

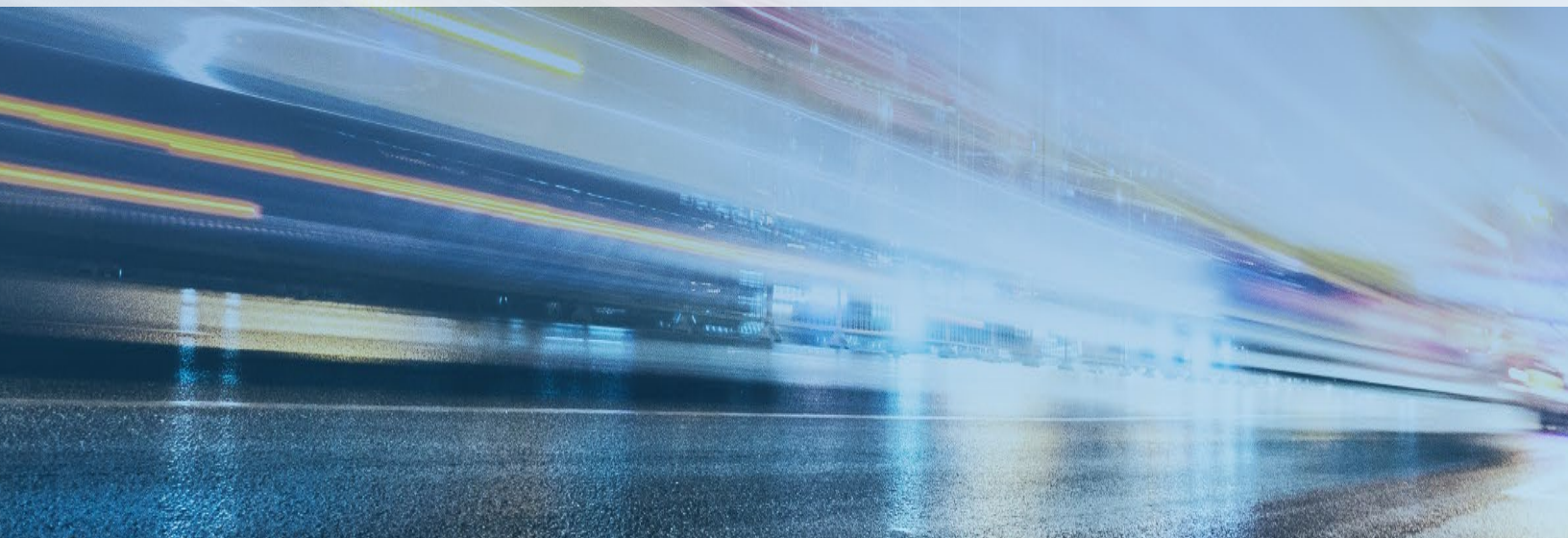
April 26, 2024

LOCALLY PREFERRED ALTERNATIVES REFINEMENT: ENGINEERING FEASIBILITY

SUPPORTING TECHNICAL DOCUMENT



East-West
Transit Study
RideKC



CONTENTS

Introduction	1
Refinement of Constraints	1
Linwood & Main Intersection Options	2
Option 1 – Inside-Running	2
Option 2 – Outside-Running	3
39 th & Main Intersection Options	4
Option 1 – Diverging Alignments with ROW Take	4
Option 2 – Wide Right Turn	5
Option 3 – Offset Center Platform with ROW Take	6
Option 4 – Offset Transit Plaza with ROW Take	7
Vehicle Maintenance Facility Analysis	8
Appendix A: Intersection Concepts	

Locally Preferred Alternatives Refinement: Engineering Feasibility

INTRODUCTION

In May 2023, the Kansas City Area Transportation Authority (KCATA), in cooperation with project partners across state lines, evaluated an east-west, high-capacity transit connection between The University of Kansas Health System and a terminus on the east side of Kansas City, MO. The vision for the East-West Corridor is to create a fast, efficient, and attractive public transit service that connects to existing Streetcar and MAX services. As an economic investment for the greater Kansas City area, the corridor would strengthen the RideKC transit network. Through the study process, which included both public engagement and technical evaluation, the study identified a set of alternatives for evaluation, followed by a preferred alignment and mode, for a high-capacity transit connection.

During the previous phase, a recommended alternative was identified for a streetcar alignment with an eastern segment along Linwood Boulevard from 31st Street & Van Brunt Boulevard to Main Street and a western segment along 39th Street from Main Street to the University of Kansas Health System (UKHS). The segments along Linwood and 39th Street would be new construction, while the segment on Main Street would interline with the Main Street Extension, which is now under construction.

