Team

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Unique Qualifications/Capabilities

project to those directly affected by the project. It will also shine a light on the successes and keep the project in the minds of the decision makers that will fund future years of the program.

Delivering an effective and positive message to the public is as important as a safe and attractive street. The public will develop its own image of the City based on our collective performance and communications. Our One Team...One Goal approach is to be proactive in making that image positive, progressive, responsive and customer friendly.

Equally important in the Communication Plan is how we work with the utilities. Utility issues will need to be addressed. which will require the use of a solid and proven communication plan with the utility companies. Utility coordination is especially critical if construction is to be completed in 2012. As in the past on City of Lawrence projects, Bartlett & West will work with utility companies to make sure utilities have been relocated prior to construction. Specifically, we are offering to perform the following services for the Iowa Street Improvements project:

 Prior to surveying, we will

BR send the utility companies a Utility Location Report, which is shown on the following page. This is our first of many contacts with the utility companies

throughout the life of the project. The purpose of the form is to make the utilities aware of the upcoming project, to gather pertinent information about their facility, and to collect contact information for each company.

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Black Hills Energy

Improving life with energy

- Following the topographical survey, we will provide each utility company with a color coded drawing showing their facility in relation to other utilities and existing features. The purpose of the initial drawings will be to seek input on the location and sizes of the utilities in the area. Most importantly, the drawings allow the utility companies to verify the locations of their facilities.
- Once conceptual plans are developed, we will send plans to the utility companies for their review. This plan set will allow the utility companies to start planning their relocation needs. In addition, we will provide an updated schedule to outline when the utilities need to be relocated.
- · After sending the conceptual plans to the utility companies, we will meet with the Utility Companies. With a project of this complexity, we would prefer to have a meeting with the Utility Companies specifically for the purposes of discussing this project. However, if the City Staff would prefer, we can attend the City's monthly utility meeting to



discuss the project and questions from the utility companies.

• At field check stage, we will send plans to the utility companies. The purpose of

these plans will be to provide final layout and profile information to the utility companies so they can finalize their relocation plans.

• After sending the field check plans to the utility companies, we will meet with the



UTILITY LOCATION REPORT						PORT		UTILITY LOCATION REPORT (cont.)			Page 2		
The purpose of this report is to provide a better understanding of the existing utilities located within the project limits. As part of our standard plan development procedures and required by law, our office has contacted or will be contacting the state One-Call Program for utility locates.						lif yes t	e #3, please describe:						
Attached is a draxing that provides a general location of the project. Please return a copy of this form and any information noted below to this office as soon as possible. Thank you for your cooperation and assistance. If you have any questions, please fast tree to contact our project manager.						4.	 In addition to the present facilities, does the sullity have any abandoned facilities that might be encountered on the preject?YesNo 						
Project Manager Joe Catelsell					Date		3/30/09	1		li yas, pinasa dascrillar,			
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Phone: 785-749-9		452 Fax :		785-749-5961	Email:	joo.caldinall@bortmcst.com			5.	Are there any encasoment If yes, place describe:	YcsNe		
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S. Are then arr da		is in progress for additional facilities								E-Mail :		<u> </u>	
Or other improvements within the project limits?YesNo						6	imengency Contact/Locate Tele	phone No. to be shown on Plans					

UTRATY LOCATION REPORT (east.)	Plage 3	
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Utility Companies. With a project of this complexity, we would prefer to have a meeting with the Utility Companies specifically for the purposes of discussing this project. However, if the City Staff would prefer, we can attend the City's monthly utility meeting to discuss the project and answer any questions from the utility companies. In addition, we will ask the utility companies to provide a written plan and schedule to complete their relocations.

- We will follow up with the utility companies to gather information regarding their relocation plans. In addition, we will attend the City's monthly utility meetings to seek additional information regarding the relocations.
- As necessary, we will meet individually with the utility companies to discuss their specific issues. For instance, on the O'Connell Road project we met with Westar and Southern Star individually on several occasions to answer questions and coordinate the proposed work for the roadway improvements.
- We will work with all utility companies to complete KDOT's 1304 form.

The protocol outlined above has proven to be successful on previous City of Lawrence projects, including the Kasold Drive, Clinton Parkway to 31st Street & Storm Sewer Improvements, Kasold Drive (Bob Billings to Clinton Parkway) Street, Storm Sewer, and Waterline Improvements, O'Connell Road Street and Storm Sewer Improvements, George Williams Way Street, Storm Sewer, and Waterline Improvements, and 25th Terrace Street, Storm Sewer, and Waterline Improvements projects.

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Project Understanding/Approach

"Bartlett & West provided design services to the City of Overland Park for storm drainage improvements to solve flooding problems in a neighborhood located at 71st to 74th, Reeds to Maple Street area. This was a very challenging project and we were pleased with the quality and completeness of plans which led to few questions and change order requests from the contractor. "

> Charlie Love, Stormwater Engineer City of Overland Park

residential and business properties on both sides. At the south end of the project, Iowa Street provides access to the University of Kansas via 15th Street/Bob Billings Parkway. The roadway is a fourlane section from just north of Bob Billings Parkway to just south of Harvard Road, and a five-lane section from south of Harvard to the north end of the project at Yale Road. There are 11 side roads and approximately 30 driveways that intersect this stretch of Iowa Street, so construction sequencing will be a critical element of the design. There are signalized intersections at Harvard Road and Bob Billings Parkway/15th Street. Finally, this section of Iowa crosses a fairly deep ravine between Bob Billings Parkway/15th Street

Iowa Street, which is also U.S. Highway 59, is the major north-south arterial through the heart of the Lawrence community. From the northern City limits to the southern City limits, Iowa Street

provides access to

businesses, residential areas, industrial facilities, and the University of Kansas. In addition, it provides access to Interstate 70 at the north end and U.S. Highway 59 at the south end, which goes to Baldwin and Ottawa. The section varies from a simple two lane section near the Hallmark property and Interstate 70 interchange to a full urban intersection with two thru lanes, dual left turn lanes, and right turn only lanes at Clinton Parkway and 31st Street.

