

3. Future Conditions

In order to assess and understand the future traffic conditions along the SR 31 West Corridor, potential development scenarios must be analyzed. For purposes of this study, the scenarios were developed for ten and twenty years into the future in order to answer the question “**Where are we going?**” Each development scenario accounted for “uncontrolled development,” where it was assumed that no Corridor management strategies have been implemented by Somerset Township, Jefferson Township, or Somerset County; as well as “controlled development,” where it was assumed that some type of zoning or other land use controls had been implemented.





Methodology

Future Development Assumptions

In order to project future traffic conditions, Mackin assumed that development along SR 31 West could come from five possible sources:

1. Hidden Valley Resort expansion;
2. Seven Springs Resort expansion;
3. Occupancy of vacant parcels along the corridor; and
4. Conversion of existing agricultural land to commercial/retail land use;
5. Increased Tourism Initiatives.

These sources were then categorized into three possible traffic impact scenarios:

- ❖ Increased traffic due to planned growth – includes currently planned for developments from the proposed Hidden Valley and Seven Springs Resort expansions.
- ❖ Increased traffic due to continued development – assumes that new growth and development can take the form of occupancy of existing vacant parcels or the conversion of agricultural land to commercial / retail uses.
- ❖ Increased traffic as a result of tourism initiatives – assumes an average vehicle trip growth rate for each municipality along the SR 31 West Corridor as a result of increased tourism initiatives.

Mackin utilized a variety of sources to assist in the creation of the projected developments (type, size, density, etc.), including telephone interviews with key persons and stakeholders, online research of newspaper articles and internet web pages and professional engineering judgment. The goal was to determine a sustainable future land use scenario and forecast developments and their size along the Corridor under four conditions:

- ❖ Year 2018 assuming uncontrolled development
- ❖ Year 2018 assuming that development is controlled and directed
- ❖ Year 2028 assuming uncontrolled development
- ❖ Year 2028 assuming that development is controlled and directed

Trip Generation Assumptions

To calculate the number of trips that each projected future development could produce, Mackin utilized the Institute of Transportation Engineers' (ITE) Trip Generation Handbook, 7th Edition. The handbook provides step-by-step procedures for developing trip generation estimates based on gathered data. The handbook allows for several types of analyses of trip generation data for each combination of land use type, independent variable (ex/ square footage) and time period (ex/ PM peak hour).

In order to utilize the formulas in the handbook to estimate trips generated, the following data was collected (or assumed where necessary):

- ❖ Projected land use – the type of land use within the projected developments was collected and then used to find a comparable ITE Land Use Code. In the case of Hidden Valley and Seven Springs, the land uses were derived from interviews with resort representatives or press releases. In other instances, Mackin made assumptions based upon information provided by local officials or other sources.
- ❖ Development size – the measuring unit and number were collected (building size, dwelling unit, etc.) for each land use. When this data was unavailable from a source, Mackin made assumptions based upon information provided by local officials or other sources, or simply used the average size.
- ❖ Studies completed – the handbook utilizes data points collected through previous traffic studies for each ITE Land Use Code in order to provide trip generation. The handbook requires a minimum of three (3) studies to provide trip generation estimates; when less than three studies have been completed, the handbook recommends local data be collected.

Mackin utilized the Institute of Transportation Engineers' (ITE) Trip Generation Handbook, 7th Edition to calculate trip generation of proposed / projected development along the SR 31 Corridor.



Current Traffic Conditions (2008)

As discussed in Chapter 2: Existing Conditions, the SR 31 corridor was divided into three (3) roadway segments based off of PennDOT’s Traffic Volume Maps. The three (3) roadway segments, their lengths, AADTs (Annual Average Daily Traffic), and DHVs (Design Hour Volumes) are shown in **Table 4.1: Roadway Segments and Traffic Volumes** below. Design Hour Volume is the traffic volume utilized in the design of a roadway, typically the peak hour in a future projected condition.

