LAUD HOWELL PARKWAY
ALIGNMENT STUDY

(LAKE FOREST DRIVE to TRINITY FALLS PARKWAY)

FINAL TECHNICAL REPORT

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PROJECT OVERVIEW

1.0 INTRODUCTION

The study effort detailed in this document is prepared for the purpose of establishing a new alignment for Laud Howell Parkway (F.K.A. "The FM 543 Connector Project") between the limits of Lake Forest Drive / FM1461 and the existing Laud Howell Parkway terminus at Trinity Falls Parkway. The alignment of Laud Howell Parkway between the limits noted above falls completely within the incorporated city limits and/or ETJ limits of the City of McKinney, Collin County, Texas. Laud Howell Parkway is currently shown in the City of McKinney *Master Thoroughfare Plan* as a future Principal Arterial (P6D Classification) facility to serve as a primary East-West thoroughfare. This segment of Laud Howell Parkway is currently located in a largely undeveloped area of McKinney known as the Northwest Sector. The City of McKinney previously conducted a study of the Northwest Sector to determine goals and objectives that will best provide for successful and strategic economic development of the Northwest Sector as the area is improved to satisfy increasing population demand. Revisions to the City of McKinney's Comprehensive Plan, including the transportation component, and the Parks, Recreation, Trails and Open Space Vision Master Plan are currently on-going and it is anticipated that the alignment recommendations of this study will be incorporated into those documents. Figure 1.1 below shows the limits of Laud Howell Parkway in this alignment study, relative to the City of McKinney Northwest Sector area.

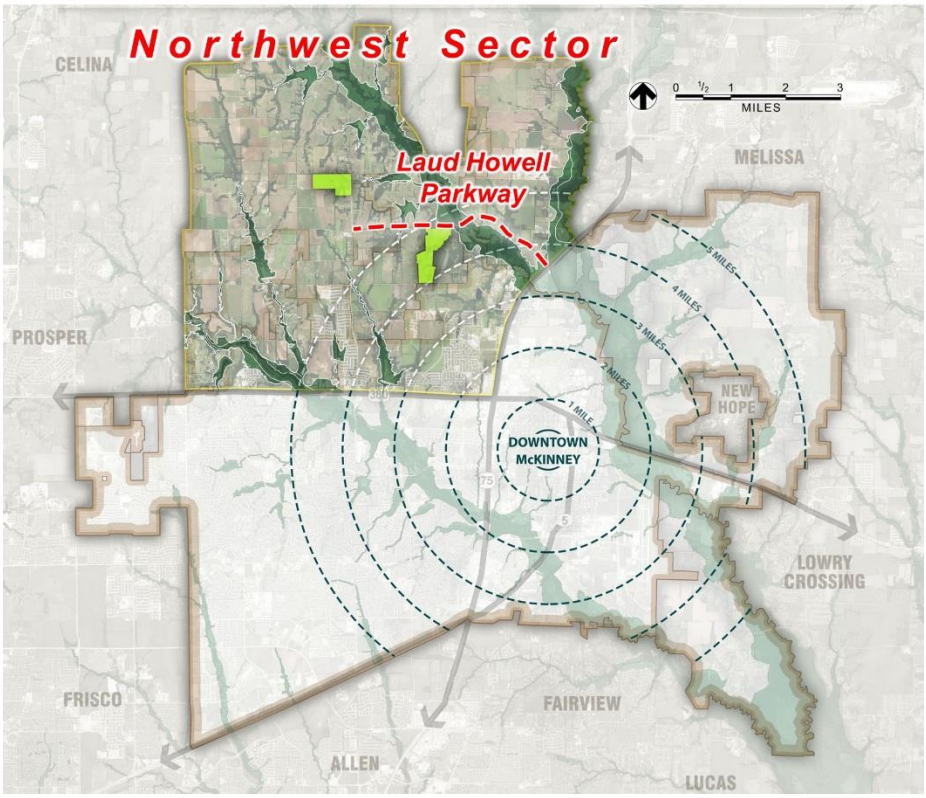


Figure 1.1 – Location Map

1.1 PREVIOUS ALIGNMENT STUDY

In 2009 the City of McKinney adopted an alignment for Laud Howell Parkway under the roadway name of "*FM 543 Connector*". This study reviewed several alternative alignments and eventually recommended an alignment which started at FM1461 / Lake Forest Drive for the western limit and closely followed East-West portions of County Roads 1006 and 201 in route to a connection with US 75 at the existing FM 543 interchange. Maps of the adopted 2009 alignment are shown below in Figures 1.2A thru 1.2C.

