

## **APPENDIX E: Transportation Technical Report**

### **E.1 Introduction**

As part of the overall environmental assessment, it is necessary to identify the potential for the proposed action to result in significant traffic impacts. The process entails identification of existing traffic operational conditions near each proposed station location, projection of future traffic volumes both with and without rail service along the corridor and isolation of the incremental effect of the proposed action on the adjacent roadway operations. Where required, suitable measures to mitigate any identified project induced traffic impacts are recommended.

The following sections detail the analysis process, assumptions, methodologies and results, identifying the potential for significant traffic impacts to result from the proposed action. NJ TRANSIT prepared ridership estimates for the proposed stations. The text addresses the potential traffic impacts resulting from the operation of each station individually. For the purposes of this analysis, increased volumes due to the peak train were added to volumes occurring during the overall peak hour for the region regardless of when the peak train departs or arrives. Typically, the peak train in the morning departs significantly before the regional peak hour begins. A conservative analysis was performed by combining the volumes attributed to the peak train with the regional peak hour volumes.

### **E.2 Existing Conditions**

#### ***Scranton Station Area***

Downtown Scranton is an urban area characterized by a relatively dense mix of land uses. The roadway system serving the area has been developed to accommodate local land use access and a relatively small proportion of local through travel. The regional roadway system, including Interstate 81 accommodates a significant portion of the regional through traffic, providing congestion relief for the downtown area.

The site of the proposed station is located at the corner of Lackawanna Avenue and Bridge Street, southwest of US Route 11. The station platform site is adjacent to a surface parking lot utilized by employees of the State Office Building and the Samters Office Building located at Lackawanna Avenue and Penn Avenue. Within the central downtown district of Scranton, adjacent land uses include the Steamtown National Historic Site (bordering the south side of the site) and the State Office Building (bordering the east side of the site). The Steamtown Mall and a parking deck are located east of the State Office Building within close proximity to the planned station area.

The Scranton Station is proposed for development as an intermodal facility, combining rail service with intercity and intracity bus service. Local bus service is operated by the County of Lackawanna Transit System (COLTS). COLTS currently operates a number of routes, with several stops proximate to the planned station site, which connects other areas of the city and nearby communities. Martz/Trailways and Greyhound provide intercity bus service in the region. The intercity bus terminal (Martz and Greyhound) is located across Lackawanna Avenue from the potential station site.

Due to the surrounding density of land use and the planned use as an intermodal facility, the station may potentially serve not only as an origin point for commuter travel to points east, but also as a destination station for recreational pursuits of people residing in points to the east.

### ***Tobyhanna Station Area***

The site of the proposed Tobyhanna, Pennsylvania station is located on the southbound side of PA Route 423 in Tobyhanna, Pennsylvania. The location is the site of the former rail station.

Regional access to the site is good, with several Pennsylvania State Routes, as well as Interstate 380 providing access to the surrounding area. Interstate 380 traverses in a north-south orientation, and passes within 3 miles of the site to the west. Interstate 380 connects with Interstates 81 and 84 to the north, and with Interstate 80 to the south.

Regional access to the site from the Interstate 380 corridor is afforded via PA Route 611 and PA Route 423. PA Route 423 also affords access from points east, intersecting with PA Route 196.

### ***Pocono Mountain Station Area***

The site of the proposed Pocono Mountain, Pennsylvania station is located along the southbound side of PA Route 611 within Coolbaugh, Pennsylvania. The proposed station site is located on a portion of the former Camp Tegawitha property; the remainder of the property and the surrounding area is slated for development as an industrial complex.

Regional access to the site is good, with several Pennsylvania State Routes, as well as Interstate 380 providing access to the surrounding area. Interstate 380 traverses in a north-south orientation, and passes within 3 miles of the site to the west. Interstate 380 connects with Interstates 81 and 84 to the north, and with Interstate 80 to the south.

Regional access from the site from the Interstate 380 corridor is afforded either via PA Route 611 North or via PA Route 611 South to PA Route 940. PA Route 940 also affords access from points east, intersecting with PA Route 390 and PA Route 191. Additional local regional access is provided by PA Route 423, which intersects with PA Route 611 north the site.

### ***Analomink Station Area***

The site of the proposed Analomink, Pennsylvania station is located along PA Route 191, just north of its intersection with PA Route 447. The station site is bounded to the east by PA Route 447, to the south by PA Route 191, and to the west by Brodhead Creek. The station will be located on the current Pennsylvania State Department of Transportation Salt and Sand storage unit.

Regional access to the site is considered fair due to the lack of proximity to the interstate highways crossing the region. The site is located approximately five miles north of Interstate 80, which is the closest highway. More localized access is provided via the regional road network including PA Route 55 to the north and US Business Route 209 to the south and east. Access is considered good from the PA Route 191 and 447 corridors, and the northern portion of East Stroudsburg located approximately 3.5 miles to the south.

### ***East Stroudsburg Station Area***

The proposed station is to be located along the north side of Crystal Street in East Stroudsburg, Pennsylvania. This long, narrow parcel is bounded to the north by Analomink Street and to the east by Ridgeway Street.

Regional access to the site is considered good due to the proximity to Interstate 80 and to PA Route 209.

The site may be accessed from Crystal Street via a number of local roadways including Analomink Street, Ridgeway Street, Brown Street, Washington Street and Federal Street. Business Route 209 will be used by vehicles traveling either to or from the north of East Stroudsburg. Business Route 209 allows access to Washington Street, Federal Street, Analomink Street, and Brown Street, all of which allow direct access to Crystal Street and the potential station area.

### ***Delaware Water Gap Station Area***

The proposed station area is located in the vicinity of the Pennsylvania Welcome Center and park-and-ride at the Delaware Water Gap exit off I-80 in Delaware Water Gap, Pennsylvania. Given its location and convenient access to I-80, the station is primarily expected to service riders coming from points west who will be using I-80 to access the station.

### ***Blairstown Station Area***

The proposed station area is located on Hope Road (Warren County Route 521) south of NJ Route 94. Warren County Route 521 provides a direct connection between Interstate 80 (Interchange 12) approximately 6 miles to the south and NJ Route 94 approximately 0.5 miles to the north. South of Interstate 80, Warren County Route 521 connects with Warren County Route 519, which connects to US Route 46 further to the south. Access to the station would be provided via a driveway intersecting with the southbound side of Warren County Route 521.