Segment	Boundaries	Length	2008 AADT	2008 DHV
1	Between Somerset/Westmoreland County Line and Trent Road (SR 3037)	4.7 miles	3,815	343
2	Between Trent Road and Coxes Creek Road (SR 4005)	4.9 miles	6,985	768
3	Between Coxes Creek Road and Somerset Township / Borough boundary	1.05 miles	9,195	1,011

Source: PennDOT, 2008

Projected Development Scenarios

As explained under methodology, three possible traffic impact scenarios were analyzed:

- ❖ Increased traffic due to planned growth
- ❖ Increased traffic due to increase in development
- ❖ Increased traffic as a result of tourism initiatives

Increased Traffic due to Planned Growth

Within the SR 31 West Corridor, there are two planned developments that will have an impact on the traffic along SR 31. As discussed in Chapter Two: Existing Conditions, both Hidden Valley and Seven Springs have plans to expand their resorts to accommodate additional housing and resort facilities.

The type of development and number of units projected for Hidden Valley and Seven Springs were estimated through research and data obtained via newspaper / online press releases, interviews with representatives of each resort, and interviews with Jefferson Township and Somerset County officials.

Hidden Valley Four Seasons Resort Forecasted Development

Hidden Valley Four Seasons Resort is located on State Route 31 in Segment One in Jefferson Township. The main access driveway intersects SR 31 between the stone quarry driveway and Kooser State Park.

The projections for Summit Village Phase II and Green Tee were provided by the Buncher Corporation, owner of Hidden Valley while the projections for the remaining developments were extrapolated from a series of press releases regarding the master site plan for Hidden Valley. Since the master plan was for 30 years, Mackin assumed that 1/3 of the total development proposed would be developed by 2018 and another 1/3 by 2028. The remaining 1/3 of the development would then occur outside of this project's timeframe.

Through interviews with Jefferson Township officials, it is assumed that if a zoning ordinance were to be enacted, it would permit the projected development at the identified type, density, etc. Therefore, the projected development and associated trip generation would be the same under the controlled and uncontrolled development scenarios.



*New Housing Development
(Source: Hidden Valley Website)*



The projected land uses and associated trip generation is shown in **Table 4.2: Potential Hidden Valley Development and Trips**.

Table 4.2: Potential Hidden Valley Development and Trips				
Within 10 years...				
Projected Land Use	ITE Land Use Code	Unit	Number	Primary Trips
Summit Village Phase II (24 units)	Recreational Homes	Dwelling Unit	18	5
	Luxury Condo/Townhouse	Dwelling Unit	8	4
Green Tee (36 units)	Recreational Homes	Dwelling Unit	27	7
	Luxury Condo/Townhouse	Dwelling Unit	9	5
Renovated lodge and condos	Resort Hotel	Rooms	400	150
Paradise Springs (267 units + 70 golf cabins)	Recreational Homes	Dwelling Unit	253	66
	Luxury Condo/Townhouse	Dwelling Unit	84	46
Golf Clubhouse/Lodge	Golf Course	Holes	18	49
Total trips by 2018				332
Within 20 years...				
Projected Land Use	ITE Land Use	Unit	Number	Primary Trips
Additional new housing (600 units)	Recreational Homes	Dwelling Unit	450	117
	Luxury Condo/Townhouse	Dwelling Unit	150	83
Equestrian Center	Multipurpose Recreation Center	Square Feet	21,050	71
Two commercial areas	Quality Restaurant	Square Feet	8,000	34
	Gasoline Service Station w/Convenience Mart	Square Feet	1,250	53
Total trips between 2018 & 2028				358
Total trips by 2028				690

3. Future Conditions



*Proposed Site of Paradise Springs
(Source: Mackin, 2008)*

It was assumed that 50 percent of the trips generated by this development would be internal to Hidden Valley, while the other 50 percent would access SR 31 via Segment One. Of these, 17 percent were expected to continue onto Segment Two and 16 percent onto Segment Three. Therefore, the following holds true for the breakdown of trip generation by segments:

- ❖ SR 31 West – Segment 1:
 - 166 additional trips by 2018
 - 345 additional trips by 2028
- ❖ SR 31 West – Segment 2:
 - 56 additional trips by 2018
 - 117 additional trips by 2028
- ❖ SR 31 West – Segment 3
 - 53 additional trips by 2018
 - 110 additional trips by 2028

Seven Springs Mountain Resort Forecasted Development

Seven Springs Mountain Resort is located on County Line Road (SR 3029) in Middlecreek Township, south of the SR 31 corridor. However, Seven Springs does have an impact on the study corridor as County Line Road intersects with Cooper Kettle Road which then intersects with Trent Road (SR 3037), which intersects SR 31 between Segments One and Two. The resort contributes to a significant amount of traffic at the intersection of Trent Road and SR 31.

