South Loop Link

Truman Road Feasibility Study / Planning Improvements over I-670

Downtown Kansas City, Missouri

Final Report

December 2009

Prepared For:

The City of Kansas City, Missouri

The Missouri Department of Transportation

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The City of Kansas City, Missouri

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Introduction

The Missouri Department of Transportation anticipates the need to replace four bridges over I-670 within the next 10 years; these bridges are at Baltimore, Main, Walnut and Grand. The City is proactively looking at the bridge replacement as an opportunity to create an asset for the City, to build on the recent successes of Downtown, to improve the pedestrian environment, to catalyze further urban development and to promote urban density and activity. The schedule for the bridge replacements allows time to analyze the highest and best use for the corridor and examine the feasibility of varying concepts. This study takes the first step: to measure public support for such a project and determine if concepts, varying in scale, are physically feasible.

Study Area and Characteristics of the I-670 Corridor

The project area is from Wyandotte Street to Oak Street and includes the total right-of-way encompassing I-670 and Truman Road and is approximately 300 feet in width. The overall planning area includes properties and neighborhood edges along the corridor that are directly influenced by modifications to Truman Road and I-670.

The existing freeway (I-670) is constructed in a sunken channel approximately 19-20 feet below Truman Road. Truman Road is a one-way pair of streets flanking the north and south sides of the freeway that functions as an urban arterial allowing traffic from the freeway to access Downtown. The physical environment is dominated by roadways, directional signage, street lights, traffic signals, and surface parking lots.

The study area is in the downtown built environment. Thus, existing and surrounding conditions dictate, to an extent, parameters (fixed conditions) that new development must adhere. The following are the fixed conditions within this corridor:

- The existing retaining walls bordering I-670 on both sides will remain in their current location.
- I-670 will remain as a highway.

Study area

- Truman Road must connect to Broadway on the west and to Locust on the east.
- All four bridge locations must remain as north/south connections (the McGee Street bridge was removed and the connection eliminated).
- Grade changes must be minimized to uphold connectivity and safety.
- Existing vertical clearances must be maintained (at a minimum) between I-670 and the bottom of the existing bridges. In most cases this is 15 feet 6 inches.
- Future corridor bridge replacements should be designed to support light rail to not preclude possible future transit modes.

Overview of the Adverse Conditions

The construction of I-670 and the dividing of Truman Road (15th Street) created adverse impacts to the socio, environmental and economic viability of downtown Kansas City.

Significant noise levels, typically exceeding 70 decibels along the corridor, impact the pedestrian environment and limit the potential of development along Truman Road. Air quality issues associated with concentrated vehicle emissions have discouraged active storefront development and deterred pedestrian and bicycle use along the corridor. Only one building in the entire study area fronts onto Truman Road.

Parcels that would typically increase in value given their proximity to the central business district have not yet fully realized their potential. In fact, almost 40% of the development parcels in the study area are currently used solely for surface parking.

Although the Downtown Loop and Crossroads District are adjacent neighborhoods in the urban core, I-670 created a gap in the urban fabric, creating a significant distance between the two areas. Walkability and the pedestrian experience are sacrificed to provide a high level of service for vehicles.

Within the corridor, impervious areas create a heat island effect (also created by a lack of shade) and increased stormwater runoff. In fact, the KCMO Fire Department has had to rescue motorists on I-670 in flash flood situations because of the inability to handle the excessive stormwater drainage.

I-670 has created a gap in the urban fabric of the city.

Goals

After reviewing adverse conditions of the corridor, the Steering Committee, public participants, and the Planning Team established goals for the project that would replace the four bridges. The goals (in no particular order) for the project are to:

- Maximize the City's investment in the Power & Light District, Sprint Arena, Convention Center and the Performing Arts Center.
- Blend the Downtown Loop and Crossroads neighborhoods but maintain their respective identities.
- Increase open space to serve the needs of the Downtown Loop as well as the Crossroads district. Open space should include pedestrian and bicycle connections.
- Redesign Truman Road to include more urban characteristics like Michigan Avenue in Chicago or Park Avenue in New York while accommodating long term capacity needs.
- Strengthen the connection to the east.
- Emphasize the pedestrian qualities of Walnut Street.
- Provide opportunities to increase development along Truman Road.
- Mitigate the environmental impacts of the I-670 corridor through downtown. This includes addressing pedestrian connectivity, air pollution and noise pollution.

Many design concepts were analyzed throughout the project. A technical analysis was performed on the final six concepts and found all concepts feasible. The Steering Committee then made a recommendation and selected two concepts to move forward. The following summarizes the technical engineering aspects evaluated as part of the feasibility study for the two recommended (by the Steering Committee) concepts.

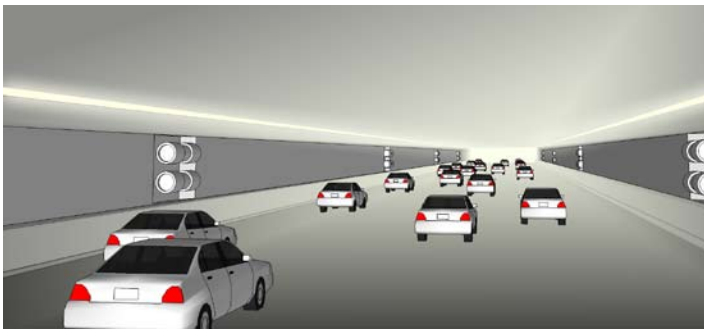
Analysis

Creating a Functional Tunnel

The proposed structural system, which accommodates grade requirements and vertical clearances, limits the flexibility to address ventilation and lighting requirements. The proposed structure has limited overhead and lateral space which does not allow for ducts because of the planned uses above. Therefore, the design recommendation is to use a longitudinal jet fan system to meet the ventilation requirements. To make this system work effectively, this requires full-height separation walls between westbound and eastbound I-670 traffic. To adequately illuminate the tunnel given the structural recommendations, continuous lighting mounted in corners of the tunnel is required. Photo sensor controls are also needed to control and manage lighting levels.

Identifying a Structural System

The deck system between the bridges and over I-670 is designed to support three feet of soil, pedestrian loads and a small service truck. The existing vertical clearances on I-670 can be maintained by using a steel girder structural system. All of the new decks would span over the existing retaining walls and rest on driven piles located behind walls and a center support system separating the highway lanes.



Lighting and ventilation systems located in the I-670 tunnel

Addressing Adverse Environmental Impacts

Construction of the tunnel for I-670 will adress the noise and air impacts along the corridor. With existing sound levels exceeding those deemed generally acceptable by HUD for development sites, enclosing the interstate is a successful approach for decreasing the sound that is experienced outside of the enclosure (NOTE: No HUD development is anticipated; the use of HUD noise standards is used solely for comparison). In fact, the recommended concepts represent dramatically improved noise levels for the surrounding properties and pedestrian environment.

Emissions from fuel combustion by the vehicles in the tunnel would be transmitted by system to either end of the tunnel, minimizing the concentration of emissions above the tunnel. Formal testing and analysis will need to take place in future phases of the project to ensure that there is enough air flow through the tunnel to fully disperse the emissions or if treatment of the air is necessary, resulting in acceptable quality along I-670.

Minimizing Utility Impacts

The utilities that are along or below the current westbound Truman Road are to remain in their existing location (due to physical limitations and expense). The utilities along existing eastbound Truman Road may be relocated and/or consolidated along the south retaining wall of I-670. The utilities in this location are not as extensive as they are under westbound Truman Road. In addition, both utility bridges (one is east of Main Street and the other is near the former McGee Street bridge) will need to be relocated.

Minimizing Traffic and Roadway Impacts

The optimal lane configuration based on the current design of the loop, the existing retaining walls and anticipated traffic patterns would include five westbound lanes and four eastbound lanes. This design minimizes the ability to have adequate shoulders, which requires a design exception. This design also requires that the current median relocate approximately 5'-6" to the south to accommodate the future lane needs. The McGee eastbound entrance ramp to I-670 is maintained in the design concepts.

Truman Road operates with three travel lanes in each direction. An analysis of use and capacity evaluated current and future travel patterns. It is possible to combine the two roadways and eliminate the additional traffic signals to increase mobility. While meeting future traffic demand, it is also possible to utilize the curb lane for on-street parking. With that, additional traffic management tools are needed such as turn lanes at some intersections and event management assistance.

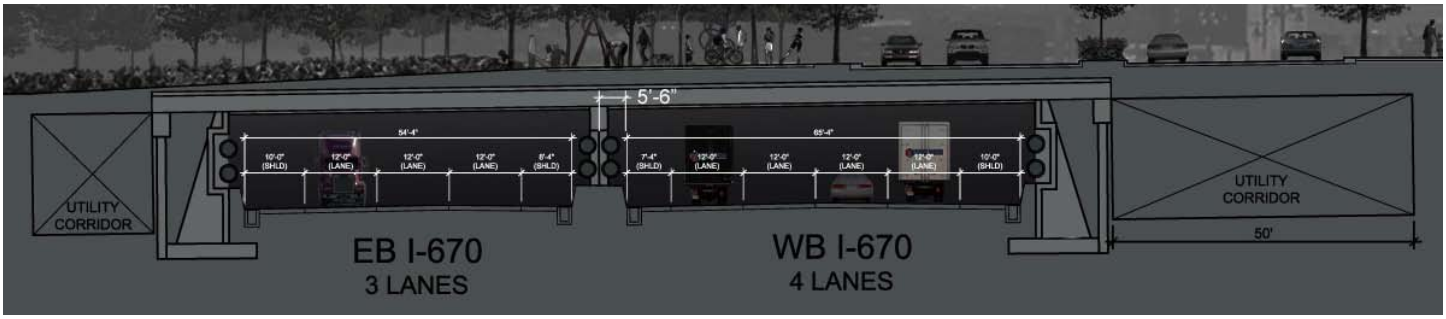
Enhancing Market Opportunities

Although development has occurred near the study area, the City has had to use its investment tools and revenue to incent projects because of the area's lack of marketability. Through an analysis of current and anticipated future conditions, higher development densities are possible when an amenity such as the proposed park is created. Residential development is likely to receive the biggest boost; office employment within the study area could increase dramatically as well.

Enhancing Urban Design Opportunities

The concepts are designed to encourage more intensive uses along Truman Road with active edges to bring vitality to the area. Active edges are defined as pedestrian-oriented, engaging areas with amenities and uses that promote a vibrant urban character. Increased activities along both sides of Truman will help reduce the barrier between the Downtown Loop and Crossroads Arts Districts. These future active edges are also essential for an attractive, well-used and safe urban space that is included in all of the concepts.

New mixed-use building edges along Truman Road can help create a sense of place with activities such



Section showing dedicated utility corridors, decking structural design, and future lane configurations of I-670.

as sidewalk cafés, linear parks, and pocket parks for people interactions. Taller structures and buildings that extend the full length of the block faces along the I-670 right-of-way can create the spatial containment necessary to establish a sense of place and overcome the large scale gap created by the right-of-way. Building heights should strive to achieve a minimum spatial proportion of 1:4 (1 foot of height for every four feet of right-of-way width), with building heights that conform to the recommendations set forth in the Greater Downtown Area Plan and encourage additional density of the urban environment. Using this proportion with an existing right-of-way width of approximately 300 feet, adjacent building heights should be at least 75 feet tall.

Gateways are important urban elements that will help shape the success of the proposed improvements. Gateways give clues to the users about arriving into a specific urban location. The Kansas City Convention Center creates a gateway on the west end of the study area. Future buildings on the north and south side of Truman Road will help create edges to the new urban space. The east end, although bordered by iconic structures, the Sprint Center and the Kansas City Star printing press, is fairly open ended and continues east into the Paseo West and Historic Jazz Districts.

Important views give focus, interest, and orientation. New development should be designed so that it is sensitive to good existing views in and around the study area. Certain selected building corners should be designed to take advantage of the views naturally generated by the new Truman Road as it enters and leaves the district. There are several landmark buildings around the study area that can be used as examples including the recently renovated Main Street Theater.

The proposed park spaces and realignment of Truman Road will improve and strengthen north-south and east-west pedestrian connections. Walnut Street is proposed as the street that provides the most pedestrian amenities and the strongest pedestrian connection between the Crossroads and the Downtown Loop. Combining Truman Road into a landscaped median parkway concentrates the vehicle interruption to the north-south pedestrian flow at one location where a generous pedestrian refuge can ease the crossing. Entire corridor enhancements include improved sidewalks, crosswalks, landscaping, and streetscape amenities and other structures, with the potential to expand east along Truman Road.

Development potential of the Truman Road corridor with buildings facing a new urban parkway and park space
(Redevelopment outside of the Truman Road right-of-way is not part of this study, but is conceptually shown to illustrate the potential of the corridor)

Recommended Approach

The Steering Committee recommendation is to pursue the next phase of environmental analysis and develop a preferred concept that decks over I-670 with a combined Truman Road alignment and park space creating an interstate tunnel. The two recommended concepts meet the goals, incorporate the fixed conditions, enhance the urban environment, provide sustainable benefits and accommodate the technical and engineering challenges.

Also, the expansion of the Kansas City Convention Center is under discussion. Although the expansion location selection is not imminent, one possible location is over I-670 between Wyandotte and Baltimore. Because the location of the potential expansion is still unknown, the study explored two options for the block between Wyandotte and Baltimore. The first includes the expansion and the second is a terraced park. Both options are feasible, but in the following discussion and images, the terraced park is used.

North Truman Concept 1A - Plan View

South Truman Concept 2 - Plan View

Concept 1 – North Truman

Concept 1 has two variations: both combine Truman Road into a landscaped parkway and align it to the north of the corridor. The roadway for both transitions between Baltimore and Main to connect to interstate access points on the west, creating a tunnel for the interstate. The main differentiator between the two variations is the eastern limits of the improvements - one variation (Concept 1A) transitions Truman Road to the south between Grand and Oak, the other (Concept 1B) transitions between Grand and McGee. The deck over the interstate allows for a signature urban park space, creates redevelopment and private investment opportunities and enhances the connections between the Downtown Loop and the Crossroads District.

Concept attributes include:

- Development parcels on the north side of Truman Road have frontage on a new urban parkway.
- Vehicular circulation flows along the north end of the corridor where the majority of the total traffic is heading to and from the Central Business District.
- Up to approximately 90' of land is captured from the existing Truman Road southern right-of-way boundary to the I-670 southern retaining wall; with approximately 20' designated for utilities, approximately 70' of "new" buildable area is adjacent to the proposed new park over I-670.
- In Concept 1A, interstate decking continues to Oak Street, providing park space adjacent to the Sprint Center and further connecting to the eastern portion of the Crossroads District.
- In Concept 1B, interstate decking (and tunnel length) is reduced (lower cost).

North Truman Concept 1B - Plan View

North Truman Concept - Perspective
(Redevelopment outside of the Truman Road right-of-way is not part of this study, but is conceptually shown to illustrate the potential of the corridor)

Concept 2 – South Truman

This concept realigns Truman Road as a landscaped parkway on the south side of the right-of-way beginning at Main Street. The roadway transitions between Baltimore and Main to connect to interstate access points to the west. As in the North Truman alignment, this angled roadway is necessary to facilitate smooth vehicular movements along Truman Road; it was determined that a perpendicular intersection would result in unacceptable traffic impacts. The eastern limit is Grand, with an extension over the eastbound I-670 lanes continuing to Oak. The deck over the interstate allows for an urban park space to be developed.

Concept attributes include:

- Road alignment is more aligned with historical 15th Street and creates a more direct connection to the east along Truman.
- Development parcels on the north side of Truman have frontage on new park space.
- The parcels south of Truman Road have frontage on a new urban parkway.
- Additional real estate fronting the new park space may be developed by one corporate entity, simplifying park programming and maintenance efforts.
- A tunnel is created over the westbound lanes from the Convention Center to Grand and the eastbound lanes to Oak.

Potential character of the park adjacent to the Power and Light District

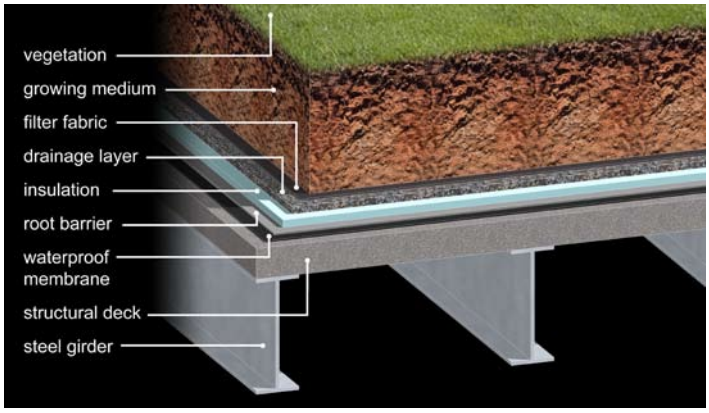
South Truman Concept - Perspective
(Redevelopment outside of the Truman Road right-of-way is not part of this study, but is conceptually shown to illustrate the potential of the corridor)

Sustainable Infrastructure Improvements

The South Loop Link recommended concepts are designed around sustainable design features and best practices. Each concept is designed to improve the socio, environmental, and economic vitality of the South Loop area by offering a new public amenity, strengthening the sense of community by re-stitching the urban grid, and promoting a healthy environment through sustainable design. The following are a few examples of sustainable practices that can be implemented in the recommended design concept:

- Stormwater filtration through rain gardens and bioswales to clean and slow runoff.
- Solar technology to collect energy to power street and pedestrian lights.
- Use of LED technology in light standards.
- Increased pedestrian amenities and accommodations between the Downtown Loop and the Crossroads District to facilitate walkability.

Although Kansas City is known for its historic parks and boulevards system, there is a perceived lack of meaningful green space in the downtown core. For example, Barney Allis Plaza, located near the study area, is an under-utilized public open space. The proposed park over the interstate and adjacent to a new, landscaped Truman Road offers significant open space to create an address for development and to host a variety of outdoor activities. Also, the proposed park would be the largest "green roof" in Kansas City, reducing the amount of impervious area.



Landscaped deck structural section


Potential character of the new park
(Redevelopment outside of the Truman Road right-of-way is not part of this study, but is conceptually shown to illustrate the potential of the corridor)

Cost and Funding

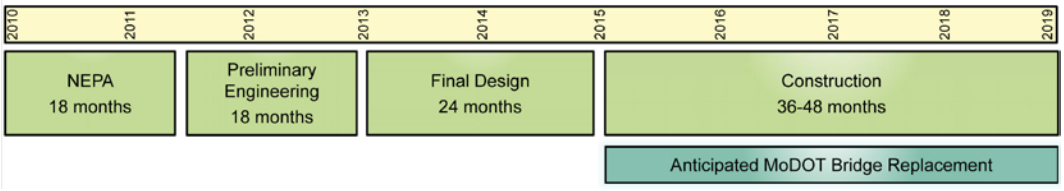
MoDOT has indicated that they are willing to leverage their design and construction funds for the corridor bridge replacements to help the community attain a vision for an improved walkable downtown and urban core. The estimated construction cost range in 2009 dollars for the bridge replacements is $10 million. These funds account for about seven-to-nine percent of the total proposed project construction cost estimate, which ranges from $145-$175 million. Leveraging other projects such as future improvements to the Kansas City Convention Center or the Power & Light District could include funds to implement portions of the project. Seeking state and federal assistance must also be part of the funding strategy.

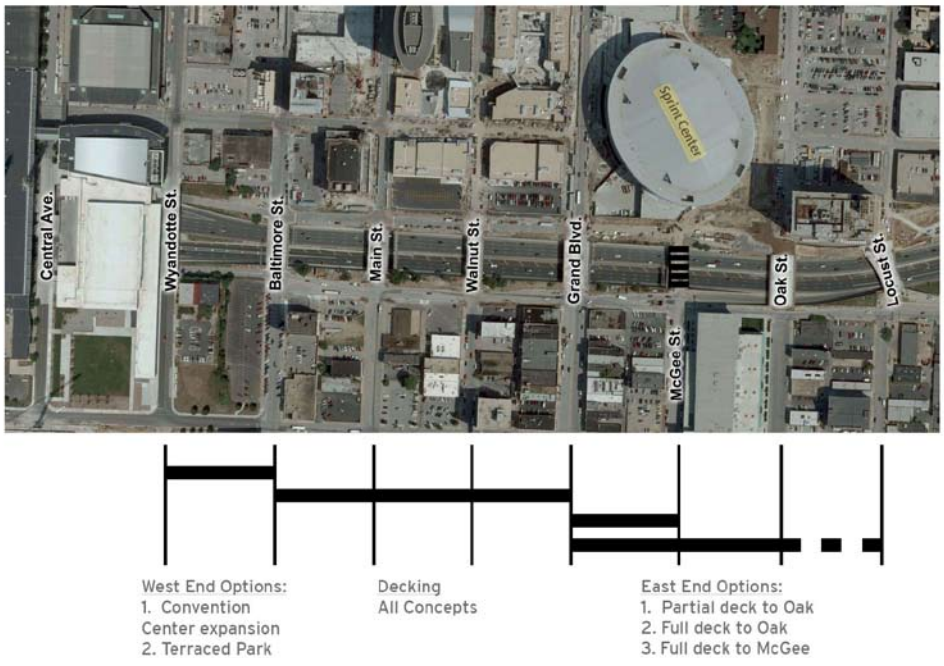
Implementation

The construction sequence for this project would be similar for each of the recommended concepts. Early phases can address utility relocations and I-670 outside shoulder improvements. Constructing the outside shoulder first will allow I-670 traffic to be shifted outward to provide space for constructing the decking supports in the median. Later phases include the construction of the abutments and decking.

A potential construction strategy consists of constructing Grand and decking east of Grand, then moving to the west. The final phase would be to construct the Baltimore bridge and decking to Main. This strategy can be adjusted to coordinate with other adjacent projects such as the convention center expansion. Based on planning level analysis, construction is expected to take three to four years if all of the funds are available to do the entire project at once.

The next step in the planning process is to complete the NEPA documentation and select a preferred alternative. Implementation of a preferred alternative is contingent on a number of issues (funding, development incentives, approvals, etc.). However, the Planning Team recommends the following implementation timeline.





Kansas City's Downtown is currently undergoing a renaissance, one that is transforming the urban core into a vibrant destination. Several large projects are completed or under construction, the results of which provide major attractions for new residents, employees and visitors into the Downtown area. These projects include:

- Convention Center Ballroom Expansion
- Power & Light Entertainment District
- H&R Block Corporate Headquarters
- Sprint Center
- Kauffman Center for the Performing Arts

Not only are all of these projects within the downtown area, they are all within one block of the sunken I-670, which bisects downtown Kansas City. Within the last five years the bridges over I-670 at Central, Wyandotte, Oak and Locust (anchoring the western and eastern edges of the corridor through Downtown) were rebuilt. The Missouri Department of Transportation (MoDOT) anticipates the bridges at Baltimore, Main, Walnut and Grand will need complete replacement within the next ten years. These necessary improvements offer the opportunity to further capitalize on the growing momentum of Downtown Kansas City's rebirth. In the recent past, the City of Kansas City, MoDOT, various organizations and private donors have spent time and money trying to enhance this corridor. But at no time since the construction of the interstate system through downtown has there been such a great opportunity for a significant enhancement to re-stitch the urban fabric of downtown Kansas City.

Kansas City's South Loop Corridor

CORRIDOR AND PLANNING AREA

The South Loop Link Corridor (Corridor), highlighted in red, includes the right-of-way (approximately 300 feet in width) for eastbound and westbound Truman Road and I-670 from Wyandotte Street to Oak Street. The larger planning area includes properties and neighborhoods along the Corridor that are directly influenced (by virtue of their adjacency) by modifications to Truman Road and I-670. The planning area extents are generally outlined as follows:

- 14th Street to the north
- 16th Street to the south
- Wyandotte street to the west
- Locust Street to the east

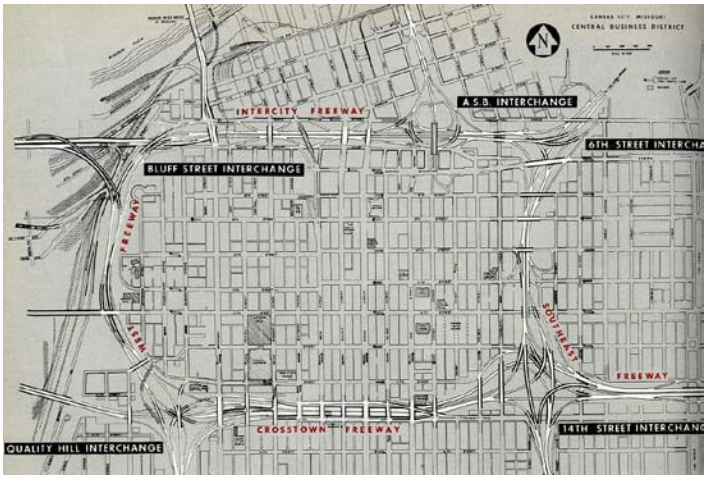
Study area

Benefits of this project will extend to include the downtown area (generally located from North Kansas City on the north, State Line on the west, 31st Street on the south and Woodland Avenue on the east), the "Downtown Loop" (generally located within the I-70, I-35, I-670 and I-29 interstate loop), and the Crossroads Arts District (generally located from Truman Road on the north, I-35 and Southwest Trafficway on the west, KC Terminal Railway on the south and Troost Avenue on the east).

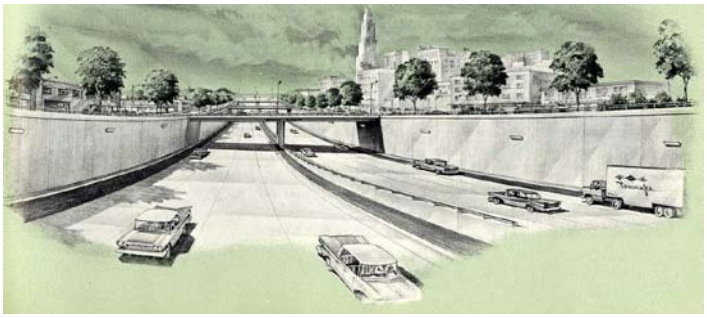
HISTORICAL CONTEXT

In the 1950's and 1960's, the concept of the Federal Interstate bypasses around local business

districts was seen as a primary benefit to efficient transportation. Completed in the early 1960s, Kansas City's downtown interstate loop, including I-670, has served the intended transportation purpose, but has



Early vision for Kansas City's Downtown Interstate Loop System



Rendering of Crosstown Freeway (I-670)

also caused the unintended consequence of dividing neighborhoods and districts and creating a significant physical barrier that has negatively impacted the pedestrian environment and hindered economic development of parcels directly adjacent the freeway.

Kansas City's downtown neighborhoods are part of a linear corridor of commercial, retail, older industrial and residential uses referred to in the ***FOCUS Kansas City Master Plan*** as the Central Business Corridor. Unlike many urban areas with a contained and compact downtown, Kansas City's commercial development extends from the Missouri River to the Country Club Plaza, much of which was developed even before the interstate highway looped the core of downtown. Union Station and the terminal railway tracks were relocated from the West Bottoms in 1912 to their present location, with the east-west terminal railway tracks forming another depressed cut in this corridor's street level fabric. Kansas City's standard street grid system actually crosses above three major east-west sunken transportation routes – I-70 (the north end of the Downtown Loop, I-670 (the south end of the Downtown Loop) and the KC Terminal Railway Tracks at 22nd Street.

Although downtown has experienced significant changes in land use and density since the 1950's, the Central Business Corridor is still the economic engine of Kansas City with over 250,000 jobs and 20,000 residents. Recent redevelopment activity in the downtown area has resulted in an increase of new office, residential, retail and commercial space. In the last ten years, projects such as a new ballroom for the Kansas City (Bartle Hall) Convention Center, a new digital printing facility for the Kansas City Star, new and revitalized park space, a new 18,000 seat arena, a new Performing Arts Center, hotel renovations, the Power and Light District and improvements to public transportation have taken shape. Future market pressure for further redevelopment will likely focus on the Crossroads area between the Downtown Loop and Crown Center due to ease of land assembly, size and scale of existing light industrial building stock and current trends to increase density in the urban core.

As mentioned previously, MoDOT has determined the need for upcoming bridge replacements over I-670. The ongoing ***I-70 First Tier Environmental Impact Statement (FTEIS)*** includes recommendations for improving the downtown loop while maintaining traffic flow for I-70, and it was recommended by MoDOT staff that the existing right-of-way should be sufficient for future use. The South Loop Link Study is a feasibility analysis to determine if creative solutions are physically feasible. These solutions are intended to transform bridge reconstruction into an asset for the city, improving the pedestrian environment, catalyzing further urban development and promoting urban density, walkability, and transit use - all critical success factors for a healthy and economically viable central city.

STUDY PROCESS

The South Loop Link study is a community-based project that relies on a four-tiered involvement process to obtain input and ideas from citizens interested in the project:

- A Steering Committee of twenty-six members was appointed by the Mayor to provide consistent leadership and guidance for key decisions.
- Open public meetings were held to share information about the project and gain feedback used to develop design concepts.
- Key stakeholders in the area, both organizations and individuals, met periodically with the Planning Team to review ideas and concepts.
- A community website was utilized to inform the broader public.

Steering Committee

The Steering Committee, chaired by Ms. Babette Macy of the City Plan Commission and Kissick Construction and Mr. Jon Copaken of Copaken White and Blitt, included twenty-six members from numerous organizations, neighborhoods, and businesses. A kick-off meeting was held August 26, 2008 in the lobby of the Grand Ballroom of the Convention Center with a panoramic view of the I-670 corridor through downtown. The Planning Team shared the impetus for the project and reviewed basic parameters regarding the upcoming necessary replacement of four of the bridges that currently cross I-670 and recommendations from previous plans such as the ***FOCUS Kansas City Urban Core Plan***, the ***Kansas City Downtown Corridor Strategy*** (Sasaki Plan), and the ***Downtown Land Use and Development Plan***. The Planning Team facilitated a discussion about material that had been distributed before the meeting on case studies from other cities. Lastly, the Planning Team and Steering Committee members took a walking tour of a portion of the project area to familiarize themselves with the pedestrian experience in the corridor. Noise levels from the highway and Truman Road made it hard to communicate and members noted the lack of trees for shade, narrow and dangerous sidewalks, and vacant lots. They commented on the exciting view of the downtown skyline and major new developments such as the Sprint Center, Kansas City Star Printing Press, the Grand Ballroom of the Convention Center and the new Performing Arts Center under construction.

The Steering Committee's second meeting was held October 14, 2008. Following a review of urban design opportunities and options discussion, the Committee was lead through a "Headline Exercise." The purpose of the exercise was to determine how the Committee wanted this project to make headlines upon completion.

The Steering Committee's third and fourth meetings were held during a four-day design charrette held at the Kansas City Design Center from November 17 – 20, 2008. In the third meeting, the Committee discussed the problem statement and project criteria/goals of the project (covered in the *Design Charrette* section). Members also reviewed numerous conceptual ideas for the project site and discussed pros and cons of the various conceptual directions. Concepts were organized as no deck, partial deck and full deck solutions.

Steering Committee Meeting, held at the Kansas City Design Center

In the fourth Steering Committee Meeting, the technical and structural options for the bridges over I-670 were presented. Following the technical presentation, concepts refined from the third meeting were discussed in terms of achieving project goals. The concepts were organized into one of the following categories:

- Transportation
- Connections
- Civic Gesture
- Neighborhood

The Steering Committee met again February 19, 2009 to review the technical assessment prepared by the Planning Team on structural issues, tunnel design, utilities, traffic flow, and noise and air quality. Components of six basic alternative design concepts were presented and reviewed against the technical considerations and the project goals. The Steering Committee narrowed down the options to pursue two variations of a concept that redesigned Truman Road to a boulevard-like alignment instead of a split one-way pair, with a series of park-like decks above I-670. The Planning Team was asked to refine the final two versions of the concept for their final meeting held in mid-May.

The Final Steering Committee meeting took place on May 21, 2009, to present the final conclusions of the study for the committee's review and consideration. Three recommended concepts were presented (the two concepts selected from the previous meeting,

Steering Committee Meeting, held at HNTB

one of which had two variations), along with refined technical analysis related to each. Renderings and design diagrams illustrated the concepts and described potential park characteristics for the proposed open space. The meeting also outlined potential phasing and construction scenarios, costs and benefit opportunities and implementation strategies.

Public Meetings

Two open public meetings were held in conjunction with the charrette process on November 18 and November 24, 2008. Several types of public advertisement were created for the charrette. A postcard invitation

Public Meeting, held at the Kansas City Design Center

was widely distributed among several groups and locations, including the steering committee, stakeholders, neighborhood associations, City Hall, Kansas City Public Library and coffee shops in and around downtown Kansas City. In addition, a digital version of the postcard was 'e-blasted' to list serves of several organizations including the Downtown Council, Greater Downtown Area Plan Team, Kansas City Design Center and area neighborhood associations. Finally, a public notice was placed in two area newspapers.

In the first meeting, a brief project presentation set the framework for design concepts displayed in an open-house format. Comment cards were used to formally record feedback.

In the second public meeting during the charrette process, a more detailed presentation was given, focusing on recapping technical issues studied during the charrette and summarizing the refined concepts. Comment cards were again utilized to record feedback, this time emphasizing responses that prioritized improvements based on identified problems associated with the I-670 corridor.

An additional public meeting was held on February 25, 2009. This presentation summarized the engineering factors discovered during the technical evaluation and discussed six proposed design concepts. An open discussion ensued and the public provided detailed feedback and preferences for the concepts, with a

consensus on developing a concept that minimizes Truman Road and adds park space to the corridor over the interstate.

Stakeholder Meetings

Members of the Planning Team met with specific stakeholders on several occasions to discuss special situations, specific properties and current events that will affect the project area, such as the location of a new convention hotel. These meetings included representatives from the Kansas City Convention and Visitors Bureau, local realtors and property owners, the Downtown Council, the Crossroads Community Association, Downtown Neighborhood Association, and members from various City departments.

Community Website

A special project website, linked from the City of Kansas City, Missouri website, was developed and regularly updated with project progress and meeting notices to reach the broader community.

Conclusion

The replacement of the Baltimore, Main, Walnut and Grand bridges over I-670 presents an opportunity not seen since the construction of the interstate system through downtown Kansas City and will likely not be seen for the next 50 years. It is of great importance to fully examine the possibilities that are presented with such an opportunity. The aforementioned methods of public engagement were utilized for this project to ensure the opportunity is what is desired for the City of Kansas City by the citizens of the City of Kansas City.

The purpose of this feasibility study is to measure public support for a public project in this corridor and determine if concepts, varying in scale, are physically feasible. In doing so, the following chapters will examine I-670 and its effects on the surrounding environment, review case studies to learn what other cities have done to correct the problem of divisive interstate systems, review the conditions that currently exist within the corridor, review the technical and design aspects of the existing system and proposed concepts, present the recommended concepts, and outline an implementation plan and funding opportunities.

Community website

OVERVIEW

The construction of I-670 and the dividing of Truman Road (15th Street) from the Bruce R. Watkins / I-70 freeway interchange on the east to the Broadway interchange on the west, created adverse impacts to the socio, environmental and economic viability of downtown Kansas City. Many urban neighborhoods were impacted by the construction of the interstate system through downtown Kansas City.

The bridge replacements in the corridor offer the opportunity to address the impacts of the interstate system to these neighborhoods and minimize the divide of the sunken expressway that separates the Downtown Loop from the Crossroads Arts District and nearby neighborhoods to the west and east.

Bridges in need of replacement within 10 years (McGee Street bridge has been removed)

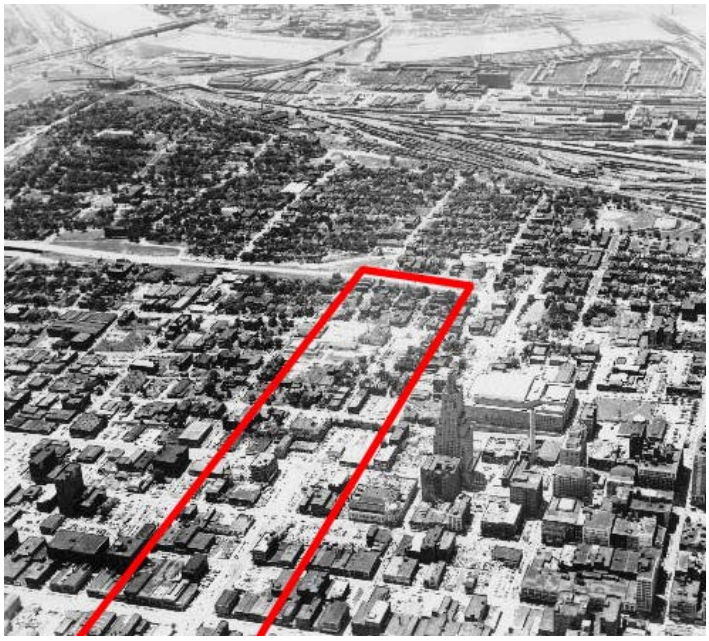
ADVERSE IMPACTS

Noise and Air Pollution

The presence of I-670 through Kansas City's urban core causes negative environmental impacts in the form of noise and air pollution. Noise levels typically exceeding 70 decibels along the corridor impact pedestrians crossing the corridor and the potential to allow residential development along the corridor. (This impact is further discussed on page 122). The air quality issues associated with concentrated vehicle emissions have discouraged active storefront development and deterred pedestrian and bicycle use along the corridor. (This impact is further discussed on page 125.)

Impact to Adjacent Properties

Interstate 670 has created a rift in the urban fabric of the city. Parcels that would typically increase in value given their proximity to the central business district have not yet fully realized their potential. In fact, almost 40% of the development parcels in the study area are currently used solely for surface parking. The freeway has created a deterrence to development along the corridor. (This impact is further discussed on page 52.)



15th Street Corridor prior to I-670 and Truman Road construction

Pedestrian Gap

Although the Downtown Loop and Crossroads are adjacent neighborhoods in the urban core, the gap between the two is extensive, with approximately 300-feet of right-of-way width to accommodate I-670 and an additional six lanes of traffic on Truman Road. Walkability and the pedestrian experience is sacrificed to the vehicle through this dense urban area, which has an impact on the perceived safety and distance between the two neighborhoods. (This is a reoccurring theme throughout this study, although specifically discussed on page 33.)

Environmental Conditions

Within the corridor, there are significant impervious areas that create both a heat island effect (coupled with a lack of shade) and increased storm water runoff. In fact, the Fire Department has had issues in the past of storm water inundating I-670 in a flash flood situation, resulting in water rescues of motorists stranded in the corridor. (The aforementioned environmental conditions and other sustainable design approaches are discussed further on page 170.)

PREVIOUS STUDIES

The resurgence of Downtown Kansas City has not occurred by accident. Many plans and studies have been conducted over the years focusing on the relationship of the Central Business District to the surrounding neighborhoods, identifying physical linkages and leveraging existing amenities while proposing new opportunities to enhance the urban core.

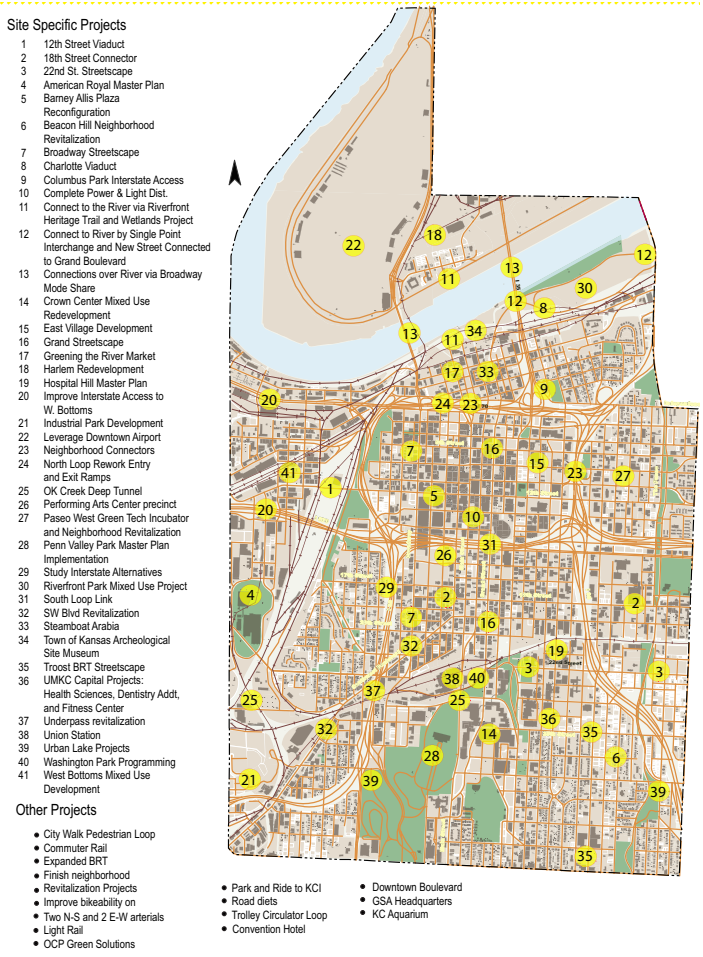
The draft ***Greater Downtown Area Plan (GDAP)*** (estimate adoption date is fall 2009) represents a collective vision for the Greater Downtown Area that focuses on connecting neighborhoods to create a strong urban community, flourishing with diversity, fostering business, maintaining historic neighborhood identities, and sustaining a safe, vibrant, and healthy Greater Downtown Area for current and future generations. The four primary goals of the Plan are to:

- Create a walkable downtown
- Double the population and increase employment in the Downtown Area
- Retain and promote safe, authentic neighborhoods
- Promote sustainability

The South Loop Link project addresses all of these goals and is specifically listed as a catalyst project, and an alternative to the existing highway system (to mitigate barriers).

The ***FOCUS Kansas City Plan***, developed and adopted in 1998, serves as a framework for the vision of the City. A portion of the Plan created eight aspirations to help achieve the goals of the urban core:

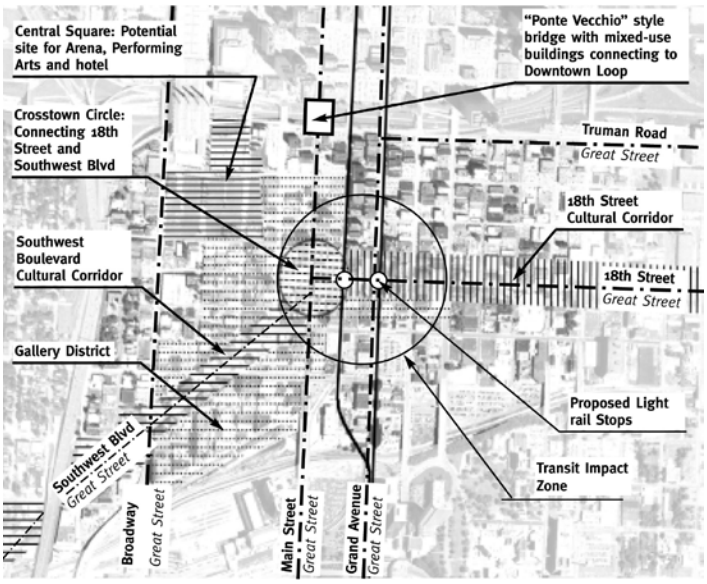
- Link activity centers with efficient, cost-effective transportation
- Reinforce, reaffirm and rebuild our great and varied neighborhoods
- Provide high-quality and accessible education for all residents of Kansas City
- Create great streets and revitalize boulevards
- Create a new generation of urban amenities
- Recognize culture as commerce
- Create and maintain America's cleanest city
- Retain and attract good business citizens and jobs



Greater Downtown Area Plan - Catalyst Projects

FOCUS Kansas City - Future View of Downtown Loop

More specifically, this Plan recommended the creation of an entertainment district near the convention center (Power & Light District), the development of commercial structures spanning the freeway loop in key locations (in this case Main Street), reserving space for expansion of the convention center (Grand Ballroom), a new arena adjacent to the Loop (Sprint Center), and the creation of urban design and streetscape guidelines (***Kansas City Downtown Streetscape Master Plan***).



FOCUS Kansas City - Crossroads District Future Plan

The ***Kansas City Downtown Corridor Strategy*** (Sasaski Plan) was created for the Civic Council of Greater Kansas City in 2005 to plan development in strategic downtown locations while focusing on placemaking. This Plan identifies public improvements to re-energize neglected areas and spur additional development (public and private) to strengthen the downtown core. The planning strategies focus on five core principles:

- Concentrate destinations to create a sense of place and magnify benefits
- Focus investments and incentives to achieve plan goals in a consistent manner
- Improve the public realm to add amenities and increase real estate values
- Diversify downtown to create a place for culture, the arts, and living, not just business
- Maintain flexibility to accommodate opportunities without sacrificing principles

Kansas City Downtown Corridor Strategy - Massing Diagram

The Plan also specifically states, in the 8 to 12 year recommendations, "the 'decking' of Truman Road at the south end of the Loop, under discussion for several years, may provide significant benefits relative to costs by this stage of downtown's development."

Kansas City Downtown Corridor Strategy - Proposed Framework

The ***Kansas City Downtown Land Use and Development Plan*** (2003) promotes an urban framework that will help guide development decisions and public investments within the Downtown Loop. Several issues were considered during the study, including neighborhood identity, land use, transportation and urban design. The Plan identified additional concerns based on feedback from key stakeholder and previous planning efforts, including:

- Lack of usable green space
- High number of vacant parcels/lots
- Perceived lack of parking

- High vacancy rates
- Lack of viable retail
- Lack of consistent streetscape
- Not pedestrian friendly
- Ease of access

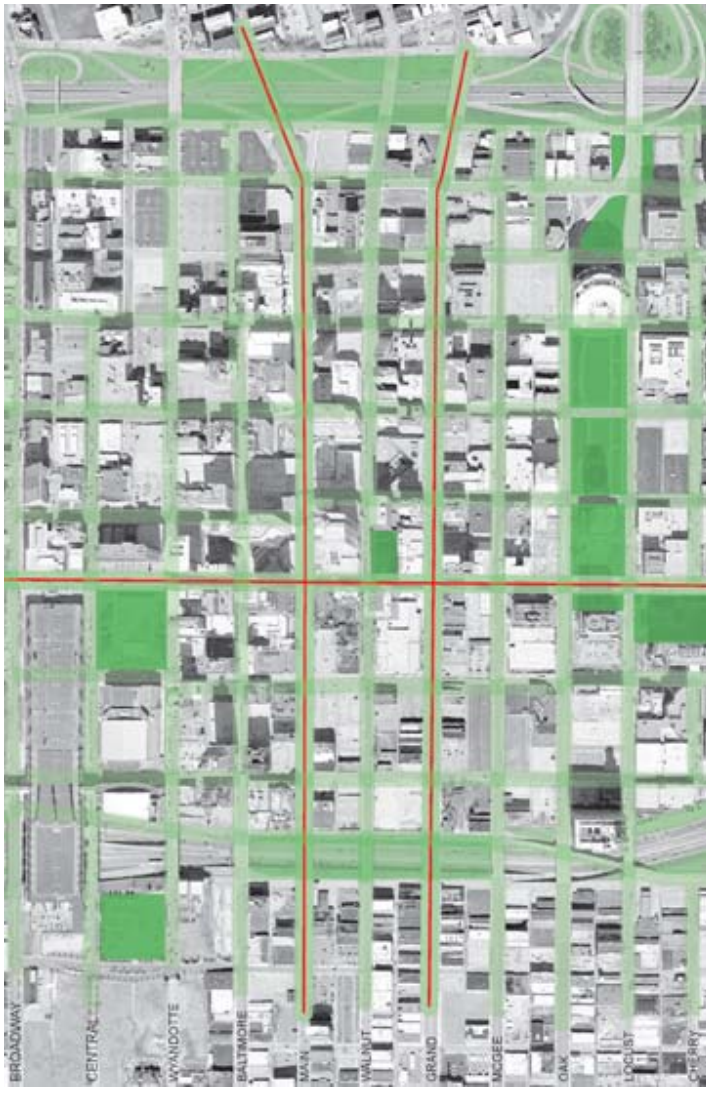
With this feedback, the Plan developed an urban design framework that identified street character types, gateway locations, civic and anchor sites, proposed open space and retail opportunities to further strengthen the Downtown Loop.

In the Future Land Use Opportunities and Strategies Chapter, freeway decks are discussed under the Special Land Use Opportunities section, stating, "A future consideration is to deck-over the Interstate Highways. The intent is to better connect the Downtown Loop to the River Market areas on the North side of the Loop and the Crossroads area on the South side of the Loop." The Plan goes on to discuss the Crossroads connection stating, "Connecting this area to the districts inside the loop presents significant development opportunities, particularly to connect new residents to goods, jobs and services."

Kansas City Downtown Land Use and Development Plan - Framework

The ***Kansas City Downtown Streetscape Master Plan*** (2005) was developed to define streetscape guidelines and standards that can be applied throughout Downtown and in a variety of street contexts. The Plan identified a total of four street types that encompass the range of streets within the Downtown Loop, which are: pedestrian priority, image streets, special character, and support streets. The following goals were set by the City of Kansas City for the Streetscape Master Plan:

- Reinforce Kansas City's civic character
- Establish unique and recognizable districts
- Promote sidewalk activity and economic vitality
- Provide a safe pedestrian movement



Kansas City Downtown Streetscape Master Plan - Greening of Downtown

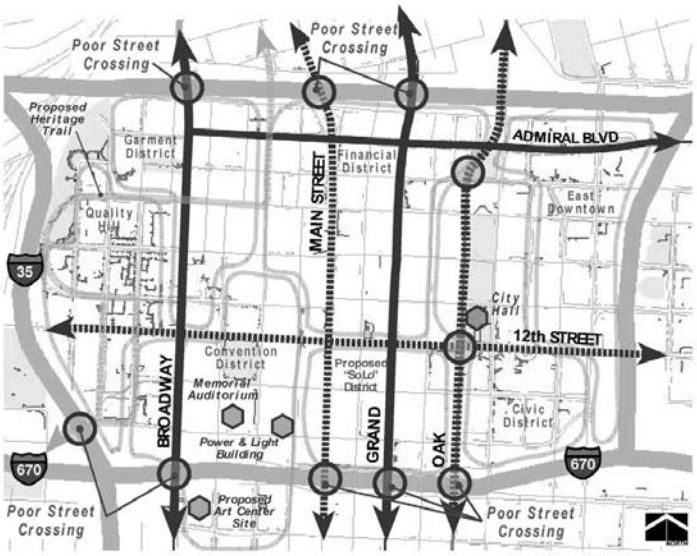
- Maintain a sense of history
- Incorporate public art opportunities
- Create a safe and attractive environment
- Integrate public transit facilities
- Ensure reasonable maintenance

Specific to the study area in this project, the Plan identifies westbound Truman Road, from Broadway to Charlotte as an "Image Street"; Wyandotte Street, from 12th Street to eastbound Truman Road as a "Character Street"; Main Street, through the study area as a "Priority Street"; Walnut Street, from 6th Street to westbound Truman Road as a "Support Street"; and Grand Boulevard, through the study area, as an "Image Street."

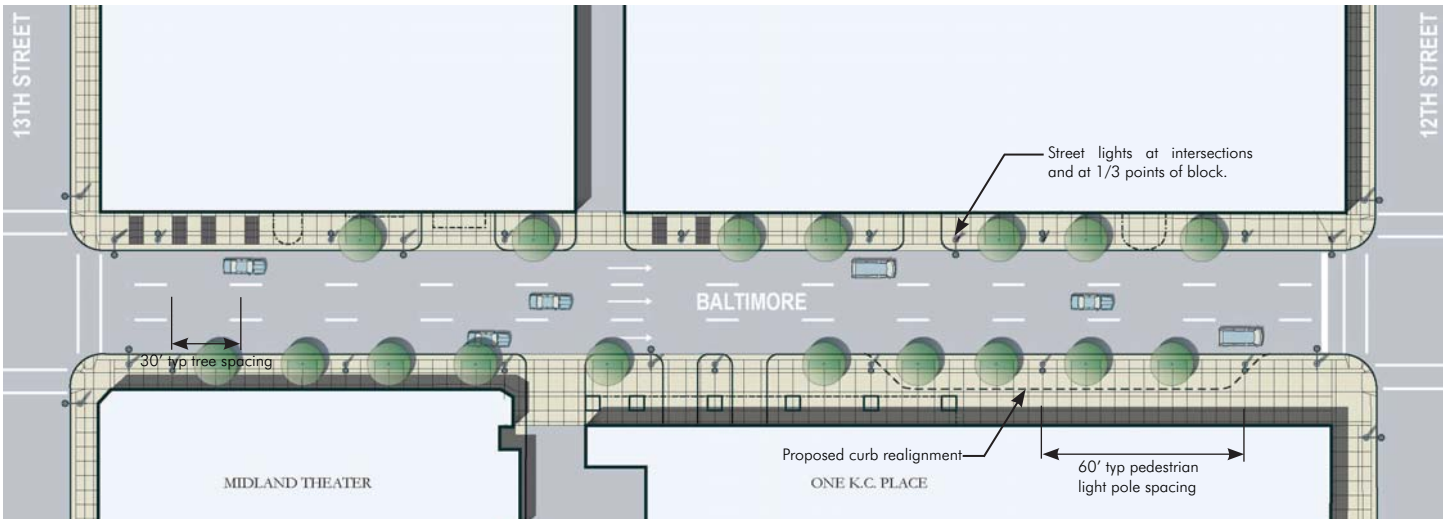
The ***Kansas City Walkability Plan*** (2003) further addresses the pedestrian environment, encouraging redevelopment that promotes walkability through planning and design practices and identifying strategies to minimize divides caused by the freeway loop system. The Plan prioritizes the pedestrian connections to specific streets, the highest priority connections south to the Crossroads are on Broadway, Wyandotte, Grand and Oak. The Plan also reaffirms the principles set forth in the ***Downtown Corridor Development Principles*** and ***FOCUS*** plans, specifically:

- Surround the study area with residential uses
- Create new parks
- Place buildings to define open space
- Locate ground floor retail on key corners and facades around park areas
- Preserve historic building stock
- Activate streets with front doors
- Place parking on the interior
- Share parking
- Use new development and pedestrian links to diminish interstate "loop"
- Promote "Avenue of the Arts"
- Minimize impact of service areas on pedestrian environment

Within the study area of this project, the Plan identifies "Poor Street Crossings" across I-670 on Main Street, Grand Street and Oak Street.



Kansas City Walkability Plan - Downtown Loop

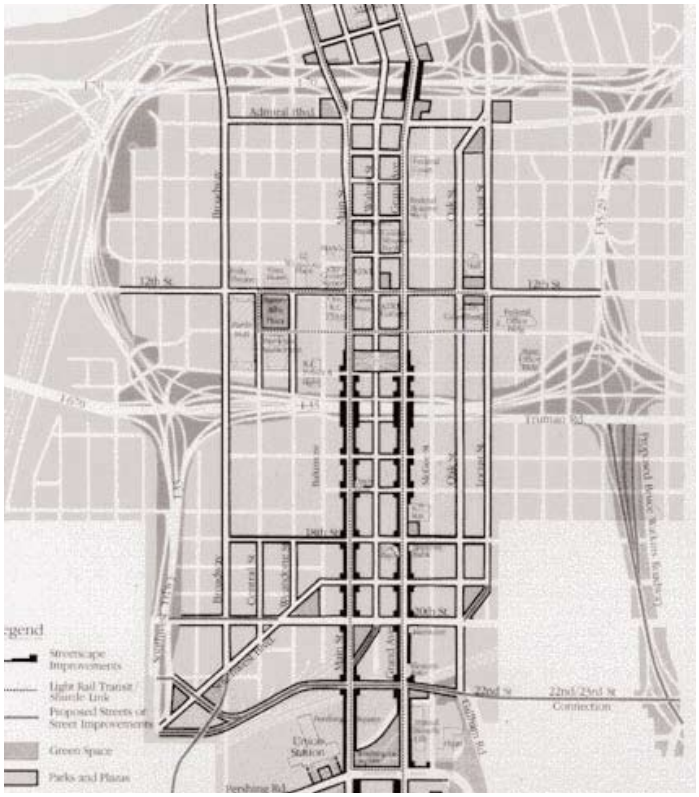


Kansas City Downtown Streetscape Master Plan - Baltimore Avenue from 12th to 13th Street

The ***Grand/Main Corridor Study*** (1987) was conducted to further strengthen the image of the major north/south corridor from Midtown to Downtown and the River Market. Recommendations from the study to improve the corridor are:

- Developing urban design strategies to reinforce and revitalize these districts
- Creating public amenities as the transition or linkage elements between districts
- Developing a hierarchy of pedestrian, vehicular and transit systems
- Providing improved access to the Riverfront
- Preparing guidelines that identify appropriately scaled development uses along the corridor

This Plan makes many references to recommended improvements over I-670, including: "...the plan suggests decking over the freeway..." A Development Opportunity recommendation in the Plan is "exploring the economic feasibility of air rights development above the depressed freeway just north of Truman Road." A Central Business District Recommendation states, "...the plan suggests decking over the freeway and using the air rights..."



Grand/Main Corridor Study - Framework Plan

The Planning Team researched a series of case studies from around the world to analyze how other communities have been enhanced by addressing the division cause by a freeway within their urban core. The following are summaries of a few of these projects, addressing the project history, context, design challenges and funding/implementation strategies.

ALASKAN WAY VIADUCT

Seattle, Washington

Originally built in the 1950's, the Alaskan Way Viaduct is an elevated section of State Route 99 (SR-99) that runs along the Elliott Bay waterfront in Seattle's Industrial District. The roadway was designed to carry 65,000 vehicles per day. Today, SR 99 continues to be a main north-south route through the city, carrying about 110,000 cars through downtown daily.

Studies in the mid-1990s showed that the viaduct was nearing the end of its useful life. In early 2001, a team of design and seismic experts began work to determine whether it was feasible and cost-effective to strengthen the viaduct by retrofitting it. In the midst of this investigation, the 6.8 magnitude Nisqually earthquake shook the Puget Sound region. The earthquake damaged the viaduct, forcing the Washington State Department of Transportation (WSDOT) to temporarily shut it down.

Post-earthquake inspections of the viaduct revealed both good and bad news concerning its condition. The good news was that the viaduct survived the 6.8 magnitude earthquake. The bad news was the earthquake caused damage to the viaduct's joints and columns, further weakening the structure and revealing its severe vulnerability. The team of experts concluded that it was not cost-effective to fully retrofit the majority of the viaduct; rather, the viaduct would need to be rebuilt or replaced.

WSDOT, the Federal Highways Administration (FHWA), and the city of Seattle have studied nearly 80 replacement options. Out of those options, two emerged as favorites: an elevated structure rebuilt or a cut and cover tunnel.

Alaskan Way Viaduct Study Area

Existing Alaskan Way Viaduct

The tunnel was envisioned as a solution to not only the viaduct's traffic limitations and safety problems, but also to allow better uses for the waterfront real estate, including parks, housing, and retail developments. While future development of the Alaskan Way real estate corridor may provide tax revenue for the city, many state lawmakers claimed the originally proposed six-lane tunnel project was too costly. In response to concerns about the cost of the original proposed tunnel construction, the city council created a scaled-down four-lane hybrid tunnel option.

In mid-December 2006, Governor Christine Gregoire called for an advisory ballot from Seattle residents. She wanted to see a ballot that consisted of both the tunnel and rebuild option, complete with their cost estimates. In March 2007, both measures receive a majority 'no' vote.

A citizen led, Stakeholder Advisory Committee began meeting in December 2007, which consists of 30 individuals that represent communities, economic interests and cause-driven organizations. They currently are providing feedback on potential solutions as officials develop a final recommendation.

Deck Details:

- The viaduct is 2.1 miles long.
- The existing structure has an overall width of 51 feet (near Madison Street).

Key Points:

- Public input will have a major impact on the design and community benefit of the decking solution.

Project Completion Status:

- Through the summer and fall of 2008, WSDOT, King County and the City of Seattle evaluated scenarios and gathered input from the Stakeholder Advisory Committee and the public. Soon after, the Governor, County Executive and Mayor made their final recommendation for a bored tunnel as the central waterfront solution.
- The Governor has stated that the State of Washington will take down the viaduct in 2012, regardless of the city government or lack of an alternative.

Project Costs:

- Cost estimate for the four-lane tunnel: $3.4 billion
- Cost estimates elevated structure: $2.4-2.8 billion
- Cost estimates for the surface option: $1.6 billion

Funding Sources:

- $1.6 Billion - 2005 Gas Tax (Partnership Funding)
- $251.4 Million - Transportation 2003 Account (Nickel Funding)
- $209.4 Million - 2005 Federal Earmark Funds
- $72.6 Million - Federal Bridge Funds
- $256.6 Million - Other Funds
- $2.39 Billion - Total Funding Available From All Sources

The construction of the proposed tunnel is expected to begin in 2011 and be open to drivers in 2015.

Alaskan Way Viaduct Option - Preferred Plan

Alaskan Way Viaduct - Bored Tunnel Solution

I-71 FORT WASHINGTON WAY

Cincinnati, Ohio

Built between 1959 and 1963, Fort Washington Way (FWW) was originally constructed as a downtown distributor, linking the Central Business District (CBD) via I-71 to the Brent Spence Bridge (I-75) Ohio River crossing. By the 1990's, the urban expressway had become functionally obsolete carrying almost twice the original traffic volume it was initially designed for, resulting in heavy congestion, traffic safety hazards, and physical deterioration.

The trench's six through lanes kinked slightly out of parallel with the street grid and far too many entrance and exit ramps made for stressful conditions. In fact, after the opening of the Lytle Tunnel in 1970, FWW's 23 entrance and exit ramps in the span of one mile were the most of any expressway in the country. Cars frequently backed up from the short exit ramps onto the through lanes and it also created a major barrier from the downtown to the waterfront and stadiums.

Reconstruction of the FWW occurred between 1998 and 2000. The objective was to narrow the expressway from two 400' wide lanes in either direction to four 180' lanes each way. Some of the project's key goals were to improve traffic flow, safety, and access on I-71; accommodate future construction of mass transit; reclaim roadway for future riverfront development; improve CBD access to the riverfront; and improve connections to new facilities such as the Great American Ballpark, Paul Brown Stadium and the future National Underground Railroad Freedom Center.

The idea for a deck over the old FWW had been tossed around for years, but with the significantly narrower trench promised by the 1998-2000 reconstruction, the idea to connect the CBD to the riverfront was much more practical. The Riverfront Advisors spearheaded the effort, as their vision for the riverfront would not be fulfilled without better connections and access. Funding for the pile driving was secured and construction of the piles took place from February through August 2000. The deck was initially proposed to be built as soon as 2005, when development south of the expressway is complete, but funding has not been identified to date. However, foundations were laid for two half and two full decks across FWW.

In August 2007, the Cincinnati chapter of the American Institute of Architects (AIA) held a public design and envisioning workshop to explore the potential of covering Fort Washington Way with decks. With over 80 people participating, the workshop revealed an overwhelming consensus on the importance of creating the deck covers and on establishing a strong link between the riverfront development and the existing downtown.

Fort Washington Way - Before Reconstruction and Artist's Rendition of Potential Development Opportunities Over the Interstate

As specific designs were created, two development strategies emerged with an equal number of participants supporting each. One strategy developed a plan that contained mostly open, green space. The other strategy envisioned significant development on the majority of the blocks. The block directly north of the Freedom Center was conceived as mostly open space in both versions. A significant number of sustainable and green design strategies were prevalent throughout the projects and provided interesting design and educational opportunities while also conserving resources and lowering the environmental impacts of the future project. The results of the charrette were presented to the City Planning Commission with the objective that the recommendations be incorporated into the Central Riverfront Urban Design Master Plan.

Deck Details:

- Four decks of various sizes between originally planned overpasses will combine for a total tunnel length of 1200'.

Key Points:

- The idea of decking the freeway had been kicked around for years prior to the reconstruction of FWW. While decking was left out of the final design due to lack of funding, the pilings were constructed, which will save millions of dollars due to construction efficiency.
- Having a project champion, such as the Riverfront Advisors, was instrumental in getting the pilings installed for the deck foundation.
- To avoid ventilation costs, two half decks and two full decks are proposed to be built in between the five existing bridges, with 25' gaps between the bridges and deck edges to allow for air intake.

Project Completion Status:

- Completion of decks unknown at this time.
- Park plans have been completed for the riverfront and implementation of the master plan has begun, the first priority for the area.

Project Costs:

- Cost for the deck foundation (pilings only, paid for as part of Fort Washington Way reconstruction): $10 million
- Cost estimate for the four platforms: $57 million*
- Cost estimate for landscaping: $14 million*
- * 2000 dollars

Funding Sources:

- Funding has not been identified.

Fort Washington Way, with 2nd and 3rd Streets Flanking Each Side

Cincinnati's Riverfront Master Plan

BRIDGING I-5

Sacramento, California

When Interstate 5 (I-5) was completed and opened to traffic more than 35 years ago, the Sacramento riverfront was effectively cut off from the rest of downtown Sacramento, isolating the community from its historic origin and the Sacramento River. A section of I-5 was built below grade (lower than city streets) to accommodate necessary over crossings and freeway ramp access at Capitol Mall, O Street, and P Street.

In 2000, the City of Sacramento's Department of Transportation and Department of Economic Development began an ambitious effort to evaluate the possibility of reconnecting downtown Sacramento with the riverfront by decking over part of I-5 south of Capitol Mall. This project would reconnect downtown to the riverfront and create an exciting new blend of parks, housing, retail, and office space, complementing the City's bold redevelopment efforts along the riverfront and downtown.

Proposed Decking Study Area

After conducting initial studies and a comprehensive community visioning process, the Bridging I-5 team developed a set of core project objectives that would help guide future planning: regain access to the river and reconnect downtown to the waterfront; create a balance of land uses that are active, vibrant, safe, and compatible with surrounding uses; create economic opportunity; and mitigate the negative impacts of the freeway.

The I-5 corridor was found to have major constraints: the highway rising out of its trench just south of O Street, the difficulty of achieving minimum clearance requirements with the introduction of a deck, and engineering challenges related to the water table under the highway.

The Bridging I-5 plan was approved by the City Council in March 2004, and the City is moving forward with the next steps in planning this signature project, which envisions shops, parks, housing, and other vibrant uses built on and around a new freeway deck structure. Three alternatives will undergo more detailed technical analysis and environmental review, with the goal of identifying a preferred alternative and paving the way for the eventual design and construction of bridging I-5.

Ultimately, the purpose of all this intensive planning work is to lay the necessary foundation for the future funding, design, and construction of Bridging I-5. Throughout all these steps, the City is committed to continually informing and engaging the community, through public meetings, hearings, stakeholder group consultations, newsletters, media outreach, and Web site updates.

Deck Details:

- Two-block-long deck, covers about 4 acres.

Key Points:

- Community participation has been a critical component of the Bridging I-5 project, helping the City develop a unique conceptual vision for decking the freeway and reconnecting its urban core to the waterfront.
- Having a mind set that even though a deck is a costly effort, it could prove a solid community investment that extends beyond a two-block area. Also, the financial benefits from property tax and sales-tax

revenue might outweigh the hefty price. At the same time helping the deck lure more tourists, increasing bed-tax revenue.

Project Completion Status:

- For concepts deemed feasible by the Project Study Report (PSR), Environmental Documents (ED) and a final Project Report (PR) will be prepared in accordance with federal and state requirements. If more than one alternative is deemed feasible, a "preferred alternative" will be designated. The PR and ED for Bridging I-5 are currently scheduled for completion by late 2010 or early 2011.

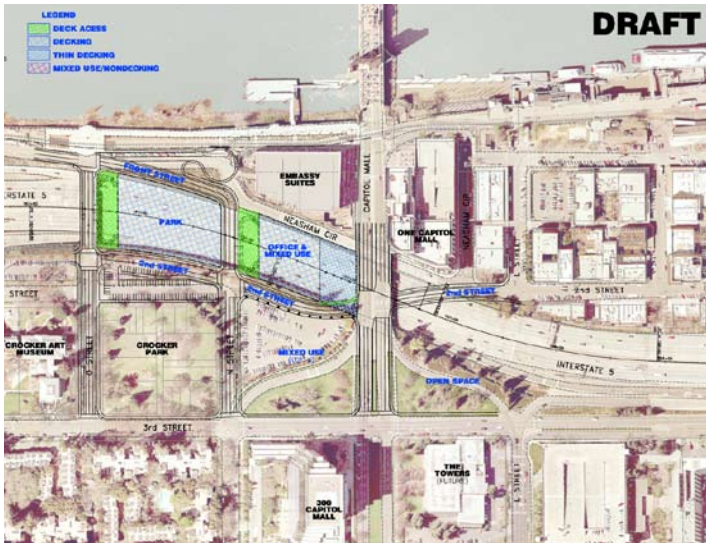
Project Costs:

- Cost for the alternatives being studied are estimated at anywhere from $250 million to $400 million. Costs will vary according to the size and complexity of the alternative selected.

Funding Sources:

- $5 Million - Federal transportation appropriations and Federal Highway Administration's National Corridor Planning and Development Program
- $1 Million - local funding
- $300,000 – Caltrans community-planning grant

Proposed Location for Decking over Interstate 5



Design Alternative for Bridging over Interstate 5

I-670 CAP

Columbus, Ohio

As plans began with the Ohio Department of Transportation to widen Interstate 670 (I-670) along the north edge of downtown Columbus within the existing right-of-way, opposition was raised by the neighboring communities. The popular Short North business district and residential neighborhood would be further isolated from the north end of downtown's entertainment and convention district. Concern was raised that the widening would compound the negative impacts that already exist related to pedestrian connections and general aesthetics crossing the highway.

The Short North district has experienced redevelopment and renewal within the past 20 years, transforming into a thriving arts community with unique shops, cafés, galleries, and homes. The Arena District south of I-670 contains bars, restaurants, and apartments around an arena, outdoor concert pavilion, movie theater, and convention center. The connection over the existing I-670 was problematic. The sidewalks were narrow and traveled adjacent to the traffic on High Street. The highway traffic below complicated the environment with steady noise. The citizens and the city wanted to not only address the problem, but provide a solution.

The Columbus City Council approved a deal between the City and Continental Real Estate Companies for construction of a one-story retail strip along each side of North High Street over I-670. The idea was to build the new High Street Bridge over the highway, and to line it on both sides with retail buildings and a covered pedestrian arcade to define the streetscape and provide a better pedestrian connection between the Short North district and the north side of downtown.

The development extends the streetscape from downtown to the Short North district. It has become popular for restaurant businesses. For a pedestrian walking along the streetscape, it is not even realized as a bridge. However, it does have some difficulties in the nature of the development. The development does not have parking associated to it, requiring patrons to either park in other locations and walk to the businesses or utilize a valet service. The development also lacks individual service areas for the businesses. A service corridor has been incorporated into the building that leads to a joint service access at the end of the building for the businesses to share. Another difficulty was the construction of utilities to the project. Utilities typically buried in the ground had to extend over the highway to access the businesses, requiring alternative engineering solutions.

The concept has been received well by the communities. The project has also won several awards and is referenced as a model for other cities that have been

Aerial Photo of Decking Site

Side and Back of Retail Development Spanning over Interstate 670

divided by a highway.

Deck Details:

- The cap supports a 1-story retail strip along each side of North High Street over I-670.
- The east side of the street has a 57' platform. The west side has a 38' platform.
- The retail development provided contains 26,000 square feet of area.

Key Points:

- The cap was built to rejoin the city's Short North district to the North Market and Convention Center area with an architecturally defined streetscape over the interstate.
- City had to gain "air" rights for development from landowners who sold only the ground at the time the highway first went through.
- Cost to retailers is about 20% higher than other retail space in the area, in large part due to higher development costs.

Project Completion Status:

- The Ohio Department of Transportation planned to widen I-670 in 2002.
- Opening date for I-670 was September 2003.
- Opening date for the retail development was fall of 2004.

Project Costs:

- Cost estimate for the cap's support structure on either side of the bridge, and to install decorative fencing, lighting, and landscaping: $1.3 million
- Cost estimate for the retail building over the structure: $7.2 million

Funding Sources:

- Ohio Department of Transportation provided $1 million in Transportation Enhancements funds.
- City provided $325,000 to install utilities.
- City to extend developer a 20-year lease for the platforms with up to 10, 5-year renewable terms for up to a total of 70 years. Developer will pay $1 rent each year and receive a 100% real estate tax abatement for 10 years.
- After 3 years, the city will receive 10% of the retail development's net rental income.

Rear Building Face of Retail Development over Interstate 670

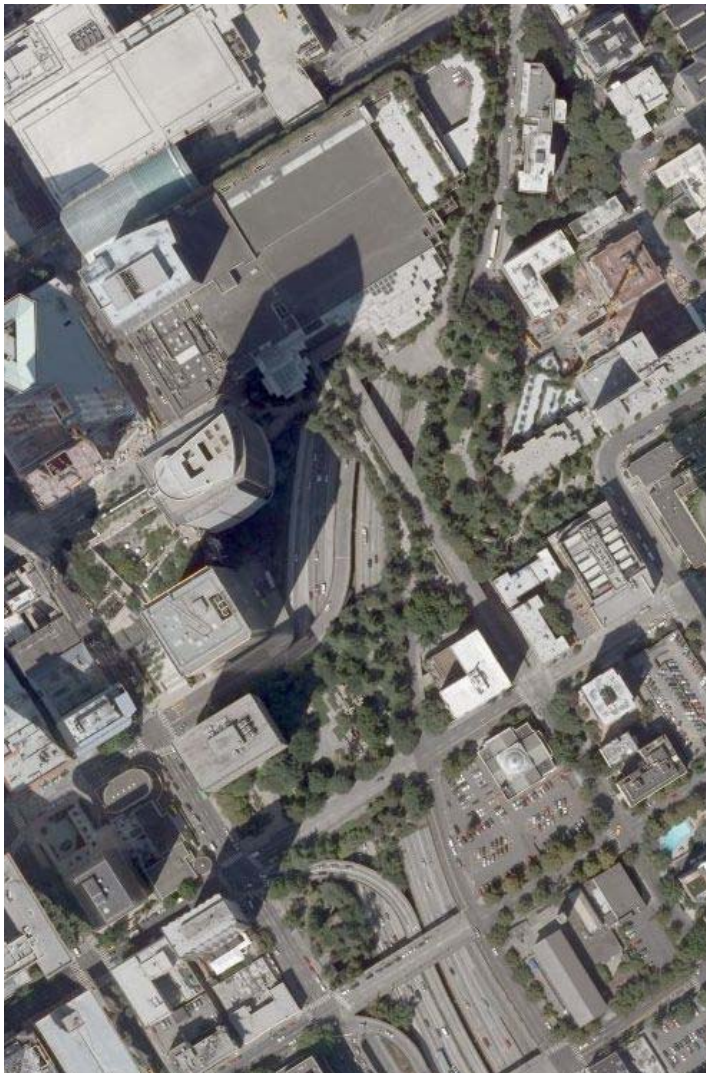
Bird's Eye View of the I-670 Cap

FREEWAY PARK

Seattle, Washington

Covering four hundred feet of Interstate 5 (I-5), Freeway Park threads its way between Seattle's commercial core and the First Hill neighborhood. Built in the 1960's and originally intended as a connection between distant cities, I-5 has increasingly become a clogged artery, the magnet for much of the state's growth. The freeway moved people so well that it became one the state's most effective, albeit unintentional, stimulant for suburban growth.

Despite the freeway's benefits, many still resented it and wanted its effects softened. Plans to deck the below-grade portion of I-5 were first discussed as early as 1966, soon after the freeway was completed. The Forward Thrust civic group formed in 1966 had pulled together a list of civic improvements, in which most would need voter approval. Voters selectively approved a third of its issues in 1968, consisting of about 370 projects, including an allocation of $65 million for open space acquisition, park improvements, and parks facilities. A linear strip along I-5 was included in the list of selected projects, which would later become part of Freeway Park.



Aerial Photo of Freeway Park

Freeway Park grew out of overlapping objectives: the need for a municipal parking garage to capture off-ramp traffic coming into downtown before it clogged the city's core, as well as a developer's interest to construct a 21-story building on property in the First Hill neighborhood. These isolated efforts to visually improve and economically develop the space along the freeway dramatically converged to expand the park's original linear area into the footprint we know today.

The park is comprised of a series of four linked spaces, with the major sections known as the Naramore Fountain and Great Box Garden, West Plaza, Central Plaza, and East Plaza. The common elements at each of these four spaces include concrete forms, vegetation, and water. Its waterfalls and fountains mute the roar of the eight-lane freeway below and its landscaping provides a green oasis and pedestrian connection between neighborhoods that were cut off from each other.

By its prominent placement over the city's main north-south thoroughfare, the park became an icon for Seattle. Its spatial location, siting, and scale provides an easily identifiable feature for both city dwellers and travelers moving through the city. The park sparked economic growth in the surrounding downtown, including hotel rooms, residential units, office/retail space, and parking.

Deck Details:

- Five-acre urban park deck covering I-5.

Key Points:

- The park provides a passive space for residents,

shoppers, downtown office workers, and visitors to enjoy while adding value to the Park Place building, which ultimately increases property tax revenues.
- Was the first project in the United States whose merits convinced city, state, and federal agencies plus private developers to convert freeway airspace to an open oasis that is usable for its citizens.

Project Completion Status:

- Construction began in 1974 and completed in 1976.

Project Costs:

- $23 million

Funding Sources:

- $5.5 million – Federal Highway Administration and State Washington DOT funds
- $4.2 million – City of Seattle for municipal parking garage
- $4.1 million – King County-Approved Forward Thrust Park Bonds, CBDC funds, municipal and interstate highway funds, Metro Transit, HUD Open Space, Interagency Outdoor Recreation, and American Legion (funding for the parks)
- $9 million – Private developers

Bird's Eye View of Freeway Park

Bird's Eye View of Freeway Park

MARGARET T. HANCE PARK

Phoenix, Arizona

Proposals to build a downtown freeway in Phoenix had been debated for decades, with the original 1966 design calling for a 100' elevated roadway. Until 1972, this seemed to have been a done deal but with growing anti-freeway sentiment nationwide and the Arizona Republic Newspaper campaigning against it, it was defeated in a 1973 ballot.

The project finally got rolling again in 1983 with a plan for a below-grade route through the center of town, and a tunnel covered by an urban park. The Papago Freeway Tunnel is part of the I-10 Freeway system as it passes through downtown and extends from approximately N. 3rd Avenue to N. 3rd Street under what is now Margaret T. Hance Park. The depressed freeway is covered by 19 side-by-side bridges that form the foundation for the 29-acre park.

Two tubes, each carrying five lanes of traffic flanked by two emergency lanes, can carry up to 16,000 vehicles per hour. The tunnel has been designed to ventilate naturally using the cars energy to help propel air through the specially designed tunnel. In times of heavy traffic and in the event of fire each tunnel has four fans providing ventilation to prevent the dangerous buildup of carbon monoxide. The tunnel has a large diesel generator approximately 50 meters east of the westbound entrance to the tunnel, ensuring that the lighting, video surveillance, and intercoms have continuous power even during an outage. For the safety of motorists, intercoms are located every 150 feet within the tunnel.

Named after former Mayor Margaret T. Hance for her strong support of the tunnel and park, the park is considered the heart of Phoenix's downtown cultural center. The park has spurred recent efforts to revitalize the surrounding area, including construction of a new library, new affordable housing projects, and the expansion or renovation of nearly all the area's museums.

The park spans several blocks and is divided by Central Avenue into two distinct areas. On one side is an open play area, playground, and picnic area with grills and sand volleyball. On the other side is a brick entryway and fountain at the base of the Phoenix Public Library and the Japanese Friendship Garden. Located on 3 acres of the park, the Japanese Friendship Garden has a Tea House, koi fishpond, and a strolling walkway.

Today, the Papago Freeway is an aesthetic, economic, and cultural success. This facility is frequently used for a variety of activities and events and the park deck is thought of as a showcase for Phoenix; not just a highway project, but also an essential element of the fabric of the City.

Aerial Photo of Margaret T. Hance Park

Deck Details:

- 1/2 mile long cut and cover tunnel, consisting of 19 side-by-side bridges. The deck pad is 6-8' deep.

Key Points:

- Immense public support for the park deck enabled the freeway to be built through the heart of the City.
- Deck park has been a catalyst for commercial and residential revitalization in surrounding area.
- Deck has experienced some minor leakage from the pond on top.
- Lighting can be a potential problem when entering/ exiting the tunnel.
- Exit ramps are too sharp and too quick so accidents occur frequently.
- Trees must be carefully and appropriately selected. Due to weight limitations, special fills are required much like a green roof.

Project Completion Status:

- Freeway completed in 1990, park deck in 1992.

Project Costs:

- $100 million for decking structures.
- $5 million for park (not including Japanese Garden).
- City pays $300/year for a 50-year air rights lease from the State, the City maintains all park facilities.

Funding Sources:

- $92 million – FHWA for decking structure
- $8 million - State and additional discretionary funds
- $5 million - City for park deck

Japanese Friendship Garden within the Park

Tea House within the Japanese Friendship Garden

Bird's Eye View of Margaret T. Hance Park

UTRECHTSEBAAN HIGHWAY

The Hague, The Netherlands

The Utrechtse Baan motorway is a busy arterial highway that cuts through the center of the Hague. The construction of the highway effectively segmented the central part of the city, seperating Central Station and the Beatrixkwartier, a central office district. The Utrechtse Baan motorway is contained in a watertight reinforced concrete trough depressed into the ground. The Grotuisplaats plan area lies in the heart of the segemented city, and an ambitious project to span the motorway and reunite the city began in the early 1990s.

Bird's Eye View of Grotuisplaats Bridge Building

Three primary buildings (Malietoren, Grotuisplaats, and the Equinox) are included in the Grotuisplaats plan area, each built with a different purpose. The Malietoren was constructed first as an office and conference building, and was built to be a "city gate" to mark the point at which the Utrechtse Baan

Malietoren Tower

Grotuisplaats Tower

Grotuisplaats Bridge Building

Equinox Building

enters the inner city. The second building is known as the Grotuisplaats. The buildings were created as a new civic center with a metro station, parking, and a mix of uses designed to attract people to the area and promote urban regeneration. The third, and newest, building spanning the Utrechtse Baan is the Equinox. This office building was designed to add transparency to the area and stitch together residential neighborhoods isolated by the highway.

Deck Details:

- The Malietoren rests on a platform 131 ft. by 106 ft. and includes 75,000 sq. ft. of parking, 30,000 sq. ft. of retail commercial, and 180,000 sq. ft. of office and conference uses. The building is supported by a composite concrete truss transfer structure 26.9 ft. high and 106 ft. wide.
- The Grotuisplaats consists of two bridge buildings that both span the motorway and define the central square of the area. The building uses are 40,000 sq. ft. of parking, 20,000 sq. ft. of retail commercial, and 60,000 sq. ft. of office uses. Construction details of the Grotuispaats include durable Z-profile louvers designed to withstand the elements; horizontal sun-louver panels on steel brackets to shade glass curtain walls; large glazing areas to maximize transparency, and steel fork-shaped supports. Both bridge buildings have five stories of office space accessible from two cores at the street level on opposite sides of the Utrechtse Baan. The load-bearing structure of steel lattice trusses spanning the motorway has been left visible.
- The Equinox rests on 23,110 sq. ft of platform which partially spanning the motorway. The building uses are 20,000 sq. ft. of parking, 10,000 sq. ft. of retail commercial, and 80,000 sq. ft. of office space.

Project Completion Status:

- The Malietoren was constructed in 1994 and completed in 1996.
- The Grotuisplaats was constructed and opened in the mid to late 1990s.
- The Equinox is completed in 2002.

Note: Project costs and funding sources were not available for this project.

Aerial Photo of Utrachtsebaan Highway

VILLE MARIE EXPRESSWAY

Montreal, Canada

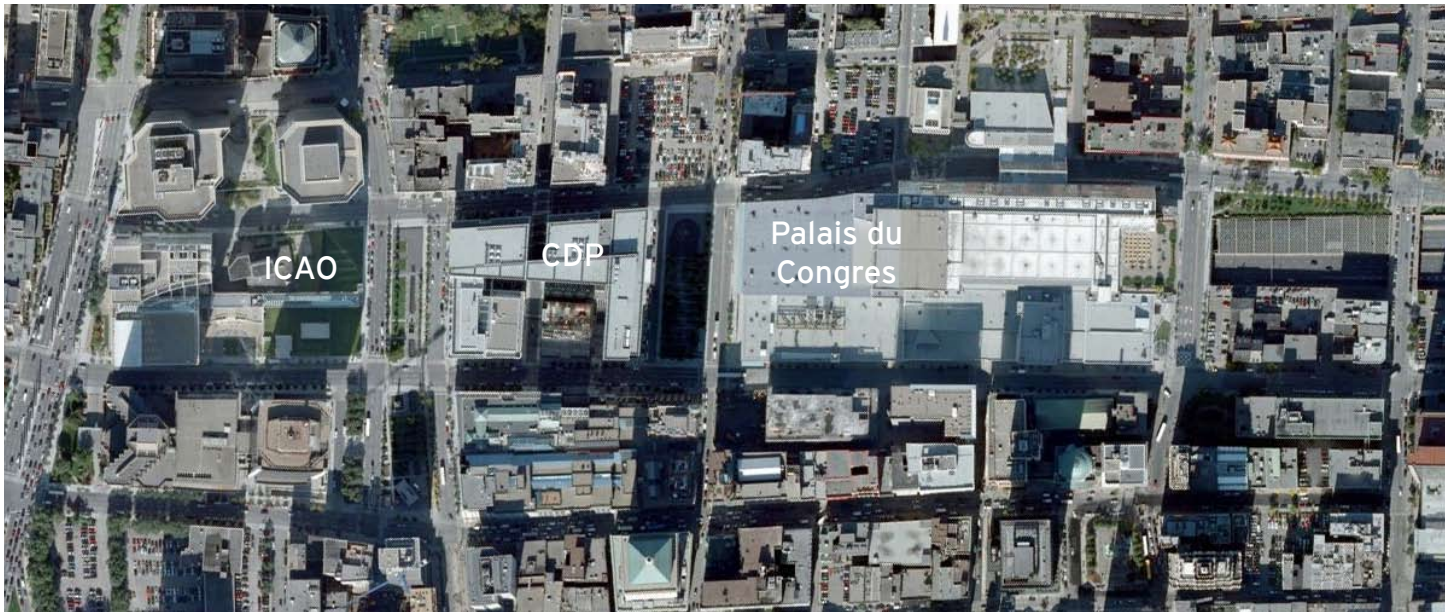
The Ville Marie Expressway (E-720) was constructed in the late 1960s in the central city of Montreal. The expressway was built in a depressed trench, and many streets and buildings were destroyed in the process. Later, planners and city leaders realized that the highway served to fragment the city, with historic and business districts isolated from each other. Additionally, the expressway caused challenges in pedestrian and bicycle transportation options. In order to restore the urban fabric, the Quartier international (the "International District" through which the expressway runs) has been improved with several major projects spanning the sunken Ville Marie.

The first project of the new Quartier international was the Palais de Congres, the Montreal Convention Center. In addition to serving as a world-class conference facility, the building is also designed to become a public amenity and to revitalize underused public spaces. The Palais de Congres was followed by a new International Civil Aviation Organization (ICAO) building. The building is composed of a 15 story office tower and a five story conference block. The conference block side of the building (under which the tunnels of the highway lie) sits on a "sophisticated system of rubber pads to isolate the conference facilities from all noise and vibration."

In 2003, the Caisse du Depots et Placement (CDP) Building was completed to fill the gap over the highway between the ICAO building and the Palais de Congres. The CDP building also features a major enclosed circulation concourse with exposed steel trusses.

Deck Details:

- All buildings constructed as part of this project are located above the expressway and feature a major enclosed circulation concourse.
- The ICAO building has 350,000 sq. ft. of rentable office space and 40,000 sq. ft. of parking space.
- The CDP Building contains 623,392 sq. ft. of floor space, including 650,000 sq. ft. of office space and 75,000 sq. ft. of retail commercial.
- The structural system of the building is a reinforced concrete slab on a steel frame with aluminum and glass cladding system.
- Large steel trusses were used through the cross section of the building to maintain a light structure that could span the expressway; the total amount of steel used in construction was 5,480 tons.
- The beams and trusses used to span the Ville Marie Expressway were sized to withstand a live load of 200 pounds per square foot, hold up under all vehicle vibrations, and absorb all noise pollution.



Aerial Photo of Ville Marie Expressway

- Oversized steel transfer beams 98 ft. long and 17.7 ft. high supporting a building that acts like a 344 ft. wide bridge across the expressway.

Key Points:

- CDP: Construction cost was tripled, due to unforeseen expenses owing to new technologies of a double facade system, a new technology adapted from Europe to the "harsh Canadian climate." The second challenge was in finding a supplier willing to experiment with the new technology at the risk of taking a huge financial loss.
- Capital costs were also high due to the use of material with high embodied energy to achieve environmental sustainability of the project such as steel, glass and aluminum. However, highly durable materials are expected to lower long term maintenance cost.

Project Completion Status:

- Palais de Congres, constructed and completed in the 1980s.
- The ICAO building was completed in 1996.
- The CDP building was completed in 2003.

Project Cost:

- The total cost of ICAO building was $100 million, though the project is credited with generating $80 million annually in revenue and creating 1,200 direct and indirect jobs.
- The CDP building was estimated at $102 million, and built at $282.7 million.

Note: Funding sources were not available for this project.

CDP Building Cross-Section

CDP Building is devided into three building blocks; Victoria Square (1), Vigier (2), and Place du Palais (3).

ICAO Building

Palais de Congres

SITE VISITS

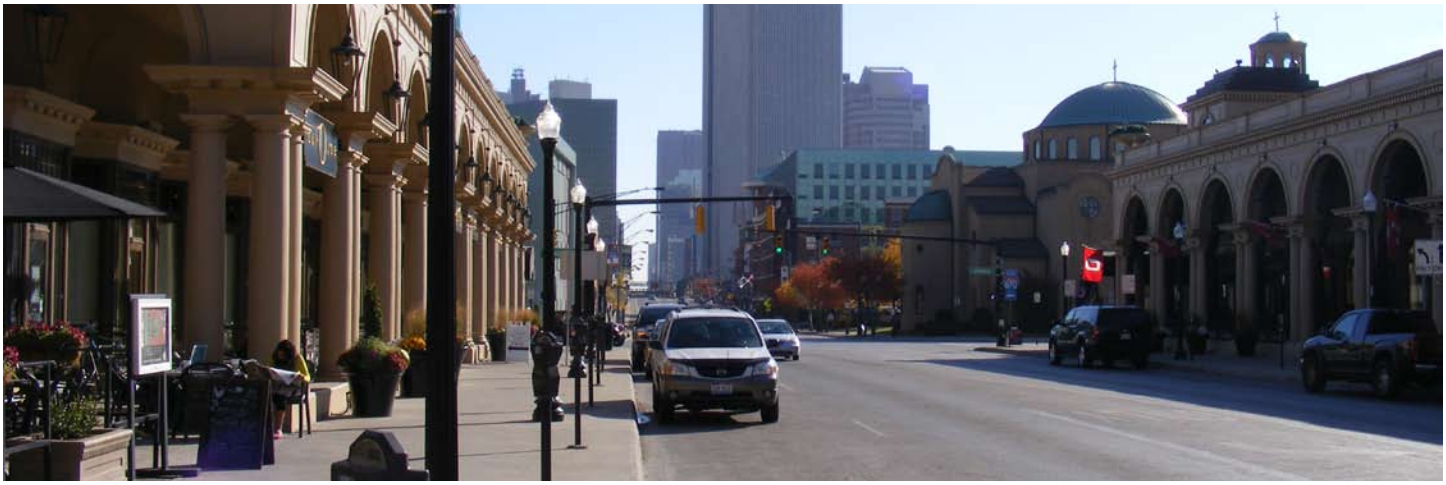
Members of the Planning Team visited two sites to further examine the details of their project, meeting with city representatives, DOT officials, community members, and private developers. The sites chosen were located in Columbus and Cincinnati, Ohio. The benefits of traveling to these sites and meeting with the various participants in the planning, design and construction of their projects included:

- Understanding the urban context and how the project addressed community issues.
- Visiting with those who were directly involved with the project.
- Measuring, photographing, and exploring the project details of the design.
- Building relationships with those who worked on these completed projects who can serve as a great resource, answering questions and offering advice as the South Loop Link project moves forward.

