Stage 0 Feasibility Study and Environmental Inventory

Widening of La 28 East

from LA 3128 to LA 1207

Rapides Parish

For:

LA DOTD

State Project No. 700-40-0145

Prepared by:

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Engineers, Architects & Planners

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Executive Summary

Background

The Louisiana Department of Transportation (DOTD) selected Buchart Horn (BH) to prepare a *Stage 0 Feasibility Study and Environmental Inventory* on the widening of LA-28 East from Libuse (LA-1205) to Holloway (LA-1207). Also, the original contract was supplemented to perform roundabout analyses in accordance EDSM VI.1.1.5 at intersections along LA 28. The report is prepared in accordance with DOTD's Stage 0 Manual of Standard Practice and the concepts address the capacity issues.

Purpose and Need

According to DOTD calculations, this stretch of LA-28 is currently operating above its capacity. The purpose of this study is to identify and evaluate alternatives to widen LA-28 East from Libuse (LA-1205) to Holloway (LA-1207) in order to address these capacity issues. Findings from this study will be used to determine the project's feasibility with regard to DOTD's Highway Program.

Concept Summary

Concept 1 is proposed with an "Urban Arterial – 4" functional classification and has four 12-foot lanes and an 18' raised median. This concept changes the existing rural roadway classification to an urban classification. The median provides control of access and accommodates left turns at intersections. The classification has the same design speed as the existing posted speed limit of 55mph. It also instigates less right of way, utility, and potential environmental impacts than all other proposed concepts. The estimated cost for Concept 1 is **$18,424,510.52.**

Concept 2 is designed to "Rural Arterial – 2" functional classification guidelines with four 12-foot lanes and a 53' depressed median. This concept allows the roadway classification to remain as a rural arterial, while controlling access and accommodating left turns at intersections and U-turn movements for a single unit truck. The classification will allow a higher speed throughout the widened portion of LA 28. It also instigates less right of way, utility, and potential environmental impacts than Concept 3. The estimated cost for Concept 2 is **$30,149,737.47.**

Concept 3 is designed to "Rural Arterial – 3" functional classification guidelines with four 12-foot lanes and a 60' depressed median. This concept allows the roadway classification to remain as a rural arterial, while controlling access and accommodating left turns at intersections and U-turn movements for a single unit truck. Of the concepts considered, this classification will allow the highest speed throughout the widened portion of LA 28. It also instigates more right of way, utility, and potential environmental impacts than Concept 1 and Concept 2. The estimated cost for Concept 3 is **$32,309,252.61.**

Roundabouts are proposed at the intersection of LA 28 at LA 3128 and the signalized intersections of LA 28 at LA 116 and LA 1207. A roundabout design is proposed at the intersection of LA 28 and LA 3128 due to the large amount of collisions that occur at this intersection. A roundabout is proposed at LA 116 due to an LOS F on the LA 28 eastbound and westbound approaches, even if widening and intersection improvements are made. The roundabout at LA 1207 is also recommended to provide for a smooth, effective transition between the four- and two-lane roadway sections. The roundabout improves all approaches at the intersection to an LOS A; also, impacts to surrounding businesses are limited by the offset design of the roundabout. The costs of the three concepts to include the three proposed roundabouts are as follows: (1) **$19,925,766.26;** (2) **$31,679,404.26;** (3) **$34,827,271.85**.

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1. Introduction

The Louisiana Department of Transportation (DOTD) selected Buchart Horn (BH) to prepare a *Stage 0 Feasibility Study and Environmental Inventory* on the widening of LA-28 East from Libuse (LA-1205) to Holloway (LA-1207). Also, the original contract was supplemented to perform roundabout analyses in accordance EDSM VI.1.1.5 at intersections along LA 28. The report is prepared in accordance with DOTD's Stage 0 Manual of Standard Practice and the concepts address the capacity issues.

The *Stage 0 Feasibility Study and Environmental Inventory* includes the development of concepts to address the capacity issues along the project corridor. The existing and projected traffic volumes were obtained from the traffic study to determine the necessity for improvements to the existing facility. Design criterion was then developed for the project concepts and alternatives per DOTD's *Roadway Design Standards* and AASHTO's *Geometric Design of Highways and Streets (2004)* (refer to **Appendix G** for Design Guidelines). The concepts were developed with their corresponding typical road sections, environmental documentation and opinion of probable cost. The typical roadway sections and exhibits were then developed for each of the proposed concepts (Please refer to **Appendix E** for Typical Sections). Any potential environmental "show stopping" constraints or issues that influence early determinations of the project's feasibility, timing, and cost to both the natural and human environment were researched and documented in Section 5.0 of this report and in the Stage 0 Environmental Checklist (see **Appendix F**). The opinion of probable cost for each proposed project concept was developed. This cost includes the right-of-way, relocation, construction, environmental, and design engineering costs. Included herein are the results of the *Stage 0 Feasibility Study and Environmental Inventory.*

Concepts evaluated as part of this study were developed for the purpose of determining their practical feasibility and ultimately, a recommendation on their inclusion in the Highway Program. Concepts were developed to an appropriate level of detail as to provide a rational basis for the evaluation and comparison of the technical, environmental and financial aspects of each concept. With the exception of those requiring a design exception, all design elements presented have been developed in accordance with DOTD standard guidelines. It should be noted that a survey of the existing topography was not included in the scope of this study effort; and to that end, there are design elements including, but not limited to superelevation, cross-sectional drainage area and cut and fill volumes that were not developed to the level of detail necessary in subsequent stages of the project delivery process. Contingencies have been incorporated into quantity and cost estimates to account for the use of limited information in this study.

2. Existing Conditions

The project corridor is inclusive of LA 28 East from its western intersection with LA 3128 to its eastern intersection with LA 1207. LA 28 is functionally classified as a rural principal arterial. LA 28 consists of four (4) lanes with a central two-way left turn lane until it tapers to two (2) lanes east of LA 1205. The posted speed limit is 55 miles per hour (mph) along LA 28 but reduces to 45 mph around signalized intersections.

The length of the corridor is approximately 7 miles and includes two (2) signal-controlled and five (5) stop-controlled intersections along the corridor. LA 28 remains in free flow condition, while all minor approaches are stop controlled for these five (5) intersections. **Figure 1** displays the project corridor and the traffic control devices at each of the study intersections.

