

# MD 180 / MD 351 PROJECT PLANNING STUDY

## PURPOSE AND NEED STATEMENT

Project No. FR549A11



Maryland State Highway Administration

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Purpose and Need Summary  
MD 180/MD 351 Project Planning Study

**PROJECT DESCRIPTION**

The MD 180/MD 351 project is located in the City of Frederick and Frederick County, Maryland. The study corridor is 2.7 miles long, includes several private driveway entrances, and 12 at-grade intersections, five of which are signalized. The project limits also include grade-separated interchanges at US 15/US 340 and I-70. US 15/US 340 is a parallel route to MD 180. Both routes extend southwest from Frederick toward Brunswick. I-70 is the primary east-west corridor connecting Frederick to Baltimore (to the east) and Hagerstown (to the west). MD 180/MD 351 is a two-lane undivided, uncontrolled Urban Collector for the corridor, with the exception of the US 15/US 340 and I-70 interchanges. The cross-section of the study corridor consists of two 12-foot lanes with shoulder widths from zero to nine feet.

**PURPOSE OF THE PROJECT**

The purpose of this project is to improve existing capacity and traffic operations along MD 180 and MD 351, from Greenfield Drive to Corporate Drive, while supporting existing and planned development.

**NEED FOR THE PROJECT**

The MD 180/MD 351 project is located in an area that is experiencing rapid growth. Businesses and residential developments in the study area have contributed to operational failures along the existing roadway network, as indicated by heavily congested roads and high traffic volumes, especially during peak periods. Existing Annual Average Daily Traffic (AADT) ranges from 3,000 to 22,650, along MD 180, and from 12,250 to 24,550, along MD 351. AADT for 2030 will range from 19,100 to 58,150, along MD 180, and from 21,400 to 46,760, along MD 351.

A Level of Service (LOS) analysis was developed for existing 2006 and forecasted 2030 No-Build conditions in the study area. Under existing conditions all signalized intersections operate at LOS C or better, with the exception of the MD 180/Himes Avenue and MD 180/Solarex Court intersections. Under 2030 No-Build conditions, the following intersections are expected to operate at or above capacity (LOS F) during both AM and PM peak hours: Butterfly Lane, Himes Avenue/Ramps from US 15/US 340, Solarex Court, Ballenger Center Drive, Crestwood Boulevard, Hannover Road, and Corporate Drive.

Analysis of crash data reveals that the total number of crashes along MD 180 and MD 351 was lower than the 2003-2005 statewide average for crashes along similar roadways. Along MD 180, a total of 37 crashes occurred in the study area: 14 injury crashes and 23 property-damage crashes. This segment of MD 180 experienced study crash rates for left-turn and angle collisions that were significantly higher than the statewide average. Along MD 351, there were a total of 43 crashes in the study area: 18 injury crashes and 25 property-damage crashes. This segment of MD 351 experienced study crash rates for opposite direction, left-turn, and angle collisions that were slightly higher than the statewide average.

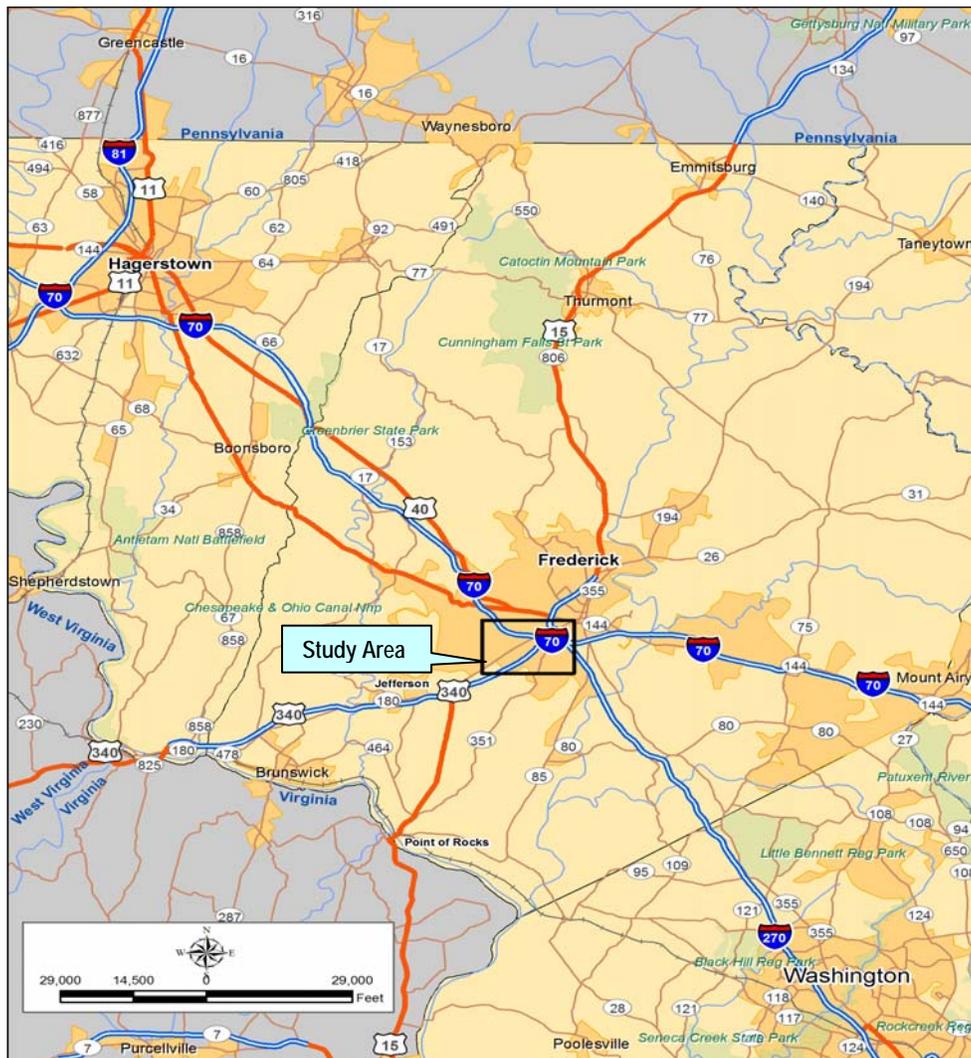
Much of the existing land use along the MD 180 portion of the project is rural in nature. Although used for limited industrial and residential purposes, the existing land is used primarily for agricultural purposes. In contrast, the MD 351 segment is highly urbanized, consisting of a mixture of residential and commercial developments, including several business/industrial parks. These developments mark the origin and destination points for a large number of motorists and commercial vehicles using this roadway. As indicated in the 2002 Frederick Region Plan, MD 180/MD 351 is located within a Frederick County Priority Funding Area and in an area that has been designated for significant planned growth. Accordingly, over 300 acres have been designated for residential and commercial development planned in the study area. When comparing years 2000 and 2030, population and employment are projected to increase by 73% and 88%, respectively.

