



Chapter 5: Environmental Consequences

This chapter discusses the social, economic and environmental impacts of the Alternatives Cs, Es, G-Cs and Preferred Alternative G-Es as directed by the National Environmental Policy Act of 1969 (NEPA). Table 5.1.1 is a summary table showing these impacts. The following sections discuss these impacts in detail.

Table 5.1.1: Comparison of Impacts for Preliminary Alternatives Cs, Es, G-Cs, G-Es, and Final Preferred Alternative G-Es					
Socio-Economic/Environmental Measure	ALTERNATIVE				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es ¹
COSTS (Total) (Mil. Of \$) (year 2005 dollars)	324.7 to 327.9	362.3 to 365.9	332.2 to 339.7	366.9 to 374.4	371.0 to 378.3
Length (Miles)	19.5	19.9	20.3	20.5	20.5
No. of New Interchanges (Total Interchanges)	5 (7)	5 (6)	5 (7)	5 (6)	5 (6)
No. of Grade Separations (Overpass/Underpass)	16	16	16	16	16
No. of Grade Separations (Railroad Crossings)	2	1	2	1	1
CONSTRUCTION COSTS (Mil. of \$)	208.6 to 211.8	218.2 to 221.3	213.4 to 220.9	221.7 to 228.7	223.2 to 230.2
RECONSTRUCTION of US 20 Right-of-Way & Construction (Mil. of \$)	29.6	21.1	29.6	21.1	21.1
LOCAL & STATE ROAD IMPROVEMENT PROJECTS Right-of-Way & Construction (Mil. Of \$)	3.6	11.5	5.8	13.7	13.6
US 31 MAINLINE RIGHT-OF-WAY COSTS (Mil. of \$)	44.7	70.7	47.1	70.9	72.5
ENGINEERING COSTS (Mil. of \$)	13.7	18.1	13.9	18.3	18.3
UTILITY RELOCATION COSTS (Mil. of \$)	17.2	17.2	17.2	17.2	17.2
MITIGATION COSTS (Mil. of \$)	7.3	5.5 to 6.0	5.2	4.0 to 4.5	5.1 to 5.4
TRAFFIC PERFORMANCE					
Meet Purpose and Need	Yes	Yes	Yes	Yes	Yes
Performance (Compared to Other Alternatives, 1 is Best Performer)	3	1	4	2	2
LAND USE	961 Ac.	968 Ac.	1,012 Ac.	1,011 Ac.	1,061 Ac.
Agricultural (row crop)	390 Ac.	395 Ac.	504 Ac.	503 Ac.	537 Ac.
Commercial	15 Ac.	23 Ac.	16 Ac.	23 Ac.	23 Ac.
Church/Religious	2 Ac.	2 Ac.	2 Ac.	2 Ac.	2 Ac.
Herbaceous Cover	51 Ac.	48 Ac.	68 Ac.	52 Ac.	53 Ac.
Open Water	<1 Ac.	<1 Ac.	<1 Ac.	<1 Ac.	<1 Ac.
Pasture	14 Ac.	12 Ac.	3 Ac.	4 Ac.	4 Ac.
Transportation	213 Ac.	220 Ac.	217 Ac.	222 Ac.	226 Ac.



Table 5.1.1: Comparison of Impacts for Preliminary Alternatives Cs, Es, G-Cs, G-Es, and Final Preferred Alternative G-Es (Continued)

