



CITY OF

Westfield
INDIANA

WESTFIELD ROAD IMPACT FEE Zone Improvement Plan

March 28, 2012

WESTFIELD ROAD IMPACT FEE

Zone Improvement Plan



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CERTIFICATION

I certify that this Road Impact Fee Zone Improvement Plan has been developed by me or under my direct supervision and that I have training and experience in the field of traffic and transportation engineering.



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- Appendix B: Road Segment Level of Service Criteria
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- Appendix D: Travel Demand Modeling Procedures
- Appendix E: Development Forecasts
- Appendix F: Capacity Analysis Data
- Appendix G: Project Cost Estimates

1 Introduction

1.1 Purpose

The City of Westfield, Indiana currently assesses a road impact fee on new development to help fund the roadway capital improvements necessary to serve growing traffic demand. The City has commissioned this study to support the update of its road impact fee ordinance to reflect changes in the community since its current ordinance was enacted in 2007.

This report has been prepared to comply with the Indiana Code 36-7-4-1300 Series requirements for impact fees,¹ which are shown in **Appendix A** of this report. The report serves as the Zone Improvement Plan for all road impact fee zones designated by the City of Westfield. This Zone Improvement Plan identifies Westfield’s anticipated roadway capital improvement needs to serve land-use development expected to occur between 2011 and 2021. It also establishes the road impact fees and assessment rates that can be applied to new development in order to help fund roadway those capital improvements. Specifically, this report:

- Designates geographic “impact zones” for road impact fees to be collected by Westfield.
- Describes the nature and location of existing infrastructure in the impact zones.
- Establishes “community level of service” criteria by which to assess whether roads in the impact zones are providing adequate service to users.
- Estimates the nature and location of development that is expected to occur in the impact zones over the next 10 years.
- Estimates the nature, location, timing and cost of road improvements that are needed to meet community level of service criteria both now and through 2021 with anticipated new development.
- Identifies revenue sources and estimated amounts that Westfield has spent on roads in the previous 5 years and intends to spend on capital improvements through 2021.

Existing and anticipated conditions in Westfield have changed significantly since the previous 10-year Zone Improvement Plan was developed in 2007. In that time, the Town of Westfield has become the City of Westfield and has annexed additional portions of Washington Township. The nationwide economic downturn that began in 2008 has slowed the tremendous pace of growth in Westfield, and several developments that were anticipated in 2007 have been delayed. However, significant new developments are now underway as the economy begins to revitalize. The initial phase of Grand Park, an ambitious mix of sports destination, commercial development and residential community, is now under construction on the northwest side of

¹ IC 36-7-4-1300 Series, Impact Fees

Westfield. Not far away, the City also expects initial implementation of its Grand Junction plan for the re-creation of its downtown. These and other developments will be stimulated by the upgrade of US 31 to a freeway facility through Westfield, which is already underway and expected to be complete by 2017. This upgrade will make new development in Westfield significantly easier to access and will change traffic patterns for those already traveling on Westfield's roads.

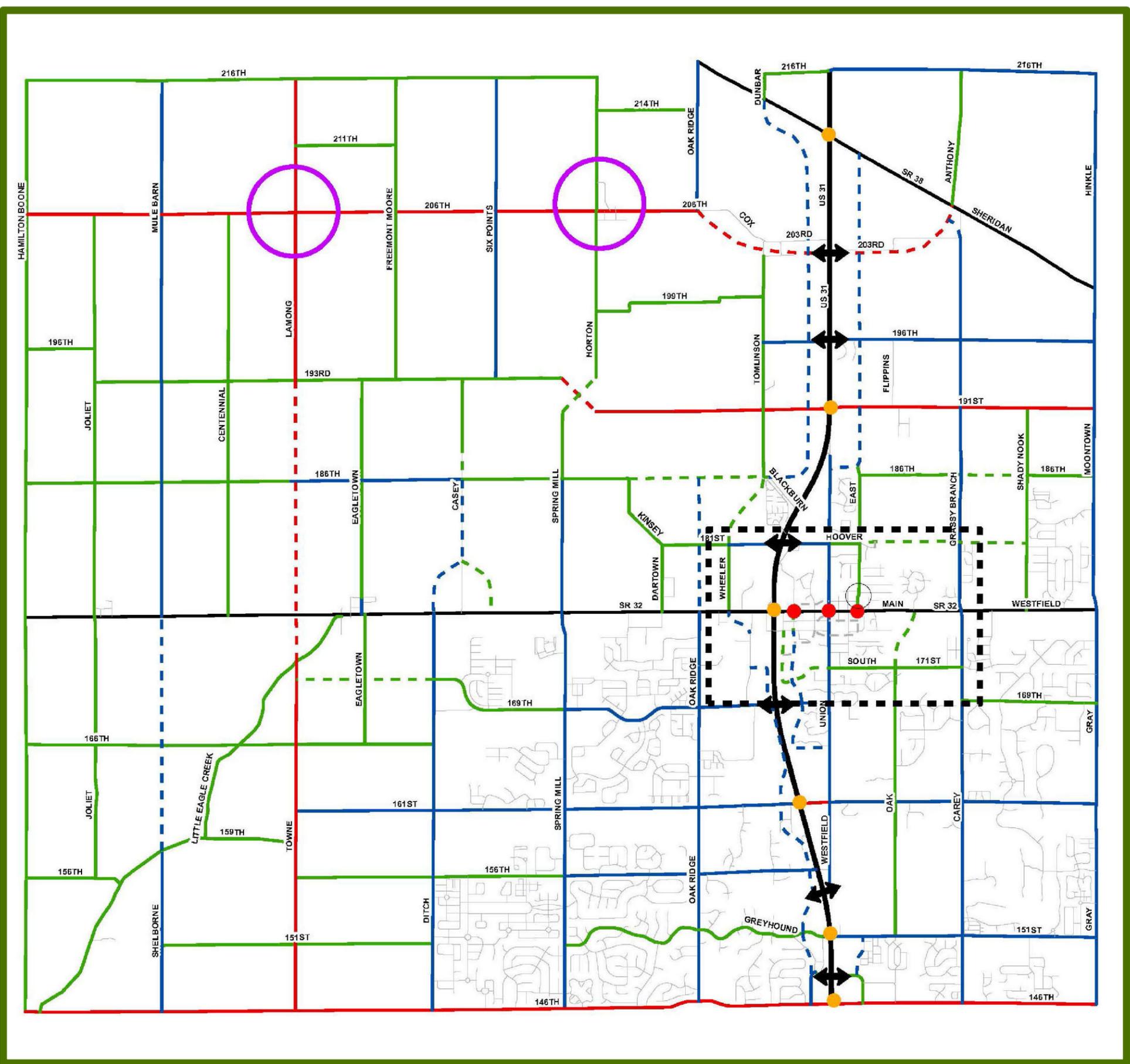
1.2 Study Area and Infrastructure Responsibility

The study area for this Zone Improvement Plan includes all of Washington Township in Hamilton County. The Westfield Advisory Plan Commission has planning and zoning authority for all of Washington Township. **Figure 1-1** is a map of the existing study area road network. **Figure 1-2** shows the current Westfield Thoroughfare Plan, which identifies the intended future roadway network and the relative importance of roads in the study area.

Although it has planning and zoning authority over the entire township, the City of Westfield is not responsible for all roads within the township. The City of Westfield Public Works Department is responsible for construction and maintenance of public roads within the corporate limits of Westfield, with the following exceptions:

- The Indiana Department of Transportation is responsible for construction and maintenance on the federal and state routes—US 31, SR 32 and SR 38
- The Hamilton County Highway Department is responsible for construction and maintenance on 146th Street, which runs along the southern boundary of Westfield
- The City of Noblesville is responsible for construction and maintenance on Moontown Road on the eastern boundary of Westfield

This Zone Improvement Plan includes 10-year capital improvement needs only for arterial and collector roads that are the responsibility of the City of Westfield. Capital improvement needs for roads in the surrounding unincorporated areas of Washington Township were also identified, but are not included in the Zone Improvement Plan. These roads are currently the responsibility of Hamilton County but could become the responsibility of Westfield if they are annexed in the future.

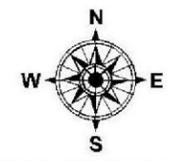
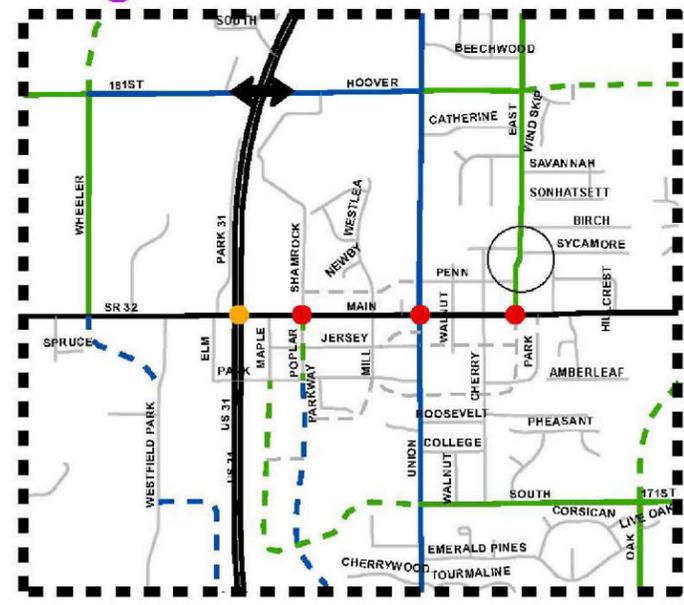


City of Westfield Thoroughfare Plan

Collector System Map
Supersedes Figure 4.7
from 2010 Summer Amendment

Legend

- Local
- - - Proposed Local
- Collector
- - - Proposed Collector
- Primary Arterial 1
- Primary Arterial 2
- - - Proposed Primary Arterial 2
- Secondary Arterial
- - - Proposed Secondary
- Proposed Full Access Intersections
- Interchanges
- ↔ Under/Over Passes
- Safety Improvements
- Context Sensitive Areas



Maps Are Not To Scale



Disclaimer: The City of Westfield, Indiana has created this map in an attempt to increase the availability of public information and enhance public knowledge. The City is continually collecting, maintaining and updating data. Information for the map themes was obtained from existing, and many times historical documentation. Because of this, the information displayed on this map is not guaranteed to be completely accurate or all inclusive. The City of Westfield retains the right to change the content of this map without prior notice. The City of Westfield assumes no liability for any actions or occurrences that may result from persons viewing the information contained on this map. This map is not meant to take the place of any existing guidelines, rules, regulations or legal procedures. No information displayed on this map should be used in place of legal documentation. Field investigations are still necessary for locating underground facilities, and contact with appropriate departmental staff if still required for determining location-based fees or designations.

**Figure 1-2
Westfield Thoroughfare Plan**

**Westfield
Road Impact Fee Study**

1.3 Historical Funding Sources

The City of Westfield has used four sources of funding for road construction and maintenance over the past five years. These include impact fees collected under the current ordinance, state distributions of funds from the Local Road and Street account and the Motor Vehicle Highway account, and tax increment financing (TIF). The TIF funds have been used only for projects in the designated TIF district surrounding the Village Park Plaza shopping center. Table 1-1 shows the amount of funding expended from each source.

Table 1-1: Disbursements for Road Construction and Maintenance—2007 to 2011

Year	Road Impact Fees	LRS State Distribution	MVH State Distribution	Tax Increment Financing	Total
2007	\$432,516	\$246,903	\$416,423	\$1,150,029	\$2,245,871
2008	\$407,238	\$302,404	\$731,956	\$1,050,595	\$2,492,192
2009	\$214,012	\$387,744	\$722,209	\$1,146,180	\$2,470,145
2010	\$380,074	\$325,760	\$984,771	\$869,665	\$2,560,269
2011	\$310,766	\$346,389	\$981,861	\$2,335,915	\$3,974,932
TOTAL	\$1,744,606	\$1,609,199	\$3,837,220	\$6,552,384	\$13,743,410

2 Community Level of Service Criteria

The term “Community Level of Service” is defined by Indiana Code as “a quantitative measure of the service provided by the infrastructure that is determined by a unit to be appropriate.”¹ This section of the plan describes the quantitative measures and methods that are used to determine whether Westfield’s road infrastructure is appropriate to serve existing and anticipated future travel demand. Separate community level of service (LOS) criteria have been established to identify the traffic operation adequacy and the geometric adequacy of the road network.

2.1 Traffic Operation Levels of Service

Traffic operation describes the effectiveness and efficiency of movement on the transportation infrastructure. Traffic operation levels of service on the Washington Township roadway network are measured using the methods of the Transportation Research Board *Highway Capacity Manual (HCM)*². That document provides standard methods to quantify the quality of traffic operations perceived by users of many different types of transportation facilities. These methods are commonly used by traffic engineers to plan, design and analyze transportation facilities. The specific LOS criteria and calculation methods differ depending on the type of transportation facility being analyzed. However, a scale of “A” to “F” is established for each facility type, based on the quantitative LOS values. An LOS of “A” represents the best quality of service, while an LOS of “F” represents the worst. An LOS of “D” or better is established by the City of Westfield as its Community Level of Service for traffic operations. Highway Capacity Levels of Service were calculated for all road segments and intersections on the Washington Township study network using the methods summarized below.

Road Segments

The road segments under study in Westfield fall into three separate facility categories as defined by the HCM. Each of the three categories of road segment has separate LOS criteria and calculation methods. Road segments that have a signalized intersection spacing of 2 miles or less are analyzed as urban streets, with LOS measured in terms of average travel speed over a segment. Two-lane highway segments with signal spacing greater than 2 miles are analyzed as rural highways, with LOS measured both by the percent time spent following other vehicles and by the average travel speed over a roadway segment. For multi-lane roadway segments (two or more travel lanes per direction) with signal spacing greater than 2 miles, LOS is measured in terms of average travel speed and the density of traffic flow on the road.

²*Highway Capacity Manual 2010*, Transportation Research Board, National Research Council, Washington, DC, 2010.

For this study, Table 1 from the Florida Department of Transportation *Quality/Level of Service Handbook*³ was used to estimate roadway segment LOS under current and projected conditions. This table is shown in **Appendix B**. It was developed for infrastructure planning purposes by using the methods of the HCM with some default parameters. While the use of this table would not be considered appropriate for facility design or detailed operational analysis, it is appropriate for generalized identification of problem locations, especially under future conditions of uncertain travel demand. This table was used to identify roadway facilities with unacceptable traffic operations LOS based on the facility type, number of through lanes, presence of medians and auxiliary lanes and current or forecast traffic volumes. Daily volumes were used for this analysis, as they are considered to be more reliable than estimates of future hourly volumes. A minimum acceptable LOS of “D” is required for each road segment.

Intersections

As with roadway segment traffic operations, intersection traffic operations LOS was determined based on the procedures of the HCM. A minimum acceptable LOS of “D” is required for each intersection approach and for traffic movements with significant volumes. For each analyzed intersection, the lane configuration necessary to achieve acceptable LOS was determined using the Synchro traffic simulation⁴ software, which can evaluate LOS using the HCM methods. In some instances, an LOS of “E” or “F” is tolerated for individual low volume traffic movements if the overall approach LOS is acceptable or the intersection does not warrant additional traffic control. Intersections on proposed new road segments and on existing segments that warrant reconstruction to meet cross section LOS standards (described in Section 2.2) were assumed to include auxiliary lanes per Indiana Department of Transportation and City of Westfield design standards.

In order to identify the roadway improvements required to provide adequate LOS at each intersection, it was also necessary to determine the appropriate traffic control at that intersection. Appropriate intersection traffic control was determined by using the traffic signal and multi-way stop control warrant procedures of the Indiana Manual on Uniform Traffic Control Devices (MUTCD)⁵. **Table 2-1** shows the minimum average daily traffic volumes on the intersecting roads required by the Indiana MUTCD to warrant installation of a traffic signal. Signal warrants based on average daily traffic volumes are provided in the MUTCD to warrant the temporary installation of traffic signals where a new intersection is to be constructed or where existing traffic is expected to change significantly. The use of current or projected daily traffic volumes is

³ Florida Department of Transportation, *2009 Quality/Level of Service Handbook*, 2009. Available at <http://www.dot.state.fl.us/planning/systems/sm/los>.

