miles

B.1.3 Crash Data

Crash data from NCDOT and the FRA was analyzed for the 13-year period from 2000 to 2013. Three crashes involving train/vehicle collisions were reported at crossings in the study area (see Table B.2). Crashes are classified as property damage only, injury, or fatality. Most collisions occurred when vehicles were stopped on the tracks. No injuries or fatalities were reported during this time period.

735 151W – West Hill Avenue South

- 12/31/2012 - Rail equipment struck highway user, property damage only, no injuries[1]

735 152D – South Bellvue Avenue

- 11/25/2000 - Rail equipment struck highway user, property damage, no injuries

735 157M – Piedmont Drive/ Faribault Lane

- No accidents were reported within this time period

[1] In addition to the 12/31/2012 accident, there have been several documented instances of trucks stuck at this crossing which have resulted in train delays.

735 160V - Partin Property

- 2/08/2002 - Rail equipment struck highway user, property damage, no injuries

Table B.3 - Train-Related Crashes at Study Area Crossings (2000 – 2013)				
Crossing Number.	**Crossing Location**	**Motor Vehicle Incidents**		
		PDO*	**Injury**	**Fatality**
735 151W	West Hill Avenue South (SR 1161)	1	0	0
735 152D	South Bellvue Avenue	1	0	0
735 157M	Piedmont Drive/ Faribault Lane (SR 1149)	0	0	0
735 160V	Partin Property	1	0	0
Total		**3**	**0**	**0**

*PDO – Property Damage Only

B.2 Train Operations

B2.1 Hillsborough Rail Station

The Hillsborough Rail Station is currently planned to be located on a 20-acre Town-owned parcel bounded by South Churton Street, US 70A/ NC 86, and Orange Grove Street. The Town of Hillsborough adopted a Rail Station Small Area Plan for the parcel in September 2010 (see Figure 1 for location). Proposed roadway improvements include an extension of the road network along its south side and a potential railroad grade separated crossing to join US 70A/ NC 86 to the north. Specific recommendations for the rail station will be determined during future environmental planning studies.

B2.2 Existing Train Service

The primary users of the NCRR/ NS Corridor through the project study area include Amtrak and Norfolk Southern Railway freight operations. The NCRR Piedmont Corridor between Raleigh and Greensboro currently hosts six daily (three round trip) intercity passenger trains, including the four daily (two round trip) NCDOT Piedmont Service trains and the twice daily (one round trip) Amtrak Carolinian. According to FRA crossing inventory data, 16 daily freight trains use the corridor making 12 through trips and four switching operations.

B2.3 Future Train Service

FRA's Southeast High Speed Rail (SEHSR) project proposes to implement approximately 162 miles of high speed rail as part of an overall plan to extend high speed passenger rail service from the Northeast Corridor (Boston to Washington, DC) southward through Virginia to Charlotte, NC. The Hillsborough TSS project study area is along the SEHSR study corridor. As performance and capacity improvements are made along the SEHSR corridor the number of intercity passenger trains will continue to increase.

The NCRR performed a commuter rail ridership and market study in 2010 to assess the viability of commuter rail on the NCRR corridor between Greensboro and Goldsboro through the year 2022. The Blue Line route in the commuter rail study between Greensboro and Raleigh considered four daily round trips (four eastbound trains the morning and four returning westbound trains in the evening). This Blue Line route was forecasted to have low commuter rail ridership potential.

In 2014, the NCRR, Triangle Transit, and other partners will begin a rail capacity study to consider the future regional and commuter rail needs along the NCRR corridor.

B.3 Other Transportation and Pedestrian Projects

Table B.4 lists transportation and pedestrian projects that are proposed in the vicinity of the at-grade study crossings. Information is based on the NCDOT 2012-2020 State Transportation Improvement Program (STIP) and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHCMPO) 2035 Long Range Transportation Plan and correspondence with Town of Hillsborough personnel.

Table B.4 - Potential Projects in the Vicinity					
Project Number	**Plan**	**Type**	**Description**	**Length**	**Status**
I-0305	NCDOT STIP	Lane Widening/ Interchange Reconstruction	I-40 at Hillsborough to 6 lanes and reconstruct interchanges. One mile from TSS study area.	7.5 mi.	Right of way scheduled for 2019, utilities 2020.
Riverwalk Greenway		Greenway Construction	8 foot wide asphalt urban greenway along the Eno River corridor. The greenway will connect into the regional trail system.	1.8 mi.	Phase I (within Gold Park) completed in 2009. Phase II (Gold Park to River Park) construction underway, to be completed Summer 2014. Phase III (Allison Street to Occoneechee Mtn. State Natural Area) construction to be completed by Fall 2014.
*CMAQ Sidewalk Connections		Sidewalk Connections	Sidewalk connections along Occoneechee, Calvin, Nash and Allison Streets and various others.	0.4 mi.	Currently in the engineering phase, project will go to bid Summer 2014.
Calvin Street Greenway		Greenway Construction	Construct greenway along Eno River south of Calvin Street providing a connection from Calvin Street to Riverwalk and Gold Park. The 300-foot paved path will include a 100-foot elevated walkway.	100 feet	Construction to be completed Summer 2014.

*CMAQ – Congestion Mitigation and Air Quality Improvement (CMAQ) Program.

SECTION C – Crossing Analysis

C. CROSSING ANALYSIS

All at-grade crossings studied were considered for potential closure. Based on train and vehicle volume data, exposure index, availability of alternative access, environmental considerations, and input from stakeholders, the South Bellvue Avenue and the West Hill Avenue South crossings are recommended to be closed. Improvements are recommended for the Dimmocks Mill Road grade separated crossing. Capacity analyses were performed to determine the operating characteristics of the adjacent road network and the impacts of the potential closure of these crossings.

C.1 Exposure Index

NCDOT uses an exposure index as one factor to determine if a grade separated crossing is warranted. The exposure index is calculated by multiplying the number of trains per day on the rail line being crossed by the number of vehicles per day at that crossing. As a general rule, grade separations should be considered in rural areas when the exposure index is 15,000 or more. In urban areas grade separations should be considered when the exposure index is 30,000 or more. The formula is shown below as:

EI = N x ADT

Where:

EI = NCDOT Rail Division's Exposure Index
N = Number of Trains per Day
ADT = Average Daily Traffic at at-grade crossing

Other factors that need to be considered in the feasibility of grade separations are accident history, topography, adjacent land use, construction impacts, and costs. The exposure index was calculated for each of the study crossings using the year 2013 ADT volumes collected during the Hillsborough TSS traffic impact analysis and the number of trains per day as reported by the FRA Crossing Inventory Data and NCDOT. The exposure index is summarized in Table C.1.

Table C.1 - Exposure Index for At-Grade Crossings

Crossing	AADT (2013)	Existing Daily Train Volume (Freight & Intercity)	Existing Exposure Index	Exposure Index Threshold
West Hill Avenue South	1,550	22	34,100	30,000
South Bellvue Avenue	1,150	22	25,300	30,000

Sources: Hillsborough TSS Traffic Impact Analysis data
* NS = Norfolk Southern

C.2 Delay Analysis

The study area crossings are mainly two lane, two-way roadways that are part of the street system in Hillsborough, NC. West Hill Avenue, South Bellvue Avenue, Dimmocks Mill Road, Eno Street, West King Street, South Nash Street, Allison Street, and Calvin Street are included in the study analysis. All intersections are stop sign controlled, with the exception of the South Nash Street and West King Street intersection which is signalized. Speed limits on all roads are 35 mph or below. Dimmocks Mill Road is rural in nature and serves several businesses on its eastern section. The other roadways are residential in nature.

Intersection capacity analyses were performed for the AM and PM peak hours for the existing and projected post-closure traffic conditions for each closure location using Synchro Version 7 software. Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a set time duration. Capacity is combined with level of service (LOS) to describe the operating characteristics of a road segment or intersection. Level of Service is a measure of the operational efficiency of the highway/rail grade crossing. It is determined using procedures from the *Highway Capacity Manual*. Level of service is expressed as a letter ranging from A (free flowing) to F (severely congested) and is determined using the average delay for all vehicles. Table C-2 summarizes the average delay and corresponding level of service.

TABLE C.2 – Level of Service

Level of Service	Signalized Intersections Control Delay Per Vehicle [sec/veh]	Unsignalized Intersections Average Control Delay [sec/veh]
A	≤ 10	≤ 10
B	> 10 - 20	> 10 – 15
C	> 20 - 35	> 15 – 25
D	> 35 - 55	> 25 – 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

Table C.3 summarizes the LOS and delay (seconds per vehicle) for all of the study intersections related to the two proposed crossing closures. Traffic impacts from two recommended alternatives were analyzed as a part of this study. In addition to the no-build scenario two additional build scenarios were investigated. Under the first scenario South Bellvue Avenue crossing would be closed and the grade separation of Dimmocks Mill Road (SR 1144) would be replaced. Under the second scenario both the South Bellvue Avenue and West Hill Avenue South crossings would be closed and the grade separation at Dimmocks Mill Road (SR 1144) would be replaced.

According to this analysis study area intersections currently operated at reasonable free flow conditions (LOS B or better) in 2013 and would continue to operate at these levels under the no-build scenario and with the closure of both South Bellvue Avenue and West Hill Avenue South crossings in 2035 (see Table C.3). Analysis results indicate study area intersections would operate at reasonable free flow conditions (LOS B or better) conditions with the closure of South Bellvue Avenue only.

Table C.3 - Intersection Levels of Service

Intersection	2013 Existing		2035 No-Build		Closure of W. Bellvue Ave and Realignment of Dimmocks Mill Rd (2035)		Closure of W. Bellvue Ave and W. Hill Ave, and Realignment of Dimmocks Mill Rd (2035)	
	AM	PM	AM	PM	AM	PM	AM	PM
West Hill Ave @ West King St								
EB	B	A	B	A	C	B	B	A
WB	B	A	B	A	C	B	B	A
NB	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A
West Hill Ave @ Eno St								
EB	A	A	A	A	A	A	A	A
WB	A	A	A	A	A	A	A	A
NB	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A
West Hill Ave @ Dimmocks Mill Rd								
EB	A	A	A	A	N/A	N/A	A	A
WB	A	A	A	A	N/A	N/A	A	A
NB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SB	A	A	B	B	N/A	N/A	B	B
West King St @ South Bellvue Ave								
EB	A	A	A	A	A	A	A	A
WB	A	A	A	A	A	A	A	A
NB	A	A	A	A	B	A	B	A
SB	B	A	B	B	B	B	B	B
South Bellvue Ave @ Eno St								
EB	A	A	A	A	A	A	A	A
WB	A	A	A	A	A	A	A	A
NB	A	A	A	A	N/A	N/A	N/A	N/A
SB	A	A	A	A	A	A	A	A

EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound,
* Denotes Signalized
** Denotes 4-Way Stop

Table C.3 - Intersection Levels of Service

Intersection	2013 Existing		2035 No-Build		Closure of W. Bellvue Ave and Realignment of Dimmocks Mill Rd (2035)		Closure of W. Bellvue Ave and W. Hill Ave, and Realignment of Dimmocks Mill Rd (2035)	
	AM	PM	AM	PM	AM	PM	AM	PM
West King St @ Nash St *								
EB	B	A	B	A	B	B	B	B
WB	A	A	A	A	B	B	B	B
NB	A	A	A	A	B	B	B	A
SB	B	A	B	A	B	A	B	A
Nash St @ Calvin St								
EB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WB	B	A	B	B	B	B	B	B
NB	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A
South Bellvue Ave @ Dimmocks Mill Rd								
EB	A	A	A	A	N/A	N/A	N/A	N/A
WB	A	A	A	A	N/A	N/A	N/A	N/A
NB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SB	A	A	B	B	N/A	N/A	N/A	N/A
Nash St @ Eno St**								
EB	N/A	N/A	N/A	N/A	A	A	A	A
WB	N/A	N/A	N/A	N/A	A	A	A	A
NB	N/A	N/A	N/A	N/A	A	A	A	A
SB	N/A	N/A	N/A	N/A	B	A	B	A
Dimmocks Mill @ Eno St (Existing & No-Build)								
EB	A	A	A	A	N/A	N/A	N/A	N/A
WB	A	A	A	A	N/A	N/A	N/A	N/A
NB	A	A	A	A	N/A	N/A	N/A	N/A
SB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound,
* Denotes Signalized
** Denotes 4-Way Stop

C.3 Economic Analysis

An economic analysis was performed of the alternatives considered at each crossing. Estimated construction costs were input into GradeDec.Net, which provided the benefit/cost information for each alternative. GradeDec.Net is a web-based decision support tool developed by FRA that assists federal, state and local authority decision makers in evaluating the benefits and costs of highway-rail grade crossing upgrades, separations, and closures. To find the high yield crossing improvement alternatives, the analysis considers traffic flows and composition by highway and rail, growth in traffic over a specified time horizon, the physical characteristics of the crossings and price information.