The projected development (land uses, number of dwelling units, etc.) for Seven Springs by year 2018 and 2028 was extrapolated from data obtained through interviews with resort representatives and press releases regarding future plans.

As the entire Seven Springs proposed development lies outside of the Project Area, any future zoning efforts by Seven Springs Borough would have no impact. Therefore, the projected development and associated trip generation would be the same under the controlled and uncontrolled development scenarios.



*Sunridge Development – Seven Springs
(Source: Mackin, 2008)*

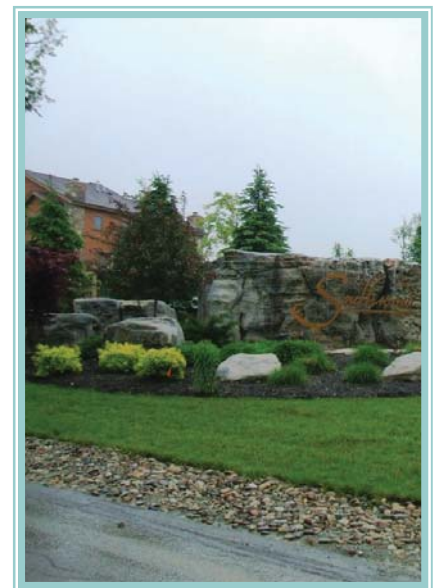


The projected land uses and associated trip generation is shown in **Table 4.3: Potential Seven Springs Development and Trips**.

Within 10 years...				
Projected Land Use	ITE Land Use	Unit	Number	Primary Trips
300 residential units	Recreational Homes	Dwelling Unit	225	59
	Luxury Condo/Townhouse	Dwelling Unit	75	41
Spa	Health/Fitness Club	Square Feet	20,000	81
Terrain park	Multipurpose Recreation Facility	Square Feet	21,050	71
Total trips by 2018				252
Within 20 years...				
Projected Land Use	ITE Land Use	Unit	Number	Primary Trips
260 residential units	Recreational Homes	Dwelling Unit	195	51
	Luxury Condo/Townhouse	Dwelling Unit	65	36
Food and beverage services	Quality Restaurant	Square Feet	8,500	36
Total trips between 2018 & 2028				123
Total trips by 2028				375

Based on the location of the resort and PennDOT’s AADT maps, it was assumed that only three (3) percent of the trips generated by this development would travel onto SR 31 within Segment One, 25 percent of the trips would travel onto Segment Two, while 24 percent would travel on Segment Three. Therefore, the following holds true for the breakdown of trip generation by segments:

- ❖ SR 31 West – Segment 1:
 - 8 additional trips by 2018
 - 12 additional trips by 2028
- ❖ SR 31 West – Segment 2:
 - 63 additional trips by 2018
 - 94 additional trips by 2028
- ❖ SR 31 West – Segment 3
 - 60 additional trips by 2018
 - 90 additional trips by 2028



*Southwind Development- Seven Springs
(Source: Mackin, 2009)*

Increased Traffic due to Increase in New Development

An increase in new development is anticipated to occur in the Project Area over the next 10 – 20 years. New development is anticipated to take place in two forms – development of vacant parcels and the conversion of agricultural land. The locations and types of development projected along SR 31 were derived by analyzing existing development patterns along the Corridor and through interviews with local and county officials. Building permit data over the past five years (2003-2008) along the SR 31 Corridor reveals the following:

- ❖ Jefferson Township issued 45 building permits for new construction
 - 42 were for residential structures
 - 2 were for commercial structures
 - 1 was for a billboard
- ❖ Somerset Township issued 22 building permits for new construction
 - 15 were for residential structures
 - 6 were for commercial structures
 - 1 was for a billboard



*New Construction in Somerset Township
(Source: Mackin, 2008)*

If the five-year building permit data was extrapolated to a ten year timeframe, Jefferson Township would issue 90 permits for new construction while Somerset Township issued 44. Some of the permits for new construction in Jefferson Township would be accounted for by the Hidden Valley expansion, while the rest would then be absorbed by either vacant parcels or agricultural land conversion.