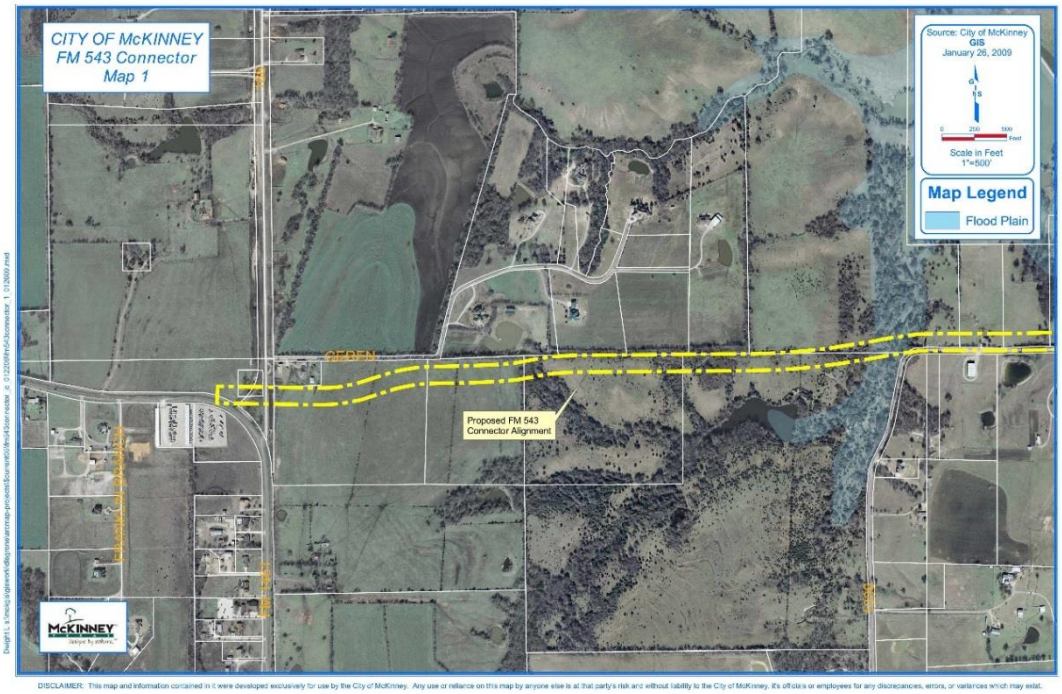


Figure 1.2A – 2009 Alignment Map 1

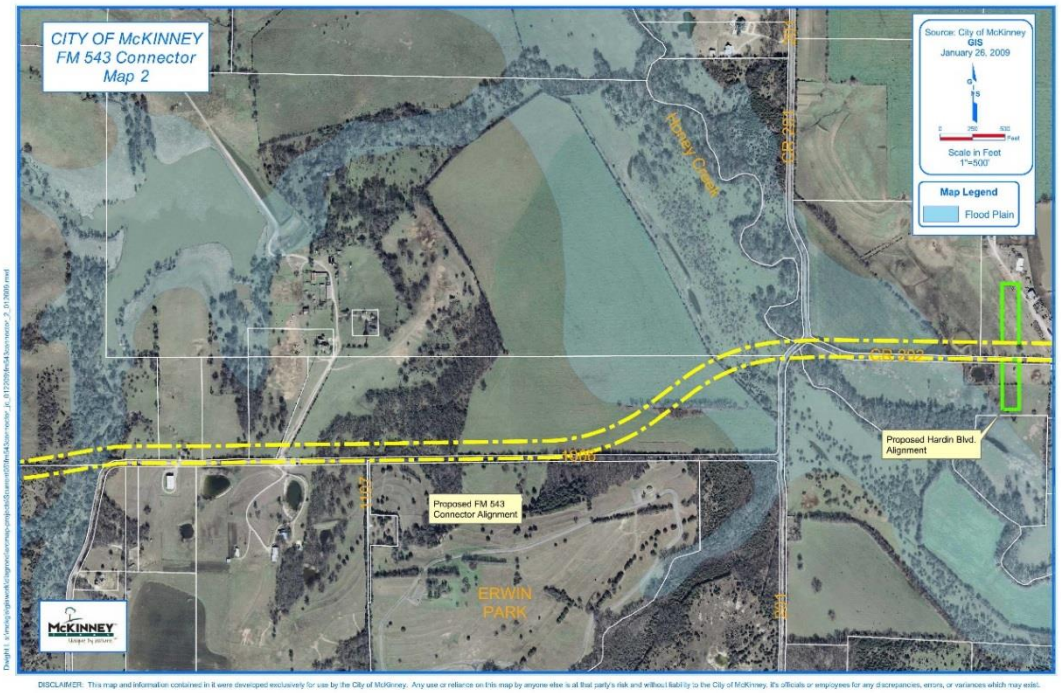


Figure 1.2B – 2009 Alignment Map 2

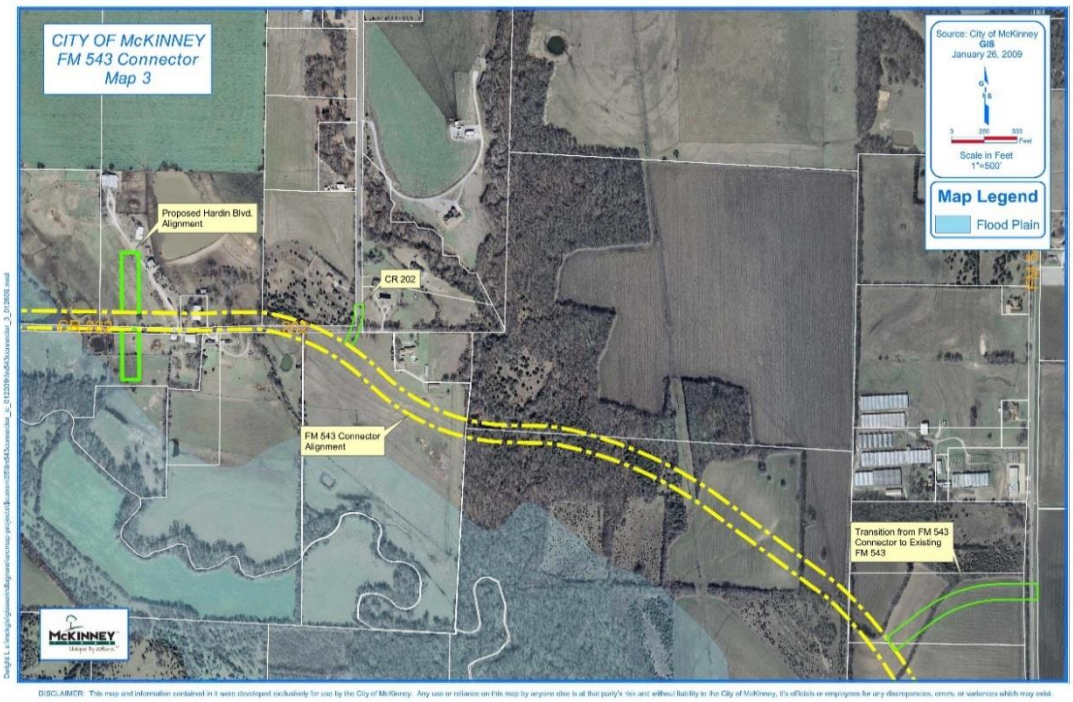


Figure 1.2C – 2009 Alignment Map 3

Beginning in 2013 the City of McKinney prepared plans and constructed a portion of the Laud Howell Parkway extending approximately 2,000 feet west of US 75 and also realigned FM 543 (Trinity Falls Parkway) to connect with Laud Howell Parkway. Laud Howell Parkway currently serves the Trinity Falls master planned development to provide access to US 75. No additional construction has been performed to date.

1.2 ALIGNMENT STUDY PURPOSE AND NEED

This study was initiated and carried out by the City of McKinney at the request of Sanchez & Associates acting on behalf of a property interest known as Cross F Ranch. Cross F Ranch is directly impacted by more than 2 miles of proposed Laud Howell Parkway that travels across their property. Cross F Ranch has expressed an interest in the immediate development of Laud Howell Parkway using an alternate alignment from that shown in the current City of McKinney Thoroughfare Plan. The proposed realignment of Laud Howell Parkway was supplied to the City of McKinney by Cross F Ranch in an exhibit dated November 19, 2015.

The purpose of Laud Howell Parkway is to provide for the orderly movement of traffic and commerce associated with the anticipated development of the adjacent lands that will be interconnected via local streets and other arterial thoroughfares. Laud Howell Parkway will provide a much more direct route for East-West traffic between US 75 and the expanding populations of the Town of Prosper and City of Celina which lie to the west. The roadway will also serve to indirectly provide traffic relief for US 380 which is located approximately 3 miles to the south. For this reason, Laud Howell Parkway is recognized as a critical transportation improvement and is currently included in the City of McKinney's 5- year capital improvement plan.

Given the importance of Laud Howell Parkway to the development of the Northwest Sector and the potential impacts of a major 6-lane divided facility on adjacent property owners and the natural environment, City of McKinney staff believed a transparent and comprehensive evaluation process should be carried out in order to ensure that a more informed alignment recommendation would be presented to the McKinney City Council for consideration.

1.3 STUDY LIMITS

The study limits for this project where chosen to determine an updated alignment that occupies the same general corridor as the alignment selected in the 2009 study. The study limits begin at FM 1461 / Lake Forest Drive and end at the current terminus of Laud Howell Parkway near Trinity Falls Parkway. At its widest point the study area is approximately ½ mile across. The study area is primarily bounded by Erwin Park and the Honey Creek floodplain on the south and by Cross F Ranch's proposed realignment of Laud Howell Parkway on the north. The study limit was not extended to the south of the current thorough plan alignment because an alignment through Erwin Park was deemed not acceptable and any further adjustment to the north was considered too close to FM 543 which is intended to be the next East-West 6-lane arterial street per the thoroughfare plan Figure 1.3 below shows the project study area.

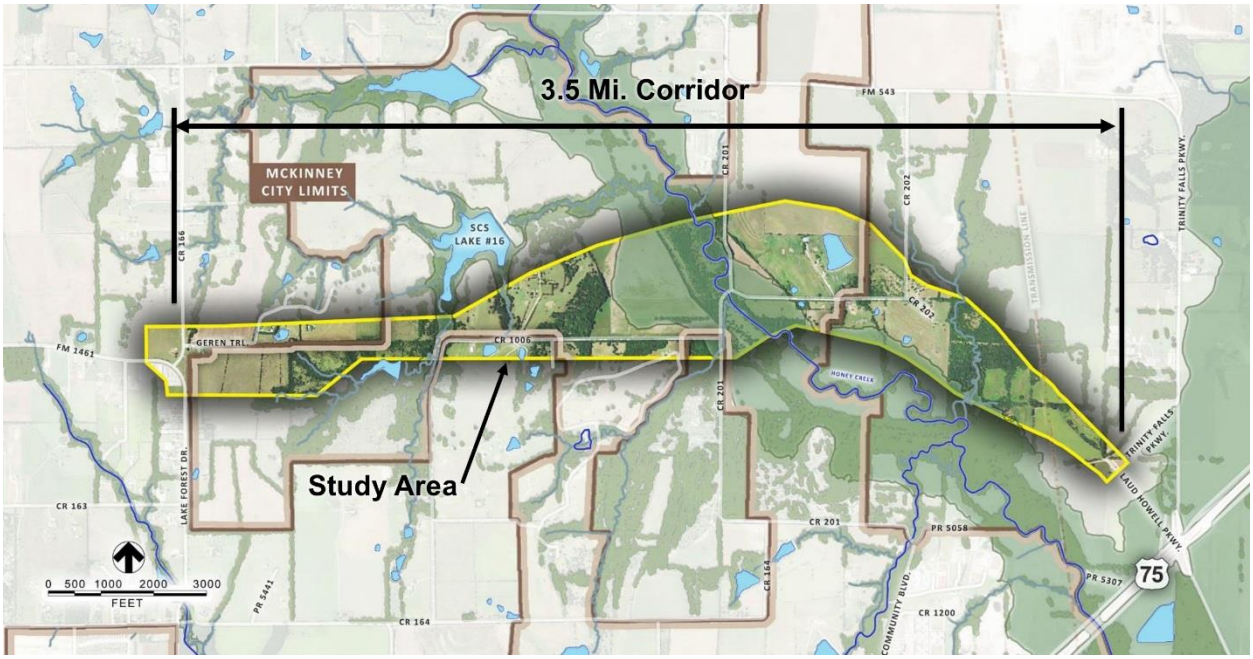


Figure 1.3 – Project Study Area

CHAPTER 2
ALTERNATIVES ANALYSIS

2.0 ALIGNMENT ALTERNATIVES DETERMINATION

The City of McKinney determined that three alternative alignments for Laud Howell Parkway would be prepared for comparative evaluation. All alignments were designed in accordance with the City of McKinney design criteria for a 6-lane divided arterial street. A summary of the specific design criteria used is included in Appendix A. Figure 2.1 below shows the alignments which are labeled as "A", "B" and "C".