## I. INTRODUCTION

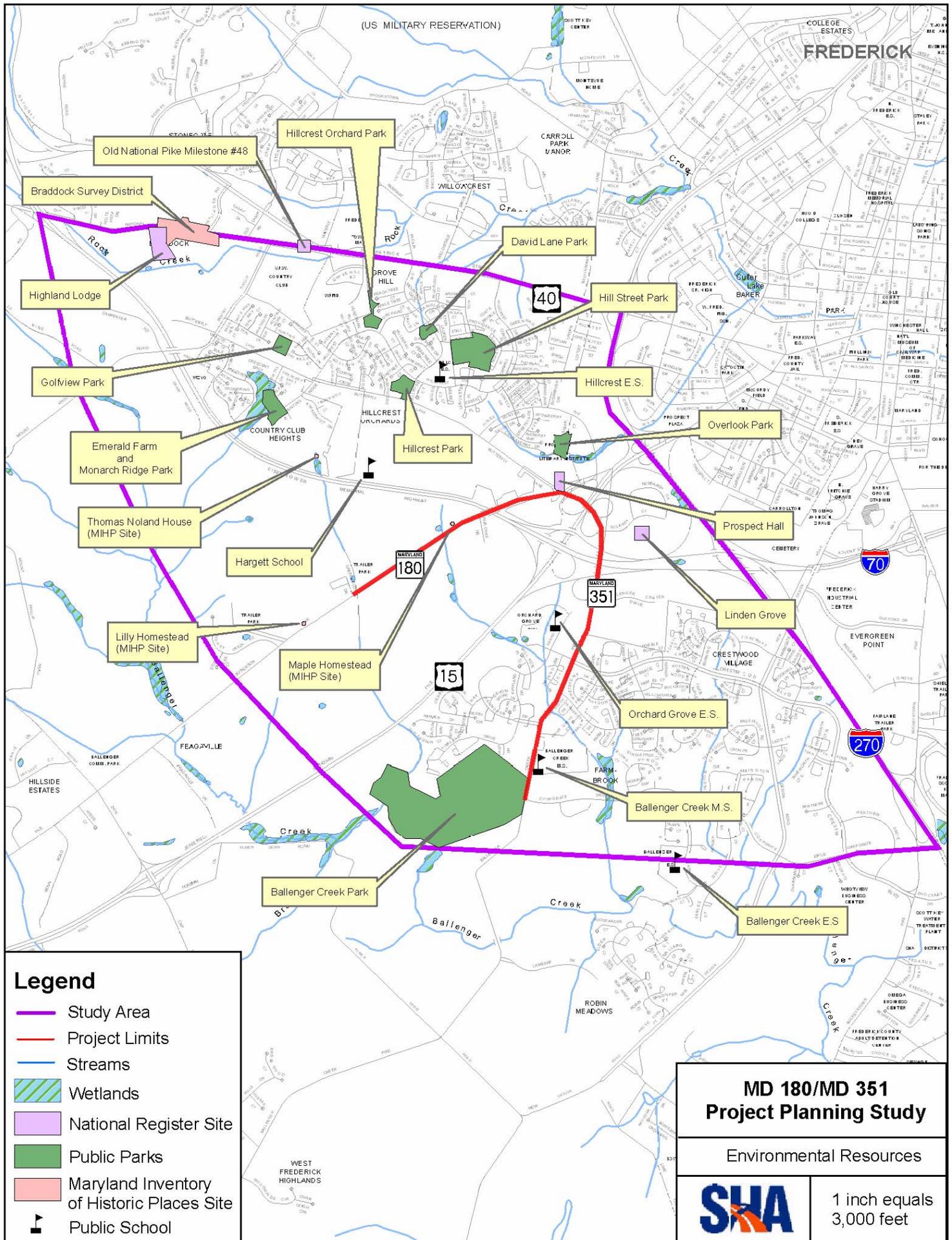
### a. Project Location and Description

The MD 180/MD 351 project is located in the City of Frederick and Frederick County, Maryland (**Figure 1**). The study corridor is 2.7 miles long, includes several private driveway entrances, and 12 at-grade intersections, five of which are signalized. The project limits also include grade-separated interchanges at US 15/US 340 and I-70. US 15/US 340 is a parallel route to MD 180. Both routes extend southwest from Frederick toward Brunswick. I-70 is the primary east-west corridor connecting Frederick to Baltimore (to the east) and Hagerstown (to the west). MD 180/MD 351 is a two-lane undivided, uncontrolled Urban Collector for the corridor, with the exception of the US 15/US 340 and I-70 interchanges. The cross-section of the study corridor consists of two 12-foot lanes with shoulder widths from zero to nine feet (**Figure 2**)

**FIGURE 1: REGIONAL PROJECT LOCATION MAP**



**FIGURE 2: STUDY AREA AND ENVIRONMENTAL INVENTORY MAP**



## II. PURPOSE OF THE PROJECT

The purpose of this project is to improve existing capacity and traffic operations along MD 180 and MD 351, from Greenfield Drive to Corporate Drive, while supporting existing and planned development.

## III. NEED FOR THE PROJECT

### a. Traffic Analysis

The MD 180/MD 351 project is located in an area that is experiencing rapid growth. Businesses and residential developments in the study area have contributed to operational failures along the existing roadway network, as indicated by heavily congested roads and high traffic volumes, especially during peak periods. **Table 1** shows the existing MD 180 and MD 351 Annual Average Daily Traffic (AADT) within the project limits. Traffic volumes are forecasted to increase substantially from 2006 to 2030, as residential, employment, and commercial growth occurs in the study area. Detailed AADT figures are included in the Appendix, Figures 7 through 12.

**TABLE 1: MD 180/MD 351 EXISTING & FORECASTED ANNUAL AVERAGE DAILY TRAFFIC DATA**

Roadway Segments	2006 ADT	2030 NB ADT
<b>MD 180 (Jefferson Pike)</b>		
South of Greenfield Drive	3,800	18,925
Between Greenfield Drive and Fair Oaks Drive	3,900	19,025
Between Fair Oaks Drive and Butterfly Lane	3,950	28,325
Between Butterfly Lane and Himes Avenue	12,000	38,050
Between Himes Avenue and Solarex Court	22,650	64,275
<b>MD 351 ( Ballenger Creek Pike)</b>		
Between Solarex Court and Ballenger Center Drive	24,550	46,750
Between Ballenger Center Drive and Crestwood Blvd	23,500	35,600
Between Crestwood Blvd and Hannover Drive	14,100	26,700
Between Hannover Drive and Corporate Drive	12,250	23,200
South of Corporate Drive	8,250	21,400

The adequacy of roadway capacity is determined by using a measure called the volume-to-capacity, or v/c, ratio the ratio of peak-hour volume carried by a roadway or intersection, and its hourly capacity, expressed in vehicles per hour. Roadways with a v/c ratio of 1.00 or greater have traffic volumes that exceed roadway capacity.

Level of Service (LOS) is a qualitative scale measuring the freedom of mobility or severity of congestion experienced by drivers and is normally determined for peak hours of the typical workday. These levels have been determined through traffic research and reflect such measurable traffic characteristics as delays, speed, traffic density, and v/c ratios. The LOS scale ranges from A to F, with LOS A representing free-flow conditions with very little or no

congestion, and LOS F representing the breakdown of traffic, with stop-and-go conditions and long traffic queues. At LOS F, roadway traffic conditions become unpredictable and unstable. LOS E occurs near a critical boundary where traffic flow becomes unstable. This level is generally considered acceptable during peak hours of traffic flow on streets and highways in urban and suburban areas.

Traffic forecasts for the MD 180/MD 351 project were developed using the Metropolitan Washington Council of Governments (MWCOC) travel demand forecast model. The Round 7.0 Cooperative Land-Use forecast and the 2006 Constrained Long Range Plan (CLRP) highway and transit networks provided input for the travel demand model. Intersection LOS analyses were performed for existing conditions and two future scenarios. Under the first scenario, 2030 No-Build Without Intersection Improvements, the existing roadway network was used to determine projected 2030 volumes. Proposed improvements are expected to occur before the 2030 design-year, therefore a second scenario, 2030 No-Build With Intersection Improvements by Developers, assumes future 2030 forecasts with proposed intersection improvements at various locations. **Table 2** summarizes the LOS and v/c ratio results of the nine intersections analyzed along MD 180 and MD 351 in the study area.