Vacant Parcels

As discussed in Chapter 2, the existing land use along SR 31 West has roughly 41 acres classified as vacant in Jefferson Township and an additional ten acres vacant in Somerset Township. In analyzing the data further, there were 140 vacant parcels along SR 31, as classified by the Somerset County tax assessment data and shown on **Maps 3.1(a) to Map 3.1(e): Development Scenarios**. Of the vacant parcels, 103 lie in Jefferson Township and 37 in Somerset Township. Many of these vacant parcels are parts of newer subdivisions that are expected to be developed in coming years. Therefore, Mackin made the assumption that approximately 1/3 of all vacant parcels would be occupied within 10 years and another 1/3 within 20 years.

There are 140 vacant parcels along SR 31, many which are par of subdivisions that could develop in the future.



It is assumed that the remaining 1/3 of the vacant parcels would either remain vacant or be developed outside the 20-year timeframe of this project. Therefore, the following number of vacant parcels are expected to be developed as follows:

- ❖ Jefferson Township
 - 34 parcels by 2018
 - 68 parcels by 2028
- ❖ Somerset Township
 - 12 parcels by 2018
 - 24 parcels by 2028

The parcels and projected development scenario for each were broken down into the identified road segments:

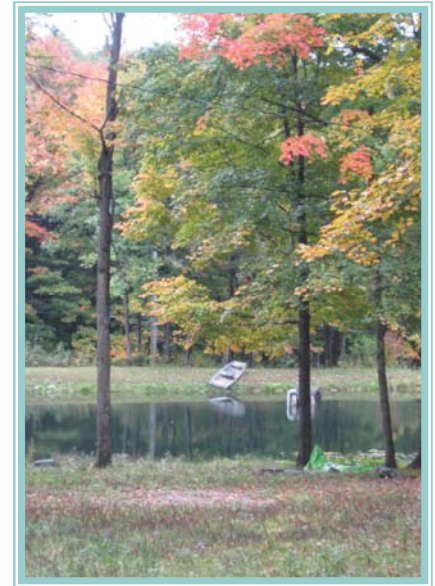
- ❖ Segment 1 – 97 vacant parcels
- ❖ Segment 2 – 18 vacant parcels
- ❖ Segment 3 – 25 vacant parcels

The expected growth rate remains the same in both the controlled and uncontrolled development scenarios. The difference between controlled and uncontrolled is the type of development that occupies these vacant parcels. In an uncontrolled scenario where no zoning is in place, the vacant parcels could accommodate any type of land use. However, the following assumptions were made in order to estimate trip generation:

- ❖ Most parcels would be developed as either single-family detached homes or recreational homes
- ❖ A small number would be developed to accommodate commercial / retail businesses, such as gas station / convenience stores, restaurants, retail, etc.

Under the controlled scenario, it is assumed that some form of zoning has been enacted. Assumptions were then made on what types of land uses zoning would permit along the three segments of SR 31 based upon existing land use and interviews with local officials. The zoning assumptions for each segment are as follows:

- ❖ Segment 1 – single-family detached homes; recreational homes
- ❖ Segment 2 – single-family detached homes; recreational homes
- ❖ Segment 3 – single-family detached homes; general office uses; pharmacy



Vacant Parcel
(Source: Mackin, 2008)

3. Future Conditions

Table 4.4: Occupancy of Vacant Parcels by 2018 displays the vacant parcels that are anticipated to be occupied within the next 10 years, their expected ITE land use, the number of parcels, and the total number of primary trips that these land uses are expected to generate.

Table 4.4: Occupancy of Vacant Parcels by 2018			
Segment 1 Scenario (32 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	16	21
	Recreational Homes	16	4
	Total	32	25
Uncontrolled	Single Family Detached Housing	15	19
	Recreational Homes	15	4
	Convenience Market w/Gasoline Pumps (2,000 SF)	1	121
	Quality Restaurant (8,000 SF)	1	60
	Total	32	204
Segment 2 Scenario (6 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	4	6
	Recreational Homes	2	1
	Total	6	7
Uncontrolled	Single Family Detached Housing	3	5
	Recreational Homes	1	0
	Building Materials/Lumber Store (8,000 SF)	1	34
	Specialty Retail Center (20,400 SF)	1	88
Total	6	127	
Segment 3 Scenario (8 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	6	9
	General Office Building (20,000 SF)	1	101
	Pharmacy w/Drive Thru (11,500 SF)	1	99
	Total	8	209
Uncontrolled	Single Family Detached Housing	5	7
	General Office Building (20,000 SF)	1	101
	Gasoline Service Station w/Convenience Mart	1	96
	Pharmacy w/Drive Thru	1	99
Total	8	303	



Table 4.5: Occupancy of Vacant Parcels between 2018 and 2028 below shows the vacant parcels that are anticipated to be occupied between 10 and 20 years from now, or between 2018 and 2028.

