



Environmental Assessment
Kansas City Downtown Streetcar Project



September 2012

ENVIRONMENTAL ASSESSMENT

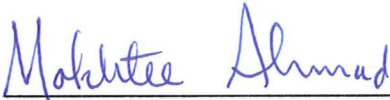
For the Kansas City Downtown Streetcar

City of Kansas City, Jackson County, Missouri

Prepared Pursuant to the National Environmental Policy Act
42 U.S.C. 4332 (2)(c) and 23 C.F.R. Part 771

by

FEDERAL TRANSIT ADMINISTRATION
And The City of Kansas City



Mokhtee Ahmad
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Date: 9/24/2012



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1. INTRODUCTION

1.1 Purpose of this Document. This Environmental Assessment (EA) has been prepared pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4347), the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR §§ 1500-1508), and the NEPA implementing procedures of the Federal Transit Administration (FTA) (23 CFR Part 771). The EA briefly discusses: 1) the need for the proposed action; 2) alternatives to the proposed action as required by Section §102(2)(E) (42 U.S.C. 4332); 3) the environmental effects of the proposed action and alternatives; and, 4) lists agencies and persons consulted (40 CFR §1508.9).

1.2 Project Sponsors. The FTA is the Federal lead agency for the proposed action: the Kansas City Streetcar Project. The City of Kansas City (City) is the project sponsor in partnership with the Kansas City Area Transportation Authority (KCATA) and Mid-America Regional Council (MARC). The City intends to construct, own and operate the Streetcar System.

1.3 Public Review of the Environmental Assessment. Notice of the availability of the EA will be made through notices published in several local newspapers of general circulation in the Project area (the Kansas City Star, The Pitch, Dos Mundos and The Call) and through emails and postcards to the project's interested party's list. It will be made available on the City of Kansas City web page at www.KCMO.org. During the 30 day public and agency review period from September 26 through October 26, 2012, written comments should be provided to:

Ralph Davis, P.E., City Engineer
City of Kansas City
414 East 12th Street,
Kansas City, MO 64106

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1.4 Comment Period and Next Steps. Following close of the comment period, FTA and the project sponsors will thoroughly consider any comments submitted. Based on information contained in this EA and any comments submitted, FTA will determine whether environmental effects are sufficiently substantial to warrant preparation of an Environmental Impact Statement. If the FTA decides that there are no adverse effects, it will prepare and sign a Finding of No Significant Impact. The determination will be made available to the general public and all who commented on this EA.

2. PURPOSE AND NEED FOR THE PROPOSED ACTION

2.1 Project Location. The proposed Streetcar Project would be located in Downtown Kansas City, Jackson County, Missouri, on Main Street. The alignment would begin with a loop around the City Market on the North and then run south on Main Street to the Union Station/Crown Center area, and then back to the City Market.

2.2 Purpose. The purpose of the Kansas City Downtown Streetcar Project is to:

- Provide strong connectivity between downtown activity centers.
- Provide "last mile" transit connectivity in the downtown area.
- Provide non-automobile travel options in the downtown area and promote walkability.
- Serve transit-dependent downtown populations through accessible and affordable downtown-focused transit service.
- Better serve parking demand in the downtown area by connecting it with transit demand.
- Slow the growth of automobile congestion in the downtown area.

2.3 Need. In downtown Kansas City there are limited linkages between activity centers. The need is to improve transportation options for local circulation. Transportation and transit problems include:

- There is poor connectivity between downtown activity centers such as River Market, downtown, Crossroads, and Crown Center. Currently, these major destinations are geographically separate. Existing transit services, including the Metro Area eXpress (MAX) Bus Rapid Transit (BRT) service, are designed to bring people to and from downtown, but there is no transit service designed to facilitate shorter trips within the downtown area. Better service for short trips is needed throughout the day, and also for special events such as “First Fridays”, Sprint Center events, and other events throughout the downtown.
- There is a lack of regional transit connectivity in the downtown area. Existing transit service in the downtown area has been designed primarily to bring commuters in and out of downtown from outlying areas. It does not serve daytime local trips within the corridor well, and it does not provide “last mile” connectivity from regional services, either existing or planned. Downtown transit service is evolving in conjunction with efforts to strengthen the downtown core, but the current transit system is not “complete” in that it does not serve visitors and convention attendees well. The lack of a strong downtown transit circulator is a major deficiency in the existing system.
- Travel between activity centers in downtown is difficult without using a car. The Downtown area is very auto-oriented, with wide streets and few buffers between vehicles and cars, which discourages many from walking. Also, the significant distances between major activity centers discourage walking. For example, the Riverfront Heritage Trail is currently difficult to access because it is somewhat isolated and disconnected from the more active parts of the downtown area.
- Many downtown residents and employees are transit dependent and rely on transit for basic mobility. Provision of an accessible and affordable downtown focused transit service with level-boarding access would better serve low income, minorities, elderly and other transit-dependent populations in the downtown area. Existing transit service does not have level boarding, and can be challenging for people using mobility devices, strollers, etc.
- Parking can be hard to find in some parts of downtown and is underused in other areas. Better downtown transit circulation would connect older buildings that do not have parking with available parking structures associated with newer development. Connecting parking needs with demand by transit would result in better utilization of the available structured parking and reduce the need for surface parking lots.
- Auto-based congestion is expected to increase with projected residential and employment growth. Better transit would allow the corridor to become less auto oriented and slow the rate of increasing future congestion in the downtown area.

3. ALTERNATIVES

The proposed action, constructing and operating modern Streetcars on Main Street in downtown Kansas City, was selected as the Locally Preferred Alternative (LPA) by the City of Kansas City, KCATA and MARC at the conclusion of the Alternatives Analysis (AA) Study in March 2012. During the AA various alignments and modes were evaluated. In this EA, a No-Build Alternative is compared to the Streetcar Alternative to assess effects of the proposed action.

3.1 No Build Alternative. The No Build Alternative is a basis for comparison of the environmental effects of the Streetcar (build) Alternative. The No Build Alternative includes the existing transportation system and all projects in MARC’s Long Range Transportation Plan (LRTP) *Transportation Outlook 2040* that are programmed to occur within the project study area and expected to be completed by 2015, the anticipated opening year for the proposed Kansas City Downtown Streetcar Project. The No Build Alternative includes current transit service in the corridor and changes to transit service bus routes and schedules planned through 2015 as outlined within the KCATA’s Comprehensive Service Assessment (CSA). The No Build Alternative does not include a significant new transit capital improvement (Streetcars) in the Downtown study area by 2015.

3.2 Streetcar Alternative. The Streetcar Alternative is shown on Figure 1. The Streetcar alignment would be approximately 2 miles long (3.9 track miles round trip), with a northern terminus in the River Market District and a southern terminus near Union Station and Crown Center. The Streetcar would operate in mixed traffic both northbound and southbound on Main Street. In the River Market area it would operate on existing street right-of-way in mixed traffic in a counterclockwise loop on 5th Street, Grand Blvd., 3rd Street, and Delaware Street. The Streetcar facilities would be constructed and would operate within existing street right-of-way, except for the vehicle maintenance facility (VMF) which would require land acquisition of one of three candidate sites.