Socio-Economic/Environmental Measure	ALTERNATIVE				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es ¹
Residential	51 Ac.	86 Ac.	55 Ac.	77 Ac.	82 Ac.
Scrub/Shrub	38 Ac.	46 Ac.	31 Ac.	36 Ac.	37 Ac.
Woodland (Wetland & Non-Wetland) (Forests)	186 Ac.	135 Ac.	115 Ac.	91 Ac.	96 Ac.
RELOCATIONS					
Residences Acquired	50	128	59	124	131
Businesses Acquired ²	7	40	5	39	39
Businesses Damaged	5	13	5	13	13
Churches Acquired	1	1	1	1	1
HISTORIC PROPERTIES (Listed or Eligible)					
SECTION 4(f) PROPERTIES	0	0	0	0	0
PROPERTIES WITHIN A.P.E.	5	4	9	8	8
PROPERTIES ADVERSELY AFFECTED BUT NO SUBSTANTIAL LOSS OF INTEGRITY	0	0	1	1	1
ARCHAEOLOGICAL SITES					
Within Alignment	2	3	2	3	3
TOTAL WETLANDS (NWI + FARMED)	51.6 Ac.	35.6 Ac.	30.7 Ac.	23.9 Ac.	29.93 Ac.³
WETLANDS (From NWI Maps)	49.6 Ac.	33.7 Ac.	27.8 Ac.	21.1 Ac.	
Forested	21.8 Ac.	17.8 Ac.	17.7 Ac.	14.8 Ac.	13.21 Ac.
Scrub/Shrub	3.0 Ac.	1.6 Ac.	1.4 Ac.	0.0 Ac.	1.45 Ac.
Emergent	24.0 Ac.	13.6 Ac.	8.7 Ac.	6.3 Ac.	15.27 Ac.
Aquatic Bed	0.8 Ac.	0.7 Ac.	0.0 Ac.	0.0 Ac.	0.0 Ac.
ESTIMATED FARMED WETLANDS	2.0 Ac.	1.9 Ac.	2.9 Ac.	2.8 Ac.	0.44 Ac.⁴
STREAM IMPACTS (No. of Impact Locations) (USGS)	18	19	18	17	17
WILDLIFE HABITAT AREAS					
Potato Creek State Park & Swamp Rose Nature Preserve	0	0	0	0	0
Notable Wildlife Habitat (IDNR)	2	1	0	0	0
Classified Wildlife Habitat (IDNR)	4	3	0	0	0
Classified Forest (IDNR)	2-3	2-3	1-2	1-2	1-2
Conservation Reserve Program (CRP) (NRCS)	1	2	2	1	1
Wetland Reserve Program (WRP) (NRCS)	1	1	0	0	0
Partners for Fish and Wildlife Program (USFWS)	2	1	0	0	0



Table 5.1.1: Comparison of Impacts for Preliminary Alternatives Cs, Es, G-Cs, G-Es, and Final Preferred Alternative G-Es (Continued)

Socio-Economic/Environmental Measure	ALTERNATIVE				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es ¹
INDIRECT IMPACTS					
Farmland	115 Ac.	50 Ac.	105 Ac.	45 Ac.	45 Ac.
Wetland	3 Ac.	3 Ac.	3 Ac.	3 Ac.	3 Ac.
Forests	30 Ac.	25 Ac.	10 Ac.	10 Ac.	10 Ac.

NOTES: The final impacts associated with Preferred Alternative G-Es are Shaded

1. Following the identification of Alternative G-Es as the Preferred Alternative, additional, in-depth studies were performed on the alternative. These additional studies included, but were not limited to, refinement of local access plan and proposed right-of-way requirements, wetland delineations, Phase 1a Archaeological Review, etc.
2. Businesses acquired include large farming operations
3. Delineations of wetlands resulted in 29.93 acres of wetlands impacted, of which, 25.51 acres were jurisdictional and 4.42 acres were isolated wetlands.
4. One farmed wetland area was identified. This area met the three U.S. Army Corps of Engineers wetland criteria and was considered an emergent wetland. This farmed wetland was included in the emergent wetland total.

5.1 Traffic and Transportation

This section examines the traffic impacts of the No-Build Alternative and the Transportation System Management Alternative (involving travel demand management strategies, transportation system management actions, intelligent transportation system applications and transit service improvements).

5.1.1 No-Build Alternative

The No-Build (No Action or Do Nothing) Alternative is represented by the existing roadway network plus programmed or committed major roadway improvements in the South Bend Metropolitan Area. By definition the No-Build Alternative excludes any major investment in US 31. (See 3.1.2 for additional No-Build discussion.) However, the No-Build Alternative includes “capacity expansion” projects in the South Bend Metropolitan Area (St. Joseph, Marshall and Elkhart counties) as reported in the MACOG Transportation Improvement Program (2004-2006 TIP) and the balance of Indiana as reported in the Indiana Statewide Transportation Improvement Program (INSTIP). The most significant programmed capacity expansion projects include the following.

- SR 331 (Capital Avenue) new construction from the US 20 Bypass to SR 23 (Edwardsburg Highway) as a six-lane divided arterial
- Ironwood Road widening to four lanes from Ridgedale Road to Randolph Street (completed)
- SR 23 widening to four lanes from Campeau Street to Edison Road and from Cleveland Road to Brick Road

Along the US 31 Corridor, INDOT has programmed traffic-operational (safety) improvements to intersections at Kern Road (completed), Roosevelt Road, Madison Road, New Road and SR 4. The new traffic signal at New Road is the most significant of these “capacity preservation” projects. As these projects do not involve major capital investments that alter the through lane traffic carrying capacity of US 31, these projects will proceed regardless of the decision to improve the US 31 corridor. A pavement-resurfacing project that would have added a continuous center left-turn lane from Madison Road to Kern Road has been suspended until the completion of this NEPA document.