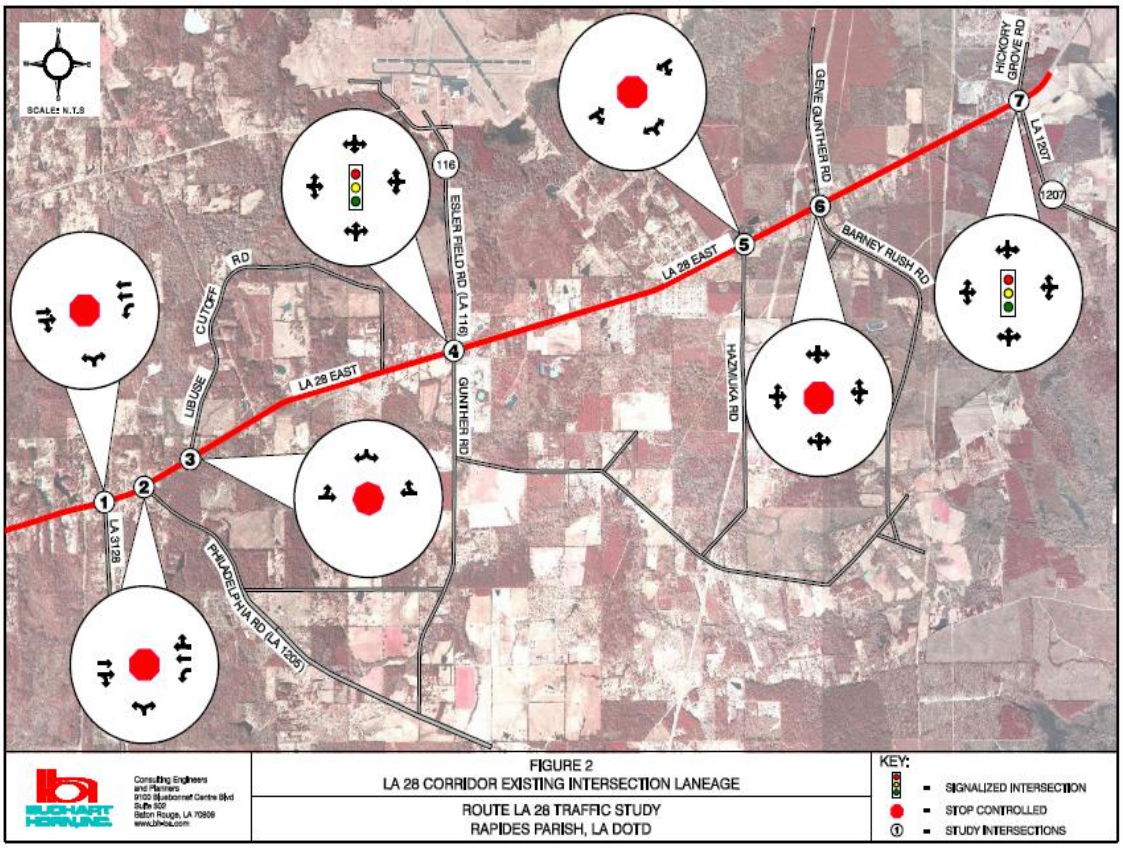

Figure 1: Project Vicinity Map

Site visits were conducted to develop an understanding of the physical features and adjacent land use along the project corridor. The findings will be summarized below. BH in association with Alliance Transportation Group conducted a traffic study throughout this corridor; please refer to the **CD** for the Traffic Report. From this traffic study, the portions of LA 28 were given a Level of Service (LOS) rating. Levels of Service range from LOS A, a condition of little or no delay to LOS F, a condition of capacity breakdown represented by heavy delay and congestion.

2.1. LA 28

The adjacent land use, geometric layout and existing traffic conditions will be briefly summarized below for LA 28. For the exhibits displaying the existing conditions, please refer to **Appendix A**.

2.1.1. Land Usage

LA 28, within the project corridor, accommodates a mixture of land uses including rural and forested lands along with scattered residential and commercial structures. Residential structures are predominately single-family detached units situated along LA 28. A variety of commercial structures consisting of stores and gas stations are also oriented along LA 28.

2.1.2. Geometric Layout

LA 28, within the project corridor, is a rural principal arterial with four (4) lanes and a central two-way left turn lane until it narrows to a non-divided, two-lane section with no turn lanes at LA 1205. The total width of the four-lane section is 78 feet and the total width of the non-divided, two-lane section is 44 feet. The travel lanes are composed of bituminous pavement; the lanes are 12-feet wide with 8-foot shoulders along the 4-lane section and 10-foot shoulders along the 2-lane section. The existing right of way varies in width, averaging 140-165 feet.

2.1.3. Traffic

This stretch of LA-28 is currently operating at a Level of Service "E" which indicates the facility is operating at or above its capacity. During the AM peak hour, the heaviest traffic volume was from vehicles traveling westbound. During the PM peak hour, the heaviest traffic volume was from vehicles traveling eastbound. Traffic conditions were projected to the 2010 and 2030 design years. Please refer to the **CD** for the traffic study.

2.2. Intersections

The adjacent land use, geometric layout and existing traffic conditions will be briefly summarized below for the intersections analyzed along the corridor at LA 3128, Libuse Cutoff Road, LA 116, Hazmuka, LA 1205, Gene Gunther, and LA 1207. For the exhibits displaying the existing conditions, please refer to **Appendix A**.

2.2.1. Land Usage

The intersections at LA 3128 and LA 1205 accommodate a mixture of land uses including rural and forested lands along with residential and commercial facilities. Four residences and two commercial facilities are within the vicinity of the intersection at LA 3128; two residences and two commercial facilities are at the intersection with LA 1205. The intersection at Libuse Cutoff Road accommodates a mixture of land uses including rural

and forested lands along with residential facilities. LA 116 provides access to Esler Regional Airport and four residences are located in the surrounding areas of the intersection. The intersection at Gene Gunther Road accommodates a mixture of land uses including rural and forested lands along with one residential and one commercial facility. The intersection at LA 1207 accommodates 4 commercial facilities on the eastbound and northbound approaches. The residential structures within the intersection vicinities are predominately single-family detached units.

2.2.2. Geometric Layout

All intersections on LA 28 within the corridor have two 12-foot travel lanes and varying shoulder widths. LA 3128 and LA 116 are classified as major collector roads and LA 1205, Libuse Cutoff, Hazmuka, Gene Gunther and LA 1207 are classified as local roads. The 3-leg intersections at Hazmuka, LA 1205, and LA 3128 approach LA 28 in the northbound direction and Libuse Cutoff Road approaches in the southbound direction. The 4-leg intersections are located at LA 116, LA 1207, and Gene Gunther. Existing right of way varies in width at each intersection.

