Newark - Park Avenue and 4th Street Road Safety Audit

FINAL REPORT

February 2012

Submitted by

Andy Kaplan Engineer Researcher

Ashley Machado Engineer Researcher

Carlos Lopez Engineer Researcher

Keeryde Talasan Traffic Engineering Intern

Center for Advanced Infrastructure & Transportation (CAIT)

Rutgers, The State University of New Jersey



NJDOT Research Project Manager David Martin

In cooperation with

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Bureau of Transportation Data Development
and
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Federal Highway Administration

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CAIT's Transportation Safety Resource Center (TSRC) and New Jersey Local Technical Assistance Program (NJLTAP) offer a statewide Road Safety Audit (RSA) service at no charge to New Jersey towns and counties. Interested parties can request road surveys conducted by a team of engineers, planners, and law-enforcement officers to help municipalities and counties make cost-effective safety improvements.

A multidisciplinary team of professionals offers assessments on roadway issues such as pedestrian and bicycle safety, intersection analyses, rural roads, human factors, speed management, and sign visibility and retroreflectivity standards.

RSAs include data-driven considerations and analysis of crashes. To determine the best safety solutions, RSA professionals perform incisive crash data evaluations on the target area using Plan4Safety, TSRC's award-winning crash database and software.

The RSA team provides a final report that includes long- and short-term countermeasure recommendations that fit within the requestor's budget. Furthermore, RSAs pay off: According to the Federal Highway Administration (FHWA), countermeasures applied after RSAs can reduce crashes by about 60 percent.

For more information, contact Andy Kaplan, engineer researcher, at akaplan1@rutgers.edu

Table of Contents

Introduction	1
Background	1
Road Safety Audit Process	3
Information Sources	3
RSA Team	4
Crash Data	5
RSA Team Findings	6
RSA Team General Observations	6
RSA Team Specific Findings	7
Potential Funding Sources	17
RSA Team's Conclusion	21
Appendix A	22
Raw Crash Data	23
Collision Diagram	25
Appendix B	26
Straight Line Diagrams	27
Appendix C	29
NI Transit Rus #41	30

Introduction

In the winter of 2011, a partnership was formed between the Rutgers Transportation Safety Resource Center (TSRC) and Caminos Seguros—a Division of Highway Traffic Safety (DHTS)—funded, community-based transportation safety program—to analyze safety concerns. The coordinators at La Casa de Don Pedro (La Casa), the community organization overseeing the northern New Jersey region of Caminos Seguros, worked with TSRC's Plan4Safety tool to identify crash-prone locations in northern Newark. One of the locations noted was the intersection of Park Avenue and 4th Street in Newark. The safety concerns identified included a history of pedestrian crashes, lack of pedestrian accommodations, proximity to transit facilities, and congestion at this intersection. A Road Safety Audit (RSA) was performed at said intersection, and this report documents the findings and recommendations made by the audit team.

A RSA is a safety performance evaluation done by an independent, multidisciplinary team on existing or future roads and intersections. The team identifies and foresees any potential road safety issues that could be hazardous to not only the motorized traffic, but to all road users including pedestrians and bicyclists.

Background



Figure 1 - Map of study area (Google Earth)

The intersection of Park Avenue and 4th Street (also known as 1st Street) is shown in Figure 1 above. Park Avenue, also known as County Route 658, is an Urban Principal Arterial with two lanes in each direction except through Branch Brook Park, where it drops to a single lane in each direction. Park Avenue runs about 4 miles in an east/west direction through the cities of Newark, East Orange, Orange

and West Orange. While Park Avenue is parallel and north of Interstate 280, 4th Street provides a direct connection between Park Avenue and the nearest I-280 entrance/exit. Except at the intersection and near the entrance/exit with I-280, 4th Street runs north/south with one lane in each direction. The speed limit in the study area is 25 miles per hour (mph).

The land use around the intersection is split between commercial and park land. To the west of the intersection are mostly commercial businesses with many access driveways. Fast-food restaurants, a gas station, and an auto detail center are in the immediate

Park Ave //4th St.

Park Ave nua Detail Center

Park Ave NLR Station

Coogle

Figure 2 Businesses and NLR station (Google Earth)

vicinity of the study area, as shown in Figure 2. To the east lies Branch Brook Park and its 360 acres of park land. ¹

Barringer High School Barringer High School

Figure 3 – Schools (Google Earth)

The NJ Transit Bus Route 41 (NJT #41), Orange to Newark, serves this intersection with a bus stop located on either side of Park Avenue. NJT #41 serves Park Avenue though the cities of Orange, East Orange, and Newark, and then turns onto Broad Street to end at Lincoln Park in downtown Newark.

NJ Transit also has the Newark Light Rail (NLR), which has a branch that stops at the Park Avenue/4th Street intersection. This branch of the NLR has 12 stops that connect the towns of Bloomfield and Belleville with Newark Penn Station. The line runs from Newark Penn Station through the University Heights neighborhood and then turns north, running the west edge of Branch Brook Park.

As shown in Figure 3, there are two public schools in the immediate area of the intersection. On the opposite side of Branch Brook Park is Barringer High School, which, as of the 2008–2009 school year, had an enrollment of 1,763 students. Located on 7th Street, off of Park Avenue, is the Dr. William Horton Elementary School, which enrolled 871 students, ranging from kindergarten to 8th grade, during the 2008–2009 school year. ²

2

¹http://www.essex-countynj.org/p/index.php?section=parks/sites/bb

²http://nces.ed.gov/

Road Safety Audit Process

The Park Avenue/4th Street RSA followed a process that began with data collection, a crucial task that served as the backbone for recommendations for improvement. Crash data was collected using Plan4Safety, a crash data analysis tool, and consisted of crash types, locations, years, road conditions, and contributing circumstances. Using the crash data, a collision diagram, shown in appendix A, was produced that showed crash types and locations.



Figure 4 - RSA team conducting site visit

The Road Safety Audit occurred on March 29, 2011. The day began with a pre-audit meeting that involved the definition of road safety audit and an overview of the intersection. A presentation showing details of the crash analysis, aerial images of the site, and an overview of NJ Transit service in the area was shown. Following the presentation, a site visit was conducted where all participants were given a chance to inspect the site and utilize their various backgrounds to brainstorm recommended improvements. After the site visit, the team was brought back together to discuss the issues observed and to discuss recommendations to remedy the issues.

Information Sources

Several sources of information were used in the RSA process. For example, crash data from 2008–2010 was examined for trends and patterns. Specific resources used in the analysis include:

- NJDOT Crash Database (2008–2010)³
- Plan4Safety Crash Data Analysis Tool
- NJDOT Straight Line Diagrams
- NJ Transit Bus Routes
- National Center for Education Statistics (NCES)
- Google Earth

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³ At the time of the Audit, the City of Newark did not submit approximately 7,000 of the approximate 14,000 2010 crash reports. The number reflected in this report includes three additional 2010 crashes.

RSA Team

The RSA team consisted of 29 members, including police officers, engineers, and planners, from different agencies across the state.