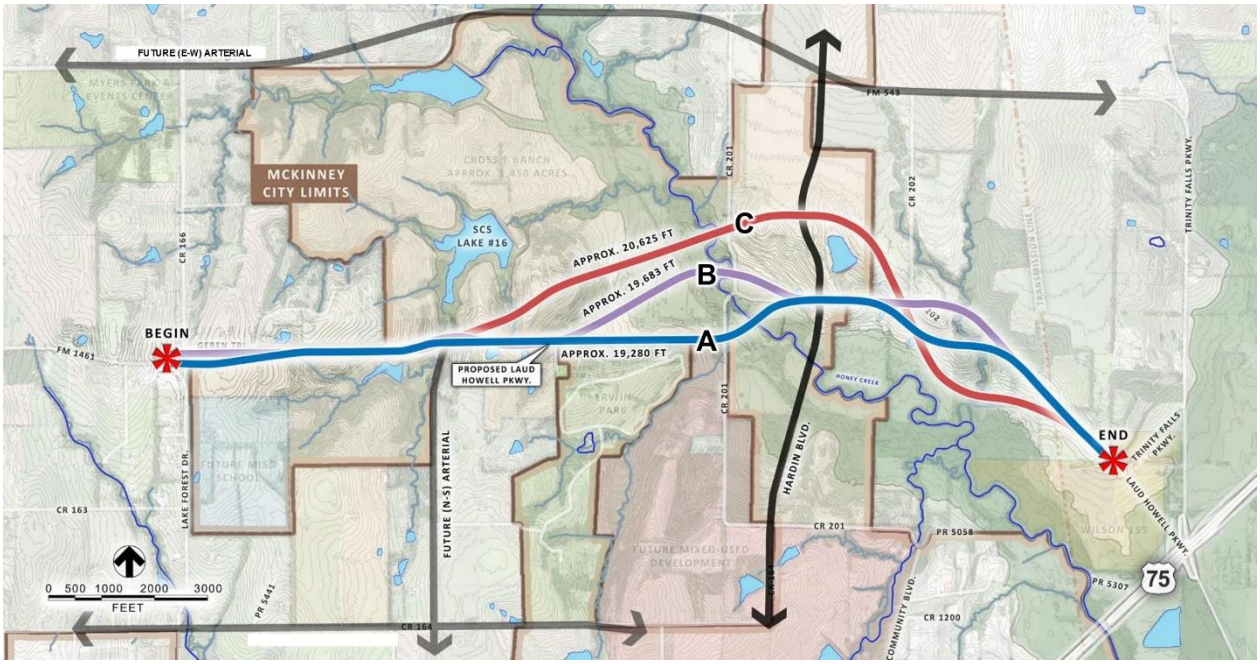


Figure 2.1 – Alternative Alignment Map

Alignment A represents the approved 2009 alignment previously known as FM 543 Connector, with two important modifications to the 2009 alignment. The first modification is at Honey Creek and the alignment modification is intended to preserve the existing County Road (CR) 201 bridge over Honey Creek that is in very good condition and will be valuable for maintaining existing County Road continuity in the short term and may be of future benefit for hike and bike trail connectivity in the floodplain. The second modification is at the east end of the study area is included to provide for a connection that lines up with the previously constructed portion of Laud Howell Parkway that connects FM 543 to US 75 via Trinity Falls Parkway.

Alignment B was determined to provide increased buffer separation between Laud Howell Parkway and existing open space land uses, primarily Erwin Park and the Honey Creek floodplain. Alignment B is designed without the Alignment A offset at FM1461 per the Cross F Ranch alignment exhibit. Traveling west

Alignment B provides a route similar to Alignment A up to the west edge of Erwin Park, maintaining the existing access point to Horn Hill Cemetery before diverting northerly to cross Honey Creek upstream of the existing CR 201 bridge. Alignment B connects back to CR 202 to match Alignment A and continues due east, departing again from Alignment A, to occupy an alignment that has increased separation from the northern Honey Creek floodplain limit. It joins back up with Alignment A prior to the connection with the existing Laud Howell Parkway pavement terminus.

Alignment C closely represents the alignment proposed by Cross F Ranch. It further increases the buffer separation at Erwin Park and relocates the intersection with Hardin Boulevard north of that shown for alignments A and B in order to increase intersection separation from the Honey Creek floodplain. Alignment C starts at the same westerly point as Alignment B and initially follows the same general route of Alignments A and B. At County Road 1006 Alignment C diverts to the northeast crossing Honey Creek nearly perpendicular and on a straight alignment west of CR 201 and further upstream of the Alignment B creek crossing location. The alignment then curves east crossing future Hardin Boulevard at a near perpendicular intersection and then curves south to minimize impacts to improvements located on the properties along CR 202. Alignment C then travels further south of alignments A and B to touch the north edge of the Honey Creek flood plain and connects to the existing centerline of LHP while also avoiding the existing ONCOR transmission line towers.

HORIZONTAL AND VERTICAL ALIGNMENT

The alignments shown were also developed with careful consideration to establishing proper coordination of horizontal geometry with vertical geometry. It is not good design practice to begin horizontal curves at the top of a crest in the roadway, and horizontal curves that begin or end at a low point have a less than desirable appearance. These factors are not typically a primary concern when developing arterial roadways in flat terrain areas, as exist in much of the DFW metroplex, because resulting vertical curve lengths do not significantly exceed stopping sight distances and arterials are typically on a grid with short horizontal curvature adjustments. Laud Howell Parkway travels through a very rolling topography resulting in long and almost continuous vertical curvature adjustments. The roadway alignment will also have extended lengths of horizontal curvature. In order to provide the highest level of safety and drivability it will be important to maintain strong horizontal and vertical alignment coordination as refinements in roadway geometry are considered and/or adopted in final design.

The alignments have been designed using mostly 50 mph criteria for horizontal and vertical curvature. It is recommended that the roadway adopt an official design speed of 45 mph to allow a more typical clear zone offset to horizontal obstructions commonly located along arterial roadways. Reducing the horizontal and vertical geometry to 45 mph design values can be considered during final design but should always be done with proper horizontal and vertical geometry coordination as described above.

The proposed profiles of the alternative roadway alignments require using the full range of the city's gradients between 0.50% minimum and 6.0% maximum. Bridge profile grades should be kept less than 3% and sags should not be located on the bridge structures. Working roadway profiles have been developed for the purposes of evaluating potential retaining wall costs and are included in the Appendix A.

2.1 DATA COLLECTION

Data collection for the project consisted primarily of gathering information from existing database sources. Property owner and parcel boundary data was taken from 2015 Collin County Appraisal District data. Ground contour information and floodplain limits were taken from GIS data available through the North Central Texas Council of Governments (NCTCOG). A hydraulic report submitted to the City of McKinney and dated October 2010 for Honey Creek was used for referencing water surface elevations in the working profile drawings. Aerial images are from 2015 data acquired from NCTCOG. Field visits were conducted for environmental inventory and for staff to familiarize themselves with specific conditions at the site. Existing construction plans for Laud Howell Parkway were obtained from the City of McKinney. Construction plans and ROW maps for FM 1461 were obtained from TxDOT. Plans for the existing electrical transmission line crossing were obtained from ONCOR. A brief summary of the data gathered is described below for environmental and survey scope tasks.

ENVIRONMENTAL INVENTORY

An inventory of environmental features consisting of land cover types, jurisdictional and non-jurisdictional waters and individual trees with a diameter equal to or greater than 36" was conducted within a distance of 150' left and right of each alternate alignment centerline (300' total width). Fence row vegetation was not considered as a mature canopy area if it was not contiguous with other trees. Additional individual trees were inventoried along the banks of Honey Creek between the various alternatives as shown below in Figure 2.2.