The proposed site was the location of a former rail station. Two buildings remain on site, a freight station loading dock and a passenger station building, both of which are located directly adjacent to the rail line. Only sparse residential land uses are located in the area surrounding the site.

Regional access to the site is limited, as Warren County Route 521 is the most direct route connecting the station site to Interstate 80. Local access is adequate via NJ Route 94 Warren County Route 521. Pedestrian access is poor as it lies nearly a mile south of the central area of Blairstown and residential land use densities surrounding the station area do not support pedestrian activity.

A single lane bridge currently exists along the Warren County Route 521 corridor just south of the proposed site. The bridge is narrow, with significant sight distance restrictions. Improvements to this bridge are currently being progressed by NJDOT as a separate initiative. The bridge replacement and realignment of Warren County Route 521 are planned to be completed prior to the proposed rail service through the Blairstown station.

### ***Andover Station Area***

The proposed rail station would be located on Roseville Road south of its intersection with Sussex County Route 613. The station area is located southeast of Andover Borough within Andover Township. The site parcel is located north of the rail line adjacent to Kymer Brook. A residential area lies adjacent to the rail line on the south side at a higher elevation than the rail line.

Regional access to the site is considered fair. A significant majority of the patrons who are expected to utilize the station would access the station area via US 206, which traverses in a north/south direction west of the station site. US 206 is located approximately 1 mile to the west. Rail passengers traveling north or south on US Route 206 will turn onto Sussex County Route 613 to the east, then south onto Roseville Road continuing to the station.

### **E.3 Environmental Effects and Mitigation**

#### ***Scranton Station Area***

During the AM peak period, an estimated 35 passengers are expected to board the train at the Scranton Station. It is estimated that approximately 12 passengers will board the most heavily utilized train departing Scranton at 5:30 AM for arrival at Hoboken at approximately 8:40 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. Of the 12 passengers, 11 are expected to drive to the station either parking or being dropped off with the remaining 1 either taking a bus, walking or being carpool passengers. The remaining 23 peak period passengers are assumed to be spread across the remaining peak period trains. Off-peak ridership is expected to be negligible, with only five off-peak boardings projected. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station would be directly from Lackawanna Avenue. Due to the relatively low number of passengers anticipated to travel to and from the station parking lot by private automobile, the intersection of the parking lot driveway with Lackawanna Avenue is not expected to require signalization. As mentioned, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods. During the periods of heaviest site related activity, background traffic volumes adjacent to the site would be relatively low. The combination of the background traffic volumes during these off-peak periods plus the newly generated site activity, would not reach or exceed the level of traffic that would be experienced during the typical AM and PM peak commuter periods. Therefore, no significant traffic impacts would be expected proximate to the proposed station location.

Regional accessibility to the site is considered to be good. The Central Scranton Expressway is located approximately 0.5 miles away, which provides access to Interstate 81, with subsequent connections to Interstate 380. The City is traversed by US 11, which is expected to be the major arterial by which vehicular trips access the station area. Further, it is expected that the overpass from Interstate 81 to Jefferson Street will accommodate the majority of the site-induced vehicle flows.

#### ***Tobyhanna Station Area***

During the AM peak period, an estimated 140 passengers are expected to board the train at the Tobyhanna Station. It is estimated that approximately 48 passengers will board the most heavily utilized train departing Tobyhanna at 5:22 AM for arrival at Hoboken at approximately 7:55 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 43 passengers are expected to drive to the peak train with the remaining 5 passengers walking, taking a bus or being carpool passengers. The 92 remaining peak period passengers are assumed to be spread across the remaining peak period trains. Ten off-peak boardings are projected. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station site would be via PA Route 423. As mentioned above, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods, but during off-peak times when traffic volumes on the adjacent roadways are low. However, for the purposes of this analysis, as mentioned above, it was conservatively assumed that all the 43 vehicle trips would be generated by the proposed station during the AM and PM peak hours. To assess the potential for significant impacts to result from these additional trips, a formal operational analysis was conducted at several key locations on the roadway network.

The following intersections were identified as the locations with potential to experience a traffic impact:

- Route 611 and Route 423 (Prospect Street)
- Prospect Street and Main Street
- Main Street and Church Street

Counts were performed at the above intersections during June 2004 for the AM and PM peak periods to determine the existing conditions at these locations. Please refer to the volume maps included at the end of this appendix. These intersections were analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-1.

**Table E.3-1: 2004 Existing Conditions – Tobyhanna**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611 with PA 423	EB	LT	1.02	142.2	F	0.47	28.8	C
		R	0.04	0.0	A	0.08	0.00	A
	WB	LTR	0.15	24.9	C	0.29	27.1	C
		NB	L	0.13	9.7	A	0.11	6.9
	SB		T	0.09	9.4	A	0.09	6.8
		T	0.10	9.4	A	0.03	6.5	A
Prospect Street with Main Street	NB	LT	0.00	7.4	A	0.02	7.6	A
		EB	LR	0.39	12.9	B	0.22	11.5
Main Street with Church Street	SB	LT	0.01	8.2	A	0.01	7.6	A
		WB	LR	0.20	11.5	B	0.19	10.5

Source: Edwards and Kelcey, 2006

The future 2030 No-Build condition was arrived at by applying a 1.5 percent per year growth rate for 26 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-2 the results of this analysis.

**Table E.3-2: 2030 No-Build Conditions – Tobyhanna**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611 with PA 423	EB	LT	1.52	988.0	F	0.74	39.0	D
		R	0.05	0.0+	A	0.12	0.0+	A
	WB	LTR	0.31	26.5	C	0.50	29.4	C
		NB	L	0.21	10.3	B	0.16	7.2
	SB		T	0.13	9.6	A	0.13	7.0
		T	0.15	9.8	A	0.04	6.6	A
Prospect Street with Main Street	NB	LT	0.01	7.6	A	0.04	7.8	A
		EB	LR	0.67	21.7	C	0.40	15.0+
Main Street with Church Street	SB	LT	0.03	8.8	A	0.02	7.9	A
		WB	LR	0.35	14.7	B	0.32	12.3

Source: Edwards and Kelcey, 2006

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-3 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-4.