Name	Organization	Phone	Email
Ashley Machado	Rutgers-TSRC	609-530-4684	amachado@rci.rutgers.edu
Andrew Kaplan	Rutgers-TSRC	609-213-6252	akaplan1@rci.rutgers.edu
Carlos Lopez	Rutgers-TSRC	201-674-8655	carlos.lopez@rci.rutgers.edu
Michael Weber	Rutgers-TSRC	732-445-3919 x 134	michael.weber@rci.rutgers.edu
Keeryde Talasan	Rutgers-TSRC	N/A	ktalasan@eden.rutgers.edu
Dan Krowetz	La Casa de Don Pedro	973-485-0701	dkrowetz@gmail.com
Alle Ries	La Casa de Don Pedro	973-485-0701	aries@lacasanwk.org
Aida Duran	La Casa de Don Pedro	973-485-0701	aduran@lacasanwk.org
Melissa Ramos	La Casa de Don Pedro	973-485-0701	mramos@lacasanwk.org
Chanda Gaither	La Casa de Don Pedro	973-485-0701	cgaither@lacasanwk.org
Andrés Roda	Rutgers-CAIT	732-445-3632 x 144	aroda@rci.rutgers.edu
Brian Tobin	Rutgers-CAIT	732-445-0579 x 109	btobin@rci.rutgers.edu
Charles Brown	Rutgers-VTC	732-932-6812 x 771	charles.brown@ejb.rutgers.edu
Leigh Ann Von Hagen	Rutgers-VTC	732-932-6812 X 613	lavh@ejb.rutgers.edu
Josh Schneider	NJTPA	973-639-8420	jschneider@njtpa.org
William Riviere	NJDOT-Bike/Ped	609-530-4646	william.riviere@dot.state.nj.us
Khalid Shaikh	NJDOT	609-530-2476	Khalid.Shaikh@dot.state.nj.us
John Nellegar	NJ Transit	973-522-3688	jnellegar@njtransit.com
Juan Feijoo	City of Newark	973-733-6460	juanf@ci.newark.nj.us
Capt. Anthony Perez	Newark Police	973-733-6044	pereza@ci.newark.nj.us
Sgt. John Siino	Newark Police	973-733-6378	siinoj@ci.newark.nj.us
P.O. Kim Gasavage	Newark Police	N/A	gasavagek@ci.newark.nj.us
David Antonio	County of Essex	973-220-8500	dantonio@essexcountynj.org
Willie Derricotte	County of Essex	973-220-8500	wderricotte@essexcountynj.org
Caroline Trueman	FHWA- NJ Division	609-637-4234	caroline.trueman@dot.gov
Violet Marrero	DHTS	609-633-9161	violet.marrero@lps.state.nj.us
Dawn Snyder	UMDNJ	973-972-4006	mondaddl@umdnj.edu
Sharon Clancy	UMDNJ	973-972-7797	clancysf@umdnj.edu
Daniel Kolodziej	Meadow Link	201-939-4242	dkolodziej@ezride.org

Crash Data

As of the date of this report, the crash data reported by the NJDOT shows a total of 29 crashes occurring during the four-year period from 2008 to 2010. The following tables show certain statistics of the crash data analyzed.

Table 1 summarizes crash data by direction of travel vs. crash type. The numbers in the table are of vehicles involved in crashes.

Directi on of Travel	Same Direction - Rear End	Same Direction - Side Swipe	Right Angle	Opposite Direction - Head On/Angular	Struck Parked Vehicle	Left Turn / U- Turn	Backing	Pedestrian	Other	Total
North	6	0	3	2	0	1	2	0	1	15
East	11	2	4	1	2	3	0	1	0	24
South	0	0	1	1	0	1	0	1	0	4
West	2	2	0	1	0	3	0	1	0	9
Total	19	4	8	5	2	8	2	3	1	

Table 1 – Direction of travel vs. crash type (2008–2010)

Four pedestrian crashes were observed between 2008 and 2010 at this intersection and are detailed in table 2. Note that 75 percent of the pedestrian crashes occurred during nighttime.

DATE	TIME	ENVIRONMENTAL CONDITION	LIGHT CONDITION	PEDESTRIANS INJURED	SEVERITY	SURFACE CONDITION
2/9/2009	6:30 PM	Clear	Dark (street lights on/continuous)	1	Injury	Dry
1/21/2010	8:52 PM	Clear	Dark (street lights on/continuous)	1	Injury	Dry
6/3/2010	2:55 PM	Clear	Daylight	1	Injury	Dry

Table 2 – Pedestrian crash data 2008–2010

RSA Team Findings

RSA Team General Observations

The following is a summary of general observations made by the team that may be outside the scope of this RSA, but should be noted.

- 1. During the RSA, it was brought to the attention of the team that the fire house two blocks west of the intersection was observed to pull out their fire trucks during morning peak hour and block one west-bound lane. This caused significant congestion for west-bound traffic. Newark PD advised that this was the firehouse conducting their "changeover," where they pull out the trucks to inspect all equipment before shift changes.
- 2. A representative from the Newark Department of Engineering notified the team that crash data from the NJDOT statewide database for the City of Newark was incomplete for the year 2010. By NJDOT estimate, approximately 7,000 crash reports were not included. It was advised that the City of Newark is working to resolve this issue with NJDOT.
- 3. Emergency medical services (EMS) use 4th Street heavily to get to/from University Hospital. It was observed, during the site visit, that ambulances were delayed due to congestion at this intersection and from parked vehicles.
- 4. The reconstruction of the Nesbitt and Clifton Streets bridges may have had a negative impact on traffic in the area during recent years. As of the date of this report, both bridges have been reopened.
- 5. It was noted that bicycle accommodations at and in the vicinity of this site were minimal. It was recommended to further study appropriately accommodating bicycle users in context of the broader transportation system connectivity.

RSA Team Specific Findings

The following represents the specific findings and recommendations made by the RSA team. The red shaded areas represent recommendations thought to be low-cost improvements, which can be implemented in the short-term.

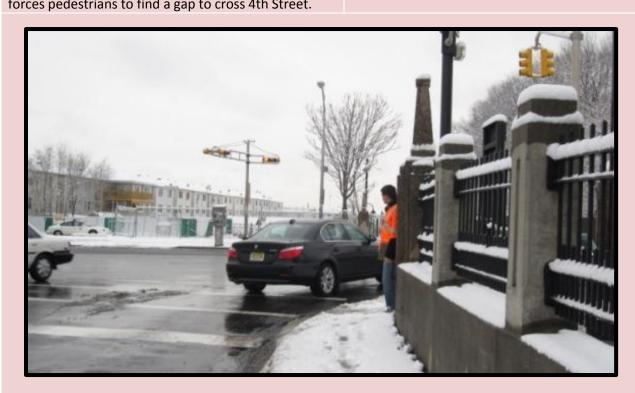
All recommendations and designs should be thoroughly evaluated with due diligence and designed as appropriate by the roadway owner and/or a professional engineer for conformance to codes, standards, and best practices.