**TABLE 2: 2006 AND 2030 MD 180/MD 351 LOS AND V/C ANALYSES RESULTS**

Location	2006 Existing		2030 NB without Intersection Improvements		2030 NB with Intersection Improvements by developers	
	AM Peak LOS (v/c)	PM Peak LOS (v/c)	AM Peak LOS (v/c)	PM Peak LOS (v/c)	AM Peak LOS (v/c)	PM Peak LOS (v/c)
<b>MD 180 at</b>						
Greenfield Drive	A(0.12)	A(0.14)	A(0.58)	D(0.83)	A(0.58)	D(0.83)
Fair Oaks Drive	A(0.12)	A(0.15)	A(0.59)	D(0.91)	A(0.59)	D(0.91)
Butterfly Lane	A(0.38)	C(0.75)	F(1.06)	F(1.50)	F(1.03)	F(1.34)
Himes Ave / Ramps from US 15/ 340	A(0.50)	E(0.92)	F(1.34)	F(2.36)	F(1.09)	F(1.65)
Solarex Court	F(1.05)	F(1.17)	F(2.20)	F(3.33)	F(1.43)	F(1.79)
<b>MD 351 at</b>						
Ballenger Center Dr./ Ramps to I-70	C(0.80)	C(0.74)	F(1.47)	F(1.53)	E(0.96)	F(1.01)
Crestwood Boulevard	C(0.76)	C(0.73)	F(1.81)	F(2.35)	F(1.58)	F(1.45)
Hannover Road	A(0.55)	A(0.56)	F(1.27)	F(1.27)	F(1.27)	F(1.27)
Corporate Drive	C(0.78)	B(0.70)	F(3.09)	F(2.75)	F(3.09)	F(2.75)

Analysis indicates that under the existing conditions (2006), all signalized intersections operate at LOS C or better, with the exception of the MD 180/Himes Avenue and MD 180/Solarex Court intersections. Under existing conditions, the MD 180/Solarex Court intersection operates at failing conditions during both AM and PM peak hours.

Field observations indicate that conditions along MD 180/MD 351—specifically, conditions through Butterfly Lane and Himes Avenue—appear to be more congested than indicated in the analysis of existing conditions presented above. It is understood that commuters originating in communities off Butterfly Lane seek the shortest time and the least congested route to US 15, I-270, and I-70. During the AM peak hour, many commuters travel north to reach US 40 and connect with US 15, thus avoiding the MD 180/Butterfly Lane intersection and the congestion through the MD 180/MD 351 interchange with US 15/US 340. At the MD 180/Butterfly Lane intersection, long queues often develop because of the single-lane approach to the intersection from Butterfly Lane. During the PM peak hour, northbound US 15 and westbound US 40 are highly congested, heavily traveled corridors which lead returning commuters to choose a different route than the one they travel during the AM peak hour. It has been observed that PM peak-hour commuters travel along northbound US 15 to US 340, then exit at MD 180/MD 351 to access Butterfly Lane. This route allows commuters to avoid the congestion along northbound US 15 and westbound US 40.

Under 2030 No-Build conditions, all of the following intersections are expected to operate at or above capacity (LOS F) during both the AM and PM peak hours: Butterfly Lane, Himes Avenue/Ramps from US 15/US 340, Solarex Court, Ballenger Center Drive, Crestwood Boulevard, Hannover Road, and Corporate Drive. With the No-Build scenarios, these intersections would operate under failing conditions, with roadway segments between the intersections experiencing long queues and heavy delays adding significantly to the deteriorating transportation system performance. Table 2 also demonstrates that study intersections under the 2030 No-Build With Intersection Improvements by Developers scenario, intersection expected to improve slightly, however most continue operating at LOS F.

#### **b. Safety**

Crash history for the study area is divided into two sections: MD 180, from Mount Zion Road to Solarex Court, and MD 351, from Hannover Drive to Solarex Court. Crash data analysis reveals that the total number of crashes along both MD 180 and MD 351 was lower than the statewide average for similar roadways. **Table 3** summarizes crash data reported during 2003-2005.

A total of 36 crashes occurred in the study area along MD 180: 14 injury crashes and 23 property-damage crashes, resulting in a total study-area crash rate of 144.7 crashes per million vehicle miles traveled. For comparable roads, the state average was 183.5 crashes per million vehicle miles traveled. This segment of MD 180 experienced study crash rates for left-turn and angle collisions that were significantly higher than the statewide average. Left-turn and angle collisions typically occur at intersections with poor sight distances and oncoming traffic traveling above posted speed limits.

A total of 43 crashes occurred in the study area along MD 351: 18 injury crashes and 25 property-damage crashes, resulting in a total study-area crash rate of 251.1 crashes per million vehicle miles traveled. For comparable roads, the state average was 306.6 crashes per million vehicle miles traveled. For this segment of MD 351, study area crash rates for opposite direction, left-turn, and angle collisions were slightly higher than statewide averages.

**TABLE 3: MD 180/MD 351 CRASH SUMMARIES**

Roadway and Limits	MD 180: Mt. Zion Road to Solarex Court						MD 351: Hannover Drive to Solarex Court/MD 180					
	2003	2004	2005	Total	Study Rate	State Rate	2003	2004	2005	Total	Study Rate	State Rate
Fatal	-	-	-	-	0.0	1.2	-	-	-	-	0.0	0.9
Injury	6	5	3	14	54.8	85.2	9	9	-	18	105.5	136.6
Number Injured	15	16	9	40	-	-	18	11	-	29	-	-
Property Damage	7	10	6	23	90.0	97.1	8	16	1	25	146.6	169.1
Total Crashes	13	15	9	37	144.7	183.5	17	25	1	43	252.1	306.6
Rate	156.5	175.7	103.2	-	-	-	270.8	388.6	23.0	-	-	-
Opposite Direction	-	1	1	2	7.8	10.5	-	4	-	4	23.5	12.7
Rear End	1	2	2	5	19.6	58.5	8	8	-	16	93.8	93.6
Sideswipe	-	1	-	1	3.9	6.5	-	3	-	3	17.6	24.0
Left Turn	4	2	2	8	31.3*	14.5	5	1	-	6	35.2	30.2
Angle	4	9	2	15	58.7*	31.2	2	7	1	10	58.6	54.2
Fixed Object	4	-	2	6	23.5	28.8	1	1	-	2	11.7	33.5
Other	-	-	-	-	0.0	14.6	1	1	-	2	11.7	32.8
Truck Related	-	-	1	1	3.9	10.9	-	2	-	2	11.7	15.8
Nighttime	4	2	2	8	21%	32%	5	4	1	10	23%	32%
Wet Surface	2	2	2	6	16%	28%	2	4	1	7	16%	28%
Alcohol Related	2	1	-	3	8%	8%	-	1	-	1	2%	8%
Intersection Related	7	12	5	24	-	-	11	14	1	26	-	-
Total Trucks	-	-	1	1	-	-	-	2	-	2	-	-
Percent Trucks	0.0	0.0	6.3	1.4	-	-	0.0	3.9	0.0	2.2	-	-

