



**NOTICE OF OPEN WORK SESSION  
OF THE CITY COUNCIL OF THE CITY OF  
NORTH KANSAS CITY, MISSOURI,**

**January 5, 2021  
6:00 PM**

**As a precautionary measure during the Covid-19 Pandemic, this meeting will be held virtually, with the Mayor, City Council members and City staff joining the meeting through an on-line platform.**

The tentative agenda of this meeting includes:

**1. Call Meeting to Order**

**2. Alternatives for Armour Road Complete Street Improvements** 

At the conclusion of the September 22 special City Council meeting, the City Council directed staff to examine a list of possible adjustments to the Armour Road Complete Street project based on community feedback. Alternatives were presented to the City Council at a work session on December 15, 2020. The January 5 work session is a continuation of that discussion. The staff memo indicates several items upon which there was City Council consensus, and presents options for others upon which further direction is needed.

**3. Adjournment**

This open work session of the City Council of the City of North Kansas City, Missouri, has been duly called pursuant to the provisions of Section 2.04.030 of the Code of the City of North Kansas City, Missouri, by the undersigned Mayor of the City of North Kansas City, Missouri.

***DONE*** this 31<sup>st</sup> day of December 2020, at 5:00 p.m.

A handwritten signature in black ink, appearing to read "Don Stielow", written over a horizontal line.

Don Stielow, *Mayor*

Representatives of the news media may obtain copies of this notice by contacting:

Crystal Doss, City Clerk, City Hall  
2010 Howell Street  
North Kansas City, Missouri 64116  
Telephone No. (816) 274-6000

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# MEMORANDUM

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**TO:** Mayor and City Council  
City Administrator

**FROM:** Sara Copeland, AICP; Community Development Director  
Jay Aber, PE, PTOE; Lead Traffic Engineer, WSP

**DATE:** January 5, 2021

**RE:** Alternatives for Armour Road Complete Street Improvements

At the conclusion of the September 22 special City Council meeting, the City Council directed staff to examine a list of possible adjustments to the Armour Road Complete Street project based on community feedback. That list included geometric improvements such as adjusting turning radii at the Post Office drop boxes, adjusting turning radii at street intersections, and re-introducing the right-turn lane at Fayette; non-geometric improvements such as island landscaping, bike lane pavement markings, and replacing the delineator guideposts; and evaluating signal operation improvements at Iron and Howell to reduce queueing at red lights. Alternatives were presented to the City Council on December 15, 2020. The January 5 work session is a continuation of that discussion.

Staff received the following direction from the City Council at the December 15 work session:

- **Turning radii at Post Office drop boxes:** Council directed staff to move forward with adjusting the markings to ease the entry to the drop boxes for both eastbound and westbound traffic.
- **Turning radii at Iron Street intersection:** Council directed staff to paint the curb noses at Iron yellow to increase their visibility. There was discussion about replacing the curb noses on the two islands on the east side of the intersection instead of replacing all four curb noses, but a final decision on a partial replacement was postponed to the next work session.
- **Right turn at Fayette:** Council consensus was to move forward with re-introducing the right turn lane at Fayette.

- **Landscaping:** Council directed staff to replace the feather reed grasses with lower height plants.
- **Bike lane pavement markings:** Council directed staff to move forward with markings at conflict points along the corridor.
- **Replacing delineator guideposts:** There was consensus to replace the guideposts rather than removing them without replacements. There was general agreement that replacement materials should be highly visible and not too low to the ground. The Council asked for additional information about the BikeRail system, which is described below.
- **Signal operation improvements at Iron and Howell:** The Council requested additional information about adding a left turn signal from eastbound Armour onto northbound Iron Street, which is provided below.

The remaining direction needed from the City Council includes the following adjustments, further described below:

- Turning radii at Iron Street intersection
- Replacing delineator guideposts
- Signal operation improvements
- Phase 2 improvements at Armour and Howell

### **Turning Radii at Street Intersections**

The islands at Armour Road and Iron Street were designed to accommodate turning movements of standard school buses which also closely resemble the turning movements of fire trucks. Modification of the turning radius may ease turning movements at the intersection and help drivers avoid scraping the curb with their wheels.