The following is a recap of the site visits, highlighting the details gathered from the design, financing and implementation of each investment.

Columbus, Ohio - High Street Cap

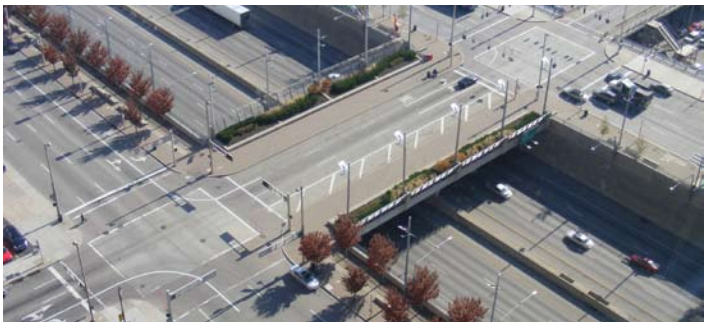
- $7.8 million retail development flanking the High Street Bridge over I-670.
- Original design included two streets with a deck in between (project reduced to eliminate tunnel conditions, decrease project costs).
- The Cap provided an opportunity for mitigation benefits, reduction of neighborhood impacts, and pedestrian connectivity while improving public perception of ODOT.
- The project consists of three bridges (two building platforms, roadway bridge).
- One-story buildings were built on the platforms (a total of 26,000 SF of commercial space).
- The market supported at this site is mainly destination food and drink establishments (restaurants, bars, coffee shops).
- The project does not generate huge profits; rather, it serves as a civic gesture uniting the adjacent neighborhoods.
- The cap attracts conventioneers over I-670 to the neighborhood and dining area north of the convention center, greatly increasing pedestrian traffic.
- The project had challenges, including material selection of the buildings due to weight restrictions of the platform, available parking and service/trash access for tenants.
- Project incentives for the developer included a 100% tax abatement for 10 years, city-provided $325,000 for extension of service utilities, and a yearly lease of the platforms of $1 to the City.
- The City shares in 10% of ongoing profits and will receive 10% of the sale amount if the buildings are sold.
- The project is seen as a success and future cap projects are under consideration.



Retail Development Cap - Columbus, Ohio

Cincinnati, Ohio - Fort Washington Way

- Project to reconstruct the freeway was triggered by safety and traffic issues; decking over the freeway became an urban design solution to mitigating the effects of the freeway.
- 3-year fast-track project to simplify access and consolidate lanes to reduce the width of the freeway resulting in 300' of additional real estate (approximately 15-20 acres).
- Five new bridges were constructed over the interstate (signature cable-stay bridges at each end, landscaped bridge platforms with wide sidewalks in between).
- Total Project Cost $328 million, $10 million for piling installation to accept future decks, (future estimated cost of $57 million for decks, $14 million for landscaping on the decks).
- Goals for the project:
  - Provide a safer through and local network for motorists and pedestrians.
  - Improve local and regional access and reconnect downtown with the riverfront.
  - Provide economic development opportunities by reclaiming highway rights-of-way.
- Decking options were not installed; the city has mainly focused on the riverfront park (45 acres, $120 million) and adjacent development.
- The Freedom Center, a national museum for the underground railroad, was constructed on a portion of the newly created real estate adjacent to the freeway.
- The riverfront park will complete a 3-mile public access (bike, pedestrian) along the riverfront.
- The Corps of Engineers have agreed to a 50-50 match of fund to implement the riverfront park, and have also contributed $3 million for design services of the $34 million cost for the first phase of the park.
- A developer has signed on for the development of the first phase of The Banks, the area between FWW and the riverfront park. The development is perceived as a "live/work/play" destination at the riverfront.
- Charges from tenants in the development will be dedicated to the riverfront park to help defray maintenance costs.



Landscaped Bridge Platform - Cincinnati, Ohio

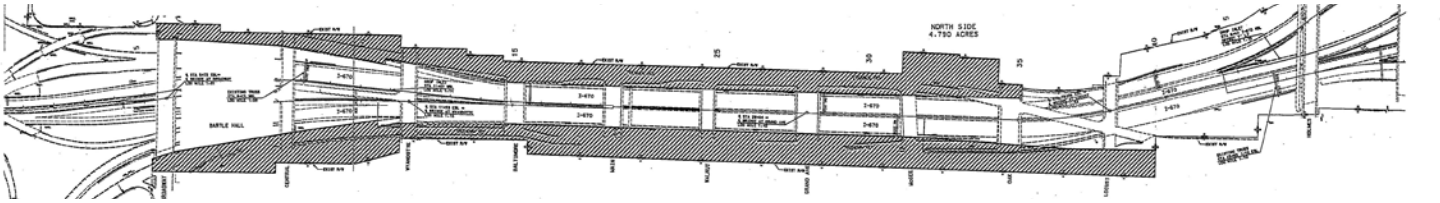
Pedestrian Promenade - Cincinnati, Ohio

TRUMAN ROAD CHARACTERISTICS

The City of Kansas City, Missouri generally owns the right-of-way along Truman Road to the retaining walls flanking I-670. MoDOT owns the retaining walls, bridges and I-670 below. It is anticipated that MoDOT will transfer bridge ownership to the City once the necessary bridge replacements are complete.

Eastbound Truman Road: Eastbound Truman Road runs along the south side of I-670, starting out under Wyandotte Street and is approximately 26' wide for two lanes of traffic. The road then widens to 48' with four lanes of traffic at Main Street and then back down to 36' with three lanes of traffic past Main. There is a left turn lane at Grand Boulevard and then the road splits for vehicles to continue east or to enter the freeway below. There are 10' wide sidewalks on the south side of Truman starting at Baltimore Avenue that continue to Oak Street, but there are no sidewalks on the north side. There are no sidewalks between Wyandotte Street and Baltimore Avenue on Truman Road because Truman Road does not intersect with Wyandotte Street; eastbound Truman crosses more than 40 feet under the Wyandotte Street Bridge. Painted crosswalks provide concrete differentiation to aid pedestrians in safely crossing Truman Road. Directly adjacent to eastbound Truman Road are several small surface parking lots, a furniture retail store, sport's bar, and the KC Star building, which fronts onto the road.

Westbound Truman Road: Westbound Truman Road runs along the north side of I-670, beginning outside of the study area when vehicles exit the freeway and at-grade with the Locust Street intersection. Westbound Truman Road at this location is approximately 36' wide for three lanes of traffic, then changes to two lanes at Baltimore Avenue. Sidewalks approximately 10' in width follow the Sprint Center from Oak Street diagonal to Truman Road at McGee Street; sidewalks then run parallel to Truman Road to Main Street. There are no sidewalks on the south side of westbound Truman Road. Currently there is not a sidewalk between Main and Baltimore on the north side of Truman Road because of new construction. There are also no sidewalks between Wyandotte Street and Baltimore Avenue on Truman Road because Truman Road does not intersect with Wyandotte Street; westbound Truman crosses more than 30 feet under the Wyandotte Street Bridge. Decorative crosswalks aid pedestrians in crossing westbound Truman Road and adjacent streets. Directly adjacent to westbound Truman Road is the historic Main Street Theater, several surface parking lots behind KC Live!, the Sprint Center, and the AT&T building. Recent streetscape improvements blend well with the new fabric of the Power & Light District to the north.



Truman Road Right-of-Way Extents (City Owns Dashed Area)

Looking West along Eastbound Truman Road at McGee Street

Looking East along Westbound Truman Road at Walnut Street

BRIDGE CHARACTERISTICS

Within the study area, the north-south streets of Wyandotte, Baltimore, Main, Walnut, Grand, McGee and Oak all have a unique character derived from the bridge width and architectural frontage beyond the bridge. Below is a brief description of each. (Note: bridge clearances listed may differ from signed clearances as it is common to sign a lower clearance for safety reasons.)

Wyandotte Street over I-670: Re-constructed in 2006, the Wyandotte Street bridge over I-670 is the western border of the study area. The superstructure is a four span continuous prestressed concrete I-Girder main span with single span prestressed concrete voided slabs on both approaches. The total bridge length is approximately 325', the longest of all the bridges because it also spans east and westbound off-ramps. The bridge is 56' wide and it consists of a 41' deck for four lanes of traffic with an 8' sidewalk on the east and a 6' sidewalk on the west. The east sidewalk is enhanced with a 1' wide 27" high parapet wall topped with a decorative fence that includes aesthetic lighting. The west sidewalk is adjacent to and provides easy access into the new Bartle Hall Ballroom Expansion. The substructure consists of reinforced concrete shell abutments supported by spread footings and three multiple column intermediate bents supported by drilled shafts. Vertical clearance at Wyandotte Street is currently greater than 16'-6" in both directions over I-670. Pedestrians crossing the bridge will notice the presence of the new ballroom addition on the west side. There is no access to Truman Road from the Wyandotte Bridge.

Wyandotte Street Bridge Art Panels

Looking West at the Wyandotte Street Bridge, with the Ballroom Expansion beyond

Baltimore Avenue: Constructed in the early 1960s and modified in 2007 with several enhancements including guardrails and sidewalk widening, the Baltimore Avenue bridge over I-670 is a two span continuous reinforced concrete voided slab structure. The superstructure is comprised of two approximately 70' continuous spans spanning 141' from face to face of abutments. The bridge is 72' wide, consisting of a 54' deck for four lanes of traffic, and 8' wide sidewalks with 1' wide parapet walls supporting decorative guardrails on each side. The substructure consists of reinforced concrete counterfort retaining wall abutments supported by spread footings and a single multiple column center bent supported by drilled shafts. Vertical clearance at Baltimore Avenue is currently 15'-2" over westbound (WB) I-670 and 15' over eastbound (EB) I-670. The bridge provides prominent views of the President Hotel and Power & Light Building when approaching Downtown from the south.

View North across the Baltimore Avenue Bridge

Baltimore Avenue Bridge Art Panels

Looking Northwest at the Baltimore Avenue Bridge

Main Street: Constructed in the early 1960s and modified in 2007 with several enhancements including guardrails and sidewalk widening, the Main Street bridge over I-670 is a two span continuous reinforced concrete voided slab structure. The superstructure is comprised of two approximately 70' continuous spans, spanning 141' from face to face of abutments. The bridge is 66' wide, consisting of a 52' deck for four lanes of traffic, and 6' wide sidewalks with 1' wide parapet walls supporting decorative guardrails on each side. The substructure consists of reinforced concrete counterfort retaining wall abutments supported by spread footings and a single multiple column center bent supported by drilled shafts. Vertical clearance at Main Street is currently 15'-4" over WB I-670 and 15'-1" over EB I-670. The bridge provides prominent views of the historic Main Street Theater and new H&R Block Headquarters building north of I-670.

Main Street Utility Bridge: This reinforced concrete slab bridge spans I-670 approximately 50' east of Main Street. The bridge carries 28 conduits serving as a duct bank for AT&T.

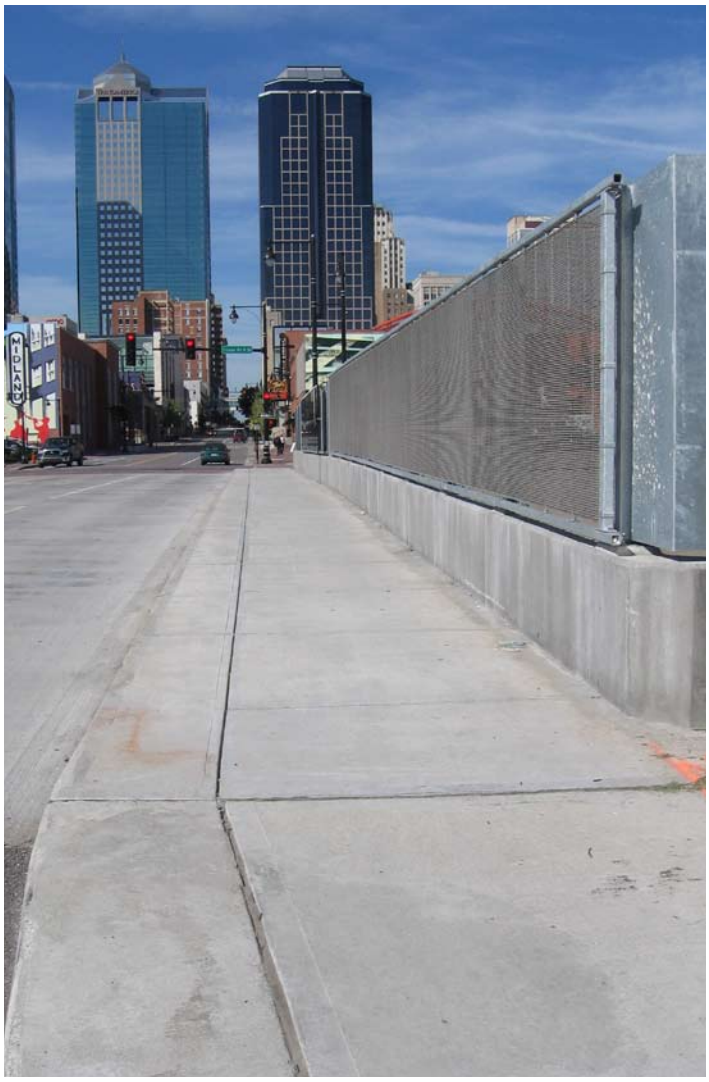
Main Street Utility Bridge

View North across the Main Street Bridge

Looking Northeast at the Main Street Bridge

Walnut Street: Constructed in the early 1960s and modified in 2007 with several enhancements including guardrails and sidewalk widening, the Walnut Street bridge over I-670 is a two span continuous reinforced concrete voided slab structure. The superstructure is comprised of two approximately 70' continuous spans spanning 141' from face to face of abutments. The bridge is 54' wide, consisting of a 36' deck for three lanes of traffic, and 8' wide sidewalks with 1' wide parapet walls supporting decorative guardrails on each side. The substructure consists of reinforced concrete counterfort retaining wall abutments supported by spread footings and a single multiple column center bent supported by drilled shafts. Vertical clearance at Walnut Street is currently 15'-5" over WB I-670 and 15'-3" over EB I-670. There is vibrant character south of the freeway with the renovation of several historic buildings, and to the north Walnut runs through the heart of the Power & Light District.

View North from 16th Street toward the Walnut Street Bridge



Looking North across the Walnut Street Bridge

Looking Northwest at the walnut Street Bridge

Grand Boulevard: Constructed in the early 1960s and modified in 2007 with several enhancements including guardrails and sidewalk widening, the Grand Avenue bridge over I-670 is a two span continuous reinforced concrete voided slab structure. The superstructure is comprised of two approximately 70' continuous spans spanning 141' from face to face of abutments. The bridge is 84' wide, consisting of a 66' deck for five lanes of traffic, and 8'0" wide sidewalks with 1' wide parapet walls supporting decorative guardrails on each side. The substructure consists of reinforced concrete counterfort retaining wall abutments supported by spread footings and a single multiple column center bent supported by drilled shafts. Vertical clearance at Grand Avenue is currently 15'-4" over WB I-670 and 15'-3" over EB I-670. Grand continues north and splits the Power & Light District and the Sprint Center, while to the south there is mixed-use retail and residential.

View South from 14th Street toward the Grand Boulevard Bridge

Grand Boulevard Bridge Decorative Railing End Treatment

Looking Northeast at the Grand Boulevard Bridge

McGee Street: This bridge was of similar construction and size of other bridges in the study area, however was not modified in 2007; it was removed in February of 2009. All utilities that spanned I-670 at McGee street have been moved to the KCP&L utility bridge to the west of McGee Street. McGee Street is not a through street, it is terminated by I-670 and the Sprint Center. Directly east of McGee Street is an eastbound I-670 on-ramp.

KCP&L Utility Bridge/Sign Truss: Constructed in 2008, the KCP&L Utility Bridge/Sign Truss spans I-670. At 150' long and almost 10' in height, it is highly visible to pedestrians and motorists alike. The bridge is a single span tube steel through truss with a decorative sheet metal cladding. Vertical clearance at the utility bridge is over 16'-6" in both directions over I-670. The bridge houses several utilities and is used for signage to motorists traveling on I-670.

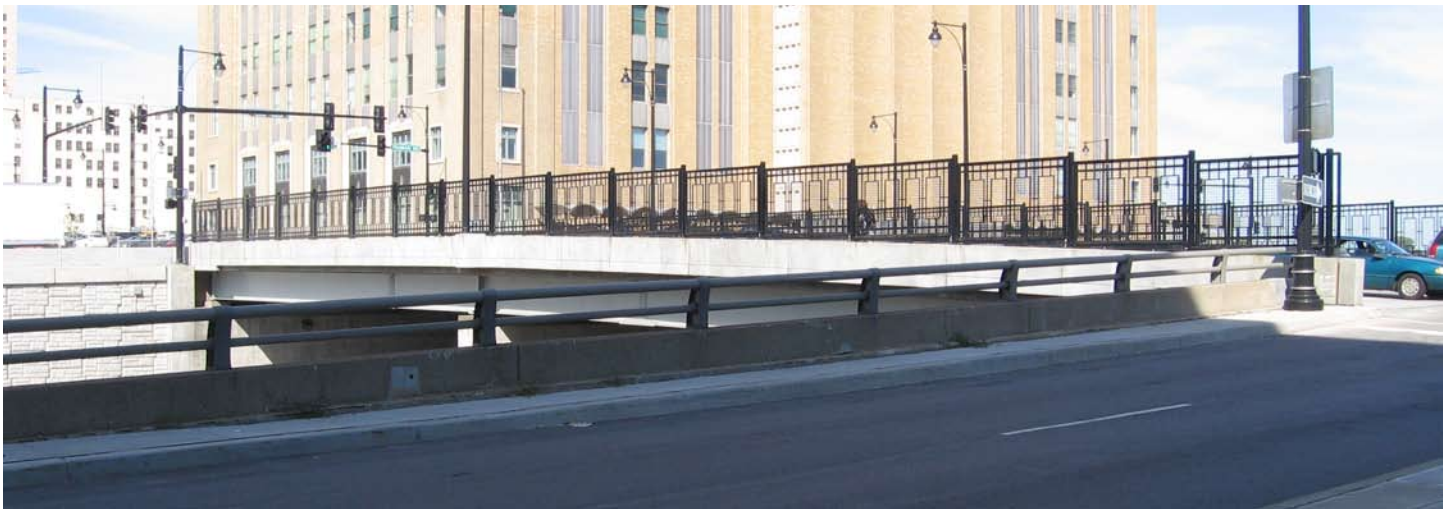
Looking Northeast at the KCP&L Utility Bridge

Looking Northwest at the KCP&L Utility Bridge

Looking Southwest at the former location of the McGee Street Bridge

Oak Street: Constructed in 2007, the Oak Street bridge over I-670 is the eastern border of the study site. The superstructure is comprised of two continuous composite plate girder spans of 71' and 93' respectively for a for a total bridge length of approximately 164'. The bridge is 79' wide, consisting of a 64' deck for six lanes of traffic, an 8'0" wide sidewalk on the west side, a 5' sidewalk on the east side and 1' wide parapet walls supporting decorative guardrail on both sides of the bridge. The substructure consists of reinforced concrete counterfort retaining wall abutments supported by drilled shafts and a single multiple column intermediate bent supported by drilled shafts. Vertical clearance at Oak Street is currently 15'-7" over WB I-670 and 15'-2" over EB I-670. The Sprint Center and AT&T building are to the north of the bridge, with the KC Star building to the south. The KCP&L Utility bridge can be seen to the west of the bridge.

Looking North across the Oak Street Bridge

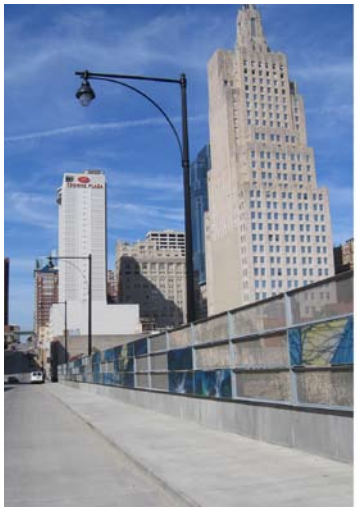


View of Oak Street Bridge from Eastbound Truman Road

STREETSCAPE ENHANCEMENTS

Streetscape enhancements were completed in the fall of 2007 to Truman Road and the Baltimore, Main, Walnut, Grand, and Oak Street bridges. Some elements included in the aesthetic enhancement project along Truman Road were resurfaced roads, new light fixtures, curbs, sidewalks, crosswalks, accessible ramps, street trees with tree grates, decorative guardrails, sodding and additional landscaping. In addition to the work done along Truman Road, the bridges received aesthetic treatments to encourage pedestrian movement through the area. Traffic lanes were re-striped to minimum acceptable widths, allowing the widening of sidewalks on the bridges to accommodate more space for pedestrian traffic. At intersections, ramps were added to aid pedestrian mobility. The Oak Street bridge has a decorative railing similar to the decorative guard rail along I-670. All other bridges showcase commissioned graphic art panels. The panels sit on a 1' wide and 18" tall parapet wall.

New Decorative Guardrail along I-670



New Light Fixtures, Art Panels and Decorative Railing on the Bridges

New Sidewalks, Light Fixtures and Trees along Truman Road

New Curbs, Pavement, Light Fixtures and Trees along Truman Road

UTILITY ASSESSMENT

The South Loop area of the Central Business District is served by a very complex system of underground utilities. These utilities run along both sides of Truman Road and down the center of the road as well. In order to quantify the location of utilities, a utility base map was assembled from information already available from the Bartle Hall project, the Truman Road Bridge Replacement project, utility as-built surveys from the Sprint Arena project, and utility as-built surveys from the KC Live! project. This existing information was supplemented with record information. This assessment is a brief overview of utilities in the corridor. A full analysis begins on page 106.

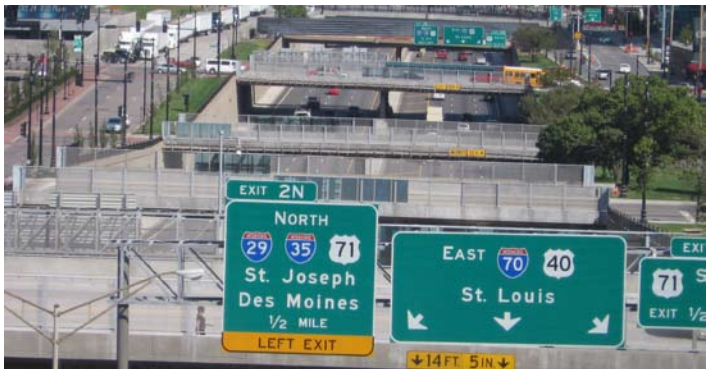
Various utilities are located along the Truman Road/I-670 corridor. Storm sewer inlets, manholes and pipes ranging from 15" to 84" are located within the study area. Sanitary sewer manholes and pipes are located on westbound Truman Road. A 24" waterline and a 12" waterline lie underneath the pavement of westbound Truman Road and eastbound Truman Road respectively. There are underground electric power lines (8-6" ducts and 12-6" ducts) along westbound Truman Road. Eastbound Truman Road also contains miscellaneous electric duct banks. Several telecommunication lines in ducts also traverse the study corridor. Telecommunication companies with facilities along the corridor include AT&T, SBC, Time Warner Cable, Qwest, Xspedius, Wiltel and Lightcore. The City of Kansas City Telecom has an underground telecommunication line along westbound Truman Road for KCSCOUT. Some of the duct banks for these telecommunication lines range anywhere from two feet to six feet in depth or width. Several fiber optic lines are located along the study corridor.

As part of the data collection for the ongoing study, the team contacted utility companies to obtain record information for facilities that are located within the project corridor. Most of the information was collected, additional coordination will take place in design development and construction documentation phases of the project.

One significant facility that has a major impact on I-670 is a major combined sewer, which crosses under I-670 at its lowest point at Walnut. City utility records note this sewer as a 66" reinforced concrete pipe (RCP). MoDOT records on the other hand, show this conduit as a large reinforced concrete box (RCB) structure. It should be noted that MoDOT drawings show a conduit with very little cover. Consequently, lowering the profile grade on I-670 appreciably may be very difficult if not impossible.

Additional constraints are a set of utility bridges over I-670. The first was constructed by KCP&L during the construction of the Sprint Arena. Prior to the bridge being constructed, KCP&L had its utilities on the McGee Street Bridge. Since the McGee Bridge was demolished and the Grand Boulevard Bridge was found to be structurally deficient for carrying additional KCP&L utility loads, the KCP&L utilities were relocated to the new utility bridge. According to KCP&L, this bridge was originally designed to carry AT&T fiber optic lines as well but AT&T decided not to use the new bridge facility. Additional utilities (primarily telecommunications) are located on another utility bridge over I-670 just east of Main Street.

Construction of the Sprint Arena and the Kansas City Power and Light District resulted in several utility lines being abandoned in place, removed or relocated. Any improvements in the vicinity of Truman Road will require special consideration of the numerous utilities in the vicinity. Some alternatives may require relocation of existing utilities, which will undoubtedly come at significant cost. Coordination with the utility companies early in the project will play a key role in a project's success, minimizing costly relocations and avoiding delays.



Looking East at the I-670 Corridor from the Wyandotte Street Bridge

REGIONAL DIAGRAMS

Please note the following diagrams were created in the late 2008 and do not reflect recently completed construction projects, namely the demolition of the McGee Street Bridge, the J.E. Dunn Headquarters Building between Oak and Locust and 10th and 11th Streets, and the Block 81 Garage on 11th Street, between Oak and Locust Streets.

Districts

As shown in the map on page 45, the study area is located between the Power and Light District of the Downtown Loop and the Crossroads Arts District, all within Downtown Kansas City. The Power & Light District extends west from the newly completed Sprint Center on the north side of I-670. The Crossroads Arts District, once filled with warehouses storing goods unloaded at Union Station, now has been revitalized by conversions of the warehouses into art galleries, living units and various commercial uses. The Kauffman Center for the Performing Arts, located just south of the Convention Center and set to open in 2011, will serve as a major regional arts destination within this district.

Surrounding the study area, other districts will be impacted by proposed enhancements of the I-670 corridor. The Westside neighborhood, just west of the Crossroads, is a strong neighborhood that is seeing housing reinvestment and increased population due to its proximity to Downtown. Quality Hill, northwest of the study area, is credited as the oldest continuously inhabited residential area in the metropolitan region. It is still home to residences as well as commercial office space. East of the study area, the Paseo West and 18th & Vine neighborhoods are home to historically significant areas for the African American population. These neighborhoods benefit greatly from east-west connections through Downtown.

I-670 Corridor Looking West

Historical Designations

Along the South Loop, a few properties on both sides of I-670 are designated as historically significant as shown on page 46. To the north, the Kansas City Power & Light Building, President Hotel, and Empire Theater are listed on the National Register. To the south, several renovated commercial and residential warehouse buildings along Walnut Street are also listed on the National Register.

Building Footprints

Highlighting the footprints of all the buildings in the Central Business and Crossroads Districts (as shown on page 47), it is obvious that there are gaps in the urban fabric. These "missing teeth" are often empty parcels used for surface parking but often diminish the continuity of the pedestrian experience in a streetscape environment. The footprints also illustrate the scale impact of large venues such as the convention center, performing arts center, and arena in comparison with surrounding development.

Parks & Open Space

Although Kansas City is known for its historic parks and boulevards system, their is a perceived lack of meaningful green space in the downtown core. The parks and open space areas as well as designated bike and trail routes in Downtown are shown on page 48.

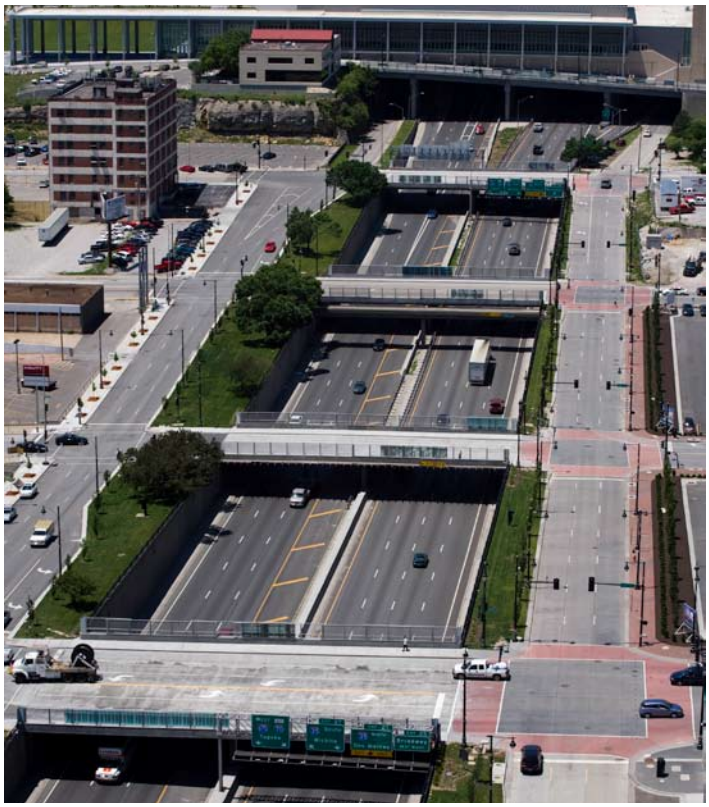
Barney Allis Plaza, located near the study area, is an under-utilized public open space at the southwest corner of the Downtown Loop. While Barney Allis Plaza is one square block located between hotels and convention center facilities, it has at-grade access from only 12th Street. The grade separation could be one reason the park is under-utilized.

Oppenstein Brothers Park, located on the northeast corner of 12th Street and Walnut Street, is frequently used by downtown employees. Construction of public art, design, and landscaping improvements was recently completed.

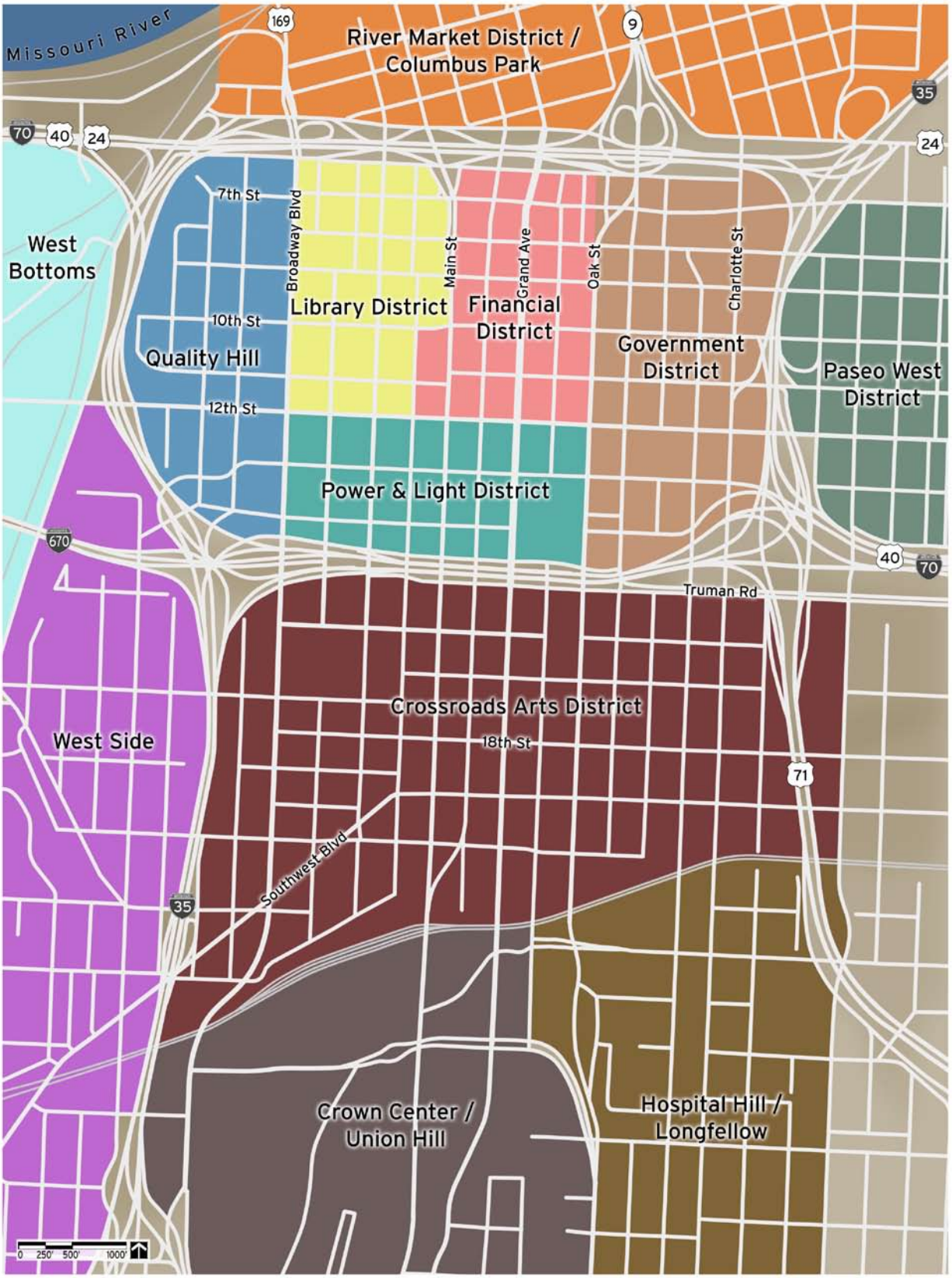
Ilus Davis Park is located between 9th and 11th Streets, from Oak to Locust Street. This park is also viewed as under-utilized; the park hosts a few events per year, a few recreational soccer games during workday lunch hours, and a weekly farmers market during the summer months. The new J.E. Dunn Headquarters, adjacent to the park, provides the final park enclosure of adjacent buildings. Park use may increase with the completion of this structure.

The Crossroads District currently lacks any meaningful green space that would cater to its residences and businesses. The nearest parks are located within the Downtown Loop or south of the KC Terminal Railroad tracks.

A recently adopted off-street bicycle plan, Trails KC!, will work with the on-street bicycle plan, BikeKC!. The off-street route nearest the corridor runs through the Westside neighborhood north to Quality Hill, then utilizing 9th Street east to Wyandotte, then proceeding north into the River Market. The nearest on-street route runs west and east on 11th and 12th Streets. Currently, neither plan recommends routes through the I-670 corridor.



I-670 is located below north-south crossing streets connecting the Downtown Loop to the Crossroads Arts District


Missouri River
River Market District / Columbus Park
West Bottoms
Quality Hill
Library District
Financial District
Government District
Paseo West District
Power & Light District
Crossroads Arts District
West Side
Crown Center / Union Hill
Hospital Hill / Longfellow
7th St
10th St
12th St
18th St
Broadway Blvd
Main St
Grand Ave
Oak St
Charlotte St
Truman Rd
Southwest Blvd
169
9
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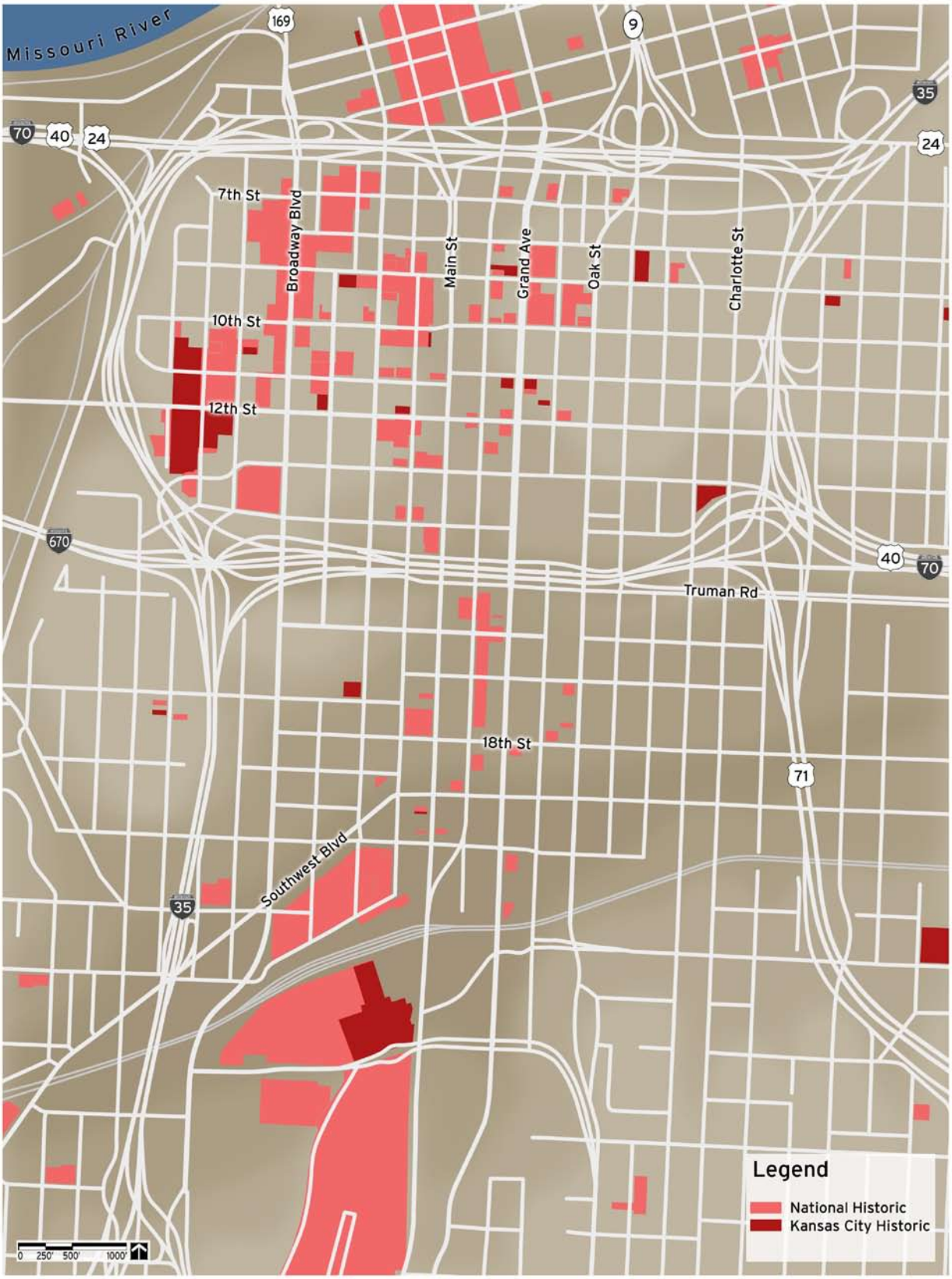
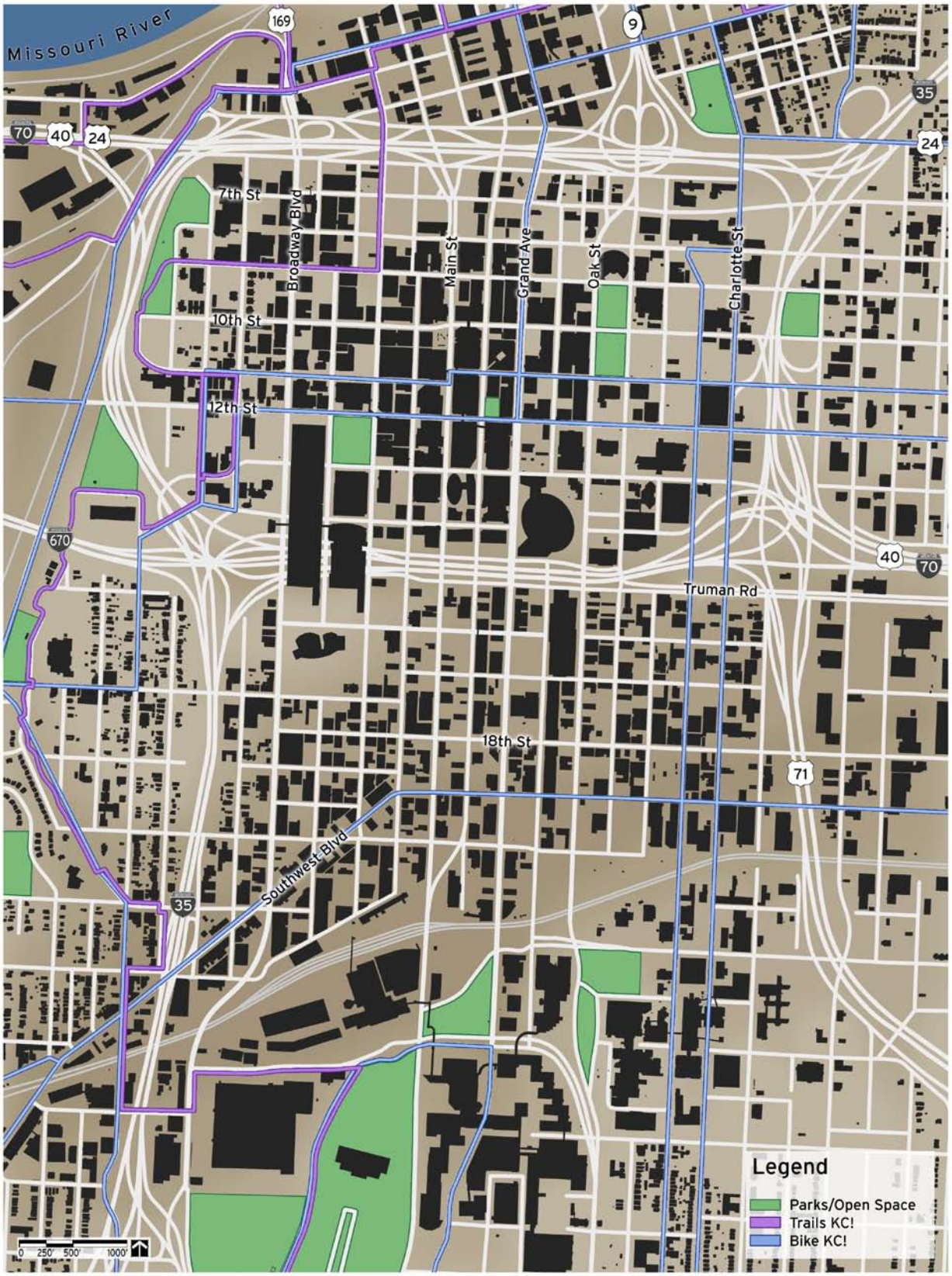
71
0 250' 500' 1000'

Districts

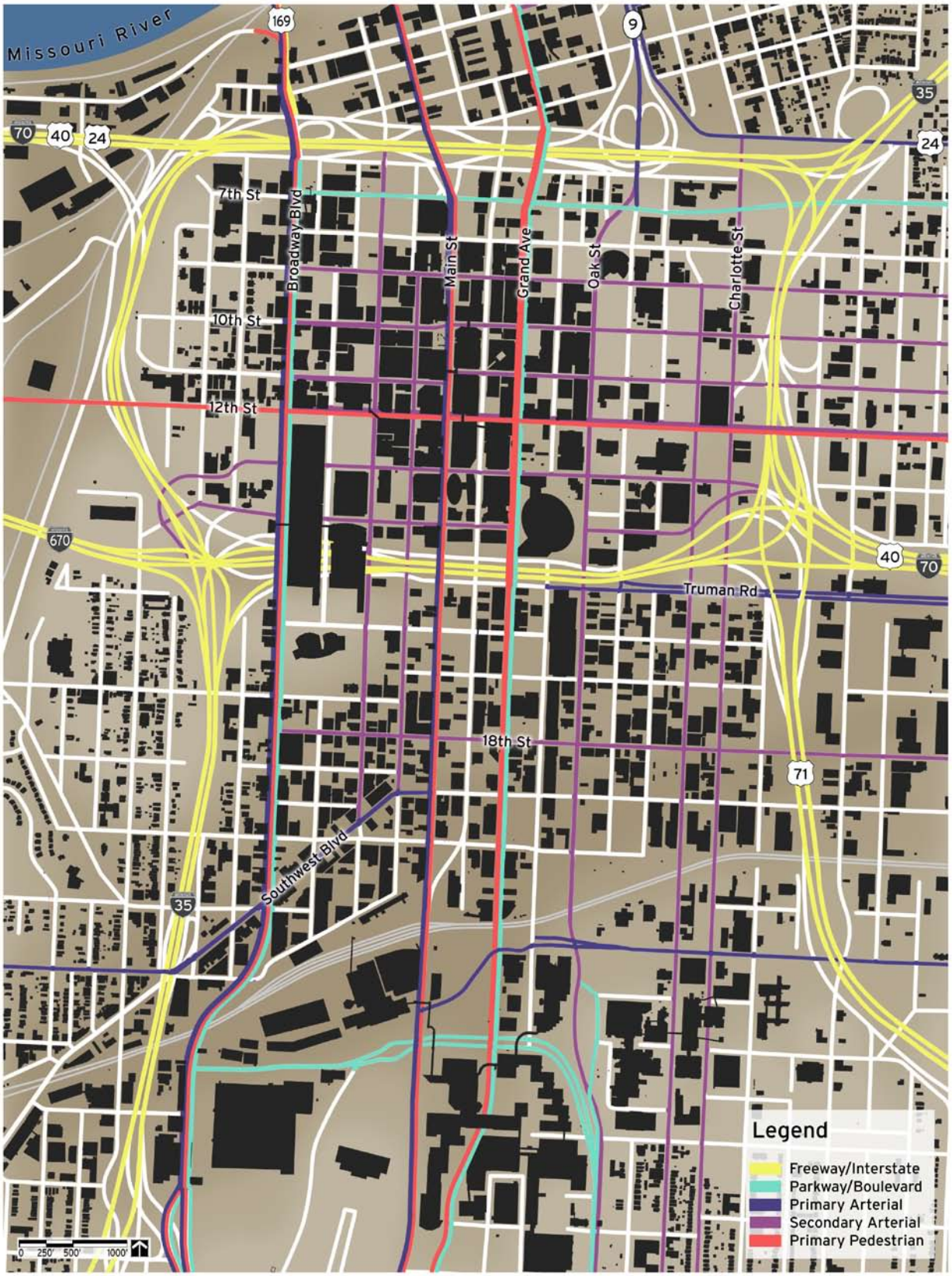


Historical Designations

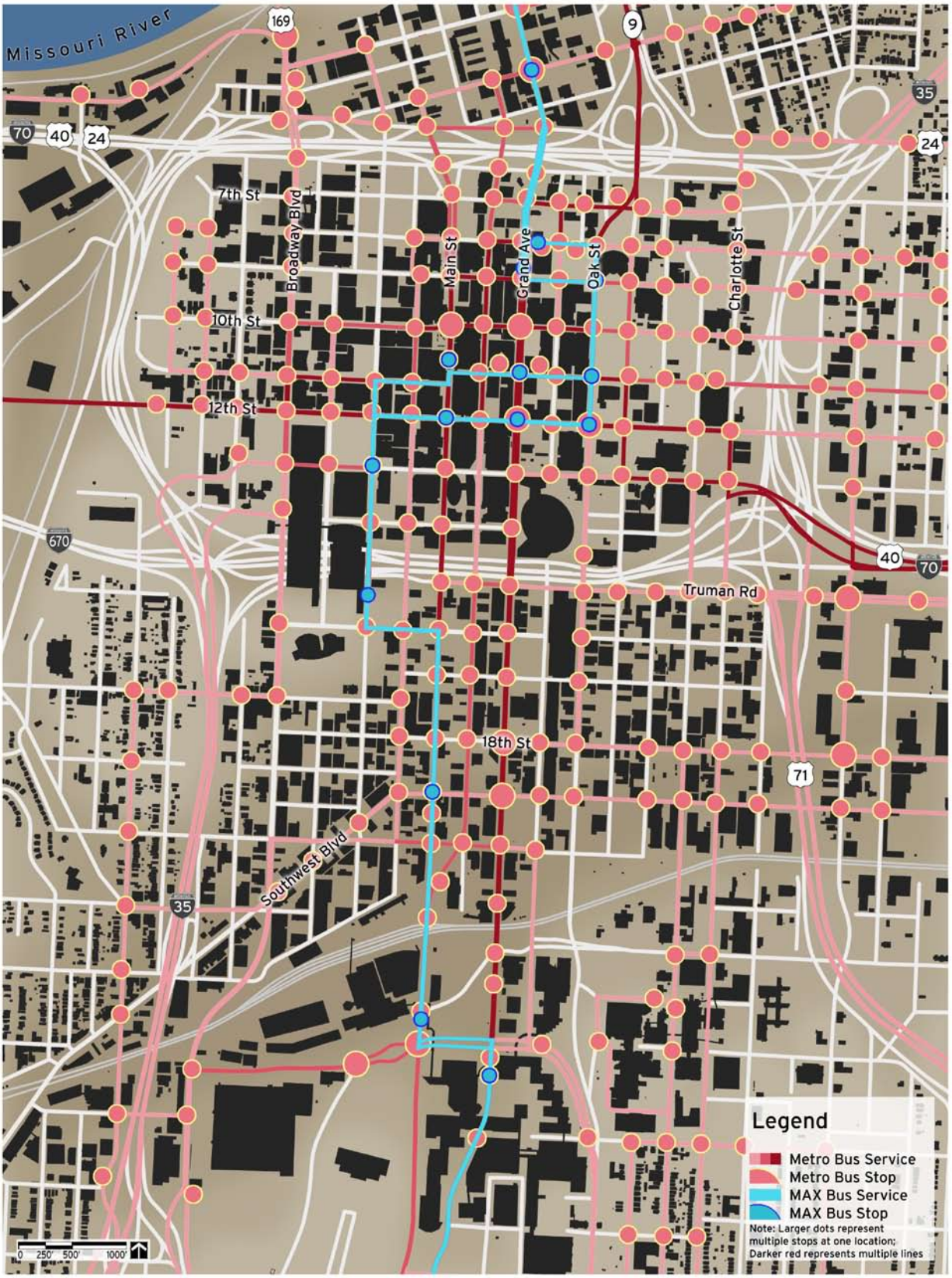
Building Footprints



Parks & Open Space



Vehicular & Pedestrian Circulation



Transit Routes

Proximity to Destinations

CORRIDOR DIAGRAMS

Characteristics of the I-670 Corridor

The I-670/Truman Road corridor currently serves as a physical and psychological barrier separating the Downtown Loop from the adjacent Crossroads District to the south. The existing freeway is constructed in a sunken channel approximately 15' below adjacent grades. Truman Road consists of a pair of one-way streets flanking the north and south sides of the freeway that serves as an urban arterial delivering traffic from the freeways and points east into various parts of Downtown and the Crossroads District. The total right-of-way encompassing the I-670/Truman Road corridor is approximately 300' in width. The buildings adjacent to Truman Road are typically one to two story structures, and currently only minimal accommodations for pedestrians exist. Fronting Truman Road to the north are several surface parking lots behind the Power & Light District, while to the south, the only building to front the road is the KC Star building. The physical environment is dominated by roadways, directional signage and traffic signals.

The following images show characteristic views of the Truman Road and I-670 corridor. These photos were taken in the Fall of 2008.

Site Photos

Site Photos

Views and Gateways

Emerging from under the Convention Center on either Truman Road or I-670, the primary east views are of the Sprint Center, KC Star building, and the AT&T building. The Sprint Center is a destination. There is a distinct advantage in seeing it as one gets off of the eastbound portion of the freeway to find a parking space. Exiting the westbound portion of the expressway onto Truman Road, views of the Convention Center art deco pylons mark the Convention Center, and views of the Power & Light District and the Sprint Center are seen over the driver's right shoulder.

The east / west views from Truman Road are unique because they locate the Sprint Center, the Power & Light District and the Convention Center. Similarly, the sense of arrival from the west to Downtown is strong passing under the Convention Center, creating a gateway. Although, emerging from under the Convention Center, the vast expanse of the I-670 right-of-way and under-utilized land on either side of it is encountered.

Continuing from the east, Truman Road is framed by the AT&T building and the KC Star building. It is worth noting that I-70 to the east is not in alignment with the I-670 corridor; rather it is lined up with the AT&T building and the Sprint Center. When the freeway

Views & Gateways

splits to the north and west directions (just east of the study area), vehicles heading west toward I-670 enter the corridor on axis with the KC Star building and then become aligned with the convention center.

Northern views of Downtown and its landmarks are strongest on Baltimore and Main Streets, but good views are also encountered on Walnut Street and Grand Boulevard. The strongest sense of arrival is on Main Street, crossing the spatial gap of the expressway from the south and enters the Downtown Loop near the Main Street Theater (formerly Empire Theater), offering the best views of the downtown central business district. The best view of the Crossroads District from Downtown is looking south down Walnut Street through the renovated historic buildings. The sense of arrival to the Crossroads District on other streets is much weaker due to the 'missing teeth' along the southern edge of the freeway. The large graphic on the northern wall of the Mainmark building as seen on southbound Main Street from the freeway is an effective identifier of the Crossroads District.

The following images show views of the corridor as well as visual landmarks located throughout the corridor. The photos were taken in the Fall of 2008.

Main Street Looking South

Views & Gateways

Views & Gateways

2

3


4

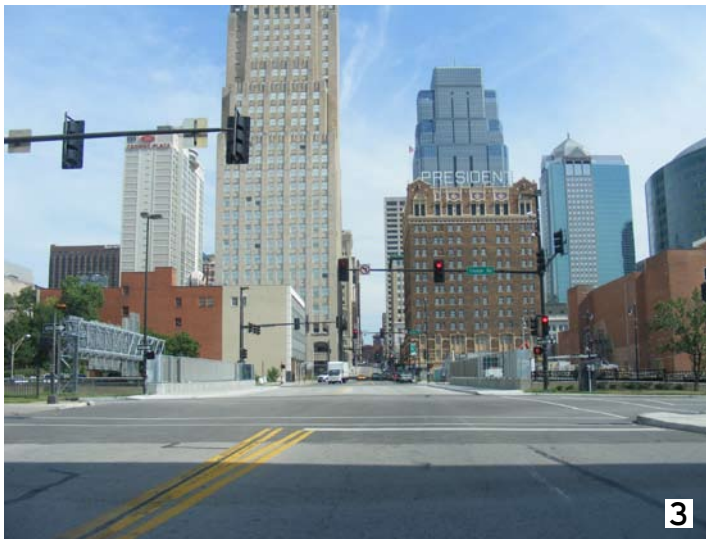
Views & Gateways


1


2


12th St
13th St
14th St
16th St
17th St
18th St
Washington St
Broadway Blvd
Central St
Wyandotte St
Baltimore Ave
Main St
Walnut St
Grand Ave
McGee St
Oak St
Locust St
Holmes St
Truman Rd
Truman Rd
670
35
1
2
3
4
5
6
7

Site Photos



Site Photos


BERLAU
PAPER
1


2


Washington St
Broadway Blvd
Central St
12th St
Wyandotte St
Baltimore Ave
Main St
Walnut St
Grand Ave
McGee St
Oak St
Locust St
Holmes St
13th St
14th St
Truman Rd
670
Truman Rd
16th St
17th St
18th St
35
1
2
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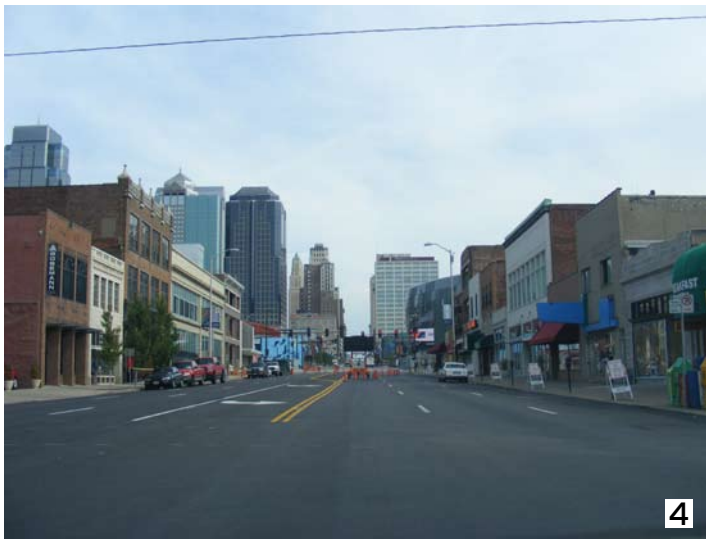
6
7
8

Site Photos


3


4


5


6


7


8

Site Photos

1. Bartle Ballroom and Pylons

2. KCPL Building

3. President Hotel

4. Main Street Theater

Visual Landmarks

5. H&R Block Building

6. Power & Light District

7. Sprint Center

8. KC Star Building

9. Berlau Paper Building

10. 1518 Walnut Building

11. EBT Warehouse Lofts

12. Mainmark Building

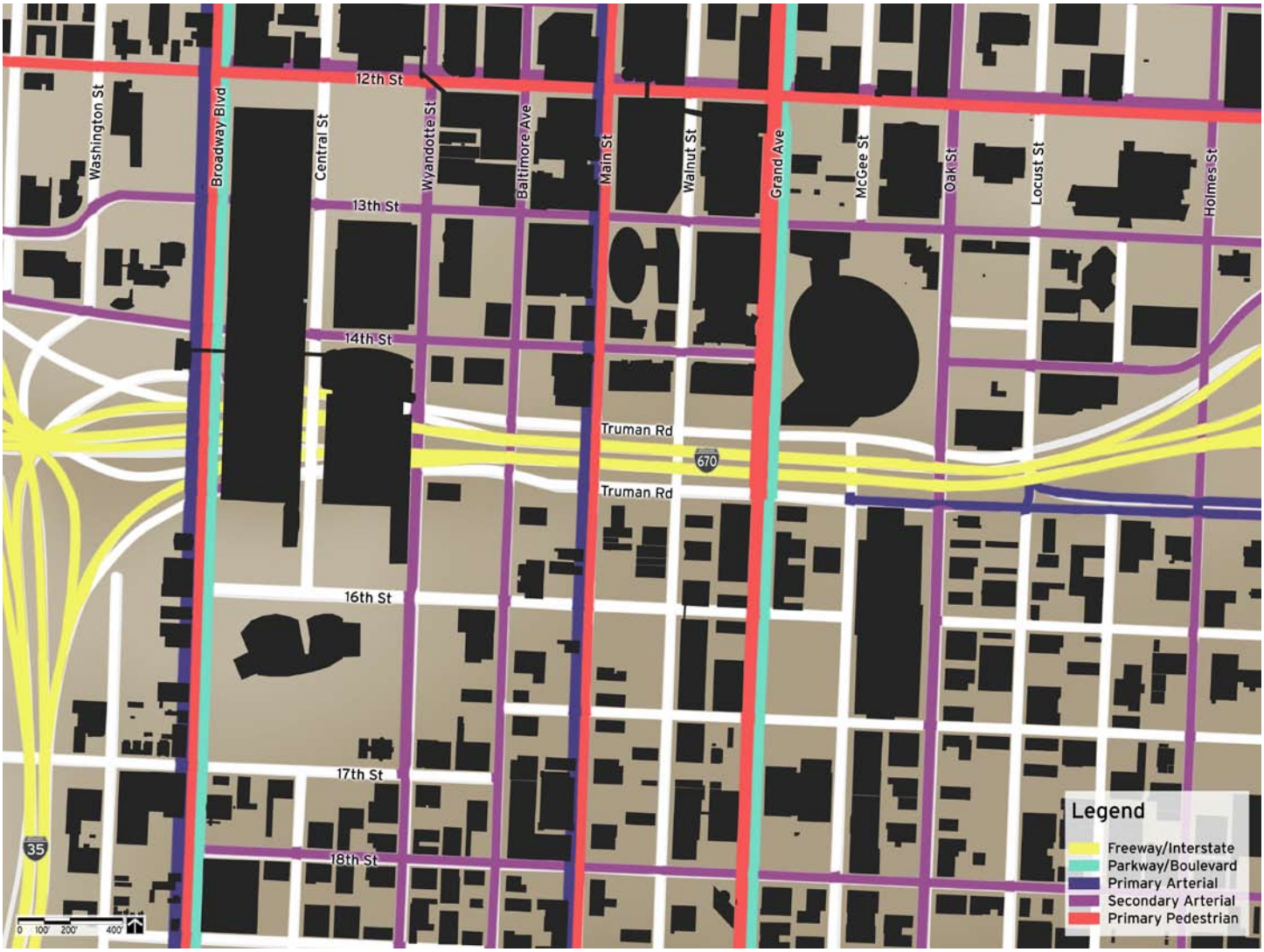
13. Kauffman Center for the Performing Arts (model shown)

Visual Landmarks

Roadway Characteristics

The Downtown Loop has the benefit of access from several interstates and highways. Unfortunately, the interstate and highway systems' scale and adjacency to the Downtown Loop reduces the connectivity between downtown districts. Vehicles can travel quickly and efficiently to and from the Downtown Loop at the expense of pedestrian connectivity.

The study area focuses on the southern portion of the Loop, specifically Interstate 670 and the northern portion of the Crossroads Arts District. Bridging the interstate are (west to east) Broadway, Central, Wyandotte, Baltimore, Main, Walnut, Grand, Oak and Locust Streets. Vehicular circulation throughout the study area is complicated by a disconnected road network and one-way pair streets. The Sprint Center and Kansas City Star Building have significant floor areas that terminate 14th Street and 16th Street, respectively, thus reducing the efficiency of the road network. This also impacts the effectiveness of 13th Street and 14th Street as a one-way pair.



Vehicular & Pedestrian Circulation

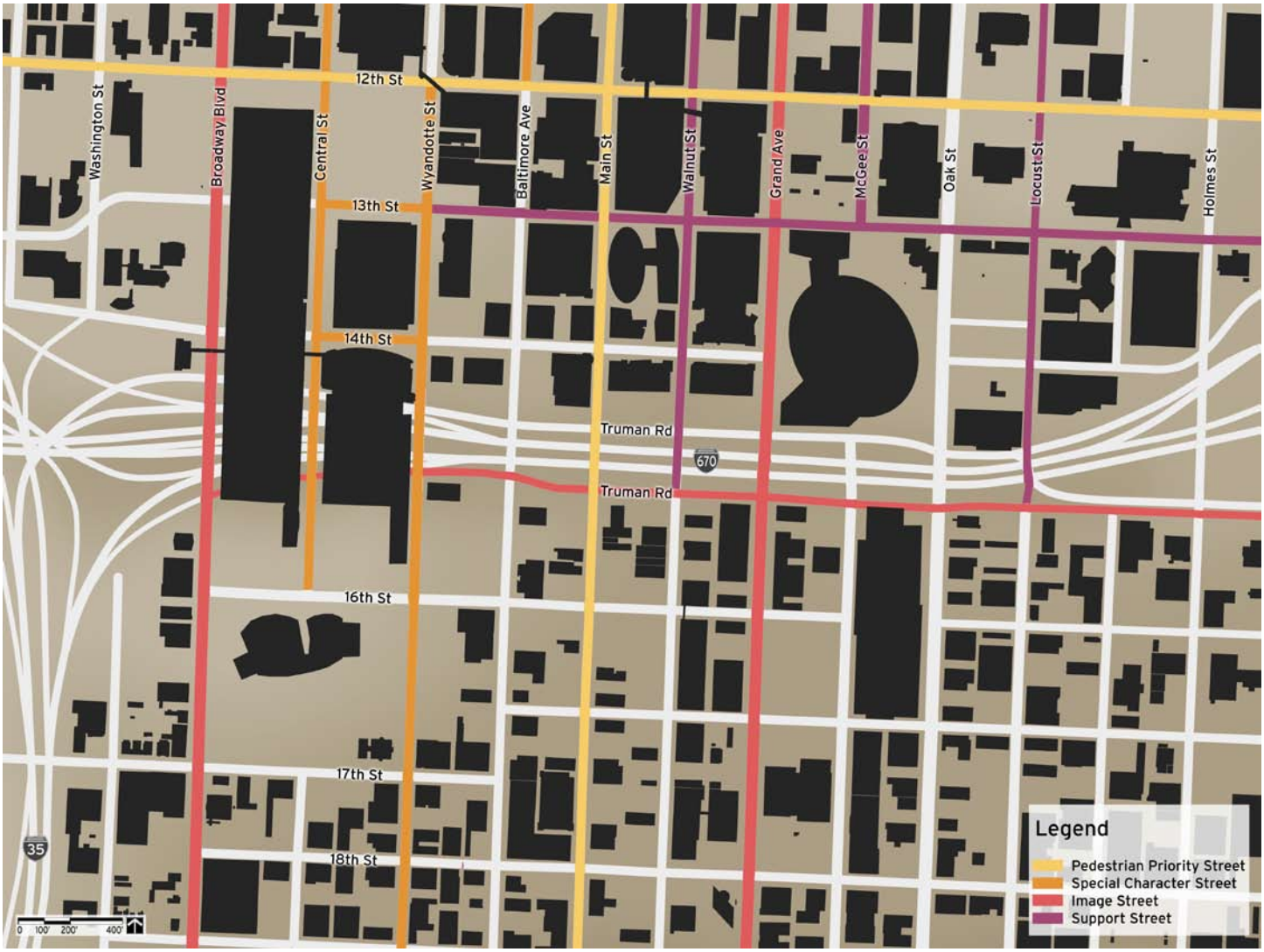
Street Types

The Downtown Streetscape Master Plan assigned a hierarchy to the streets within the Downtown Loop and south of I-670 to eastbound Truman Road between Baltimore Avenue and Oak Street and further south between Broadway and Baltimore Avenue. Four types of streets were identified, each with its own streetscape character and treatments. These street types are referred to as pedestrian priority, special character, image, and support streets.

Pedestrian priority streets are gateways and main spines linking the Downtown Loop to the City at large. The streetscape is designed with wide sidewalks, generous streetscape furnishings and amenities to accommodate high volumes of pedestrian traffic.
Special Character streets are generally shorter corridors having a unique visual character or function. The streetscape design for this street type should reflect unique features, furnishings, and site-specific urban design treatments.

Image streets are primarily designed to provide access to and through Downtown, and may provide visitors with their first impression of Downtown. Therefore, significant streetscape and gateway elements are needed to enhance the sense of arrival.

Finally, support streets are intended to serve adjacent



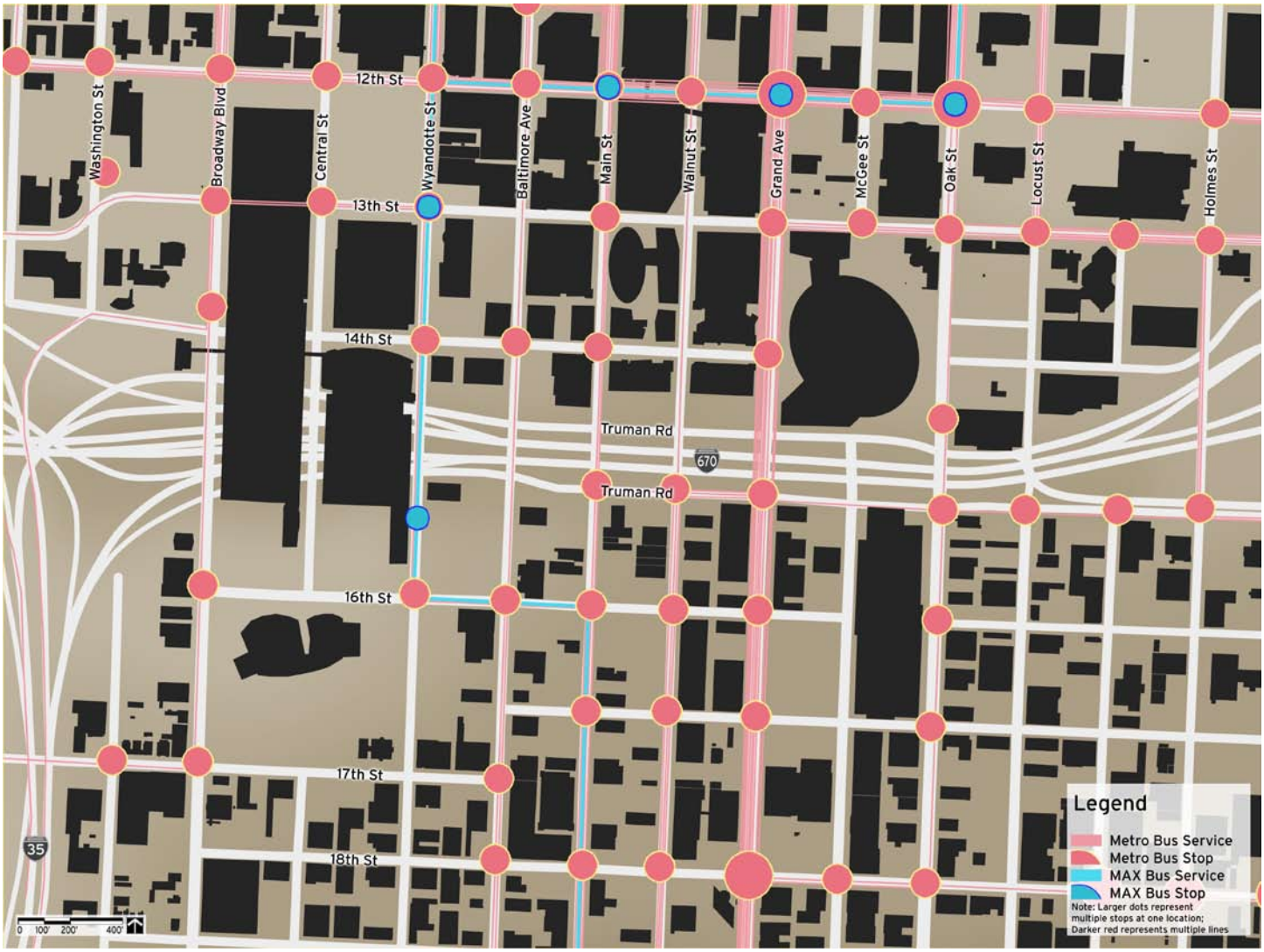
Street Types

downtown land uses and are intended to access large parking garages, building service entries and loading areas, but should also have furnishings to provide an attractive and safe pedestrian environment.

The Greater Downtown Area Plan identifies Corridor Streets and states their streetscape improvements are among the highest priorities. The Corridor Streets in the study area are Truman Road, Wyandotte, Main, Grand, and Oak.

Transit Routes

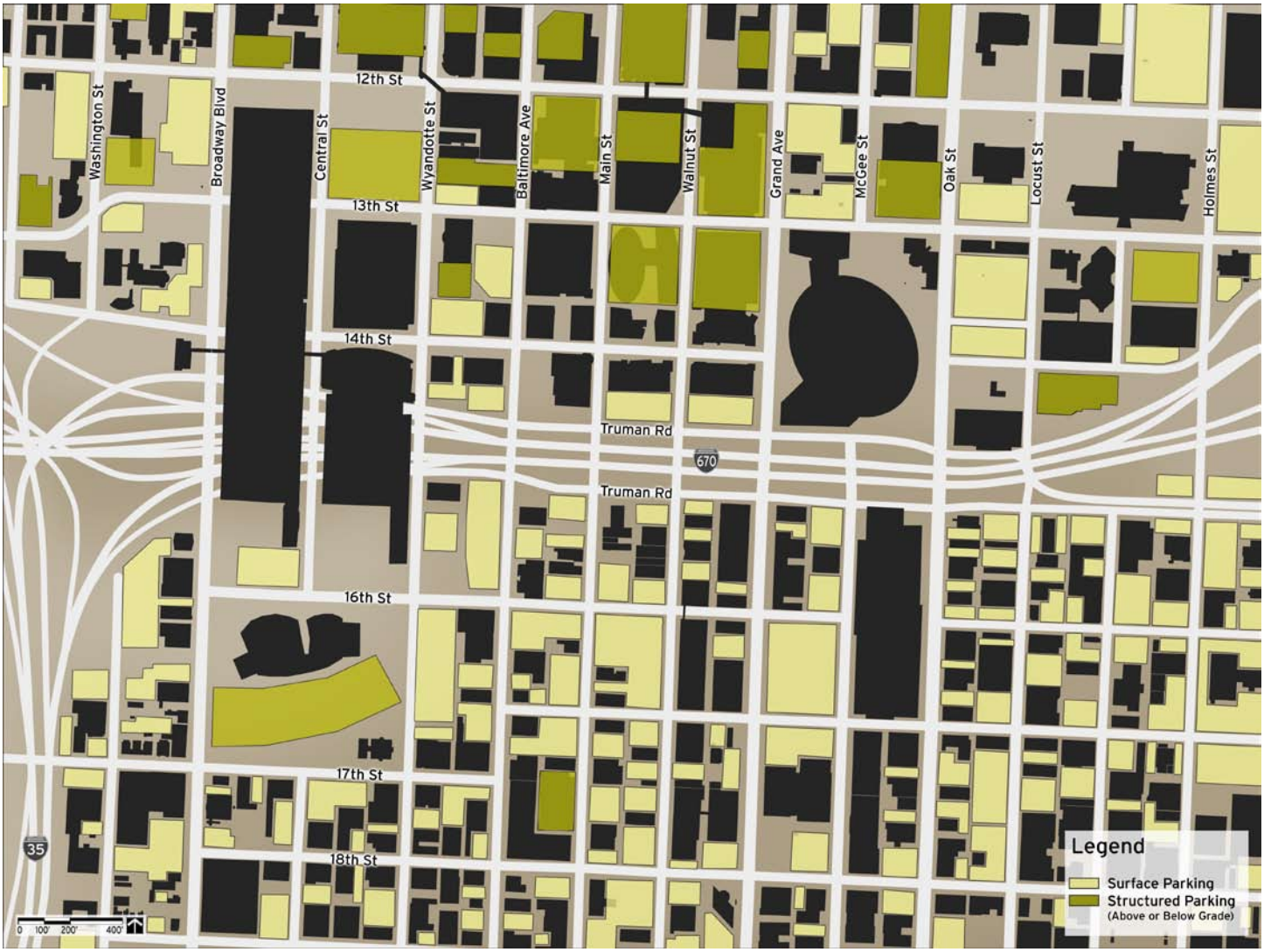
The study area has great transit access as many local bus service (Metro) lines traverse I-670 to feed the Downtown Loop. In fact, the entire study area is within a 1/4 mile from a bus stop. Grand Avenue has the most number of bus lines providing service to the area, and Wyandotte Street is utilized by the bus rapid transit (MAX) line. Future MAX lines will provide increase service to Downtown and the surrounding areas. The Kansas City Area Transit Authority (KCATA) continually looks to improve the area's public transportation options, and is currently investigating the possibility of incorporating light rail transit into the overall system.



Transit Routes

Parking Locations

As land use density continues to increase in Downtown, surface parking lots are being converted to building footprints or structured parking. Several parking structures are located at the northern perimeter of the study area, providing daytime employment parking as well as nightlife entertainment and event parking. The Auditorium Plaza Garage beneath Barney Allis Plaza and other parking lots and structures throughout the Power & Light District provide parking to the surrounding hotels and convention facilities. South of Interstate 670 there are several surface parking lots feeding the Crossroads Arts District community. The Performing Arts Center will house around 1,000 underground parking stalls for performances and other events. On-street stalls throughout the study area provide additional parking options.



Parking Locations

Parking Supply

Field data was collected as part of the I-670 Pedestrian Crossing Study conducted in 2006. This study concluded that there was an adequate supply of parking within a 5-10 minute walk from the Sprint Center to accommodate a total gross attendance of 22,000 for an arena event. Likewise, the parking supply listed in these maps and tables shows the concentration of new parking in the Power & Light District can support a large parking demand. It also shows the scattered surface lots in the Crossroads District. Note, this study did not include the Auditorium Plaza Garage, the projected 1,000 stall underground Performing Arts Center Garage, or the Block 81 Garage, all of which offer additional parking opportunities for this study area. Also note that much of the "Future Planned" parking is now constructed and in operation.

Parking Availability within the Downtown Loop*

Parking Type	0-5 Minute Walk	5-10 Minute Walk	Over 10 Minute Walk	Total Parking
Public Access	9,445	13,402	8,454	31,303
Future Public	3,112	455	0	3,567
Limited Access	1,945	4,422	4,842	11,209
Total	**14,502**	**18,279**	**13,296**	**46,077**

Parking Availability located South of I-670 (to 19th Street)*

Parking Type	0-5 Minute Walk	5-10 Minute Walk	Over 10 Minute Walk	Total Parking
Public Access	37	616	1,018	1,671
Future Public	0	455	0	455
Limited Access	744	1,533	239	2,516
Total	**781**	**2,604**	**1,257**	**4,642**

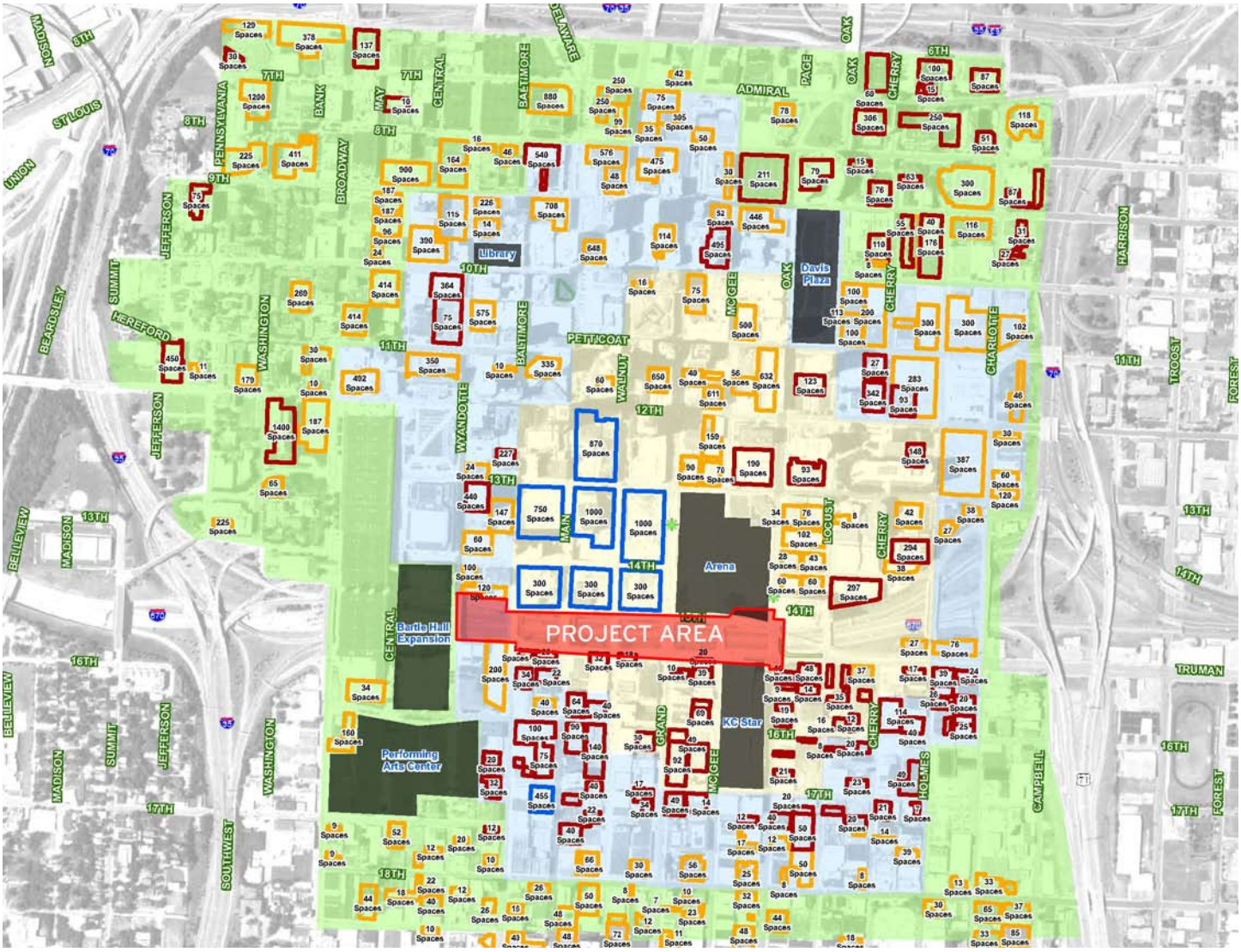
Legend

Walking Time
- 0 to 5 Minute Walk
- 5 to 10 Minute Walk
- Greater than 10 Minutes

Arena Entrance

Parking
- Public
- Limited
- Future Planned

* Walk distance from the Sprint Center



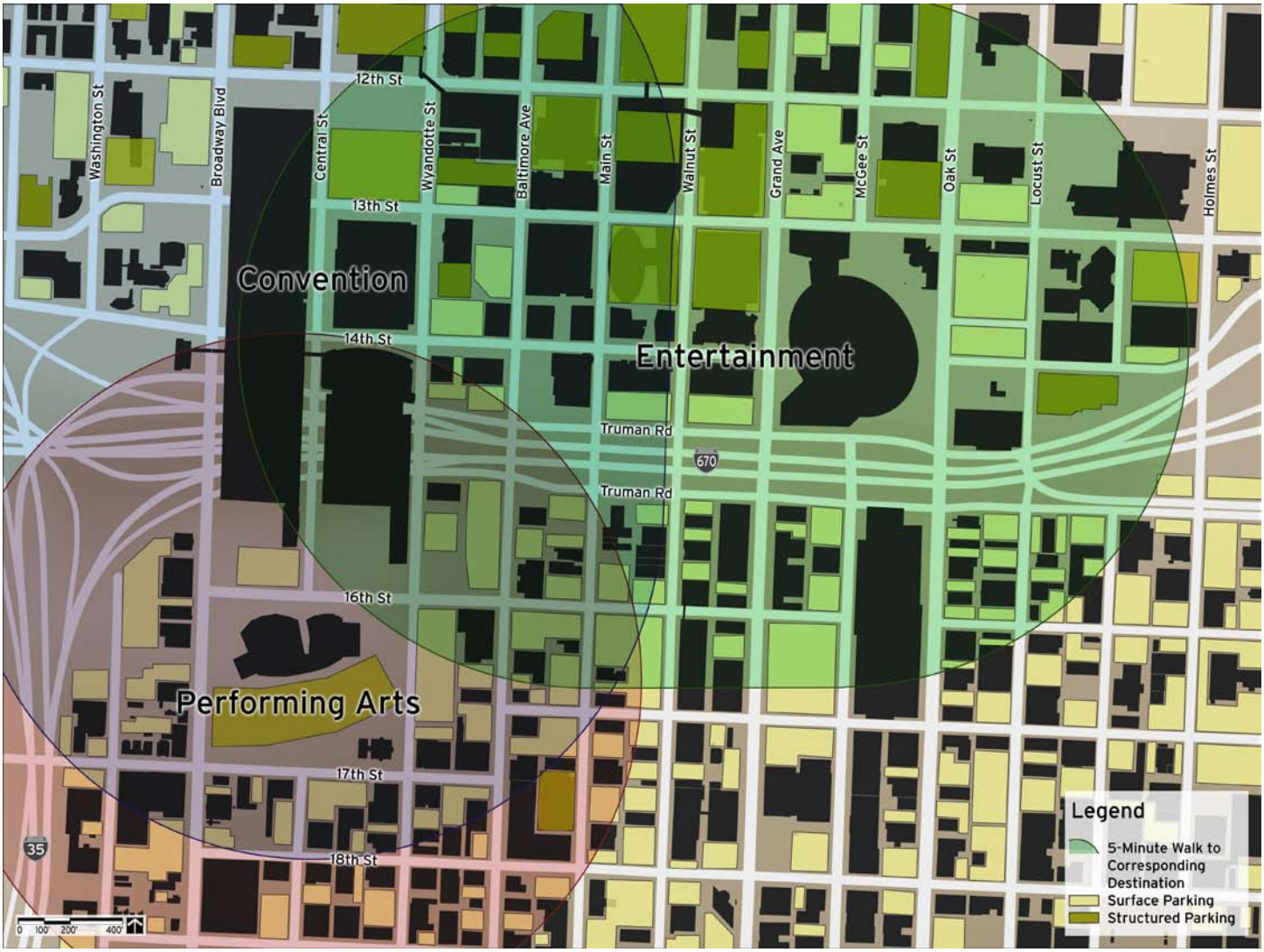
Parking Supply

Proximity to Destinations

With the recent redevelopment of the southern portion of the Downtown Loop, three distinct destination areas are created. The first is the convention zone, highlighted by the Kansas City Convention Center and the newly constructed Ballroom Expansion. Secondly, the development of the Power & Light District, Kansas City Live! and Sprint Center anchor an entertainment destination. Finally, the construction of the Kauffman Center for the Performing Arts is a performing arts destination, bolstered by the thriving arts community already established in the Crossroads District. These create a synergy that can leverage additional investment in the urban core.

When overlaying a five-minute walk radius at each destination and highlighting existing parking options, one can make a determination as to the adequacy of available parking located within a general proximity of these destinations.

Even with the separation of I-670, several parking areas south of the freeway are within a walkable distance to the heart of the entertainment zone. Likewise, any new development along the Truman Road corridor will have proximity to several parking facilities both north and south of the interstate. Any improvements to the pedestrian experience over I-670 will only strengthen the connections between the Downtown Loop and the Crossroads.

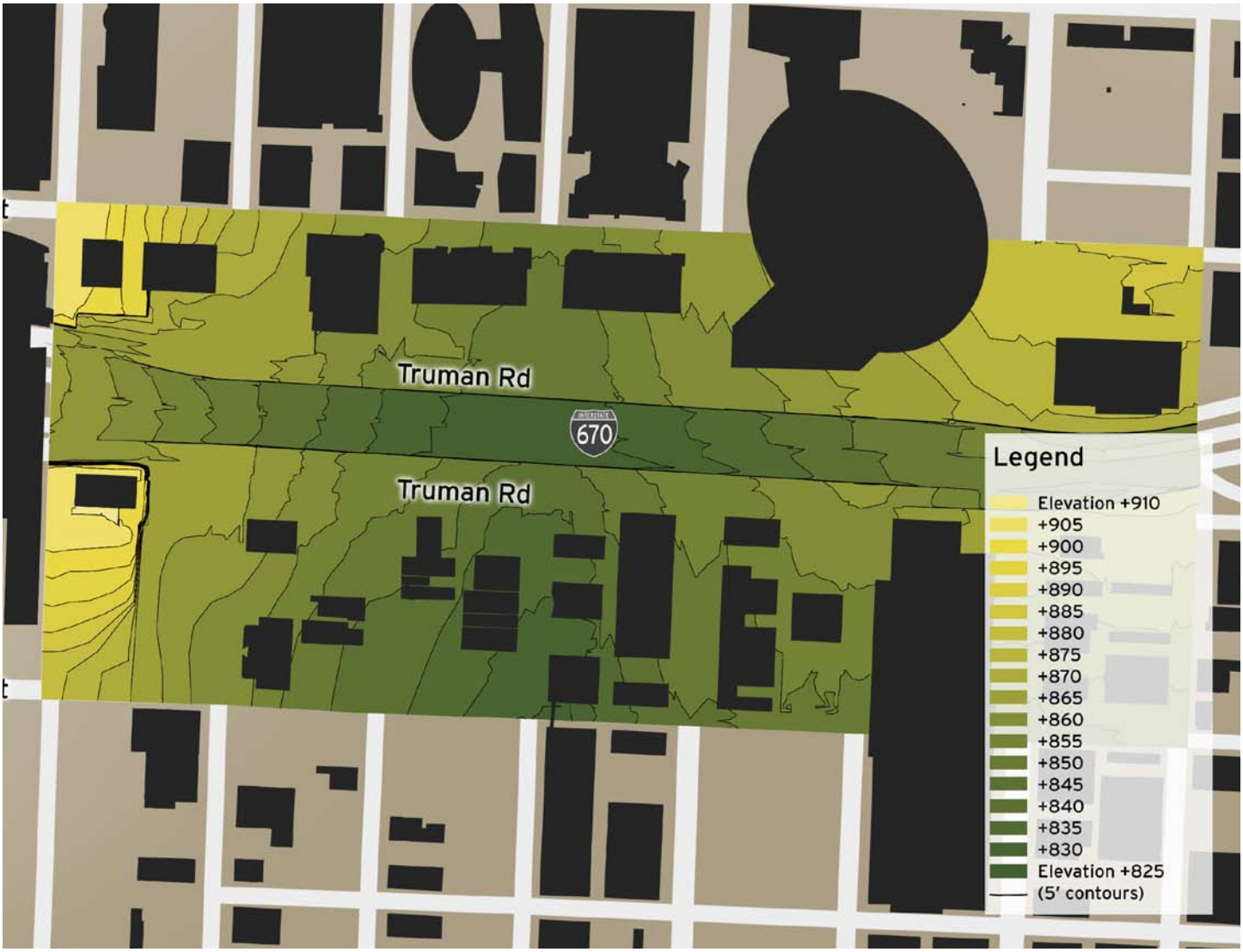


Proximity to Destinations

Topography

The study area has significant topographical features that need to be addressed as potential design solutions are studied. The overall low point of the I-670 corridor occurs below Walnut Street. There is also a noticeable grade change from eastbound Truman to westbound Truman, with westbound Truman Road higher in elevation. Options that include a roadway conversion with tunnel properties are recommended to meet a standard vertical clearance of 16'-6", although there are many existing locations in the corridor where the bridges have less than less than 16'-6" clearance. An at-grade pedestrian connection over the interstate is preferred, but if a decking solution is above the surrounding grade to accommodate the vertical clearance below, physical connections may be lost and foot traffic may be disrupted. Coordination with MoDOT and FHWA will be required to determine the minimum vertical clearance required.

	Wyandotte Street (Above Truman Rd)	Baltimore Avenue	Main Stree	Walnut Street	Grand Avenue	McGee Street	Oak Street
Approx. Elevation at WB Truman Road (ft)	890	863	849	841	850	861	870
Approx. Elevation at EB Truman Road (ft)	904	861	847	838	848	856	864



Topography

Shade Study

Shade patterns created from the built environment can not only show the development density but also hint at building heights with respect to each other. Greater density and taller buildings are located within the Downtown Loop. The Crossroads Arts District contains a fewer tall buildings, most ranging in height from one to three stories.

As possible development scenarios are tested over the course of this study, it will be important to look at additional shade studies to not only take into account development density but also the effect of shadows on the pedestrian environment. Shade could be a positive element in a mostly hardscape condition but at the same time microclimate and vegetation selection are affected. Shade and shadows can influence the way people interact within a space; for example, people seek shade when the temperature is warm and sunshine in colder temperatures. People may also perceive large shaded spaces as unsafe or uncomfortable.

Shade Study

WORKSHOP FEEDBACK

The Kick-off and Design Parameters Workshop was held at HNTB in Kansas City, Missouri, August 25-27, 2008. One of the main areas of focus was defining the design parameters with the City of Kansas City and the Missouri Department of Transportation (MoDOT). This component of the workshop allowed for a question-and-answer session to gain technical information appropriate for this project. Additionally, non-technical input was gathered to understand the city's vision for the project and the characteristics they would like to see incorporated into the concepts. The following information was taken from the workshop, and served as a starting point for research and analysis.

Roadway Design

- Improvement Timeframe: Within 10-15 years, the bridges on Baltimore, Main, Walnut, and Grand Streets will need to be replaced.

- I-670 Roadway Width: Recently completed traffic studies project the need for additional lane capacity throughout the extents of the project area. Current width at Baltimore Avenue is approximately 118' and approximately 115' wide at Oak Street, with four westbound and 3 eastbound lanes. Bridges on Oak and Locust Streets were designed to provide for an additional lane in each direction of this portion of the interstate. MoDOT has no intention to purchase the AT&T or KC Star properties, which are two buildings that currently limit the width of I-670. A roadway conversion to a tunnel would strengthen the need for a wider shoulder section (8-10' currently) to accommodate maintenance needs and breakdown refuge.

- Truman Road Width: Truman Road plays an important role within the street network; it supplements the freeways and accommodates traffic to and from the Power & Light District Modifying the current roadway configuration is not preferred. The City of Kansas City, Missouri (KCMO) owns Truman Road, and prefers three travel lanes in each direction with a preferred lane width of 12'. To examine this point, a traffic study was conducted and its findings are discussed on page 150 and in the appendix.