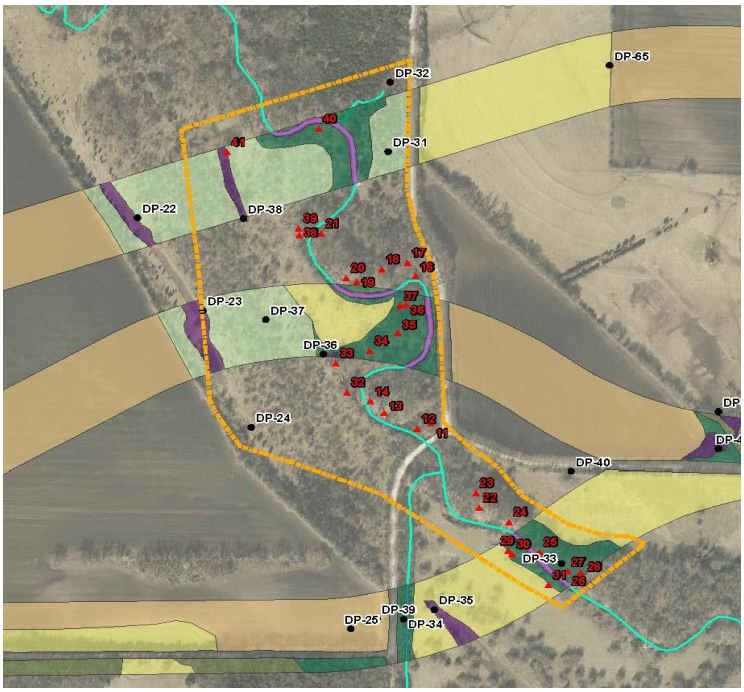


Figure 2.2 – Environmental Inventory Limits at Honey Creek

Tree data forms are included in Appendix A for the 55 trees that were identified as being 36" and larger. Of those 55 trees, 22 were found to have a diameter of 42" or greater qualifying them as "Specimen" trees per City of McKinney Code Section 146-136. The largest tree identified is a 75" Cottonwood as is located along the bank of Honey Creek.

Environmental data point forms were also prepared to document observed conditions and are included in the Appendix. These forms support the reconnaissance level efforts to identify, survey and map potential jurisdiction waters including wetlands and streams. A roll plot with all environmental data graphically categorized is included in the Appendix. It should be noted that the determinations of jurisdictional water areas in the produced mapping is not intended to be accurate enough to assess impacts related to Section 404 permitting requirements and may not be comprehensive enough to capture all areas. All alignments encounter wetlands, intermittent streams and perennial streams. Future detailed design efforts will need to more precisely identify and determine impacts to jurisdictional waters. Potential impacts to jurisdictional waters in the Honey Creek floodplain will most likely be avoided by bridge construction and appropriately located bent lines for bridge support.

SURVEY

Three new horizontal and vertical control points were placed for future design and survey control. The control sheets are included in the Appendix. Some of the temporary control points noted in the existing Laud Howell paving plans were recovered and found to be consistent with the City of McKinney master control points. The design plan centerline data for existing Laud Howell Parkway was used to establish the eastern end of the proposed alternative alignments. Survey ties to the existing pavements at FM 1461 were also accomplished to scale aerial topography, better approximate the position of existing right-of-way and confirm that the alternative's alignment lengths were accurately based on a surface coordinate datum. Topography surveys were accomplished at the spillway for SCS Lake #16 and determined the spillway crest elevation to be 624.85. According to conversations with Mr. Clyde Hogue at the USDA Natural Resources Conservation Service, the design flood pool elevation is 2.0 feet above the spillway crest. Elevation 626.85 is impacted by all of the alternative alignments and future design of the roadway should take this into consideration. The small SCS Lake has a blanket easement and the placement of future roadway fill materials below 626.85 within the lake footprint should be coordinated and approved by the City of McKinney and the Collin County Soil and Water Conservation District.

2.2 TYPICAL SECTION

A constant right of way width of 140' is used for the purpose of quantifying area based impacts. This dimension is based on two factors, the first being the standard right of way width 130' for a P6D facility as determined by the City of McKinney Street Design Manual adopted in 2010. The second factor is the City's May 2012 On-Street Bicycle Transportation Master Plan which indicates that dedicated on-street bike lane for Laud Howell Parkway should be implemented. The Street Design Manual in Section 8.5 states that "*the width of ROW for arterial roadways on designated bike routes shall be increased by ten (10) feet*". Additional ROW and/or easements will be required for intersections and other roadway design features identified during final design and were not considered for the purposes of this study. A potential midblock typical section for consideration in a 140' wide right of way is shown in Figure 2.3 and includes buffered bike lanes.

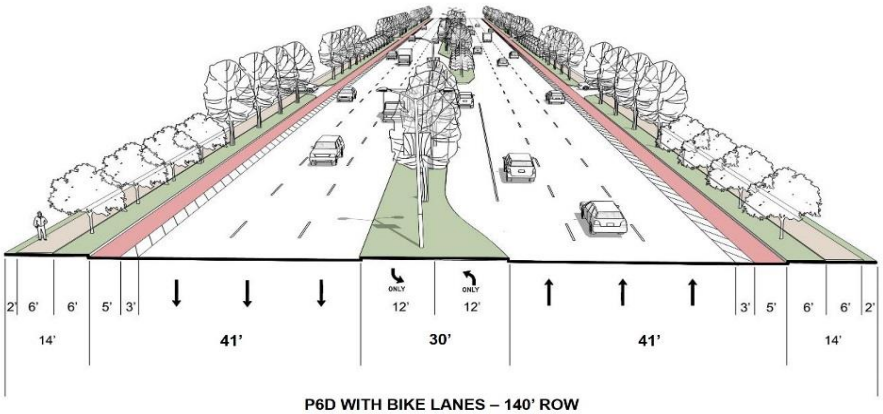


Figure 2.3 – 140' Right of Way with On-Street Bike Lanes

The City of McKinney is currently reviewing the adopted bike plan as part of the effort to update the City's Comprehensive Plan as well as the City's Trail System Plan. As noted earlier, the portion of Laud Howell Parkway within the project study limits is intended to have characteristics of a 45 to 50 mph facility and there are numerous steep roadway gradients that extended for long distances. Both of these factors tend to reduce the compatibility between cyclists and automobiles sharing the roadway, especially recreational or commuting cyclists. The alternative sections shown in Figure 2.4 below are alternatives that could be considered to provide accommodations for bicycles with a wider sidewalk functioning as a shared use path.

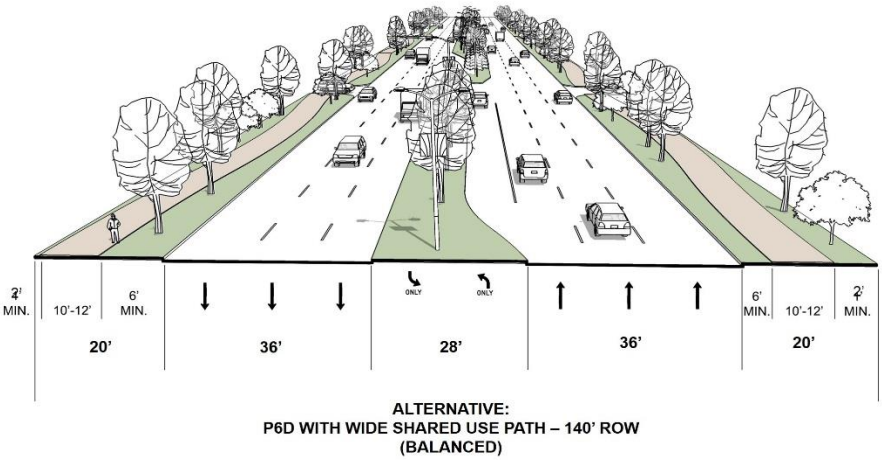
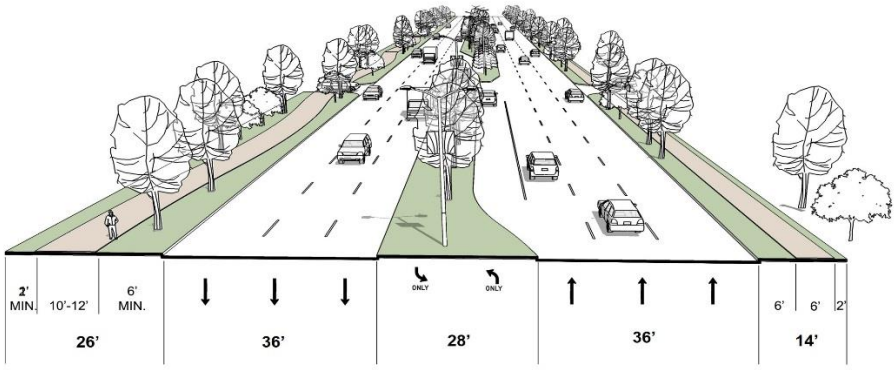