⁴ Trafficware, Ltd., *Synchro plus SimTraffic* Version 8 [software], 2011.

⁵ Indiana Department of Transportation, *Indiana Manual on Uniform Traffic Control Devices*, November 2011. Available at <http://www.in.gov/dot/div/contracts/design/mutcd/mutcd.html>

not a substitute for a full warrant analysis with hourly volume data and is used in this analysis only to indicate where new traffic signals are likely to be required.

Table 2-1: Traffic Signal Warrants Based on Daily Volumes

Approach Lanes		Daily Approach Volumes From Both Directions			
		Condition A1 -- Minimum Vehicular Volume		Condition A2 -- Interruption of Continuous Traffic	
Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street
1	1	8,300	4,600	12,500	2,300
2	1	10,000	4,600	15,000	2,300
2	2	10,000	6,000	15,000	3,100
1	2	8,300	6,000	12,500	3,100

Source: Indiana MUTCD, Table 4C-2

Table 2-2 shows the minimum average daily traffic volumes used in this study to indicate the need for multi-way stop control at intersection. The MUTCD does not contain multi-way stop warrants based on daily traffic volumes, but they were estimated for this analysis using the same ratio of hourly to daily volumes as was used for traffic signal warrants provided in the MUTCD.

Table 2-2: Multi-way Stop Warrants Based on Daily Volumes

Daily Volumes Approaching From Both Directions			
Each of 8 hours		Estimated Daily*	
Major Street	Minor Street	Major Street	Minor Street
300	200	4,980	3,320

*Not official MUTCD Warrants

The City of Westfield prefers to construct modern roundabouts to control intersection traffic operation where engineering and cost considerations allow. However, there are no standard warrants for the installation of a roundabout at an intersection, as there are for traffic signals or multi-way stop control. In developing this plan, the operation of a roundabout was evaluated at any location where a new traffic signal is anticipated to be warranted. Construction of a new roundabout is recommended rather than a new traffic signal if the roundabout is expected to provide satisfactory traffic operation. A roundabout was also evaluated for intersections where multi-way stop is not warranted, but more than two approach lanes would be required on one or more legs in order to provide acceptable peak hour LOS. The future intersection traffic control

type identified in this plan is preliminary and subject to change during the project development process.

2.2 Roadway Cross Section Level of Service

Traffic operation is not the only measure used to determine whether Westfield’s roads provide an appropriate level of service. As traffic volumes in Westfield increase, inadequate road design may have safety and maintenance impacts in addition to congestion impacts. Much of the roadway infrastructure in Washington Township was originally constructed with pavement widths and design appropriate for rural, low volume conditions and not for the current traffic volumes and vehicle loads. According to the American Association of State Highway and Transportation Officials, “Roads with a narrow traveled way, narrow shoulders, and an appreciable traffic volume tend to provide poor service, have a relatively higher crash rate, and need frequent and costly maintenance.”⁶

To help minimize traffic crashes and excessive roadway maintenance on 2-lane roadways with inadequate design, a cross section LOS standard is also applied to roadway segments. Acceptable LOS per this standard is that any road segments carrying a volume of at least 5,000 vehicles per day will have a minimum of 11-foot wide travel lanes and 2-foot wide shoulders. Roadway segments identified as having either existing 2011 or projected 2021 daily traffic volumes of at least 5,000 vehicles were measured to determine whether they have a pavement width of at least 22 feet. Those segments with insufficient pavement width are identified for improvement.

⁶ American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, 2004, P. 313.

3 2011 Existing Conditions and Needs Assessment

3.1 Traffic Volumes

Recent roadway segment and turning movement counts were obtained from various sources, including the City of Westfield, the Hamilton County Highway Department, The Indiana Department of Transportation, the City of Carmel, and the City of Noblesville. Additional 24-hour segment counts and peak period intersection turning movement counts were collected at key network locations as part of this study.

Where recent road segment counts were not available or collected as part of this study, segment traffic volumes were estimated based on older counts and counts from adjacent segments. Where peak hour turning movement volumes were not available or collected, these volumes were estimated from the volumes on the intersection approach links using methods described in Chapter 8 of National Cooperative Highway Research Project Report 255⁷

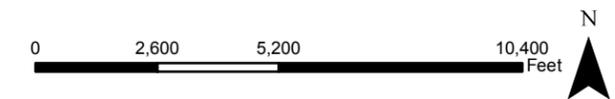
Figure 3-1 shows the existing daily traffic volumes on the study area road network segments. Existing peak hour turning movement volumes at intersections are provided in **Appendix C**.

⁷ Pederson, N.J., and D.R. Samdahl, *Highway Traffic Data for Urbanized Area Project Planning and Design*, National Cooperative Highway Research Program Report 255, Transportation Research Board, Washington, D.C., 1982.

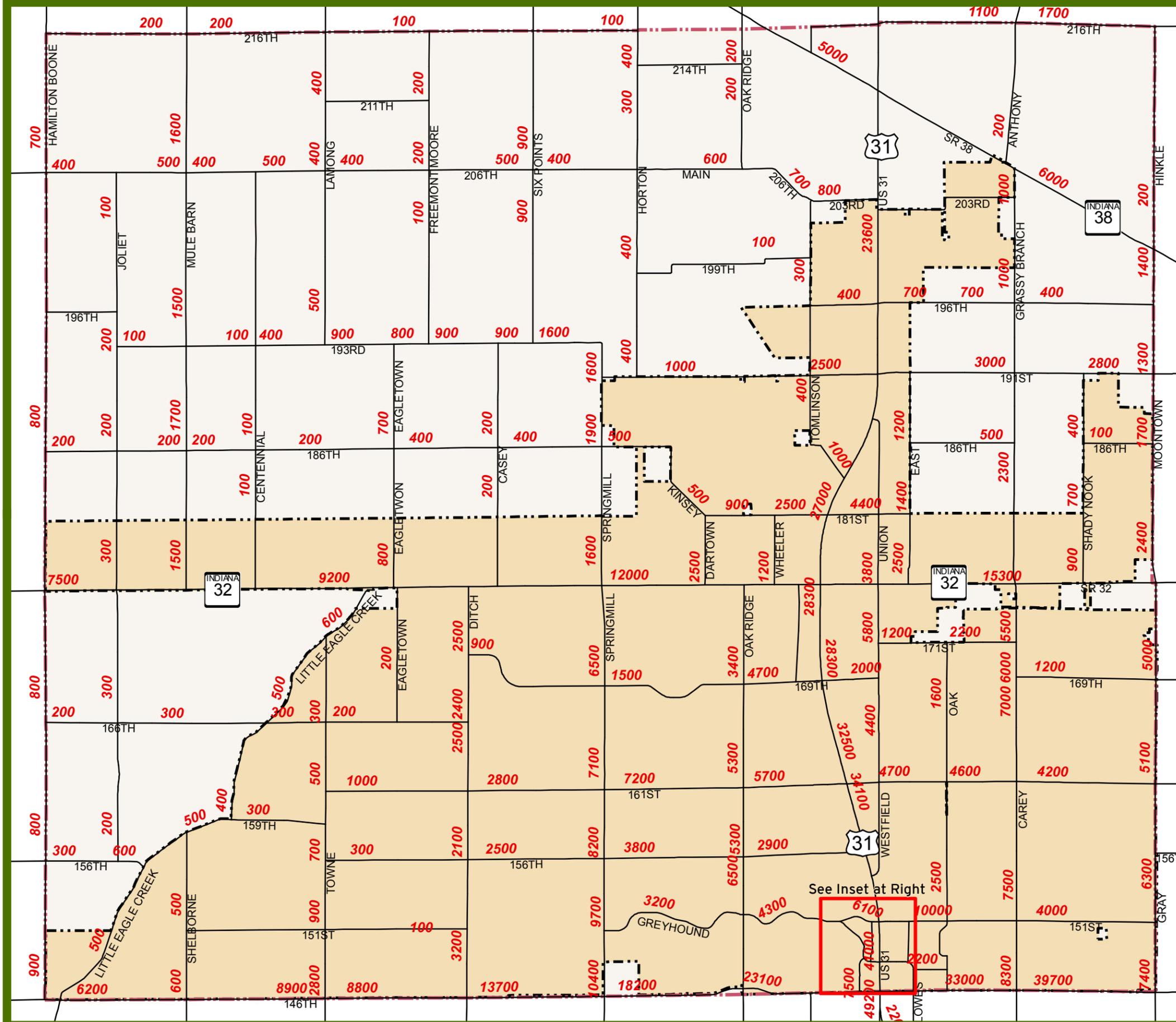
Road Impact Fee Study

Figure 3-1 Existing Traffic Volumes

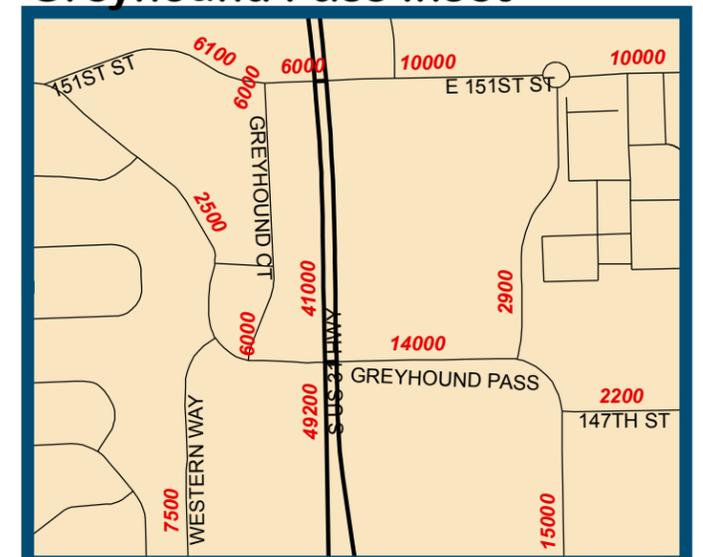
-  City of Westfield
-  Washington Township
- ###** Existing Average Daily Traffic



HNTB April 2012



Greyhound Pass Inset



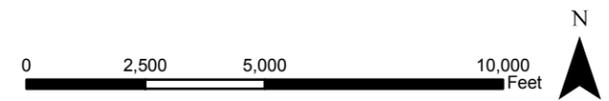
3.2 Intersection Traffic Control

The existing lane configuration and traffic control at each study area intersection were verified through field investigation. The adequacy of existing traffic control at each intersection was evaluated using existing traffic volumes and the warrant criteria for traffic signals and multi-way stop control described in **Section 2, Community Level of Service Criteria**. **Figure 3-2** shows existing and warranted intersection traffic control based on 2011 conditions. Based on existing daily traffic volumes, no intersections in Washington Township were found to warrant the installation of new traffic signals or new multi-way stop control.

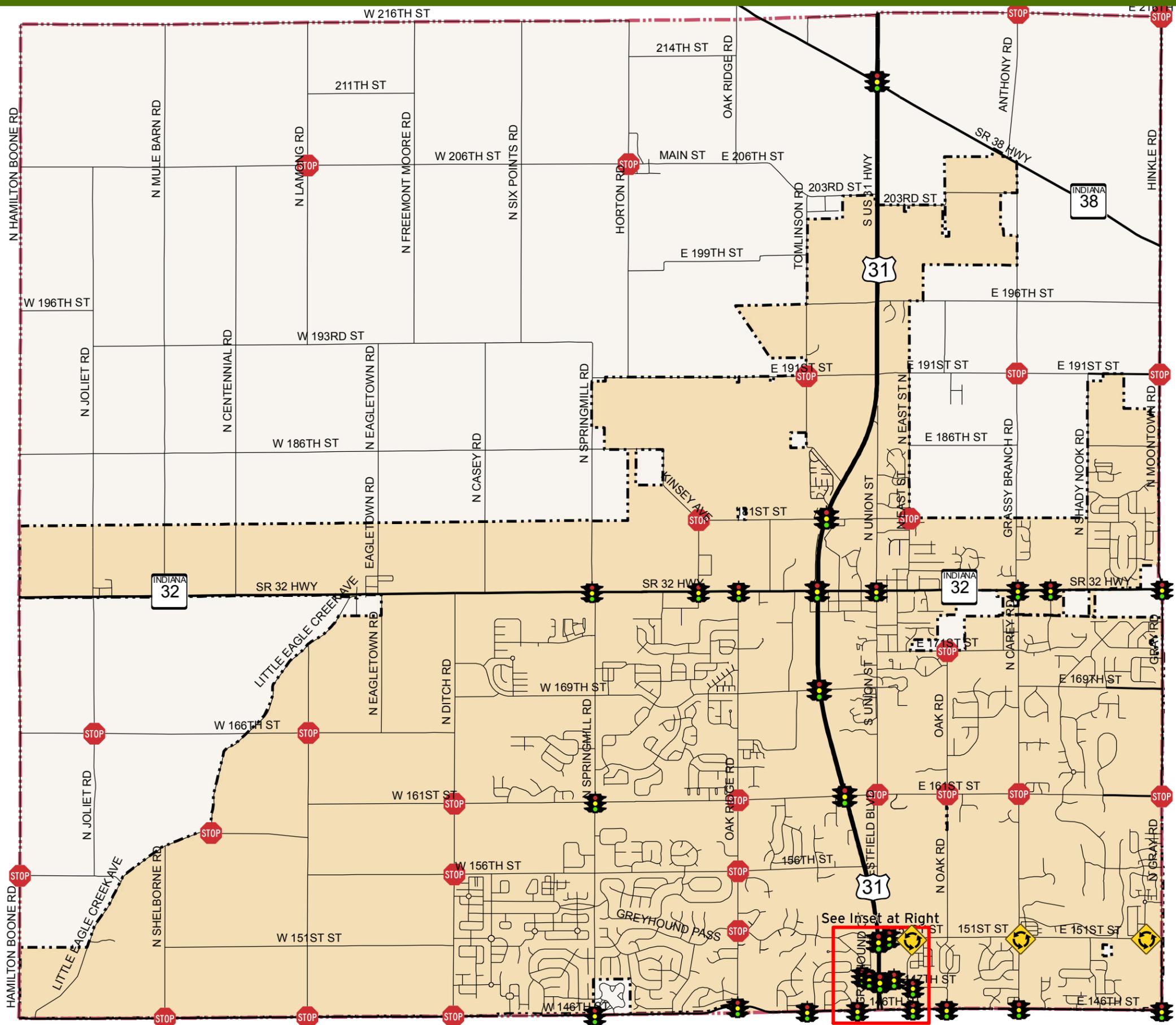
Road Impact Fee Study
Figure 3-2
Existing & 2011 Warranted
Traffic Control

-  City of Westfield
-  Washington Township
-  Existing All-Way Stop
-  Existing Traffic Signal
-  Existing Roundabout

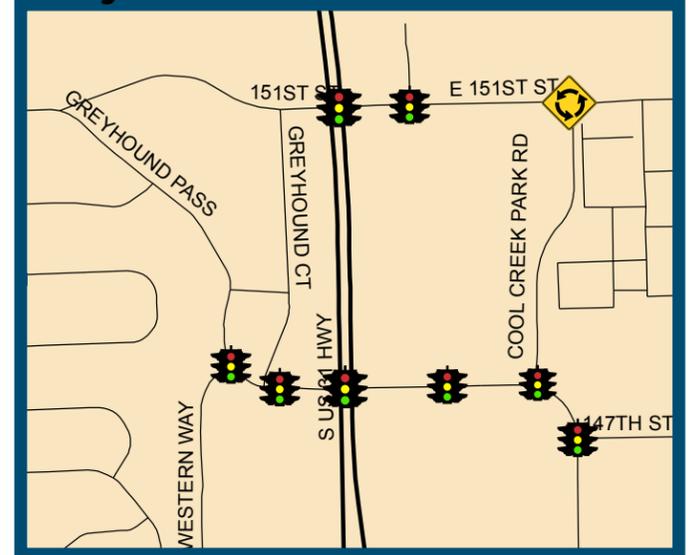
NOTE: No intersections warrant additional traffic control



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3.3 Levels of Service and Infrastructure Needs

Roadway segment levels of service and intersection levels of service were determined under existing 2011 conditions using the criteria and methods described in Section 2, Community Level of Service Criteria. Table 3-1 lists the roadway segments that currently do not meet the roadway cross section LOS criterion of a 22-foot minimum paved width for segments carrying at least 5,000 vehicles per day. Figure 3-3 shows the intersections and segments in the study area that do not meet minimum acceptable traffic operations LOS under existing conditions.