Streetcar stops would be spaced approximately every two blocks, generally at even-numbered streets, with a platform for exiting and loading in each travel direction. Streetcar stops are planned to be similar in scale to the existing MAX BRT stops, with some stops shared with existing bus service to facilitate easy transfers. Stops would include platforms, shelters, transit system information and related features. The majority of the stop platforms would be located on the far-side of the cross-street intersections. There would be nine stops northbound and nine stops southbound (counting the 3rd Street/Grand Boulevard stop as a southbound stop). There would be four single platform stops, within the River Market District and at Union Station; and seven paired platform stops, each with a northbound platform on the east side of Main Street and a southbound platform on the west side of Main Street (see Figure 1).

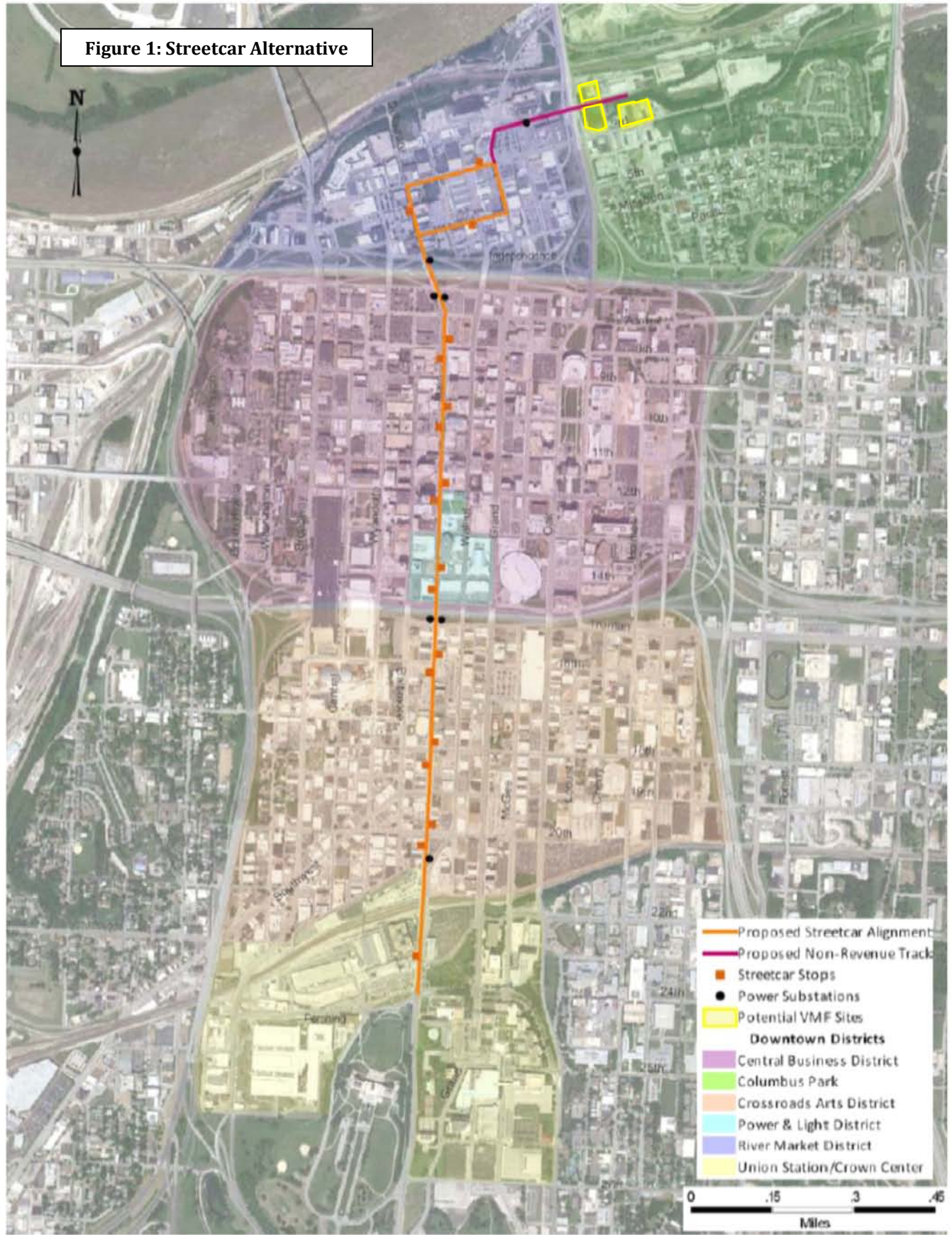
Streetcar service is planned to open in 2015 and would operate during the following hours and with the following frequencies:

- Monday - Thursday: 6 AM to 9 PM every 10 minutes
- Monday - Thursday: 9 PM to 12 AM every 20 minutes
- Friday - Saturday: 6AM to 2 AM every 10 minutes
- Sundays - 8 AM to 9 PM every 20 minutes

The Streetcar travel time is projected to be 13 minutes one-way and 26 minutes round-trip, which would allow for a 4 minute layover at the terminus. Existing bus and MAX service would remain and function in tandem with the Streetcar service. A small number of existing bus and MAX stops would be relocated to facilitate Streetcar improvements and to allow for efficient transfers. At the 10th and Main Street the Streetcar would connect with the existing transit center, and at 3rd and Grand it would serve the existing park-and-ride lot in the River Market area. Many existing bus lines in the downtown area would intersect with the Streetcar route.

A new vehicle maintenance facility (VMF) would be constructed to store and maintain the streetcar vehicles, and serve as the Streetcar operations center. Three sites are being considered for the VMF near the northern terminus of the Streetcar route. The VMF would be large enough to accommodate 3 active vehicles and one spare for a total of 4 Streetcar Vehicles. The Streetcars would be powered by an electrical traction power system and between 2 and 5 power substations along the route (depending on the system design approach selected), along with overhead and underground wires to power the electric vehicles. VMF candidate sites and possible power substation sites are shown on Figure 1.

Figure 1: Streetcar Alternative



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4. ENVIRONMENTAL CONSEQUENCES

This section provides a summary of the expected effects of the construction and operations of the Streetcar Alternative and the No Build Alternative by topic.

4.1 Resources with No Concern. Based on early coordination, scoping, and a review of the project, the proposed project would have no impacts on the following resource categories: Wetlands/Waters of the U.S. (Clean Water Act, Section 404); Community Disruption; Floodplains; Migratory Bird Treaty Act, Navigable Waterway, Wild and Scenic Rivers, Biological Resources/Threatened and Endangered Species, Section 6(f) Resources, Farmlands, Geologic Features.

A brief summary of the analyses of potential effects in several categories is included in the following sections. For some topics, additional information may be found in the supporting technical reports and memoranda.

4.2 Air Quality. The Downtown Streetcar Project is included in Transportation Outlook 2040. An Air Quality Analysis was conducted by MARC for the projects listed in the LRTP which indicated that regional mobile source emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx) remain below the levels budgeted in the regional State Implementation Plan (SIP), while accounting for the roadway capacity projects listed in the 2010-2014 Transportation Improvement Program (TIP) and the LRTP as being operational by 2040.¹ Air emissions in the downtown area could be expected to decrease by a very small amount due to reduced congestion and reduced vehicle-miles traveled with the Streetcar Alternative.