More specifically, Iowa Street between Yale Road and Bob Billings Parkway is an undivided arterial that is bordered by



and Terrace Road. **Figure 1** shown on the following page gives an overall plan view of the existing project.

Very similar to the two *Kasold Drive* projects Bartlett & West completed for the City of

Lawrence, the corridor is inundated with utilities. There is overhead power along the west side of the roadway that will likely need to be moved due to potential widening. Perhaps the most unique utility in this corridor is the LightCore conduit bank that carries five conduits for LightCore, KDOT, and the City of Lawrence. This conduit bank is located along the east side of the project. Other utilities certainly include the normal list of companies such as Black Hills Energy, AT&T, and Sunflower Cable. As for City utilities, the main waterline runs along the east portion of the existing roadway and is presently under reconstruction from Yale



IOWA STREET OVERALL PROJECT

Team

Project Understanding/Approach



Road to University Drive. The new waterline will be close to the east back of curb line in several locations. Finally, the sanitary sewer conflicts seem to be limited to the area of the project between Bob Billings Parkway/15th Street and Terrace Road.

Existing storm water systems are generally confined to three locations. First, there is a fairly extensive storm sewer system at the intersection of Iowa Street and Bob Billings Parkway/15th Street. This system drains east of Iowa to the west and follows the median of Bob Billings Parkway to west of Crestline. Second, there is a fivefoot x four-foot RCB located about 500 feet to 600 feet north of Bob Billings Parkway/15th Street that drains under Iowa Street from east to west. There is also some associated Iowa Street drainage with this system from the Terrace Road area. Finally, there are a series of inlets and pipes at the intersection of Iowa Street and Harvard Road that flows to the west down Harvard Road.

City Staff would like to reconstruct the roadway along this stretch of Iowa Street within the existing right-of-way. In addition, the City wants to provide center turn lanes throughout the project limits with possibly the exception being at Terrace Road due to topographical constraints of crossing the deep ravine south of Terrace

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Road. From an intersection perspective, the intersections at Bob Billings Parkway/15th Street, University Drive, and Stratford Drive should be reviewed to determine if additional capacity is necessary at these locations.

There has been some discussion regarding the sidewalk/shared use path possibilities along the route. More specifically, the City would like sidewalk on the east side of the project, which is likely to be a challenge as you head south. At a presentation in March to the City Commissioners by Chuck Soules, public comment was received regarding a desire to have a shared use path along this route. After discussions between City Staff and the Bicycle Advisory Board, they determined the feasibility of constructing the shared use path over the ravine area south of Terrace would be cost prohibitive. In addition, Erick Struckhoff from the Bicycle Advisory Committee, expressed some concern about general safety of bicycle use in this area due to the significant number of side roads and driveways. Therefore, City staff has settled on having sidewalks on both sides of the street, which will still create significant challenges crossing the ravine south of Terrace Road.

Finally, the City Staff has had two public meetings to discuss this project. The first meeting was a Public Information Meeting held at the Fire Station near Iowa Street and 19th Street. The second meeting was a presentation to the City Commission where the public was afforded a second opportunity to comment on the proposed improvements. The recurring theme from both meetings is some residents who live in the West Hills area, located off of University Drive and Stratford Road, are very concerned about increased traffic to

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Project Understanding/Approach

their neighborhoods. In short, the City Staff has determined they will work with the neighborhood, separate of this project, to discuss traffic calming measures that could be introduced to help alleviate some of their concerns regarding increased traffic volumes. Therefore, we will not address that issue as a part of our proposal. However, it is important to point out that we have handled several potentially contentious projects successfully in the past, and if necessary, we can provide more information as it relates to a Public Involvement campaign if you deem it necessary.

Based on our understanding of your issues on this project, we feel that the following items warrant further discussion:

- Traffic Modeling
- Plan Issues Along Iowa Street
- Sidewalk Through Ravine Area
- Intersection Design at:
 - Iowa & BBP
 - Iowa & University
 - Iowa & Stratford
- Utility Issues
- Geotechnical Issues
- Construction Sequencing
- Bob Billings Parkway/15th Street Profile Issues

Below is a detailed discussion for each of these items.

Traffic Modeling

To prepare this proposal, we decided to do some preliminary traffic modeling, so we can develop realistic lane configurations and typical sections. Without this information, any discussion regarding the proposed improvements and how they might fit within the existing right-of-way is pure speculation. To begin our analysis, we contacted David Woosley, the City of Lawrence Traffic Engineer. David provided some current traffic count numbers. In addition, we contacted Todd Girdler, who is the Senior Transportation Planner with the Lawrence/ Douglas County Metropolitan Planning Organization, to obtain future traffic projections. On our behalf Mr. Girdler contacted KDOT, who provided the future traffic projections for the year 2030.

With those traffic projections, our traffic engineers created an initial model to determine necessary queue lengths at the intersections, as well as necessary lane configurations at the intersection of Iowa Street and Bob Billings Parkway/15th Street. They modeled both the existing conditions as well as the future requirements for 2030. Based on the modeling, our traffic engineers determined the following lane configurations and lengths for the 2030 traffic projections and a Level of Service 'C':

Iowa Street:

- Dual Left Turn Lanes, Two Through Lanes, and a Right Turn Only Lane in Each Direction.
- Northbound Dual Left-Turn Lanes 250 feet
- Northbound Right Turn Only Lane 250 feet
- Southbound Dual Left-Turn Lanes 250 feet
- Southbound Right Turn Only Lanes – 275 feet

Bob Billings Parkway/15th Street:

- One Left Turn Lane, Two Through Lanes, and a Right Turn Only Lane in Each Direction.
- Eastbound Left Turn Lane 225 feet
- Eastbound Right Turn Only Lane 200 feet

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- Westbound Left Turn Lane 175 feet
- Westbound Right Turn Lane 175 feet

Generally speaking, we will be adding a right turn only lane to the eastbound and westbound legs of Bob Billings Parkway/15th Street, as well as the southbound leg of Iowa Street. The dual lefts on lowa could be placed on the existing pavement surface by removing the striping that is adjacent to the existing left turn lanes. The biggest challenge from a geometry standpoint will be to reconstruct the westbound leg of Bob Billings Parkway/15th Street to a distance far enough to the east to provide the desired lengths. The expansion of this intersection will be discussed in more detail later in the proposal.