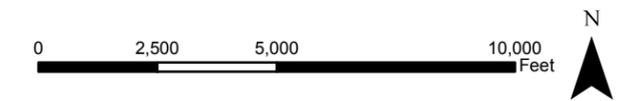
Figure 3-4 summarizes the existing roadway improvement needs for roads that are currently the responsibility of the City of Westfield. Widening in order to meet minimum standards for 2-lane road width is needed on Springmill Road, Oakridge Road, Carey Road, Gray Road and 151st Street. Although daily volumes do not warrant a signal at the intersection of 161st and Carey, a new roundabout is necessary to achieve adequate traffic operation LOS. Detailed evaluation could reveal that this intersection meets signal warrants. Analysis of the intersection of 156th and Springmill indicates that new left turn lanes are required on the north and south approaches to achieve adequate traffic operation LOS. While existing operational deficiencies are also indicated on US 31, SR 32 and 146th Street, these facilities are not the responsibility of the City of Westfield.

Table 3-1: 2011 Roadway Segment Cross Section Deficiencies

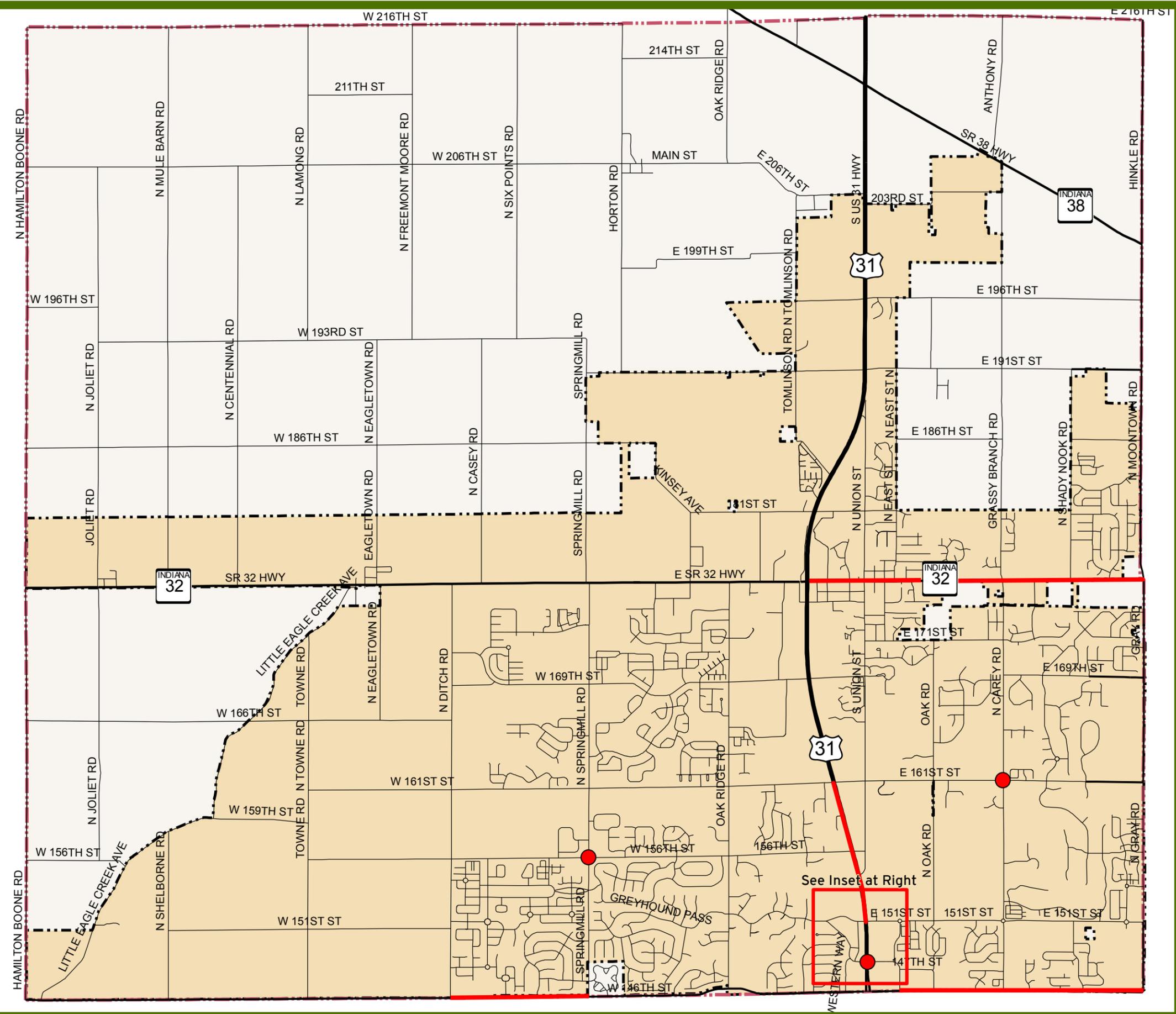
Road	Begin	End	Average Daily Traffic Volume	Typical Paved Width (feet)
Carey Road	Saddlehorn Drive	151st Street	8,300	21
Carey Road	151st Street	161st Street	7,500	21
Gray Road	Guerin Way	161 st Street	6,300	19
Gray Road	161 st Street	169 th Street	5,100	19
Gray Road	169 th Street	Golden Hinde Way	5,000	19
Oakridge Road	Sapphire Way	Greyhound Pass	5,100	20
Oakridge Road	Greyhound Pass	156th Street	6,500	19
Oakridge Road	156th Street	169th Street	5,300	19
Springmill Road	City Limit	Greyhound Pass	10,400	20
Springmill Road	Greyhound Pass	156th Street	9,700	20
Springmill Road	156th Street	161st Street	8,200	20
Springmill Road	161st Street	169th Street	7,100	20
Springmill Road	169th Street	SR 32	6,500	20
151 st Street	Carmel Landing	Carey Road	6,300	20

Road Impact Fee Study
Figure 3-3
2011 Traffic Operation
Levels of Service

-  City of Westfield
-  Washington Township
-  Intersection Level of Service 'E' or 'F' in either AM or PM Peak Hour
-  Roadway Segment Level of Service 'E' or 'F' Based on Daily Volumes

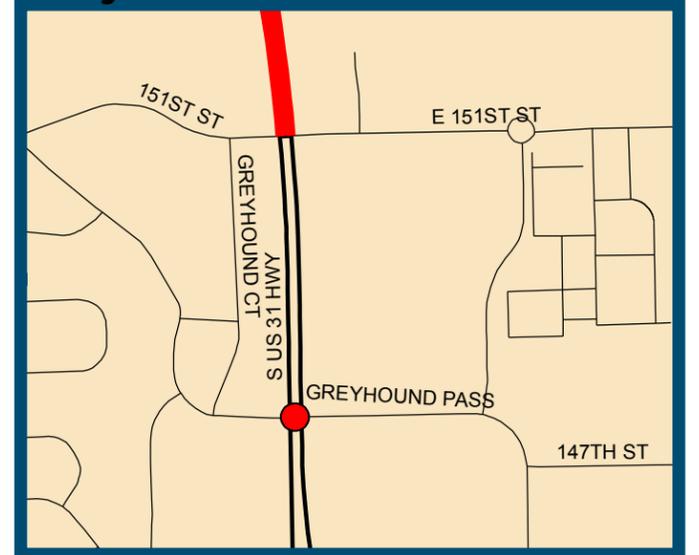


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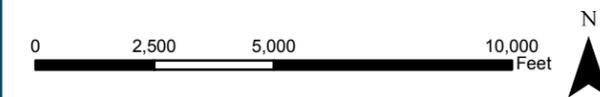
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Greyhound Pass Inset



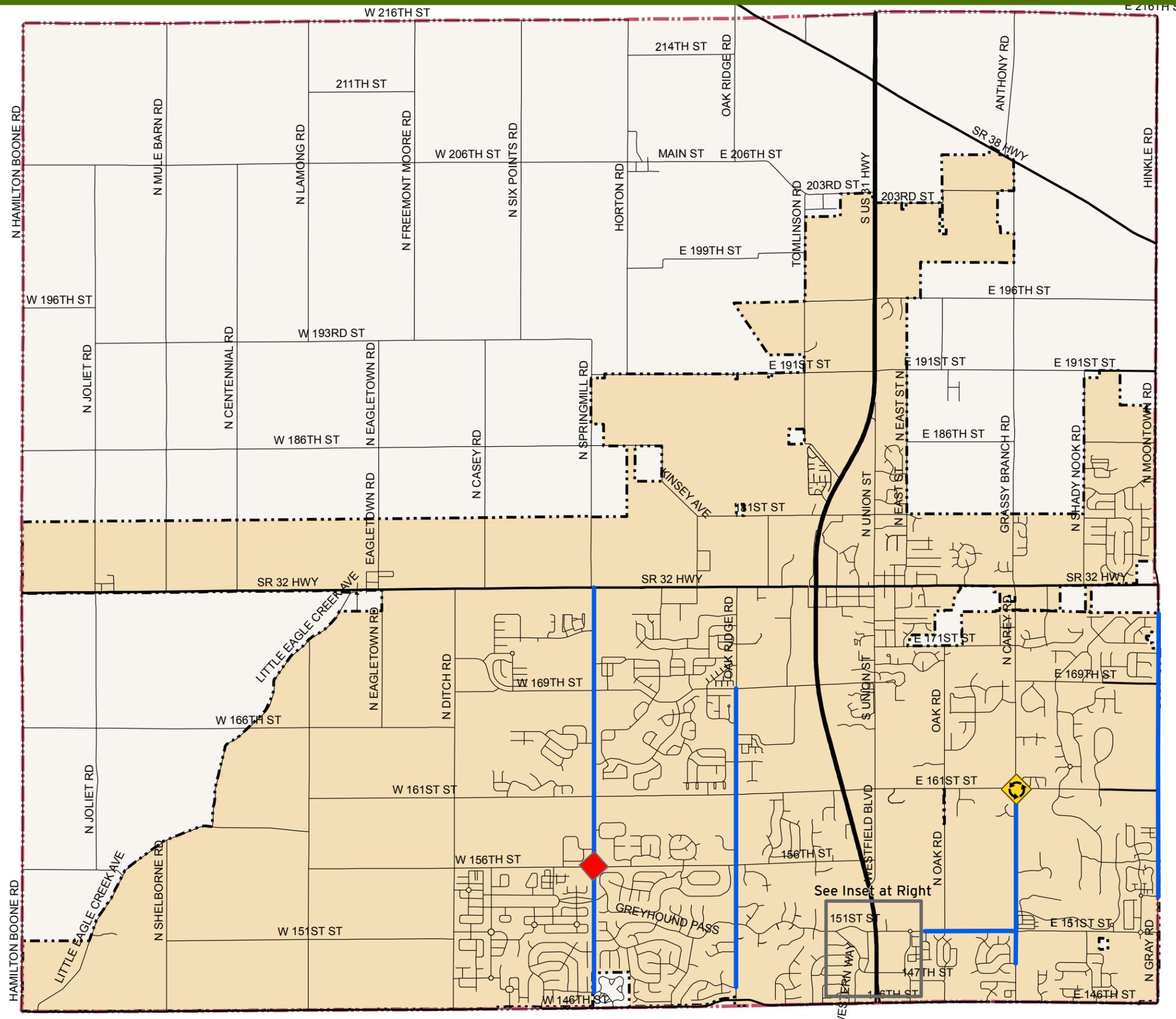
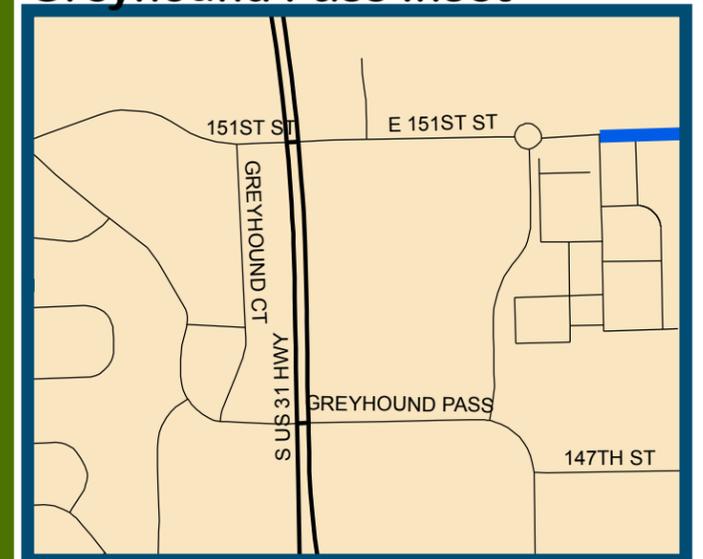
Road Impact Fee Study
Figure 3-4
2011 Roadway
Improvement Needs

-  City of Westfield
-  Washington Township
-  Widen & Overlay - 2 Lanes
-  Added Intersection Lanes
-  New Roundabout



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Greyhound Pass Inset



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4 2021 Travel Demand Forecast

4.1 Forecast Method Overview

A computerized travel demand model of Westfield and the surrounding area was developed using the TransCAD software package.⁸ A travel demand model uses a four-step process of trip generation, trip distribution, mode choice, and route assignment to forecast future traffic volumes based on that identify existing or anticipated socio-economic conditions in the study area. In Westfield, because public transit represents a very small share of total trips, the model excludes the mode choice step and assumes that all trips are made by automobiles and trucks.

To ensure adequate model performance throughout Washington Township, the Westfield travel demand model covers an area larger than Washington Township itself. The modeled area is bounded by Hazel Dell Parkway, Little Chicago Road, and Cammack Road on the east; 236th Street and SR 47 on the north; Boone County Road 1000 East and US 421 on the west; and 131st Street on the south. In addition to Washington Township, this area includes portions of Clay, Noblesville, Jackson, and Adams Townships in Hamilton County and Marion, Union, and Eagle Townships in Boone County. **Figure 4-1** shows the model area in relation to Westfield and Washington Township.

Existing 2011 and forecast 2021 households, employment and school enrollment are the primary socio-economic inputs to the Westfield travel demand model. These characteristics were estimated for each of 128 subareas within the model called Traffic Analysis Zones (TAZs), which are assumed to be reasonably homogeneous in terms of socio-economic characteristics. **Figure 4-2** shows the TAZs for the portions of the model lying in Washington Township.

The other major input to the model is the roadway network. For the Westfield model, this includes all streets classified as a collector or arterial on the Thoroughfare Plan. Data such as facility type classification, number of lanes, type of access control, and existing traffic volumes are included in the model for each roadway in the network. The model can be run to forecast future travel conditions with the existing road network. Proposed new roads can also be included in the model in order to evaluate the impacts that they would have on future travel.

The main output generated by the computerized travel demand model is a forecast of daily traffic volume on each roadway link in the model network. The model also provides forecasts of the morning and afternoon peak hour traffic volume on each roadway link, which were adjusted based on existing traffic count data and anticipated changes in roadway function over the forecast horizon. The adjusted morning and afternoon peak hour link forecasts were used to

⁸ Caliper Corporation, *TransCAD Version 5.0* [software], Newton, MA, www.Caliper.com.

develop peak hour intersection turning movement volume forecasts using the turning movement estimation procedures of NCHRP Report 255.

The 2021 travel demand forecast is an input to the 2021 needs analysis discussed in Section 5 of this plan. For more detailed information on the modeling process used in this analysis, refer to **Appendix D**.

