

EXISTING SIGNALIZED/ADA INTERSECTION EQUIPMENT AND PROPOSED IMPROVEMENTS TECH MEMO **DRAFT**

MAIN STREET & BROOKSIDE BLVD., 51ST STREET TO PERSHING

Purpose

The purpose of this memo is to capture the traffic signal (and associated ADA) improvements that will be needed due to the streetcar expansion south on Main Street.

Project Background/General Configurations –

Existing Configuration: The Kansas City Streetcar is planned to be extended south along Main Street, from its current terminus near Union Station at Pershing Boulevard, to 51st Street / Brookside Boulevard. For much of the Main Street corridor, the existing typical section is six lanes wide with time-restricted left-turns allowed from the inside lane shared with through movements, and time-restricted parking/bus lane on the outside lane. The third outside lane in each direction is rarely used for vehicular capacity, making Main Street essentially a four-lane street.

Proposed Configuration: The plan for the streetcar extension is to generally provide two travel lanes in each direction (with streetcar station-stops and potential parking along the curb), with the streetcar generally running in the outside through lanes (45th Street to 27th Street).

Variations from this general concept are anticipated in three segments:

- 51st Street / Brookside Boulevard to 47th Street / Cleaver II Boulevard: Northbound and southbound streetcars would operate in a dedicated right-of-way on the east side of the corridor.
- 47th Street/Cleaver II Boulevard to 45th Street: Northbound streetcars would run in mixed traffic, while southbound streetcars would run in a dedicated lane in the median.
- 27th Street to Pershing Boulevard: Northbound streetcars would run in mixed traffic, while southbound streetcars would operate in semi-exclusive lanes against the curb.

In the locations where the streetcar needs to transition to and from dedicated or semi-exclusive lanes, separate signal transit phases will be needed to ensure the safe ingress/egress of the streetcar from vehicular traffic.

Types of Improvements

Some of the improvements described in this memo are required directly because of the streetcar project, such as:

- Transit-only phases as noted above.
- Signal poles and equipment currently located in the proposed streetcar alignment that need to be relocated.
- Shifts in traffic lanes due to the streetcar track alignment, or the addition of turn lanes.

In some cases, the design team also recommends taking the opportunity to address existing traffic issues by adding turn lanes (at locations such as the Cleaver II Boulevard and Volker Boulevard intersections).

In addition, several types of modifications are included in this memo due to changes in City policy or design standards from the time each intersection was last improved. Examples of these include:

- Replacing a single diagonal curb ramp on a corner with two perpendicular curb ramps.
- Providing accessible pedestrian push-buttons (distance to curb ramps, provision of turn spaces, and button design).
- Use of flashing yellow arrows (FYAs) for protective-permissive or permissive-only left turns.
- Use of pan/tilt/zoom (PTZ) cameras.
- Use of non-intrusive detection (radar or video).
- Use of Opticom for emergency vehicle pre-emption.
- Replacement of outdated signal controllers. The design team assumes that all signals in the corridor will need to be Model 2070, to maximize communication and coordination opportunities.
- Use of Internally Illuminated Street Name Signs (IISNS) (note that 51st Street / Brookside Boulevard is already equipped with IISNS). Most of the existing mast arm poles not already being replaced for OCS poles (i.e., side street poles) would need to be replaced due to the load ratings with the new IISNS.
- The traffic signal equipment (most notably the poles) will also need to conform to the Main Street streetscape standards between 44th Street and Pershing Boulevard. This includes special pole-base covers and potentially controller wraps as shown at right.



Transit Signal Priority (TSP)

The traffic signal equipment in the corridor will also be affected by the implementation of Transit Signal Priority (TSP), which allows transit vehicles to request a traffic signal controller to modify signal timing or phasing, improving transit system reliability. Exactly which TSP system will be implemented is currently unknown. KCATA is developing, implementing and testing a new TSP system for the Prospect MAX route, and this system may be considered for the Main Street streetcar southern extension. Another implementation possibility would be to extend the approach used on the Downtown streetcar line. A third possibility would be the use of “off the shelf” commercial systems currently on the market. Systems available include decentralized (special hardware at individual signals) and centralized (no hardware at signals) options. Any decisions made about signal equipment and design throughout the corridor must allow integration of TSP. For example, several controllers along the corridor are recommended for upgrade/modernization, and one objective achieved by such upgrades is to ready them for modern TSP systems.

The remainder of this memo describes proposed traffic signal (and associated) improvements intersection by intersection, from south to north. Two tables are attached to this document: Table 1 includes level of service (LOS) analysis results, and Table 2 details the signal improvements in a line-item manner conducive to future cost-estimating.

51st Street

The streetcar will run outside of the street section near this intersection. No improvements anticipated.

49th Street

The streetcar is proposed to run on the east side of Brookside Boulevard outside of traffic. The one-way east leg of the Brookside Boulevard / 49th Street will be closed to reduce streetcar / auto conflicts.

Streetcar-Related Improvements

- **Signal Improvements:** Due to the closure of the east leg of 49th Street, the eastbound signal heads should be changed from green/yellow ball indications to left and right arrow indications.

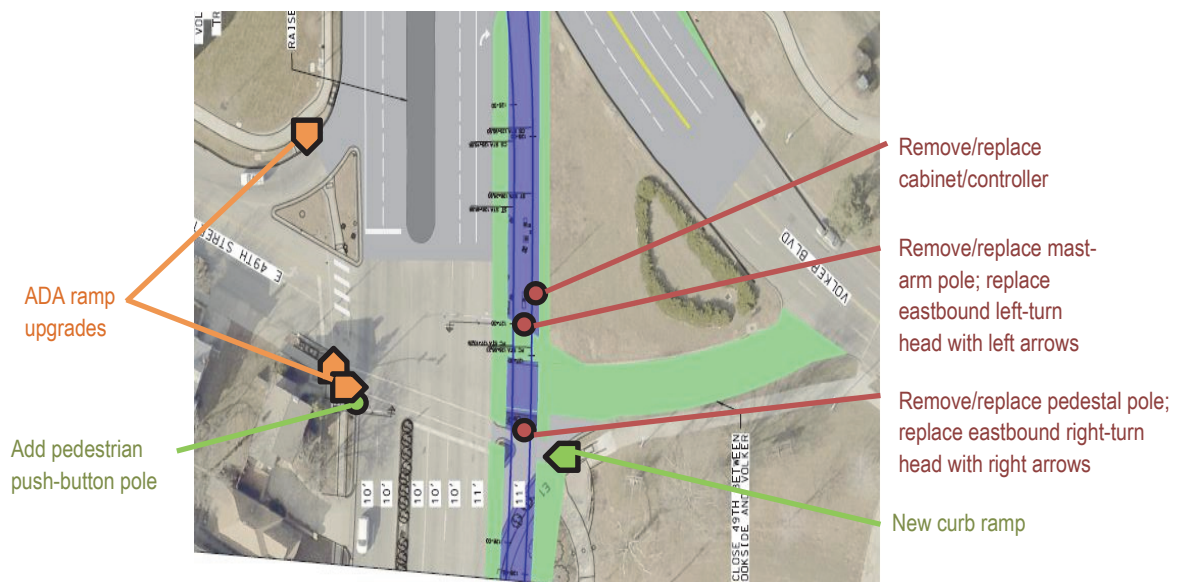
The proposed streetcar alignment would displace the existing signal cabinet and two signal poles on the east side, requiring new locations but also equipment upgrades.

Policy Improvements

- New curb ramps are required in two locations; upgraded curb ramps are required in two locations. All ramps should include detectable warning surfaces (DWS).
- A new pedestrian push-button pole is needed in the southwest quadrant.
- All existing push buttons should be replaced with APS push buttons.
- The existing 5-section head for protective-permissive northbound left is recommended to be replaced with a 4-section head FYA.
- The existing intersection is equipped with Opticom; this functionality should remain.

City Preference Improvements: Non-intrusive detection and a PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/B in 2024 with the proposed reconfiguration and streetcar service in place.



Volker Boulevard

The streetcar is proposed to run on the east side of Brookside Boulevard outside of traffic, except to cross Volker Boulevard. The outside northbound lane of Brookside Boulevard at Volker Boulevard would be converted from a through lane to a right-turn lane. The existing lane widths would be reduced and automobile lanes would be shifted west. A crosswalk would be added to the east leg.