Plan Issues Along Iowa Street

City Staff has indicated they would like to construct the improvements within the existing right-of-way, which varies from about 80 feet wide to about 112 feet wide through this stretch of Iowa Street. There are a couple issues which will drive whether or not the proposed improvements can be constructed with the existing right-of-way. First, we need to evaluate whether or not there will be significant profile changes. For this project, we have cut a profile based on the City contours and reviewed the existing 'K' values. On Iowa Street, the 'K' values are sufficient for a 45 mph design speed. Therefore, we do not see any substantial required changes for the profile along lowa Street. The second item that will determine if the proposed improvements can be constructed within the existing right -of-way is the typical section. The number

of driving lanes, sidewalk widths, and sidewalk locations will determine if the typical section fits or not.

Typical Section Discussion

Since we have eliminated significant revisions to the existing profile, we will discuss how the typical sections might impact being able to construct the improvements within the right-of-way. For the purposes of laying out the typical sections, we are proposing using 11-feet wide lanes, which are the same widths of the lanes we designed for both the Kasold Drive projects. In addition, since City Staff and the Bicycle Advisory Committee concluded that building a 10-feet wide shared use path is not feasible, we have shown 6-feet wide sidewalks on both the east and west sides. Next, we are proposing a ¼-inch per foot cross slope on the pavement. Based on our recent experience with the Kasold Drive, Clinton Parkway to 31st Street project, we know that KDOT will not allow a cross slope steeper than 3.0%, as dictated by the AASHTO Policy on Geometric Design of Highways and Streets, a.k.a. "The Green Book". Finally, we are showing a 10-inch non-reinforced dowel jointed (NRDJ) concrete pavement constructed on 9inches of fly ash treated subgrade with 4inch edge drains on each side. The pavement thickness and material will be furthered defined during the design process, and for now this thickness and material has been used just to create a typical section.

On the following page, **Figure 2** shows three typical sections that will be used throughout the project limits along lowa Street. The top typical section provides a five-lane section that can be used for either a continuous two-way left-turn lane throughout portions of the project or in



IOWA STREET TYPICAL SECTIONS

FIGURE 2

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cases of introducing a left turn lane in a median location. With the number of existing driveways and side road intersections, we think the use of a continuous left turn lane throughout the project limits makes the most sense. Therefore, we do not envision any locations where a raised median would be used. The middle typical section shows a five-lane section over the ravine south of Terrace Road. While the Request for Qualifications (RFQ) shows dropping the continuous left turn lane in this area, we decided to keep it to look at a worse case scenario in terms of the grading requirements to construct this section. We will discuss this in more detail in the "Sidewalk Options Through The Ravine" section of the proposal. The other key element to recognize with this middle typical section is the use of KDOT's TL-3 Curb Barrier section between the driving lanes and the proposed sidewalks shown on both sides. This is the same barrier we are using as the solution to cross the 4-cell RCB along the Kasold Drive, Clinton Parkway to 31st Street project. Finally, the typical section at the bottom of the page shows a 7-lane section, which includes room for a right turn only lane, two through lanes, dual left turn lanes, and two more through lanes. This typical section is being proposed for use on either side of Bob Billings Parkway/15th Street. This is the ultimate layout required to handle 2030 traffic volumes. As the pavement exists today in these areas, there is already room for six lanes of traffic, so we are really only adding one more lane with this proposed section. Please note, we did not show a median separator between the dual lefts and the oncoming through lanes. Although "The Green Book" recommends a separator, we choose to eliminate this from the typical section due to width constraints of the existing right-of-way. In

addition, there are multiple intersections around Lawrence that are constructed like the proposed typical section. The closest of those intersections is on Iowa Street at Clinton Parkway, so drivers will have familiarity with this type of configuration, which decreases accidents due to unfamiliar situations.

Most importantly, these are only options considered for the purposes of this proposal. The final solution may be one of the options presented, a combination of some of the options, or a completely new solution uncovered by interactive project meetings between Bartlett & West and City Staff.

Review of Plan Layout Impacts

Based on the typical sections, we have provided a horizontal plan layout, which is shown on the following two pages in **Figures 3A & 3B**. The objective of the drawings is to determine how the proposed improvements need to be constructed so it fits within the existing right-of-way. There are several areas to point out as you review these drawings.

First of all, we have not shown anything south of Bob Billings Parkway/15th Street. There are not really any issues with the proposed improvements falling within the existing right-of-way. In addition, this area is shown in detail later in the proposal under the "Intersection Details" discussion.

Secondly, the sidewalk on the east side is shown along the back of curb or within four feet of the back of curb throughout the entire project limits. The sidewalk is tight to the back of curb between Bob Billings Parkway/15th Street and University Drive primarily due to the topographical constraints as the roadway/sidewalk crosses the ravine. From just south of





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University Drive to the north end of the project at Yale Road, the sidewalk is within one foot of the existing right-of-way line.

Next, the sidewalk on west side of the roadway is very similar to the sidewalk on the east side. The sidewalk is against the back of the curb as it crosses the ravine, and then shifts out from the back of curb and it located within one foot of the existing right-of-way line. The right-of-way line from just south of Orchard Lane to the northerly project tie-in extends out to the west and provides a little more horizontal

separation between the sidewalk and the existing right-of-way line.