Figure 2.4 - Alternate Typical Sections using 140' Right of Way



ALTERNATIVE:
P6D WITH WIDE SHARED USE PATH – 140' ROW
(UNBALANCED)

Figure 2.4 cont'd - Alternate Typical Sections using 140' Right of Way

2.3 HONEY CREEK BRIDGE

The Northwest Sector Implementation summary document recommends the construction of four specific "gateway" bridges. This document goes even further by making the following statements;

> "…***these four bridges should be seen as the "floodgate" to unlocking the next wave of growth and development in McKinney; and their locations and proposed design offer both connectivity and gateway potential."***
>
> ***"While offering to unlock development opportunities, these bridges are also poised to serve as meaningful gateways into the sector and should be used as landmark locations rather than basic floodplain crossings. With gateway bridge crossings, the City can elevate the baseline expectation of quality from future development in the area."***

The Laud Howell Parkway (LHP) Bridge at Honey Creek is one of four bridges identified for "gateway" treatments at major creek crossings. In addition to the roadway alignment study for Laud Howell Parkway, the bridge aesthetic options were developed to determine preferences for unique design features that would establish a "gateway" design. The consistent ideology proposed for the Laud Howell Parkway bridge concepts is "Celebrating Nature" with **Big, Bold Statements** that acknowledge the riparian and greenbelt corridor of Honey Creek, natural landscape and rolling hills. Four initial design concepts were presented and are summarized below:

Bridge Concept 'A' – *"Combining Man-made with Nature"*, utilizes simple man-made forms such as "fence or gate panels" found in the agrarian and rural landscape and stone representing *"nature's building blocks"* to establish the framework for the large 45' to 50' tall gateway monument feature and a secondary 25' tall gateway feature. Simple, but iconic structures frame dramatic views of the greenbelt corridor and is amplified by the significant changes in topography as you approach Honey Creek via vehicle or by other alternative means. As shown below in Figure 2.5 this option initially incorporated a single width bridge structure.

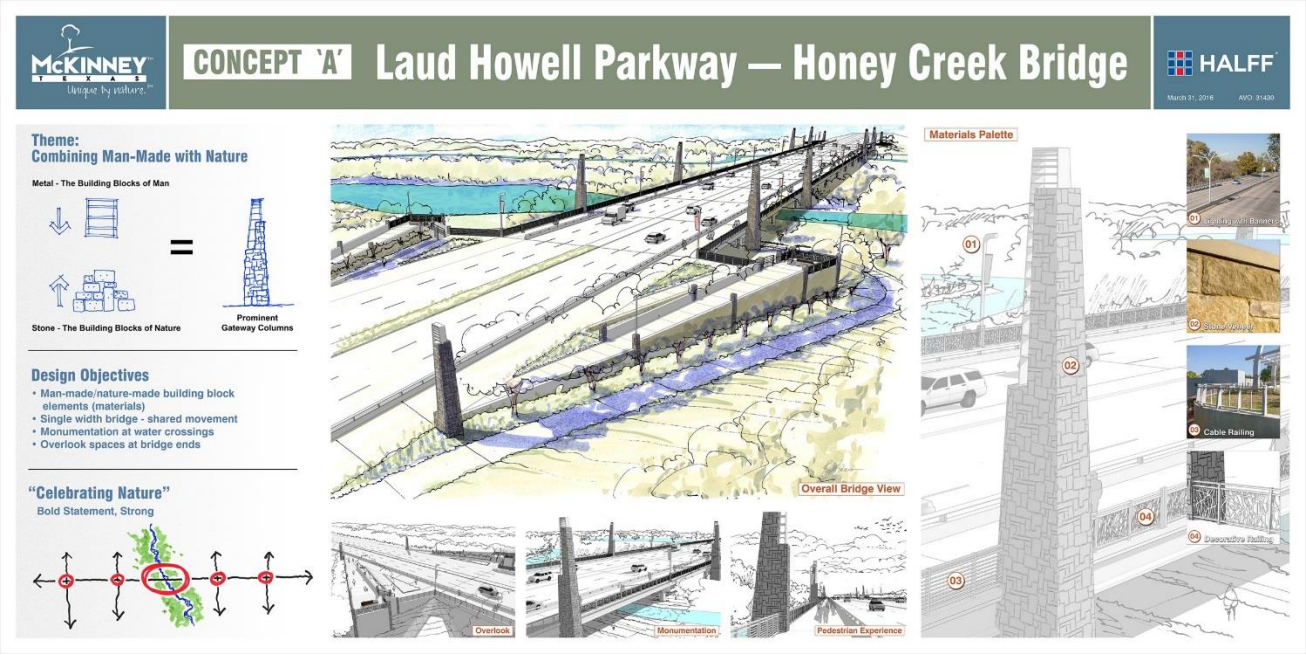


Figure 2.5 - Bridge Concept A

Bridge Concept 'B' – "Emerging from the Earth" represents a single "blade of grass" found in native stands of Little Bluestem at Erwin Park and the surrounding prairie. The abstracted, but simple form becomes the split alignment or "opening" of the bridge into two pieces and is the basis for the bridge structural elements, column features, architectural lighting and a large 75' tall gateway monument as the "Centerpiece" emerging from the densely vegetated forest

Figure 2.6 – Bridge Concept B

Bridge Concept 'C' – "Immersed in Nature" is developed as a hybrid from Bridge Option 'B', Concept C provides a parallel but separated pedestrian bridge giving access to a 'tree-top canopy tour' of Honey Creek. It is the "Human Experience" that allows users to be immersed in the natural canopy of the trees while being separated from busy vehicular traffic.

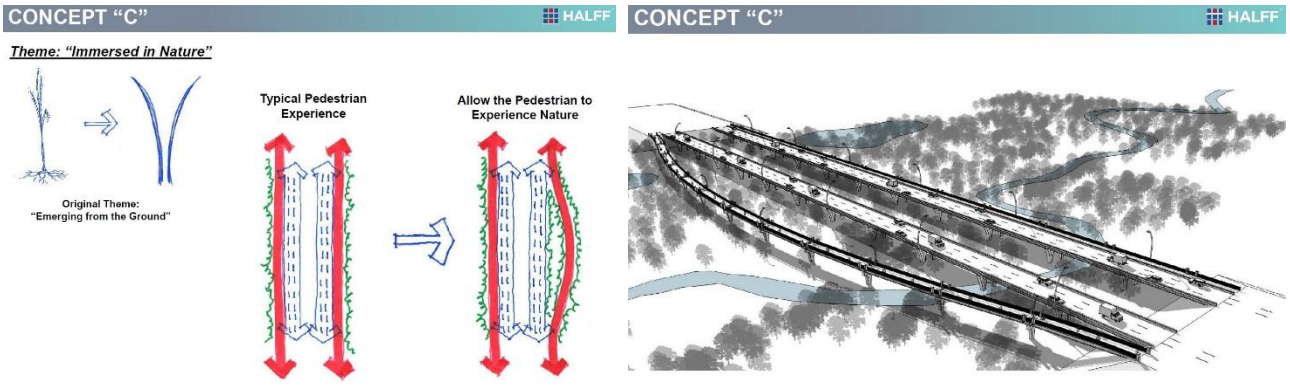


Figure 2.7 – Bridge Concept C

Bridge Concept 'D' – *"Blending Nature with the Built Environment"*, embraces the growth and expansion of the Northwest Sector, while preserving the natural beauty of the greenbelt corridor, rolling topography, agrarian landscape and the abundance of large stands of trees. The juxtaposition of the "Natural" and "Built" environments blend together to create the gateway for the bridge. There is a Celebratory moment at the center of the bridge allowing for a cantilevered pedestrian walkway "stretching out" over Honey Creek. The walkway would be supported by a "Suspension Bridge", which would form an iconic gateway.