4.3 Energy. The Streetcars would be electrically powered via overhead wires and substations along the route. The amount of power used by the Streetcars and VMF would not create a new demand for additional power generation sources or facilities because the existing sources could meet expected demands of the Streetcar Alternative. In addition, the project could reduce fossil fuel consumption due to reduction in auto use. The VMF would be designed with energy efficient and environmentally sustainable measures.

4.4 Land Use, Consistency with Plans and Zoning. The Streetcar Alternative would be located within a heavily developed urban area with a mix of commercial, office, light industrial and residential uses along major arterial and collector roadways. General urban land use patterns in the area can be seen on the aerial photo base map of Figure 1. Existing land uses within a one-quarter mile buffer around the proposed streetcar alignment and three candidate VMF sites were inventoried and are shown in the table below.

Land Use Type	Acreage	Percent of Study Area
Commercial/Industrial	530	59.0
Single and Multi-Family Residential	98.3	11.0
Transportation	85.8	9.6
Institutional	21.3	2.4
Other – park, mixed use, vacant commercial	162.4	18.0

There would be no direct land use changes due to the Streetcar Alignment because the proposed streetcar facilities (tracks, stops, and related infrastructure) would be constructed predominantly within existing street

¹ The metropolitan and statewide planning regulations that govern MARCs LRTP and TIP require projects within both documents to be financially constrained for the time periods each plan covers. Regionally significant roadway projects and fixed-guideway transit projects must provide sufficient detail to permit an air quality analysis. Projects both in the LRTP and TIP have been analyzed as a group to determine that their project air quality impacts are lower than a budgeted amount to ensure that the region’s air quality is not adversely affected by mobile-source pollution. (SOURCE: Transportation Outlook 2040; Appendix G: Air Quality Analysis).

right-of-way. Consequently, there would be minor changes in the use of the right-of-way and no changes in the use of adjacent lands. In most locations, the stops would be constructed on bulb-outs (i.e., curb and sidewalk extensions constructed to accommodate curbside stations), but in some locations where the existing right-of-way is very narrow, the streetcar stop would be constructed on the public sidewalk behind the existing curb. In these areas, the stops would be designed to not interfere with existing building or business entrances. Power substations would be constructed within existing rights-of-way, surface parking lots or public parking garages, and would not affect existing land use.

The Streetcar Alternative would be consistent with, and supportive of, Regional and City plans, policies, zoning and other regulations. The Streetcar Alternative would connect downtown activity centers, improving direct transit access to key businesses and business districts as well as many of the City's major visitor and tourism activity centers, including Union Station, Crown Center, the Power & Light District, Sprint Center, Kauffman Center for the Performing Arts and the City Market.

A new VMF would result in a change in the current use of the land of one of the three candidate sites. The 3 potential sites are all located in an area of light industrial uses. One of the candidate VMF sites under consideration for the VMF is undeveloped, one has a structure on it, and one is currently occupied by a light industrial use. Development of the VMF on one of the two sites with frontage on 3rd Street could accommodate mixed-use or commercial development at street level in support of the current redevelopment plan for the Columbus Park neighborhood, sponsored by Columbus Park Developers, LC. The development of the VMF would be consistent with the proposed Columbus Park Redevelopment Plan, and would be allowed under the current zoning.

The No Build Alternative would not support implementation of existing land use plans, because it would not improve transit access or connectivity between activity centers.

4.5 Land Acquisition. The Streetcar improvements would be constructed and operated primarily within existing public right-of-way, so no residential or business relocations or displacements would be required. Property acquisition would be required for construction of the VMF. One of the three sites under consideration is vacant. If an occupied site is selected for construction of the VMF, the City would compensate the relocated business owner and provide assistance with the relocation process in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act), as amended (49 CFR Part 24).

With the No Build Alternative, there would be no land acquired for Streetcar improvements or a VMF.

4.6 Economics. The study area includes a large number and variety of businesses (office, retail, restaurant, galleries and studios, and entertainment venues) and six major employers with more than 1,000 employees each. According to the 2010 census, approximately 65,047 total jobs were provided within the study area census tracts. MARC projections indicate a 20 percent increase in employment in the study area by 2020, with a 61 percent increase forecast by 2040.²

A small number of new jobs would be created for Streetcar operations and maintenance (including activities at the VMF site). The Project would be expected to result in long-term economic benefits by encouraging economic growth, improving access to businesses and tourist destinations, creating long-term jobs, and increasing property values. The Project would be funded in part through a proposed Missouri Transportation Development District (TDD), which would establish a one-cent sales tax and levy a special assessment tax on property within

² Mid-America Regional Council (MARC). (2011, December 23). *Long range forecast for the Kansas City metropolitan area: 2011 update of adopted population, households, and employment forecast*. <http://www.marc.org/metrodataline/longrange.htm> (accessed April 2012)

the geographic boundaries of the TDD. The City would create development incentives and regulatory process improvements within the TDD that would foster growth and real estate development (KCMO Council Resolution No. 120246).

The No Build Alternative would not result in new jobs for operations or maintenance of the Streetcars. It would also not result in new taxes to pay for the capital and operating costs of new Streetcar facilities.

4.7 Visual and Aesthetics. The overall visual character of the project area is that of a mature developed urban center. Streetcars were in use in Downtown Kansas City from 1869 through 1957. Reintroduction of the various facilities necessary to implement the modern Streetcar service (trackway, stops, vehicle maintenance facility, power traction system of poles and wires and substations) would be similar to those from historic streetcars, and therefore would not introduce new elements that would result in substantial negative visual effects in the highly urbanized area along Main Street and near the City Market. Lighting and signage for the Streetcar Alternative at stops and other locations would be compatible with the existing surrounding urban facilities and infrastructure. The VMF would be designed to be compatible with the surrounding industrial uses.

With the No Build Alternative there would be no project related visual changes in the study area.

4.8 Storm Water/Water Quality. The study area is located within the Turkey Creek/Central Industrial District drainage basin as defined by the Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (MDNR). There are no surface water resources within the study area. The nearest receiving waterbody is the Missouri River, approximately 0.25 miles north of the intersection of 2nd Street and Grand Boulevard. Within the study area, the stormwater and sanitary sewer systems are combined. The City is currently implementing an Overflow Control Plan that was developed to meet regulatory requirements put forth by the EPA and the MDNR related to minimizing overflows from the combined sewer and separate sewer systems. Under the 2010 Consent Decree, Combined Sewer Overflow (CSO) control measures were identified for implementation by drainage basin. The Overflow Control Plan includes citywide improvements targeted at eliminating or capturing for treatment approximately 88 percent of the wet weather flow in the combined sewers and controlling sanitary sewer overflows during a 5-year rainfall event. The plan places an emphasis on green infrastructure solutions and programs that encourage the inclusion of rain gardens, underground stormwater storage tanks, bioswales, and/or permeable pavement into public works projects.