Furthermore, there are almost a dozen side road intersections and nearly 30 driveways

located along this stretch of Iowa Street. Most of the driveways provide access to residential properties, but there are a few

that provide access to businesses in this stretch of Iowa Street. According to City Staff, there will not be any driveway consolidation. Probably the most challenging issue with the driveways will be to provide access during construction. To address this issue, we will visit with two contractors during design to discuss this issue to see if there is anything from a design perspective or



construction sequencing plan that we should address. We have provided these kinds of constructability reviews on virtually every project we have completed for the City of Lawrence, including most recently on the *Kasold Drive, Clinton Parkway to 31st Street* project. In addition, while City Staff has indicated they may want to build a 3-lane section on University Drive and Stratford Road, for the purposes of this preliminary exhibit, we have shown them as two-lane roadways as they intersect Iowa Street.

> Finally, one of the concerns we heard from a local resident is from the landowner at the southwest corner of Iowa Street and Terrace Road. She has done some extensive landscaping to shield her property from the thousands of cars per

day that travel on Iowa Street. She has some concerns about losing some of the landscaping buffer she has created. To





address her concerns, we would suggest some individual landowner meetings with her as plans start to develop, so we can try to maintain her landscape buffer in a reasonable manner.

Sidewalk Through Ravine Area

A key component to determining if this project is a success or not is to determine how and/or if sidewalks can be constructed along both sides of the roadway as it crosses the ravine

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Project Understanding/Approach

between Bob Billings Parkway/15th Street and Terrace Road. The existing roadbed includes four lanes of pavement with a sidewalk on the west side only. Each side of the roadway is protected by traditional guard rail, which is no longer generally a very commonly accepted solution in an urban environment. At the edge of the west sidewalk, the slope drops dramatically at about a 1.5:1 slope. On the east side of the roadway, there are a few feet before the slope breaks over at roughly a 2:1 slope. So, the issue is the top of the roadbed is not wide enough to add an additional turn lane and a sidewalk on the east side-without a somewhat unique solution.

For this proposal we have developed four possible solutions to address this issue: cantilevered slab, pier and girder system, retaining wall, and profile reduction. With KDOT's involvement in this project, it will be critical to meeting the schedule to get their feedback early on a proposed solution. These options are discussed in detail below.

Cantilevered Slab

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The first possible solution is to build a cantilevered slab that will contain the necessary sidewalk width. Our initial thought is the cantilevered slab would be constructed directly under the new lowa Street pavement. It would likely require a 2:1 ratio for the cantilever to work appropriately. For instance, if you want a six feet wide sidewalk, then you will need 12 feet of cantilever pavement under the new roadway, which results in a cantilevered slab of 18 feet in width. This cantilevered slab would likely require a toe wall/dead weight at the one edge to help hold it in place. A pedestrian handrail would be required at the edge of the sidewalk. So, if you can imagine a 12-inch thick concrete slab sticking out from under the new pavement so the last six feet of the cantilevered slab could be used as the sidewalk. The outer edge of the slab/ sidewalk would be unsupported, but would also eliminate the need to address additional fill on an already step foreslope.

Pier & Girder System

In this scenario, piers would be constructed at 25-feet intervals along the roadway – one at the back of curb and one at the back edge of the desired sidewalk location. Then a girder system would be poured along with the sidewalk slab to create an almost bridge-like sidewalk system. Again, similar to the Cantilevered Slab option, there would not be any fill under most of the sidewalk as it would be supported by the piers and girders in this option. A pedestrian handrail is planned for the edge of the sidewalk.

Retaining Wall System

This is likely the most conventional solution. A retaining wall will be built at the outside edge of the sidewalk, since it is virtually impossible to construct a fill slope from the proposed back of sidewalk due to the extremely steep grades. Due to the steep foreslopes, we would suggest constructing a standard concrete retaining wall with a traditional footing system to eliminate any potential sliding issues. We are not comfortable that a modular block wall with a shallow footing is a good solution in this case due to the adjacent steep foreslopes. A pedestrian handrail is planned for the edge of the sidewalk.

Profile Reduction

Perhaps the most cost effective solution would be to lower the profile through this area. The sump between Bob Billings Parkway/15th Street and Terrace Road is placed on a relatively long 700-feet vertical

Team

Project Understanding/Approach

curve. So, lowering this Point of Vertical Curvature (PVC) will have impacts from south of the Bob Billings Parkway/15th Street intersection to the north of University Drive. So, due to time, we were not able to take a completely comprehensive look at this potential solution, but at first glance it seems to be a plausible solution. There are a couple issues that would need further evaluation. First, lowering the PVC causes the elevation through the intersection at Bob Billings Parkway/15th Street to be lowered as well. While this could have enormous benefits for the west leg of this intersection, it may also have negative impacts on the east side because it will steepen the slope. Preliminary calculations show this could be as little an increase as 0.5%, which is virtually negligible. Second, based on some discussion with R.D. Johnson staff who are presently working on the waterline on Iowa Street, rock seems to be pretty shallow along lowa Street, perhaps as shallow at 4 feet. Lowering the profile along Iowa Street may create more rock excavation, which is a costly proposition. Through the geotechnical investigation, we will determine the depth of rock to determine the cost impact of lowering lowa Street. Lastly, lowering the profile may result in relocation of LightCore, City and KDOT fiber optic conduits on the east side.

If profile reduction is the chosen solution, it will be critical to minimize the impacts north of University Drive. We feel we can accomplish this by adding an intermediate vertical curve to the profile. One of the biggest reasons to limit the vertical changes north of University Drive is to avoid relocating the brand new waterline R.D. Johnson is currently installing.

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Figure 4 on the next page shows preliminary cross sections at certain

locations between Bob Billings Parkway/15th Street and Iowa Street. If you flip back to **Figures 3A & 3B**, you can see where these cross sections fall in the plan view. As you can see, lowering the profile widens the top of the roadbed and allows you to get a wider typical section constructed in this area without having to deal with the adjacent steep foreslopes.