2.2.3. Traffic

The LA 28 east and westbound approaches are in free flow condition and all minor approaches are stop controlled for the five unsignalized intersections. Due to the lack of turn lanes, drivers may be forced to yield to oncoming traffic, which may cause delays and safety concerns. The majority of the vehicles traveling on LA 3128 made left turns to travel west on LA 28. The approaches of LA 3128 and LA 1205 are currently operating at a Level of Service C, which indicates a condition of small delay. LA 116 is deemed to operate well below its capacity and has an LOS A, a condition of little or no delay. After traffic analyses, it was estimated that Gene Gunther Road operates at LOS D. Delays were noted at the intersection at LA 1207 due to the amount of traffic at the intersection. LA 1207 is classified as operating at LOS B. Traffic conditions were projected to the 2010 and 2030 design years. For the traffic study, please refer to the provided **CD.**

3. Project Concepts

Three (3) project concepts were developed to address congestion throughout the project corridor. These project concepts were developed in accordance with the LADOTD Roadway Design Guidelines. The three proposed functional classifications are as follows:

- Concept 1: Urban Arterial-4 (UA-4)
- Concept 2: Rural Arterial-2 (RA-2)
- Concept 3: Rural Arterial–3 (RA-3)

As-built plans for the existing corridor were obtained and reviewed to determine whether the existing horizontal and vertical geometry were adequate for the concepts evaluated. The existing horizontal curvature presented in the as-built plans was found to exceed the minimum radius of curvature identified in DOTD guidelines for UA-4, RA-2 and RA-3 classifications. The existing vertical curvature was evaluated to confirm adequate sight distance for the increased speeds of the UA-4, RA-2 and RA-3 classifications. The 25-year flood elevation was also compared with the existing roadway elevation at sag curves to confirm whether the existing roadway elevations are adequate. Upon completion of these evaluations it was determined that both the existing horizontal and existing vertical geometry are adequate for all concepts presented and evaluated herein.

The feasibility of implementing roundabouts at intersections within the corridor for each of these proposed concepts was evaluated and is discussed below.

3.1. Concept 1: "UA-4" Proposed Roadway Classification

According to Rapides Area Planning Commission, land use projections in this area of Rapides Parish indicate a significant potential for future development. It is with this assumption in mind that in addition to evaluating this stretch of LA-28 as a Rural Arterial, a concept with a proposed Urban Arterial (UA) roadway classification was developed. To maintain the existing speed limit of 55mph, a "UA-4" roadway classification with a 55mph design speed was selected. In order to minimize impacts to the surrounding areas, some design elements included in this concept would need design exceptions such as the median and inside shoulder width. These items will be revisited in future stages of the design process. Please refer to **Appendix G** for the applicable design guidelines for this roadway classification. The items that will require design exceptions are indicated in the first column of the chart on page 1. The exhibit displaying the plan view of this concept can be found in **Appendix B**. The typical sections for this concept can be found in **Appendix E**.

3.1.1. Widening of LA 28

The facility for this project concept consists of four 12-foot lanes divided by an 18-foot raised median, 8-foot outside shoulders, and open ditches. The roadway portion of LA 28 west of LA 1205 will be widened a total of 4 feet and the eastern portion of LA 28 will be widened a total of 36 feet.

The 18-foot raised concrete median with 2-foot mountable curbs separates east and westbound traffic on LA 28 and provides for protected left turns at major intersections. Also, the outside shoulders will provide drivers suitable refuge for stops, which reduces potential congestion in the case of an accident. The designed concept provides a minimum left turn lane storage length of 100' with an 8:1 straight-line taper. The proper storage length should be confirmed by the District Traffic Operations Engineer (DTOE) in subsequent stages of design. These turn lanes are provided on the westbound approaches of LA 28 at LA 3128, LA 1205, Hazmuka Road and on the eastbound approach of LA 28 at Libuse Cutoff Road. Dedicated left turn lanes are also provided on the eastbound and westbound approaches of LA 28 at the intersections at Esler Field Road, Gene Gunther Road, and LA 1207. Refer to **Appendix B** for the plan view of this concept.

3.2. Concept 2: "RA-2" Proposed Roadway Classification

In keeping with the same general classification as the existing roadway, this concept proposes the widening of LA 28 in accordance with Rural Arterial (RA) classification guidelines. The currently posted speed limit on LA 28 in the project corridor is 55mph; therefore the "RA–1" classification was not considered due to a lower design speed of 50mph for this functional classification. The guidelines for an "RA-2" roadway classification specify a design speed of 60mph, which will allow a higher speed limit to be carried throughout the widened corridor. The concept and the proposed roundabouts for this concept will be discussed below.

Please refer to page 2 of **Appendix G** for the "RA-2" applicable design guidelines. The exhibit displaying the plan view of this concept can be found in **Appendix C**. The typical sections for this concept can be found in **Appendix E**.

3.2.1. Widening of LA 28

The typical section, geometry of roadway & intersections, and median openings of the proposed concept are presented below. The project concept is in accordance with the guidelines from the following sources: (1) LADOTD Roadway Design Procedures and Details Manual, (2) AASHTO Policy on the Geometric Design of Highways and Streets, (3) DOTD Engineering Directives and Standards (EDSMs) and (4) USDOT and FHWA "Roundabouts: An Informational Guide".

3.2.1.1. Roadway Typical Section

The facility for this concept consists of four 12-foot lanes divided by a 53-foot depressed median with 4-foot inside, 8-foot outside shoulders and open ditches. See **Appendix E** for the concept's typical section.

In order to utilize the existing pavement in the proposed typical section, the new centerline would have to be offset from the existing centerline by 38.5-feet. The benefits of using the existing asphalt to reduce costs are outweighed by cost for the large amount of required right of way acquisition if the centerline is offset. For the proposed concept,

the existing 2-lane roadway section will be removed and the new section will be symmetric about the existing centerline.

3.2.1.2. Geometry of Roadway and Intersections

The existing 5-lane section of LA 28 between LA 3128 and LA 1205 will remain, as the existing AM and PM peak hour capacity analysis of this portion of roadway resulted in an LOS A. Also, the 2030 projected no build capacity analysis resulted in an levels of service above the minimum desirable LOS D for this portion of LA 28. The widening transition between the existing 5-lane section and the proposed section with depressed median begins at LA 1205 and ends just west of Libuse Cutoff Road.

Partial median openings will be provided at unsignalized intersections of LA 28 at Libuse Cutoff Road, Hazmuka Road, and Gene Gunther. A partial median opening is defined as a median opening that allows for lefts from the mainline and right-in and right-out from the side street; this opening does not allow for left or thru traffic from the side street and are designed with left turn lane(s). The geometry of these partial median openings is designed to discourage wrong-way traffic maneuvers.

The unsignalized intersection at Gene Gunther Road is also a partial median opening, but has slightly different geometry than the other intersections. Gene Gunther Road is a 4-leg intersection and is designed with offset left turn lanes. This is due to a common sight distance problem for vehicles making left turns due to vehicles in the opposing left turn lane. Research has determined that problems normally occur when the width of the median is 18 feet or greater. In order to eliminate this sight distance interference, the opposing left turn lanes are offset from each other.

The two remaining 4-leg signalized intersections are located on LA 28 at LA 116 and LA 1207. These intersections meet the requirements given in EDSM No: IV.2.1.4 to allow the design of a full access median opening by: (1) meeting the MUTCD Traffic Signal Warrant 1A (100%) and (2) spacing the intersection ½ mile away from another median opening.