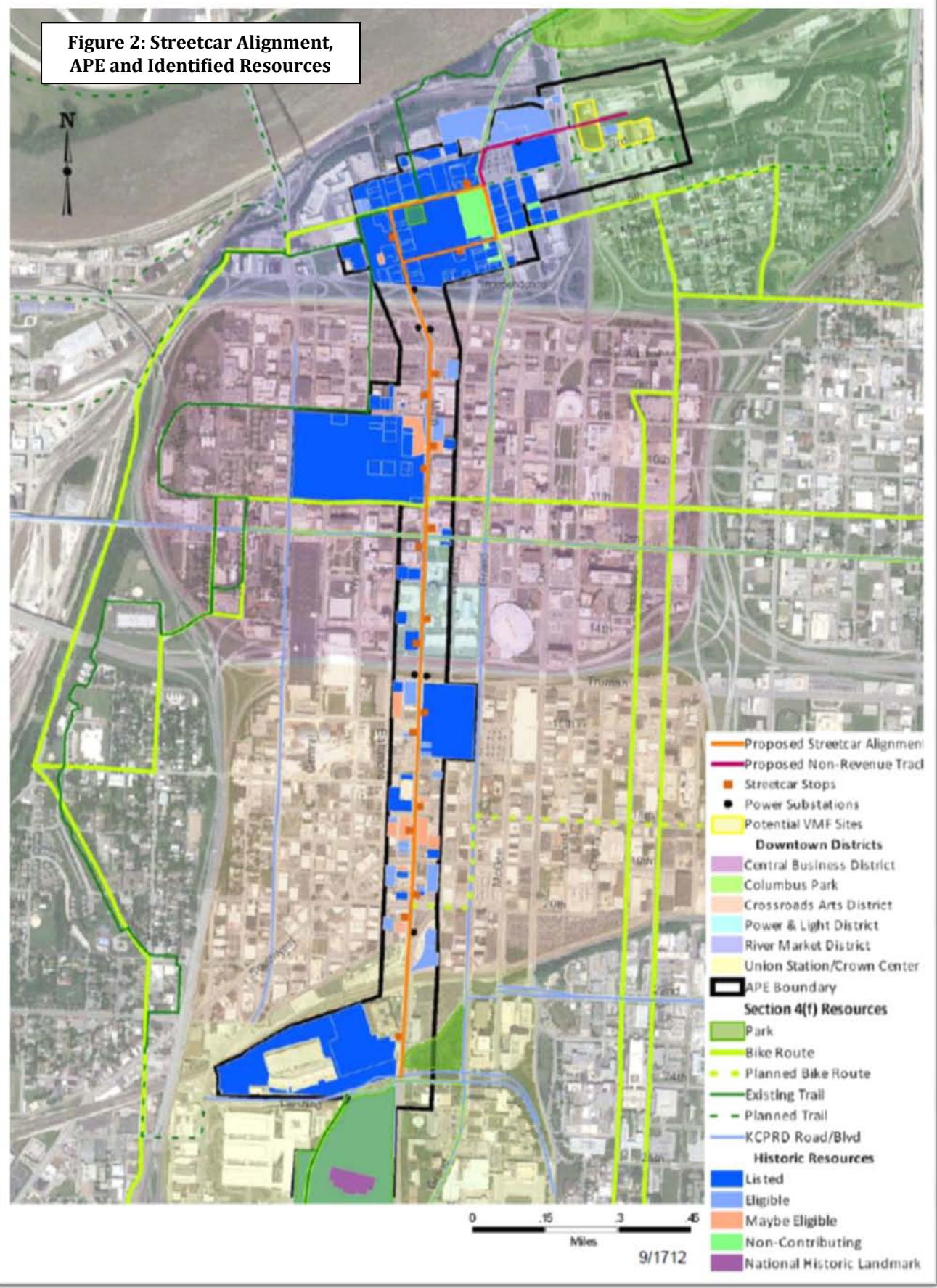
In accordance with the Consent Decree, the Streetcar Alternative improvements (including the VMF) would need to include green infrastructure solutions as well as construction BMPs, as applicable, to address issues associated with stormwater management during both construction and operation of the Streetcar Alternative. Future design work during Preliminary Engineering and Final Design would incorporate these storm water management details in the design of the Streetcar improvements.

With the No Build Alternative there would be no project-related changes to storm water or water quality.

4.9 Cultural Resources. Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended requires federal agencies to take into account the effect of any undertaking on historic properties. FTA initiated Section 106 consultation with the Missouri State Historic Preservation Officer (SHPO) on June 1, 2012. Tribal consultation was initiated on May 15, 2012.

FTA defined the project's area of potential effect (APE) to comprise approximately 300 feet on both sides of the centerline of the Streetcar route, except in areas where historic districts are located (see Figure 2). A review of previous archaeological surveys was conducted for the Streetcar Alternative. No recorded archaeological sites would be affected by the Streetcar Alternative. The architectural survey conducted for the Streetcar Project included 287 properties within the area of potential effect (APE) – 145 already listed in the NRHP, 19 properties previously determined to be eligible for listing in the NRHP, and 23 properties newly determined eligible for listing in the NRHP. Figure 2 shows the location of identified historic resources within the APE.

Figure 2: Streetcar Alignment, APE and Identified Resources



The construction of the streetcar line, stops, VMF, and substations would not involve any modification of identified historic properties within the APE and thus would have no direct adverse effect on historic properties. Additionally, the reintroduction of the streetcar in downtown Kansas City would not result in adverse visual effects to the historic resources since it essentially duplicates the features of previous streetcar lines. As a result, FTA has determined that there would be no adverse effect to these historic properties. SHPO concurred with this determination on 9/13/2012 (see Appendix A). For additional information, refer to the *Historic Properties Survey Technical Report*.

No effects to historic or archaeological resources would occur as a result of the No Build Alternative, nor would Streetcars be reintroduced into downtown Kansas City.

4.10 Section 4(f) Resources: Parks, Recreation and Historic Resources. Section 4(f) of the DOT Act of 1966 specifies that the Secretary (of Transportation) may approve a transportation project requiring the use of publicly owned land from a public park, recreation area, wildlife or waterfowl refuge of local, state, or national significance, or land from an historic site of local, state, or national significance (as determined by the agency having jurisdiction over the park, recreation area, refuge, or historic site) only if there is (1) no prudent or feasible alternative to the use of the land; and (2) the project has included all possible measures to minimize harm to the park, recreation area, refuge, or historic site resulting from the use. Use of a Section 4(f) property, defined in Section 23 CFR 774.17, occurs when:

- Land is permanently incorporated into a transportation facility;
- There is a temporary occupancy of the Section 4(f) property that is adverse in terms of the statute's preservationist purpose; or
- When there is a constructive use of land, which occurs when the transportation project does not incorporate land, but its proximity to the property substantially impairs the activities, features, or attributes that qualify a resource for protection under Section 4(f) (23 CFR 774.15).

Kansas City Parks & Recreation Department (KCPRD) maintains control over not only parks but certain boulevards and city streets as part of the overall Parks & Boulevards System. Although the Streetcar route would be constructed within existing rights-of-way adjacent to park property and under 'The Link' (also managed by the KCPRD), it would not result in a use, constructive use, or temporary occupancy of these properties.

A portion of the Streetcar route would be constructed across 12th Street and within the section of Grand Boulevard from 5th Street to 2nd Street. Both 12th Street and Grand Boulevard are included in the KCPRD Parks & Boulevard System. The primary use of both streets is for transportation, not as a public park or recreation facility. The Streetcar Alternative would expand the transportation use of both street segments. Neither street nor its associated right-of-way is considered a Section 4(f) resource. There would be no use of parks or recreation lands with any of the 3 candidate VMF sites.