Cost Comparisons

In discussions with City Staff, you indicated construction of sidewalk on both sides of the roadway in this area will largely be dependent on the cost associated with the construction. So, we have determined preliminary cost estimates for each of the options describe above and compared that to the cost to build a sidewalk in a normal cross section. Keep in mind, these numbers are very preliminary and are based on several assumptions. For instance, in the Pier and Girder option, we had to chose a depth at which the pier would be poured. This depth would have to be verified following a geotechnical investigation to determine the depth of rock. However, these estimates should give you a reasonable appreciation for what it might cost you to construct sidewalk across the ravine.

Potential Solution	Cost
Normal Sidewalk	\$24,000
Cantilevered Slab	\$672,000
Pier & Girder System	\$588,000
Retaining Wall	\$1,188,000
Profile Reduction	\$100,000

Intersection Designs

Based on input from City Staff, there are three main intersections that need to be reviewed to make sure proper lane



Project Understanding/Approach

configurations are provided. These intersections include Iowa Street & Bob Billings Parkway/15th Street, Iowa Street & University Drive, and Iowa Street & Stratford Road. The discussion below will include a separate discussion for the Bob Billings Parkway/15th Street intersection and a combined discussion for the University Drive and Stratford Road intersections.

Iowa Street & Bob Billings Parkway/15th Street

After receiving the City of Lawrence current traffic counts and the future traffic projections from KDOT, we prepared a traffic analysis using the Synchro program. We analyzed several scenarios for this intersection including:

- The existing configuration,
- Using the existing second through lane on Bob Billings Parkway/15th Street as a dedicated right turn only lane,
- Adding a right turn only lane on both legs of Bob Billings Parkway/15th Street,
- Adding a right turn only lane on both legs of lowa Street with one left turn lane,
- Adding a right turn only lane on both legs of lowa Street with dual left turn lanes.

To provide the most appropriate level of service for the 2030 traffic projections, initially it appears the best solution is to add a dedicated right turn only lane on the east and west legs of Bob Billings Parkway/15th Street and to add a right turn only lane to the north leg of Iowa Street and dual lefts at both legs of Iowa Street. This configuration is shown on **Figure 5** on the following page. As shown in the "Traffic Modeling" section, the lengths of the recommended turn lanes are:

Iowa Street:

- Dual Left Turn Lanes, Two Through Lanes, and a Right Turn Only Lane in Each Direction.
- Northbound Dual Left-Turn Lanes 250 feet
- Northbound Right Turn Only Lane 250 feet
- Southbound Dual Left-Turn Lanes 250 feet
- Southbound Right Turn Only Lanes – 275 feet

Bob Billings Parkway/15th Street:

- One Left Turn Lane, Two Through Lanes, and a Right Turn Only Lane in Each Direction.
- Eastbound Left Turn Lane 225 feet
- Eastbound Right Turn Only Lane –
 200 feet
- Westbound Left Turn Lane 175 feet
- Westbound Right Turn Lane 175 feet

While, on the surface, this may seem to be a drastic change from the existing intersection, it is generally no more than adding a new lane for any of the legs of the intersection. More specifically, the changes can be described as follows:

- South Leg of Iowa Street remains virtually unchanged in width. That existing leg is already wide enough to provide the proposed seven lanes of traffic. Essentially the turn lanes would need to be lengthened. In addition, the second left turn lane could be added by revising the existing pavement markings.
- North Leg of Iowa Street will require the addition of the southbound right turn



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only lane. This will likely impact the trees between the existing lowa Street pavement and the adjacent church parking lot on the northwest corner of the intersection. It appears the right turn only lane can be added and still keep the adjacent sidewalk within the existing right-of-way. The proposed second left turn lane can be added by revising the existing pavement markings.

- West Leg of Bob Billings Parkway/15th Street – will require the addition of the eastbound right turn only lane. While the area for the addition of the right turn only lane is wide open, Figure 5 does show the existing eastbound lanes already cross the existing right-of-way. This right-of-way is from the City's GIS, so one of the early steps in the project will be to determine the actual right-ofway along the south side of Bob Billings Parkway/15th Street.
- East Leg of Bob Billings Parkway/15th Street – will require the most work of any of the legs. The only additional lane we are proposing is a westbound right turn only lane. However, if we

issue along this leg is there are two through lanes that merge together. We have also considered the possibility of adding a third lane to the section of 15th Street between Iowa Street and Engel Road. The third lane would be an additional eastbound lane, which could serve two purposes. First the proposed improvements recommend dual left turn lanes from southbound lowa Street and two through lanes heading eastbound on Bob Billings Parkway/15th Street. The additional lane would allow this traffic coming onto eastbound 15th Street more time to merge. Secondly, the additional through lane could become a dedicated right turn only lane into the University of Kansas dormitories. If this is a desirable option for you, we would need to determine how this might fit in with the project budget. This could be done once we can get a clearer picture of the other proposed improvements to see if the addition of a lane on 15th Street fits within the budget.

Iowa Street & University Drive/Iowa Street & Stratford Road

push this lane into the existing green space north of the existing lanes, there is a chance we will be encountering rock excavation, which is located somewhat close to the existing houses at the top of the hill. If we push it south, we will be encroaching

on the University's signs. The biggest change for the intersection is the length of the left turn lane. With this lengthening, we will need to slightly revise the geometry of this leg to get everything to fit. Another potential



For the two intersections at University Drive and Stratford Road, City Staff has suggested an additional lane. After reviewing the preliminary traffic model we prepared, these intersections

can operate effectively as two lane intersections. However, adding a third lane will only improve a driver's ability to make turning movements in these locations. Based on cursory review of the plan layout, it appears a third lane could fit within the existing right-of-way. The

One Team One Goal



Project Understanding/Approach

biggest concern we have with making these three lane intersections is the response we might receive from the folks who live in the West Hills area and raised previous concerns about adding the dedicated center turn lane on Iowa Street.