The proposed modification to the islands at Iron is to enlarge the radius at the end of the islands and construct tapered island ends. A tapered island end slopes down from the center of the island towards the end of the island so that if a driver does hit the island with their wheels, the jolt to the vehicle is reduced. Figure 1 and Figure 2 show a layout of proposed modification to the islands at Iron Street and an example photo of a tapered median island nose.

Modifications to the islands at Iron Street are estimated at \$10,000 per island, for a total of \$40,000 to reconstruct all four islands at the Iron Street intersection. If this design is preferred, it may also be incorporated into future intersection improvements along the corridor, such as the Phase 2 improvements at the Howell Street intersection.

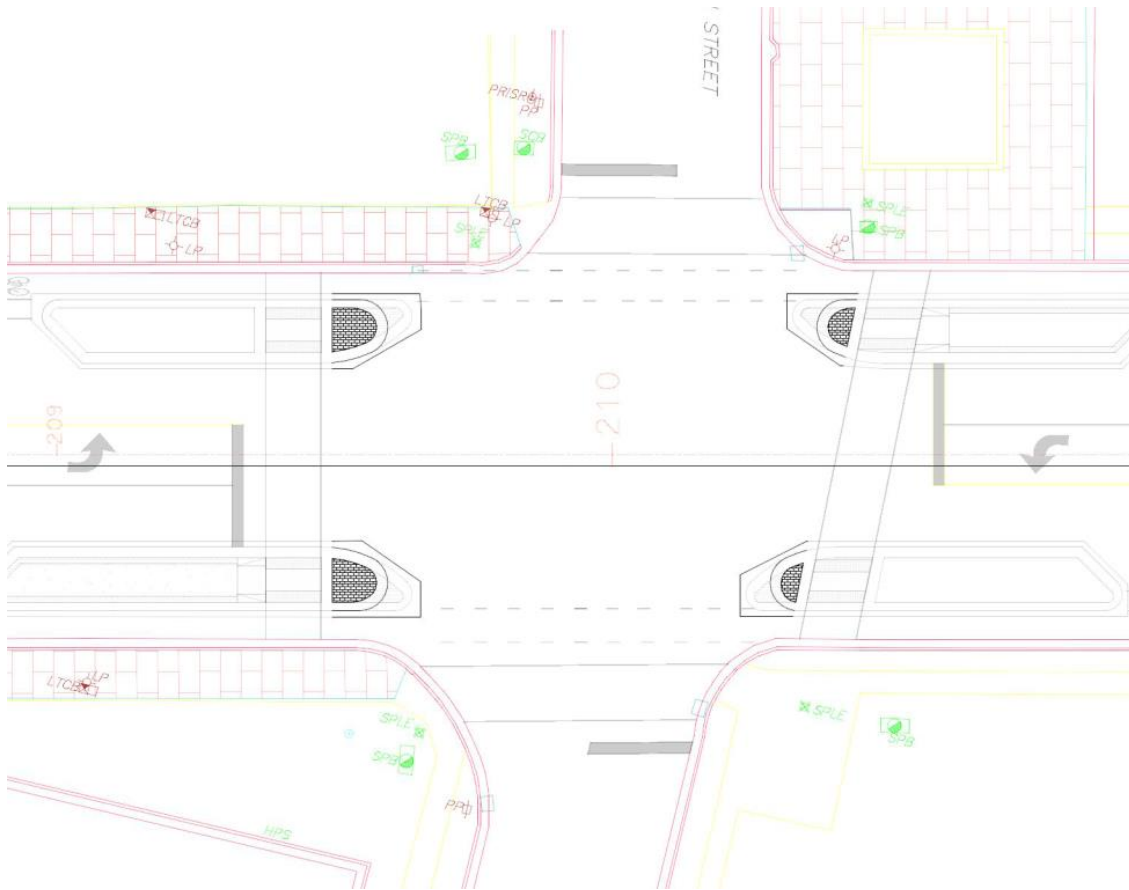


Figure 1: Proposed modification to curb island noses at Armour Road and Iron Street



Figure 2: Example tapered median nose in Overland Park, KS (Image source: Google Earth)



## Replacements for Delineator Posts

The white delineator posts were installed at the conclusion of Phase 1 in order to increase the visibility of the new lane configurations. In some areas, such as at the Howell Street intersection, the delineators outline buffer areas that are planned for upgraded replacement in future phases. The community has clearly indicated that the delineators are undesirable. There are several options to replace the white delineator posts.