- Vertical Clearance: A minimum vertical clearance of 16'-6" should be anticipated as a requirement for structures built over the interstate system. Many bridge clearances in the study area are currently less than 16'-6" (see table on page 125). A vertical clearance less than 16'-6" is allowed by exemption from FHWA.

- Utilization of Air Rights over MoDOT Property: State law prohibits the utilization of state property for commercial ventures by profit making entities. Further review and possible exemptions from state law will need to be explored for solutions that anticipate the creation of a commercially viable space.

- Utility Crossings and Drainage: Options for a roadway conversion with tunnel properties will need to include access accommodations to manage below surface maintenance needs. This could come into play with any proposed decking solution. Walnut Street currently is the low spot for the study area. Relocation of utilities and drainage structures either outside the tunnel limits or to a location that promotes access for maintenance will need further investigation.

- Green Technology: The study area has the opportunity to put green technologies in place and serve as a catalyst for other developments. General examples of green technology include green roof design, reducing waste and pollution by changing patterns of production and consumption, new means of generating energy and energy efficiency, green building, and improving water and air quality.

- Other considerations:
  - Make accommodations for future transit opportunities, including light rail.

Truman Road Enhancements Guardrail Detail

- Aesthetic opportunities exist that would allow the study area to follow adopted Downtown streetscape standards.
- Potential solutions should make sure the corridor looks like it belongs within the Downtown Loop and Crossroads Districts, increase the amount of significant green space, and make the design an asset to the area.
- Land use issues to be considered from the Greater Downtown Area Plan include building heights; a light rail component within or near the study area; a convention hotel needed in the near future; and general urban design issues.

Tunnel Design

- Tunnel Designation: Structures constructed over I-670 will be built in accordance with current AASHTO bridge design specifications. Input from MoDOT, KCMO and emergency services first responders will determine if the structures will also have to be in compliance with FHWA Road Tunnel Design guidelines.

- FHWA Guidelines: Tunnel projects should be designed for long life (50-75 years) to maximize the investment return.

- Maintenance Walks: Need for extra tunnel width to accommodate maintenance walks can be eliminated with the use of closed circuit camera surveillance.

- Ventilation Installation: The conversion of the south loop (I-670) will be very similar to "cut and cover" tunnel installation. This method of tunnel construction requires additional width and depth requirements to accommodate ventilation equipment, fire suppression equipment, and other electrical or mechanical systems. The additional space requirements will need to be accounted for in the development of design alternatives. Outdoor air intake and exhaust locations should be reviewed for typical installation location and integration with the surrounding area.

- Roadway Signing: Application of the Manual on Uniform Traffic Control Devices (MUTCD) standards for highway signing will need to be further refined with MoDOT and FHWA for allowable variance within this section of I-670.

- Equipment Noise: Noise ratings, including the exhaust system equipment, should be reviewed to determine the impact on the surrounding area.

Funding

- MoDOT in conjunction with the Department of Economic Development (DED) can offer funding if the development supports long-term job creation and is proven to be a state-wide benefit.
- If the final solution includes open space, the park land could be leased for up to 50 years from the city's Parks & Recreation Department.
- Arterial street impact funds could be used as well; however, there is no district currently in the study area, one would need to be created.
- A public private partnership (PPP) could include funding for the project.

Looking East at the Main Street Bridge

PARAMETERS FROM PREVIOUS STUDIES

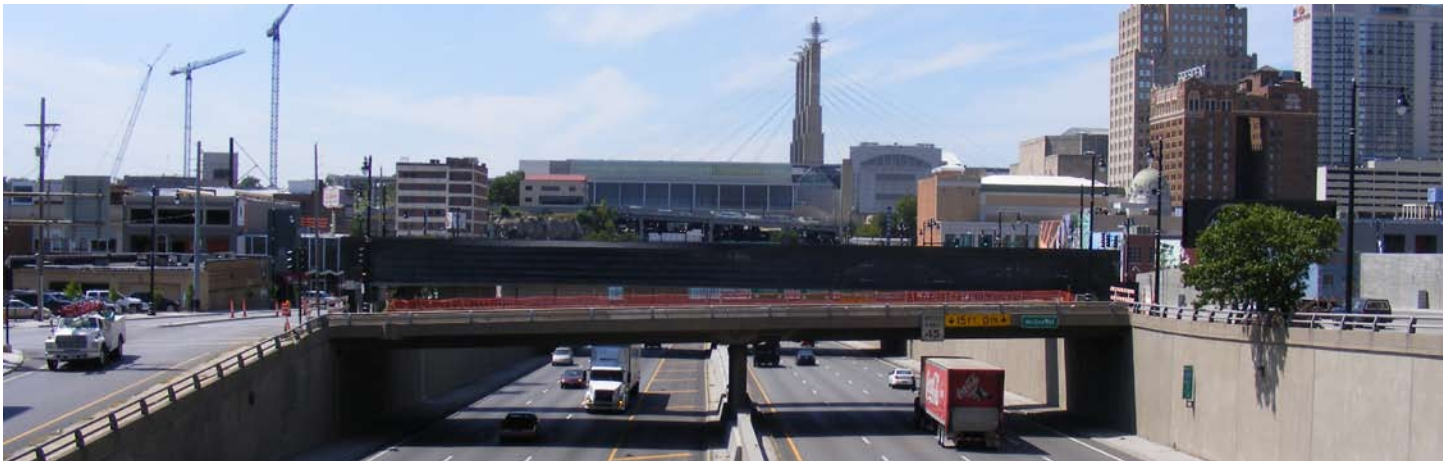
A brief description of previous studies adopted/ conducted by the City of Kansas City, Missouri is included in the Context section of this report. Below is a list of recommendations/guiding principles compiled from those studies that address design parameters in the study area.

Land Use

- Reinforce and embrace dense, mixed use development in the Central Business Corridor.
  - Concentrate the highest density and scale of development within the Downtown Loop and the Crown Center/Hospital Hill districts. Connect these districts with a dense transit corridor utilizing Transit Oriented Development generally along Grand Boulevard / Main Street.
- Connect neighborhoods and activity centers.
  - Link commercial/business, mixed use, and residential areas with various transportation modes and community amenities.
  - Improve the connectivity between neighborhoods and enhance the sense of arrival to the area.
- Promote sustainable development.
  - New development should follow the "sustainability" principles of equity, environment and economic development. Emphasize stormwater management approaches which enhance environmental stewardship. Sustainable materials should be encouraged within new development.
- Encourage urban development.
- Preserve the street grid.
- Avoid disruption of the dense urban street grid and maintain pedestrian scale blocks.
- Focus active retail uses in designated nodes and corridors.
- Promote a mixture of residential types and densities throughout the Downtown Loop.
- Address architecture and 'amenities' as art by cultivating an atmosphere that promotes creative yet contextual solutions that contribute to an overall eclectic and dynamic environment for buildings and urban design elements.
- Reinforce existing land uses in the Crossroads area.

Public Realm

- Investigate alternatives to the existing highway system including:
  - Capping I-670 south of the Downtown Loop. Consolidate Truman Road, develop buildings up to the edge of the roadway, and cap the highway with programmed greenspace.
- Downtown streets should accommodate pedestrians, cyclists, and automobiles. The level of design for all streets should be raised by providing streetscape and public space. Priority should be given to Corridor Streets for improvements.
  - Corridor Streets (Truman Road, Wyandotte, Main, Grand, Oak) form connections between neighborhoods. Their larger capacities often support denser development and greater, more diverse, transportation loads. Streetscape improvements on these Corridor Streets are among the highest priorities, beginning with streets that connect major activity centers.
  - Reinforce walking as the primary mode of transportation.
  - Implement road diets and improve bikeability.



Looking West at the Oak Street Bridge

- Invest in streetscape improvements and gateway features/signage at identified Gateways (a primary gateway is identified in the Greater Downtown Area Plan (GDAP) at Truman Road and Broadway; secondary gateways are identified in the GDAP at Truman Road at Main, Walnut, and Oak).
- Connect activity centers and public gathering spaces. Prioritize investments in streetscape projects that connect existing activity centers.
- Create vibrant urban community nodes that integrate neighborhood services with living, working, shopping, eating, cafes, and night life.
- Reduce the need for automobile usage in activity centers by targeting and incenting dense mixed use development within 1/4 mile of existing activity centers and transit stops.
- Concentrate development on focal points that tie together activity centers.
  - Connect the Kauffman Center for the Performing Arts with other downtown destinations.
- Use open space for urban forestry to improve air quality and mitigate heat island effect including areas around the highways.

Parks & Open Space

- Future park and public spaces should go beyond providing simple passive recreation and physical relief from the built environment. Rather, each space should help define the distinctive character of each district.
- Incorporate publicly visible art in new private development and public spaces.

Transportation

- Remove barriers and improve connections between neighborhoods and activity centers.
- Maintain opportunities for public transit connections from the CBD to the surrounding community.
- Traffic calming mechanisms should be considered in transportation design and planning to promote walkability.
- Accommodate future transit, including bus rapid transit and light rail.

Infrastructure

- Utilize public spaces to implement green solutions.
- Design streetscape improvements to include green solutions.
  - Showcase green solutions in City-owned facilities Downtown.
- Decrease impervious surface while increasing density.
  - Identify green solutions pilot/demonstration projects and areas.
  - Build upon the 10,000 Rain Gardens program to create more urban rain gardens downtown.
  - Promote and encourage building practices that effectively manage stormwater (reduced impervious surface, improved water quality, rainwater harvesting, trees/landscaping to improve air quality, etc.).

Housing

- Each neighborhood in the Greater Downtown Area has a strong identity. Investment and development should align with that identity to support authentic places.
- Promote density.

Streetscape

- Streetscape improvements should address the following objectives:
  - Reinforce Kansas City's civic character
  - Establish unique and recognizable districts
  - Promote sidewalk activity
  - Provide for safe pedestrian movement
  - Maintain a sense of history
  - Incorporate public art opportunities
  - Create a safe and attractive environment
  - Integrate public transit facilities
- To promote the walkability between districts, an effort should be made to minimize these divides, especially within the Downtown Loop.
- Encourage redevelopment that promotes walkability through planning and design practices.

INTRODUCTION

The Planning Team organized a multi-day charrette to explore ideas and design possibilities for the I-670 corridor through downtown Kansas City.

Prior to the charrette, the Planning Team completed the site analysis of I-670 and Truman Road in the surrounding context of the study area, goals and needs were discussed and developed, and the two site visits were conducted to explore similar projects and gain background information.

To kick off the design charrette, the design team met with the steering committee on Monday, November 17, 2008. On the second day (Tuesday, November 18), each designer produced multiple ideas through several rounds of brainstorming. For the public meeting that evening, the ideas were displayed and sorted into three categories: full deck, partial deck, and no deck. These categories offered unique solutions with varying levels of intensity regarding development over the interstate and within the project limits.

Technical information was presented on the third day (Wednesday, November 19) along with discussion about traffic patterns and road functionality. Issues such as tunnel designation characteristics, bridge structure types and utilities were discussed to educate the charrette participants of potential impacts to design solutions. The Planning Team then took a closer look at the previous concepts and developed them further.

Public Meeting, held at the Kansas City Design Center

On the fourth day of the charrette (Thursday, November 20), the concepts were grouped into four categories: civic gesture, connectivity, neighborhood and transportation. The design team then focused on concept refinement in preparation for the steering committee meeting that evening. The design team then met internally on the final day (Friday, November 21), to process the feedback from the charrette and organize and narrow down the concepts.

A public presentation of the final charrette concepts was held the following week (Monday, November 24) to showcase the ideas and receive feedback.

Information presented to the public was made available on the project's website.

Public Participants Reviewing Concepts

Participants / Attendees

HNTB Corporation
Wayne Feuerborn
Chris Handzel
Erica Young
Mitch Zeller
Scott Capstack
Alex Ogata
Walt Blesser
Jim Kinder
Richard Farnan

Civitas, Inc.
Dick Farley
Mark Johnson

Taliaferro & Browne
Meg Babani
Nikki Chestnut

Collins, Noteis Assoc.
Vicki Noteis

Burns & McDonnell
Mike Herleth
Ron Schikevitz

FP&C Consultants
Michael Koop

MoDOT
Linda Clark
Jeff Hardy
Allan Zafft

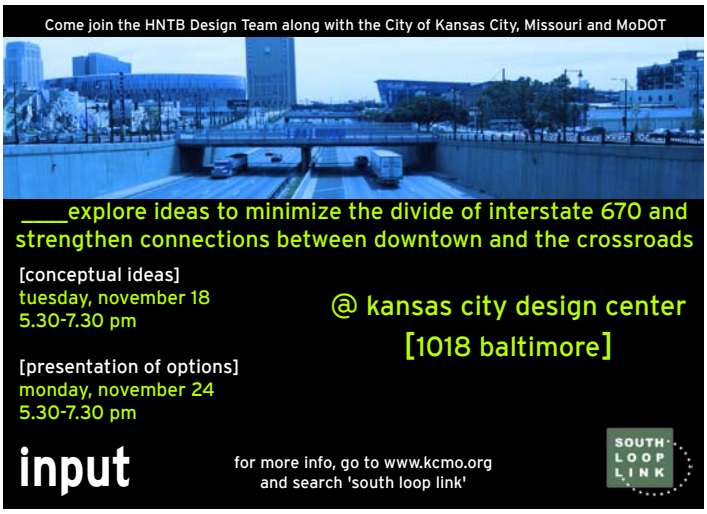
City of Kansas City, Missouri
Kellie Johnston
Bob Langenkamp

CHARRETTE PREPARATION / AWARENESS

The design charrette was held at the Kansas City Design Center in downtown Kansas City. This location, a space dedicated to an interdisciplinary studio for students in the field of architecture, landscape architecture and planning offered a gallery-style venue with an open storefront that maximized awareness of the project to passersby.

Several types of public advertisement were created for the charrette. A postcard invitation was widely distributed among several groups and locations, including the steering committee, stakeholders, neighborhood associations, City Hall, Kansas City Public Library and coffee shops in and around downtown Kansas City. In addition, a digital version of the postcard was 'e-blasted' to list serves of several organizations including the Downtown Council, Greater Downtown Area Plan Team, Kansas City Design Center and area neighborhood associations.

Front of Postcard Invitation



Back of Postcard Invitation

Members of the team also attended meetings of downtown organizations to promote the charrette and HNTB utilized their booth at the Downtown Council Annual Luncheon (held on Friday, December 5th at the Sprint Center) to display the results and bring additional awareness to the project.

MONDAY, NOVEMBER 17	*Steering Committee Charrette Kick-Off Meeting
TUESDAY, NOVEMBER 18	- Generate Ideas / Brainstorming - Review Ideas with Design Team *Public Meeting
WEDNESDAY, NOVEMBER 19	- Technical Information Presentation *Progress Review Lunch - Steering Committee, City of Kansas City, Missouri - Concept Refinement
THURSDAY, NOVEMBER 20	- Concept Organization - Final Concept Design *Steering Committee Meeting - Final Charrette Concept Review
FRIDAY, NOVEMBER 21	- Design Team Discussion - Next Steps
MONDAY, NOVEMBER 24	*Public Meeting - Final Charrette Concept Review

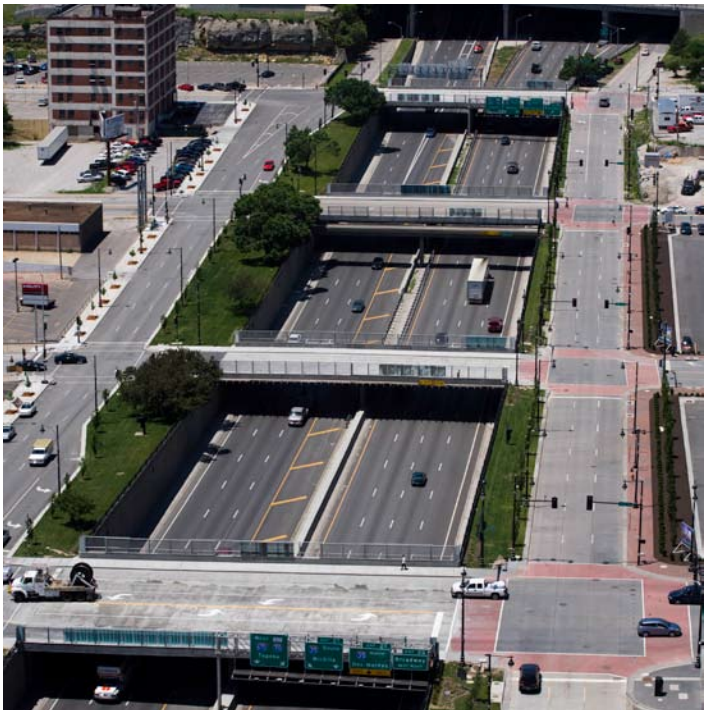
Charrette Schedule

Feedback obtained from meetings was documented in the form of meeting notes.

BACKGROUND INFORMATION

Project Criteria

In advance of the design charrette, the Planning Team created a series of diagrams illustrating project criteria. The criteria are a series of topics derived from the urban design analysis as an initial step in formulating a concept. Each was explored as a potential goal or opportunity to be addressed by the concepts developed at the charrette. The project criteria topics are listed to the right.



Project Criteria Topics

Pedestrian + Bike Connections

Pedestrian Experience

Vehicular Connections

Transit Connections

Green Space Connections

Neighborhood Connections

Real Estate Opportunities

I-670 and Truman Road as a Gateway

District Unification

District Synergy

Driving Experience

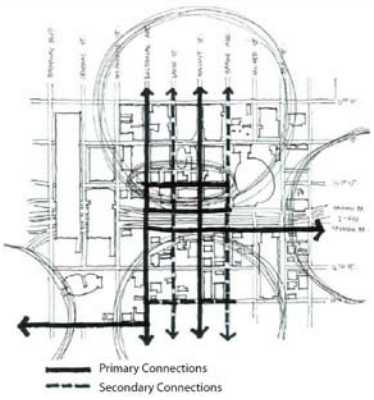
Sustainability

New Technology

Environmental Mitigation

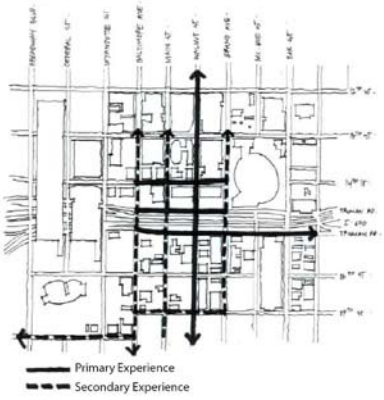
Traffic Distribution

PEDESTRIAN/BIKE/NEIGHBORHOOD CONNECTIONS



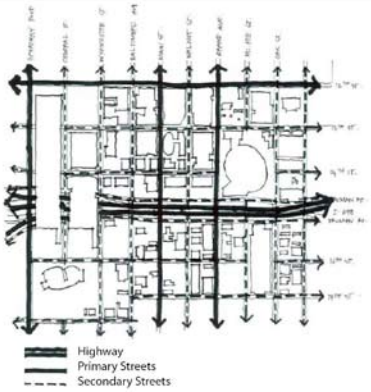
- Improve Pedestrian and Bike Connections Across and Along Truman Road and I-670
- Connect Eastside, Westside, Crossroads Community and Downtown Neighborhoods

PEDESTRIAN EXPERIENCE



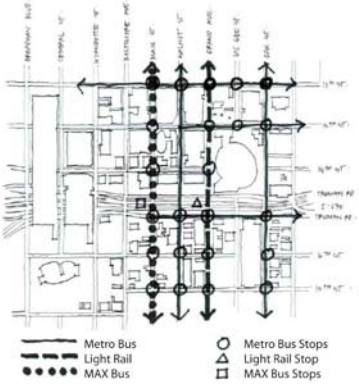
Enhance the Pedestrian Environment Throughout the Corridor

VEHICULAR CONNECTIONS



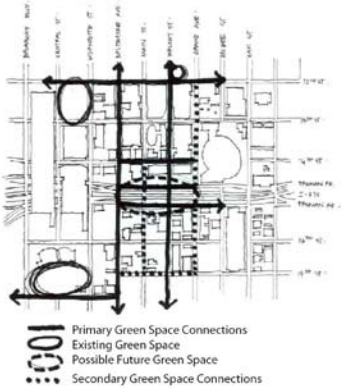
Strengthen Vehicular Connections to North, South, East and West

TRANSIT CONNECTIONS



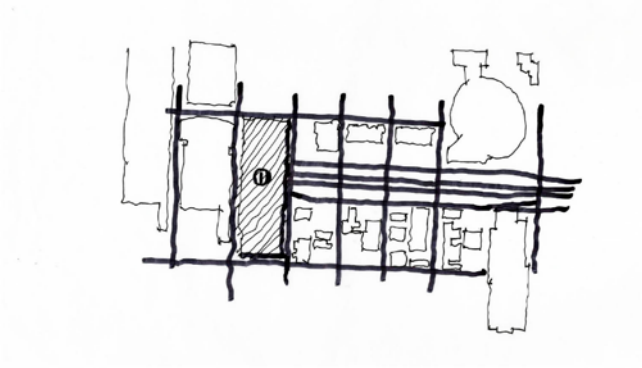
Potential Transit on Truman Road and I-670

GREEN SPACE CONNECTIONS



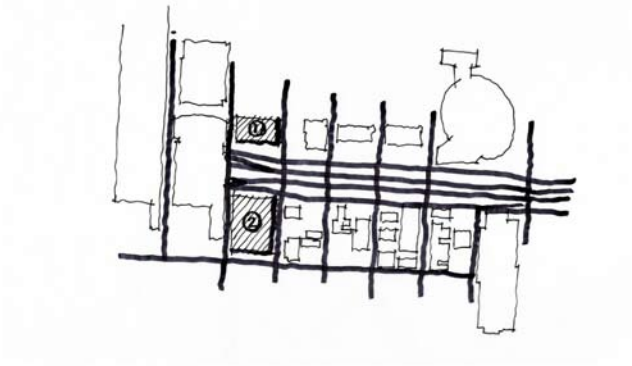
Capitalized on "Found' Real Estate to Create Additional Green Space

REAL ESTATE OPPORTUNITIES



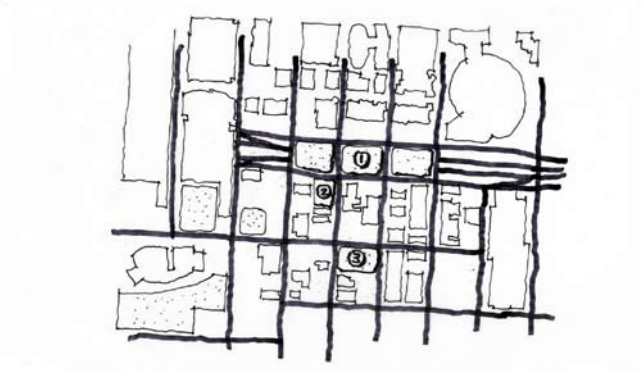
Convention Center Expansion

REAL ESTATE OPPORTUNITIES



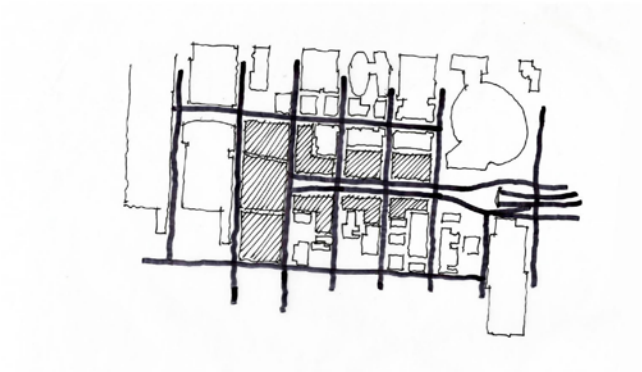
Potential Convention Center Hotel Sites

REAL ESTATE OPPORTUNITIES



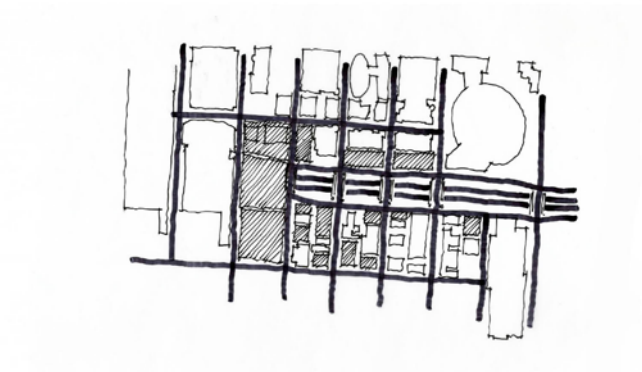
Green Space Locations
1. Over I-670
2. Adjacent to I-670
3. Within surrounding neighborhood

REAL ESTATE OPPORTUNITIES



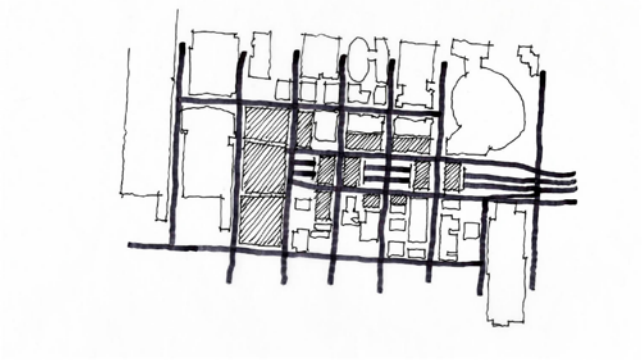
Development Parcels - Boulevard Scenario

REAL ESTATE OPPORTUNITIES



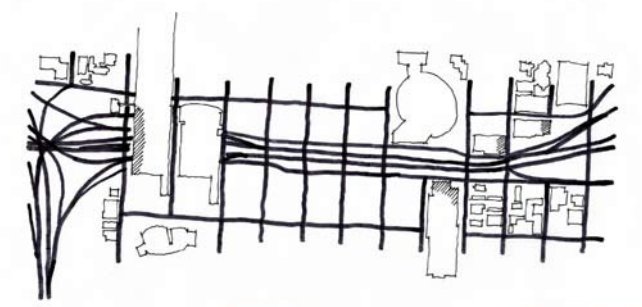
Development Parcels - Enhanced Bridges Scenario

REAL ESTATE OPPORTUNITIES



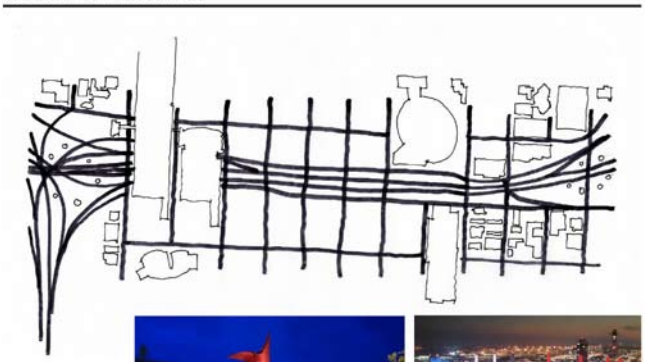
Development Parcels - Building Cap Scenario

GATEWAY OPPORTUNITIES



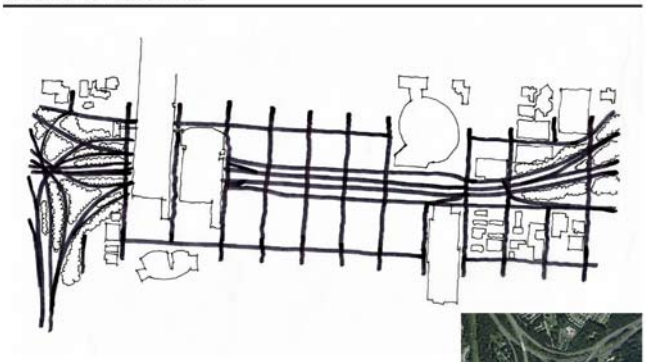
Architecture as Gateways

GATEWAY OPPORTUNITIES



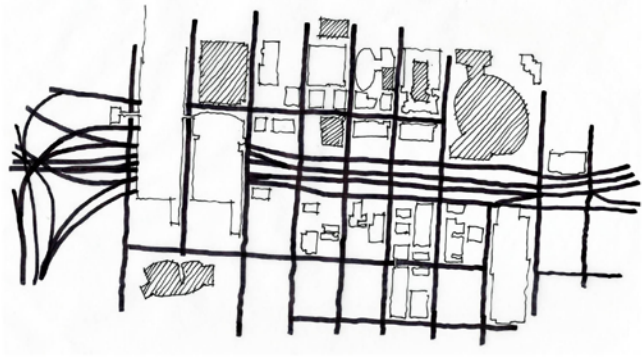
Art as Gateways

GATEWAY OPPORTUNITIES



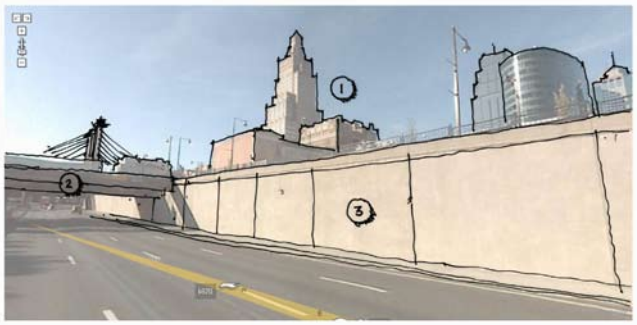
Landscape as Gateways - Urban Forest

DISTRICT UNIFICATION



Unify Entertainment Venues Along the Corridor

DRIVING EXPERIENCE

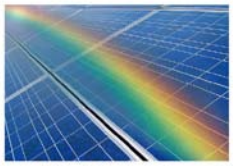


Experience Kansas City from I-670
1. Skyline/Landmarks
2. Bridge Treatments
3. Wall Aesthetics

SUSTAINABILITY

Site
Rain Gardens
Street Trees
Vegetated Swales
Pocketed Wetlands
Infiltration Planters
Vegetated Median Strips
Permeable Pavements

Building/Development
Green Roofs
Rain Barrels and Cisterns
Alternative Energy Systems

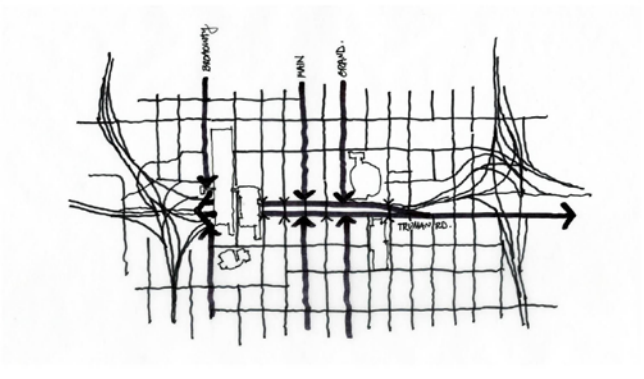



Integrate Sustainable Development Practices and Systems

ENVIRONMENTAL MITIGATION

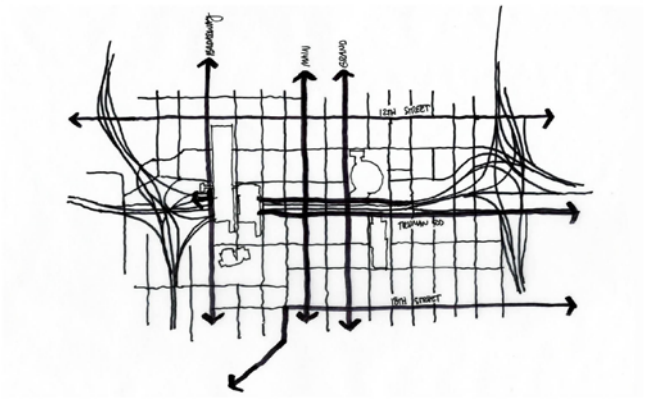

Reduce Noise and Air Pollution from I-670

TRAFFIC DISTRIBUTION



Concentrate Vehicular Traffic on Truman Road

TRAFFIC DISTRIBUTION



Distribute Vehicular Traffic from Truman Road

EARLY IDEAS

The first step of the charrette centered on the generation of "big move" ideas. These macro-level diagrams explored design strategies with little regard for constraints. Multiple ideas were developed for discussion; the most compelling were refined further.

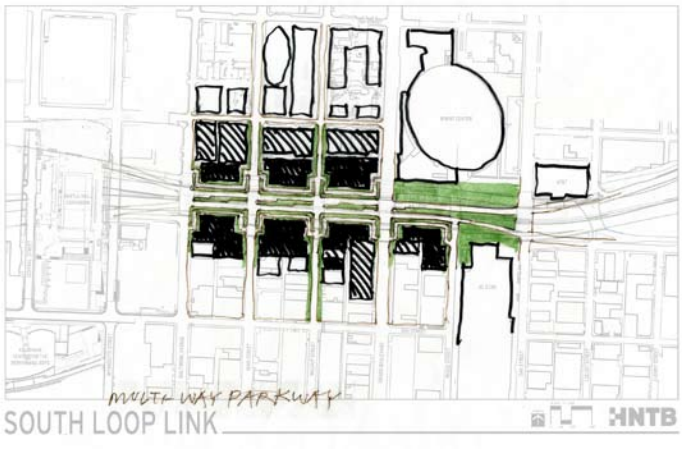
As the alternatives were refined, they were sorted into three logical categories that delineate the physical framework for a potential design solution (page 88):

- Full Deck - completely decking over I-670 through the study area
- Partial Deck - decking over a portion of I-670 through the study area
- No Deck - no deck over I-670

Planning Team answering questions at the Public Meeting

Public Meeting, held at the Kansas City Design Center

Planning Team reviewing ideas

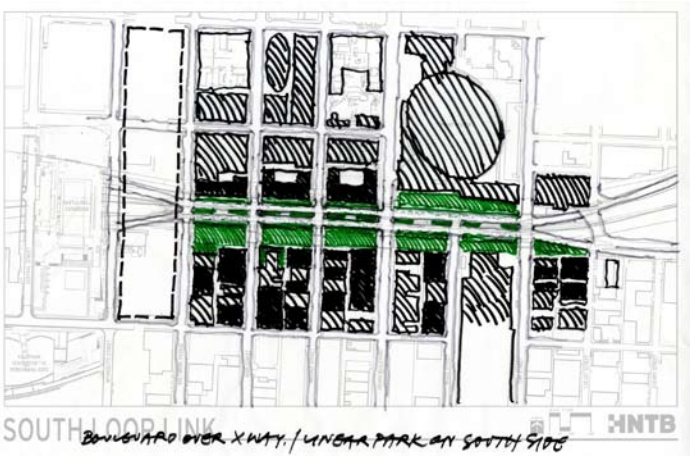


Early Concept Sketch: Multi-Way Parkway

Early Concept Sketch: Continuous Boulevard

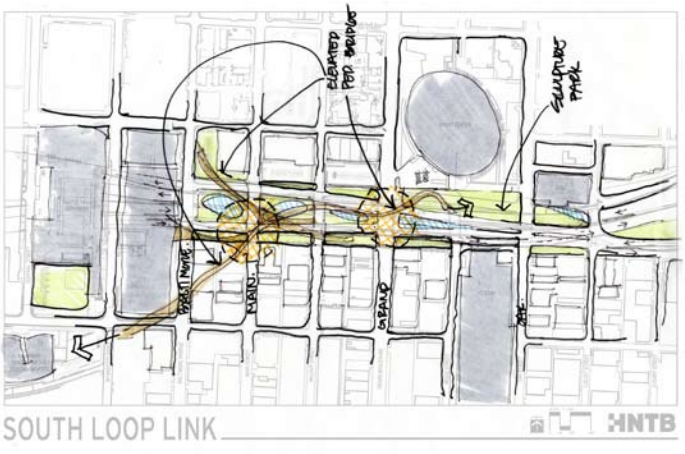
Early Concept Sketch: Full Deck Park

Early Concept Sketch: Full Deck Park



Early Concept Sketch: Boulevard/Linear Park

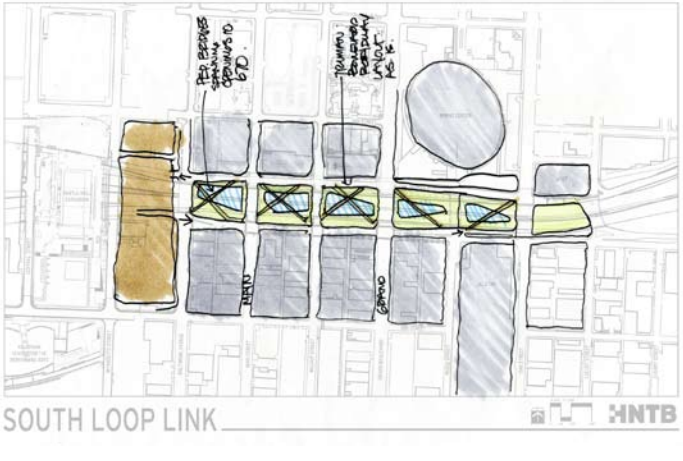
Early Concept Sketch: Disconnected Boulevard



Early Concept Sketch: Partial Deck Sculpture Park

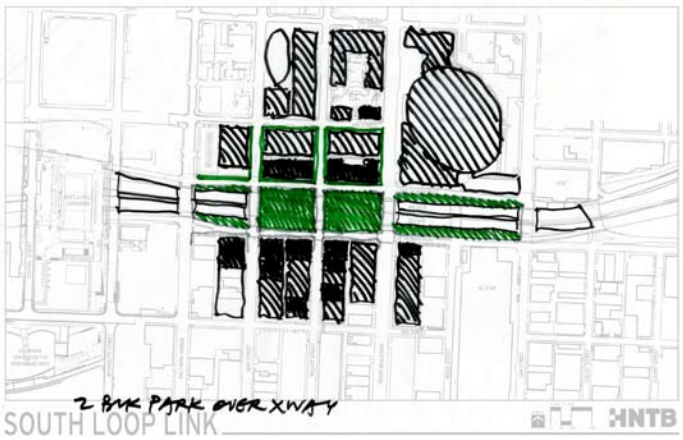
Early Concept Sketch: Partial Deck Development

Early Concept Sketch: Full Deck linking Destinations

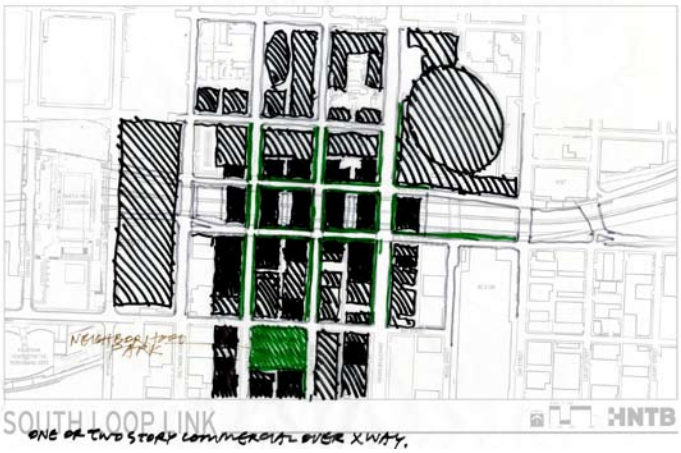


Early Concept Sketch: Partial Deck Park

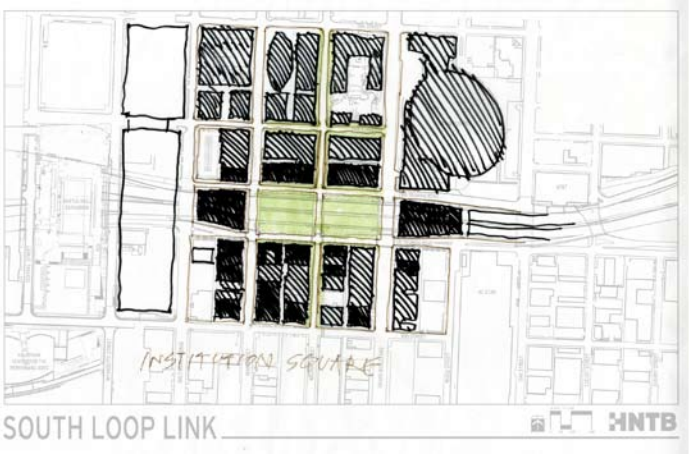
Early Concept Sketch: Continuous Boulevard



Early Concept Sketch: Partial Deck Park

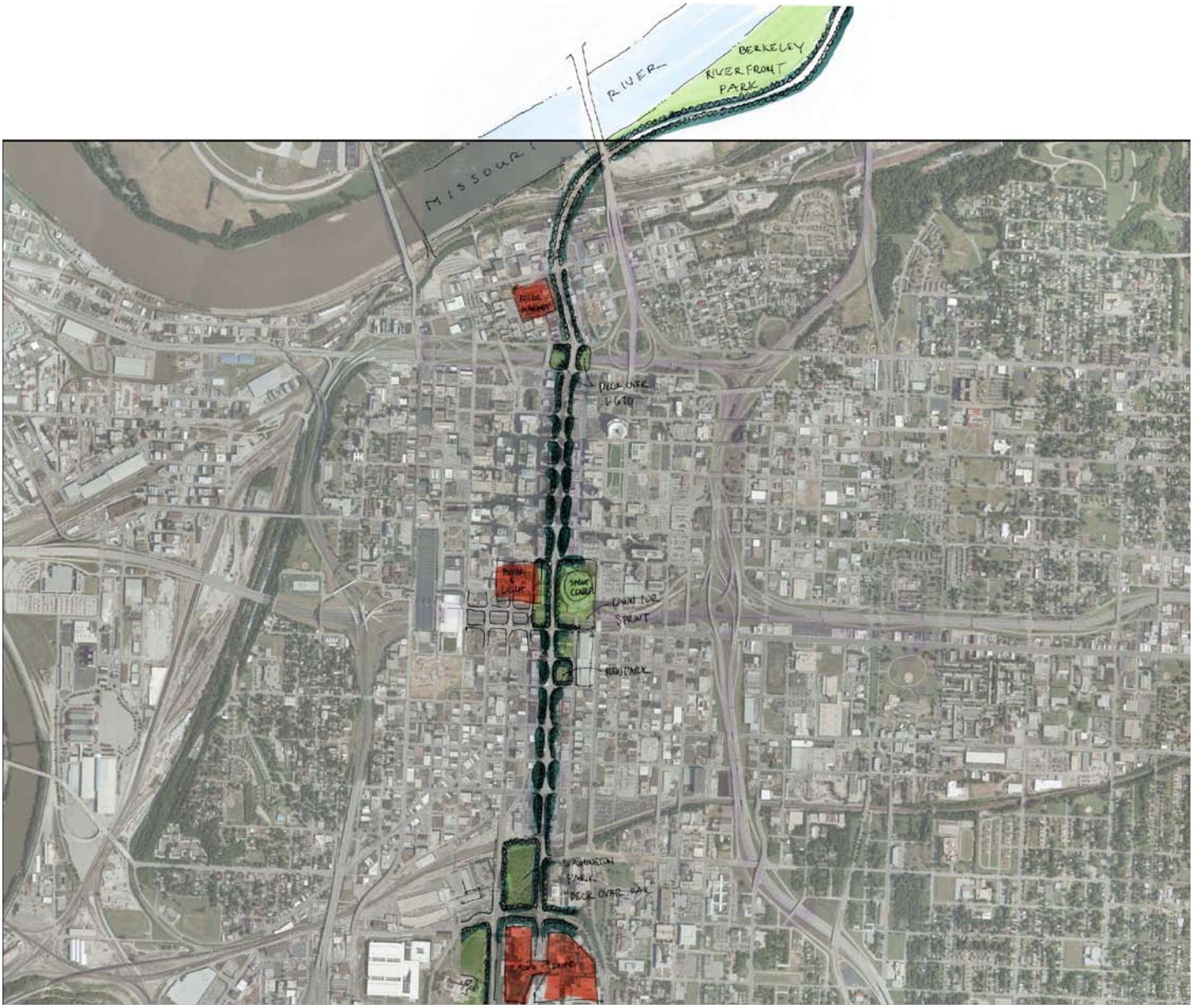


Early Concept Sketch: Partial Deck Development



Early Concept Sketch: Full Deck Park/Development

Early Concept Sketch: Truman Road Cultural Corridor



Early Concept Sketch: Grand Boulevard Parks Connection

FULL DECK SOLUTIONS


SPRINT CENTER
BARTLE HALL EXPANSION
KC STAR
KAUFFMAN CENTER FOR THE PERFORMING ARTS
WYANDOTTE STREET
BALTIMORE AVENUE
MAIN STREET
WALNUT STREET
GRAND BOULEVARD
OAK STREET
LOCUST STREET
CHERRY STREET
15TH STREET

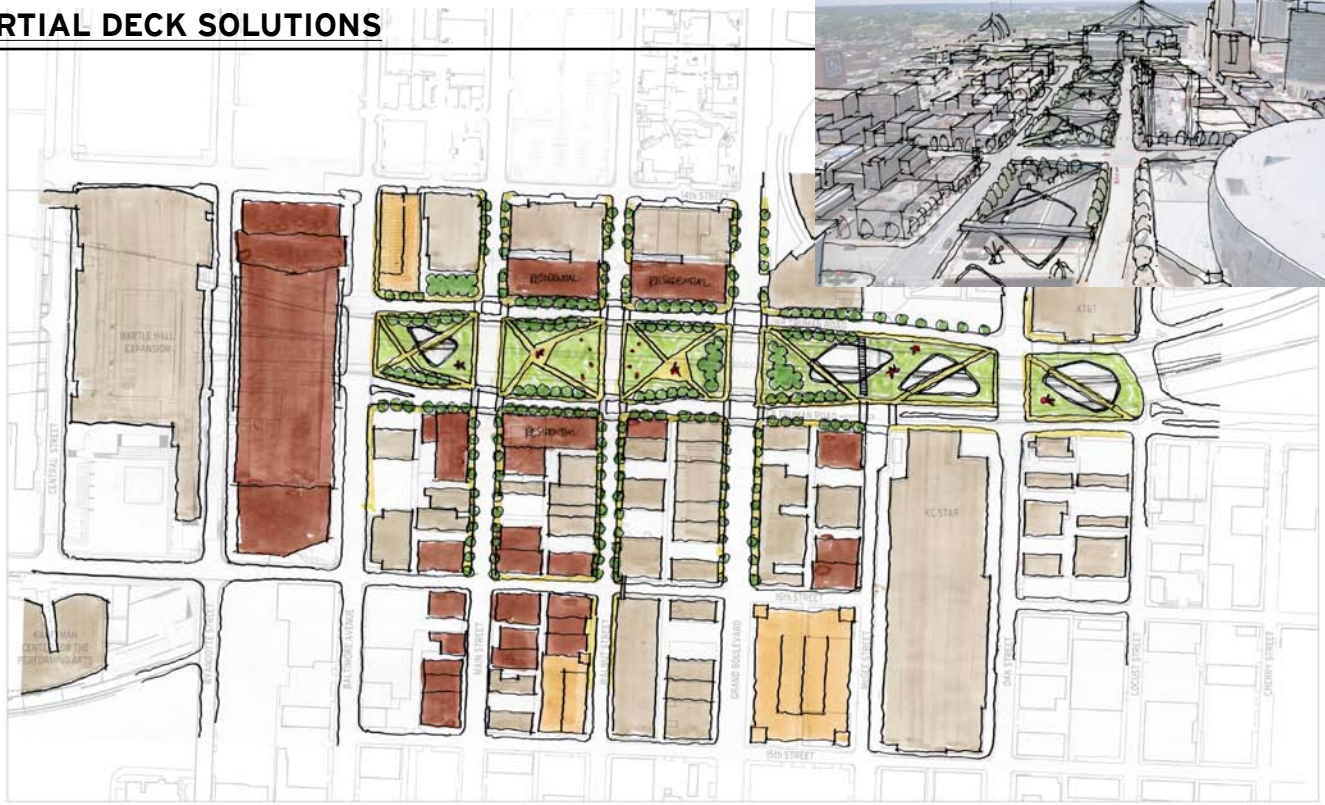

SPRINT CENTER
BARTLE HALL EXPANSION
KC STAR
KAUFFMAN CENTER FOR THE PERFORMING ARTS
WYANDOTTE STREET
BALTIMORE AVENUE
MAIN STREET
WALNUT STREET
GRAND BOULEVARD
OAK STREET
LOCUST STREET
CHERRY STREET
15TH STREET


SPRINT CENTER
14th STREET
AT&T
BARTLE HALL EXPANSION
EB TRUMAN ROAD
WB TRUMAN ROAD
KC STAR
16th STREET
15th STREET
CENTRAL STREET
WYANDOTTE STREET
BALTIMORE AVENUE
MAIN STREET
WALNUT STREET
GRAND BOULEVARD
MCGEE STREET
OAK STREET
LOCUST STREET
CHERRY STREET


14th STREET
AT&T
BARTLE HALL EXPANSION
CENTRAL STREET
WYANDOTTE STREET
BALTIMORE AVENUE
MAIN STREET
WALNUT STREET
GRAND BOULEVARD
Deck Level


14th STREET
WB TRUMAN ROAD
EB TRUMAN ROAD

PARTIAL DECK SOLUTIONS




HOTEL
CONVENTION EXPANSION
SPRINT CENTER
AT&T
KC STAR
BARTLE HALL EXPANSION
CENTRAL STREET
KAUFFMAN CENTER FOR THE PERFORMING ARTS
BALTIMORE AVENUE
MAIN STREET
WALNUT STREET
GRAND BOULEVARD
OAK STREET
LOCUST STREET
CHERRY STREET
15TH STREET


P
AT&T
KC STAR
BARTLE HALL EXPANSION
CENTRAL STREET
KAUFFMAN CENTER FOR THE PERFORMING ARTS
BALTIMORE AVENUE
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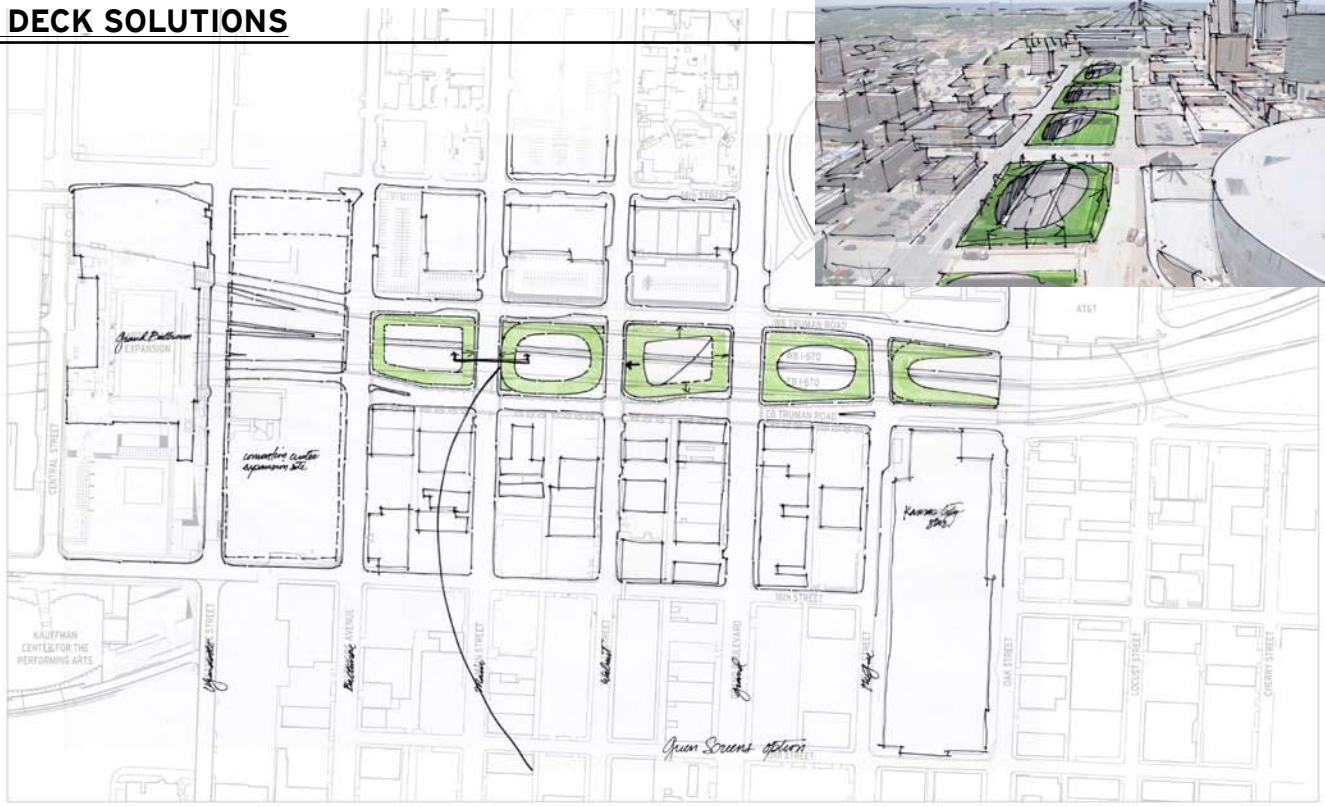
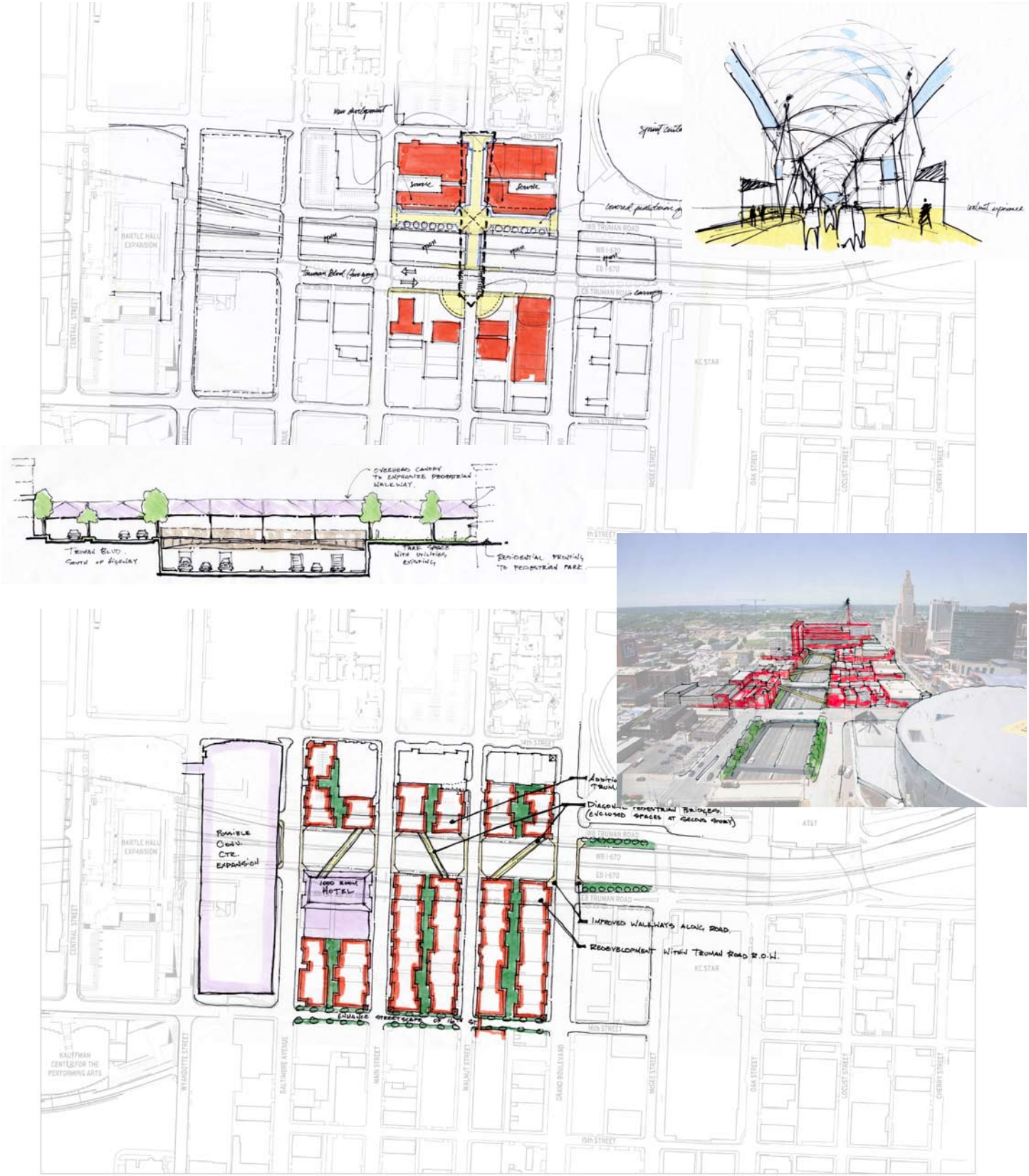
CHERRY STREET
15TH STREET

NO DECK SOLUTIONS




OVERHEAD CANOPY TO EMPHASIZE PEDESTRIAN WALKWAY.
TRUMAN BLVD. SOUTH OF HIGHWAY
PARK SPACE WITH UTILITIES EXISTING
RESIDENTIAL FRONTING TO PEDESTRIAN PARK
POSSIBLE CONV. CTR. EXPANSION
1000 ROOM HOTEL
IMPROVED WALKWAYS ALONG ROAD.
REDEVELOPMENT WITHIN TRUMAN ROAD R.O.W.
BARTLE HALL EXPANSION
CENTRAL STREET
MAIN STREET
WALNUT STREET
OAK STREET
LOCUST STREET
GRAND BOULEVARD
BALTIMORE AVENUE
KC STAR
AT&T
KAUFFMAN CENTER FOR THE PERFORMING ARTS

FINAL CONCEPTS

Steering Committee Meeting, held at the Kansas City Design Center

While evaluating the early ideas, it was discussed that many of the "no deck" or "partial deck" concepts could be the first phases of a "full deck" concept. With this in mind, the alternatives were filtered again, only separated into a design strategy, giving an overall focus of the solution. The four design strategies were:

- Transportation - The Transportation concepts focus on the road system and transit opportunities through the corridor.
- Connections - The Connections concepts focus on connecting the Downtown Loop with the Crossroads District at the pedestrian level.
- Civic Gesture - The Civic Gesture concepts are big ideas for the corridor on a grand scale that directly relate to the regional draws to Downtown.
- Neighborhood - The Neighborhood concepts tie the Downtown Loop to the Crossroads District on a smaller, neighborhood scale.

Also identified as a differentiating factor is the alignment of Truman Road. The Planning Team examined three options for the Truman Road alignment: the existing split alignment flanking I-670, a stacked configuration over the freeway, and a combined solution to the south of I-670. The following concepts illustrate solutions utilizing each of these strategies.

Truman Road - Existing Alignment

Truman Road - Stacked over I-670

Truman Road - Combined South of I-670

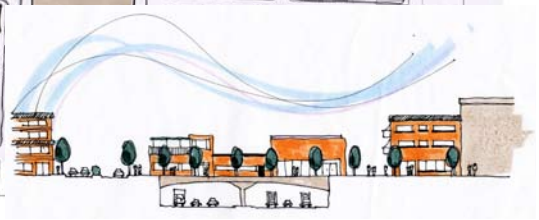
TRANSPORTATION

Kennedy Plaza - Providence, RI

Commonwealth Avenue - Boston, MA

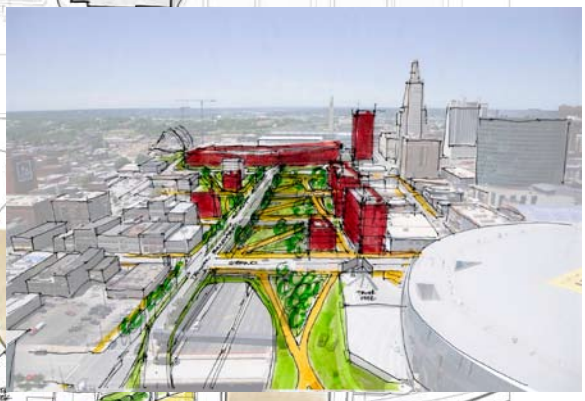
Commonwealth Avenue - Boston, MA

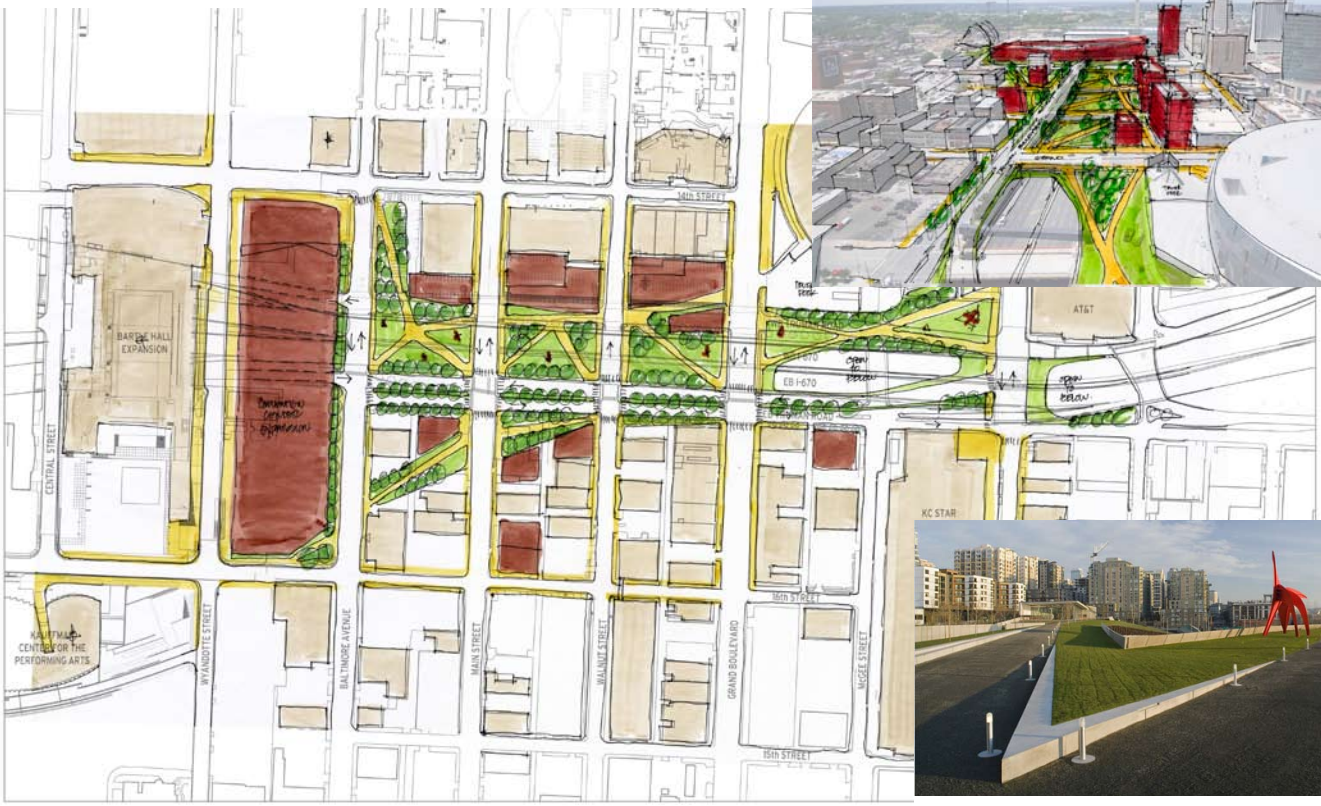
CONNECTIONS

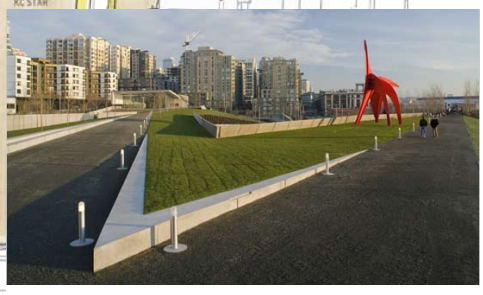


CIVIC GESTURE

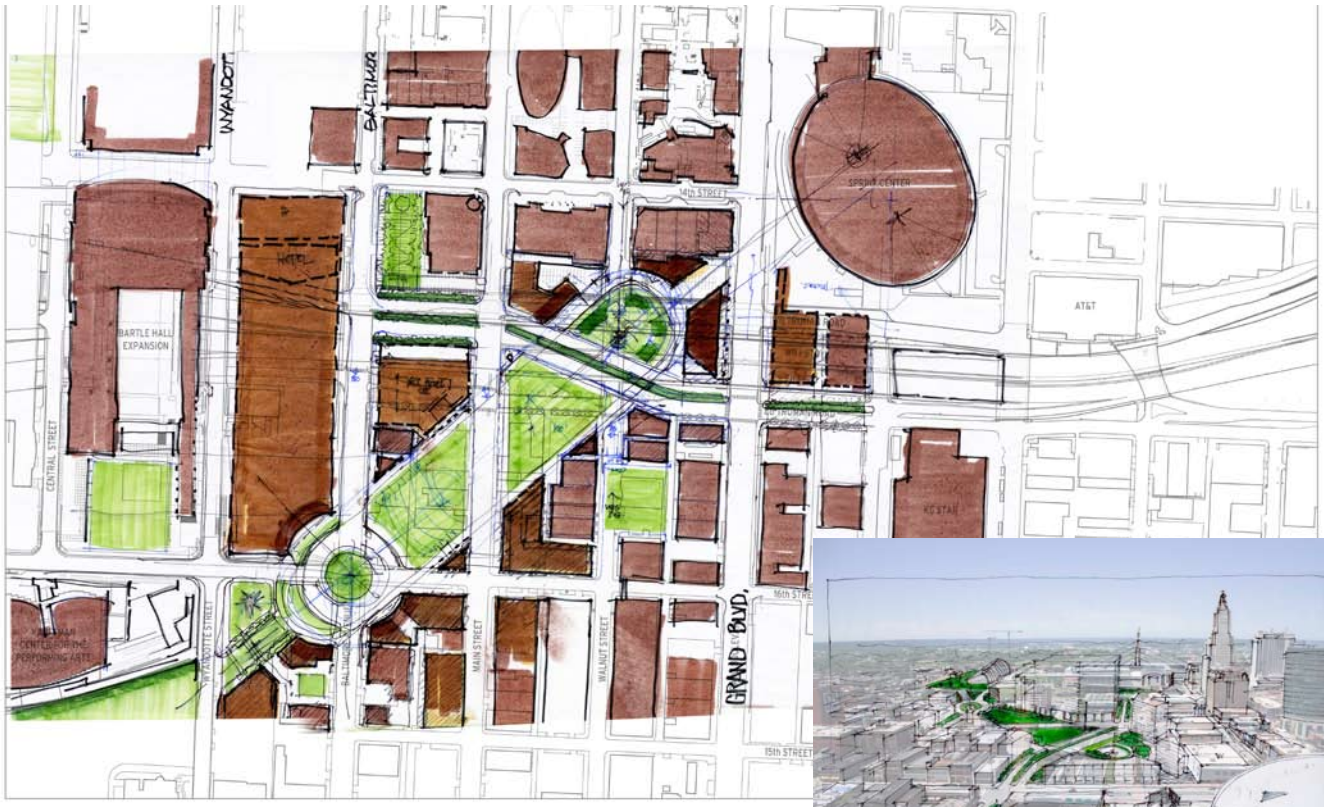
Millennium Park - Chicago, Il







Olympic Sculpture Park - Seattle, WA


WYANDOTT
BALTIMORE
14th STREET
SPRINT CENTER
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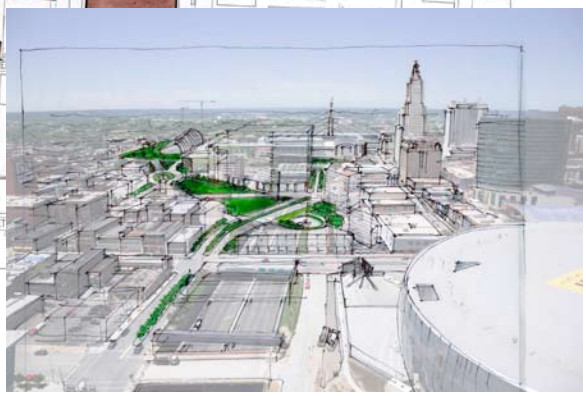
GRAND BLVD.
15th STREET



NEIGHBORHOOD

I-670 Cap - Columbus, OH

Throughout the charrette process the Planning Team met with the steering committee, city staff, and the public to receive feedback on the design alternatives. This input guided the formation of the concepts that would be further evaluated in the design process. Below is a summary of the comments received by the aforementioned groups.

Steering Committee

- Blend the neighborhoods but maintain their identities.
- No preference of Truman Road Alignment.
- Need green space (park), pedestrian and bicycle connections.
- Green space should only be part of the solution, with a mix of development.
- Truman Road should be more of an urban street (Michigan Avenue, Park Avenue).
- Improve connections to the east.
- Interested in development facing Truman where possible.
- Examine necessary width for Truman Road, and if is narrowed, how it would impact adjacent streets.
- Open to thinking of the corridor in a new and different way.
- Walnut identified as a primary pedestrian street.
- Interested in strengthening Truman Road to Paseo as a route to access I-70 east-bound as opposed to the McGee on ramp.

City Staff (City Planning and Development, Public Works, Parks and Recreation)

- Study regional traffic impacts if solutions alter Truman Road's current alignment or capacity.
- Dog Parks are highly desired/needed within the Downtown area.
- Open space could be in competition with the Power & Light District, if open space is part of the proposed concept, design to ensure it is complementary.
- There is a lack of green space for residential users near the South Loop.
- Proposed parks should have programmed elements.
- Examine appropriate park sizes to ensure effective space.

Public

- Walnut is a primary pedestrian street.
- Blend the two neighborhoods.
- Pedestrian connectivity, air pollution, and noise pollution are the most important issues in the corridor.
- Decking over the interstate to address pedestrian connectivity, air pollution, and noise pollution, is the preferred solution; also liked a combination of strategies (including partial decking and widening sidewalks on the bridges).
- Preferred the existing Truman Road split alignment and the combined alignment to the south of I-670.
- Split on the preference of a Civic Gesture or Neighborhood as a defining strategy.
- Liked the idea of a park over I-670 and in the Crossroads neighborhood, but were divided if a new park is needed in the Downtown Loop.
- Additional transit accommodations should be part of the Truman Road Corridor.
- Truman Road should be narrowed if possible.
- Accommodate bicycles.
- Program any green open space or parks to make it successful.

Conclusion

Throughout the charrette process the Steering Committee, public, city staff, and stakeholders reviewed and commented on various concepts. The Planning Team then filtered the numerous design concepts through the feedback and utilized the feedback to further develop and refine the concepts. At the conclusion of the charrette, the Planning Team examined the technical aspects of the project to the magnitude illustrated in the design concepts and evaluated the engineering impacts of the alternatives.

Goals

After reviewing adverse conditions of the corridor, the Steering Committee, public participants, and the Planning Team established goals for the project that would replace the four bridges. The goals all focused around creating an open, accessible, connected urban

space in the heart of the Downtown Loop and the Crossroads to incent additional development and investment. The goals (in no particular order) for the project are to:

- Maximize the City's investment in the Power & Light District, Sprint Arena, Convention Center and the Performing Arts Center.
- Blend the Downtown Loop and Crossroads neighborhoods but maintain their respective identities.
- Increase open space to serve the needs of the Downtown Loop as well as the Crossroads district. Open space should include pedestrian and bicycle connections.
- Redesign Truman Road to include more urban characteristics like Michigan Avenue in Chicago or Park Avenue in New York while accommodating long term capacity needs.
- Strengthen the connection to the east.
- Emphasize the pedestrian qualities of Walnut Street.
- Provide opportunities to increase development along Truman Road.
- Mitigate the environmental impacts of the 1-670 corridor through downtown. This includes addressing pedestrian connectivity, air pollution and noise pollution.

EVALUATION SUMMARY

The Planning Team conducted a technical investigation to study the impacts of design alternatives to the existing infrastructure of the corridor, with additional focus placed on requirements for additional improvements to accommodate each solution.

With regard to utilities, it was determined that those beneath westbound Truman Road must remain due to their system connections. However, those beneath eastbound Truman Road have more flexibility and can be relocated if necessary. Additional impacts are the Main Street and McGee Street utility bridges that span I-670, which may need relocation.

From a structural standpoint, it was determined that any decking over I-670 can be designed with a minimized structure depth to be level with the grade of Truman Road. This is desirable to maintain an inviting and accessible environment for the deck improvements. Because of the minimized structure depth, additional loads such as increased soil depth for landscaping will require additional steel support girders at an additional cost.

Constructing a building spanning the interstate incurs a significant cost, as much as four times the cost of traditional on-grade development. Finally, it was determined that the bridge replacements of Baltimore, Main, Walnut and Grand will cost approximately $10 million, with additional cost for landscaping, decorative railings, or other aesthetic enhancements.

Since many of the alternatives consider the creation of a tunnel, the team investigated its functional requirements. For instance, it is recommended that the tunnel have a solid median wall separation between the westbound and eastbound lanes. This separation allows for the most efficient design of lighting ventilation, and fire containment systems. The preferred method of ventilation is longitudinal ventilation, incorporating ductless jet fans to move exhaust to the ends of the tunnel. A tunnel is a successful method of mitigating the noise and air effects of I-670, but a concept utilizing noise walls or a similar approach can be effective for partial sound mitigation.

Truman Road is an important thoroughfare for the South Loop. Therefore, the Planning Team investigated the traffic impacts of Truman to the corridor. Traffic counts were conducted at strategic locations throughout the corridor on an evening with major events at the Sprint Center, Midland Theater and a meeting at the Bartle Ballroom. The counts represented the evening peak hour traffic with event traffic, the highest concentration of vehicular circulation on Truman Road. The data was analyzed, incorporating pedestrian traffic, and a few conclusions were reached. First, if a design alternative proposed closing the McGee Street on-ramp to eastbound I-670, alternative interstate access routes need to be enhanced. Also, Truman Road can function as a combined arterial and can be reduced to two through lanes as long as the intersections can maintain an acceptable level of service. Finally, the existing north-south stacking distance between westbound and eastbound Truman (+/-200') must be retained for the cross streets (the existing alignment) or the two roadways can be joined to form a or a combined road alignment.

The following is a more detailed description of the technical evaluation. For this analysis the Planning Team studied the impacts of three alternatives. Although the final charrette concepts centered around a "full deck" strategy, the team studied a range of physical forms to determine the engineering impacts, including: no deck over the interstate, a partial deck, and a full deck over the length of the corridor. Also taken into consideration are the impacts of a possible expansion of the Convention Center between Wyandotte and Baltimore over the interstate. Although this potential expansion is not part of this study, it would have impacts to proposed solutions and therefore is considered in this analysis. It is anticipated that any design concept would fall into the category of one of the alternatives, so each was studied to determine the extent of the required improvements from an engineering standpoint.

EVALUATION ALTERNATIVES

Alternative 1 - No Deck (Mitigation Measures):

This alternative makes minimal improvements to the corridor, primarily improved pedestrian accommodations and bridge replacement, in an attempt to mitigate the effects of I-670 to the surrounding properties and the pedestrian environment. Improvements include wider sidewalks on the replaced bridges, additional streetscape amenities throughout the corridor and possible mitigation strategies to deflect or baffle the noise and air quality nuisances caused by the freeway below. Decking over the interstate is not included as part of the solution in this alternative.

Alternative 2 - Partial Deck:

This alternative builds upon the minimal mitigation measures from the first alternative by introducing a partial deck covering approximately two blocks over I-670 (for purposes of the evaluation, the partial deck was proposed to span from Main to Grand). Also included for study is a building spanning the interstate at one end of the partial deck. This enhanced solution addresses the nuisances of the interstate and enhances the pedestrian environment and adjacent parcel valuations at a higher level than the first alternative.

Alternative 3 - Full Deck:

This alternative includes many of the improvements proposed in the previous options with the addition of a deck over the interstate throughout the entirety of the corridor to reduce the impacts of the freeway below. Located on the deck is park space and a possible realignment of Truman Road. These improvements allow for enhancement of the pedestrian environment through the addition of park land, masking the interstate system along the corridor, streetscape amenities, and a modification of the traffic flow through the corridor. The improvements also add value to the adjacent parcels.

UTILITIES

The utility study area is bound on the north by 14th Street, on the south by 16th Street, on the west by Wyandotte Street, and on the east by Oak Street. Utility record information for facilities that are located within the study area was obtained from as-built drawings and existing survey information. The majority of the information regarding location, size, and dimensions has been provided by utility companies and has not been field verified.

In this review, existing utility conditions are summarized and three proposed alternatives are analyzed for their

Evaluation Matrix for Existing Utilities

		Utility						
Scoring: 5 = Significant Impact 4 3 2 1 = Minimal Impact		Domestic Water	Sanitary	Storm Sewer	Natural Gas	Underground Electric	Communications	**Average Impact Score**
Alternative 1	**No Deck**	1.4	1.1	1.0	1.0	1.0	1.0	**1.1**
Alternative 2	**Partial Deck**	1.6	1.2	1.5	1.8	1.8	1.9	**1.6**
Alternative 3	**Full Deck**	4.3	4.4	4.8	4.3	4.9	4.6	**4.6**

impacts to the existing utility facilities. The impacts include severity of utility conflict as well as expense for accommodation or relocation.

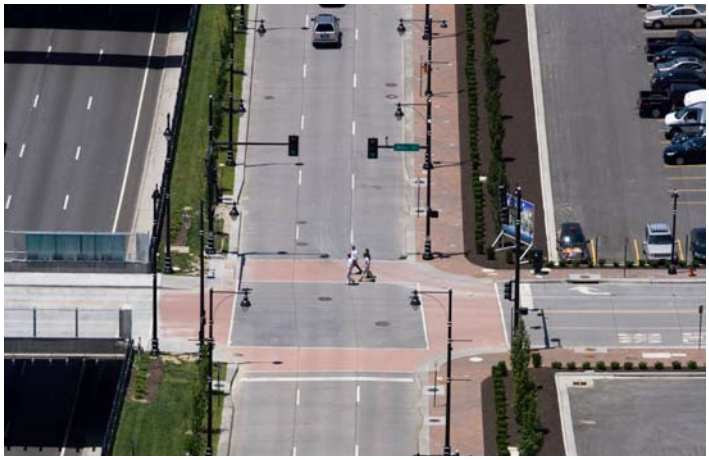
The basic public utilities (domestic water, sanitary sewer, and storm sewer) lie within the proposed study area. The same holds true for the private utilities (natural gas, electrical power, telephone, and cable television). The future size and/or capacity of these utilities will depend on the concept chosen and proposed land use. The existing conditions of these major utility systems is described below and then specifically analyzed in reference to each general alternative (no deck, partial deck, full deck).

Domestic Water

There are two major water transmission mains located in the study area. An existing 20-inch cast iron pipe (CIP) transmission main runs west along westbound (WB) Truman Road from Baltimore Avenue, then turns south to cross under I-670 (approximately 180' west of the centerline on Baltimore), then east along eastbound (EB) Truman Road until Baltimore Avenue, then finally running south. The existing transmission main that runs parallel with westbound Truman Road on the north side ranges from 16-inch to 30-inch and is comprised of ductile iron pipe (DIP). This transmission main crosses under I-670 approximately 135 feet east from the centerline of Baltimore Avenue. There is also a 12-inch DIP distribution main that connects with this transmission main and then runs parallel to eastbound Truman Road along the south side until it turns north approximately 260 feet east of the Cherry Street centerline and ties into the 12-inch main located on the north side of EB Truman Road.

Sanitary Sewer

The existing sanitary sewer in the study area has recently undergone extensive modifications due to the construction of the Sprint Arena and the Power and Light District. Existing sanitary sewer mains ranging from 10-inch to 24-inch run both east and west along westbound Truman Road parallel to the street centerline. This system has been recently separated from the combined system to carry only sanitary flows from Wyandotte to Oak Street. The east and west sewer segments meet at Walnut Street and tie into an existing 8'x4'-6" reinforced concrete



Existing sanitary sewer mains are located below westbound Truman Road

box (RCB) combined sewer constructed under I-670. Original design plans show that there is approximately two feet of cover over the RCB. This may inhibit appreciable lowering of the profile grade on I-670. The structural design should be evaluated to determine the maximum allowable cover. This RCB then ties into a 66-inch combined brick sewer that flows south to the OK Creek Sewer.

Domestic Water

Sanitary Sewer

There is a small segment of existing sanitary sewer along eastbound Truman Road. A 15-inch RCP commencing in Main Street and running parallel in eastbound Truman Road on the north side of the street. This segment flows east then turns south along the alley east of Main Street.

Storm Sewer

The existing storm sewer system has recently undergone extensive modifications as well. In 2006, the City constructed approximately 1500-feet of new storm sewer ranging from 10-inch to 84-inch. The west upstream end begins approximately 20-feet from the west property line of Baltimore Avenue with an 18-inch RCP that runs parallel to the centerline of westbound Truman Road on the north and flows east to pick up additional flows at junctions of each street intersection. The system has a total tributary area upstream of approximately 145-acres. This system flows to the OK Creek Sewer through the 8'X4'-6" RCB constructed under I-670 at Walnut. The Long Term Control Plan for the City recommends a deep tunnel system that will help provide additional storage and reduce the number of combined sewer overflows the system produces in extreme wet weather conditions.

The capacity of the existing storm system for both westbound and eastbound Truman Roads should be adequate in localized conditions for all proposed development along the project corridor.

Storm Sewer

Natural Gas

There is a major gas main ranging in size from a 12-inch to 20-inch on the east side of Walnut Street that runs north-south across westbound Truman then drops down approximately 28 feet deep to cross under I-670. An existing 8-inch natural gas line runs parallel outside westbound Truman Road on its north side. There is also an existing 8-inch natural gas line running parallel outside eastbound Truman Road on the south side. Both lines would be available for connection to proposed building development along the project corridor. A 10-inch gas main also runs north-south along the east side of Baltimore Avenue and may need to be extended to service proposed development.

Natural Gas

Underground Electric

There is an extensive network of underground electrical conduits along the project corridor. There are underground electric power lines (8-6-inch ducts and 12-6-inch ducts) along westbound Truman Road including a recently completed decoratively clad utility bridge that spans across I-670 at McGee. Eastbound Truman Road also contains electric duct banks for which future additional investigation is required. Further investigation and coordination with the utility companies will need to take place during a future

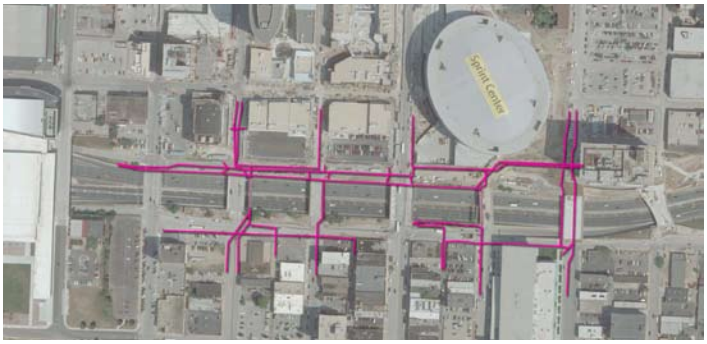
Underground Electric

phase of the project, as the details of the proposed design are finalized.

Telecommunications

Several telecommunication lines in ducts also traverse the study corridor. Telecommunication companies with facilities along the corridor include AT&T, SBC, Time Warner Cable, Qwest, Xspedius, Wiltel and Lightcore. MoDOT has an underground telecommunication line along westbound Truman Road for KC SCOUT. Some of the duct banks for these telecommunication lines range anywhere from two feet to six feet in depth or width. Several fiber optic lines are located along the study corridor.

Proposed alternatives that require the relocation of existing utilities will also require the most investment.



Telecommunications

Existing KCP&L utility bridge east of Grand Boulevard

Existing AT&T duct bank east of Main Street

KC SCOUT System Infrastructure

Existing Facilities

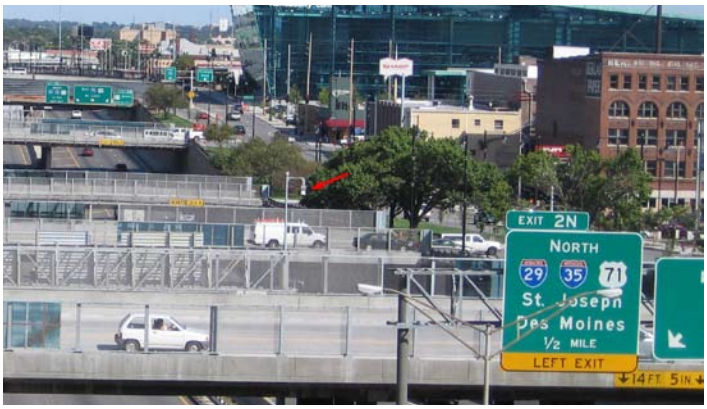
The Kansas City SCOUT intelligent transportation system (ITS) includes traffic monitoring and travelers advisory field devices along the I-670 corridor. All data is fed in real time to the Scout Traffic Operations Center (TOC) located in the MoDOT District 4 office in Lee's Summit.

KC SCOUT System

The system communications backbone consisting of a pair of 48-strand fiber optic cables run along I-670 for the length of the project limits. From I-35 to the east, the line is located in the green space along Truman Road just behind the north retaining wall. The line crosses to the south side, attached to the east side of the Grand Boulevard bridge structure, and continues to the east behind the south retaining wall. Forty of

the strands are lit and active, and the other 48-strand line is reserved for future needs.

A pair of closed circuit television (CCTV) video cameras are mounted on the median edge of the overhead sign truss just east of the Baltimore Avenue bridge. There is also a west-facing camera mounted on the south side of I-670 just west of the Locust Street Bridge.



CCTV video camera just east of the Baltimore Avenue bridge

There are side-fired radar traffic monitoring devices at several locations within the project area. These devices monitor real time traffic volumes, speed, and vehicle density along I-670. One is located west of Locust on the same pole that houses the CCTV camera, and monitors traffic along all lanes in both directions on I-670. Separate units are mounted on the north and south side of I-670 in the area between Charlotte and Holmes.

Variable message dynamic signs (VMS) are mounted along I-70, I-35, and I-29 providing traveler information predominantly for traffic heading towards the downtown loop. These devices are generally used to provide information relating to expected travel times, and are strategically located to provide adequate lead time to divert to other roadway during incidents and other congested periods.

SCOUT also deploys a hazard alert radio (HAR) system which provides additional readily available travelers information on AM radio.

Sensors for all emergency response systems should connect and feed data to the TOC via the fiber optic communications backbone. SCOUT's predominant responsibility under emergency conditions will be traffic management and diversion, with a secondary support function relating to emergency response.

Continuous traffic data should be collected in both directions along I-670 within the limits of a tunnel at a maximum spacing of approximately 0.10 miles. Loops or other in-pavement sensors would be required, as the side-fired RTMS radar devices would not operate satisfactorily in the tunnel section.

Green Solutions

The overall impacts to the utilities in the corridor can be minimized with the introduction of various green solutions. These sustainable alternatives can further emphasize the benefits of this project by reducing the long-term infrastructure needs of the corridor.

One example of a green solution is the use of innovative stormwater management techniques such as the use of pervious materials can filter, store and convey stormwater prior to it reaching an inlet or pipe. This runoff can even be stored for irrigation or other practical uses. Rain gardens and bioswales can also help treat and absorb stormwater runoff before it enters the city's infrastructure. Additional sustainable elements are detailed on pages 170-172.

Alternative 1 – No Deck

This concept provides the least impact on existing utilities in the project corridor. The overall utility impact rating score was 1.1 on a scale of 1-5 with 1 representing minimal impacts and 5 significant impacts (as shown in the table on page 106). There are minimal utility relocation and/or upgrading needs required for this concept. The following is a brief discussion of specific utility adjustments and accommodations necessary for this solution.

Domestic Water
Any new development will require new domestic water service connections, which will have a minimal cost impact. While the specific demands are not known at this time, the sizes of piping appear to be adequate for a standard commercial and residential development.

The potential expansion of the Convention Center between Wyandotte and Baltimore conflicts with the 20-inch CIP transmission main crossing under I-670. This line must be accommodated in the design as the relocation of a major transmission main will be costly.

Sanitary
The only impact to the sanitary sewer system for this concept is service connection taps into the existing sewers for the any new development that may occur. There is sufficient capacity to handle these connections in the current system.

Storm Sewer
The only impact to the storm sewer system for this concept is the roof drain connections that will tie into the existing system once any new development occurs. There is sufficient capacity to handle these connections in the current system.

Natural Gas
The only impact to the existing gas mains for this concept is service connection taps into the existing mains for any new development that may occur, which the system can accommodate.

Underground Electric
This concept does not require any underground electric facility relocation. However, KCP&L may have to add additional cables to their duct banks to allow for expansion of their facilities to accommodate new development that may occur.

Telecommunications
This concept does not require any relocation of telecommunication lines. However, various utilities may have to add additional cables to their duct banks to allow for expansion of their facilities to accommodate any new development that may occur.

KC SCOUT System
Under this approach, the existing system would not be affected functionally but certain devices would require relocation due to physical widening of the bridges. These accommodations would also most likely be required if the bridges were simply replaced. The CCTV cameras east of the Baltimore Avenue bridge would likely require relocation. The fiber optic line on the Grand Boulevard bridge would require relocation as part of the widening. The rest of the fiber along the outside edge of the I-670 retaining wall may also require relocation depending on the extent and location of the sound mitigation and green space development along the edge.

Alternative 2 - Partial Deck

This concept provides a greater impact on existing utilities in the project corridor than alternative 1. The overall utility impact rating score was 1.6 on a scale of 1-5 with 1 representing minimal impacts and 5 significant impacts (as shown in the table on page 106). There are minimal to moderate utility relocations and/or upgrading needs required for this concept. The following is a brief discussion of specific utility adjustments and relocations necessary for this concept.

Domestic Water
The same impacts apply here as they would in alternative 1. Additionally, modifications such as relocation or adjustment to allow structural supports

may be required to the 24-inch transmission and the 12-inch distribution water mains located along westbound and eastbound Truman Road between Main and Grand to accommodate the new partial deck.

Sanitary
Service connection taps into the existing sewers for any new development will be required. The existing 8'x4'-6" reinforced concrete box (RCB) combined sewer under I-670 may pose a clearance problem for the partial deck addition over Walnut. This combined sewer eliminates the option of lowering I-670. This is a major sewer that needs to remain in place. There is sufficient capacity to handle these connections in the current system.

Storm Sewer
Roof drain connections that will tie into the existing system for any new development are necessary for this concept. There is sufficient capacity to handle these connections in the current system, but any green space shown atop of the full deck additions would provide an excellent opportunity to implement green design solutions such as rain gardens and street trees.

Natural Gas
Service connection taps into the existing gas main will be required for any new development that may occur. An existing 8-inch polyethylene gas main running north-south on the east side of Walnut will need to be accommodated within the partial deck addition.

Underground Electric
The same impacts occur here as in Alternative 1.

Telecommunications
In addition and more specific to the impacts in Alternative 1, there are some conflicts to be aware of with a partial deck addition over I-670 from Main Street to Grand Boulevard. There is an existing major AT&T duct bank on a utility bridge crossing over I-670, approximately 50 feet east of Main Street carrying 28 conduits that would need to be accommodated and a fiber optic duct bank that crosses Walnut Street (attached to the side of the bridge) from westbound Truman Road to eastbound Truman Road would need to be accommodated with a partial deck addition over I-670 from Main Street to Grand Boulevard.

KC SCOUT System
Special monitoring and response facilities are required under the tunnel conditions resulting from both Alternatives 2 and 3.

Currently, there are two CCTV cameras located along the corridor. At a minimum, four CCTV cameras would be required under Alternative 2. A minimum of eight cameras will be required to monitor the tunnel in Alternative 3.

In addition to the existing VMS signs, MoDOT suggests supplementary sign displays at the southbound approaches from I-35 and I-29. These signs should be installed at an appropriate location to provide drivers adequate warning to divert to alternate routes in emergency situations, incidents, or other cases of congestion in the tunnel or the approaches.