Streetcar-Related Improvements

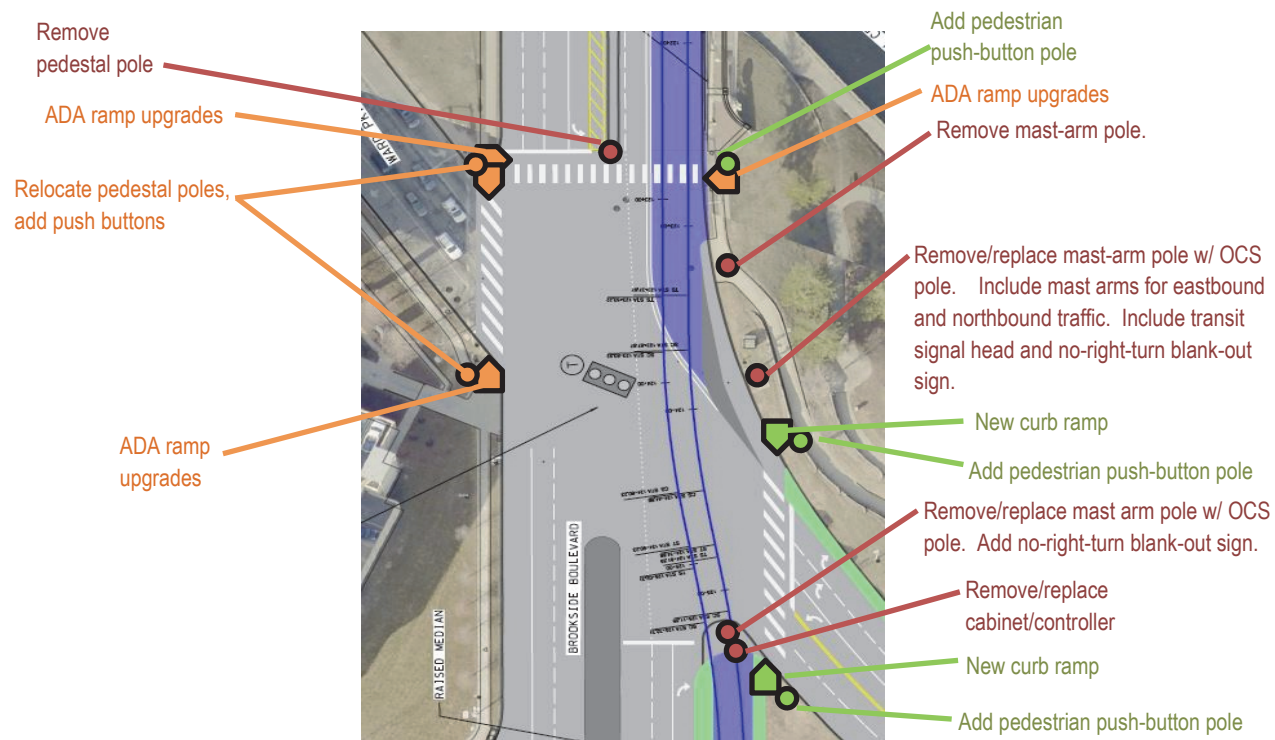
- **Signal Improvements:** A transit phase is needed to allow the streetcar to cross the Volker Boulevard intersection in both directions. The transit phase can run concurrent with northbound and southbound through movements, although northbound right turns must be prohibited during this phase to avoid unexpected conflicts. For the signal cycles in which the transit phase is activated, a blank-out sign should be activated indicating “No Right Turns” until the streetcar phase has finished, at which time the blank-out sign can turn off. For the remaining cycles, northbound right turns can operate in protected-permissive mode (permissive when pedestrians are crossing Volker Boulevard, and protected when westbound left-turns have a green indication).
- The proposed streetcar alignment would displace the existing signal cabinet and three signal poles on the east side, requiring new locations but also equipment upgrades.
- The lane shift will displace the existing pedestal pole in the north median island.

Policy Improvements

- New curb ramps are required in two locations; upgraded curb ramps are required in three locations. All ramps should include detectable warning surfaces (DWS).
- New pedestrian push-button poles are needed in the southeast and northeast quadrants. Relocated pedestrian push-button poles are needed in the southwest and northwest quadrants.
- All existing push buttons should be replaced with APS push buttons.
- The existing intersection is equipped with Opticom; this functionality should remain.

City Preference Improvements: Non-intrusive detection and a PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS D/D and would operate at LOS D/D in 2024 with the proposed reconfigurations and streetcar service in place.



Ward Parkway

The streetcar is proposed to continue running outside of traffic on the east side of Brookside Boulevard, mostly in the area of the existing pavement section, but with some encroachment on the existing sidewalk requiring reconfiguration of the east curb line. The existing median width would be reduced and automobile lanes would be shifted west. A crosswalk would be added to the north leg (resulting in crosswalks on all legs).

Streetcar-Related Improvements

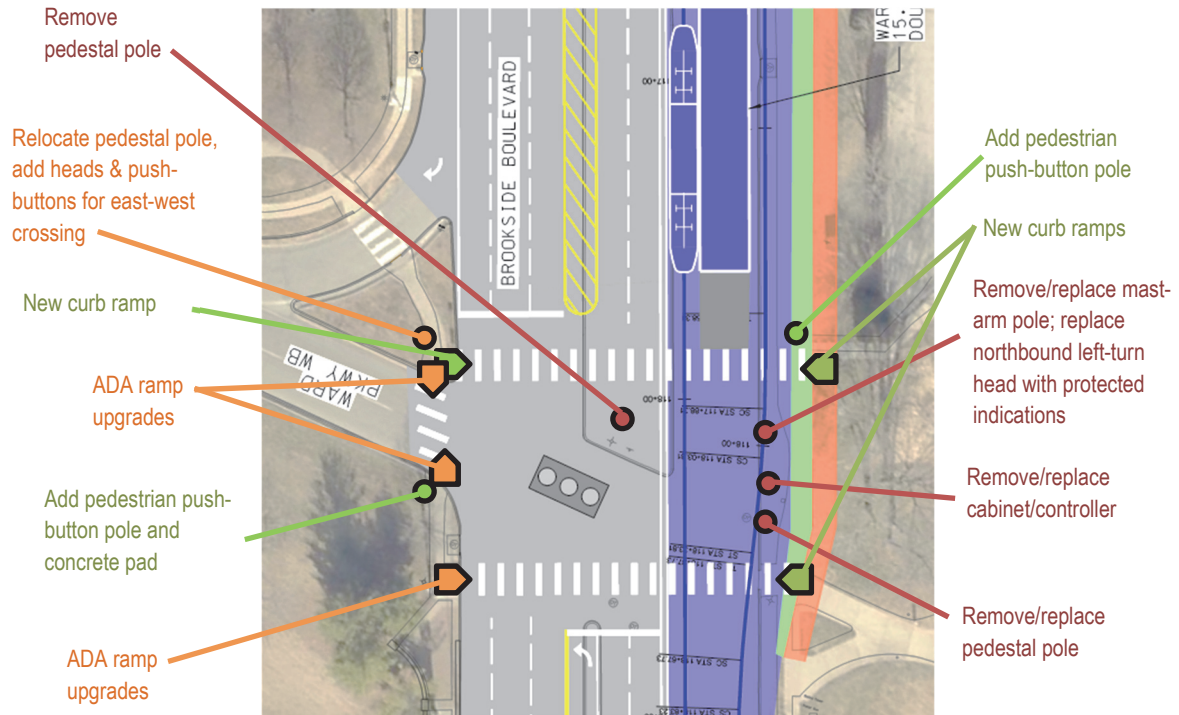
- **Signal Equipment:** The existing signal cabinet and two poles on the east side of the street would be in conflict with the proposed streetcar alignment, and would need to be replaced in new locations with newer equipment and at the appropriate lengths (including covering the shifted northbound left-turn lane). The existing pedestal pole in the north median would need to be removed due to the removal of the median.
- Pedestrian signals need to be added for the new north crosswalk.
- An additional signal head will be needed for southbound vehicles, and the northbound left-turn head will need to be replaced to provide protected operation.

Policy Improvements

- New curb ramps are required in three locations; upgraded curb ramps are required in three locations. All ramps should include detectable warning surfaces (DWS).
- A new pedestrian push-button pole is needed in the southwest quadrant, along with a concrete pad for the existing mast-arm pole for push-button access.
- All existing push buttons should be replaced with APS push buttons.
- The existing intersection is equipped with Opticom; this functionality should remain.

City Preference Improvements: Non-intrusive detection and a PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/A in 2024 with the proposed reconfiguration and streetcar service in place. Further attention should be paid, as design progresses, to potential ways to shorten east-west pedestrian crossing distances.



Cleaver II

The streetcar is proposed to be on the east side of Main Street and outside of traffic south of Cleaver II Blvd. Through the intersection, the streetcar is proposed to enter northbound traffic, while the southbound direction will transition from the median north of the intersection to the east side south of the intersection. The existing northbound right-turn lane and island will be removed, with the right-turn movement proposed to occur from a shared through/right-turn lane. Dual southbound lefts are proposed to aid in signal operations, as opposed to a single left currently, and the existing raised median with the pedestal pole on the south approach for the southbound left is proposed to be removed.

Streetcar-Related Improvements

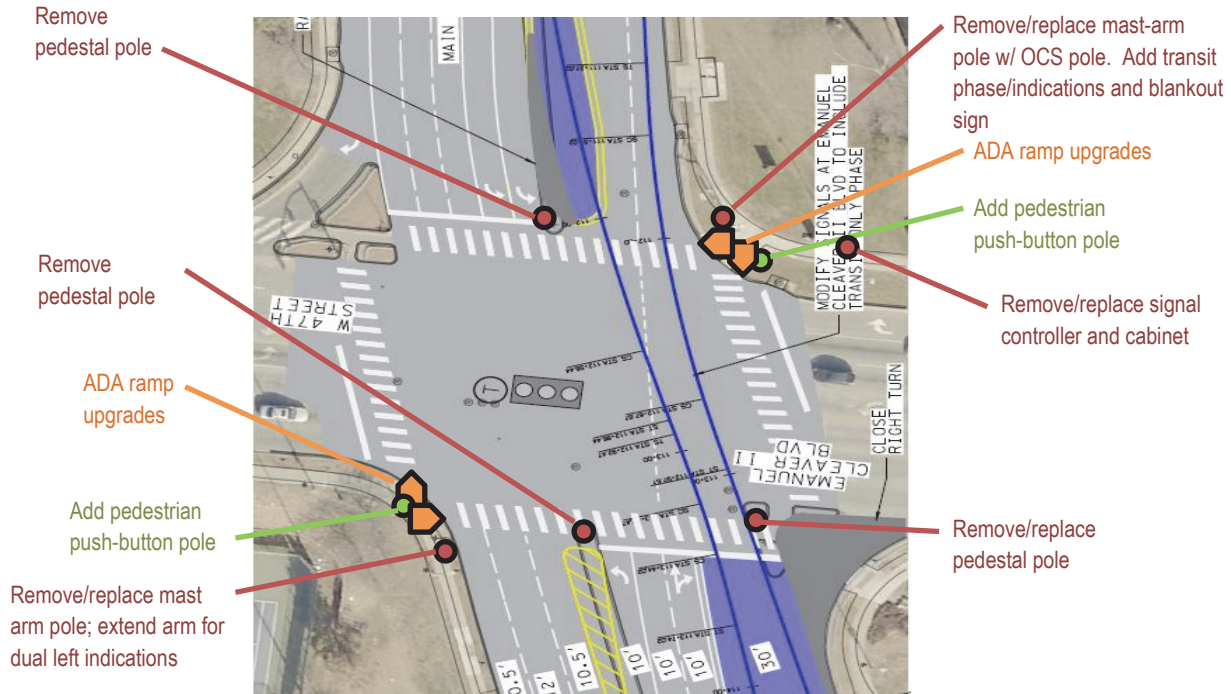
- *Signal Equipment:* A transit phase will be needed for signal cycles when the streetcar is at the intersection for the northbound streetcars entering traffic and the southbound streetcars crossing the northbound traffic lanes. The transit phase may coincide with the southbound through automobile phase only.
- The existing signal pole in the northeast quadrant will need to be replaced with an OCS pole, and the signal pole in the southwest quadrant will need to be replaced to accommodate the dual left signal heads.
- The alignment shift will displace the existing pedestal poles in the north and south median islands. The streetcar will displace the existing pedestal pole in the right-turn island in the southeast quadrant.
- The existing intersection has a PTZ camera, which should be functionally retained. The existing signal controller and cabinet are recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in two locations. All ramps should include detectable warning surfaces (DWS).
- New pedestrian push-button poles will be needed in the southwest and northeast quadrants.