The storage length of all left turn lanes were designed at 100-feet, but this length should be verified by the DTOE in subsequent design stages. The taper length for these left turn lanes is 15:1 due to the high design speed of the proposed roadway classification. The turnouts for these seven (7) intersections were designed based on the minimum traveled way for a WB-67 truck per the AASHTO Policy on the Geometric Design of Highway and Streets.

3.2.1.3. Median Openings

According to EDSM No: IV.2.1.4, all median openings shall be designed for at least a single unit (SU) truck. It is not necessary to design each opening for a WB-50 or WB-67. Although the minimum median width for the proposed roadway classification is 42 feet, a 53-foot width is required to accommodate the U-turn movements of a Single Unit (SU)

truck. This median width will place the back tires of a SU truck on the outer shoulder of the roadway section in U-turn movements. Through our traffic investigation and the knowledge of consecutive traffic studies at locations adjacent to the project location, it was established that LA 28 maintains a large percent of heavy vehicles in the area. In order to develop the pavement section and/or a truck apron on the outside shoulder at locations accommodating U-turn movements, it is recommended to consider the percent of heavy vehicles in future design stages.

EDSM No: IV.2.1.4 requires that the spacing of directional U-turn median openings be at least every ½ mile. The definition given of a directional U-turn opening is given as: a median opening that serves one or both directions where only U-turns are allowed and are to be separated to allow for adequate sight distances and shall be designed with a turn lane.

Many considerations are taken into account with the placement of directional median U-turn openings along LA 28:

- Place directional U-turn openings every ½ mile (EDSM No: IV.2.1.4);
- Horizontal and vertical curvature in the roadway;
- Intersection and stopping sight distances;
- Spacing from intersections;
- Driveways not to be situated within the functional boundary of at-grade intersections (longitudinal limits of auxiliary lanes);
- Access connections should be located directly opposite or downstream from a median opening to prevent wrong way maneuvers.

Consideration was given to the aforementioned elements and other limiting criteria pertaining to the location of median U-turns. Due to the large number of drives, small side streets and curvature, the directional median U-turn opening locations for this concept do not always meet all the location criteria. In order to meet all criteria, drives and small side streets may need to be realigned if further consideration is given to this concept.

3.3. Concept 3: "RA-3" Proposed Roadway Classification

This concept is based on guidelines for an "RA-3" roadway classification and was evaluated generally for the same reasons as the previous "RA-2" classification concept. The design guidelines for an "RA-3" roadway classification specify a design speed of 70mph. The concept is to the "RA-2" concept, due to similar design guidelines; the differences will be clarified in the sections below. Also, please refer to page 3 of **Appendix G** for applicable design guidelines for this functional classification. The exhibit displaying the plan view of this concept can be found in **Appendix D**. The typical sections for this concept can be found in **Appendix E**.

3.3.1. Widening of LA 28

The facility for this project concept consists of four 12-foot lanes divided by a 60-foot depressed median with 4-foot inside, 10-foot outside shoulders and open ditches. The typical section, found in **Appendix E**, shows the typical pavement section for this concept.

The geometry of the intersections and directional U-turn openings is very similar to the previous concept. The placement of the U-turns was based on the same considerations as Concept 2. The taper length for the widening transitions is longer due to the higher design speed. The larger median width accommodates U-turns for a SU truck and places the back tires on the outside travel lane, with only a slight encroachment on the shoulder; therefore, truck aprons and/or a roadway pavement section along the shoulder may not be necessary.

3.4. Proposed Roundabouts

Dual lane roundabouts are proposed at the intersections of LA 28 at LA 3128, LA 116, and LA 1207. For each concept, the approach of LA 116 is a single-lane and the approaches of LA 1207 and LA 3128 have right turn lanes. The approach geometry along LA 28 varies with each concept and the differences will be clarified in the subsequent descriptions.

Lighting will be used at all proposed roundabouts in order to reduce nighttime accidents and facilitate traffic flow. A minimum of four (4) high-pressure lighting fixtures should be used at each roundabout as well as a gradual illumination transition zone of approximately 260 feet beyond the exit; this is in order to aid drivers in adapting their vision from the illuminated roundabout to the dark rural environment. The estimated cost for roundabout lighting is included in the construction cost for the concepts with roundabouts.

The safety and capacity at these three intersections are improved with the proposed roundabout design. A comparison between the existing intersections and roundabouts in the 2030 design year was completed with Sidra analysis. The Sidra output files can be found in **Appendix G** of the Traffic Report provided on the CD. The following tables summarize the results from this analysis.

TABLE 1
Projected Conditions Intersection Analysis
LA 28 @ LA 3128

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 3128 at LA 28	**N/A**	**27.3**	**N/A**	**32.5**
LA 3128 northbound	F	286.3	F	306.7
LA 28 eastbound	A	1.7	A	1.4
LA 28 westbound	A	0.4	A	3.5

TABLE 2
Projected Conditions Intersection Analysis
LA 28 @ LA 116

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 116 at LA 28	**F**	**208.3**	**E**	**61.7**
LA 116 northbound	C	33.1	C	29.8
LA 116 southbound	C	33.5	C	32.0
LA 28 eastbound	D	50.7	E	62.5
LA 28 westbound	F	294.7	F	84.9

TABLE 3
Projected Conditions Intersection Analysis
LA 28 @ LA 1207

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 1207 at LA 28	**F**	**142.7**	**D**	**45.4**
LA 1207 northbound	F	299.5	C	33.5
LA 1207 southbound	C	30.3	C	28.0
LA 28 eastbound	D	47.8	D	54.6
LA 28 westbound	D	52.4	C	26.1

TABLE 4
Projected Conditions Roundabout Analysis
LA 28 @ LA 3128

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 3128 at LA 28	**A**	**5.9**	**A**	**5.4**
LA 3128 northbound	B	11.9	B	13.3
LA 28 eastbound	A	1.7	A	4.6
LA 28 westbound	A	5.3	A	5.0

TABLE 5
Projected Conditions Roundabout Analysis
LA 28 @ LA 116

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 116 at LA 28	**A**	**8.2**	**A**	**5.5**
LA 116 northbound	B	12.9	B	13.1
LA 116 southbound	A	7.1	A	4.4
LA 28 eastbound	A	4.7	A	4.3
LA 28 westbound	A	4.8	A	2.3

TABLE 6
Projected Conditions Roundabout Analysis
LA 28 @ LA 1207

Intersection/ Approach	AM Peak		PM Peak	
	LOS	Delay sec/veh	LOS	Delay sec/veh
LA 1207 at LA 28	**A**	**6.6**	**A**	**7.6**
LA 1207 northbound	B	11.4	B	13.5
LA 1207 southbound	B	14.7	B	12.7
LA 28 eastbound	A	4.9	A	6.6
LA 28 westbound	A	5.6	A	5.0

Roundabout design and study is in accordance with DOTD EDSM VI.1.1.5.