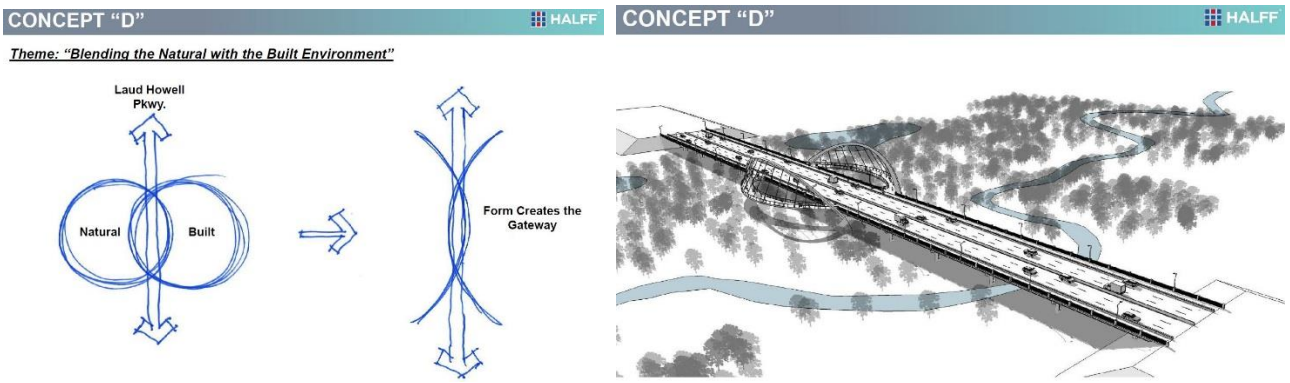


Figure 2.8 – Bridge Concept D

Bridge Concepts C and D are more costly options and were eliminated from further consideration after initial presentation to staff. Bridge Concepts A and B were further developed and presented at the initial Council Workshop meeting and the Public Input meeting as staff's preferred concepts. Comments received were mostly in favor of the monument aesthetic shown in Concept A and the split bridge appearance shown in Concept B. As a result of these comments a final design concept combining the favored features was prepared and is shown below in Figure 2.9.

Figure 2.9 – Recommended Bridge Aesthetic Concept

The gateway bridge costs identified in the Northwest Sector Implementation document show a potential "gateway" bridge cost of $12,718,000 for the Laud Howell location based on a bridge length of 930 LF. The bridge length in the Northwest Sector Study was estimated at 1/3 the distance across the flood plain. Estimated probable costs for the preferred Bridge Concept A structure are shown below and include 36' for 3 traffic lanes and 12' for a traffic separated sidewalk/trail on each of the directionally split structures.

1,500 LF Twin Bridges at $7,420 per linear feet=	$ 11,130,000
Bridge Aesthetic Components =	$ 500,000
Pedestrian Overlook Areas =	$ 1,000,000
Total Estimated Construction Cost =	**$ 12,630,000**

The 1,500 LF structure length used in the estimate is the shortest of the bridge lengths determined for each of the alternative alignments evaluated in this study. Detailed hydraulic engineering studies must be performed to determine actual bridge lengths and other considerations such as grading impacts to the floodplain's natural environment and allowing changes in floodplain water surface elevations will be key determinants in the final design length of the bridge. Based on a preliminary review of the bridge crossing sites, it appears 1,500 LF is a reasonable figure to consider for budgeting purposes.

2.4 PUBLIC INVLOVEMENT

It is important to note that this study was initiated and carried out at the request of a property owner(s) directly impacted by more than 2 miles of proposed Laud Howell Parkway right of way across their property.

Given the importance of Laud Howell Parkway to the development of the Northwest Sector and the potential impacts of a major 6-lane divided facility on adjacent property owners and the natural environment, City of McKinney staff believed a more comprehensive evaluation process should be carried out in order to ensure that a more informed alignment recommendation would be presented to the McKinney City Council for consideration. The process of determining, presenting and evaluating the alternative alignments has been carried out with the goal of keeping the public constantly informed and responding to citizen and property owner concerns. City of McKinney staff and their consultants have made themselves available for individual meetings as requested by property owners to answer questions and discuss specific City procedures for infrastructure development in more detail. The timeline below gives a summary of formal public involvement steps and presentations of specific project details and data collected. All exhibits and other documentation presented are included in the Appendix.

January 11, 2016 – City of McKinney staff mailed out notification to property owners within and adjacent to the project study area.

February 2016 – Halff Associates began data collection including working with property owners to obtain rights of entry to gather site specific data by on the ground observations and measurements.

March 14, 2016 – Public City Council Work Session meeting held to present initial alternative alignments, bridge aesthetic options and provide information on project schedule.

March 2016 – Notice of Public Meeting mailed to property owners within and adjacent to the project study area. Legal notice for Laud Howell Public Meeting published in the McKinney Courier Gazette on Sunday, March 27, 2016.

March 31, 2016 – Public Open House meeting held at Meyers Event Center from 5:30 pm to 7:30 pm. Over 60 persons attended and were able to review alignment maps, environmental inventory data, bridge options and get questions answered by project staff members. Comment forms were provided and accepted at the meeting.

April 6, 2016 – Published deadline date for receipt of written public comments in order to consider them in the formal project evaluation. Copies of received written comments are included in Appendix B

April 18, 2016 – Public City Council Work Session held to present summary of public input comments and findings of the alternative alignment evaluation. City staff presented a Hybrid alternative alignment in response to public input received in written responses and additional individual property owner meetings. Although this Hybrid Alignment was not displayed at the public meeting, it was individually coordinated with adjacent property owners prior to the April 18, 2016 Council Work Session.

2.5 EVALUATION OF ALTERNATIVES

The formal evaluation of the alternatives was prepared after receipt of public input to provide a quantitative and qualitative comparison of the alignments. The evaluation process is performed on alignments A, B and C as originally proposed and also includes the Hybrid alignment as shown in Figure 2.10 below which is proposed in response to public input comments.

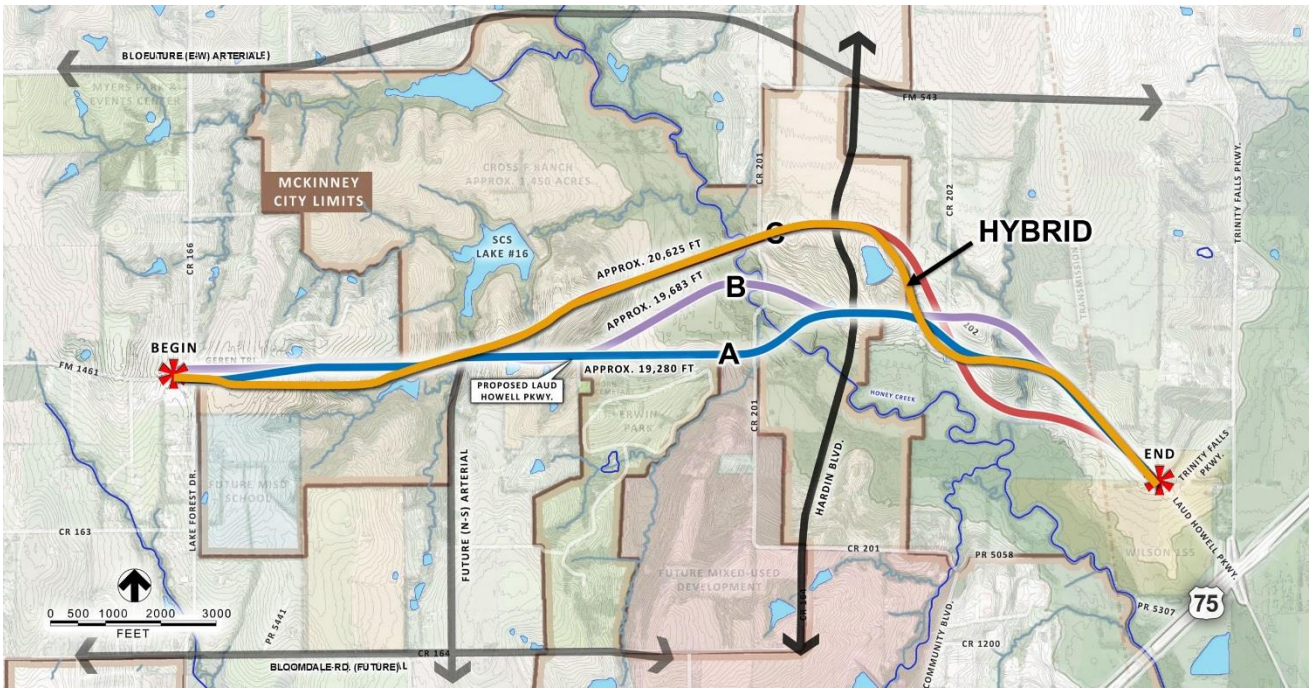


Figure 2.10 – Alternative Alignments Map with Hybrid

The evaluation of the alternative alignments is separated into the following categories:

- Engineering and Design Features
- Community and Socioeconomic Impacts
- Environmental Impacts
- Other Impacts
- Project Costs

A complete matrix of the evaluation criteria is included in the Appendix along with a notes page that provides an explanation of the data entries. The evaluation score highlighted in green represents the alignment(s) with the most favorable ranking.