Issue: East-bound "Delayed Green" Sign	Safety Risk		
Description: The west-bound approach on Park	Medium		
Avenue has a lead green phase for all movements.			
Since there is no indication of the west-bound lead			
on the east-bound approach, this may cause			
inattentive motorists to proceed through the red			
light based on the movement of the opposing			
traffic.			
RSA Team's Recommendation	Cost	Potential Safety Benefit	
Install "Delayed Green" signs on the east-bound	Low	Medium	
approach, as per the MUTCD.			

Issue: East-bound Lane Drop	Safety Risk		
Description: East of the intersection, two east-bound lanes merge into one lane with no advance warning.	Low		
RSA Team's Recommendation	Cost	Potential Safety Benefit	
Install advance warning signs and/or merge arrow pavement markings, as per the MUTCD, to indicate the merge.	Low	High	

Issue: Deteriorated Sidewalk	Safety Risk		
Description: Parts of the sidewalk surrounding the intersection are in poor condition creating a tripping hazard and making them impassable by pedestrians with disabilities.	High		
RSA Team's Recommendation	Cost	Potential Safety Benefit	
Repair/replace sidewalk as needed.	Medium	High	

Issue: Right Turns on Red on 4th Street	Safety Risk
Description: Heavy right turn traffic off of 4th Street	High
forces nedestrians to find a gan to cross 4th Street	



RSA Team's Recommendation	Cost	Potential Safety Benefit
Add signs alerting turning vehicles of the stop for	Low	High
pedestrian law. Also investigate possibility of		
eliminating right turns on red.		

Issue: Accessible Curb Ramps	Safety Risk		
Description: Accessible compliant curb ramps are missing. This makes it very difficult for pedestrians with disabilities to cross either street.	N	1edium	
RSA Team's Recommendation	Cost	Potential Safety Benefit	
Install accessible compliant curb ramps.	Medium	Low	

Issue: East-bound Right Turns – Car Wash Sign	Safety Risk
Description: The car wash business in the southwest	Medium
corner of the intersection has sidewalk signs that limit	
the sight distance for drivers making a right turn onto	
4th Street.	



RSA Team's Recommendation	Cost	Potential Safety Benefit
Review current regulations on sidewalk signs and	Low	Medium
reach out to the car wash business to discuss safety		
concerns.		

Issue: Lack of Pedestrian Signals Description: No pedestrian signals are present, and pedestrians have a very limited view of the current traffic signals. This may lead pedestrians to cross both streets at inappropriate times.





RSA Team's Recommendation	Cost	Potential Safety Benefit
Install countdown pedestrian signal equipment	Medium	Medium
with pedestrian push buttons conforming to the		
MUTCD.		

Issue: Park Avenue Crosswalks	Safety Risk
Description: Crosswalks are missing on Park Avenue.	High





RSA Team's Recommendation	Cost	Potential Safety Benefit
Install high visibility style crosswalks, conforming	Low	Medium
to Essex County's standards for installation, on the		
east and west side of the intersection.		

Issue: Bicyclists	Safety Risk
Description: Intersection is located next to a park	Medium
where bicycle traffic was observed. Currently, no	
bicyclist accommodations are present.	





RSA Team's Recommendation	Cost	Potential Safety Benefit
Investigate the installation of signs and/or shared lane use markings to alert drivers of the presence of bicyclists.	Low	Medium

Issue: General Lighting	Safety Risk	
Description: Three out of the four pedestrian crashes at this intersection occurred at night. This may indicate poor lighting conditions.	High	
RSA Team's Recommendation	Cost	Potential Safety Benefit
A design engineer should be consulted to review and perform a lighting study at the intersection. The engineer should prepare a plan indicating the appropriate location of any proposed lighting improvement.	Medium/High	High

Issue: Damaged Light Pole	Safety Risk
Description: The light pole in the southeast corner of the intersection has been knocked down leaving an exposed foundation.	High



RSA Team's Recommendation	Cost	Potential Safety Benefit
In the short-term, the knocked down equipment	Medium/High	High
should be replaced. Additionally, a design engineer		
should be consulted to review and perform a		
lighting study at the intersection. The engineer		
should prepare a plan indicating the appropriate		
location of any proposed lighting improvement,		
and a contractor should be hired to install the		
lighting improvement.		

Issue: Fixed Time Signal	Safety Risk	
Description: The signal at the intersection is a fixed time signal, which may not be optimal for the amount of traffic experienced.	Low	
RSA Team's Recommendation	Cost	Potential Safety Benefit
A design engineer should be consulted to perform a signal study. The engineer should prepare a plan indicating the proposed improvements to signal operations.	Medium	Low

Issue: Lead Left without Arrows	Safety Risk
Description: West-bound traffic on Park Avenue has	High
a protected lead left but no signal arrows to	
indicate when that protection terminates. Drivers	
may initially hesitate to make a left as they are	
unaware that it is protected. Drivers are also	
unaware when the lead terminates and left-turning	
vehicles no longer have the right-of-way when	
opposing traffic is released.	



RSA Team's Recommendation	Cost	Potential Safety Benefit
A design engineer should be consulted to perform a	Medium	High
signal study. The engineer should prepare a plan		
indicating the proposed improvements to signal		
operations.		

Issue: East-bound Glare	Safety Risk			
Description: East-bound traffic may experience glare in the morning due to the incline leading to the signal. This may result in poor visibility of the traffic signal.				
RSA Team's Recommendation	Cost	Potential Safety Benefit		
Install back plates on all signal faces.	Low	Medium		

Issue: 8-inch Signal Heads

Safety Risk

Description: Current signal heads are 8 inches.

Low



RSA Team's Recommendation	Cost	Potential Safety Benefit
Upgrade to 12-inch signal heads to increase	Low	High
visibility.		

Issue: 4th Street Parking

Safety Risk Low

Description: The parking of cars and delivery trucks on the west side of 4th Street restricts the flow of traffic and emergency vehicles from Park Avenue onto 4th Street.



RSA Team's Recommendation	Cost	Potential Safety Benefit
Review municipal parking ordinance around the	Low	Medium
intersection, properly sign/enforce, and modify as		
appropriate.		

Issue: Hess Station Access Description: The Hess gas station driveways lack signing and pavement markings to indicate entrance and exits. Left turns from the station into the intersection have also been observed to be a potential hazard.



RSA Team's Recommendation	Cost	Potential Safety Benefit
Reach out to Hess station owner and/or Hess corporate	Low	High
regarding safety concerns. Review current Hess station		
access agreement with the county. Prohibit left turns		
out of driveway nearest to the intersection.		

Medium

Issue: West-bound Bus Stop Sign	Safety Risk

Description: The west-bound bus stop sign is located on the signal pole, in the middle of the intersection. This is located away from the actual bus stop.



RSA Team's Recommendation	Cost	Potential Safety Benefit	
Reach out to NJ Transit to move bus stop sign back to	Low	Low	
the proper location.			