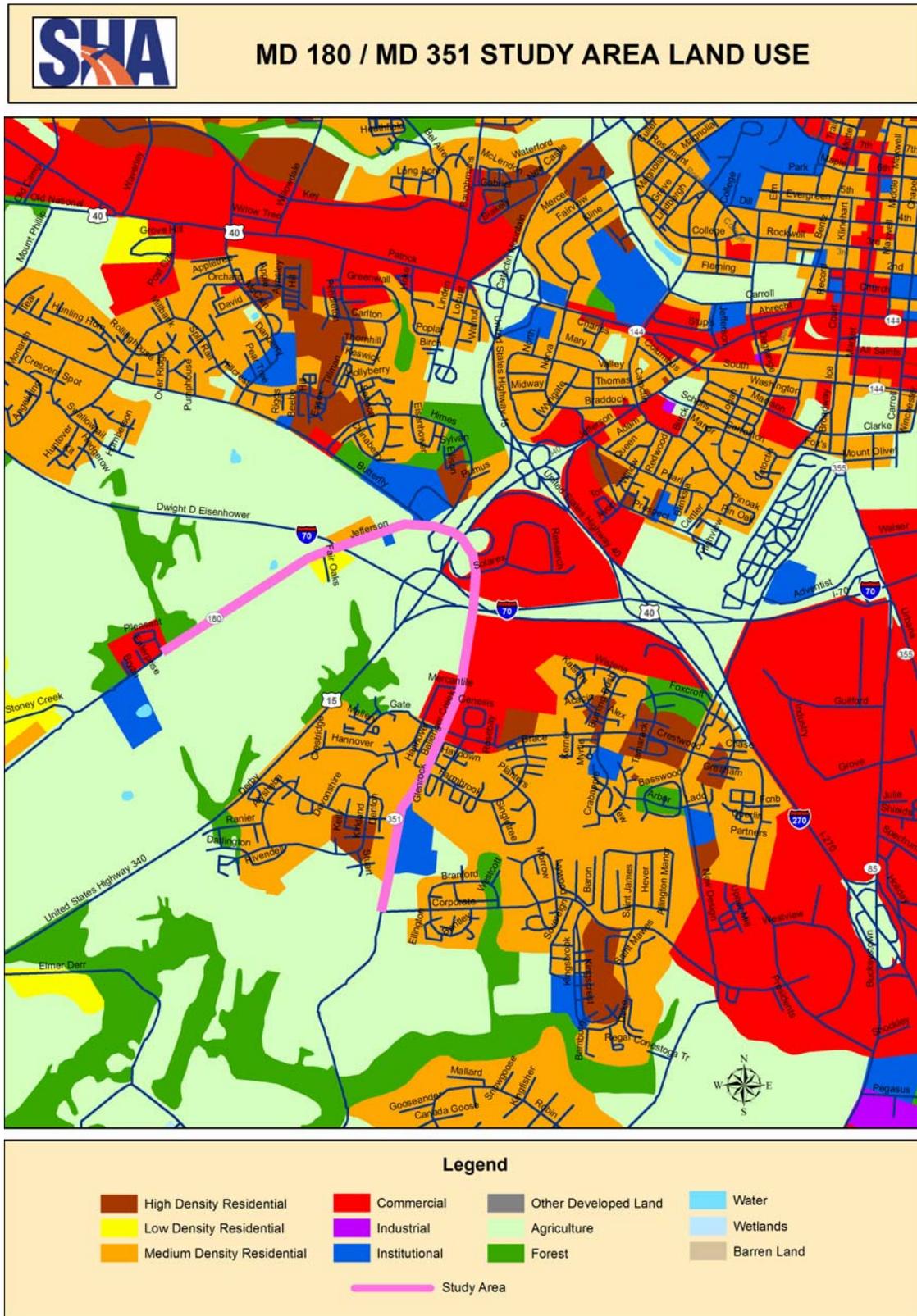
\* Significantly Higher than the Statewide Average

### c. Land Use, Planning, and Development

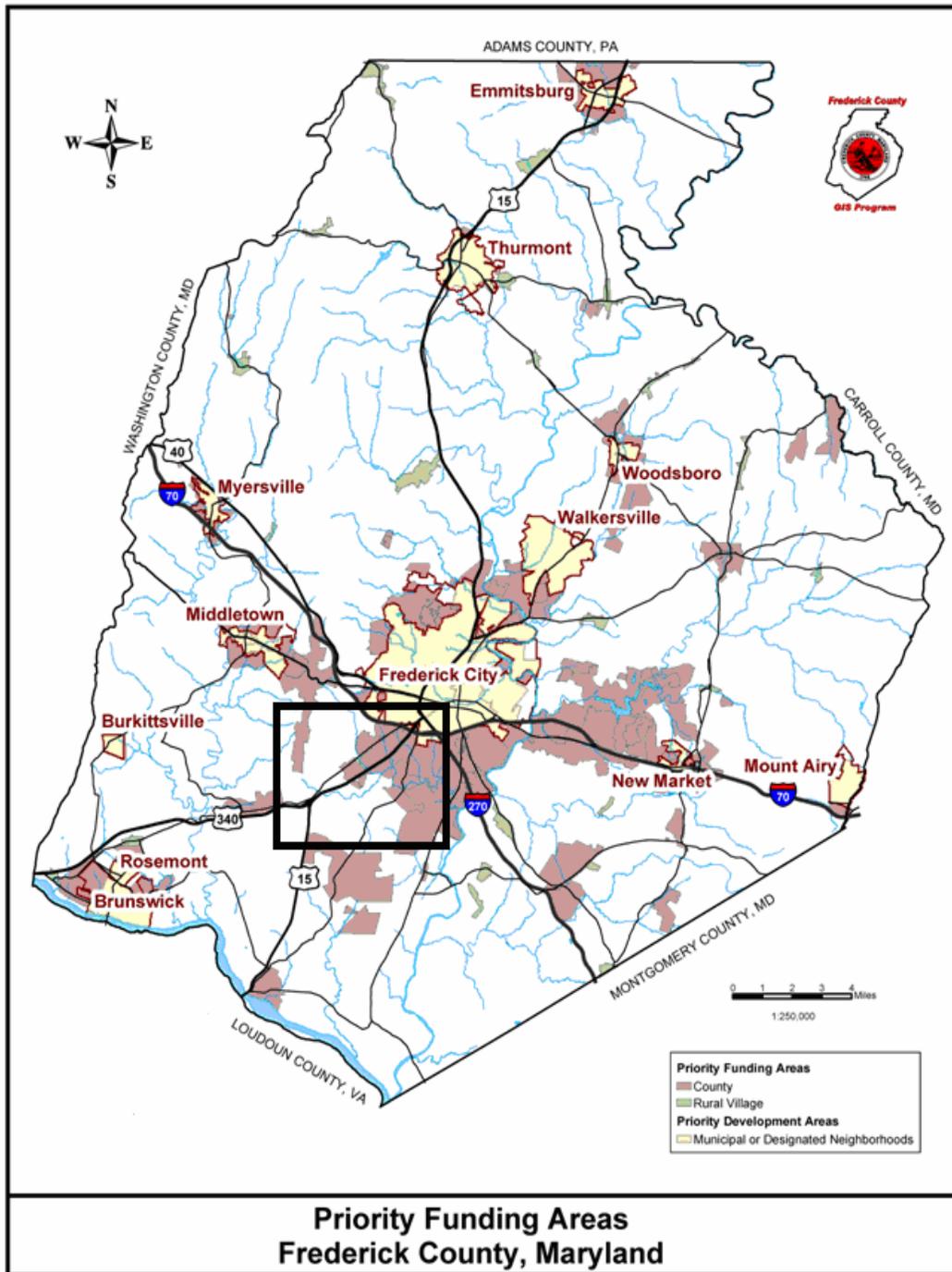
Much of the existing land use along the MD 180 portion of the project is rural in nature. Although used for limited industrial and residential purposes, the existing land is used primarily for agricultural purposes. In contrast, the MD 351 segment is highly urbanized, consisting of a mixture of residential and commercial developments, including several business/industrial parks. These developments mark the origin and destination points for a large number of motorists and commercial vehicles using this roadway. **(Figure 3)**

MD 180/MD 351 is within a Frederick County Priority Funding Area **(Figure 4)** and in an area that has been designated for significant planned growth, as indicated in the 2002 Frederick Region Plan. Accordingly, there are several planned and approved residential and commercial developments within the project area. When comparing years 2000 and 2030, population and employment are projected to increase 73% and 88%, respectively. **(Figure 5, Table 4).**

