



ES.5 Summary of Impacts and Selection of the Preferred Alternative

Following the modifications made to the preliminary alternatives throughout the study process, as detailed above, and based on the following findings, the range of reasonable alternatives in the decision-making process included the No-Build Alternative and four Freeway Alternatives Cs, Es, G-Cs and G-Es (see Figure ES.4.3). Following the DEIS public comment period, the Public Hearing and additional fieldwork, this FEIS has been prepared. The US 31 Improvement Project has been a dynamic process, and the following data is from the information and conceptual design parameters available at each of the phases in the screening of alternatives process. As the study progressed, additional information was collected and analyzed, more specific design parameters and details were developed, and the associated impacts were revised and updated.

A comparison of the remaining freeway alternatives, Alternatives Cs, Es, G-Cs and G-Es identified different types of impacts related to each alternative. Some generalizations related to the impacts of the alternatives included (note that the generalizations are based on data shown in Table ES.5.3):

- The alternatives that were west of existing US 31 (Alternatives Cs, Es and the northern most portion of G-Cs) exhibited higher impacts to the natural environment, particularly wetlands and forests
- The alternatives that were east of existing US 31 (Alternatives G-Cs and G-Es) exhibited higher farmland impacts but had lower wetland and forest impacts
- The alternatives that utilized more of the existing US 31 corridor (Alternatives Es and G-Es) exhibited higher impacts to the human environment, particularly residential and business relocations
- The alternatives that utilized more of the existing US 31 corridor (Alternatives Es and G-Es) generally exhibited higher total costs than those that were largely new terrain corridors
- The alternatives that utilized more of the existing US 31 corridor (Alternatives Es and G-Es) were generally better traffic performers; however, all remaining freeway alternatives meet the projects purpose and need and the associated performance measures
- 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. This more refined data is included in the Final Preferred Alternative G-Es column.

Socio-Economic/Environmental Measure	ALTERNATIVE ¹				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es ²
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



Table ES.5.3: Comparison of Impacts for Preliminary Alternatives Cs, Es, G-Cs,G-Es, and Final Preferred Alternative G-Es (Continued)

Socio-Economic/Environmental Measure	ALTERNATIVE ¹				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es 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.
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 ³	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



Table ES.5.3: Comparison of Impacts for Preliminary Alternatives Cs, Es, G-Cs, G-Es, and Final Preferred Alternative G-Es (Continued)

Socio-Economic/Environmental Measure	ALTERNATIVE ¹				
	Cs	Es	G-Cs	G-Es	Final Pref. Alt. G-Es ²
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.⁴
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.⁵
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
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. No-Build Alternative – does not meet purpose and need of the project; however, it was carried forward for detailed study.
2. 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. This more refined data is included in this column.
3. Businesses acquired include large farming operations
4. 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.
5. 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.



Direct impacts are defined by the Council on Environmental Quality (CEQ) Regulation as “effects which are caused by the action and occur at the same time and place.” For this project, the direct impacts are the result of the right-of-way needs for the project. Impacts such as these may be permanent or temporary, and positive or negative in nature. Temporary direct impacts typically occur in the right-of-way during construction activities. They usually result in physical effects but do not cause permanent alteration of the land or water bodies. Temporary easements, for example, may be required for access and storage of equipment on site. Indirect impacts are those that occur as a result of a project action but are removed from the immediate right-of-way. The FHWA defines indirect impacts as those that are “caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induce changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.” Cumulative impacts are “the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (FHWA Executive Order 13274)

The No-Build Alternative did not address the purpose and need for this project; however, it was carried forward for evaluation throughout the development of the Environmental Impact Statement and served as a baseline when comparing the effectiveness and potential impacts of other alternatives. The No-Build Alternative, while having no *direct* construction costs or impacts, would result in indirect economic and quality of life impacts that can be expected from the continued deterioration of system capacity as identified in the Purpose and Need Statement. The No-Build Alternative fails to address existing and future congestion in the US 31 Corridor. Traffic growth over the next 30 years results in deterioration of the LOS along all US 31 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 US 31 roadway segments from Michigan Road to the US 20 Bypass, all signalized intersections, and all but one unsignalized intersection.

Purpose and Need - Although Alternatives Cs, Es, and G-Cs and G-Es all meet the purpose and need of the project, they perform at different levels with regard to reduction in congestion.

- Alternative Es is the best traffic performer, as it provides existing US 31 with an LOS of A from the southern terminus at the US 30 interchange to Roosevelt Road. From Roosevelt Road to the northern termini at US 20, the alternative provides an LOS of B
- Alternative G-Es performs very similarly to Alternative Es as it provides existing US 31 with an LOS of A from the southern terminus at the US 30 interchange to Roosevelt Road. From Roosevelt Road to the northern termini at US 20, the alternative provides an LOS of B. The difference between the performance of Alternatives Es and G-Es is that Alternative G-Es has a future daily traffic volume that is approximately 1,150 vehicles per day higher than that of Alternative Es
- Alternative Cs provides existing US 31 with an LOS of A from the southern terminus at the US 30 interchange to Roosevelt Road. From Roosevelt Road to the northern termini at US 20, the alternative provides an LOS of D, the minimum acceptable LOS for an urban section, along existing US 31
- Alternative G-Cs performs very similarly to Alternative Cs as it provides existing US 31 with an LOS of A from the southern terminus at the US 30 interchange to New Road. From New Road to Roosevelt Road, the alternative provides an LOS of B. From Roosevelt Road to the northern termini at US 20, the alternative provides an LOS of D, the minimum acceptable LOS for an urban type section



Agricultural Land/Farmland Impacts - Farmland (row crop) impacts were based on 2002 aerial photographs:

- Alternatives Cs will impact an estimated 390 acres
- Alternative Es will impact an estimated 395 acres
- Alternative G-Es will impact an estimated 503 acres, approximately 115 acres more than Alternatives Cs and Es
- Alternative G-Cs will impact an estimated 504 acres, approximately 115 acres more than Alternatives Cs and Es

Natural Resource Impacts

Alternatives Cs and Es traverse an area of complex glacial drift in the northwestern quarter of the study area, from approximately the north edge of Lakeville to US 20, formerly the Maxinkukee Moraine. The glacial deposits in this area are also unique from a wildlife habitat perspective. These areas are less conducive to agriculture, thus many forested and wetland communities remain. The majority of threatened and endangered species records from the Indiana Natural Heritage Data Center are from this area, as are many of the notable wildlife habitat areas as identified by the Indiana Department of Natural Resources (IDNR), and lands enrolled in state and federal programs that promote and manage wildlife habitat. Alternative G-Cs avoids this area for the most part, with the exception of the northern most portion, from approximately Roosevelt Road to its northern terminus at US 20. Alternative G-Es is located east of and avoids this complex glacial drift area.