Road Impact Fee Study

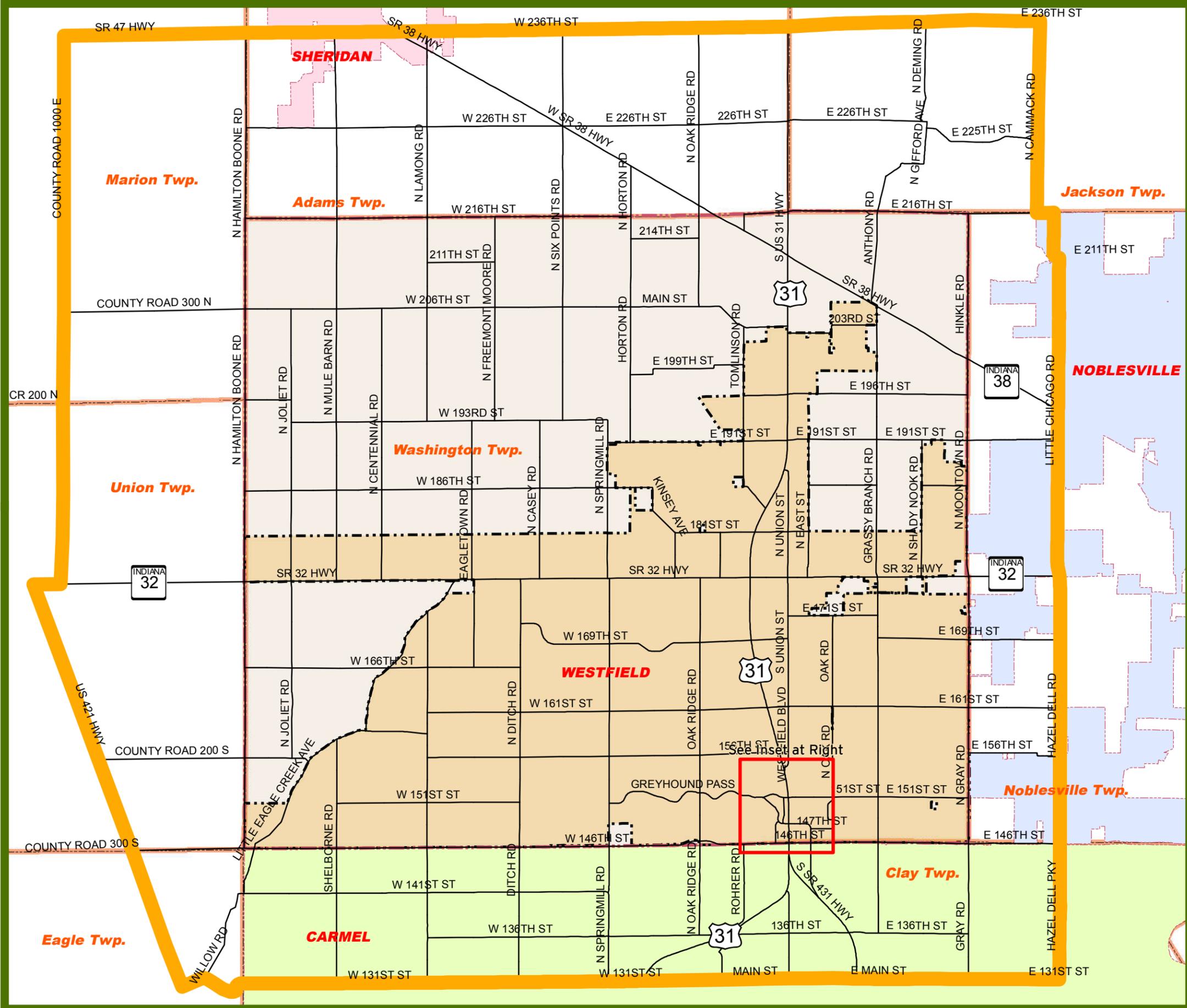
**Figure 4-1
Study Modeling Area**

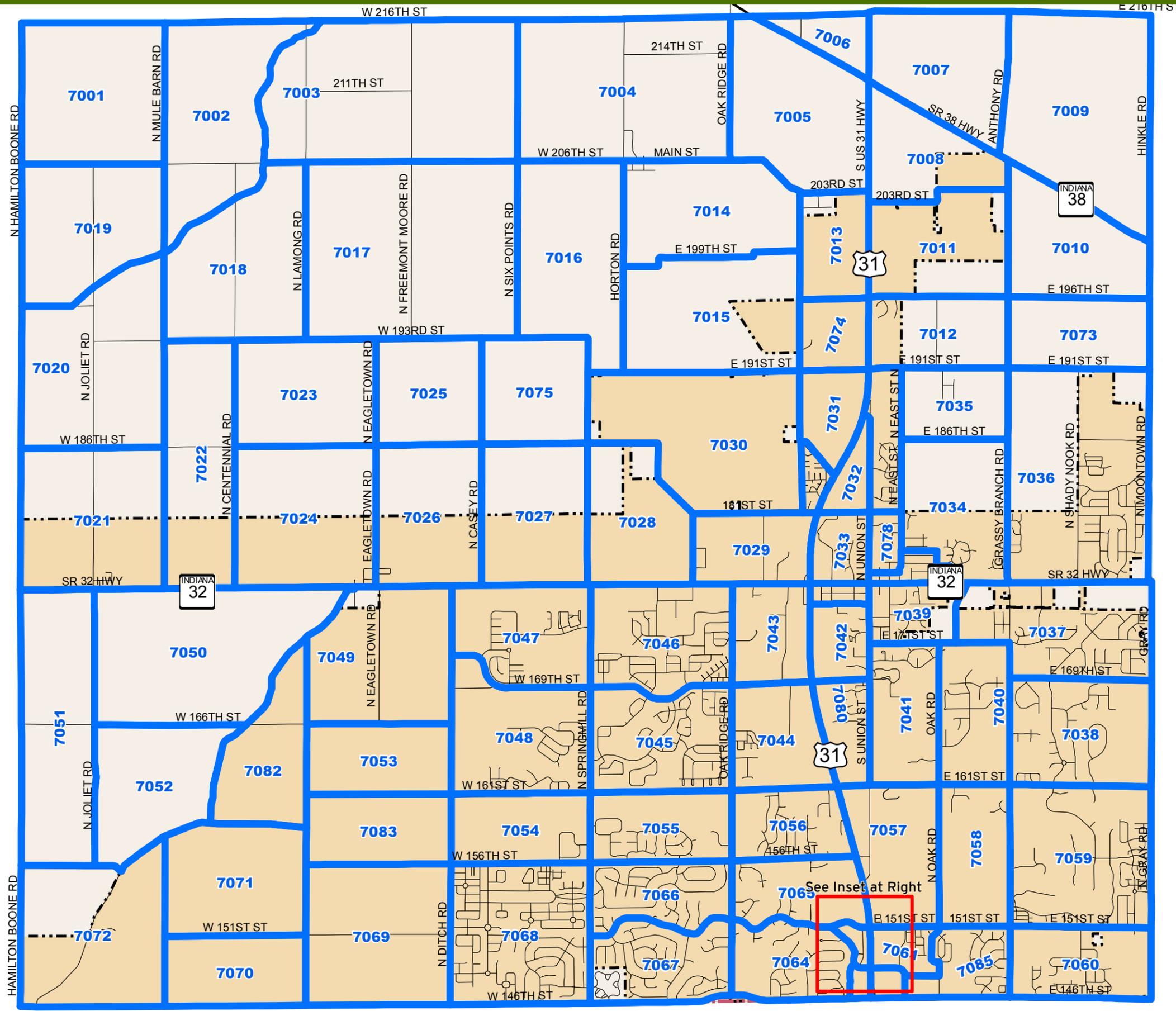
-  Model Area Boundary
-  Model Network Roads
-  Township Boundaries
-  City of Westfield
-  Washington Township



HNTB April 2012

Greyhound Pass Inset

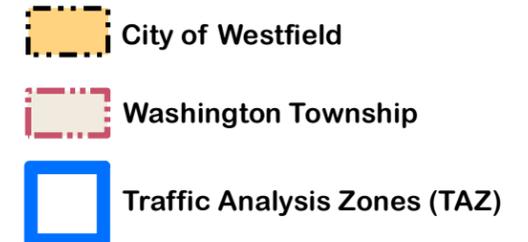





 CITY OF
Westfield
 INDIANA

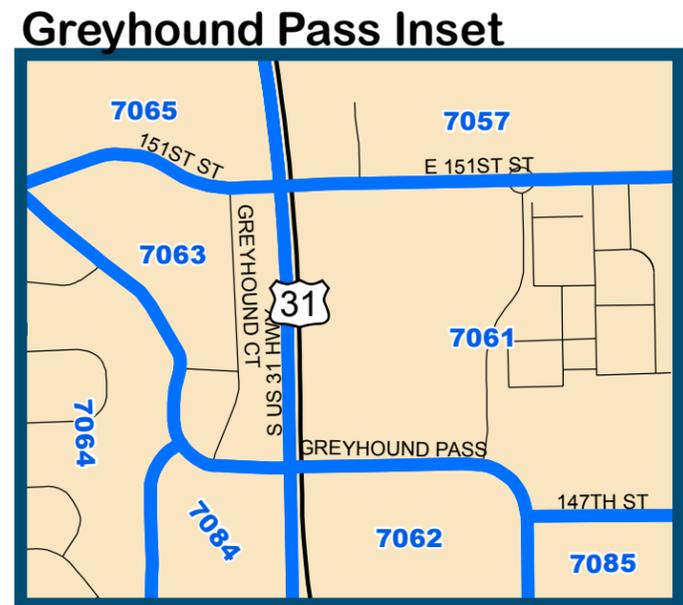
Road Impact Fee Study

Figure 4-2
Traffic Analysis Zones



0 2,500 5,000 10,000
 Feet

HNTB April 2012



4.2 Travel Demand Model Calibration

A travel demand model should be able to replicate existing traffic patterns when given existing housing, employment, school enrollment and road network inputs. Calibration is the process of modifying the assumptions made about input data and the internal model calculations to ensure that the model is capable of replicating existing conditions within a certain variance. Once the model calibration process produces a model that can replicate existing conditions within this acceptable range, the model is considered to be validated and can be used to forecast future conditions.

For the Westfield model, calibration was performed by adjusting internal model calculations, such as trip generation rates, and by adjusting road network attributes, such as the location of centroid connectors and the facility types of roads. More detailed information on model calibration and validation is provided in **Appendix D**.

4.3 Housing and Employment Growth Forecast

Household data for 2011 was estimated by aggregating block-level household counts from the 2010 Census to the model TAZ level. City of Westfield building permit information was used to estimate the number and location of new households established between the 2010 Census and the middle of 2011. Additional household statistics necessary for modeling—the number of workers, vehicles, and persons per household—were obtained from the 2010 Census and assumed to remain constant throughout the forecast period. Employment data for 2011 was developed based on point-level employment data obtained from Neilson-Claritas. This information was error-checked for major omissions, double-counts, and erroneous business locations, and corrected as necessary.

The forecast of 2021 households and employment was a two-step process. The first step was to use past trends and forecasts to develop target forecasts of 2021 households and employment for Washington Township as a whole. The second step was to use the Westfield Comprehensive Plan and more detailed planning data to identify where within Washington Township the household and employment growth would occur.

Overall 2021 population and housing unit forecasts for Washington Township were developed using the linear growth rates observed during the 2000-2010 time period. This resulted in a 2021 forecast of approximately 48,900 residents and 18,700 housing units, which is consistent with forecasts in the Westfield Comprehensive Plan. An overall 2021 employment forecast of 15,200 for Washington Township was developed by assuming that existing employment would grow at the same overall 3.5% annual rate that was observed for Hamilton County between 2000 and 2010.

The overall township-wide housing and employment forecasts were used as targets for aggregating more specific information about planned development provided by the City of Westfield. Based on this information, development in the next 10 years is expected to focus in three primary areas: Grand Park, Grand Junction and the Springmill Trails Planned Unit Development. Information about anticipated 10-year build-out of these areas and other approved developments was identified in conjunction with the Westfield Community and Economic Development Department. Development in these three areas is expected to account for nearly all of the 10-year employment growth, with the remainder to occur in industrial areas north of 191st Street and east of US 31. Housing development is expected to be less concentrated, with these three primary development areas accounting for approximately 38% of the new housing over the next 10 years. The remaining housing unit growth was distributed through Washington Township based on analysis of available infill residential areas using aerial mapping and on discussions of likely development locations among City of Westfield staff.

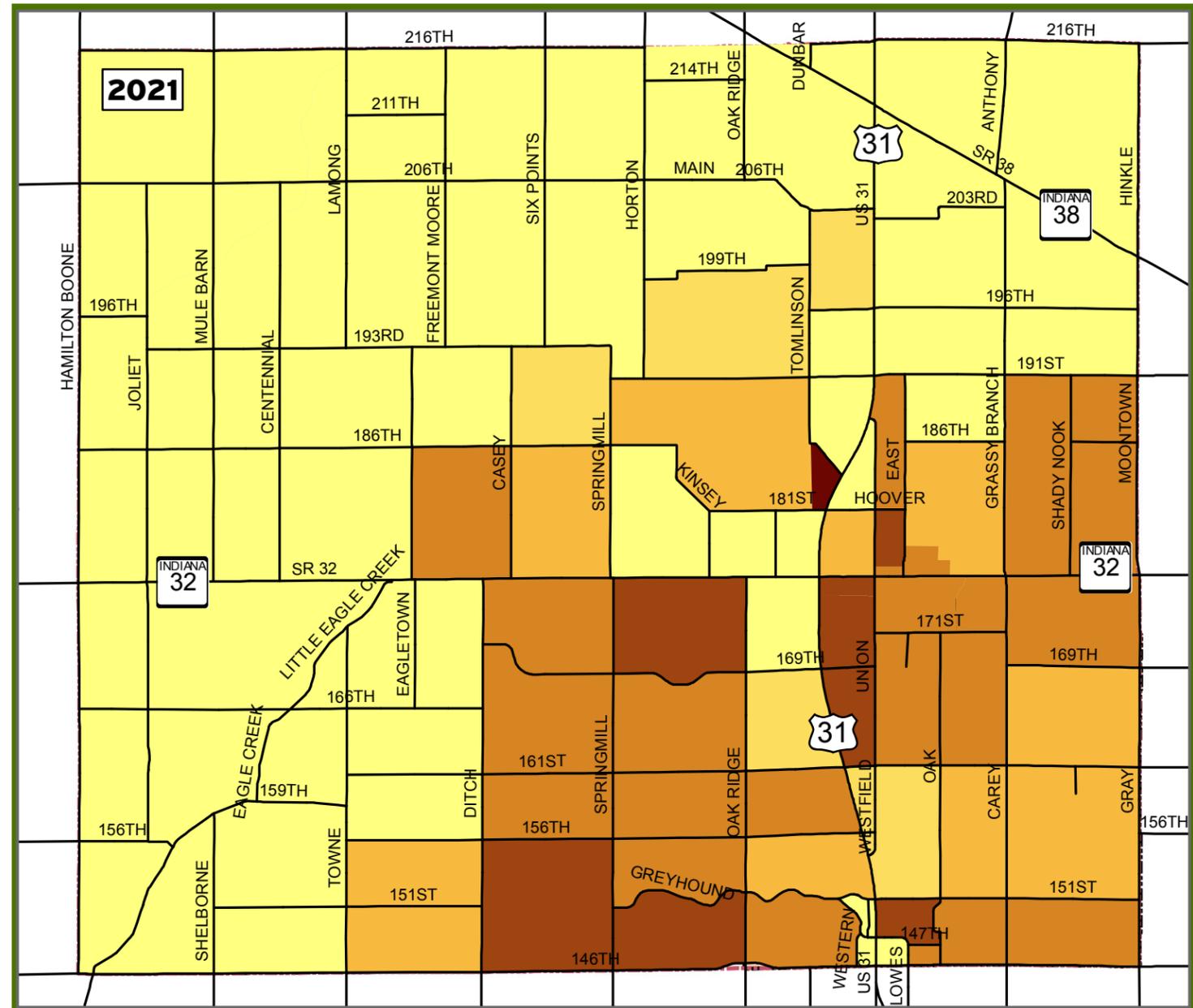
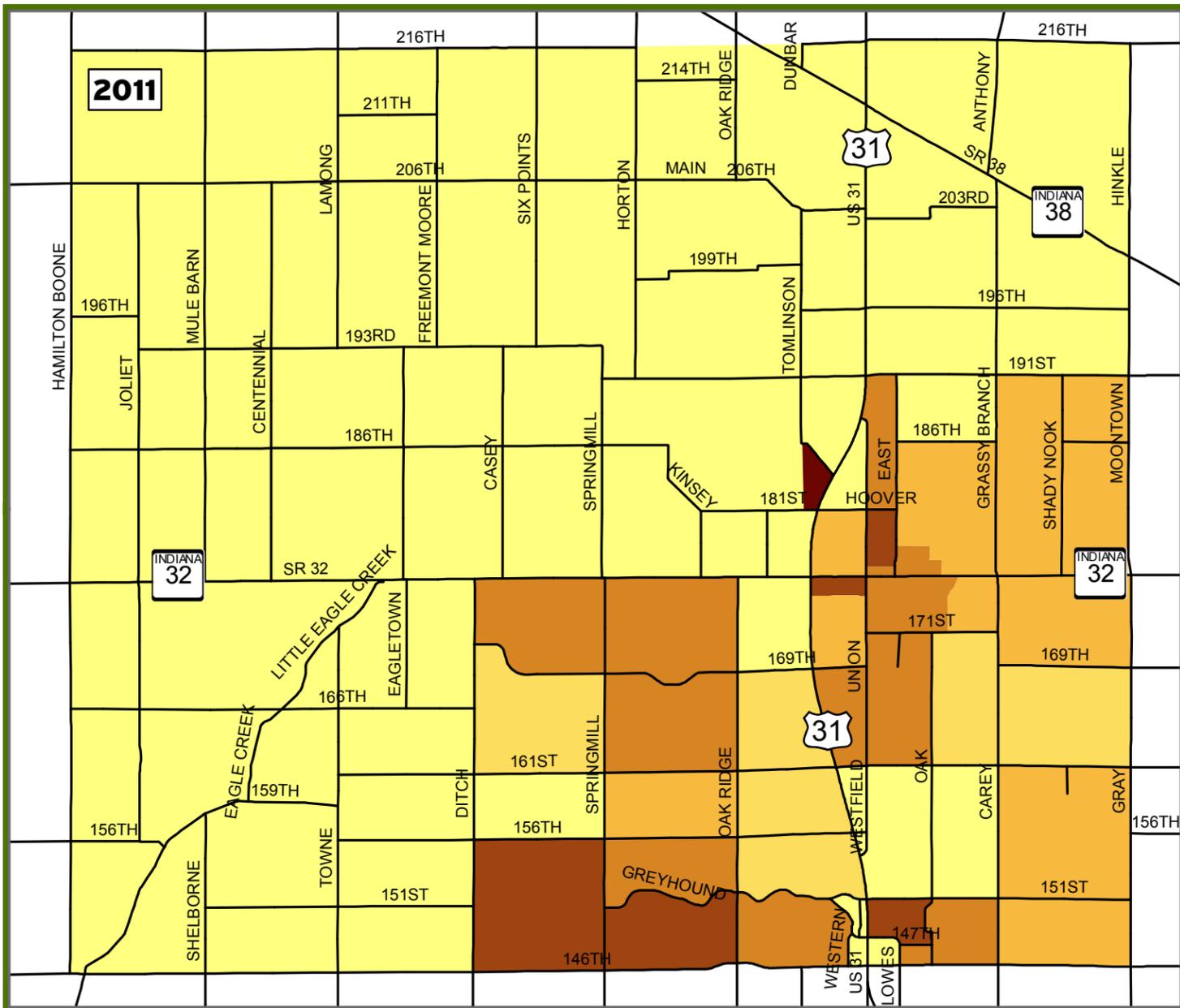
Table 4-1 summarizes the household and employment projections for each TAZ in Washington Township; **Figure 4-3** and **Figure 4-4** show this information in a graphic format. The final analysis resulted in a 2021 Washington Township forecast of 18,149 households (18,149 housing units) and a 2021 Washington Township employment forecast of 16,563. For more detailed information on the assumptions for planned developments, refer to **Appendix E**. For more information on household and employment projections in areas outside Washington Township, refer to **Appendix D**, which describes travel demand modeling procedures.