## BikeRail System

Council expressed interest in the BikeRail system that was shown with a planter box in the December 15 Council Memo. BikeRail is a modular system of steel rails connected to posts that are anchored to the roadway surface. Rails sit two inches above the road surface to allow for stormwater drainage and have an overall height of seven inches. The rails may be powder coated with a variety of colors and may be topped with a variety of vertical elements, including flexposts or decorative ribbons.



The modular nature of the product also presents an opportunity to reduce the total amount of BikeRail installed by strategically installing alternating sections of BikeRail rather than installing bike lane for the entire distance of a block.

Installation of BikeRail to provide protection for the bike lanes between Linn and Ozark was included as an Add Alternate in the 2019 construction bidding. At that time, the bids received ranged from \$60 to \$130 per linear foot. The many options possible with this product (powder coating, vertical elements, planter boxes, total length) make a more specific cost estimate difficult. If Council is serious about this option, DeziignLine offers a BikeRail Kit that provides 80 linear feet of BikeRail for pilot projects that can be re-used, or staff could work with the company on specific options for pricing.



## Removal with Replacement

The existing delineator posts might be replaced with different barrier elements to encourage proper motor vehicle operations and maintain safety for all users on the street. The greatest need for buffer area protection is at right-turning locations approaching intersections. These are the locations where drivers may attempt to use the buffer area and bike lanes as a de facto right turn lane and collide with cyclists. These areas are also where the greatest sight distance issues would be created by cars parked close to intersections. Based on these concerns, there are three areas where significant bicycle protections are most desirable. These locations include:

- Between Knox and Linn Streets
- Howell Street Intersection
- Gentry Street Intersection

These locations are highlighted in Figure 3 and Figure 4 below.