Algorithms in GradeDec.NET calculate the effects of the improvements, incorporating recent research findings relating safety to crossing improvements. The analysis includes sets of tables and graphs, included in Appendix D, that rank crossing improvements and provide quick indicators for high yield investments. The impact analysis also evaluates shifts in traffic flows in a corridor due to grade separations and closures. The analysis considers the cost side as well and provides summary measures of costs and benefits. The GradeDec analysis incorporated the best available information at the time it was performed in May 2014. Table C.5 summarizes the results of the GradeDec analysis for each long term recommended alternative.

Table C.5 - GradeDec Results – Recommended Long Term Alternatives

Crossing Concept Recommendation	Benefit-Cost Ratio	Base Year Collisions Per Year	Future Predicted Collisions Per Year
Concept 1 • Replace Dimmocks Mill Road grade separation • Close the South Bellvue Avenue crossing • Improve the West Hill Avenue South crossing	0.37 (traditional rail model) 0.41 (high speed rail model)	0.07 0.05	0.05 0.03
Concept 2 • Replace Dimmocks Mill Road grade separation • Close the South Bellvue Avenue crossing • Close the West Hill Avenue South crossing	0.49 (traditional rail model) 0.53 (high speed rail model)	0.07 0.05	0.00 0.00

SECTION D – Safety & Mobility Issues

D. SAFETY AND MOBILILTY ISSUES

This section summarizes the existing warning devices at each of the at-grade crossings studied, and discusses safety and mobility issues at each crossing.

D.1 Vehicles Queuing Across Railroad Tracks at South Bellvue Avenue

The presence of nearby traffic signals, intersections, or parallel roadways can result in queues of stopped vehicles extending onto or across a highway/rail crossing. During the site inspections vehicle queuing was observed at the South Bellvue Avenue crossing on to Dimmocks Mill Road (SR 1144). The distances between the track and adjacent intersections on South Bellvue Avenue are very short leaving little stacking distance for vehicles.

D.2 Humped Crossings

A "humped" crossing exists where the elevation of the railroad is significantly higher than the crossing roadway, causing vehicles to ascend on one side of the tracks and descend on the other. The severity of this condition can range from discomfort at normal speeds, to "bottoming out" of vehicles with long wheelbases or low clearances. This dragging can damage vehicles, or cause them to become stuck on the crossing, creating a serious hazard. Routine track maintenance tends to exacerbate the problem over time, as track ballast work typically adds about three inches per occurrence. Over a ten-year period, the railroad may rise as much as one foot as a result of this routine maintenance. One study area crossing has a humped profile: 735 151W - West Hill Avenue South. In addition to the one reported accident, several trucks have gotten stuck at this crossing resulting in train delays.

D.3 Crossing Protection Device Upgrades

Upgrading existing warning devices is one of the most cost-effective methods of improving safety at an at-grade railroad crossing. Commonly used warning devices, include signs, crossbucks, flashers and warning bells, and gate arms. Passive devices like signs and crossbucks alert the driver to the presence of the crossing but do not prevent them from driving through the crossing when a train is present. Such devices are generally used when train volumes and vehicle crossing volumes are low, train speeds are low, and sight distance is not an issue.

Active devices such as gate arms, flashers, and bells warn the driver of a train approaching the crossing. These devices are generally used at higher volume crossings, where train speeds are higher, or when there is a history of train/vehicle collisions. The effectiveness of warning signs, pavement markings, traffic signals, and other traffic control devices is largely dependent upon proper installation and maintenance. All study area crossings include both active and passive devices. No crossing protection device upgrades are proposed.

D.4 Grade Crossing Condition

A poor grade crossing surface can result in a rough, uneven ride. This can increase wear and tear on vehicles, potentially create a traffic safety hazard, and may add to congestion by reducing travel speeds. The crossing materials used on grade crossings include asphalt, concrete slab, and rubber. Even though some materials provide a slightly improved ride and longer term maintenance, the main safety issue is the condition of the crossing. All study area crossings have good to fair crossing surface conditions.

D.5 Vehicles Driving Around Automated Gates

Several situations can lead to the circumvention of automated gates by motorists:

- Gates are lowered, but no train is visible
- Gates fail, and remain in the lowered position
- Gates are lowered and train is visible, but motorist is too impatient to wait

According to NCDOT and FRA accident reports, none of the recorded accidents since 2000 were due to vehicles driving around automated gates. All of the accidents reported in Hillsborough were attributed to vehicles being stopped on the tracks.

D.6 Crossing Consolidation/Elimination

Vehicle and train volumes, geometry, safety, and proximity to nearby crossings are factors that are considered when identifying potential crossing closures. Good candidates for closure often have one or more of the following issues:

- Alternate crossing locations located within reasonable distance
- Skewed crossings
- Limited sight distance
- History of train/vehicle crashes
- Private crossing with no identifiable owner
- Complex crossings (e.g. multiple tracks, switching operations, etc.) that cannot be safely served with warning devices
- Crossings with short distance to adjacent intersections which result in insufficient vehicular stacking distances.

Based on these factors two crossings, the South Bellvue Avenue and West Hill Avenue South are recommended for consolidation/elimination.

D.7 Grade Separation

Grade-separated crossings eliminate the potential for train/vehicle collisions while maintaining vehicular and pedestrian access across the railroad tracks. However, stringent design standards and cost make changes to the railway difficult. Railroad overpasses of highways require approximately 15 feet of vertical clearance, and highway overpasses of railroad tracks require approximately 23 feet of clearance. Sight distance requirements on the overpass vertical curves generally result in long approaches, which can create adjacent property access and connectivity issues. In addition, visual and noise impacts associated with overpasses can negatively affect neighborhoods or historic areas. The Dimmocks Mill Road (SR 1144) crossing currently has 12.25 feet of vertical clearance; therefore, it is recommended the existing grade separation be replaced.

SECTION E – Community Characteristics

E. COMMUNITY CHARACTERISTICS

The project study area encompasses a half-mile radius around each of the at-grade crossings. Potential impacts to community resources were considered when analyzing and ranking long term alternatives. The project study area is developed with a mix of residential, commercial, office, institutional, and industrial land use.

E.1 Community Features

An aerial mapping review and field visit were performed to identify community facilities such as hospitals, churches, schools, fire and rescue stations, parks, and recreation areas. The following community features were observed near the crossings:

- Murray Street Park
- Eno United Methodist Church
- Gold Park
- First Community Baptist Church
- West Hill Baptist Church
- Orange County Library
- Hillsborough Historic District (Listed on National Register of Historic Places)
- Various Contributing Historic Resources

E.2 Community Planning

A number of state, Town of Hillsborough and Orange County plans have been developed and have relevance on community planning in the project study area, including the following:

- Private Crossing Safety Initiative (PCSI) (2003)
- Hillsborough Rail Station Small Area Plan (2010)
- Community Connectivity Plan (2009)
- Parks and Recreation Master Plan (Updated 2014)
- Strategic Growth Plan (2007)

E.3 Development Projects

Development projects in the study area have the potential to be affected by crossings included:

Expedition School (437 Dimmocks Mill Road) is a free, public charter school. Expedition School is a project-based science, technology, engineering and math school (STEM). The school will be opening on August 14, 2014 for grades K-6, expanding to Grade 8 over the first three years of operation. There will be no bussing associated with the school. The school will accommodate 230 children during the 2014-15 school year.

J.W. Faircloth & Son (Corner of Dimmocks Mill Road and Allison Street) involves the construction of a 16,429 square foot fabrication and assembly plant. The parcel is located on the south side of Dimmocks Hill Road, approximately 750 feet east of West Hill Avenue. A Conditional Use permit has been issued but a construction timeframe has not been determined.

Bellevue Mill Residential Development (202 Nash Street) involves construction of 104 to 125 apartments in a historic former fabric mill building. The project will include a public pedestrian path through the site. A Conditional Use permit has been issued but a construction timeframe has not been determined.

SECTION F – Public Involvement

F. PUBLIC INVOLVEMENT

A Public Involvement program was established as part of this study. This program involved:

- Funding Partner Meetings
- Stakeholder Group Meetings
- Public Meeting
- Mailings/press release

F.1 Funding Partner Meetings

A Funding Partners group was formed to provide feedback on the study's progress. This group met on April 26, 2012 and January 30, 2013 to review improvement concepts, traffic impact analysis, stakeholder and public involvement, and the next steps in the study process. The following organizations were participants in the Funding Partners group:

- Town of Hillsborough Planning Department
- North Carolina Railroad Company
- NCDOT Division 7
- NCDOT Rail Division
- Norfolk Southern Railway

F.2 Stakeholder Committee Meetings

A stakeholder committee was formed to provide opportunities for key agencies and organizations to participate in the recommendation process. Stakeholder committee meetings were held on May 21, 2012, February 21, 2014, and June 9, 2014. Members of the stakeholder committee were as follows:

- Town of Hillsborough, Town Manager
- Town of Hillsborough Planning Department
- Orange County Rural Fire Department
- Town of Hillsborough Police Department
- Orange County Emergency Services
- Orange County Schools Transportation Department
- Orange County Planning Department
- Piedmont Minerals Company
- North Carolina Railroad Company
- Norfolk Southern Railway
- NCDOT Rail Division
- NCDOT Division 7
- Interested Citizens

F.3 Public Meeting

A public meeting for the project was held on March 27, 2014. Maps showing each crossing and closure and improvement concepts were displayed and project team members spoke with citizens individually about their concerns and ideas for the crossings. The meeting included two short project overviews provided by the Project Team, one at 5:30 pm and one at 6:30 pm. A total of 29 people signed in at the workshop.

Seven written comments were received and six email comments were received following the meeting. A summary of public meeting comments is provided in Appendix B. Four individuals are opposed to any changes to the rail crossings. Three individuals favor closing South Bellvue Avenue, improving the West Hill Avenue South crossing, and improving the Dimmocks Mill Road grade separation. Six individuals favor improvements to Dimmocks Mill Road and closing both the West Hill Avenue South and South Bellvue Avenue crossings. Specific comments received were as follows:

- **General Comments -** Emergency access is important. Narrow streets in the area are not designed to State standards.
- **West Hill Avenue South -** Crossing improvements would provide a clear unobstructed crossing.
- **South Bellvue Avenue –** The South Bellvue Avenue crossing is an unobstructed crossing. If South Bellvue Avenue is to be closed, it should not be done until after any improvement at the other sites is completed.
- **Dimmocks Mill Road -** Classic red flashing signal, with or without gates, would be more affordable and almost as effective. Safe passage for pedestrians and bicycles under the trestle is needed. Closing both the Bellvue and West Hill crossings would put additional pressure on the Dimmocks Mill crossing.

F4. Project Mailing/Press Release

A press release was sent to local papers announcing the March 27, 2014 public meeting. A total of 850 postcards announcing the workshop were mailed to property owners within 0.25 miles of each of the crossings.

F5. Public Hearing

The Town of Hillsborough Board of Commissioners advertised and held a July 28, 2014 public hearing to receive public comments on the recommendations of the Draft Traffic Separation Study Report. After evaluating the draft report and public comments, the Town of Hillsborough adopted a resolution on September 8, 2014 expressing a preference for Concept 1 but remaining open to other options that may be developed upon further study. The Town requested NCDOT to prepare necessary agreements and move forward in implementing the recommendations.

SECTION G – Alternatives Considered and Eliminated

G. ALTERNATIVES CONSIDERED AND ELIMINATED

Through the course of the Hillsborough TSS, many alternatives were considered. Based on the analysis of costs and benefits of the each alternative and input from citizens and stakeholders, several alternatives have been eliminated. Descriptions of these alternatives and the reasons for their elimination are presented below:

West Hill Avenue South Pedestrian Underpass - In the past, West Hill Avenue residents have expressed concern about increased truck and automobile traffic that may result if the West Hill Avenue crossing is improved. During the May 2012 stakeholder meeting, an underpass was suggested for consideration at West Hill Avenue to address pedestrian needs. The terrain is not suited for a pedestrian underpass in this location since West Hill Avenue and Eno Street are at similar elevations as the railroad tracks. In addition, a temporary railroad detour track would likely be required to build a pedestrian culvert beneath the tracks. For these reasons, a pedestrian underpass was eliminated from further consideration in this study.