Table 4-1: Household and Employment Projections

TAZ	2011 Households	2021 Households	HH Growth	2011 Employment	2021 Employment	Emp. Growth
7001	16	16	0	0	0	0
7002	13	13	0	4	4	0
7003	40	40	0	27	27	0
7004	55	55	0	3	3	0
7005	33	33	0	0	0	0
7006	8	8	0	12	12	0
7007	22	22	0	5	5	0
7008	13	13	0	3	157	154
7009	24	24	0	0	0	0
7010	18	18	0	27	27	0
7011	13	13	0	350	350	0
7012	35	35	0	0	0	0
7013	8	88	80	0	245	245
7014	50	50	0	1	1	0

TAZ	2011 Households	2021 Households	HH Growth	2011 Employment	2021 Employment	Emp. Growth
7015	36	243	207	0	300	300
7016	144	157	13	0	6	6
7017	30	30	0	6	6	0
7018	33	33	0	9	9	0
7019	6	6	0	3	3	0
7020	31	31	0	2	2	0
7021	62	62	0	46	46	0
7022	13	13	0	6	6	0
7023	17	17	0	13	13	0
7024	43	43	0	11	11	0
7025	23	23	0	0	0	0
7026	58	507	449	9	9	0
7027	63	397	334	170	408	238
7028	13	13	0	122	1443	1321
7029	3	3	0	489	1157	668
7030	29	715	686	6	888	882
7031	10	34	24	38	692	654
7032	0	0	0	145	145	0
7033	90	90	0	506	672	166
7034	236	354	118	247	247	0
7035	54	54	0	14	14	0
7036	655	1017	362	57	57	0
7037	478	564	86	504	504	0
7038	201	282	81	78	78	0
7039	247	247	0	363	379	16
7040	146	412	266	29	29	0
7041	380	524	144	20	20	0
7042	100	349	249	213	218	5
7043	21	21	0	728	728	0
7044	98	98	0	502	502	0
7045	819	904	85	358	358	0
7046	914	1039	125	537	562	25
7047	468	762	294	104	104	0
7048	236	641	405	6	6	0
7049	28	28	0	61	61	0
7050	47	47	0	74	74	0
7051	54	54	0	25	25	0

TAZ	2011 Households	2021 Households	HH Growth	2011 Employment	2021 Employment	Emp. Growth
7052	25	25	0	3	3	0
7053	18	18	0	37	37	0
7054	67	316	249	79	79	0
7055	256	430	174	29	29	0
7056	69	295	226	17	17	0
7057	31	169	138	212	212	0
7058	62	213	151	4	4	0
7059	344	382	38	228	228	0
7060	241	473	232	103	103	0
7061	258	258	0	2000	2000	0
7062	0	0	0	538	538	0
7063	1	1	0	177	177	0
7064	325	406	81	58	58	0
7065	84	190	106	210	210	0
7066	513	513	0	43	43	0
7067	834	834	0	40	40	0
7068	1281	1330	49	160	160	0
7069	11	355	344	0	0	0
7070	7	7	0	6	6	0
7071	23	23	0	1	1	0
7072	69	69	0	3	3	0
7073	5	5	0	4	4	0
7074	38	38	0	0	0	0
7075	6	106	100	0	0	0
7076	222	222	0	95	95	0
7077	178	178	0	286	286	0
7078	158	158	0	64	64	0
7079	91	91	0	194	207	13
7080	286	332	46	75	75	0
7081	78	78	0	87	214	127
7082	19	19	0	0	0	0
7083	6	6	0	2	2	0
7084	0	0	0	409	409	0
7085	367	367	0	496	646	150
Total	12207	18149	5942	11593	16563	4970



Road Impact Fee Study:

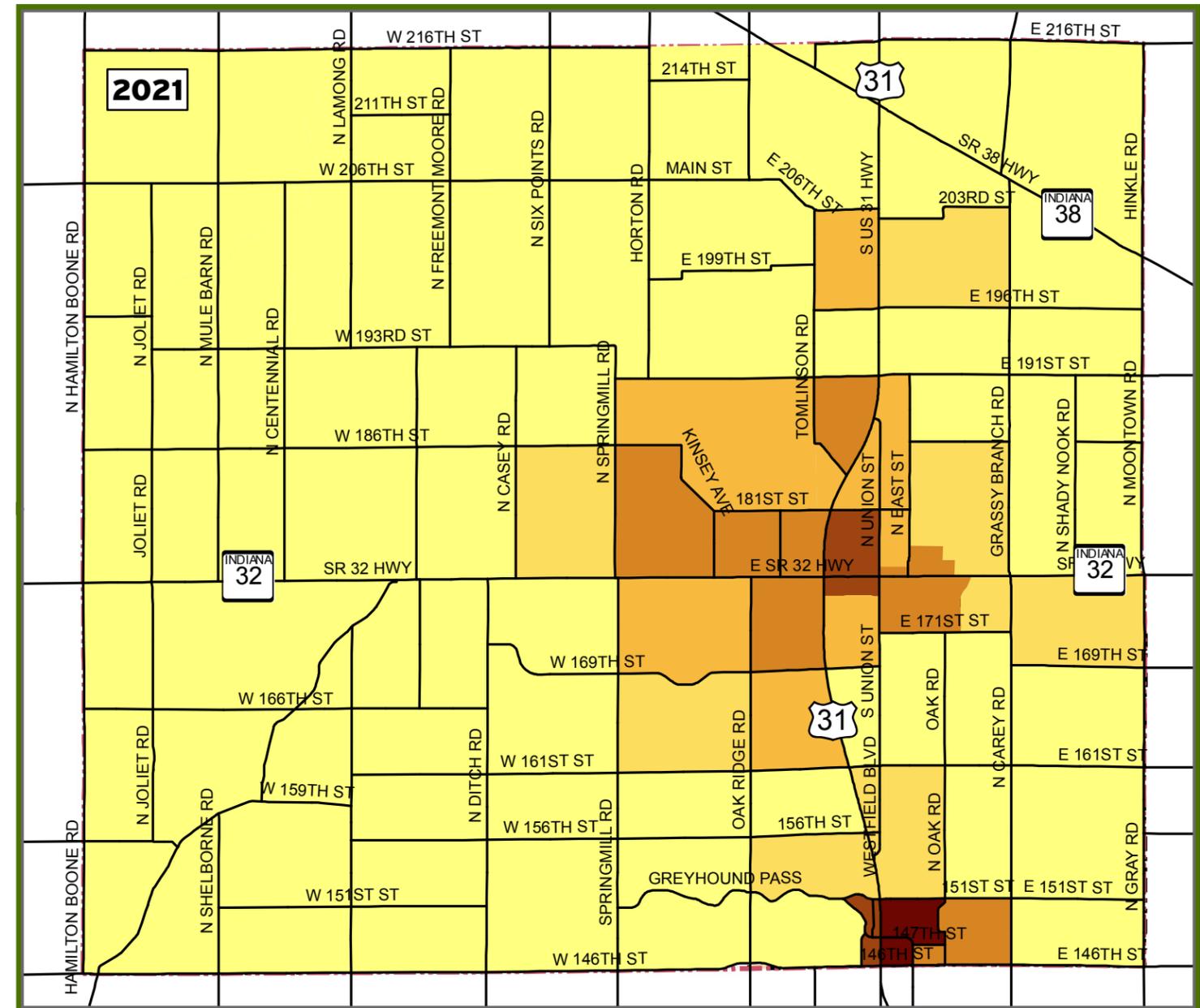
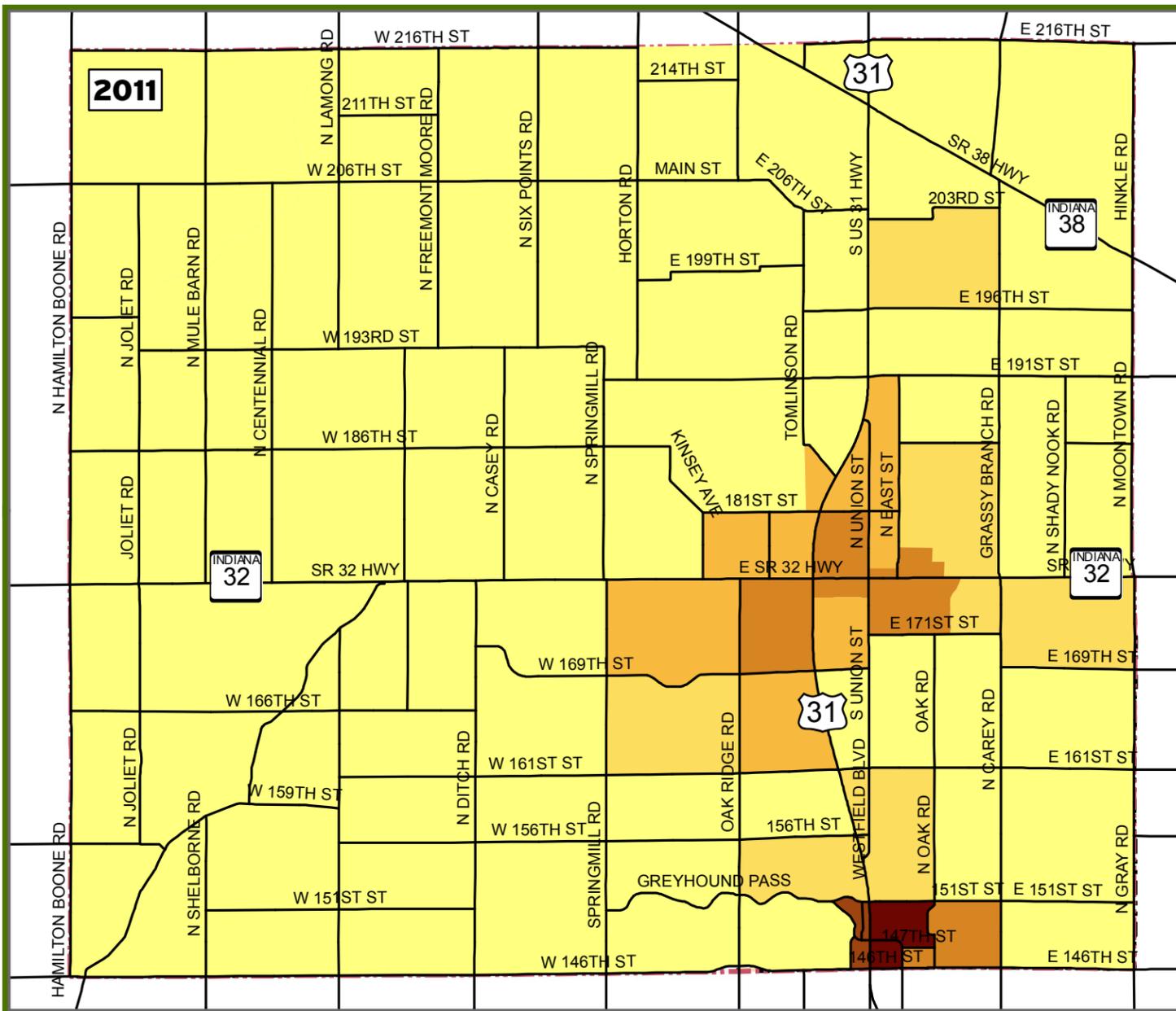
**Figure 4-3
Household Growth**

- Less than 0.25 Households per Acre
- 0.25 - 0.5 Households per Acre
- 0.5 - 1 Households per Acre
- 1 - 2 Households per Acre
- 2 - 3 Households per Acre
- More than 3 Households per Acre

Washington Township



April 2012

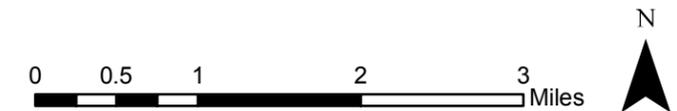


Road Impact Fee Study:

**Figure 4-4
Employment Growth**

- | | | | |
|---|----------------------------------|---|---------------------------------|
|  | Less than 0.5 Employees per Acre |  | 2 - 5 Employees per Acre |
|  | 0.5 - 1 Employees per Acre |  | 5 - 10 Employees per Acre |
|  | 1 - 2 Employees per Acre |  | More than 10 Employees per Acre |

 Washington Township



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4.4 Committed Network Improvements

In order to correctly model future roadway conditions, it is necessary to reflect the transportation improvement projects that are already funded and are expected to be in place by 2021. These “committed” projects are coded into the travel demand model. This allows analysis of the future network to focus on areas where there are additional improvement needs that are not currently being addressed. Table 4-2 lists the committed projects that are included as part of the 2021 roadway network. These projects are either under construction in 2011 or have construction funding identified in the 2012-2015 Regional Transportation Improvement Program maintained by the Indianapolis Metropolitan Planning Organization.