**Table E.3-3: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
I-380 to/from the north	5	2
I-380 to/from the south	10	4
PA-423 to/from the north	37	16
PA-423 to/from the south	16	7
PA-611 to/from the south	16	7
Main Street (Local)	16	7
<b>TOTAL</b>	<b>100</b>	<b>43</b>

Source: Edwards and Kelcey, 2006

**Table E.3-4: 2030 Build Conditions – Tobyhanna**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611 with PA 423	EB	LT	1.56	1046	F	0.78	42.4	D
		R	0.05	0.0+	A	0.12	0.0+	A
	WB	LTR	0.31	26.5	C	0.71	37.8	D
		L	0.21	10.3	B	0.16	7.2	A
	NB	T	0.13	9.6	A	0.14	7.0	A
		L	0.16	9.8	A	0.04	6.6	A
SB	T	0.22	10.1	B	0.08	6.7	A	
	LT	0.01	7.6	A	0.04	7.9	A	
Prospect Street with Main Street	EB	LR	0.72	24.7	C	0.40	15.3	C
Main Street with Church Street	SB	LT	0.04	8.9	A	0.02	7.9	A
		LR	0.37	15.7	C	0.37	12.9	B

Source: Edwards and Kelcey, 2006

As shown above in the tables, there are movements that would be adversely affected by the proposed station operations. It should be noted that the potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate these identified impacts under these worst case conditions ensures that the potential impacts can also be mitigated under actual conditions. To establish this, the effect of minor improvements in the operational characteristics of the affected intersection was subsequently analyzed. The following details the improvements that are proposed for the problem intersection.

The results of the HCS analysis suggest that project-related traffic increases will impact the intersection of Route 611 and Route 423 during both the morning and afternoon peak periods. During the morning peak period, delay for eastbound vehicles completing the left-turn and through movements is expected to increase by approximately 60 seconds. During the afternoon peak period, delay for the eastbound left-

turn and through movements is expected to increase slightly as well. In addition, level of service on the westbound approach is expected to decline from LOS C to LOS D.

The proposed mitigation involves replacing the current 95-second cycle with a 60-second cycle. This measure will allow all intersection approaches to function at LOS C or better during both the morning and afternoon peak periods.

The results of the analysis of operational conditions with the additional improvements measures in place are summarized in Table E.3-5.

**Table E.3-5: 2030 Mitigated Conditions – Tobyhanna**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611 with PA 423	EB	LT	0.83	18.3	B	0.30	7.1	A
		R	0.05	0.0+	A	0.13	0.0+	A
	WB	LTR	0.12	6.2	A	0.21	6.6	A
		L	0.54	24.5	C	0.59	25.6	C
	NB	T	0.35	20.0-	B	0.43	20.5	C
		L	0.41	21.1	C	0.18	19.3	B
	SB	T	0.55	21.6	C	0.30	19.7	B

Source: Edwards and Kelcey, 2006

As shown in the table, the above improvements would effectively mitigate the project-induced impacts during both the AM and PM peak hours.

### **Pocono Mountain Station Area**

During the AM peak period, an estimated 960 passengers are expected to board the train at the Pocono Mountain Station. It is estimated that approximately 324 passengers will board the most heavily utilized train departing Pocono Mountain at 5:26 AM for arrival at Hoboken at approximately 7:55 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 307 vehicles are expected to drive to the station. The remaining 636 peak period passengers are assumed to be spread across the remaining peak period trains. Off-peak ridership is expected to be negligible, with only 80 off-peak boardings projected. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station site would be via a new road between the station site and PA Route 611. As mentioned above, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods, but during off-peak times when traffic volumes on the adjacent roadways are low. However, for the purposes of this analysis, as mentioned above, it was conservatively assumed that the 307 vehicle trips would be generated by the proposed station during the AM and PM peak hours. To assess the potential for significant impacts to result from these additional trips, a formal operational analysis was conducted at several key locations on the roadway network.

The following intersections were identified as the locations most likely to experience a traffic impact:

- Route 611/Route 940/Route 196 (North)
- Route 611/Route 940 (South)

Counts were performed at the above intersections during June 2004 for the AM and PM peak periods to determine the existing conditions at these locations. Please refer to the volume maps included at the end of this appendix. These intersections were analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-6.

**Table E.3-6: 2004 Existing Conditions – Pocono Mountain**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611/PA 196 with PA 940 (Northern)	EB	LTR	0.99	106.3	F	1.04	158.6	F
	WB	LT	1.04	180.3	F	0.91	72.5	E
	NB	DefL	0.98	116.0	F	0.92	67.7	E
		TR	0.66	24.5	C	1.04	140.3	F
	SB	LTR	0.92	57.1	E	0.85	45.0	D
PA 611 with PA 940 (Southern)	EB	LTR	0.82	71.2	E	1.04	216.4	F
	WB	DefL	0.34	41.7	D	0.35	41.8	D
		T	0.04	39.0	D	0.02	38.9	D
	NB	LTR	0.53	33.1	C	0.76	38.9	D
	SB	DefL	N/A	N/A	N/A	0.44	11.7	B
		LTR	0.43	4.6	A	0.30	4.0	A

Source: Edwards and Kelcey, 2005

The future 2030 No-Build condition was arrived at by applying a 1.5 percent per year growth rate for 21 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-7 shows the results of this analysis.

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-8 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-9.