Eno Street to Exclusive Pedestrian Use - If the Bellvue Avenue crossing is to be closed, Eno Street would be the only nearby pedestrian route to Gold Park, nearby businesses, and the Riverwalk greenway. During the May 2012 stakeholder meeting, an idea was suggested to retain Eno Street (from Bellvue Avenue to Dimmocks Mill Road) for exclusive pedestrian use. Eno Street is within the NCRR corridor, and is not likely to be a candidate for improvements. Current access points to the Riverwalk greenway are from Allison Street, Gold Park, and Calvin Street. Eno Street is an important link for roadway access to nearby neighborhood and businesses. Town of Hillsborough and NCDOT believe Eno Street should remain open for vehicle use.

Dimmocks Mill Road Grade Separation and Realignment - At Dimmocks Mill Road, the curved alignment, limited clearance, and narrow pavement present difficulties for trucks and emergency vehicles to maneuver beneath the bridge. During the May 2012 stakeholder meeting, participants suggested realigning Dimmocks Mill Road to provide a straighter road using a skewed angle rather than keeping the "S" curves. Provisions should be considered for truck access to nearby commercial properties.

Concepts were developed to realign Dimmocks Mill Road, replace the railroad bridge, and shift the location of the railroad tracks. Several of these would require extensive reconstruction along Nash Street to cross either above or below the railroad (refer to sketches in Appendix C). During the January 2014 funding partners meeting, Town representatives did not favor the realignment concepts because they would negatively affect the Town's sidewalk connections project and other related planning projects in this part of West Hillsborough. In response, an alternative was developed to minimize roadway construction, address concerns with sight distance and street connectivity, and improve the intersections at Dimmocks Mill Road/ Eno Street and at Eno Street/ Nash Street. As a result, the Dimmocks Mill Road realignment concepts were eliminated from further consideration.

Piedmont Drive/Faribault Lane Crossing Closure – The potential closure of this crossing was originally considered as part of this study. The Piedmont Drive/Faribault Lane crossing provides access only to the Piedmont Minerals Company mining operation but the site is also accessible from Eno Mountain Road to the south. This crossing was considered for closure due to its relatively low traffic volumes. During the initial study phases, the rerouting of all traffic through the Eno Mountain Road entrance was considered which would render the rail crossing unnecessary. Discussion during the stakeholder meeting on May 21, 2012 revealed that for safety reasons, Piedmont Minerals Company is required to keep its mining entrance separate from the employee and vendor entrance. If the Piedmont Drive/Faribault Lane crossing is closed alternative access would need to be maintained. There are no reasonable options on the north side of the property for providing access to a nearby public road. A separate access to the south would require an extensive reworking of the internal road system within the property. For these reasons the closure of this crossing was removed from consideration.

Partin Property Crossing Closure – The closure of the crossing on the Partin property was originally recommended as part of NCDOT's Private Crossing Safety Initiative (PCSI) study. The provision of another method of access was also suggested in the PCSI study. Safety issues identified at the crossing included a humped crossing, poor crossing geometry, and poor sight distance conditions. At the May 21, 2012 stakeholder meeting emergency services representatives noted that accidents have occurred at the Partin Property private road and US 70A. These have involved trucks carrying mobile homes. The relocation of this crossing would not only improve safety at the railroad crossing but also at this major highway crossing.

The Hillsborough Rail Station Small Area Plan recommends extending Orange Grove Road along its south side and adding a future railroad grade separated crossing to join US 70A/ NC 86 at Tuscarora Drive to the north. The Partin Property access can connect to the proposed extension of Orange Grove Road as part of the station plan. At the February 21, 2014 stakeholder meeting, participants believed that improvement options for this crossing should be further developed during later Hillsborough Rail Station planning studies. This study concurs with prior evaluations recommending the closure of this crossing once the alternative access is constructed as part of the Hillsborough Rail Station.

SECTION H – Recommended Alternatives

H. Recommended Alternatives

The West Hill Avenue South and South Bellvue Avenue crossings were considered for potential closure or improvement. The Dimmocks Mill Road grade separation was considered for replacement. Two improvement concepts were considered:

- Concept 1 replaces the Dimmocks Mill Road grade separation, closes the South Bellvue Avenue crossing, and improves the West Hill Avenue South crossing.
- Concept 2 (Recommended) replaces the Dimmocks Mill Road grade separation and closes both the South Bellvue Avenue and the West Hill Avenue South crossings

Near-term (less than three years) recommendations are not proposed. Mid-term (three to seven years) recommendations are to conduct environmental and design studies for replacing the Dimmocks Mill Road grade separation and minor resurfacing of West Hill Avenue South roadway approaches to flatten the roadway crossing surface. Long-term recommendations (more than seven years) include replacing the Dimmocks Mill Road grade separation, improving adjacent intersections, extending sidewalk and bicycle improvements between Nash Street and Gold Park, closing the South Bellvue Avenue crossing, and improving safety at the West Hill Avenue South crossing.

Table H.1 below summarizes the recommended alternatives. For each location, multiple near and/or midterm solutions could be implemented. These near and midterm solutions could, in most cases, be made instead or in addition to one of the long term solutions. The cost estimates presented below are for construction only and do not include right of way acquisition, utility relocation, or costs associated with construction phasing where railroad construction is required.

Table H.1 Alternative Concepts

Crossing Reference Number	Crossing Number	Street Name	Near Term (0 to 3 years)	Construction Cost	Mid-Term (3 to 7 years)	Construction Cost	Long Term (More than 7 years)	Construction Cost	Comments
1	735 151W	West Hill Avenue South	None	$0	Minor resurfacing of roadway approaches to flatten the roadway crossing surface.	$20,000	Concept 1 – Improve the crossing by raising roadway grades on West Hill Avenue South, Eno Street, and Dimmocks Mill Road. Concept 2 - Close the crossing, remove pavement, and remove railroad crossing signals and equipment.	$870,000 $25,000	The long term West Hill Avenue South recommendation would occur after the Dimmocks Mill Road grade separation is replaced.
2	735 152D	South Bellvue Avenue	None	$0	None	$0	Close the crossing, remove pavement, and remove railroad crossing signals and equipment.	$25,000	The South Bellvue Avenue crossing closure would occur after the Dimmocks Mill Road grade separation is replaced.
3	735 154S	Dimmocks Mill Road	None	$0	Environmental and design studies for replacing the Dimmocks Mill Road grade separation and improving adjacent intersections.	$0	Replace the Dimmocks Mill Road grade separation, improve adjacent intersections, and extend sidewalk and bicycle improvements between Nash Street and Gold Park.	$3,200,000	Improvements to Dimmocks Mill Road crossing are a primary recommendation in conjunction with the closing of both the South Bellvue Avenue and West Hill Avenue South crossings.

H.1 West Hill Avenue South

West Hill Avenue South (Crossing No. 755 151W) carries approximately 1,150 vehicles per day (vpd) with 7% trucks across the railroad tracks at this location. It is a local road and is expected to carry similar traffic volumes in the future. This is a humped crossing that has caused vehicles to become stuck on the tracks. There are no sidewalk or bike lanes at this crossing. The crossing has warning signs, gates, and flashers. The crossing has poor geometry and sight conditions, and is considered to be a redundant crossing. There has been one accident recorded by FRA since 2000. No injuries were reported. The nearest major intersection is an unsignalized T-intersection with Dimmocks Mill Road and Allison Street, which is about 0.2 miles east.

Existing land use in the study area consists of residential, commercial, parks and open space, institutional and industrial land uses. According to the Town of Hillsborough Future Land Use Map (2007) these land uses will also be present in the future.

Future development plans in the project vicinity include:

- Riverwalk Greenway
- Sidewalk Connections
- Calvin Street Greenway
- Expedition Charter School

Community facilities near the crossing include:

- Murray Street Park
- Eno United Methodist Church
- Gold Park
- First Community Baptist Church
- West Hill Baptist Church
- Orange County Library
- Hillsborough Historic District (Listed on National Register of Historic Places)
- Various Contributing Historic Resources

Recommended Alternatives

The West Hill Avenue South crossing has mid-term alternatives that may be implemented independently of actions taken at other study area crossings. The long-term alternative is recommended for implementation in combination with improvements to the Dimmocks Mill Road crossing and the closure of the South Bellvue Avenue crossing.

Near Term Alternative – None.

Mid Term Alternative – Minor resurfacing of roadway approaches to flatten the roadway crossing surface.

Long Term Alternative – Concept 1 proposes improving the West Hill Avenue crossing by raising roadway grades on West Hill Avenue South, Eno Street, and Dimmocks Mill Road to flatten the roadway crossing (see Figure 2). The estimated construction cost is $870,000, and additional right of way would be required. Although it allows an alternative route for traffic to cross the railroad in West Hillsborough, it has higher impacts to adjacent land use, a higher cost, and long term maintenance of the at-grade railroad crossing. As described in a September 8, 2014 resolution, the Town of Hillsborough prefers Concept 1 but remains open to other options that may be developed upon further study. Concept 2 proposes to close the crossing, remove pavement, and remove railroad crossing signals and equipment (see Figure 3) after the Dimmocks Mill Road grade separation is replaced. The estimated construction cost is $25,000, and no right of way acquisition is required. Concept 2 offers the highest level of railroad crossing safety in conjunction with the grade separation and the highest benefit-cost ratio by closing both at-grade crossings. Recommended improvements to the nearby grade separation at Dimmocks Mill Road provide adequate and safer access to land uses on both sides of the track.

Table H.2 - Design Considerations at West Hill Avenue South

Design Considerations	Proposed Action
Alignment	No change
Rail Crossing	No further crossings at this location
Business Impacts	None
Residential Impacts	None
Local Road Impact	Minimal
Retaining Walls	None

H.3 South Bellvue Avenue (Crossing No. 755 152D)

South Bellvue Avenue carries approximately 1,550 vehicles per day (vpd) with 2% trucks across the railroad tracks at this location. It is a local road and is expected to carry similar traffic volumes in the future. The nearest major intersection is an unsignalized T-intersection with Dimmocks Mill Road and Allison Street, which is about 200 feet west. There are no sidewalk or bike lanes at this crossing. The crossing has warning signs, gates, and flashers. The crossing has poor geometry and sight conditions, and is considered to be a redundant crossing. There has been one accidents recorded by FRA since 2000. No injuries or fatalities were reported.

Existing land use in the study area consists of residential, commercial, parks and open space, institutional and industrial land uses. According to the Town of Hillsborough Future Land Use Map (2007) these land uses will also be present in the future.

Future development plans in the project vicinity include:

- Riverwalk Greenway
- Sidewalk Connections
- Calvin Street Greenway
- Expedition Charter School

Community facilities near the crossing include:

- Murray Street Park
- Eno United Methodist Church
- Gold Park
- First Community Baptist Church
- West Hill Baptist Church

- Orange County Library
- Hillsborough Historic District (Listed on National Register of Historic Places)
- Various Contributing Historic Resources

Recommended Alternatives

At the South Bellvue Avenue crossing, near-term and mid-term alternatives are not recommended. The long-term alternative (crossing closure) is recommended for implementation in combination with improvements to the Dimmocks Mill Road crossing.

Near Term Alternative – None.

Mid Term Alternative – None.

Long Term Alternative - Close the crossing, remove pavement, remove railroad crossing signals and equipment (see Figure 3). Recommended improvements to the nearby grade separation at Dimmocks Mill Road provide adequate and safer access to land uses on both sides of the track.

Table H.3 - Design Considerations at South Bellvue Avenue

Design Considerations	Proposed Action
Alignment	No change
Rail Crossing	No further crossings at this location
Business Impacts	None
Residential Impacts	None
Local Road Impact	Minimal
Retaining Walls	None

H.3 Dimmocks Mill Road

Dimmocks Mill Road (Crossing No. 755 154S) carries approximately 1,800 vehicles per day (vpd) with 6% trucks under the railroad tracks at this location. It is a local road and is expected to carry similar traffic volumes in the future. The nearest major intersection is a signalized 4-way intersection with West King Street, which is about 0.25 miles north of the crossing. There are no sidewalk or bike lanes at this underpass; however, the roadway is a signed bicycle route. The bridge is not perpendicular to Dimmocks Road which turns sharply to the west on the south side of the bridge.

The roadway has poor sight conditions on the northbound and southbound approaches. There are no recorded train/roadway vehicle accidents but the bridge has a substandard 12-foot, 3-inch clearance, and truck impacts with the bridge are possible.

Existing land use in the study area consists of residential, commercial, parks and open space, institutional and industrial land uses. According to the Town of Hillsborough Future Land Use Map (2007) these land uses will also be present in the future.