3.4.1. Proposed Roundabouts for Concept 1

Dual lane modern roundabouts are proposed at the intersections of LA 28 at LA 116, LA 1207, and LA 3128 for Concept 1. The roundabout geometry for Concept 1 includes two-lane approaches on LA 28 with the splitter islands tying to the 18-foot raised median. Please refer to **Appendix B** for the exhibit displaying these proposed roundabouts.

3.4.2. Proposed Roundabouts for Concept 2

Dual lane modern roundabouts are also proposed at the intersections of LA 28 at LA 116, LA 1207, and LA 3128 for Concept 2. Roundabouts located on rural roads often have additional design considerations due to higher approach speeds. In order to provide the safest and most efficient rural roundabout design, the geometric alignment of approach roadways should be constructed to maximize the visibility of the central island and the general shape of the roundabout. Also, curbing improves delineation, which helps to ensure

lower speeds. Speed reduction can also be achieved through a combination of geometric design and approach curves.

The roundabout geometry for this concept includes two-lane approaches on LA 28 with extended splitter islands. A straight-line taper is provided from the depressed median to the roundabout approach on LA 28. This provides vehicles with adequate visibility and ample distance to comfortably decelerate to the appropriate speed before entering the circulating roadway. Please refer to **Appendix C** for the exhibit displaying these proposed roundabouts.

3.4.3. Proposed Roundabouts for Concept 3

Dual lane modern roundabouts are also recommended at the intersections of LA 28 at LA 3128, LA 116, and LA 1207 for Concept 3. Special design elements should also be considered with this concept, as it has an even higher design speed than Concept 2. The roundabout geometry includes two-lane approaches on LA 28 with extended splitter islands. A longer straight-line taper is provided from the depressed median to the roundabout approach on LA 28. This provides vehicles with adequate visibility and ample distance to comfortably decelerate to the appropriate speed before entering the circulating roadway. Please refer **Appendix D** for the exhibit displaying these roundabout alternatives.

4.0 Impacts

Potential right of way, environmental, and utility impacts for the previously depicted concepts will be described below. Also, please refer the Stage 0 Environmental Checklist for a categorical breakdown on the environmental impacts for each concept located in **Appendix F**.

Three gas stations were found within or adjacent to the project location:

- Cenla Express
  - 6448 LA 28 E, Pineville, La 71360
- Exxon Outpost
  - 12800 LA 28 E, Deville, La 71328
- Holloway General Store and Gas
  - 12749 LA 28 E #B, Pineville, La 71360

The aforementioned gas stations are adjacent to the project and may have underground storage tanks, though they may not be impacted.

The estimated cost of the environmental document for each concept is included in the total estimated cost for each concept in Section 5.0 of this report. There were no wetlands identified from research done on readily available materials; therefore, it is assumed that no mitigation is required.

From the environmental databases researched, only one threatened or endangered species could possibly inhabit this area, the American Chaffseed. In Louisiana, most records of the American Chaffseed have been in the Parishes of Rapides, Allen, Calcasieu, although it is likely to be found on pimple mounds with well-drained sandy soils and in hilly upland longleaf pine country.

No right of way (R/W) acquisition is necessary for the proposed Concept 1: Urban Arterial-4 functional classification concept. The only required R/W acquisition for this concept is with the addition of the proposed roundabouts. Due to the fact that the proposed widening for this concept remains within the existing R/W, it is not probable that the construction of this concept would impact utilities or threatened/endangered species.

Approximately 16.5 acres of R/W will need to be acquired for Concept 2: Rural Arterial-2 functional classification concept due to the addition of lanes, a wide median, and the required clear zone of 32 feet. This concept is more likely to have environmental impacts, such as significant trees. Although no significant trees were noticed on the site survey, some forested areas will need to be cleared. The above ground utilities noticed on the windshield survey are transmission lines that are located within the proposed right of way. These utilities along with any subsurface utilities will need to be offset and this cost will be taken into consideration in the estimated total cost in Section 5.0.

Approximately 26.9 acres of R/W will need to be acquired for Concept 3: Rural Arterial-3 functional classification due to the addition of lanes, a wide median, and the required clear zone of 34 feet. This concept is more likely to have environmental impacts than the aforementioned concepts. Although no significant trees were noticed on the site survey, more forested areas will need to be removed within the required clear zone width. Transmission lines and other subsurface utilities within this acquired R/W will need to be offset and this cost will be taken into consideration in the estimated total cost in Section 5.0.

5.0 Engineer's Opinion of Probable Cost

The estimated construction, environmental, acquired right of way, utility relocation, and engineering costs were totaled to determine The Engineer's Opinion of Probable Cost. A categorical breakdown of these costs can be found below and in the Stage 0 Preliminary Scope and Budget Checklists (Section E) in **Appendix F**. The estimated costs for each proposed concept will be totaled below. The cost of each concept with the implementation of roundabouts at the intersections of LA 28 at LA 116 and LA 1207 is also given below.

Due to the extended taper on LA 28, east of LA 1207, to tie the proposed alignment for each concept with the existing roadway, some of the construction costs to implement roundabouts were offset by the cost to construct this extension. Please see exhibits in **Appendix B**, **C**, and **D** for the proposed concepts.

5.1. Concept 1: "UA-4" Proposed Roadway Classification

5.1.1. Widening of LA 28

The following table is an itemized list of estimated costs for the Urban Arterial-4 proposed classification concept. Please see **Appendix B** for an exhibit of this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 1: Proposed UA-4 Roadway Classification
Rapides Parish

CONSTRUCTION COST ESTIMATE

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01- 00100	Clearing and Grubbing	LUMP	LUMP	LUMP	$250,000.00
202-02- 06100	Removal of Concrete Walks and Drives	SY	8250.0	$12.00	$99,000.00
203-01- 00100	General Excavation	CY	260000.0	$4.00	$1,040,000.00
303-01- 00200	In-Place Cement Stabilized Base Course (8 1/2" Thick)	SY	76717.0	$7.00	$537,019.00
502-01- 00100	Superpave Asphaltic Concrete	TON	27277.0	$94.00	$2,564,038.00
302-02- 06000	Class II Base Course (12" Thick)	SY	949.0	$35.00	$33,215.00
508-01- 00100	Asphalt Concrete (Sma) Wearing Course	TON	35955.4	$100.00	$3,595,540.00
701-01- 01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
706-02- 00200	Concrete Drive (6" Thick)	SY	8250.0	$65.00	$536,250.00
713-01- 00100	Temporary Signs and Barricades	LUMP	LUMP	LUMP	$300,000.00
706-03- 00100	Incidental Concrete Pavement (4")	SY	55576.0	$80.00	$4,446,080.00
732-02- 01000	Plastic Pavement Striping (Solid Line)(4" Width)	MI	33.000	$2,605.00	$85,965.00
732-03- 01000	Plastic Pavement Striping (Broken Line)(4" Width)	MI	14.000	$836.00	$11,704.00
732-04- 01020	Plastic Pavement Legends and Symbols (Arrow)	EA	75.0	$192.00	$14,400.00
732-04- 01040	Plastic Pavement Legends and Symbols (Double Arrow)	EA	50.0	$222.00	$11,100.00
				Subtotal	$13,942,811.00
			Contingency @ 20%		$2,788,562.20
				Total Estimated Construction Cost =	**$16,731,373.20**