Issue: Light Rail Gates	Safety Risk			
Description: The light rail entrance gates on the north side of Park Avenue are currently locked. This forces pedestrians to use the south side entrances and results in more pedestrians crossing Park Avenue.	High			
RSA Team's Recommendation	Cost	Potential Safety Benefit		
NJ Transit has expressed that this is due to the poor condition of the stairs leading down to the light rail and the lack of funding to repair them. Reach out to NJ Transit and City of Newark to investigate potential funding sources.	Medium	High		

Issue: Bus Shelter/Benches	Safety Risk
Description: Currently, there are no bus shelters or	Low
benches for the convenience of pedestrians.	



RSA Team's Recommendation	Cost	Potential Safety Benefit
Reach out to NJ Transit and City of Newark to	Low	Low
discuss adding accommodations for pedestrians.		

Potential Funding Sources

In this economy, budget constraints may hamper the implementation of some of these recommendations. Finding alternative funding sources is critical to ensuring the investment in the safety of the intersection's users.

Local Funding Sources:

Roadway Owner's Maintenance and Operation Budget:

Existing funds from local and county sources, as appropriate, which are allocated for investment in maintenance and operational activity, can be used to implement above suggestions. Many of the above countermeasures may be eligible for the appropriate use of these existing funds. The manager of these funds who understands the full budget picture should be consulted.

State Funding Sources:

Contact:

NJDOT Local Aid District 2 Office 153 Halsey Street - 5th floor Newark, NJ 07102 Phone: 973-877-1500

Fax: 973-877-1556

Municipal Aid/Urban Aid Program (NJDOT Local Aid):

http://www.state.nj.us/transportation/business/localaid/municaid.shtm

This program has been a significant resource for municipalities in funding local transportation projects. All municipalities are eligible. The department continues to encourage municipalities to consider using the Municipal Aid Program to fund projects that support walking and biking in their communities. NJDOT has set a goal to award up to 10 percent of the Municipal Aid Program funds to projects such as pedestrian safety improvements, bikeways, and streetscapes.⁴.

Local Aid Infrastructure Fund (Discretionary Aid):

http://www.state.nj.us/transportation/business/localaid/descrfunding.shtm

Subject to funding appropriation, a discretionary fund is established to address emergencies and regional needs throughout the state. Any county or municipality may apply at any time. These projects are approved at the discretion of the commissioner. Payment of project costs is the same as the Municipal Aid Program. Under this program a county or municipality may also apply for funding for local pedestrian safety and bikeway projects⁵.

http://www.state.nj.us/transportation/business/localaid/documents/2011Letter.pdf

⁴ Local Aid Letter Dated June 18, 2010, available publicly:

⁵ NJDOT TTF State Aid Handbook available publicly:

Safe Streets to Transit:

http://www.state.nj.us/transportation/business/localaid/safe.shtm

The intent of this program is to encourage counties and municipalities to construct safe and accessible pedestrian linkages to transit facilities in order to promote increased usage of transit by all segments of the population.

NJDOT Centers of Place Program:

http://www.state.nj.us/transportation/business/localaid/safe.shtm

The program provides a funding opportunity to municipalities that have been designated as a Center of Place by the New Jersey Department of Community Affairs to obtain funding for nontraditional transportation improvements that advance municipal smart growth management objectives. Eligible program projects include pedestrian and bicycle facilities, scenic or historic transportation programs, parking and circulation management, landscaping/beautification of transportation-related facilities, and rehabilitation of publicly owned transportation structures

Contact:

New Jersey Business Action Center Office for Planning Advocacy Department of State P.O. Box 204 Trenton, New Jersey 08625-0204 Barry Ableman

Phone: 609-292-3228

Email: bableman@dca.state.nj.us

Office of Smart Growth Downtown Business Improvement Zone Loan Fund

http://www.nj.gov/state/planning/docs/techassist071506.pdf

To provide loans up to \$500,000 to make capital improvements within designated downtown business improvement zones

Contact:

New Jersey Department of Community Affairs 101 South Broad Street PO Box 800 Trenton, NJ 08625-0800 Laura Julian

Phone: 609-633-6265

Email: ljulian@dca.state.nj.us

Community Services Block Grant (CSBG)

http://www.state.nj.us/dca/divisions/dhcr/offices/comact.html

Awards funds to agencies for provision of health, education, employment housing, and other services to the low-income population of New Jersey. Ninety percent of the annual allocation must go to designated community action agencies (CAAs).

Federal Funding Sources via NJDOT Office of Local Aid:

Contact:

NJDOT Local Aid District 2 Office 153 Halsey Street - 5th floor Newark, NJ 07102 Phone: 973-877-1500

Fax: 973-877-1556

Safe Routes to Schools (SRTS):

http://www.state.nj.us/transportation/business/localaid/srts.shtm

The federal-aid SRTS program provides federal-aid highway funds to State Departments of Transportation over five fiscal years (FY2005–FY2009). The program targets schools for grades K–8 only. The main objectives of the program are:

- to enable and encourage children, including those with disabilities, to walk and bicycle to school;
- to make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and
- to facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

Funds are available for infrastructure projects that benefit elementary and middle school children in grades K–8 in both public and private schools. The infrastructure portion can fund design, construction, and planning of the proposed improvements, while the non-infrastructure portion would fund activities that encourage walking and bicycling to school.

Selection of SRTS projects involves the participation of civic, education, and environmental groups, the transportation community, and other government organizations such as the state's metropolitan planning organizations.

<u>Federal Funding Sources via North Jersey Transportation Planning Authority</u> (NJTPA):

Contact:

North Jersey Transportation Planning Authority One Newark Center, 17th Floor Newark, NJ 07102

Phone: 973-639-8400 Fax: 973-639-1953

Local Safety Program:

http://www.njtpa.org/Project/Devel/local_safety/default.aspx

The federally funded Local Safety Program (LSP) is a component of wider safety planning at the NJTPA, supporting construction of quick-fix, high-impact safety improvements on county and local roadway facilities in the NJTPA region. Projects supported by this program have included new and upgraded traffic signals, signage, pedestrian indications, crosswalks, curb ramps, pavement markings, and other improvements to increase the safety of drivers, bicyclists, and pedestrians.

The Local Safety Program:

- typically addresses NJTPA and/or NJDOT derived high priority crash locations on county or local roadways,
- supports quick-fix projects, backed with detailed crash data, with minimal or no environmental or cultural resource impacts (eligible for programmatic categorical exclusion from FHWA), and
- funds the construction phase of work only— planning, design, and right-of-way acquisition are the responsibility of the sponsor.

Local CAMQ Mobility Initiatives:

http://www.njtpa.org/Project/Mobility/CMAQ/CMAQMobility.aspx

The federal Congestion Mitigation and Air Quality (CMAQ) program provides funds to reduce roadway congestion and reduce single occupancy auto usage in order to lessen the level of pollutants and greenhouse gases generated through the use of fossil fuels. The NJTPA has established the Local CMAQ Mobility Initiatives program to help meet these goals, including ridesharing, transit usage, travel demand management, and traffic mitigation projects. Proposals must implement strategies and policies in the Regional Transportation Plan, Plan 2035.