Future development plans in the project vicinity include:

- Riverwalk Greenway
- Sidewalk Connections
- Calvin Street Greenway
- Expedition Charter School

Community facilities near the crossing include:

- Murray Street Park
- Eno United Methodist Church
- Gold Park
- First Community Baptist Church
- West Hill Baptist Church
- Orange County Library
- Hillsborough Historic District (Listed on National Register of Historic Places)
- Various Contributing Historic Resources

Recommended Alternatives

The Dimmocks Mill Road crossing has mid-term alternatives that may be implemented independently of actions taken at other study area crossings. The long-term alternative (crossing upgrade) is recommended for implementation in combination with the closure of the South Bellvue Avenue and West Hill Avenue South crossings.

Mid Term Alternative – Environmental and design studies for replacing the Dimmocks Mill Road grade separation and improving adjacent intersections.

Long Term Alternative - Replace the Dimmocks Mill Road grade separation, improve adjacent intersections, and extend sidewalk and bicycle improvements between Nash Street and Gold Park (see Figures 2 and 3).

Table H.4 - Design Considerations at Dimmocks Mill Road

Design Considerations	Proposed Action
Alignment	No change
Rail Crossing	No further crossings at this location
Business Impacts	Requires additional right of way
Residential Impacts	Requires additional right of way
Local Road Impact	Minimal
Retaining Walls	None
Railroad Detour	Required during construction

Appendix A – Crossing Inventory Photographs

Table AppA.1 – Site Photograph Index	
Crossing	**Page Number**
West Hill Avenue South Aerial	Appendix A-1
West Hill Avenue South Ground Level	Appendix A-2
South Bellvue Avenue Aerial	Appendix A-3
South Bellvue Avenue Ground Level	Appendix A-4
Piedmont Drive/Fairbault Lane Aerial	Appendix A-5
Piedmont Drive/Fairbault Ground Level	Appendix A-6
Partin Property Aerial	Appendix A-7
Partin Property Ground Level	Appendix A-8

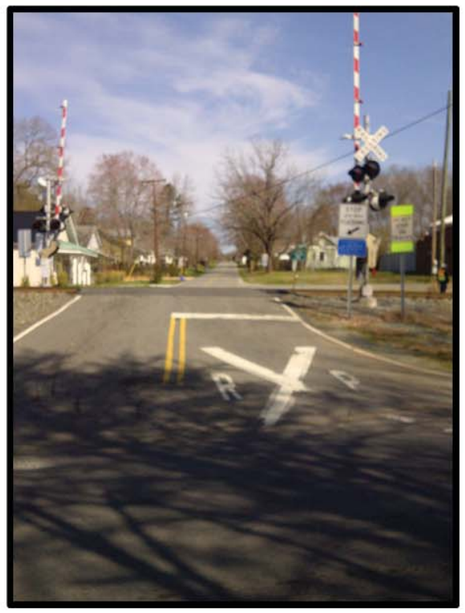
Crossing Number	Milepost	Railroad	Street Name	Street Classification	Warning Device	Land Use
735 151W	H 40.36	NCRR/NS	West Hill Avenue (SR 1161)	Local	Signs, Gates & Flashers	Residential

24 Hour ADT	Future ADT	24 Hour Train Volume	Accident History	Transit Route	School Bus Route	Truck Route
1,550 (2013)	1,650 (2024)	16	12/31/12 - Uninjured	No	Yes	No

Preemption	Humped Crossing	Crossing Condition Geometry	Crossing Surface Condition	Crossing Condition Sight	Redundant Crossing
No	Yes	Poor	Good to Fair	Poor	Yes

Economic Impact if Closed	Feasibility of Roadway Improvements	Grade Separation Investigation	Need for Enhanced Warning Devices
Low	Medium	No	No

Crossing Number 735 151W – West Hill Avenue (SR 1161)



Looking North

Looking South

Looking East

Looking West

Crossing Number	Milepost	Railroad	Street Name	Street Classification	Warning Device	Land Use
735 152D	H 40.61	NCRR/NS	S. Bellvue Avenue	Local	Signs, Gates & Flashers	Commercial

24 Hour ADT	Future ADT	24 Hour Train Volume	Accident History	Transit Route	School Bus Route	Truck Route
1,150 (2013)	1,250 (2024)	16	11/25/00 - Uninjured	No	Yes	No

Preemption	Humped Crossing	Crossing Condition Geometry	Crossing Surface Condition	Crossing Condition Sight	Redundant Crossing
No	No	Poor	Good to Fair	Poor	Yes

Economic Impact if Closed	Feasibility of Roadway Improvements	Grade Separation Investigation	Need for Enhanced Warning Devices
Low	Low	No	No

Crossing Number 735 152D – S. Bellvue Avenue

Looking North

Looking South

Looking East

Looking West

Crossing Number	Milepost	Railroad	Street Name	Street Classification	Warning Device	Land Use
735 157M	H 41.20	NCRR/NS	Piedmont Dr./Faribault Ln. (SR 1149)	Local	Signs, Gates & Flashers	Commercial

24 Hour ADT	Future ADT	24 Hour Train Volume	Accident History	Transit Route	School Bus Route	Truck Route
176 (2007)	N/A	16	N/A	No	No	No

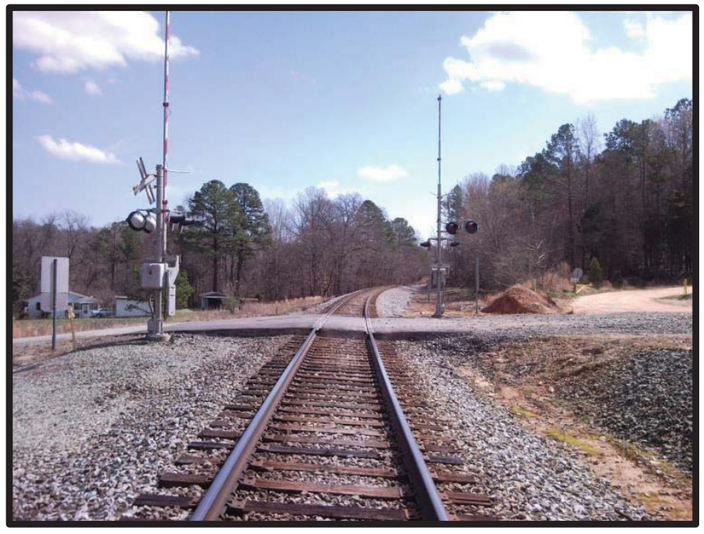
Preemption	Humped Crossing	Crossing Condition Geometry	Crossing Surface Condition	Crossing Condition Sight	Redundant Crossing
No	Yes	Poor	Good to Fair	Poor	No

Economic Impact if Closed	Feasibility of Roadway Improvements	Grade Separation Investigation	Need for Enhanced Warning Devices
High	Low	No	No

Crossing Number 735 157M – Piedmont Drive (SR 1149)

Looking North

Looking South



Looking East

Looking West

Crossing Number	Milepost	Railroad	Street Name	Street Classification	Warning Device	Land Use
735 160V	H 41.82	NCRR/NS	Terrells Trailer Park	Private	Gates & Flashers	Residential

24 Hour ADT	Future ADT	24 Hour Train Volume	Accident History	Transit Route	School Bus Route	Truck Route
N/A	N/A	16	02/08/02 - Uninjured	No	No	No

Preemption	Humped Crossing	Crossing Condition Geometry	Crossing Surface Condition	Crossing Condition Sight	Redundant Crossing
No	Yes	Poor	Good to Fair	Poor	No

Economic Impact if Closed	Feasibility of Roadway Improvements	Grade Separation Investigation	Need for Enhanced Warning Devices
Low	High	No	No

Crossing Number 735 160V – Terrells Trailer Park

Looking South

Looking North

Looking East

Looking West

Appendix B – Public Comment Summary

Table App B.1 – Public Comment Summary	
Crossing	**Page Number**
General Comments	Appendix B-1
Dimmocks Mill Road	Appendix B-1
Alternative 1 – South Bellvue Avenue Crossing Closure	Appendix B-1
Alternative 2 – South Bellvue Avenue and West Hill Avenue South Crossing Closure	Appendix B-1
Town of Hillsborough Resolution	Appendix B-2

General Comments

- I am against closing any of these crossings. Years ago I witnessed a fire in that area. Needless to say there was pandemonium; people and cars need to get out and fire trucks need access. The little streets are not regulation-width and there is little extra room. I think all the crossings should be left open.
- When you speak about "closing railroad crossings", are you talking about blocking the road so no traffic can get through? This will be a hardship for almost everybody living in West Hillsborough if you close all three; and a nuisance for people who will have to funnel onto the street which remains open, if you close one or two of them.
- The West Hill Avenue South crossing with improvements would provide a clear unobstructed crossing that serves residents of that area and will serve future residential development. It is needed.
- However, there are other trails into the park and signage could be posted to encourage cyclists and pedestrians to enter the park where the streets of Collins and Occoneechee meet.
- If crossing(s) are closed, I think the community should have the option to have sidewalks installed on Eno Street between West Hill and Nash, or between Bellvue and Nash. It would be preferably for these to be on the RR side of Eno Street. As I understand that might not be possible, I believe we should not be annexing property to put in sidewalks before understanding the need, particularly between West Hill and Bellvue where sidewalks would significantly impact residential yards. The option for sidewalks should be granted, but the decision not made until after the changes have been in place for a period of time so that the actual impact on Eno Street can be felt, and the community can decide whether or not sidewalks are needed and worth the harm done to our neighbors' yards.
- I feel strongly that the neighborhood deserves more information about the situation and greater opportunity for feedback. I think very few people understand the increase of development planned around the intersections of Dimmocks, Eno, and Nash, and that the improvements to the trestle there are dependent on the closing of at least one of the other crossings.
- I'm guessing that a whole new underpass would be the most expensive project, and take the longest, although the result would presumably be smooth and open sailing; but perhaps the classic red flashing signal, with or without gates, would be more affordable and almost as effective.

Dimmocks Mill Road Improvements

- Dimmocks Mills is by far more dangerous and "improvements" don't really address the issue that the underpass is curved and ends abruptly at the intersection. This plan may reduce the difficulty but does not eliminate it and with traffic increasing it appears that additional work will need to be done in the not too distant future.
- Improving the trestle on Dimmocks Mill at Gold Park is essential. It feels far too dangerous as it is, especially for pedestrians and bikers.
- Improvements on Dimmocks Mill at West Hill are necessary if West Hill is to remain a crossing.

Alternative 1 – South Bellvue Avenue Crossing Closure

- The South Bellvue Avenue Crossing Closure proposal seems like the most practical. Will there be some type of traffic slow down and/or crossing signal some distance north of the tracks?
- The South Bellvue Avenue crossing is an unobstructed crossing that serves a business.
- Most traffic crossing the railroad at these 3 sites now is to get to Eno Mountain Road. If South Bellvue Avenue is to be closed it should not be done until after any improvement at the other sites is completed.
- If Bellvue needs to close to allow for the trestle to be fixed, I can support that, but please do not close West Hill.

Alternative 2 – South Bellvue Avenue and West Hill Avenue South Crossing Closures

- The South Bellvue Avenue and West Hill Avenue South Crossing closures are the only option that makes any sense. If you spend the money to improve the overpass. Why spend the money to improve the West Hill Avenue South crossing?
- In favor of closing the at-grade crossings at both West Hill Avenue South and South Bellvue Avenue if the grade separated crossing at Dimmocks Mill Road were improved so that there was safe passage for pedestrians and bicycles under the trestle.
- I would like to request that both the West Hill Avenue and the South Bellvue Avenue crossings be closed, and the Dimmocks Mill trestle area be updated for safety and accessibility by pedestrians. Eliminating traffic will enhance safety for all as it will decrease the car traffic overall on the side streets. Upgrades to the Dimmocks Mill trestle will also add long-term to the safety of pedestrians and bicyclists wanting to access Gold Park. Closing West Hill and South Bellvue will better route traffic through Nash Street or Ben Johnston. Nash Street now has a sidewalk and I don't think Ben Johnston will ever be walk-able. The residents of West Hillsborough are walkers and I think this will be the safest solution for all long-term.
- I strongly support closing the crossings at both West Hill and Bellvue. These are both dangerous crossings, especially the one on West Hill which has stranded at least 3 trucks on its tracks in the past 24 months. In addition, a school bus cannot make the turn from West Hill on to Dimmocks Mill without its rear covering the tracks while stopped to make the turn. To reconfigure the West Hill crossing would be very expensive and not worth the money when there is a slightly less convenient alternate just a few blocks away at Dimmocks Mill. Our dollars would be better invested at the Dimmocks Mill trestle crossing which is ESSENTIAL not only for the train and for car/trucks but for pedestrians needing a safe footway to reach Gold Park, a destination for neighborhood families. Strong consideration should also be given to a path or sidewalk along Eno as drivers are blinded by the sun and cannot see neighbors who are walking, jogging along this street that is likely to increase in traffic usage.