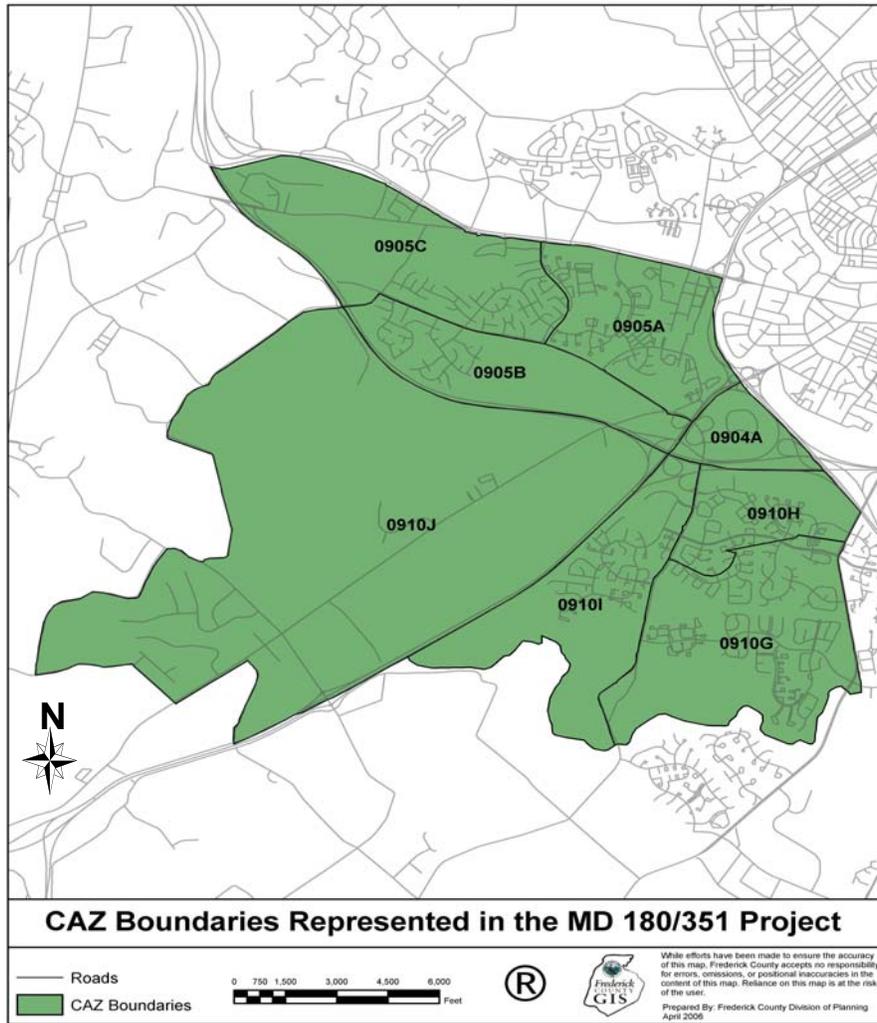
**FIGURE 3: LAND USE**



**FIGURE 4: FREDERICK COUNTY PRIORITY FUNDING AREAS**



**FIGURE 5: CAZ BOUNDARIES MAP**



**TABLE 4: POPULATION AND EMPLOYMENT STATISTICS – CAZ BOUNDARIES**

CAZ No.	Acreage	Household		Household Population		Total Population		Employment	
		2000	2030	2000	2030	2000	2030	2000	2030
0905C	721.6	789	1012	2490	3194	2510	3214	1515	1742
0905A	479.9	1893	2706	5094	7282	5098	7286	1879	2406
0905B	452.4	328	826	1169	2744	1169	2744	96	396
0910J	2818.0	366	1404	991	3792	991	3792	1385	2239
0904A	164.3	0	0	0	0	0	0	642	2480
0910I	610.4	934	1626	2672	4639	2672	4639	298	429
0910H	286.7	941	2104	2245	5013	2248	5016	545	1355
0910G	812.3	1987	2943	4993	7367	4993	7367	306	1483
<b>TOTAL</b>	<b>6345.6</b>	<b>7238</b>	<b>12621</b>	<b>19654</b>	<b>34031</b>	<b>19681</b>	<b>34058</b>	<b>6666</b>	<b>12530</b>
<b>% Increase</b>		<b>74%</b>		<b>73%</b>		<b>73%</b>		<b>88%</b>	

More than 300 acres have been designated for residential and commercial development planned in the study area. These property locations can be seen on the Planned Development Map in **Figure 6**. **Table 5** summarizes the zoning and land uses of planned development areas that will greatly impact the roadway within the project vicinity.

**FIGURE 6: PLANNED DEVELOPMENT MAP**



**TABLE 5: PROPOSED DEVELOPMENT**

VICINITY LAND USES					
Vicinity (see map)	Owner / Developer	Acreage	Approval Status	Zoning	Existing & Proposed Land Use
1	Albert L Hargett, Sr. / Hargett Farm LLC (Proposed)	148.16	Pending	Low Density Residential	Residential: Single Family, Town homes, Multifamily Commercial HOA Pool / Park Public Use Right of way
2	MedImmune, Inc. (Expansion)	27.47	Pending Grading plan approved	Light Manufacturing	Manufacturing Warehouse Offices
3	Jefferson Park Development, Inc. (Proposed)	173.38	Pending	Mixed Residential & Commercial	Residential Commercial Combined Residential & Commercial Public Use Open Space Right of Way
4	Howard S. Leatherwood / ACE Printing LLC (Proposed)	23.39	Pending	Planned Industrial	Publishing & Printing
5	BP Solar International LLC (Expansion)	23.04	Pending	Light Industrial	Additional 166,687 sq ft

**d. Environmental Inventory**

The following summary provides an inventory of known natural environmental, socioeconomic, and cultural resources within the study area that may be impacted by proposed improvements:

Encroachment may occur in areas of 100-year floodplains associated with Ballenger Creek and its tributaries. A review of National Wetland Inventory and Department of Natural Resources (DNR) non-tidal wetland mapping indicates that palustrine wetlands are located within the project area. In the event that disturbance occurs within floodplains, wetlands, or instream areas, including modifications to existing drainage structures, permits will be required from the Maryland Department of Environment (MDE) and the US Army Corps of Engineers (COE).

Coordination with DNR indicates that the study area is within the Ballenger Creek and Rock Creek drainage areas. Ballenger Creek, Rock Creek, and their tributaries are classified as Use III-P waters (Non-tidal Cold Water and Public Water Supplies). In general, no in-stream work is permitted in Use III streams from October 1 through April 30, inclusive, during any year. Any in-stream construction will require permits from MDE and the COE.

Coordination with DNR further indicates that a natural brown trout population has been documented in Ballenger Creek. DNR indicates that this species, and any other species that may

occur within the study area, should be adequately protected by the in-stream work prohibition period, erosion and sediment control measures, and other Best Management Practices typically used for protection of stream resources.

Coordination with the US Fish and Wildlife Service (FWS) and DNR – Wildlife and Heritage Service indicates that there are no current records of any state- or federal-listed rare, threatened, or endangered species, other than occasional transient individuals. Although the state-listed endangered loggerhead shrike (*Lanius ludovicianus*) is known to have previously inhabited the study area, it is unlikely that the project would impact this species which has not been observed since the late 1980s. DNR representatives also indicated that there is a rock outcrop habitat known to support three rare lichen species located within the study area, approximately 0.8 mile west of US 15, south of US 40. DNR recommends that SHA avoid disturbing this habitat and the surrounding areas.

The study area contains four properties that are listed on the National Register of Historic Places: the Old National Pike Milestone #48 (E-3-66), Highland Lodge (F-3-137), Prospect Hall (F-3-61), which also has a Maryland Historic Trust (MHT) easement on the property, and Linden Grove (F-3-102). Investigations will be needed to determine the eligibility of the following properties that are listed in the Maryland Inventory of Historic Properties, but which have not been evaluated for National Register eligibility: Braddock Survey District, Maple Homestead, Lily Homestead, and the Thomas Noland House. The Frederick Memorial Park (also called Clustered Spires Cemetery) is also likely to be eligible for listing as a historic landscape. Coordination with MHT will continue throughout the project planning process to determine effects on significant cultural resources.