RSA Team's Conclusion

The RSA Team's recommendations suggested in this report should improve the safety of the intersection. Many of the recommendations can be implemented through routine maintenance, while others will take more time and investment. However, physical improvements alone will not eliminate the safety issues identified.

A combined effort of public education and police enforcement is necessary to make this intersection a safer place for all its users. Education about traffic safety in public schools, such as drivers' education courses in high school, and distributing informational pamphlets to pedestrians are just a sample of the different educational campaigns that can benefit road users. Enforcement, especially in the areas of parking and pedestrian right-of-way, can go a long way in reducing crashes and alerting drivers of the seriousness of being safety conscious. Officers may also hand out pamphlets during routine traffic stops to educate motorists of changes in traffic laws.

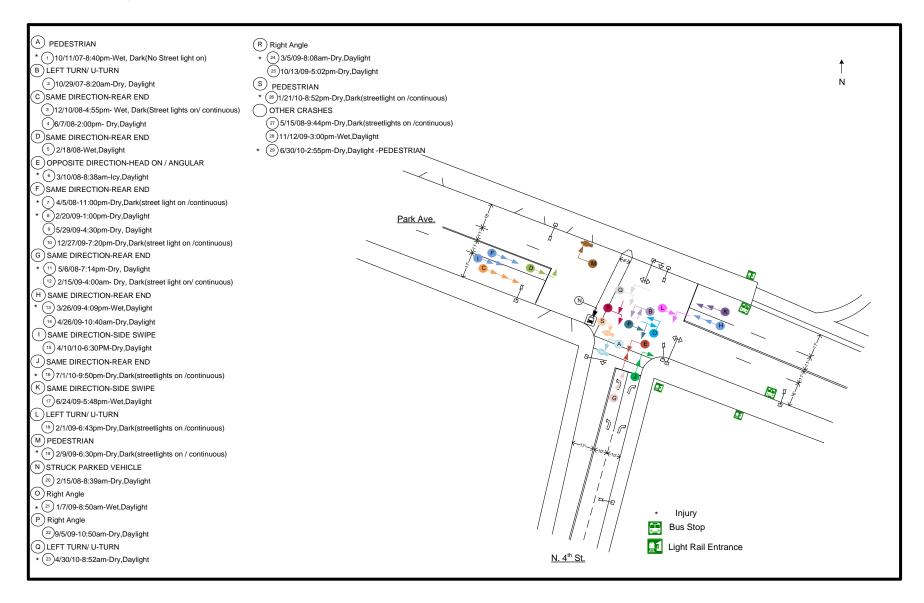
Appendix A

Raw Crash Data

<u>Crash Date</u>	<u>Crash</u> <u>Time</u>	<u>Crash Type</u>	Environmental Condition	Light Condition	<u>Severity</u>	Surface Condition	Total Injured	Total Pedestrians Involved	
12/10/2008	4:55 PM	Same Direction - Rear End	Rain	Dark (Street Lights On/ continuous)	Property Damage	Wet	C		0
3/10/2008	8:38 AM	Opposite Direction - Head On/Angular	Clear	Daylight	Injury	lcy	1		0
4/5/2008	11:00 PM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	2		0
5/6/2008	7:14 PM	Same Direction - Rear End	Clear	Daylight	Injury	Dry	1		0
5/15/2008	9:44 PM	Opposite Direction - Head On/Angular	Clear	Dark (Street Lights On/ continuous)	Property Damage	Dry	C		0
2/15/2008	8:39 AM	Struck Parked Vehicle	Clear	Daylight	Property Damage	Dry	C		0
10/6/2008	10:18 AM	Backing	Clear	Daylight	Property Damage	Dry	C		0
2/15/2009	4:00 AM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Property Damage	Dry	C		0
2/20/2009	1:00 PM	Same Direction - Rear End	Clear	Daylight	Injury	Dry	1		0
3/5/2009	8:08 AM	Right Angle	Clear	Daylight	Injury	Dry	1		0
3/26/2009	4:09 PM	Same Direction - Rear End	Rain	Daylight	Injury	Wet	1		0
4/26/2009	10:40 AM	Same Direction - Side Swipe	Clear	Daylight	Property Damage	Dry	C		0
5/29/2009	4:30 PM	Same Direction - Rear End	Clear	Daylight	Property Damage	Dry	C		0
6/24/2009	5:48 PM	Same Direction - Side Swipe	Rain	Daylight	Property Damage	Wet	C		0

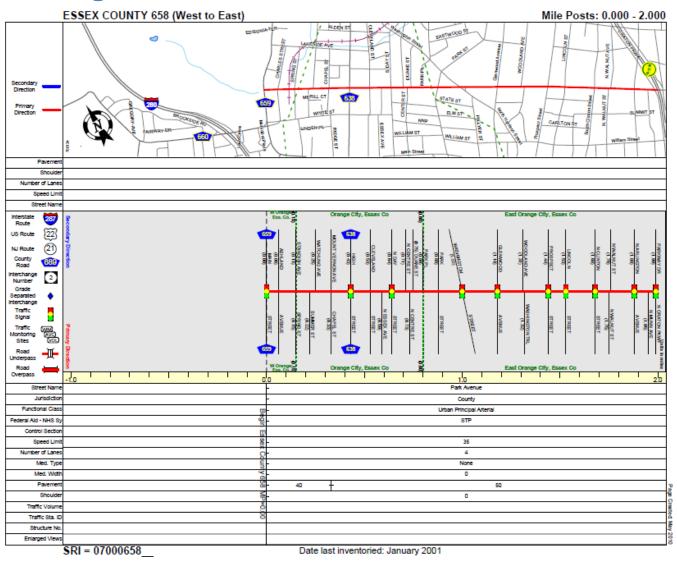
2/1/2009	6:43 PM	Left Turn / U Turn	Clear	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0
2/9/2009	6:30 PM	Pedestrian	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	1	1
1/7/2009	8:50 AM	Right Angle	Rain	Daylight	Injury	Wet	1	0
11/12/2009	3:00 PM	Other	Rain	Daylight	Injury	Wet	1	0
12/27/2009	7:20 PM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0
9/5/2009	10:50 AM	Right Angle	Clear	Daylight	Property Damage	Dry	0	0
10/13/2009	5:02 PM	Right Angle	Clear	Daylight	Property Damage	Dry	0	0
11/15/2009	10:55 PM	Left Turn / U Turn	Clear	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0
4/30/2010	8:52 AM	Left Turn / U Turn	Clear	Daylight	Injury	Dry	1	0
6/3/2010	2:55 PM	Pedestrian	Clear	Daylight	Injury	Dry	1	1
7/1/2010	9:50 PM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	1	0
1/21/2010	8:52 PM	Pedestrian	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	1	1
11/12/2010	1:00 PM	Same Direction - Side Swipe	Clear	Daylight	Property Damage	Dry	0	0
11/12/2010	5:38 PM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	1	0
11/20/2010	9:55 PM	Same Direction - Rear End	Clear	Dark (Street Lights On/ continuous)	Injury	Dry	2	0