Table 4-2: Committed Network Capacity Improvements in 2021 Travel Demand Model

Road	Location	Description	Responsible
US 31	96 th St to 216 th St	Upgrade to Freeway. Widen to 6 lanes. Add interchanges, frontage roads, and relocated property access points	INDOT
146 th St	Spring Mill Rd to Ditch Rd	Widen to 4 lanes. Roundabout at Ditch.	Hamilton County
156 th St	At Springmill Rd	Construct roundabout	Westfield
161 st St	At Oakridge Rd	Construct roundabout	Westfield
161 st St	At Cool Creek	Replace existing 1-lane bridge #147	Hamilton County
186 th St	Tomlinson Road to Grand Park Entrance	New road on new alignment	Westfield
Towne Rd*	131 st St to 146 th St	Widen to 4 lanes with roundabouts	Carmel

*under construction in 2011

The upgrade of US 31 to a limited access freeway facility from 96th Street to 216th Street will have by far the most significant impact on travel in the Westfield area. Transportation patterns in and around Westfield are expected to shift appreciably when improvements are made to US 31. Within Washington Township, US 31 interchanges are planned for 146th Street, 151st Street, 161st Street, SR 32, 191st Street and SR 38. Many of these east-west roads will experience increased traffic demand from travelers accessing US 31, while many roads parallel to US 31 will experience less growth or possibly a decrease in traffic demand from existing conditions. The US 31 freeway upgrade is expected to be in place through Westfield by 2017

4.5 2021 Travel Demand

The TransCAD travel demand model was used to forecast 2021 network traffic volumes based on anticipated housing and employment and with the committed road network improvements in place. **Figure 4-5** shows the average daily traffic volumes that are forecast for the proposed study area road network in 2021. Because of the planned upgrade of US 31 to a freeway through the study area, traffic patterns through Westfield are expected to change significantly during the 10-year forecast period. Despite the forecast growth in housing and employment, 2021 traffic volumes on some Westfield roads will be only somewhat higher than today. In some cases they may be lower than today's volumes. Other roads, those that directly serve new development or provide access to the US 31 freeway, will experience higher traffic growth.

Morning and afternoon peak hour turning movement volume forecasts were developed using the daily forecasts from TransCAD along with existing and forecast estimates of peak period road link demand and the turning movement estimation procedures of NCHRP Report 255. This is the same method that was used to estimate missing intersection turning movement volumes under existing conditions. 2021 forecast intersection turning movement volumes are provided in **Appendix C**.

5 2021 Needs Assessment

Roadway capital improvements that will be necessary by 2021 were identified using the forecast 2021 traffic volumes and the same LOS criteria used to identify 2011 improvement needs. These criteria are identified in Section 2, Community Level of Service Criteria

5.1 Intersection Traffic Control

The appropriate traffic control at each intersection under forecast 2021 traffic conditions was determined by using the traffic signal and multi-way stop control warrant procedures of the Indiana MUTCD, as discussed in Section 2.1. **Figure 5-1** shows the existing intersection traffic control and new traffic control that is expected to be warranted by 2021.

Road Impact Fee Study

**Figure 5-1
2021 Committed &
Warranted Traffic Control**

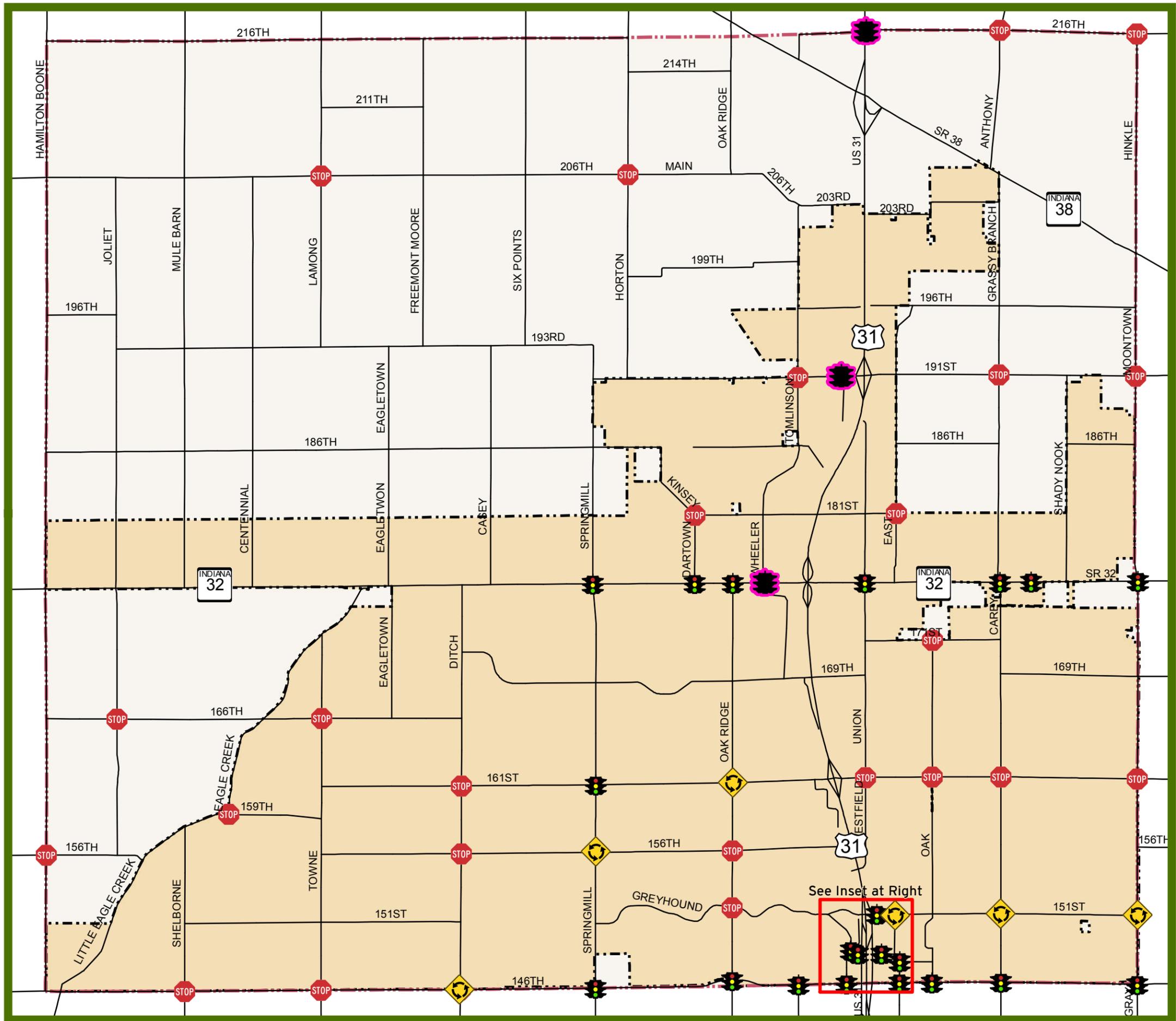
-  City of Westfield
-  Washington Township
-  Existing or Committed All-Way Stop
-  Existing or Committed Traffic Signal
-  Existing or Committed Roundabout
-  Daily Volumes Warrant
New Traffic Signal

NOTE: US 31 ramp intersection control not shown




HNTB April 2012

Greyhound Pass Inset



See Inset at Right

5.2 Levels of Service and Infrastructure Needs

Roadway segment and intersection levels of service were evaluated using the forecast 2021 traffic volumes and assuming that the committed improvements identified in Table 4-2 are in place. These evaluations were conducted using the criteria and methods described in Section 2, Community Level of Service Criteria. Table 5-1 lists the roadway segments that are not expected to meet the roadway cross section LOS criterion of a 22-foot minimum paved width for segments carrying at least 5,000 vehicles per day by 2021. Beyond those identified as existing 2011 needs, several additional 2-lane road segments are identified for widening by 2021. Segments of Springmill Road and 191st Street are identified as requiring improvement, but are currently outside of the Westfield municipal boundaries. The cost of improving these segments is not included in the impact fee cost calculations, but could be included in future updates if these roads become the responsibility of Westfield.

Figure 5-2 shows the intersections and road segments that are not expected to meet minimum acceptable traffic operations LOS by 2021. The figure includes both Westfield roads and other roads in the study area that are not Westfield responsibility. For Westfield roads, traffic operation LOS problems are forecast on Springmill Road, 161st Street and 191st Street. Construction of the committed roundabout at 156th and Springmill will address the existing improvement need for additional lanes at this intersection, although the road segment between 146th Street and 156th Street is still anticipated to experience unacceptable LOS. Traffic forecasts suggest that the roundabout at 161st and Carey, identified as a 2011 need, might not be necessary for adequate LOS after the US 31 freeway is in place. However, this roundabout will continue to be necessary at least until post-freeway traffic patterns are well-established.

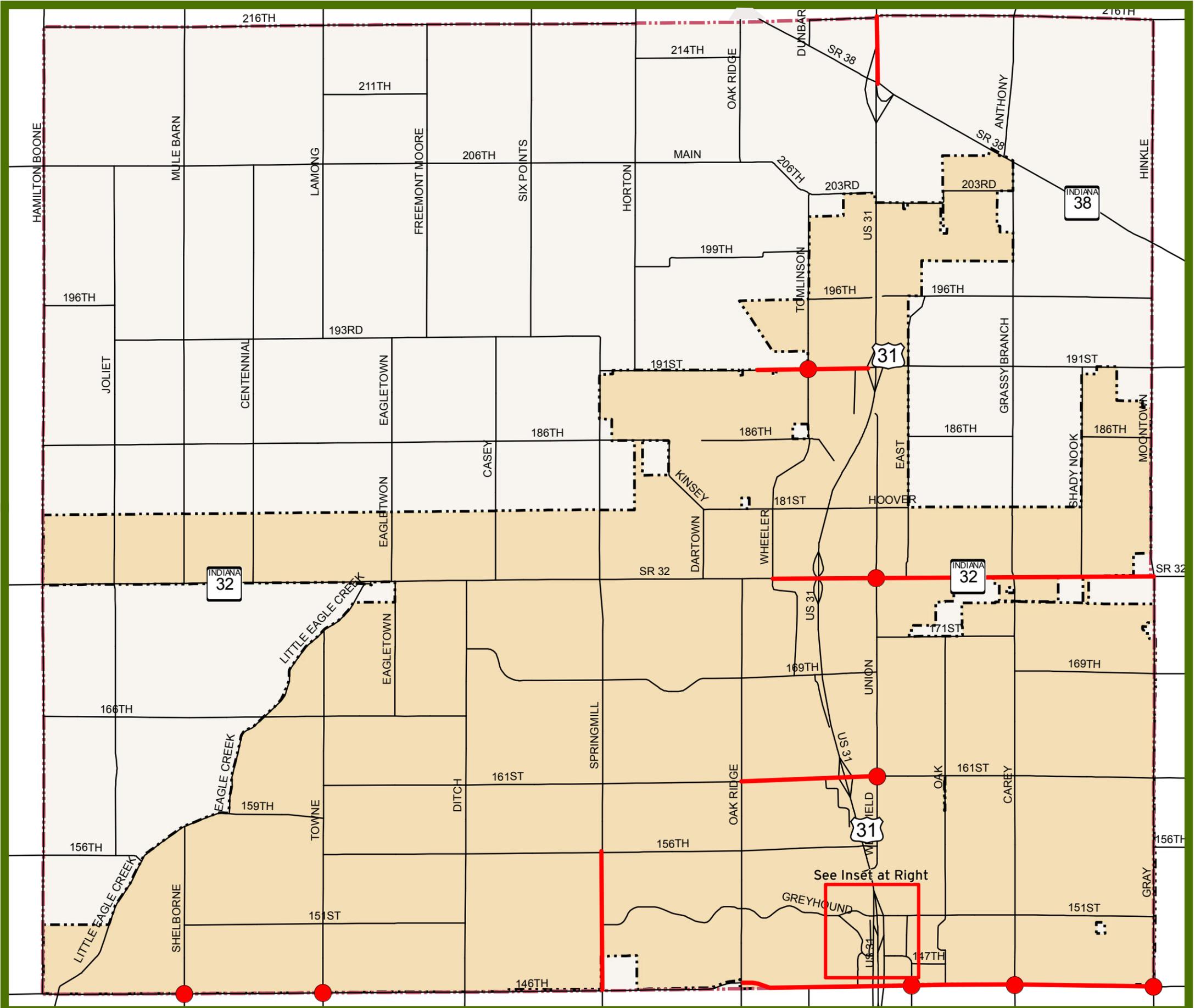
Figure 5-3 shows the expected 2021 roadway improvement needs for roads that are currently the responsibility of the City of Westfield. All identified deficiencies and recommended improvements are based on current expectations of development patterns and traffic demand through 2021. In addition to the 2011 improvement needs shown in Figure 3-4, this figure identifies the need to reconstruct segments of Springmill Road, 161st Street and 191st Street as 4-lane roads. New roundabouts will be needed at 191st and Tomlinson, at 191st and the planned West Access Road, and at 161st and Union Street. Figure 5-4 identifies the projects that are not needed to provide adequate LOS for existing development but will be required to provide for anticipated development. These projects are eligible for funding with road impact fee receipts.

Changes in the location or timing of land use development could result in some variation in the road network improvement needs identified in Figure 5-3 and should be considered in future updates of the impact fee study.

Table 5-1: 2021 Roadway Cross Section Deficiencies

Road	Begin	End	2021 Average Daily Traffic Volume	Typical Paved Width (feet)
Carey Road	Saddlehorn Drive	151 st Street	10,100	21
Carey Road	151 st Street	161 st Street	5,200	21
Gray Road	161 st Street	Golden Hinde Way	5,500	19
Oakridge Road	Sapphire Way	Greyhound Pass	5,700	20
Oakridge Road	Greyhound Pass	156 th Street	5,900	19
Oakridge Road	156 th Street	161 st Street	5,000	19
Oakridge Road	161 st Street	169 th Street	8,100	19
Oakridge Road	169 th Street	Pine Ridge Drive	6,800	18
Springmill Road	City Limit	Greyhound Pass	12,600	20
Springmill Road	Greyhound Pass	156 th Street	12,400	20
Springmill Road	156 th Street	161 st Street	10,400	20
Springmill Road	161 st Street	169 th Street	8,900	20
Springmill Road	169 th Street	SR 32	8,600	20
Springmill Road*	SR 32	186 th Street	6,600	18
Springmill Road*	186 th Street	191 st Street	7,100	18
Union Street	161 st Street	David Brown Drive	5,700	20
Wheeler Road	SR 32	181 st Street	9,300	18
151 st Street	Carmel Landing	Oak Road	5,100	20
151 st Street	Oak Road	Carey Road	5,000	20
151 st Street	Carey Road	Setters Road	5,000	21
191 st Street	Springmill Road	Horton Road	6,200	17
191 st Street	Horton Road	Tomlinson Road	13,900	18
191 st Street	Tomlinson Road	US 31	17,500	18
191 st Street	US 31	East Street	9,100	20
191 st Street*	East Street	Moontown Road	8,300	19

*Portions of this segment are not under City of Westfield jurisdiction but could be by 2021



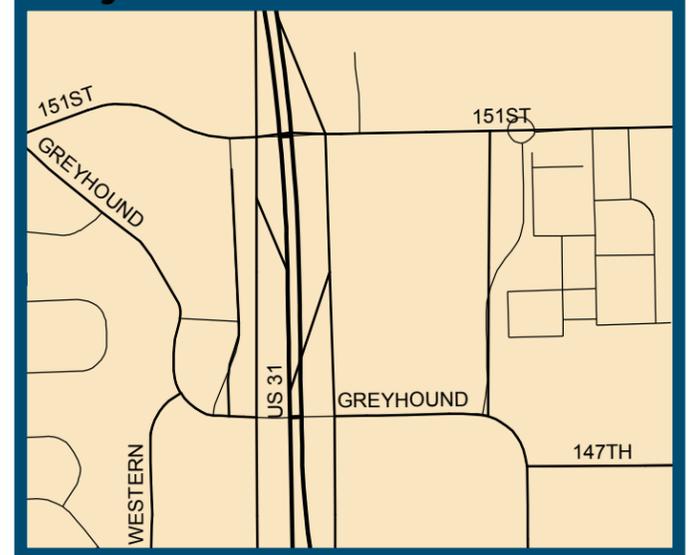
Road Impact Fee Study
Figure 5-2
2021 Committed Network
Traffic Operation
Levels of Service