Based on our preliminary traffic model, there are no other intersections within the project limits that will require modifications.

Bob Billings Parkway/15th Street Profile Issues

In discussions with City Staff, they would like to see the west leg of the **Bob Billings** Parkwav/15th Street intersection be modified to eliminate the steep median between the westbound and eastbound legs. In our discussions, we have noted the fact that if you turn from the northbound left turn lane on lowa Street onto the westbound lanes of Bob Billings Parkway/15th Street, there is a noticeable bump. Eliminating this from the profile would be desirable.

Figures 6A and 6B show plan and profile views for the west and east legs of Bob Billings Parkway/15th Street, respectively. On **Figure 6A**, we have shown the "Existing Profile Right", which is the eastbound lanes and the "Existing Profile Left", which is the westbound lanes. Also on that figure is a proposed profile, and as you can, it is relatively steep, which is due to the surrounding topography. As is shown on the profile view, the existing eastbound and westbound lanes do not

have the same elevation until approximately 77+00 on Bob Billings Parkway. Therefore, we would likely need to reconstruct approximately 650 feet of this roadway to alleviate the original concerns. To help illustrate the differences between the westbound and eastbound lanes, we have cut six cross sections, which are shown on **Figure 6C**.

A significant advantage to reconstructing this portion of Bob Billings Parkway is that this intersection will not



need to be modified a second time when the City proceeds forward with the reconstruction of Bob Billings Parkway at some point in the near future. In addition, this avoids a second set of traffic control devices at the intersection when Bob Billings Parkway is reconstructed.

Similar to the discussion about adding an additional through lane to 15th Street, east of Iowa Street, we will want to get a clearer picture of what

the proposed improvements will be to the lowa Street corridor before being able to determine if the proposed improvements to Bob Billings Parkway can fit within the project budget.

Utility Issues

We have had discussions with each utility company that has facilities within the project limits. In addition, we have studied maps provided by utility companies, we have studied your GIS system, and we have walked the site to obtain a thorough



FIGURE 6A



15th/BOB BILLINGS PKWY. PLAN & PROFILE

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FIGURE 6B



15th/BOB BILLINGS PKWY. CROSS SECTIONS





Project Understanding/Approach

understanding of the utilities in the area. The following discussion is a brief summary of our findings. Obviously, as a part of the design process, we will have all facilities located and surveyed and provide more detailed information regarding the utility locations and our potential impact on them.

City of Lawrence

Water

EST

The City's utility department is in the process of completing a waterline improvements project along Iowa Street, from University Drive to 9th Street. We have obtained a set of the plans for this project and they depict new waterline in the following locations within the Iowa Street project limits:

- 12-inch ductile iron pipe main six feet to eight feet behind the east back of curb line of Iowa Street from University Drive to Oxford Road.
- 12-inch ductile iron pipe main directly under the east back of curb line of Iowa Street from Oxford Road to Yale Road.
- Eight-inch restrained joint PVC crossing Iowa Street inside a 16-inch steel casing south of Orchard Lane.
- 12-inch DIP crossing lowa Street inside a 20-inch steel casing south of Harvard Road.
- Eight-inch restrained joint PVC crossing lowa Street inside a 16-inch steel casing north of Yale Road.

In addition to the main locations listed above, there are several existing service lines and meters that will need to be accounted for through design and construction.

The location of the new waterline improvements along lowa Street is very

similar to the location of the existing waterline along the *Kasold Drive, Clinton Parkway to 31st Street* project. Due to the proximity to the new curb line, underdrain and proposed storm sewer, minor relocations may be necessary to miss new curb inlets. In an effort to minimize or eliminate relocations, we will explore the use of special inlet structures.

Sanitary Sewer

The existing sanitary sewer within the project limits was constructed in the 1950's and 1960's. The City's utility department indicated they do not have condition assessment information available. Prior to developing our scope, we will work with City Utility staff to determine the condition of the existing infrastructure. If the existing infrastructure is in poor condition, City Utility staff may want to replace the portion of their system that would ultimately be under the new roadway. Furthermore, relocations may be necessary to avoid conflict with some of the proposed improvements.

Existing sanitary sewer facilities can be found in the following locations:

- Eight-inch VCP flows east to west under the east bound lanes of Bob Billings Parkway/15th Street, east of Iowa to a manhole on the southeast corner of Bob Billings Parkway/15th Street and Iowa Street.
- Eight-inch VCP crosses diagonally flowing northwesterly from the manhole at the southeast corner of Bob Billings Parkway/15th Street and Iowa Street to a manhole under the pavement at the northwest corner of Bob Billings Parkway/15th Street and Iowa Street.
- Eight-inch VCP flows north under the southbound lanes of Iowa Street from



Project Understanding/Approach

the manhole at the northwest corner of Bob Billings Parkway/15th Street and Iowa Street to a manhole roughly 370' north of the Bob Billings Parkway/15th Street and Iowa Street Intersection.

- Eight-inch DIP flows east to west and crosses Iowa Street roughly 380' south of the intersection of Terrace Road and Iowa Street.
- Eight-inch VCP flows west to east and crosses lowa Street on the south side of Terrace Road.

Storm Sewer

15-inch storm sewer

southbound lanes of lowa Street south of

Parkway/15th Street.

storm sewer draining

south to north on the east side of Iowa

Street to a junction box approximately

Parkway/15th Street. A portion of this is

west crossing Iowa Street approximately

24-inch storm sewer draining east to

24-inch storm sewer draining south to

north crossing Bob Billings Parkway/15th

160 feet south of Bob Billings

160 feet south of Bob Billings

Parkway/15th Street.

Street east of lowa.

under existing pavement.