An assessment of archeological potential has revealed the presence of four archeological sites recorded within the study area. The potential for undiscovered archeological resources is low for the majority of the study area because of intense development. However, the more rural portion of the project along MD 180, from I-70 to Stoney Creek Drive, has a high potential to contain prehistoric archeological resources. Detailed cultural resource investigations, including Phase I archeological survey, if required, will be conducted in subsequent stages of the study when the project scope is further refined.

Eight public parks are located within the study area: Emerald Farm and Monarch Ridge Park, Golfview Park, Hillcrest Orchard Park, Hillcrest Park, David Lane Park, Hill Street Park, Overlook Park, and Ballenger Creek Park. In addition, three public schools with heavily used public recreational facilities are located within the study area: Hillcrest Elementary School, Ballenger Creek Middle School, and Orchard Grove Elementary School. A fourth school has been proposed between Butterfly Lane and I-70 to accommodate planned development.

This project may require the acquisition of right-of-way and easements from private properties throughout the study area. The right-of-way acquisition has the potential to result in residential, business, or institutional displacements, and/or loss of parking spaces resulting from roadway widening and grading, depending upon the final design of the project. Based on the final design of the project, modifications to ingress/egress at numerous properties may also be required.

In compliance with Executive Order 12898, "Federal Actions to Address Environmental Justice (EJ) in the Minority and Low-Income Populations," SHA is taking steps to identify and avoid

disproportionately high or adverse effects on minority and low-income communities. As SHA moves forward in the transportation decision-making process, the agency will ensure the full and fair participation by all potentially affected communities in the study area. To date, coordination with the City of Frederick has identified a predominantly Hispanic population in the Hillcrest Orchards community located in the northwest portion of the study area. Further research is being conducted to identify other potential minority and/or low-income communities and determine whether they will be impacted disproportionately by the proposed project.

#### **e. Other Related Transportation Projects**

Ongoing major transportation projects in the study area include the following:

- I-70 Improvement Projects – These SHA design projects are evaluating the upgrade of existing I-70 from Mt. Phillip Road to MD 144, a distance of 5.30 miles. Improvements include widening the 4-lane section and reconstructing the interchanges.
- I-270/US 15 Multi-Modal Corridor Study – This SHA planning project is a study that is considering highway and transit improvements along I-270/US 15 from Shady Grove Road in Montgomery county to Biggs Fords Road in Frederick county. Proposed highway improvements are 31 miles in length, and transit improvements are 14 miles in length.
- MD 351 (Ballenger Creek Pike) at Crestwood Boulevard – This project will widen MD 351 to accommodate double right-turn lanes on Crestwood Boulevard. This project is funded for concept development only.
- Butterfly Lane – The City of Frederick has programmed funds to improve Butterfly Lane.

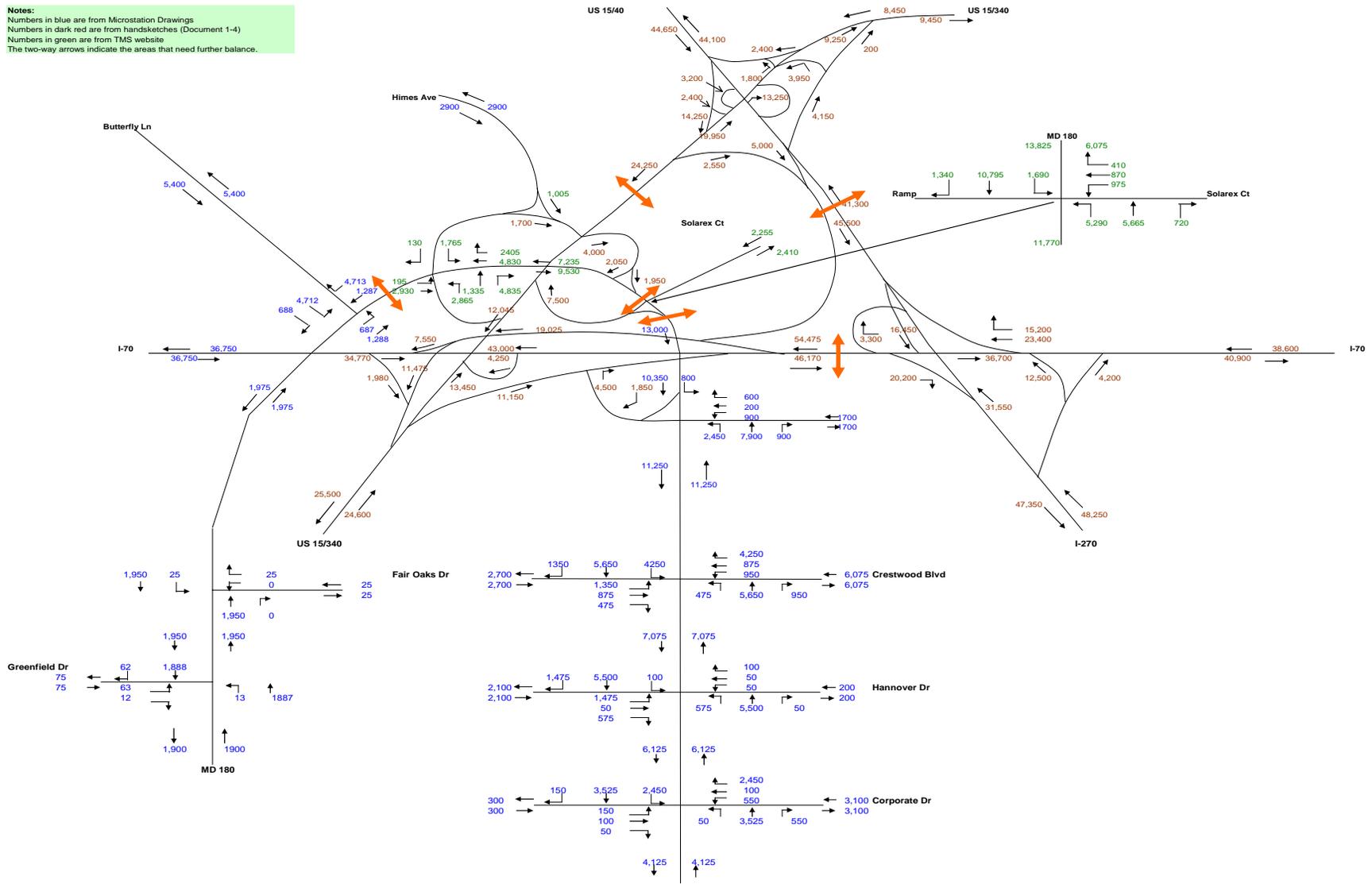
#### **IV. CONCLUSION**

Growth within the study area is expected to continue, and the existing roadway network is insufficient to handle the traffic generated by 2030. With the anticipated development within the study area, this study will look for ways to accommodate the projected traffic volumes, improve existing and future roadway capacity, and traffic operations along the corridor.