ESTIMATED ENGINEERING DESIGN COST $1,673,137.32

ESTIMATED ENVIRONMENTAL COST $700,000.00

ESTIMATED R/W ACQUISITION COST none

ESTIMATED UTILITY RELOCATION COST none

TOTAL ESTIMATED COST= $19,104,510.52

5.1.2. Widening of LA 28 with Proposed Roundabouts

The following is an itemized list of the estimated costs associated with the Urban Arterial-4 concept with roundabouts. The construction quantities required for the implementation of roundabouts beyond the amounts specified in 5.1.1 and the quantities that could be excluded with this design were identified to develop the estimated construction cost for this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 1: Proposed UA-4 Roadway Classification with Roundabouts
Including Roundabouts at LA 116, LA 1207, and LA 3128
Rapides Parish

CONSTRUCTION COST ESTIMATE

ITEM NO.		ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01-	00100	Clearing and Grubbing	LUMP	LUMP	LUMP	$250,000.00
202-02-	06100	Removal of Concrete Walks and Drives	SY	10250.0	$12.00	$123,000.00
202-02-	38500	Removal of Surfacing and Stabilized Base	SY	4000.0	$5.00	$20,000.00
203-01-	00100	General Excavation	CY	260135.0	$4.00	$1,040,540.00
303-01-	00200	In-Place Cement Stabilized Base Course (8 1/2" Thick)	SY	66971.6	$7.00	$468,801.20
502-01-	00100	Superpave Asphaltic Concrete	TON	26419.0	$94.00	$2,483,386.00
302-02-	06000	Class II Base Course (12" Thick)	SY	949.0	$35.00	$33,215.00
508-01-	00100	Asphalt Concrete (Sma) Wearing Course	TON	36158.4	$100.00	$3,615,840.00
701-01-	01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
706-02-	00200	Concrete Drive (6" Thick)	SY	10250.0	$65.00	$666,250.00
707-01-	00100	Concrete Curb	LF	10000.0	$7.00	$70,000.00
713-01-	00100	Temporary Signs and Barricades	LUMP	LUMP	LUMP	$300,000.00
706-03-	00100	Incidental Concrete Pavement (4")	SY	55988.0	$80.00	$4,479,040.00
730-05-	10000	Light Pole	EA	33.000	$4,030.00	$132,990.00
730-06-	01020	High Mast Pole	EA	11.0	$76,908.00	$845,988.00
730-07-	01000	Luminaire	EA	55.0	$500.00	$27,500.00
730-10-	00100	Fabricated Light Pole Support	EA	33.000	$1,020.00	$33,660.00
732-02-	01000	Plastic Pavement Striping (Solid Line)(4" Width)	MI	33.000	$2,605.00	$85,965.00
732-03-	01000	Plastic Pavement Striping (Broken Line)(4" Width)	MI	14.000	$836.00	$11,704.00
732-04-	01020	Plastic Pavement Legends and Symbols (Arrow)	EA	80.0	$192.00	$15,360.00
732-04-	01040	Plastic Pavement Legends and Symbols (Double Arrow)	EA	75.0	$222.00	$16,650.00
732-04-	15020	Plastic Pvmt Lgnds & Symb (ONLY)	Ea	40.0	$225.00	$9,000.00
					Subtotal	$14,947,550.20
				Contingency @ 20%		$2,989,510.04
		Total Estimated Construction Cost =				**$17,937,060.24**
		ESTIMATED ENGINEERING DESIGN COST				$1,793,706.02
		ESTIMATED ENVIRONMENTAL COST				$700,000.00
		ESTIMATED R/W ACQUISITION COST				$125,000.00
		ESTIMATED UTILITY RELOCATION COST				$50,000.00
		TOTAL ESTIMATED COST=				**$20,605,766.26**

5.2. Concept 2: "RA-2" Proposed Roadway Classification

5.2.1. Widening of LA 28

The following table is an itemized list of construction costs for the Rural Arterial-2 concept. Please see **Appendix C** for an exhibit of this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 2: Proposed RA-2 Roadway Classification
Rapides Parish

CONSTRUCTION COST ESTIMATE

SPEC	ITEM	ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01-	00100	Clearing and Grubbing	LS	LUMP	LUMP	$250,000.00
202-02-	06100	Removal of Concrete Walks and Drives	SY	31750.0	$12.00	$381,000.00
202-02-	38500	Removal of Surfacing and Stabilized Base	SY	173222.0	$5.00	$866,110.00
203-01-	00100	General Excavation	CY	249536.0	$4.00	$998,144.00
302-02-	01000	Class II Base Course (4" Thick)	SY	98618.4	$13.00	$1,282,039.20
302-02-	06000	Class II Base Course (12" Thick)	SY	266667.0	$35.00	$9,333,345.00
401-01-	00100	Aggregate Surface Course (Adjusted Vehicular Measurement)	CY	6287.0	$47.00	$295,489.00
502-01-	00100	Superpave Asphaltic Concrete	Ton	29333.0	$94.00	$2,757,302.00
502-01-	00200	Superpave Asphaltic Concrete, Drives, Turnouts and Miscellaneous	Ton	396.0	$118.00	$46,728.00
508-01-	00100	Asphalt Concrete (SMA) Wearing Course	Ton	22000.0	$100.00	$2,200,000.00
701-01-	01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
713-01-	00100	Temporary Signs and Barricades	LS	LUMP	LUMP	$300,000.00
732-02-	01000	Plastic Pvmt Strip (Solid Line) (4" W) (Thermo 40 mil)	Mile	31.1	$2,605.00	$80,885.25
732-03-	01000	Plastic Pvmt Strip (Brkn Line) (4" W) (Thermo 40 mil)	Mile	14.5	$836.00	$12,122.00
732-04-	01020	Plastic Pvmt Legends & Symbols (Arrow - Straight)	Ea	90.0	$192.00	$17,280.00
732-04-	01040	Plastic Pvmt Legends & Symbols (Arrow - Dbl)	Ea	45.0	$222.00	$9,990.00
732-04-	15020	Plastic Pvmt Lgnds & Symb (ONLY)	Ea	27.0	$225.00	$6,075.00
					Subtotal	$19,255,009.45
				Contingency @ 20%		$3,851,001.89
					Total Estimated Construction Cost=	**$23,106,011.34**
		ESTIMATED ENGINEERING DESIGN COST				$2,310,601.13
		ESTIMATED ENVIRONMENTAL COST				$700,000.00
		ESTIMATED R/W ACQUISITION COST				$1,650,000.00
		ESTIMATED UTILITY RELOCATION COST				$3,063,125.00
					TOTAL ESTIMATED COST=	**$30,829,737.47**