- City of Westfield
- Washington Township
- Intersection Level of Service 'E' or 'F' in either AM or PM Peak Hour
- Roadway Segment Level of Service 'E' or 'F' Based on Daily Volumes



HNTB April 2012

Greyhound Pass Inset

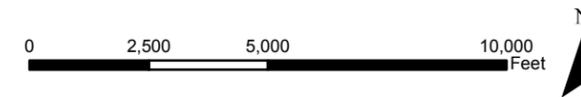


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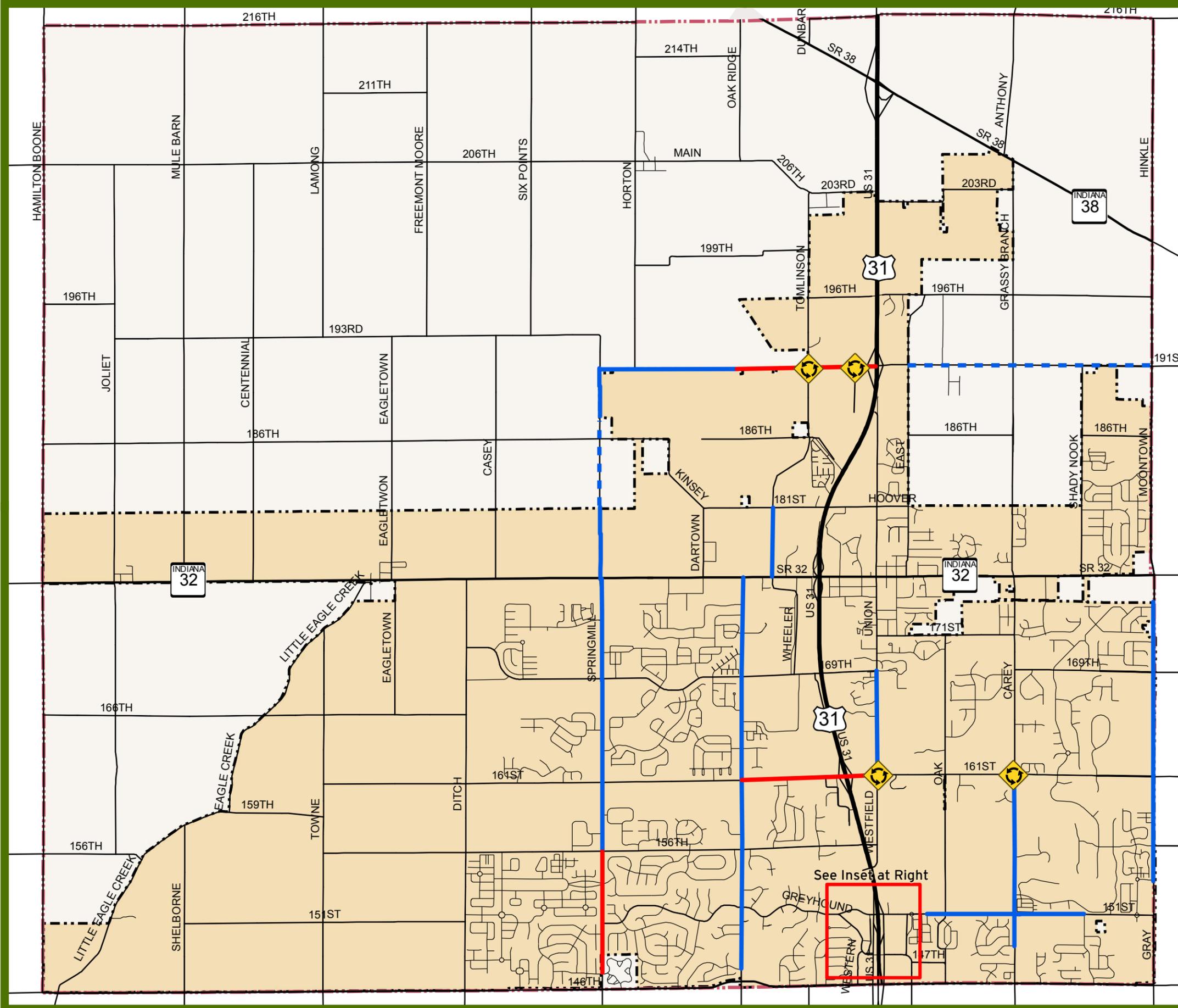
Road Impact Fee Study

**Figure 5-3
2021 Roadway
Improvement Needs**

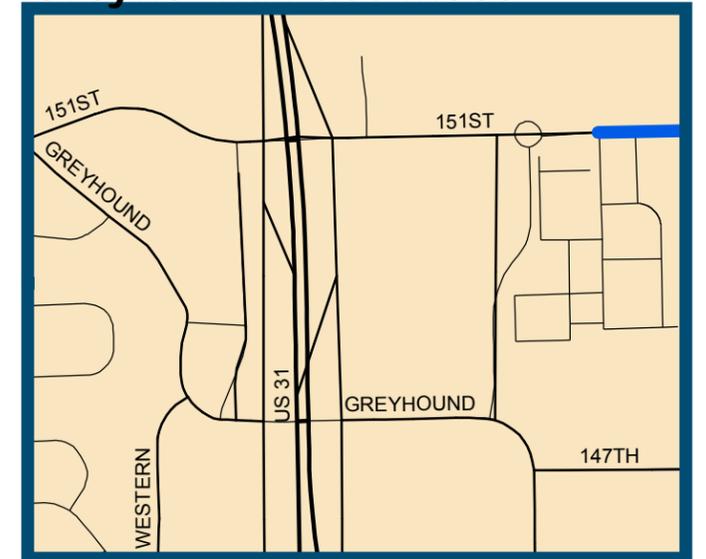
-  City of Westfield
-  Washington Township
-  Widen & Overlay - 2 Lanes
-  Widen & Overlay - 2 Lanes
(Potential Future Westfield Road)
-  Widen/Reconstruct - 4 Lanes
-  New Roundabout



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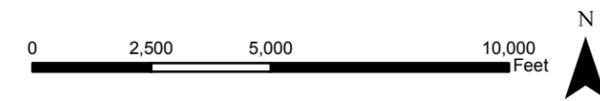
Greyhound Pass Inset



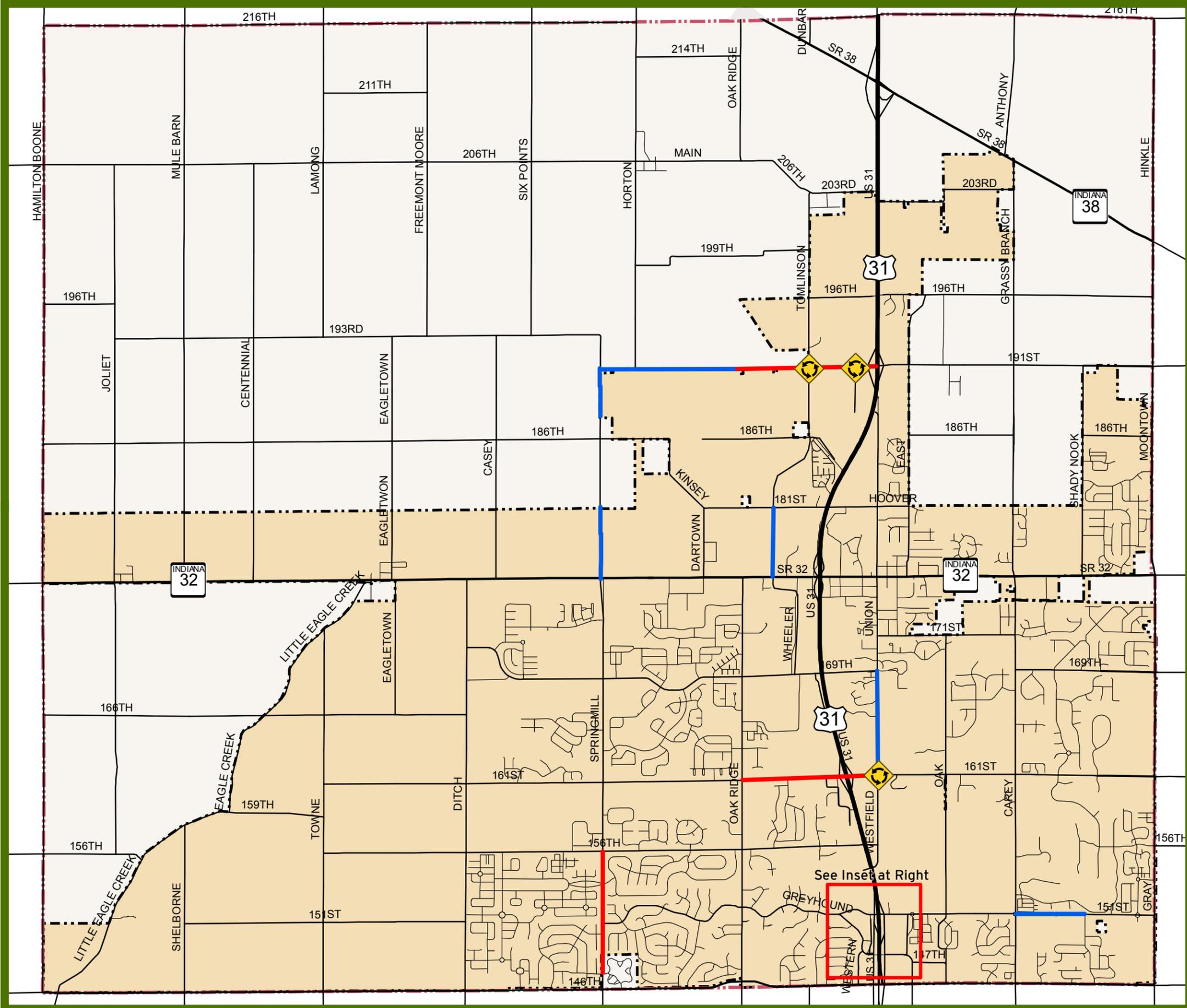
Road Impact Fee Study

**Figure 5-4
Projects Eligible for
Impact Fee Funding**

-  City of Westfield
-  Washington Township
-  Widen & Overlay - 2 Lanes
-  Widen/Reconstruct - 4 Lanes
-  New Roundabout

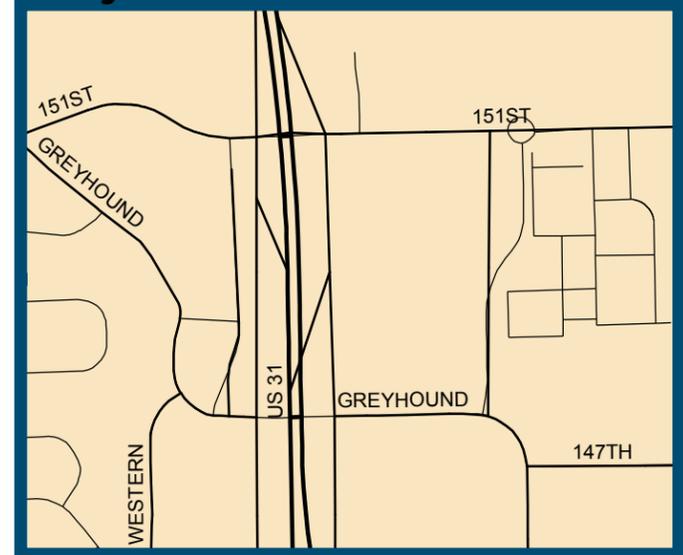


HNTB April 2012



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Greyhound Pass Inset



6 Infrastructure Improvement Costs

The estimated costs of the improvement projects required to meet existing 2011 and projected 2021 needs are shown in Table 6-1 and Table 6-2. Detailed project cost estimates are provided in Appendix G.

Cost estimates for widening and overlay of existing 2-lane roads that do not currently meet the cross section requirements are based on providing two 12-foot travel lanes with 2-foot asphalt shoulders and open drainage on both sides. Right-of-way acquisition was assumed to be required in locations where the existing available right-of-way width is less than 50 feet, as estimated using Hamilton County Geographic Information System online maps. Right-of-way costs were estimated using average per-acre assessed values of potentially impacted parcels and adding an estimated per-parcel cost for land acquisition fees.

Cost estimates for the reconstruction of existing roads to a 4-lane section are based on providing four 12-foot travel lanes, a 16-foot raised median, curb and gutter and enclosed drainage. An 8-foot asphalt multi-use trail is assumed on each side of the new road in accordance with City of Westfield standards.

The tables identify the portion of the cost of several projects that is necessary to correct existing 2011 deficiencies. These capital costs are the responsibility of the City of Westfield and are not included in the impact fee calculation. The City of Westfield anticipates using several sources of funds to meet these capital improvement obligations. These include the use State MVH and LRS distributions, general obligation bonds, possible federal-aid highway funding, and the possible implementation of new TIF districts. Impact fees collected under the 2007 road impact fee ordinance may also be used to address existing deficiencies on Oakridge Road, Gray Road and at the 156th and Springmill intersection, as these deficiencies did not exist at that time and were identified as improvement needs in the previous Zone Improvement Plan.

The typical roadway features described in this section comply with the design requirements of the City of Westfield, but they were used only to develop improvement cost estimates. These features do not comprise specific design recommendations for the various projects.

Table 6-1: 2011 Improvement Costs

Road	Begin	End	Project	Typical Section	Cost to Meet 2011 LOS			
					Construction	Design, Survey & Inspection (15%)	Right-of-Way Acquisition	Total
Carey Road	Saddlehorn	161st Street	Widen and Resurface. Roundabout at 161st	2-lane with shoulders	\$2,451,600	\$367,700	\$23,000	\$2,842,300
Springmill Road	City Limits	156th Street	Widen and Resurface. NB and SB left turn lanes at 156th	2-lane with shoulders	\$745,500	\$111,800	\$22,700	\$880,000
Springmill Road	156th Street	161st Street	Widen and Resurface	2-lane with shoulders	\$359,000	\$53,900	\$4,300	\$417,200
Springmill Road	161st Street	SR 32	Widen and Resurface	2-lane with shoulders	\$1,015,600	\$152,300	\$26,400	\$1,194,300
Gray Road	Guerin Way	161st Street	Widen and Resurface	2-lane with shoulders	\$916,500	\$137,500	\$39,200	\$1,093,200
Gray Road	161st Street	Golden Hinde Way	Widen and Resurface	2-lane with shoulders	\$1,031,900	\$154,800	\$59,700	\$1,246,400
Oakridge Road	Sapphire Drive	161st Street	Widen and Resurface	2-lane with shoulders	\$979,600	\$146,900	\$65,700	\$1,192,200
Oakridge Road	161st Street	169th Street	Widen and Resurface	2-lane with shoulders	\$995,800	\$149,400	\$8,500	\$1,153,700
151st Street	Carmel Landing	Carey Road	Widen and Resurface	2-lane with shoulders	\$558,100	\$83,700	\$0	\$641,800
TOTAL:					\$9,053,600	\$1,358,000	\$249,500	\$10,661,100