ENGINEERING AND DESIGN FEATURES

ALIGNMENT EVALUATION CRITERIA	LAUD HOWELL PARKWAY ALTERNATIVE ALIGNMENTS Lake Forest/CR166 to Existing Laud Howell Pavement End All alignments are subject to future refinements.			
	A	**B**	**C**	**Hybrid**
ENGINEERING / DESIGN FEATURES				
Alignment Length (miles)	3.577	3.643	3.823	3.836
Estimated Proposed ROW Need (ac)	59.731	60.856	63.910	64.135
Frontage (LF) along the Alignment with a minimum Developable Acreage lot depth of 400'.	20,200	21,900	23,100	23,000

The alignment lengths are based on the centerline distance of each alignment between the east right of way line of Lake Forest/CR166 and the existing pavement end of Laud Howell Parkway located approximately 250' northwest of the Trinity Falls intersection. This same existing pavement end is located approximately 2,100' from the intersection with US 75. Alignment A has the shortest distance at 3.577 miles and the Hybrid alignment is the longest at 3.836 miles, approximately 7% longer than alignment A. Correspondingly, alignment A has the lowest proposed right of way area at 59.731 acres. The proposed right of way areas are based on a constant 140' right of way width and do not include any reductions for areas where they overlap existing prescriptive rights of way in the county road network. As noted in section 2.2 above, additional ROW and/or easements will be required for cross street intersections and other roadway features identified during final design.

In an attempt to quantify the influence of roadway alignment on the ability to provide opportunities for quality development, the length of available frontage with unimproved property having a developable depth of at least 400' was measured for each alignment. This depth was chosen because a typical minimum depth of 250' to 300' is available in many areas throughout the City of McKinney. Property of good depth on well-travelled arterial streets has higher value and therefore tends to attract more unique and higher quality improvements that raise property values. Alignment C and the Hybrid show a 14% improvement in this measurement over alignment A. It should be noted that the half of this difference (7%) is directly related to the additional length in alignments A and the Hybrid. Nevertheless, the separation from Erwin Park and the Honey Creek floodplain provided by alignments C and the Hybrid will provide for many more acres of roadway frontage property and will significantly improve the development options available for all four corners of the major intersection located at Hardin Boulevard.

COMMUNITY AND SOCIOECONOMIC IMPACTS

ALIGNMENT EVALUATION CRITERIA	LAUD HOWELL PARKWAY ALTERNATIVE ALIGNMENTS Lake Forest/CR166 to Existing Laud Howell Pavement End All alignments are subject to future refinements.			
	A	**B**	**C**	**Hybrid**
COMMUNITY AND SOCIOECONOMIC IMPACTS				
# of Displaced Residences	1	2	2	0
# Residences within 200' of ROW	4	6	2	1
# Residences within 500' of ROW	9	11	8	3
# of Displaced Auxiliary Bldgs/Barns	1	4	3	0
# of Auxiliary Bldgs/Barns within 200' of ROW	8	7	3	2
# of Property Owners Impacted by ROW take	6	9	8	7
Proposed ROW Impact to Public School Properties (ac)	0	0	0	0
Proposed ROW Impact to Parks (ac)	0	0	0	0
Proposed ROW Impact to Cemeteries (ac)	0	0	0	0

The quantitative measurements in this category are primarily focused on existing property owners and property improvements within the study area. Displaced structures are those that fall directly within the 140' right of way footprint of an alignment. Separation distances between the proposed alignment right of

way and improved structures is also considered. A distance of 200' separation was chosen as an indication of the limit at which development of property between the proposed roadway and an existing structure would suggest that the structure should eventually be removed and/or repurposed. A separation distance of 500' was also reviewed to provide an indication of potential sound impacts. Beyond 500', the noise experienced by a receptor would not likely be directly related to an arterial roadway's traffic noise. The number of structures at a given distance includes displaced structures so that the cumulative impacts of each alignment are more easily identified by the numeric values shown.

The number of property owners impacted by any of the alignments is a relatively small number for a 3.5 mile corridor. Cross F Ranch is a combination of numerous individual tracts on the tax role but is considered as one property owner for the purposes of this study. Regardless of the alignment, approximately 70% of the proposed right of way is within the Cross F Ranch property boundary.

There are no historic (officially listed or potential) properties impacted by the evaluated alignments. Only one residential structure within 500' of an alignment is more than 50 years old but it does not appear to have any specific historic significance. No schools, parks, cemeteries or other public places are directly impacted by any of the evaluated alignments. From the recommended hybrid alignment, McKinney ISD has a future High School site located approximately 550' south, Erwin Park is located more than 800' to the south and Horn Hill Cemetery is located more than 1,100' to the south.

ENVIRONMENTAL IMPACTS

ALIGNMENT EVALUATION CRITERIA	LAUD HOWELL PARKWAY ALTERNATIVE ALIGNMENTS Lake Forest/CR166 to Existing Laud Howell Pavement End All alignments are subject to future refinements.			
	A	**B**	**C**	**Hybrid**
ENVIRONMENTAL IMPACTS				
Proposed ROW Impact within 100 YR Floodplain (ac)	7.649	12.020	7.489	6.203
Proposed ROW Impact to Open Water (Ponds & Lakes) (ac)	0.048	0.341	0.000	0.000
Proposed ROW Impact to Wetlands (ac)	0.174	0.492	0.306	0.259
Proposed ROW Impact to Streams (lf)	1,408	1,598	1,379	1492
Proposed ROW Impacts to Large Trees 36" dia or greater (ea)	8	10	4	4
Proposed ROW Impacts to Riparian Forested Areas (ac)	2.457	3.121	3.212	2.402
Proposed ROW Impact to Upland Forested Areas (ac)	15.286	19.783	13.449	16.266

Impacts to environmentally sensitive areas are tabulated for consideration and are typically based on the area which falls within the direct footprint of the 140' right of way width for each alignment. Individual impacts to trees and jurisdictional streams include impacts within an additional 20' on either side of the 140' right of way footprint. Based on the field reconnaissance efforts that were conducted the environmental impacts anticipated are consistent with typical rural to urban property development. The scope of this study did not include specific review of the project area for endangered and threatened species and their habitats.

Based on the project location and other similar studies within the McKinney area, permanent impacts to threatened and endangered species is not anticipated. Temporary impact to endangered and threatened species habitats during construction is possible and will need to be evaluated during final design and addressed as necessary in construction plans and specifications.

Open water area impacts are those related to non-jurisdictional waters. Jurisdictional waters impacts are separated into wetlands and streams because they are considered individually when obtaining Section 404 permits from the Corps of Engineers. Larger impacts to jurisdictional waters can make projects incrementally more difficult, costly and time consuming to obtain necessary permits.

Impacts to forested areas are categorized into two categories due to the fact that riparian forested areas tend to have a higher concentration of large diameter trees as compared to upland forest areas. Riparian forested areas within the project study areas are typically along water courses and dominated by mature canopy trees generally consisting of American elm, cedar elm, hackberry, shumard oak, pecan, cottonwood, bur oak and bois d'arc. Upland forested areas within the project study area are dominated by mature canopy trees and/or mature juniper and include a dense understory of scrub vegetation and greenbrier. Floodplain scrub forest area does not generally include large canopy trees and is included with upland forest area for the purpose of this evaluation. Species most observed include juniper, cedar elm, bois d'arc, hackberry, honey locust and pecan.

OTHER IMPACTS

ALIGNMENT EVALUATION CRITERIA	LAUD HOWELL PARKWAY ALTERNATIVE ALIGNMENTS Lake Forest/CR166 to Existing Laud Howell Pavement End All alignments are subject to future refinements.			
	A	**B**	**C**	**Hybrid**
OTHER IMPACTS				
Effect on Regional Mobility	++	++	++	++
Effect on Local Access	- -	-	O	O
Effect on Operations/Safety	++	++	++	++
Construction Difficulty or Traffic Disruption	- -	-	O	+
Effect on Existing Use of Park/Open Spaces	-	O	++	++
Public Acceptance	+	- -	-	NA

Non quantitative impacts are also considered in the study and are qualitatively scored with comparison to a no-build condition that assumes no significant improvements to the existing county road system. All alignments meet the intent of serving the traffic demands projected by the City of McKinney Thoroughfare Plan. Similarly, all alignments are consistent with the City of McKinney Street Design Manual and will provide a much higher level of safety by improving roadway conditions, improving roadway geometry and providing a roadway that is not subject to the flash flood hazards which impact the current County Road facilities near Honey Creek.

Alignments C and the Hybrid score better on minimizing the effects on local access because they allow the existing county road system to remain more intact and functional. County Road 201 is severed by all of the

alignments but alignment C and the Hybrid will require the least impactful amount of County Road realignment to avoid a dead-end condition and maintain through traffic connectivity.