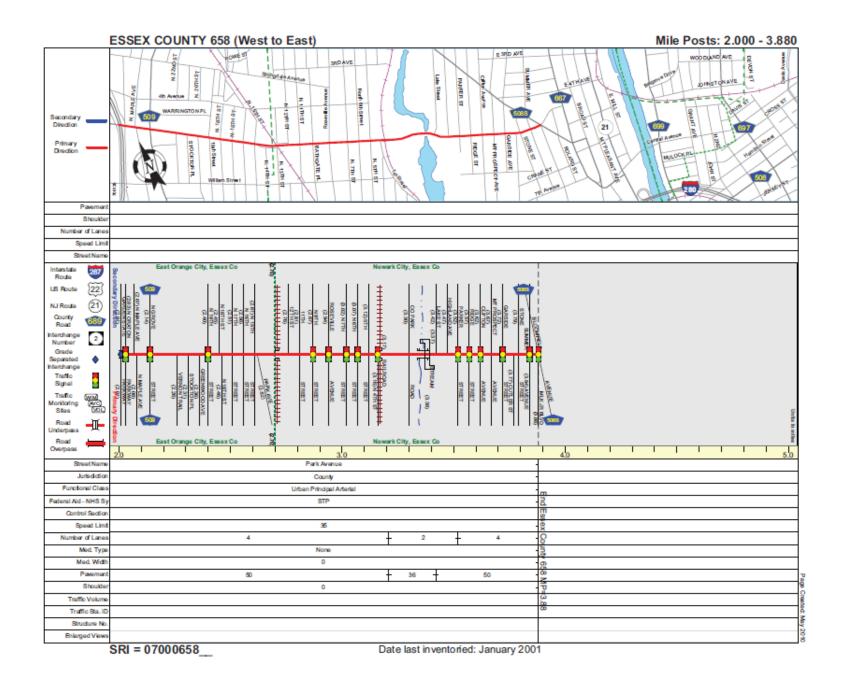
Collision Diagram



Appendix B

Straight Line Diagrams





Appendix C

NJ Transit Bus #41

To Orange

Weekdays

	on Pt.					y St.
	EWARK road St. at Branford PL/Edison PL.	Washington St			ton St.)RANGE I.R. place at Essex Ave./S. Day St.
ımp St	anford	t Wash	T RAIL	ORANGE Ave. at Grove St.	ashing	ssex A
. at C	at Br	Ave. at	LIGHT R. Station	ST ORANGE rk Ave. at G	ORANGE Ave. at Wa	e at E
EWARK road St. at Camp St.	EWAR road Si	EWAR! entral	EWAR	AST OR ark Ave	AST OR ark Ave	RANGE .R. pla
20	20	MAP	REFER	ENCE	ш &	02
1	2	3	5	6	7	8
605 625	609 629	612 633	621 644	626 650	632 656	638
640	645	649	700	706	712	702 718
- 1	-	-	705	711	717	723
700	705	709	720 735	726 741	732 747	738 753
720	725	729	740	741	752	758
-	-	-	750	756	802	808
735 745	740 750	744 754	755 805	801 811	807 817	813 823
750	755	759	810	816	822	828
805	810	814	825	831	837	843
820 835	825 840	829 844	840 855	846 901	852 907	858 914
845	850	854	905	911	917	924
855	900	905	915	921	927	934
908	913	918	928	934	940	947 1002
923 943	928 948	933 953	943 1003	949 1009	955 1015	1002
1008	1013	1018	1028	1034	1040	1047
1038	1043	1048	1058	1104	1110	1117
1108 1138	1113 1143	1118 1148	1128 1158	1134 1204	1140 1210	1147 1217
1208	1213	1218	1228	1234	1240	1247
1238	1243	1248	1258	104	110	117
108 138	113 143	118 148	128 158	134 204	140 210	147 217
208	213	218	228	234	240	247
238	243	248	258	304	310	317
303 318	308 323	313 328	323 338	329 344	335 350	342 357
330	335	340	350	356	402	409
342	347	352	402	408	414	421
357 412	402 417	407 422	417 432	423 438	429 444	436 451
427	432	437	447	453	459	506
438 450	443 455	448 500	458 510	504 516	510 522	517 529
502	507	512	522	528	534	541
512	517	522	532	538	544	550
526 540	531	536	546 558	552 604	557	603
540 555	545 600	550 605	613	604 619	609 624	615 630
610	615	620	628	634	639	645
625 643	630	635	643	649 707	654 712	700
703	648 708	653 713	701 721	707 727	712 732	718 738
733	738	743	751	757	802	807
803	808	812	819	825	830	835
903	908	912	849 919	855 925	900	905 935
948	953	957	1004	1010	1015	1020
1033 1118	1038 1123	1042 1127	1049 1134	1055 1140	1100 1145	1105 1150
			1134	1140		

Saturdays

NEWARK Broad St. at Camp St. NEWARK Broad St. at Branford PL/Edison Pl. NEWARK Central Ave. at Washington St. NEWARK LIGHT RAIL Park Ave. Station EAST ORANGE Park Ave. at Grove St. EAST ORANGE Park Ave. at Washington St. ORANGE	R.R. place at Essex Ave./S. Day St.
MAP REFERENCE	
1 2 3 5 6 7 8	
	26
	03
	43
	323
	03
	43
	23
	L03
	L43
	23
	.03
	43
	23
	03
	43 23
	03
	43
	23
	03
	43
	23
	03
	43
	28
1042 1047 1051 1057 1102 1107 11	13
	58
	243

Sundays

NEWARK Broad St. at Camp St.	NEWARK Broad St. at Branford PL/Edison PL.	NEWARK Central Ave. at Washington St.	NEWARK LIGHT RAIL Park Ave. Station	EAST ORANGE Park Ave. at Grove St.	EAST ORANGE Park Ave. at Washington St.	ORANGE R.R. place at Essex Ave./S. Day St.
1	2	3	5	6	7	8
826	830	834	840	844	848	853
906	910	914	920	924	928	933
946	950	954	1000	1004	1008	1013
1026	1030	1034	1040	1044	1048	1053
1106	1110	1114	1120	1124	1128	1133
1146	1150	1154	1200	1204	1208	1213
1226	1230	1234	1240	1244	1248	1253
106	110	114	120	124	128	133
146	150	154	200	204	208	213
226	230	234	240	244	248	253
306	310	314	320	324	328	333
346	350	354	400	404	408	413
426	430	434	440	444	448	453
506 546	510 550	514 554	520 600	524 604	528 608	533 613
626	630	634	640	644	648	653
706	710	714	720	724	728	733
741	745	749	755	759	803	808
821	825	829	835	839	843	848
903	907	911	917	921	925	930
948	952	956	1002	1006	1010	1015
1033	1037	1041	1047	1051	1055	1100
1118	1122	1126	1132	1136	1140	1145
1213	1217	1221	1227	1231	1235	1240

A.M. - Light face type

P.M. - Bold face type

Fare Information

This is an exact fare line. Passengers are required to have exact fare when boarding buses on this line. One dollar bills and most U.S. coins are accepted. Drivers do not carry money and cannot make change.