• 15-inch and 24-inch

draining south to

north under the

Bob Billings

In an effort to learn more about the storm sewer system along Iowa Street, we conducted a site visit, met with the City's Stormwater Engineer, downloaded GIS information, and obtained old Iowa Street Plans. The following is a summary of our findings:

- 24-inch storm sewer draining east to west crossing lowa Street north of Bob Billings Parkway/15th Street. This lines continues down the north side of Bob Billings Parkway/15th Street past the church entrance where it crosses over and continues west under the median.
- 15-inch storm sewer draining the Westwood cul-de-sac drops vertically into a curb inlet on the east side of Iowa Street approximately 160 feet north of Bob Billings Parkway/15th Street.
- 15-inch storm sewer draining north to south behind Iowa Street's east curb line north of Bob Billings Parkway/15th Street.
- 15-inch and 18-inch storm sewer draining north to south under the southbound lanes north of Bob Billings Parkway/15th Street.



• Five-foot by four-foot reinforced concrete box (RCB) draining east to west and crossing lowa Street approximately 580 feet north of Bob Billings Parkway/15th Street. This structure shows up on City GIS as 60" CMP. Our site

visit revealed a five-foot x four-foot reinforced concrete box structure. Old lowa Street plans from 1952 show that the structure was built with that project. We will need to discuss this structure with the City's Stormwater Engineer. The RCB is 20-30 feet deep and would be very costly to replace. Also, it would be nearly impossible to replace without closing lowa Street, which you would like very much to avoid. One alternative to replacing it is to supplement it by boring and jacking a pipe parallel to the existing RCB. The solution will likely depend on



Project Understanding/Approach

the condition of the structure and its remaining life expectancy.

- 15-inch storm sewer draining east to west crossing lowa Street approximately 160 feet north of Terrace Road.
- 15-inch storm sewer draining north to south behind Iowa Street's west curb line. This line crosses Terrace Road and discharges into a ditch that parallels the west side of Iowa Street south of Terrace Road.
- 15-inch storm sewer draining south to north on the east side of Iowa Street. This line runs from a curb inlet on the south side of Harvard to a curb inlet on the north side of Harvard.
- Three-foot by two-foot reinforced concrete box draining east to west crossing Iowa Street approximately 50 feet north of Harvard. This line drains back to the northwest corner of Iowa Street and Harvard and then continues west down Harvard out of the project limits.

During our discussions with City staff, we heard they would like to change the way the existing storm system functions in a couple locations. area may be the special flume inlets we used on the *Kasold Drive*, *Clinton Parkway* to 31st Street project. This special structure has a much shorter flume perpendicular to the curb and functions more like a traditional curb inlet. The new sidewalk on the east side of Iowa Street will likely be adjacent to the flume of the new inlet. If this is the case, we will design the inlets to have a covered flume to prevent pedestrians from falling into the flume.

The second location they would like to change is just north of the existing flume we just discussed. There is a curb inlet that has a 15-inch CMP draining into the top of the structure. This 15-inch CMP drains the Westwood Road cul-de-sac and enters the Iowa Street right-of-way elevated above the top of the curb inlet, which is a very unique situation. Typically, the pipe would drain into the inlet from the back and underground. We are speculating that it was constructed in an elevated and exposed position to reduce the amount of rock excavation. Shallow rock is prevalent in this area. In order to accommodate the new sidewalk that will be added to the east side of Iowa Street, the vertical pipe system will need to

change. We would consider the following three solutions:

1. Construct a junction box on the east side of the new sidewalk. The existing CMP would drain into the east side of the junction box. Water draining from the

CMP would experience a drop down to an elevation that would allow it to flow out the west side and under the sidewalk. This option is the more

First, there is a flume running along the east lowa Street curb line just north of Bob Billings Parkway/15th Street. City staff would like to see this flume eliminated. The



long flume was likely constructed because a normal curb inlet would not work due to a conflict with the fiber optic line on the east side of Iowa. A better solution in this



Project Understanding/Approach

traditional solution but would require extensive rock excavation.

- Cut the existing 15-inch CMP at the top of the rock ledge and allow the water to cascade down the rock ledge on the east side of the new sidewalk. A flume would then be installed under the sidewalk to drain the water from the east side of the new sidewalk to the back of a curb inlet on the west side of the new sidewalk.
- Reroute the flow from Westwood Road to drain north into the open channel that ultimately crosses Iowa Street through the 5'x4' reinforced concrete box. We would have to assess the adverse affects the additional flow would have on the downstream system.

Lastly, in past meetings with City Staff, they have indicated a desire to possibly design arterial roads for a larger design storm. During our design criteria discussion, we will discuss whether we will design to a 10, 25 or 50 year storm event.

LightCore

The City GIS information depicted a fiber optic line behind the east lowa Street curb line the entire length of the project. We spoke with James Risner with the City's Traffic Department, Shoeb Uddin with the Public Works Department and Bobby Kennedy and Kirk Thoelke with LightCore to learn more about the fiber optic facility. The fiber optic line shown on City GIS is actually a group of five ducts – two, 1-1/4" orange LightCore ducts, two, 1-1/4" green KDOT ducts and one, 1-1/4" blue City duct. Based on discussions with Bobby Kennedy, these facilities could range from three to 12 feet deep. Mr. Kennedy explained the ducts in great detail. One LightCore duct is vacant and the other contains a 96-count hybrid fiber. The hybrid fiber is half LEAF fiber and half single mode fiber. Twelve of those 96 fibers are KDOT fibers. If relocations are necessary, KDOT will be financially responsible for relocating their portion of this duct group. More specifically, they will have to pay for 2/5 of the duct relocations and 12/96 of the fiber relocations.