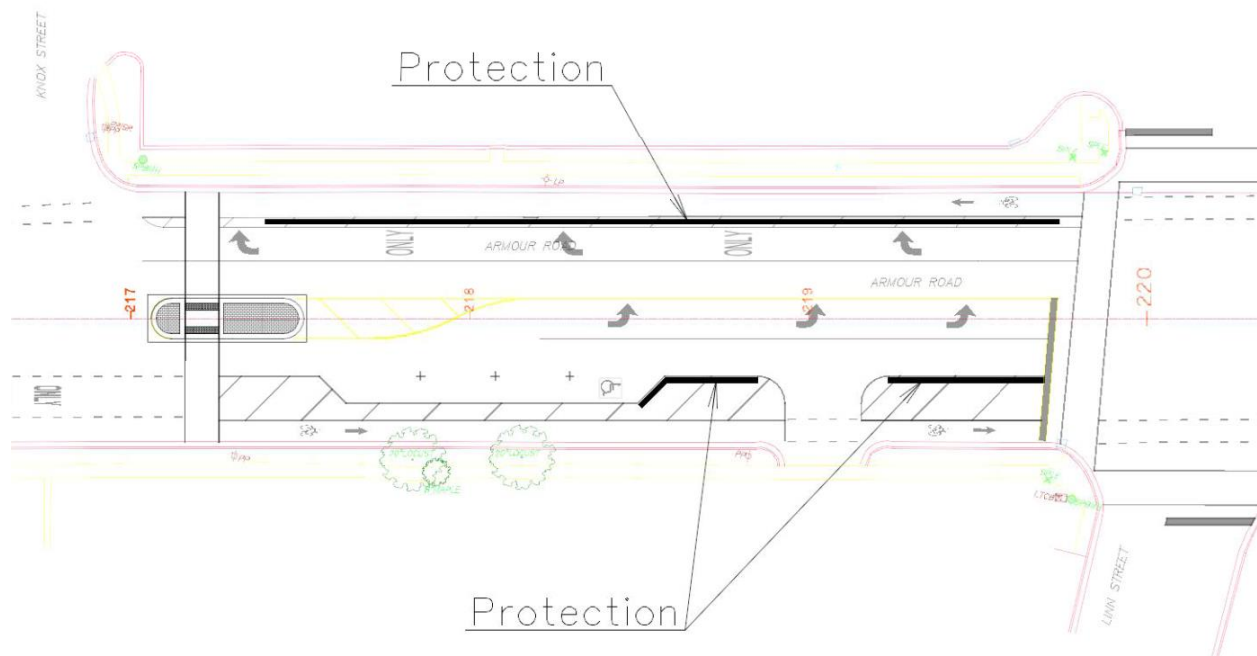


Figure 3: Area of high priority protection between Knox and Linn Street

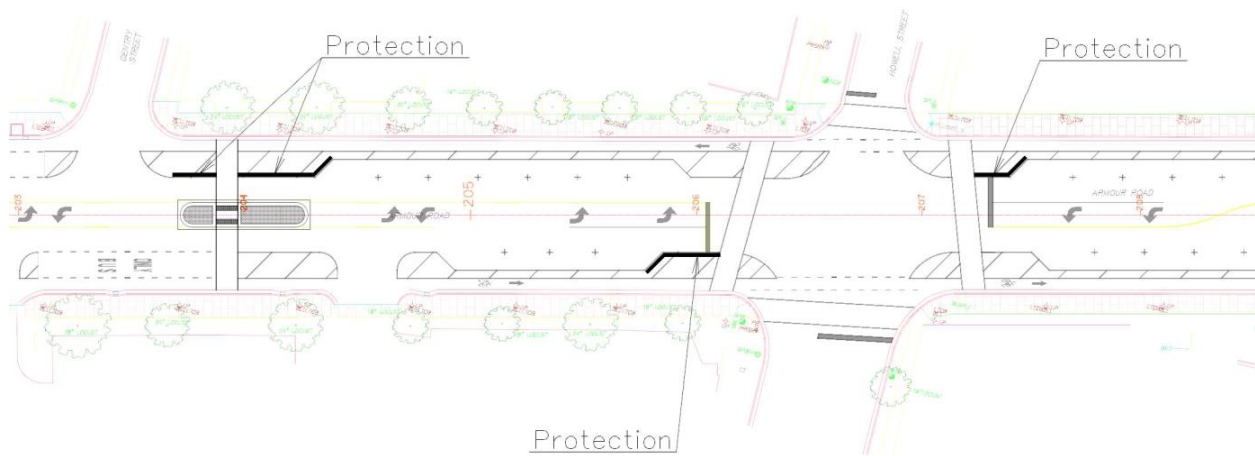


Figure 4: Area of high priority protection at Gentry and Howell Street

### Protection Replacement Options

Many options exist for bike lane/buffer area protection. Two different solutions are likely necessary to provide protection along Armour Road. On the north side of Armour between Knox and Linn Streets, the bike lane has a narrow buffer that will require a narrow, linear solution. The buffer areas at Gentry, Howell, and on the south side of Armour between Knox and Linn Street can accommodate wider spot treatments (such as large concrete features like planter boxes).

Several options exist for the narrow linear protection needs between Knox and Linn Street. Representative pictures of these options are shown in Figure 5. The preferred options include:

- **Wheel stops intermixed with flexible delineators.** This alternative is not preferred aesthetically but would provide good protection for cyclists at a relatively low cost.
  - Approximate cost: \$12,000 for Knox to Linn segment (\$50/linear foot)
- **Bumps.** This alternative is more aesthetically pleasing and provides good protection for cyclists with a cost similar to concrete wheel stops.
  - Approximate cost: \$12,000 for Knox to Linn segment (\$50/linear foot)
- **Cast-in-place/Pre-cast Curb.** This alternative is more aesthetically pleasing and provides the best protection for cyclists. However. The cost is higher than other options.
  - Approximate cost: \$18,000 for Knox to Linn segment (\$75/linear foot)
- **Wave Delineator.** This alternative is visually unique provides good protection for cyclists. However, it is the most expensive because it is a proprietary product.