As previously reported in Tables 4.1.1 and 4.1.2, the No-Build Alternative fails to address existing and future congestion in the US 31 Corridor. Further, traffic growth over the next 30 years results in deterioration of the LOS along all roadway segments, signalized intersections and major unsignalized (two-way stop-controlled) intersections. In fact, while LOS C is the minimum acceptable standard, an LOS of E or F results on all roadway segments from Michigan Road to the US 20 Bypass, all signalized intersections, and all but one unsignalized intersection.

5.1.2 Transportation System Management Alternative

This alternative includes a combination of travel demand management strategies, transportation system management actions, intelligent transportation system applications and public transportation service improvements.

Travel Demand Management (TDM) strategies involve actions to spread the peak-hours of travel or to encourage the shift to alternative modes of travel to the single-occupancy vehicle. These include such actions as flexible work hours or workdays, trip-reduction ordinances, employer-based trip reduction programs, vanpooling/carpooling, improved transit services and improved bicyclist and pedestrian facilities. With no major employment centers in the corridor, most development being residential or supportive retail/service uses, and no existing or viable transit service along US 31, viable TDM strategies cannot be successfully implemented in the US 31 corridor to reduce trip making.

Transportation System Management (TSM) strategies involve low-cost capital investments to reduce congestion and improve traffic flow, and increased measures to optimize performance of the existing transportation infrastructure. These strategies involve intersection improvements, signal coordination and timing, lane control (reversible lanes) and high-occupancy vehicle (HOV) lanes, among others. Present signalized intersections in the US 31 Corridor have separate left-turn bays. INDOT has already programmed the improvement of most traffic signals in the corridor, including the installation of a traffic signal at New Road. However, three of the four existing signalized intersections operate at an unacceptable LOS today, and the fourth signalized intersection will operate at an unacceptable LOS before the year 2030. Even with further improvements to the lane configurations and signal timings at these four intersections, the temporary improvements in traffic flow will soon disappear as traffic grows more than 40% over the next 30 years in the corridor. Except for the spacing between the Johnson Road and Kern Road traffic signals, the spacing to adjacent traffic signals is more than a mile apart. Thus, traffic signal interconnection, real-time traffic flow monitoring at the traffic signals and traffic signal coordination are not viable options, and provide only a temporary improvement to traffic flow over the next 30 years. Finally, adding a continuous center left-turn lane from Miller Road to Kern Road as part of a resurfacing project may be considered a TSM strategy; however, while this action clearly improves safety, a four-lane divided facility is inadequate to handle the forecasted traffic load. In conclusion, improving traffic signals and adding a continuous center left-turn lane northward from Lakeville results in about a 5% improvement in capacity carrying capability; yet, the increased capacity remains insufficient to handle current traffic volumes at an acceptable LOS, let alone future forecasted traffic.

Intelligent Transportation System (ITS) options include a variety of technology-based programs to actively manage the roadway system. The most common systems provide travel information on roadway conditions to daily commuters. This enables commuters to adjust travel routes to changing travel conditions. Incident management programs are also part of the ITS toolbox to reduce the effect of accidents and vehicle breakdowns on traffic flow. In light of the rural character, length of the corridor and lack of adequate alternative north-south routes, ITS options cannot be effectively applied in the US 31 Corridor to solve congestion problems.

As previously noted, the bus ridership is characterized by a transit-dependent population, and served only 1.2% of the work trips in St. Joseph County and 0.4% of the work trips in Marshall County in the year 2000. Significant transit service is not a viable option in the US 31 Corridor for the following reasons:



- Nearly half of the travel in the corridor is through traffic (without a trip origin or destination within the corridor).
- Trips with an origin or destination within the corridor are characterized by dispersed trip-ends inside and outside the corridor.
- Less than 5% of the corridor will have sufficient population densities in the year 2030 to meet the minimum threshold considered necessary for the provision of transit service.

In conclusion, a combination of viable travel demand management strategies, transportation system management actions, intelligent transportation system applications and public transportation service improvements is inadequate to address existing, let alone future, congestion in the corridor.