5.2.2. Widening of LA 28 with Proposed Roundabouts

The following is an itemized list of the estimated costs associated with the Rural-Arterial-2 concept with roundabouts. The construction quantities required for the implementation of roundabouts beyond the amounts specified in 5.2.1 and the quantities that could be excluded with this design were identified to develop the estimated construction cost for this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 2: Proposed RA-2 Roadway Classification
Including Roundabouts at LA 116, LA 1207, and LA 3128
Rapides Parish

CONSTRUCTION COST ESTIMATE

SPEC	ITEM	ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01-	00100	Clearing and Grubbing	LS	LUMP	LUMP	$250,000.00
202-02-	06100	Removal of Concrete Walks and Drives	SY	32750.0	$12.00	$393,000.00
202-02-	38500	Removal of Surfacing and Stabilized Base	SY	177222.0	$5.00	$886,110.00
203-01-	00100	General Excavation	CY	246153.0	$4.00	$984,612.00
302-02-	01000	Class II Base Course (4" Thick)	SY	98618.4	$13.00	$1,282,039.20
302-02-	06000	Class II Base Course (12" Thick)	SY	256833.6	$35.00	$8,989,176.00
401-01-	00100	Aggregate Surface Course (Adjusted Vehicular Measurement)	CY	6200.0	$47.00	$291,400.00
502-01-	00100	Superpave Asphaltic Concrete	Ton	28475.0	$94.00	$2,676,650.00
502-01-	00200	Superpave Asphaltic Concrete, Drives, Turnouts and Miscellaneous	Ton	396.0	$118.00	$46,728.00
508-01-	00100	Asphalt Concrete (SMA) Wearing Course	Ton	21703.0	$100.00	$2,170,300.00
701-01-	01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
706-03-	00100	Incidental Concrete Paving (4" Thick)	SY	7412.1	$80.00	$592,965.60
707-01-	00100	Concrete Curb	LF	10000.0	$7.00	$70,000.00
713-01-	00100	Temporary Signs and Barricades	LS	LUMP	LUMP	$300,000.00
730-05-	10000	Light Pole	EA	33.000	$4,030.00	$132,990.00
730-06-	01000	High Mast Pole	EA	11.0	$76,908.00	$845,988.00
730-07-	01000	Luminaire	EA	55.0	$500.00	$27,500.00
730-10-	00100	Fabricated Light Pole Support	EA	33.000	$1,020.00	$33,660.00
732-02-	01000	Plastic Pvmt Strip (Solid Line) (4" W) (Thermo 40 mil)	Mile	33.3	$2,605.00	$86,746.50
732-03-	01000	Plastic Pvmt Strip (Brkn Line) (4" W) (Thermo 40 mil)	Mile	14.6	$836.00	$12,205.60
732-04-	01020	Plastic Pvmt Legends & Symbols (Arrow - Straight)	Ea	94.0	$192.00	$18,048.00
732-04-	01040	Plastic Pvmt Legends & Symbols (Arrow - Dbl)	Ea	83.0	$222.00	$18,426.00
732-04-	15020	Plastic Pvmt Lgnds & Symb (ONLY)	Ea	40.0	$225.00	$9,000.00
					Subtotal	$20,536,044.90
				Contingency @ 20%		$4,107,208.98
					Total Estimated Construction Cost =	**$24,643,253.88**
		ESTIMATED ENGINEERING DESIGN COST				$2,464,325.39
		ESTIMATED ENVIRONMENTAL COST				$700,000.00
		ESTIMATED R/W ACQUISITION COST				$1,525,000.00
		ESTIMATED UTILITY RELOCATION COST				$3,063,125.00
					TOTAL ESTIMATED COST=	**$32,395,704.27**

5.3. Concept 3: "RA-3" Proposed Roadway Classification

5.3.1 Widening of LA 28

The following table is an itemized list of construction costs for the Rural Arterial-3 concept. Please see **Appendix D** for an exhibit of this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 3: Proposed RA-3 Roadway Classification
Rapides Parish

CONSTRUCTION COST ESTIMATE

SPEC	ITEM	ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01-	00100	Clearing and Grubbing	LS	LUMP	LUMP	$296,069.00
202-02-	06100	Removal of Concrete Walks and Drives	SY	34500.0	$12.00	$414,000.00
202-02-	38500	Removal of Surfacing and Stabilized Base	SY	173222.0	$5.00	$866,110.00
203-01-	00100	General Excavation	CY	265537.0	$4.00	$1,062,148.00
302-02-	01000	Class II Base Course (4" Thick)	SY	115632.0	$13.00	$1,503,216.00
302-02-	06000	Class II Base Course (12" Thick)	SY	266667.0	$35.00	$9,333,345.00
401-01-	00100	Aggregate Surface Course (Adjusted Vehicular Measurement)	CY	11251.0	$47.00	$528,797.00
502-01-	00100	Superpave Asphaltic Concrete	Ton	29333.0	$94.00	$2,757,302.00
502-01-	00200	Superpave Asphaltic Concrete, Drives, Turnouts and Miscellaneous	Ton	396.0	$118.00	$46,728.00
508-01-	00100	Asphalt Concrete (SMA) Wearing Course	Ton	22000.0	$100.00	$2,200,000.00
701-01-	01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
713-01-	00100	Temporary Signs and Barricades	LS	LUMP	LUMP	$481,412.00
732-02-	01000	Plastic Pvmt Strip (Solid Line) (4" W) (Thermo 40 mil)	Mile	31.1	$2,605.00	$80,885.25
732-03-	01000	Plastic Pvmt Strip (Brkn Line) (4" W) (Thermo 40 mil)	Mile	14.5	$836.00	$12,122.00
732-04-	01020	Plastic Pvmt Legends & Symbols (Arrow - Straight)	Ea	90.0	$192.00	$17,280.00
732-04-	01040	Plastic Pvmt Legends & Symbols (Arrow - Dbl)	Ea	45.0	$222.00	$9,990.00
732-04-	15020	Plastic Pvmt Lgnds & Symb (ONLY)	Ea	27.0	$225.00	$6,075.00
					Subtotal	$20,033,979.25
				Contingency @ 20%		$4,006,795.85
					Total Estimated Construction Cost =	**$24,040,775.10**
		ESTIMATED ENGINEERING DESIGN COST				$2,404,077.51
		ESTIMATED ENVIRONMENTAL COST				$700,000.00
		ESTIMATED R/W ACQUISITION COST				$2,650,000.00
		ESTIMATED UTILITY RELOCATION COST				$3,787,400.00
					TOTAL ESTIMATED COST=	**$33,582,252.61**

5.3.2 Widening of LA 28 with Proposed Roundabouts

The following is an itemized list of the estimated costs associated with the Rural-Arterial-3 concept with roundabouts. The construction quantities required for the implementation of roundabouts beyond the amounts specified in 5.3.1 and the quantities that could be excluded with this design were identified to develop the estimated construction cost for this concept.