City Preference Improvements: Non-intrusive detection and Opticom may be desired by the City.

Operations: The intersection currently operates at LOS D/D; however, it would operate at LOS D/D in 2024 with traffic growth alone (no streetcar). It would continue to operate at LOS D/D in 2024 with the proposed reconfigurations and streetcar service in place.



HAWK/46th Street

The existing HAWK just north of 46th street is proposed to be removed and replaced with a standard pedestrian signal at 46th Street.

Streetcar-Related Improvements

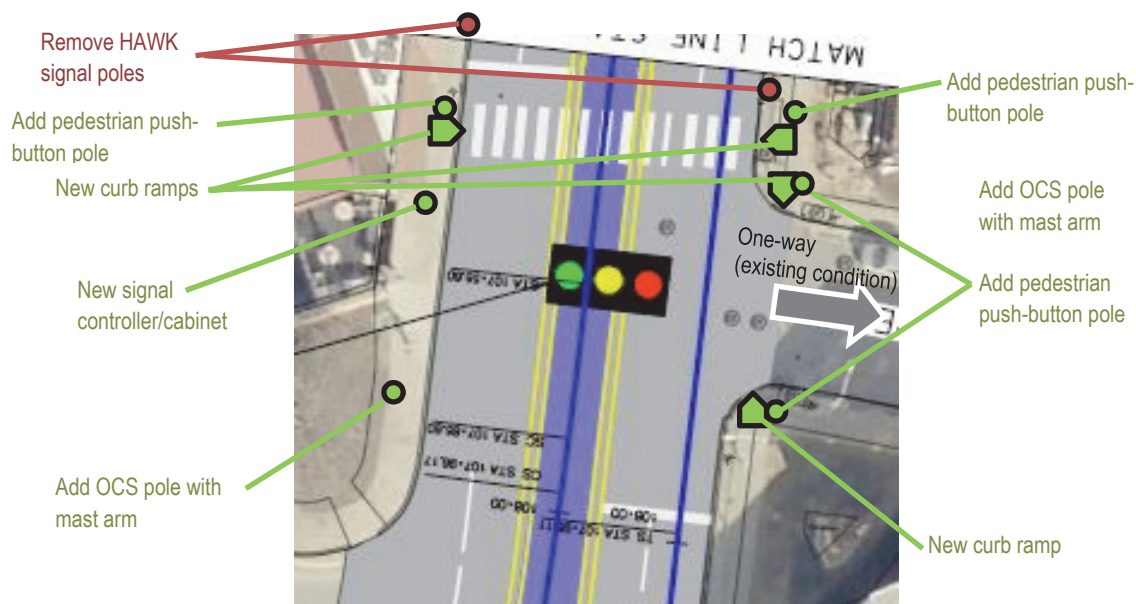
- **Signal Equipment:** Install OCS signal poles on Main. New signal equipment should include a 2070 signal controller in a 332 cabinet and non-intrusive detection.
- Interconnect the 46th Street signal with Cleaver II and 45th Street intersections.

Policy Improvements

- New curb ramps will be needed in three quadrants (southeast, northeast and northwest) for new crosswalks on the east and north intersection approaches. Pedestrian push button poles with APS push buttons should be included.

City Preference Improvements: A PTZ camera and Opticom may be desired by the City.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/A in 2024 with the proposed reconfigurations and streetcar service in place.



45th Street

Northbound streetcars would continue running in mixed traffic in the outside lane, while southbound streetcars would transition to a semi-exclusive guideway through the intersection, from the southbound right-turn lane to the median.

Streetcar-Related Improvements

- **Signal Equipment:** A transit phase would be required for signal cycles during which a southbound streetcar is approaching. The southbound streetcar transit phase could run simultaneously with the northbound through/right-turn movements, but no other movements at the intersection. The northbound left-turn indication (existing protected/permissive) should be red during the transit phase.

The Main Street signal poles will need to be replaced with OCS poles.

One signal face should be removed from the northbound mast arm to match the lanes.

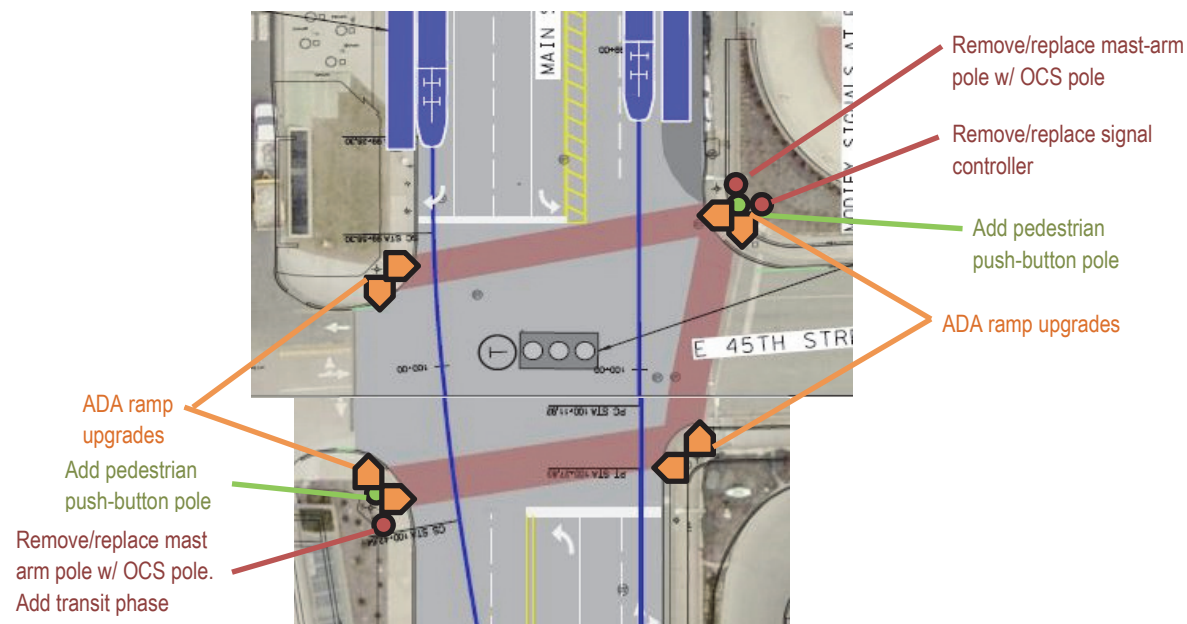
The existing intersection has opticom and video detection, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Two additional pedestrian push-button posts are needed (southwest and northeast) to meet accessibility requirements. Curb-ramp reconstruction is needed on three corners (southwest, northwest, northeast). All existing push buttons (eight total) should be replaced with APS push buttons.

City Preference Improvements: A PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS B/B and would operate at LOS B/B in 2024 with the proposed reconfigurations and streetcar service in place.



43rd Street

The Main Street roadway typical section is proposed to go from a 6-lane section with no exclusive turn lanes and time-restricted parking/bus lanes on the outside to a 4-lane section with streetcar stops and potential parking along the curb north of 43rd street.