The Streetcar route would pass through three historic districts listed in the National Register of Historic Places (NRHP) and within the right-of-way adjacent to 145 NRHP-listed properties, 19 previously determined NRHP-eligible properties, and 23 newly determined NRHP-eligible properties based on the historic architectural survey completed for the Streetcar Project. These resources listed or eligible for listing in the NRHP are also considered Section 4(f) resources. The Streetcar Alternative would not involve any conversion of land occupied by these resources, or modify the features that make the resources eligible for listing in the NRHP. The Streetcar Project would not result in visual or noise effects to these historic properties. The SHPO concurred with the FTA's determination of 'no adverse effect' on historic properties (see Appendix A). Therefore, the Streetcar Alternative (including candidate VMF sites) would not result in any use of a Section 4(f) resource.

Because no construction or land acquisition would occur, the No Build Alternative would not result in the use of any Section 4(f) property.

4.11 Environmental Justice. An analysis of possible disproportionately high and adverse effects on environmental justice populations was conducted for the Streetcar Alternative in accordance with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*; U.S. DOT Order 5610.2(a), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*; and FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*. Below is a summary of the Environmental Justice analysis. More details can be found in the *Environmental Justice Technical Memorandum*.

The study area for the environmental justice analysis included a one-quarter mile buffer around the proposed Streetcar alignment and candidate VMF sites. Minority and low-income populations within the study area were identified using data from the 2010 U.S. Census and the 2006-2010 American Community Survey 5-Year Estimates. Census data was collected at the census tract level (income) and at the block level (race and ethnicity), and compared to data for the City of Kansas City, Missouri, as a whole, as a reference. Based on the data collected, the study area has a total population of 5,419 residents, with a total minority population of 28.4 percent (compared to a total minority population of 45.1 percent for the City). Median household incomes within the six census tracts that intersect the study area range from \$23,723 to \$54,821. Low-income populations are identified when the median household income in the census tracts that intersect the study area is at or below \$33,075, or 150 percent of the HHS 2010 poverty guideline for a family of four.³ The percent of the population that is below the poverty threshold in the study area is 23.8 percent, compared to 18.1 percent for the City as a whole. Based on this criterion, Census Tract 3 is identified as a low-income population. Census Tract 3 is located in the northeast portion of the study area and includes the Columbus Park neighborhood. An analysis based on US Census Bureau data indicates that the percent of the population that is below the Census Bureau's poverty threshold in the study area is 23.8 percent, compared to the 18.1 percent for the City as a whole.

Short-term/temporary (construction related) and longer term (operations related) effects and benefits associated with construction and operations of the Streetcar Alternative would affect all populations equally within the study area. The benefits include enhanced mobility due to the new transit service and the effects include disruption during construction. The effects on all of the identified environmental justice populations would not exceed those borne by non-environmental justice populations in the study area. Furthermore, enhancement measures incorporated into the project (i.e., possible inclusion of mixed-use retail or office in conjunction with the VMF) would lessen the effects of the Project. The Project would also benefit the community by providing improved access to transit. Therefore, the Streetcar Alternative would not cause disproportionately high and adverse effects on any minority or low-income populations.

³ FTA Circular 4703.1 suggests the use of a locally developed poverty threshold, such as that used for FTA's grant program, to identify a low-income person. The grant program defines a low-income person as an individual whose family income is at or below 150 percent of the HHS poverty guideline. The HHS "poverty guidelines" are issued each year and are a simplification of the "poverty thresholds" published by the U.S. Census Bureau. The HHS "poverty guidelines" are used for administrative purposes by federal agencies to determine, for example, financial eligibility for certain federal programs (HHS, 2012b).

The U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty (U.S. Census Bureau, 2012). If a family's total income is less than the applicable threshold, then that family and every individual in it is considered in poverty. For example, Family A has four members consisting of two adults and two children, and the total income of all family members was \$20,000 in 2010. The 2010 poverty threshold for a family of four with two children was \$22,113 in 2010, and, therefore, Family A (and every individual in this family) is considered "in poverty" according to the U.S. Census Bureau official definition.

There would be no project-related impacts to minority or low-income populations with the No Build Alternative.

4.12 Hazardous Materials. Environmental desktop reviews were conducted for the Streetcar Route and candidate VMF sites. Below is a summary of the hazardous materials analysis. More details can be found in the *Hazardous Materials and Waste Sites Summary Technical Report*.

An Environmental Data Resources (EDR) search identified multiple potentially contaminated sites along the Streetcar route and in the vicinity of the candidate VMF sites. The search did not specifically identify any known contamination. Construction of the Streetcar trackway and stops would involve ground disturbance to a depth of approximately 18 inches. Construction of the power substations and the VMF, installation of catenary poles, and utility relocations could involve excavations to depths greater than 18 inches, increasing the risk of encountering contaminated materials.

The City would conduct a Phase I ESA for the selected VMF site as a requirement of acquiring the property. If warranted, the City would conduct a Phase II (subsurface) ESA which would include soil and groundwater testing, as appropriate. Should the Phase I ESA (and Phase II ESA if conducted) reveal the presence of hazardous materials, mitigation and clean-up measures would be defined and required as part of the property purchase agreement.

The likelihood of encountering soil/groundwater contamination within the majority of the right-of-way where streetcar construction is proposed is low. The EDR search identified 10 locations where the potential for contamination adjacent to or within the right-of-way is greater than within the rest of the right-of-way. For these locations, additional site-specific information would be obtained by the City and used to determine whether additional Phase I and/or Phase II investigations need to occur in and/or adjacent to the right-of-way to determine the potential for soil contamination. Should these additional investigations reveal the presence of hazardous materials within the right-of-way, mitigation and clean-up measures would be defined and required prior to initiating construction. Within the right-of-way where the Streetcar improvements would be constructed, potential contamination is less likely to be encountered within the top 18 inches below the street surface than at depths greater than 18 inches, because potential sources of contamination from these sites is likely set back substantially from the edge of the right-of-way and proposed streetcar tracks, such that past releases would be unlikely to have migrated that distance horizontally.

If unanticipated sources of hazardous or regulated materials are encountered during construction activities, specific mitigation activities would be immediately implemented. The handling, treatment, and disposal of any hazardous materials would occur in full compliance with all federal, state, and local requirements. The discharge of any wastewater suspected of containing hazardous/regulated materials would be subject to a Missouri Pollutant Discharge Elimination System (MPDES) Permit issued by MDNR. If concentrations of hazardous constituents exceed the discharge levels allowed under an MPDES permit, contaminated water would need to be hauled to a disposal facility.

With the No Build Alternative, no construction or ground disturbance within the right-of-way or on any of the candidate VMF sites would occur. Therefore there would be no risk of disturbing potentially contaminated soils or groundwater. Existing contaminants would be left in place.

4.13 Noise and Vibration. Noise effects from Streetcar-related noise sources including the candidate VMF sites were evaluated using FTA General Noise Assessment guidelines. Existing noise levels were measured at six representative locations within the project study area. Project-related noise sources were evaluated to determine the potential for noise impacts based on FTA impact thresholds. Below is a summary of the noise and vibration analysis. More details can be found in the *Noise and Vibration Analysis Technical Memorandum*.