Static HAR advisory signs should also be installed along all mainline interstate approaches to the tunnel to provide additional real time driver information under incidents or emergency situations.

Alternative 3 - Full Deck

This alternative has the greatest impact on existing utilities in the project corridor of all three concepts with an impact score of 4.6 on a scale of 1-5 with 1 representing minimal impacts and 5 significant impacts (as shown in the table on page 106). There are extensive utility relocations and/or upgrading needs required for this alternative. The following is a brief discussion of specific utility adjustments and relocations necessary for this concept.

Domestic Water
New domestic water service connections will be required for any new development that may occur. In the case of any realigned Truman Road, some water mains will need relocation to follow the new alignment while accommodating any adjacent development.

Sanitary
In addition to the impacts described in Alternative 2, in the case of a realigned Truman Road, some sanitary sewers may need to be relocated to follow the new alignment. There is sufficient capacity to handle these connections in the current system.

Storm Sewer
New roof drain connections will be required for any new development. In the case of any realigned Truman Road, curb inlets and storm sewer pipe will require relocation to follow the new alignment.

Natural Gas
New gas service connections will be required for any new development. Gas mains running along the corridor may need to be relocated so as not to impact future development and those crossing I-670 will need to be accommodated within the deck addition.

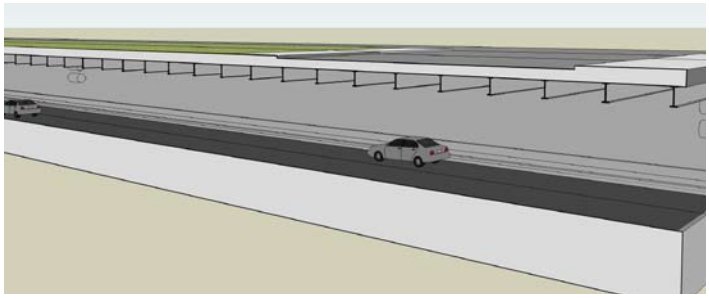
Underground Electric
There is an extensive network of underground electrical conduits along the project corridor that will need to be accommodated or relocated with a full deck and future development. A utility bridge along Main as well as a recently completed decoratively clad utility bridge that spans across I-670 at McGee will require relocation.

Telecommunications
Telecommunication companies with facilities along the corridor may need to or relocate their facilities to accommodate the full deck addition, depending on the location of future development and the possible realignment of Truman Road.

KC SCOUT System
Impacts to this system are the same as in Alternative 2. A minimum of eight cameras will be required to monitor the tunnel. This includes the replacement or relocation of existing monitoring cameras mounted beneath the Convention Center complex that is monitored by Bartle Hall staff.

STRUCTURAL DESIGN

The Planning Team investigated a variety of options for the structural design of a deck spanning over I-670 and found that two types of structural systems were most appropriate in this situation: a precast inverted "T" girder system and a standard structural steel girder system. The following analysis pertains to alternatives 2 and 3 (partial and full deck). The structural design is the same for both alternatives, with the only variable being the length of the deck.



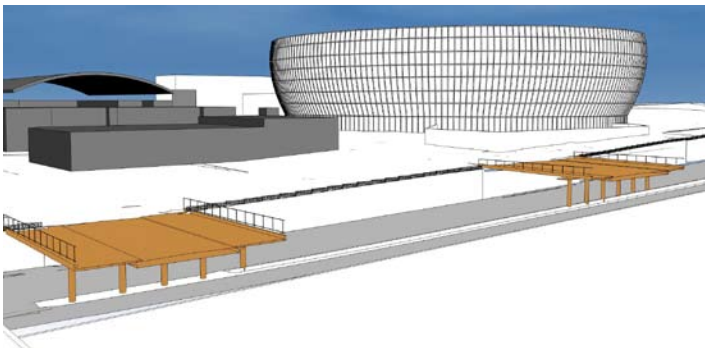
Steel girder structural system

After weighing the benefits of each structural system, it is recommended to use a steel girder system because it allows the most design flexibility which will be important given the varying structural conditions required along the I-670 corridor. This flexibility includes the ability to accommodate varying span lengths and structural loads while allowing minor utility penetrations or other modifications. This steel girder system would require fireproofing to satisfy code requirements.

A conservative structural depth of 43" includes the girder and an 8-1/2" depth composite structural concrete deck. An early study spaces the girders at 9'-0" O.C. which would support loads of around 175-200 pounds per square feet (typical for bridge loading) and allows 15" of soil in a landscaped deck (similar to a roof garden). Additional load requirements such as an increase in soil depth would result in the need to reduce the girder spacing (more girders) or an increase in the structural depth of the system.

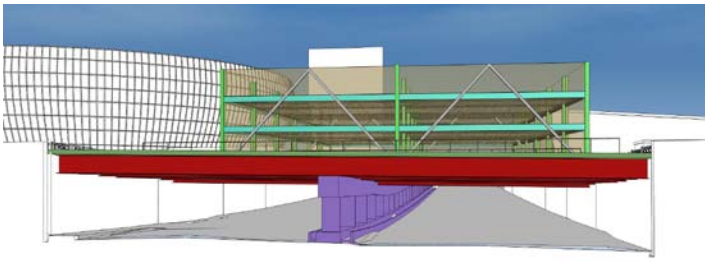
A preliminary study of the structural design also concluded that a replacement cost for the four

bridges identified by MoDOT (Baltimore, Main, Walnut, and Grand) will cost approximately $10 million. This amount includes a widened sidewalk at the back of curb for pedestrian accommodations. Any additional treatment of the bridges such as enhanced landscaping and decorative railings will incur additional cost.



Replacement of existing bridges with new bridges and widened sidewalks

Early ideas developed during the design charrette proposed buildings over the interstate. Given the clearance issues of the freeway and the desire to match the grades at the north and south ends of a cross street, the best structural solution is the use of a structural truss that would not only serve to span the interstate but also as structure for the building. Any solution would be rather expensive, with a cost exceeding four times that of building on grade. For instance, an on-grade structure (warm shell) would cost around $200/sf for a one to three- story building, but a one-story building over the freeway would cost around $800/sf and a three-story building would cost around $1,400/sf.



Building structure over the interstate below

LIFE SAFETY AND CODES

The following analysis pertains to alternatives 2 and 3 (partial and full deck). The analysis is the same for both alternatives, with the only variable being the length of the deck and the subsequent design recommendations related to life safety and codes.

The 2008 edition of the *NFPA 502 Standard Road Tunnels, Bridges, and Other Limited Access Highways* is a standard that provides designers and regulators with guidelines for the construction, operation, maintenance, and fire protection of limited-access highways, tunnels, bridges, elevated highways, and air right structures. As a non-adopted standard (it is not a code), it provides recommendations and guidance as to which features should be incorporated in the design of a tunnel or air-right structure which would be created by extending the decking of I-670.

Tunnel Requirements

Road tunnels are defined (*NFPA 502 Section 3.3.38*) as "an enclosed roadway for motor vehicle traffic with vehicle access that is limited to portals."

Oak Street bridge, considered a road tunnel

The requirements for a tunnel depend on the category of tunnel. The following designations are used in the *NFPA 502 Standard for Different Lengths of Tunnels.*

1. Category X: "If the tunnel length is less than 300 feet, none of the following sections apply."

2. Category A: "If the tunnel is greater than or equal to 300 feet in length, only standpipes and traffic control as described in this section of the report shall be provided."

3. Category B/C: "If the tunnel length is greater than or equal to 800 feet and maximum exit travel distance exceeds 400 feet, or the tunnel length is greater than 1,000 feet, all the following sections of the standard apply, unless noted otherwise."

4. Category D: "If the tunnel length is greater than or equal to 3,280 feet, all the following sections apply without exception."

Roadways beneath Air-Right Structures
Air-right structures are defined as "a structure other than a skywalk bridge that is built over a roadway using the roadway's air-rights" (*NFPA 502 Section 3.3.41.1*).

Where an air-right structure encloses both sides of a roadway, it is to be considered a road tunnel (*NFPA 502 Section 8.2.2*). The class of tunnel (X, A, B, C, or D) will determine the fire protection and life safety requirements.

Where an air-right structure does not fully enclose the roadway on both sides, the Authority Having Jurisdiction (AHJ, in this case, MoDOT) may determine if the structure is considered a road tunnel (*NFPA 502 Section 8.2.3*).

Construction
If the anticipated fire exposure is 20 megawatts (MW) or less and flammable liquid in bulk cargo is prohibited from the covered roadway, the structural element of the tunnel should have a minimum 2-hour fire resistance rating. Otherwise, the rating of the structural elements should be 4-hour (*NFPA 502 Section 8.4.1-2*).

The AHJ may at his discretion require the structural elements of the tunnel to have their fire resistance rating determined in accordance with a more severe time-temperature curve than the standard used for building elements. This more severe time-temperature curve, Rijkswaterstaat (RWS), is typically used in petroleum plants and similar structures and would result in more fireproofing being required to accomplish the same rating. With this in mind, further analysis and determination of the amount of fireproofing required will need to take place during the design phase of a tunnel.

Fire Protection
The following information in the *NFPA 502* standard applying to tunnels relates to fire protection features:

Fire Alarm (Tunnels Only) - Cat. B/C, D
For categories B/C and D, manual fire alarm boxes are required to be installed at intervals of not less than 300 feet and at all cross passages and means of egress (*NFPA 502 Section 7.4.1.2.1*).

Fire Detection (Tunnels Only) - Cat. B/C, D
Closed Circuit Television (CCTV) is permitted to identify fires in tunnels with 24-hour supervision (*NFPA 502 Section 7.4.1.3*).

If 24-hour monitoring is not provided, automatic fire detection systems are required to be installed in accordance with *NFPA 72 Section 7.4.1.4*.

Ancillary spaces are required to be provided with automatic fire detection systems (*NFPA 502 Section 7.4.1.4*).

Sprinklers
Sprinklers are not required by the standard. *Annex E* of the *NFPA 502* standard recommends consideration of automatic sprinklers where an analysis indicates they would improve the level of safety.

Standpipes (Tunnels and Air-Right Structures) - Cat. A, B/C, D
Standpipes are required (*NFPA 502 Section 7.7*) to be Class I, either wet or dry, installed in accordance with *NFPA 14* (*NFPA 502 Section 9.1*). Standpipes are required to be connected to an approved supply that is capable of supplying the system demand for a minimum of 1-hour (*NFPA 502 Section 9.2.1*).

Fire Pump (Tunnels and Air-Right Structures)
Where tunnels are greater than 3,280 feet long fire pumps are required (*NFPA 502 Section 9.5*).

Egress (Tunnels) - Cat. B/C, D
Emergency exits are required to not be spaced more than 1,000 feet apart. When stairways are provided as emergency exits, they are required to be provided with a minimum 2-hour fire rated enclosure (*NFPA 502 Sections 7.14.6.1 & 7.14.6.3*).


Emergency exits are required in a tunnel

Cross passageways may be provided in lieu of exit stairs where tunnels are divided by a minimum 2-hour rated separation. Cross passages are required to be no more than 656 feet apart and are required to be protected with 60-minute rated doors. A minimum 3.6 clear width foot walkway is required to be provided on both sides of the cross passage (*NFPA 502 Section 7.14.7*).

Egress (Air-Right Structures)
Air-right structures do not have any specific requirements for egress; however, Air-Right Structures are required (*NFPA 502 Section 8.8.2*) to have an Emergency Response Procedure. The Emergency Response Procedure is required to meet the criteria in *NFPA 502 Chapter 2* and have the approval of the AHJ.

Emergency Power (Tunnels Only) - Cat. B/C, D
A separate service or on-site generator is permitted to provide a secondary source for electrical power, with approval from the local authority (*NFPA 502 Section 11.5*).

Emergency Lighting (Tunnels Only) - Cat. B/C, D
Emergency lighting is to be installed in accordance with *NFPA 70, NFPA 110, and NFPA 111*. All emergency lights and exit signs are required to be powered by an emergency power supply (*NFPA 502 Section 11.6.2*). Emergency lighting is to provide an average of at least 1 foot-candle illumination and no less than 0.1 foot-candle at the road and walkway surfaces. The maximum to minimum illumination ratio is not allowed to exceed 40:1 (*NFPA 502 Section 11.6.6-7*).

Emergency Ventilation (Tunnels and Air-Rights Structures) - Cat. B/C, D
Emergency ventilation for removal and control of smoke will be required unless it can be demonstrated by an engineering analysis that an equivalent level of safety is provided by natural ventilation or by enhancing the means of egress. Ventilation is required in tunnels greater than 3,280 feet in length (*NFPA 502 Section 10.1.1*). Fans are required to be operational for 1 hour at an air stream temperature of 482ºF. Where fans may be exposed directly to the fire, redundant fans will be required.

Emergency Communication (Tunnels Only) - Cat. B/C, D
Where necessary for reliable communication for fire department personnel, a radio network capable of two-way communication is required in the tunnel (*NFPA 502 Section 7.5.1*).

Traffic Control (Tunnels Only) - Cat. A, B/C, D
Means are required to be provided to stop traffic before entering a tunnel and to clear traffic downstream following the activation of a fire alarm (*NFPA 502 Section 7.6.1*), unless the tunnel is longer than 800 feet, in which case means to prevent traffic from entering the direct approach to the tunnel should be provided.

Drainage (Tunnels) - Cat. B/C, D
A drainage system must be provided to store or discharge water or hazardous or flammable liquid spills within the tunnel (*NFPA 502 Section 7.11.1*). The drainage system is required to be of sufficient capacity

to receive the rate of flow from the standpipe system and the flow from any fixed fire fighting system (such as automatic sprinklers) without causing flooding on the roadway (*NFPA 502 Section 7.11.5*).

Drainage (Roadways Beneath Air-Rights Structures)
The AHJ may require a drainage system as described above for tunnels (*NFPA 502 Section 8.6*).

TUNNEL DESIGN

Ventilation

Alternative 1 – No Deck

For this approach, no ventilation would be required since a there would be no deck over the interstate. In the case of the Convention Center expansion between Wyandotte and Baltimore, further analysis prior to an expansion may suggest mechanical ventilation is needed.

Alternative 2 – Partial Deck

General Ventilation for Vehicle Emission Contaminant Control:
Alternative 2 proposes a two-block long enclosed deck section. This section would be considered a tunnel (Category A) and a ventilation system will be required to control the air quality, mainly focusing on carbon monoxide levels from exhaust of all vehicles and visibility due to diesel engine exhaust.

It is assumed for this study that the tunnel would not be able to rely on natural ventilation alone or the natural piston effect from moving traffic. The maximum clear height of the deck from Main to Grand would be approximately 15-feet, 6-inches over the existing freeway, due to meeting existing grade on either side of the interstate. This limited clearance does not allow for the addition of supply or exhaust air ductwork below the deck level. Therefore, in this tunnel, the use of a ducted system will require all ventilation equipment to reside within the tunnel shoulder and median space or on top of the deck, an aesthetically undesirable location.

With the limited space for ducts and associated equipment in the tunnel, longitudinal ventilation is the likely method of emission control. The longitudinal ventilation method would rely on jet fans installed within the tunnel structure along the shoulder and median to generate and maintain the required air velocity. Fresh air would enter one end of the tunnel and exit the other. Jet fans would be located at the tunnel inlet and outlet, as well boosters spaced periodically throughout the length of the tunnel. Fans can be cycled on and off, as needed, to control and limit the monitored vehicle emission concentrations. The fans would be required to be reversible, to change the airflow direction for the control of smoke and fire, and for varying meteorological conditions. All components of the ventilation system would be required to be on emergency backup power.


Jet fans within the tunnel structure

Longitudinal ventilation is possible for both one-way and two-way traffic tunnels. However, if used in two-way, a separate emergency ventilation system for fire and smoke control would be required.

Emergency Ventilation for Fire and Smoke Control:
The tunnel created between Main and Grand is anticipated to contain a divider wall between directional lanes, creating a one-way tunnel in both directions of traffic. The longitudinal ventilation system utilized for general ventilation would be used for fire and smoke

control, also. With the reversible jet fans, the direction of the airflow would be determined in order to most effectively remove the heat and smoke from within the tunnel.

Longitudinal ventilation system

Alternative 3 – Full Deck

General Ventilation for Vehicle Emission Contaminant Control:

Alternative 3 proposes a corridor-long enclosed deck section. This section would be considered a tunnel (Category B/C) and a ventilation system will be required to control the air quality, mainly focusing on carbon monoxide levels from exhaust of all vehicles and visibility due to diesel engine exhaust.

The tunnel length of approximately 2,000-feet is a relatively short tunnel, but is likely too long to rely on natural ventilation or the natural piston effect from moving traffic. The minimum clear height of the majority of the tunnel would be approximately 15-feet, 6-inches over the existing freeway. Therefore, as mentioned for Alternative 2, longitudinal ventilation is recommended for the tunnel in this approach.

Emergency Ventilation for Fire and Smoke Control:

The tunnel created throughout the I-670 corridor is anticipated to contain a divider wall between directional lanes, creating a one-way tunnel in both directions of traffic, as described in Alternative 2.

Ventilation Conclusions (For Alternatives 2 and 3):

- Proposed solution: Ductless jet engine fans, piston effect with flow of traffic
- Long tunnels may require intermediate ventilation
- Concentration of emissions may affect air quality at openings (additional analysis is required, including air quality measurements recorded throughout the corridor to determine a baseline reading for existing air quality)

Lighting

Alternative 1 – No Deck

Included in this alternative are improvements to the bridges in the corridor that will add additional width for pedestrian accommodations on either side of the roadway. The Federal Highway Administration tunnel guidelines require daytime underpass lighting for length to height ratios greater than 10:1. For example, a bridge with a clearance of 16'-0" would not need additional lighting unless the width of bridge exceeded 160 feet. In Alternative 1, the Grand Boulevard bridge would be approximately 120 feet in width with 15' sidewalks and 10' planter strips on each side of the roadway curb. With an existing minimum clearance of 15'-3", it is possible that no additional daylighting would be required.

For lighting purposes, these underpasses may also be considered as short tunnels. Final measurements will need to be verified during design, but for lighting estimates, it was assumed that daylighting will be required in these short tunnels at 50% of the recommended luminance listed in *ANSI RP-22, Table 3* (the standard for recommended practice for tunnel lighting).

The luminaires in the existing tunnel under the Convention Center are high pressure sodium and are controlled by lighting contactors, a PLC (programmable logic controller) and photo sensors located at the entrances of the tunnel. The PLC increases/decreases daylighting as the light levels increase/decrease. The tunnel luminaires switch to nighttime lighting at a certain low ambient light level outdoors. All lighting circuits are electronically monitored to provide maintenance alerts when more than 20% of the lamps in that circuit have failed. The Convention Center currently powers and monitors the tunnel luminaires under the Center.

Alternative 2 – Partial Deck

Alternative 2 includes the tunnel formed by a deck over I-670 between Main and Grand. The Main/Grand decking will be categorized as a tunnel for lighting purposes and will need daylighting, sensors

and light level controls on the same order as the existing Bartle Hall tunnel. The luminaires should be high pressure sodium because of their efficiency and short strike time, as well as for consistency in light quality with relation to the Bartle Hall tunnel. The luminaires should be controlled by lighting contactors or controllers, a programmable logic controller (PLC) for automation, and photo sensors located at the entrances of the tunnel. As recommended by *ANSI RP-22*, the PLC will increase/decrease luminance levels as the ambient light levels increase/decrease outdoors. Zones will be established to allow the eyes to adapt to the lower luminance as a driver enters the tunnel, and then again must adapt to higher luminance as the driver prepares to leave the tunnel. All lighting circuits should be electronically monitored to provide maintenance alerts when more than 20% of the lamps in that circuit have failed.

Because of its length, the power and control systems for the tunnel should be divided into physical sections in order to provide efficient power distribution and lighting control. Each section should include power distribution equipment, lighting control equipment and a PLC to coordinate lighting control and communication. This report assumes 480V rated luminaries will be used because they allow longer and smaller gauge circuits - a more economical solution to lower voltages. It is approximated that the Main/ Grand tunnel will require three total sections in each one-way tunnel.

As explained earlier, it would be best to assume that daylighting will be required in these short tunnels at 50% of the recommended luminance listed in *RP-22, Table 3*.

Alternative 3 – Full Deck

The tunnel in this approach extends the length of the corridor. Because of its length, this tunnel will need to have the daylighting and controls as explained in the previous alternative and as recommended in *RP-22*. It is expected that a public entity will be responsible to monitor the lighting, ventilation and security systems, and provide power to all equipment.

Like the shorter tunnel of the previous concept, this tunnel will be divided into physical sections in order to provide efficient power distribution and lighting control. Because of its length, this tunnel will require at least five total sections in each one-way tunnel. Each section would include power distribution equipment, lighting control equipment and a PLC to coordinate lighting control and communication. It is assumed that 480V rated luminaries will be the most efficient means of lighting this tunnel.

References

- *Guidelines for Tunnel Lighting Design*
- *ANSI/IES RP-22-05, Recommended Practice for Tunnel Lighting*
- *FHWA publication, Road Tunnel Design Guidelines*
- *NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways*

Electrical System

Many recommendations described below are based on standards and recommendations from *NFPA 502, the Standard for Road Tunnels, Bridges, and Other Limited Access Highways*. It is encouraged that the City of Kansas City, Missouri, and the Missouri Department of Transportation use this standard, where applicable, for longer tunnels.

According to *NFPA 502*, the power source for a tunnel shall need to be of the capacity and configuration to provide power to all the systems of the tunnel, both normal and for emergency purposes. These systems include the following:

- Lighting
- Lighting for means of egress and areas of refuge
- Exit signs
- Communications
- Tunnel drainage and fire pump(s)
- Ventilation

The primary source of electrical service for a tunnel shall be the local utility, Kansas City Power and Light. The emergency power source may be an emergency standby generator, or if it can be demonstrated that a single event within the utility system cannot affect both the primary and secondary source, KCP&L may also be the secondary source of power. For example,

the secondary source may be a service drop from a separate substation than the primary source of power. It is recommended that an automatic switching be the transfer point between the primary and the emergency power sources so that the transfer is automatic.

The *FHWA Tunnel Design Guidelines* recommend that if there are dual utility power sources, one-half of the tunnel lighting should be connected to each supply so that if one source fails, at least half of the lighting will be available until the load can be transferred to the remaining source.

If an emergency generator is used as an emergency power source, FHWA guidelines state that one-sixth of the tunnel lighting be connected to an emergency circuit. This circuit, upon power failure, would transfer to an emergency battery system or uninterruptible power source (UPS) until the generator can start up and power one-half of the tunnel lighting load.

This report recommends that the tunnel systems be powered from two utility sources, each sized to carry the full load of the tunnel, with a tie breaker that can close and provide a single power source under emergency. Several advantages to this system are the following:

- It is assumed that the City of Kansas City can take advantage of the existing KCP&L electrical distribution system (which has adequate capacity) routed throughout the I-670 corridor.
- All of the tunnel systems can quickly be brought to full power rather than relying on 1/2 the minimum capacity required to be supplied by a standby generator under emergency.
- The City can avoid the expense of maintaining a series of generators and UPS units.

The tunnel power distribution system will need to be divided into a series of power systems, each with its own switchboard with automatic switching, overcurrent protection, and power panel. The power panel would supply power to lighting control stations and lights, ventilation fans, step-down transformers and low-voltage power panels, cameras, radios, and traffic control signage. A small uninterruptable power supply should be installed in front of the communication and control systems to allow them to ride through an interruption in power until emergency power can be switched in. The electrical equipment for each tunnel section will need to be mounted in an electrical room built into the opposite side of the tunnel's retaining wall, or above the tunnel, at street level.

According to the Kansas City Convention Center Phase II – Ballroom Expansion & Improvements Report, the existing Bartle Hall Convention Center expansion underpass is monitored 24 hours a day by the Center's security staff over close circuit TV (CCTV). They notify SCOUT and any emergency response agencies of problems that may occur in the underpass. It is their responsibility to shut down ventilation to the Center and initiate any needed evacuations of the Center. The lighting system and cameras are powered through the Convention Center's electrical system. Emergency backup power is provided by switching to another electrical substation.

As innovations in lighting and energy technologies increase, it is possible that this project could take advantage of sustainable power harvesting and utilization methods. For instance, photovoltaic panels and wind micro-turbines can harvest clean energy to help offset the tunnel's lighting and ventilation systems demand. New lighting innovations could also utilize more efficient systems such as light-emitting diode (LED) technology to illuminate the tunnel. These sustainable systems should be considered when designing future phases of this project.

Alternative 1 – No Deck

With the proposed bridge enhancements increasing the length of the underpasses, additional lighting of the underpasses may be required (as discussed in the previous section). Final measurements will need to be verified, but for power estimating purposes it is conservative to assume daylight luminaires will be required for these underpasses. Neither standard requires emergency lighting for underpasses.

Each underpass will require a service drop and power distribution equipment to power its light fixtures. A typical power system consists of a power disconnect, power panel or light controller, and a mini-load center

to power any low voltage controls or cameras. No ventilation is required for the underpasses. It is estimated that the lighting in each underpass will produce a load of approximately 85 kW. This will require a 480V, 3-phase, distribution equipment rated no greater than 225A for each underpass.

Alternative 2 - Partial Deck

NFPA requires a minimum of lighting, ventilation and emergency power for this tunnel. A public entity will need to monitor and control this tunnel for emergency situations. The tunnel will require a series of separate power distribution systems, each with its own primary and secondary power sources, automatic switching, overcurrent protection, power panel and lighting control stations.

Because of its higher luminance requirements, daytime lighting is used to estimate the lighting load requirements.

The tunnel between Main and Grand will require a total of three total power distribution systems each rated 1200A.

This approach will also require the same accommodations for the bridge underpasses as stated in the first alternative.

Alternative 3 – Full Deck

Alternative 3 is comprised of a single long tunnel. Because all tunnel systems – lighting, ventilation, communications, etc. – will need to act as one throughout the tunnel, a public entity will need to be responsible for all systems, even within the Bartle Hall tunnel. In fact, adjustments to the existing Bartle tunnel systems may be required to ensure a seamless transition throughout the combined tunnel. For example, it is likely that the Convention Center may wish to install additional cameras in the tunnel to monitor for emergency situations that may impact their structure and its occupants, and additional lighting might be necessary to maintain adequate illumination levels.

As in the shorter tunnels of the previous alternatives, the electrical distribution system of the tunnel will need to be installed in sections, each with its own standby emergency source, automatic switching, overcurrent protection, power panel and lighting control stations. It is estimated that this tunnel will require approximately 1720 kW of power for lighting. The ventilation will require 80 30 HP jet fans for a total of 2552 kVA just for the ventilation. For a total of 4273 kVA, this tunnel will require a distribution system divided into five segments of electrical equipment, each rated at 1200A.

References

- *FHWA publication Road Tunnel Design Guidelines*
- *NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways*

SIGNAGE

Overhead interstate guide signs are installed on truss assemblies at the following locations along I-670 that would be affected by the tunnel concepts.

Westbound:

- East of Grand Bridge
- East of Baltimore Bridge

Eastbound:

- West of Baltimore Bridge
- West of McGee Bridge

These signs provide a legible distance of approximately 400 feet based on 10-inch standard lettering sizes and Manual of Uniform Traffic Control Devices (MUTCD) guidelines of 40 feet of legible distance per inch of height. Conservatively, advanced signage should be designed to accommodate a 500-foot visibility distance. Due to minimal overhead and lateral clearances in the tunnel constrained by other physical attributes of bridges and desired green space planes, there is not adequate space in the tunnel section to replace the guide signs in kind.

To improve guidance conforming with pending updates to the MUTCD, the current signs and all new signs should be replaced to graphically indicate destinations for each lane as shown below.

Other technologies that may be considered to

provide supplemental driver information may include ceiling signage and pavement markings. High-profile vehicles would adversely affect the visibility of ceiling markings. The effectiveness of these methods would also be significantly limited during periods of relatively heavy traffic, but pavement markings would be highly visible since the area will be lit at all times, and should require minimal maintenance since they will be protected from the elements inside the tunnel.

Incident management and other advanced driver information related to conditions in and approaching the tunnel will be provided by hazard alert radio (HAR) and dynamic message signing inclusive with the KC SCOUT ITS system.

ENVIRONMENTAL

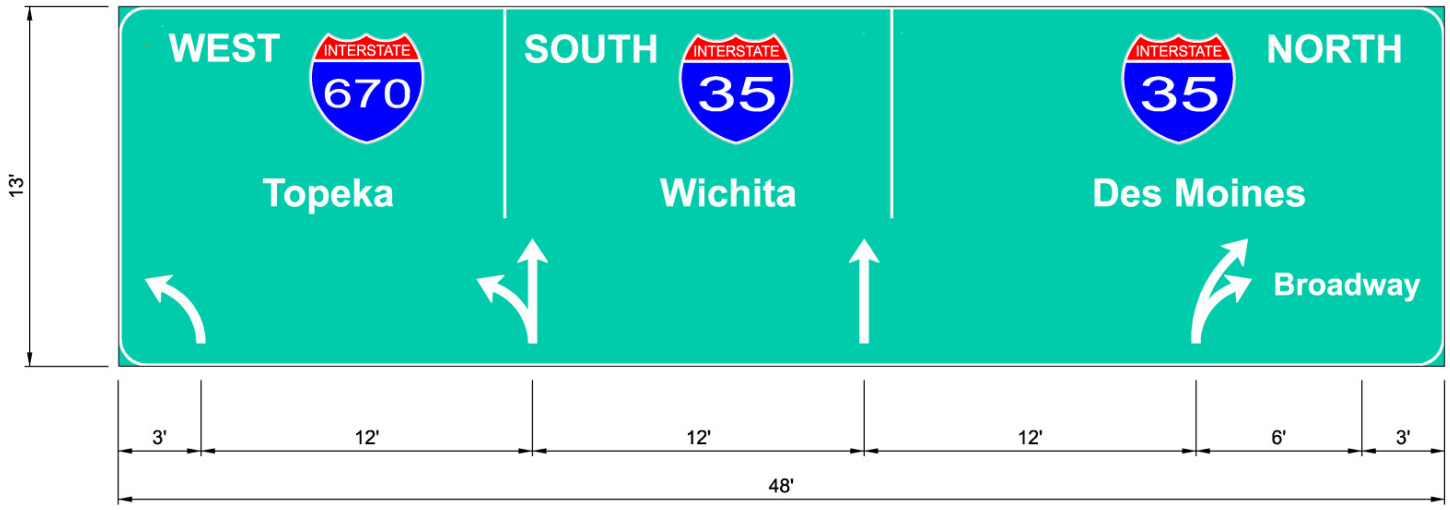
Noise

A preliminary noise analysis was conducted to determine what affects various improvements to I-670 between Wyandotte and Oak Streets would have on the surrounding environment. Any roadway improvements for a federally-funded project will be required to complete a Traffic Noise Model analysis.

The primary source of noise for the study area is Interstate 670. The peripheral roadways contribute to the overall noise, but only slightly. The diagram on page 123 shows ambient sound measurements taken on November 11, 2008 between the hours of 7:00 A.M. and 8:00 A.M. Below the diagram are examples of common sound comparisons and their associated sound levels.

The Department of Housing and Urban Development (HUD) developed a noise guidebook that recommends that noise levels not exceed 65 decibels as generally acceptable for the noise environment of a housing site. Noise levels above 65 decibels but below 75 decibels are deemed normally unacceptable and may require special construction to buffer the sound from indoor environments. Levels beyond 75 decibels are labeled as unacceptable, requiring in many cases significant costs to mitigate the noise that would make the project cost prohibitive.

The existing environment would be considered to be highly disturbed. The sound levels measured are typical for an area directly adjacent to an interstate. A noise prediction model (using CADNA) was developed to create a graphical representation of the existing environment and various future concepts. The measured data was used to as a benchmark to calibrate the model. Roads were included as noise sources, and tunnel concepts include noise from fans that would be required for ventilation. Actual values were not the desired output from the model because the actual design cases have not been developed. The graphical output, however, can be used for comparing scenarios to one another.



Proposed sign reflecting updates to the Manual of Uniform Traffic Control Devices (MUTCD)

Ambient Sound Measurement Locations

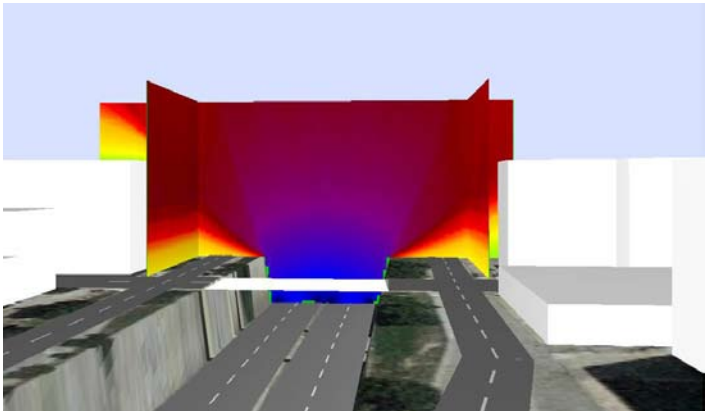
Location Description	Measured Sound Level (L_{eq}, dBA)	Acceptability Level (based on HUD Noise Guidebook)	Comments
Main St and Truman Rd, Adjacent to I-670, north of Truman Rd	77.7	unacceptable	Steady traffic on interstate
Main St and Truman Rd, south of Truman Rd next to Main St	66.8	moderately acceptable	Interstate audible, light side street traffic
Main St and Truman Rd, west side of Main St (second row of parking)	62.3	acceptable	Light traffic, interstate still audible
Walnut St and Truman Rd, Adjacent to I-670, south of Truman Rd	79.0	unacceptable	Steady traffic on interstate
In parking lot adjacent to Walnut St, south of Truman Rd	67.3	moderately acceptable	Interstate clearly audible, light side street traffic
Truman Rd and Grand Blvd, adjacent to I-670 on north	74.5	moderately acceptable	Steady traffic on interstate
14th St and Grand Blvd corner	66.0	moderately acceptable	Light side street traffic, interstate still audible
Next to Lucky Strike by entrance into common area west of Grand Blvd	70.9	moderately acceptable	Music audible from common area

Preliminary noise analysis levels

Sound Level (dBA)	Typical Comparison
60 dBA	Conversational Speech, Typical Office
70 dBA	Vacuum Cleaner, Hair Dryer, Dishwasher
80 dBA	Garbage Disposal, School Cafeteria, Alarm Clock, Police Whistle

Noise level comparison

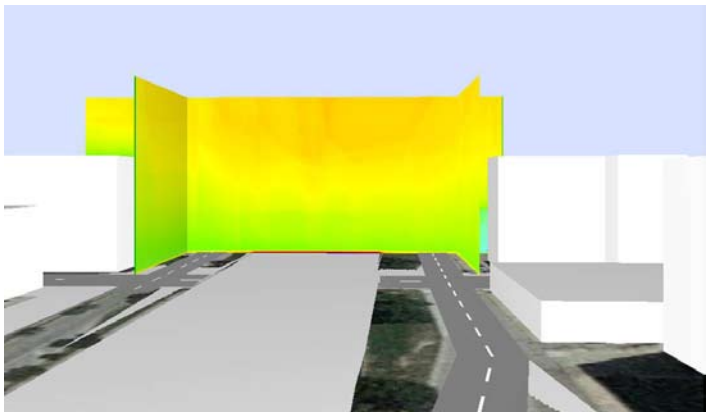
The following is a graphical depiction of the current noise environment along I-670. There are three intersecting vertical grids shown for this analysis. The first is a cross section of I-670. The second and third are grids running parallel to I-670, one to the north and one to the south of the interstate. The color range from yellow to orange is a generally acceptable noise level for an urban environment but the dark red to blue range represents noise levels that significantly negatively impact the surrounding parcels and pedestrian environment. A reduction of noise adjacent to Truman Road would improve the pedestrian environment and make development more cost-effective and desirable.



Current noise environment along I-670

The objective of this noise analysis is to determine what benefits one alternative would give over the others. Intuitively, enclosing the interstate decreases the sound that is experienced outside of the enclosure. However, enclosures require a significant number of fans for airflow. These fans create multiple new noise sources. A generic fan was used for the modeling of a partially or fully-enclosed interstate.

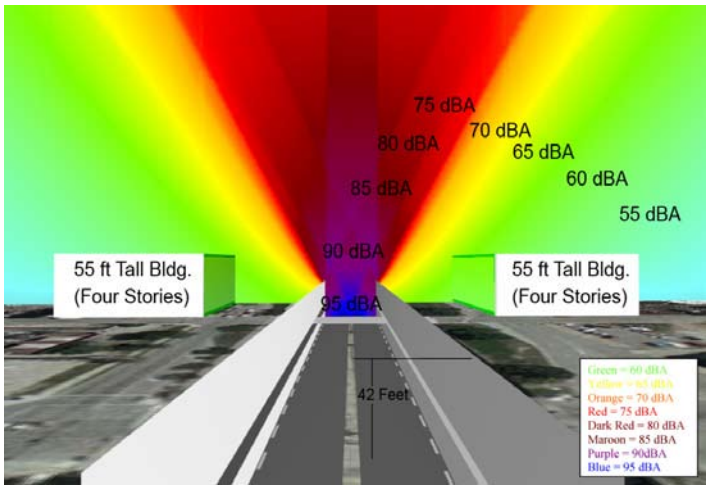
The modeling results for partial and full deck alternatives would be identical for the area of interest shown in the following diagram (between Main and Walnut). The following graphic depicts a partially or fully decked interstate. The color range of green to yellow represents dramatically improved noise levels for the surrounding properties and pedestrian environment.



Anticipated noise environment above I-670 with a partial or full deck

It is safe to assume that the noise emanating from the interstate will be most noticeable on either end of a tunnel and in the spaces that are not enclosed. Occupants of any building located adjacent to a section of the interstate that is not enclosed will experience considerably louder road-borne noise than occupants in a building next to an enclosed section.

An additional analysis looked at a modified approach of mitigating the noise from the interstate below through noise walls or cantilevered baffles over the freeway. These measures could be used in lieu of decking over the highway and would buffer the pedestrian environment and adjacent buildings from the impacts of the noise from the interstate. It was determined that these measures could be successful in minimizing noise levels, but the height required would exceed 12-15' above grade.



Anticipated noise environment above I-670 with noise walls

Air Quality

Vehicle exhaust consists primarily of carbon monoxide (CO), nitrogen oxides (NOx), particulate (PM10), and volatile organic compounds (VOC) emissions. These emissions are emitted from the vehicles traveling throughout the corridor, with a higher volume resulting from interstate traffic. Currently the emissions are open to the air and are emitted and dispersed into the atmosphere in quantities that are below the *National Ambient Air Quality Standards (NAAQS)* but are still undesirable at the Truman Road street level pedestrian environment.

ROADWAY DESIGN

An important factor when designing a tunnel for I-670 is maintaining or improving the vertical clearances for I-670. The existing minimum vertical clearances over I-670 are as follows, according to as-built plans.

Road	Over WB I-670	Over EB I-670
Wyandotte	>16'-6"	>16'-6"
Baltimore	15'-2"	15'-0"
Main	15'-4"	15'-1"
Walnut	15'-5"	15'-3"
Grand	15'-4"	15'-3"
Oak*	16'-6"	16'-1 3/8"
Truman Conn.*	15'-6"	N/A
Locust*	18'-1/4"	17'-4 5/8"
Holmes	15'-3"	15'-5"
Charlotte	18'-0"	15'-3"

* New bridges built by MoDOT in 2007.

The standard A*merican Association of State Highway and Transportation Officials* (AASHTO) vertical clearance over an interstate is 16'-6", however, for this project, the study team proposes to provide a vertical clearance equal to the existing minimum vertical clearance, which is 15'-0". Approval from AASHTO will be required to allow this design parameter. For the recently constructed bridges at Oak, Truman Connection and Locust, a design exception for a minimum vertical clearance of 15'-6" was submitted and approved by AASHTO.

If required to provide a minimum vertical clearance of 15'-6", the profiles for each cross-street would need to extend to the north and south, transitioning the road back to existing grade. Lowering of the grade of I-670 at strategic locations, due to utility locations and costs, will not be pursued.

The existing typical section for eastbound and westbound I-670 between Baltimore and Grand consists of a 6-foot shoulder on the left, four 12-foot lanes, and a 10-foot shoulder on the right. Currently, all four lanes are being utilized for westbound traffic, but only three of the existing four lanes are being used for eastbound traffic.

Eastbound I-670:

Since only three of the four lanes are being utilized, the existing shoulder on the left is 18 feet. This will be reduced to 15 feet to accommodate a separation wall, light fixtures and circulation fans. The right shoulder will be reduced from the existing 10 feet to about 6 feet to provide space for the light fixtures and circulation fans.

If desired, these existing lanes can be re-striped to shift traffic 4 feet to the north, providing for a 10-foot right shoulder.

Preliminary transportation planning for the Downtown Loop indicates the need for four eastbound lanes between Wyandotte and Grand. If another lane is ultimately necessary, the pavement can be re-striped to four 12-foot lanes, with a 3-foot shoulder on the left and a 6-foot shoulder on the right.

Westbound I-670:

The existing 6-foot shoulder on the left will be reduced to 3 feet to accommodate the separation wall, light fixtures and circulation fans. The right shoulder will be reduced from the existing 10 feet to 6 feet to provide space for the circulation fans and light fixtures. As an alternative, the existing four lanes could be reduced to 11-foot width, providing the opportunity to increase the median shoulder from 6 feet to 10 feet.

Preliminary planning for the Downtown Loop indicates the need for five westbound lanes between Locust and the exit to Broadway, with the fifth lane exiting to Broadway. If the tunnel is constructed as proposed, the overall width between barriers is 57 feet. With a minimum lane width of 11', the five lanes would require

a width of 55 feet leaving only one-foot left and right shoulders.

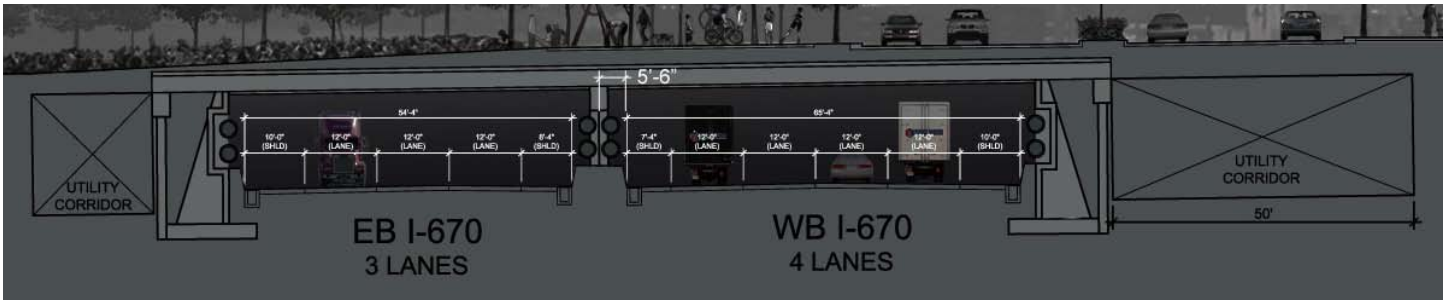
Consideration should be given to construct the separation wall south of the existing centerline to better fit the existing and future lane configurations. If the wall is shifted 5-1/2 feet south, the result would provide 5-1/2 foot right shoulders and 2-foot left shoulders, with five 11-foot lanes for westbound traffic and four 11-foot lanes for eastbound traffic.

TRAFFIC ANALYSIS

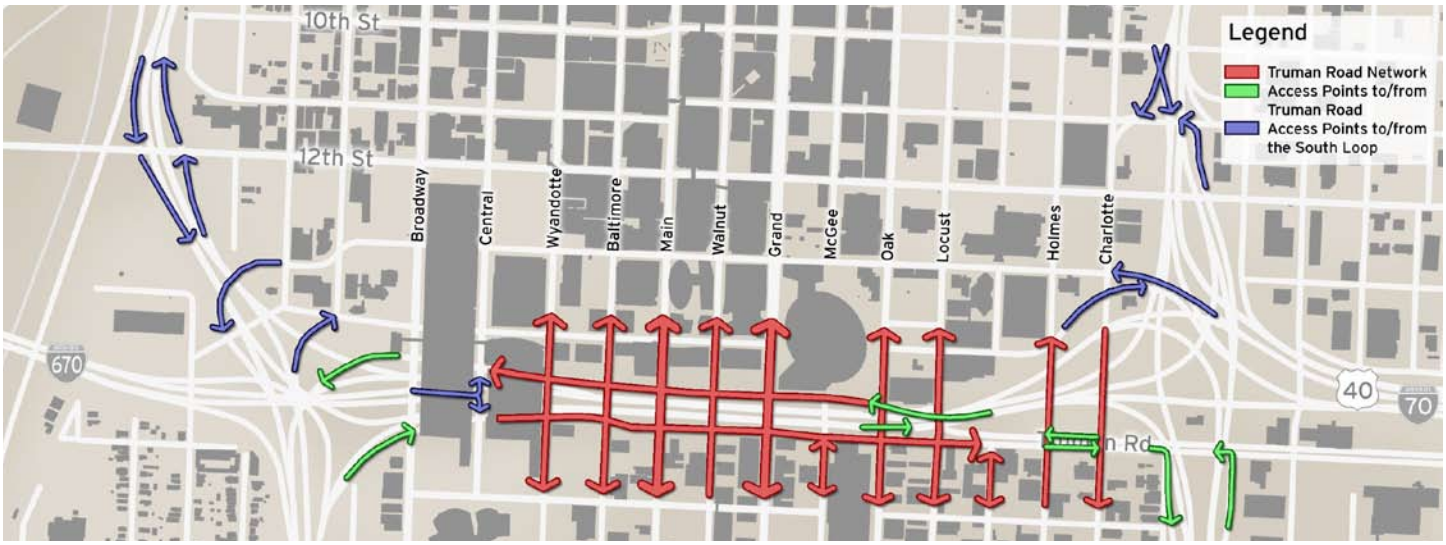
A 2005 traffic study documented 21,000 vehicles per day use the Truman Road Corridor. With the completion of the Power & Light District, Sprint Arena and other venues along the corridor, the traffic is anticipated to increase to 30,000 vehicles per day by 2030. In the diagram below, the green arrows identify access points to Truman Road from I-35, I-70, and 71 Highway. The blue arrows identify alternative access points into downtown's South Loop that do not directly feed into Truman Road. Any alteration of the access to Truman may impact these points. Overall, Truman Road's function is to distribute large volumes of traffic to the north and south.

A traffic study was conducted to analyze the impacts of proposed modifications to Truman Road from Wyandotte to Locust streets. This traffic study was performed at a high level and was primarily intended to identify impacts to the transportation network for the proposed alternatives. This study is included in the appendix of this report.

Based on traffic counts conducted in the corridor and considering factors such as peak hour and event traffic scenarios and pedestrian traffic, several conclusions were reached. First, closing eastbound ramp to I-670 at McGee would not negatively impact the function of Truman Road, assuming vehicles would utilize other routes for interstate access. However, there are objections to this idea because of limited options for



Section showing future lane configurations and the proposed location of the separation wall



Existing road network through study corridor

accessing eastbound I-670 so it is advised to maintain the McGee Street ramp.

The Planning Team also discovered through traffic modeling for a peak hour and downtown event scenario that Truman Road has excess capacity and reducing a lane for both east and westbound routes did not greatly impact the traffic operations, with intersections generally operating at a level of service "E" or better, not uncommon for an urban environment. Likewise, analysis concluded that a combined Truman Road would operate at an acceptable level. A more detailed analysis will need to take place at the preliminary design phase to assist with policy decisions regarding appropriate levels of service within this corridor.

MARKET ANALYSIS

During the initial planning stages to assess existing conditions, the planning team considered conditions to understand the potential market forces that could come into play if improvements were made to address the environmental factors to which the market might be sensitive. The effort was to consider the market impacts if no or aesthetic only improvements were made or if there was a complete transformation of the corridor. These benchmark conditions were chosen to illustrate the opportunities lost and gained. At the time of this evaluation, it was not known if a deck or tunnel was physically and technically possible. The following summaries describe the potential market opportunities. The complete Market Conditions Report is included in the appendix of this report.

Market Analysis Scenarios

Alternative 1 – No Deck

Essentially a baseline or status quo scenario, in which the freeway's noise and air pollution remain, new real estate is not created, and a major amenity, (such as meaningful park land) is not added. In this scenario the bridges are replaced but the freeway continues to divide the neighborhoods.

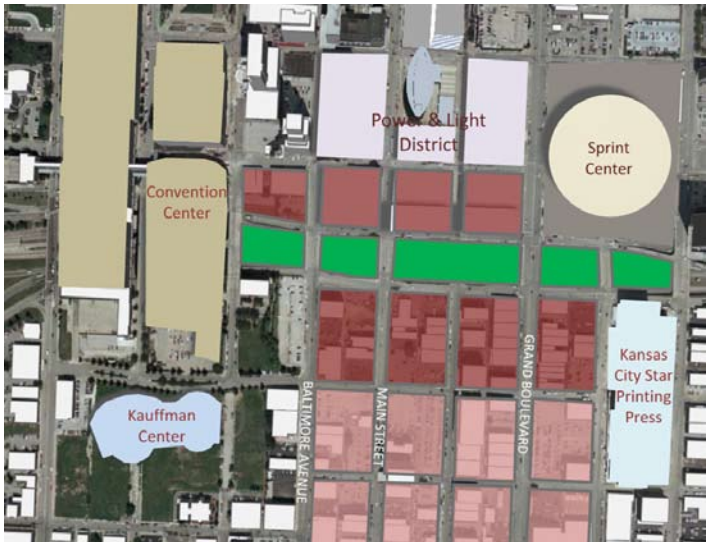
Alternative 2 – Full Deck

The freeway is covered with a full deck (i.e., noise and air pollution is removed), new real estate may be created, and a significant public space amenity (e.g. a large urban park) is added.

Market Analysis Scenario Conclusions

These alternatives were evaluated in the Market Conditions Report (located in the appendix) in terms of their likely impact on real estate values as illustrated below. The increase in values represents demand over and above the current demand for the area. Areas in dark red would be expected to experience the greatest gains in value, followed by those in pink. Areas not colored are not believed to increase in value due to the improvements of the proposed concept.

Alternative 1



Alternative 2

The following is a review of the market impact that is anticipated for each of the market scenarios. Generally, the greater the improvement in the study area, the greater the increase in property value and use. If a substantial improvement is made in the study area, the likelihood of residential, office, retail and hotel not only increases but so do the sale and lease rates.

	Summary Comments		Replacement Bridges Only	Deck and Public Space Improvements	Demand
RENTAL	▪ The regional housing market has declined significantly: permits decreased from 15,000 in 2005 to 2,500 in 2009. ▪ Long-term trends for urban housing (demographics, consumer preferences) are all positive. ▪ Downtown added 4,500 housing units since 2000; however supply of historic buildings is running out. ▪ Downtown market is likely to recover, but incentives may be needed to stimulate new construction. ▪ Downtown's market consists primarily of young singles & couples. The South Loop Link Area can target the premium empty nester and early workforce markets.	▪ On a per-square-foot basis, downtown rents are second-strongest, behind the Plaza. ▪ Downtown has added 200-400 units each year since 2002, yet occupancies have remained steady. ▪ Most new units exceed $900/month; $700-$900 market is largely ignored. ▪ South Loop Link Area target households: $50,000-$100,000.	Rents: $750-$1040/mo. ($1.00-$1.05 psf)	Rents: $1,000-$1,500/mo. ($1.15-$1.30 psf)	<u>Downtown:</u> 700-950 units/year <u>Replacement Bridges Only:</u> Up to 70-100 units per year for Crossroads, until all existing buildings are occupied <u>Deck and Public Space Enhancements:</u> Focus Area: 70-140 units/year, including 50-70 units in South Loop Link Area for 10 years
FOR-SALE		▪ Market is slow, at present; home prices have declined. ▪ South Loop Link Area Target Households: $75,000-$150,000.	Sales: $150,000-$250,000 ($175-$200 psf)	Sales: $250,000-$450,000 ($250-$300 psf)	
OFFICE	▪ Crossroads is not an "A" location for office space, but the South Loop Link Area could become one, with deck and public space enhancements. ▪ The greater obstacle is the downtown market in general, though it may not be as bad as it seems. - Downtown's share of regional office space it 25 percent, but its share of growth is 15 percent. - Lease rates for new suburban properties are higher than new downtown properties, driving supply outward. - Still, newer downtown properties—many of which are in Crown Center—achieve lease rates of $21-$23 *psf*, with 97% occupancy. - In the premium market, downtown is inferior to the Plaza, though new product is largely untested.		Lease Rates: $14-$17	Lease Rates: $22-$25	<u>Downtown:</u> 2.0-2.5 million s.f. over 10 years <u>Replacement Bridges Only:</u> Up to 280K for Crossroads over 5 to 10 years (or until all existing buildings are full) <u>Deck and Public Space Enhancements:</u> 560K-840K s.f. over 10 years for South Loop Link Area
RETAIL	▪ Downtown is in many ways over-retailed. ▪ Crossroad galleries happened organically and exist because of inexpensive rents and critical mass – the Truman Lid will provide minimal benefit. ▪ Every 1,000 residents in Crossroads will create demand 20,000 s.f. of retail.		Lease rates: $13-$15	Lease rate: $20	20,000 to 30,000 s.f. of new resident demand

Program Matrix

CORRIDOR CHARACTERISTICS

Several engineering and planning criteria were listed at the beginning of the design process and given as fixed conditions. These are:

- The existing retaining walls bordering I-670 on both sides will remain in their current location.
- I-670 will remain as a highway.
- Truman Road must connect to Broadway on the west and to Locust on the east.
- All four bridge locations must remain as north/south connections (the McGee Street bridge was removed and the connection eliminated).
- Grade changes must be minimized to uphold connectivity and safety.
- Existing vertical clearances must be maintained (at a minimum) between I-670 and the bottom of the existing bridges. In most cases this is 15 feet 6 inches.
- Future corridor bridge replacements should be designed to support light rail to not preclude possible future transit modes.

These fixed conditions established the framework in which all the concepts must fit to be considered feasible.

GOALS

After reviewing adverse conditions of the corridor, the Steering Committee, public participants, and the Planning Team established goals for the project that would replace the four bridges. The goals all focused around creating an open, accessible, connected urban space in the heart of the Downtown Loop and the Crossroads to incent additional development and investment. The goals (in no particular order) for the project are to:

- Maximize the City's investment in the Power & Light District, Sprint Arena, Convention Center and the Performing Arts Center.
- Blend the Downtown Loop and Crossroads neighborhoods but maintain their respective identities.
- Increase open space to serve the needs of the Downtown Loop as well as the Crossroads district. Open space should include pedestrian and bicycle connections.
- Redesign Truman Road to include more urban characteristics like Michigan Avenue in Chicago or Park Avenue in New York while accommodating long term capacity needs.
- Strengthen the connection to the east.
- Emphasize the pedestrian qualities of Walnut Street.
- Provide opportunities to increase development along Truman Road.
- Mitigate the environmental impacts of the 1-670 corridor through downtown. This includes addressing pedestrian connectivity, air pollution and noise pollution.

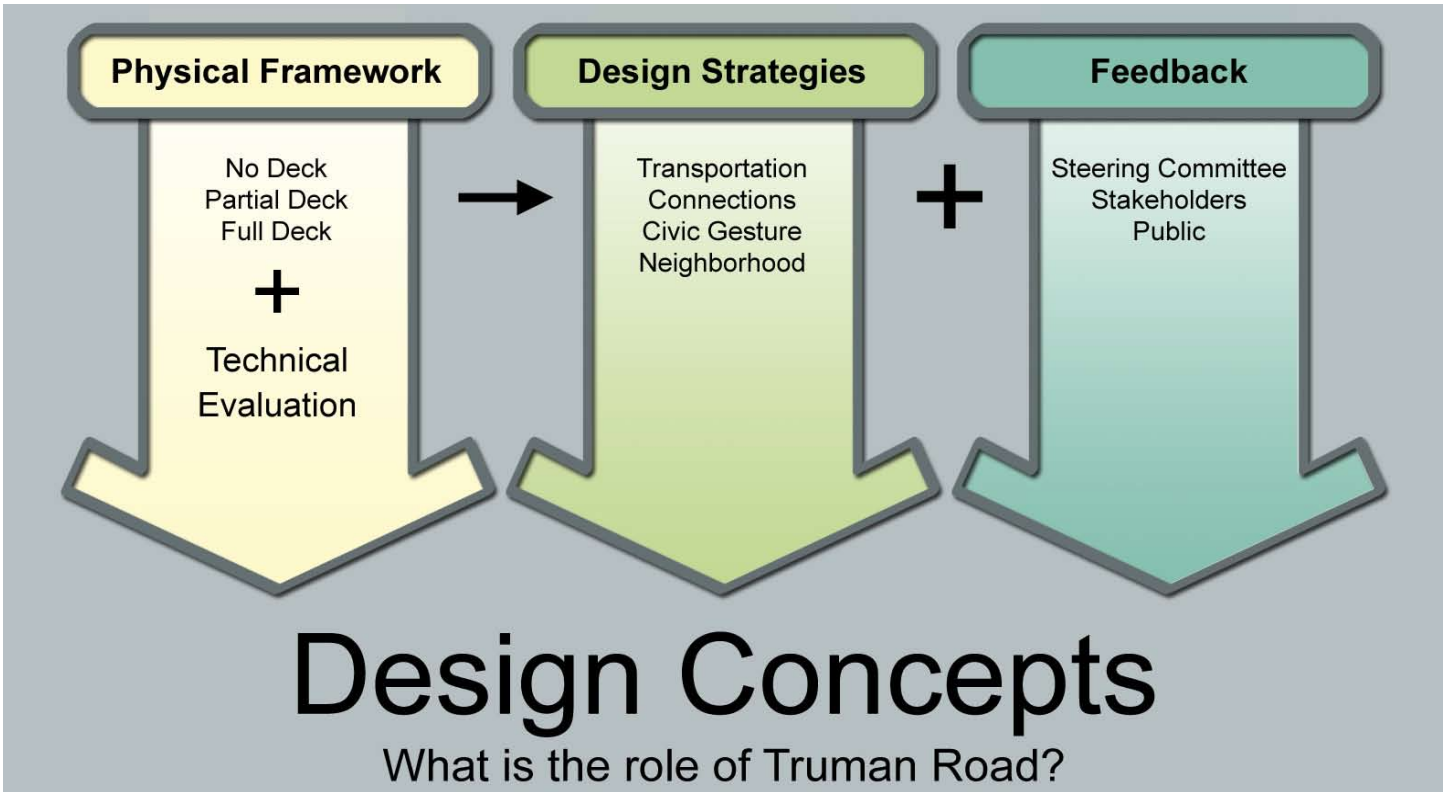
Conceptual design process

The framework through which the Planning Team reviewed and organized the design concepts changed with every adaptation of concept review. The Planning Team began the organizing the design concepts based on the physical framework. That is, if the design was of a full deck, partial deck, or no deck. When the design concepts were then refined, they were reviewed and organized by design strategy. The design strategies focused on: transportation, connections, a civic gesture, or the neighborhood. It was through reviewing the physical framework, design strategies, and feedback from the Steering Committee, stakeholders, and the public, the Planning Team arrived at the six proposed concepts. The greatest differentiating factor of the six proposed concepts was the location of Truman Road. Four concepts maintained Truman Road in its current alignment, and two concepts realigned Truman Road into a boulevard-like thoroughfare. Therefore, the six proposed concepts were organized by the location and role of Truman Road.

The following is a recap of the six proposed concepts, as presented to the Steering Committee, public and stakeholders, sorted into a summary description of how each relates to design factors that stem from the goals: road network, connectivity, real estate, mitigation and urban design. These six concepts meet the guidelines and goals for this feasible study.

Each of the following six feasible concepts assumes there will be a convention center expansion over I-670 between Wyandotte and Baltimore Streets. The Planning Team has also considered if a proposed convention center expansion is not constructed at this site. Further discussion and a sketch is located on page 152.

Note: The gray buildings shown in the following Design Concepts plan and perspective images represent buildings that are either currently approved in a development plan or buildings that are envisioned to help frame the study area (properties currently surface parking, for sale, newly available due to Truman Road realignment, etc.). Redevelopment outside of the Truman Road right-of-way is not part of this study but is examined to understand the existing conditions and realize the potential of the corridor as a whole.



Conceptual design process

ENHANCED BRIDGES

* Rebuild scenario with widened sidewalks.

Road Network
This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). There is no change to the existing street network and interstate access. This concept does not create a tunnel for Interstate 670.

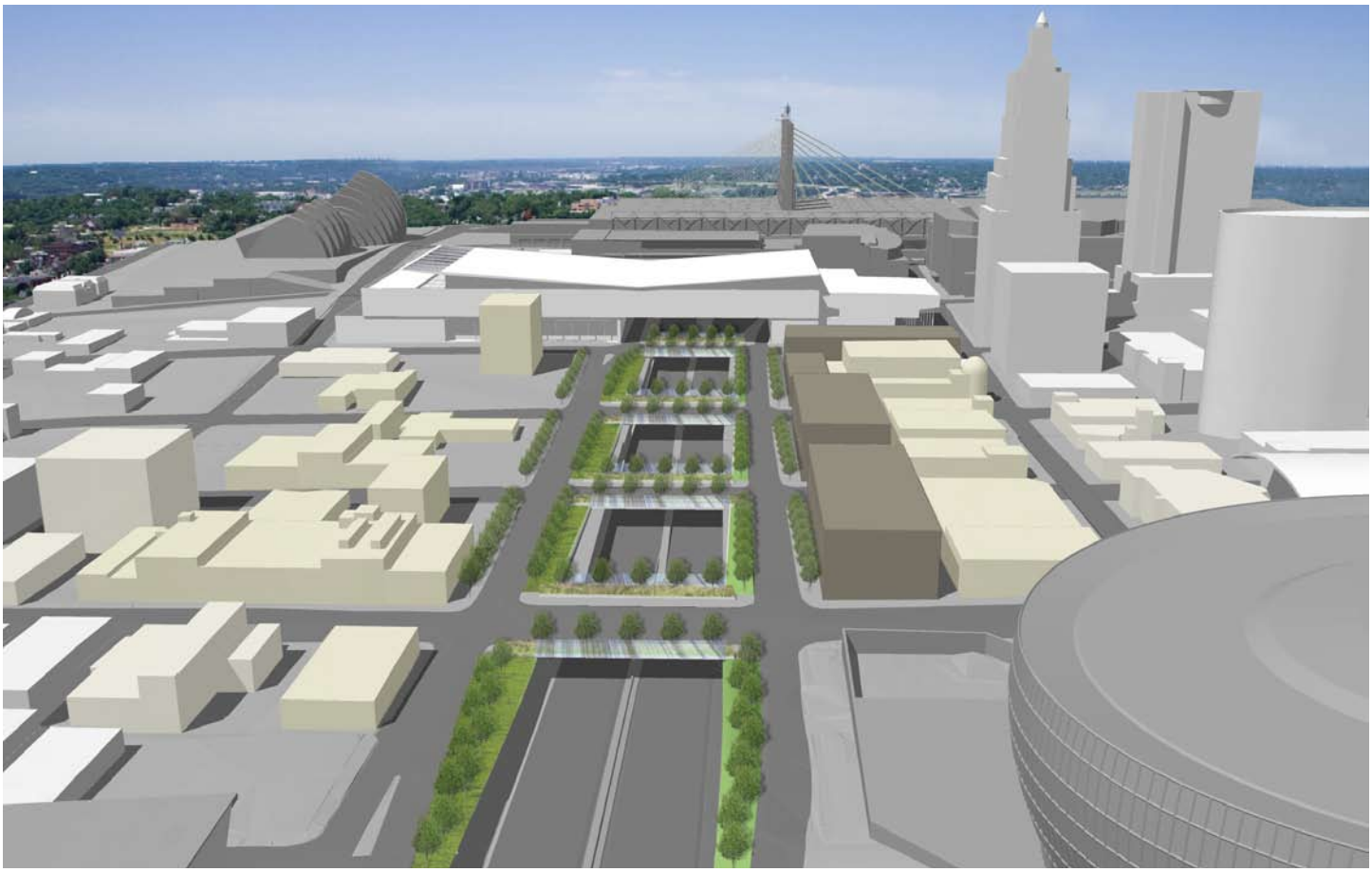
Connectivity
This concept maintains the current vehicular and pedestrian circulation patterns, only modifying the street character with enhanced streetscape amenities and wider sidewalks.

Real Estate
This concept does not create new real estate, maintaining the existing road alignment within the current right-of-way. The investment of four new bridges and modest streetscape amenities may only have a minimal effect on existing real estate.

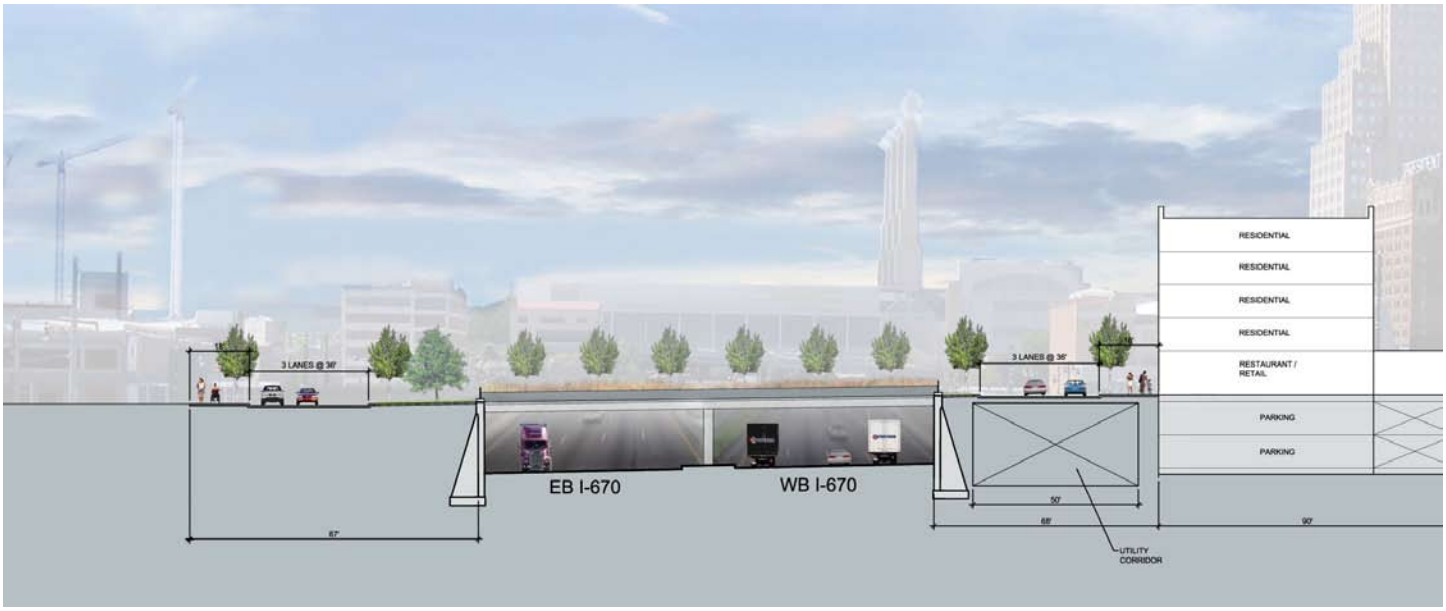
Mitigation
Wider sidewalks and landscaping on the bridges will provide minimal sound relief to the crossing pedestrian but they will not address air pollution.

Urban Design
This concept does not allow for new park space. The replaced bridges enhanced with pedestrian and streetscape treatments such as landscaping, decorative lighting, and decorative railings add an amenity to the corridor, but only minimally improve its urban design characteristics.

Enhanced Bridges Concept - Plan View



Enhanced Bridges Concept - Perspective



Enhanced Bridges Concept - Section

ENHANCED TRUMAN ROAD

* Cantilevers greenspace for an angled landscape baffle over I-670, leaving an open area above the middle of the interstate.

Road Network

This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). There is no change to the existing street network and interstate access. This concept does not create a tunnel for Interstate 670 because it provides enough openings for proper air circulation, but these same openings act as daylight shafts that will create bright spots on the interstate. The bright spots could cause visibility problems for drivers and would need additional lighting measures to even out illumination levels on the freeway.

Connectivity

This concept maintains the current vehicular and pedestrian circulation patterns, only modifying the street character with enhanced streetscape amenities. The streetscape amenities are not only located along the bridges but also along the freeway, creating a buffer for both the driver and pedestrian. This buffer is vertical, obscuring the pedestrian view through the corridor.

Real Estate

This concept does not create new real estate, maintaining the existing road alignment within the current right-of-way. The increased investment of the buffer around the edges of the bridges and interstate will provide some enhancement to the existing parcels adjacent to the corridor, primarily caused by buffering the noise pollution and additional landscaping.

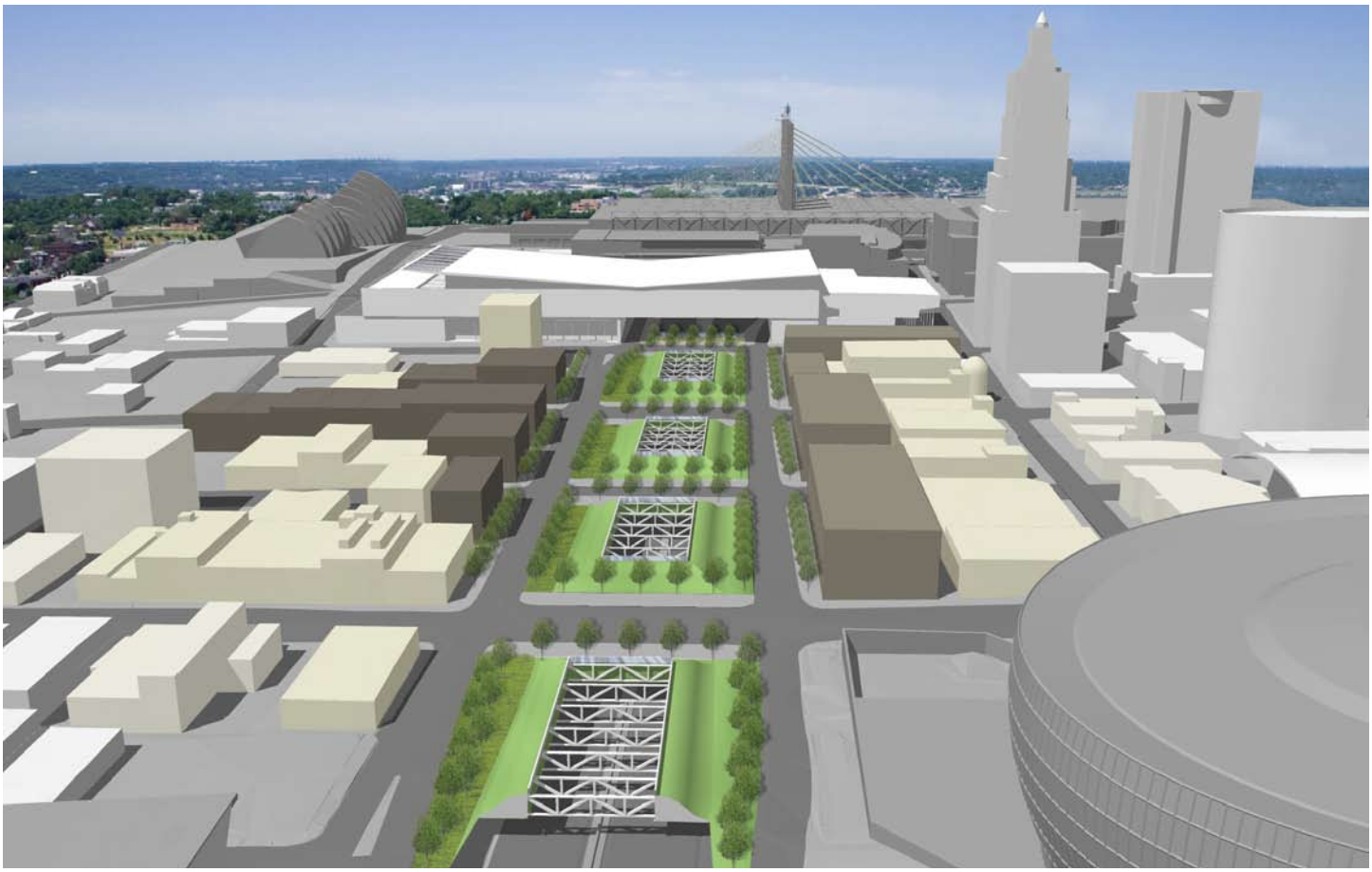
Mitigation

This concept partially reduces noise and air pollution in the corridor. Wider sidewalks and the angled landscape baffle around the interstate edges elevated approximately 12-15 feet from ground level will provide some sound relief to the crossing pedestrian and adjacent parcels, funneling both sound and air pollution upward.

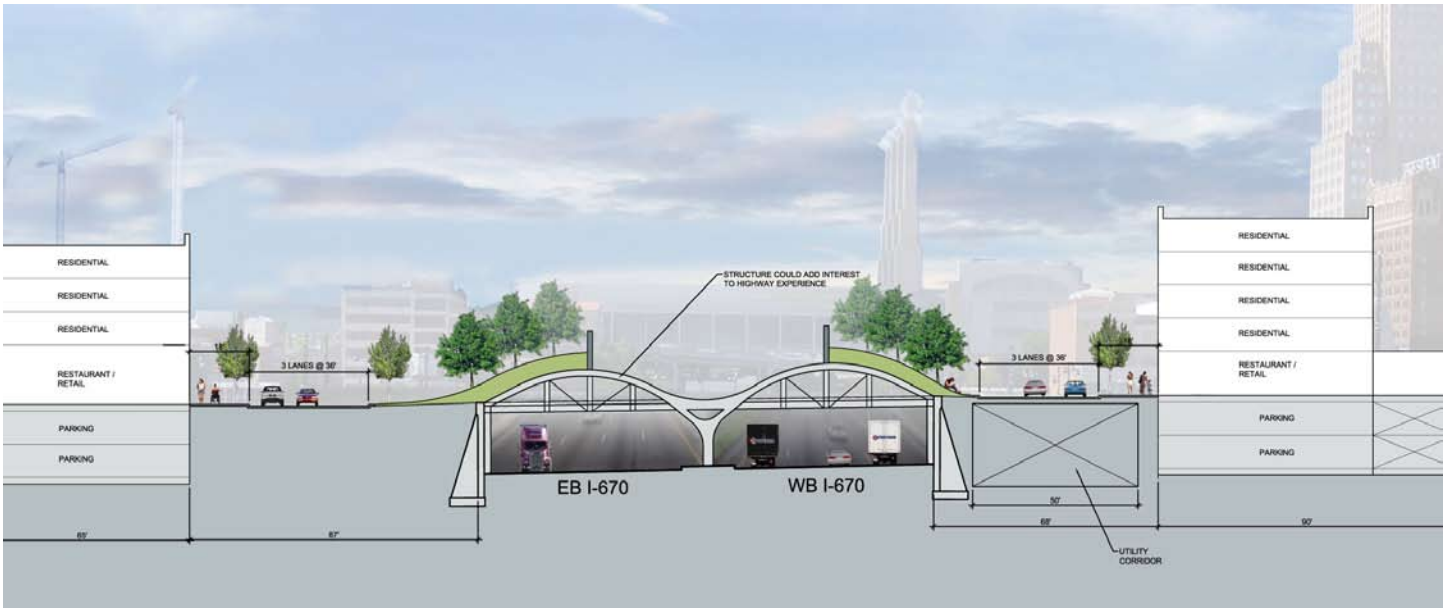
Urban Design

This concept does not allow for new park space, but the landscaped baffles over the interstate screen I-670 from pedestrians and motorists. The baffles also provide pedestrian and streetscape treatments such as landscaping, decorative lighting, and decorative railings at the top of the baffles to add an amenity to the corridor, but their height will visually separate the corridor which may not be a desirable urban design characteristic.

Enhanced Truman Road Concept - Plan View



Enhanced Truman Road Concept - Perspective



Enhanced Truman Road Concept - Section

WALNUT DECK

* Creates a park over I-670 between Main Street and Grand Boulevard.

Road Network
This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). There is no change to the existing street network and interstate access. This concept creates a tunnel between Main and Grand, requiring the relocation of the utility bridge east of Main.

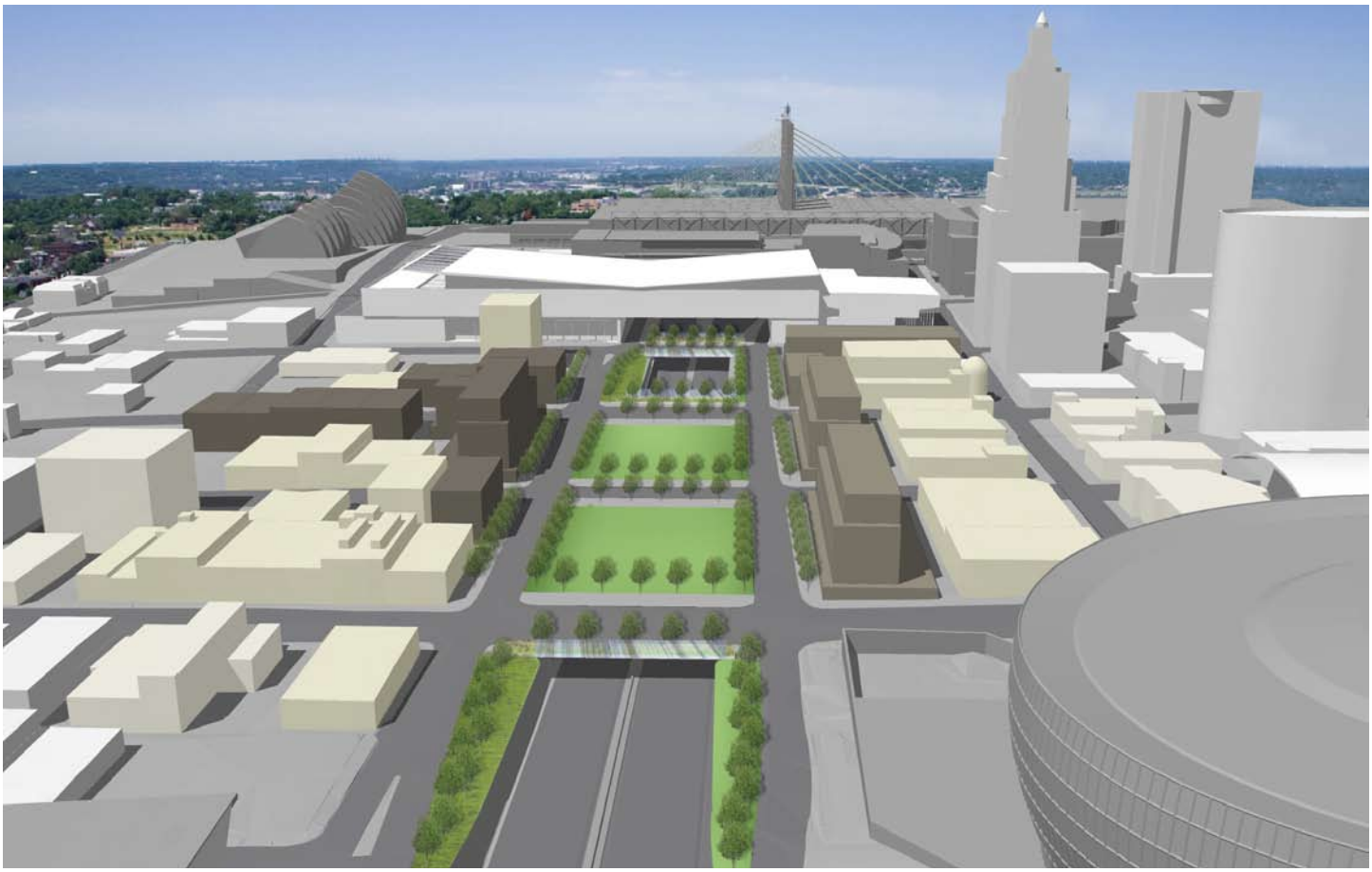
Connectivity
This concept maintains the current vehicular and pedestrian circulation patterns; the street character is modified with enhanced streetscape amenities. Additional pedestrian enhancements and amenities are focused along Walnut, creating a hierarchy than designates Walnut as a pedestrian-priority street.

Real Estate
This concept does not create new real estate, maintaining the existing road alignment within the current right-of-way. The new park space over the interstate is not considered "new" real estate due to the restrictions of use and ownership/user rights in interstate airspace. The decking between Main and Grand does provide significant enhancement to those parcels directly adjacent to the investment because of the noise and air pollution mitigation as well as the creation of a new park amenity in the corridor.

Mitigation
This concept eliminates the noise and air pollution of the interstate between Main and Grand. However, if not properly treated, the noise and air pollution could be greater to the west of Main Street and east of Grand Boulevard. Other locations along the corridor are still exposed to the effects of I-670, but the wider sidewalks and landscaping on the bridges will provide minimal sound relief to the crossing pedestrian.

Urban Design
This concept allows for two blocks of new park space while limiting the length of the deck to minimize the tunnel characteristics of the interstate. The park space and enhanced pedestrian accommodations connect the Crossroads and to the Power & Light District. The replaced bridges are enhanced with pedestrian and streetscape treatments such as landscaping, decorative lighting, and decorative railings.

Walnut Deck Concept - Plan View



Walnut Deck Concept - Perspective

Walnut Deck Concept - Section

EXISTING TRUMAN ROAD

* Creates a park over I-670 between Baltimore Street to Grand Boulevard.

Road Network

This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). There is no change to the existing street network and interstate access. This concept creates a tunnel between Baltimore and Grand, requiring the relocation of the utility bridge east of Main.

Connectivity

This concept maintains the current vehicular and pedestrian circulation patterns, only modifying the street character with enhanced streetscape amenities. Extensive decking over the interstate maximizes accommodations for pedestrian connections between the Crossroads and the Downtown Loop.

Real Estate

This concept does not create new real estate, maintaining the existing road alignment within the current right-of-way. The new park space over the interstate is not considered "new" real estate due to the restrictions of use and ownership/user rights in interstate airspace. The decking between Baltimore and Grand does provide significant enhancement to those parcels directly adjacent to the investment because of the noise and air pollution mitigation as well as the creation of a new park amenity in the corridor.

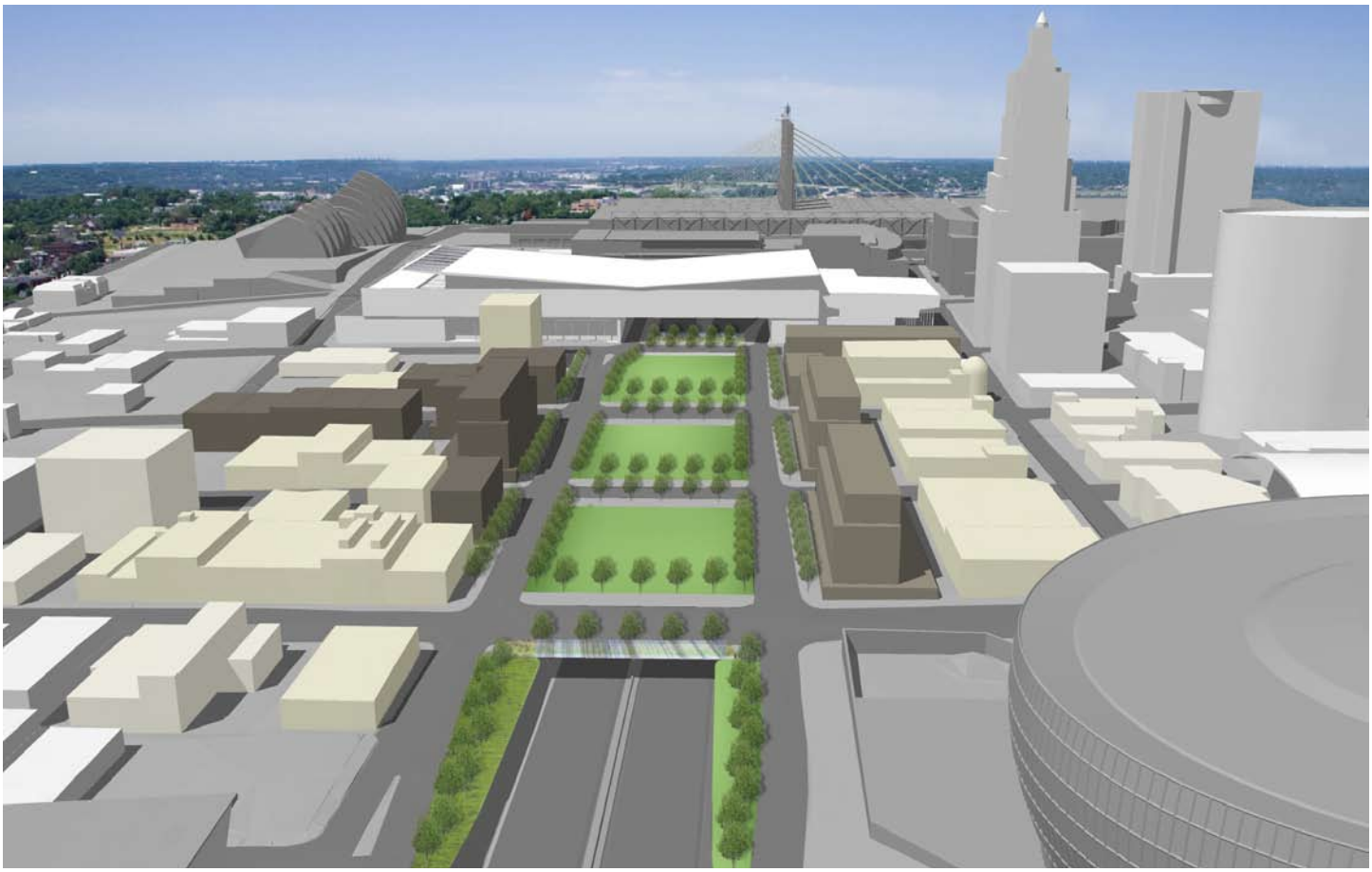
Mitigation

This concept eliminates the noise and air pollution of the interstate between Baltimore and Grand. However, if not properly treated, the noise and air pollution could be greater between the proposed park and convention center and east of Grand Boulevard.

Urban Design

This concept allows for three blocks of new park space over the interstate. The park space and enhanced pedestrian accommodations connect the Crossroads and to the Power & Light District while setting up a civic gesture to Bartle Hall. This concept keeps the Downtown Loop and Crossroads as separate districts while joining them with the park amenity.

Existing Truman Road Concept - Plan View



Existing Truman Road Concept - Perspective

Existing Truman Road Concept - Section

REALIGNED SOUTH TRUMAN BOULEVARD

(The term "boulevard" is used as an urban design classification, not the standard established by the KCMO Parks and Recreation Department)

* Realigns the Truman Road one-way pairs to a boulevard-like roadway along the southern right-of-way boundary. A park is then created over I-670 and in the existing westbound Truman Road right-of-way.

Road Network

This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). The existing street network is altered, combining Truman Road and aligning it to the existing eastbound Truman Road alignment to simplify traffic movements. Truman Road, in this instance, is more aligned with the historical 15th Street alignment and makes a more direct connection to the east. This results in the removal of the eastbound I-670 on-ramp at McGee Street. It also requires a new access route from the westbound I-670 off-ramp at Locust. This concept creates a tunnel between Baltimore and Grand, requiring the relocation of the utility bridges east of Main and between Grand and Oak.

Connectivity

This concept alters vehicular circulation patterns by combining Truman Road. North-south pedestrian connectivity improves because the number of street crossings is reduced. The extensive decking over the interstate maximizes accommodations for pedestrian connections between the Crossroads and the Downtown Loop.

Real Estate

Up to approximately 90 feet of land is captured from the existing Truman Road southern right-of-way boundary to the I-670 southern retaining wall. Approximately 20 feet should be designated for a utility corridor, and assuming the realigned Truman Road is constructed above the utility corridor, up to 70 feet of "new" buildable area is left adjacent to the new parkway. The new park space over the interstate is not considered "new" real estate due to the restrictions of use and ownership/user rights in interstate airspace. The decking between Baltimore and Grand does provide significant enhancement to those parcels directly adjacent to the investment because of the noise and air pollution mitigation as well as the creation of a new park amenity in the corridor. The real estate directly adjacent the new roadway could also benefit by having an address on the new urban parkway.

Mitigation

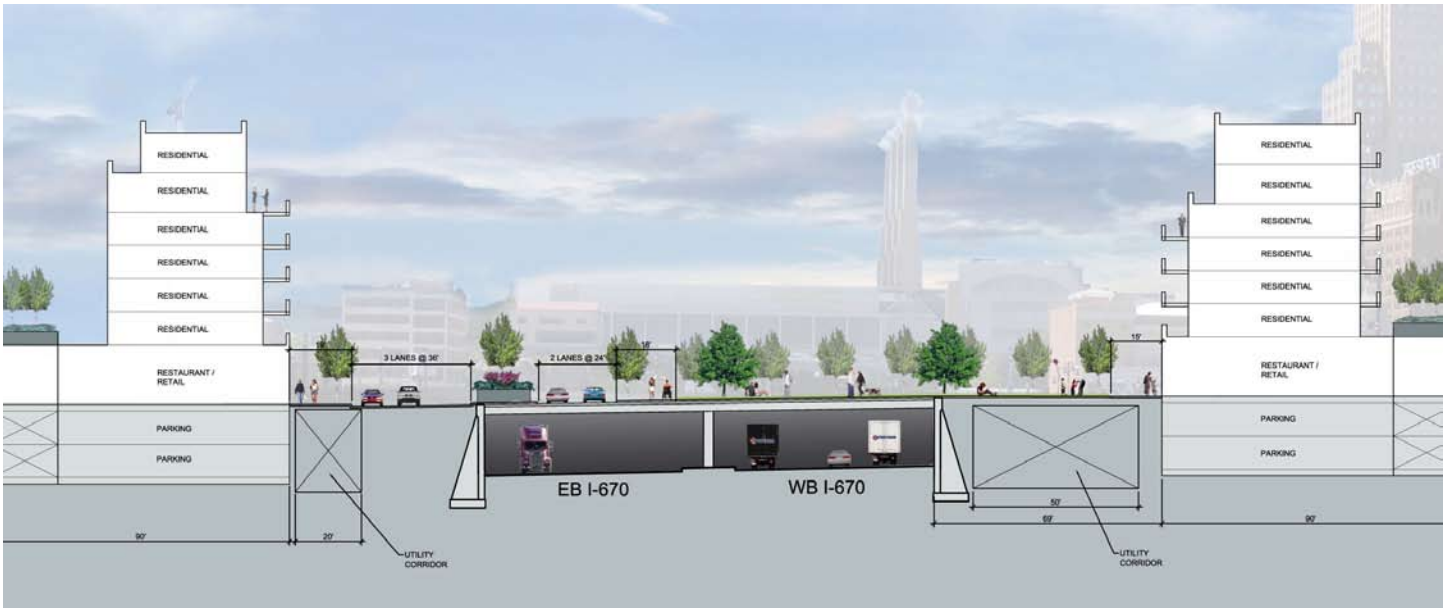
This concept, like the previous, removes the noise and air pollution of the interstate between Baltimore and Grand. Both pedestrians and the adjacent land parcels benefit from the reduced noise and air pollution levels along the corridor. However, if not properly treated, the noise and air pollution could be greater between the proposed park and convention center and east of Grand Boulevard.

Urban Design

This concept allows for nearly three blocks of new park space both on the vacated portion of the existing westbound Truman Road alignment and over the interstate. The park space is adjacent to the Power & Light District with development parcels adjacent to the park. Truman Road is reconfigured as an urban parkway with a landscaped median.

Realigned South Truman Boulevard Concept - Plan View

Realigned South Truman Boulevard Concept - Perspective



Realigned South Truman Boulevard Concept - Section

REALIGNED NORTH TRUMAN BOULEVARD

(The term "boulevard" is used as an urban design classification, not the standard established by the KCMO Parks and Recreation Department)

* Realigns the Truman Road one-way pairs to a boulevard-like roadway along the northern right-of-way boundary. A park is then created over I-670 and in the existing eastbound Truman Road right-of-way.