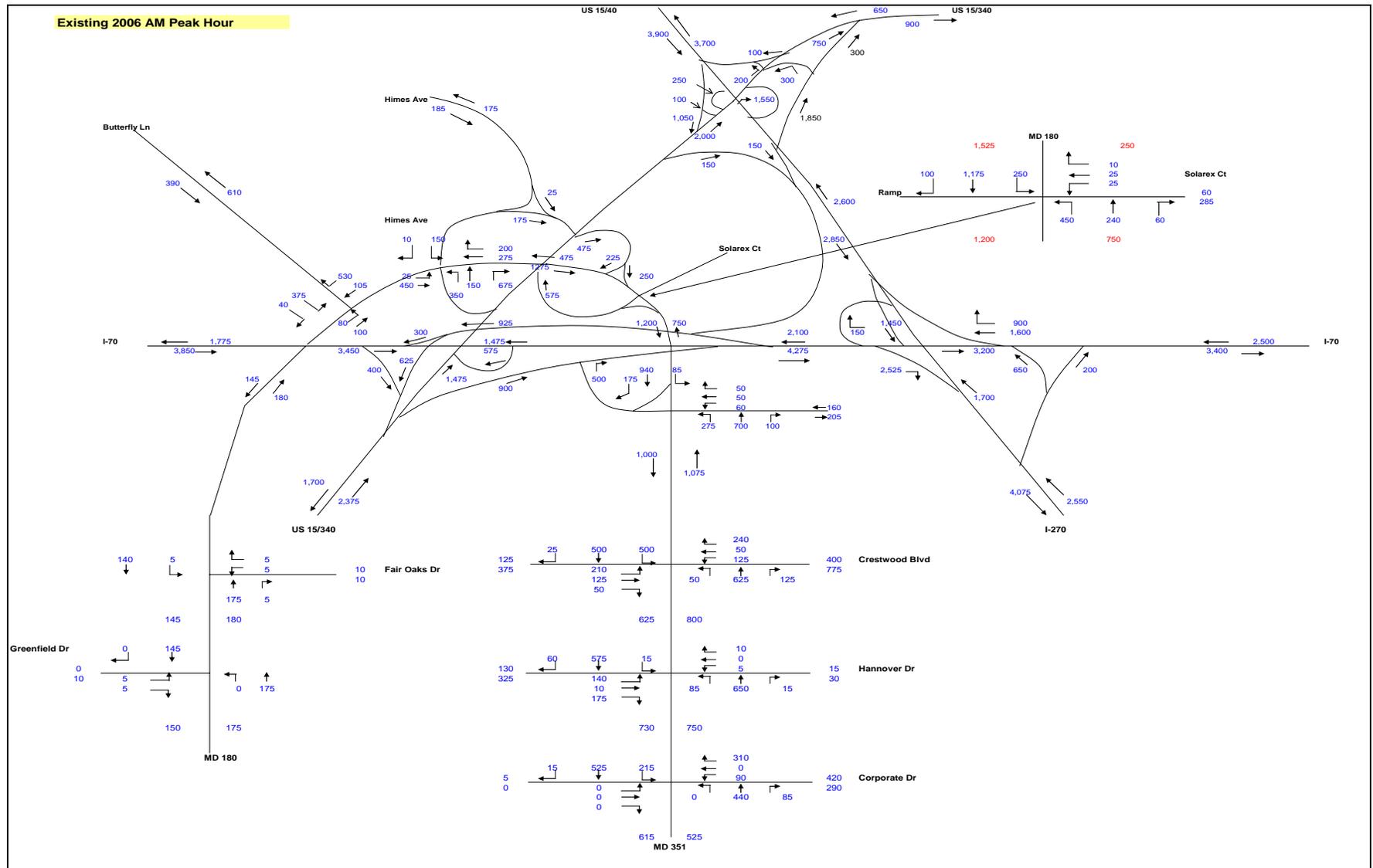
## **APPENDIX**

**FIGURE 7: ADT 2006**

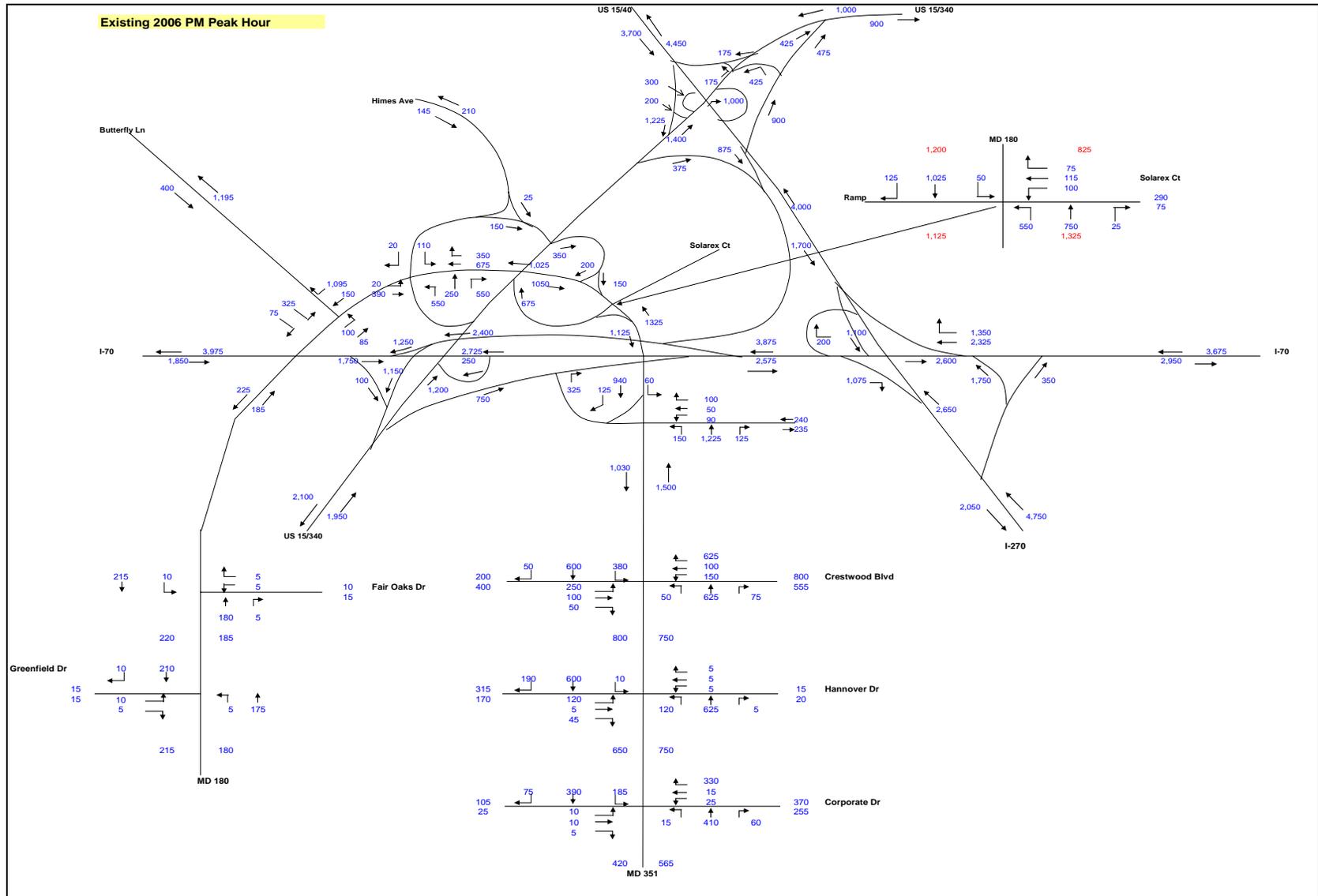
**Notes:**  
 Numbers in blue are from Microstation Drawings  
 Numbers in dark red are from handsketches (Document 1-4)  
 Numbers in green are from TMS website  
 The two-way arrows indicate the areas that need further balance.