5.1.3 Alternatives

5.1.3.1 Traffic Conditions

Table 5.1.2 shows the extent to which the alternatives relieve traffic congestion along the existing US 31 Corridor. The daily traffic volumes in the year 2000 are actual traffic counts adjusted to the year 2000. The LOS is based on the daily capacities found in Table 2.1.1. The daily traffic volumes in the year 2030 are assigned traffic volumes from the US 31 Improvement Project Travel Demand Model with a refined roadway network for the alternatives. The LOS is consistent with the daily capacities used in the evaluation of alternatives in Table 3.1.3.

Referring to Table 5.1.2, Alternatives Cs, Es, G-Cs and Preferred Alternative G-Es relieve traffic congestion on existing US 31 achieving an acceptable LOS in the year 2030. This is in contrast to the No-Build Alternative in the year 2030 that results in an unacceptable LOS on existing US 31 from Michigan Road to the US 20 Bypass. With a reduction of 30% or more over year 2000 traffic volumes, and 50% or more over year 2030 traffic volumes for the No-Build condition, an acceptable LOS may be achieved for both the present and the year 2030 for all segments, signalized intersection and major unsignalized (two-way stop-controlled) intersections in the existing US 31 corridor.

Segments (location of daily volume reported)	Rural or Urban	Alternatives / Year					
		No Build 2000	No Build 2030	Cs 2030	Es 2030	G-Cs 2030	G-Es (Preferred) 2030
US 30 to Michigan Road (north of W6A Road)	Rural	16,989(B)	21,215(C)	512(A)	514(A)	612(A)	426(A)
Michigan Road to US 6 (south of US 6)	Rural	24,232(C)	26,542(D)	4,485(A)	4,324(A)	4,593(A)	4,450(A)
US 6 to Tyler Road (south of Tyler Road)	Rural	19,845(E)	23,270(F)	2,695(A)	2,530(A)	3,885(A)	3,193(A)
Tyler Road to Lake Trail (south of South Quinn Trail)	Rural	21,400(C)	23,362(D)	2,998(A)	2,837(A)	4,147(A)	3,339(A)



Table 5.1.2: Future Traffic and Level-of-Service on Existing US 31 for the Alternatives (Daily Traffic Volumes (LOS) in Year 2030 – Unacceptable LOS* shaded) (Continued)

Segments (location of daily volume reported)	Rural or Urban	Alternatives / Year					
		No Build 2000	No Build 2030	Cs 2030	Es 2030	G-Cs 2030	G-Es (Preferred) 2030
Lake Trail to SR 4 (north of Patterson Street)	Rural	27,217(F)	29,691(F)	5,327(A)	5,227(A)	5,441(A)	3,355(A)
SR 4 to New Road (south of New Road)	Rural	24,240(E)	26,789(F)	5,435(A)	4,072(A)	7,001(A)	5,187(A)
New Road to Roosevelt Road (south of Roosevelt Road)	Rural	26,419(E)	29,445(F)	7,681(A)	6,684(A)	9,407(B)	7,990(A)
Roosevelt Road to US 20 Bypass (north of Kern Road)	Urban	31,526(F)	43,512 39,323(F)	18,369(D)	7,987(B)**	19,587(D)	9,133(B)**

* An LOS C is the minimum acceptable for rural segments. An LOS D is the minimum acceptable for urban segments.
 ** Volume south of Kern Road is shown because it is higher than north of Kern Road.
 Source: US 31 Improvement Project Travel Demand Model for 2030 daily volumes; for year 2000, actual traffic counts adjusted to year 2000.

The Alternatives Cs, Es, G-Cs and Preferred Alternative G-Es have no significant impact on existing and future daily traffic volumes on Michigan Street (Business US 31) north of the US 20 Bypass. South of Ireland Road, these traffic volumes are the same as the No-Build Alternative daily traffic volume for Alternative Cs and G-Cs and are within 14% of the No-Build Alternative for Alternatives Es and Preferred Alternative G-Es North of Ireland Road, the year 2030 daily traffic volumes on Michigan Street (Business US 31) are comparable to the No-Build Alternative.

Table 5.1.3 shows the forecasted traffic volumes for the alternatives for the year 2030 and the associated LOS. For the alternatives, a four-lane freeway is proposed from US 30 to Kern Road with operating speed of 65 mph (LOS C = 46,800 vpd), and a six-lane freeway is proposed from Kern Road to the US 20 Bypass with an operating speed of 55 mph (LOS C = 70,200 vpd). As the alternatives result in an LOS C or better, the minimum acceptable standards of LOS C in rural areas and LOS D in urban areas are met.