Road Network

This concept includes the replacement of four bridges in the corridor (Baltimore, Main, Walnut, and Grand). The existing street network is altered, combining Truman Road and aligning it to the north. This alignment maintains connections to the eastbound I-670 on-ramp at McGee Street for interstate access, and may act as a traffic calming mechanism as vehicles enter the corridor. A tunnel is created between Baltimore and Grand, requiring the relocation of the utility bridges east of Main and between Grand and Oak.

Connectivity

This concept alters vehicular circulation patterns by combining Truman Road. North-south pedestrian connectivity improves because the number of street crossings is reduced. The extensive decking over the interstate maximizes accommodations for pedestrian connections between the Crossroads and the Downtown Loop.

Real Estate

Up to approximately 90 feet of land is captured from the existing Truman Road southern right-of-way boundary to the I-670 southern retaining wall. Approximately 20 feet should be designated for a utility corridor, leaving up to 70 feet of "new" buildable area adjacent to the proposed new park over I-670. The new park space over the interstate is not considered "new" real estate due to the restrictions of use and ownership/user rights in interstate airspace. The decking between Baltimore and Grand provides significant enhancement to those parcels directly adjacent to the investment because of the noise and air pollution mitigation as well as the creation of a new park amenity in the corridor. The parcels directly adjacent the new roadway could benefit by having an address on the new urban parkway.

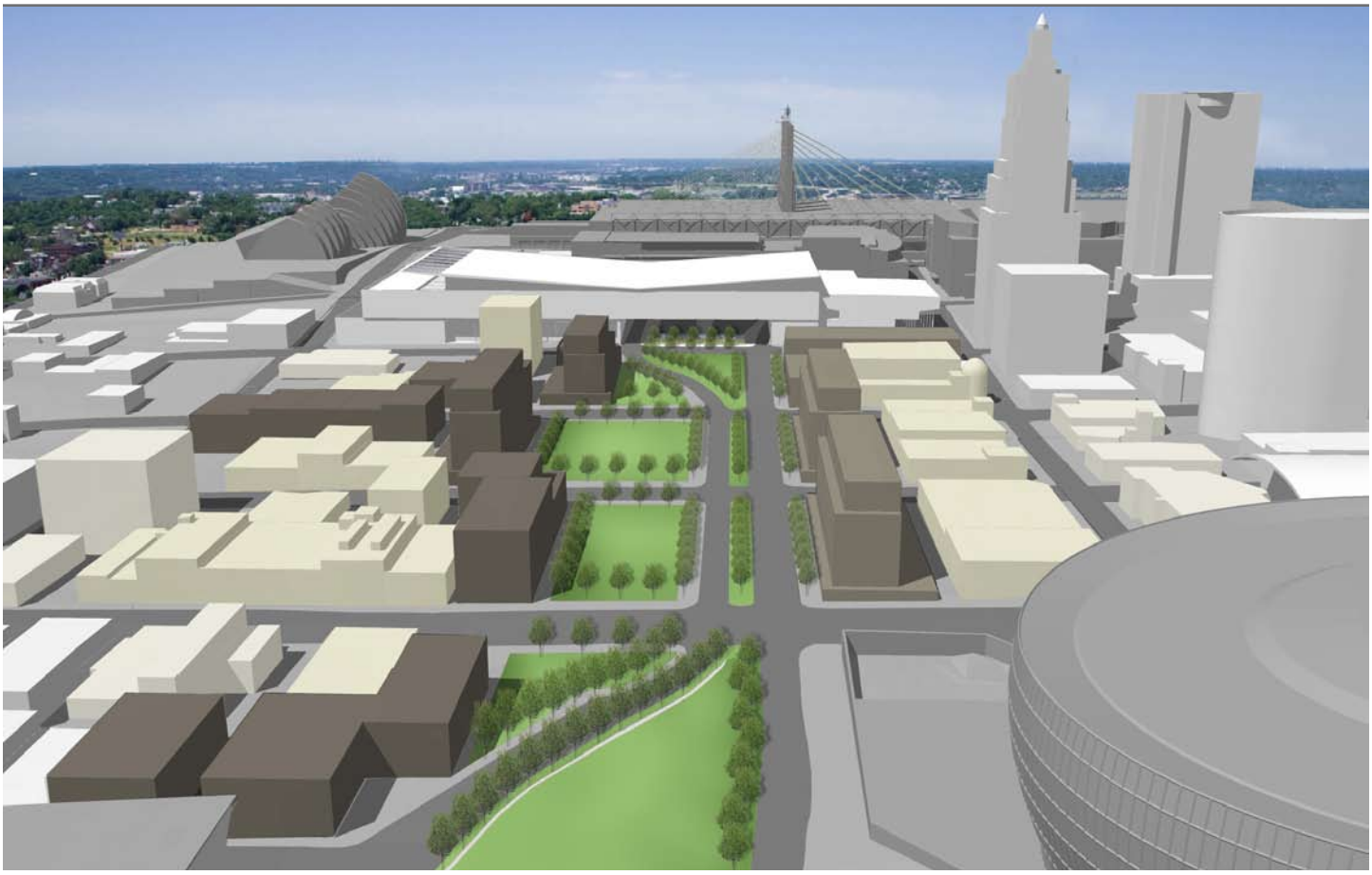
Mitigation

This concept eliminates the noise and air pollution of the interstate between Baltimore and Grand. Both pedestrians and the adjacent land parcels benefit from the reduced noise and air pollution levels along the corridor. However, if not properly treated, the noise and air pollution could be greater between the proposed park and convention center and east of Grand Boulevard.

Urban Design

This concept allows for nearly three blocks of new park space both on the vacated portion of the existing westbound Truman Road alignment and over the interstate. The park space is adjacent to the Power & Light District with development parcels adjacent to the park. Truman Road is reconfigured as an urban parkway with a landscaped median.

Realigned North Truman Boulevard Concept - Plan View



Realigned North Truman Boulevard Concept - Perspective

Realigned North Truman Boulevard Concept - Section

COST COMPARISON

The six concepts were not only evaluated based on their potential to minimize the impacts of the interstate to the corridor, they were also reviewed for high-level cost comparisons.

As can be expected, the concepts with more decking area over the interstate are more costly than those with less intensive design solutions. The most expensive solutions, those that realign Truman Road, not only have costs associated with decking over the interstate but also require infrastructure improvements related to the roadway realignment.

Below is a summary breakdown of the major items covered in each category along with a diagram comparing the costs for the design concepts in 2009 dollars, with a planning-level (30%) contingency.

Utilities / Roadway

- Relocated underground utilities
- Relocated utility bridges
- Roadway construction costs associated with Truman Road improvements (curb and gutter, crosswalks, minimum sidewalks, traffic signals, street lights)

Bridges / Decks

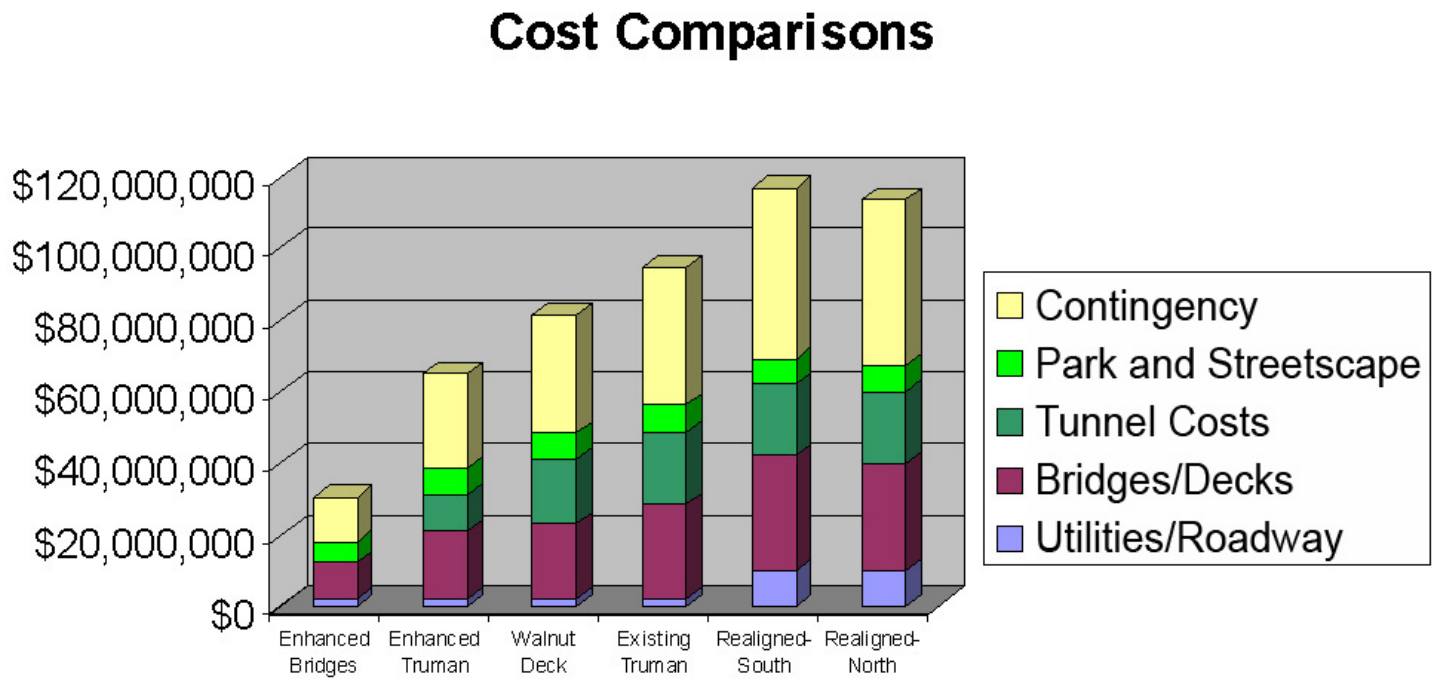
- Bridge replacement for Baltimore, Main, Walnut, and Grand
- Decking costs associated with each concept, including structural steel, concrete decking and associated pier supports

Tunnel Costs

- Ventilation system costs
- Lighting system costs
- Electrical system costs
- Signage / KC Scout system costs
- Tunnel fireproofing

Park / Streetscape

- Deck soil medium - 15" depth
- Site furnishings and amenities (benches, trash receptacles, bike racks, tree grates, decorative lighting)
- Landscaping
- Hardscaping (decorative paving, enhanced sidewalks)
- Public art



RECOMMENDED APPROACH

The Planning Team presented the six concepts through meetings involving the Steering Committee, Public, City Staff, and other stakeholders. The discussion and feedback recorded from those meetings led to the filtering of the six concepts to one recommended approach: a combined Truman Road, tunnel, and active park space.

RECOMMENDATION: Pursue the next phase of environmental analysis for a concept that decks over I-670 with a combined Truman Road alignment and public park space creating a tunnel for the interstate.

Variations on the approach were discussed and preferences were split between a northern and southern road alignment through the corridor. This feasibility study evaluated all of the conditions that would need to be addressed to complete a viable infrastructure improvement within the study area. These conditions include:

- Creating a functional tunnel and meeting life safety codes.
- Identifying a structural system that will support a park/open space and maintain existing grades above each end of the tunnel.
- Addressing the adverse environmental conditions that were created from the interstate highway.
- Minimizing utility impacts.
- Minimizing traffic and roadway impacts while maintaining capacity and functionality of Truman Road.
- Enhancing market opportunities within the corridor.
- Enhancing urban design opportunities within the corridor.

This section will first outline the tunnel features that impact the above ground recommendations. The above ground concepts will then be described. The benefits of moving forward are then summarized along with cost and phasing recommendations.

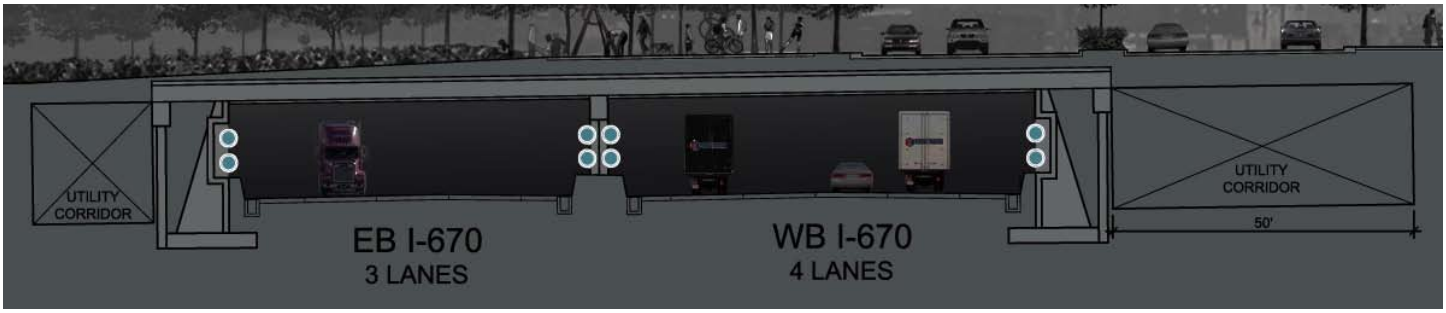
CREATING A FUNCTIONAL TUNNEL

Ventilation

As mentioned in the Technical Evaluation section in this report, the proposed decking solution in the recommended concepts will require the ventilation system to be common throughout the tunnel. It would be required to control the air quality within the tunnel, mainly focusing on carbon monoxide levels from exhaust of all vehicles and visibility due to diesel engine exhaust.

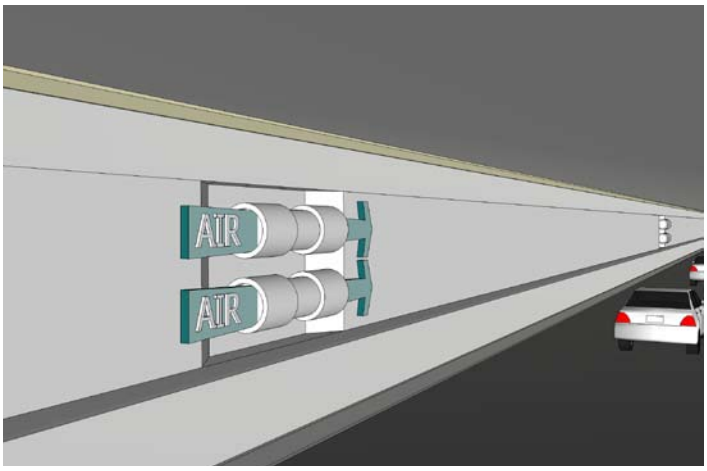
The tunnel length designed is likely too long to rely on natural ventilation or the natural piston effect from moving traffic, especially during slow or stopped traffic conditions. The minimum clear height of the tunnel is around 15 feet over the existing freeway. This limited clearance does not allow for the addition of supply or exhaust air ductwork below the deck level. Aesthetic concerns of the park space above the tunnel dictate the equipment reside along the shoulders and median of I-670. The tunnel created throughout the I-670 corridor is anticipated to contain a divider wall between directional lanes, creating two one-way tunnels.

Longitudinal ventilation is recommended for the tunnel in this approach. This method would rely on jet fans installed within the tunnel structure, along the shoulder and median, to generate and maintain the required air velocity. It is estimated that a total of



Section showing tunnel and jet fan locations

120,000 cfm of fresh air would need to enter one end of each tunnel and exit the other end to maintain the desired levels of contaminant concentration.



Jet fans installed within the tunnel structure

Jet fans would be located at the tunnel inlet and outlet, as well boosters spaced periodically throughout the length of the tunnel. Fans can be cycled on and off, as needed, to control and limit the monitored vehicle emission concentrations.

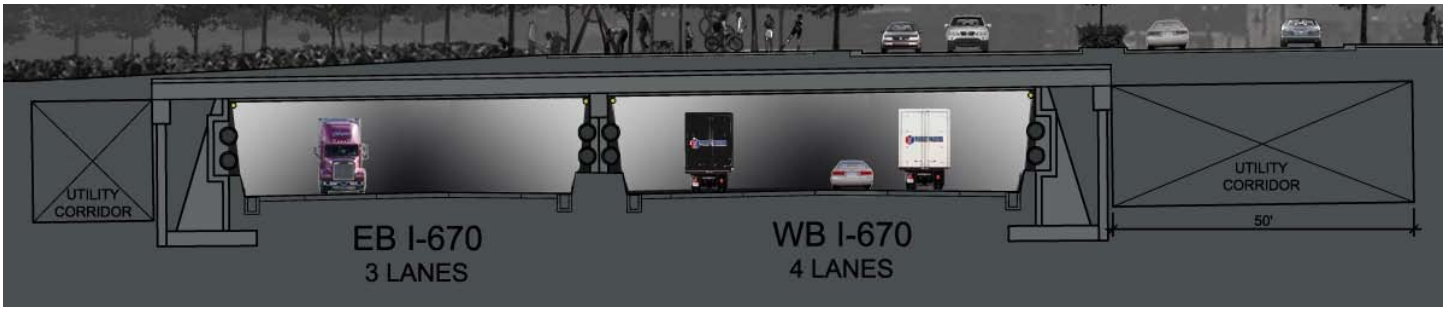
The fans would be reversible to change the airflow direction for the control of smoke and fire and for varying meteorological conditions. The longitudinal ventilation system utilized for general ventilation would be used for fire and smoke control, also. With the reversible jet fans, the direction of the airflow would be determined in order to most effectively remove the heat and smoke from within the tunnel. The gradient of the existing roadway places the lowest elevation near the middle of the proposed tunnel, with each end of the tunnel at a higher elevation, adding some buoyant effect to the heat and smoke which would likely aid in their removal out either end of the tunnel. The emergency ventilation conditions would need to be modeled in the design of the longitudinal ventilation system. All components of the ventilation system would be required to be on an emergency backup power source.

Lighting

With the tunnel recommended, the area under the Convention Center will no longer be categorized as an underpass, or short tunnel, but as a long tunnel. The lighting under the Center will need to be redesigned, and the existing daylighting levels in the existing tunnel will need to be increased to meet the recommended levels of Table 3 of *ANSI RP-22*, the standard for tunnel lighting.

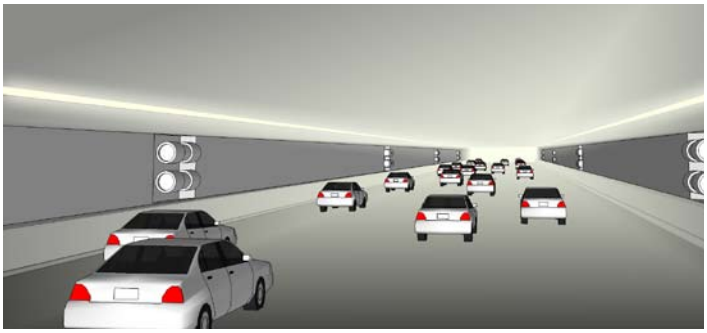
It is expected that a public entity will now be responsible for monitoring the lighting, ventilation and security systems, and for providing power to all equipment.

Similar to the existing Convention Center tunnel, the new tunnel stretching to the east will need daylighting, sensors and light level controls. The luminaires should be high pressure sodium because of their efficiency and short strike time, as well as for consistency in light quality with relation to the existing tunnel. The luminaires should be controlled by lighting contactors or controllers, a PLC, and photo sensors located at the entrances of the tunnel. As recommended by *ANSI RP-22*, the PLC will increase/decrease luminance levels as the ambient light levels increase/decrease outdoors. Zones will be established to allow the eyes to adapt to the lower luminance as a driver enters the tunnel, and then again to allow the eyes to adapt to higher luminance as the driver prepares to leave the tunnel. All lighting circuits should be electronically monitored to provide maintenance alerts when more than 20% of the lamps in that circuit have failed.



Section showing a redesigned lighting system that will need to meet recommended levels

Because of its length, it is recommended that the power and control systems for the tunnel be divided into physical sections in order to provide efficient power distribution and lighting control. Each section would include power distribution equipment, lighting control equipment and a PLC to coordinate lighting control and communication. This report assumes 480V rated luminaries will be used because they allow longer and smaller gauge circuits - a more economical solution to lower voltages. The tunnel (including the Convention Center tunnel) will need to be divided into approximately seven electrical and lighting distribution sections.



A consistent light level is needed in the proposed tunnel

Impact of recommended concepts:

- The responsibility to power, light and monitor the existing tunnel will be turned over to a public entity.
- Light levels in the existing tunnel will need to be redesigned and increased to *RP-22* recommended levels.
- Light levels in the tunnel formed to the east of Bartle Hall will need to meet *RP-22* recommended levels.

References:

- *Guidelines for Tunnel Lighting Design – Resources*
- *ANSI/IES RP-22-05, "Recommended Practice for Tunnel Lighting"*
- *FHWA publication "Road Tunnel Design Guidelines"*
- *NFPA 502, "Standard for Road Tunnels, Bridges, and Other Limited Access Highways"*

Electrical System

Additional lighting, tunnel ventilation and traffic control signage is required under NFPA 502, so this report will assume that the responsibility for all tunnel systems will fall to a public entity. However, because of its responsibility for the safety of the Convention Center and its occupants, it is possible that the Convention Center's security staff would still want to be the main entity responsible for initiating emergency responses and the Center would want to provide power and emergency power for lighting and security cameras. Further coordination will need to take place between the City and MoDOT to agree on a single entity to monitor security cameras within the tunnel.

Daytime light levels are being used to estimate power requirements since this is the highest level required. A tunnel from Broadway to Oak is used to provide the most conservative values. It is estimated that the lighting load will be 2380 kW. Mechanical estimates for ventilation include 108 fans at 30 horsepower each, or approximately 3570 kVA. It is estimated that the tunnel will require seven power distribution systems each rated at 1200A.

Security cameras and signage have not been included in this estimate since their power use is negligible.

Impact of recommended concepts:

- The power to the existing tunnel will be turned over to the public utility, KCP&L.
- It is recommended that emergency power be provided by automatic switching to a second KCP&L substation.
- The power requirements in the existing tunnel section will increase substantially to bring luminance to full recommended levels as well as to provide ventilation.
- The electrical equipment for each tunnel section will need to be mounted in an electrical room built into the opposite side of the tunnel's retaining wall, or above the tunnel, at street level.
- It is estimated that the tunnel will require 7 segments of distribution equipment, each rated 1200A.

References:

- *FHWA publication "Road Tunnel Design Guidelines"*
- *NFPA 502, "Standard for Road Tunnels, Bridges, and Other Limited Access Highways"*

Life Safety and Codes

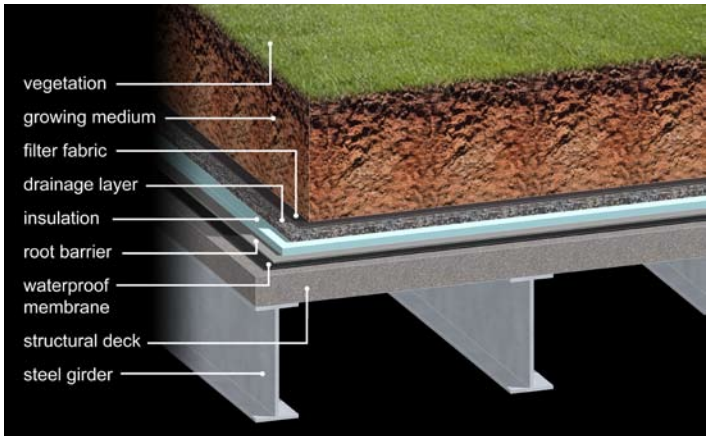
The recommended concepts create a Category B/C tunnel. The recommendations stated for this type of tunnel regarding life safety and codes in the Technical

Evaluation section should be followed during the design and construction phases of the chosen concept. Please refer to that section (page 114) for a full description of the recommendations.

IDENTIFYING A STRUCTURAL SYSTEM

The specific structural design scenarios are described under each concept. The overall parameters for the structural design are listed below.

In addition to the vehicular load cases of AASHTO HL-93 and a Light Rail Vehicle for the roadway bridges, each deck segment that has green space has been designed for 3 feet of soil, 100 pounds per square foot of pedestrian live loading as well as an HS-10 service truck (typical light duty park maintenance truck). Existing minimum vertical clearances over I-670 are maintained throughout the tunnel.



Landscaped deck structural section

The foundation system for the proposed structures will not impact the existing counterfort retaining walls. Instead, each girder will continue approximately 4' past the existing retaining wall and rest on cast in place pier caps that are supported by driven piles or drilled shafts. Although this will require the top of the existing walls to be modified or reduced in height, this new abutment will act as an independent system and the new structural loads will not impact the existing walls, similar to the design used at Wyandotte Street.

The center supports proposed for the median of I-670 are anticipated to be 4' diameter columns at approximately 20'-0" spacing with 4'-6" x 4'-6" capbeams. Due to fire protection requirements, an 18" minimum thickness wall will be constructed between the faces of the columns.

ADDRESSING ADVERSE ENVIRONMENTAL IMPACTS

Noise

The recommended concepts include decking over the interstate for much of the study corridor. Any roadway improvements for a federally-funded project will be required to complete a Traffic Noise Model analysis; however, a few conclusions can be deduced in consideration of the recommended concepts.

As mentioned in the technical evaluation section of this report, the primary source of noise for the study area is Interstate 670. The peripheral roadways contribute to the overall noise, but only slightly. With existing sound levels exceeding those deemed generally unacceptable by HUD for development sites, enclosing the interstate is a successful approach for decreasing the sound that is experienced outside of the enclosure (NOTE: No HUD development is anticipated; the use of HUD noise standards is used solely for comparison).

A tunnel condition for I-670 requires several fans, creating multiple new noise sources. It was determined the fans, which are fitted with simple tubular silencers on either side of the fan, would not create additional noise impacts above the tunnel at the Truman Road street level.


The Truman Road corridor environment is greatly impacted by the noise of vehicles traveling along I-670

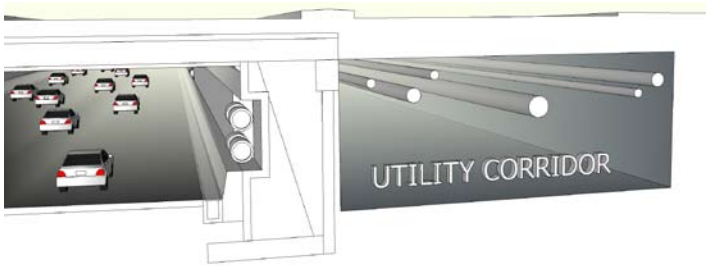
In consideration of the recommended concepts, the noise emanating from the interstate will be most noticeable on either end of a tunnel. Occupants of any building located adjacent to a section of the interstate that is not enclosed will experience considerably louder road-borne noise than occupants in a building next to an enclosed section. Additional special construction materials may be required for these sites to buffer the sound from indoor environments. Measures such as sound wall technology and other noise-dampening techniques may be required to improve the street level pedestrian environment. Overall, the recommended concepts represent dramatically improved noise levels for the surrounding properties and pedestrian environment.

Air quality

The emissions from fuel combustion by the vehicles in the tunnel would be concentrated and emitted at the entrance and exit of the tunnel, with the fans blowing the emissions out the exits. A formal testing and analysis of the existing air quality levels should be performed during the preliminary design phase to ensure that the concentration of the emissions at the entrance and exit of the tunnel will not exceed the NAAQS or any other health-based standards. The formal testing and analysis will also ensure that there is enough air flow through the tunnel to fully disperse the emissions at the entrance and exit of the tunnel, resulting in acceptable air quality along I-670.

MINIMIZING UTILITY IMPACTS

The recommended concepts do not require major utility relocations in westbound Truman Road. However, there are utilities located in eastbound Truman Road that will require utility relocations and/or upgrading. The following is a brief discussion of specific utility adjustments and necessary relocations.



Domestic Water

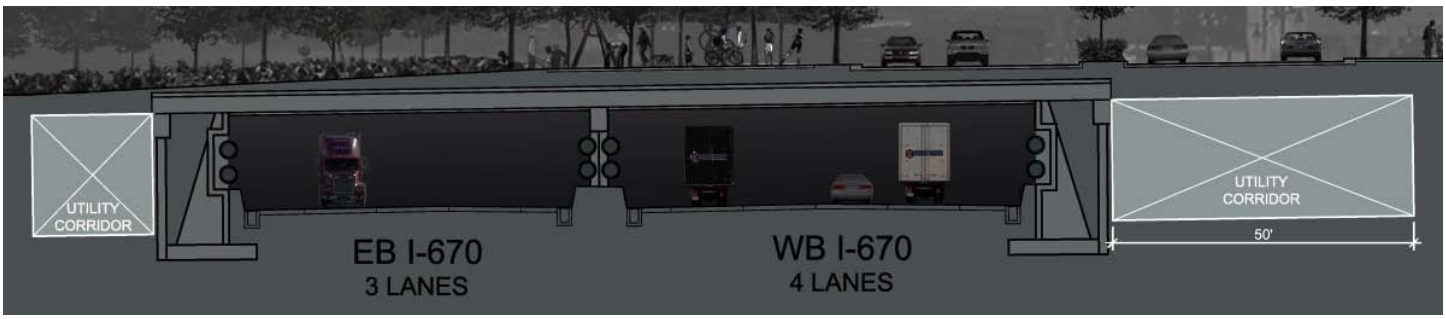
The existing 24-inch transmission main along eastbound Truman Road between Baltimore Avenue and Grand Boulevard may need to be relocated to accommodate the new decking and any proposed building parcels within the current Truman Road right-of-way.

Additionally, the proposed building parcels throughout the corridor will require new domestic water service connections. While the specific demands are not known at this time, the sizes of piping appear to be adequate for the potential development.

Sanitary Sewer

It is assumed that there will be no appreciable lowering of the profile grade on I-670. Therefore, there should be no adverse impacts from construction of the deck at Walnut Street.

There is a small segment of existing sanitary sewer along eastbound Truman Road from Main Street to the alley east of Main that may need relocation.



Section showing proposed utility corridor locations

Storm Sewer

The capacity of the existing storm system for Truman Road should be adequate in localized conditions for all potential development along the project corridor. The curb inlets and storm sewer pipe along eastbound Truman Road will require relocation from Wyandotte Street to Oak Street in all concepts, with accommodations for increased capacity if the westbound lanes are moved to the south as in Concept 2.

Natural Gas

The construction of a full deck spanning across the interstate will not impact the major gas main due to the existing depth of the utility.

Records indicate that there currently are no mains located within project corridor that will need relocation. However, the 10-inch gas main running north-south along the east side of Baltimore Avenue will need to be extended to service proposed building parcels. It appears adequate gas mains are available for service.

Underground Electric

The decoratively clad utility bridge that spans across I-670 at McGee will either need to be worked into the structural design of the deck span across McGee or otherwise relocated.

There is approximately 3,200 feet of underground electrical conduit currently located along eastbound Truman Road. Much of this can be consolidated and relocated behind the I-670 retaining wall. The existing street lighting will also need to be relocated to the proposed road alignment, which may require expansion of the existing facilities.

Finally, KCP&L may have to add additional cables to their duct banks to allow for expansion of their facilities to accommodate new development along the corridor.

Telecommunications

Construction of the Sprint Arena and the Power and Light District resulted in relocation and/or expansion of major telecommunications facilities located in westbound Truman Road. The preferred concepts allow for those facilities to remain.

In 2007, AT&T bored under I-670 adjacent to one of its major interchanges to place 250 feet of 36-inch steel casing 18 feet below the existing interstate at approximately 115 feet east of Locust. The construction of a full deck spanning across the interstate will not impact the AT&T utilities east of Locust due to the existing depth of the utility.

However, there is a major AT&T duct bank crossing over I-670 approximately 50 feet east of Main Street that carries 28 conduits housed in a concrete utility bridge. This is a joint "Axon" duct/manhole system that runs north-south along Main Street. The utility bridge will need to be worked into the structural design of the deck span across Main Street or otherwise relocated. There is also a fiber optic duct bank that crosses Walnut Street from westbound Truman Road to eastbound Truman Road that may need to be relocated or incorporated into the deck design.

Various utilities may have to add additional cables to their duct banks to allow for expansion of their facilities to accommodate new development along the corridor.

MINIMIZING TRAFFIC AND ROADWAY IMPACTS

Traffic analysis focused on understanding Truman Road traffic patterns and changes in the existing roadway network. Two primary changes were analyzed:

- A reduction of lanes on the existing Truman Road alignment.
- Relocating North Truman Road or South Truman Road to a combined roadway.

A summary of the analysis and conclusions are provided in this section under each concept. For a full description please refer to the traffic study located in the appendix.

Based on the Steering Committee's recommendation of a combined roadway, the two road alignment options were further studied.

Both the North and South options utilize an angled roadway used to combine Truman. This is necessary to facilitate smooth vehicular movements along Truman and connect into the existing road network; analysis concluded that a perpendicular intersection would result in unacceptable traffic impacts. Below is a list of operational characteristics envisioned for the combined roadway option:

- Parkway/Boulevard Functional Class
- 35 mph posted speed
- 2-lanes with on-street parking during off-peak
- 3-lanes during peak and event
- Trucks allowed
- McGee on-ramp remains

Additional analysis focused on analyzing event existing traditional and future traditional PM peak hour traffic for the North and South combined options. The refined traffic analysis conclusions for each option are provided in their respective sections.

ENHANCING MARKET OPPORTUNITIES

As mentioned in the Market Conditions Report (located in the appendix), an enhancement to the I-670/Truman Road corridor will improve connectivity and provide opportunities for strengthening existing neighborhoods and stimulating economic development. Considering the extent of the improvements of the recommended concepts, the focus area can expect a significant benefit. The following summarizes the amount of development expected with the proposed investment of the recommended concepts. Some of the estimates are higher than noted in the Design Concepts section due to the desire of maximizing the City's investment in the surrounding districts, a stated goal of this feasibility study for the project.

Residential Unit Absorption

- Downtown Loop and Crossroads combined estimate - 900 units per year
- South Loop Corridor estimate - 120 units per year
  *More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor
- Resident Population in Corridor estimate - 1,800 additional residents after ten years (1,200 units, 7% vacant)
- Average Household Income estimate *(2009)* - $90,000

Office Space Absorption

- Downtown Loop and Crossroads combined estimate - 1,800,000 square feet over 10 years
- South Loop Corridor estimate - 300,000 square feet over 10 years
  *More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor
- Office Employment in Corridor estimate - 1,000 additional employees after ten years (300 sq. ft./ employee)
- Average Wage or Salary estimate *(2009)* - $65,000

Retail Space Absorption

- Downtown Loop and Crossroads combined estimate - 100,000 square feet over 10 years
- South Loop Corridor estimate - 20,000 square feet over 10 years
  *More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor
- Retail Employment in Corridor estimate - 80 additional employees after ten years (250 sq. ft./employee)
- Average Wage or Salary estimate *(2009)* - $28,000

ENHANCING URBAN DESIGN OPPORTUNITIES

Building Edges and Views

Taller buildings and buildings that face Truman Road and abut the right-of-way or park will create the spatial containment necessary to establish a sense of place and overcome the large scale of the 'gap' created by the right-of-way. Building heights should strive to achieve a minimum spatial proportion of 1:4 (1 foot of height for every four feet of right-of-way width), with building heights that conform to the recommendations set forth in the Greater Downtown Area Plan and encourage additional density of the urban environment. Using this proportion with an existing right-of-way width of approximately 300 feet, adjacent building heights should be at least 75 feet tall.

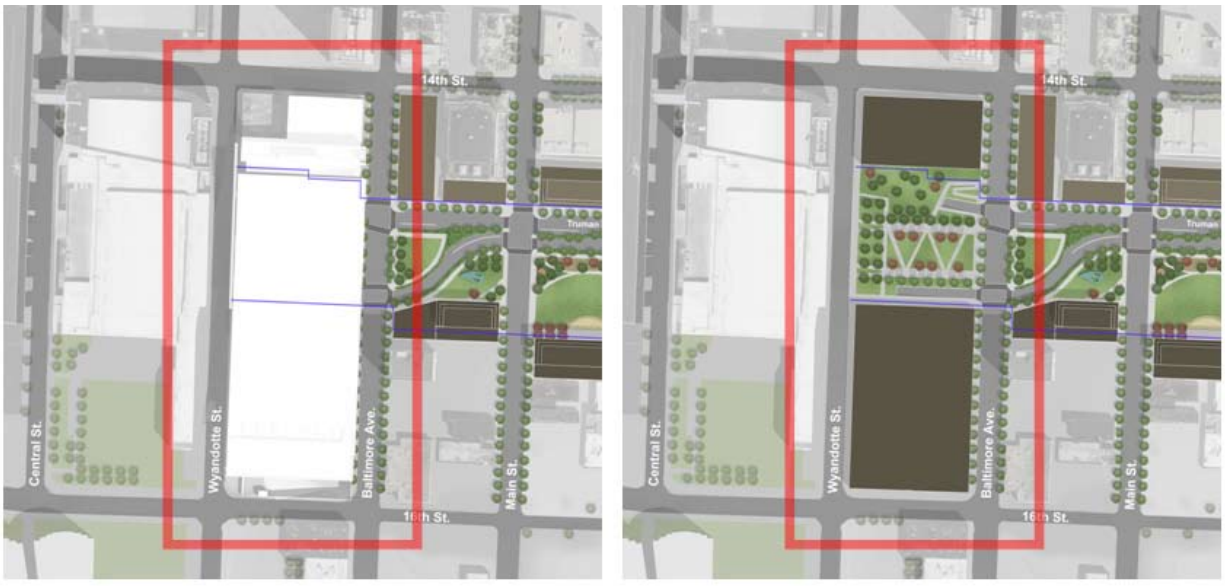
Buildings on the south side of the right-of-way should be stepped back at their upper levels to minimize the shadows they cast onto the park.

Buildings along the corridor should face the park to maximize the interaction of building use and park space. This building frontage will promote activity that will emphasize the pedestrian environment, thriving retail uses, and a strong sense of neighborhood for urban residents.

Important views give focus, interest, and orientation. New development should be designed so that it is sensitive to good existing views in and around the study area. Certain selected building corners should be designed to take advantage of the views naturally generated by the new Truman Road as it enters and leaves the district. Analysis about important views of the corridor occurs on page 54 and a diagram illustrating the existing landmark or architecturally significant buildings occurs on page 62.

Wyandotte to Baltimore Block

The idea of expanding the Kansas City Convention Center is under discussion. Although the expansion location selection is not imminent, one possible location is adjacent to the Grand Ballroom of the Kansas City Convention Center, over I-670 between Wyandotte and Baltimore. Because the potential Convention Center location is still unknown, this study explores two options for the block between Wyandotte and Baltimore, from 14th to 16th Street. The first is the Convention Center expansion and the second option illustrates development potential north and south of the interstate with a terraced park that spans over I-670. The park terraces transition the 40-foot grade change from Wyandotte down to meet the elevation of Baltimore.



Design options between Wyandotte and Baltimore

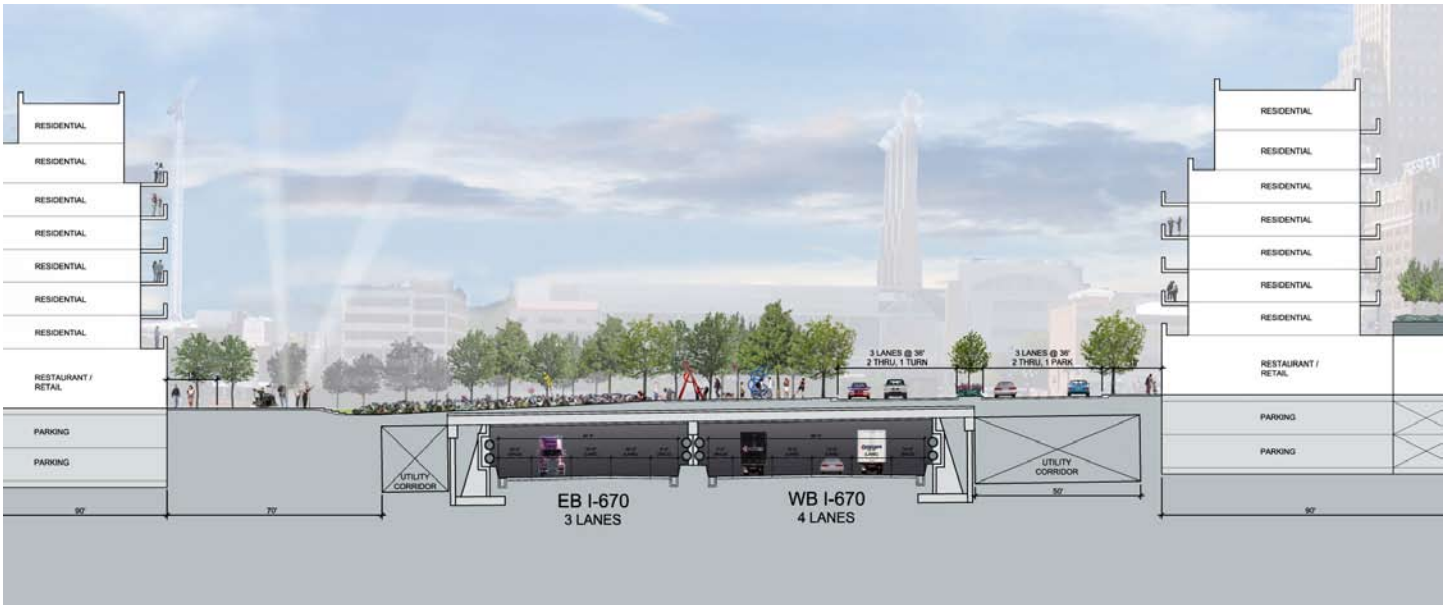
CONCEPT 1 – NORTH TRUMAN

Concept 1 has two variations: both combine Truman Road and align it to the north. The roadway for both transitions between Baltimore and Main to connect to interstate access points on the west. The main differentiator between the two variations is the eastern limits of the improvements - one variation (Concept 1A) transitions Truman Road to the south between Grand and Oak, the other (Concept 1B) transitions between Grand and McGee. Additional development is conceptually illustrated for parcels adjacent the corridor (redevelopment outside of the Truman Road right-of-way is not part of this study, but is shown to exemplify the potential of the corridor as a whole). Both plans illustrate a terraced park from Baltimore to Wyandotte.

North Truman Concept 1A - Plan View

North Truman Concept 1B - Plan View

North Truman Concept 1A - Perspective

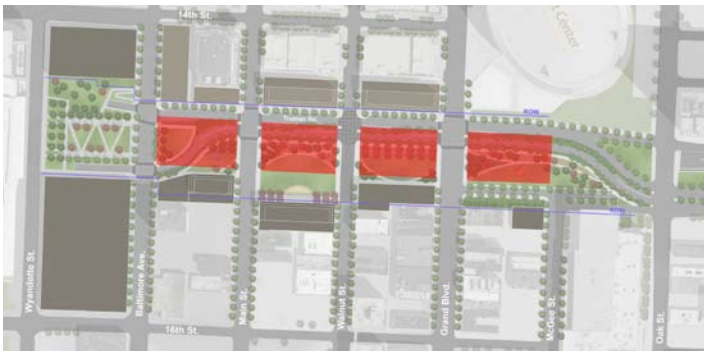


North Truman Concept - Section

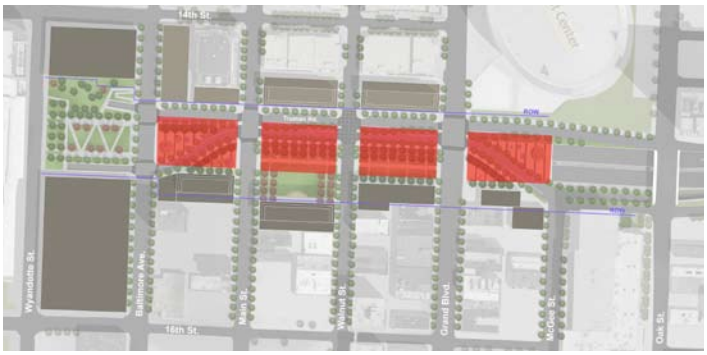
Tunnel and Structural Design

To determine the most efficient steel design, these bridge designs were evaluated to address each condition of Concept 1:

1. Green space and one direction of Truman Road. This segment of deck is utilized in Concepts 1A and 1B between Baltimore and McGee. This design results in a 160' structure that consists of two - 80' continuous steel girder spans that are 2'-9" deep. The flanges are composite with the cast in place 8 1/2" thick concrete deck. The girders are continuous over the median pier, and spaced at 6'-9".



Concept 1A - Deck location for green space and one direction of Truman Road



Concept 1B - Deck location for green space and one direction of Truman Road

2. Green space and both directions of Truman Road. This segment of deck supports both directions of traffic over I-670 as eastbound and westbound Truman Road traverse I-670 between McGee and Oak Street, as depicted in Concept 1A. This bridge scenario is the most demanding load case due to two directions of traffic traversing the deck between McGee and Oak Street. The structural design for this segment of the deck resulted in a 180' structure that consists of one - 80' span and one – 100' span. The steel girders are 3'-3" deep, and have an 8 1/2" composite deck which is continuous over the median pier. The girders are spaced at 6'-9".

Concept 1A - Deck location for green space and both directions of Truman Road

3. Replacement of the Baltimore, Main, Walnut, and the Grand Boulevard bridges, designed for AASHTO HL-93 and a Light Rail Vehicle. These bridges all have a similar design consisting of two-80' continuous spans. The streets will be supported by steel girders that are 2'-9" deep. The flanges are composite with the cast in place 8 1/2" thick concrete deck. The girders are continuous over the median pier, and are spaced at 9'-0". Based on this design criteria, the new bridges could accommodate a standard Light Rail Vehicle.

Concept 1A - Deck location for bridge replacements

Concept 1B - Deck location for bridge replacements

For the tunnel condition illustrated between Wyandotte and Baltimore, a detailed design analysis has not been conducted to determine the structural requirements to support the proposed terraced park.

In addition to the four bridge replacements, Concept 1A includes a combined Truman traversing the current Oak Street bridge. Replaced in 2007, the Oak Street bridge deck was not designed for traffic perpendicular to the bridge. The southern third of the bridge deck will need to be redesigned and replaced. Some additional diaphragms and girder modifications may also need to be made to accommodate the different loading.

Road Configuration and Signage

Truman Road is proposed as two traffic lanes in each direction with a curbside parking lane that can be converted to a travel lane when necessary. The following are the traffic analysis conclusions for the North Truman Road alignment (Concept 1):

- Existing and future traditional peak hour traffic operates at a desirable level of service for both four and six- lane options.
- During an event, the four-lane option works better than the current six lanes because a shared westbound through and right turn lane approaching Grand is converted to a right turn only to better serve traffic demand.
- One location at Truman and Walnut operates at level of service (LOS) F due to the heavy southbound Walnut traffic demand.
  - Capital improvements or event traffic management could be used to solve this problem.
- The North option separates access to eastbound McGee on-ramp from other Truman Road access to improve traffic operations in the study area.

North Truman option, highlighting capacity problems

Overhead advanced guide signs in the westbound and eastbound directions on I-670 at the Baltimore bridge will be removed for the tunnel.

In the westbound direction, signs provide basic lane guidance for movements to I-670, I-35 (north and south), and the Broadway exit. In place of the existing sign structure at Grand, the directional signage is recommended for placement east of the Oak Street Bridge for Concept 1A and at McGee Street for Concept 1B. Existing guide signs mounted below the Bartle Hall Convention Center at Broadway can remain. Additional ground-mounted guidance and signage at the Broadway exit can be coordinated and incorporated into the tunnel design.

Lane guidance for eastbound traffic can be provided by overhead signs mounted beneath the existing Bartle Ballroom structure, the proposed convention expansion, or the terraced park. The directional guidance currently provided by the overhead sign at McGee can be replaced by new signs at the Locust Street bridge under Concepts 1A and at Oak Street under Concept 1B.

Concept 1A - Signage locations

Concept 1B - Signage locations

Development and Urban Design Opportunities

Economic Development

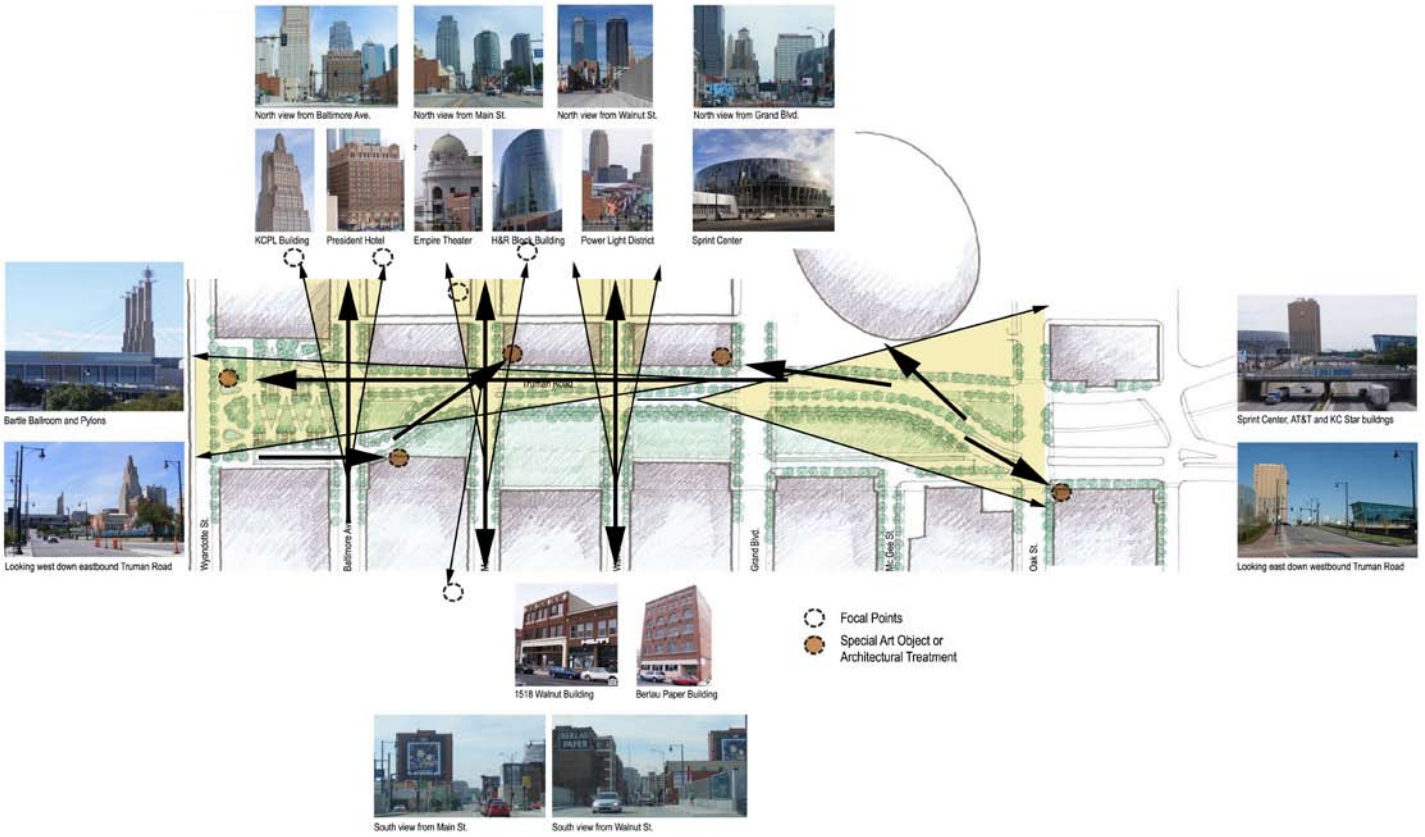
The tunnel addresses the environment impacts to increase the development potential along the Truman Road corridor. The proposed park above the tunnel not only enhances the value of development along the south edge of the right-of-way, the resultant 70 feet of additional buildable real estate can still allow a substantial amount of new land for development. If such development was largely mixed-use residential, then the park would have excellent informal oversight and activity provided by the residents. Development on the north side would also benefit from proximity to the park as well as the exposure to a new parkway with streetscape treatments and appropriate urban setbacks. This infrastructure investment should be the catalyst that results in significant private investment.

Development opportunities adjacent to the new Truman Road

Gateways

The configuration of Truman Road and the proposed park space will be successful if the design of buildings around this infrastructure improvements frame the space and establish visual clues for important views and gateways.

Gateways give a sense of arrival and can be used to enhance or frame visual connections to important areas and landmarks.

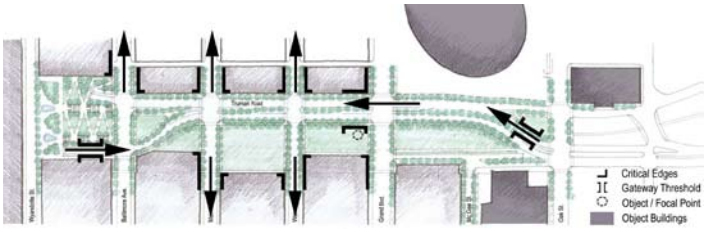


Concept 1 - North Truman Views

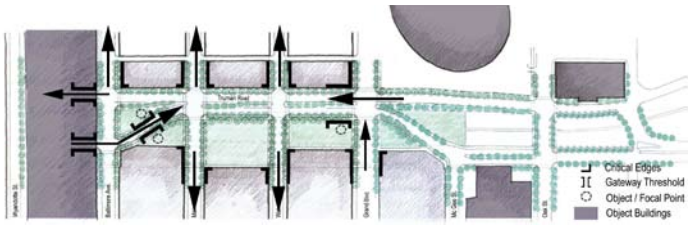
The west and east ends of each new building proposed in the study area should be designed to frame important views or landmark buildings to the north and south. These gateway elements will enhance north-south pedestrian connections that link the Power and Light and Crossroads Arts Districts.

The extension of the park in a series of terraces up to Wyandotte (as shown in the concept) provides an exceptional landscaped view at the western terminus of Truman Road and the park. The terraced park, or 'hill garden' would also provide exceptional views from it and Bartle Hall back toward the park, downtown, and the Crossroads neighborhood. If a Convention Center addition is built between Wyandotte and Baltimore Streets, its eastern facade that visually terminates the park should also be seen as a special piece of architecture and should allow views of the corridor as well.

Active Edges



Concept 1A - North Truman Gateways



Concept 1B - North Truman Gateways (Convention Expansion shown)

New developments along Truman Road in the study area should be designed with active edges to bring people to the area. Active edges can be defined as pedestrian-oriented, engaging areas with amenities and uses that promote an vibrant urban character, such as active storefronts, window displays, and sidewalk cafes. Increased activities along both sides of Truman will help fill the gap and reduce the barrier between the Power and Light and Crossroads Arts Districts. These active edges are also essential for an attractive, well-used and safe park.

Connections

Creating, maintaining and strengthening connections for all transportation modes is a goal of the study for the project. In addition, there is a desire to incorporate streetscape amenities to emphasize the pedestrian qualities of the corridor. Combining Truman Road into a landscaped median parkway concentrates the vehicle interruption to the north-south pedestrian flow at one location where a generous pedestrian refuge can ease the crossing. Entire corridor enhancements include improved sidewalks, crosswalks, and streetscape amenities.

With Truman Road located on the north side of the I-670 right-of-way and proposed as a parkway, the linear park formed on the south side of the road has a strong affinity with the Crossroads neighborhood. With pedestrian accommodations and a median wide enough to provide a comfortable pedestrian refuge, connections between the Crossroads, the Downtown Loop and the Power and Light District are improved. Walnut Street is given priority as the best north-south pedestrian connection from the Crossroads to the Power and Light District. With prior approval from KCMO Public Works, Walnut could be closed for events, allowing the free flow of pedestrians between park blocks. Residential development north of the I-670 right-of-way would have an excellent view of the park, increasing safety and oversight. It would also have good access to the park, helping to activate it. The parkway's location on the north side of the corridor requires a careful transition between Grand and Oak to make the connection to its eastern extension.

The west end terraced park provides additional pedestrian connections from Wyandotte and the Convention Center down to the new park spaces and development. Such connections can link ballroom functions to the entertainment venues of the Power and Light District. It can also make a pedestrian connection to the Performing Arts Center from the Power and Light District more feasible. If the convention expansion occurs on this block, pedestrian connections could still occur at the street edge but would be less direct than with the terraced park.

For Concept 1A, the extended park space (and

additional potential streetscape enhancements) to the east allows pedestrian connections to better link to the neighborhood east of the Kansas City Star Printing Press. For Concept 1B, the connection to the east is more dependent on the streetscape enhancements than park space. For either concept, extending the streetscape enhancements further to the east (outside the project limits) would strengthen that connection.

Concept Attributes

- Vehicular circulation flows along the north end of the corridor where the majority of the total traffic is heading to and from the Central Business District.
- Road transitions to the north for Eastbound Truman (highest traffic volume), serving as a traffic calming device.
- Development parcels north of Truman have frontage on a new urban parkway.
- Up to approximately 90' of land is captured from the existing Truman Road southern right-of-way boundary to the I-670 southern retaining wall; with approximately 20' designated for utilities, approximately 70' of "new" buildable area is adjacent to the proposed new park over I-670.
- In Concept 1A, interstate decking continues to Oak Street, providing park space adjacent to the Sprint Center and further connecting to the eastern portion of the Crossroads.
- In Concept 1B, interstate decking is less than that of Concept 1A (lower cost).

View from the terraced park on the west end of the corridor

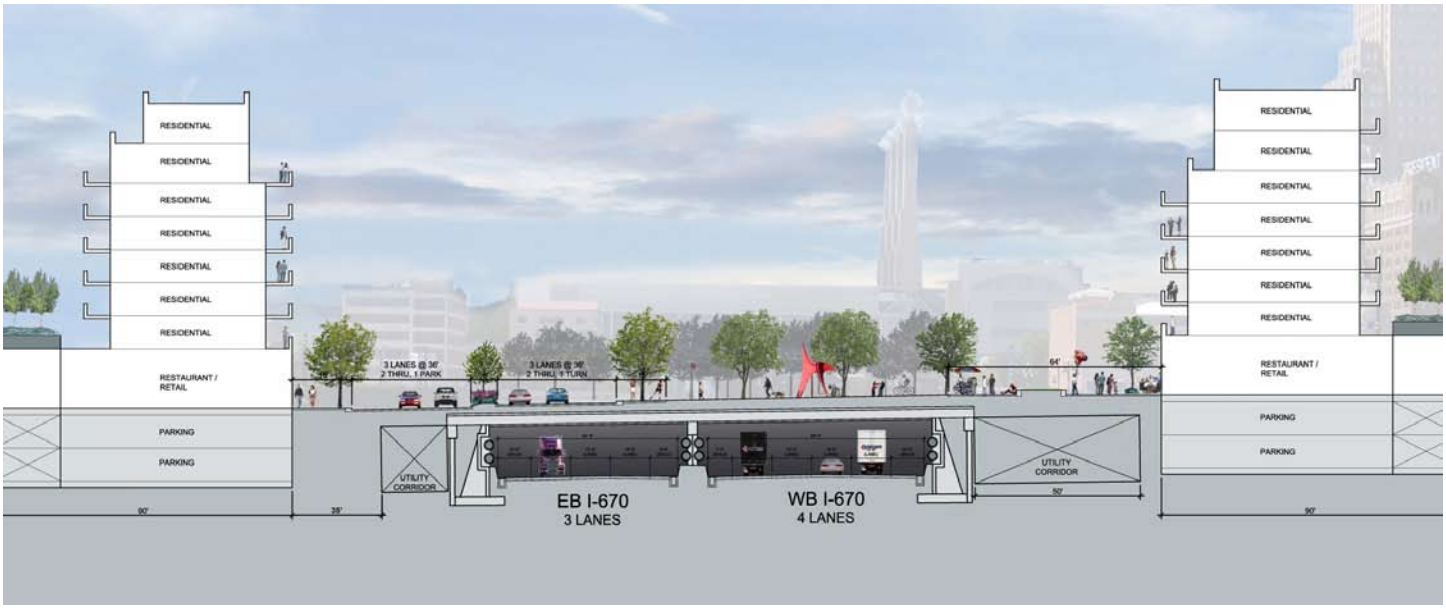
CONCEPT 2 – SOUTH TRUMAN

This concept combines Truman Road and aligns it to the south from Main to the east. The roadway transitions between Baltimore and Main to connect to interstate access points. The resultant areas created by decking over the interstate provide urban park space. Development opportunities are illustrated for those parcels adjacent the corridor (redevelopment outside of the Truman Road right-of-way is not part of this study, but is shown to exemplify the potential of the corridor as a whole). This concept illustrates a terraced park from Baltimore to Wyandotte.

South Truman Concept 2 - Plan View

View looking west on the north end of the new park space

South Truman Concept 2 - Perspective



South Truman Concept 2 - Section

Tunnel and Structural Design

In order to determine the most efficient steel design, four different bridge designs were evaluated to address each condition of the recommended concepts:

1. Green space and one direction of Truman Road. This segment of deck is utilized in Concept 2 between Baltimore and Grand. This design results in a 160' structure that consists of two - 80' continuous steel girder spans that are 2'-9" deep. The flanges are composite with the cast in place 8 1/2" thick concrete deck. The girders are continuous over the median pier, and spaced at 6'-9".

Concept 1A - Deck location for green space and one direction of Truman Road

2. Green space and one direction of Truman over half of I-670 (the southern half) from Grand to Locust Street, as depicted in Concept 2. This bridge scenario is unique in that the structure is a single span, from a south abutment to the median pier; there is no structure over the westbound I-670 traffic at this location. Due to the fact this structure is a non-continuous span (does not reach the north abutment), with green space and two lanes of traffic, the structural design for this segment of the deck resulted in a simple span of 80'. The steel girders are 3'-3" deep, and have an 8 1/2" composite deck. The girders are spaced at 8'-0".

Concept 1A - Deck location for green space and both directions of Truman Road

3. Replacement of the Baltimore, Main, Walnut, and Grand Boulevard bridges, designed for AASHTO HL-93 and a Light Rail Vehicle. These bridges all have a similar design consisting of two-80' continuous spans. The streets will be supported by steel girders that are 2'-9" deep. The flanges are composite with the cast in place 8 1/2" thick concrete deck. The girders are continuous over the median pier, and are spaced at 9'-0". Based on this design criteria, the new bridges could accommodate a standard Light Rail Vehicle.

Concept 1A - Deck location for bridge replacements

For the tunnel condition illustrated between Wyandotte and Baltimore, a detailed design analysis has not been conducted to determine the structural requirements to support the proposed terraced park.

In addition to the four bridge replacements, Concept 2 includes a combined Truman traversing the current Oak Street bridge. Replaced in 2007, the Oak Street bridge deck was not designed for traffic perpendicular to the bridge. The southern third of the bridge deck will need to be redesigned and replaced. Some additional diaphragms and girder modifications may also need to be made to accommodate the different loading.

Road Configuration and Signage

Truman Road is proposed as two traffic lanes in each direction with a curbside parking lane that can be converted to a travel lane when necessary. The following are the traffic analysis conclusions for the South Truman Road alignment.

- Existing and future traditional peak hour traffic operates at a desirable level of service for either the four or six-lane options with the exception of Truman and Walnut for the four-lane option.
- During an event, the six-lane option works better than the four-lane option.
- The four-lane option shows capacity problems from Main to Grand and would require six-lanes of capacity
  - Capital or event traffic management could be used to solve this problem.
- The South option does not separate access to eastbound McGee on-ramp from other Truman Road access, thus contributing to capacity problems along Truman Road.

South Truman option, highlighting capacity problems

Overhead advanced guide signs in the westbound and eastbound directions on I-670 at the Baltimore bridge will be removed for the tunnel.

In the westbound direction, the signs provide basic lane guidance for movements to I-670, I-35 (north and south), and the Broadway exit. The existing sign structure at Grand may remain in place under Concept 2, but with recommended directional information conforming to the new MUTCD guidance as explained on page 122. Existing guide signs mounted below the Bartle Hall Convention Center at Broadway can remain. Additional ground-mounted guidance and signage at the Broadway exit can be coordinated and incorporated into the tunnel design.

Lane guidance for eastbound traffic can be provided by overhead signs mounted beneath the existing Bartle Ballroom structure, or the proposed expansion. The directional guidance currently provided by the overhead sign at McGee can be replaced by new signs at Locust.

Concept 2 - Signage locations

Development and Urban Design Opportunities

Economic Development

The tunnel addresses the environment impacts to increase the development potential along the Truman Road corridor. The proposed park above the tunnel enhances the value of development along the right-of-way, one of the goals of this study. If such development was mixed-use residential, the park would have excellent informal oversight and activity provided by the residents. Development on the south side would benefit from proximity to the park as well as the exposure to a new parkway with streetscape treatments and appropriate setbacks. This infrastructure investment should be the catalyst that results in significant private investment.

Gateways

The configuration of Truman Road and the proposed park space will be successful if the design of buildings around this infrastructure improvements frame the

Development opportunities adjacent to the new Truman Road

space and establish visual clues for important views and gateways.

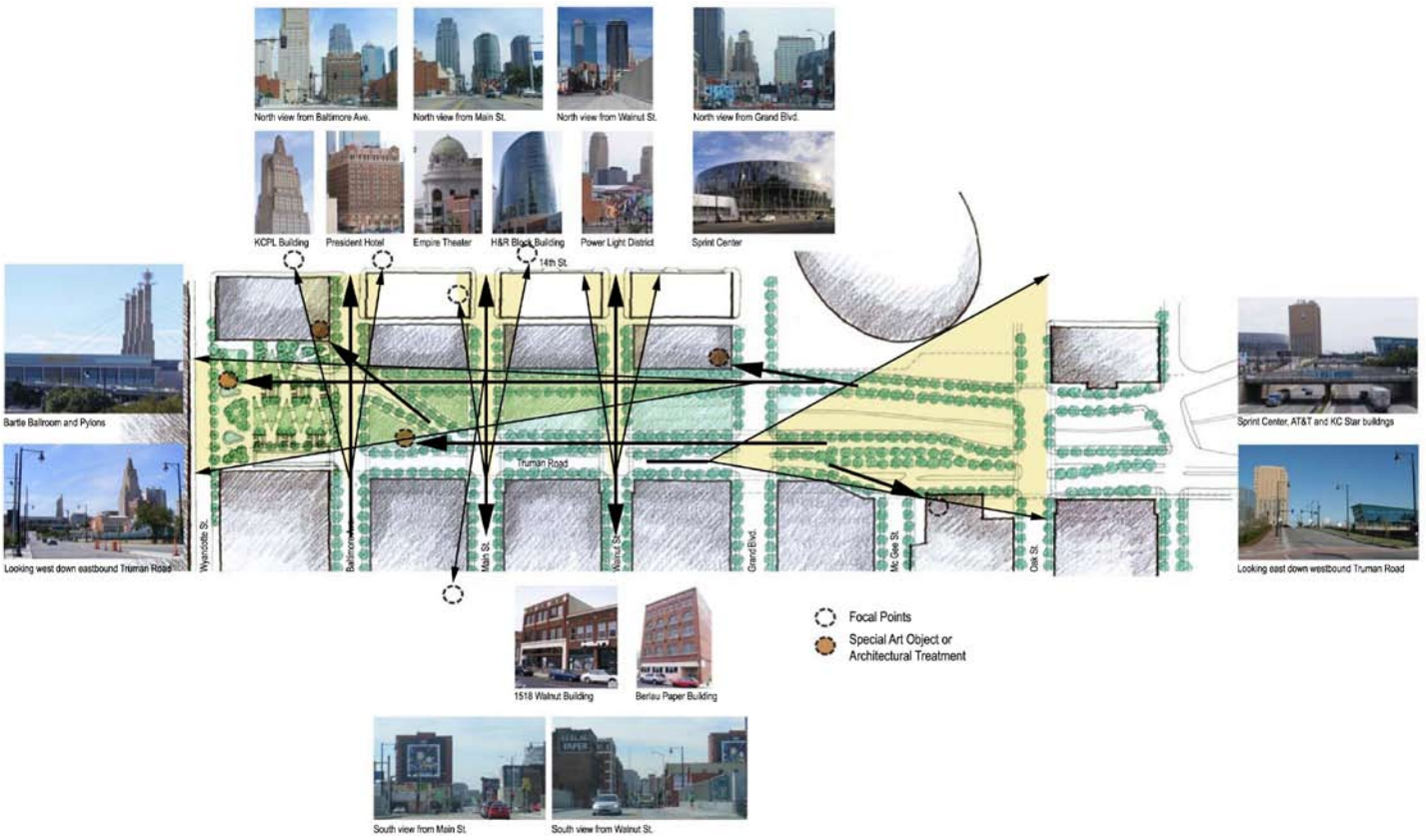
The west and east ends of each new building proposed in the study area should be designed as gateway elements that frame important views (discussed on page 152) or landmark buildings to the north and south. These gateway elements will enhance north-south pedestrian connections that link Power and Light and Crossroads Arts Districts.

The west end of the park has the potential to form a gateway entering and leaving the park using major pieces of sculpture to frame the location. The terraced park will allow spectacular views down the corridor from the Grand Ballroom. If a Convention Center addition is built between Wyandotte and Baltimore Streets, its eastern wall that visually terminates the park should also be seen as an opportunity for a special piece of art or architecture. The east end of the park, where Truman crosses Grand is another location where art or special structures can mark the entry into the downtown.

An art element or special structure which can mark the entry into downtown from the east should be located in the park at the intersection of Truman and Grand.

Active Edges

New developments along Truman Road in the study area should be designed with active edges to bring people to the area. Active edges can be defined as pedestrian-oriented, engaging areas with amenities and uses that promote an vibrant urban character, such as active storefronts, window displays, and sidewalk cafes. Increased activities along both sides of Truman will help fill the gap and reduce the barrier between the Power and Light and Crossroads Arts Districts. These active edges are also essential for an attractive, well-used and safe park.



Concept 2 - South Truman Views

Connections

With Truman Road located on the south side of the I-670 right-of-way and proposed as a parkway, the linear park formed on the north side has a strong relationship with the Downtown Loop and the Power and Light District. Truman Road is designed with pedestrian accommodations including a median wide enough to provide a comfortable pedestrian refuge for connections between the Crossroads neighborhood and Downtown Loop. The development potential of the parcels along the southern edge of the right-of-way is greatly enhanced. With the approval of KCMO Public Works, Walnut Street could be closed along the park for events, allowing the free flow of pedestrians between park blocks.

For Concept 2, the extended park space (and additional streetscape enhancements) and the southern parkway alignment naturally connects the street grid and extends Truman Road to the neighborhoods to the east.

Concept Attributes

- Road alignment is more aligned with historical 15th Street and creates a more direct connection to the east along Truman.
- Development parcels on the north side of Truman have frontage on new park space.
- The parcels south of Truman Road have frontage on a new urban parkway.
- Additional real estate fronting the new park space may be developed by one corporate entity, simplifying park programming and maintenance efforts.
- A tunnel is created over the westbound lanes from the Convention Center to Grand and the eastbound lanes to Oak.

PROJECT BENEFITS

Improved Road Network

The reconfiguration of Truman Road into a boulevard model, with a planted median, on-street parking options and the reduction of signalized intersections will positively change the driving and pedestrian experience and begin to blend the Downtown Loop and the Crossroads district together. In addition, the possibility of allowing on-street parking on Truman Road throughout the corridor could maintain existing traffic operations while reducing the number of lanes with moving traffic to ease pedestrian crossings. This will help satisfy the goal of creating a more urban Truman Road.

Enhanced Pedestrian Connectivity

A stated goal in this study for the project, a renewed emphasis on the pedestrian will provide a safer, more active, and more walkable community. Streetscape enhancements such as wider sidewalks, decorative crosswalks, landscape additions and other amenities offer a sense of scale and vitality to the corridor which has long been emphasized for vehicular movements. These pedestrian accommodations will strengthen not only north-south connections through the corridor but also east-west linkages, including the potential to enhance the streetscape on Truman Road further to the east.

New and/or Enhanced Real Estate

All of the recommended concepts not only provide new developable land but all will also act as a catalyst for new infill development. New development adjacent to Truman Road should front the new park and urban parkway, with ground level retail, restaurants, and mixed-use activity to add vibrancy to the neighborhood. This new/enhanced real estate will help to capitalize on the City's investment in the surrounding development and provide opportunities to increase development along Truman Road - two stated goals.

Enhanced Convention Center

The recommended concepts provide important options for the City Council, City, and the Convention and Visitors' Bureau regarding site locations for the next

A renewed emphasis on the pedestrian will strengthen the experience of the pedestrian while improving connectivity throughout the corridor

addition the Bartle Hall complex and a new convention hotel. The plan retains the block between Wyandotte and Baltimore Streets for convention expansion, but also provides an intriguing alternative, a terraced park, should the Convention Center expansion not locate on the east side of the current facility. In either option, the Convention Center has the potential to front the corridor in an enhanced fashion and the opportunity to leverage the improvements of the corridor to attract additional conventions and events. The park space over the interstate will satisfy the goal of increasing open space to serve the needs of the Convention and Entertainment District, including guests staying at a possible new convention hotel nearby.

Mitigation

Another stated goal of the study for the project, the reduction of detrimental visual, noise and air pollution along the corridor will not only improve the pedestrian environment, but also improve the potential for additional corridor development. Decking over the interstate hides from view the large amount of vehicular traffic on I-670 and minimizes the daunting task of bridge crossings, replacing it with attractive park space and urban street activity. The audible nuisance of trucks and other vehicles on the interstate will also be mitigated by the decking, allowing the potential for urban development, including residential, that is not likely to occur otherwise. Capping the interstate will force air exhaust and particulate matter to the ends of the tunnel rather than allowing it to release at the street level along the Truman Road. At the end of the tunnel mitigation measures may be necessary in order to not simply shift the pollutants out of this corridor. An improvement of this magnitude offers the opportunity to use green solutions in a major civic project that is visible and usable to the thousands of downtown residents, employees, and visitors.

Urban Design Character

Sidewalks will be widened on Baltimore, Main, Walnut, Grand and Truman Road. Streetscape improvements with plantings and new lighting will be added to enhance safety and security. New park and open space will be a significant improvement to the area and will provide a needed, prominent downtown amenity for enhanced quality development, connections between major civic investments and activity space for neighborhood residents. This corridor will act as a gateway threshold into both the Downtown Loop and the Crossroads, reinforcing the urban fabric and street grid while accommodating necessary improvements to the pedestrian environment. Surrounding the park space and realigned Truman Road, new infill development would provide the density and scale necessary for a successful urban setting. These urban design components contribute to satsfying several of the stated goals, including maximizing the City's investments in the corridor, blending the Downtown and Crossroads neighborhoods, increasing open space, creating a more urban Truman Road, and emphasizing the pedestrian qualities of Walnut Street.

The potential for convention center expansion and a new convention hotel is provided in both preferred options

Park Concept Opportunities

The following three park designs and programs presented can be adapted to fit any concept. Although this study provides three park concept designs and descriptions, the preferred park design will be decided in future phases of the project - the descriptions are given to help visualize the utility of the park space.

Art Park

Park Character and Activities

The park's adjacency to the Crossroads neighborhood and location within the downtown area gives it the potential to become an important neighborhood amenity, attracting residents, artists and employees. While the park would support casual activities such as dog-walking, strolling, jogging, picnicking, children's play, and some programmed events, its character would be defined by the concentration of large, high quality pieces of art similar to the art gardens at the Walker Art Museum in Minneapolis. The curving walks and groves of trees establish a more relaxed, casual, and natural feel to the park in contrast to the hard edged quality of the surrounding urban environment. The south edge of the park could develop with restaurants and sidewalk cafes at the intersections with Baltimore, Main, Walnut, and Grand.

The west end of the park, where Truman returns to a one way couplet, has the potential to form a gateway entering and leaving the park using major pieces of sculpture to frame the location. Large pieces of sculpture can be located in a sequence along the new parkway alignment, identifying downtown as a special place. If a Convention Center addition is built between Wyandotte and Baltimore Streets, its eastern wall that visually terminates the park should also be seen as a special piece of art or architecture. If not, the terraced park option on that block could offer additional opportunities for public art.

Art park potential character, as shown for Concept 1

Festival Park

Park Character and Activities

The park's location gives it the potential to become an important neighborhood amenity, attracting residents, artists and employees to its active, programmed space. While the park would support casual activities such as dog-walking, strolling under allées of trees, jogging, picnicking, children's play, and simply sitting outside, its character would be defined by its ability to support art fairs, farmer's markets, flea markets, neighborhood events, and music performances. Its simple, flexible layout promotes its role as a gathering place.

Program Park

Park Character and Activities

The park's location next to the Power and Light District and within the boundaries of downtown gives it the potential to attract residents, visitors and employees to its programmed activities. Such programmed activities could be fairs, markets, and Convention Center related exhibits along a market walk specifically designed to accommodate such events. The remaining part of the park would be composed of flexible lawns framed with shade trees and containing elements such as play areas and performance pavilions to encourage both passive and active use.

Festival park cross-section

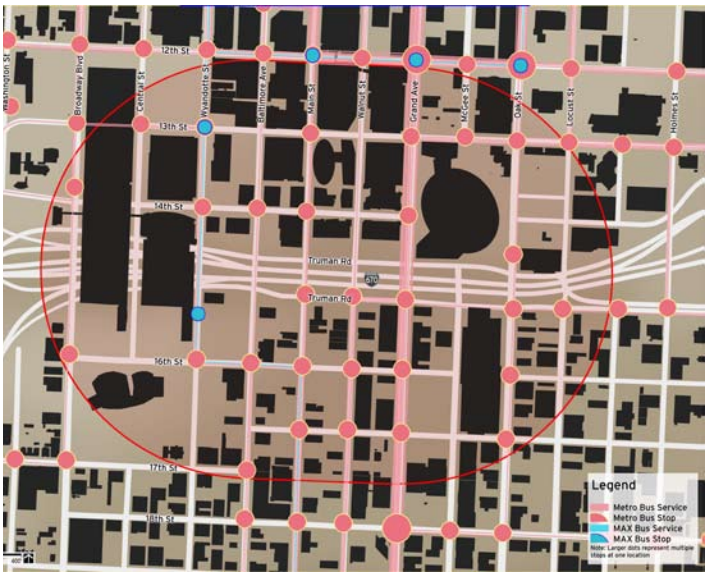
Program park potential character, as shown for Concept 2

Sustainable Project Benefits

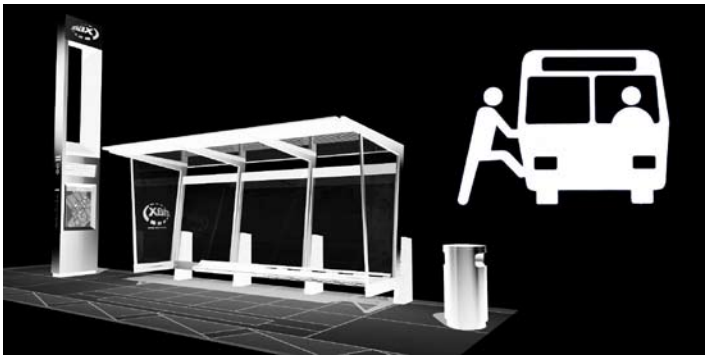
The South Loop Link project should incorporate sustainable design practices and elements into the infrastructure improvement project. The project can improve the socio, environmental, and economic vitality of the South Loop area by offering a new public amenity, strengthening the sense of community by re-stitching the urban grid, and promoting a healthy environment through sustainable design. The following are a few examples of sustainable practices that can be included in the recommended design concept.

Transit Accommodations

Improvements to the Truman Road corridor must incorporate the necessary accommodations for transit. Allowing for bus stops, including enhanced stations that could include additional MAX Bus Rapid Transit services and future considerations of light rail or other mass transit modes are desired. Increasing transit throughout the corridor will result in the opportunity to reduce the parking demand of associated development. It can also improve air quality by reducing automobile emissions.



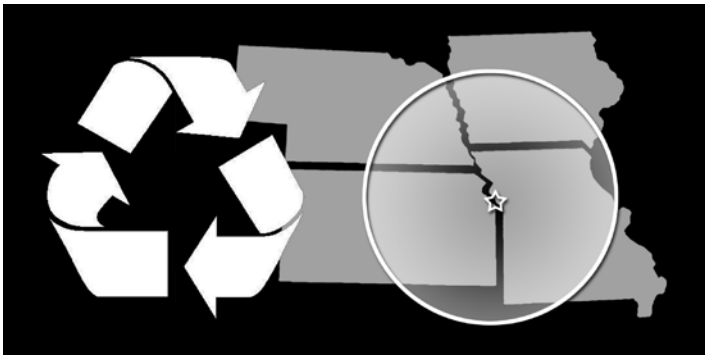
Existing transit stops within a 5-minute walk radius around the corridor.


Include transit accommodations through the corridor.

Material Selection

The selection of materials for use in the improvements through the Truman Road corridor can play a big role in achieving a sustainable development. The design development phase of this project should promote the use of the following materials to ensure a responsible use of building materials.

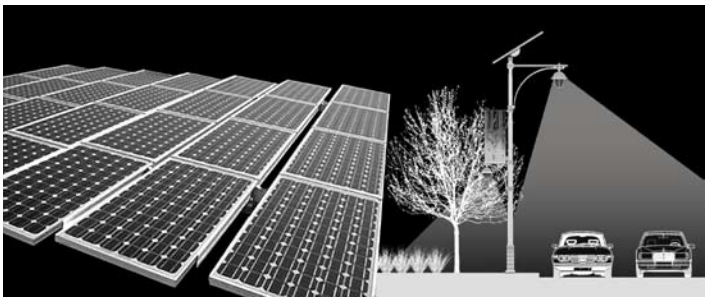
- Materials harvested locally and regionally minimize the distance they are transported to the site, resulting in fewer fossil fuels consumed while helping the local economy and encouraging the use if indigenous resources.
- Rapidly renewable materials can be used as a more environmentally responsible material choice to traditional finite resources.
- Materials with recycled content can help divert waste to landfills while contributing to the development. Examples that could use recycled content are site amenities and furnishings, paving systems and materials used for building construction.
- Hardscape materials with high-albedo that reflect heat.


Select renewable and local materials for the corridor improvements.

Alternative Energy

With the design of the deck over I-670 and associated new development, opportunities for creative alternative renewable energy and energy efficient solutions can be investigated to offset the overall energy demand and decrease the consumption of fossil fuels. There are several opportunities to use this emerging technology.

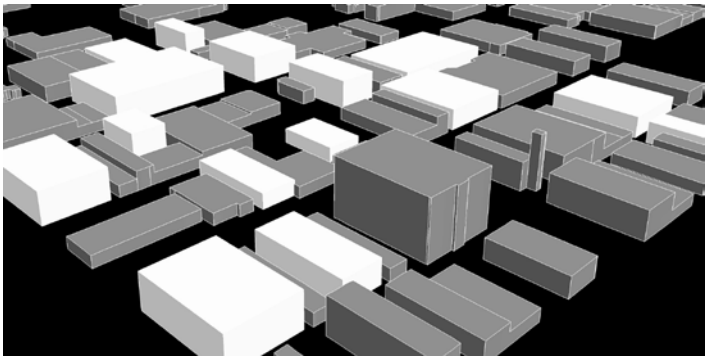
- New development can use photovoltaic and solar thermal panels or wind micro-turbines to harvest energy for their use or to power the lighting and ventilation systems used in the tunnel.
- New development can maximize daylighting, ventilation cooling and other free resources to diminish energy consumption.
- Solar technology can be used to power infrastructure such as site lighting.
- The tunnel can utilize energy-efficient lighting and ventilation systems.



Incorporate energy efficient solutions into the design.

Development Density

Decking over the interstate and creating a new urban park will serve as a catalyst that will spur additional development within the South Loop area. This additional development will increase the density of the Downtown Loop and the Crossroads within the existing urban fabric, taking advantage of existing infrastructure.

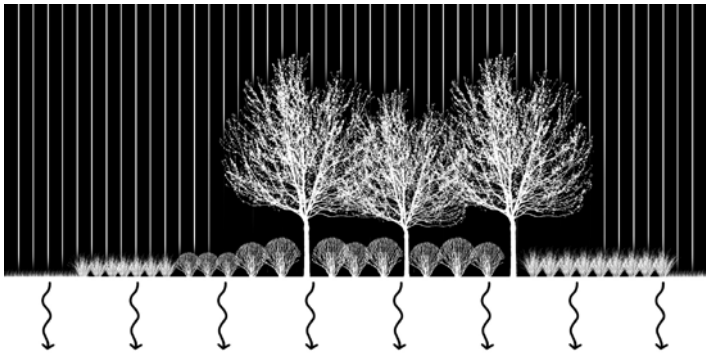


Infill development takes advantage of existing infrastructure.

Stormwater Management

The concept of decking over the interstate with a combined boulevard and associated open space offers many benefits to the management of stormwater. Within the existing right-of-way, approximately 1.5 acres of land is pervious. By decking over the interstate as shown in the recommended concepts, as much as 3.8 acres of pervious area is created, more than 2.5 times the existing area.

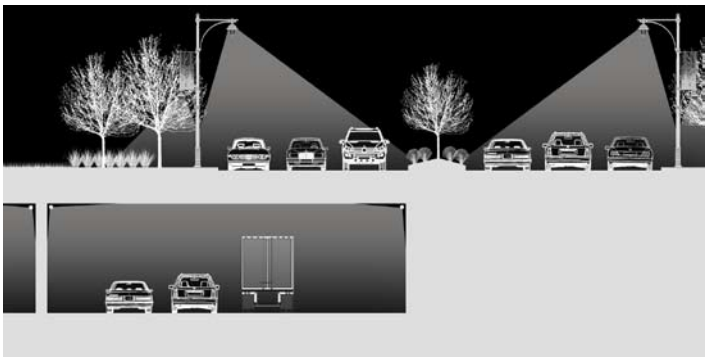
- The reduction of impervious cover (asphalt and concrete) results in improved management of runoff while increasing infiltration opportunities. Pervious materials (vegetation, pervious pavement) allow stormwater to be filtered, stored, and conveyed if necessary to appropriate devices. This will help alleviate flash flooding problems on I-670 that occasionally occur.
- Stored runoff can be utilized for a non-potable use such as irrigation.
- Rain gardens along the roadway can capture stormwater and promote infiltration.



The use of pervious materials allow stormwater to infiltrate the soil, creating less runoff.

Light Pollution Reduction

Although not currently an issue in the corridor, through the careful design of lighting systems in the park and in new development, the amount of light trespass released into the night sky can be reduced, resulting in increased visibility and minimized disruption to the nocturnal environment, an important component to maintaining a balanced ecology. When the corridor experiences increased growth, safety concerns and a vibrant 24-hour environment will require additional lighting. The proper selection and placement of full cutoff light fixtures can minimize glare while providing uniform light levels throughout the site and ultimately contribute to a safe and comfortable nighttime environment.

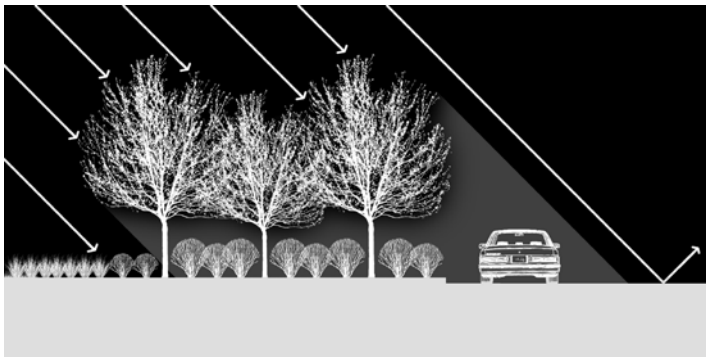


Reduce light pollution with appropriate lighting systems.

Heat Island Reduction

Heat islands refer to areas (predominately in urban locations) dominated by development such that the temperature is much warmer than rural areas due to heat absorption by building materials, pollution, and lowered humidity levels caused by lack of vegetation. The reduction of heat islands minimize the impacts to urban microclimates resulting in a cooler environment with reduced energy loads during the summer months. The following are strategies that could reduce heat islands in the South Loop.

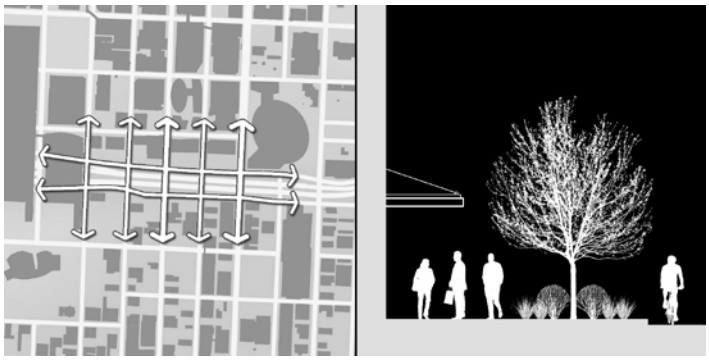
- Decking over the interstate with park space and shade trees minimize the amount of pavement that can absorb daytime summer heat.
- The use of high-albedo materials in hardscape improvements to reduce heat absorption.



Reduce the heat island effect with more park space, trees (shade), and less hardscape.

Community Connectivity

As part of the stated goal to increase connectivity between the Downtown Loop and Crossroads neighborhoods, additional development within the study area will take advantage of the adjacencies to existing basic services and maximize the walkability and bikeability of the urban core. Improvements over the interstate will greatly improve the pedestrian environment and overall connections between the Downtown Loop and the Crossroads, promoting all modes of transportation, not just single-occupancy vehicles.



The urban core will benefit from maintaining and enhancing pedestrian connections between the Downtown Loop and the Crossroads with the improvements over the interstate.

COST ESTIMATE

Below is a summary of the major improvement items in each category and a diagram comparing the costs for the recommended concepts in 2009 dollars:

Utilities / Roadway

- Relocate underground utilities
- Relocate utility bridges
- Roadway construction costs associated with Truman Road improvements (curb and gutter, crosswalks, minimum 5' width standard sidewalks, traffic signals, street lights)

Bridges / Decks

- Bridge replacement for Baltimore, Main, Walnut, and Grand
- Decking costs associated with each concept, including structural steel, concrete decking and associated pier supports
- Oak Street bridge modifications where necessary

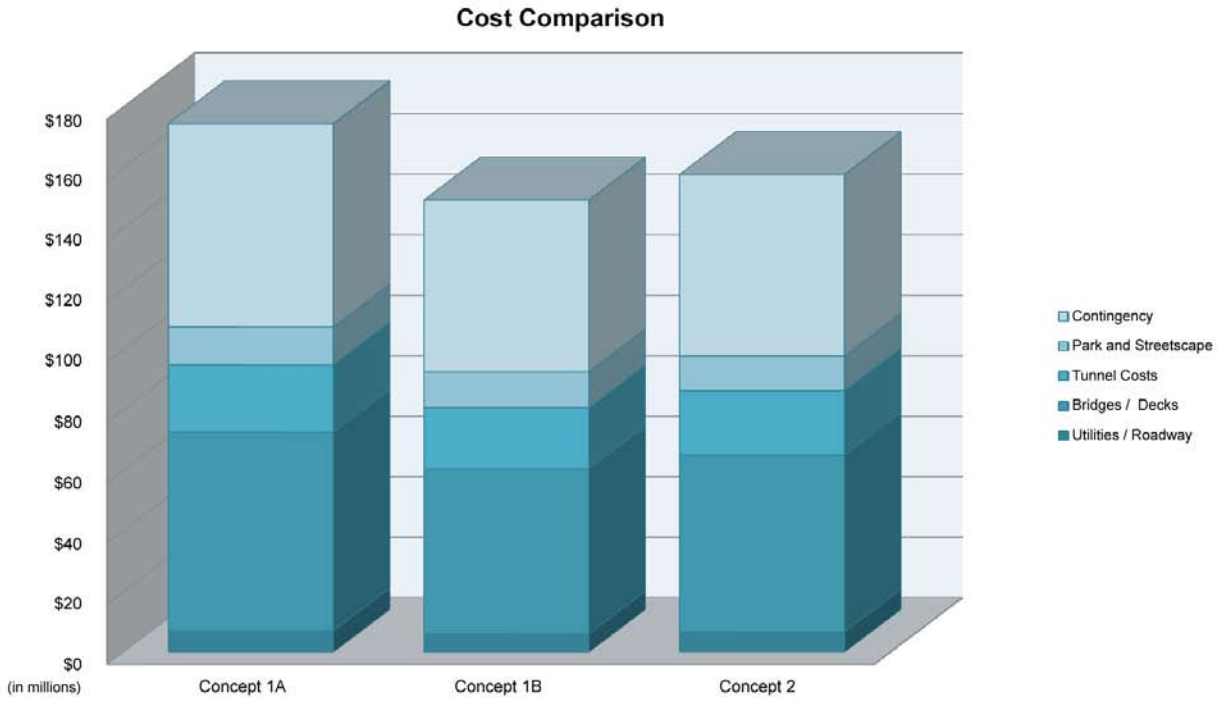
Tunnel Costs

- Ventilation system costs
- Lighting system costs
- Electrical system costs
- Signage / KC Scout system costs
- Tunnel fireproofing
- Retaining wall modifications necessary to house ventilation system
- Vehicle barrier, pavement and drainage modifications, lane marking and other associated tunnel costs

Park / Streetscape

- Deck soil medium - 36" depth
- Site furnishings and amenities (benches, trash receptacles, bike racks, tree grates, decorative lighting)
- Landscaping
- Hardscaping (decorative paving, enhanced sidewalks, all other paving outside of roadway paving)
- Public art

The cost comparison numbers increased slightly over the preliminary figures due to refined structural and decking system design over the interstate, additional soil depth to accommodate the park design, and necessary tunnel accommodations. Another factor that contributes to the overall cost is the addition of more decking in the recommended concepts than in the initial design concepts. These concepts include an estimated cost for the terraced park concept between Wyandotte and Baltimore. The estimate shown is in 2009 dollars with a planning-level (30%) contingency.