- Existing noise levels in the project area are relatively loud and typical of an urban arterial street that is dominated by transportation noise (i.e., roadway traffic noise).

- General noise assessment results indicate there would be no noise impacts at any noise-sensitive receptor due to operation of the streetcar alternative.
- Construction noise may affect noise sensitive land uses, such as residences or some parks, near the construction activity, but noise effects would be temporary and would normally occur during “noise and vibration tolerant” periods of the day (i.e., daylight hours).

Potential effects from Streetcar-related vibration sources including the candidate VMF sites were also assessed using FTA General Vibration Assessment methods. The vibration propagation was calculated to determine the receptors that would experience an impact, according to FTA impact thresholds. The results of the vibration analysis are as follows:

- General assessment results indicate there would be no impacts at any noise-sensitive receptor due to Ground Borne Vibration from the Streetcar Alternative.
- Construction vibration may affect vibration sensitive land uses, such as businesses that use vibration sensitive equipment, near the construction activity, but vibration effects would be temporary and would normally occur during “noise and vibration tolerant” periods of the day.

4.14 Transportation. The transportation analysis has established existing conditions and projected effects of operating the Streetcar in the study area, identifying and evaluating the effects on traffic, transit, parking, loading, access, pedestrians and bicycles. Below is a summary of the transportation analysis. More details can be found in the *Transportation Technical Report*. As the Streetcar Project moves into the detailed design phase, the design team will work with stakeholders to ensure that the design optimizes efficiency and safety as the streetcar integrates with each of the modes described below.

Traffic - The Streetcar operations would affect traffic in a manner similar to a bus traveling in the drive lane, including lane blockages during passenger boarding and alighting with an approximate 20-second dwell time. With the Streetcar Alternative, most of Main Street would be converted to a three-lane travel section (one lane in each direction plus a center turn lane), and some traffic control features would change. The three-lane section would improve access and safety for left-turning vehicles on Main Street. The City, in late 2012 and early 2013 (building on historical studies and ongoing stakeholder collaboration), is initiating development of a downtown simulation model to support creation of broad downtown transportation strategy involving one-way conversions, signal coordination, signal removals, parking management, highway access, and more in the downtown area, and the Streetcar plans would be coordinated with these efforts. The current conceptual level of design has taken into account preserving access to adjacent properties along the alignment, so all current access would be preserved, some with modifications.

The Streetcar would be designed to maximize safety in its interactions with traffic. The Streetcar would run in mixed traffic, and would follow the same rules of the road as vehicles – except at locations where special transit-only signal phases would be added to facilitate safe streetcar movements (mainly turns). Streetcar operators would be required to meet applicable safety training and performance criteria.

The Streetcar would not have a substantial effect on emergency response services operating on Main Street. On either end of Main Street (north of 9th Street and south of 20th Street), multiple through lanes in each direction would allow emergency vehicles to pass the streetcar at any time. In the three-lane sections, the center turn lane would provide a potential area for emergency vehicles to bypass streetcars. Inside the Downtown Loop and in the River Market area, the situation would be somewhat similar to the situation encountered under existing conditions with a bus traversing the corridor. The inclusion of transit preemption on the signals along the Streetcar route could also allow the inclusion of emergency vehicle preemption, enhancing response times.



The VMF would not have a substantial effect on traffic operations, access, or safety, as it would generate small amounts of vehicular traffic daily, and the non-revenue track would experience infrequent streetcar usage and would largely run in a dedicated right-of-way.

With the No Build Alternative traffic growth would result in two intersections operating unacceptably within the study corridor, but changes brought about by the Streetcar Project would restore these intersections to acceptable operations. Ongoing plans related to downtown could also potentially resolve these operations, but specific projects have not been identified or funded related to these specific intersections.

Transit - No substantial project-related impacts were identified related to transit. The project is an enhancement to the downtown transit system, and a potentially important connection to the future regional transit system. Projected opening year ridership is shown by stop location on the table to the right Local bus service changes would be minimal and largely related to stop location issues. In some locations along Main Street some bus stops might need to be shifted. Joint use of stops by streetcar service and local bus service is desirable to facilitate easy transfers. VMF operations would have no substantial effect on the existing transit system.

Opening Year (2015) Daily Ridership

Forecasts - By Streetcar Stop

3 rd /Grand	51
5 th /Walnut	43
4 th /Delaware	25
8 th /Main	208
10 th /Main	499
12 th /Main	811
14 th /Main	248
16 th /Main	84
18 th /Main	141
20 th /Main	243
Union Station	333
Total	2,686

Source: HDR Engineering, Inc.

With the No Build Alternative, Bus transit system changes in downtown would improve passenger convenience and service levels.

Parking/loading/access - No substantial project-related impacts were identified related to parking, loading and access from the Streetcar Alternative. Much of Main Street would be converted from a four-lane street with no dedicated turn lanes to a three-lane street with dedicated turn lanes and dedicated on-street parking. On many parts of Main Street, the outer travel lanes currently allow parking during off-peak periods only. With the Streetcar Alternative, over 4,000 feet of Main Street would have a reconfigured cross-section that would allow dedicated on-street parking at all times of day, not just during off-peak periods – increasing the total hours of parking availability. Approximately 1,745 feet of on-street parking would be lost due to the addition of platforms at Streetcar stops, right-turn lanes and track design needs. This loss would not be considered a substantial impact because additional parking capacity is available on Main Street, on nearby cross-streets, and in surface and structured parking lots throughout the corridor. By adding a center turn lane to the majority of Main Street, the Streetcar Alternative would improve access to existing off-street parking, for left turns both into and out of parking lots and structures. The VMF would have no substantial effects on parking, loading, or access.

With the No Build Alternative, parking, loading, and access conditions would not be expected to differ substantially from existing conditions in the study corridor.

Pedestrians - No substantial project-related impacts were identified related to pedestrians. The project would benefit pedestrians by improving downtown circulation and assisting with implementing accessibility compliance along the corridor. With stops every two blocks, the streetcar would improve the pedestrian environment and enhance connectivity for those who choose to walk in the downtown area. The project would result in alterations at all 26 of the study intersections along the corridor, which, consistent with the agreement between the City of Kansas City and the Department of Justice, would accelerate compliance with applicable accessibility guidelines. The stop platforms would all be designed to maximize accessibility. The system is being planned to meet current ADA standards for boarding (both 10-inch platforms, with bridge plates, and 14-inch platforms are being considered). An additional feature of the Streetcar alternative is the inclusion of curb bulb-outs at several intersections along the corridor. At corners, these bulb-outs would have the effect of reducing

the intersection width, thereby decreasing pedestrian crossing times. VMF operations, including vehicle and Streetcar access to and from the facility would not affect pedestrian access within the Columbus Park neighborhood. The VMF, and associated non-revenue track, would be designed to maximize pedestrian accessibility and safety.

With the No Build Alternative, no substantial pedestrian improvements are expected in the study corridor.

Bicycles - No substantial project-related impacts were identified related to bicycles. The Streetcars are planned to accommodate bicycles on-board (rather than on external racks as with the bus system), and level or near-level boarding would facilitate boarding and de-boarding of bicyclists. Where the streetcar route coincides with existing or planned bicycle routes, the design team will work with the bicycle community to ensure that the final design functions safely for both the streetcar and bicycles. VMF operations would not affect bicycle traffic within the Columbus Park neighborhood and the VMF, and associated non-revenue track, would be designed to maximize bicycle safety.