**Table E.3-7: 2030 No-Build Conditions – Pocono Mountain**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611/PA 196 with PA 940 (Northern)	EB	LTR	1.46	870.8	F	1.53	1010	F
	WB	LT	1.54	1022	F	1.34	667.2	F
	NB	DefL	1.44	848.1	F	1.46	883.3	F
		TR	0.97	68.6	E	1.54	997.8	F
	SB	LTR	1.36	693.3	F	1.25	500.9	F
PA 611 with PA 940 (Southern)	EB	LTR	1.21	466.1	F	1.53	1029	F
	WB	DefL	0.53	44.8	D	0.53	44.9	D
		T	0.06	39.2	D	0.03	38.9	D
	NB	LTR	0.78	40.3	D	1.12	278.0	F
	SB	DefL	0.51	12.1	B	0.68	18.2	B
		LTR	0.67	7.4	A	0.44	4.7	A

Source: Edwards and Kelcey, 2006

**Table E.3-8: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
PA 611 to/from the north	15	45
PA 940 to/from the west	53	164
PA 940 to/from the east	32	98
<b>TOTAL</b>	<b>100</b>	<b>307</b>

Source: Edwards and Kelcey, 2006

**Table E.3-9: 2030 Build Conditions – Pocono Mountain**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611/PA 196 with PA 940 (Northern)	EB	LTR	1.79	1473	F	1.53	1010	F
	WB	LT	1.54	1022	F	1.34	667.2	F
	NB	DefL	1.44	848.1	F	1.46	883.3	F
		TR	1.12	264.8	F	1.54	997.8	F
SB	LTR	1.36	693.3	F	1.73	1363	F	
PA 611 with PA 940 (Southern)	EB	LTR	1.21	466.1	F	1.53	1029	F
	WB	DefL	0.53	44.8	D	0.53	44.9	D
		T	0.06	39.2	D	0.03	38.9	D
	NB	LTR	0.78	40.3	D	1.12	278.0	F
	SB	DefL	0.51	12.1	B	0.81	23.7	C
LTR		0.67	7.4	A	0.44	4.7	A	

Source: Edwards and Kelcey, 2006

As shown above in the tables, there are movements that would be adversely affected by the proposed station operations. It should be noted that the potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate these identified impacts under these worst case conditions ensure that the potential impacts can also be mitigated under actual conditions. To establish this, the effect of minor improvements in the operational characteristics of the affected intersection was subsequently analyzed. The following details the improvements that are proposed for the problem intersection.

The intersection of Route 611 and Route 940 is expected to experience heavy delays under the No-Build scenario due to background traffic growth. For the southern portion of the intersection, the implementation of the Build scenario should not impact traffic operations significantly. However, the increased traffic resulting from the implementation of the proposed rail project is expected to further aggravate already congested conditions at the northern portion of this intersection. For example, during the morning peak period, significant increases in delay are expected for the eastbound approach (602 seconds) and for the northbound through and right-turn movements (196 seconds). For the northbound approach, the expected increase in delay would trigger a decline from LOS E to LOS F.

The proposed mitigation involves replacing the existing 100-second cycle with a 150-second cycle. Although the intersection would continue to operate at LOS F, delays with the revised signal timing would be less than delays using the current 100-second cycle.

During the afternoon peak period, it is expected that the greater volume of traffic will increase delay on the southbound approach to the northern part of the intersection by approximately 800 seconds. As with the morning peak period, the proposed mitigation involves replacing the existing 100-second cycle with a

150-second cycle. The results of the analysis of operational conditions with the additional improvements measures in place are summarized in Table E.3-10.

**Table E.3-10: 2030 Mitigated Conditions – Pocono Mountain**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 611/PA 196 with PA 940 (Northern)	EB	LTR	1.56	1074	F	1.53	1030	F
	WB	LT	1.54	1042	F	1.55	1060	F
		DefL	1.46	897.9	F	1.47	915.8	F
	NB	TR	1.04	144.4	F	1.27	535.6	F
		SB	LTR	1.16	352.6	F	1.25	503.5
PA 611 with PA 940 (Southern)	EB	LTR	0.70	62.1	E	1.38	775.9	F
	WB	DefL	0.31	51.1	D	0.47	62.2	E
		T	0.04	47.5	D	0.03	56.6	E
	NB	LTR	0.99	124.4	F	0.81	49.2	D
	SB	DefL	0.55	22.3	C	0.91	51.4	D
		LTR	0.71	14.7	B	0.43	5.5	A

Source: Edwards and Kelcey, 2006

As shown in the table, the above improvements would effectively bring operations closer to conditions expected to be experienced under the no-build condition.

### **Analomink Station Area**

During the AM peak period, an estimated 235 passengers are expected to board the train at the Analomink Station. It is estimated that approximately 79 passengers will board the most heavily utilized train departing Analomink at 6:38 AM for arrival at Hoboken at approximately 8:40 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. Of the 79 passengers, 74 are expected to drive to the station with the remaining 5 either taking a bus, walking or being carpool passengers. The 156 remaining peak period passengers are assumed to be spread across the remaining peak period trains. Off-peak ridership is expected to be negligible, with only 15 off-peak boardings anticipated. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station will be afforded directly from PA Route 447, to the north of the intersection with PA Route 191 south. As mentioned above, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods, but during off-peak times when traffic volumes on the adjacent roadways are low. However, for the purposes of this analysis, as mentioned above, it was conservatively assumed that all 74 vehicle trips would be generated by the proposed station during the AM and PM peak hours. To assess the potential for significant impacts to result from these additional trips, a formal operational analysis was conducted.

The following intersection was identified as the location most likely to experience a traffic impact:

- Route 447 and Route 191

Counts were performed at the above intersection during June 2004 for the AM and PM peak periods to determine the existing conditions at this location. Please refer to the volume maps included at the end of this appendix. The intersection was analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway

Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-11.

**Table E.3-11: 2004 Existing Conditions – Analomink**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 447 with PA 191	EB	LR	0.65	34.5	C	0.80	31.2	C
	NB	LT	0.28	8.7	A	0.87	33.4	C
	SB	T	0.42	9.7	A	0.32	13.4	B
		R	0.18	0.1	A	0.13	0.0	A

Source: Edwards and Kelcey, 2005

The future 2030 No-Build Condition was arrived at by applying a 1.5 percent per year growth rate for 26 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-12 shows the results of this analysis.

**Table E.3-12: 2030 No-Build Conditions – Analomink**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 447 with PA 191	EB	LR	0.95	84.4	F	1.18	359.7	F
	NB	LT	0.51	10.9	B	1.51	946.6	F
	SB	T	0.62	12.3	B	0.47	14.8	B
		R	0.26	0.1	A	0.19	0.1	A

Source: Edwards and Kelcey, 2006

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-13 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-14.