Streetcar-Related Improvements

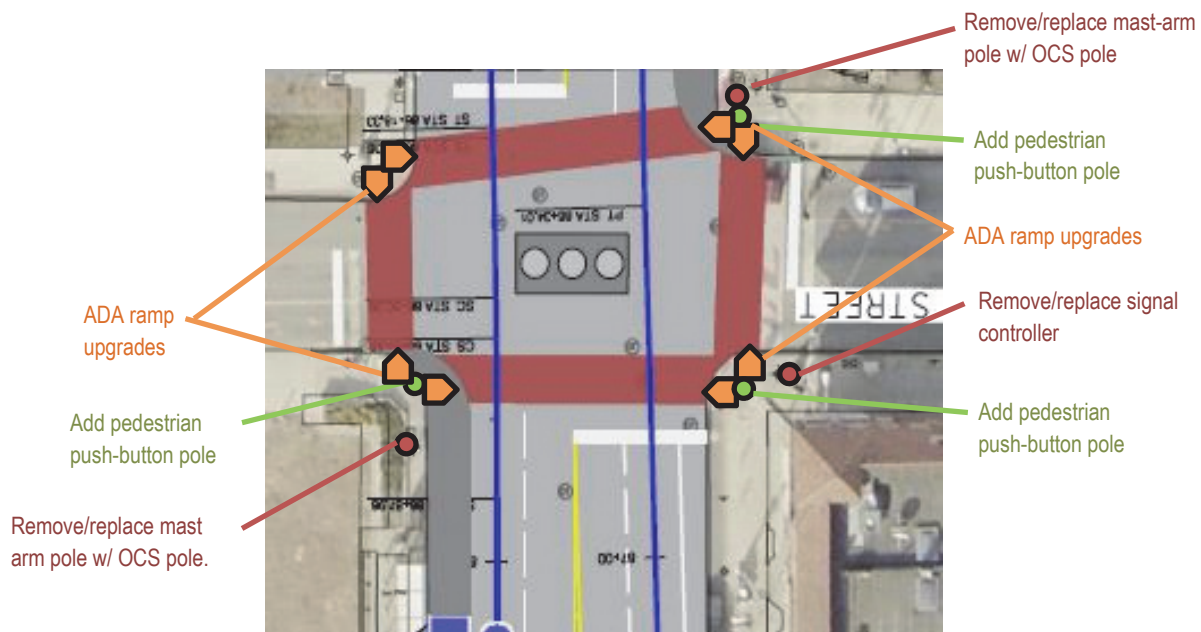
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The outside signal indications should be removed from the northbound and southbound mast arms.
- The existing intersection has a PTZ camera, video detection and Opticom, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in three quadrants (southwest, southeast and northeast). All ramps should include detectable warning surfaces (DWS).
- All existing push buttons (eight total) should be replaced with APS push buttons.
- Existing colored and textured crosswalks may be impacted.
- New pedestrian push-button poles will be needed in the southwest, southeast and northeast quadrants.

City Preference Improvements: None.

Operations: The intersection currently operates at LOS A/B and would operate at LOS B/D in 2024 with the proposed reconfigurations and streetcar service in place. The existing time-of-day left-turn prohibitions should remain.



40th Street

The Main Street roadway typical section is proposed to go from a 6-lane section with time-restricted left-turns allowed from the inside lane shared with through movements, and time-restricted parking/bus lane on the outside lane, to a 5-lane section with left-turn bays.

Streetcar-Related Improvements

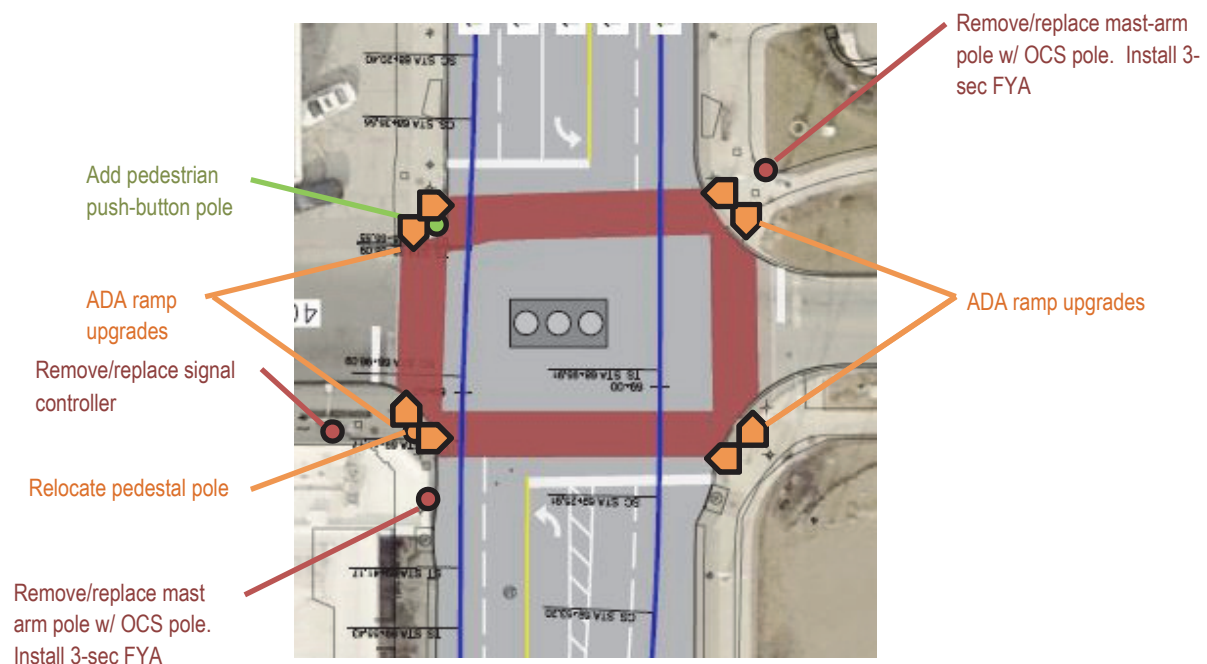
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The mast arms will need to be extended for the exclusive left turn bay, with 3-section FYA's for permissive northbound and southbound left turns.
- The existing intersection has video detection and Opticom, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- Existing pedestrian push button poles may need to be relocated.
- Existing colored and textured crosswalks may be impacted.
- A new pedestrian push button pole may be needed in the northwest quadrant.

City Preference Improvements: A PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/B in 2024 with the proposed reconfigurations and streetcar service in place. The existing time-of-day left-turn restrictions would be removed.



Westport Road

The Main Street roadway typical section is proposed to go from a 6-lane section with time-restricted left-turns allowed from the inside lane shared with through movements, and time-restricted parking/bus lane on the outside lane, to a 5-lane section with left-turn bays.

Streetcar-Related Improvements

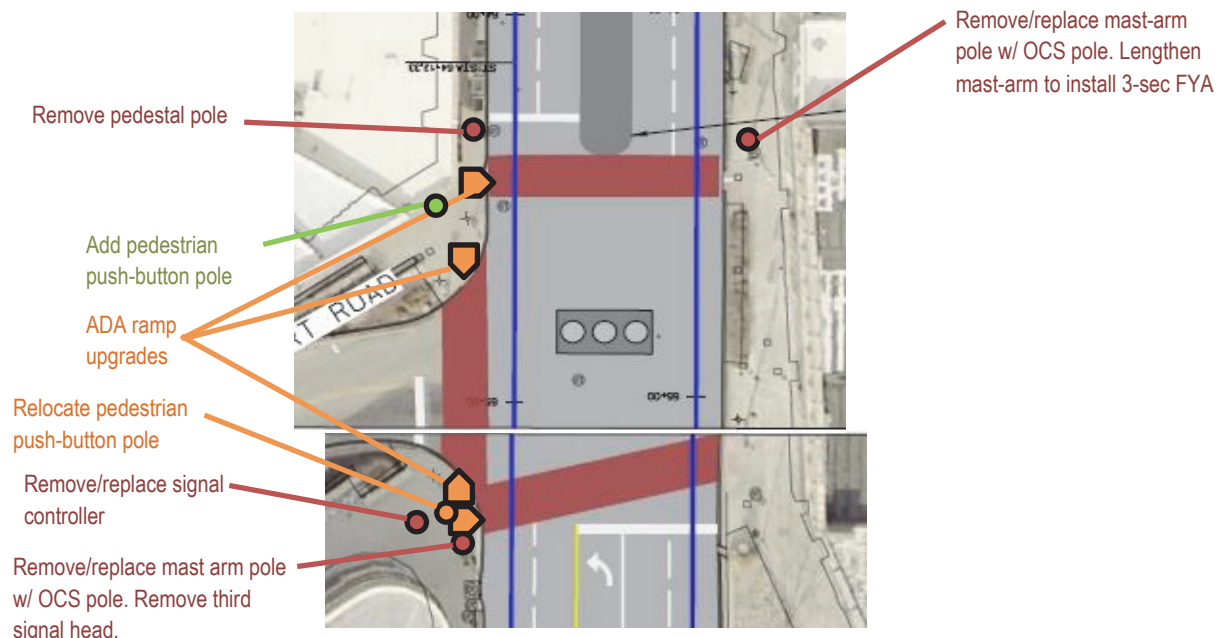
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The mast arm in the northeast quadrant will need to be extended for the exclusive left turn bay, with 3-section FYA's for permissive northbound left turns. The third overhead signal indication should be removed from the pole in the southwest quadrant.
- The existing intersection has a PTZ camera, video detection and Opticom, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in two quadrants (southwest and northwest). All ramps should include detectable warning surfaces (DWS).
- The existing pedestrian push button pole in the southwest quadrant may need to be relocated.
- Existing colored and textured crosswalks may be impacted.
- An existing pedestal pole in the northwest quadrant (with no signal heads or push buttons remaining on it) should be removed.

City Preference Improvements: None.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/A in 2024 with the proposed reconfigurations and streetcar service in place. Time-of-day left-turn restrictions should be removed. An emergency crossover will be installed at this intersection; operations are yet to be determined but may be flagger-based.



39th Street

The Main Street roadway typical section is proposed to go from a 6-lane section with no exclusive turn lanes and time-restricted parking/bus lanes on the outside, to a 4-lane section with streetcar stops and potential parking along the curb north of 39th street.