Wetland delineations were performed from the Preferred Alternative G-Es during July - October 2004. A total of 29.93 acres of wetland were delineated within the Preferred Alternative G-Es footprint. Representatives from the United States Army Corps of Engineers (USACE) and the Indiana Department of Environmental Management (IDEM) reviewed the potential wetland impacts for the Preferred Alternative G-Es during a field review on November 4-6, 2004. In a jurisdictional determination letter dated February 24, 2005, the USACE identified 25.51 acres as falling under federal jurisdiction and 4.42 acres as isolated wetlands. Isolated wetland impacts will likely fall under state jurisdiction under the Indiana Department of Environmental Management (IDEM) Isolated Wetlands Regulatory Program.

Based on calculations from the National Wetland Inventory (NWI) Maps and an estimate of farmed wetland impacts:

- Alternative G-Es has the least amount of estimated wetland impacts at 29.93 acres
- Alternative G-Cs has an estimated 30.7 acres of wetland impacts
- Alternative Es has an estimated 35.6 acres of wetland impacts
- Alternative Cs has the highest amount at 51.6 acres

Forest (woodland) impacts were based on 2002 aerial photographs:

- Alternative G-Es has the least estimated forest (woodland) impacts with 91 acres
- Alternative G-Cs has an estimated 115 acres of forest (woodland) impacts



- Alternative Es has an estimated 135 acres of forest (woodland) impacts
- Alternative Cs also has the highest estimated forest (woodland) impacts with 196 acres

Based on calculations from digital Federal Emergency Management Agency (FEMA) floodplain data:

- Alternatives Cs and Es have the least amount of potential floodplain impacts at 1,400 and 1,450 feet in length of impacts, respectively, along with 10.3 and 9.9 acres in area
- Alternatives G-Cs and G-Es have similar potential floodplain impacts at 1,995 and 2,045 feet in length of impacts, respectively, along with 11.4 acres in area

Related to the floodplain impacts is the number of water crossings noted for each of the build alternatives:

- Alternative G-Es is estimated to cross 17 streams.
- Alternatives Cs and G-Cs are estimated to cross 18 streams.
- Alternative Es is estimated to cross 19 streams.

Residential/Commercial Relocations - Relocations for each of the four build alternatives vary:

- Alternative Cs has the fewest residential relocations at 50.
- Alternative G-Cs has 59 residential relocations.
- Alternative G-Es has 125 residential relocations.
- Alternative Es has the most residential relocations with 128.

Differences in commercial relocations indicate that Alternatives Es and G-Es are substantially higher than Alternatives Cs and G-Cs.

- Alternative G-Cs has the least impacts to businesses with an estimated five businesses acquired and five businesses damaged.
- Alternative Cs has an estimated seven associated businesses acquired and five businesses damaged.
- Alternatives Es and G-Es impact a commercial corridor as they join existing US 31 from just north of Kern road to US 20. Commercial relocations for Alternative Es are estimated at 40 businesses acquired and 13 businesses damaged. For Alternative G-Es, commercial relocations are estimated at 39 businesses acquired and 13 businesses damaged.

Historic and Archaeological Resources - Section 106 of the National Historic Preservation Act (“Section 106”) requires consultation with the State Historic Preservation Officer (SHPO) and other consulting parties to develop and evaluate alternatives or modifications that could avoid, minimize, or mitigate historic and archaeological effects. Consulting parties have been contacted on an ongoing basis in order to avoid and minimize the impacts of the undertaking on historic and archaeological properties. Mitigation of impacts may mean avoiding the



impact altogether, minimizing the impact, rectifying the impact, reducing or eliminating the impact over time, or compensating for the impact.

- Alternatives Es and Cs have the lowest estimated number of Historic Properties (listed or eligible for the NR) within the Area of Potential Effects (APE) with five and four, respectively. Neither alternative has any associated properties adversely affected.
- Alternatives G-Cs and G-Es have the highest estimated number of Historic Properties (listed or eligible for the NR) within the Area of Potential Effects (APE) with nine and eight, respectively. Both alternatives have one property adversely affected. The FHWA finding of effects for the project is “Historic Properties Affected- Adverse Effect.” There will be adverse effects to the W.O. Bunch Farm.

Thirty-one previously recorded archaeological sites were identified within an area extending one mile on either side of the alignments. These sites include two prehistoric loci of unidentified cultural affiliation and one reported historic farmstead, none of which is considered eligible for listing in the (NR).

- Alternatives Cs and G-Cs would impact two previously recorded sites.
- Alternatives Es and G-Es would impact three previously recorded sites.

Following a Phase 1a archaeological field reconnaissance and analysis of other available information, the proposed project should have no effect on significant archaeological resources meeting the criteria established for inclusion in the Indiana Register of Historic Sites and Structures (IRHSS) or the NR.

Air Quality – The US 31 Improvement Project appears in the MACOG 2025 Transportation Plan Update (March 18, 2002) as New Road Construction from the US 20 Bypass to the St. Joseph County Line. It is further described as a limited access road with interchanges at several locations that would continue to US 30 in Marshall County. As part of the Long Range Plan (LRP) Update, MACOG conducted transportation air quality conformity analyses, and FHWA and Federal Transit Administration (FTA) jointly determined the LRP meet transportation conformity requirements. The US 31 Improvement Project has also been included in the MACOG Transportation Improvement Plan (TIP) for 2003-2005, and the associated transportation conformity analysis has also been approved by FHWA and FTA. As the US 31 Improvement Project is in an adopted LRP and TIP that have met transportation conformity requirements, the project will not jeopardize MPO air quality conformity with the applicable mobile source emission budgets established in the SIP for St. Joseph and Elkhart counties.

On October 26, 2004, MACOG performed an air quality conformity analysis of the adopted LRP with the alignment and proposed interchanges of the preferred final Alternative G-Es, and demonstrated compliance with applicable SIP emission budgets. Because the SIP emission budgets are based on tons of emissions per day, the demonstration of air quality conformity applies to both designation of St. Joseph and Elkhart Counties as a “maintenance” area for the one-hour standard for VOCs and NOX and as a “nonattainment” area for the eight-hour standard for VOCs and NOX.

On March 30, 2005, MACOG performed another Air Quality Transportation Conformity analysis for the new *2030 Long Range Transportation Plan* and the *FY 2005-2007 Transportation Improvement Program* that were adopted by MACOG on April 13, 2005. The 2030 Long Range Transportation Plan continues to include the preferred final Alternative G-Es for US 31 Improvement Project, and the air quality conformity analysis using MOBLE 6.2 resulted in slightly lower emissions (5.52 tons per day of VOC and 5.35 tons per day of NOX) than the analysis of October 26, 2004. On May 24, 2005, the FTA and FHWA concluded that the criteria of the conformity rule have been met by the MACOG conformity analysis.