**Table E.3-13: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
PA 447 to/from the north	42	31
PA 191 to/from the north	58	43
<b>TOTAL</b>	<b>100</b>	<b>74</b>

Source: Edwards and Kelcey, 2006

**Table E.3-14: 2030 Build Conditions – Analomink**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
PA 447 with PA 191	EB	LR	0.95	84.4	F	1.18	359.7	F
	NB	LT	0.51	10.9	B	1.51	946.6	F
	SB	T	0.62	12.3	B	0.47	14.8	B
		R	0.26	0.1	A	0.19	0.1	A

Source: Edwards and Kelcey, 2006

As shown above in the tables, there are no expected operational impacts due to this station and therefore no mitigation is required.

### ***East Stroudsburg***

During the AM peak period, an estimated 420 passengers are expected to board the train at the East Stroudsburg Station. It is estimated that approximately 139 passengers will board the most heavily utilized train departing East Stroudsburg at 6:44 AM for arrival at Hoboken at approximately 8:40 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 110 passengers are expected to drive to the peak train. The 291 remaining peak period passengers are assumed to be spread across the remaining peak period trains. Off-peak ridership is expected to be negligible, with only 40 off-peak boardings projected. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station will be afforded directly from Crystal Street and from Brown Street via its intersection with Bridge Street. As mentioned above, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods, but during off-peak times when traffic volumes on the adjacent roadways are low. However, for the purposes of this analysis, as mentioned above, it was conservatively assumed that all the 110 vehicle trips would be generated by the proposed station during the AM and PM peak hours. To assess the potential for significant impacts to result from these additional trips, a formal operational analysis was conducted at several key locations on the roadway network.

The following intersections were identified as the locations most likely to experience a traffic impact:

- Crystal Street and Analomink Street
- N. Crystal Street and Analomink Street
- Courtland Street and Analomink Street
- Courtland Street and N. Crystal Street
- Courtland Street and Day/Washington Street
- Ridgeway Street and Prospect Street
- Courtland Street and Ridgeway Street/Brown Street
- Washington Street and Brown Street

Counts volumes at the above intersections were obtained from previous reports done in the area for the AM and PM peak periods to determine the existing conditions at these locations. Please refer to the volume maps included at the end of this appendix. These intersections were analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway Capacity Software, version 4.1e, for both the AM and PM

peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-15.

**Table E.3-15: 2004 Existing Conditions – East Stroudsburg**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Crystal Street with Analomink Street	WB	LT	0.05	8.0	A	0.18	8.5	A
	NB	LR	0.14	11.1	B	0.32	15.7	C
N. Crystal Street with Analomink Street	EB	LT	0.00	7.6	A	0.00	7.9	A
	SB	LR	0.24	11.5	B	0.24	12.6	B
Courtland Street with Analomink Street	SB	LT	0.01	8.1	A	0.01	8.7	A
	WB	LR	0.20	15.8	C	0.42	28.3	D
Courtland Street with N. Crystal Street	SB	LT	0.14	8.4	A	0.15	9.2	A
	WB	R	0.09	10.5	B	0.29	14.5	B
Courtland Street with Day/Washington Street	WB	TR	0.21	19.2	B	0.41	20.8	C
	NB	L	0.07	7.2	A	0.12	7.4	A
		TR	0.43	9.3	A	0.69	13.3	B
SB	LR	0.47	9.8	A	0.89	31.1	C	
Ridgeway Street with Prospect Street	EB	LTR	0.69	32.8	C	0.66	36.3	D
	WB	LTR	0.05	22.1	C	0.05	26.3	C
	NB	L	0.20	14.6	B	0.61	18.5	B
		TR	0.38	15.4	B	0.28	12.3	B
SB	LTR	0.54	24.9	C	0.81	39.2	D	
Courtland Street and Ridgeway/Brown Street	EB	L	0.32	13.6	B	0.53	15.2	B
		TR	0.38	2.9	A	0.32	2.7	A
	WB	T	0.51	22.1	C	0.89	47.8	D
SB	LR	0.00	28.6	C	0.00	28.6	C	
Washington Street with Brown Street	EB	T	0.48	7.5	A	0.57	8.3	A
	WB	T	0.26	6.3	A	0.50	7.8	A
	SB	L	0.12	19.8	B	0.29	20.8	C

Source: Edwards and Kelcey, 2005

The future 2030 No-Build Condition was arrived at by applying a 1.5 percent per year growth rate for 26 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-16 shows the results of this analysis.

**Table E.3-16: 2030 No-Build Conditions – East Stroudsburg**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Crystal Street with Analomink Street	WB	LT	0.08	8.5	A	0.30	9.6	A
	NB	LR	0.27	13.8	B	0.83	68.6	F
N. Crystal Street with Analomink Street	EB	LT	0.00	7.8	A	0.00	8.3	A
	SB	LR	0.41	14.7	B	0.45	18.4	C
Courtland Street with Analomink Street	SB	LT	0.02	8.6	A	0.01	9.7	A
	WB	LR	0.47	30.0	D	1.23	557.3	F
Courtland Street with N. Crystal Street	SB	LT	0.24	9.4	A	0.28	11.2	B
	WB	R	0.17	12.4	B	0.61	29.0	D
Courtland Street with Day/Washington Street	WB	TR	0.31	19.9	B	0.60	23.5	C
	NB	L	0.11	7.3	A	0.18	7.7	A
		TR	0.63	11.8	B	1.02	92.4	F
	SB	LR	0.79	18.8	B	1.68	1251	F
Ridgeway Street with Prospect Street	EB	LTR	1.02	135.9	F	0.98	100.4	F
	WB	LTR	0.08	22.4	C	0.07	26.6	C
	NB	L	0.37	16.9	B	1.10	249.9	F
		TR	0.55	17.8	B	0.41	13.7	B
	SB	LTR	0.80	35.0	C	1.19	391.4	F
	Courtland Street and Ridgeway/Brown Street	EB	L	0.47	14.7	B	0.78	20.0
TR			0.56	3.9	A	0.47	3.3	A
WB		T	0.75	29.7	C	1.31	598.0	F
SB		LR	0.00	28.6	C	0.00	28.6	C
Washington Street with Brown Street	EB	T	0.71	10.1	B	0.84	14.0	B
	WB	T	0.38	7.0	A	0.74	12.0	B
	SB	L	0.18	20.2	C	0.43	21.8	C

Source: Edwards and Kelcey, 2006

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-17 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-18.