Streetcar-Related Improvements

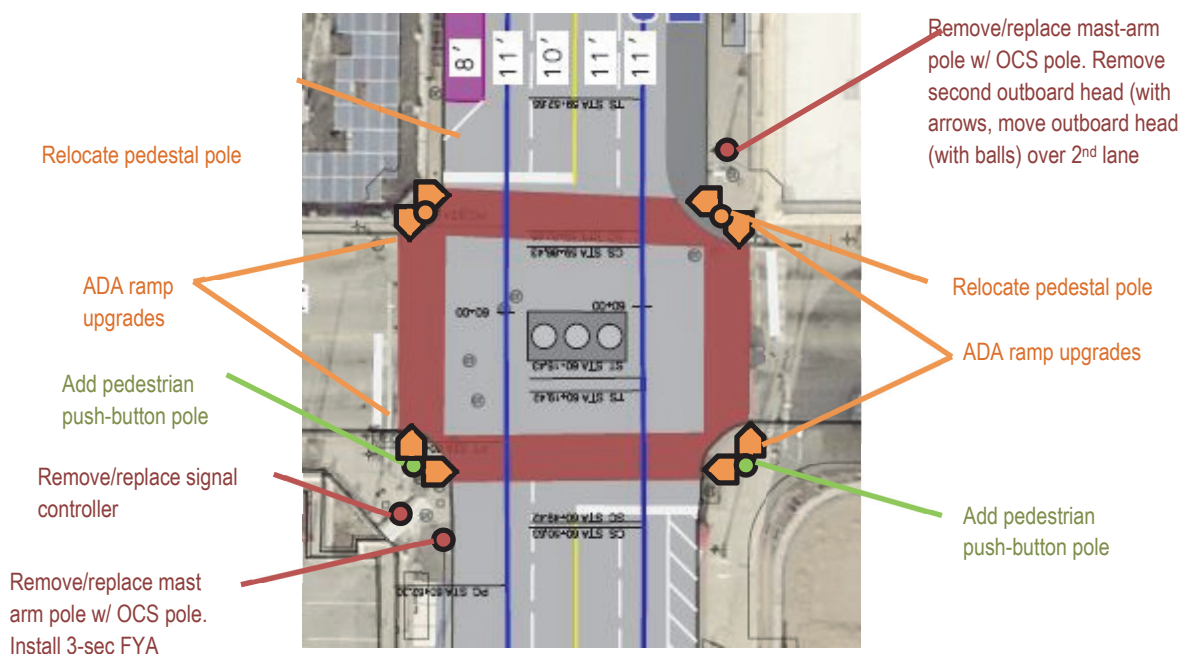
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The middle overhead signal indications (with straight arrows) should be removed from the poles for northbound and southbound traffic as all lanes will be shared with turns.
- The existing intersection has a PTZ camera, video detection and Opticom, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- The existing pedestrian push button poles in the northwest and northeast quadrants will need to be relocated.
- Existing colored and textured crosswalks may be impacted.
- New pedestrian push button poles will be needed in the southwest and southeast quadrants.

City Preference Improvements: None.

Operations: The intersection currently operates at LOS B/B and would operate at LOS B/C in 2024 with the proposed reconfigurations and streetcar service in place. Existing time-of-day left-turn restrictions would remain.



37th Street

The existing 37th street intersection is unsignalized and has a HAWK pedestrian signal approximately 100 feet south of the intersection for a mid-block pedestrian crossing. It is recommended to remove the HAWK signals and crosswalk and signalize the 37th Street intersection. The proposed Main Street typical section is a 5-lane section with exclusive left turn lanes with streetcars running in the outside through lanes.

Streetcar-Related Improvements

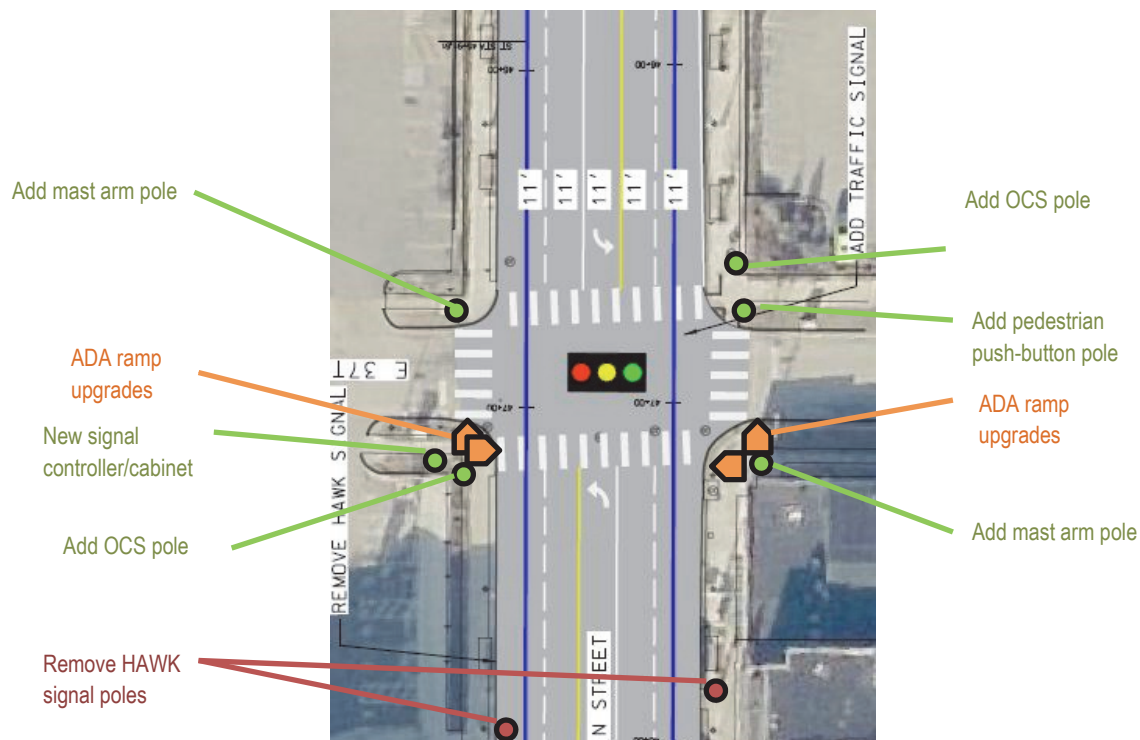
- **Signal Equipment:** The Main Street signal poles will need to be OCS poles. Install mast arm poles for the side street as well. New signal equipment should include a 2070 signal controller in a 332 cabinet.

Policy Improvements

- Upgraded curb ramps are required in two quadrants. All ramps should include detectable warning surfaces (DWS) and APS pedestrian push buttons.
- New pedestrian push button poles will be needed in the northeast and southeast quadrants.

City Preference Improvements: Non-intrusive detection, Opticom and a PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS D/F and would operate at LOS A/B in 2024 with the proposed reconfigurations and streetcar service in place. The existing levels of service are based on the worst approach for an unsignalized intersection.



36th Street

The Main Street roadway typical section is proposed to go from a 6-lane section with no exclusive turn lanes and time-restricted parking/bus lanes on the outside to a 4-lane section with streetcar stops and potential limited parking along the southbound curb.

Streetcar-Related Improvements

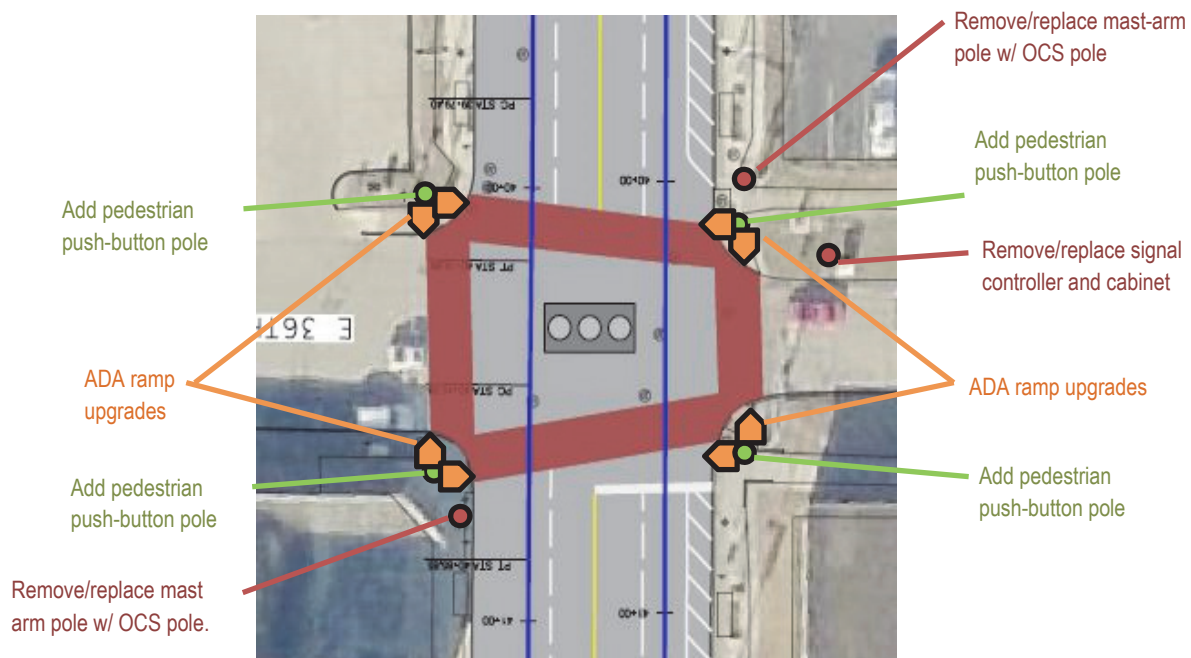
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The third (outside) overhead signal indications should be removed from the poles for northbound and southbound traffic.
- The existing intersection has Opticom, which should be functionally retained.
- The existing signal controller and cabinet are recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- All existing push buttons (eight total) should be replaced with APS push buttons.
- Existing colored and textured crosswalks may be impacted.
- New pedestrian push button poles may be needed in all four quadrants.