Table 5.1.3: Future Traffic and Level-of-Service for the Alternatives (Daily Traffic Volumes (LOS) in Year 2030 – Unacceptable LOS* shaded)

Segment	Alternatives				
	No-Build	Cs	Es	G-Cs	G-Es (Preferred)
US 30 to CR 7th	24,227 (C)	31,780 (B)	31,740 (B)	29,890 (B)	30,820 (B)
CR 7th to Michigan Road	21,215 (C)	34,360 (C)	33,980 (C)	31,160 (B)	32,590 (B)
Michigan Road to US 6	26,542 (D)	34,360 (C)	33,980 (C)	31,160 (B)	32,590 (B)
US 6 to SR 4	29,691 (F)	33,260 (B)	35,270 (C)	27,520 (B)	32,480 (B)
SR 4 to New Road	26,789 (F)	35,850 (C)	38,610 (C)	29,670 (B)	34,590 (C)
New Road to Kern Road	29,445 (F)	35,850 (C)	38,610 (C)	29,670 (B)	34,590 (C)
Kern Road to US 20 Bypass	47,929 (F)	39,290 (B)	51,380 (C)	33,800 (B)	46,780 (B)



*An LOS C is the minimum acceptable for rural segments. An LOS D is the minimum acceptable for urban segments.
Source: US 31 Improvement Project Travel Demand Model for 2030 daily volumes.

The ramp-crossroad intersections created at interchanges along the freeway alternatives would be designed to meet the INDOT standard of LOS C or better for rural areas and LOS D or better for urban areas. One lane on and off-ramps appear sufficient to handle the year 2030 peak-hour traffic at the interchanges along the alternatives. At the possible Kern Road interchange, the on and off-ramps to and from the north must be two lanes on the departure from and approach to the Kern Road for adequate storage capacity and functioning of the ramp-crossroad intersections in the case of Alternatives Es and Preferred Alternative G-Es. Also, in the case of Alternatives Es and G-Es, Kern Road must be widened to five lanes from the existing US 31 intersection to the west interchange ramp-crossroad intersection to accommodate peak-hour shifting from existing US 31 to the new freeway. In the case of Alternatives Cs and G-Cs at the possible Kern Road interchange and the balance of the possible interchanges on all alternatives except for the possible interchange at US 6, the widening of the crossroad to three lanes through the interchange area to accommodate left-turn lanes appears sufficient. Because a portion of US 6 is already four lanes east of existing US 31, consideration is being given to extending this four-lane section through the possible US 6 interchange.

In addition to the widening of Kern Road from the interchange to existing US 31 in the case of Alternatives Es and Preferred Alternative G-Es and the widening of US 6 from east of existing US 31 through the possible US 6 interchange in the case of all alternatives, County Road 7 must be extended from Linden Road through the possible East 7th Road interchange to Michigan Road. A high type two-lane roadway (12-foot lanes and 10-foot paved shoulders) will be needed for East 7th Road from the US 31 interchange to Michigan Road in order for all build alternatives to handle the high access traffic volumes (including truck traffic), which range from 6,370 vpd for Alternative G-Cs to 7,580 vpd for Alternative Cs (6,820 vpd for preferred Alternative G-Es). In the case of Alternatives G-Cs and Preferred Alternative G-Es, Pierce Road (which becomes SR 4 at existing US 31) should also be reconstructed from existing US 31 to the new freeway interchanges due to significantly higher traffic volumes on this section of Pierce Road (4,510 vpd for Preferred Alternative G-Es)

5.1.3.2 Access

Table 5.1.4 shows the preliminary treatment of roads that intersect with the alternative corridors. Table 5.1.5 shows the forecasted interchange daily ramp volumes for the year 2030.