As we write this proposal, the City's duct sits vacant. That is likely to soon change. During discussions with City Staff, they indicated the City is in the process of working with Olsson and Associates to complete an Intelligent Transportation System (ITS) project. Based on discussions with Olsson and Associates, the ITS project will include running a 288count fiber through the City's vacant duct, tying the new fiber in with existing traffic signals, and installing proposed hand holes at the southeast corner of the Oxford Road and Iowa Street intersection and south of the University Drive and Iowa Street intersection. In addition, a closed circuit camera will be installed at the northwest corner of Bob Billings Parkway/15th Street and Iowa Street. This project is scheduled to be complete by the end of the year.

The City may want to consider delaying the ITS project until the geometrics of the lowa Street Improvements have been agreed upon. Delaying the project could be prudent for two reasons:

LightCore indicated they are responsible for relocating the City's vacant duct. LightCore thinks the City would be responsible for relocating their new fiber within the duct.

Team

Project Understanding/Approach

The new geometrics could be in conflict with the existing hand holes or the new hand holes planned to be installed with the ITS project. The City obviously would not want to relocate a brand new fiber optic line or new hand holes. During design, Bartlett & West will review the agreement between LightCore, KDOT, and the City to determine which percentage of relocation each entity is responsible for.

Bartlett & West will design around the duct bank to reduce or completely eliminate necessary relocations. However, if relocations are necessary, we will coordinate with LightCore, KDOT, and City staff to make sure the relocations are designed and funded appropriately. LightCore needs at least three months lead time to have their facilities designed and relocated. Kirk Thoelke will be our contact for LightCore throughout the project.

Westar

EST

Westar has substantial facilities within the project limits. Their main feed for the University of Kansas is located at the intersection of Bob Billings Parkway/15th Street and Iowa Street. They have both underground and overhead facilities at that intersection. From the intersection, their main lines head west down the center of the median of Bob Billings Parkway/15th Street, east along the north side of Bob Billings Parkway/15th Street, and north along the west side of Iowa Street. All of the main lines are aerial as they head west, east and north away from the Bob Billings Parkway/15th Street and Iowa Street Intersection. There are some aerial crossings along Iowa Street to feed some of the side roads to the east.

The scope of this project will include widening of Iowa Street, sidewalks on both sides of Iowa Street, and could include some significant changes to the intersection geometrics at Bob Billings Parkway/15th Street and Iowa Street. Because of narrow right-of-way widths, there is a potential for conflict between the new sidewalk and existing power poles. As we did on the Kasold Drive, Clinton Parkway to 31st Street project, we will modify sidewalk alignments to miss power poles where the right-of-way allows but there may be areas where power pole relocations are unavoidable. Another element of design that could cause power pole relocation is grade change adjacent to the poles. If necessary, we will work with Westar to coordinate grade issues. If relocations are required, Westar needs at least 49 working days to engineer and construct their relocations.

We will need to determine if there is an easement for the Westar facility that existed prior to the roadway easement to determine who has ultimate rights to the corridor. If past plans are any indication, it does not appear the Westar facility is protected by an easement. Regardless, we will verify their easement.

Lastly, there are existing street lights on both the east and west side of Iowa Street. At the beginning of the project we will discuss street lighting with Westar and the City so this is an issue that is addressed up front. It will be important to discuss street lighting with the public and the Commissioners early in the process to get everyone's buy-in.

Southern Star Gas Company

Fortunately, there are no Southern Star gas facilities within the project limits.

Black Hills Energy

We discussed the Iowa Street project with Black Hills Energy personnel. Following

Team

Project Understanding/Approach

our discussion, they sent us maps of their facilities for the Iowa Street Corridor. Starting from the south, Black Hills Energy has a 6-inch main that crosses lowa Street south of KU's Visitor's Center, which is south of the Bob Billings Parkway/15th Street and Iowa Street intersection. This main crosses from the east side to the west side and follows the west curb line to a cluster of valves at the southwest corner of Bob Billings Parkway/15th Street and lowa Street. From this cluster of valves, a 6-inch main heads west following the south right-of-way line for Bob Billings Parkway/15th Street and a 4-inch main crosses Bob Billings Parkway/15th Street and follows the west Iowa Street curb line to the north. The 4-inch main runs north to Yale and is located 7-12' off the west lowa Street curb line. In addition to the main on the west side, a two-inch main runs 6-10' behind the east Iowa Street curb line from Harvard Road to the north side of Yale Road, two-Inch and 4-Inch lines cross Iowa Street where side roads intersect from the east.

AT&T

EBT

AT&T has buried cable on the north side of Bob Billings Parkway/15th Street that crosses lowa Street. Along the west side of Iowa Street, they have a combination of buried and aerial cable the entire length of the project. From just north of University Drive to Yale Road they have buried fiber optic lines in addition to numerous buried cable lines on the west side of Iowa Street. Their facilities on the east side of Iowa Street between Terrace Road and Yale Road consist of a combination of buried and aerial cable and buried fiber optic. As you can see, there will likely be significant relocations needed to accommodate the widening of Iowa Street, new sidewalks and storm sewer.

Sunflower Broadband

Sunflower Broadband has a vault at the southwest corner of Bob Billings Parkway/15th Street and Iowa Street. From the vault, they have two coaxial cables and a fiber optic line heading south, west, and to the power pole roughly seven -foot away. All of their facilities north of the power pole at the southwest corner of Bob Billings Parkway/15th Street and Iowa Street and within the project limits are aerial.

Geotechnical Issues



On recent projects we have designed for the City of Lawrence, including *Kasold Drive, Clinton Parkway to 31st Street* and *25th Terrace, O'Connell to Franklin Road*, the City has only had us drill borings to determine rock depths. On those projects, the threat of rock at shallow cuts was very limited. On this project, geotechnical expertise is likely to play a more significant role for a few reasons.

First, when we were walking this project in the field preparing to develop this proposal, we talked with a R.D. Johnson staff member who is currently working on the waterline installation along Iowa Street. He indicated rock is pretty shallow on this project – four to five feet deep in several locations. In addition, he mentioned the existing pavement thickness varied quite a