**Table E.3-17: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
PA 209 to/from the north via Crystal Street	60	66
PA 209 to/from the north via Washington Street	40	44
<b>TOTAL</b>	<b>100</b>	<b>110</b>

Source: Edwards and Kelcey, 2006

**Table E.3-18: 2030 Build Conditions – East Stroudsburg**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Crystal Street with Analomink Street	WB	LT	0.08	8.8	A	0.30	9.6	A
	NB	LR	0.28	14.5	B	1.56	108.4	F
N. Crystal Street with Analomink Street	EB	LT	0.00	7.8	A	0.00	8.5	A
	SB	LR	0.53	17.1	B	0.48	19.6	C
Courtland Street with Analomink Street	SB	LT	0.02	8.6	A	0.01	10.0	A
	WB	LR	0.50	33.1	D	1.32	705.8	F
Courtland Street with N. Crystal Street	SB	LT	0.31	9.8	A	0.29	11.5	B
	WB	R	0.17	12.4	B	0.86	65.7	F
Courtland Street with Day/Washington Street	WB	TR	0.31	19.9	B	0.60	23.5	C
	NB	L	0.11	7.3	A	0.18	7.7	A
		TR	0.63	11.8	B	1.02	92.4	F
	SB	LR	0.96	57.4	E	1.68	1251	F
Ridgeway Street with Prospect Street	EB	LTR	1.02	135.9	F	0.98	100.4	F
	WB	LTR	0.08	22.4	C	0.07	26.6	C
	NB	L	0.37	16.9	B	1.10	249.9	F
		TR	0.55	17.8	B	0.41	13.7	B
	SB	L	0.80	35.0	C	1.19	391.4	F
		TR	0.47	14.7	B	0.78	20.0	B
Courtland Street and Ridgeway/Brown Street	EB	TR	0.56	3.9	A	0.47	3.3	A
	WB	T	0.75	29.7	C	1.31	598.0	F
	SB	LR	0.00	28.6	C	0.00	28.6	C
	EB	T	0.71	10.1	B	0.84	14.0	B
Washington Street with Brown Street	WB	T	0.38	7.0	A	0.74	12.0	B
	SB	L	0.18	20.2	C	0.43	21.8	C

Source: Edwards and Kelcey, 2006

As shown in the tables, several individual movements at the key intersections would be adversely affected by the proposed station operations. It should be noted that the potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate these identified impacts under these worst case scenario ensures that the potential impacts can be mitigated under actual conditions. To establish the likelihood of mitigating project-related impacts, the effect of minor improvements in the operational characteristics of the affected intersections was subsequently analyzed. The following text details the improvements that are proposed for the problem locations.

It is anticipated that the increase in traffic volumes between the present day and 2030 will result heavy delays at several intersections under the 2030 No Build scenario. As Table E.3-16 revealed, there are numerous intersections where one or more movements are expected to operate at LOS F under the No Build condition. The addition of traffic generated by the proposed rail station is expected to impact traffic operations at three locations: the southern portion of the offset intersection at Crystal Street and Analomink Street, the intersection of Courtland Street and North Crystal Street, and the intersection of Courtland Street and Analomink Street. All of these expected impacts are for the afternoon peak period.

For example, it is predicted that PM peak period delay on the northbound approach to the intersection of Crystal Street and Analomink Street would increase from 68.6 seconds under the No-Build scenario to 1,084 seconds under the Build scenario. The proposed mitigation is to replace the two existing T-intersections with one four-way intersection and to install a two-phase 100-second cycle traffic signal. With the implementation of these measures, the northbound approach would function at LOS D while the eastbound, westbound, and southbound approaches would function at LOS E or higher. A two-phase 60-second cycle is recommended for the morning peak period.

Due to the difficulties associated with interrupting traffic flow along this portion of Route 209 (Courtland Street), no mitigation measures are proposed for the intersection of Route 209 and N. Crystal Street or the intersection of Route 209 and Analomink Street.

The results of the analysis of operational conditions with the additional improvements measures in place are summarized in Table E.3-19.

**Table E.3-19: 2030 Mitigated Conditions – East Stroudsburg**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Crystal Street with Analomink Street (signalized)	EB	LTR	0.28	14.5	B	0.21	10.4	B
	WB	LTR	0.60	20.4	C	0.97	63.4	E
	NB	LTR	0.24	12.9	B	0.77	47.1	D
	SB	LTR	0.55	17.6	B	0.75	49.9	D
Courtland Street with Day/Washington Street	WB	TR	0.28	14.5	B	0.21	10.4	B
	NB	L	0.60	20.4	C	0.97	63.4	E
		TR	0.24	12.9	B	0.77	47.1	D
	SB	LR	0.55	17.6	B	0.75	49.9	D

Source: Edwards and Kelcey, 2006

As shown in the table, the above improvements would effectively mitigate the project-induced impacts during both the AM and PM peak hours.

### ***Delaware Water Gap Station Area***

During the AM peak period, an estimated 890 passengers are expected to board the train at the Delaware Water Gap Station. It is assumed that approximately 297 passengers will board the most heavily utilized train departing Delaware Water Gap at 6:07 AM for arrival at Hoboken at approximately 7:55 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 270 passengers are expected to drive to the station. The 593 remaining peak period passengers are assumed to be spread across the remaining peak period trains. Off-peak ridership is expected to be negligible, with only 90 off-peak boardings projected. The reverse pattern is expected to occur during the PM peak period.

Vehicular access to the proposed station will be afforded directly from I-80 and through the intersection of the ramps with River Road. As mentioned above, the majority of these vehicular trips would not occur during the typical AM and PM peak commuter periods, but during off-peak times when traffic volumes on the adjacent roadways are low. However, for the purposes of this analysis, as mentioned above, it was conservatively assumed that all vehicle trips would be generated by the proposed station during the AM and PM peak hours. To assess the potential for significant impacts to result from these additional trips, a formal operational analysis was conducted.

The following intersection was identified as the location most likely to experience a traffic impact:

- Route 80 Ramps and River Road

Counts were performed at the above intersection during June 2004 for the AM and PM peak periods to determine the existing conditions at this location. Please refer to the volume maps included at the end of this appendix. The intersection was analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway

Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-20.