City Preference Improvements: Non-intrusive detection and a PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS A/A and would operate at LOS A/A in 2024 with the proposed reconfigurations and streetcar service in place.



Armour Boulevard

The Main Street roadway typical section is proposed to go from a 6-lane section with no exclusive turn lanes and time-restricted parking/bus lanes on the outside to a 4-lane section with streetcar stops and potential parking along the curb north of Armour Boulevard. An exclusive southbound right turn lane is planned to be provided.

Streetcar-Related Improvements

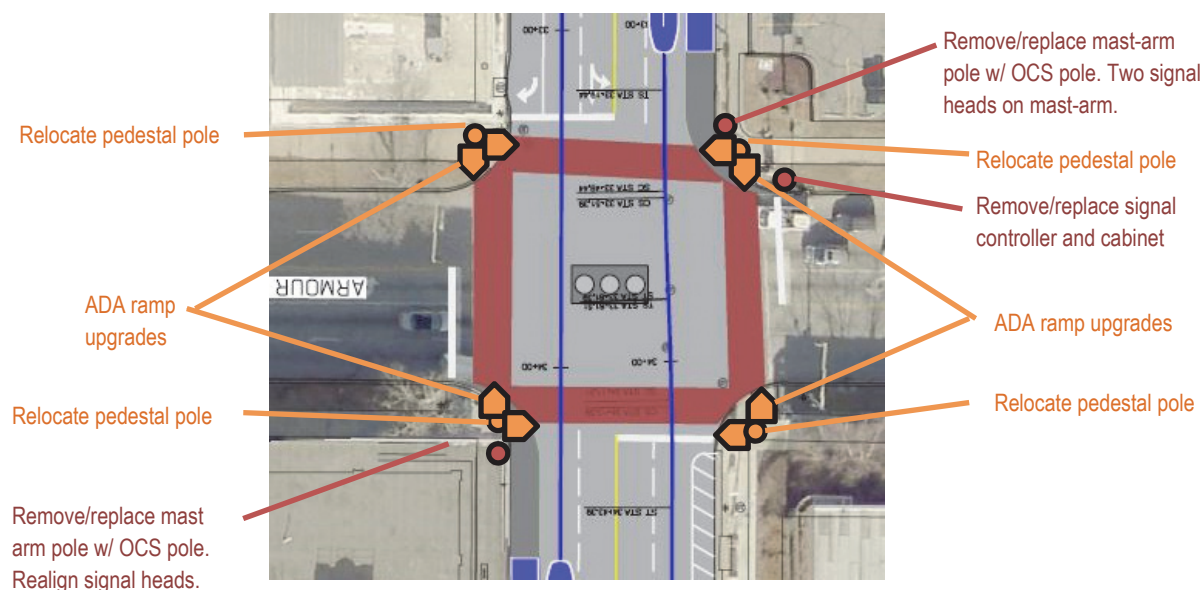
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. A second overhead signal indication should be added to the pole for northbound traffic.
- New curb ramps with detectable warning surfaces (DWS) should be added from the curb bumpouts from two locations.
- The existing intersection has video detection and a PTZ camera, which should be functionally retained.
- The existing signal controller and cabinet are recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS). The existing poles with pedestrian push buttons in all four quadrants may need to be relocated, or pedestrian push-button poles provided.
- Existing colored and textured crosswalks may be impacted.

City Preference Improvements: Non-intrusive detection may be desired by the City.

Operations: The intersection currently operates at LOS B/B and would operate at LOS B/C in 2024 with the proposed reconfigurations and streetcar service in place. Time-of-day left-turn restrictions should remain.



Linwood Boulevard

The Main Street roadway typical section is proposed to go from a 7-lane section (two through lanes, outside bus lanes and exclusive left-turn lanes) to a 5-lane section (two through lanes, with potential parking along the curb and exclusive left- and right-turn lanes).

Streetcar-Related Improvements

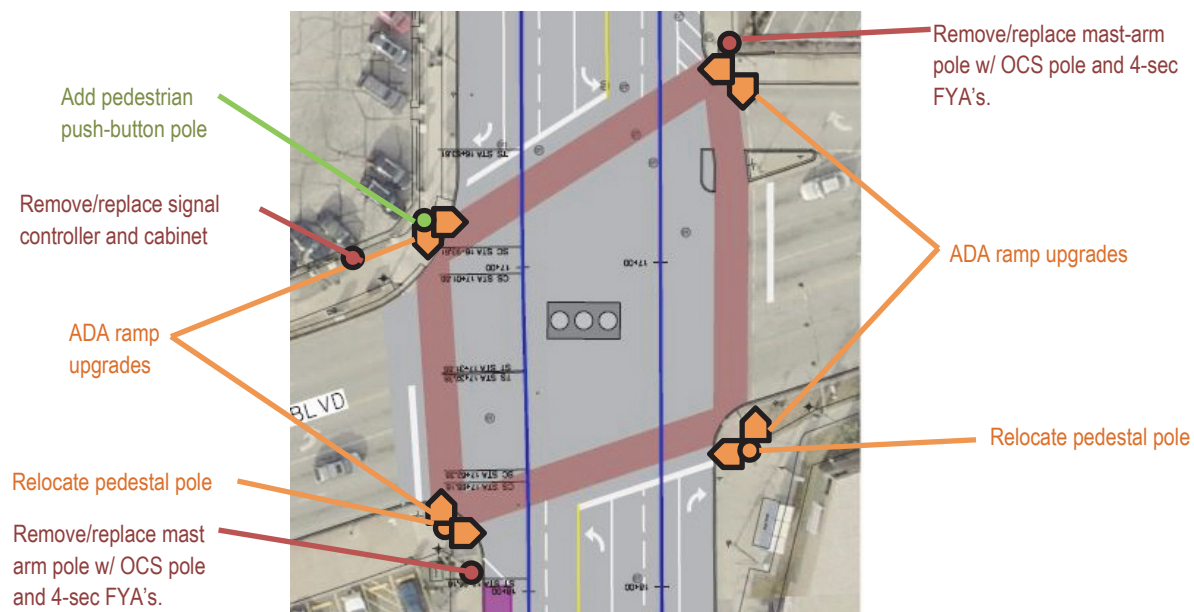
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The new arms should be longer due to shifted left-turn lanes, and the existing 5-section heads for protective-permissive left turns should be replaced with 4-section FYA's for northbound and southbound traffic.
- The existing intersection has video detection, Opticom and a PTZ camera, which should be functionally retained.
- The existing signal controller and cabinet are recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- Pedestrian push button poles will be needed in the northwest and southwest quadrants. Existing push button poles in the southeast quadrant may need to be relocated.
- Push button extensions should be added to the poles in the right turn island and the mast arm pole in the northeast quadrant.
- Existing colored and textured crosswalks may be impacted.

City Preference Improvements: None.

Operations: The intersection currently operates at LOS C/C and would operate at LOS C/C in 2024 with the proposed reconfigurations and streetcar service in place.



31st Street

The Main Street roadway typical section is proposed to go from a 7-lane section (two through lanes, outside bus lanes and exclusive left-turn lanes) to a 5-lane section (two through lanes, with streetcar stops and potential parking along the curb and exclusive left- and right-turn lanes).

Streetcar-Related Improvements

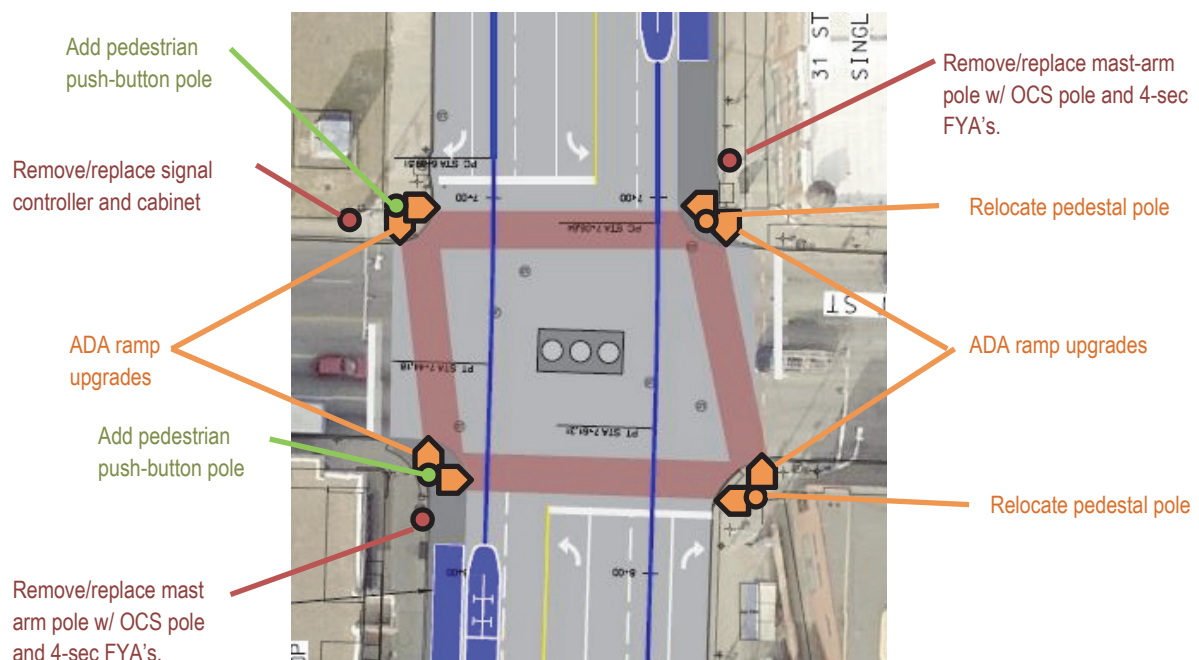
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The existing 5-section heads for protective-permissive left turns should be replaced with 4-section FYA's for northbound and southbound traffic.
- The existing intersection has video detection, Opticom and a PTZ camera, which should be functionally retained.
- The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- A pedestrian push button pole may be needed in the southwest quadrant. Existing poles with push buttons in all four quadrants may need to be relocated, or new push-button poles provided.
- Existing colored and textured crosswalks may be impacted.