This current effort, Phase 1.5, the Locally Preferred Alternatives Refinement, continues the work of Phase 1 completed in May 2023. It further defines the East-West Streetcar project including the station locations, service plan, local route modifications, ridership, and capital and operating costs. The project engineering team further reviewed engineering constraints at the connection points of the potential east-west corridor with the existing Main Street Extension under construction. The engineering feasibility review is documented within this report.

REFINEMENT OF CONSTRAINTS

For this phase of the project, the project engineering team was tasked with analyzing potential turning movements at two intersections:

- Linwood Boulevard and Main Street
- 39th Street and Main Street

Streetcar turning movements, the location of proposed platforms, potential traffic signal impacts, potential right-of-way (ROW) and/or private property impacts, as well as potential impacts to the Main Street Extension were reviewed for both intersections. The options are presented below without preference, and are numbered for differentiation. The options are illustrated in Appendix A.

Linwood & Main Intersection Options

The proposed movement at this intersection takes the eastern segment of the alignment and turns it south to tie into the Main Street Extension. Both streets are characterized by wide ROW here and the angle of the intersection is favorable to this turning movement. Adjacent buildings are set back from the street. A gentle vertical crest curve on Main Street through the intersection will need to be addressed with profile modifications but does not appear to be insurmountable.

Option 1 – Inside-Running

Overview

This option assumes that the eastbound and westbound tracks on Linwood Boulevard occupy the inside lanes, either in shared-use or exclusive lanes.

Turning Movements

The westbound to southbound move enters the left-turn lane at Main Street and turns south to tie into the southbound Main Street track.

The northbound to eastbound move enters the right-turn lane at Linwood and turns east into the inside lane on Linwood.

A crossover move is possible at the “Costco” intersection between Main Street and McGee Street. If exclusive lanes are used for the alignment, this could operate bi-directionally.

Proposed Platforms

A single shared center platform would be located just west of the “Costco” intersection on Linwood. No new platforms are constructed on Main Street, with the assumption that transfers will occur at the Armour Boulevard stop.

Traffic Signal Impacts

Transit-only phases may not be required at the Linwood & Main intersection. A transit-only phase or flagging would be required at the “Costco” intersection for crossover moves.

Right-of-Way Impacts

At the Linwood Boulevard intersection, right-of-way (ROW) impacts are minimal. Both streets have a wide cross-section and adequate ROW for the turn movements. The curb return at the southeast corner of Linwood & Main would require modification to provide clearance for the northbound to eastbound track.

Main Street Extension Impacts

Approximately 400’ of each Main Street track will require reconstruction at the Linwood intersection to accommodate the turnouts, diamonds, and to flatten the vertical curve. No Main Street platforms are impacted.

Feasibility Summary

The track geometry appears to be feasible for this option. Mitigation of the vertical curves in Main Street and accommodation of the diamond will require careful design at a future stage.

Option 2 – Outside-Running

Overview

This option assumes that the eastbound and westbound tracks on Linwood Boulevard occupy the outside lanes, either in shared-use or exclusive lanes.

Turning Movements

The westbound to southbound move enters the left-turn lane at Main Street and turns south to tie into the southbound Main Street track.

The northbound to eastbound move enters the right-turn lane at Linwood and turns east into the outside lane on Linwood.

A crossover move is possible at the “Costco” intersection between Main Street and McGee Street. If exclusive lanes are used for the alignment, this could operate bi-directionally.

Proposed Platforms

Two new side platforms would be constructed just east and west of the “Costco” intersection on Linwood. No new platforms are constructed on Main Street, with the assumption that transfers will occur at the Armour Boulevard stop.

Traffic Signal Impacts

Transit-only phases may not be required at the Linwood & Main intersection. A transit-only phase or flagging would be required at the “Costco” intersection for crossover moves.

Right-of-Way Impacts

At the Linwood Boulevard intersection, right-of-way (ROW) impacts are minimal. Both streets have a wide cross-section and adequate ROW for the turn movements. The curb return at the southeast corner of Linwood & Main would require modification to provide clearance for the northbound to eastbound track.

Main Street Extension Impacts

Approximately 400’ of each Main Street track will require reconstruction at the Linwood intersection to accommodate the turnouts, diamonds, and to flatten the vertical curve. No Main Street platforms are impacted.

Feasibility Summary

The track geometry appears to be feasible for this option. Mitigation of the vertical curves in Main Street and accommodation of the diamond will require careful design at a future stage.

39th & Main Intersection Options

This intersection features a 90-degree turn from Main Street to a narrow 39th Street ROW. Three of the four corners feature buildings constructed up to the ROW line and sidewalks are narrower without buffers. The profile of the Main Street tracks at this intersection is flatter than at Linwood. Given the narrower width of 39th Street relative to Linwood Boulevard, lane sections in excess of three lanes are not feasible and all options assume outside lanes on 39th Street.