Interchanges. The INDOT Design Manual establishes a minimum interchange spacing of one mile in urban areas and two miles in rural areas for non-Interstate freeways. [For the Interstate Highway System, the FHWA interchange spacing guidelines average an eight-mile spacing with a minimum spacing of two miles in rural areas and a two-mile spacing with a minimum spacing of one mile in urban areas.] All alternatives involve six interchanges that will be refined in later phases. These include two system-interchanges at US 30 and US 20 Bypass, and possibly four service-interchanges (East 7th Road, US 6, SR 4/Pierce Road and Kern Road). While the interchanges at US and State designated roadways are usually built to ensure state highway network continuity, the interchanges at local roads are not a certainty. Because the movement from Plymouth via Michigan Road to existing US 31 near West 4A Road involves 13,000 vpd at present and 15,000 vpd in the future, the flow of this Michigan Road traffic to the new freeway is very important for access to the north side of Plymouth, and involves nearly 8,000 vpd in the year 2030 from the possible East 7th Road interchange to Michigan Road. Because the alternatives depart the existing alignment of US 31 south of the current Michigan Road interchange and just east of the Maple Road/West 4A Road intersection, an interchange is proposed at East 7th Road (about 2.0 miles north of US 30) to accommodate the heavy traffic movement from Michigan Road to the freeway. Excluding the system-interchanges, the interchange at East 7th Road carries the highest daily traffic volumes in the case of Alternatives Cs and G-Cs, the second highest daily traffic volumes in the case of Alternative Es and third highest daily traffic volumes in the case of Preferred



Table 5.1.4: Possible Access for the Alternatives (Preferred Alternative G-Es Shaded)

Crossroad	Alternatives			
	Cs	Es	G-Cs	G-Es (Preferred)
US 30	Existing Interchange	Existing Interchange	Existing Interchange	Existing Interchange
Plymouth-Goshen Trail	grade separation	grade separation	grade separation	grade separation
West 7B Road	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced
East 7th Road	Diamond Interchange	Diamond Interchange	Diamond Interchange	Diamond Interchange
Lilac Road/West 6th Road	grade separation	grade separation	grade separation	grade separation
West 5A Road	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced
Existing US 31	closed southeast of Maple Rd./West 4A Rd. intersection	closed southeast of Maple Rd./West 4A Rd. intersection	closed southeast of Maple Rd./West 4A Rd. intersection	closed southeast of Maple Rd./West 4A Rd. intersection
West 4A Road	grade separation	grade separation	grade separation	grade separation
West 3A Road	grade separation	grade separation	grade separation	grade separation
Maple Road	relocated	relocated	relocated	relocated
West 2C Road	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced
US 6	Diamond Interchange	Diamond Interchange	Diamond Interchange	Diamond Interchange
West 1B Road	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced
CSX Railroad	grade separation	grade separation	grade separation	grade separation
East 1st Road	grade separation	grade separation	grade separation	grade separation
North Lilac Road			relocated	relocated
Tyler Road	grade separation	grade separation	grade separation	grade separation
Shively Road	closed and cul-de-saced	closed and cul-de-saced		
Linden Road			closed and cul-de-saced	closed and cul-de-saced
Rockstroh Road			closed and cul-de-saced	closed and cul-de-saced
Kenilworth Road			grade separation	grade separation
Leeper Road	grade separation	grade separation		
US 31	grade separation	grade separation		
Quinn Trail	relocated	relocated		
Lake Trail			grade separation	grade separation
Quinn Road	grade separation	grade separation	closed and cul-de-saced	closed and cul-de-saced
SR 4 (Pierce Road)	Diamond Interchange	Diamond Interchange	Diamond Interchange	Diamond Interchange
Osborne Road	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced	closed and cul-de-saced
New Road	grade separation	grade separation	grade separation	grade separation
Miller Road			grade separation	grade separation
Madison Road	grade separation	grade separation		
Louise Dr.		closed		
Roycroft Road		closed		
Existing US 31			grade separation	grade separation
Roosevelt Road	grade separation	grade separation	grade separation	grade separation
Kern Road	Diamond Interchange	Diamond Interchange	Diamond Interchange	Diamond Interchange
Main Street		closed and cul-de-saced		grade separation
Dice Street		grade separation		closed and cul-de-saced
Linden Road	relocated		Relocated	
Johnson Road	grade separation	grade separation	grade separation	grade separation
Jewell Avenue		grade separation		closed and cul-de-saced
Jackson Road				grade separation
US 20 Bypass	Trumpet Interchange	Modified Existing Interchange	Trumpet Interchange	Modified Existing Interchange
Interchanges	6	6	6	6
Road Grade Separations	13	15	13	15
Railroad Grade Separations	1	1	1	1
Road Relocations	3	2	3	2
Road Closures	7	10	9	10