Hot spot air quality analysis for carbon monoxide (CO) was completed along all of the proposed Freeway Build Alternatives and the No-Build Alternative using the CAL3QHC mobile source air dispersion model for the one-hour standard of 35.0 ppm. Results of the Air Quality Analysis show that no alternative will exceed the 35.0 ppm hour emission standard for the nearest receptor within 15 feet of the edge of pavement. Thus, the less stringent 8-hour emissions standard of 9.0 ppm will not be exceeded either.

Noise – In accordance with INDOT Traffic Noise Policy, a noise impact occurs when one or both of the following criteria are met:

- The predicted design year hourly L_{eq} approaches or exceeds the appropriate noise abatement criteria (NAC). Approach means that the future levels are higher than 1 dBA $L_{eq}(h)$ below the appropriate NAC.
- The predicted design year hourly L_{eq} substantially exceeds existing noise levels. Substantially exceeds means that predicted levels are 15 dBA or more above existing levels.

Noise impacts for each of the four build alternatives indicate no conclusive advantage for any one of the alternatives. Each of the alternatives is close to some suburban neighborhoods in the north end of the project area.

- Alternative Es impacts approximately 51 residences, three businesses and four recreational areas including two baseball and two soccer fields
- Alternative G-Es impacts approximately 53 residents, two businesses and four recreational areas including two baseball fields and two soccer fields
- Alternative G-Cs impacts approximately 64 residents, no business and four recreational areas including two baseball and two soccer fields
- Alternative Cs is higher than the others with approximately 78 residences impacted one business and four recreational areas including two baseball and two soccer fields impacted. It should be noted that approximately 30 of the residences impacted by Alternative Cs are in very close proximity to each other as they are all located within the Sun Communities Mobile Home Park off of Locust Road.

At all sensitive receivers where traffic noise impacts are predicted under the freeway alternatives, noise mitigation measures will be considered. One method of mitigating traffic noise impacts is to construct a noise barrier in the form of an earthen berm and/or vertical wall. According to INDOT's Highway Traffic Noise Policy, when impacts have been identified, there must be consideration of any reasonable and feasible measures that would abate the traffic noise impacts. Additional noise abatement measures (altering vertical or horizontal alignment, eliminating truck traffic, and reducing vehicle speed limits) were evaluated and found to be either unwarranted or not feasible for any of the freeway alternatives.

Farmland - Impacts to agricultural lands resulting from direct conversion to transportation use were assessed in terms of prime farmland impacts (Farmland Conversion Impact Rating system), total number of existing farmland acres converted, and the potential annual loss in crop cash receipts. Coordination with the USDA-NRCS regarding assessment of farmland conversion impacts in accordance with the Farmland Protection Policy Act was initiated with a request to the USDA-NRCS Indianapolis state headquarters office. The following summarizes the assessment of anticipated impacts to farmland (agricultural, row crops) based on the USDA-NRCS evaluation of the alternatives:

- Alternative Cs would impact an estimated 390 acres of farmland.
- Alternative Es would impact an estimated 395 acres of farmland.



- Alternative G-Es would impact an estimated 503 acres of farmland.
- Alternative G-Cs has the greatest impact farmland acreage with 504 acres

Section 4(f) Resources - This project involves no Section 4(f) use of any Section 4(f) resources.

Compatibility with Local Land Use Plans

- The Plymouth Comprehensive Plan includes the upgrade of US 31
- The Marshall Thoroughfare Plan assumes the upgrade of existing US 31 throughout Marshall County
- The South Bend and St. Joseph County Comprehensive Plan incorporates the land use plan for the local MPO, MACOG. The MPO land use plan identifies that area immediately south of the existing US 31 and

Indirect Impacts

- Alternative G-Es had the lowest amount of indirect land conversion, with 58 acres. Of this, 45 acres are farmland, 10 acres are forest, and 3 acres of wetlands
- Alternative Es is estimated to have 78 acres of land conversion indirect impacts. Of this, 50 acres are farmland, 25 acres are forest, and 3 acres of wetland
- Alternative G-Cs is estimated to have 118 acres of land conversion indirect impacts. Of this, 105 acres are farmland, 10 acres are forest, and 3 acres of wetland
- Alternative Cs is estimated to have the greatest amount of land conversion as indirect impacts, with a total of 148 acres. Of this, 115 acres are farmland, 30 acres are forest, and 3 acres of wetlands

Total Costs - Total costs associated with each of the four build alternatives studied in detail range from \$264.1 to \$343.1 million. These preliminary total costs include construction costs associated with the alternative, required reconstruction of US 20, local road improvement projects, right-of-way costs and preliminary engineering (design) costs. The costs are in year 2005 dollars.

- Alternative Cs has the lowest total cost between \$300.2 and \$303.4 million
- Alternative G-Cs has a total cost between \$309.8 and \$317.3 million
- Alternative Es has a total cost between \$339.6 and \$342.7 million
- Alternative G-Es has the highest total cost between \$345.7 and \$352.7 million.

A comparison of construction costs indicates:

- Alternative Cs has the lowest construction cost between \$208.6 and \$211.8 million
- Alternatives G-Cs and Es have essentially the same construction costs with Alternative G-Cs between \$213.4 and \$220.9 million, and Alternative Es between \$218.2 and \$221.3 million
- Alternative G-Es has the highest construction cost between \$221.7 and \$228.7 million



US 20 interchange as an area expected to see residential growth in the future. It also identifies the portion of US 31 included in the study area as an area that would benefit from further study

Following publication of the DEIS, local officials in Marshall County and Plymouth expressed concerns with the local access plan associated with the preliminary alternatives within the county and met with the Project Management Team on two occasions to discuss these access issues. These issues focused on interchange, overpass/underpass and cul-de-sac locations. Through the course of discussions at these meetings, Marshall County, Plymouth and INDOT officials were able to modify the Marshall County local access plan and produce a plan that was in the best interest of both parties. The most significant change related to the revised Marshall County local access plan involved the elimination of a proposed interchange at West 5A Road and the addition of an interchange at 7th Road. This change in local access is consistent with the Marshall County Comprehensive Plan and the Plymouth Comprehensive Plan. No interchange had been proposed at the 7th Road location initially as no intersecting roadway currently exists at 7th Road and US 31. Due to the lack of a connecting roadway at the 7th Road interchange location, Marshall County officials made a written commitment to complete a 7th Road extension project that would begin at Michigan Road and extend eastward to the western limits of the proposed US 31 interchange at 7th Road. It would then begin on the east side of the proposed 7th Road interchange and continue eastward to 7th Road. This commitment included funding associated with preliminary engineering, environmental studies, right-of-way acquisition and construction costs.