City Preference Improvements: Replacing the existing 5-section heads for protective-permissive left turns with 4-section FYA's for eastbound and westbound traffic may be desired by the City.

Operations: The intersection currently operates at LOS D/D and would operate at LOS C/D in 2024 with the proposed reconfigurations and streetcar service in place.



Warwick Trafficway

The Main Street roadway typical section is proposed to go from a 7-lane section (two through lanes, outside bus lanes and exclusive left-turn lanes) to a 5-lane section (two through lanes and exclusive left- and right-turn lanes).

Streetcar-Related Improvements

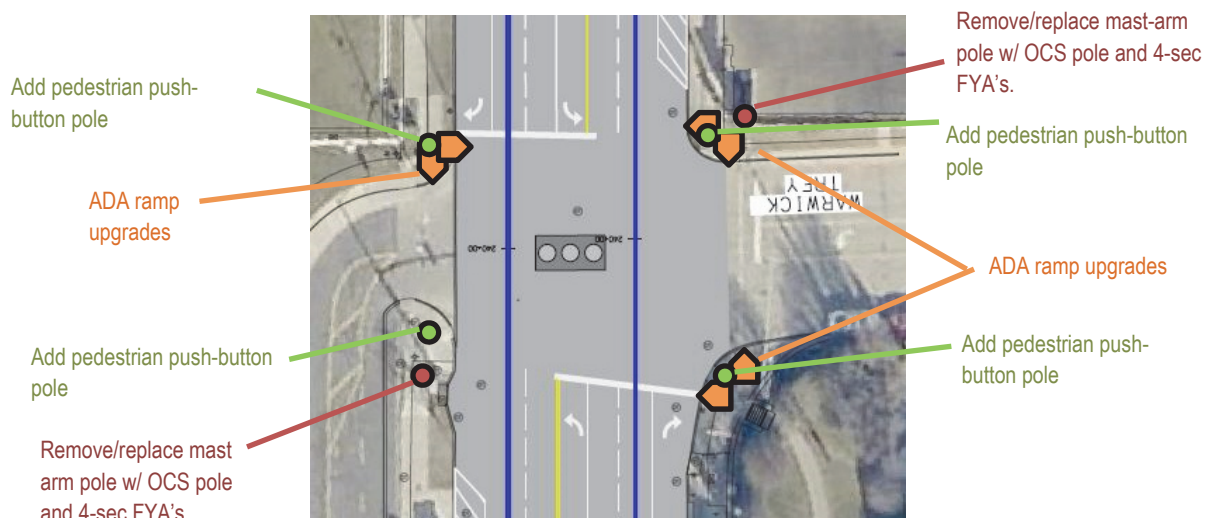
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The existing 5-section heads for protective-permissive left turns should be replaced with 4-section FYA's for northbound and southbound traffic. One through head should be removed from each of these mast-arms.
- The existing intersection has video detection and Opticom, which should be functionally retained.
- The existing signal controller has recently been upgraded.

Policy Improvements

- Upgraded curb ramps are required in three quadrants. All ramps should include detectable warning surfaces (DWS).
- Pedestrian push button poles may be needed in all four quadrants, with existing APS push buttons relocated to them.

City Preference Improvements: A PTZ camera may be desired by the City.

Operations: The intersection currently operates at LOS B/A and would operate at LOS A/A in 2024 with the proposed reconfigurations and streetcar service in place.



Grand Boulevard

The Main Street roadway typical section is proposed to go from a 6-lane section with no exclusive turn lanes and time-restricted parking/bus lanes on the outside to a 4-lane section with the streetcar running in the outside lanes.

Streetcar-Related Improvements

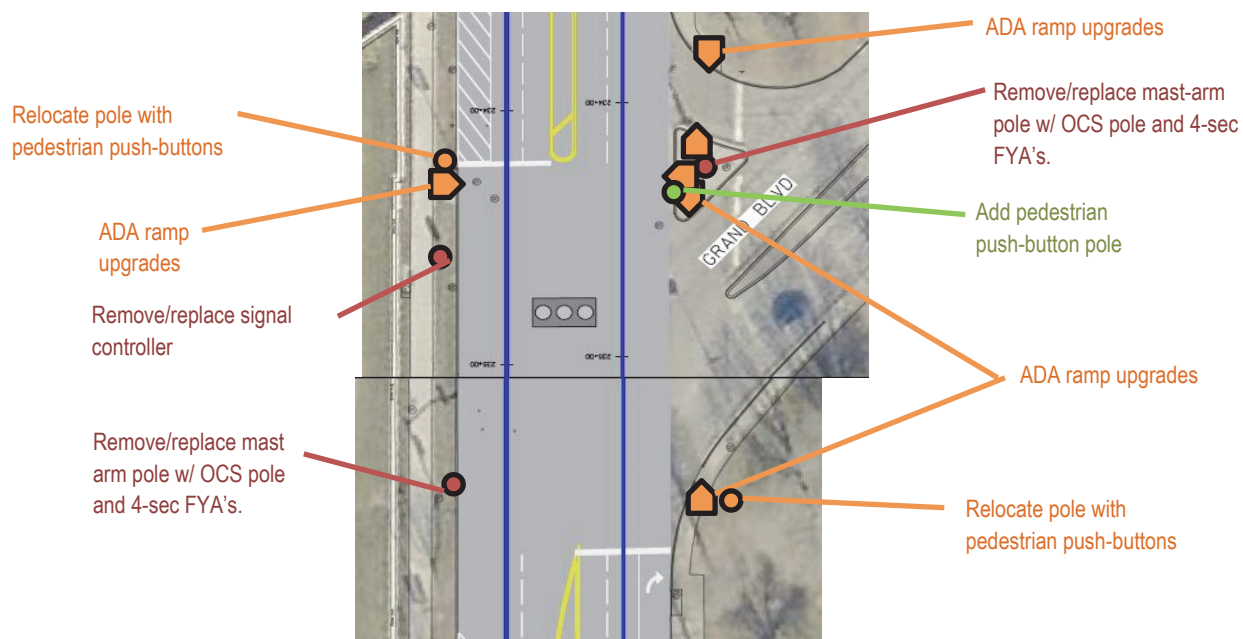
- **Signal Equipment:** The Main Street signal poles will need to be replaced with OCS poles. The mast-arm lengths may need to be adjusted to match lanes.
- The existing intersection has Opticom, which should be functionally retained. The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in two quadrants (southeast and northeast, including right-turn island). All ramps should include detectable warning surfaces (DWS).
- Existing pedestrian push button poles will need to be relocated in the northwest and southeast quadrants.
- A new pedestrian push button pole may be needed in the northeast quadrant (island).
- All existing push buttons should be replaced with APS push buttons.

City Preference Improvements: A PTZ camera and non-intrusive detection may be desired by the City.

Operations: The intersection currently operates at LOS A/B and would operate at LOS B/B in 2024 with the proposed reconfigurations and streetcar service in place.



27th Street

The Main Street roadway typical section is proposed to go from a 7-lane section (three through lanes with time restricted on-street parking in the southbound lane, outside bus lanes, and a northbound left turn lane) to a 5-lane section (two through lanes, a northbound left-turn lane, streetcar stops, and an exclusive southbound streetcar lane north of the intersection). Northbound streetcars would continue in the outside lane of traffic. Southbound streetcars would enter traffic from the outside through the intersection.

Streetcar-Related Improvements

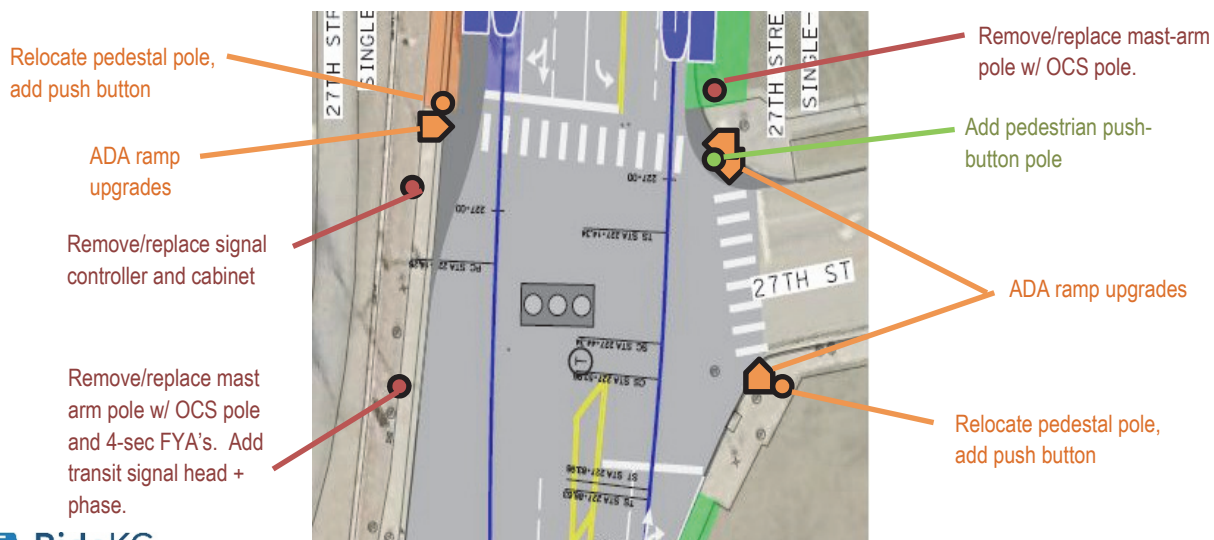
- **Signal Equipment:** A transit phase would be required for the signal cycles when a southbound streetcar is approaching. The southbound streetcar transit phase could run simultaneously with the northbound through movements only.
- The Main Street signal poles will need to be replaced with OCS poles. The new mast arm for southbound traffic should be long enough to cover the left-turn lane due to the proposed shift in traffic, and the 5-section signal head for protected/permissive southbound lefts should be replaced with a 4-section FYA.
- The existing intersection has Opticom, which should be functionally retained.
- The existing signal controller and cabinet are recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all three quadrants. All ramps should include detectable warning surfaces (DWS).
- Existing pedestal poles will need to be relocated in the northwest and southeast quadrants. APS push buttons will need to be added.
- A new pedestrian push button pole will be needed in the northeast quadrant.
- Existing gaps in sidewalk should be constructed, and existing sidewalk sections in poor condition should be replaced.