Interchanges	Ramps	Alternatives (Daily Volumes)			
		Cs	Es	G-Cs	G-Es (Preferred)
East 7th Road	NB off	2,041	2,116	2,151	2,077
	NB on	3,807	3,661	3,174	3,468
	SB off	3,636	3,495	3,013	3,215
	SB on	2,008	2,052	2,115	2,046
	Total	11,492	11,324	10,453	10,806
US 6	NB off	3,032	2,309	3,288	2,846
	NB on	2,422	3,318	1,431	3,502
	SB off	2,388	2,615	1,405	2,004
	SB on	2,876	2,325	3,193	2,774
	Total	10,718	10,577	9,317	11,126
SR 4	NB off	1,162	936	360	295
	NB on	2,284	2,489	1,333	1,800
	SB off	2,598	3,400	1,543	2,255
	SB on	1,134	933	361	303
	Total	7,178	7,758	3,597	4,653
Kern Road	NB off	851	1,208	585	1,038
	NB on	2,679	5,292	2,769	4,895
	SB off	2,572	8,861	2,531	8,922
	SB on	952	1,242	587	1,048
	Total	7,054	16,603	6,472	15,903

Source: US 31 Improvement Project Travel Demand Model for 2030 daily volumes.

Alternative G-Es. The interchange at East 7th Road is recommended in the Plymouth Comprehensive Plan (2003) when US 31 is upgraded to a freeway.

Serving LaPaz, the proposed US 6 interchange carries the second highest service-interchange daily traffic volumes in the case of Alternatives Cs, G-Cs and Preferred G-Es, and the third highest daily traffic volume in the case of Alternative Es.

In the case of all Alternatives, an interchange with existing US 31 south of Lakeville is not proposed because of minimum interchange spacing guidelines for rural areas and adverse impacts on the human and natural environment. The proposed SR 4 interchange is only 6,500 feet north of the existing US 31 crossover, and handles the heavier traffic movements to the north from Lakeville than traffic movements to the south from Lakeville. The proposed SR 4 interchange carries the least daily traffic volumes of the four service interchanges for all Alternatives, except for Alternative Cs where it handles slightly more traffic than the Kern Road interchange.

In the case of Alternative G-Cs, an interchange with existing US 31 south of Roosevelt Road is not proposed because significant freeway traffic would get off at the interchange to use existing US 31 to the US 20 Bypass, thereby, negating the purpose of constructing the freeway. Such an interchange would be less than two miles from the proposed Kern Road interchange contrary to minimum interchange spacing guidelines for rural areas.

With the highest service-interchange daily traffic volumes in the case of Alternatives Es and Preferred Alternative G-Es, an interchange is proposed at Kern Road for all build alternatives to provide access to the existing suburban commercial and residential development on the south side of the US 20 Bypass. This would be the first service



interchange on the US 31 Improvement Project south of the US 20 Bypass. In the case of Alternatives Es and Preferred Alternative G-Es, the Kern Road interchange siphons off traffic from existing US 31, provides access to several highway-oriented businesses on US 31 near Kern Road (two gas station/convenient stores, two motels and restaurants) that would not be displaced and provides access to remaining and relocated businesses along existing US 31 from Kern Road to the US 20 Bypass. The proposed Kern Road interchange has the third highest daily traffic volumes in the case of Alternative G-Cs and the least service interchange volumes in the case of Alternative Cs.

Grade Separations and Local Service (Frontage) Roads. In general, grade separations are proposed on all alternatives at roadways functionally classified as collectors or arterials and at public roads so as to achieve a freeway crossover spacing of not more than two miles in rural areas and not more than one mile in urban areas. When two public roads are close to one another, the grade separation may be provided at one road and the other road relocated to use the same grade separation. Frontage or service roads may be provided where land may be landlocked by full access control of the alternative. The determination of grade separations and frontage/service roads may not be finalized until final design.

From US 30 to Michigan Road, existing US 31 already has partial access control and provides no direct access to private property. Thus, no frontage/service roads are necessary for landlocked property. The draft *Plymouth Comprehensive Plan* (2003) recommends an interchange at East 7th Road, a grade separation of Plymouth-Goshen Trail and no access to US 31 at East 7B Road and East 6th Road (Lilac Road). All Alternatives would provide an interchange at East 7th Road, a grade separation at Plymouth-Goshen Trail (a rural major collector), close and cul-de-sac West 7B Road and provide a grade separation at West 6th Road (Lilac Road).