Table 4.5: Occupancy of Vacant Parcels between 2018 and 2028			
Segment 1 Scenario (32 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	16	21
	Recreational Homes	<u>16</u>	4
Total		32	25
Uncontrolled	Single Family Detached Housing	15	19
	Recreational Homes	15	4
	Drinking Place (3,000 SF)	1	34
	Specialty Retail Center (20,400 SF)	<u>1</u>	<u>88</u>
	Total	32	145
Segment 2 Scenario (6 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	4	6
	Recreational Homes	<u>2</u>	<u>1</u>
Total		6	7
Uncontrolled	Single Family Detached Housing	3	5
	Recreational Homes	1	0
	Quality Restaurant (6,000 SF)	1	45
	Drinking Place (3,000 SF)	<u>1</u>	<u>34</u>
Total		6	84
Segment 3 Scenario (8 parcels)			
	ITE Land Use	Parcels	Trips
Controlled	Single Family Detached Housing	7	10
	General Office Building (15,000 SF)	<u>1</u>	<u>96</u>
Total		8	106
Uncontrolled	Single Family Detached Housing	6	9
	General Office Building (15,000 SF)	1	96
	Fast-Food Restaurant w/Drive-thru Window	<u>1</u>	<u>104</u>
Total		8	209

These trips were distributed across the three (3) road segments according to the following percentages given in **Table 4.6: Vacant Parcel Trip Distribution**.

	Percentage of trips that travel onto:		
	Segment 1	Segment 2	Segment 3
Segment 1	80%	30%	20%
Segment 2	30%	95%	40%
Segment 3	25%	40%	75%

Conversion of Agricultural Land to Commercial Land

The last source of new trips that were added to the corridor was the projected conversion of existing agricultural land to commercial/retail land use. There is a great deal of agricultural farmland along the study corridor, especially in Segment Two, as can be seen in **Map 2.7: Agricultural Resources**. It is expected as development continues, it would most likely move from east to west, starting with Segment Three and then moving into Segment Two.

The conversion of agricultural land to commercial land was assumed to only occur if development was left uncontrolled. Assumptions were made that if zoning was put in place, the existing agricultural lands would be zoned for agricultural uses only; thereby no additional development would take place.

The type of development and square footage were determined by utilizing input from the Advisory Committee and interviews with Somerset County officials. Somerset County Officials wanted to illustrate the worst case scenario of development without land use controls in place. Development is expected to occur within the Corridor due to the close location of regional attractions, the availability of sewerage, and the close proximity to the proposed expansions of Hidden Valley and Seven Springs.

Table 4.7: Projected Trips Produced by Conversion of Agricultural Land to Commercial Land by 2018 shows the expected trips within the next 10 years that would be produced if agricultural land was bought by developers and converted to commercial land use. These trips were distributed onto the SR 31 corridor using the same trip distribution percentages given in Table 4.6: Vacant Parcel Trip Distribution.



*Agricultural Land
(Source: Mackin, 2008)*



Table 4.7 – Projected Trips Produced by Conversion of Agricultural Land to Commercial Land by 2018

Segment	ITE Land Use	Parcels	Trips
2	Free-Standing Discount Store (95,000 SF)	1	399
2	Nursery/Garden Center (4,000 SF)	1	15
2	Convenience Store w/Gas Station (2,200 SF)	1	45
2	Pharmacy w/Drive-Thru (3,500 SF)	1	50
2	Drinking Place (3,500 SF)	1	40
2	Automobile Care Center (10,500 SF)	1	35
2	Self-Service Car Wash	1	33
Total		7	617
Segment	ITE Land Use	Parcels	Trips
3	High-Turnover Restaurant (6,000 SF)	1	38
3	Fast Food Restaurant w/Drive Thru (3,000 SF)	1	52
Total		2	90

Table 4.8: Projected Trips Produced by Conversion of Agricultural Land to Commercial Land between 2018 and 2028 displays the expected trips between 10 and 20 years that would be produced if agricultural land was bought by developers and converted to commercial land use. These trips were distributed onto the SR 31 corridor using the same trip distribution percentages given in Table 4.6: Vacant Parcel Trip Distribution.