Alignment A scores the lowest with regard to construction difficulty because it overlaps the longest length of existing County roads. This overlap results in the need for additional traffic control measures and more inconvenience to the travelling public during construction. The Hybrid alignment scores slightly better than alignment C because it does not require substantial rework of the CR 202 intersection with Armadillo Ridge Road.

The effect on existing open space uses is primarily scored on the basis of roadway separation from Erwin Park. Erwin Park currently serves as a preserved natural area with hike and bike trails and allows for both day time and overnight camping uses. The master plan for Erwin Park shown in Figure 2.9 below seeks to maintain that natural character of the space with an emphasis on providing opportunities for the public to interact with nature. There are no plans to provide for any type of team sport athletic fields and facilities and the topography in the current park boundary would not accommodate large level playing surfaces. As such there is not a significant traffic demand for park ingress and egress. The topography at the northern area of the park rises as much as 60' from the existing north property line along existing CR 1006 and proposed Alignment A, making a vehicular entrance very long and steep, potential bisecting common use park areas. There are flatter topographic conditions west of the current park that are more compatible for improved access points and could be incorporated into other arterial and/or collector street alignments as future development occurs.

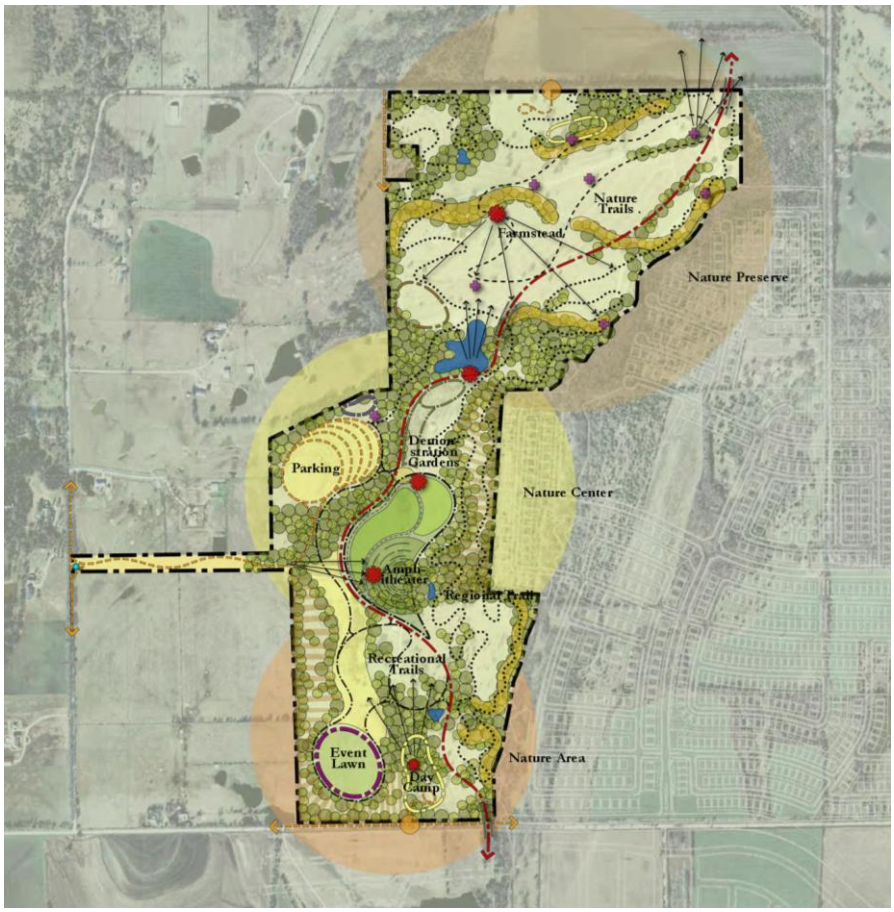


Figure 2.11 – Erwin Park Master Plan

Public acceptance of the proposed alignment is an important consideration but must be balanced against currently adopted plans by the City of McKinney to appropriately provide for the infrastructure that is necessary to support growing population and commercial development. Alignment A received the most favorable responses from the written public comments that were received. Of the 16 formal responses received, 13 listed alignment A as preferred. Of those 13, 8 further commented that they preferred alignment A because its specific location at Lake Forest did not directly impact the Geren and Kim properties. There were no responses that favored alignment B so it received the lowest score. Alignment C received 3 favorable responses including comments emphasizing separation from Erwin Park. The recommended hybrid alignment is not scored because it was not presented at the public meeting.

PROJECT COSTS

ALIGNMENT EVALUATION CRITERIA	LAUD HOWELL PARKWAY ALTERNATIVE ALIGNMENTS Lake Forest/CR166 to Existing Laud Howell Pavement End All alignments are subject to future refinements.			
	A	**B**	**C**	**Hybrid**
PROJECT COSTS (IN $ MILLIONS)				
Estimated Construction Costs ($M)	$ 36.6	$ 37.5	$ 36.2	$ 36.9
Estimated Right-of-Way Costs ($M)	$ 3.9	$ 4.0	$ 4.2	$ 4.2
Estimated Utility Costs ($M)	$ -	$ -	$ -	$ -
Engineering, Surveying, Geotech & Inspection at 20% ($M)	$ 7.3	$ 7.5	$ 7.2	$ 7.4
Estimated Total Costs ($M)	**$ 47.8**	**$ 48.9**	**$ 47.6**	**$ 48.4**

The project costs tabulated above are intended to serve as order of magnitude figures for comparative evaluation. Detailed preliminary engineering studies of the alternative alignments were not performed and must be completed to determine actual construction cost estimates. These estimated construction costs are based on the following primary components and the rates shown were derived from the bids of new arterial street construction projects recently completed in the Collin County area:

- 4 –lane divided roadway on new location = $5,600,000 per mile
- 2 additional inside lanes = $700,000 per mile
- 6-lane bridge = $7,420 per linear foot
- bridge aesthetic allowance = $1,500,000 fixed sum
- retaining walls = $35 per square foot.

The total construction costs in the table above are further based upon a 4-lane section between Lake Forest Drive and Honey Creek, a 6-lane section for the Honey Creek bridge and a 6-lane section between Honey Creek and the existing pavement terminus west of Trinity Falls Parkway. Bridge lengths for the alignments were determined by taking a cross section of the flood plain at each alignment centerline and assuming the bridge would span across any areas where the 100-year flow was greater than 2 feet in depth. Bridge lengths varied from 1,500 LF for alignment C up to 1,800 for alignment B. The bridge length determination has a significant impact on the total cost due to the fact that bridge costs are approximately 7.5 times the cost of roadway built on grade for the same given distance. Retaining wall costs were estimated from working profile drawings that compared top of curb grades with the elevations of existing ground at the proposed

right of way lines. Only elevation differences greater than 4' were used to compute the square feet value of retaining walls for each alignment. These numbers may be reduced during final design based on more detailed studies and the assumption that cut and fill slopes, in lieu of retaining walls, could be extended beyond the right of way where slope easements can be obtained at a more economical cost and at an acceptable impact to any existing vegetation that may exist. Even though the length of alignment C exceeds the others, it shows to have the least construction cost because it has the shortest bridge length and the alignment falls on topography that is flatter, requiring fewer retaining walls, than the other alignments.

Right of way costs are based on the proposed right of way areas using a value of $1.50 per square foot. No consideration has been included for potential no-cost right of way dedications nor has any discount been applied to the value of right of way that will be acquired in the Honey Creek floodplain.

No major utility relocation costs are anticipated. Crossing of the existing ONCOR transmission line is required for all alignments and ONCOR has advised that they prefer no excavation work be accomplished within 50' of an existing support tower foundation. All of the alternative alignments maintain this requested separation. Engineering, Survey, Geotechnical and Inspection costs are estimated at 20% of the estimated construction cost.

2.6 RECOMMENDATIONS

Based on the quantitative and qualitative scoring measured and reported in the alignment evaluation criteria list, the Hybrid alignment which incorporates elements of alignments A and C is recommend by City of McKinney staff for the adopted alignment of Laud Howell Parkway. The Hybrid alignment ranks either first or second with regard to the most favorable scoring on 15 of the 18 individual evaluation items where comparative distinctions between the alignments can be made. Additionally, the total project costs for the hybrid alignment are less than 2% more than the lowest cost alternative, a difference which can be considered statistically insignificant for the preliminary level of design work that has been accomplished in conjunction with this study.

The decision to adopt any alignment for Laud Howell Parkway should be done after a Public Hearing forum is conducted by the City Council for the purpose of taking additional comments from citizens and property owners.