Town of Hillsborough Resolution

Resolution #20140908-12.C

Town of Hillsborough
Since 1754
(c) 1994 Town of Hillsborough

RESOLUTION RECEIVING THE RECOMMENDATIONS IN THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION'S
TRAFFIC SEPARATION STUDY FOR THE TOWN OF HILLSBOROUGH

WHEREAS, the North Carolina Department of Transportation, North Carolina Railroad, Norfolk Southern and the Town of Hillsborough, on the, entered into an agreement on the 20th day of July, 2011 for the performance of a railroad crossing analysis to eliminate redundant or unsafe crossings within the city limits;

WHEREAS, the parties supplemented this agreement to include traffic counts at key intersections in the study area;

WHEREAS, the North Carolina Department of Transportation, North Carolina Railroad, Norfolk Southern, and the Town of Hillsborough have agreed to make a "best faith" effort to adhere to the finding of the analysis and implement the recommendations of the analysis; and

WHEREAS, the analysis has been completed and the Town of Hillsborough received the recommendations in the North Carolina Department of transportation's "Traffic Separation Study for the Town of Hillsborough Concept 1 or 2", which includes the closure of the at-grade crossing at Bellevue Avenue (and Dimmocks Mill Road) along with significant improvement to the grade separation intersection trestle near Dimmocks Mill Road and South Nash Street.

NOW, THEREFORE, BE IT RESOLVED by the Town Board of Commissioners of the Town of Hillsborough that it does hereby receive the recommendations in the North Carolina Department of transportation's "Traffic Separation Study for the Town of Hillsborough Concept 1 or 2", expresses a preference for Concept 1 as discussed in the study, but further expresses its desire and intent to remain open to other options which may be developed upon further study to support public safety and connectivity, and, further, that the Town Board of Commissioners of the Town of Hillsborough does hereby request that the North Carolina Department of Transportation develop the necessary agreements for execution to move forward with the implementation of projects related to these recommendations.

This the 8th day of September, 2014.

Tom Stevens, Mayor

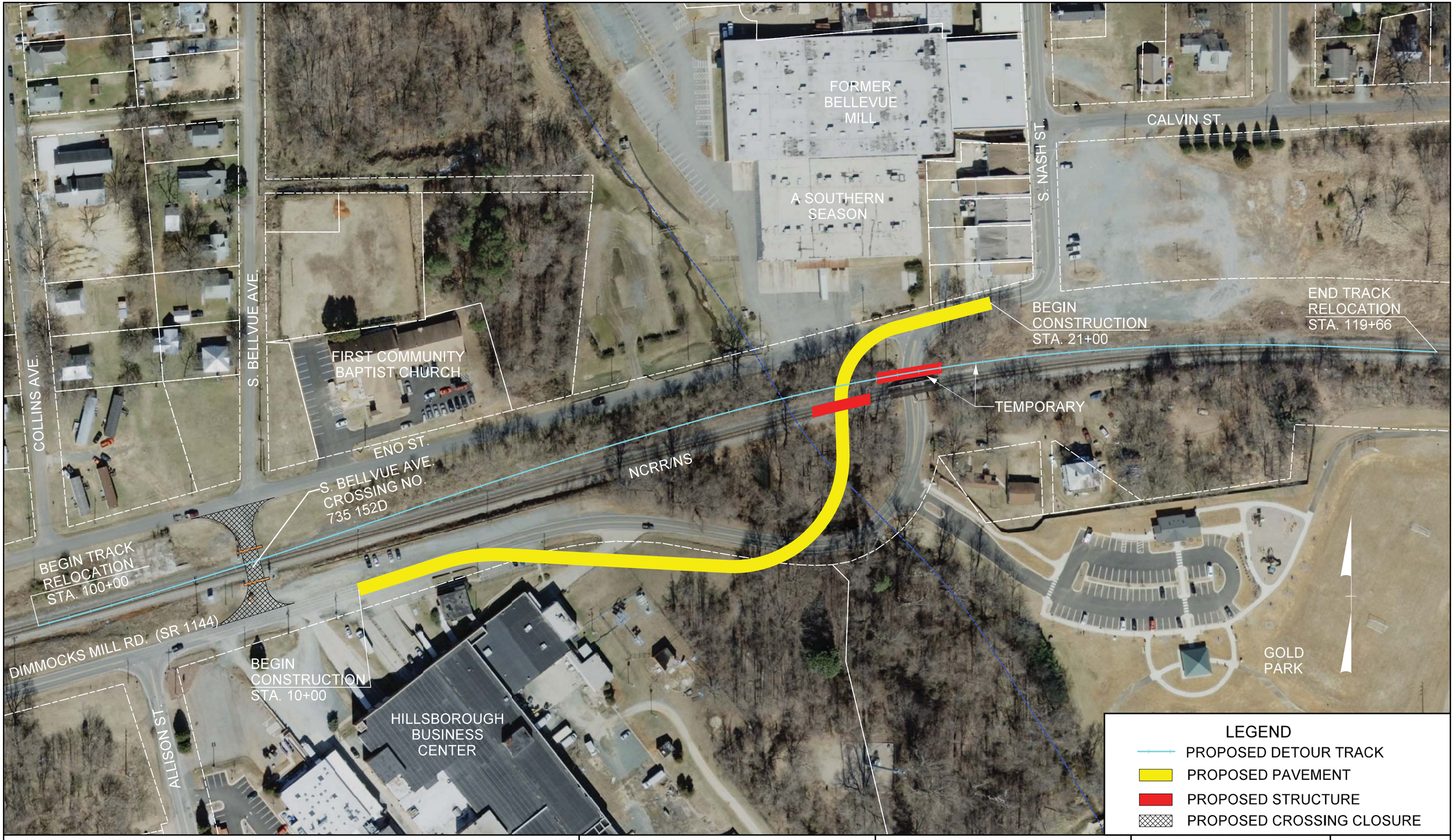
Attest:

Katherine M. Cathey, Town Clerk

101 East Orange Street • P. O. Box 429 • Hillsborough, North Carolina 27278
919-732-1270 • Fax 919-644-2390

North Carolina Department of Transportation
RAIL DIVISION

Appendix C –Eliminated Alternatives



Florence & Hutcheson
An ICA Company
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

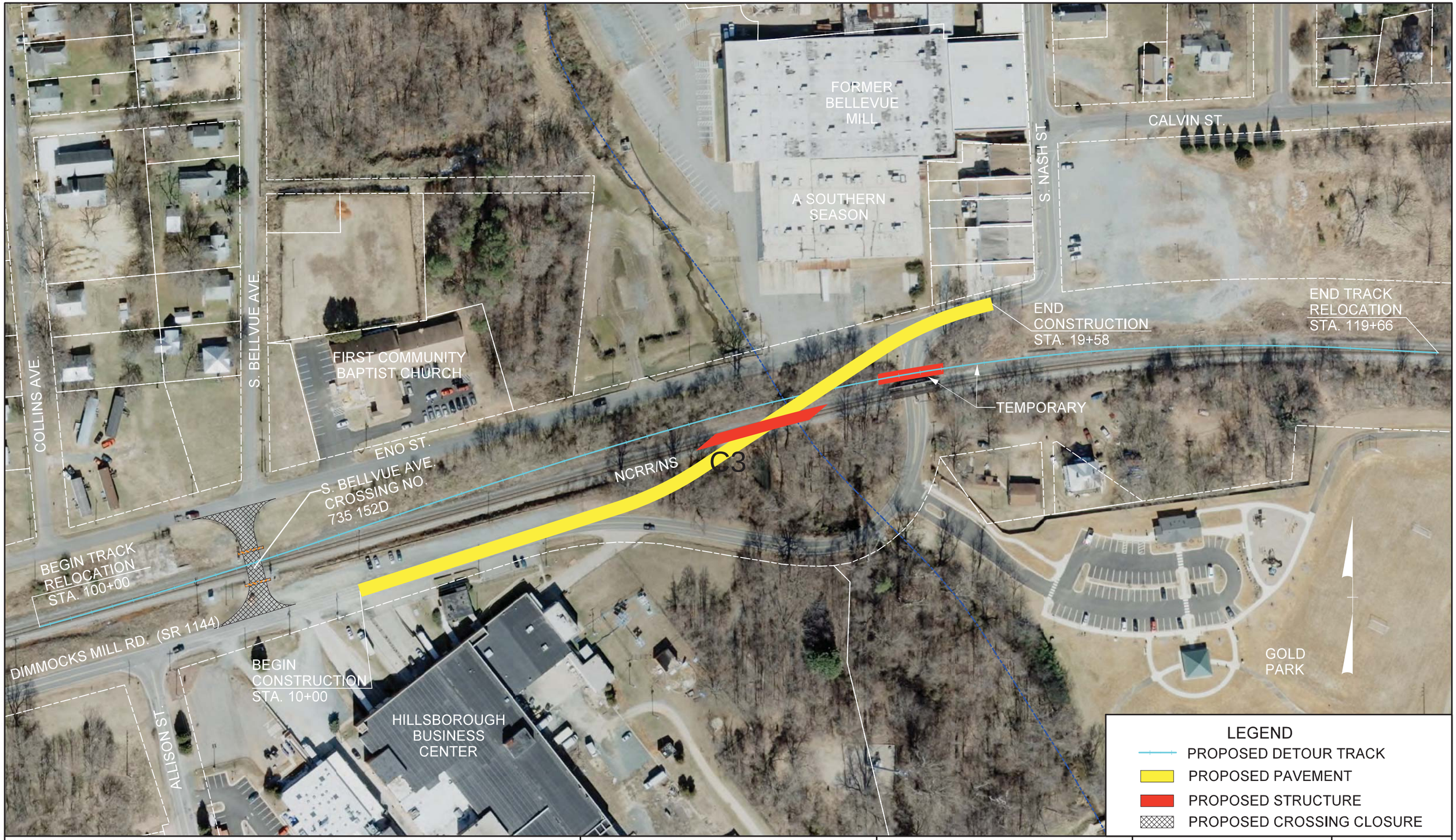
North Carolina Department of Transportation
RAIL DIVISION

HILLSBOROUGH TRAFFIC SEPARATION STUDY

DIMMOCKS MILL RD.
GRADE SEPARATION
CROSSING IMPROVEMENTS
CONCEPT #2

0' 60' 120' 180'

FIGURE NO.
C1



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NC License No: F-0258

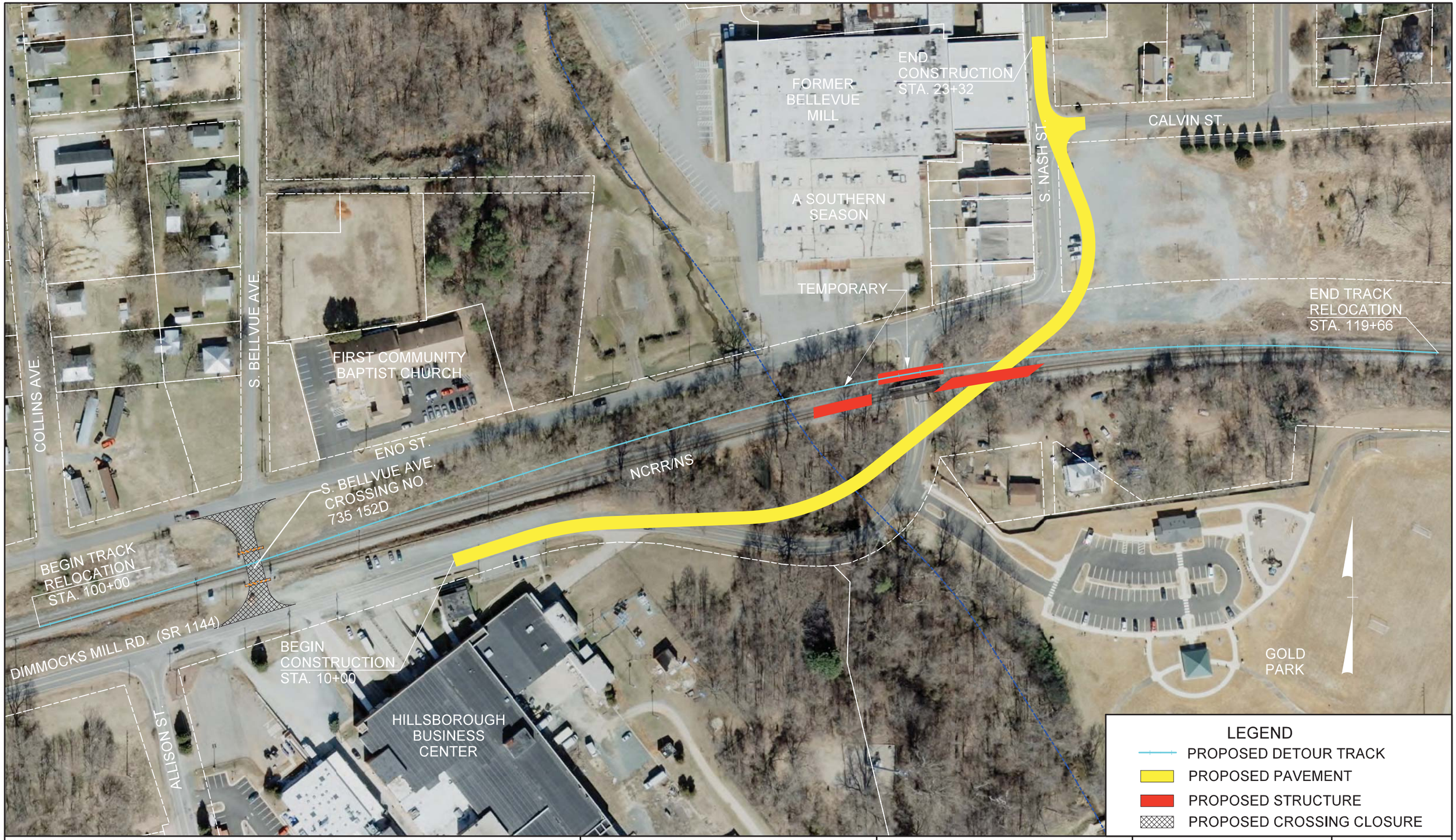
North Carolina Department of Transportation
RAIL DIVISION