With the No Build Alternative, additional bicycle routes would be added downtown, some intersecting the study corridor (the same new routes as with the Streetcar Alternative).

Freight - No substantial project-related impacts were identified related to the Streetcar Alternative. With the conversion of existing parking/loading zones to “full-time” use, the times of day available for loading would increase. Curb radii and turning radii would be designed for the appropriate design vehicle. The VMF would have no substantial effects on freight.

With the No Build Alternative, freight conditions would not be expected to differ substantially from existing conditions in the study corridor.

4.15 Construction Related Effects. Short-term impacts related to construction of the Streetcar Alternative (including the selected VMF) would include a number of elements including construction of guideway and trackwork, construction of streetcar platforms, a vehicle maintenance, operations and storage facility and roadway re-construction. It would also include installation of specialty system work such as traction power, communications, and train/traffic signaling. The equipment used in construction would include graders, bulldozers, cranes, concrete trucks, flat bed trucks, dump trucks to haul dirt, and other equipment as described below.

Staging areas for construction would be established in the vicinity of the project and would be used for storage of equipment and materials. Construction staging areas are expected to be located primarily within the Street right-of-way along the Streetcar route. One of the most ideal locations for a possible staging area is the 2nd Street right-of-way near the three VMF candidate sites, as it has good vehicle access and is long enough to weld a variety of lengths of rail strings together before placement in the streets. A portion of the nearby KCATA-owned park-and-ride lot could also partially be used if an agreement between the City and KCATA could be reached, as well as many other potential sites along the alignment. For day to day activities, the contractor may use the on street work zone for temporary staging.

Disruption during construction of the Streetcar Alternative would affect adjacent businesses, residents and neighborhoods. Effects would include traffic delays, loss of on-street parking, temporary sidewalk closures, and short-term interruptions in access to business and residential parking areas to allow for the movement of construction equipment and materials during construction. These effects would be intermittent and of short duration, and efforts would be made to minimize their effects on vehicular and pedestrian traffic. Trackway construction would create the most inconvenience for businesses and residences due to temporary relocation of access drives and sidewalks, and the restriction on left turns. Driveways could be temporarily relocated if possible, or maintained using steel plates to bridge over the construction zone. Affected parties would be notified in advance, and measures would be taken to minimize the inconvenience as much as possible.

Construction Noise levels along the Streetcar route, although temporary, could be a nuisance at nearby sensitive receptors. Noise levels during construction are difficult to predict and vary depending on the types of construction activity and the types of equipment used for each stage of work. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns and is not usually at one location very long.

Construction-Related Effects on Traffic would include closure of one or more travel lanes temporarily, to facilitate construction of the track and streetcar stops. A traffic control plan would be developed in conformance with local, state, and federal requirements to minimize these temporary traffic and access impacts. Construction supply deliveries would be scheduled and routed so as to minimize interference with daily traffic flows in the corridor.

Utility Disruption During Construction would occur in the area of the Streetcar improvements. Some utilities would need to be adjusted or relocated prior to construction of the proposed Streetcar improvements. Standard utility construction or relocation procedures would be used. The adjustments would be handled so that no substantial interruptions would occur. The City would work with all the utility companies to define the relocation or adjustment plans. If previously unidentified utility lines are found during construction, then work would cease until a resolution is developed and the appropriate utility company, residents and/or property owner are notified.

With the No Build Alternative, construction effects associated with the Streetcar Alternative and described above would not occur.

4.16 Indirect and Cumulative Effects. Indirect impacts are “caused by the action and occur late in time or farther removed in distance but are reasonably foreseeable”. Additionally, these impacts “may include growth-related effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water and other natural systems, including ecosystems” (40 CFR 1508.8). Cumulative effects are “impact(s) on the environment which results from the incremental impact of the action (project) when added to other past, present, and reasonably foreseeable future actions”(40 CFR 1508.7).

The study area for the indirect and cumulative effects is the same as the project study area, and the horizon is the projected opening year of the Streetcar Alternative (2015). Reasonably foreseeable projects in the study area by 2015 include ongoing private development and redevelopment, and KCATA’s comprehensive service analysis transit changes.

- Land use indirect and cumulative effects of the Streetcar Alternative could include additional transit supportive development along the corridor in accordance with the Downtown Area Plan and other relevant planning documents. Planning for the Streetcar Alternative was conducted in support of implementation of local and regional transportation and land-use plans. Implementation of streetcar service would likely result in more land development and redevelopment, redevelopment to more intense uses, and redevelopment sooner than with the No Build Alternative.
- Economic indirect and cumulative effects could include an increase the number of residents and employees in the downtown area, which would increase demand for services. In addition to increasing employment, the Project would increase property values within the study area. The economic analysis conducted for the Project indicated that property values would appreciate faster with the Project than without, resulting in a total economic benefit of \$93.6 million (\$4.5 million for residential properties and

\$89.1 million for commercial properties) over the life of the Project. Based on the economic analysis⁴ for the Project, the Streetcar Alternative would create 1,345 job-years (defined as one job for one year) and \$113.6 million in value added, including \$75.8 million in labor income, during the construction period.

- Environmental Justice indirect and cumulative effects could include an increase in low-income, minority and other transit dependent populations in the downtown area due to the improved mobility from the Streetcar Alternative. Employment and business ownership may increase in the area. Increased mobility in the study area would improve access to employment, educational, entertainment, and recreational opportunities.
- Transit indirect and cumulative effects when combined with KCATA's comprehensive service analysis implementation in the downtown area would likely include improvements to the bus transit system that would make transit service in the downtown more understandable and therefore easier to use.
- Historic resources indirect and cumulative effects would include private development pressures that could result in restoration of historic properties in the area.

4.17 Environmental Permits, Commitments, and Mitigation Measures

- Prior to initiating construction, the City would obtain coverage under a National Pollutant Discharge Elimination System (NPDES) General Permit from the MDNR. A Stormwater Pollution Prevention Plan (SWPPP) would also need to be prepared, and a Notice of Intent (NOI) would be submitted prior to commencing construction activities.
- All property acquisitions would comply with the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, and the Uniform Relocation Act Amendments of 1987.
- If hazardous materials are unexpectedly encountered during construction, then the City would ensure work would cease at that location and appropriate personnel and regulatory agencies would be contacted to arrange for proper assessment, treatment, or disposal of those materials at licensed facilities.
- Prior to construction, the traffic control plan (TCP) would be developed to minimize traffic impacts. The TCP would be developed and implemented during construction to manage vehicular, transit, and pedestrian circulation and access within the construction zone. The traffic control plan would identify any detour routes required and would indicate the type and location of signage, signals, barriers, lighting, and flagmen as needed to implement the plan. The TCP would be prepared in accordance with traffic engineering principles and practices governing traffic control during construction as prescribed in the MUTCD and by the City. Access, both vehicular and pedestrian, to all businesses and residences would be maintained during construction,
- Prior to construction, the City would conduct an energy assessment of the vehicle maintenance facility and incorporate all feasible and sustainable elements.
- A Phase I ESA would be conducted for the selected VMF site prior to acquiring the property.