Option 1 – Diverging Alignments with ROW Take

Overview

This option utilizes a portion of the private property south of 39th Street between Main Street and Baltimore Avenue. Turning movements from the Main Street alignment occur within the intersection of 39th & Main. After making the move, the two tracks run in a contraflow configuration for one block, offset to the south side of the ROW, with a shared center platform between them. They transition to typical outside-running shared-use lanes west of Baltimore Avenue.

Turning Movements

The southbound to westbound move turns west through a turnout. After crossing a diamond with the eastbound track, it runs counter-flow for one block within an exclusive lane, following the south ROW line of 39th Street. It then transitions into a westbound shared-use lane at the Baltimore Avenue intersection.

The eastbound to northbound track occupies a shared-use lane on 39th Street up to the Main Street intersection, where it then turns north through a turnout just south of the northbound 39th Street platform. This track will pass through two diamonds, one across the westbound 39th Street track, and one across the southbound Main Street track.

A crossover movement at Baltimore Avenue is possible for eastbound streetcars to return to the west, but not for a westbound to return to the north or the east. A westbound or southbound streetcar would utilize the Westport Road crossover for that return move.

Proposed Platforms

A single shared platform will be located between the eastbound and westbound tracks within the contraflow section between Main Street and Baltimore Avenue along the south side of 39th Street.

Traffic Signal Impacts

A traffic signal would be added at Baltimore. A transit-only signal phase may be required for the southbound to westbound move at Main, and will be required for the transition at Baltimore. A transit-only signal phase may be required for the eastbound to northbound move. The crossover move at Baltimore may also require a transit-only phase.

Right-of-Way Impacts

This option would require acquisition of an approximately 15' wide strip of property along the south ROW line between Main and Baltimore.

Main Street Extension Impacts

Approximately 300 track feet (TF) of the southbound track and 250 TF of the northbound track would have to be rebuilt and realigned. The platforms along Main Street would not be impacted. The crosswalk at the north leg of the intersection would need to be moved north to stay out of the two turnouts.

Feasibility Summary

This option requires three diamonds, two of which feature complex geometry. The stock rails for the diamond across the southbound Main Street track may interact with the southbound to westbound turnout, potentially requiring an expensive custom-built piece of special trackwork. There is also significant reconstruction of both Main Street tracks. Feasibility of property acquisition is unknown at this time but may cause this option to rank behind others that remain within the ROW.

Option 2 – Wide Right Turn

Overview

In this option, both eastbound and westbound tracks occupy exclusive or shared-use lanes on 39th Street. Turning movements occur in the intersection of 39th & Main.

Turning Movements

The southbound to westbound move starts at a left-hand turnout approximately 200' north of the intersection. The streetcar moves into the inside southbound lane, where it proceeds to the intersection and makes the right turn across the southbound Main Street track with a transit-only phase. From there it proceeds west in a center-running exclusive lane on 39th Street. At Baltimore Avenue, a new signal will serve a transit-only phase for the streetcar to transition to a shared-use lane along the north curb.

The eastbound to northbound move transitions from a shared-use lane across the 39th & Baltimore intersection to an exclusive lane between Baltimore and Main. From this lane it makes the northbound turn at Main Street served by a transit-only phase to cross the Main Street southbound track with a diamond and tie into the northbound track before the northbound 39th Street platform.

A crossover movement is possible from eastbound to westbound in the exclusive lanes between Main and Baltimore. A westbound or southbound streetcar would utilize the Westport Road crossover for that return move.

Proposed Platforms

The westbound platform will be located northwest of the 39th & Baltimore intersection. The eastbound platform will be located just southwest of Main Street, between the crossover and the northbound turn onto Main.

Traffic Signal Impacts

A traffic signal would be added at Baltimore. A southbound-only transit signal will halt traffic southbound on Main Street for the southbound turnout north of 39th Street. Eastbound to northbound movements would require a transit signal phase at Main Street. For the crossover move from eastbound to westbound on 39th Street, an eastbound red phase will be required at Baltimore with a green eastbound phase at Main Street to flush out traffic in that block to allow the streetcar to enter the center lane from the exclusive lane and then the streetcar will utilize the same transit only phase westbound at Baltimore as a normal service move.

Right-of-Way Impacts

This option does not impact private property. The curb return at the northeast corner of 39th & Main would require modification to provide clearance for the southbound to westbound track.

Main Street Extension Impacts

The southbound Main Street track is minimally impacted, but the northbound would require significant reconstruction. The Main Street platforms are not impacted.

Feasibility Summary

While this option is contained within the ROW and only features a single diamond, the addition of a second transit signal north of 39th Street introduces a cost and operational complication. This option would require less reconstruction of the Main Street tracks compared to other options.