**Table E.3-20: 2004 Existing Conditions – Delaware Water Gap**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
I-80 Ramps and PA Route 2028	NB	LT	0.01	7.6	A	0.01	7.7	A
	SB	LT	0.09	8.2	A	0.14	9.0	A
	WB	LT	0.51	21.4	C	0.63	34.2	D
	EB	LTR	0.05	10.4	B	0.08	12.5	B

Source: Edwards and Kelcey, 2005

The future 2030 No-Build Condition was arrived at by applying a 1.5 percent per year growth rate for 26 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-21 shows the results of this analysis.

**Table E.3-21: 2030 No-Build Conditions – Delaware Water Gap**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
I-80 Ramps and PA Route 2028	NB	LT	0.01	7.9	A	0.01	8.0	A
	SB	LT	0.14	8.8	A	0.26	10.6	B
	WB	LT	1.05	211.8	F	1.54	1045	F
	EB	LTR	0.09	11.9	B	0.21	19.7	C

Source: Edwards and Kelcey, 2006

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-22 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-23.

**Table E.3-22: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
I-80 to/from the west	77	209
Broad Street to/from the south (Local)	14	14
River Road to/from the east/north (Local)	9	47
<b>TOTAL</b>	<b>100</b>	<b>270</b>

Source: Edwards and Kelcey, 2005

**Table E.3-23: 2030 Build Conditions – Delaware Water Gap**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
I-80 Ramps and PA Route 2028	NB	LT	0.01	7.9	A	0.01	8.0	A
	SB	LT	0.40	10.7	B	0.26	10.6	B
	WB	LT	2.93	3557	F	2.27	2349	F
	EB	LTR	0.19	22.1	C	0.21	19.7	C

Source: Edwards and Kelcey, 2006

As shown in the tables, one movement would be adversely affected by the proposed station operations. It should be noted that the potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate the identified impacts under these worst case conditions ensures that the potential impacts can be mitigated under actual conditions. To establish the probability of mitigating the impacts from project-related traffic, the effect of minor improvements in the operational characteristics of the affected intersection was analyzed. The following text details the improvements that are proposed for the intersection.

The implementation of the Build scenario would impact westbound traffic operations at the intersection of River Road and the Interstate 80 entrance and exit ramps during the morning and afternoon peak periods. Project-related traffic increases are expected to cause delays to increase by 3345 seconds during the morning peak period and by 1304 seconds during the afternoon peak period.

The proposed mitigation is the installation of a traffic signal at this intersection. Recent improvements at the visitor center have included this installation of the traffic signal. A two-phase 80-second cycle is recommended for the AM peak period and a two-phase 70-second cycle is recommended for the PM peak period. The traffic signal may not be visible to southbound traffic exiting the highway due to the curvature of the ramp. Because vehicles exiting the highway are likely to be traveling at high speeds, it is recommended that warning flashers be installed to alert drivers of the presence of the traffic signal.

The results of the analysis of operational conditions with the additional improvements measures in place are summarized in Table E.3-24.

**Table E.3-24: 2030 Mitigated Conditions – Delaware Water Gap**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
I-80 Ramps and PA Route 2028 (signalized)	EB	LTR	0.12	21.5	C	0.10	13.9	B
	WB	LT	0.86	47.5	D	0.85	33.6	C
	NB	LTR	0.28	8.9	A	0.56	15.0	B
	SB	DefL	0.88	35.9	D	0.86	46.7	D
		TR	0.31	9.2	A	0.43	13.8	B

Source: Edwards and Kelcey, 2006

As shown in the table, the above improvements would effectively mitigate the project-induced impacts during both the AM and PM peak hours.

### Blairstown Station Area

During the AM peak period, an estimated 280 passengers are expected to board the train at the Blairstown Station. It is estimated that approximately 97 passengers will board the most heavily utilized train departing Blairstown at 7:08 AM for arrival at Hoboken at approximately 8:40 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 93 vehicles would drive to the peak train. The 183 remaining peak period passengers are assumed to be spread across the remaining peak period trains. No off-peak boardings are anticipated. The reverse pattern is expected to occur during the PM peak period.

The following intersection was identified as the location most likely to experience a traffic impact:

- Route 94 and Route 521

Counts were performed at the above intersection during April 2006 for the AM and PM peak periods to determine the existing conditions at this location. Please refer to the volume maps included at the end of this appendix. The intersection was analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-25

**Table E.3-25: 2004 Existing Conditions – Blairstown**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 94 and Route 521	NB	L	0.06	7.4	A	0.11	7.5	A
	WB	LT	0.45	16.1	C	0.65	26.5	D
	EB	T	0.48	15.5	C	0.47	18.3	C
		R	0.15	8.9	A	0.13	8.8	A

Source: Edwards and Kelcey, 2006

The future 2030 No-Build Condition was arrived at by applying a 1.5 percent per year growth rate for 26 years to the existing volume levels. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-26 shows the results of this analysis.

**Table E.3-26: 2030 No-Build Conditions – Blairstown**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 94 and Route 521	NB	L	0.09	7.5	A	0.16	7.7	A
	WB	LT	0.98	120.4	F	1.72	1342	F
	EB	T	0.82	37.8	E	0.91	80.9	F
		R	0.22	9.2	A	0.19	9.1	A

Source: Edwards and Kelcey, 2006

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-27 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the

volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-28.

**Table E.3-27: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
Route 94 to/from the northwest	100	93
<b>TOTAL</b>	<b>100</b>	<b>93</b>

Source: Edwards and Kelcey, 2006

**Table E.3-28: 2030 Build Conditions – Blairstown**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 94 and Route 521	NB	L	0.09	7.5	A	0.23	7.9	A
	WB	LT	1.03	180.4	F	*	*	F
	EB	T	0.82	37.8	E	1.30	615.2	F
		R	0.33	9.9	A	0.19	9.1	A
Route 521 and Driveway	NB	LT	0.00	8.0	A	0.00	7.6	A
	EB	LR	*	*	*	0.19	13.4	B

\* Highway Capacity Software did not calculate.