⁴ City of Kansas City, Missouri. (2012, March 19). Kansas City Downtown Streetcar Tiger IV Grant Application. <http://www.kcmo.org/idc/groups/publicworks/documents/publicworks/streetcarnarrativetigergrant.pdf>

5. PUBLIC AND AGENCY COORDINATION

5.1 Public Involvement. Public outreach and engagement has been an integral part of the Kansas City Downtown Streetcar Project since the initiation of the Downtown Corridor Alternatives Analysis (AA) in early 2011. A Public Involvement Plan provided the framework that guided the public participation process for the AA, continuing through the Advanced Conceptual Engineering (ACE) phase of the project including the NEPA process.

The public outreach effort has been based on the belief that people whose lives could be affected by planning and investment decisions have a right to be involved in the decision-making process and influence the choices to be made. The Partnership Team (City of Kansas City Missouri, Jackson County, Mid-America Regional Council (MARC), and Kansas City Area Transit Authority (KCATA)) designed the public engagement program to be a proactive process in which the governing bodies worked to engage the public through a variety of opportunities to become involved. There has been a meaningful and transparent process that has ensured effective communication about how public participation would influence decisions.

Several open houses and other opportunities were provided for the public to learn about and discuss the study. In addition to a number of outreach tools to used to engage the public, stakeholder groups, and public officials in the planning and preliminary design process, materials were developed and made available to the public in English as well as Spanish. Existing community and advocacy groups, including the Kansas City Regional Transit Alliance, Downtown Council, Columbus Park Neighborhood Association, and Streetcar Neighbors Advocacy Group; have assisted in disseminating information about the project with their members and the public.

Downtown Corridor Alternatives Analysis. During the AA, a series of three Public Open Houses were held to share information and receive feedback on the AA process. The Project Team provided information on the transit modes and alignments under review and gathered feedback that was used it to inform the selection of the Locally Preferred Alternative, gain input on financing options and discuss related community issues and concerns. In conjunction with the second Public Open House, a Streetcar Party was conducted at Union Station where attendees had the opportunity to tour a modern streetcar vehicle and bus.

MARC hosted a project website located on the www.kcsmartmoves.org web page. The website was regularly updated with current study materials, invitations to the Public Open Houses, and information on other local transit-related studies and activities. In addition, e-mail blasts and social media (Twitter and Facebook) were also used to share study information with the public.

Advanced Conceptual Engineering (ACE) and NEPA. During the ACE/NEPA phase, public outreach efforts continued through holding more Public Open Houses, publishing project updates through coordination with MARC through the SmartMoves electronic newsletter, and presenting information to other civic groups and interested stakeholder groups.

Three more public open houses were held to provide updated information on the Project in May at the Downtown Branch of the Kansas City Library, the Steamboat Arabia Museum at Union Station. Information was shared on the progress of the conceptual engineering, how the Streetcar would operate, the general construction process and how construction effects could be minimized, and the environmental review process. Notice was provided via press releases, www.kcsmartmoves.org, direct mail, and direct contact with the public through advocacy groups (i.e., Kansas City Transit Alliance, Streetcar Neighbors Advocacy Group, and Columbus Park Neighborhood Association). All information was presented in reader-friendly formats using simple text and clear graphics to illustrate concepts and project details. Project information was made available in Spanish and English, although no one requested copies of the Spanish materials. All open houses were held in ADA-compliant public facilities.



In total, 227 people attended the three open houses. Attendees included downtown residents, business representatives, neighborhood groups, agencies, advocacy groups, institutions, and news media. Thirty-eight comment cards were returned during the weeks that followed the open houses. Generally, the feedback received related to the anticipated positive aspects of the Streetcar service, general concerns about streetcars and different route sections, and suggestions for mitigating construction effects.

5.2 Agency Coordination. The table below provides a list of agencies who have been invited to comment on the proposed project. Related correspondence from these tribes or agencies is included in Appendix A.

Federally Recognized Tribes
Delaware Nation
Iowa Tribe of Kansas and Nebraska
Iowa Tribe of Oklahoma
Kaw Nation
Osage Nation
Sac & Fox Nation of the Mississippi in Iowa
Sac & Fox Nation of the Missouri in Kansas and Nebraska
Sac & Fox Nation of Oklahoma
Wyandotte Nation
Federal Agencies
U.S. Environmental Protection Agency, Region 7
State Agencies
Missouri Department of Conservation
Missouri Department of Natural Resources, State Historic Preservation Office
Missouri Department of Natural Resources, Division of Environmental Quality, Hazardous Waste Program
Missouri Department of Transportation
Local Agencies
Kansas City Landmarks Commission
Kansas City Parks & Recreation Department
Kansas City Area Transportation Authority (KCATA)
Mid America Regional Council (MARC)

REFERENCES

The following documents are incorporated into the EA by reference.

Kinzel, Christopher and Frazer, Robert, (2012). *Kansas City Streetcar Transportation Technical Report*; Kansas City, Missouri: HDR.

MARC, KCATA and City of Kansas City (2012). *Regional Alternatives Analysis: Downtown Streetcar Alternatives Analysis and Locally Preferred Alternative Report*; Kansas City, Missouri.

Houghton, S, RPA], (2012). *Kansas City Downtown Streetcar Archaeological Reconnaissance Survey Technical Report*; Kansas City, Missouri. Burns & McDonnell Engineering Company, Inc.

Millstein, C. (2012). *Kansas City Downtown Streetcar Historic Properties Technical Report*; Kansas City, Missouri. Architectural & Historical Research, LLC..

Sizemore, S.E.S, PE and G. Gorman, PE, (2012). *Environmental Desktop Review, Streetcar Route Technical Report*; Kansas City, Missouri.: Burns & McDonnell Engineering Company, Inc.

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Sizemore, S.E.S, PE and G. Gorman, PE, (2012). *Hazardous Materials and Waste Sites Summary Technical Report, Kansas City Downtown Streetcar Project*; Kansas City, Missouri. Burns & McDonnell Engineering Company, Inc.

Mid-America Regional Council (MARC). *Transportation Outlook 2040*,

Kansas City Area Transit Authority (KCATA). *Comprehensive Service Assessment*.

FA Circular 4703.1

Advanced Conceptual Engineering Documents:

HDR Engineering Inc., Luke Olson Task Lead, (August 2012), Advanced Conceptual Engineering Concept Plans for the Kansas City Downtown Streetcar Project.

Maintenance Design Group in association with HDR (July 2012) Kansas City Streetcar Operations and Maintenance Facility: Technical Design Report.

HDR Engineering Inc, Luke Olson Task Lead, (September 2012), Kansas City Downtown Streetcar Cost Methodology and Summary of Opinion of Probable Costs.

HDR Engineering Inc, Luke Olson Task Lead, (2012), Kansas City Downtown Streetcar Condition and Load Rating Assessment of Structures

HDR Engineering Inc, Luke Olson Task Lead, (May 2012) Streetcar Traction Power Substation Siting Memo

Environmental Assessment



HDR Engineering Inc, Luke Olson Task Lead, (September 2012), Streetcar Construction Methods Technical Memorandum

HDR Engineering Inc, Luke Olson Task Lead, (May 2012), Streetcar Vehicle Technology Report