PHASING / CONSTRUCTABILITY

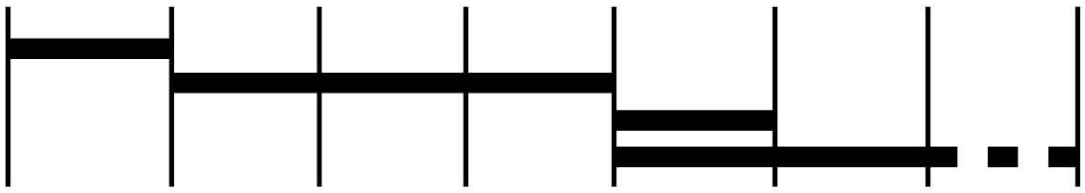
The construction sequence for this project would be similar for each of the recommended concepts as described below.

All Phases

- Building one block at a time minimizes the impact to downtown traffic, providing detour routes onto other existing I-670 bridge crossings or previously completed crossings. Just one bridge crossing would be closed at any one time.
- Shift I-670 traffic onto the widened shoulders constructed in Phase 1 to provide additional space in the median for constructing the median bents. The existing eastbound 3 lanes and the existing 4 lanes in the westbound direction can be maintained except during off-peak times when materials are being delivered or while concrete is being placed.
- Eastbound and westbound I-670 will be closed during off peak travel times while superstructure is being placed. Intermittent lane closures will also be necessary on I-670 during non-peak travel times for installing fans and lighting along I-670.

Phase 1

- Reconstruct the outside shoulder of eastbound (EB) and westbound (WB) I-670.
  - Constructing the outside shoulder first will allow I-670 traffic to be shifted outward to provide space for constructing the new bents in the median.
  - The three existing lanes for EB I-670 can be maintained, but WB I-670 will be reduced from 4 lanes to 3 lanes during this phase.
- Begin construction of the new south abutments of the lid.
  - There is adequate space to drive the piling while maintaining traffic on the existing EB Truman Road.



West End Options:
1. Convention Center expansion
2. Terraced Park

Decking
All Concepts

East End Options:
1. Partial deck to Oak
2. Full deck to Oak
3. Full deck to McGee

Phase 2

- Construct Grand and decking east of Grand.
  - To provide sufficient space for equipment and materials, the existing EB and WB Truman Road would also be closed. Accommodations could be made to maintain Sprint Center loading.
  - The westbound ramp from I-670 would be closed at Oak.
  - For each of the options, once the portion east of Grand is completed, Grand access to and from the east can be opened in its completed form.

Phase 3

- Construct Walnut and decking to Grand.
  - Downtown access to/from the east will be in the complete at Grand.
  - Walnut traffic crossing I-670 will be detoured to other crossings.
  - WB and EB Truman will be closed between Walnut and Grand for material storage and construction of support pilings to receive the decking.

Phase 4

- Construct Main and decking to Walnut.
  - Main traffic crossing I-670 will be detoured to other crossings.
  - WB and EB Truman will be closed between Main and Walnut for material storage and contruction of support pilings to receive the decking.

Phase 5

- Construct Baltimore and decking to Main.
- Baltimore traffic crossing I-670 will be detoured to other crossings.
- WB and EB Truman will be closed between Baltimore and Main for material storage and construction of support pilings to receive the decking.

Duration of Construction

- Concept 1A – North Truman: 3-4 years
- Concept 1B – North Truman: 2-3 years
- Concept 2 – South Truman: 3-4 years

The duration could be minimized if the project is constructed in two phases, with the first phase occurring at Grand and to the east, and the second phase with the remaining work west of Grand. In this instance Baltimore, Main and Walnut would be closed at the same time.

Should the Convention Center expansion between Wyandotte and Baltimore commence prior to or concurrent with the deck construction, work could start there and proceed east with minimal impacts to the construction timeline.

It is preferred to maintain ongoing construction to complete the project, but if project funding or other issues result in a break in construction, the project could be phased block by block. However, accommodations will need to be made to ensure through traffic on Truman Road will be maintained and proper lighting and ventilation is provided in a tunnel condition along I-670. The design of the park spaces may need to be modified as well until the project is complete. These accommodations will result in an increased cost and complexity of construction for the overall project.

Construction Traffic Impacts

I-670

- Same for all options, except the duration of impacted traffic is a year longer for Concepts 1A and 2 than Concept 1B.

WB I-670 Ramp to Oak and Locust

- The westbound exit ramp will remain open to Oak for all options. When westbound Truman Road is closed for Concept 1A and 1B, traffic will need to use Oak Street.
- Concept 1A – Westbound access to Sprint Arena is impacted the most with this option. Westbound Truman Road along the south side of Sprint Arena between Grand and Oak will be closed for approximately 12 months. The westbound access to Grand will be in its completed state about 18 to 24 months after construction begins.
- Concept 1B – Westbound Truman Road closed between Grand and Oak for 3-6 months. The westbound access to Grand will be in its completed state upon completion of the 3-6 month period.
- Concept 2 – No impact to westbound Truman Road east of Grand, continual direct access to Sprint Arena.

Ramp from McGee to EB I-670

- While this ramp is closed, traffic will be detoured east on Truman Road to head south on US-71 or continue to Paseo to access eastbound I-70.
- Concept 1A – Ramp will be closed for 6-9 months while the south abutment of the deck is being constructed and while the superstructure is being placed.
- Concept 1B – Ramp can remain open except for short duration while the new Grand pavement is being constructed.
- Concept 2 – Ramp will be closed for 9-12 months while the south abutment for the deck between Grand and Locust is being constructed and while the deck superstructure is being placed.

Oak Street

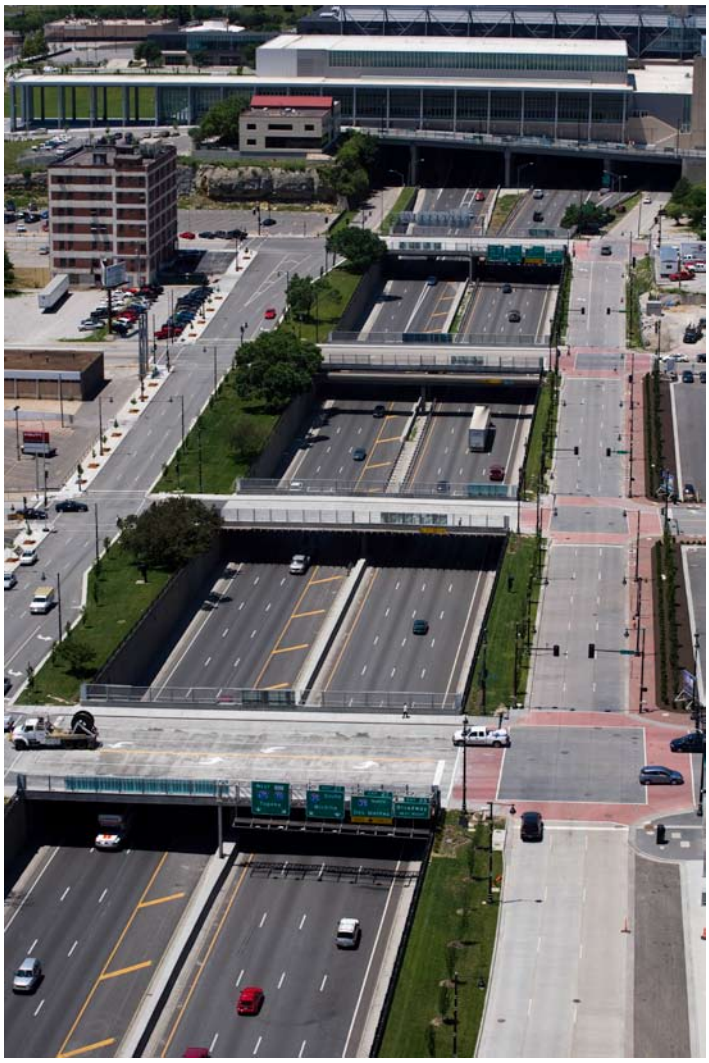
- Concept 1A & 2 – The existing two lanes will be reduced to one lane in each direction for 6-9 months while the lid is being constructed near Oak.
- Concept 1B – No impact.

Baltimore, Main, Walnut, Grand

- Impact to north-south through traffic is the same for all options with respect to closures for bridge replacements.

I-670 Future Lanes

- All three options do not accommodate future lanes on I-670 through the length of the proposed tunnel. When additional lanes become necessary east of the tunnel, the median bent and the south abutment of the Locust Bridge will have to be shifted to the south. The existing retaining wall along the south side of eastbound I-670 east of Oak will also need to be shifted south. The newly rebuilt Locust and Oak bridges have been designed to accommodate this shift.
- For Concepts 1 & 2, any work east of Oak Street will have to be designed to accommodate this southerly shift in the future.



IMPLEMENTATION MATRIX

The Implementation Matrix is intended to provide a general reference guide and action plan for key Plan recommendations. Located on the following page, the matrix outlines:

- A summary of recommendations or actions
- Lead organization and partners responsible for initiation, oversight and monitoring
- Applicable funding programs
- Anticipated time frames

IMPLEMENTATION PLAN

Implementation of a preferred strategy is contingent on a number of issues. However, the Planning Team recommends the following implementation timeline.

Short-Term Projects (0 to 3 years)

Public Involvement and Planning Process

- Work with MoDOT to determine the necesary NEPA documentation and lead agency.
- Secure funding for NEPA process, appropriate for the level of NEPA analysis required.
- Identify agency (local or state) to manage project.
- Select the consultant team for NEPA evaluation, if needed.
- Identify project champions.
- Incorporate project into Regional Transportation Plan (MARC's Transportation Outlook 2040).
- Coordinate with recommendations of MoDOT's I-70 First Tier Environmental Impact Statement (FTEIS).
- Coordinate with I-70 Second Tier EIS and any other studies relating to the replacement of a Wyandotte St. ramp from Truman Road to westbound I-670.
- Establish parameters for the development strategy in the corridor.
- Begin NEPA analysis; the levels of analysis and estimated timeline to complete are:
  - Categorical Exclusion: 8 months
  - Environmental Assessment: 12 months
  - Environmental Impact Statement: 18 months

Pedestrian/Transit

- Update the City of Kansas City Major Street Plan to reflect modifications and impacts of Truman Road and surrounding streets.
- Continued study of pedestrian improvements.

Tunnel

- Identify new technology exhaust measures.
- Coordinate with Convention and Visitors Bureau for Convention Center expansion needs.

Environmentally Sensitive and Green Solutions

- Explore technologies that can capture storm water run-off to provide water to the proposed open spaces, roadway medians and streetscape features.
- Explore opportunities to connect the Bike KC! Plan.
- Continue to review and research information that would make the project more "Green."
- Identify sustainable landscape materials.

Mid-Term Projects (3 to 7 years)

Public Involvement and Planning Process

- Complete NEPA process and submit request for review and approval.
  - Select locally preferred alternative
- Secure funding for Preliminary Design process.
- Identify agency to manage project.
  - Prepare memorandum of understanding between City and State
- Complete Preliminary Design.
- Use project champions to lead design review process.
- Determine Phasing/ Construction sequencing.
- Secure funding for Final Design and complete Final Design.

Pedestrian/Transit

- Coordinate with the KCATA on transit enhancements.
  - Coordinate construction sequencing plan

Roadway

- Prepare design guidelines to expand the "parkway or boulevard" character to Truman Road, east of the terminus of this project.
- Coordinate with MoDOT on the construction of SCOUT projects that are needed to provide information to motorists in advance of entering the corridor.
- Secure funding to design and construct the "parkway or boulevard" character to Truman Road, east of the terminus of this project.

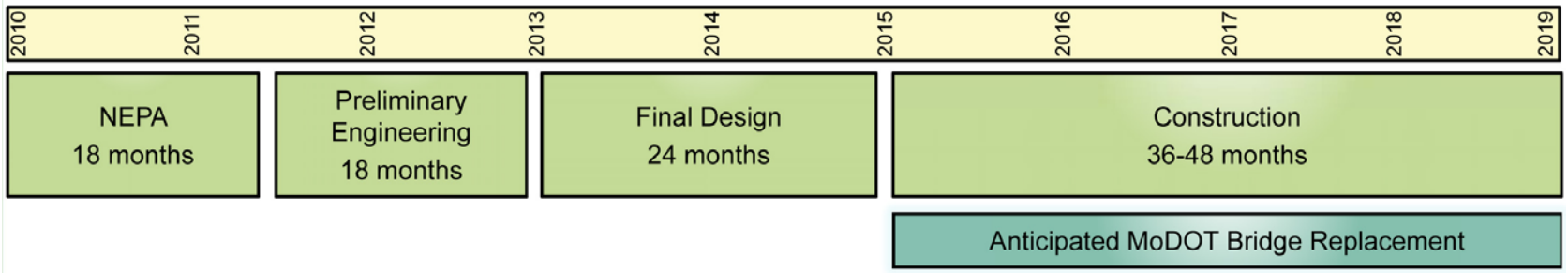
Environmentally Sensitive and Green Solutions

- Prepare a sustainable design construction manual for South Loop Link.

Long-Term Projects (8 years and beyond)

Public Involvement and Planning Process

- Secure funding for construction.
- Select consultant for program management.



Implementation Timeline

Public Involvement and Planning Process Matrix

Lead Responsibility - ●

Action or Initiative	Responsibility				Partnership		Funding		Initiated By
	Citizens and Businesses	City of Kansas City, Missouri	Other Jurisdictions	Consultant	Public and Private	Legislative	Estimated Cost	Funding Source	Time Frame
Short-Term Projects									
Work with MoDOT to determine NEPA documentation and lead agency		●	■						2009
Secure funding for NEPA process	■	●	■			■	$ 700,000	CIP; STP; Other Federal/State/Private Sources	2009
Identify project champions	●	■	■	■	■				2009
Work with MODOT to secure support	■	●	■	■					2009
Coordinate with I-70 First Tier Environmental Impact Statement (FTEIS)		●	■	■					2010
Coordinate with I-70 Second Tier EIS and any other studies relating to the replacement of a Wyandotte St. ramp from Truman Road to westbound I-670		●	■	■					2010
Establish development parameters		●	■	■		■			2010
Select consultant team for NEPA evaluation, if required		●	■						2010
Begin NEPA evaluation and analysis		■	■	●					2010
Mid-Term Projects									
Complete NEPA process, submit request for review and approval		●	■	■					2011-2012
Secure funding for Preliminary Design process and complete Preliminary Design	■	●	■	●		■	$ 5,000,000	CIP; STP; Other Federal/State Sources	2011-2013
Use project champions to lead preliminary design review process	●	■	■	■	■				2011-2013
Determine Phasing/Construction sequencing plan		■	■	●					2014
Secure funding for Final Design process and complete Final Design	■	●	■	●		■	$ 9,000,000	CIP; STP; Other Federal/State Sources	2013, 2015
Long-Term Projects									
Secure funding for Construction	■	●	■			■	$145,000,000 - $175,000,000 (2009 dollars)	CIP; EECBG; STP; CMAQ; TE; EDA; CDBG; CID; TDD; MODESA; MoDOT; Parks Fee-in-Lieu; Other Federal/State Sources	2017
Select consultant team for Program Management		●	■				$ 3,000,000	CIP; STP; Other Federal/State Sources	2017
Use project champions to lead final design review process	●	■	■	■	■				2015-2017
Commence Construction		■	■	●					2018
Complete Construction		■	■	●					2021 +

- Use project champions to lead final design review process.

Tunnel

- Finalize operations and maintenance plan

FINANCING PROGRAMS

There are a variety of funding sources and incentives which the City of Kansas City, Missouri and the Missouri Department of Transportation may pursue to generate the funds needed to implement the South Loop Link project. The implementation chapter of this Study is a first step towards identifying some of the available sources.

The following section is a summary of the currently available funding sources available to pursue for implementation of the Feasibility Study recommendations. In each case, the targeted use of the funds, the requirements necessary to obtain funding, and the application process are summarized. Some available development tools such as Chapter 353 and tax increment financing (TIF) may be used to create public/private partnerships. Funds generated or payments-in-lieu may be used to pay for infrastructure improvements.

Public Funding/Incentive Sources

Capital Improvement Sales Tax

A one-cent sales tax provides the majority of revenue for the City's Capital Improvements Program. The Public Improvements Advisory Committee (PIAC, 13 persons, two from each council district and a chairperson, appointed by the Mayor and City Council) solicits citizen input and makes recommendations regarding both the citywide and neighborhood portions of the capital budget to the City Council. PIAC holds a series of public hearings beginning in early summer. These hearings provide citizens with an opportunity to express their opinions, concerns and project requests regarding the forthcoming capital budget. This Committee submits a balanced five-year capital improvements program and neighborhood recommendations to the City Council in early February.

Energy Efficiency and Conservation Block Grants

The Energy Efficiency and Conservation Block Grants (EECBG) Program, funded for the first time by the American Recovery and Reinvestment Act (ARRA) of 2009, represents a Presidential priority to deploy the cheapest, cleanest, and most reliable energy technologies we have - energy efficiency and conservation - across the country. The Program, authorized in Title V, Subtitle E of the Energy Independence and Security Act (EISA), is modeled after the Community Development Block Grant program administered by the Department of Housing and Urban Development (HUD). It is intended to assist U.S. cities, counties, states, territories, and Indian tribes to develop, promote, implement, and manage energy efficiency and conservation projects and programs designed to:

- Reduce fossil fuel emissions.
- Reduce the total energy use of the eligible entities.
- Improve energy efficiency in the transportation, building, and other appropriate sectors.
- Create and retain jobs.

Through formula and competitive grants, the Program empowers local communities to make strategic investments to meet the nation's long-term goals for energy independence and leadership on climate change.

Surface Transportation Program

The Surface Transportation Program (STP) provides the greatest flexibility in the use of Federal Highway Administration funds. These funds may be used (as capital funding) for public transportation capital improvements, car and vanpool projects, fringe and corridor parking facilities, bicycle and pedestrian facilities, and intercity or intracity bus terminals and bus facilities. As funding for planning, these funds can be used for surface transportation planning activities, wetland mitigation, transit research and development, and environmental analysis. Other eligible projects under STP include transit safety improvements and most transportation control measures.

STP funds are distributed among various population and programmatic categories within a State. The

largest portion of STP funds may be used anywhere within the State to which they are apportioned.

Congestion Mitigation and Air Quality Improvement Program

The Congestion Mitigation and Air Quality Improvement Program (CMAQ) has the objective of improving the Nation's air quality and managing traffic congestion. CMAQ projects and programs are often innovative solutions to common mobility problems and are driven by Clean Air Act mandates to attain national ambient air quality standards. Eligible activities under CMAQ include transit system capital expansion and improvements that are projected to realize an increase in ridership; travel demand management strategies and shared ride services; pedestrian and bicycle facilities and promotional activities that encourage bicycle commuting. Programs and projects are funded in air quality nonattainment and maintenance areas for ozone, carbon monoxide (CO), and small particulate matter (PM-10) that reduce transportation-related emissions. Metropolitan Kansas City is currently in a maintenance area.

Funds are apportioned to States based on a formula that considers the severity of their air quality problems.

Transportation Enhancement (TE)

Transportation Enhancement (TE) activities offer funding opportunities to help expand transportation choices and enhance the transportation experience through 12 eligible TE activities related to surface transportation, including pedestrian and bicycle infrastructure, landscaping and scenic beautification, and environmental mitigation. TE projects must relate to surface transportation and must qualify under one or more of the 12 eligible categories.

Economic Development Administration (EDA)

The Economic Development Administration (EDA) was established under the Public Works and Economic Development Act of 1965 to generate jobs, help retain existing jobs, and stimulate industrial and commercial growth in economically distressed areas of the United States. The administration offers a variety of programs centered around infrastructure and facility upgrades that can attract new investment and spur redevelopment.

Community Development Block Grant (CDBG)

The Community Development Block Grant Program, provided by the United States Department of Housing and Urban Development, offers a variety of options for funding local community development of affordable housing and public infrastructure.

Semi-Public/Private Funding/Incentive Sources

Community Improvement District (CID)

A Community Improvement District (CID) provides a non-profit corporation the power to levy special assessments within a specified district to construct, reconstruct, install, repair, maintain, and equip public improvements including parks and streets. Special assessments may be imposed only by the board of directors by resolution after receipt of a special assessment petition signed by 1) owners of real property collectively owning more than 50% by assessed value of the real property within the boundaries of the district and 2) more than 50% per capita of all owners of real property within the boundaries of the district. The petition must also specify the projects to be funded by the special assessments, the method of allocation, the amount of the proposed assessments, and the expiration date of the assessments. If the CID is a political subdivision, the improvements may also be funded by a real property tax levied within the district after approval by a majority of the qualified voters within the district.

The Downtown Council has formed a CID that includes a majority of the properties within the Downtown Loop.

Transportation Development District (TDD)

A Transportation Development District (TDD) is a political subdivision of the State of Missouri that can collect taxes and assessments as well as issue bonds to finance the construction of roads, parking, and other transportation-related facilities with the boundary set by the TDD.

Planned Industrial Expansion Authority (PIEA)

The Planned Industrial Expansion Authority (PIEA)

is one of the development agencies available to the City for encouraging new job creation through tax abatement, the power of eminent domain, and bond financing for land acquisition, construction, and equipment in designated redevelopment areas.

Chapter 353 Incentive

Chapter 353 of the Missouri statutes authorizes the creation of urban redevelopment corporations for the purpose of redeveloping blighted areas. The urban redevelopment corporation must prepare and submit to the City a development plan for redeveloping an area within the City that is determined to be blighted. If the area is determined to be blighted and the development plan is approved by the City, the urban redevelopment corporation, upon acquisition of title to the property, may receive a maximum ad valorem tax abatement for 100% of the value of the improvements to the property for a period of ten years and a maximum of 50% for the following fifteen years. Ad valorem taxes are still assessed and paid with regard to the value of the land only during this twenty-five year period. The City may enter into a contract with the urban redevelopment corporation to require that payments in lieu of taxes are made and/or to ensure that the development plan is carried out, including the use of the funds available to the corporation as a result of the abatement of taxes.

Tax Increment Financing District (TIF)

The basic concept behind tax increment financing (TIF) is that the redevelopment of the area approved as a redevelopment district will increase the equalized assessed valuation of the property, thereby generating new revenues to a city that can be used to pay for specified costs of a redevelopment project. These costs may include construction of public facilities within a redevelopment area.

Property taxes and other revenues generated by the existing development in a legislatively defined redevelopment district are frozen when the redevelopment is approved by the City Council and the increased property tax and a portion of other revenues generated by the new development are captured and placed in a special fund to pay for the costs of redeveloping the area. Those new property tax revenues are the source of the term "increment," and they are also referred to as "payments in lieu of taxes" (PILOTs). In addition to the PILOTs, the development may also capture up to 50% of certain locally imposed taxes (commonly referred to as economic activity taxes or "EATS") such as local sales, franchise taxes and utility taxes and local earnings taxes to fund project costs. Certain new state revenues (one-half of general state sales tax or one-half of state individual income tax withheld from new employees in the redevelopment area) generated by a redevelopment project may be captured under limited circumstances where the area is blighted and is located in either an enterprise zone, federal empowerment zone, or a central business district or urban core area with at least one 50 year old building and that suffers from 20 year pattern of declining population or property tax revenue. State statutes also authorize bonds to be issued that are paid from the PILOTs and EATs generated in the redevelopment area. The bonds do not count against the City's debt limit. The TIF statute limits the areas of the city that are eligible for TIF to "blighted," "conservation" (near blighted) or "economic development" areas as defined in the statute. The constitutionality of the use of TIF in "economic development" areas has been questioned.

Missouri Downtown Economic Stimulus Act (MODESA)

The Missouri Downtown Economic Stimulus Act (MODESA) allows some downtown projects to recover Missouri sales and income tax for reinvestment into downtown infrastructure costs. The formula includes a match by local governments. Funding is reserved for major initiative areas, such as job creation, tourism, and/or improvement of quality of life.

The City must submit an application to the Department of Economic Development (DED) which will forward copies to the Missouri Development Finance Board (MDFB). During the review process, there will be communication and consultation between DED and MDFB staff. DED will present an analysis and recommendation to MDFB. A funding decision will be made by MDFB. If a project is approved for funding by MDFB, DED will issue a Certificate of Approval outlining the terms of the financing. Applications may be submitted at any time of the year, but only after approval of the local development plan and prior to

the commencement of the project (either construction or bond financing).

Missouri Department of Transportation (MoDOT)

The Missouri Department of Transportation (MoDOT) provides funding for capital improvement projects. MoDOT has identified the need to replace the Baltimore, Main, Walnut, and Grand bridges over I-670. MoDOT anticipates needing to complete the replacement sometime between 2015 and 2020. Based on 2009 dollars the average estimated replacement cost for each bridge is $2,500,000. One consideration is for MoDOT to transfer the deed of the bridges over to the City of Kansas City, Missouri, along with the funds to replace the bridges.

KCMO Parks and Recreation, Payment-in-Lieu Fund

The Kansas City, Missouri Parks and Recreation Department allows developers to make a payment to the department in lieu of providing dedicated open space for their development. These funds, to be used within fifteen years of the receipt of payment, are to be used for the acquisition, development, or improvement of a public park, generally within three miles of the subdivision for which they were paid. In addition, the Parks and Recreation Department maintains parks throughout the City and may be a source for operation and maintenance.

Downtown Council / Private Foundations

The Downtown Council is a private, nonprofit membership organization representing many of Kansas City's downtown businesses, property owners, and organizations. Their mission of creating a vibrant, diverse and economically sustainable Downtown Kansas City is shared by the goals of the South Loop Link project. Assistance from the Downtown Council as well as from the many generous private foundations can contribute to the infrastructure and park investments proposed by this study.

Market Conditions Report

South Loop Link

Kansas City, Missouri

December 1, 2009

Prepared for:

The City of Kansas City

Table of Contents

Project Problem and Scope

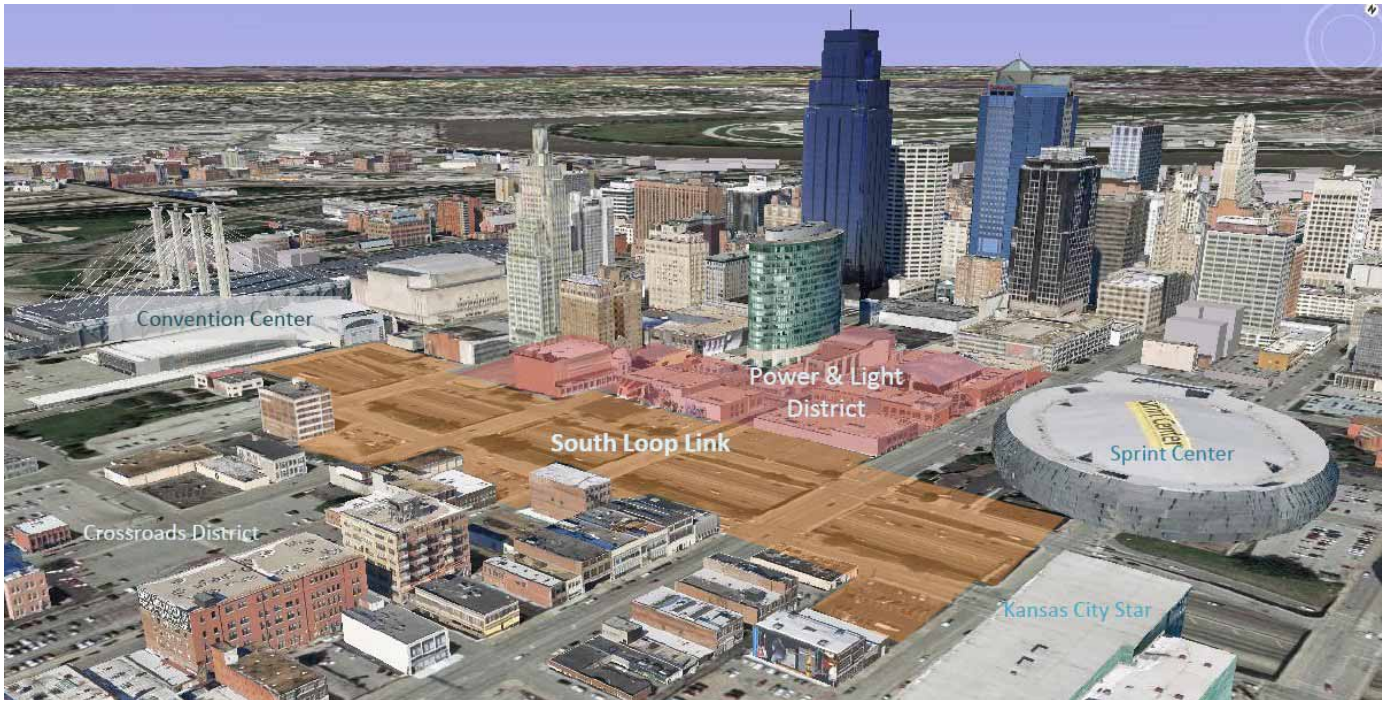
The Power & Light District and other recent projects throughout downtown Kansas City enhance the value of adjacent properties, but opportunities to capitalize on them are limited by I-670. This study considers the potential effects of implementing the South Loop Link Steering Committee's recommendations, which would essentially place a deck over a portion of the interstate, and put public space and real estate in its place.

This study considers the outcome of enhancing or capping a portion of interstate (I-670), thus reconnecting two parts of downtown Kansas City. Cities throughout the world are considering (or have completed) "deck" proposals whereby interstates are covered to create or enhance at-grade crossings, parks, and new real estate.

In San Francisco, Milwaukee, and Chattanooga, portions of interstates were simply removed in favor of narrower, lower-traffic avenues that united portion of their cities.

In Kansas City the development of the Power & Light District and Sprint Center means that the southern edge of the Downtown Loop is no longer a transitional area of surface parking lots at the edge of the traditional downtown; instead it is has become a vibrant activity center and integral part of the city's renaissance.

This is significant because it enhances the long-term potential of adjacent real estate. The eight-lane I-670 and parallel Truman Road form a hard boundary that limits the quality and quantity of development in the corridor.



A "South Loop Link" could provide a deck over I-670, offering new public space, and reconnecting the Crossroads District with the Downtown Loop.

Project Problem and Scope (continued)

The conclusions of this report are intended to guide the city's decision-making process in determining the feasibility of undertaking the South Loop Link project.

This study has been commissioned to consider the real estate ramifications that creating a deck and providing meaningful public space (i.e. the South Loop Link) would have on nearby property, as well as any new property that may be created.

This study considers:

- site context,
- marketability opportunities and constraints,
- socio-economic characteristics,
- existing supply, and demand "opportunity gaps."

These analyses result in the concluded market estimates of achievable rents, sales, lease rates, and absorption.

This study then considers simply reconstructing the bridges with modest pedestrian enhancements and the recommended concepts of the Steering Committee that were devised by the planning team headed by HNTB. It also considers ways in which existing and new assets can be leveraged to add value.

I-670 forms a hard boundary that divides the Downtown Loop from the Crossroads District.

Context and Marketability

Greater Downtown and its Submarkets

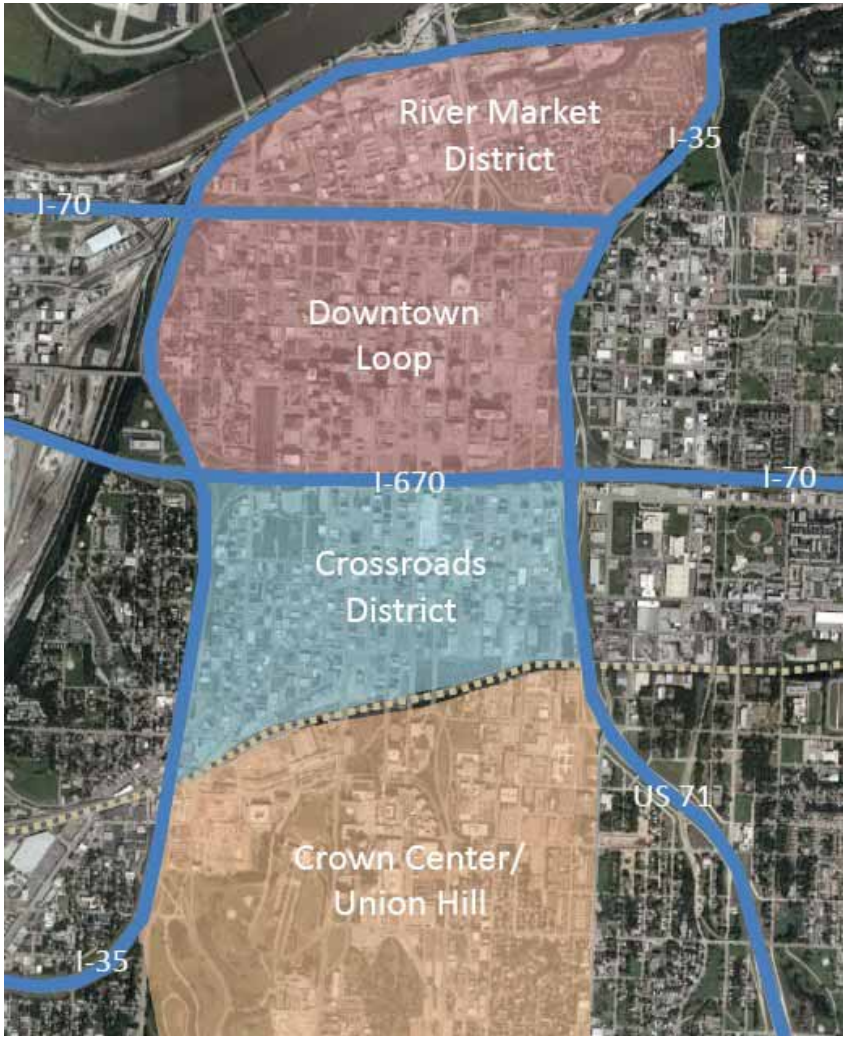
I-670 separates the Downtown Loop from the Crossroads District. The South Loop Link presents an opportunity to reconnect these neighborhoods, encouraging a merging of economies.

Kansas City's Greater Downtown market area (as defined by DSI) occupies several square miles and is at the geographic heart of the region. With 26 million square feet of office space and 82,000 employees, it is the largest employment center in the region. It is also an activity center and symbol of pride for the region, acting as a gateway for visitors, newcomers, and conventioneers. In this way, it is often the first and most lasting impression that outsiders will have of the city.

For this study, Greater Downtown market has been subdivided into three districts: River Market/Downtown Loop, Crossroads, and Crown Center/ Union Hill.

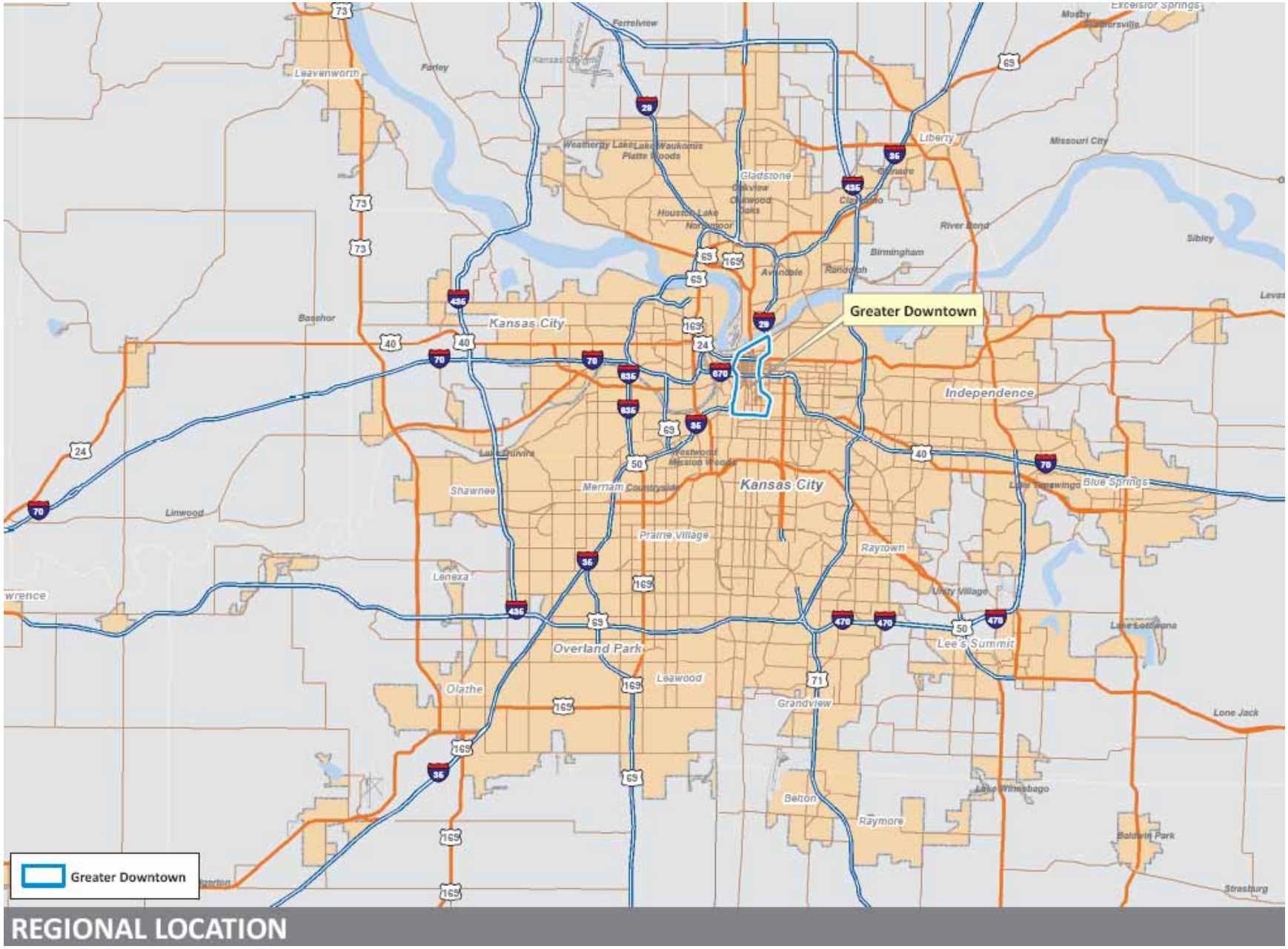
- **River Market District** is making great progress in revitalizing, and has the region's best farmers market.
- **The Downtown Loop** has the region's greatest concentration of employment, as well as the convention center, hotels, Sprint Center, and new Power & Light entertainment district.
- **Crossroads District** lies between the Loop and Crown Center. Historically, it was a center for warehousing and back offices, but recently has emerged as a burgeoning arts district.
- **Crown Center/Union Hill** is a significant center of office employment—it generates more new speculative office development and achieves higher lease rates than properties in the Downtown Loop.

Each of these districts is separated by a significant barrier, such as an interstate or railroad. An I-670 enhancement represents an opportunity to enhance the connections of the Downtown Loop and Crossroads, ensuring better connectivity and encouraging a merging of residents and economies.



Category	Loop / River Market	Crossroads	Crown Center	Totals
Residents	8,000	1,300	3,300	12,600
Workers	48,100	11,300	22,700	82,100
Office Space *(millions)*	17.9	1.7	6.0	25.6
Retail Space *(thousands)*	1,090	475	530	2,095

Sources: ESRI, INFO USA, CoStar, 2009



REGIONAL LOCATION

Crossroads District, Focus Area, and South Loop Link Area

The greatest opportunity lies in the South Loop Link Area; its numerous nearby amenities, coupled with the possibility of adding greater connectivity and meaningful public space, provide it an excellent opportunity to be a premier location.

This study concludes that the Crossroads District stands to benefit the most from I-670 enhancements, because it would improve the connectivity of this area with the Downtown Loop and the Power and Light District. The gains would not be evenly distributed throughout the district; Crossroads is, after all, an expansive area. The majority of economic benefit would be felt in the South Loop Link Area, and secondary benefits would occur in the Focus Area (see image, bottom right).

The South Loop Link Area is where the greatest opportunities lie; its numerous nearby amenities and opportunities provide it an excellent opportunity to be a premier location:

- Kauffman Performing Arts Center (PAC);
- Kansas City Star Printing Press;
- Kansas City Convention Center;
- Power & Light District;
- Sprint Center;
- Central Business District (CBD); and
- view premiums generated by the downtown skyline.

The South Loop Link Area would be further strengthened with meaningful public space. Such a combination would likely have residual benefits throughout much of the Focus Area.

Marketability Analysis: Assets & Opportunities

The South Loop Link could provide meaningful public space around which to organize land development. Such space would enhance the image and visibility of the area, making it attractive for office, hotel, residential, and retail uses. In the process the nuisance of the interstate would be removed.

Public Space/Connections: The greatest opportunity of the South Loop Link Area is to create meaningful public space (such as Citygarden in St. Louis) that will generate image, visibility, and a recognizable address for all types of real estate. The "Link" will improve connections to the Downtown Loop and Power & Light District, and remove the nuisance of the interstate.

Kauffman Performing Arts Center (PAC): The new, $405 million Kauffman Center for the Performing Arts, scheduled to open in 2010, will be a powerful addition to the Greater Downtown.

Per a study by Americans for the Arts, performing arts attendees spend an average of $28 per event, in addition to the cost of admission. This creates "spinoff" opportunities for Crossroads, an already-burgeoning art district, since this spending supports restaurants and retailers in the area.

The opportunity for the Crossroads District is particularly acute, since a number of locally-owned, midscale to upscale restaurants in a low-key setting are likely to have greater appeal to the sensibilities of some performing art enthusiasts, as opposed to a large scale sports/entertainment center. In this way, the Kauffman Center and Crossroads District could complement—not compete with—the Power & Light District.

Convention/Entertainment: The strength of the Kansas City Convention Center, Power & Light District, and Sprint Center is that they attract spending to the downtown from a broad market area that includes the entire Kansas City MSA. They therefore create opportunities—particularly for retailers and hoteliers—for more development than the downtown population can sustain on its own. The South Loop Link would simultaneously create valuable real estate that is adjacent to these regional attractions, and strengthen the connection to the Crossroads District.

Kansas City Star/Printing Press: The Kansas City Star has been a strong, stabilizing presence in the neighborhood for many decades. Recently, it expanded its influence by building the $200 million printing press facility in the district. The building's appealing modern architecture, along with the Sprint Center and Kauffman Center, provides attractive view premiums for new residential properties.

Downtown and Employment: Perhaps the most obvious asset that the Crossroads District has is proximity to downtown and Crown Center, which offer employment, retail, entertainment, and living options to Kansas City residents. Residents, retailers, and employers in the Crossroads District benefit from synergies with downtown. While Crossroads is easily accessed by car or transit, South Loop Link enhancements would make walking/biking more viable.

Views: Some of the most attractive views of the Kansas City skyline are found in the South Loop Link Area, providing view premiums for residences, offices, and hotels.

Vibrant, interactive public space such as Citygarden in St. Louis (shown here in three photos) will enhance the image and visibility of the South Loop Link, as well as create instantly recognizable addresses—all to the benefit of nearby real estate.

Marketability Analysis: Assets & Opportunities

Map above: A number of projects have been completed or are underway that greatly benefit the potential South Loop Link Area. **At right:** (from top to bottom) the Sprint Center, a model of the Kauffman Performing Arts Center (PAC), the Kansas City Star Printing Press, a rendering of the Power & Light District

Marketability Analysis: Liabilities

Removing physical barriers, adding public amenity, and ensuring new development is of a high quality are essential to fully revitalizing the Focus Area; the deck proposal for the South Loop Link would likely address these obstacles.

Lack of Park/Meaningful Public Space: The lack of a park amenity and/or meaningful public space is a principal concern among existing residents, and likely keeps other residents away.

For most residents in the Kansas City area, living in a dense urban environment means sacrificing private outdoor space (i.e., a sizeable backyard). To urban residents, the relinquishing private open space is made worthwhile if public open space is provided, and daily needs can be met nearby. Public open space also can be a useful organizing tool for office, retail, and hotel uses, and can enhance the values of these uses.

Perception of Safety: According to a downtown survey conducted in 2005, this has been an area of great improvement, thanks in no small part to efforts by the Downtown Council.

Nevertheless, roughly one-third of Crossroads residents reported feeling unsafe at night, meaning progress needs to be made to assuage the concerns of prospective residents.

Crime perception is a "Chicken and Egg" paradox: more street activity fosters a sense of safety, encouraging more activity; people avoid the streets unless they feel safe.

While there are some established activity centers in the district, there are also vast expanses of parking lots, or unoccupied storefronts that feel unsafe at night.

The above open space map (provided by Sasaki Associates) shows that the Crossroads District—outlined in dashed orange—is lacking in this amenity. This presents a marketability hurdle that could become an opportunity.

Marketability Analysis: Liabilities (continued)

Disrupted Urban Fabric: Presently, there are simply too many exposed surface parking lots and vacant storefronts for the district to have a feeling of continuity. Repairing these "broken teeth" will enhance the marketability of the area, as well as perceptions of safety.

A deck may spur market-generated redevelopment in the South Loop Link Area (and likely the broader Focus Area) by creating a high-value district around which new businesses and residents will wish to locate.

Physical Barriers: One of the Crossroads District's starkest obstacles is the physical barriers that separate it from the more highly valued downtown core and Crown Center. A deck would effectively remove the obstacle to the north.

Image of Main Avenues: The Crossroads District's main north-south avenues (e.g. Walnut, Main Street, Grand Boulevard) are the "front doors" to the district, and provide newcomers their first impressions.

These avenues have a disrupted urban fabric, with portions providing a positive image, and portions offering a negative one. Repairing one or more of these avenues will aid in a market-based revitalization strategy in the district.

Existing Land Uses: The historical use of the Crossroads District has been one of commerce, trade, and warehousing that was tied to the railroad. Many of these warehousing operations have since relocated to the suburban fringe.

Existing adult businesses and heavy commercial uses may deter members of some large market segments from locating their residences or businesses to parts of the Crossroads District. As a result, these portions of the Crossroads District may continue to attract select tenants, but will not appeal to the broadest market possible.

However, a physical survey undertaken for this study indicates that there is not a critical mass of these uses which will substantially impact the marketability of the South Loop Link Area in a negative way.

Above: I-670/Truman Road is a physical barrier that separates the Central Business District from the Crossroads District. **Middle:** Surface parking lots provide inexpensive parking, which is attractive to office tenants, but detracts from urban design and the pedestrian realm. **Bottom:** Adult businesses and some industrial uses are typically incompatible with residential, office, retail, and hotel uses because they detract from the marketability and image of the area.

Demographic & Market Segment Analysis

The Greater Downtown grew significantly during the past decade. New residents tend to be more affluent and educated, and are more likely to own their homes, resembling residents in the Central Kansas City market—an area stretching from downtown to south of the Plaza.

The Greater Downtown consists of roughly 11,800 people—up 22 percent from 2000. Central Kansas City—a diverse area that includes downtown, Country Club Plaza, and affluent neighborhoods south of the "Plaza"—has historically yielded higher incomes and levels of education, relative to the Greater Downtown. However, data indicates that the new residents moving into downtown are more likely to share traits with those in the Plaza and neighborhoods to the south.

In other words, the demographics of the Greater Downtown tell us about who lives in the area today, while demographics of Central Kansas City (which skew toward a more affluent, educated residential base) tell us more about the people that are moving into the area, and what the Greater Downtown might look like in the future. Following are a few findings:

- **Homeownership:** 2009 estimates reveal a high percentage of residents in the Greater Downtown are renters (82 percent versus 32 percent for the region). This correlates with the high percentage of singles and young residents.

  However, supply analysis (provided later in this report) tells us that new housing additions have tilted toward the for-sale market. Fifty-eight percent of households in Central Kansas City rent, which might be a better indicator of the direction Greater Downtown is moving.

- **Income:** Evidence suggests that new downtown residents tend to be more affluent than existing residents. A survey by the Downtown Council showed average incomes elevated 10 percent between 2002 and 2004,

Population Trends

Description	*Crossroads District*	*Greater Downtown*	*Central KC*	*Kansas City*	*Kansas City MSA*
2014 Projection	1,370	12,600	76,100	481,000	2,150,000
2009 Estimate	1,290	11,800	76,000	467,000	2,040,000
2000 Census	630	9,700	76,500	442,000	1,840,000
1990 Census	540	9,500	82,300	436,000	1,640,000
Growth 2009-2014	6%	7%	0%	3%	5%
Growth 2000-2009	105%	22%	-1%	6%	11%
Growth 1990-2000	17%	2%	-7%	1%	12%

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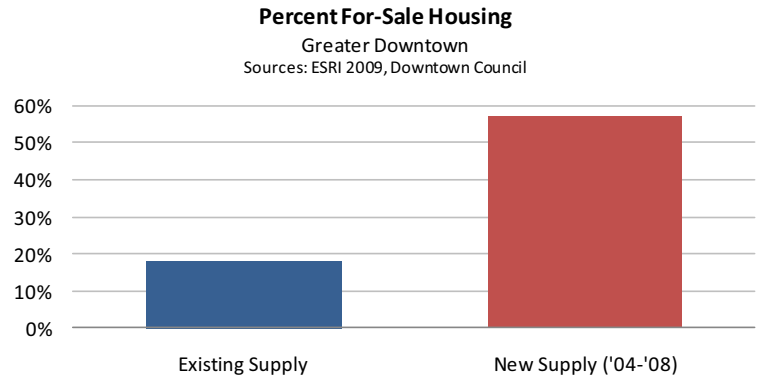
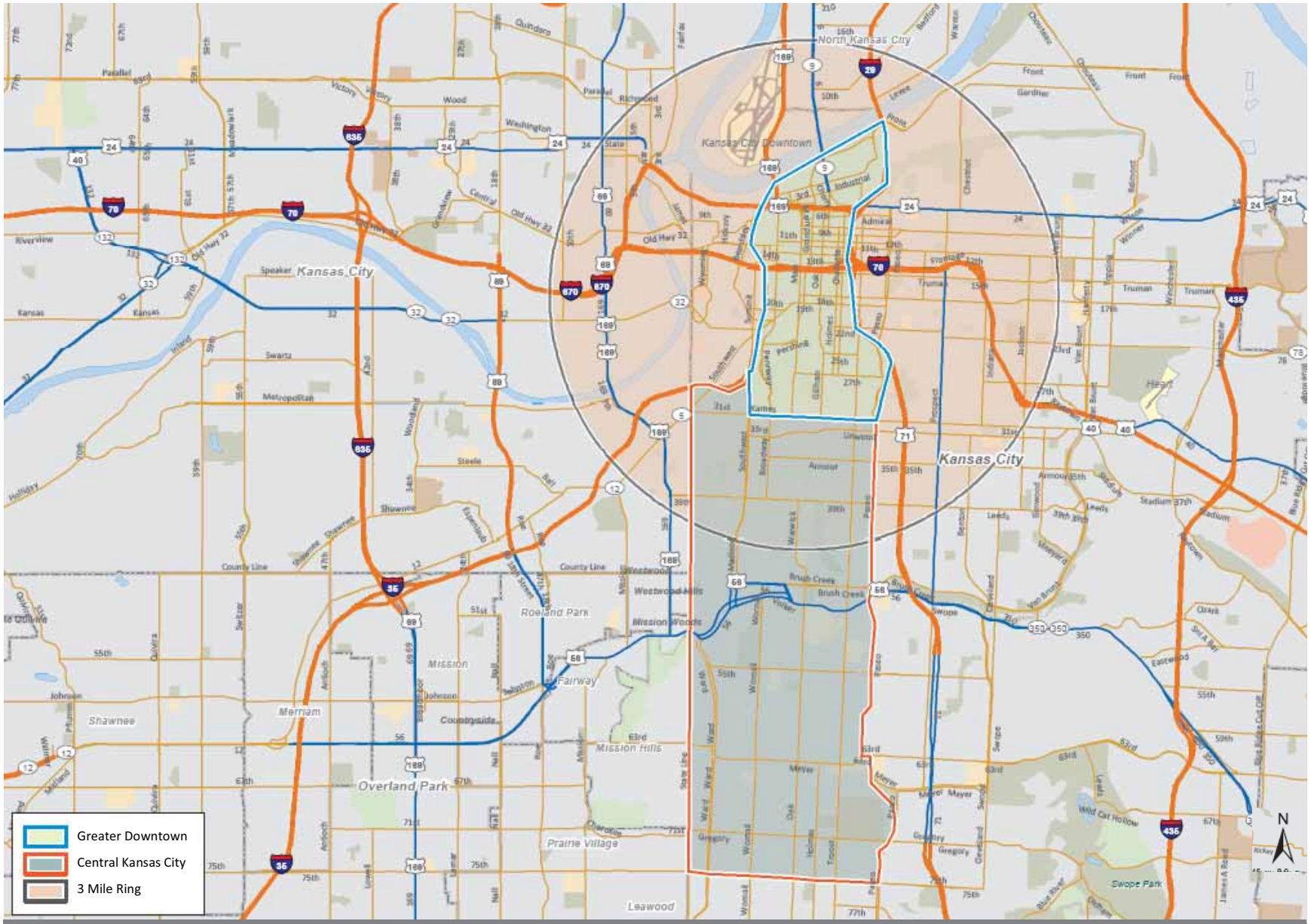


Top: Growth in the Greater Downtown has been robust. **Bottom:** Downtown residents have historically been renters. An underserved market for homeowners has been targeted by recent developments; over time this trend will change the ratio of renters to owners in the downtown.

(Note: the market areas listed in the top table are additive. Thus, Crossroads District is part of Greater Downtown, Greater Downtown is part of Central KC, etc. The Greater Downtown and Central KC market areas have been defined by Development Strategies.)



SELECT MARKET AREAS
South Loop Link Market Conditions Report

Demographic Analysis

New households that will buy or rent market rate housing in the Greater Downtown will generally be well-educated, and consist of singles and couples. One and two-bedroom units will be most popular.

Household Size: An overwhelming majority of households in the Greater Downtown (88 percent) consist of single and two-person households, and few families (25 percent of households); this is likely to be true of the market for housing at the South Loop Link. (Note: there is some overlap between two-person households and family households.)

Indeed, the Crossroads District, which doubled in population during this decade, experienced a substantial decline in average household size, indicating that new resident households are smaller than households of longstanding residents. This reinforces that one and two–bedroom units will be in greatest demand.

Family Composition: The Greater Downtown has a low share of school-aged children.

- 15 percent of the area's households have children under the age of 19—roughly half the regional average.
- Central Kansas City (which includes Greater Downtown) is somewhat higher at 20 percent.

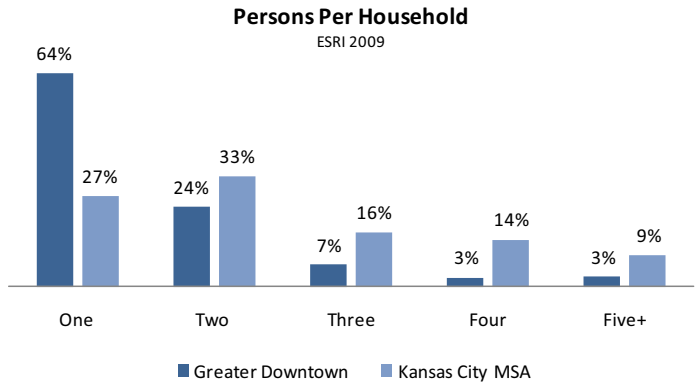
The demand analysis in this study will exclude most households with children, since children represent only a small percentage of the demographic profile of prospective residents.

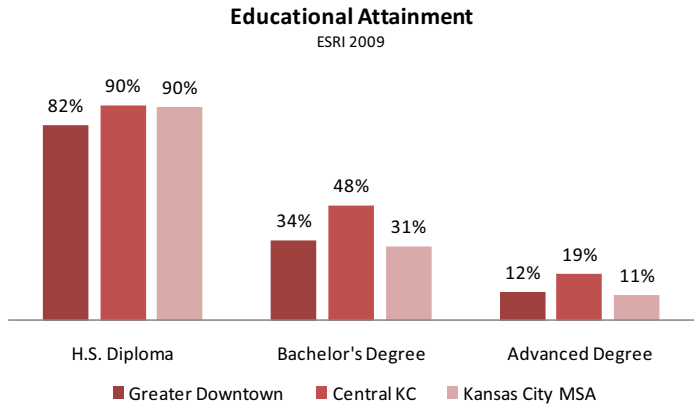
Education: Among existing residents, Greater Downtown has relatively average levels of educational attainment. Central Kansas City has significantly higher than average levels, and this is likely to be indicative of the type of future residents who will buy or rent market-rate housing downtown.

Household Overview

Description	*Crossroads District*	*Greater Downtown*	*Central KC*	*Kansas City*	*Kansas City MSA*
'09 Housing Units	650	8,100	47,200	226,000	880,000
Occupied	510	6,500	38,600	196,000	800,000
Occupancy Rate	78%	81%	82%	87%	91%
% Owner-Occupied	29%	18%	42%	58%	68%
% Family Households	48%	25%	38%	58%	67%
Average HH Size	1.84	1.53	1.86	2.33	2.50
Children Present (<19)	15%	15%	20%	27%	28%

© 2009 ESRI HH= Households





Demographic Analysis

As more affluent residents continue to move downtown, income growth in the area will outpace the region. Market-rate housing demand will be driven by people in the early workforce and empty nesters.

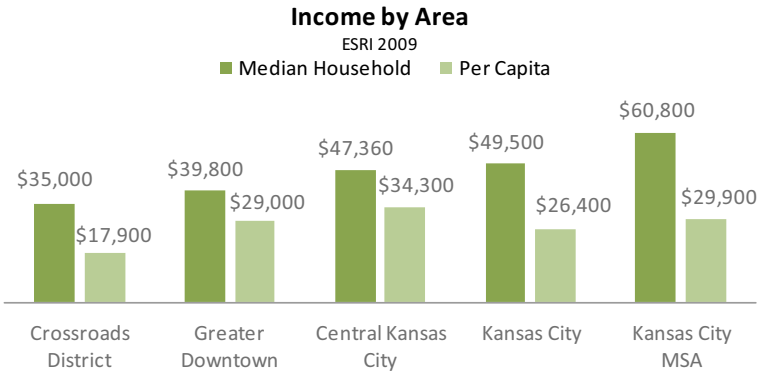
Income: With a median income of $39,800, households in the Greater Downtown earn considerably less than those in the region ($60,800). However, on a *per capita* basis, residents in both the downtown and throughout the region earn roughly the same amount. This is explained by the high percentage of singles downtown.

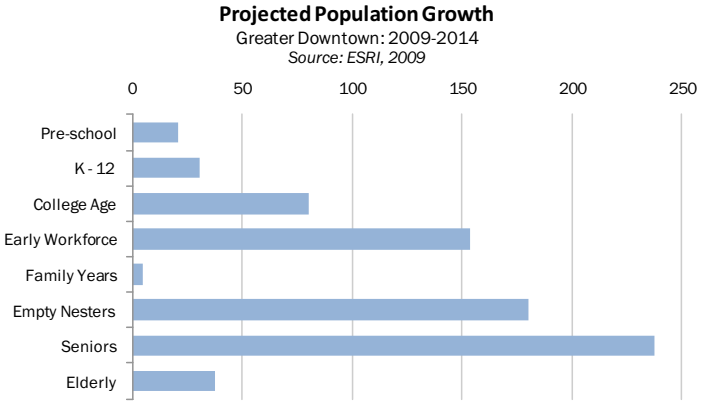
Demographic projections indicate that income growth in Greater Downtown is likely to outpace Kansas City MSA figures in the future (six percent over the next five years, compared to one percent for the MSA). Consider the following data:

- New downtown residents are rapidly boosting the buying power of the downtown, per a recent survey by the Downtown Council.
- Kansas City's Downtown Council reports average condo sales of $230,000, which correlates with a household income of roughly $70,000.
- A recent survey of downtown employees indicated that 19 percent would be interested in moving downtown. The average income of this group was $85,000.

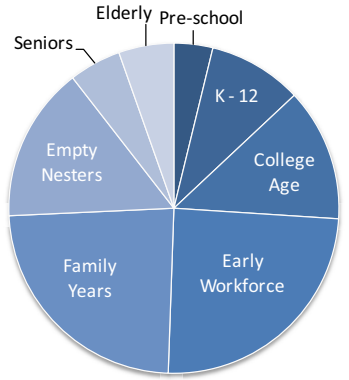
Age Characteristics: Market-rate housing growth is likely to be driven by two groups: young people, primarily in the early workforce, and empty nesters.

- **Early Workforce:** Aged 25-34; this group comprises an impressive 25 percent of the downtown population—double that of the region. This group tends to be single or recently married, and does not have school-age children. They rent or are first-time homebuyers.
- **Empty Nesters:** aged 50-64, this group comprises a modest amount of the downtown population; its share will increase over time. This group has relatively high incomes and large assets. It will drive demand for two- and three-bedroom condos.





Top: Per Capita incomes in the Greater Downtown are among the strongest in the region. **Middle:** The Early Workforce and Empty Nesters are two key growth demographics. (Seniors will also grow significantly; however, much of this growth will likely be driven by the affordable housing market.) **Bottom:** The Early Workforce (ages 25-34) comprises an impressive 25 percent of the downtown population.



Market Segment Analysis

Analysis of the Central Kansas City market area—the area most representative of potential residents in the South Loop Link Area—shows significant market support, primarily from the Early Workforce, Family Years, and Empty Nesters groups. The target market earns between $75,000 and $150,000 annually.

Following is a discussion of five market segments, and how each could potentially impact the Focus Area and South Loop Link housing markets.

College-age (18-24): typically the lowest income-earners in the market, and the Greater Downtown is no exception.

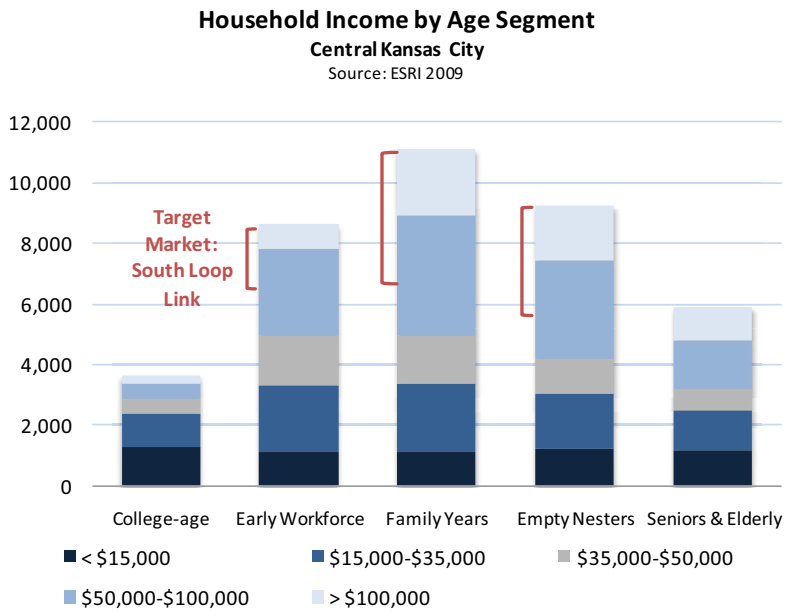
- The Downtown Council reports that nearly 8,000 college students attend classes in downtown.
- A far greater number of students are concentrated in Westport and Country Club Plaza, which are convenient to the University of Missouri at Kansas City (enrollment: 14,000), Rockhurst University (3,000), and the Kansas City Art Institute (520).
- This is not a deep market for the South Loop Link.

Early Workforce (25-34):

- Residents in the early workforce will provide a sizable market for housing in the Focus Area, as well as the South Loop Link.
- Households in this group are often single or married without children.
- The Focus Area will likely be attractive to those earning $35,000 to $75,000 annually.
- Higher income-earners will be attracted to the South Loop Link.

Family Years (35-49):

- While this age bracket is best-known as the "child-rearing" group, almost one-half of such households do not have children.



- This age bracket consists of the market's highest wage earners.
- Singles and childless couples who earn more than $75,000 annually are likely to provide support for housing in the South Loop Link Area.

Empty Nesters (50-64): this group is projected to provide significant population gains to the Greater Downtown over the next five years.

- This group wishes to "downsize" but typically wants—and can pay for—more space than younger age brackets.
- The current image of Crossroads is not likely to appeal to this market segment, but it will likely be attracted to the South Loop Link.
- A niche market likely exists in this age category for residents that would be attracted to living near the Performing Arts Center.

Seniors and Elderly (65+): At present, this study does not anticipate that market rate senior housing would excel in the South Loop Link Area.

Demographic Analysis:

Population Density

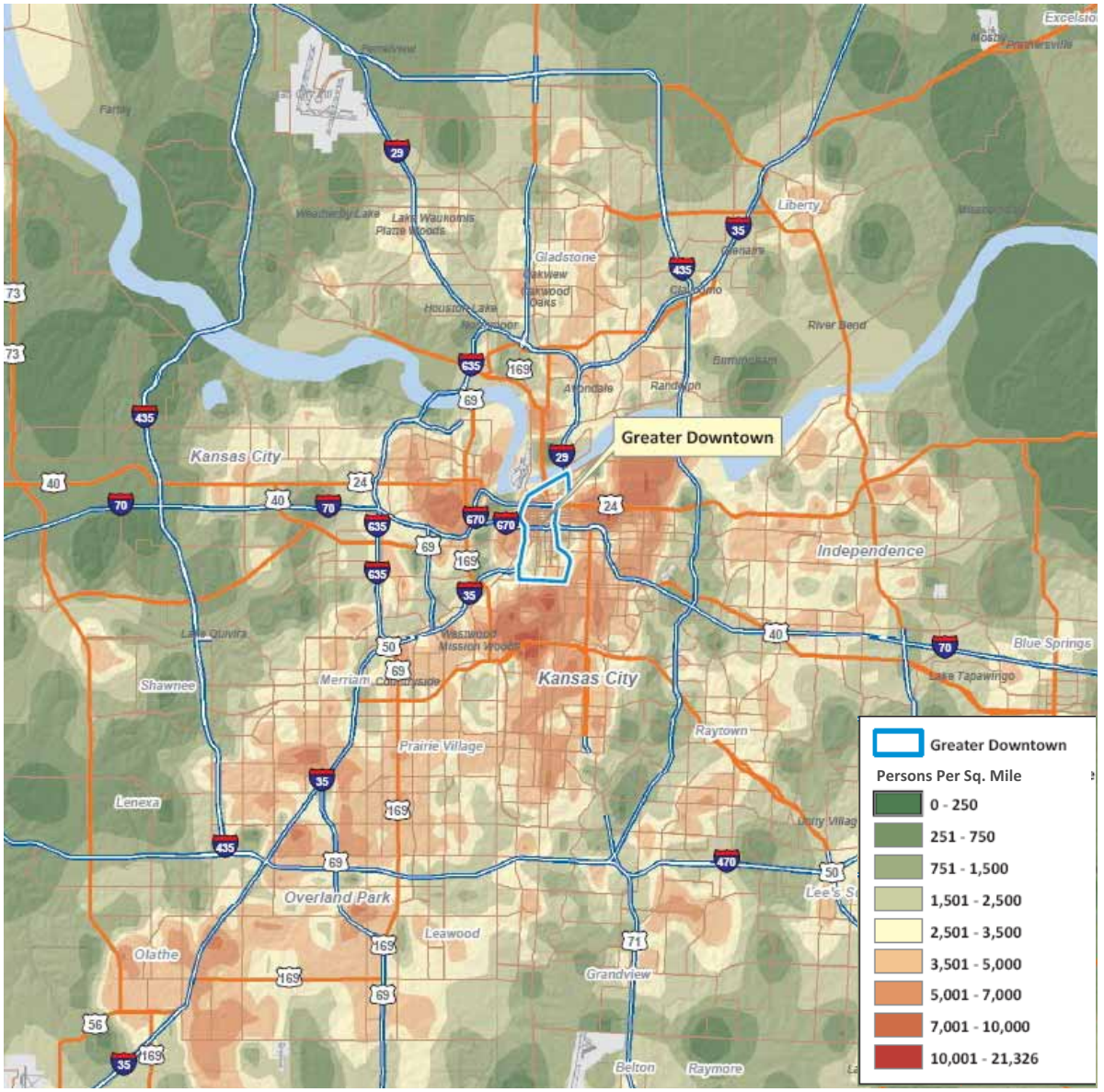
Downtown lies amidst the densest part of the region. This is the area most accommodating to dense housing, transit-oriented development, pedestrian-oriented retail, and office users that wish to cluster near other employers.

The adjacent map shows population density, with areas of greatest density (persons per square mile) in red-orange, and areas of lowest density in green.

The map clearly shows that the Greater Downtown sits amidst a heavy cluster of orange and red, meaning it is the most dense part of the region. This is the area where transit is best-linked, and where dense housing types are broadly accepted.

For retailers, average household incomes may not be high, but income densities (i.e., the total amounts of income per square mile) are likely to be relatively strong.

Office employers that wish to have large numbers of potential employees nearby, or wish to be transit accessible, will be well-located here.



Demographic Analysis:

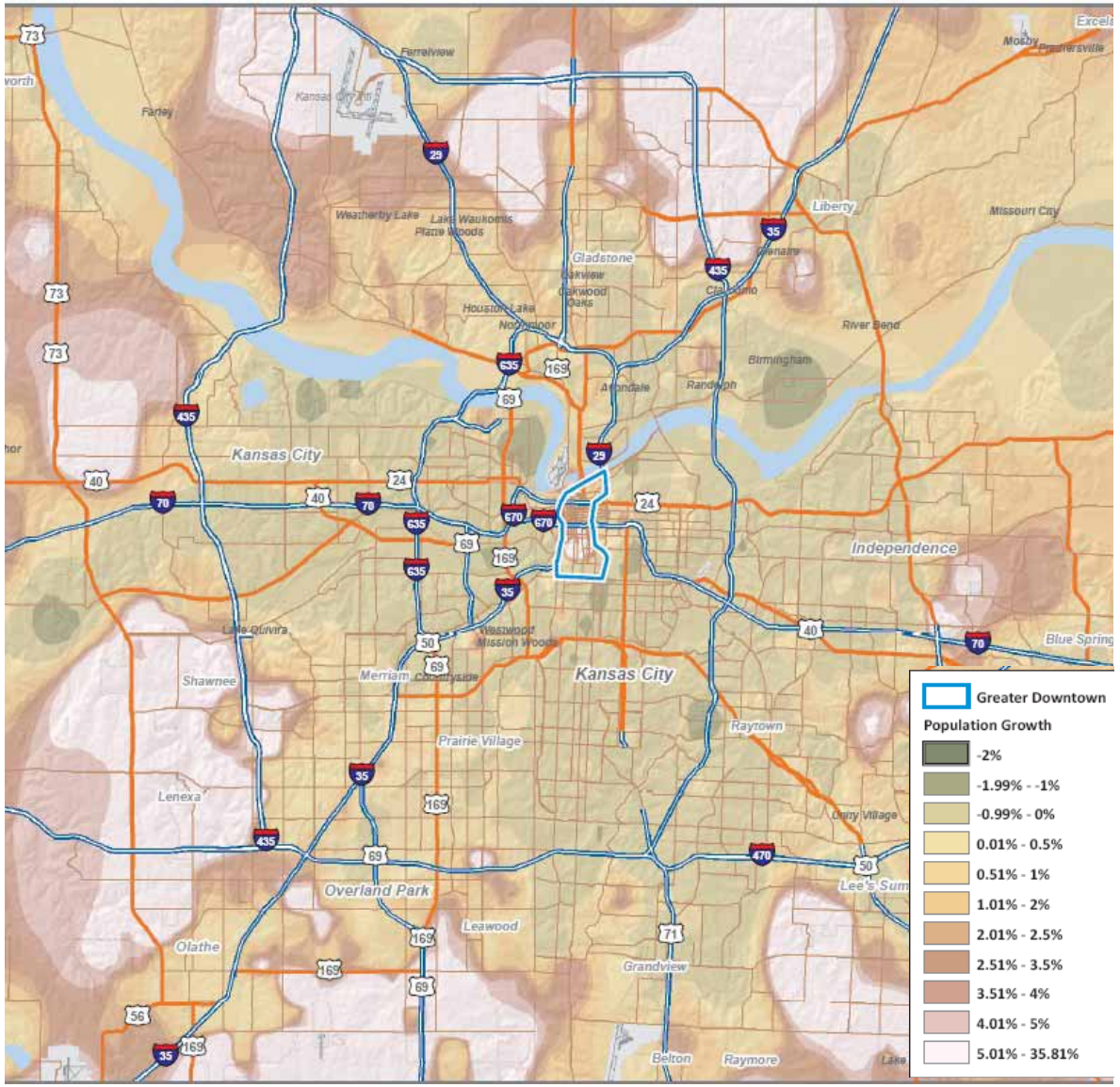
Population Growth

During this decade, Greater Downtown experienced significant population growth, bucking a trend of development at the regional periphery. Capturing just a small amount of regional growth has led to substantial development downtown.

The adjacent map shows population growth trends between 2000 and 2008, with areas of heaviest growth indicated in white, followed by brown.

The map shows that virtually all of the population growth took place outside the region's outer belt. Interestingly, the only "white hot" urban growth location was within the Greater Downtown.

This underscores that, even when the vast majority of housing and population growth occurs at the periphery, a microtrend of urban growth needs only to capture a small percentage of regional growth to make a significant impact.



Demographic Analysis:

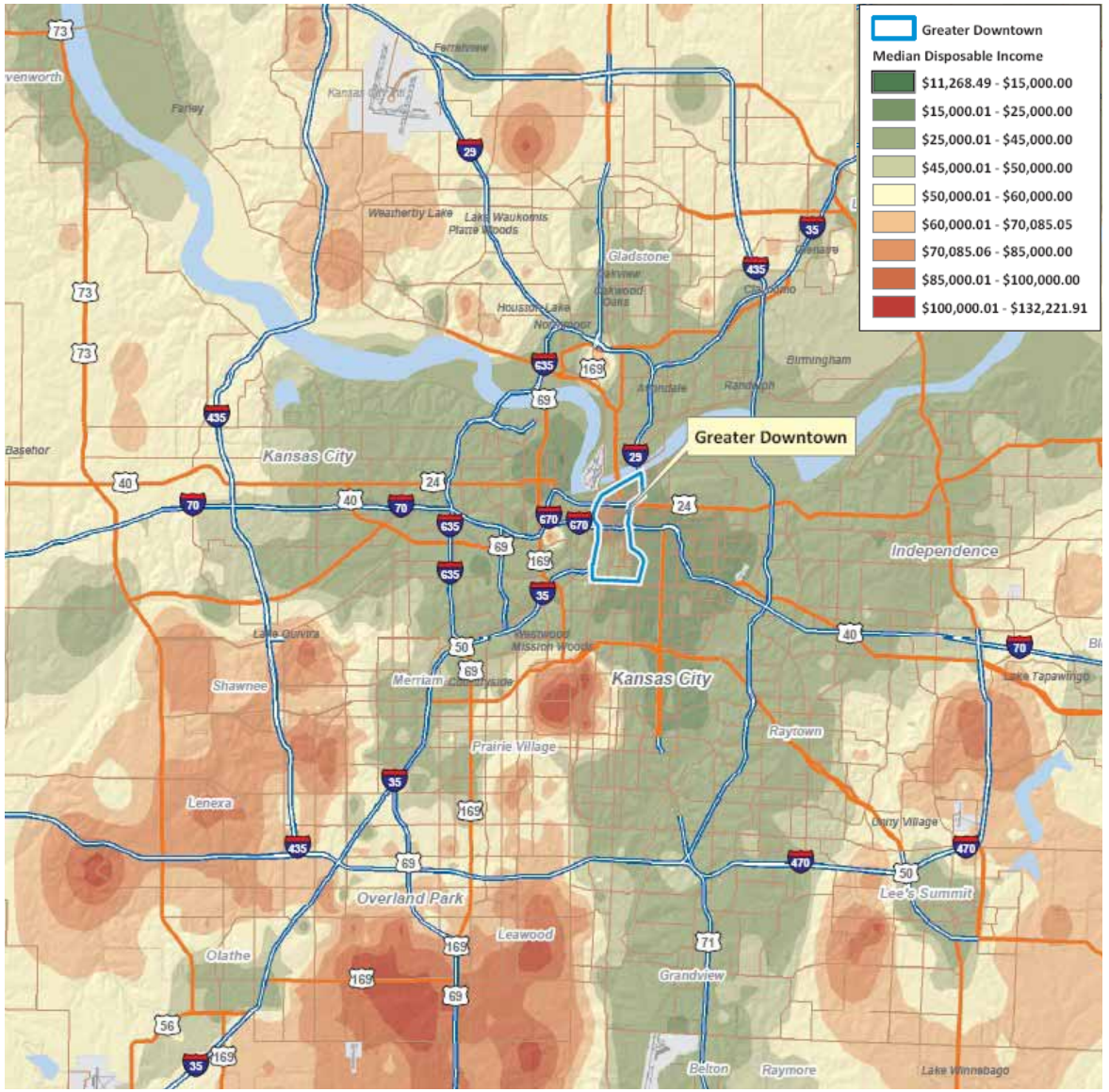
Income

The areas with the highest household incomes are primarily located in the suburbs, and retail and office uses have followed. Downtown attracts more singles and young couples, who have lower household incomes, on average.

The map shows median disposable income, with areas of highest income in orange and red, and areas of lowest income in green.

The Greater Downtown has relatively low household disposable income. As demonstrated on the following pages, this is largely due to the small household size in downtown. On a per capita basis, downtown residents earn amounts comparable to regional residents.

The Kansas suburbs to the southwest, such as Overland Park and Olathe, are among the wealthiest in the region. This cluster and others indicated in red and orange are the most competitive areas for new residents, office space, and retailers. (Note: data for maps is provided by ESRI, 2009)



Economy and Employment Overview

The nation is currently in its worst economic condition since the Great Depression of the 1930's. Still, the economy is cyclical and long term growth curves are persistently upward. Development projections must span a sufficiently long period to account for market fluctuation.

Presently, economists debate whether or not the country is out of recession, which revolves partly around Gross Domestic Product (GDP) growth.

What is less debatable is that the "real economy" (i.e. employment, consumer spending, home buying) remains in the doldrums.

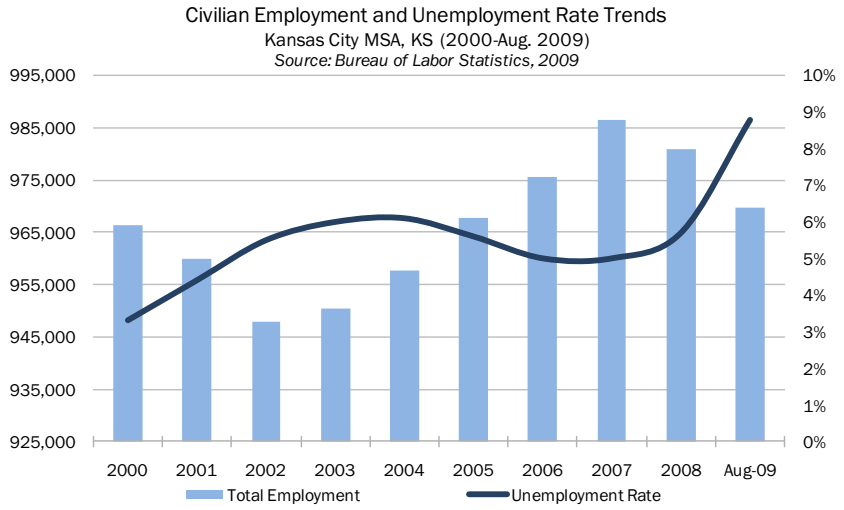
Projections for the Focus Area and the Crossroads District should be sufficiently long—say, 10 to 15 years—to account for at least one downturn and one upturn. Projections should neither be overly pessimistic (as they often are during a recession), nor overly optimistic (as they often were during the housing boom of the previous several years).

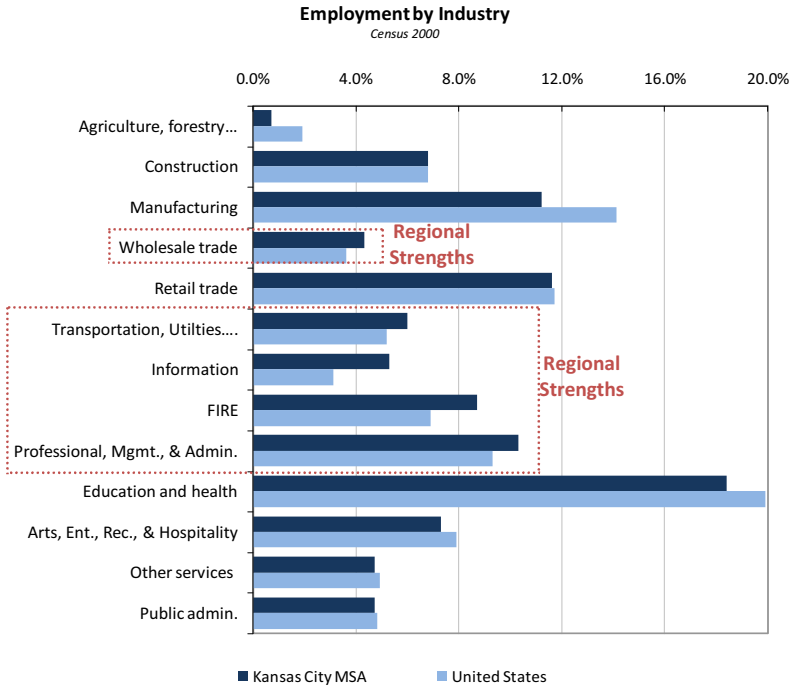
This report, therefore, takes into account "big picture" trends—e.g. regional population, employment, and housing growth—over many years, and even decades.

Regional Employment Trends: After five years of significant employment gains, the Kansas City region has lost approximately 17,000 jobs in 2008 and 2009 (combined).

The unemployment rate for metro Kansas City is 8.8 percent—one percentage point below the national average.

In a relative sense, Kansas City is actually outperforming the nation. Having stated that, each sector of the real estate market is performing poorly.



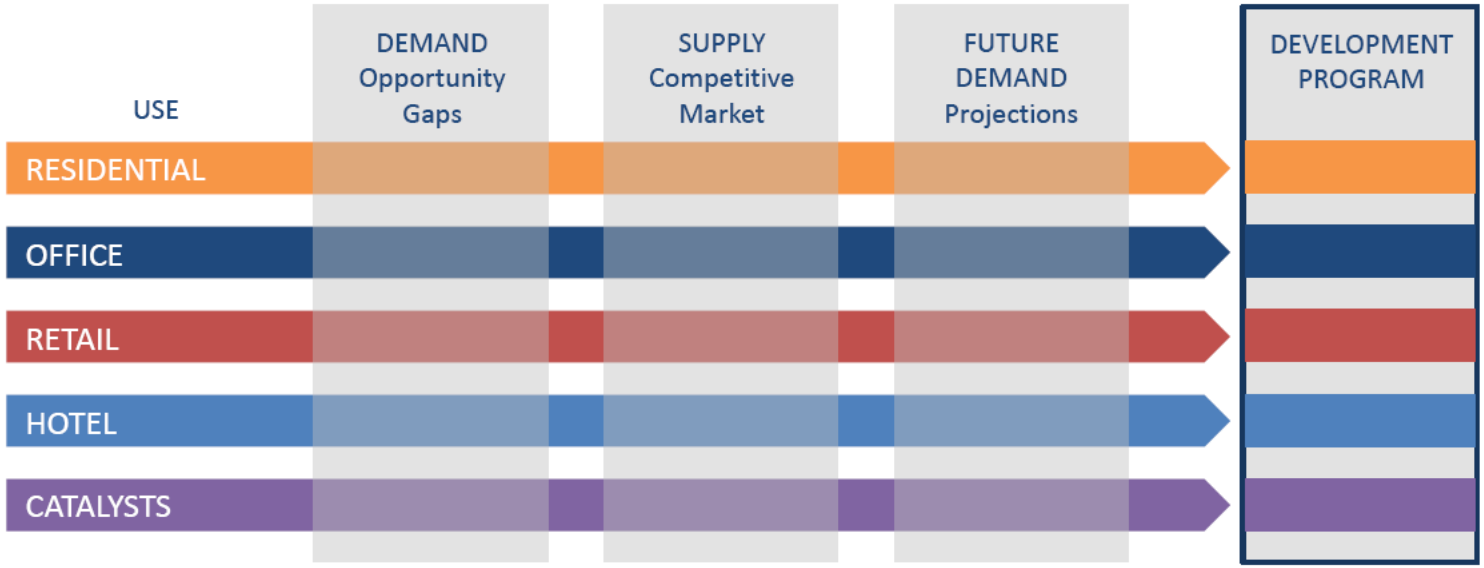


Market Analysis: Process Overview

Arriving at a feasible development program requires evaluating each land use through different "prisms": supply, demand, and future demand (growth).

To determine a marketable development program for a site, neighborhood, or district, this study first evaluates each potential land use separately. Each use is evaluated through different "prisms": supply, demand, and future demand; this results in conclusions regarding the most realistic and market-feasible development program.

- **Demand:** This study evaluates demand to determine if it is in equilibrium with supply. Often, supply is misaligned with demand. For instance, surveys may show that one-third of the housing market desires a new urban housing product, yet only five percent of supply is meeting this demand. This misalignment creates an "opportunity gap" whereby a developer can provide an undersupplied product, and a relatively large and unserved demand pool awaits.
- **Supply:** Analysis of existing supply indicates a great deal about what the market will bear in terms of rents, sales prices, and lease rates. It indicates preferences for specific products or locations. Analysis of the competitive market can reveal specific opportunities for developers. For example, demand analysis may reveal that a particular market area has an adequate amount of retail. However, the existing shopping centers and/or retailers may be dated or obsolete. An opportunity may exist for a new, more competitive shopping center with contemporary retail tenants to "beat out" the competition. This also holds for location: a superior site can provide competitive opportunity.
- **Future Demand:** An assessment of future growth can reveal opportunities for new development. Employment growth may necessitate more office development. Similarly, population growth requires more housing and more retail.



Market Analysis: Residential

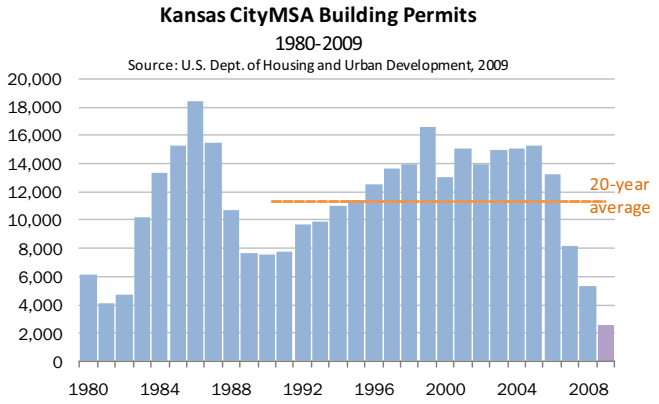
For-Sale Housing Overview

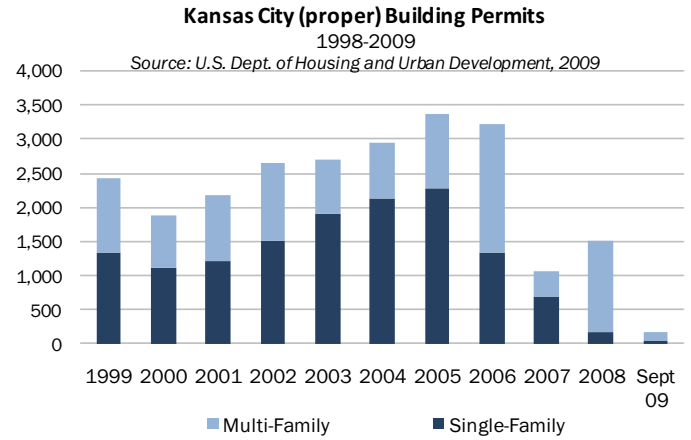
Though housing permits are down substantially in 2009, the Kansas City region averaged roughly 11,500 units per year over the past 20 years. In recent years, the city captured 20 percent of regional permits, and the downtown's share of the city's activity ranged from one-third to one-half.

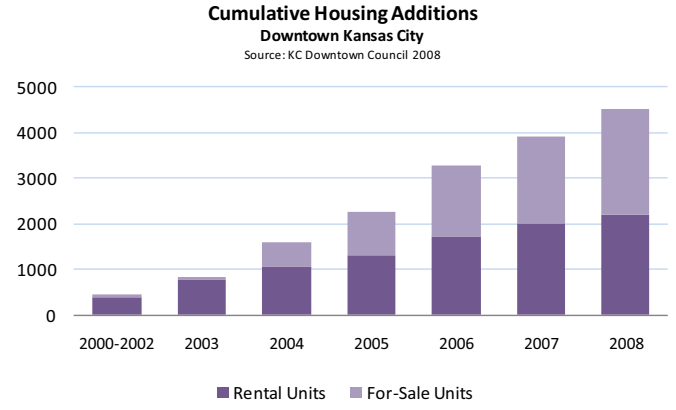
Regional Housing: The economic recession has greatly affected the regional housing market in Kansas City. It is projected to record roughly 2,500 housing permits in 2009, the lowest recorded number since 1980, the earliest year for which the U.S. Department of Housing and Urban Development (HUD) offers this data. The decline has been sharp; as recently as 2006, the region recorded roughly 13,000 permits.

Still, development around the South Loop Link would occur over a period of 10 to 15 years, so long-term patterns are more relevant than the current state of the economy. Over the past twenty years, through several recessions and housing booms, the region added roughly 11,500 permits per year. While analysts predict a housing market recovery will lag behind other sectors of the economy, this study finds a projection of 11,000 annual housing units to be reasonable for the Kansas City region, once the market recovers. This will guide this study's projections for housing throughout the region, right down to the South Loop Link Area.

Downtown Housing: As the bottom chart indicates, roughly 4,500 housing units have been added to downtown since 2000 (through 2008), and the proportion of for-sale housing additions steadily increased. From 2004 through 2008, new downtown housing accounted for between one-third and one-half of all housing starts in the city. As the following pages display, much of the recent housing development downtown—and in fact, projects currently under construction—is being driven by the affordable market (defined by HUD as households that earn between 30 and 60 percent of area median income—roughly $18,000 and $36,000, respectively, in metro Kansas City). Such projects receive tax credits, and are therefore not truly market-driven.