The difference in construction costs associated with the alternatives is largely due to the differences in length of the alternatives as the longest alternative, Alternative G-Es, is one mile longer than the shortest alternative, Alternative Cs.

A comparison of right-of-way cost indicates:

- Alternative Cs also has the lowest right-of way costs at approximately \$44.7 million.
- Alternative G-Cs has a right-of-way cost of approximately \$47.1 million, only slightly higher than Cs despite its longer length.
- Alternatives Es and G-Es have the highest right-of-way costs with Alternative Es at approximately \$70.7 and Alternative G-Es at approximately \$70.9 million.

Differences in the right-of way costs are largely due to the number and type of relocations associated with each alternative.

Utility relocation costs associated with Alternatives Cs, Es, G-Cs and G-Es are estimated at \$17.2 million. An estimate of wetland, noise and stream mitigation costs associated with Alternative G-Es ranges from \$4.0 to \$4.5 million. Mitigation costs associated with Alternatives G-Cs and Es are similar and estimated at \$5.2 million and ranging from \$5.5 and \$6.0 million, respectively. Alternative Cs has the highest estimated mitigation costs at \$7.3 million.

Selection of the Preferred Alternative

The Preferred Alternative was selected through a multi-stage process that involved extensive analysis of traffic performance, environmental impacts and costs, as well as consideration of input from resource agencies, local elected and appointed officials and the public. Following the evaluation of alternatives, five alternatives remained for further review (See Figure ES.4.3):

- No-Build Alternative



- Alternative Cs (Freeway Alternative)
- Alternative Es (Freeway Alternative)
- Alternative G-Cs (Freeway Alternative)
- Alternative G-Es (Freeway “Hybrid” Alternative)

The No-Build Alternative did not address the purpose and need for this project; however, it was carried forward for evaluation throughout the development of the Environmental Impact Statement and served as a baseline when comparing the effectiveness and potential impacts of other alternatives. A comparative evaluation of the data contained in Table ES.5.3 above resulted in the identification of Alternative Cs as a Non-Preferred Alternative. The impacts associated with Alternatives Cs and G-Cs were very similar with respect to both social and environmental impacts, particularly costs, relocations and land use. A comparison of Alternatives Cs and G-Cs revealed that Alternative Cs had a slightly lower associated engineering (total) cost, slightly lower residential impacts and significantly lower agricultural (row crops) impacts. However, its associated business impacts were slightly higher and environmental impacts to wetlands and forests (woodland) were significantly higher than those associated with Alternative G-Cs. In fact, the impacts to wetlands and forests associated with Alternative Cs were the highest among the remaining freeway alternatives. Alternative Cs was considered a Non-Preferred Alternative due to its higher relative environmental impacts to wetlands and forests while exhibiting similar impacts to residences and businesses.

A comparative evaluation of the data contained in Table ES.5.3 above also resulted in the identification of Alternative Es as a Non-Preferred Alternative. The impacts associated with Alternatives Es and G-Es were very similar with respect to both social and environmental impacts, particularly costs, relocations and land use. A comparison of Alternatives Es and G-Es revealed that Alternative Es had slightly lower engineering (total) cost and significantly lower agricultural (row crops) impacts; however, its residential and business impacts were slightly higher and environmental impacts to wetlands and forests were significantly higher than those associated with Alternative G-Es. Alternative Es was considered a Non-Preferred Alternative due to its higher relative environmental impacts to wetlands and forests while exhibiting similar impacts to residences and businesses.

Following the initial comparative evaluation of the data contained in ES.5.3, Alternatives Cs and Es were identified as Non-Preferred Alternatives. Alternatives G-Cs and G-Es remained as alternatives to be further evaluated. Since these alternatives follow the same alignment from US 30 northward to near Roosevelt Road, the FHWA and the INDOT agreed that additional field data should be collected and analyzed, roadway engineering and associated costs should be refined and further developed and the human and natural environmental impacts should be re-assessed. The additional analysis focused on the area in which Alternatives G-Cs and G-Es did not follow a common alignment, essentially from Roosevelt Road northward to US 20. Some of the additional items included in the additional analysis of Alternatives G-Cs and G-Es from Roosevelt Road to US 20:

- Delineation and quality evaluation of wetland complexes and refinement of wetland impacts;
- Refinement of forest and farmland impacts;
- Further conceptual design and cost update for the US 31 and US 20 interchange associated with each of the alternatives including reconstruction of US 20 within the interchange limits;
- Further conceptual design and cost update of local access issues, particularly related to Alternative G-Es from Kern Road to US 20 and northward to Ireland Road;
- Refinement of residential and business relocations and the associated costs; and
- Determination of potential mitigation measures and estimation of associated mitigation costs – wetland mitigation and bridging of wetlands, context sensitive solutions and noise mitigation.



Table ES.5.4 contains the results of the additional analysis that focused on the area in which Alternatives G-Cs and G-Es did not follow a common alignment, essentially from Roosevelt Road northward to US 20.

Table ES.5.4: Comparison of Preliminary Alternatives G-Cs and G-Es		
SOCIO-ECONOMIC/ENVIRONMENTAL MEASURE	ALTERNATIVE	
	G-Cs	G-Es
COST (Without Mitigation) (Mil. Of \$) (Year 2005 Dollars)	309.8 to 317.3	345.7 to 352.7
CONSTRUCTION COSTS (Mil. Of \$)	213.4 to 220.9	221.7 to 228.7
RECONSTRUCTION OF US 20 Right-of-Way & Construction (Mil. Of \$)	29.6	21.1
LOCAL AND STATE ROAD IMPROVEMENT PROJECTS Right-of-Way & Construction (Mil. Of \$)	5.8	13.7
US 31 MAINLINE RIGHT-OF-WAY COSTS (Mil. Of \$)	47.1	70.9
ENGINEERING (DESIGN) FEES (Mil. Of \$)	13.9	18.3
* MITIGATION COST (Mil. Of \$)	32.8 to 36.2	21.0 to 24.0
WETLAND MITIGATION (Mil. Of \$)	3.6 to 4.1	2.0 to 2.5
BRIDGING OF WETLANDS (Mil. Of \$)	10.7	0.0
CONTEXT SENSITIVE SOLUTIONS (Mil. Of \$)	16.8 to 19.7	17.5 to 20.0
NOISE MITIGATION (Mil. Of \$)	1.7	1.5
TOTAL PROJECT COSTS (Mil. Of \$)	342.6 to 353.5	366.7 to 376.7
TRAFFIC PERFORMANCE		
Meet Purpose and Need	Yes	Yes
Traffic Operational Problems with US 31 and US 20 Interchange	Yes	No
RELOCATIONS		
Residences Acquired	58	124
** Businesses Acquired	5	39
Businesses Damaged	5	13
Churches Acquired	1	1
*** WETLANDS (NWI + FARMED)	30.7 Ac.	23.9 Ac.
FORESTS	115 Ac.	91 Ac.
FARMLAND (ROW CROPS)	504 Ac.	503 Ac.