How to determine your fare

Your fare is based on the number of zones you travel through. Check the map on this schedule to see how many zones you travel. Each time you cross a zone boundary, you must pay for another zone.

Cash Fares

Zone	1	2	Transfer
Adult	\$1.50	\$2.35	\$0.70
Children &			
Sr. Citizens	\$0.70	\$1.05	\$0.35

Transfers must be purchased when boarding bus. For additional information about the NJ TRANSIT bus fares and ticket options, please consult the NJ TRANSIT Bus Rider Guide or our website, www.njtransit.com

To Newark

Weekdays	W	ee	kd	a١	IS
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	ORANGE R.R. place at Essex Ave./S. Day St.	EAST ORANGE Park Ave. at Washington St.	EAST ORANGE Park Ave. at Grove St.	NEWARK LIGHT RAIL Park Ave. Station	NEWARK - Washington Park Broad St. at Lombardy St.	NEWARK Broad St. at Branford PL/Edison PL.	NEWARK Broad St. at Lincoln Park
ľ	8	7	6	5	4	2	1
Γ	528	534	539	544	552	555	559
ı	548	554	559	604	612	615	619
ı	603	609	614	619	627	630	634
l	618	624	629	635	646	649	653
L	633	639	647	653	704	707	711
l	643	649	657	703	-	-	-
l	648	654	702	708	719	722	726
l	658	704	712	718	-	-	-
1	703	709	717	723	734	737	741
ŀ	713	719	727	733	-	-	-
1	718	724	732	738	749	752	756
l	728	734	742	748	-	-	-
ı	733	739	747	753	804	807	811
ı	743	749	757	803 810	814	817	821
ŀ	750	756	804		821	824	828
ı	758	804	812	818	829	832	836
l	810 823	816 829	824 837	830 843	841 854	844 857	848 901
l	838	844	852	858	908	912	916
l	858	905	913	919	929	933	937
ŀ	923	930	938	944	954	958	1002
l	953	1000	1008	1014	1024	1028	1032
l	1023	1030	1038	1044	1054	1058	1102
ı	1053	1100	1108	1114	1124	1128	1132
ı	1123	1130	1138	1144	1154	1158	1202
ŀ	1153	1200	1208	1214	1224	1228	1232
l	1223	1230	1238	1244	1254	1258	102
l	1253	100	108	114	124	128	132
l	123	130	138	144	154	158	202
L	153	200	208	214	224	228	232
ſ	218	225	233	239	249	253	257
l	227	234	242	248	258	302	306
l	239						300
l		246	254	300	310	314	318
1	251	258	306	312	310 322	314 326	318 330
H	306	258 313	306 321	312 327	310 322 337	314 326 341	318 330 345
İ	306 321	258 313 328	306 321 336	312 327 342	310 322 337 352	314 326 341 356	318 330 345 400
	306 321 337	258 313 328 344	306 321 336 352	312 327 342 358	310 322 337 352 408	314 326 341 356 412	318 330 345 400 416
	306 321 337 352	258 313 328 344 359	306 321 336 352 407	312 327 342 358 413	310 322 337 352 408 423	314 326 341 356 412 427	318 330 345 400 416 431
	306 321 337 352 402	258 313 328 344 359 409	306 321 336 352 407 417	312 327 342 358 413 423	310 322 337 352 408 423 433	314 326 341 356 412 427 437	318 330 345 400 416 431 441
	306 321 337 352 402 417	258 313 328 344 359 409 424	306 321 336 352 407 417 432	312 327 342 358 413 423 438	310 322 337 352 408 423 433 448	314 326 341 356 412 427 437 452	318 330 345 400 416 431 441 456
	306 321 337 352 402 417 427	258 313 328 344 359 409 424 434	306 321 336 352 407 417 432	312 327 342 358 413 423 438	310 322 337 352 408 423 433 448 458	314 326 341 356 412 427 437 452 502	318 330 345 400 416 431 441 456 506
	306 321 337 352 402 417 427 441	258 313 328 344 359 409 424 434 448	306 321 336 352 407 417 432 442 456	312 327 342 358 413 423 438 448 502	310 322 337 352 408 423 433 448 458 512	314 326 341 356 412 427 437 452 502 516	318 330 345 400 416 431 441 456 506 520
	306 321 337 352 402 417 427 441 455	258 313 328 344 359 409 424 434 448 502	306 321 336 352 407 417 432 442 456 510	312 327 342 358 413 423 438 448 502 516	310 322 337 352 408 423 433 448 458 512 526	314 326 341 356 412 427 437 452 502 516 530	318 330 345 400 416 431 441 456 506 520 534
	306 321 337 352 402 417 427 441 455 510	258 313 328 344 359 409 424 434 448 502 517	306 321 336 352 407 417 432 442 456 510 525	312 327 342 358 413 423 438 448 502 516 531	310 322 337 352 408 423 433 448 458 512 526 541	314 326 341 356 412 427 437 452 502 516 530 545	318 330 345 400 416 431 441 456 506 520 534 549
	306 321 337 352 402 417 427 441 455 510 525	258 313 328 344 359 409 424 434 448 502	306 321 336 352 407 417 432 442 456 510 525 540	312 327 342 358 413 423 438 448 502 516 531	310 322 337 352 408 423 433 448 512 526 541 556	314 326 341 356 412 427 437 452 502 516 530 545 600	318 330 345 400 416 431 441 456 506 520 534 549 604
	306 321 337 352 402 417 427 441 455 510	258 313 328 344 359 409 424 434 448 502 517 532	306 321 336 352 407 417 432 442 456 510 525	312 327 342 358 413 423 438 448 502 516 531	310 322 337 352 408 423 433 448 458 512 526 541	314 326 341 356 412 427 437 452 502 516 530 545	318 330 345 400 416 431 441 456 506 520 534 549
	306 321 337 352 402 417 427 441 455 510 525	258 313 328 344 359 409 424 434 448 502 517 532	306 321 336 352 407 417 432 442 456 510 525 540	312 327 342 358 413 423 438 448 502 516 531 546	310 322 337 352 408 423 433 448 512 526 541 556	314 326 341 356 412 427 437 452 502 516 530 545 600	318 330 345 400 416 431 441 456 506 520 534 549 604
	306 321 337 352 402 417 427 441 455 510 525 540 558	258 313 328 344 359 409 424 434 448 502 517 532 547 604	306 321 336 352 407 417 432 456 510 525 540 555 610	312 327 342 358 413 423 438 502 516 531 546 601 616	310 322 337 352 408 423 433 448 512 526 541 556 609 624	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627	318 330 345 400 416 431 441 456 506 520 534 549 604 616 631
	306 321 337 352 402 417 427 441 455 510 525 540 558 618	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624	306 321 336 352 407 417 432 456 510 525 540 555 610 630	312 327 342 358 413 423 438 448 502 516 531 546 601 616 636	310 322 337 352 408 423 433 448 458 512 526 541 556 609 624 644	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627 647	318 330 345 400 416 431 441 456 506 520 534 549 604 616 631 651
	306 321 337 352 402 417 427 441 455 510 525 540 558 618 648	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624 654	306 321 336 352 407 417 432 456 510 525 540 555 610 630 700	312 327 342 358 413 423 448 502 516 531 546 601 616 636 706	310 322 337 352 408 423 433 448 458 512 526 541 556 609 624 644 714	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627 647 717	318 330 345 400 416 431 441 456 506 520 534 549 604 616 631 651 721
	306 321 337 352 402 417 427 441 455 510 525 540 558 618 648 718	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624 654 724	306 321 336 352 407 417 432 456 510 525 540 555 610 630 700 730	312 327 342 358 413 423 438 502 516 531 546 601 616 636 706 736	310 322 337 352 408 423 433 448 512 526 541 556 609 624 644 714	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627 647 717 747	318 330 345 400 416 431 441 456 506 520 534 549 604 616 631 651 721 751
	306 321 337 352 402 417 427 441 455 510 525 540 558 618 648 718 748	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624 654 724	306 321 336 352 407 417 432 456 510 525 540 555 610 630 700 730 800	312 327 342 358 413 423 438 448 502 516 531 546 601 616 636 706 736	310 322 337 352 408 423 433 448 552 526 541 556 609 624 644 714 744 814	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627 647 717 747	318 330 345 400 416 431 441 456 506 520 534 604 616 631 651 721 751
	306 321 337 352 402 417 427 441 455 510 525 540 618 648 748 818	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624 654 724 754 824	306 321 336 352 407 417 432 442 456 510 525 540 630 700 730 800 830	312 327 342 358 413 423 438 502 516 631 546 601 616 636 706 736 806 836	310 322 337 352 408 423 433 448 458 512 526 641 744 744 814 814	314 326 341 356 412 427 437 452 502 516 530 645 647 717 747 817 847	318 330 345 400 416 431 441 456 506 520 534 549 604 616 631 721 751 821 851
	306 321 337 352 402 417 427 441 455 510 525 540 618 648 748 818 903	258 313 328 344 359 409 424 434 448 502 517 532 547 604 624 654 724 754 824 909	306 321 336 352 407 417 432 446 510 525 540 630 700 730 800 830 915	312 327 342 358 413 423 438 448 502 516 631 641 646 646 746 746 746 846 846 921	310 322 337 352 408 423 433 448 512 526 541 556 609 624 644 714 744 814 814	314 326 341 356 412 427 437 452 502 516 530 545 600 612 627 747 747 817 847 932	318 330 345 400 416 431 441 456 506 520 534 604 616 631 651 721 751 821 821