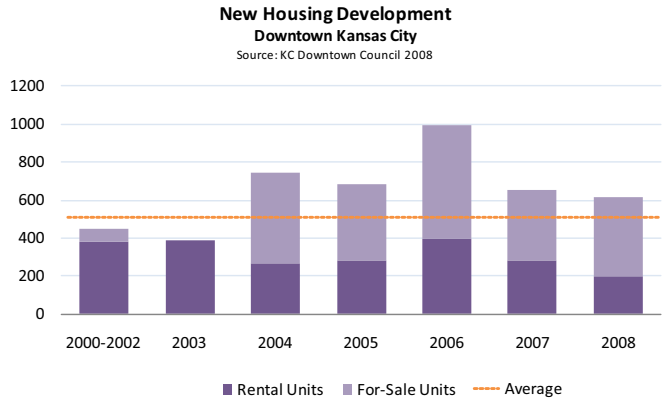
Rental Housing Overview

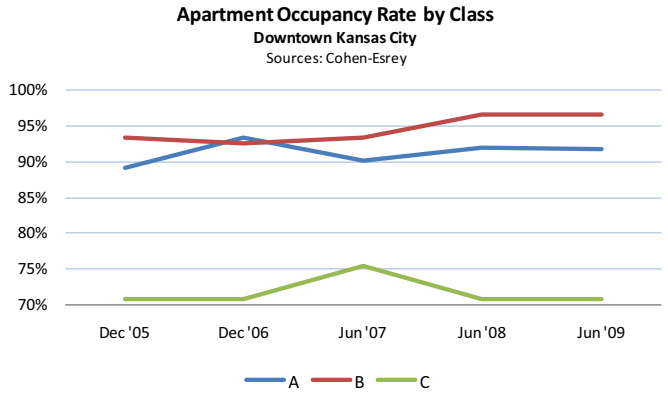
Relative to other real estate sectors, the downtown rental market has performed relatively well, signaling that demand will likely recover along with the economy.

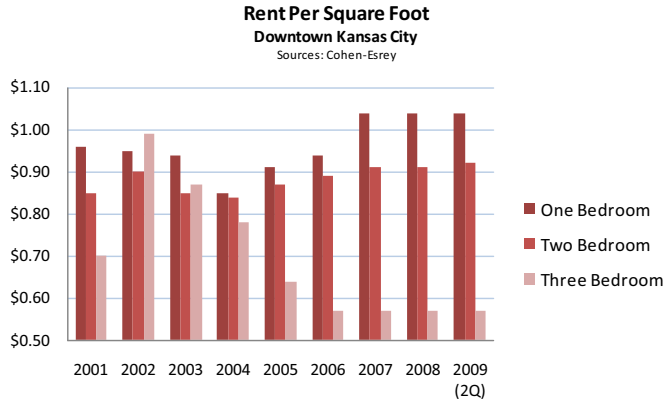
On a macro scale, downtown Kansas City is an attractive market for rental housing. Though the region has experienced rising vacancies in the past year, downtown's overall vacancy has remained constant (Cohen-Esrey, 2009 2Q). Rents have also remained level—a good indicator since, nationally, the rental market (and indeed all real estate sectors) has struggled.

On a per-square-foot (psf) basis, downtown Kansas City is the market's second highest performer, behind the region's premier market, Country Club Plaza.

The chart at top shows the steady supply of between roughly 200 and 400 new units in each year since 2002.







Downtown Residential Supply

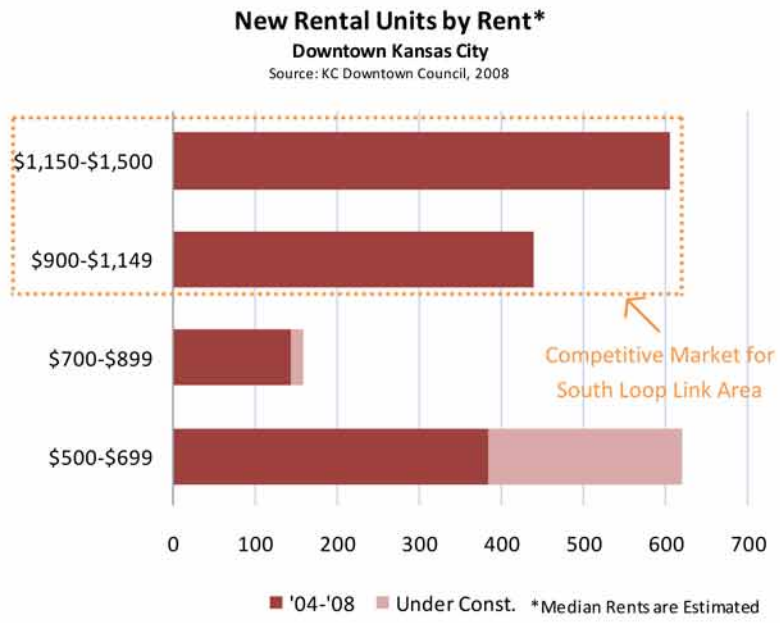
In recent years, modestly-priced "workforce" housing has been ignored—an opportunity for the Crossroads District and Downtown Loop. The opportunity for the South Loop Link Area, however, is in the upscale market, where it will have a competitive advantage over many other locations.

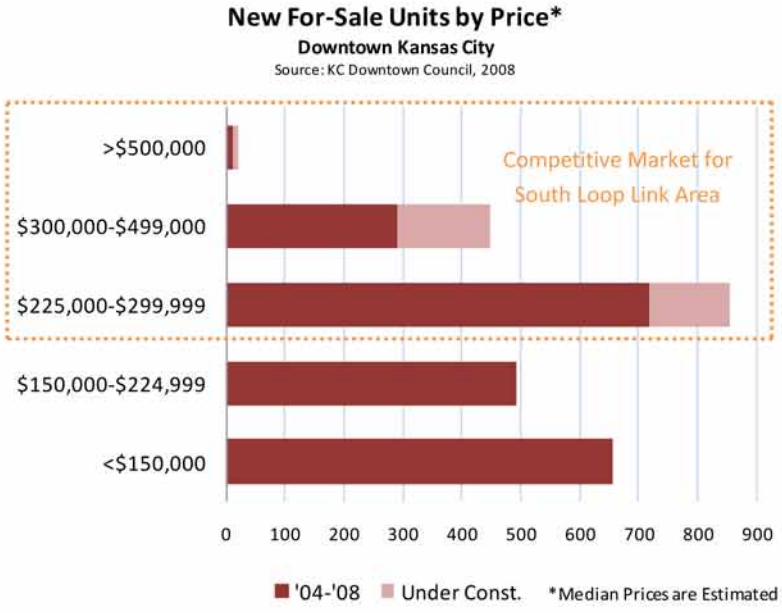
To better understand new downtown supply, this report assessed median rents and prices for each new property that has been placed on the market from 2004 to 2008. During that time, over 3,700 housing units were added, 57 percent of which are in the for-sale market.

New Rental Units: As the upper chart shows, the majority of new rental units built in the past few years targeted the high-end market, with over 600 units offering monthly rents between $1,150 and $1,500. Another 440 have rents between $900 and $1,149 per month. Several affordable projects (using the HUD definition) are under construction, with rents below $700 per month, and will bring the total number of recent affordable additions up significantly.

Meanwhile, products that rent between $700 and $899 per month have been largely ignored. This lack of new, mid-priced "workforce" housing (i.e. that which targets households earning between 60 and 120 percent of area median income—roughly $36,000 and $73,000, respectively, in the Kansas City area) reveals an underserved market. The South Loop Link will create a location for premium rental units, and the site could eclipse some existing projects as a superior location.

New For-sale Units: The bottom chart shows that pricing for new for-sale product has been well-distributed. Developers have particularly targeted the $225,000 to $300,000 market – this is wise, given strong market demand for products in this price range. The "$150,000 and under" market has also been well-served, specifically by properties in the Government District such as the Metropolitan. The South Loop Link will be an attractive location for upscale housing, will products likely to perform well in both the $225,000-plus and $300,000-plus brackets, once the market recovers.





Competitive Supply: Condo

The South Loop Link's attractive location will likely command average sale prices of $250 to $300 per square foot for new condo product, once the market recovers.

After a flurry of development in recent years, the downtown condo market has cooled. The projects listed below primarily occurred during the height of the condo boom, and thus were successful in selling units.

- **1819 Lofts** is a model for what is achievable in Crossroads. Units were priced between $175,000 and $350,000, and sold at $200 per square foot. These are likely to be sustainable price points, once the for-sale housing market recovers. New product at the South Loop Link will almost certainly perform even better.

Other properties indicated below highlight different aspects of the downtown market.

- **Wallstreet Tower** achieved very high price points during the height of the housing boom. The South Loop Link could offer a superior product, but probably not match the prices that the property achieved, because they were artificially inflated during the housing boom.
- **Metropolitan** and **The View** successfully marketed small units at prices that previously-ignored market segments could afford.
- **The Reserve** is an architectural gem that has stalled. Its luxury product positioning is ill-timed, given the current state of the economy, and its priced may be too high even when the market recovers.

This study finds that median prices of $250 to $300 per square foot are likely to be realistic near the South Loop Link Area, once the market recovers.


Wallstreet Tower


1819 Lofts

Western Auto Lofts

Downtown Kansas City
Condos

PROPERTY	Percent Sold	Number of Units	One-Bedroom Avg. Price	One-Bedroom Size (SF)	One-Bedroom Price PSF	Two-Bedroom Avg. Price	Two-Bedroom Size (SF)	Two-Bedroom Price PSF	Three-Bedroom Avg. Price	Three-Bedroom Size (SF)	Three-Bedroom Price PSF
Metropolitan	**97%**	**219**	**$98,900**	**633**	**$156**	**$188,400**	**927**	**$203**	**$369,900**	**1,875**	**$197**
Wallstreet Tower	95%	145	$320,000	871	$367	$536,000	1,401	$383	-	-	-
The View	**92%**	**144**	**$120,000**	**741**	**$162**	**$284,050**	**1,231**	**$231**	-	-	-
1819 Lofts	100%	26	$178,000	1,019	$175	$399,000	1,923	$207	-	-	-
The Reserve	**22%**	**134**	**$276,556**	**904**	**$306**	**$427,855**	**1,372**	**$312**	**$1,000,000**	**2,337**	**$428**
Western Auto Lofts	100%	166	$109,900	-	-	$311,900	-	-	-	-	-
Freighthouse Flats	**86%**	**22**	**$190,000**	-	-	-	-	-	**$625,000**	-	-
Average/Totals*	**84%**	**856**	**$175,000**	**777**	**$234**	**$335,000**	**1,223**	**$270**	-	-	-

**Three-bedroom data not statistically significant*

Competitive Supply: Rental

Reasonable rents in the Focus Area, on a per-square-foot basis, range from $1.15 to $1.30—probably not enough to make new construction, with parking, feasible.

Since 2002, the Greater Downtown has added a minimum of 200 apartment units per year. Several of these projects occurred in the Crossroads District.

- The **Freighthouse Lofts** and **Soho South Lofts** are exemplary of quality apartment development in Crossroads. In particular, Freighthouse Lofts features historic architecture, large windows, and high ceilings. It is therefore able to achieve relatively high rents for the District—$1.13 on a per square foot basis for a one-bedroom unit.

Other quality properties in Crossroads are more likely to achieve between $1.00 and $1.05 per square foot for a one-bedroom unit.

As with condos, new apartment product is largely untested.

- **909 Walnut** achieves some of the highest rents downtown; it is a landmark building that was rehabilitated during this decade. It is not comparable to a new property because of its uniqueness, but it may indicate what the "rent ceiling" is for the downtown market. Parking is not included in the rent.

- Market rate units at **Cold Storage Lofts** achieve very high rents. However, with just 22 market rate units, it is hard to determine how much market depth exists at this rate.

A new quality product in the Focus Area might achieve rents of $1.30 per square foot for a small, one-bedroom unit, and $1.15 for a mid-sized, two-bedroom unit.

Downtown Kansas City
Apartments

			One-Bedroom			Two-Bedroom			Three-Bedroom		
PROPERTY	*Occ.*	*Number of Units*	*Avg. Rent*	*Size (SF)*	*Rent PSF*	*Avg. Rent*	*Size (SF)*	*Rent PSF*	*Avg. Rent*	*Size (SF)*	*Rent PSF*
Professional Building*	**100%**	**132**	**$606**	**1,041**	**$0.58**	**$668**	**1,192**	**$0.56**	-	-	-
Quality Hill	100%	382	$760	752	$1.01	$1,000	955	$1.05	-	-	-
909 Walnut	**98%**	**159**	**$950**	**800**	**$1.19**	**$1,500**	**1,300**	**$1.15**	**$2,450**	**1,950**	**$1.26**
Cold Storage Lofts	95%	22	$840	702	$1.20	$1,100	894	$1.23	$1,250	1,041	$1.20
Cold Storage Lofts*	**99%**	**202**	**$575**	**702**	**$0.82**	**$663**	**894**	**$0.74**	**$775**	**1,041**	**$0.74**
Soho South Lofts	87%	231	$720	720	$1.00	$1,080	1,080	$1.00	-	-	-
Freighthouse Lofts	**94%**	**127**	**$935**	**825**	**$1.13**	**$1,295**	**1,295**	**$1.00**	**$1,495**	**1,500**	**$1.00**
Average/Totals	**96%**	**1255**	**$750**	**781**	**$0.96**	**$1,021**	**1,070**	**$0.95**	**$1,498**	**1,418**	**$1.06**

**LIHTC at 50% and/or 60% AMI*


Freighthouse Lofts


Soho South Lofts


Cold Storage Lofts


Quality Hill

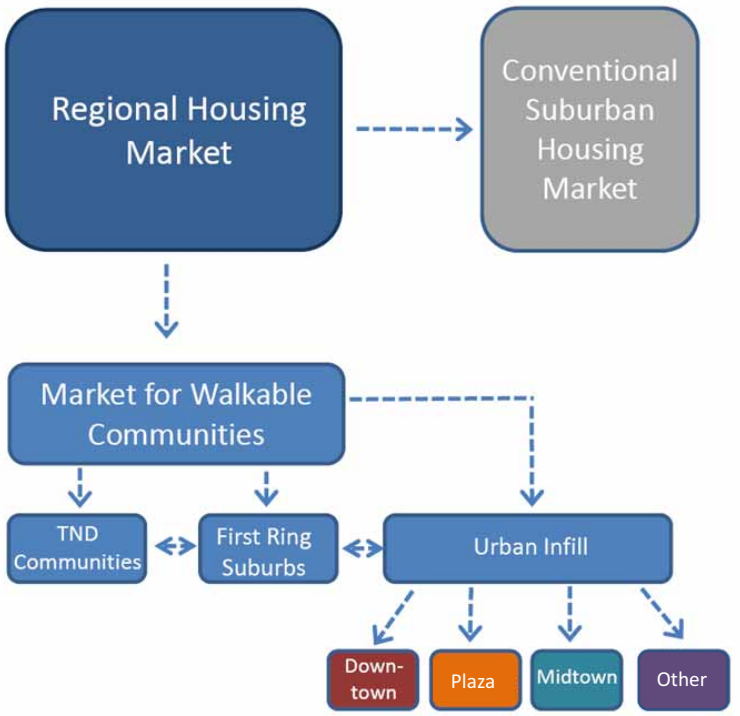
Residential Demand: Overview

The market for walkable communities can be divided into New Urban or TND, first-ring suburb, and urban infill, which consists of downtown, the Plaza, midtown, and urban neighborhoods.

This study analyzes the regional housing market, national trends, and demographics to assess the total amount of annual downtown housing demand. It takes the total amount of regional housing development, and makes assumptions based on scholarly research and attitudinal surveys, as well as demographics, to determine how many new housing units could be supported in downtown if the right products, environment, and services are offered.

This study concludes that the Kansas City region can sustain additions of about 11,000 housing units annually (once the market recovers). Studies and surveys indicate that roughly one-third of the households in the market would prefer to live in a dense, walkable community. This can be provided in a number of settings, including Traditional Neighborhood Development (TND, or New Urbanism), first-ring suburbs, or urban infill. A number of demographic variables can predict the type of community that this market for walkable communities prefers—especially the presence or lack of school-age children (just five percent of downtown residents that completed a survey in 2004 reported that they have school-age children). This study applies these demographic variables to a matrix that separates age and income to arrive at the average annual demand for each community (product) type.

In the case of urban infill, this study further refines the data, estimating the percent of households that downtown can capture relative to other competitive locations, such as midtown or the Plaza (which might be thought of as an uptown location), and other urban neighborhoods of lower density. The end product of this analysis is a pool of people with certain age and income characteristics, which are then used to estimate the number of for-sale and rental units that are in demand annually, and their likely prices and lease rates.



Percent Market Capture - Jackson County

Age Bracket	*18 - 24*	*25 - 34*	*35 - 44*	*45 - 54*	*55 - 64*	*65 - 74*	*75+*
Population							
× % Urban, Walkable	70%	70%	70%	70%	70%	70%	70%
× % Singles, Couples	**80%**	**60%**	**45%**	**65%**	**94%**	**100%**	**100%**
+ % Non-Traditional Families	5%	10%	5%	5%	0%	0%	0%
× Downtown Capture Rate	**35%**	**35%**	**35%**	**35%**	**35%**	**35%**	**35%**
= Downtown Housing Demand	*26*	*89*	*74*	*112*	*104*	*59*	*53*

DEVELOPMENT STRATEGIES

Percent Market Capture - MSA (Excluding Jackson County)

Age Bracket	*18 - 24*	*25 - 34*	*35 - 44*	*45 - 54*	*55 - 64*	*65 - 74*	*75+*
Population							
× % Urban, Walkable	35%	35%	35%	35%	35%	35%	35%
× % Singles, Couples	**80%**	**60%**	**45%**	**65%**	**94%**	**100%**	**100%**
+ % Non-Traditional Families	0%	0%	0%	0%	0%	0%	0%
× Downtown Capture Rate	**30%**	**30%**	**30%**	**30%**	**30%**	**30%**	**20%**
= Downtown Housing Demand	*14*	*62*	*70*	*114*	*112*	*45*	*22*

DEVELOPMENT STRATEGIES

Demand Analysis

Macro Trend Overview

Surveys show that one-third of residents would prefer a more urban product that often is not supplied. In Atlanta, over half would "trade down" on lot size for a location that is closer to employment. These data are encouraging when evaluating demand for the Greater Downtown.

The current state of the economy notwithstanding, a number of trends are converging that will likely lead to increased demand for urban housing over the next several decades, benefitting Greater Downtown. Following are four separate studies that support this:

New Urbanism Market Study: University of Southern California 2001

- 30 to 55 percent of homebuyers would prefer to live in "dense, walkable" environment.

Atlanta Study: SMARTRAQ 2007

- 33 percent of residents in conventional suburbs prefer a more walkable environment.
- 49 percent prefer a neighborhood where they can walk to nearby shopping.
- 20 to 40 percent of residents showed a preference to compact, walkable neighborhoods, but only five percent live in such an environment.
- 55 percent would prefer shorter commutes, even if it means living in a higher density environment with smaller lot sizes.
- 55 percent would accept a smaller house if it meant more options to walk, cycle, or take transit.
- 53 percent prefer closer proximity to work over living on a cul-de-sac.

Top: Image from visual preference survey presented to Atlanta residents. 55 percent of respondents preferred the denser, closer-in option A over option B. **Bottom:** A study showed current demand for dense, walkable neighborhoods to be 30 percent of survey respondents—a significantly greater proportion than that which is being supplied in the regional market.

Residential Demand: Macro Trend Overview

Nationally, 70 million homes are projected to be built over the next thirty years. Demand will be greatest from singles and families without school-age children, meaning demand for large, single family homes will recede, and demand for more compact housing will increase. The devaluation of homes following the housing bubble has not hit urban areas as hard as suburban areas.

Home Values Following the Housing Bubble Devaluation/Gas Price Spike: CEO's for Cities 2008

- Between the fourth quarter of 2006 and 2007, home prices in distant neighborhoods (those 13 miles from downtown) lost value at a greater rate than close-in neighborhoods (less than three miles from downtown).
- In some instances, close-in neighborhoods gained value, even as the regional market declined.

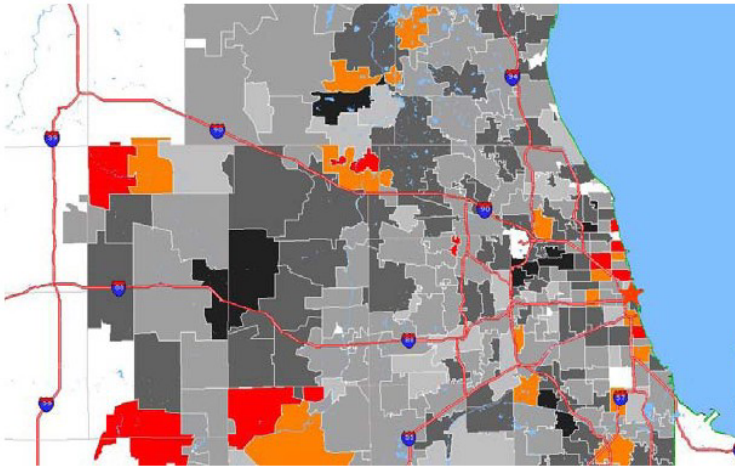
Future Population Growth: The Next 100 Million: Virginia Polytechnic Institute 2007

- The U.S. population will reach 400 million around 2040, up 100 million from 2005.
- The next 100 million people will require 40 million homes. Add 30 million replacement homes, and 70 million homes will be constructed between 2005 and 2040, for an average of two million homes per year.
- The population is aging; 41 million of the next 100 million will be over 65.
- Households are becoming more diverse. In 1970, 44 percent of households had children. By 2040, this number will be reduced to 27 percent.
- In 1970, 17 percent of all housing units were occupied by a single person. This had increased to 26 percent in 2006, and is projected to remain constant through 2040.
- Housing preferences are changing. The current supply of large, single family homes is already in oversupply for the next decade.

Change in Housing Prices Last 12 Months

Metro Area	Region-wide Average	Close-In Neighborhoods	Distant Neighborhoods
Chicago	-4%	0%	-4%
Los Angeles	-11%	-6%	-10%
Pittsburgh	0%	2%	-5%
Portland	-1%	3%	-5%
Tampa	-13%	-9%	-14%

Chicago



Top: A study revealed that urban neighborhoods in five metro regions have faired better than their suburban counterparts. **Bottom:** Map of home value changes in metro Chicago between the fourth quarters of 2006 and 2007. Areas in red and orange increased in value; these areas are located disproportionately in Chicago's center, along its lakefront, where transit is most accessible.

Residential Demand: Macro Analysis

Annual demand for Greater Downtown housing is 700 units. Of this, the Crossroads District could capture 70 to 140 units per year, and the South Loop Link Area could capture 50 to 70 units, annually.

Regional Downtown Demand Estimate: Based on the analysis of this study, Greater Downtown could, in theory, support roughly 950 housing units annually. In reality, this estimate should be lower, since the model assumes that the quality, pricing, and range of supply will be in complete equilibrium with demand. It also assumes relative ease of acquisition of development sites.

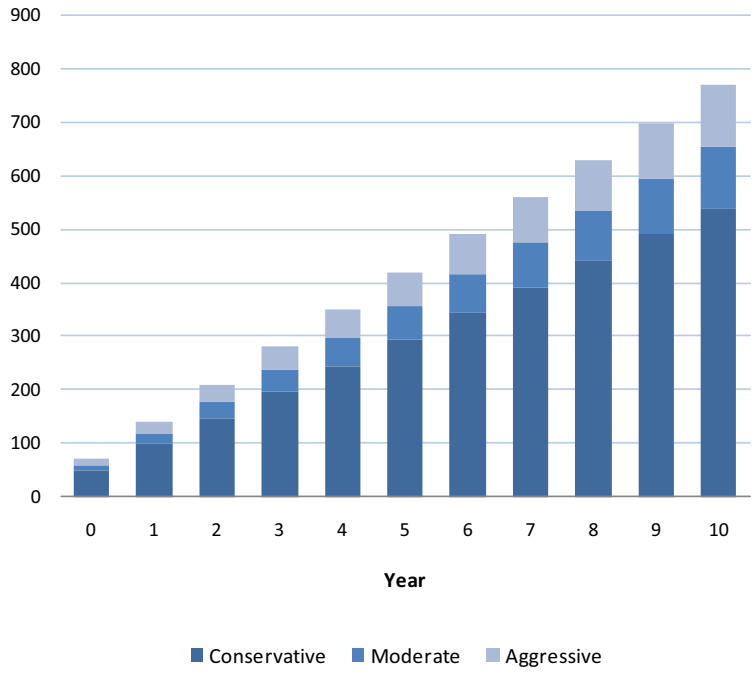
Still, this analysis provides a reasonable "order of magnitude" of demand. An adjustment of 20 to 25 percent would still indicate annual demand for 700 units, which this study concludes is a reasonable number.

In theory, an opportunity is being lost for downtown, urban infill, and TND projects in the Kansas City region (and most other regions, for that matter). The demand analysis conducted in this study indicates that demand exists for several thousand housing units in these settings, annually. Yet the market only provides a fraction if this.

The beneficiary of this undersupply of urban product is the suburban housing market, which in this study's theoretical model gains several thousand housing units annually from households that would likely prefer a different type of housing product. Housing builders have not adapted sufficiently.

South Loop Link Area Demand Estimate: Based on an estimated 700 units of annual downtown housing demand, this study considers three capture rate estimates—conservative (seven percent), moderate (8.5 percent), and aggressive (10 percent)—for the South Loop Link Area. The chart at right shows that, after 10 years, a conservative housing estimate is roughly 550 housing units, and an aggressive estimate is roughly 750 units, with a moderate estimate of 650 units.

Cumulative 10-Year Housing Demand
South Loop Link, Kansas City
DEVELOPMENT STRATEGIES, 2009



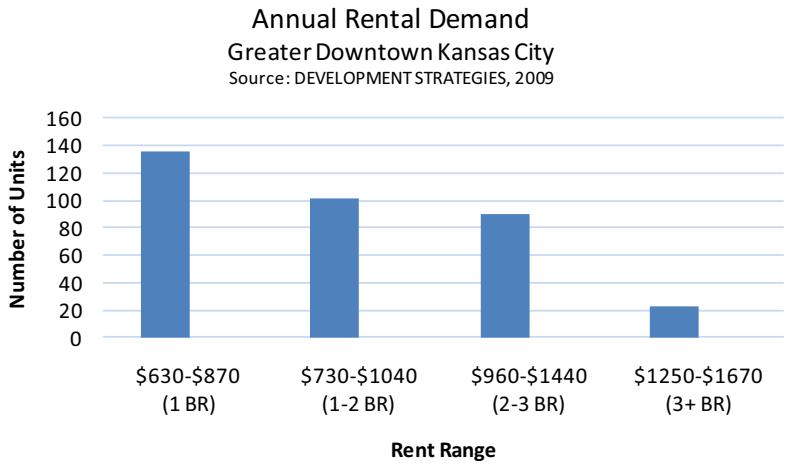
Residential Demand: Macro Analysis

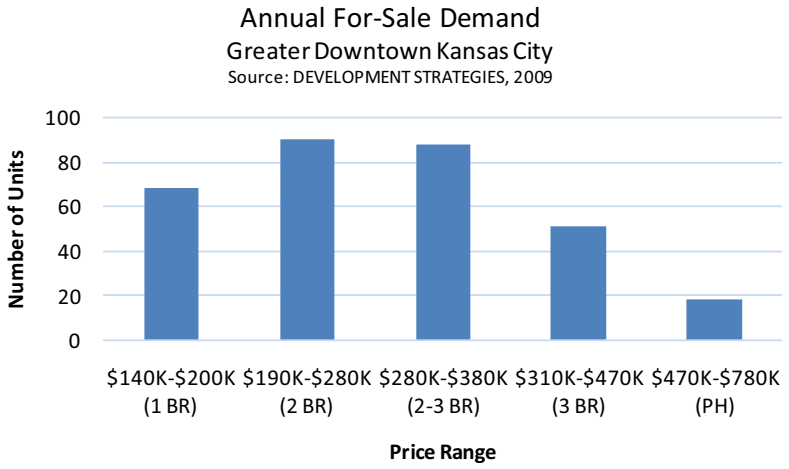
To meet demand for downtown housing, a diverse range of products and pricing must be offered. The majority of demand is for moderately-priced units, but products at the South Loop Link Area should be competitively positioned to capture the upscale market.

The adjacent charts indicate optimal pricing for rental and for-sale units, respectively, that would ensure that the greatest number of housing units could be absorbed into the Greater Downtown market each year.

As the top chart shows, demand for rental units is greatest at monthly rates of $630 to $870, and progressively declines at higher price points. Lower-priced, affordable units would likely be in even greater demand; however, this study does not calculate this, since it is not a function of market rate demand.

The bottom chart indicates for-sale demand, which is deepest at the $190,000 to $280,000 price range. Of course, lower-priced product would do well, assuming it is cost-feasible. Products at lower price points can run into conflict with the rental market because their monthly costs are comparable. Demand is still relatively deep for products that are priced between $280,000 and $380,000, and tapers downward from there.





Residential Demand: Micro Analysis (For-Sale)

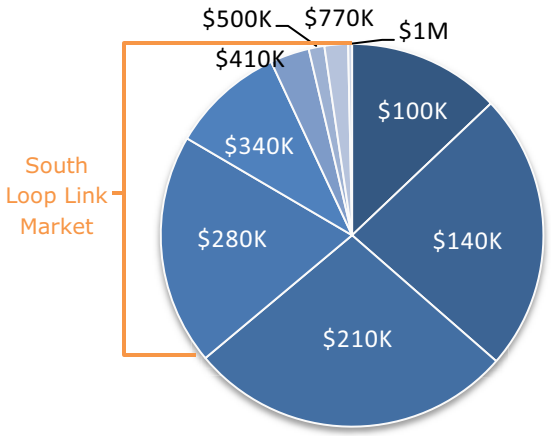
Presently, the downtown is not capturing the affluent home-buyer market to the degree that it could. This is probably because the right products and the right environments have not been offered. The South Loop Link could change that.

Unlike the macro demand analysis on the preceding several pages, which focuses on who might move downtown if the right products are offered, this micro analysis focuses on who is *already there*, and what they are able to pay. The adjacent charts reveal the following:

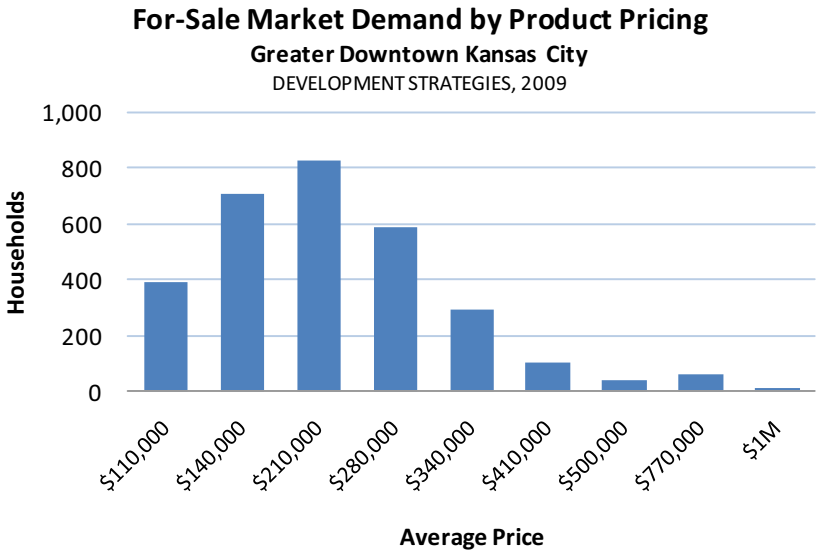
- Over half of the existing residents of for-sale housing fall in the $140,000 to $210,000 range (over 1,500 households). The supply analysis reveals that few such units have been provided since 2004.
- Twenty percent of residents can afford housing at $280,000.
- Ten percent can afford housing at $340,000.
- Just six percent of existing residents can afford housing in the categories over $400,000.

Based on analysis of supply and demand, downtown has not yet fully capitalized on the affluent market of empty nesters that wish to move downtown. Macro analysis indicates that over 20 percent of demand for for-sale housing in the downtown exceeded a price of $400,000, yet only six percent of existing downtown residents can afford housing at this price. Clearly, there is a gap between the demand for high-end housing that downtown could capture, versus what it actually captures.

The South Loop Link Area, with public space and proximity to the Power and Light District, could become pivotal in a strategy to capture this affluent market.



Market Demand
For-Sale Housing, Greater Downtown



Residential Demand: Micro Analysis (Rental)

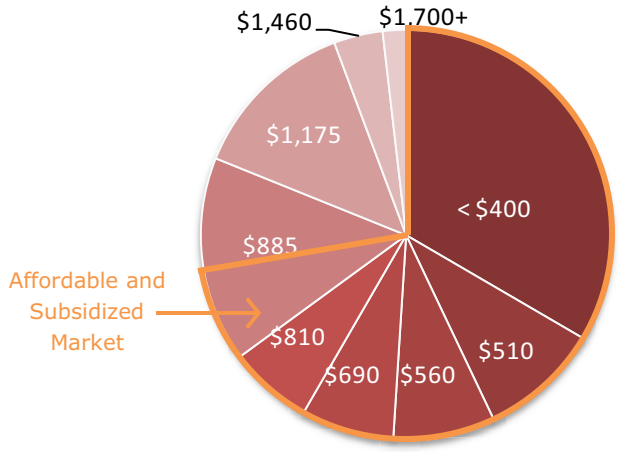
Just over a quarter of existing renters in the Greater Downtown can afford market-rate housing. Nevertheless, significant demand exists for market rate rental units, implying that an opportunity has not been fully capitalized upon, probably because the right products (and locations) have not been offered.

As the adjacent charts show, nearly three-quarters of the existing market for rental housing in the downtown consists of either:

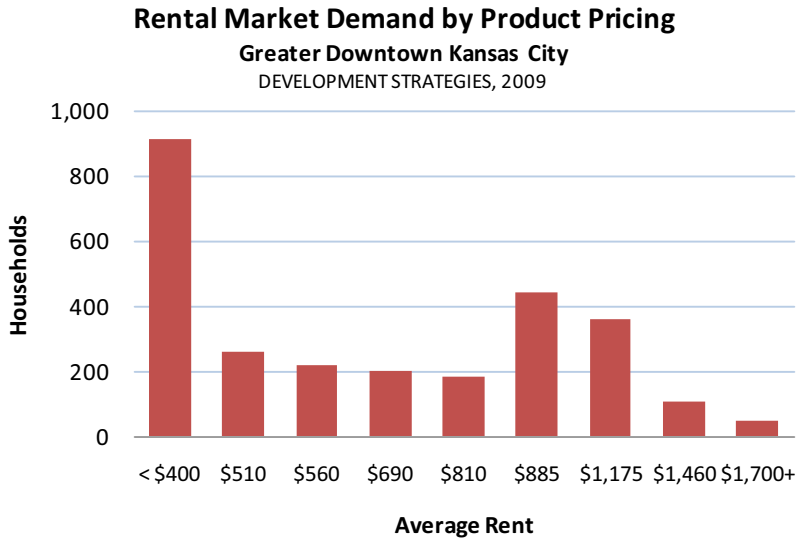
- Affordable housing (which HUD defines as a net rent* of roughly $850 per month for a two-bedroom unit); or
- Subsidized housing (which can be defined as having a net rent of roughly $400 to $600 per month).

Despite this figures—which, again, tell us more about who is already downtown (versus who might move downtown)—this report's macro analysis revealed substantial demand for market rate housing. Projects in the South Loop Link Area could target renter households that earn $50,000 to $100,000 annually. These households can pay monthly rents of $1,000 to $1,500.

(*Net rent refers to rent that excludes utility costs, whereas gross rent is inclusive of both net rent and utilities.)



Market Demand
Rental Housing, Greater Downtown



Market Analysis: Office Overview

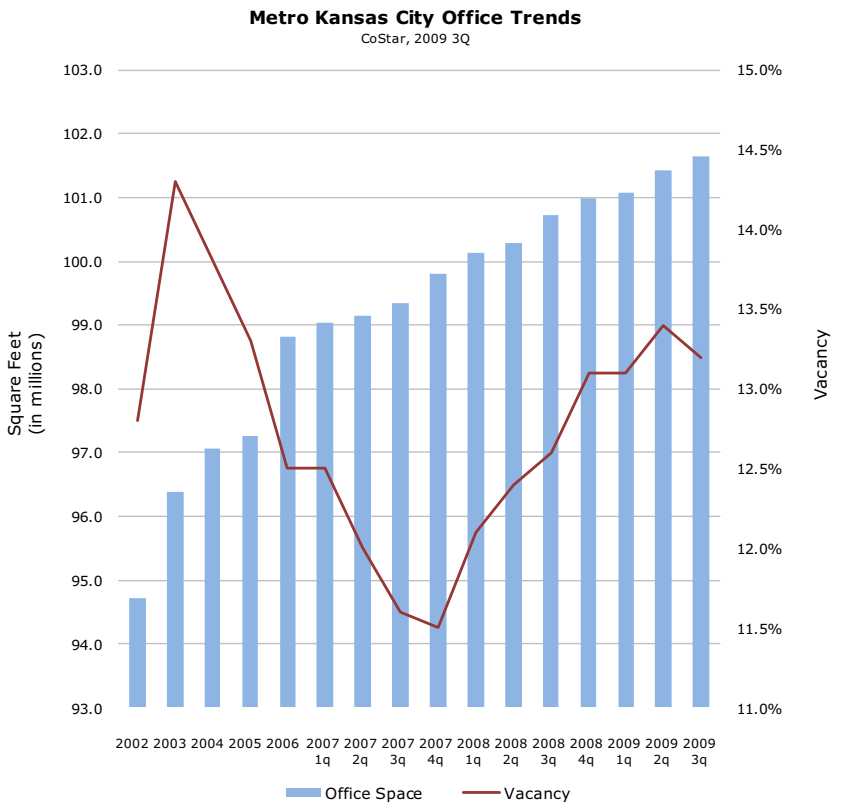
Historically, the Kansas City region has added nearly 2 million square feet of office space per year, though the market is performing poorly at present. With 25 percent of the region's supply, downtown is the largest office market in the region, but is losing share as growth occurs in the suburbs.

Office development is an essential component of downtown districts and mixed-use projects alike. It has synergies with restaurant and hotel uses, as well as retail, to a lesser extent. New office space not only adds employment, but enhances the image of a district.

Regional Overview: After rebounding well from the recession in the early part of the decade, the regional office market is again in decline, as the national economy continues to perform poorly (economists debate whether or not the nation is still in recession). Nevertheless the market's recovery from the last recession demonstrates resiliency, and is likely an indication that the market will again recover after the current recession is over.

Over the past 25 years, the regional market has added 1.8 million square feet of office space per year, though the average was roughly 1.5 million during this decade (CoStar 2009 3Q). These numbers aid in projecting future office development for the region, and downtown.

Downtown: There is a total of 102 million square feet of office space in the region, of which 26 million can be found in the Greater Downtown (a roughly 25 percent market share). However, the downtown has been losing market share for several decades, as the majority of new office development occurs in suburban office parks. The downtown's share of new office growth since 2000 typically ranges between 10 and 15 percent. Average lease rates for the region, on a per square foot basis, are: $21 for Class A space, $18 for Class B space, and $13 for Class C space. These numbers assist in understanding lease rates regionally, and downtown.



Office Space by Class
Metro Kansas City

Office Class	*Number of Buildings*	*Gross Leasable Area (s.f.)*	*Vacant Space (s.f.)*	*Vacancy Rate*	*Under Construction (s.f.)*	*Quoted Rates*
A	123	20,900,000	4,100,000	19.6%	220,000	$20.78
B	1,662	62,000,000	7,340,000	11.8%	15,000	$17.58
C	1,618	18,700,000	2,010,000	10.8%	0	$13.19
Total:	*3,403*	*101,600,000*	*13,450,000*	*13.2%*	*235,000*	*$17.90*

CoStar, 2009 3Q

Office New Supply

In an average year, downtown receives 10 to 15 percent of regional office growth, typically when an existing company wants a new headquarters. Presently, lease rates are not high enough in Crossroads to stimulate new, speculative buildings, but a deck and public space in the South Loop Link Area could change that.

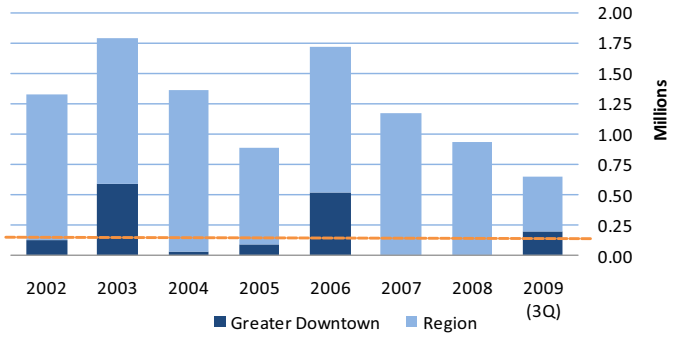
Downtown Share: Downtown's share of regional office development fluctuates significantly from year to year, and is driven largely by single-tenant or owner occupied properties, as opposed to speculative properties. The chart at top right shows that, since 2002, the region has added an annual average of 1.6 million square of office space.

The Greater Downtown has captured a significant amount of development in three of the last eight years. These include a new 600,000 square foot speculative building in Crown Center (the one place in Greater Downtown where speculative development has occurred) in 2003, the 500,000 square foot H & R Block headquarters in 2006, and the J.E. Dunn headquarters in 2009. Still, speculative developers remain hesitant to build downtown; this means that tenants will likely have to be secured before significant new construction occurs in the study area. A "build it and they will come" approach is not likely to be undertaken by area developers.

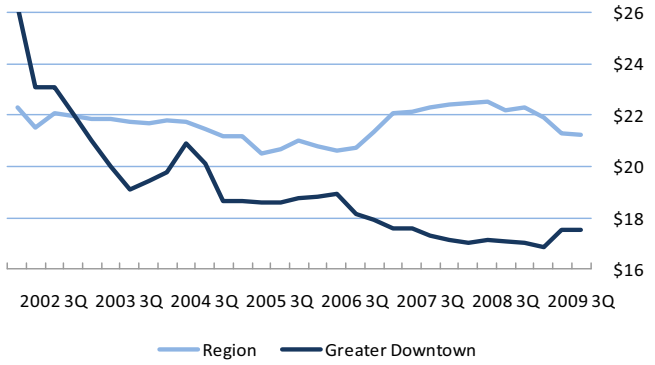
Downtown Lease Rates: The lack of enthusiasm by the local development community to build new office space downtown likely arises from the fact that lease rates lag behind regional figures. As the middle chart shows, asking lease rates for new space downtown is below $18 per square foot, compared to roughly $21 per square foot elsewhere in the region. This is significant because the gap between downtown and suburban lease rates encourages developers to build on the region's periphery, instead of at its center.

Still, lease rates for new properties tend to be higher than those of older properties. A new project probably needs to achieve a minimum of $20 per square foot in order to be profitable, and thus encourage development. Presently, Greater Downtown does not appear to be meeting this threshold on a consistent basis, with some Crown Center properties proving to be the exception.

Downtown Share of Regional Office Growth by Volume
Buildings Constructed 2000-2009
Source: CoStar, 2009 (3Q)



Average Asking Lease Rates
Buildings Constructed 2000-2009
Source: CoStar , Development Strategies 2009 (3Q)



Office Space by Year Built
Downtown Kansas City

Year Built	Square Feet (in millions)	Lease Rate*	Occupancy
2000-Present	**1.9**	**$21**	**97%**
1990-1999	1.9	$20	96%
1980-1989	**4.6**	**$18**	**88%**
1960-1979	4.0	$16	80%
1940-1959	**1.6**	**$16**	**96%**
pre-1940	8.1	$14	87%

*Listed Lease rate; Sources CoStar, DEVELOPMENT STRATEGIES, 2008

Office Supply: Submarkets

Sandwiched between two Class A office districts (CBD and Crown Center), Crossroads appeals to firms that seek low rents and a creative atmosphere. A new public park and adjacency to the Power and Light District would likely make the Focus Area a viable Class A office location.

Submarket Comparison: Historically, the Crossroads District has been characterized as a location for heavy commercial use, sandwiched between the established office submarkets of Crown Center and the Downtown Loop. By volume, the Downtown Loop has the most office space of any submarket, Class A or otherwise. Class A lease rates and vacancy rates in this submarket are less-than-stellar ($18, 24%), giving way to the premium urban market of Country Club Plaza, and the suburban market of College Boulevard. The map on the following page shows regional office clusters.

Crossroads Office: Though it lacks premium office space, the Crossroads District does in fact have 1.7 million square feet of Class B and C space, which achieve lease rates that are comparable to those in the Greater Downtown. In fact, Crossroads is truly a Class B market, full of midscale warehouses and lofts that lend themselves readily to office use for creative firms. The availability of cheap, adjacent surface parking undoubtedly appeals to office users that choose Crossroads over the Downtown Loop or Crown Center.

The South Loop Link Area: With its proximity to the Downtown Loop, Power and Light District, and—as is proposed in one alternative considered in this study—deck and park improvements, the the South Loop Link Area could become a strong site for new Class A space. In other words, these existing and proposed amenities could make a small portion of the Crossroads District a viable Class A office location.

Class A Office Space
Selected Submarkets, Kansas City

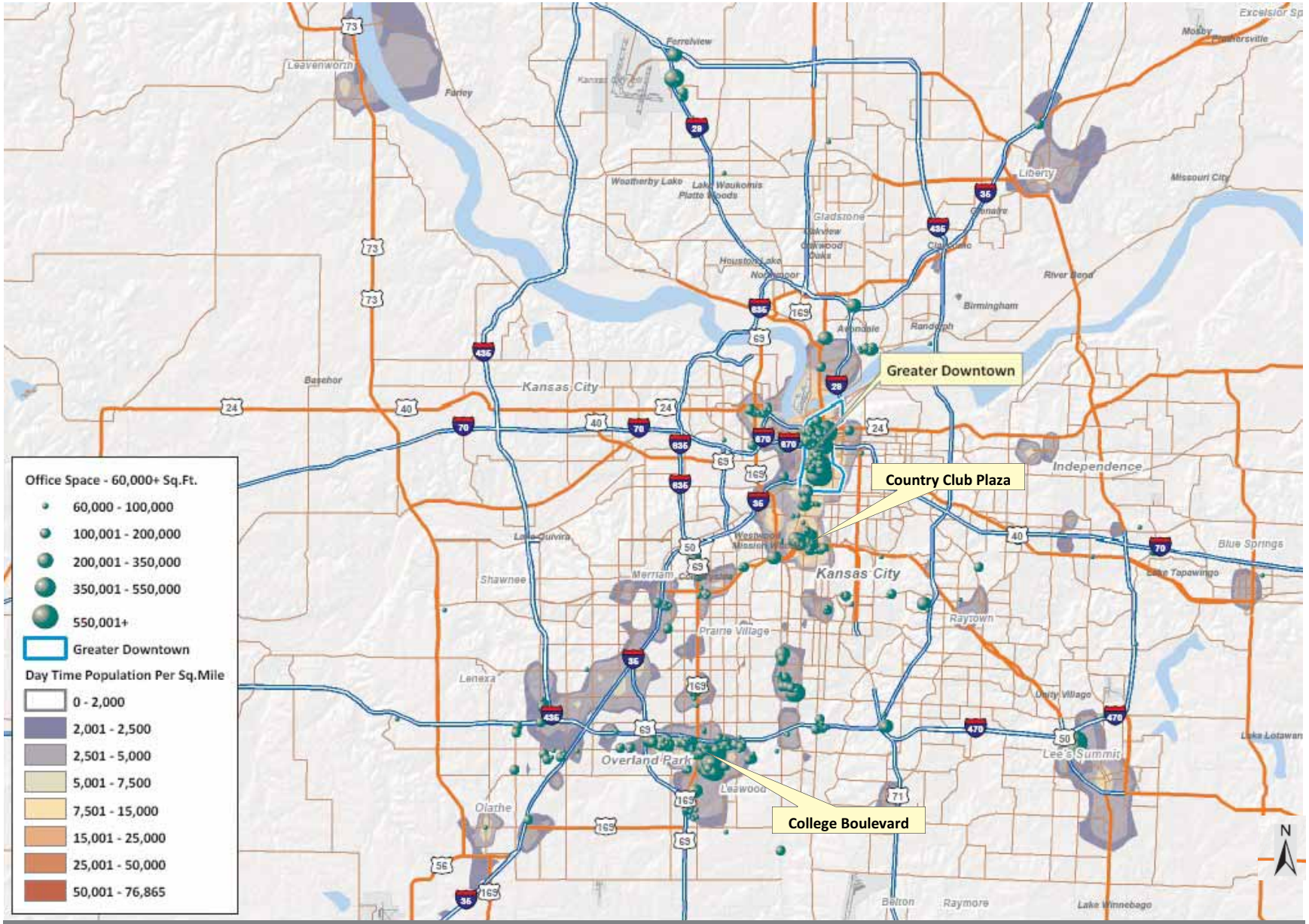
Submarket	*Number of Buildings*	*Gross Leasable Area (s.f.)*	*Vacancy Rate*	*Under Construction (s.f.)*	*Lease Rates*
Downtown Loop	**14**	**5,221,000**	**24%**	**0**	**$17.79**
College Blvd	44	6,116,000	19%	0	$21.36
Country Club Plaza	8	1,863,000	15%	220,000	$25.08
Crown Center	**6**	**2,096,000**	**15%**	**0**	**$19.46**
East Jackson County	5	336,000	22%	0	$19.65
Crossroads District	**0**	**0**	**0%**	**0**	**$0.00**
North of the River	8	1,045,000	13%	0	$18.85
Northeast Johnson County	4	364,000	35%	0	$22.70
Northwest Johnson County	6	661,000	5%	0	$24.25
South Johnson County	13	1,095,000	27%	0	$22.22
South Kansas City MO	2	382,000	53%	0	$0.00
Ward Parkway	7	1,275,000	16%	0	$18.00
West Bottoms	0	0	0%	0	$0.00
Regional Totals	123	20,940,000	20%	220,000	$20.78

CoStar, 2009 3 Q

Office Space by Class
Greater Downtown & Crossroads District

Office Class	*Number of Buildings*	*Gross Leasable Area (s.f.)*	*Vacant Space (s.f.)*	*Vacancy Rate*	*Under Construction (s.f.)*	*Quoted Rates*
Greater Downtown						
A	*14*	*5,220,000*	*1,240,000*	*23.7%*	*0*	*$17.79*
B	*117*	*10,090,000*	*1,290,000*	*12.8%*	*0*	*$16.40*
C	*59*	*2,630,000*	*220,000*	*8.3%*	*0*	*$13.15*
Total:	*190*	*17,940,000*	*2,750,000*	*15.3%*	*0*	*$16.62*
Crossroads District						
A	0	-	-	-	-	-
B	34	910,000	160,000	17.5%	0	$15.92
C	58	770,000	90,000	11.5%	0	$14.09
Total:	*92*	*1,680,000*	*250,000*	*14.8%*	*0*	*$15.57*

CoStar 2009 3Q Note: Crossroads numbers are included in Greater Downtown numbers



OFFICE CLUSTERS AND JOB DENSITY
Kansas City MSA 2008

Office Supply: Competitive Environment

Historically, Crossroads has been a Class B office market, achieving rents that are too low to stimulate new construction. The South Loop Link could change that, at least in parts of the Focus Area, where lease rates of $22 to $25 per square foot could be achieved.

Crossroads is a classic Class B and Class C office submarket. Tenants who choose it forgo higher-visibility locations downtown and instead are attracted to the district's stock of loft/warehouse properties, lower lease rates. and the availability of inexpensive parking. The table below indicates selected properties in Crossroads that are generally in good repair. Lease rates for these properties tend to range from $15 to $17 per square foot. One notable exception is the Retro Interiors building. It may be that this building has unique challenges that make rehabilitation costlier than other buildings in Crossroads.

New, Class A office construction is nonexistent in Crossroads. Indeed, new space—particularly the type that isn't built with a single tenant in mind (e.g. speculative or "spec" office)—is rare in the Downtown Loop and Crown Center. Two relatively new buildings in Crown Center, 2555 Grand and 2301 McGee, are more-or-less fully occupied, and command lease rates that range between $22 and $24 per square foot. This almost puts them in the same class as new properties in South Johnson County ($24 to $28 psf) and the Plaza ($27 to $33 psf).

The South Loop Link could make a portion of the Focus Area attractive for new office development that could achieve lease rates $22 to $25 per square foot—rates at which developers can profitably build new office space. If a high-profile site is created, a headquarters (not unlike the new J.E. Dunn building) or Class A property might be attracted by the visibility and prestige that it generates. Such a site would need to be close to the South Loop Link, perhaps along a new park, where visibility and prestige are greatest.

Selected Office Properties
Crossroads and Greater Downtown

Map Code	Class	Building Name	Address	Square Feet	Occupancy	Listed Lease* (per s.f.)	Year Built/ Renovated	Stories	Parking Ratio**
Crossroads									
1	B	-	113 W 18th Street	30,000	100%	-	1915/1985	3	0.2
2	B	Cortes Building	1600 Baltimore Ave.	36,000	88%	$17.50	1930/1999	3	3.5
3	B	-	1800 Balltimore Ave.	28,000	100%	$17.50	1920/NA	6	2.1
4	C	Townsend Building	1925 Central Street	20,000	90%	$14.00	1962	2	4.0
5	B	Mainmark Building	1627 Main Street	60,000	96%	$16.50	1917/1985	12	3.0
6	C	Retro Interiors	1712 Main Street	43,000	6%	-	1953	7	2.0
7	B	Kirkwood Building	1737 McGee Street	48,000	88%	$18.50	1918	4	2.7
8	B	-	1801 McGee Street	20,000	100%	$16.00	1915/2000	2	1.0
9	C	Corrigan Building	1828 Walnut	103,000	87%	$13.00	1921/1987	10	1.4
Downtown Loop and Crown Center									
10	A	-	2555 Grand Blvd.	595,600	100%	$23.00	2003	24	4.5
11	A	JE Dunn HQ	1001 Locust St.	204,000	100%	-	2009	5	4
12	A	-	2301 McGee St.	159,000	100%	$23.00	1986	8	3

CoStar, 2009 *Leases are reported as full service, where possible; some are nnn **Parking spaces per 1,000 s.f. of GLA


Cortes Building


J.E. Dunn HQ

Office Demand

The Kansas City region is projected to add roughly 1,800 office jobs per year. This growth and replacement space will drive a forecasted 1.4 millions square feet per year. A 15 percent share of this growth translates into 2.1 million square feet of office space for the downtown over a period of 10 years.

Demand Methodology: Office demand can be calculated by using employment projections to determine future space needs. First, using employment projections provided by the Missouri Economic Research and Information Center (MERIC), the annual number of jobs that will be added by occupation is determined. This translates into a quantity of office demand that each industry will demand (based on occupational data on per-square foot demands per employee, which is provided by CoStar).

Based on current projections, this will provide 560,000 square feet of office demand throughout the region. But development history indicates that the region is more likely to add roughly 1.5 millions square feet per year (because much office growth is driven not by job growth, but by existing tenants who desire newer space). Average regional office growth of 1.4 million square feet of space is forecasted.

Downtown Office Capture: As indicated in the bottom right table, 1,819 office jobs per year are projected. This, plus demand for replacement space, will drive annual demand for office space to 1.4 million square feet, or 14 million square feet over ten years. The Greater Downtown captures roughly 15 percent of regional office demand, amounting to an addition of 2.1 million square feet of office space over ten years. If the Focus Area could capture four percent of regional demand (or roughly a quarter of downtown demand), this would amount in roughly 560,000 square feet of office space over 10 years. Aggressively, a six percent capture (achievable if say, a large corporate headquarters locates here) would lead to 840,000 square feet over 10 years.

Projected Annual Office Demand Matrix
Kansas City Metropolitan Statistical Area

Occupation	Office Category	Employment Estimated 2006	Employment Projected 2016	Numeric Change	Average Annual Change	% Office Users*	Number of Office Users	SF/ Employee**	Annual Office Space	10% Vacancy Factor***
Management Occupations	Conventional	19,230	19,900	677	70	100%	70	350	25,000	27,500
Business and Financial Operations Occupations	Convention[illegible]	[illegible]30	28,380	2,457	250	100%	250	300	75,000	82,500
Computer and Mathematical Occupations	Co[illegible]	[illegible]20	20,110	4,189	420	90%	378	275	104,000	114,400
Architecture and Engineering Occupations	[illegible]	[illegible]	8,730	1,019	100	100%	100	315	32,000	35,200
Life, Physical, and Social Scien[illegible] Occ[illegible]	[illegible]	[illegible]	4,970	544	50	80%	40	315	13,000	14,300
Com[illegible] Occ[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25,300
Leg[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	18,700
Edu[illegible] Occ[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7,700
Arts[illegible] and[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16,500
Hea[illegible] Occ[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	75,900
Hea[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	46,200
Protective Service Occupations	Civic/Social	10,710	11,370	653	70	20%	14	275	4,000	4,400
Food Preparation and Serving Related Occupations	-	44,230	47,570	3,418	340	0%	0	275	0	0
Building & Grounds Cleaning & Maintenance Occup.	-	19,530	21,760	2,272	230	0%	0	275	0	0
Personal Care and Service Occupations	Conventional	16,100	17,900	1,690	170	5%	8.5	300	3,000	3,300
Sales and Related Occupations	Conventional	62,440	64,560	2,098	210	20%	42	275	12,000	13,200
Office and Administrative Support Occupations	Conventional	103,920	106,930	2,902	290	100%	290	225	65,000	71,500
Farming, Fishing, and Forestry Occupations	-	770	820	55	10	0%	0	250	0	0
Construction and Extraction Occupations	-	29,320	30,940	1,651	170	0%	0	250	0	0
Installation, Maintenance, and Repair Occupations	-	23,930	24,300	366	40	0%	0	250	0	0

Occupation	Office Category	Employment Estimated 2006	Employment Projected 2016
Management Occupations	Conventional	19,230	19,900
Business and Financial Operations Occupations	Conventional	25,930	28,380

Projected Office Demand, in Square Feet
Kansas City

	Office User Type: Conventional	Civic	Medical	Total
Annual Office Employment Growth	1,274	125	420	1,819
Annual Regional Demand *(in millions)*	1.00	0.10	0.30	1.40
5 Years	5.0	0.50	1.5	7.0
10 Years	10.0	1.00	3.0	14.0
15 Years	15.0	1.50	4.5	21.0
10 Year Greater Downtown Capture *(in millions)*				
Conservative (@ 10%)	1.0	0.1	0.3	1.4
Moderate (@ 15%)	1.5	0.2	0.5	2.1
Aggressive (@ 20%)	2.0	0.2	0.6	2.8
10 Year Focus Area Capture				
Conservative (@ 2%)	200,000	20,000	60,000	280,000
Moderate (@ 4%)	400,000	40,000	120,000	560,000
Aggressive (@ 6%)	600,000	60,000	180,000	840,000

Employment Projections provided by Missouri Economic Research and Information Center (MERIC)
Office usership provided by CoStar, 2009; Data analysis and forcast by DEVELOPMENT STRATEGIES, 2009

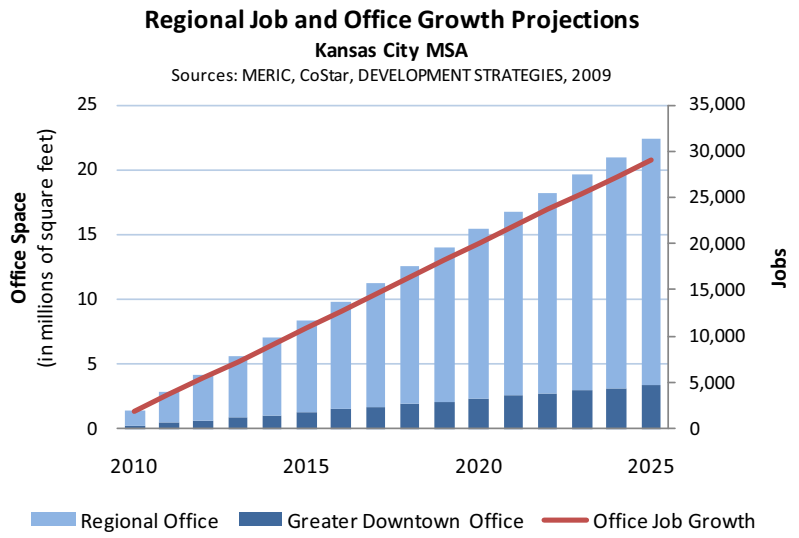
Office Demand

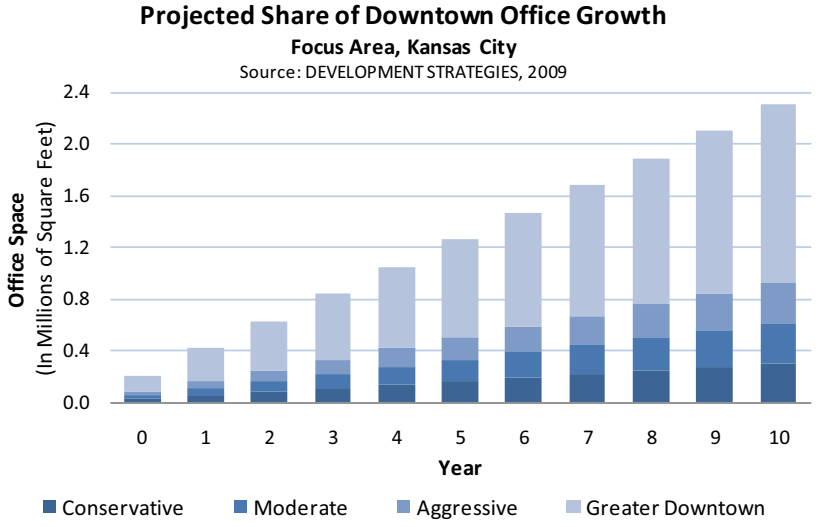
By capturing just over a quarter of downtown development over ten years, the Focus Area could add 560,000 square feet of new office space, thanks to the increased visibility and image created by attractive public space at the South Loop Link.

Regional Employment Growth: The addition of several thousand square feet of office space each year can add up to a large number over time. Over a 15 year period, the Kansas City Region is projected to add over 30,000 office jobs. This, and replacement space translates into over 20 million square feet of office space for the region. If the downtown captures 15 percent of this growth—as it did during this decade, it will add nearly 2.4 million square feet of space over the 15 year time period (see chart at upper right).

South Loop Link Area Projection: The chart at bottom right shows the projected impact of three scenarios in the South Loop Link Area. The first, assuming a conservative one percent regional capture, results in over 280,000 square feet in 10 years. The second, moderate assumption of a two percent capture results in over 560,000 square feet for the time period. Aggressively, if the South Loop Link Area could capture three percent of regional growth, it would amount to over 840,000 square feet of office space in 10 years.

Under the conservative scenario, the Crossroads would continue as it is; its stock of industrial buildings will continue to be rehabilitated, and select tenants will continue to remain in the area. Under the moderate and aggressive scenarios, efforts are made to enhance the image, visibility, and accessibility of the district, and this stimulates investment in new office properties at higher rents.





Market Analysis: Retail Overview

The retail market has been adding 1.9 million square feet per year. This has occurred primarily in suburban locations where growth and incomes are greatest—the Power and Light District is the exception.

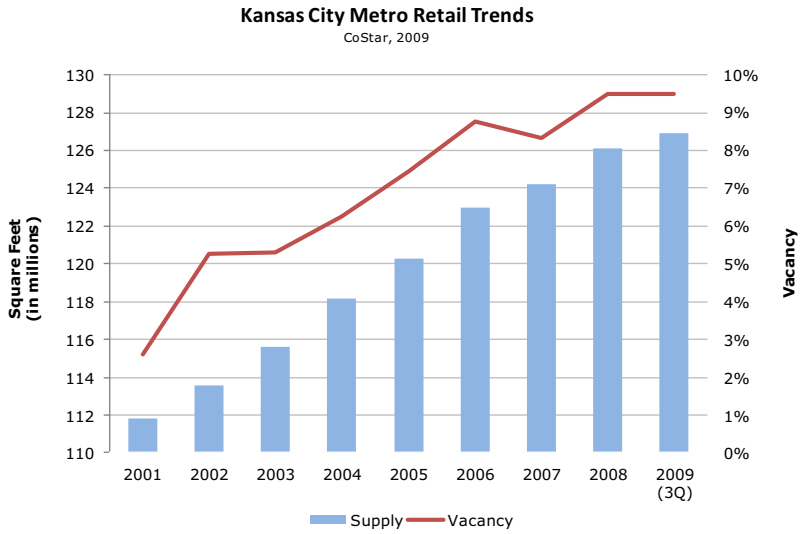
Retail development, in the urban context, generates pedestrian activity and vibrancy, adds value to surrounding development, and enhances the overall desirability of a neighborhood or district. Retail is perhaps the most competitive of the real estate industries; products and retailers are constantly evolving to meet changing consumer demands, often replacing outdated products (be they shopping centers or competitive retailers) in what is often referred to as "Retail Darwinism."

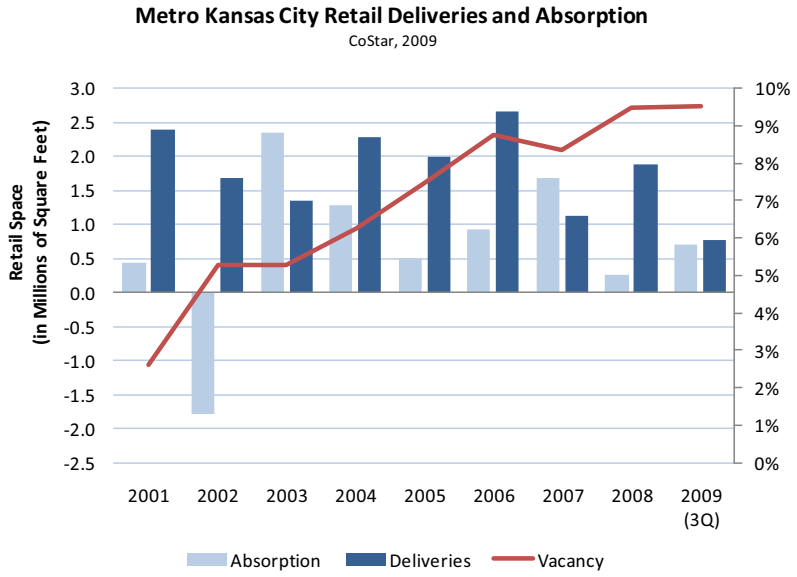
Regional Development Overview: As the chart at top right shows, significant retail development has occurred in the region since 2001, at a rate of 1.9 million square feet per year (though this year is projected to deliver fewer than one million square feet). This has led to a substantial increase in vacancy over the period, from three percent to over nine percent, since deliveries have outpaced absorption (see chart at bottom right).

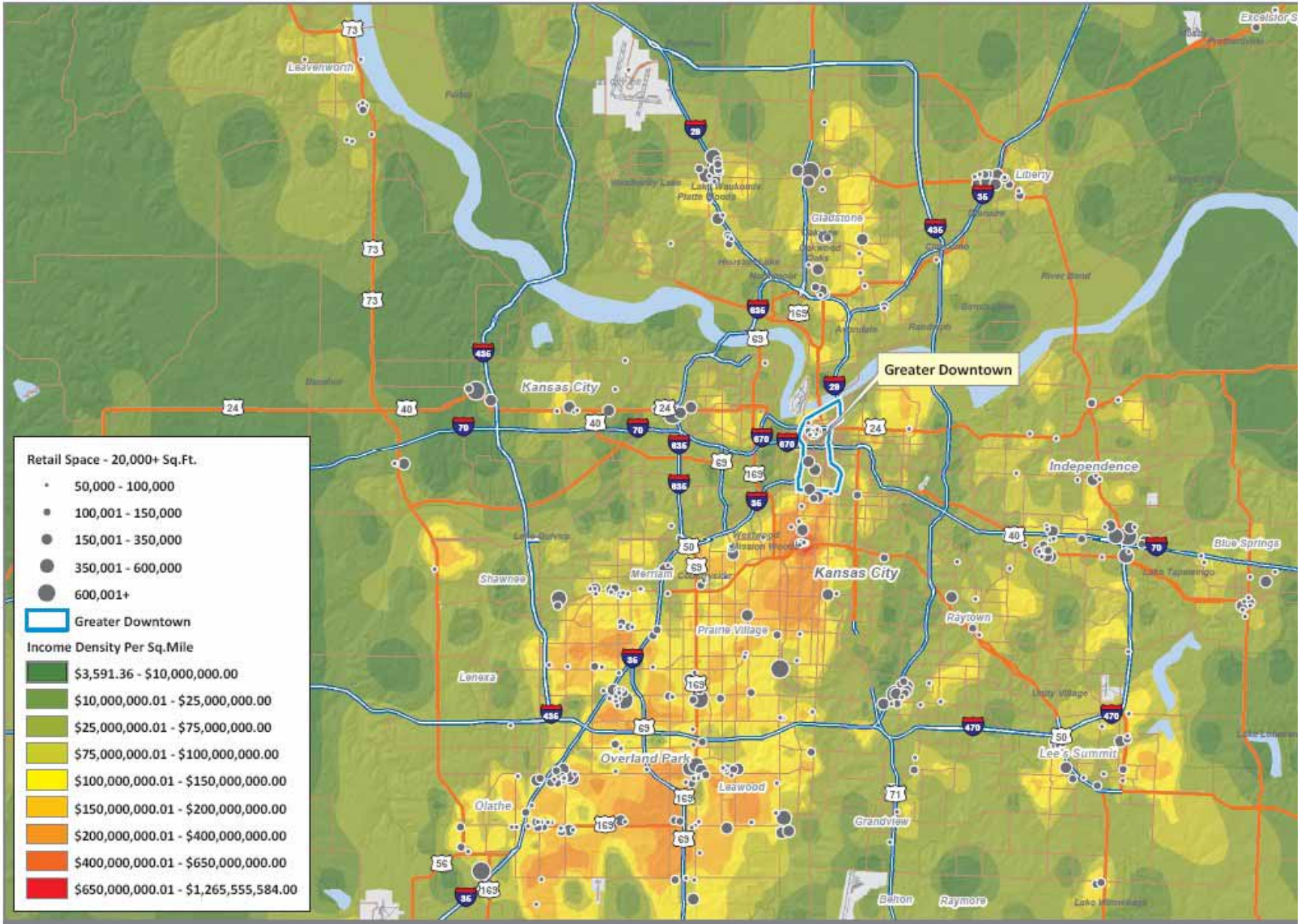
The increase in vacancy has likely occurred as new shopping centers have been constructed, causing retail tenants to leave older, obsolete shopping centers in favor of a more modern product. The older shopping centers are often left vacant or marginally occupied.

Much of the recent retail development has occurred in suburban markets that are growing or have high household incomes, such as Overland Park and other areas (see map on following page).

The Power & Light District added 600,000 square feet of new space, providing downtown a significant boost in the retail/entertainment market.







RETAIL CLUSTERS AND INCOME DENSITY
Kansas City MSA 2008

Retail Supply: Submarkets

The Power and Light District has expanded the amount of retail/entertainment space offered downtown by drawing from a regional market area. This enhances residential, office, and hotel opportunities in the South Loop Link Area, but not retail.

Submarket Overview: Historically the three downtown submarkets—Downtown Loop, Crown Center, and Crossroads—have been characterized by moderate rents, modest occupancies, and little growth. Enter the Power and Light District, which—in a little over a year—more than doubled the total amount of retail/entertainment space in the Downtown Loop.

The Power and Light District added nearly 600,000 square feet of retail/entertainment space by attracting non-traditional anchors, specialty retailers, and providing public space—all of which has allowed it to draw from a regional market. Per the Kansas City Business Journal, 28 percent of its customers come from at least 100 miles away.

Country Club Plaza remains the premier retail submarket in the region, achieving the highest rents, with low vacancy. Lease rates average $33 per square foot. Other "hot" markets include Southern Johnson County, which is growing rapidly, Kansas City north, which has the successful Zona Rosa project, and College Boulevard, an established suburban office and retail market.

Downtown/Crossroads: Within the Greater Downtown, retail in the Downtown Loop and Crown Center has historically served downtown workers. The Crossroads retail market is different. Its low rents and stock of old warehouse buildings have made it an ideal host to numerous art galleries—60 in total. This has helped Crossroads support 475,000 square feet of retail space, an impressive number given the neighborhood's relatively small residential base. By providing a center of specialty retail, Crossroads draws from a regional market area. Still, it is likely that most galleries could not afford the $20 to $25 per square foot lease rates that new space would require. Therefore, this is probably a limited growth opportunity for new construction properties in the Focus Area.

Selected Retail Submarkets
Kansas City MSA

Submarket	*Buildings*	*Square Feet*	*Vacancy Rate*	*Under Construction*	*Listed Lease Rates*
Greater Downtown	194	2,095,000	10%	0	$16.96
Downtown Loop	87	1,090,000	12%	0	$21.50
Loop Remainder	63	495,000	8%	0	$16.30
Power and Light	24	595,000	14%	0	$25.00
Crossroads District	21	475,000	10%	0	$12.00
Crown Center	86	530,000	9%	0	$13.00
Country Club Plaza	102	1,521,000	5%	0	$32.68
Midtown (non-Plaza)	245	2,717,000	14%	0	$13.99
Kansas City KS	522	7,245,000	12%	0	$12.57
E Jackson County	1137	16,218,000	12%	179,700	$9.54
N Johnson County	699	15,421,000	9%	37,200	$12.39
Kansas City North	687	15,810,000	9%	0	$14.95
S Johnson County	746	17,158,000	10%	0	$16.81
South KC	347	8,149,000	15%	0	$11.29
SE Jackson County	274	4,854,000	7%	67,000	$15.36
Other	46	230,000	0%	9,000	$0.81
Totals	4999	91,419,000	11%	292,900	$13.69

Source: CoStar 3Q 2009; DEVELOPMENT STRATEGIES, Kansas City Business Journal

Retail Supply: Competitive Environment

Most retail needs are being met within Central Kansas City, leaving little opportunity for the Focus Area, other than small, specialty tenants.

The competitive environment for urban retail stretches roughly four miles from downtown to Country Club Plaza. The area shown in the map at right has a population of roughly 50,000, but serves a much broader area for regional retail.

Many consumer retail needs are met by competitive retailers in the area at right. For instance, comparison shopping for clothing and apparel are generally met at Country Club Plaza, and home repair and furnishings can be found at the Home Depot at Midtown Marketplace.

Two supermarkets—Sun Fresh Market at Mill Street Station and Cosentino's in the Downtown Loop—serve the area. A discount general merchandise retailer (e.g. Wal-Mart, Target) is conspicuously absent but, given the size of these retailers—and their massive parking requirements—these are not ideal tenants for the Focus Area.

In short, there are few retail opportunities for the Focus Area. Regional entertainment is provided at the Power and Light District, regional shopping is offered at Country Club Plaza, and other daily needs are met at various shopping centers in between. Art galleries generally can only afford lease rates of $12 to $15 per square foot, not the $20 to $25 per square foot rates that new construction requires.

As the population grows in Crossroads, a market may be created in which a neighborhood grocery store may thrive. A few specialty retailers and restaurants may fill some new ground-level retail space, serving building residents, office tenants, and overnight visitors.

Central Kansas City Retail

Country Club Plaza: The region's premier retail destination. Lease rates are the highest in the region, at $35 per square foot.

Mill Street Station: Sun Fresh Market is one of only two competitive supermarkets in Central Kansas City. Estimated rent: $15-$20 *psf*.

Midtown Marketplace: Anchored by two regional retailers: Costco and Home Depot. It has few inline stores. Estimated rent: $20-$25 *psf.*

Crown Center Shops: Serves the daytime worker crowd at Crown Center. It consists of specialty stores Rent: $13-$15 *psf.*

Crossroads: A burgeoning art gallery district that increasingly serves a regional specialty market.

Downtown Loop: Serves the daytime worker population. Rents: $15-$17 *psf*.

Power & Light District: provide regional entertainment and retail, and also has a high-end supermarket. Anchors include a cinema and concert venue. Rents: $25-$30 *psf*.


Country Club Plaza

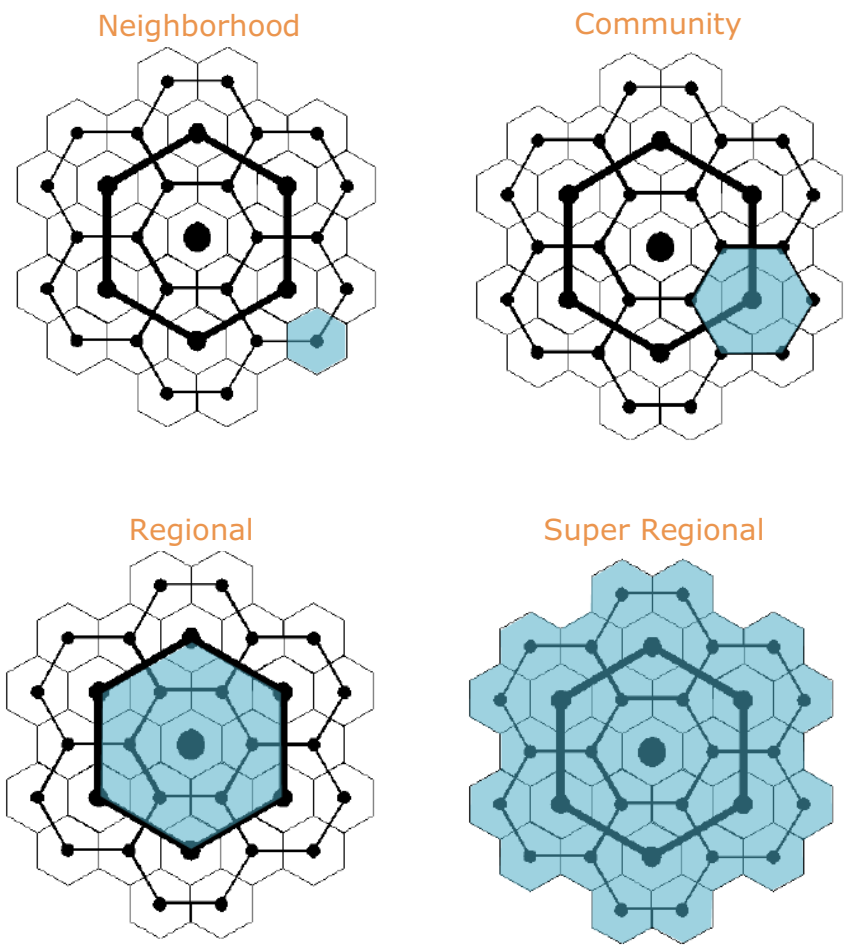

Power & Light District

Retail: Residentially-Driven Demand

By comparing supply and demand for retail services in overlapping trade areas, "opportunity gaps" are determined: circumstances in which demand exists that is not currently being met by supply.

Demand Methodology: Evaluating retail market demand requires assessing several different levels: neighborhood, community, regional, and—sometimes—super regional. Essentially, large shopping centers and malls with a broader range of services and more anchor stores draw from larger market areas than say, a grocery store-anchored center with a few shops. Conversely, market areas often overlap. A neighborhood might not have a need for a large shopping center because one is located within three miles, but may have a need for a drugstore and supermarket.

The U.S. government collects data on consumer expenditures each year. It shows, for example, that the average household spends roughly 30 percent of its income on retail goods. By comparing the types of goods that households in a market area are buying with the actual stores located in a market area, it can be determined whether supply is effectively meeting demand. If not, there may be opportunities for more stores.



Above: Four levels of retail trade areas: Neighborhood, Community, Regional, and Super-Region. The diagrams offer variations of Christaller's Central Place Model, which illustrate the interconnectedness of overlapping trade areas. "Higher Order" suppliers require lots of consumers, and tend to serve large trade areas. Increasingly, large stores have used a low-cost strategy to drive out competition from smaller, neighborhood-oriented retailers.

General Characteristics of Shopping Centers

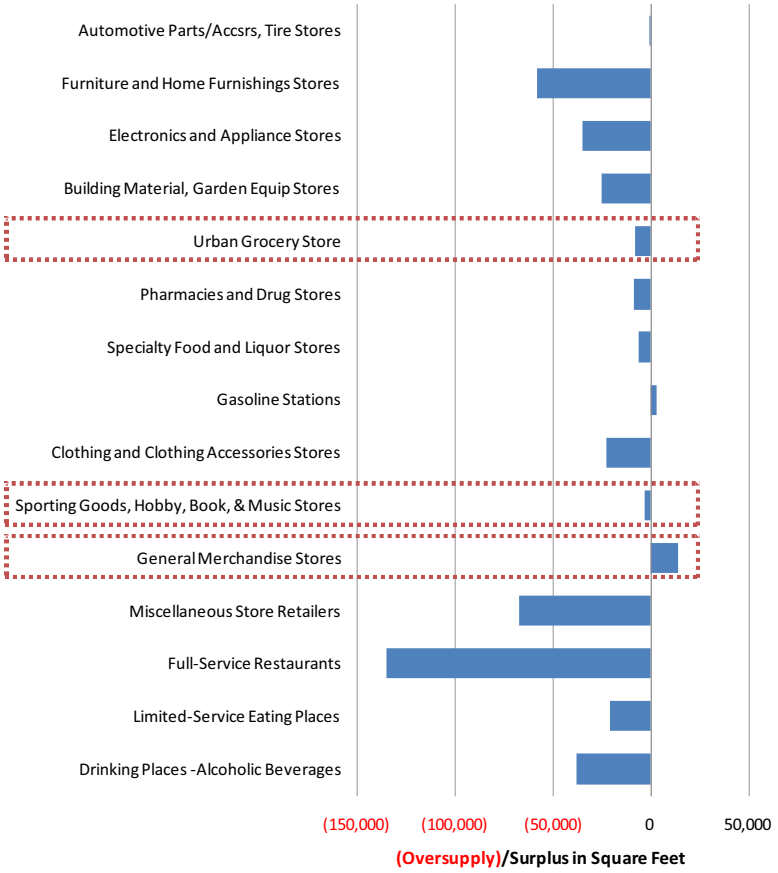
Type of Center	*Typical Anchor*	*Gross Leasable Area (s.f.)*	*Population Support*	*Trade Area Radius (miles)*	*Drive Time (minutes)*
Neighborhood	Drugstore/Supermarket	30,000-100,000	3,000-40,000	1.5	5-10
Community	Junior Dept. Store	100,000-450,000	40,000-150,000	3-5	10-20
Regional	1-2 Full-line Dept. Stores	300,000-900,000	>150,000	8	20
Super Regional	3-4 Full-line Dept. Stores	500,000-2 Million	>300,000	12	30

Source: Urban Land Institute

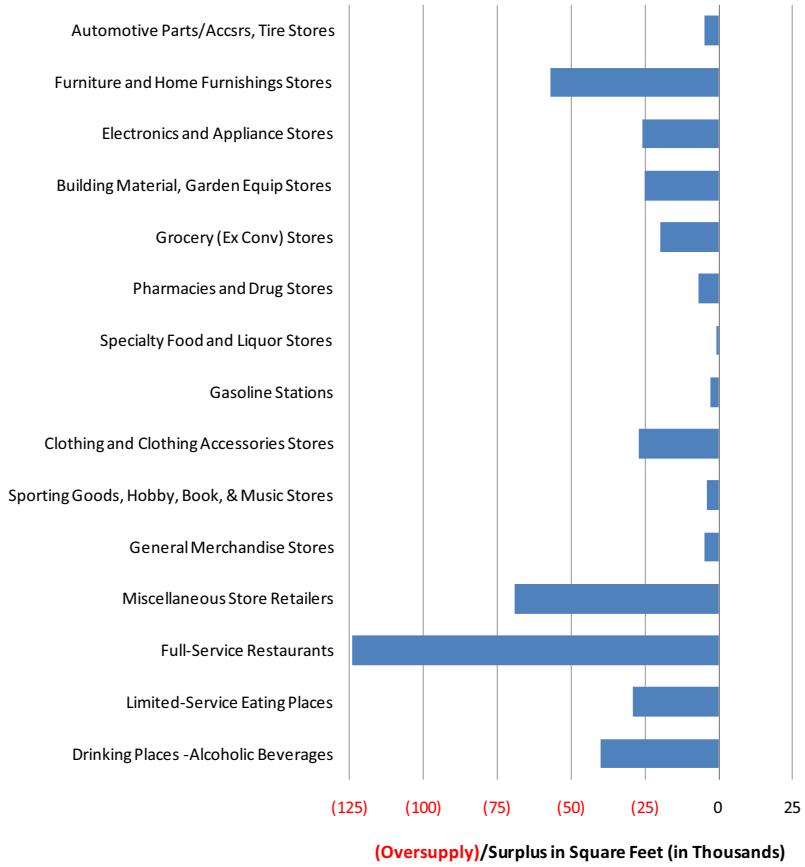
Retail: Residentially-Driven Demand

Downtown generally appears over-retailed. As the downtown population grows, opportunities may exist for additional urban grocers, and a book-store.

Residentially-Driven Retail Demand
Greater Downtown, Kansas City 2009
Sources: ULI Dollars and Cents, BizStats, Development Strategies



Residentially-Driven Retail Demand
3 Mile Radius of Greater Downtown, Kansas City 2009
Sources: ULI Dollars and Cents, BizStats, Development Strategies



Retail Demand: Workers and Overnight Visitors

After considering worker and overnight visitor spending, downtown still appears over-retailed. This is because certain elements, like the Power and Light District and Crossroads, serve regional markets. Unless 10,000 residents or 20,000 workers are added, or another regional attraction is provided, opportunities for more downtown retail are limited.

Worker Spending: As noted earlier, standard demand methodology does not take into account worker spending. Based on studies conducted internally, the average downtown worker spends between $5.00 and $8.00 per day on retail goods—mostly at restaurants. With 82,000 workers in downtown Kansas City, this results in a significant amount retail support. Applying a conservative daily expenditure of $6.00 per worker and retail sales of $300 per square foot amounts to 410,000 square feet of worker-supported retail.

Overnight Spending: Overnight spending is another overlooked form of retail support. Per Smith Travel Research, the downtown hotel market has an occupancy rate of 57 percent. With nearly 4,000 hotel rooms, this amounts to roughly 830,000 room nights. Assuming the average overnight visitor spends $50 per day on retail goods and food, the amount of retail supported by overnight spending is 140,000 square feet.

Total Spending: By adding overnight spending, worker spending, and resident spending, the downtown supports 780,000 square feet of retail—well short of the nearly 2.1 million square feet of retail supply in downtown. In aggregate, the downtown appears "over-retailed." Of course, many retailers are supported by consumers outside the downtown. For instance, the galleries in Crossroads draw regional support. Also, these aggregate numbers do not necessarily mean there are not certain *types* of undersupplied retail, like say, a bookstore. Nevertheless, retail in aggregate is certainly not grossly undersupplied.

Worker Spending Greater Downtown, Kansas City	
Downtown Workers*	82,000
Daily Spending Per Worker	$6.00
Total Daily Spending	$492,000
Work Days	250
Total Annual Spending	$123,000,000
Sales/square foot	$300
Total Supportable Restaurant/Retail Space (s.f.)	***410,000***

*ESRI, 2009; DEVELOPMENT STRATEGIES

Overnight Vistor Spending Greater Downtown, Kansas City	
2007 Occupied Room Nights*	830,000
Average Daily Spending (food, shoppi	$50
Total Annual Spending	$41,500,000
Sales/square foot	$300
Total Supportable Retail Space	***140,000***

*Downtown KC Council, Smith Travel Research, 2007 (most recent year data is avail.)
DEVELOPMENT STRATEGIES, 2009

Total Spending Greater Downtown, Kansas City	
Downtown Retail Demand	
Downtown Workers	410,000
+ Overnight Visitors	140,000
+ Downtown Residents	230,000
*= Total Existing Demand**	*780,000*
- Supply	*2,100,000*
= Demand Surplus/(Gap)	**(1,320,000)**

*CoStar, 2009; DEVELOPMENT STRATEGIES

Retail Supply: New Residents

New residents are the strongest opportunity to create retail demand in the Focus Area. As a general rule, every 1,000 households will drive demand for 20,000 square feet of retail. It is estimated that the Greater Downtown could add households at a rate of 700 per year.

New Resident Demand: Another form of support for retail development could come from future demand from new residents. As noted previously, the Consumer Expenditure Survey (CES) helps estimate the amount households spend on various retail goods. The Urban Land Institute provides sales per square foot that a store needs to earn to sustain itself. The table at top right shows the amount of supportable retail another 1,000, 2,000, 3,000, and 5,000 residents would generate.

Captured Demand: However, consumers do not make all retail expenditures within the confines of their neighborhood. Some of it "leaks" elsewhere. For instance, consumers will travel to restaurants outside their neighborhood, and will go to a regional mall to look for comparison goods, such as clothing. The chart at right estimates the percentage of retail expenditures that the downtown could capture. It is estimated that every 1,000 new units of housing would generate 20,000 square feet of retail demand.

Number of Stores: Retailers often have minimum size thresholds to optimize their profitability. For instance, many national chain pharmacies require a minimum of 10,000 square feet, but prefer 15,000 square feet. Thus, 6,000 square feet of demand will not support a pharmacy. The final table (bottom right) shows the number of stores that new resident-generated demand translates into.

Demand from New Downtown Housing (s.f.)

Retail Stores	*Estimated Sales/s.f.**	*1,000 Units*	*2,000 Units*	*3,000 Units*	*5,000 Units*
Furniture and Home Furnishings Stores	**$350**	**2,000**	**4,000**	**5,000**	**9,000**
Electronics and Appliance Stores	$400	2,000	5,000	7,000	11,000
Building Material, Garden Equip Stores	**$300**	**3,000**	**5,000**	**8,000**	**14,000**
Urban Grocery Store, Conv. Store	$350	10,000	19,000	29,000	48,000
Pharmacies and Drug Stores	**$650**	**1,000**	**2,000**	**3,000**	**4,000**
Gasoline Stations	$1,300	2,000	4,000	6,000	9,000
Clothing & Accessories	**$350**	**5,000**	**11,000**	**16,000**	**26,000**
Bookstores, Music Stores, etc.	$250	2,000	3,000	5,000	8,000
Full-Service Restaurants	**$350**	**4,000**	**8,000**	**12,000**	**20,000**
Limited-Service Eating Places	$400	3,000	5,000	8,000	13,000
Drinking Places (Bars)	**$375**	**1,000**	**3,000**	**4,000**	**6,000**
Total (rounded):	-	***40,000***	***70,000***	***110,000***	***170,000***

Capture from New Downtown Housing (s.f.)

Retail Stores	*Percent Capture*	*1,000 Units*	*2,000 Units*	*3,000 Units*	*5,000 Units*
Furniture and Home Furnishings Stores	**50%**	**1,000**	**2,000**	**2,500**	**4,500**
Electronics and Appliance Stores	33%	660	1,650	2,310	3,630
Building Material, Garden Equip Stores	**33%**	**990**	**1,650**	**2,640**	**4,620**
Urban Grocery Store, Conv. Store	85%	8,500	16,150	24,650	40,800
Pharmacies and Drug Stores	**85%**	**850**	**1,700**	**2,550**	**3,400**
Gasoline Stations	80%	1,600	3,200	4,800	7,200
Clothing & Accessories	**40%**	**2,000**	**4,400**	**6,400**	**10,400**
Bookstores, Music Stores, etc.	50%	1,000	1,500	2,500	4,000
Full-Service Restaurants	**50%**	**2,000**	**4,000**	**6,000**	**10,000**
Limited-Service Eating Places		1,500	2,500	4,000	6,500
Drinking Places (Bars)	**50%**	**500**	**1,500**	**2,000**	**3,000**
Total (rounded):		***20,000***	***40,000***	***60,000***	***100,000***

Store Demand from New Downtown Housing

Retail Stores	*Typical Store Size (s.f.)*	*1,000 Units*	*2,000 Units*	*3,000 Units*	*5,000 Units*
Furniture and Home Furnishings Stores	**8,000**	**0.1**	**0.3**	**0.3**	**0.6**
Electronics and Appliance Stores	8,000	0.1	0.2	0.3	0.5
Building Material, Garden Equip Stores	**7,500**	**0.1**	**0.2**	**0.4**	**0.6**
Urban Grocery Store, Conv. Store	10,000	0.9	1.6	2.5	4.1
Pharmacies and Drug Stores	**15,000**	**0.1**	**0.1**	**0.2**	**0.2**
Gasoline Stations	2,000	0.8	1.6	2.4	3.6
Clothing & Accessories	**7,500**	**0.3**	**0.6**	**0.9**	**1.4**
Bookstores, Music Stores, etc.	10,000	0.1	0.2	0.3	0.4
Full-Service Restaurants	**4,000**	**0.5**	**1.0**	**1.5**	**2.5**
Limited-Service Eating Places	3,000	0.5	0.8	1.3	2.2
Drinking Places (Bars)	**3,000**	**0.2**	**0.5**	**0.7**	**1.0**
Total:	-	***4***	***7***	***11***	***17***

Sources: Consumer Expenditure Survey, Urban Land Institute, Development Strategies, 2009

Development Program & Feasibility

Market opportunities for the South Loop Link Area vary greatly depending on the level of public investment. This section considers the likely market outcomes of creating a deck and public space, as well as providing replacement bridges.