Table 4.8 – Projected Trips Produced by Conversion of Agricultural Land to Commercial Land between 2018 and 2028

Segment	ITE Land Use	Parcels	Trips
2	New Car Sales (27,000 SF)	1	76
2	Furniture Store (40,000 SF)	1	18
2	Drive-In Bank (2,500 SF)	1	60
2	Quality Restaurant (8,500 SF)	1	36
2	Hardware/Paint Store (12,000 SF)	1	50
Total		5	240
Segment	ITE Land Use	Parcels	Trips
3	Shopping Center (100,000 SF)	1	413
Total		1	413

Increased Traffic as a Result of Tourism Initiatives



Laurel Highlands
(Source: Mackin, 2008)

In addition to increased trips due to new development, it is also expected that some increase in trips along SR 31 will be due to tourism initiatives, such as the Laurel Highlands Conservation Landscape Initiative (CLI). The CLI is being led by the Pennsylvania Department of Conservation and Natural Resources (DCNR) and is a marketing effort to promote the recreational and natural resources of Pennsylvania to attract visitors to the state. The Laurel Highlands Initiative will focus efforts to protect the character of the region with the goal to make the area a destination for tourism, as well as a place to live and work by the year 2015. As marketing efforts increase and the Laurel Highlands becomes known as a tourism destination, an increase in visitors, traffic, and seasonal housing can be expected (Laurel Highlands, 2008).

The Laurel Highlands CLI is not clearly defined but has four geographic focuses which include the Great Allegheny Passage, Chestnut Ridge, Laurel Ridge, and Stoneycreek. Currently, DCNR is concentrating on the Laurel Ridge due to the presence of seven State Parks, numerous State Game Lands, and portions of Forbes State Forest. The State Route 31 Corridor would be directly impacted by this initiative as it is a link between the various geographic focuses within the CLI. However, it was not possible to determine how this initiative will affect trips throughout the corridor. Therefore, the existing background annual growth rates for trip generation for the two townships were used, as received from PennDOT Central Office:

- ❖ Jefferson Township – 0.5% compounded annual growth rate; and
- ❖ Somerset Township – 0.19% compounded annual growth rate.

It is assumed that the projected trip generation from tourism initiatives would not change with zoning in place; therefore the projected amount of trips would be the same under both the controlled and uncontrolled development scenarios.



Table 4.9: Tourism Initiative Trips depicts the projected number of trips for each segment based upon the compounded annual growth rate for each Township.

Table 4.9: Tourism Initiative Trips	
Within 10 years...	
Segment	Primary Trips
Segment 1	18
Segment 2	39
Segment 3	19
Total	76
Within 20 years...	
Segment	Primary Trips
Segment 1	18
Segment 2	41
Segment 3	20
Total	79



*Forbes State Forest
(Source: Mackin, 2008)*

Summary of Projected Trips & Traffic Volumes

Combining all of the projected new trips from the five (5) sources under the three scenarios, the following new proposed traffic volumes in 2018 and 2028 for both controlled and uncontrolled conditions were developed, as can be seen in **Table 4.10: Summary of Projected Trips and Traffic Volumes**.

Table 4.10 – Summary of Projected Trips and Traffic Volumes

Controlled Scenario						
Location	2008 AADT	2008 Design Hour Volume	Total Trips Added by 2018	2018 Controlled Design Hour Volume	Additional Trips Added by 2028	2028 Controlled Design Hour Volume
Segment 1	3,815	343	254	597	250	847
Segment 2	6,985	768	237	1,005	190	1,195
Segment 3	9,195	1,011	262	1,273	196	1,469
Uncontrolled Scenario						
Location	2008 AADT	2008 Design Hour Volume	Total Trips Added by 2018	2018 Uncontrolled Design Hour Volume	Additional Trips Added by 2028	2028 Uncontrolled Design Hour Volume
Segment 1	3,815	343	569	912	550	1,462
Segment 2	6,985	768	1,015	1,783	694	2,477
Segment 3	9,195	1,011	683	1,694	693	2,387