Option 3 – Offset Center Platform with ROW Take

Overview

This option utilizes a portion of the private property south of 39th Street between Main Street and Baltimore Avenue. Turning movements from the Main Street alignment occur within the intersection of 39th & Main. After making the move, the two tracks are offset to the south side of the ROW with a shared center platform between them.

Turning Movements

The southbound to westbound move turns west through a 20-meter turnout into an exclusive lane for one block, following the south ROW line of 39th Street. It then transitions into a westbound shared-use lane at the Baltimore Avenue intersection to proceed westbound. A traffic signal would be added at Baltimore to facilitate this move.

The eastbound to northbound track occupies an exclusive lane on 39th Street from Wyandotte Street (without signal) up to the Baltimore Avenue intersection, where it moves through a turnout into an off-street exclusive lane. This track will pass across the southbound Main Street track with a diamond before turning north and tying into the Main Street track.

A bi-directional crossover move is possible at the Baltimore Avenue intersection.

Proposed Platforms

A single shared platform will be located between the eastbound and westbound tracks between Main Street and Baltimore Avenue.

Traffic Signal Impacts

A traffic signal would be added at Baltimore. A transit-only signal phase would be required for the southbound to westbound move at Main, and for the transition at Baltimore. A transit-only signal phase may be required for the eastbound to northbound move at Main. The crossover move at Baltimore would require use of a transit-only phase.

Right-of-Way Impacts

This option would require acquisition of an approximately 20' wide strip of property along the south ROW line between Main and Baltimore. The curb return at the northeast corner of 39th & Main would require modification to provide clearance for the southbound to westbound track.

Main Street Extension Impacts

The northbound Main Street track is minimally impacted, but the southbound would require significant reconstruction. The Main Street platforms are not impacted.

Feasibility Summary

This option requires only one diamond. There is also significant reconstruction of Main Street tracks, but less than Option 1. Feasibility of property acquisition is unknown at this time but may cause this option to rank behind others that remain within the ROW.

Option 4 – Offset Transit Plaza with ROW Take

Overview

This option constructs a transit plaza with a shared center platform in the southwest corner of the 39th & Main intersection.

Turning Movements

The southbound to westbound movement would begin in the 39th & Main intersection, turning west into the transit plaza, then transitioning into a shared-use lane at the Baltimore Avenue intersection and continuing west.

The eastbound to northbound movement enters an exclusive lane at Wyandotte Street (without signal) and then enters the transit plaza at Baltimore Avenue. After departing the transit plaza, it crosses the Main Street southbound track at a diamond and ties into the northbound track at the north side of the 39th & Main intersection.

A bi-directional crossover move is possible at the west end of the transit plaza, through the Baltimore Avenue intersection.

Proposed Platforms

A shared center platform would be located between the eastbound and westbound tracks in the transit plaza.

Traffic Signal Impacts

A traffic signal would be added at Baltimore. A transit-only phase would be required for the turning moves at Main Street and for the westbound transition at Baltimore Avenue. Relative to the other options, 39th Street auto traffic would have fewer impacts.

Right-of-Way Impacts

This option would require significant property acquisitions south of 39th Street between Main and Baltimore.

Main Street Extension Impacts

This option would require moderate reconstruction of the northbound Main Street track and minimal reconstruction of the southbound track. The Main Street platforms are not impacted.

Feasibility Summary

The track geometry for this option is straightforward. However, there is significant reconstruction of both Main Street tracks. Feasibility of property acquisition is unknown at this time but may cause this option to rank behind others that remain within the ROW.

Vehicle Maintenance Facility Analysis

The current KC Streetcar Vehicle Maintenance Facility (VMF), located at 3rd & Holmes is undergoing renovations for the Main Street Extension. While it will feature adequate capacity to stable up to 14 vehicles, it will not be able to accommodate further expansion of the fleet. Furthermore, it is located miles from the proposed east-west route and would require deadheading crews and vehicles to the new alignment. To address these concerns, the need for a secondary VMF along the new alignment was identified.

Based on the service plan, the East-West alignment will require 13 new vehicles. The PMT also identified the following goals for the facility:

- Interior space for a minimum of 25% of vehicles.
- One interior position that includes a pit and mezzanine to accommodate regular inspections, pan carbon swaps, and other light maintenance. An overhead crane is optional.
- One interior position with a wash bay.
- Interior administration space for maintenance and operations staff with a break room, restrooms, and other support spaces.
- An exterior laydown area for spare parts storage.
- A pre-engineered metal building of approximately 3,200 square feet for spare parts storage.
- The option to turn vehicles.

Taking these criteria, using a schematic level vehicle maintenance facility layout, approximately three (3) acres is required to house these functions. Several potentially suitable sites were identified along the Linwood segment of the alignment. No suitable sites were identified along the 39th Street segment. Further study will be required to vet these sites and selected a preferred alternative.

APPENDIX A: INTERSECTION CONCEPTS