- Approximate cost \$32,000 for Knox to Linn segment (\$130/linear foot)

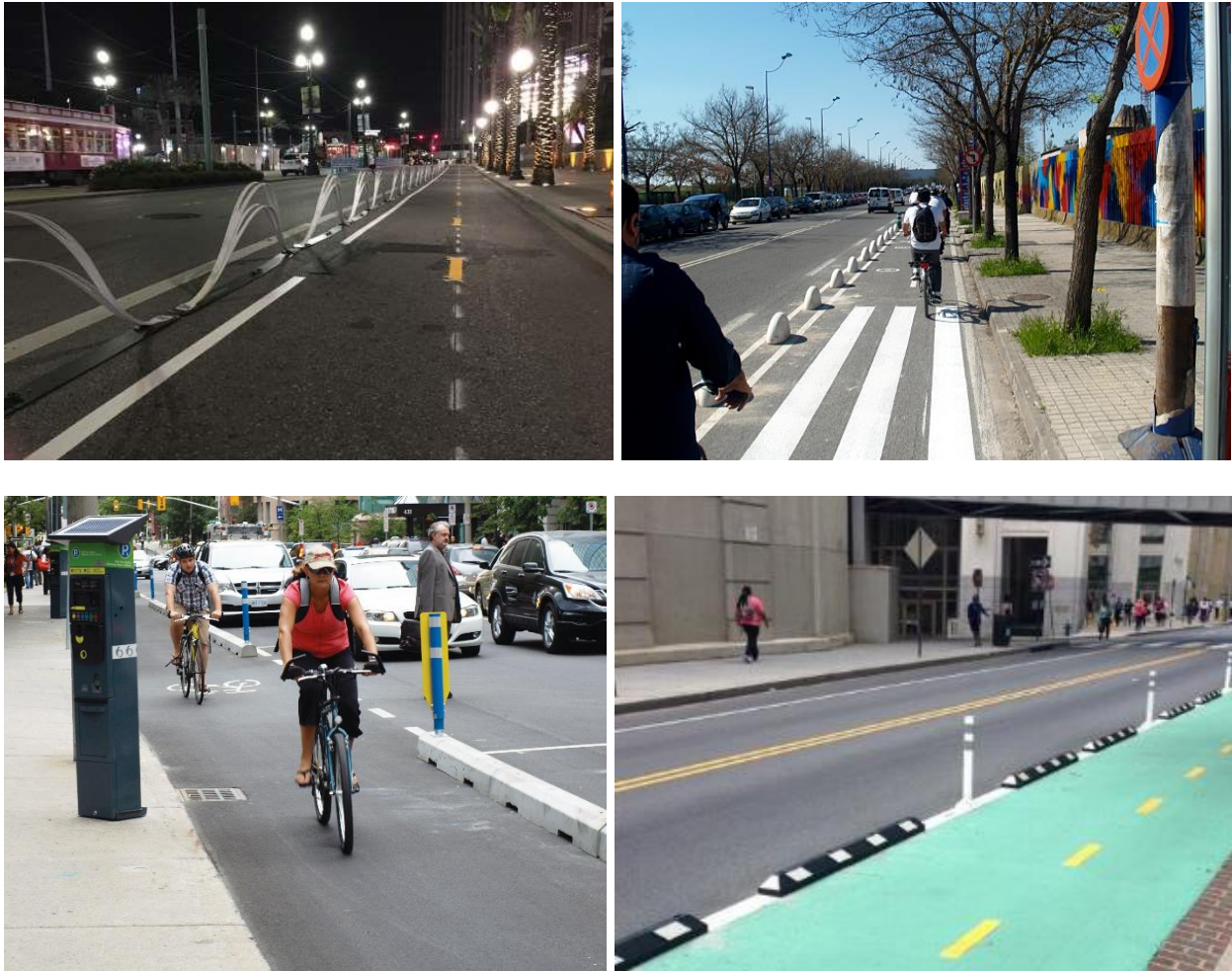


Figure 5: Representative photos of linear bike protection options. Top left: Wave Delineator, top right: bumps, bottom left: pre-cast curb, bottom right: wheel stops (Picture Source: Saris, People for Bikes, WSP)

For the wider buffer areas, there are more options. All of the alternatives for the linear area are also possible alternatives for buffer areas. Other options also exist, and artistic options could be included as well. Artistic options would need to be carefully considered because of the possibility that the objects may be struck by a vehicle and replacement costs may be a concern. Any objects placed in the buffer area should maintain a total overall height of less than 2.5-feet tall to avoid sight distance issues and be placed a minimum of 2-feet from the edge of the motor vehicle travel lanes. Representative pictures of these options are shown in Figure 6. The preferred options include:

- **Curb Islands.** Curb islands were installed at Armour Road and Iron Street as part of Phase 1 improvements. This option is the most aesthetically pleasing and provides the best protection. However, it is the most expensive.
  - Approximate cost: \$380,000 for areas at Howell, Gentry, and Linn (approximately \$54,000 per island)

- **Planter boxes.** Several proprietary planter box solutions exist that provide good aesthetics and good protection. Cost is high for this option and it requires ongoing maintenance of the plantings including yearly re-planting of annuals and continuous watering throughout the growing season.
  - Approximate cost: \$30,000 for areas at Howell, Gentry, and Linn (approximately \$2,000/box)
- **Limestone Block** (or other stone block). This alternative entails simply placing large cut limestone (or other stone) blocks in the buffer areas. These blocks have a modern aesthetic appeal that may fit well with the modern landscaping and other artistic elements along Armour but may not be viewed as aesthetically pleasing to some residents. Cost is minimal for this option.
  - Approximate cost: \$15,000 for areas at Howell, Gentry, and Linn (approximately \$225/block)
- **Concrete Spheres.** This alternative entails casting in place or placing pre-cast concrete spheres in the buffer areas. These blocks have a modern aesthetic appeal that may fit well with the modern landscaping and other artistic elements along Armour. Cost is average for this option.
  - Approximate cost: \$23,000 for areas at Howell, Gentry, and Linn (approximately \$350/sphere)



Figure 6: Representative photos of wide area bike protection options. Top left: Concrete spheres; Top Right: planter boxes; Bottom Left: curb island; Bottom Right: limestone blocks. (Picture Source: Street Smarts Design + Build, People for Bikes, WSP)

**Signal Operations between Iron and Howell**

Traffic signal timing on Armour Road is coordinated as part of the Operation Green Light program. As part of Phase 1 of the complete street improvements on Armour Road from Fayette Street to Ozark Street, signal timing was adjusted and travel time studies show that overall, the amount of time required to travel between Burlington and Ozark is shorter than travel times before construction. However, traffic queuing between Howell and Iron for red lights sometimes exceeds the distance between these two signals. Signal timing in this segment of the corridor was studied to identify possible improvements.

Based on the traffic modeling of the network, the existing timing is providing the least queuing and stopping along Armour Road possible for all three volume scenarios. In general, Armour Road experiences good traffic operations and is expected to have good traffic operations well after the COVID-19 pandemic is contained. It appears that the signal timing currently being utilized on the corridor is the most efficient timing plan. However, the close spacing of the traffic signals at Howell Street and Iron Street will continue to experience intermittent queuing between the signals. Potential options to mitigate the interaction between the intersections are:



- Set the signal timing on Howell such that the light stays green for the north-south movements even if no traffic exists to necessitate that green time. This change would facilitate proper signal coordination between the signals and reduce the instances of the Howell Street signal turning green before the Iron Street signal. This option will largely mitigate queuing between the signals but may reduce slightly increase travel times along Armour Road. This option has no additional cost.
- Add signal detection for the westbound traffic at Howell Street and Iron Street (none exists today) to allow different signal timing strategies to extend the north-south green time on Howell when queues have not cleared at Iron Street. This option may reduce queuing issues and cause minimal disruption to overall traffic operations. The cost estimate for this option is approximately \$40,000.

### **Left Turn Signal Cost Estimates**

City Council members indicated that a greater concern was for left turning movements from eastbound Armour onto northbound Iron Street, and requested cost estimates for a new dedicated left signal at this intersection. WSP provided cost estimates for three options:

- **New signal and detection on the existing pole and mast arm.** The lowest cost option is to replace the existing signal head with a new five section signal head on the existing mast arm, with new video detection camera on the mast arm and new signal wiring. This option is not recommended; it is unclear whether the existing pole and mast arm were designed to accommodate the extra load of a new signal head, signs, and detection equipment and so this option may not be feasible. WSP is unable to provide certification regarding the additional load and believes that it is unlikely that any manufacturer would certify the existing pole and mast arm for the additional load. The cost estimate for this option is \$22,000.
- **Replace the eastbound signal pole, foundation, and signal heads.** The medium cost option is to replace the traffic signal pole and mast arm for the eastbound signal with a new mast arm mounted, shared five section signal head centered between the eastbound lane and the left turn lane and a pole mounted three section signal head. This option also includes new pedestrian/bicycle signals and push buttons, one new video detection camera, conduit and wiring. The cost estimate for this option is \$75,000.
- **Replace entire intersection signal infrastructure.** The highest cost option is to replace the signal infrastructure for the entire Armour and Iron intersection. This option would permit the City to update all the signals to provide mast arm mounted four-section signals with flashing yellow turning signals centered on each left turn lane, mast arm mounted three-section signal heads centered on each through lane, and pole mounted three-section signal heads on the side of each pole; four new signal poles and mast arms; a new traffic signal cabinet; new video detection camera system; new

pedestrian and bicycle signals and push buttons; conduit and wiring. The cost estimate for this option is \$285,000.

## **Next Steps**

The adopted Fiscal Year 2021 Budget includes Armour Road Phase 2 improvements, which is planned as improvements to the Howell Street intersection to shorten pedestrian crossing distances, replace delineators by installing landscaped islands similar to those at Iron Street, and decorative crosswalks. There is \$66,575 remaining in the budget for Phase 2 improvements. There are two primary options for improvements to Armour Road in 2021:

- Make adjustments to Armour Road in FY 2021 based on Council direction within the seven categories described above, but defer planned Phase 2 improvements to 2022.
- Make adjustments in FY 2021 based on Council direction within the seven categories described above, and move forward on Phase 2 improvements at Howell Street during FY 2021. Howell Street intersection improvements will incorporate Council direction regarding turning radii and landscaping.

If Council directs staff to advance any of the above improvements that would total more than the amount remaining in this year's budget, a budget amendment will be prepared for consideration at a future Council meeting. Next steps may also include a task order for further engineering services, as outlined in the table below.

## **Summary of Alternatives**

The options above are presented for improvement to Armour Road as a corridor that is safe, serves all users, incorporates sustainable measures, is visually appealing, and is economically vibrant. Cost estimates provided are based on expected costs from contractors<sup>1</sup>. "Next Step" indicates when engineering plans are required for a particular alternative. Table 1 summarizes the improvement options outlined in this memorandum.

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<sup>1</sup> The estimates for the construction and maintenance cost in this memorandum are based on WSP's professional experience and judgment and shall be deemed to represent the company's opinion. WSP has no control over the cost of labor, material, equipment, and other relevant factors that could influence the ultimate construction costs. Thus, our company does not guarantee that proposals, bids, or the actual facility cost will be the same as the estimate of probable construction cost or that construction costs will not vary from its opinions of probable cost.

Table 1: Summary of Improvement Options

Improvement	Alternatives	Next Step
<b>Turning radii at post office drop boxes</b>	Adjust markings to facilitate turning – minimal cost (in-house)	Revise plans for Municipal Services crews
<b>Turning radii at intersections</b>	Replace island ends closest to intersection with tapered island ends – \$40,000	Revised plans for bidding
<b>Right turn lane at Fayette</b>	Shift bike lane to provide right turn lane – \$12,000	Prepare plans
<b>Landscaping</b>	Replace feather reed grass with alternate landscaping – \$4,000	Consult with Municipal Services crews re: in-house capacity
<b>Bike Lane Visibility</b>	Green markings at conflict points only – \$30,000	Use existing plans for bidding
<b>Replace Delineators</b>	<ul style="list-style-type: none"> <li>• Wheel stops with posts (linear area) - \$12,000</li> <li>• Bumps (linear area) - \$12,000</li> <li>• Cast-in-place/Pre-cast curb (linear area) - \$18,000</li> <li>• Wave delineator or BikeRail (linear area) - \$32,000</li> <li>• Curb islands (buffer areas) - \$380,000</li> <li>• Planter boxes (buffer areas) - \$30,000</li> <li>• Limestone block (buffer areas) - \$15,000</li> <li>• Concrete spheres (buffer areas) - \$23,000</li> </ul>	Evaluate possible procurement needs
<b>Iron-Howell Queueing</b>	<ul style="list-style-type: none"> <li>• Set signal timing on Howell to coordinate with Iron traffic – no cost</li> <li>• Install new detection for Iron and Howell westbound traffic – \$40,000</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinate with Operation Green Light</li> <li>• Prepare plans for new detection for bidding</li> </ul>
<b>Left Turn Signal at Armour/Iron</b>	<ul style="list-style-type: none"> <li>• Replace eastbound signal pole – \$75,000</li> <li>• Replace signals for entire intersection – \$285,000</li> </ul>	Prepare plans for bidding