Source: Edwards and Kelcey, 2005

As shown in the preceding tables, the intersection of Route 94 and Route 521 would experience negative impacts due to proposed station operations. It should be noted that the potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate the identified impacts under these worst-case conditions ensures that the possible impacts can be mitigated under actual conditions. To establish this likelihood, the effect of minor improvements in the operational characteristics of the affected intersection was analyzed. The following text details the improvements that are proposed for the intersection.

The implementation of the Build scenario would impact traffic operations at the intersection of Route 94 and Route 521 during the morning and afternoon peak periods. Delay on the westbound approach is expected to increase by 60 seconds during the morning peak period. During the afternoon peak period, delay on the westbound approach would increase to the point of being immeasurable. During the afternoon peak period, the eastbound through movement is expected to experience a 500-second increase in delay.

The proposed mitigation is the installation of a traffic signal at this intersection. A two-phase 60-second cycle is recommended for both the AM and PM peak periods. The results of the analysis of operational conditions with the additional improvements measures in place are summarized in Table E.3-29.

**Table E.3-29: 2030 Mitigated Conditions – Blairstown**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 94 and Route 521	NB	L	0.55	26.2	C	0.66	20.7	C
	WB	LT	0.39	6.1	A	0.57	13.2	B
	EB	T	0.41	6.1	A	0.42	11.5	B

Source: Edwards and Kelcey, 2005

### Andover Station Area

During the AM peak period, an estimated 140 passengers are expected to board the train at the Andover Station. It is estimated that approximately 48 passengers will board the most heavily utilized train departing Andover at 7:21 AM for arrival at Hoboken at approximately 8:40 AM. This is consistent with the typical arrival time patterns exhibited by workers within the New York Metropolitan area. 45 vehicles would drive to the peak train. The 92 remaining peak period passengers are assumed to be spread across the remaining peak period trains. Ten off-peak boardings are anticipated. The reverse pattern is expected to occur during the PM peak period.

The following intersections were identified as the locations most likely to experience a traffic impact:

- Route 206 and Route 517
- Route 206 and Route 613

Counts were performed at the above intersection during April 2006 for the AM and PM peak periods to determine the existing traffic volumes at these locations. Please refer to the volume maps included at the end of this appendix. The intersections were analyzed for capacity and level of service following the procedures set forth in the *2000 Highway Capacity Manual*. The analysis itself was conducted utilizing the Highway Capacity Software, version 4.1e, for both the AM and PM peak hours under existing conditions. The results of the operational analysis are summarized in Table E.3-30.

**Table E.3-30: 2004 Existing Conditions – Andover**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 206 and Route 517	NB	LT	0.01	10.3	B	0.00	9.4	A
	EB	LR	1.02	286.8	F	0.45	48.5	E
Route 206 and Route 613	SB	LT	0.05	8.8	A	0.07	9.4	A
	WB	LR	0.21	14.4	B	0.17	15.7	C

Source: Edwards and Kelcey, 2005

The application of a 1.5 percent annual growth rate to the existing volume levels for 26 years resulted in the future 2030 No-Build Condition. Please refer to the volume maps included at the end of this appendix. The no-build condition was then analyzed for both the AM and PM peak hours. Table E.3-31 shows the results of this analysis.

**Table E.3-31: 2030 No-Build Conditions – Andover**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 206 and Route 517	NB	LT	0.02	12.9	B	0.00	11.2	B
	EB	LR	4.32	6164	F	1.80	1645	F
Route 206 and Route 613	SB	LT	0.09	10.0+	B	0.15	11.4	B
	WB	LR	0.48	27.4	D	0.43	31.0	D

Source: Edwards and Kelcey, 2005

Based upon the ridership estimates and origins provided by NJ TRANSIT, the station-related trips were distributed through the affected intersections and applied to the appropriate movements at each location. Table E.3-32 summarizes the travel paths, and the proportion of the station-induced traffic flow that would be expected on each travel path. This resulted in the build condition volumes. Please refer to the volume maps included at the end of this appendix. The build condition was analyzed and the results are shown in Table E.3-33.

**Table E.3-32: Distribution of Station – Induced Vehicle Trips**

Travel Path	Percent	Vehicle Trips During Peak Hours
Route 206 to/from the north	100	45
<b>TOTAL</b>	<b>100</b>	<b>45</b>

Source: Edwards and Kelcey, 2005

**Table E.3-33: 2030 Build Conditions – Andover**

Intersection	Approach	Mov't.	AM Peak Hour			PM Peak Hour		
			v/c ratio	Stopped delay (seconds)	LOS	v/c ratio	Stopped delay (seconds)	LOS
Route 206 and Route 517	NB	LT	0.02	12.9	B	0.00	11.2	B
	EB	LR	4.32	6164	F	1.80	1645	F
Route 206 and Route 613	SB	LT	0.19	10.6	B	0.26	13.4	B
	WB	LR	0.53	32.4	D	0.80	74.9	F
Roseville Road & Driveway	NB	LTR	0.00	7.2	A	0.03	7.3	A
	WB	LT	0.06	9.3	A	0.12	10.3	B
	EB	TR	0.09	9.0	A	0.09	10.2	B

Source: Edwards and Kelcey, 2005

One movement would be adversely affected by the proposed station operations. The potential impacts identified in the analysis are the result of a series of conservative, worst case assumptions, which are not likely to occur. However, assessing the ability to mitigate these identified impacts under these worst-case conditions assures that potential impacts can be mitigated under actual conditions. The potential to mitigate project-related impacts was analyzed.

As demonstrated in the preceding tables, the westbound approach to the intersection of Route 206 and Route 613 would experience an increase in delay of approximately 40 seconds during the afternoon peak period. Ordinarily, the proposed mitigation would be the installation of a traffic signal in order to improve the allocation time between the different approaches to the intersection. However, installation of a traffic signal in this location would cause problems at the signalized intersection of Route 206 and Smith Street, which is about 800 feet south of the intersection of Route 206 and Route 613.

Furthermore, according to the HCS analysis for Build scenario, the 95% queue length on the westbound approach would be approximately nine vehicles. The westbound approach is about 225 feet long. Assuming an average length of 25 feet per vehicle, there is adequate space to accommodate the 9 vehicles expected to queue during the portions of the afternoon peak period. Therefore, installation of a traffic signal is not recommended for this location.