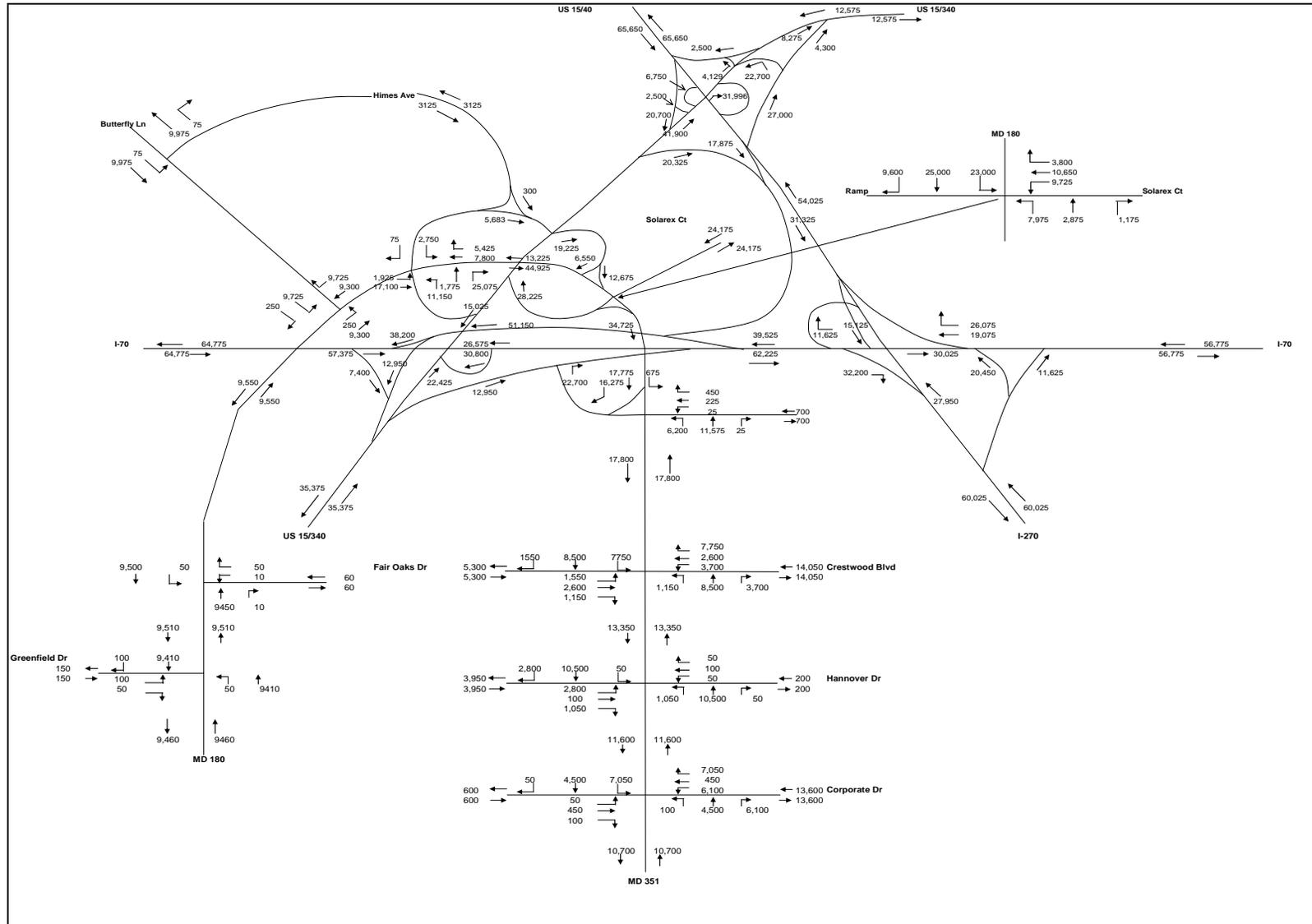
**FIGURE 8: EXISTING 2006 AM PEAK HOUR**



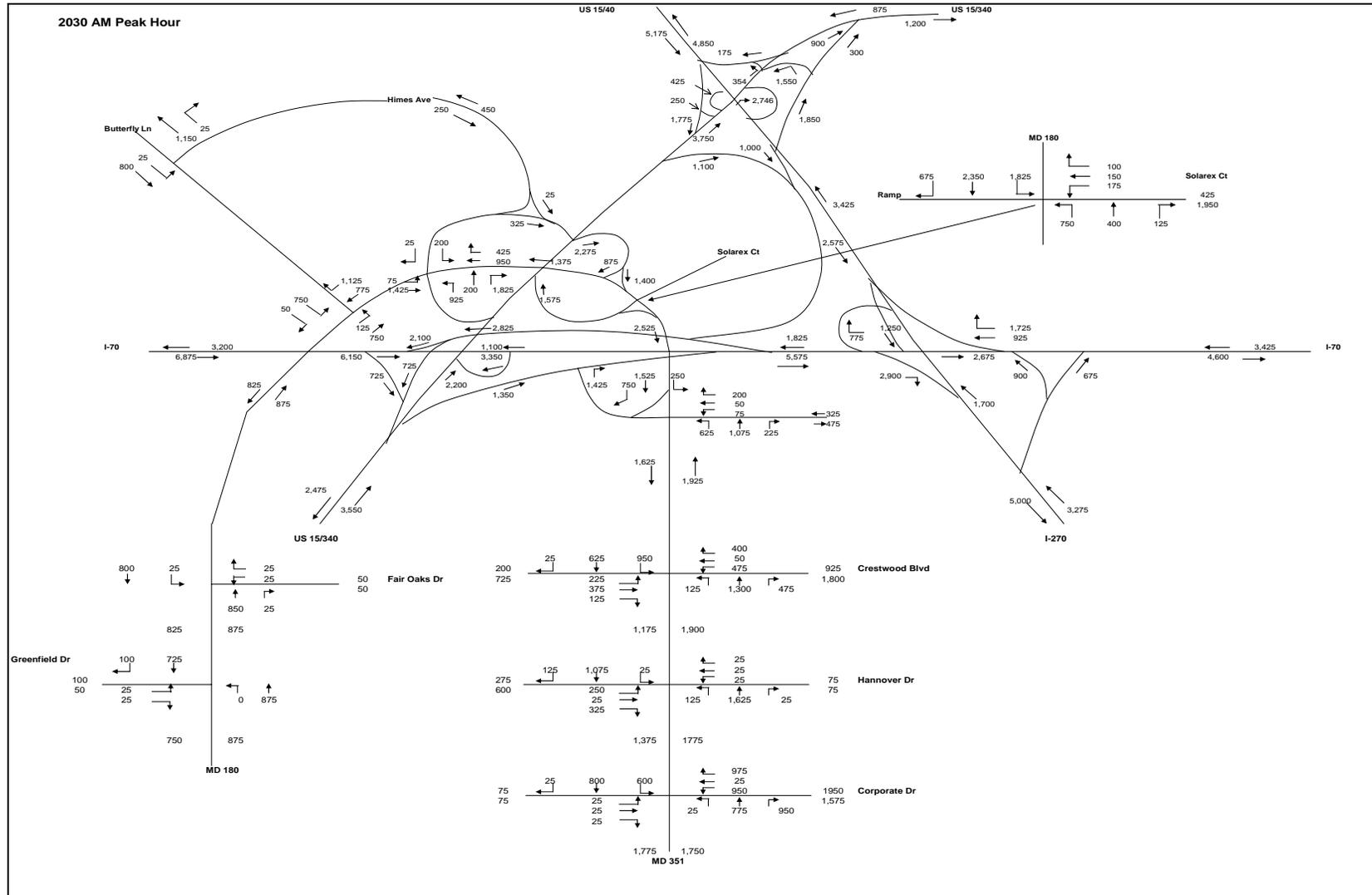
**FIGURE 9: EXISTING 2006 PM PEAK HOUR**



**FIGURE 10: ADT 2030**



**FIGURE 11: ADT 2030 AM PEAK HOUR**



**FIGURE 12: ADT 2030 PM PEAK HOUR**