NOTES: * Wetland Mitigation Ratios are based off of the INDOT MOU signed January 28, 1991, and investigators professional judgment on quality. Costs estimates associated with Mitigation for Bridging Wetlands only include those areas north of Roosevelt Road.

** Businesses Acquired Includes Large Farming Operations.

*** Wetland Impacts are from NWI Maps and estimated Farmed Wetlands are calculated as 2% of all Hydric Soils on agricultural land. The percentage is an estimate based on coordination with the Natural Resources Conservation Service (NRCS).



A comparative evaluation of the data contained in Table ES.5.4 resulted in the identification of Alternatives G-Cs as a Non-Preferred Alternative and Alternative G-Es as the Preferred Alternative. Alternative G-Cs had lower associated total project cost and lower residential and business impacts than those associated with Preferred Alternative G-Es. While residential and business impacts associated with Preferred Alternative G-Es are higher than those for Alternative G-Cs, this FEIS found that it appears that there is sufficient availability of comparable housing to accommodate the expected number of residential relocations. This FEIS also found that the availability of commercial real estate is most prevalent in the South Bend area at the north end of the corridor (near the US 20 Bypass) and that there appears to be adequate availability of commercial property. It is anticipated that there will be opportunities for many of the relocated businesses to rebuild in the same general vicinity with little or no loss in business in the long-term.

The traffic performance of Alternative G-Cs was not as good as Preferred Alternative G-Es. Alternative G-Cs utilized very little of existing US 31, although it did meet the purpose and need of the project and the associated performance measures. As a more detailed conceptual design of the interchange of Alternative G-Cs with US 20 developed, engineers expressed concerns with operational problems associated with the interchanges proximity to the existing US 31 and US 20 interchange. The operation problems associated with the interchange configuration focused on insufficient traffic weaving lengths for several traffic movements. Traffic weaving lengths are essentially a distance that a driver has to weave through other lanes of traffic in order to get to an appropriate lane that allows the traffic movement that a driver desires. Inadequate weaving lengths or lengths near minimum allowable values tend to lead to traffic congestion and generally less safe driving conditions as driver actions become less predictable. The proposed interchange at US 20 for Preferred Alternative G-Es consists of the reconstruction of the existing interchange and did not exhibit operational problems.

The associated environmental impacts to wetlands and forests for Alternative G-Cs were higher than those for Preferred Alternative G-Es. Alternative G-Cs had severe impacts on several high quality wetland complexes located north of Roosevelt Road, south of US 20 and west of existing US 31. Wetlands in this portion of the study area are among the highest quality wetland complexes within the entire study area. Impacts to these wetland complexes would be very difficult to mitigate as they are in many cases forested wetlands that cannot be reconstructed and take many years to develop. Bridging of these wetlands as a mitigation measure was evaluated but this method of mitigation is relatively expensive and often still results in the destruction of considerable amounts of forested wetlands. By utilizing the existing US 31 alignment north of Kern Road, Preferred Alternative G-Es does not impact these high quality wetland complexes. In comments received during the DEIS Public Comment Period, the U.S. Environmental Protection Agency (USEPA) emphasized the importance of selecting a preferred alternative in accordance with the wetlands permitting requirements under Section 404 of the Clean Water Act. In particular, the USEPA mentioned the need to ensure consistency with the Section 404(b)(1) Guidelines, which require (in the context of Section 404 permit decisions) selection of the “least environmentally damaging practicable alternative” or “LEDPA”. A LEDPA consistency analysis was completed as part of the FEIS. This alternative would also have resulted in a higher loss of forestland and the fragmentation of forest habitat.

Description of the Preferred Alternative

Preferred Alternative G-Es (see maps contained in Appendix A) begins at the existing US 31 and US 30 interchange, utilizing the existing cloverleaf configuration, and proceeds northward along the existing US 31 alignment to just south of West 4A Road in Marshall County, just south of LaPaz. It then departs the existing US 31 alignment and continues northward on new alignment east of LaPaz, paralleling existing US 31. Just south of the Marshall-St. Joseph County line, the alternative assumes a northeasterly direction east of Riddles Lake, and then continues north, east of Lakeville, paralleling existing US 31. Near Miller Road, Preferred Alternative G-Es turns in a northwesterly direction and crosses existing US 31 just south of Roosevelt Road. As the Preferred Alternative G-Es approaches Kern Road, it assumes a northeasterly direction and ties into existing US 31. It then uses the existing US 31 alignment northward and terminates at the existing US 31 and US 20 interchange location. Proposed interchange locations include the use of the existing interchange at US 30, new interchanges at the proposed extension of 7th Road,



and at US 6 in Marshall County; as well as at Pierce Road (extension of SR 4), at Kern Road and a reconfiguration of the existing US 31 and US 20 interchange (see Appendix S) in St. Joseph County. The alternative is approximately 20.5 miles in length.

Following the identification of Alternative G-Es as the Preferred Alternative, additional, in-depth studies were performed on the alternative. These studies included, but were not limited to, refinement the of local access plan and proposed right-of-way requirements, wetland delineations, wetland quality evaluations, Phase 1a Archaeological Review, etc. Table ES.5.5 summarizes some of the impacts associated with the Preferred Alternative G-Es.