ORANGE R.R. place at Essex Ave./5. Day St.	EAST ORANGE Park Ave. at Washington St.	EAST ORANGE Park Ave. at Grove St.	NEWARK LIGHT RAIL Park Ave. Station	NEWARK - Washington Park Broad St. at Lombardy St.	NEWARK Broad St. at Branford PL/Edison PL.	NEWARK Broad St. at Lincoln Park
8	7	6 6	5 S	ENCE 4	2	1
553	559	604	609	616	620	625
633	639	644	649	656	700	705
713	719	724	729	736	740	745
753	759	804	809	816	820	825
833	839	844	849	856	900	905
913	919	924	929	936	940	945
953	959	1004	1009	1016	1020	1025
1033	1039	1044	1049	1056	1100	1105
1113	1119	1124	1129	1136	1140	1145
1153	1159	1204	1209	1216	1220	1225
1233	1239	1244	1249	1256	100	105
113	119	124	129	136	140	145
153	159	204	209	216	220	225
233	239	244	249	256	300	305
313	319	324	329	336	340	345
353	359	404	409	416	420	425
433	439	444	449	456	500	505
513	519	524	529	536	540	545
553	559	604	609	616	620	625
633	639	644	649	656	700	705
713	719	724	729	736	740	745
753	759	804	809	816	820	825
833	839	844	849	856	900	905
913	919	924	929	936	940	945
958	1004	1009	1014	1021	1025	1030
1043	1049	1054	1059	1106	1110	1115
1128	1134	1139	1144	1151	1155	1200

Sundays

	ORANGE R.R. place at Essex Ave./S. Day St.	EAST ORANGE Park Ave. at Washington St.	EAST ORANGE Park Ave. at Grove St.	NEWARK LIGHT RAIL Park Ave. Station	NEWARK - Washington Park Broad St. at Lombardy St.	NEWARK Broad St. at Branford PL/Edison PL.	NEWARK Broad St. at Lincoln Park
			MAP	REFER	ENCE	•	
	8	7 754	6	5	4	2	1
ı	749		758	802	808	812	816
ı	829	834	838	842	848	852	856
ı	909	914	918	922	928	932	936
ı	949	954	958	1002	1008	1012	1016
ı	1029	1034	1038	1042	1048	1052	1056
ı	1109	1114	1118	1122	1128	1132	1136
ı	1149	1154	1158	1202	1208	1212	1216
ı	1229	1234	1238	1242	1248	1252	1256
ı	109	114	118	122	128	132	136
Į	149	154	158	202	208	212	216
ı	229	234	238	242	248	252	256
ı	309	314	318	322	328	332	336
ı	349	354	358	402	408	412	416
ı	429	434	438	442	448	452	456
ı	509	514	518	522	528	532	536
	549	554	558	602	608	612	616
ı	629	634	638	642	648	652	656
ı	709	714	718	722	728	732	736
ı	749	754	758	802	808	812	816
J	823	828	832	836	842	846	850
ı	903	908	912	916	922	926	930
ı	948	953	957	1001	1007	1011	1015
J	1033	1038	1042	1046	1052	1056	1100
1	1118	1123	1127	1131	1137	1141	1145

A.M. - Light face type

P.M. - Bold face type



All trips are operated with lift-equipped buses. NOTE: when traveling into or out of the Port Authority Bus Terminal or George Washington Bridge Bus Station,

Holiday Service Guide

Holiday Service Guide						
Holiday	Schedule in Effect					
New Year's Day - Jan. 1**	Sunday					
Martin Luther King Jr. Day	Saturday					
Presidents' Day	Saturday					
Good Friday	Weekday					
Memorial Day	Sunday					
Independence Day - July 4**	Sunday					
Labor Day	Sunday					
Columbus Day	Weekday					
Veterans Day	Regular service					
Wednesday Before Thanksgiving	See website for details					
Thanksgiving Day	Sunday					
Friday After Thanksgiving	Saturday					
Christmas Eve	See website for details					
Christmas Day - Dec. 25**	Sunday					
New Year's Eve	See website for details					
**Observed Holidays - When this holiday falls on a weekend, a special schedule will be operated on the observed holiday. Please check our website at www.nitransit.com to confirm the schedule in effect on holidays.						