## Minutes of the North Kansas City, Missouri City Council Work Session Meeting of January 5, 2021

The City Council met in work session on Tuesday, January 5, 2021, via an on-line platform at 6:00 p.m. As a precautionary measure during the Covid-19 Pandemic, this meeting was held virtually, with the Mayor, City Council members and City staff joining the meeting through an on-line platform.

The following were present:

Mayor: Don Stielow  
Councilmembers: Bryant DeLong  
Anthony Saper  
Jesse Smith  
Lisa Tull  
Zachary Clevenger  
Rick Stewart  
Amie Clarke  
Tom Farr

Staff Present: Eric Berlin, City Administrator  
Kim Nakahodo, Assistant City Administrator  
Sara Copeland, Community Development Director  
Jay Aber, Senior Traffic Engineer, WSP Engineers

Mayor Stielow called the meeting to order at 6:00 p.m.

City Administrator Eric Berlin stated that at the conclusion of the September 22 special City Council meeting, the City Council directed staff to examine a list of possible adjustments to the Armour Road Complete Street project based on community feedback. A work session was held on this topic on December 15, 2020, and this work session is to continue the discussion and obtain Council guidance on unresolved items.

Mr. Berlin asked Community Development Director Sara Copeland to present this item to Council. Ms. Copeland noted that at the previous work session Council had provided the following direction:

- **Turning radii at Post Office drop boxes:** Council directed staff to move forward with adjusting the markings to ease the

Alternatives for Armour  
Road Complete Street  
Improvements

entry to the drop boxes for both eastbound and westbound traffic.

- **Turning radii at Iron Street intersection:** Council directed staff to paint the curb noses at Iron yellow to increase their visibility. There was discussion about replacing the curb noses on the two islands on the east side of the intersection instead of replacing all four curb noses, but a final decision on a partial replacement was postponed to the next work session.
- **Right turn at Fayette:** Council consensus was to move forward with re-introducing the right turn lane at Fayette.
- **Landscaping:** Council directed staff to replace the feather reed grasses with lower height plants.
- **Bike lane pavement markings:** Council directed staff to move forward with markings at conflict points along the corridor.
- **Replacing delineator guideposts:** There was consensus to replace the guideposts rather than removing them without replacements. There was general agreement that replacement materials should be highly visible and not too low to the ground. The Council asked for additional information about the BikeRail system, which is described below.
- **Signal operation improvements at Iron and Howell:** The Council requested additional information about adding a left turn signal from eastbound Armour onto northbound Iron Street, which is provided below.

Ms. Copeland stated that the remaining direction needed from Council involved the following items:

- Turning radii at Iron Street intersection
- Replacing delineator guideposts
- Signal operation improvements

- Phase 2 improvements at Armour and Howell

Council provided the following direction on these items after discussion:


- **Turning radii at Iron Street intersection:** Council directed staff to paint the curb noses at Iron yellow to increase their visibility.
- **Replacing delineator guideposts:** Council directed staff to replace the delineators with pre-cast curbs.
- **Signal operation improvements at Iron and Howell:** The Council directed that the traffic signal for eastbound Armour Road be replaced with a new traffic signal pole and mast arm to accommodate a new five section signal head centered between the eastbound lane and the left turn lane and a pole mounted three section signal head. This work will include new pedestrian/bicycle signals and push buttons, one new video detection camera, conduit and wiring.

Mr. Berlin said that staff would put together a memo summarizing the Council guidance that had occurred at the last two work sessions, along with the costs involved with that guidance, and seek final direction from Council on proceeding with those items and on whether to proceed to Phase 2 of the project this fiscal year.

Mayor Stielow declared the meeting adjourned at 6:50 PM.

Adjournment

Council Adjourned



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Mayor

Attest:

Council Work Session Minutes  
January 5, 2021  
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City Clerk

Approved this 19<sup>th</sup> day of January 2021.