Table ES.5.5: Impacts Associated with Preferred Alternative G-Es	
Socio-Economic/Environmental Measure	ALTERNATIVE G-Es
COSTS (Total) (Mil. Of \$) (year 2005 dollars)	371.0 to 378.3
Length (Miles)	20.5
No. of New Interchanges (Total Interchanges)	5 (6)
No. of Grade Separations (Overpass/Underpass)	16
No. of Grade Separations (Railroad Crossings)	1
CONSTRUCTION COSTS (Mil. of \$)	223.2 to 230.2
RECONSTRUCTION of US 20 Right-of-Way & Construction (Mil. of \$)	21.1
LOCAL & STATE ROAD IMPROVEMENT PROJECTS Right-of-Way & Construction (Mil. Of \$)	13.6
US 31 MAINLINE RIGHT-OF-WAY COSTS (Mil. of \$)	72.5
ENGINEERING COSTS (Mil. of \$)	18.3
UTILITY RELOCATION COSTS (Mil of \$)	17.2
MITIGATION COSTS (Mil of \$)	5.1 to 5.4
TRAFFIC PERFORMANCE	
Meet Purpose and Need	Yes
Performance (Compared to Other Alternatives (Cs, Es and G-Cs), 1 is Best Performer)	2
LAND USE	1,061 Ac.
Agricultural (row crop)	537 Ac.
Commercial	23 Ac.
Church/Religious	2 Ac.
Herbaceous Cover	53 Ac.
Open Water	<1 Ac.
Pasture	4 Ac.
Transportation	226 Ac.
Residential	82 Ac.
Scrub/Shrub	37 Ac.
Woodland (Wetland & Non-Wetland) (Forests)	96 Ac.
RELOCATIONS	



Table ES.5.5: Impacts Associated with Preferred Alternative G-Es (Continued)	
Socio-Economic/Environmental Measure	ALTERNATIVE G-Es
Residences Acquired	131
Businesses Acquired ¹	39
Businesses Damaged	13
Churches Acquired	1
HISTORIC PROPERTIES (Listed or Eligible)	
SECTION 4(f) PROPERTIES	0
PROPERTIES WITHIN A.P.E.	8
PROPERTIES ADVERSELY AFFECTED BUT NO SUBSTANTIAL LOSS OF INTEGRITY	1
ARCHAEOLOGICAL SITES	
Within Alignment	3
TOTAL WETLANDS (DELINEATED)²	29.93 Ac.
Forested	13.21 Ac.
Scrub/Shrub	1.45 Ac.
Emergent	15.27 Ac.
Aquatic Bed	0.0 Ac.
ESTIMATED FARMED WETLANDS³	0.44 Ac.
STREAM IMPACTS (No. of Impact Locations) (USGS)	17
WILDLIFE HABITAT AREAS	
Potato Creek State Park & Swamp Rose Nature Preserve	0
Notable Wildlife Habitat (IDNR)	0
Classified Wildlife Habitat (IDNR)	0
Classified Forest (IDNR)	1-2
Conservation Reserve Program (CRP) (NRCS)	1
Wetland Reserve Program (WRP) (NRCS)	0
Partners for Fish and Wildlife Program (USFWS)	0
INDIRECT IMPACTS	
Farmland	45 Ac.
Wetland	3 Ac.
Forests	10 Ac.

NOTES:

1. Businesses acquired include large farming operations
2. 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.
3. 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.



The Preferred Alternative G-Es is a freeway alternative that will have full access control. Control of access refers to the regulation of public access rights to and from properties abutting the highway. With full control of access, preference is given to through traffic on US 31 by providing access connections with selected public roads only at interchanges, by prohibiting crossings at grade utilizing stop controlled or traffic signalized intersections, and by prohibiting direct private and commercial driveway connections.

Refined roadway typical cross sections, as approved by INDOT, will be determined during subsequent project design phases. For use in this study, the rural section of the Preferred Alternative G-Es from US 30 to just south of West 4A Road in Marshall County is shown in Figure ES.5.4. This segment consists of an upgrade of existing US 31 and the rural typical section will consist of a four-lane freeway with two lanes in each direction. It will have a depressed grass median that will vary in width from 50 to 76 feet from north of the US 30 interchange to the bridge over the Yellow River. The grass median will be 76 feet north of the Yellow River Bridge. It will have 4-foot paved inside shoulders, 12-foot paved outside shoulders, on a total of approximately 300 feet of right-of-way, with a design speed of 70 mph. The existing median in this segment was widened to a total of 84 feet in order to provide adequate room for the potential expansion of the facility to a six-lane freeway, with three lanes in each direction. This would be accomplished, if warranted by future traffic volumes, with the addition of the third lane in the median of both the northbound and southbound sides and would result in a 60-foot (required minimum median width) median following the expansion.

The rural section of the Preferred Alternative G-Es from just south of West 4A Road in Marshall County to the proposed interchange at Kern Road in St. Joseph County is shown in Figure ES.5.5. In this segment, the rural typical section will consist of a four-lane freeway with two-lanes in each direction. It will have an 76-foot depressed grass median width, 4-foot paved inside shoulders, 12-foot paved outside shoulders, on a total of approximately 300 feet of right-of-way, with a design speed of 70 mph. The median in this segment was widened to a total of 84 feet in order to provide adequate room for the potential expansion of the facility to a six-lane freeway, with three lanes in each direction. This would be accomplished, if warranted by future traffic volumes, with the addition of the third lane in the median of both the northbound and southbound sides and would result in a 60-foot (required minimum median width) median following the expansion.

The section of the Preferred Alternative G-Es between Kern Road and US 20 is considered an urban section as shown in Figures ES.5.6 and ES.5.7. The urban section of the Preferred Alternative G-Es between the Kern Road interchange and the Johnson Road overpass is shown in Figure ES.5.6. In this segment, the urban typical section will consist of an eight-lane freeway with four lanes in each direction. This section will have a 30.5-foot depressed grass median, 12-foot paved inside shoulders, 14-foot paved outside shoulders with concrete median barrier, on a total of approximately 300 feet of right-of-way, with a design speed of 55 mph. The median width in this section is sufficient for an additional future travel lane.

The urban section of Preferred Alternative G-Es between Johnson Road and the US 20 interchange is shown in Figure ES.5.7. In this segment, the urban typical section will have five through lanes (three northbound through lanes and two southbound through lanes). In addition to these through lanes, five auxiliary lanes will also be provided, (two northbound and three southbound auxiliary lanes). This section will have a 30.5-foot depressed grass median, 12-foot paved inside shoulders, 14-foot paved outside shoulders with concrete median barrier, on a total of approximately 300 feet of right-of-way, with a design speed of 55 mph. The median width in this section is sufficient for an additional future travel lane.