In a controlled scenario, trips would increase as follows:

- ❖ Segment 1 – 147 %
- ❖ Segment 2 – 56 %
- ❖ Segment 3 – 45 %

However, in an uncontrolled scenario, the increase in trips more than doubles the controlled scenario, as follows:

- ❖ Segment 1 – 326 %
- ❖ Segment 2 – 223 %
- ❖ Segment 3 – 136 %

It is important to note that only five sources were used in this analysis and other factors could occur that could increase traffic volumes in 2018 and 2028. One such example is the proposed expansion of the stone and lime quarry in Jefferson Township. Currently, Segment 1 has 9 percent truck traffic and Segment 2 has 10 percent truck traffic and if the expansion occurs the amount of truck traffic could increase dramatically within the Corridor.



Two-Lane Capacity Analysis

The entire length of SR 31 within the study corridor limits can be described as a two-lane highway. A two-lane highway is defined as an undivided roadway with two lanes, one for use by traffic in each direction. Passing a slower vehicle requires the use of the opposing lane as sight distance and gaps in the opposing traffic stream permit. As volumes and geometric restrictions increase, the ability to pass decreases and cars begin to form clusters. Motorists in clusters are subjected to delay because they are unable to pass. The primary measures of service quality for two-lane highways are percent-time-spent-following and average travel speed.

Segment 1 has the highest level of service (LOS) rating within the SR 31 West Corridor, at LOS-C, which is average. Segments 2 and 3 rate just below average, at LOS-D.

Mackin analyzed the SR 31 Corridor by examining each of the three (3) roadway segments under both the controlled and uncontrolled conditions in future years 2018 and 2028. The Design Hour Volumes from Table 4.10: Summary of Proposed Trips and Traffic Volumes above were used. The measure which is used to define how well traffic conditions are operating is called Level-of-Service (LOS). Thus, LOS for two-lane roads is defined in terms of percent-time-spent-following and average travel speed. A LOS of “A” describes the highest quality of traffic service, when motorists are able to travel at their desired speed. A LOS of “F” represents heavily congested flow with traffic demand exceeding capacity and speeds highly variable.

The resulting Levels-of-Service are presented in Table 4.11: Level of Service (Percent-Time-Spent-Following).

Table 4.11: Level-of-Service

Location	Level of Service (Percent-Time-Spent-Following)				
	2008 Existing	2018 Uncontrolled	2018 Controlled	2028 Uncontrolled	2028 Controlled
Segment 1	C (58.1%)	D (73.7%)	C (63.3%)	E (82.6%)	D (71.8%)
Segment 2	D (69.7%)	E (87.0%)	D (73.8%)	F (95.4%)	D (77.9%)
Segment 3	D (73.2%)	E (85.5%)	D (78.6%)	E (92.0%)	D (82.3%)

* **bold** denotes a drop in LOS from Existing Conditions
 * **red** denotes an undesirable condition where the LOS is at an E or F level.

As can be seen in Table 4.10: Level of Service, the existing 2008 LOS are as follows:

- ❖ Segment 1 – LOS C
- ❖ Segment 2 – LOS D
- ❖ Segment 3 – LOS D

Note that these LOS appear low, however these analyses are conducted using the design hour volume (DHV) which is described as the peak travel hour or worst case travel hour of the day.

Projected LOS in 2018

If left uncontrolled, the LOS on each segment could drop one level by 2018. A LOS of E is generally not considered acceptable by PennDOT. Therefore, if left uncontrolled, Segments Two and Three should be considered for widening to four (4) lanes by 2018. If development is controlled and/or directed, the existing LOS could be maintained by 2018.

Projected LOS in 2028

By the year 2028, under the uncontrolled scenario, traffic conditions are expected to get much worse, as the projected LOS are E, F, and E for Segments One, Two, and Three, respectively. To mitigate these poor LOS, widening of the entire corridor to four (4) lanes would be necessary. However, if development is controlled and/or directed, LOS D could be maintained in 2028 for all three roadway segments, and widening would not be necessary.

With land use controls in place, the entire SR 31 West Corridor could maintain its existing LOS ratings by 2018 and 2028, despite the increase in development. However, if development is left uncontrolled, the projected LOS ratings would drop and SR 31 should be considered for widening to four lanes within Segments 2 and 3.