HILLSBOROUGH TRAFFIC SEPARATION STUDY

DIMMOCKS MILL RD.
GRADE SEPARATION
CROSSING IMPROVEMENTS
CONCEPT #3

0' 60' 120' 180'

FIGURE NO.
C2



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North Carolina Department of Transportation
RAIL DIVISION

HILLSBOROUGH TRAFFIC SEPARATION STUDY

DIMMOCKS MILL RD.
GRADE SEPARATION
CROSSING IMPROVEMENTS
CONCEPT #4

0' 60' 120' 180'

FIGURE NO.
C3

Appendix D – Economic Analysis

Concept 1 – Summary of Benefits and Predicted Accidents

(Traditional Rail Model)

GradeDec.Net - Federal Railroad Administration - Internet Explorer

U.S. Department of Transportation
Federal Railroad Administration

GradeDec.Net - System for Highway-Rail Grade Crossing Investment Analysis

Current Settings ==>	User: mreep@flohut.com	Dataset: HillsboroughTSS	Model: Corridor	Corridor: NCRR - NS	Scenario: Improve W. Hill Ave. & Dimmocks Mill Rd.	Results: Placeholder - Corridor Model

Settings | Crossings | Import | Scenario | Parameters | Simulation | **Results** | Help | Update | Logout

Results: Placeholder - Corridor Model

Selected results data group: Benefits and Benefit-Cost Summary [Go] Show summary chart

	Variable	Mean Value	Standard Deviation
View	Safety benefits, thous $ PV	93.436	NaN
View	Travel time savings, thous $ PV	0.928	NaN
View	Environmental benefits, thous $ PV	0.004	NaN
View	Veh operating cost benefit, thous $ PV	0.064	NaN
View	Network benefits, thous $ PV	0.000	NaN
View	Total benefits, thous $ PV	1448.002	NaN
View	of this, benefits from induced trips, thous $ PV	0.027	NaN
View	of this, disbenefits from induced trips, thous $ PV	0.000	NaN
View	of this, investment salvage value, thous $ PV	1353.542	NaN
View	Total costs, thous $ PV	3862.900	NaN
View	Net benefits, thous $ PV	-2414.898	NaN
View	Benefit-cost ratio	0.375	NaN
View	Rate of return (constant dollars), %	-5.028	NaN
View	Local benefits (not included in summary), thous $ PV	72.400	NaN

GradeDec.Net - Federal Railroad Administration - Internet Explorer

U.S. Department of Transportation
Federal Railroad Administration

GradeDec.Net - System for Highway-Rail Grade Crossing Investment Analysis

Current Settings ==>	User: mreep@flohut.com	Dataset: HillsboroughTSS	Model: Corridor	Corridor: NCRR - NS	Scenario: Improve W. Hill Ave. & Dimmocks Mill Rd.	Results: Placeholder - Corridor Model

Settings | **Crossings** | Import | Scenario | Parameters | Simulation | Results | Help | Update | Logout

Crossings in the Corridor

Select a crossing to view or edit:
1. MP:40.36 ID:735151W NS - WEST HILL AVE.
2. MP:40.61 ID:735152D NS - BELLVUE AVE
3. MP:40.79 ID:735154S NS - DIMMOCKS MILL RD.

[Go] Enter "Delete Crossings" mode

Select data to view / edit: General | Devices | Highway | Rail | Cost | **APS MODEL** | HSR model

Data for the crossing MP:40.36 ID:735151W [Edit]

	Item	Value
Edit all	Number of accidents in previous five years at the crossing	1
Edit all	Include aggravating risk factors?	False

Edit to modify the data for the selected crossing.
NOTE: Click "Go" to refresh the data after "Edit all" or "Quick Import"

Recalculate Show Chart

Annual Predicted Accidents

		This Crossing		Corridor Summary	
		Base	Alt	Base	Alt
Fatal		0.004919	0.005123	0.006515	0.005123
Injury		0.014576	0.015183	0.019305	0.015183
PDO		0.032548	0.033902	0.043108	0.033902
Total		0.052043	0.054208	0.068928	0.054208

Concept 1 – Summary of Benefits and Predicted Accidents

(High Speed Rail Model)

GradeDec.Net - Federal Railroad Administration - Internet Explorer

U.S. Department of Transportation
Federal Railroad Administration

GradeDec.Net - System for Highway-Rail Grade Crossing Investment Analysis

Current Settings ==>	User: mreep@flohut.com	Dataset: HillsboroughTSS	Model: Corridor	Corridor: NCRR - NS	Scenario: Improve W. Hill Ave. & Dimmocks Mill Rd.	Results: Placeholder - Corridor Model

Settings | Crossings | Import | Scenario | Parameters | Simulation | **Results** | Help | Update | Logout

Results: Placeholder - Corridor Model

Selected results data group: Benefits and Benefit-Cost Summary [Go] Show summary chart

	Variable	Mean Value	Standard Deviation
View	Safety benefits, thous $ PV	231.797	NaN
View	Travel time savings, thous $ PV	0.928	NaN
View	Environmental benefits, thous $ PV	0.004	NaN
View	Veh operating cost benefit, thous $ PV	0.064	NaN
View	Network benefits, thous $ PV	0.000	NaN
View	Total benefits, thous $ PV	1586.463	NaN
View	of this, benefits from induced trips, thous $ PV	0.127	NaN
View	of this, disbenefits from induced trips, thous $ PV	0.000	NaN
View	of this, investment salvage value, thous $ PV	1353.542	NaN
View	Total costs, thous $ PV	3862.900	NaN
View	Net benefits, thous $ PV	-2276.437	NaN
View	Benefit-cost ratio	0.411	NaN
View	Rate of return (constant dollars), %	-4.437	NaN
View	Local benefits (not included in summary), thous $ PV	79.323	NaN

GradeDec.Net - Federal Railroad Administration - Internet Explorer

U.S. Department of Transportation
Federal Railroad Administration

GradeDec.Net - System for Highway-Rail Grade Crossing Investment Analysis

Current Settings ==>	User: mreep@flohut.com	Dataset: HillsboroughTSS	Model: Corridor	Corridor: NCRR - NS	Scenario: Improve W. Hill Ave. & Dimmocks Mill Rd.	Results: Placeholder - Corridor Model

Settings | **Crossings** | Import | Scenario | Parameters | Simulation | Results | Help | Update | Logout

Crossings in the Corridor

Select a crossing to view or edit:
1. MP:40.36 ID:735151W NS - WEST HILL AVE.
2. MP:40.61 ID:735152D NS - BELLVUE AVE.
3. MP:40.79 ID:735154S NS - DIMMOCKS MILL RD.

[Go] Enter "Delete Crossings" mode

Select data to view / edit: General | Devices | Highway | Rail | Cost | APS model | **HSR MODEL**

Data for the crossing MP:40.36 ID:735151W [Edit]

In this view there are no data to edit.

Recalculate Show Chart

Annual Predicted Occurences

		This Crossing		Corridor Summary	
		Base	Alt	Base	Alt
	Accidents	0.027904	0.030215	0.053462	0.030215
On Highways	**Fatalities**	0.007506	0.008127	0.014420	0.008127
	Injuries	0.013510	0.014629	0.025956	0.014629
	Fatalities	0.000325	0.000352	0.000613	0.000352
On Trains	**Injuries**	0.000585	0.000634	0.001103	0.000634
	Fatalities	0.007831	0.008479	0.015033	0.008479
Total	**Injuries**	0.014095	0.015263	0.027060	0.015263

FEDERAL RAILROAD ADMINISTRATION
GRADEDEC.NET
CORRIDOR AND CROSSING DATA
(without phased improvements)

User:	mreep@flohut.com
Dataset:	HillsboroughTSS
Corridor ID	5

Corridor Name	NCRR - NS				*Avg. No. Trains Per Day*	*Train Time-of-Day Distribution*
				Passenger	6.0	Uniform
Technology Factors	0.50	0.50	0.50	*Freight*	12.0	Uniform
Signal Synchronization?	False			*Switch*	4.0	Uniform

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 04-Jun-2014 2:31 pm

	Fatal	**Injury**	**PDO**	**Total**
Base	0.006515	0.019305	0.043108	0.068928
Alternate	0.005123	0.015183	0.033902	0.054208

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.36 | Crossing ID 735151W | Accidents in 5 Years 1

Description NS - WEST HILL AVE.

Paved? True	Urban? True
GCX Base Type	Gates
Safety Sup. Type	None
GCX Alt Type	Gates
Safety Sup. type	None
No. RR Tracks	1

Train Speeds (mph)	
Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics	*Base*	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.25	0.3
AADT	1,550	1,550
Auto TOD Dist	Uniform	Uniform
Percent Trucks	7.0	7.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform
Costs in '000 $ of Hway Improvement		870.0

Predicted Annual Accidents	*Base*	*Alternate*
Fatal	0.00492	0.00512
Injury	0.01458	0.01518
PDO	0.03255	0.03390
Total	0.05204	0.05421

Costs in '000 $	*Base*	*Alternate*
Grade Crossing Devices		
O&M	1.6	1.6
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

Milepost 40.61 | Crossing ID 735152D | Accidents in 5 Years 0

Description NS - BELLVUE AVE

Paved? True	Urban? True
GCX Base Type	Gates
Safety Sup. Type	None
GCX Alt Type	Closure
Safety Sup. type	None
No. RR Tracks	1

Train Speeds (mph)	
Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics	*Base*	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.20	0.2
AADT	1,150	1,150
Auto TOD Dist	Uniform	Uniform
Percent Trucks	3.0	3.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform
Costs in '000 $ of Hway Improvement		0.0

Predicted Annual Accidents	*Base*	*Alternate*
Fatal	0.00160	0.00000
Injury	0.00473	0.00000
PDO	0.01056	0.00000
Total	0.01688	0.00000

Costs in '000 $	*Base*	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.79 | Crossing ID 735154S | Accidents in 5 Years 0

Description NS - DIMMOCKS MILL RD.

Paved? True	Urban? True
GCX Base Type	Grade Separation
Safety Sup. Type	None
GCX Alt Type	Grade Separation
Safety Sup. type	None
No. RR Tracks	1

Train Speeds (mph)	
Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics	*Base*	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.20	0.2
AADT	1,800	1,800
Auto TOD Dist	Uniform	Uniform
Percent Trucks	6.0	6.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform
Costs in '000 $ of Hway Improvement		3,200.0

Predicted Annual Accidents	*Base*	*Alternate*
Fatal	0.00000	0.00000
Injury	0.00000	0.00000
PDO	0.00000	0.00000
Total	0.00000	0.00000

Costs in '000 $	*Base*	*Alternate*
Grade Crossing Devices		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

FEDERAL RAILROAD ADMINISTRATION

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CORRIDOR AND CROSSING DATA - HSR MODEL

(without phased improvements)

User: mreep@flohut.com
Dataset: HillsboroughTSS
Corridor ID 5

Corridor Name	NCRR - NS				Avg. No. Trains Per Day	Train Time-of-Day Distribution
				Passenger	6.0	Uniform
Technology Factors	0.50	0.50	0.50	*Freight*	12.0	Uniform
Signal Synchronization?	False			*Switch*	4.0	Uniform

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 04-Jun-2014 2:

		Train		Highway		Total	
	Accidents	**Fatalities**	**Injuries**	**Fatalities**	**Injuries**	**Fatalities**	**Injuries**
Base	0.053462	0.000613	0.001103	0.014420	0.025956	0.015033	0.027060
Alternate	0.030215	0.000352	0.000634	0.008127	0.014629	0.008479	0.015263

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.36 Crossing ID 735151W
Description NS - WEST HILL AVE.