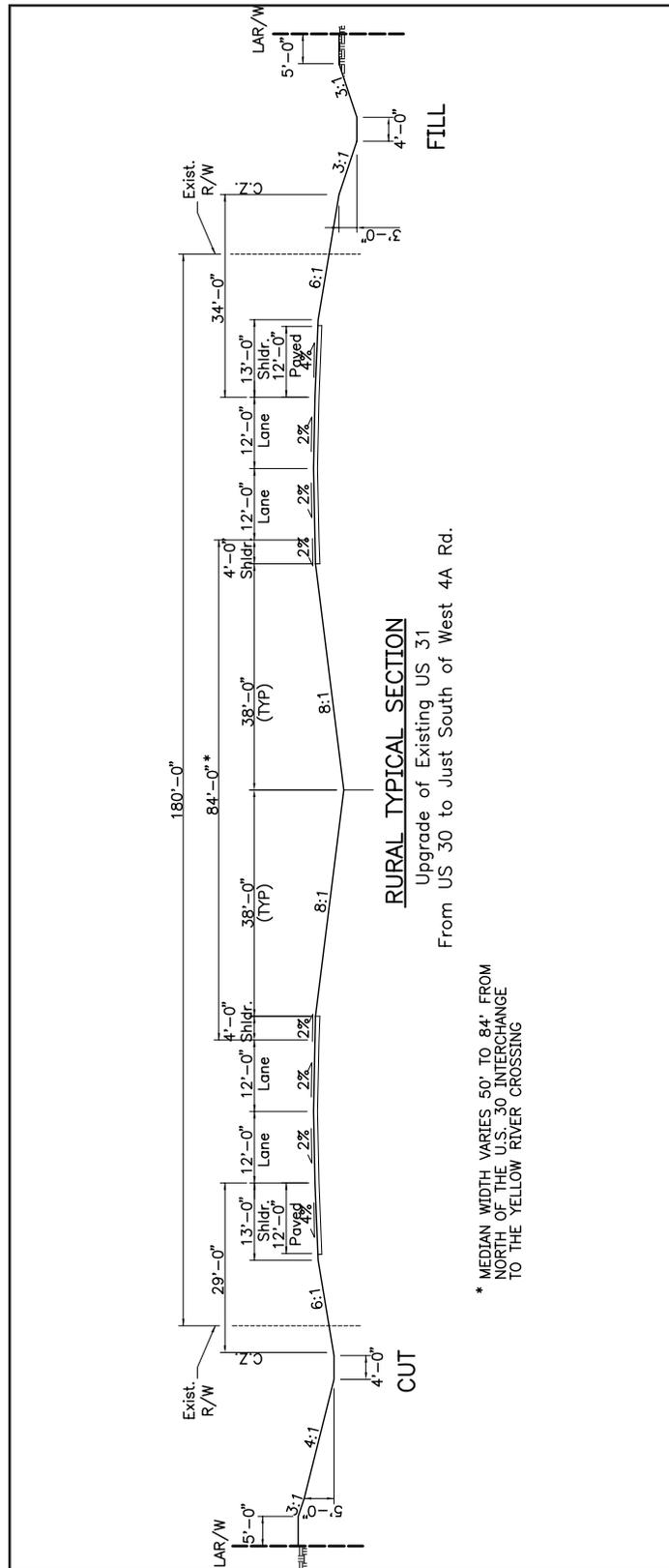


Figure ES 5.4: Rural Typical Section (From US 30 to Just South of West 4A Road)

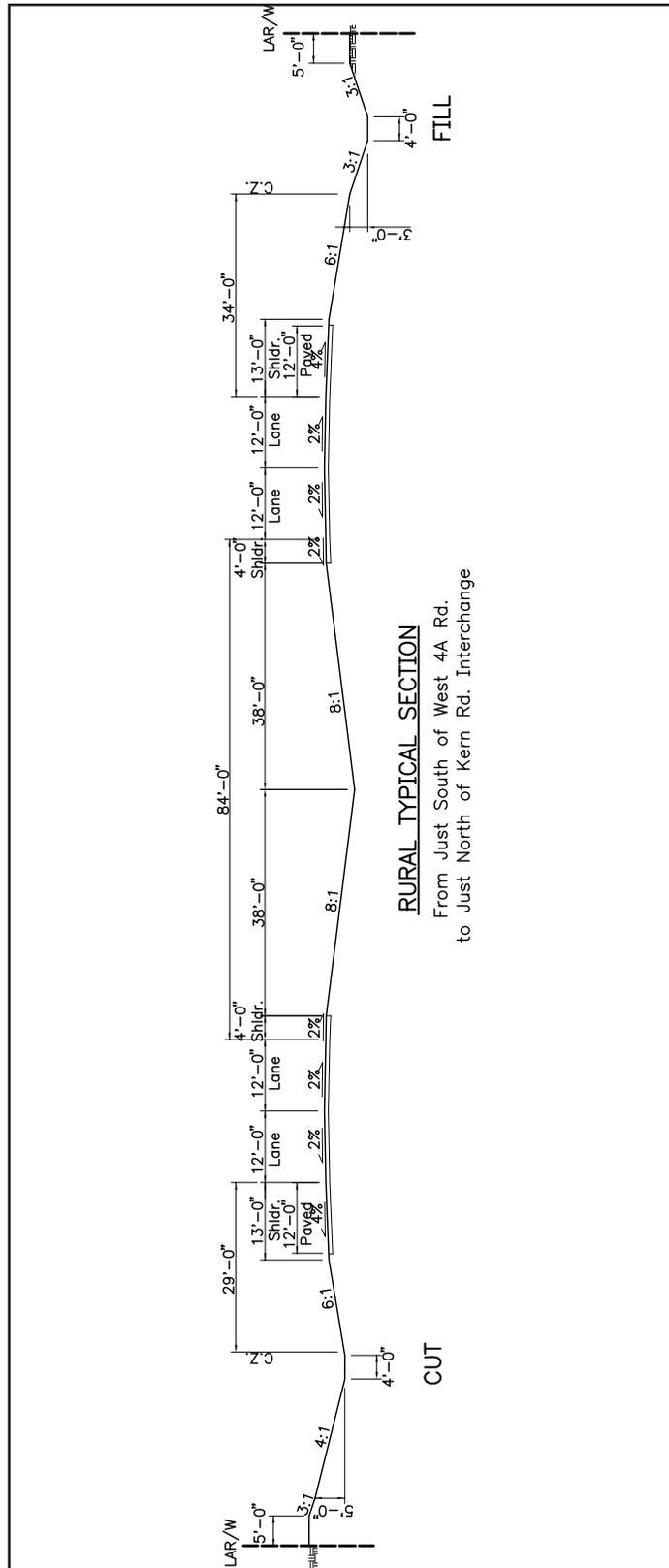
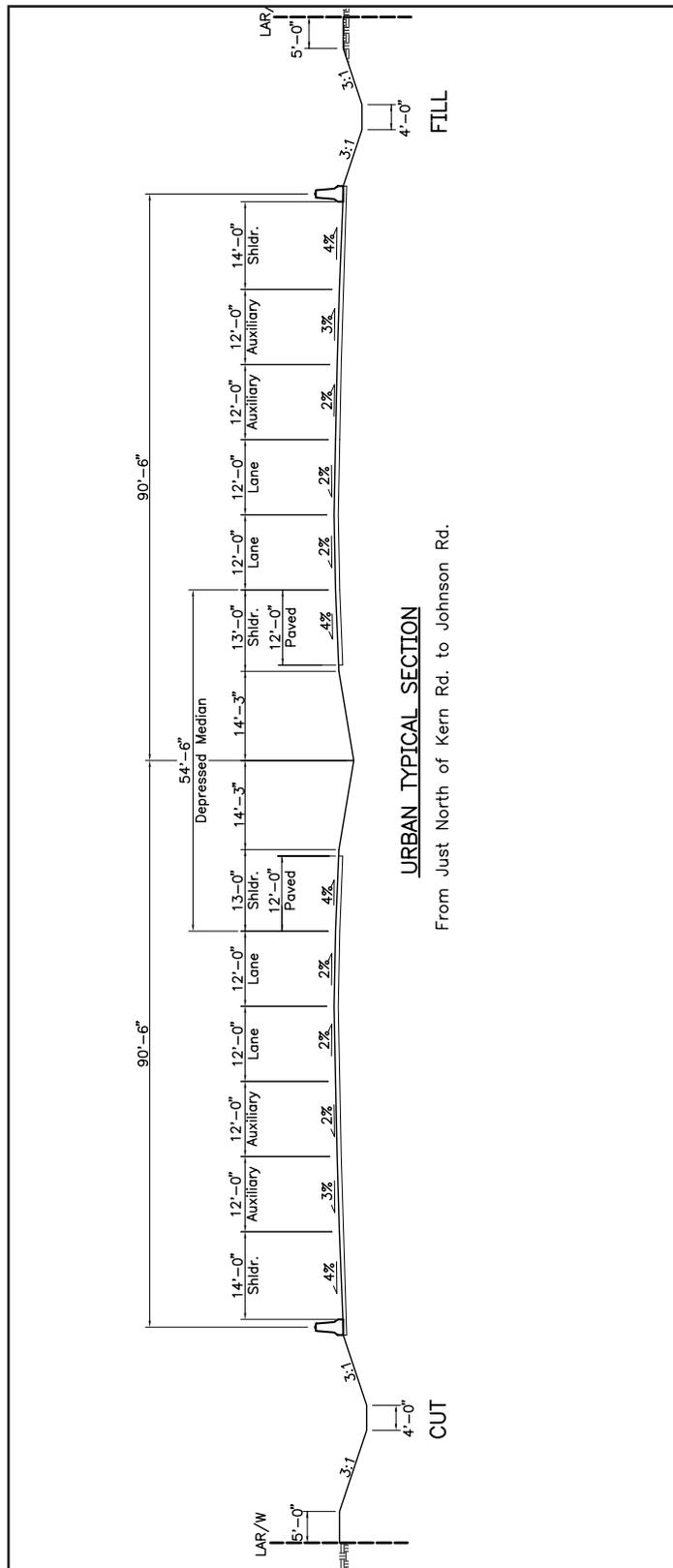