City Preference Improvements: A PTZ camera and non-intrusive detection may be desired by the City.

Operations: The intersection currently operates at LOS A/B and would operate at LOS B/C in 2024 with the proposed reconfigurations and streetcar service in place.



Pershing Road

The existing Main Street roadway typical section is essentially a 5-lane section with two thru lanes each direction, with northbound and southbound left turn lanes and a southbound right turn lane. The proposed section offers a similar lane configuration, albeit on a smaller footprint to allow an exclusive southbound streetcar lane out of traffic and a possible “multi-use trail/mobility lane” adjacent to that. Northbound streetcars would continue in mixed traffic and connect to the existing starter line. Southbound streetcars would continue from the terminus of the existing starter line outside of traffic, enter a southbound right-turn lane at the Pershing intersection then continue in a semi-exclusive lane south of the intersection. A crossover alternative between southbound and northbound tracks is proposed to be implemented from the southwest to northeast part of the intersection.

Streetcar-Related Improvements

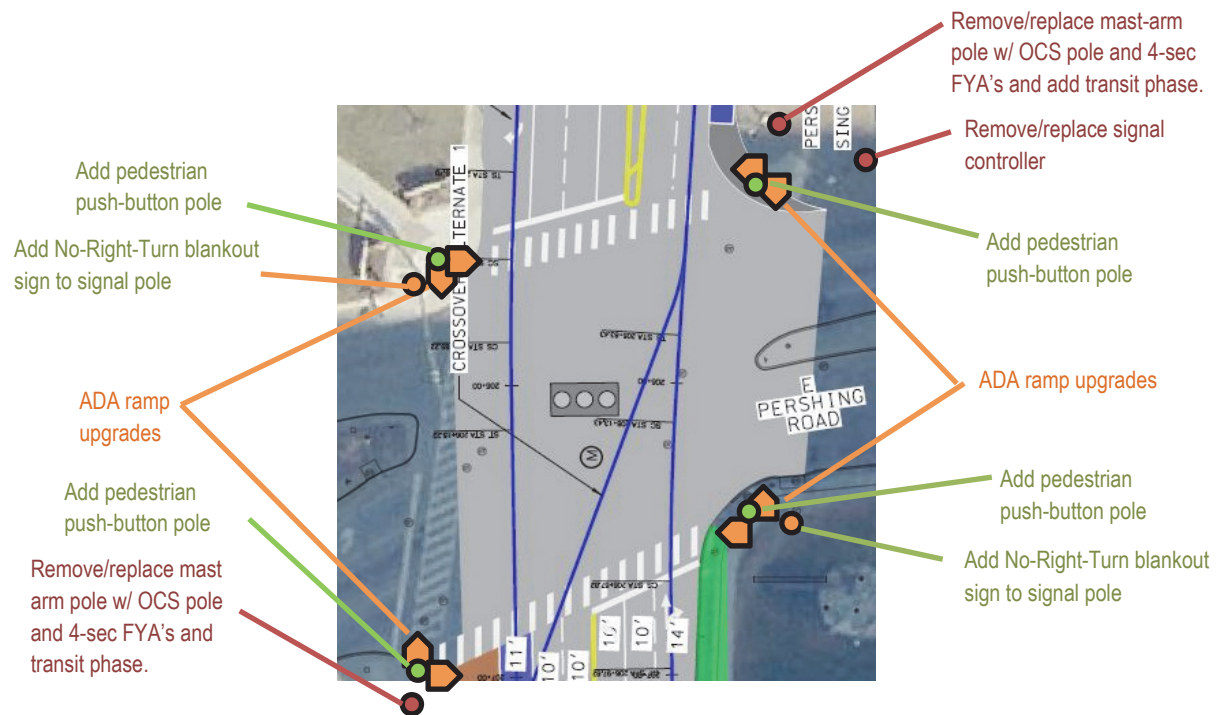
- *Signal Equipment:* A transit phase would be required for the signal cycles when a streetcar would use the crossover through the intersection. This would be an exclusive transit phase with no other vehicular phases allowed. Northbound and southbound pedestrian movements may be allowed. No-right-turn blank-out signs would need to be installed on the eastbound and westbound approaches.
- The Main Street signal poles will need to be replaced with OCS poles. The new mast-arm for southbound traffic should be long enough to cover the left-turn lane over the proposed shift in traffic, and the 5-section signal head for protected/permissive southbound lefts should be replaced with a 4-section FYA for northbound and southbound traffic.
- The existing intersection has video detection and a PTZ camera, which should be functionally retained.
- The existing signal controller is recommended to be upgraded.

Policy Improvements

- Upgraded curb ramps are required in all quadrants. All ramps should include detectable warning surfaces (DWS).
- The existing pedestal pole will need to be relocated in the northeast quadrant.
- New pedestrian push button poles may be needed in all quadrants.

City Preference Improvements: Opticom may be desired by the City.

Operations: The intersection currently operates at LOS C/C and would operate at LOS C/C in 2024 with the proposed reconfigurations and streetcar service in place.



ID	Intersection	Existing Condition				No Build				With Streetcar			
		AM		PM		AM		PM		AM		PM	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
66	Main St & Pershing Rd	C	30.1	C	25.7	C	31.7	C	26.2	C	32.2	C	31.2
63	Main St & 27th St	A	6.5	B	14.6	A	6.2	B	15.4	B	12.0	C	21.8
61	Main St & Grand Blvd	A	6.1	B	10.4	A	7.0	B	10.3	B	11.1	B	14.2
58	Main St & Warwick Trfy	B	10.3	A	2.0	B	10.6	A	2.0	A	2.7	A	4.7
3	Main St & 31st St	D	46.5	D	53.0	C	32.7	D	43.1	C	27.6	D	47.7
6	Main St & Linwood Blvd	C	25.7	C	31.0	C	26.4	C	32.0	C	27.0	C	27.2
2	Main St & Armour Blvd	B	12.6	B	12.5	B	13.2	B	12.7	B	15.3	C	25.5
54	Main St & 36th St	A	5.8	A	5.8	A	5.9	A	6.0	A	4.7	A	5.5
62*	Main St & 37th St (EB)	D	34.1	F	77.0	E	39.0	F	113.2	A	6.6	B	12.3
11	Main St & 39th St	B	12.0	B	14.3	B	12.2	B	15.0	B	17.4	C	25.0
17	Main St & Westport Rd	A	4.6	A	6.9	A	5.0	A	7.3	A	4.5	A	5.6
18	Main St & 40th St	A	6.6	A	6.9	B	10.9	A	9.0	A	7.4	B	10.5
10*	Main St & Veterans Memorial Dr (EB)	E	38.1	E	45.8	F	51.2	F	62.2	F	53.1	F	143.0
48	Main St & 43rd St	A	9.3	B	15.8	B	11.1	B	17.0	B	17.2	D	39.1
75*	Main St & 44th St (WB)	F	154.9	F	468.2	F	233.1	F	765.7	F	234.6	F	549.4
51	Main St & 45th St	B	13.8	B	10.9	B	14.2	B	11.5	B	18.2	B	14.0
81*	Main St & 46th St	A	3.3	A	1.4	A	3.1	A	1.5	B	12.0	A	0.1
21	Main St & 47th St/Emanuel Cleaver II Blvd	D	48.2	D	52.5	E	56.7	E	56.7	D	51.5	D	52.0
25	JC Nicholls Pkwy & 47th St	C	23.0	C	24.8	C	25.1	C	30.2	C	30.7	D	36.9
29	Brookside Blvd & Ward Pkwy	A	1.4	A	5.7	B	14.6	B	15.8	A	0.9	A	5.7
30	Baltimore Ave & Ward Pkwy	B	19.6	C	21.0	B	19.4	C	22.7	C	29.8	C	29.7
33	Brookside Blvd & Volker Blvd	D	46.6	D	39.3	D	46.2	C	34.6	D	52.9	D	46.3
38*	49th St & Volker Blvd (NEB)	B	14.8	C	18.8	C	15.5	C	20.4	-	--	-	--
36	Brookside Blvd & 49th St	A	5.7	A	9.2	A	4.2	A	9.5	A	6.4	B	13.4
14	Brookside Blvd & 51st St	B	19.2	C	20.0	C	20.2	C	20.8	C	25.1	C	24.1