Table 6-2: 2021 Improvement Costs

Road	Begin	End	Project	Typical Section	Cost to Meet 2021 LOS				Cost to Meet 2011 LOS	Impact Fee Cost
					Construction	Design, Survey & Inspection (15%)	Right-of-Way Acquisition	Total		
Carey Road	Saddlehorn	161st Street	Widen and Resurface. Roundabout at 161st	2-lane with shoulders	\$2,451,600	\$367,700	\$23,000	\$2,842,300	\$2,842,300	\$0
Springmill Road	City Limits	156th Street	Widen and Reconstruct	4-lane with median, curb & gutter	\$4,533,500	\$680,000	\$144,500	\$5,358,000	\$880,000	\$4,478,000
Springmill Road	156th Street	161st Street	Widen and Resurface	2-lane with shoulders	\$359,000	\$53,900	\$4,300	\$417,200	\$417,200	\$0
Springmill Road	161st Street	SR 32	Widen and Resurface	2-lane with shoulders	\$1,015,600	\$152,300	\$26,400	\$1,194,300	\$1,194,300	\$0
Springmill Road	SR 32	191st	Widen and Resurface	2-lane with shoulders	\$669,300	\$100,400	\$65,800	\$835,500	\$0	\$835,500
Gray Road	Guerin Way	161st Street	Widen and Resurface	2-lane with shoulders	\$916,500	\$137,500	\$39,200	\$1,093,200	\$1,093,200	\$0
Gray Road	161st Street	Golden Hinde Way	Widen and Resurface	2-lane with shoulders	\$1,031,900	\$154,800	\$59,700	\$1,246,400	\$1,246,400	\$0
151st Street	Carmel Landing	Carey Road	Widen and Resurface	2-lane with shoulders	\$558,100	\$83,700	\$0	\$641,800	\$641,800	\$0
151st Street	Carey Road	Setters Road	Widen and Resurface	2-lane with shoulders	\$389,600	\$58,400	\$0	\$448,000	\$0	\$448,000
161st Street	Oakridge Road	US 31	Widen and Reconstruct	4-lane with median, curb & gutter	\$4,633,900	\$695,100	\$1,301,400	\$6,630,400	\$0	\$6,630,400
161st Street	US 31	Union Street	Widen and Reconstruct. Roundabout at Union	4-lane with median, curb & gutter	\$2,950,300	\$442,500	\$131,500	\$3,524,300	\$0	\$3,524,300
Oakridge Road	Sapphire Drive	161st Street	Widen and Resurface	2-lane with shoulders	\$979,600	\$146,900	\$65,700	\$1,192,200	\$1,192,200	\$0
Oakridge Road	161st Street	169th Street	Widen and Resurface	2-lane with shoulders	\$995,800	\$149,400	\$8,500	\$1,153,700	\$1,153,700	\$0
Oakridge Road	169th Street	Pine Ridge Drive	Widen and Resurface	2-lane with shoulders	\$448,700	\$67,300	\$1,700	\$517,700	\$0	\$517,700
Wheeler Road	SR 32	181st Street	Widen and Resurface	2-lane with shoulders	\$380,800	\$57,100	\$40,900	\$478,800	\$0	\$478,800
Union Street	161st Street	David Brown Drive	Widen and Resurface	2-lane with shoulders	\$514,400	\$77,200	\$29,000	\$620,600	\$0	\$620,600
191st Street	Springmill Road	Grand Park Entrance	Widen and Resurface	2-lane with shoulders	\$736,700	\$110,500	\$83,500	\$930,700	\$0	\$930,700
191st Street	Grand Park Entrance	Tomlinson Road	Widen and Reconstruct. Roundabout at Tomlinson	4-lane with median, curb & gutter	\$6,176,100	\$926,400	\$1,034,800	\$8,137,300	\$0	\$8,137,300
191st Street	Tomlinson Road	US 31	Widen and Reconstruct. Roundabout at West Access	4-lane with median, curb & gutter	\$4,041,800	\$606,300	\$2,230,300	\$6,878,400	\$0	\$6,878,400
TOTAL:					\$33,783,200	\$5,067,400	\$5,290,200	\$44,140,800	\$10,661,100	\$33,479,700

7 Impact Fee Calculation

7.1 Supportable Impact Fee

Based on an analysis of trip patterns using the TransCAD travel demand model, a single road impact fee zone is established for Westfield, which is coterminous with the Westfield corporate boundaries. The current impact zone boundaries are shown in **Figure 7-1**. These boundaries may change as property is annexed into the City of Westfield.

Table 7-1 shows the per-trip road impact fee rate that can be supported for new development in the City of Westfield Road Impact Zone. The actual road impact fee rate that the City of Westfield decides to assess could differ from this rate for various reasons. This supportable rate is based on the total cost of improvements in the impact zone divided by the number of new daily trip ends anticipated in the impact zone by 2021. The number of new daily trip ends in the impact zone was determined from the travel demand model.

The cost of projects to bring existing LOS up to Community LOS standards is the responsibility of Westfield. This cost is subtracted from the 2021 needs in determining the total impact cost. No impact deductions or non-local funding sources have been identified at this time to further reduce the total impact cost.

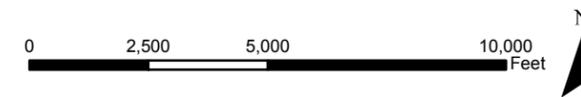
Table 7-1: Calculation of Supportable Impact Fee

	Total
2021 Road Improvement Needs	\$44,140,800
Cost to Serve Existing Traffic	(\$10,661,100)
Cost of Impact Fee Study*	\$236,750
Total Impact Cost	\$33,716,450
New Daily Trip Ends	84,023
Impact Fee Per New Daily Trip End	\$401

Road Impact Fee Study

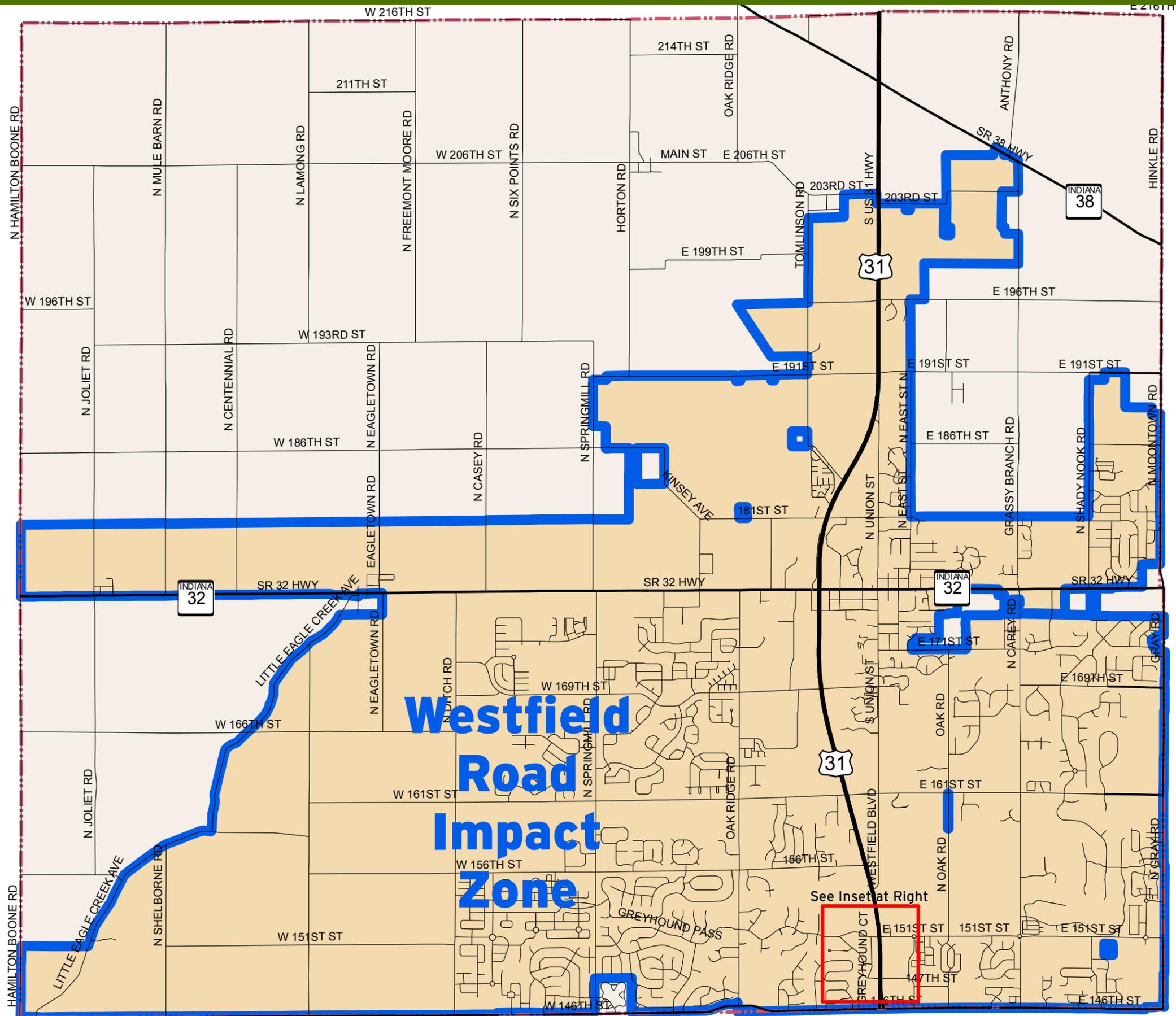
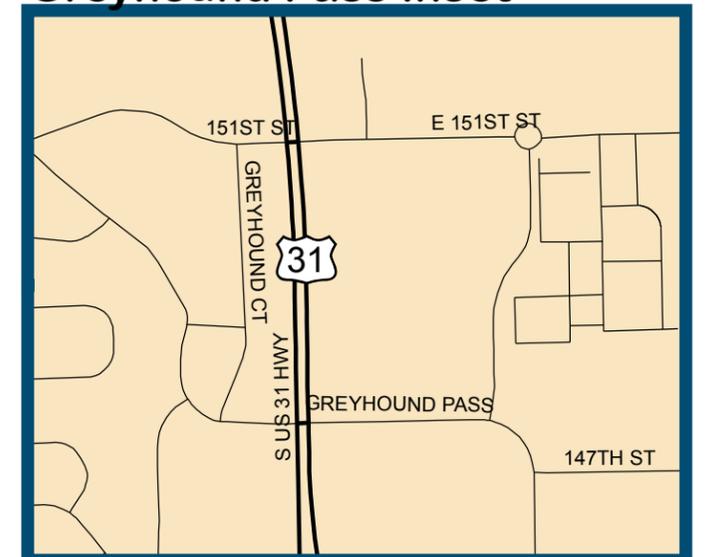
**Figure 7-1
Road Impact Zone
Current Boundaries**

-  City of Westfield
-  Washington Township
-  Road Impact Zone



HNTB April 2012

Greyhound Pass Inset



7.2 Impact Fee Assessment

Procedures

The impact fee rates calculated in this study are based on average daily trip ends generated by new development. With the following exceptions and restrictions, the City of Westfield will assess impact fees for individual developments based on a calculation of average weekday trip ends according to the methods and rates provided in the latest editions of *Trip Generation*⁹ and the *Trip Generation Handbook*¹⁰, published by the Institute of Transportation Engineers.

1. Independent Variable

- a. The independent variable used to calculate average weekday trip ends shall be as follows:
 - Residential Uses: Dwelling Units
 - Retail Uses: Gross Floor Area or Gross Leasable Area
 - Industrial Uses: Gross Floor Area
 - Office Uses: Gross Floor Area
 - Lodging Uses: Total Number of Rooms
 - Churches: Gross Floor Area
 - Gasoline/Service Stations: Number of Fueling Positions
 - Other Services Uses: Gross Floor Area
- b. For land uses not listed above or for which the above independent variables cannot be used, the independent variable to be used will be approved by the City of Westfield

2. Trip End Calculation

- a. Trip ends for residential uses shall be calculated using the average weekday trip rate provided in *Trip Generation*.
- b. Trip ends for land uses other than residential shall be calculated using either the average weekday trip rate or the weekday fitted curve regression equation provided in *Trip Generation*. The determination of whether to use the average rate or the regression equation shall be based on the recommended procedure in the *Trip Generation Handbook*.

⁹ Institute of Transportation Engineers, *Trip Generation, 8th Edition*, Washington, DC, 2008 (or later edition).

¹⁰ Institute of Transportation Engineers, *Trip Generation Handbook, Second Edition, An ITE Recommended Practice*, Washington, DC, 2004 (or later edition).

3. Passby Trip Reduction

- a. The following daily passby trip reduction percentages will be allowed:
- Free-Standing Discount Superstore (ITE 813): 28%
 - Shopping Center (ITE 820): 34%
 - Home Improvement Superstore (ITE 862): 48%
 - Drive-in Bank (ITE 912): 47%
 - Quality Restaurant (ITE 931): 44%
 - High-Turnover (Sit-Down) Restaurant (ITE 932): 43%
 - Fast Food Restaurant with Drive Through (ITE 934): 50%
 - Gasoline/Service Station with Convenience Market (ITE 945): 62%

b. Passby reduction for other uses will be allowed only if justification is provided.

4. Internal capture rates for multi-use development, when used, shall be calculated using the procedures of the *Trip Generation Handbook*, using the daily capture rates. Internal capture rates may not be applied to:

- Shopping centers
- Office parks or office buildings with retail
- Hotels with limited retail and/or restaurant space
- Any development where traffic between the uses crosses a thoroughfare

Examples

1. An example calculation of the impact fee assessment for a 100 home residential development is as follows:

ITE Trip Generation rate for single-family detached housing (ITE Code 210):

$$T = 9.57 (X)$$

Where, T = the daily trip ends
 X = the number of dwelling units

For 100 dwelling units, the number of daily trip ends = 957 trips/day

$$957 \text{ trips/day} * \$401/\text{trip} = \$383,757 \text{ impact fee for the entire development}$$

$$= \$3,838 \text{ per home}$$

2. An example calculation of the impact fee assessment for a 400,000 square foot shopping center is as follows:

ITE Trip Generation rate for a shopping center (ITE Code 820):

$$\ln(T) = 0.65 \ln(X) + 5.83$$

Where, T = the daily trip ends
 X = 1,000 square feet of gross leasable area

For a 400,000 SF shopping center, the number of daily trip ends = 16,721 trips/day

Passby reduction = 34% x 16,721 trips/day = 5,685 trips/day

Total new trips generated = 16,721 – 5,685 = 11,036 trips/day

11,036 trips/day * \$401/trip = \$4,425,436 impact fee for the entire development

7.3 Impact Fee Adjustment

The impact fee calculated in this study was developed based on 2011 construction cost estimates and current forecasts of development. It will be necessary to periodically update the calculations and assumptions used to develop the impact fee to account for cost inflation and changes in development forecasts. In any case, this Zone Improvement Plan will need to be updated within 5 years in order to meet the schedule for replacement of the impact fee ordinance that is dictated by Indiana code.

8 Anticipated Timing of Improvements

Table 8-1 shows an example construction schedule for identified road improvements in Westfield. The schedule is based on estimates of future development patterns over the next ten years. Actual construction should occur as needed to meet evolving system requirements. This schedule is primarily intended to indicate the priority groupings of individual projects.

Construction according to this schedule would require the following to occur:

- The full value of supportable impact fees is assessed for all development
- Development occurs as expected and evenly throughout the 10-year impact fee horizon
- Other funding sources are available when needed
- City, contract and consultant staffing resources are sufficient to design and construct all projects within the required time frame

Table 8-1: Example Road Improvements Construction Schedule

Project	Road	Begin	End	Description	Years*
1	Carey Road	Saddlehorn Drive	161st Street	Widen and Resurface. Roundabout at 161st	1-3
2	Springmill Road	at 156th Street		Roundabout (committed project)	1-3
3	Oakridge Road	at 161st Street		Roundabout (committed project)	1-3
4	186th Street	Grand Park Entrance	Tomlinson Road	New 2-lane road (committed project)	1-3
5	Oakridge Road	Sapphire Drive	161st Street	Widen and Resurface	1-3
6	Oakridge Road	161st Street	169th Street	Widen and Resurface	1-3
7	Wheeler Road	SR 32	181st Street	Widen and Resurface	1-3
8	161st Street	US 31	Union Street	Widen and Reconstruct. Roundabout at Union	4-6
9	Springmill Road	City Limits	156th Street	Widen and Reconstruct	4-6
10	Springmill Road	156th Street	161st Street	Widen and Resurface	4-6
11	161st Street	Oakridge Road	US 31	Widen and Reconstruct	4-6
12	191st Street	Springmill Road	Grand Park Entrance	Widen and Resurface	4-6
13	191st Street	Grand Park Entrance	Tomlinson Road	Widen and Reconstruct. Roundabout at Tomlinson	4-6
14	191st Street	Tomlinson Road	US 31	Widen and Reconstruct. Roundabout at West Access	4-6
15	Gray Road	Guerin Way	161st Street	Widen and Resurface	7-10
16	Gray Road	161st Street	Golden Hinde Way	Widen and Resurface	7-10
17	151st Street	Carmel Landing	Carey Road	Widen and Resurface	7-10
18	151st Street	Carey Road	Setters Road	Widen and Resurface	7-10
19	Union Street	161st Street	David Brown Drive	Widen and Resurface	7-10
20	Springmill Road	161st Street	SR 32	Widen and Resurface	7-10
21	Springmill Road	SR 32	191st	Widen and Resurface	7-10
22	Oakridge Road	169th Street	Pine Ridge Drive	Widen and Resurface	7-10

*Illustrative schedule only. See text for assumptions.