Figure ES 5.5: Rural Typical Section (From Just South of West 4A Road to Just North of the Kern Road Interchange)



URBAN TYPICAL SECTION

From Just North of Kern Rd. to Johnson Rd.

Figure ES 5.6: Urban Typical Section (From Just North of the Kern Road Interchange to Johnson Road)

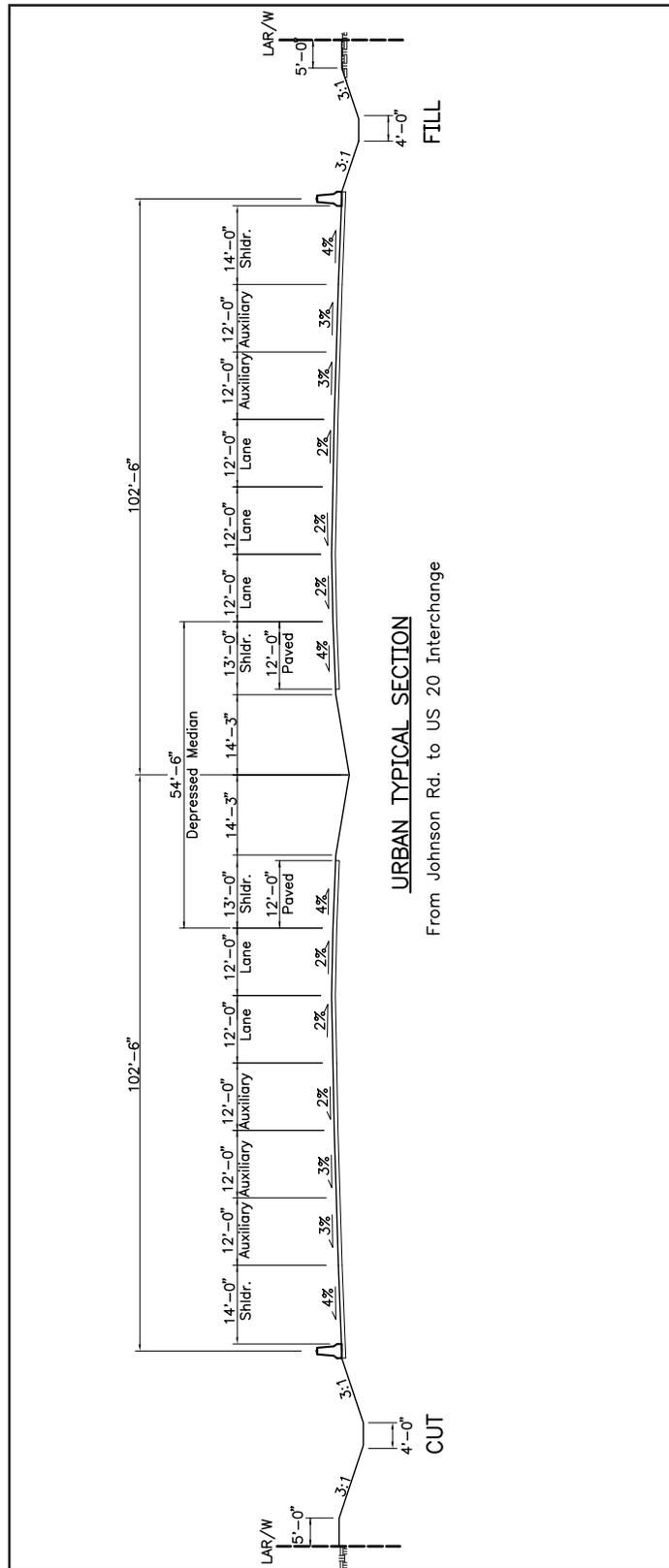


Figure ES 5.7: Urban Typical Section (From Johnson Road to the US 20 Interchange)