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 1

GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Gates
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.027904	0.030215
Train Fatalities	0.000325	0.000352
Highway Fatalities	0.007506	0.008127
Train Injuries	0.000585	0.000634
Highway Injuries	0.013510	0.014629
Total Fatalities	0.007831	0.008479
Total Injuries	0.014095	0.015263

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.3	0.3
AADT	1,550	1,550
Auto TOD Dist	Uniform	Uniform
Percent Trucks	7.0	7.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 870.0

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	1.6
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

Milepost 40.61 Crossing ID 735152D
Description NS - BELLVUE AVE

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 0

GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Closure
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.025558	0.000000
Train Fatalities	0.000288	0.000000
Highway Fatalities	0.006914	0.000000
Train Injuries	0.000518	0.000000
Highway Injuries	0.012446	0.000000
Total Fatalities	0.007202	0.000000
Total Injuries	0.012964	0.000000

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.2	0.2
AADT	1,150	1,150
Auto TOD Dist	Uniform	Uniform
Percent Trucks	3.0	3.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 0.0

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.79 Crossing ID 735154S
Description NS - DIMMOCKS MILL RD.

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 0

GCX Base Type Grade Separation
Safety Sup. Type None
GCX Alt Type Grade Separation
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.000000	0.000000
Train Fatalities	0.000000	0.000000
Highway Fatalities	0.000000	0.000000
Train Injuries	0.000000	0.000000
Highway Injuries	0.000000	0.000000
Total Fatalities	0.000000	0.000000
Total Injuries	0.000000	0.000000

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.2	0.2
AADT	1,800	1,800
Auto TOD Dist	Uniform	Uniform
Percent Trucks	6.0	6.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 3,200.0

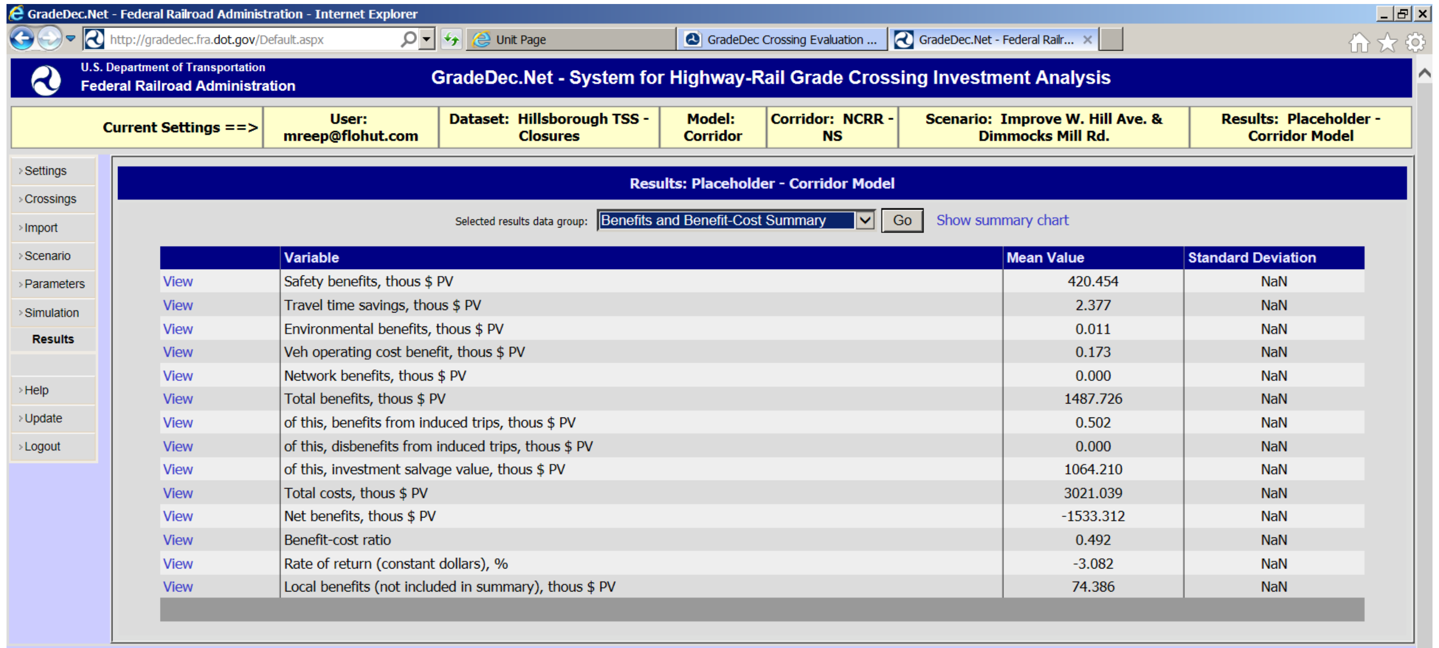
Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

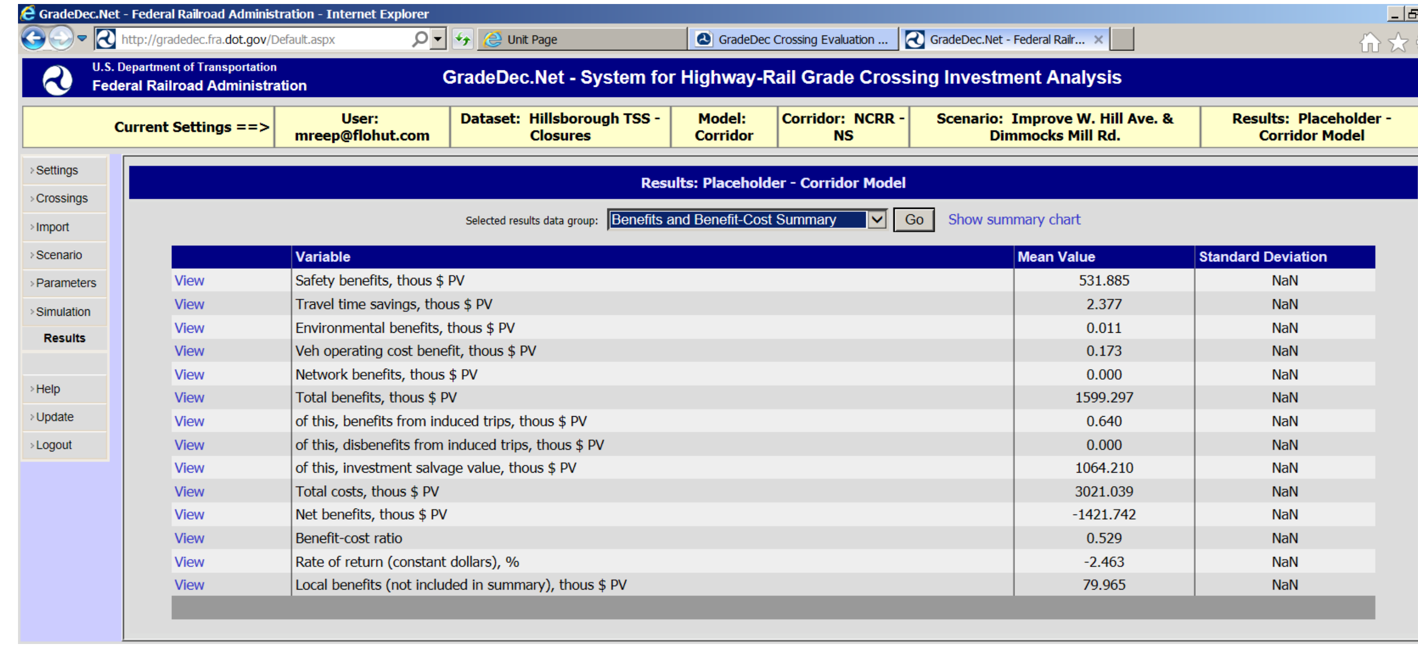
Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

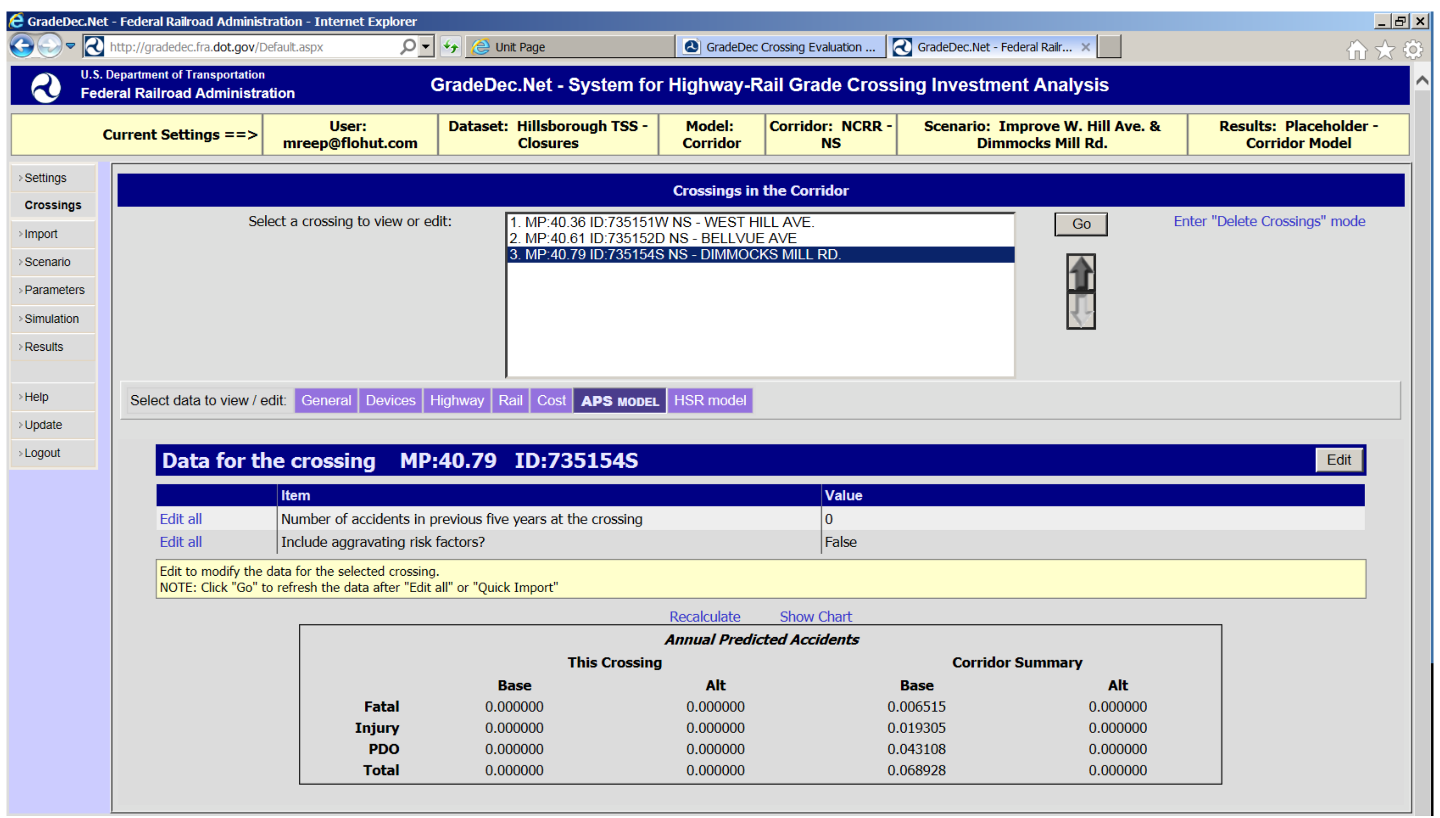
Concept 2 – Summary of Benefits and Predicted Accidents (Traditional Rail Model)	Concept 2 – Summary of Benefits and Predicted Accidents (High Speed Rail Model)