State Project No. 700-40-0145
LA 28 Widening Stage 0 Feasibility Study
Concept 3: Proposed RA-3 Roadway Classification With Roundabouts Including Roundabouts at LA 116, LA 1207, and LA 3128
Rapides Parish

CONSTRUCTION COST ESTIMATE

SPEC	ITEM	ITEM	UNIT	QUANTITY	UNIT COST	COST
201-01-	00100	Clearing and Grubbing	LS	LUMP	LUMP	$500,000.00
202-02-	06100	Removal of Concrete Walks and Drives	SY	35500.0	$12.00	$426,000.00
202-02-	38500	Removal of Surfacing and Stabilized Base	SY	177222.0	$5.00	$886,110.00
203-01-	00100	General Excavation	CY	262154.0	$4.00	$1,048,616.00
302-02-	01000	Class II Base Course (4" Thick)	SY	115632.0	$13.00	$1,503,216.00
302-02-	06000	Class II Base Course (12" Thick)	SY	256833.6	$35.00	$8,989,176.00
401-01-	00100	Aggregate Surface Course (Adjusted Vehicular Measurement)	CY	11000.0	$47.00	$517,000.00
502-01-	00100	Superpave Asphaltic Concrete	Ton	28475.0	$94.00	$2,676,650.00
502-01-	00200	Superpave Asphaltic Concrete, Drives, Turnouts and Miscellaneous	Ton	396.0	$118.00	$46,728.00
508-01-	00100	Asphalt Concrete (SMA) Wearing Course	Ton	21703.0	$100.00	$2,170,300.00
701-01-	01000	Cross Drain Pipe (24" RCP/PP)	LF	4500.0	$93.00	$418,500.00
706-03	00100	Incidental Concrete Paving (4" Thick)	SY	7412.1	$80.00	$592,965.60
713-01-	00100	Temporary Signs and Barricades	LS	LUMP	LUMP	$625,000.00
730-05-	10000	Light Pole	EA	33.000	$4,030.00	$132,990.00
730-06-	01000	High Mast Pole	EA	11.0	$76,908.00	$845,988.00
730-07-	01000	Luminaire	EA	55.0	$500.00	$27,500.00
730-10-	00100	Fabricated Light Pole Support	EA	33.000	$1,020.00	$33,660.00
732-02-	01000	Plastic Pvmt Strip (Solid Line) (4" W) (Thermo 40 mil)	Mile	33.1	$2,605.00	$86,225.50
732-03-	01000	Plastic Pvmt Strip (Brkn Line) (4" W) (Thermo 40 mil)	Mile	14.5	$836.00	$12,122.00
732-04-	01020	Plastic Pvmt Legends & Symbols (Arrow - Straight)	Ea	94.0	$192.00	$18,048.00
732-04-	01040	Plastic Pvmt Legends & Symbols (Arrow - Dbl)	Ea	83.0	$222.00	$18,426.00
732-04-	15020	Plastic Pvmt Lgnds & Symb (ONLY)	Ea	40.0	$225.00	$9,000.00
					Subtotal	$21,584,221.10
				Contingency @ 20%		$4,316,844.22
					Total Estimated Construction Cost =	**$25,901,065.32**

ESTIMATED ENGINEERING DESIGN COST
$2,590,106.53

ESTIMATED ENVIRONMENTAL COST
$700,000.00

ESTIMATED R/W ACQUISITION COST
$2,565,000.00

ESTIMATED UTILITY RELOCATION COST
$3,787,400.00

TOTAL ESTIMATED COST= $35,543,571.85

6.0 Public Involvement

Public informational meetings were held on November 6, 2008 and April 8, 2010 for the proposed LA 28 project concepts. The meetings were conducted to provide the public with information on the concepts presented herein. Those present were given an opportunity to ask questions and submit comments. Comments were captured using questionnaires and comment forms developed by the project team.

Comments received reveal the public's considerable concern for the concepts' impedance on unrestricted access to commercial and residential driveways. Also, the public was concerned with the limited access to businesses at intersections with proposed roundabouts. Due to length of the splitter islands and the guidelines set forth in the EDSM VI.1.1.5, all drives within 100 feet of the intersections must be removed. All comments and concerns received are noted herein and will be taken into consideration in further stages of the project. Please refer to **Appendix H** for the completed questionnaires.

7.0 Summary

Concept 1 is proposed with an "Urban Arterial – 4" functional classification and has four 12-foot lanes and an 18' raised median. This concept changes the existing rural roadway classification to an urban classification. The median provides control of access and accommodates left turns at intersections. The classification has the same design speed as the existing posted speed limit of 55mph. It also instigates less right of way, utility, and potential environmental impacts than all other proposed concepts. The estimated cost for Concept 1 is **$18,424,510.52.**

Concept 2 is designed to "Rural Arterial – 2" functional classification guidelines with four 12-foot lanes and a 53' depressed median. This concept allows the roadway classification to remain as a rural arterial, while controlling access and accommodating left turns at intersections and U-turn movements for a single unit truck. The classification will allow a higher speed throughout the widened portion of LA 28. It also instigates less right of way, utility, and potential environmental impacts than Concept 3. The estimated cost for Concept 2 is **$30,149,737.47.**

Concept 3 is designed to "Rural Arterial – 3" functional classification guidelines with four 12-foot lanes and a 60' depressed median. This concept allows the roadway classification to remain as a rural arterial, while controlling access and accommodating left turns at intersections and U-turn movements for a single unit truck. Of the concepts considered, this classification will allow the highest speed throughout the widened portion of LA 28. It also instigates more right of way, utility, and potential environmental impacts than Concept 1 and Concept 2. The estimated cost for Concept 1 is **$32,309,252.61.**

Roundabouts are proposed at the intersection of LA 28 at LA 3128 and the signalized intersections of LA 28 at LA 116 and LA 1207. A roundabout design is proposed at the intersection of LA 28 and LA 3128 due to the large amount of collisions that occur at this intersection. A roundabout is proposed at LA 116 due to an LOS F on the LA 28 eastbound and westbound approaches, even if widening and intersection improvements are made. The roundabout at LA 1207 is also recommended to provide for a smooth, effective transition between the four- and two-lane roadway sections. The roundabout improves all approaches at the intersection to an LOS A; also, impacts to surrounding businesses are limited by the offset design of the roundabout. The costs of the three concepts to include the three proposed roundabouts are as follows: (1) **$19,925,766.26;** (2) **$31,679,404.26;** (3) **$34,827,271.85**.