Between the East 7th Road interchange and the US 6 interchange, grade separations are proposed at West 6th Road, West 4A Road and West 3A Road. Due to the proximity of Maple Road to the freeway near West 2C Road, Maple Road will be relocated along the east side of the freeway to maintain its intersection with West 2C.

Between the US 6 interchange and the SR 4 (Pierce Road) interchange, Alternatives Cs and Es share a common alignment with five roadway grade separations (East 1st Road, Tyler Road, Leeper Road, US 31 and Quinn Road). The south end of Quinn Trail in Lakeville may be relocated on the northeast side of the proposed freeway to maintain continuity of the street system in Lakeville. North of East 1st Road, Alternative G-Cs and Preferred Alternative G-Es depart the common alignment of the other two alternatives. Alternative G-Cs and Preferred Alternative G-Es have four roadway grade separations (East 1st Road, Tyler Road, Kenilworth Road (a rural major collector) and Lake Trail).

From the SR 4 (Pierce Road) interchange to the Kern Road interchange, Alternatives Cs and Es provide grade separations at New Road, Madison Road and Roosevelt Road. Cutting through a residential subdivision north of Madison Road, Louise Drive and Roycroft Road would be closed on the east side of the freeway as residential structures are displaced west of the freeway. In the case of Alternatives G-Cs and Preferred Alternative G-Es, grade separations are proposed at New Road, Miller Road, Existing US 31 and Roosevelt Road.

From Kern Road to the US 20 Bypass, Alternatives Cs and G-Cs are on a similar alignment, and would have a grade separation of Johnson Road. Linden Road may have to be relocated along the west side of the freeway to Johnson Road to provide continuity for this roadway that is also grade-separated at the US 20 Bypass. Alternatives Es and Preferred Alternative G-Es provide grade separations at Dice Street (Alternative Es) or Main Street (Preferred Alternative G-Es), at Johnson Road, and at Jewell Avenue (Alternative Es) or Jackson Street (Preferred Alternative G-Es).

In the case of Alternative Es, the alignment north of Kern Road joins the existing alignment of US 31 near Dice Street. At Dice Street, traffic may pass from existing US 31 to Main Street which intersects with the Johnson Road



grade separation; traffic may return to the east side of the freeway at the Jewell Avenue grade separation. For Preferred Alternative G-Es, traffic may pass from existing US 31 to Main Street which intersects with the Johnson Road grade separation. A grade separation is proposed at Jackson Street over the freeway in Preferred Alternative G-Es to link the east and west side of the freeway. Grade separations are also proposed in Preferred Alternative G-Es at Fellows Street and Scott Street between Jackson Road and Ireland Road to connect the areas north and south of the US 20 Bypass.

Summary of Preferred Alternative G-Es

Table 3.6.41 gives an overview of the socio/economic and environmental impacts associated with Preferred Alternative G-Es. These impacts are discussed in greater detail throughout Chapter 5.

Preferred Alternative G-Es would result in a future (year 2030) LOS of A (the best) for all rural segments of existing US 31. This would be from US 30 to Roosevelt Road. It would result in a future (year 2030) LOS of B from Roosevelt Road to the US 20 Bypass. Thus, the Preferred Alternative G-Es will relieve traffic congestion on existing US 31 achieving an acceptable LOS in the year 2030. The Preferred Alternative G-Es will have no significant impact on existing and future daily traffic volumes on Michigan Street (Business US 31) north of the US 20 Bypass.

Preferred Alternative G-Es is expected to have acceptable LOS and forecasted traffic volumes for the year 2030 for the freeway itself. The LOS will range from B to C in rural segments and B in the urban segment.

Preferred Alternative G-Es will involve six interchanges that will be refined in later phases of the project development. These include two system-interchanges at US 30 and US 20 Bypass, and possibly four service-interchanges (East 7th Road, US 6, SR 4/Pierce Road and Kern Road).

Preferred Alternative G-Es will involve 16 grade separations (overpass/underpass). Grade separations will be located at Plymouth-Goshen Trail, Lilac Road/West 6th Road, West 4A Road, West 3A Road, CSX Railroad, East 1st Road, Tyler Road, Kenilworth Road, Lake Trail, New Road, Miller Road, existing US 31, Roosevelt Road, Main Street, Johnson Road and Jackson Road.

Preferred Alternative G-Es will involve the relocation of two roads. Due to the proximity of Maple Road to the freeway near West 2C Road, Maple Road will be relocated along the east side of the freeway to maintain its intersection with West 2C. North Lilac Road will likely be relocated to maintain its connection with Tyler Road.