	Variable	Mean Value	Standard Deviation
View	Safety benefits, thous $ PV	420.454	NaN
View	Travel time savings, thous $ PV	2.377	NaN
View	Environmental benefits, thous $ PV	0.011	NaN
View	Veh operating cost benefit, thous $ PV	0.173	NaN
View	Network benefits, thous $ PV	0.000	NaN
View	Total benefits, thous $ PV	1487.726	NaN
View	of this, benefits from induced trips, thous $ PV	0.502	NaN
View	of this, disbenefits from induced trips, thous $ PV	0.000	NaN
View	of this, investment salvage value, thous $ PV	1064.210	NaN
View	Total costs, thous $ PV	3021.039	NaN
View	Net benefits, thous $ PV	-1533.312	NaN
View	Benefit-cost ratio	0.492	NaN
View	Rate of return (constant dollars), %	-3.082	NaN
View	Local benefits (not included in summary), thous $ PV	74.386	NaN



	Variable	Mean Value	Standard Deviation
View	Safety benefits, thous $ PV	531.885	NaN
View	Travel time savings, thous $ PV	2.377	NaN
View	Environmental benefits, thous $ PV	0.011	NaN
View	Veh operating cost benefit, thous $ PV	0.173	NaN
View	Network benefits, thous $ PV	0.000	NaN
View	Total benefits, thous $ PV	1599.297	NaN
View	of this, benefits from induced trips, thous $ PV	0.640	NaN
View	of this, disbenefits from induced trips, thous $ PV	0.000	NaN
View	of this, investment salvage value, thous $ PV	1064.210	NaN
View	Total costs, thous $ PV	3021.039	NaN
View	Net benefits, thous $ PV	-1421.742	NaN
View	Benefit-cost ratio	0.529	NaN
View	Rate of return (constant dollars), %	-2.463	NaN
View	Local benefits (not included in summary), thous $ PV	79.965	NaN



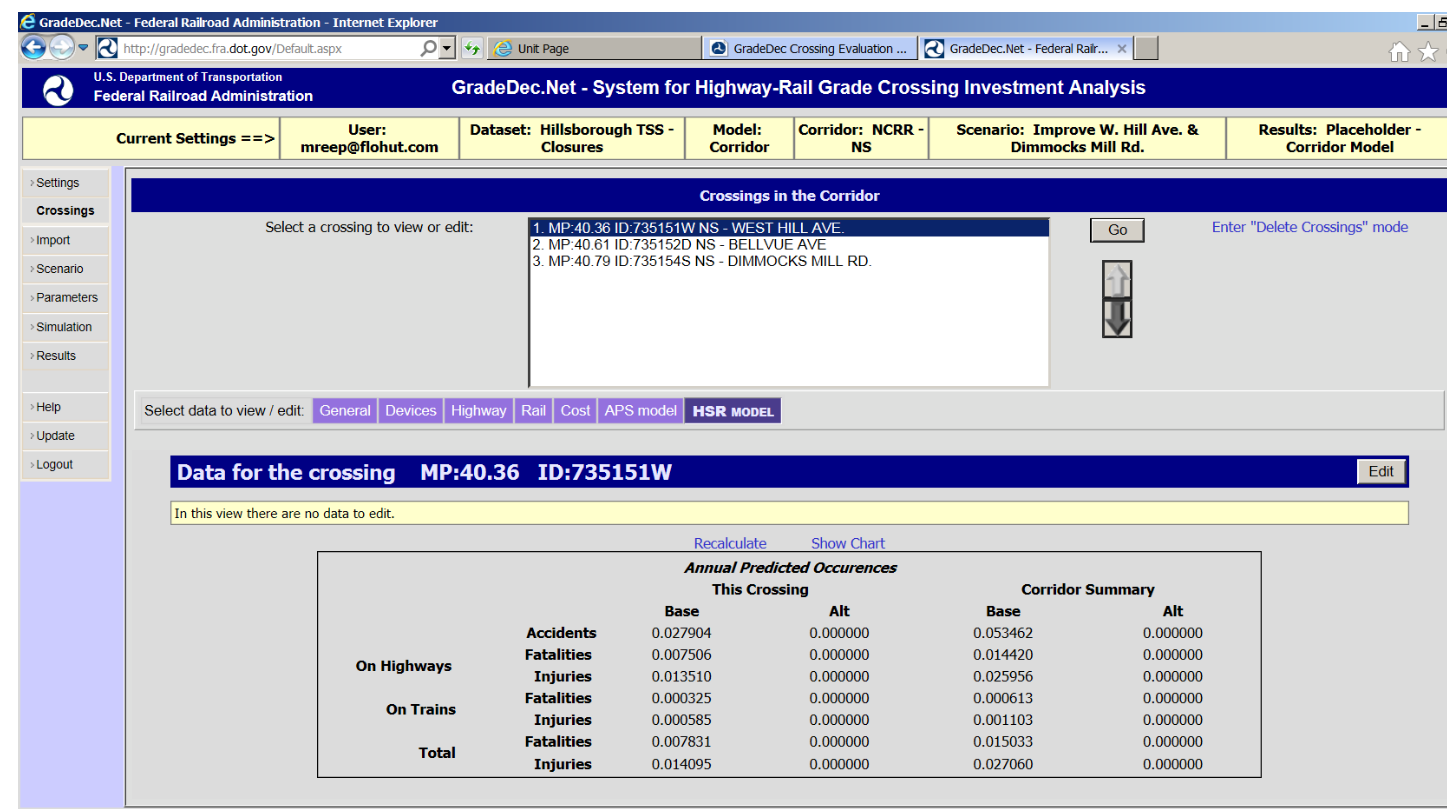
	Item	Value
Edit all	Number of accidents in previous five years at the crossing	0
Edit all	Include aggravating risk factors?	False

Edit to modify the data for the selected crossing.
NOTE: Click "Go" to refresh the data after "Edit all" or "Quick Import"

Recalculate Show Chart

Annual Predicted Accidents

	This Crossing Base	This Crossing Alt	Corridor Summary Base	Corridor Summary Alt
Fatal	0.000000	0.000000	0.006515	0.000000
Injury	0.000000	0.000000	0.019305	0.000000
PDO	0.000000	0.000000	0.043108	0.000000
Total	0.000000	0.000000	0.068928	0.000000



Annual Predicted Occurences

		This Crossing Base	This Crossing Alt	Corridor Summary Base	Corridor Summary Alt
On Highways	**Accidents**	0.027904	0.000000	0.053462	0.000000
	Fatalities	0.007506	0.000000	0.014420	0.000000
	Injuries	0.013510	0.000000	0.025956	0.000000
On Trains	**Fatalities**	0.000325	0.000000	0.000613	0.000000
	Injuries	0.000585	0.000000	0.001103	0.000000
Total	**Fatalities**	0.007831	0.000000	0.015033	0.000000
	Injuries	0.014095	0.000000	0.027060	0.000000

FEDERAL RAILROAD ADMINISTRATION

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CORRIDOR AND CROSSING DATA

(without phased improvements)

User: mreep@flohut.com
Dataset: Hillsborough TSS - Closures
Corridor ID 5

					Avg. No. Trains Per Day	*Train Time-of-Day Distribution*
Corridor Name	NCRR - NS					
				Passenger	6.0	Uniform
Technology Factors	0.50	0.50	0.50	*Freight*	12.0	Uniform
Signal Synchronization?	False			*Switch*	4.0	Uniform

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 04-Jun-2014 3:22 pm

	Fatal	Injury	PDO	Total
Base	0.006515	0.019305	0.043108	0.068928
Alternate	0.000000	0.000000	0.000000	0.000000

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.36 Crossing ID 735151W Accidents in 5 Years 1

Description NS - WEST HILL AVE.

Paved? True Urban? True
GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Closure
Safety Sup. type None

No. RR Tracks 1

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics

	Base	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.25	0.3
AADT	1,550	1,550
Auto TOD Dist	Uniform	Uniform
Percent Trucks	7.0	7.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Costs in '000 $ of Hway Improvement 0.0

Predicted Annual Accidents

	Base	*Alternate*
Fatal	0.00492	0.00000
Injury	0.01458	0.00000
PDO	0.03255	0.00000
Total	0.05204	0.00000

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

Milepost 40.61 Crossing ID 735152D Accidents in 5 Years 0

Description NS - BELLVUE AVE

Paved? True Urban? True
GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Closure
Safety Sup. type None

No. RR Tracks 1

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics

	Base	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.20	0.2
AADT	1,150	1,150
Auto TOD Dist	Uniform	Uniform
Percent Trucks	3.0	3.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Costs in '000 $ of Hway Improvement 0.0

Predicted Annual Accidents

	Base	*Alternate*
Fatal	0.00160	0.00000
Injury	0.00473	0.00000
PDO	0.01056	0.00000
Total	0.01688	0.00000

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.79 Crossing ID 735154S Accidents in 5 Years 0

Description NS - DIMMOCKS MILL RD.

Paved? True Urban? True
GCX Base Type Grade Separation
Safety Sup. Type None
GCX Alt Type Grade Separation
Safety Sup. type None

No. RR Tracks 1

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Highway Traffic Characteristics

	Base	*Alternate*
H'way Lanes	2	2.0
Dist from hway	0.20	0.2
AADT	1,800	1,800
Auto TOD Dist	Uniform	Uniform
Percent Trucks	6.0	6.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Costs in '000 $ of Hway Improvement 3,200.0

Predicted Annual Accidents

	Base	*Alternate*
Fatal	0.00000	0.00000
Injury	0.00000	0.00000
PDO	0.00000	0.00000
Total	0.00000	0.00000

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

FEDERAL RAILROAD ADMINISTRATION

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CORRIDOR AND CROSSING DATA - HSR MODEL

(without phased improvements)

User: mreep@flohut.com
Dataset: Hillsborough TSS - Closures
Corridor ID 5

Corridor Name	NCRR - NS				Avg. No. Trains Per Day	Train Time-of-Day Distribution
				Passenger	6.0	Uniform
Technology Factors	0.50	0.50	0.50	*Freight*	12.0	Uniform
Signal Synchronization?	False			*Switch*	4.0	Uniform

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 04-Jun-2014 3:

	Train			Highway		Total	
	Accidents	**Fatalities**	**Injuries**	**Fatalities**	**Injuries**	**Fatalities**	**Injuries**
Base	0.053462	0.000613	0.001103	0.014420	0.025956	0.015033	0.027060
Alternate	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.36 Crossing ID 735151W
Description NS - WEST HILL AVE.

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 1

GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Closure
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.027904	0.000000
Train Fatalities	0.000325	0.000000
Highway Fatalities	0.007506	0.000000
Train Injuries	0.000585	0.000000
Highway Injuries	0.013510	0.000000
Total Fatalities	0.007831	0.000000
Total Injuries	0.014095	0.000000

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.3	0.3
AADT	1,550	1,550
Auto TOD Dist	Uniform	Uniform
Percent Trucks	7.0	7.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 0.0

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

Milepost 40.61 Crossing ID 735152D
Description NS - BELLVUE AVE

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 0

GCX Base Type Gates
Safety Sup. Type None
GCX Alt Type Closure
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.025558	0.000000
Train Fatalities	0.000288	0.000000
Highway Fatalities	0.006914	0.000000
Train Injuries	0.000518	0.000000
Highway Injuries	0.012446	0.000000
Total Fatalities	0.007202	0.000000
Total Injuries	0.012964	0.000000

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.2	0.2
AADT	1,150	1,150
Auto TOD Dist	Uniform	Uniform
Percent Trucks	3.0	3.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 0.0

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	1.6	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0

CROSSING DATA FOR THE NCRR - NS CORRIDOR

Milepost 40.79 Crossing ID 735154S
Description NS - DIMMOCKS MILL RD.

Paved? True Urban? True
No. RR Tracks 1
Accidents in 5 Years 0

GCX Base Type Grade Separation
Safety Sup. Type None
GCX Alt Type Grade Separation
Safety Sup. type None

Predicted Annual Accidents

	Base	*Alternate*
Accidents	0.000000	0.000000
Train Fatalities	0.000000	0.000000
Highway Fatalities	0.000000	0.000000
Train Injuries	0.000000	0.000000
Highway Injuries	0.000000	0.000000
Total Fatalities	0.000000	0.000000
Total Injuries	0.000000	0.000000

Highway Traffic Characteristics

	Base	*Alternate*
Lanes	2	2.0
Dist from H'way	0.2	0.2
AADT	1,800	1,800
Auto TOD Dist	Uniform	Uniform
Percent Trucks	6.0	6.0
Of this, % trailers	0.0	0.0
Truck TOD Dist	Uniform	Uniform
Percent Bus	0.0	0.0
Bus TOD Dist	Uniform	Uniform

Cost of H'way Improvements ('000$) 3,200.0

Train Speeds (mph)

Max Timetable	59.0
Passenger	59.0
Freight	47.2
Switch	17.7

Costs in '000 $

	Base	*Alternate*
Grade Crossing Devices		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0
Supplementary Safety		
O&M	0.0	0.0
Oth. Lcycle	0.0	0.0
Capital		0.0