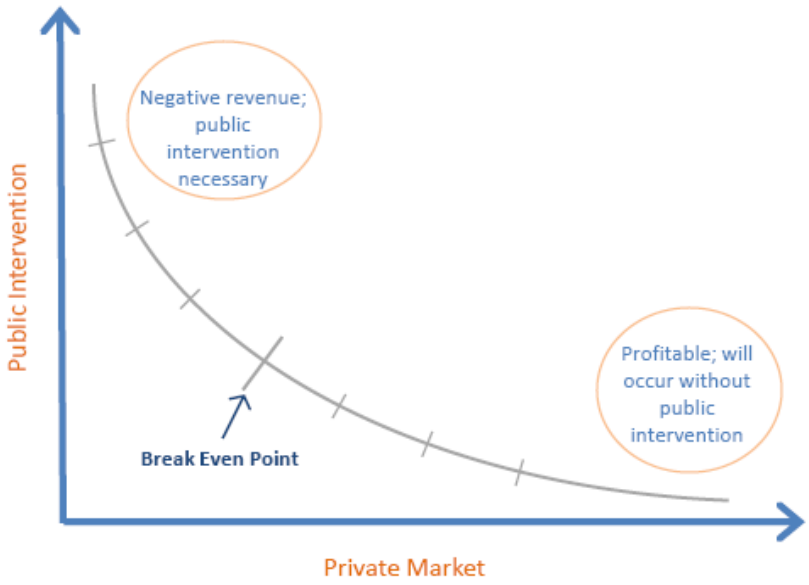
The Steering Committee's recommendation of concepts 1a, 1b, and 2 all envision a deck created over a section of I-670, a redesign of Truman Road, the addition of significant public space, and the creation of some new land, on which development can occur. For the purposes of this level of analysis, all three of these options are considered together as a deck and public space improvement.

This section provides a market-based program which supports the designs—it includes lease rates, sale prices, absorption rates, and a likely phasing schedule.

This section also considers the market implications of providing replacement bridges over a section of I-670. These replacement bridges are understood to have pedestrian-friendly enhancements, such as wide sidewalks, street furniture, pedestrian-scale lighting, etc. It is also assumed that these bridges would better accommodate bicycles.

This report also presents preliminary financial feasibility analysis. Generally, the better the market numbers, the more feasible a project is likely to be. The feasibility analysis of this study considers the "break even" point for each use—the point at which revenues and construction costs are equal.

The conclusion of this analysis is that public intervention will improve the financial feasibility of the market program and design alternatives, thus increasing market opportunities and private investment. With public intervention, the vision shown on the following pages can be made into reality.

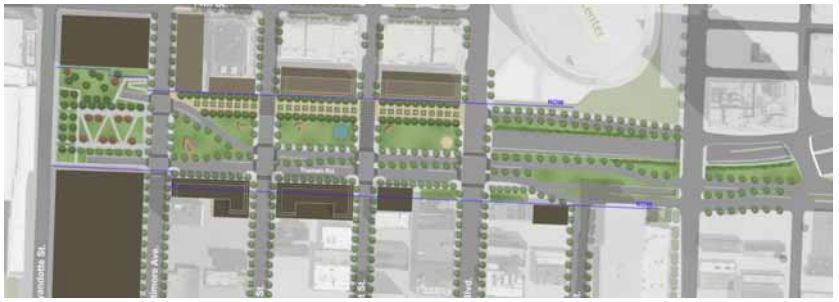


Development Program: Concepts 1a and 1b

Concepts 1a and 1b would shift Truman Road to the north, and provide public space to the south.

Development Program: Concept 2

Concept 2 would shift Truman Road to the south, and provide public space to the north.



Development Strategy: Program Matrix

	Summary Comments		Replacement Bridges Only	Deck and Public Space Improvements	Demand
RENTAL	▪ The regional housing market has declined significantly: permits decreased from 15,000 in 2005 to 2,500 in 2009. ▪ Long-term trends for urban housing (demographics, consumer preferences) are all positive. ▪ Downtown added 4,500 housing units since 2000; however supply of historic buildings is running out. ▪ Downtown market is likely to recover, but incentives may be needed to stimulate new construction. ▪ Downtown's market consists primarily of young singles & couples. The South Loop Link Area can target the premium empty nester and early workforce markets.	▪ On a per-square-foot basis, downtown rents are second-strongest, behind the Plaza. ▪ Downtown has added 200-400 units each year since 2002, yet occupancies have remained steady. ▪ Most new units exceed $900/month; $700-$900 market is largely ignored. ▪ South Loop Link Area target households: $50,000-$100,000.	Rents: $750-$1040/mo. ($1.00-$1.05 psf)	Rents: $1,000-$1,500/mo. ($1.15-$1.30 psf)	<u>Downtown:</u> 700-950 units/year <u>Replacement Bridges Only:</u> Up to 70-100 units per year for Crossroads, until all existing buildings are occupied <u>Deck and Public Space Enhancements:</u> Focus Area: 70-140 units/year, including 50-70 units in South Loop Link Area for 10 years
FOR-SALE		▪ Market is slow, at present; home prices have declined. ▪ South Loop Link Area Target Households: $75,000-$150,000.	Sales: $150,000-$250,000 ($175-$200 psf)	Sales: $250,000-$450,000 ($250-$300 psf)	

Development Strategy: Program Matrix

	Summary Comments	Replacement Bridges Only	Deck and Public Space Improvements	Demand
OFFICE	▪ Crossroads is not an "A" location for office space, but the South Loop Link Area could become one, with deck and public space enhancements. ▪ The greater obstacle is the downtown market in general, though it may not be as bad as it seems. - Downtown's share of regional office space it 25 percent, but its share of growth is 15 percent. - Lease rates for new suburban properties are higher than new downtown properties, driving supply outward. - Still, newer downtown properties—many of which are in Crown Center—achieve lease rates of $21-$23 *psf*, with 97% occupancy. - In the premium market, downtown is inferior to the Plaza, though new product is largely untested.	Lease Rates: $14-$17	Lease Rates: $22-$25	<u>Downtown:</u> 2.0-2.5 million s.f. over 10 years <u>Replacement Bridges Only:</u> Up to 280K for Crossroads over 5 to 10 years (or until all existing buildings are full) <u>Deck and Public Space Enhancements:</u> 560K-840K s.f. over 10 years for South Loop Link Area
RETAIL	▪ Downtown is in many ways over-retailed. ▪ Crossroad galleries happened organically and exist because of inexpensive rents and critical mass – the deck will provide minimal benefit. ▪ Every 1,000 residents in Crossroads will create demand 20,000 s.f. of retail.	Lease rates: $13-$15	Lease rate: $20	20,000 to 30,000 s.f. of new resident demand

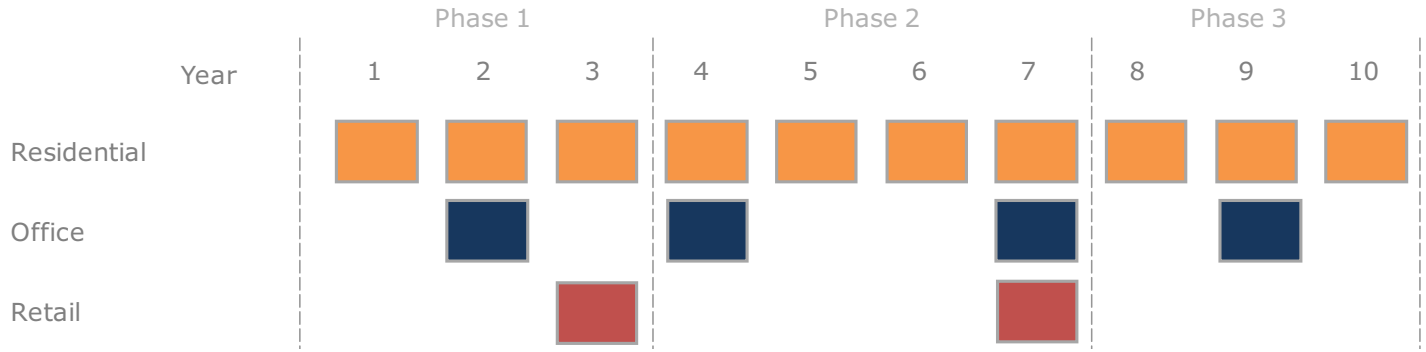
Development Program: South Loop Link Phasing

Under the more aggressive scenario in which a deck and public space are added, the South Loop Link Area could absorb 700 housing units, 575,000 square feet of office space, and 20,000 square feet of retail over 10 years.

Projected Phasing and Absorption

	Location	Pre-Development	1-3 YEARS	4-7 YEARS	8-10 YEARS	TOTAL
RESIDENTIAL	SLL Area	-	150-210 units	200-280 units	150-210 units	500-700 units
OFFICE	SLL Area	-	175K	225K	175K	575K
RETAIL	SLL Area	-	10K	10K	-	20K
CATALYST	SLL Area	South Loop Link Deck and Public Space Improvements				

SLL = South Loop Link; Projections assume deck and public space will be added



Development Program: Financial Feasibility

Preliminary financial analysis reveals that public intervention would be required for most development types under the deck and public space scenario, particularly if structured or underground parking is desired. Large amounts of high quality, new construction are not likely to be feasible—even with public intervention—under the bridge replacement scenario.

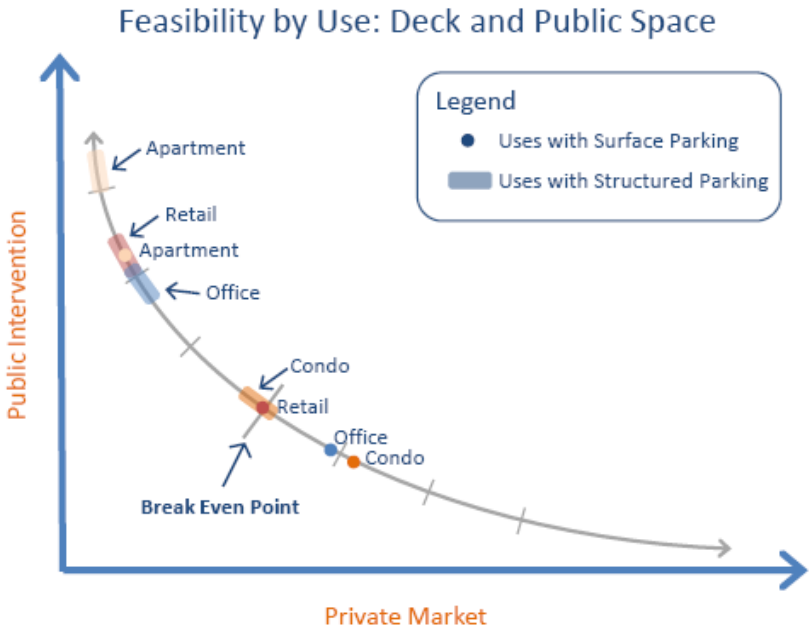
Market feasibility by no means guarantees financial feasibility. Preliminary forecasts of market returns for the development program, when compared to construction costs, reveal that public intervention—in some form—would be required for most development types.

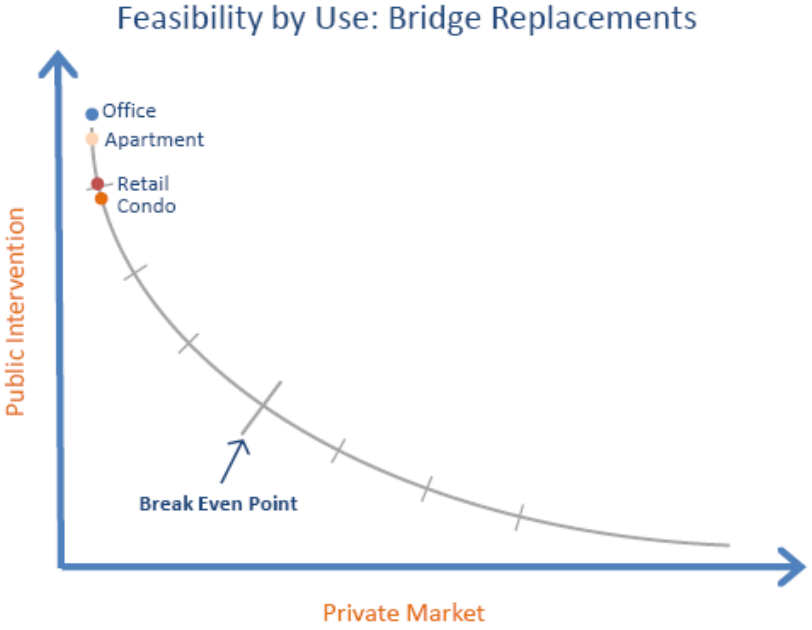
Public intervention could come in many forms—tax increment financing or construction of public parking garages are two common forms. Perhaps underground parking could be constructed as part of the proposed deck project. Such intervention will likely bring infeasible projects into feasibility. The analysis conducted for this report is preliminary; more detailed analyses should be undertaken before any real public intervention would occur.

Based on this feasibility analysis, the cost of structured or underground parking drives feasible projects into infeasibility. Condominiums are most likely to occur at the site without any form of public subsidy. Still, if underground parking is desired for this use, or if land becomes difficult to acquire for structured parking, these types of uses may also require intervention.

If office development is to occur at the site, in the manner expressed in the alternative scenarios (i.e. with structured or underground parking) significant intervention will be required.

Under the bridge replacements scenario, all uses are infeasible, assuming high quality construction. This is true even if surface parking is utilized. The costs of constructing buildings with parking garages for the proposed uses, under this scenario, are literally "off the chart" (see bottom right). Projects would be unlikely to move forward, even with public intervention.





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SOUTH LOOP LINK CONCEPT STUDY

Traffic Impact Study

May 1, 2009

PREPARED FOR

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South Loop Link Feasibility Study
Traffic Impact Study

The purpose of this memorandum is to summarize the traffic study for the South Loop Link Feasibility Study. This memorandum will present the study purpose, methodology, findings and conclusions. The feasibility study purpose is to analyze at a high-level, alternatives to improve quality of life around the south central business district freeway loop. The team also submitted a technical appendix to the City Public Works Department that provides the traffic model used in the analysis as well as the backup materials and additional analysis requested by the City.

1.0 Study Purpose

Traffic analysis was performed to analyze the impacts of proposed modifications to Truman Road from Baltimore to Locust streets. This initial traffic study was performed at a high level and was primarily intended to identify fatal flaws for the proposed alternatives. More detailed traffic analysis would be performed on the preferred alternative during the environmental documentation phase.

The purpose of the traffic study was to evaluate changes to the roadway network consisting of:

- A lane reduction on Truman Road from 3 lanes to 2 lanes in each direction.
- Closing the McGee Street on-ramp.
- Combining westbound Truman Road and eastbound Truman Road into a parkway/boulevard.

2.0 Methodology

The study approach was discussed with Kansas City, Missouri Public Works Department. At the request of the Public Works Department, the transportation analysis focused on a weekday PM peak hour with an 8:00 PM Sprint Center Arena event. This time period was chosen to represent a worst case scenario. Traditional peak hours for existing and future time periods were also analyzed. Two tools were used to evaluate traffic during an event consisting of:

- *2008 Big 12 Tournament VISUM Model* – The City's VISUM travel demand model of the 2008 Big 12 Basketball Tournament held at the Sprint Center Arena was used to assess traffic demand and travel patterns. The model assumed an attendance of 18,000 persons.

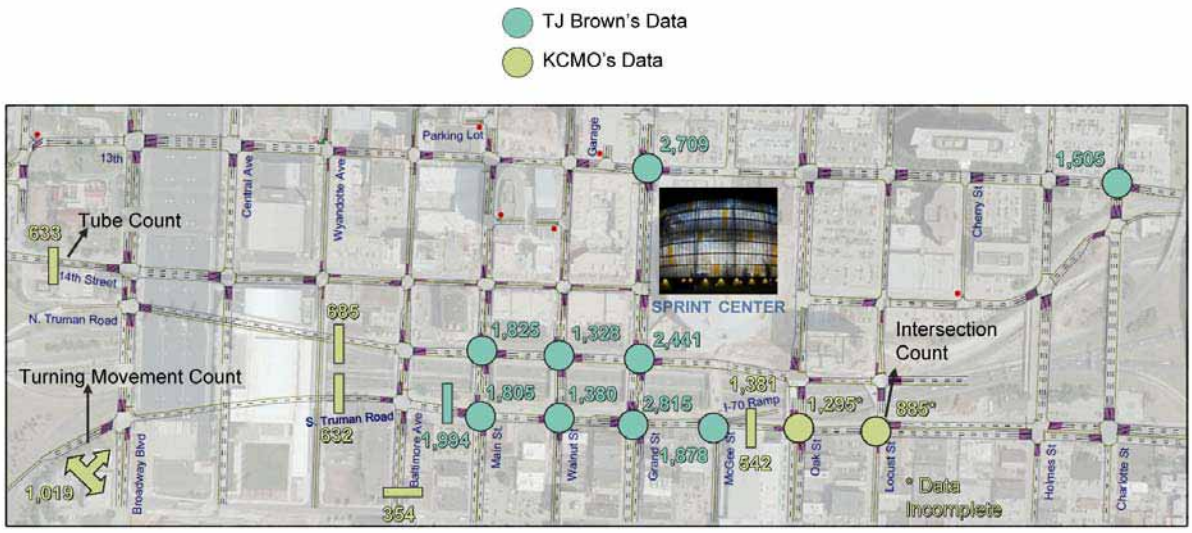
- *Collected Traffic Counts During a Sprint Event* – Actual traffic count data was collected on January 21, 2009 during an event at the Sprint Center plus other downtown events. Pedestrian volumes were estimated, based on field observations, and added to the traffic model. The attendance at each event was:

    - Sprint Center – AC/DC concert (13,294)
    - Midland Theater – Jesus Christ Superstar (1,200)
    - Bartle Hall – Fusion Center Tech Meeting (120)

Data Collection

A sub-consultant (TJ Brown) was hired to collect traffic data on Wednesday January 21, 2009 during an event at the Sprint Center Arena. Traffic data was collected from 4:30 PM to 8:00 PM. Figure 1 indicates that the orange sites represent locations where manual intersection turning movement counts were collected. The green sites represent locations where the City also collected traffic data. The numbers next to each site represents either the total intersection traffic volume during the event peak hour or the total mainline count.

Figure 1
Data Collection Sites



In order to adjust traffic counts from the actual 8:00 PM concert start time to a more conservative 7:00 PM concert start time, traffic volumes were manually adjusted by shifting them forward and overlapping them with background traffic. Figure 2 shows the existing actual collected data and Figure 3 shows the adjusted peak hour data.

Figure 2
Existing (January 21, 2009) Traffic Demand for an 8:00 PM Concert Start Time

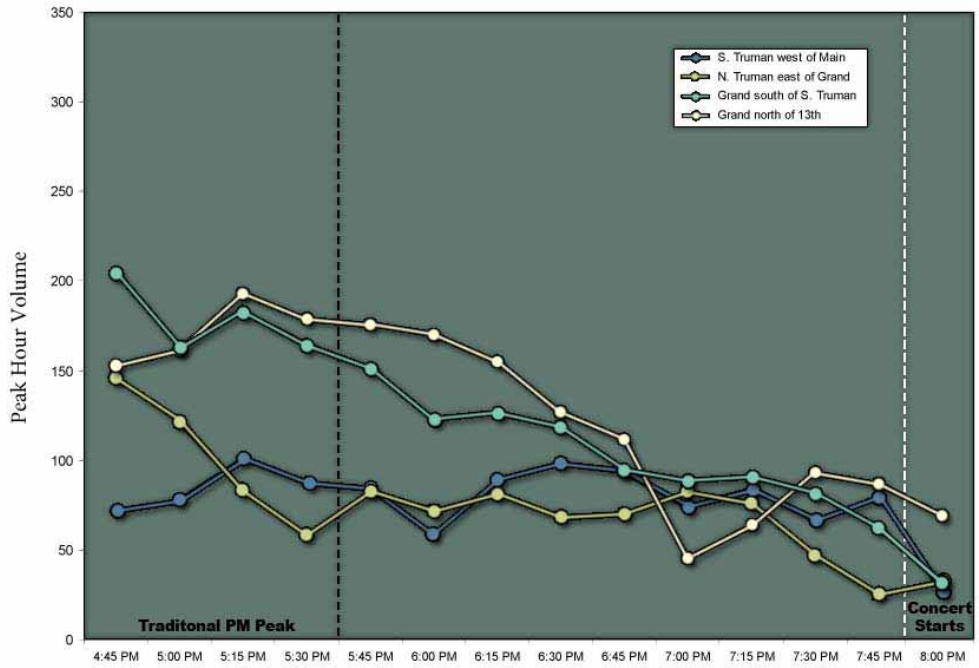
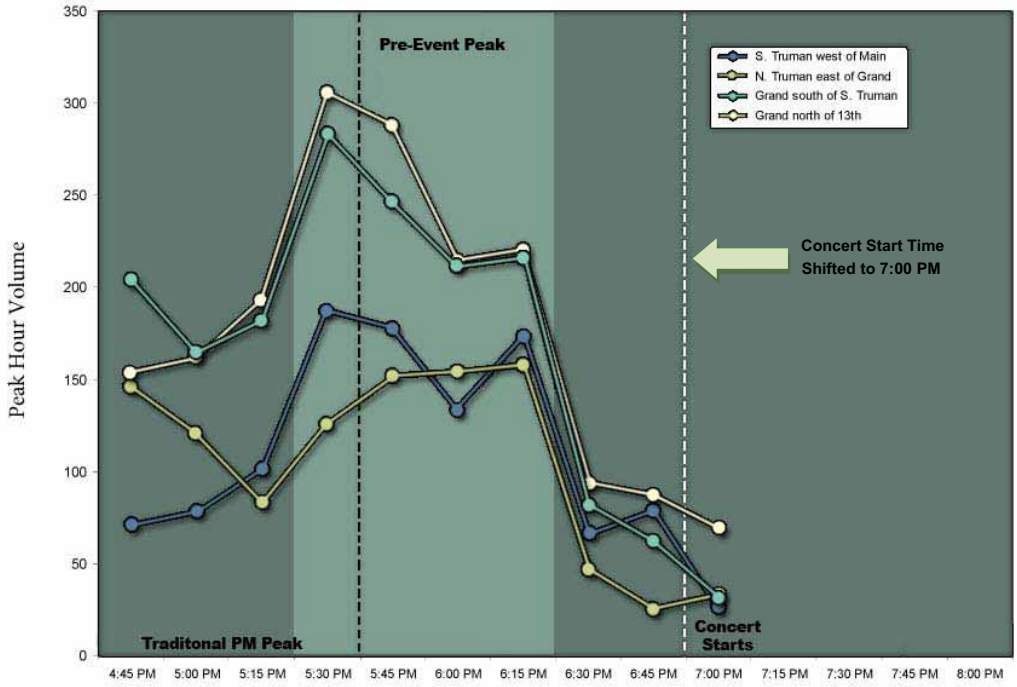


Figure 3
Adjusted (January 21, 2009) Traffic Demand for an 7:00 PM Concert Start Time



Alternatives

The traffic study was divided into two phases. Phase 1 represents the initial screening of alternatives which evaluated the base condition with a Sprint Center event in addition to evaluating reduced lanes on Truman Road. Phase 1 also analyzed combining Truman Road into a combined roadway (two-way arterial with a raised median).

Phase 2 provided more detailed analysis of the preferred North/South Combined Alternative (in both a north and south of I-670 configuration options) and evaluated 3 lanes versus 2 lanes in each direction as well as a hybrid of lane reduction along the corridor.

Roadway Configurations Analyzed

- Phase 1 – Initial Alternatives Screening
    1. Existing traffic with Sprint Center event / existing roadway configuration (Replace Bridges)
    2. Existing traffic with Sprint Center event / reduce lanes on Truman Road from 3 to 2
    3. Existing traffic with Sprint Center event / combined Truman Road two-way arterial and remove I-70 on-ramp

- Phase 2 - Preferred Alternative Evaluation
    1. North and South options
    2. 6 or 4 Lanes
    3. 6 or 4 Lane hybrid

The Phase 1 analysis focused on the PM peak with a Sprint Center event. The Phase 2 analysis included an existing traditional PM peak hour and a future traditional PM peak hour analysis.

Time Periods Analyzed

- Existing Traditional PM Peak Hour
    - 4:30 – 5:30 weekday PM peak hour
- Existing with a Sprint Event
    - 5:30 – 6:30 PM weekday peak hour with a 7:00 Sprint Center event start time
- Future Traditional PM Peak Hour
    - 4:30 – 5:30 PM weekday peak hour plus 1% annual growth to 2030

Operations

Synchro/SimTraffic (Version 7) was used to analyze traffic operations. SimTraffic provides the advantage of evaluating level of service using Highway Capacity Manual methodology to analyze intersections that are part of a system. Level of Service (LOS) was used as the primary measure of effectiveness for evaluation.

3.0 Phase 1 Study Findings

3.1 Big 12 Travel Model

The City's Big 12 VISUM Travel Demand Model was used to assess traffic along Truman Road during an event at the Sprint Center Arena. Primary questions that were addressed in this evaluation were:

- Who uses Truman Road?
- What is the existing traffic demand leading up to a Sprint Center event?
- What happens when changes are made to the roadway network?

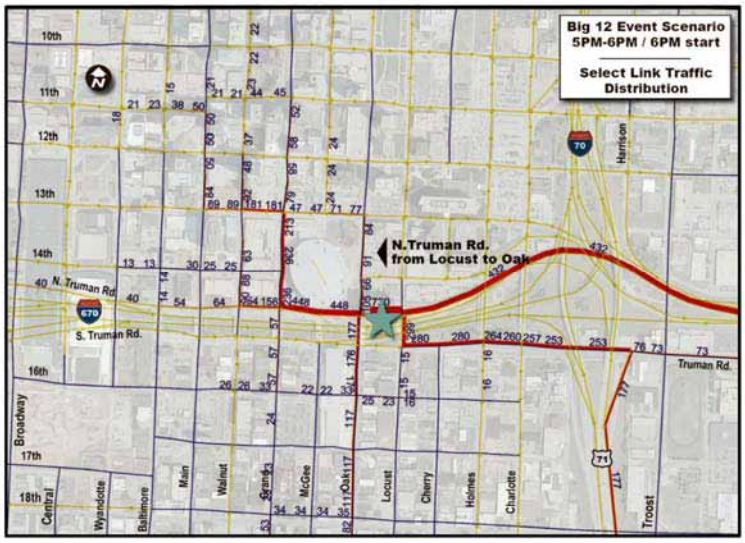
Figure 4 shows the users of Truman Road during an event from each of the four interstate access corners of Truman Road during an event. The figure shows where the motorists are coming from, which roads they are using and where they are going.

Figure 4
Truman Road Users
Big 12 Event (5:00 – 6:00 PM)

<table>
<tr>
<td> 
</td>
<td>Truman Road Eastbound

Approximately 1,400 eastbound motorists exit from northbound I-35 and use eastbound Truman Road. Motorists primarily use Walnut, Main and Grand to access parking areas north of I-670. Traffic volumes diminish on the north/south roads the farther east on Truman Road.</td>
</tr>
<tr>
<td> 
</td>
<td>Truman Road Westbound

Approximately 450 westbound motorists use westbound Truman Road to access I-35 southbound. Motorists primarily use 13th Street to Baltimore from parking areas north of I-670.</td>
</tr>
</table>



Truman Road Westbound

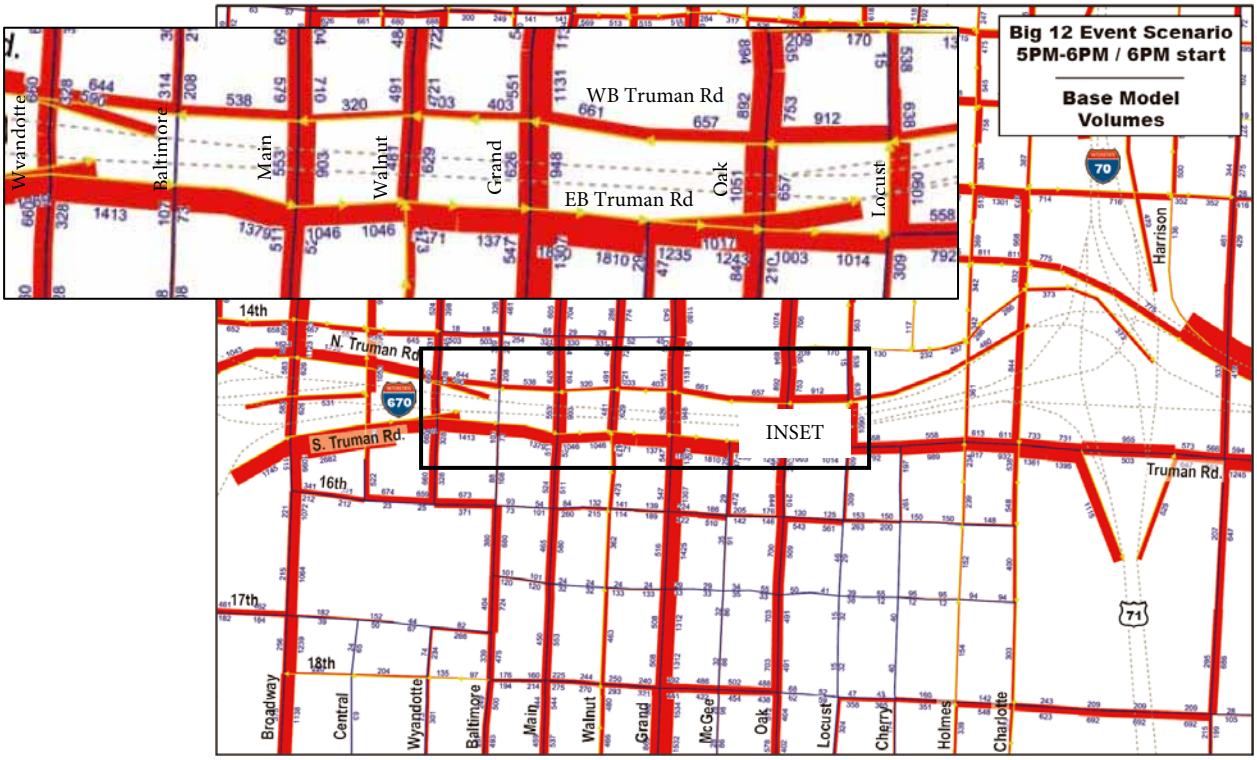
Approximately 700 westbound motorists exit from I-70 westbound and US 71 northbound to use westbound Truman Road. Motorists primarily use Oak, Grand and Walnut to access parking areas north of I-670. Oak is also used to access areas south of I-670.

Truman Road Eastbound

Approximately 1,000 eastbound motorists exit to I-70 eastbound and US 71 southbound. Motorists primarily use Walnut and Grand to access the highways. A significant amount of traffic is generated south of I-670 that uses eastbound Truman Road.

Figure 5 shows the future projected 2010 total traffic demand on Truman Road during an event at Sprint Center Arena with Grand Boulevard open. As shown in the figure, eastbound Truman Road has a higher traffic volume than westbound Truman Road. Eastbound Truman Road has a PM peak hour traffic demand in the range of 1,400 to 1,800 vehicles with the highest demand east of Grand. Westbound Truman Road PM peak hour traffic demand is in the range of 300 to 900 vehicles.

Figure 5
Existing Event Traffic Demand
(With Grand Boulevard Open)



The travel model was used to analyze changes in traffic patterns when changes are made to the roadway network. The model indicated that when Truman Road lanes were reduced from 3 to 2 lanes in each direction, there was little change in travel patterns. This indicates that Truman road has excess capacity and can continue to service the demand with reduced lanes.

The model was also used to analyze the impacts of removing the McGee eastbound on-ramp to I-70. After review of the results, the conclusion was that the ramp plays an important role in the collection of vehicles from within the loop to eastbound I-70 but an even greater role in the collection of vehicle from south of the loop to eastbound I-70 where there are few alternative options.

3.2 January 21, 2009 Event Traffic

Section 3.1 evaluated traffic using the City's travel demand model which replicates an event scenario. This section evaluates traffic using actual traffic counts collected during an event. Primary questions that were addressed in this evaluation were:

- What is the actual traffic demand?
- What is the LOS goal during an event?
- What do motorists experience?
- Are there any problems and what are the solutions?

The actual traffic demand along Truman Road collected on January 21, 2009 and adjusted for a 7:00 PM start time is shown below:

- Westbound Truman Road: 1,390 vehicles (west of Main) to 1,478 vehicles (east of Grand)
- Eastbound Truman Road: 1,216 vehicles (west of Main) to 2,181 vehicles (east of Oak)

The level of service goal during an event is different than it is during a traditional weekday peak hour. The Kansas City, Missouri Public Works Department strives for LOS D in the urban area during traditional weekday peak travel times. However, during and event, motorists expect and tolerate higher delays and congestion because of the high traffic generation and peaking characteristics of the event. After discussions with the Public Works Department, the City has indicated that a level of service E would be considered acceptable during an event. If the base event scenario is a level of service F, then no vehicle delay degradation in that level of service would be the City's goal.

Table 1 shows the level of service for the three scenarios analyzed in Phase 1. As shown in Table 1, each alternative identified only one location that operated at LOS F during an event.

Table 1
Existing Traffic with Sprint Event
5:30 – 6:30 PM Peak Hour
Level of Service

Phase 1 Study Intersection	Existing Roadway Configuration (Base)	Reduced Lanes from 3 to 2 Lanes	Combined Roadway
WB Truman and Main	B	B	--
WB Truman and Walnut	C	B	--
WB Truman and Grand	C	E	--
EB Truman and Main	E	**F**	C
EB Truman and Walnut	E	E	E
EB Truman and Grand	D	E	E
EB Truman and McGee	C	B	**F**
13th and Grand	**F**	D	C

Source: SimTraffic
Shaded areas represent locations that degraded beyond a LOS E during an event.

As shown in Table 1, there were limited locations that operated at LOS F. This was consistent with field observations. When modifications to the roadway network were made, similar system delay is experienced by the motorists with no overall system degradation. Alternative solutions to these isolated problem locations may be resolved with additional capital improvements and/or non-capital event traffic management. Regardless, these problem locations are expected to be experienced in short duration.

Higher delays may be expected after an event with vehicle exiting parking garages. It was reported that up to 2 hours of delay was recorded by persons parked at the top of the parking garage at 13th Street and Grand.

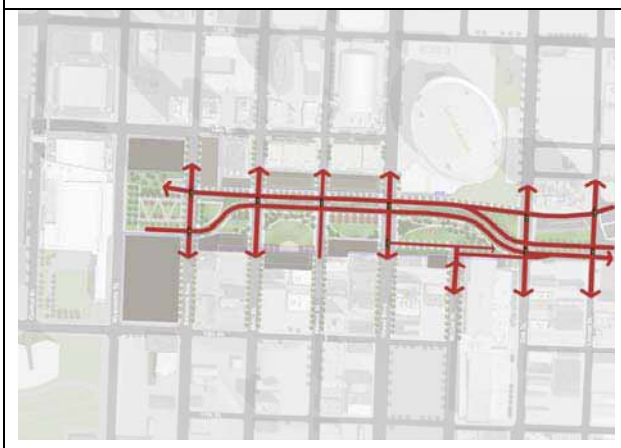
4.0 Phase 2 Study Findings

The Phase 2 Analysis was conducted as a more focused effort on the proposed concepts with additional refined constraints as directed by the Kansas City, Missouri Public Works Department, such as the traffic

impacts with Grand Boulevard closed for a Sprint Center event. The following analysis reflects these additional constraints, representing the highest level of traffic impacts for the corridor.

Based on Phase 1 traffic analysis as well as other factors, the South Loop Link Steering Committee identified the combined roadway as the recommendation. Two options of the recommendation were identified for further study. The North option primarily uses westbound Truman as its alignment. The South option primarily uses eastbound Truman as its alignment. The North option has two alternative alignments between Grand and Oak, one terminates at McGee and the other at Oak. For the purposes of this study, the alternative that terminates at Oak will be analyzed. All options would require connections to existing interstate access points at all four corners of Truman Road. Figure 6 shows the concept design and network for both options.

Figure 6
North and South Options

North Option	South Option
	
	

Both the North and South options would have similar operational characteristics. Below is a list of operational characteristics envisioned for the combined roadway alternative.

- Parkway/Boulevard Functional Class
- 35 mph posted speed
- 2-lanes with on-street parking during off-peak

- 3-lanes during peak and event
- Trucks allowed
- McGee on-ramp remains

Figure 7 shows the total future projected 2010 traffic demand on Truman Road during an event at Sprint Center Arena with Grand Boulevard closed. Truman Road has been reconfigured to represent the North option. As shown in the figure, eastbound Truman Road has a peak hour traffic demand in the range of 400 to 600 in the three block section of combined roadway from Main to Oak. Westbound Truman Road has a peak hour traffic demand in the range of 200 to 800 vehicles in the three block section of combined roadway from Main to Oak. These traffic volumes during an event are below the reasonable capacity of a two or three lane roadway in each direction.

Figure 7
Existing Event Traffic Demand
(With Grand Boulevard Closed and North Option)

Table 2 shows the Phase 2 North options LOS results for an event scenario and a traditional peak hour scenario. As shown in Table 2 the traditional peak hour for a 4 or 6 lane combined Truman Road does not show any traffic operational problems. The event peak hour results indicate that isolated locations are expected to operate at LOS F.

Table 2
Level of Service for Sprint Event and Traditional Peak Hour
North Option

Phase 2 Study Intersection	Existing Event Peak Hour (Existing Lanes)	Existing Event Peak Hour (6/4 lanes)	Existing Traditional PM Peak Hour (6/4 lanes)	Future Traditional PM Peak Hour (6/4 lanes)
WB Truman and Main	B	C / D	B / B	B / B
WB Truman and Walnut	C	C / **F**	B / B	B / B
WB Truman and Grand	C	**F** / D	B / B	C / C
Grand and EB Truman	D	**F** / E	B / B	B / B
EB Truman and McGee	C	A / A	A / A	A / A
14th and Grand	--	A / A	A / A	A / B
13th and Grand	**F**	C / C	B / B	B / B

Source: SimTraffic
Shaded areas represent locations that degraded beyond a LOS D during Traditional Peak Hour or LOS E during an event.
These Levels of Service reflect a closed Grand Boulevard, as needed for a major Sprint Center event.

Table 3 shows the Phase 2 South option level of service results for an event scenario and a traditional peak hour scenario. As show in the table the traditional peak hour 6- lane combined Truman Road does not show any signs of traffic operational problems, however, the 4-lane option begins to have a problem at Truman and Walnut. During an event scenario, the 6-lane option does not have any undesirable LOS intersection, but the 4-lane indicates that more locations than the North option would have undesirable LOS conditions.

Table 3
Level of Service for Sprint Event and Traditional Peak Hour
South Option

Phase 2 Study Intersection	Existing Event Peak Hour (Existing Lanes)	Existing Event Peak Hour (6/4 lanes)	Existing Traditional PM Peak Hour (6/4 lanes)	Future Traditional PM Peak Hour (6/4 lanes)
WB Truman and Main	E	--	--	--
EB Truman and Main	E	C / **F**	B / C	C / C
EB Truman and Walnut	E	C / **F**	B / C	B / **F**
EB Truman and Grand	D	E / **F**	C / C	C / D
EB Truman and McGee	C	A / A	B / B	B / B
14th and Grand	--	A / A	A / A	A / A
13th and Grand	**F**	C / C	B / B	B / B

Source: SimTraffic
Shaded areas represent locations that degraded beyond a LOS D during Traditional Peak Hour or LOS E during an event.
These Levels of Service reflect a closed Grand Boulevard, as needed for a major Sprint Center event.

In order to look at a hybrid option that could mix a 4 and 6-lane scenario, locations were first identified where the 4-lane combined Truman Road shows undesirable LOS during an event scenario. These locations are highlighted in orange on Figure 8.

Figure 8
North and South Alternatives
4-Lane Event Scenario LOS Problem Locations

North Option

South Option

The locations highlighted in orange represent locations where mitigation would be necessary to address event capacity problems. Mitigation efforts could be capital capacity improvements or event traffic management options.

5.0 Conclusions

A high-level traffic study was performed for the South Loop Link Feasibility Study. Traffic analysis was performed to analyze the impacts of proposed modifications to Truman Road from Baltimore to Locust. Traffic study conclusions are discussed below.

5.1 Phase 1 Analysis

The Phase 1 analysis focused on understanding Truman Road traffic patterns and changes in the existing roadway network. Two primary alternatives were tested consisting of (1) a reduction of lanes on the existing Truman Road alignment and (2) relocating westbound Truman Road and eastbound Truman Road to a combined roadway. Phase 1 conclusions are:

<u>Big 12 VISUM Model</u>

- Truman Road is used to access the Power & Light and the Crossroads/Crown Center Districts.
- Eastbound Truman Road has the highest volume at the McGee on-ramp.
- Few vehicles divert when Truman Road is reduced to two-lanes.
- Closing the McGee on-ramp would not negatively impact Truman Road.
- Adding an EB lane to 13th Street attracts 100 new vehicles to use the 14th Street on-ramp. (This option was studied as an alternative to alleviate EB traffic bound for EB I-670 on Truman Road.)

January 21, 2009 Downtown Events Field Observations

- People arrive earlier than 1-hour prior to an event.
- Pedestrian volumes were higher at 13th and Grand than along Truman Road and impacted traffic operations.
- An All-Red (all pedestrian) phase would be beneficial at 13th and Grand.
- Trucks were parked on westbound Truman Road from Oak to Grand.

January 21, 2009 Downtown Events Synchro Analysis

- The 1/21/09 counts were lower than the Big 12 model volumes.
- Truman Road currently operates at LOS E/F for an event at several intersections.
- If Truman Road is reduced, then improvements are necessary, however several intersections still operate at LOS E/F.
- If Truman Road becomes a two-way arterial, traffic can operate at a more desirable LOS for an event.
- Other factors such as travel speed should be considered.

5.2 Phase 2 Analysis

The Phase 2 analyses focused on analyzing event existing traditional and future traditional PM peak hour traffic for North and South combined options. Phase 2 conclusions are:

North Option

- Existing and future traditional peak hour traffic operates at a desirable level of service for both 4 or 6 lane options.
- During an event, the 4-lane option works better because a shared westbound through and right turn lane approaching Grand is converted to a right turn only to better serve traffic demand.
- One location at Truman and Walnut operates at LOS F due to the heavy southbound Walnut traffic demand.
    - Capital improvements or event traffic management could be used to solve this problem.
- The North option operates better than the South option.
- The North option separates access to eastbound McGee on-ramp from other Truman Road access to improve traffic operations in the study area.

South Option

- Existing and future traditional peak hour traffic operates at a desirable level of service for either the 4 or 6 lane options with the exception of Truman and Walnut for the 4-lane option.
- During an event, the 6-lane option works better than the 4-lane option.
- The 4-lane option shows capacity problems from Main to Grand and would require 6-lanes of capacity.
    - Capital or event traffic management could be used to solve this problem.
- The South option does not operate as well as the North Option.
- The South option does not separate access to eastbound McGee on-ramp from other Truman Road access, thus contributing to capacity problems along Truman Road.

5.3 Traffic Conclusion Summary

In summary, the preferred alternative of a North or South combined Truman Road would pose no negative impact to traffic operations during the existing or future PM peak hour for either a four or six lane facility. During an event when traffic demand is highest, some additional congestion beyond reasonable expectations is noticed. Keeping access to the eastbound McGee on-ramp to I-70 was determined to be important to the areas traffic circulation. The North option performed better for 4-lanes than the South option. Part of this is due to the separation of Truman Road and the eastbound McGee on-ramp to I-70. The isolated problem for the North option during an event may be mitigated with additional capital improvements or an event traffic management plan.

Table 4 provides a summary of the evaluation of the North/South options compared to the existing base condition.

Table 4
Evaluation of North or South Options
Compared to the Existing Base Condition

Evaluation Factors	North or South Options
Operations	The North or South options can operate as well as the existing condition for a traditional peak hour using either 4 or 6-lane configurations. Some isolated degradation in operations was identified during an event compared to the base condition.
Access	Full access to and from I-35 and I-70 is maintained
Safety	Combining the facility and reducing lanes can improve safety for motorists and pedestrians compared to 3-lane one-way streets.
Transit	There is no impact to existing transit routes. Future light rail is not precluded with this design.
Walkability	Walkability is improved with a combined facility.

Presentation Recap

PUBLIC PRESENTATION - NOVEMBER 24, 2008

Public Presentation **11.24.08**

SOUTH LOOP LINK

PROCESS

- Urban Design and Feasibility Study
- Preparation of design concepts and strategy for Truman Road between Wyandotte and Oak Streets
  - Existing Conditions — July-September, 2008
  - Problem Statement — September-November, 2008
  - Conceptual Design Options — November-February, 2009
  - Select Preferred Option — February-April, 2009
  - Final Report — April, 2009

This slide explains the process of this project. Currently we are working on the problem statement and beginning to look at conceptual design options, the main purpose for the design charrette.

PROCESS

- Technical review of design concepts:
  - Structural
    - Tunnel
  - Roadway
  - Environmental
  - Constructability
  - Utilities
  - Adjacent Properties
  - Order of Magnitude Cost Estimates
    - Funding options
  - Cost / Benefit Review

Within this feasibility study, the team will evaluate multiple components that could lead to a design solution. Listed are a few of the factors that need to be considered, including technical and urban design criteria as well as phasing strategies, cost breakdowns and funding strategies.

How big is this corridor?

I-670 Corridor

Country Club Plaza

The I-670 corridor has created a physical and perceived gap between Downtown and the Crossroads. The following pages illustrate scale comparisons of the Truman Road Corridor to local examples of open space and neighborhoods. This page shows the Country Club Plaza and Brush Creek Corridor. The creek and streets on each side are similar in scale to Truman Road and I-670. Notice the urban fabric of the Plaza and the focus on the pedestrian. Most users consider the Plaza to be very WALKABLE. Walkable characteristics of the Plaza include storefront windows, limited curb cuts, pocket parks, outdoor dining, enhanced sidewalk and streetscape, public art and pedestrian focused lighting.

How big is this corridor?

I-670 Corridor

Ilus Davis Park

This example compares the study area to Kansas City's governmental civic space, Ilus Davis Park. City Hall faces the park on the south with the Federal Courthouse on the north side. Although aesthetically pleasing, this park has been described as underutilized. The width of Illus Davis Park is about the same width as the Truman Road Corridor and the length is similar to the distance from Baltimore to Grand Boulevard. This comparison provides insight on the scale of a large civic open space.

How big is this corridor?

I-670 Corridor

Liberty Memorial

This example compares the Liberty Memorial Mall to the study area. The grand mall, approximately the same length as Wyandotte to Grand Boulevard, and memorial are a well-known civic landmark and host large festivals and other regional events accommodating large crowds. The lawn also serves as a dramatic approach to the monument. For a large civic open space buildings need to be an appropriate scale and mass to provide a terminus to the civic space.

How big is this corridor?

I-670 Corridor

Ward Parkway

This example compares the study area with Ward Parkway (with Meyer Circle on the left and approximately 59th Street to the right), an historical boulevard and part of Kansas City's Parks and Boulevard System. While the uses, building scale and character differs from the study area, the right-of-way width of the parkway and its large central median is very similar to Truman Road and I-670.

What we heard from you…

Highest Priority to Pedestrians – Walnut Street

Mix of open space, economic development, focus on the pedestrian

Open to thinking of Truman Road differently while still accommodating its function

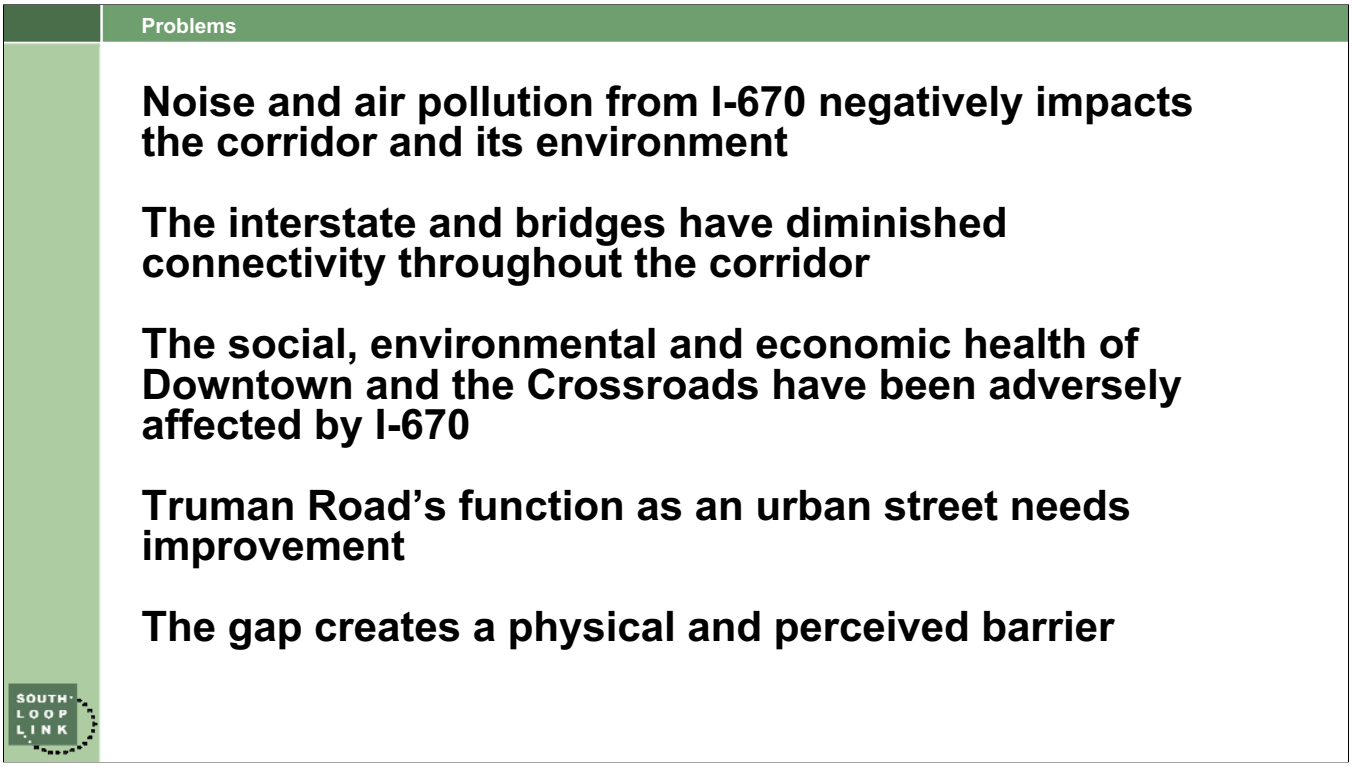
What is the cost and how will this project be funded?

In the first public meeting held Tuesday, November 18, initial concepts were on display in an open house format at the Kansas City Design Center. The public was given an opportunity to talk with the consultant team and complete a comment card to provide feedback on the concepts for the study area. Although the responses covered a wide range of topics, the majority of the feedback centered on the issues listed above.

Goal Statement

Improve the socio, environmental and economic viability of Downtown and the Crossroads.

Through discussions with the public, the Steering Committee and stakeholders, the goal statement above emerged as an overall approach to address the problems that have resulted from the impacts of the interstate highway.



The design team identified five problems that have resulted from the implementation of I-670 through this portion of the Downtown and Crossroads. Listed above (not necessarily in order of importance) are the problems that ultimately affect the social, environmental and economic viability of this corridor.

Bridge Considerations

1. **Clearance**

2. **Depth of Bridge Deck – typical deck + improvements**

From a technical standpoint, the design team is investigating requirements for bridges and bridge platforms that could be used to deck over the interstate. The team is working with MoDOT to determine required vertical clearances for I-670. The team is also investigating bridge deck depths when considering the structural loads for proposed buildings over the interstate as well as increase structural planting medium requirements for landscaped decks over the interstate.

Technical Review

Noise Considerations

1. Mitigation Measures

2. Parcel Valuation

Noise Comparison

Airport – 60dB – Architectural Mitigation Req'd
>65 dB – No Residential Allowed

Truman Road +/- 70dB

SOUTH LOOP LINK

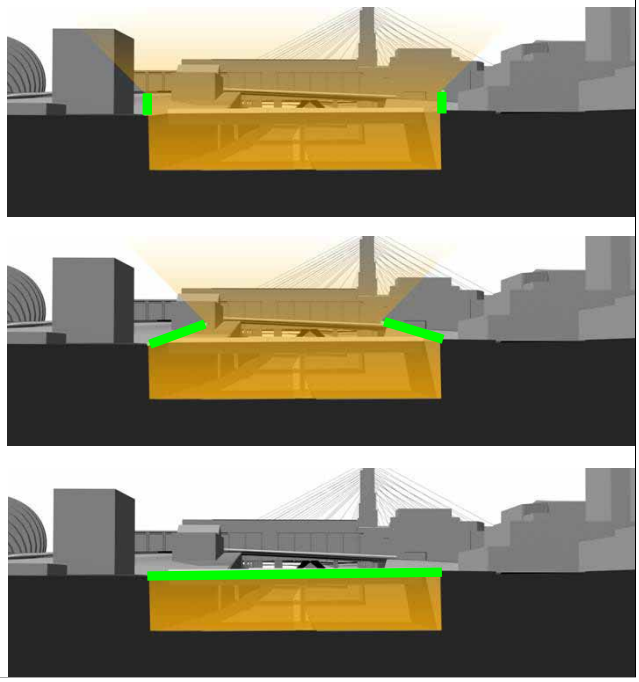
Another technical consideration is noise mitigation of the interstate. The diagram above identifies parcels (undeveloped or surface parking lots, shown in pink) that are impacted by the ambient noise produced by traffic along the interstate. Identified in red are building faces adjacent to the corridor and are most directly impacted by noise. Inset on this page is a description of the situation of an airport, where a reading of 60 decibels requires additional architectural mitigation such as double and triple pane windows, increased insulation and other measures. A reading of 65 decibels or above prohibits residential land uses which is consistent with HUD recommendations. Preliminary readings of the I-670 corridor recorded noise levels of approximately 70 decibels between Baltimore and Locust along Truman Road.

Noise Mitigation Strategies

1. **Sound Wall**
   - **inexpensive**
   - **creates visual barrier**
   - **may not block noise from upper floors of buildings**

2. **Angled Reflector**
   - **absorbs/ reflects noise**
   - **can be landscaped**
   - **“partial deck” solution**
   - **can affect views across corridor**

3. **Deck Solution**
   - **most expensive solution**
   - **completely mitigates noise**
   - **hides the interstate**



Three approaches have been identified to mitigate noise from the interstate.

Tunnel Implications

1. **One Block (less than 300 feet)**
   - **not a tunnel**

2. **Two Blocks (300-1,000 feet)**
   - **traffic control**
   - **stand pipes (fire suppression)**
   - **egress towers**
   - **ventilation**

3. **Three or more Blocks (over 1,000 feet)**
   - **emergency power**
   - **drainage**
   - **fire-rating**
   - **fire alarm systems**

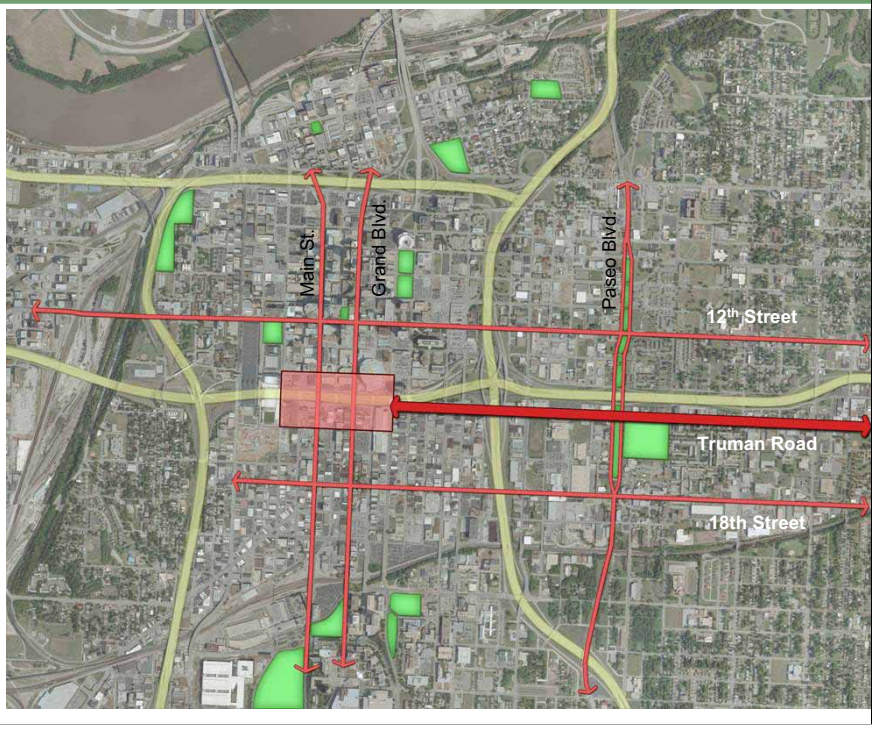
As potential design options explore the use of a deck over I-670 as a solution, the design team will investigate the need for additional infrastructure required to create a tunnel. Listed above are three scenarios and some requirements. A single block deck is not considered a tunnel and may not need any additional measures. Two blocks of decking creates tunnel characteristics and requires some additional safety measures. A deck for three or more blocks requires all of the safety measures needed for a tunnel.

Role of Truman Road

Primary East-West Arterial

Alternative access routes into Downtown if we alter existing access points along the corridor (12th, 18th Streets)

Connections to North and South through Study Area



SOUTH LOOP LINK

This graphic illustrates the regional role of Truman Road in the city's transportation network. Truman Road is a primary east-west arterial through the city. Although 12th Street provides connectivity through downtown, it doesn't have the capacity of Truman. 18th Street connects the Eastside to the Crossroads but it becomes less prominent at Cleveland Avenue.

Potential enhancements to Truman Road through the project site can be used to extend improvements to the east. Truman Road connects other civic spaces on the Eastside and can serve as the link to connect these destinations. Streetscape enhancements, pedestrian accommodations, open space linkages and transportation strategies promote connections between the neighborhoods for the benefit of the community.

Role of Truman Road in the transportation network

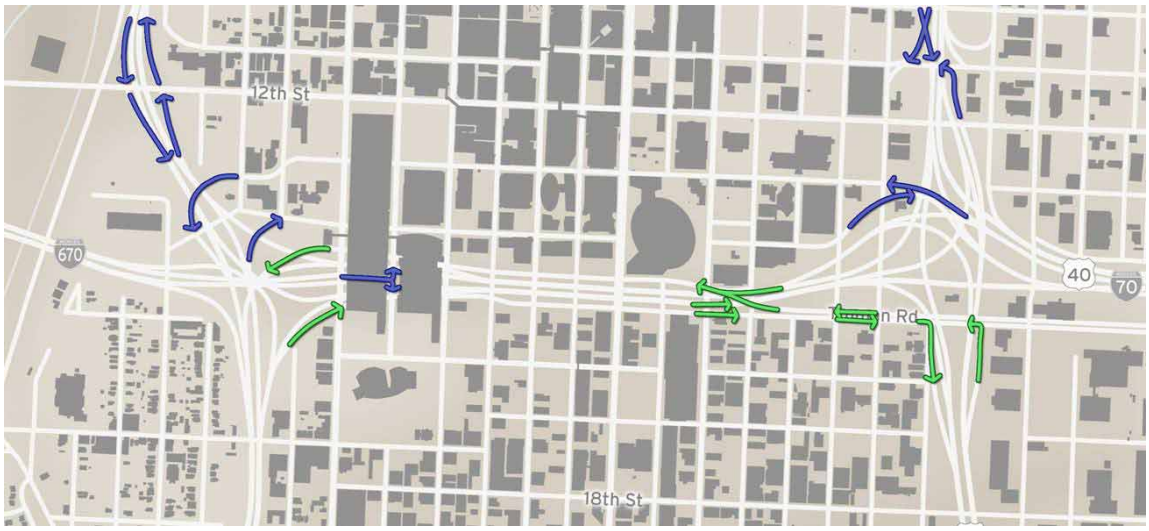
21,000 vehicles per day (2005)
30,000 vehicles per day (2030)

SOUTH LOOP LINK

A 2005 traffic study have documented that 21,000 vehicles per day use the Truman Road Corridor. With the completion of the Power & Light District, Sprint Arena and other venues along the corridor, the traffic is anticipated to increase to 30,000 vehicles per day by 2030. The green arrows identify access points to Truman Road from I-35, I-70, and 71 Highway.

Role of Truman Road in the transportation network

21,000 vehicles per day (2005)
30,000 vehicles per day (2030)

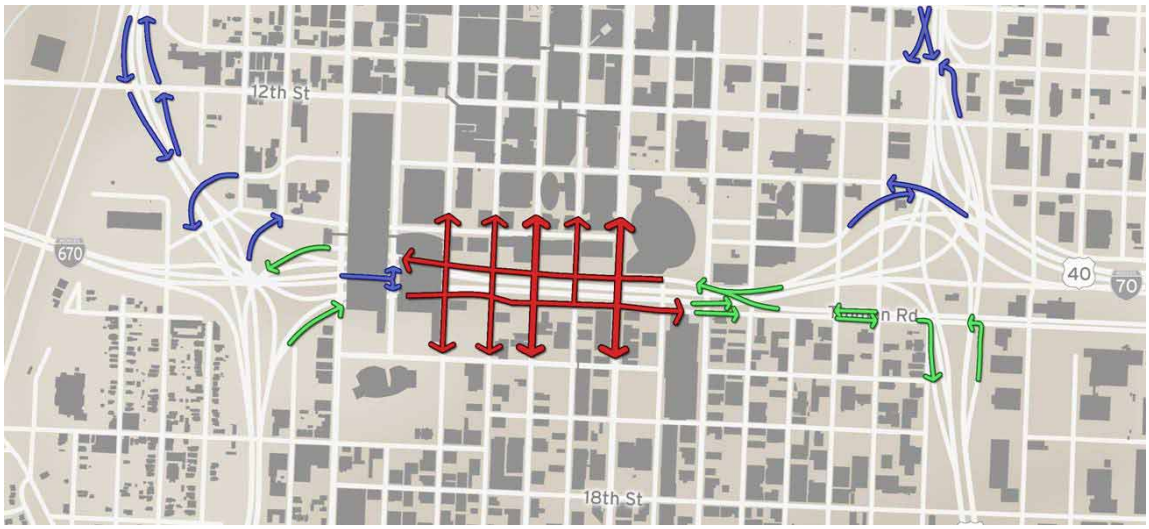


SOUTH LOOP LINK

The blue arrows identify alternative access points into Downtown's South Loop that do not directly feed into Truman Road. Any alteration of the access to Truman may impact these points.

Role of Truman Road in the transportation network

21,000 vehicles per day (2005)
30,000 vehicles per day (2030)



SOUTH LOOP LINK

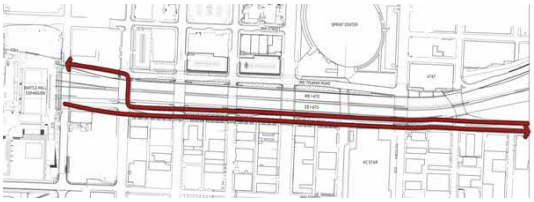
Truman Road's function is to distribute large volumes of traffic to the north and south to access Downtown and the Crossroads.

Truman Road Alignments

1. **Current Alignment**

2. **Consolidated over I-670**

3. **Consolidated south of I-670**



The design team is evaluating three alignments of Truman Road: the existing split alignment, a consolidated Truman Road over I-670 and a consolidated alignment south of I-670. Preliminary investigations determined that consolidating Truman north of I-670 was not possible due to right-of-way width limitations, road alignment concerns and impacts to the development blocks north of Truman Road.

Should Downtown and the Crossroads be blended/merged?

Should they be left distinct?

Both? (Should they remain distinct while creating a shared space?)

Prior to considering the concepts developed during the charrette, the public was asked to consider the above questions pertaining to the role of the study area. The following concepts looked at each of these approaches while emphasizing a priority for each. The concepts were organized into four sections, TRANSPORTATION, CONNECTIONS, CIVIC GESTURE, and NEIGHBORHOOD.

TRANSPORTATION

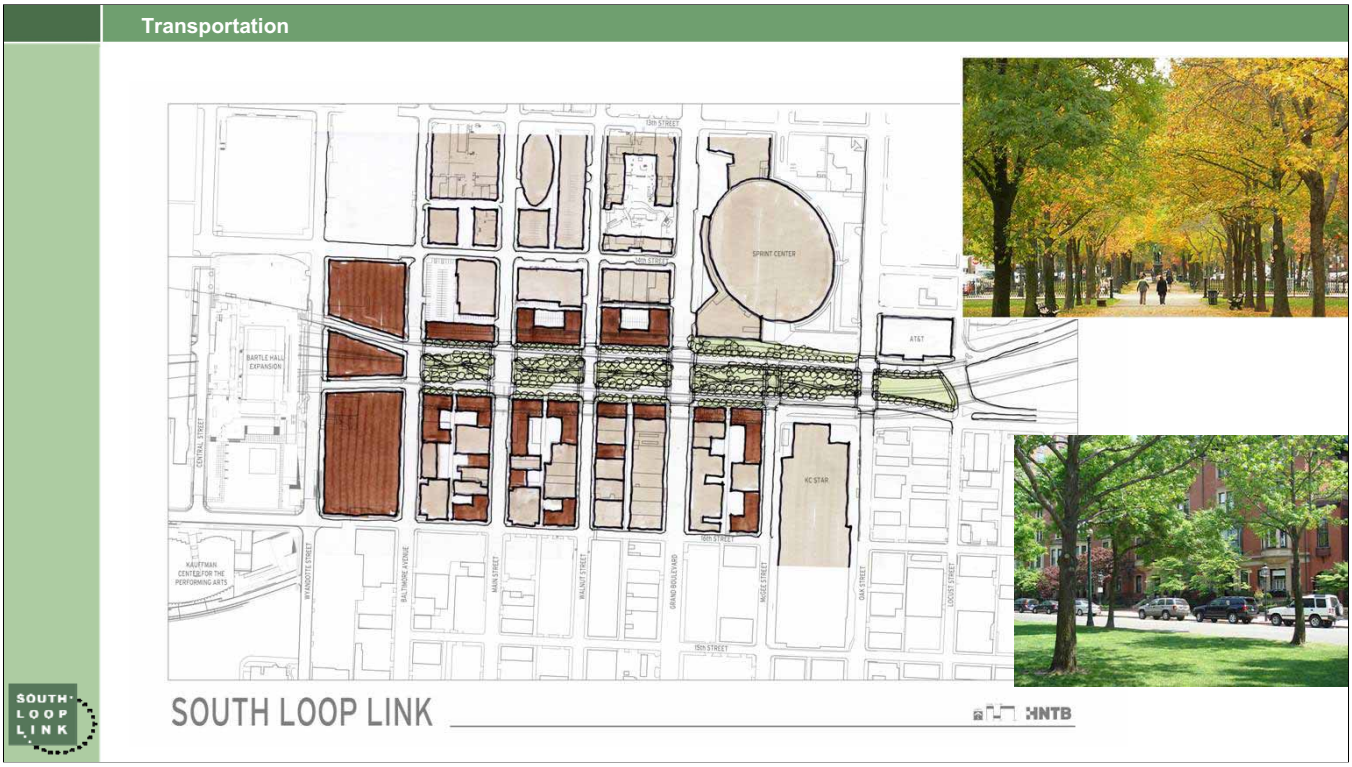
*NOTE: All the illustrations highlight I-670 in a light gray tone for clarity and orientation. The design team has also assumed the superblock between 14th and 16th Streets, Wyandotte and Baltimore as a placeholder for future convention expansion and/or support uses. **Most of these concepts envision a 'full-build' scenario with full-decking configurations. This feasibility study will also look at phasing opportunities and partial-decking options.**

This concept illustrates Truman consolidated south of I-670 with infill development (darker brown) on the surface lots north of I-670. This concept consolidates Truman Road in a manner that allows a smooth extension to the East but does little to mitigate the impacts of I-670. The former Truman Road right-of-way on the north side of I-670 becomes open space and buffering.

SOUTH LOOP LINK

HNTB

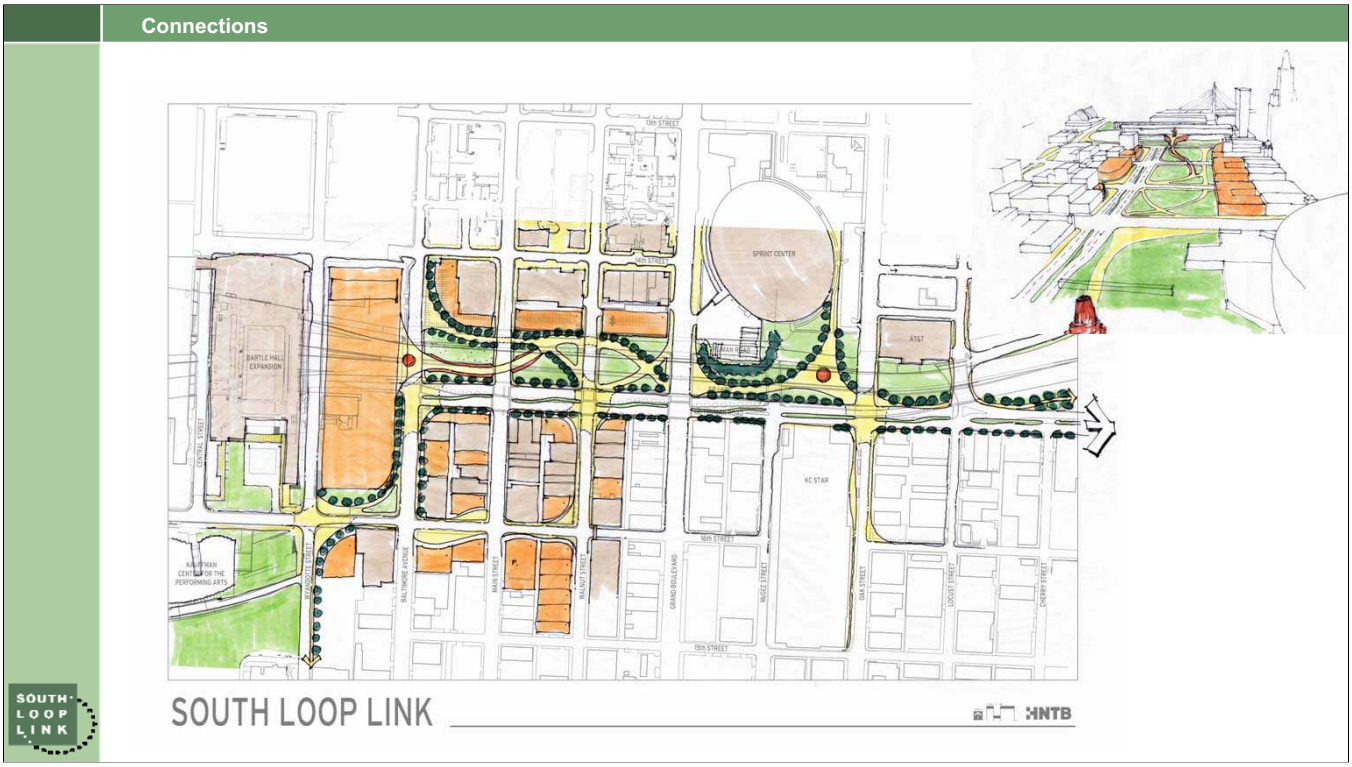
This concept retains Truman Road in its current configuration (although the transition of westbound traffic is altered at Locust). Between Main and Grand a transit center is proposed to serve as a hub to distribute pedestrians north and south. Special enhancements are shown for Walnut Street, including pedestrian and streetscape amenities and possibly even decorative paving to enforce pedestrian priority. Bus Rapid Transit facilities are shown on Baltimore to further integrate transit in this corridor. This solution would deck over the interstate between Main and Grand.



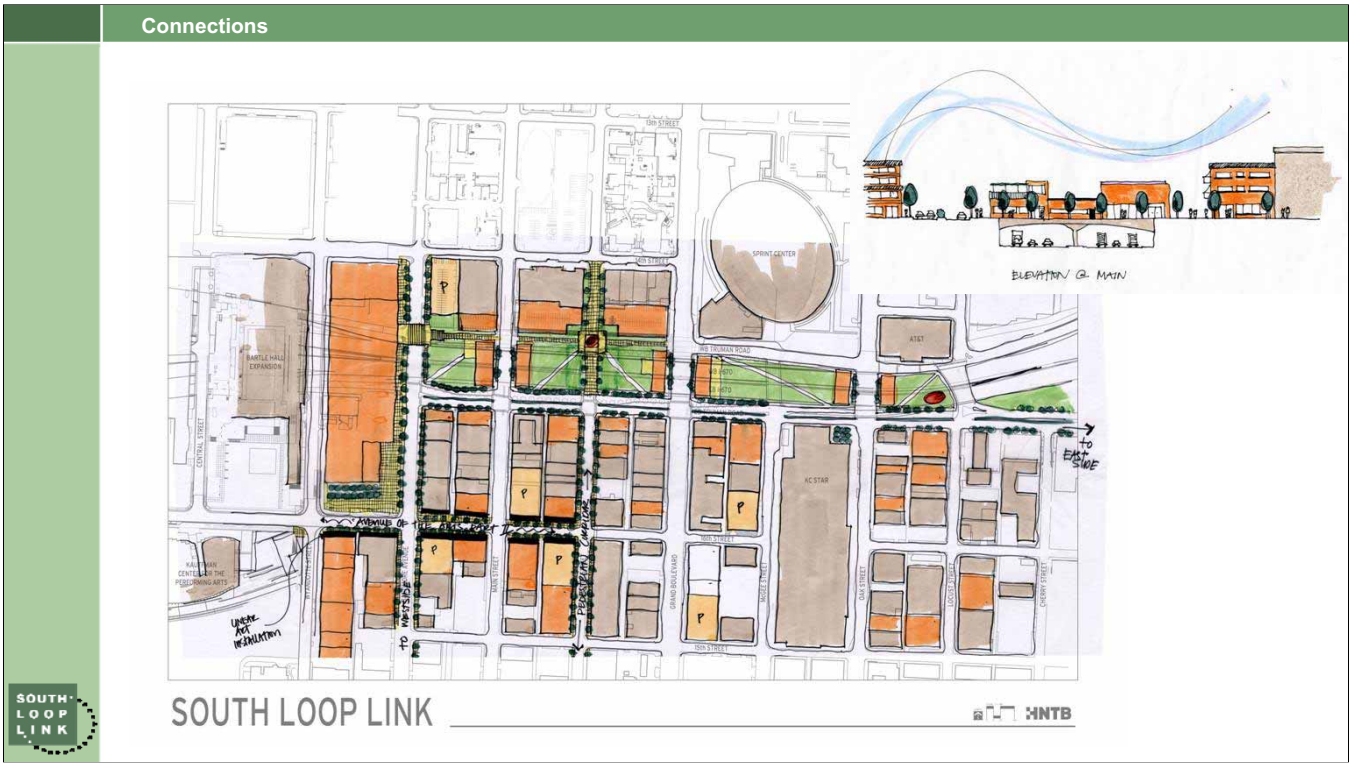
This concept illustrates Truman Road as an urban parkway built over the interstate on a deck from Baltimore to Locust. The re-alignment provides additional area for development 'end-caps' to allow new buildings to have frontage on the urban parkway. The center median is wide enough to accommodate pedestrian connections and areas for dog-walking or other passive recreation opportunities.

CONNECTIONS

The next two concepts focus mainly on enhancing and improving pedestrian connections through the corridor.



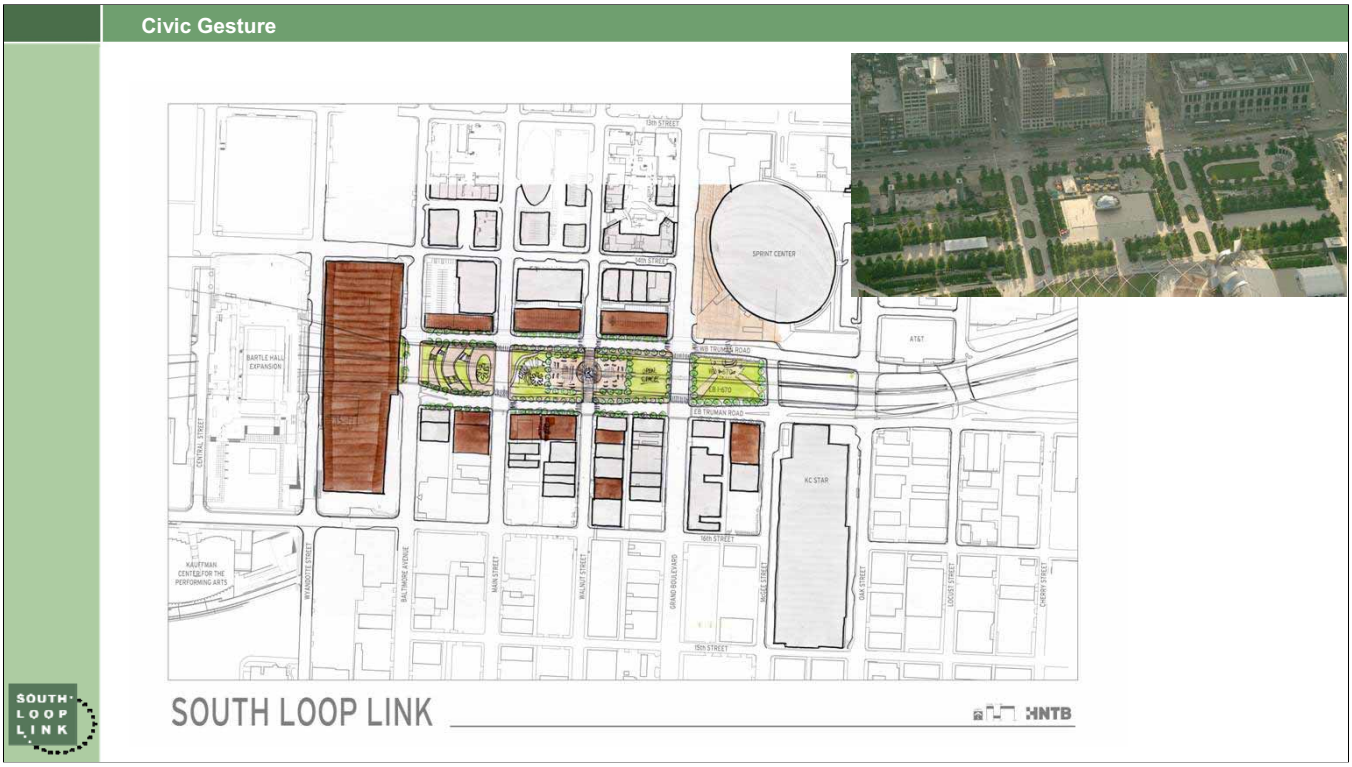
With Truman consolidated to the south, this option illustrates connections (shown in yellow) that link destinations throughout the corridor, including the Metropolitan Performing Arts Center, Convention Center Expansion, Power & Light District, Sprint Center (both west and east entrances), and the Crossroads neighborhood. Intersection treatments, streetscape plantings and amenities, and public art (shown in red) contribute to the emphasis of the pedestrian in this concept. The streetscape enhancements can continue to the east to unify the entire Truman Road corridor. This solution would deck over I-670 from Baltimore to Locust.



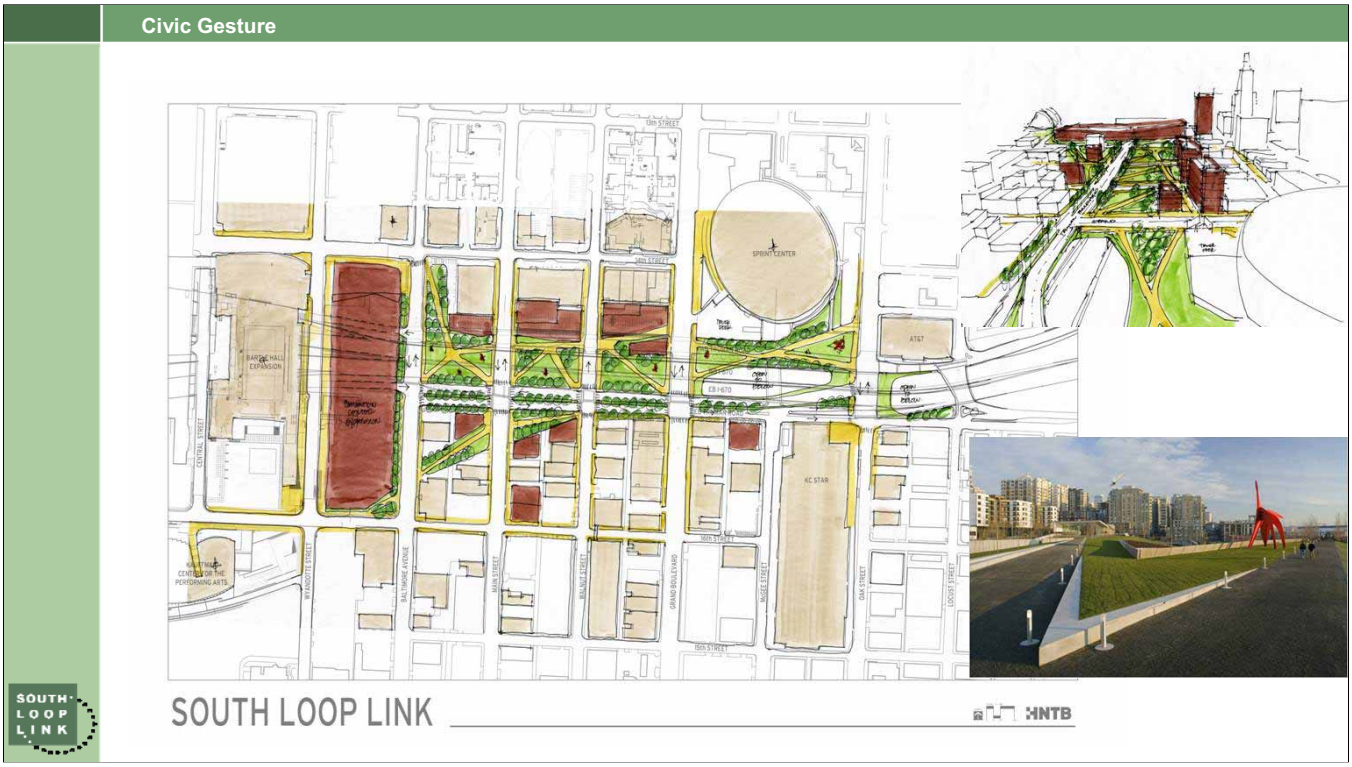
This option provides similar pedestrian connections to destinations throughout the corridor as the previous concept, but also proposes buildings over the interstate along Main, Grand and Oak in an effort to seamlessly join the Downtown and Crossroads neighborhoods. Also identified are priority streetscape enhancements along 16th Street from the Performing Arts Center to Walnut and along Walnut from 16th to 14th Streets. This approach is meant to leverage the investment of the PAC and maximize its benefit to the Crossroads. This solution would deck over I-670 from Baltimore to Locust.

CIVIC GESTURE

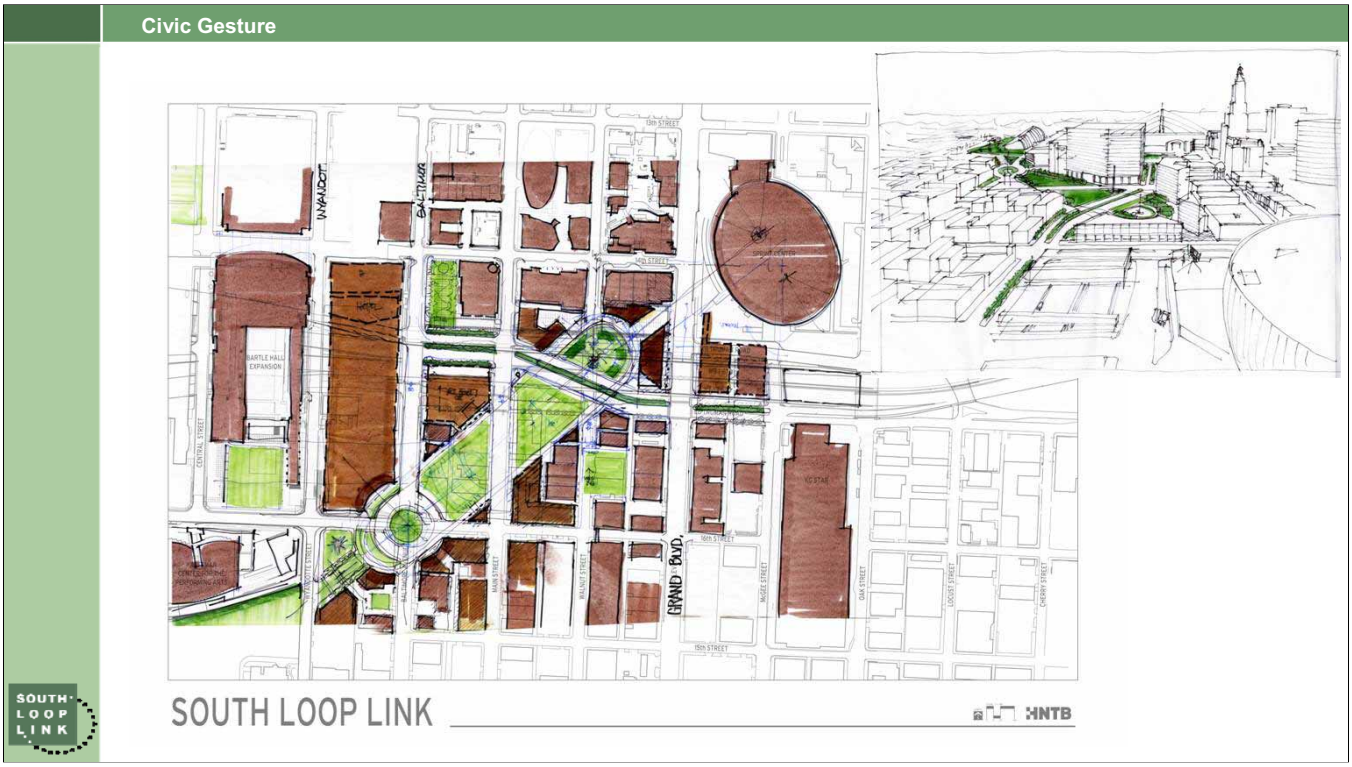
The next three concepts illustrate strategies to create a grand civic gesture through the use of open space, pedestrian amenities and type and placement.



In an effort to create a grand civic gesture, this concept proposes decking over the interstate from Baltimore to approximately McGee Street with park space. Truman Road would remain in its current configuration. Each park block could have its own identity or all four blocks could be combined to serve a single function. The park would act as a catalyst for development on all sides, mitigating the effects of the interstate below.



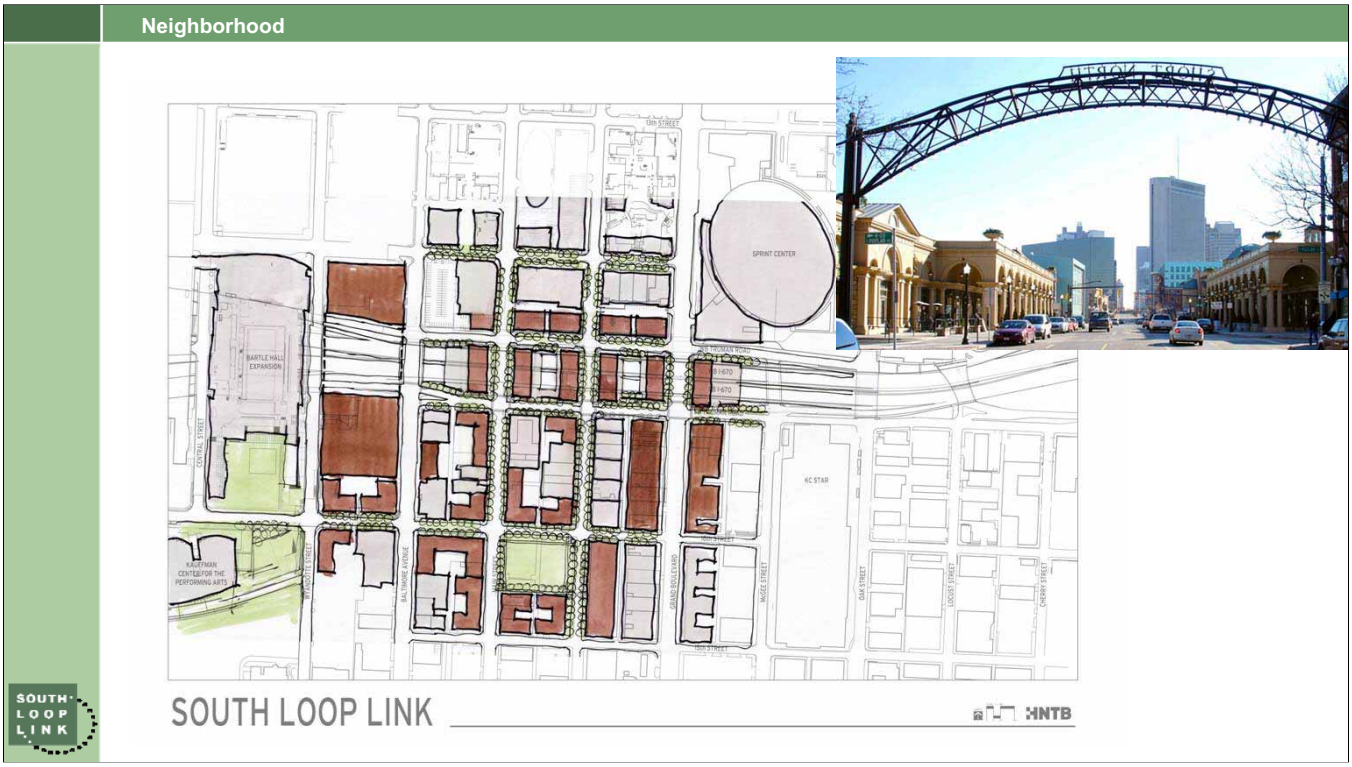
This concept is similar to the first *Connections* concept in that it provides linkages to destinations throughout the corridor, even providing mid-block connections as well as reaching to the northwest toward Bartle Hall and Municipal Auditorium. These linkages could continue to the east, connecting additional destinations along the Truman Road Corridor. This concept differs from the previous *Civic Gesture* option because it consolidates Truman to the south, allowing the park blocks to maximize adjacency with new development parcels south of the Empire Theater and Power & Light retail buildings. The park space could be programmed as a large civic space that may have a sculpture/art component, similar to that of Olympic Sculpture Park in Seattle (inset photo). This solution decks over the interstate from Baltimore to Grand, with partial decks (or widened bridges) at Grand and Oak to diminish the effects of I-670 and maintain improved pedestrian connections.



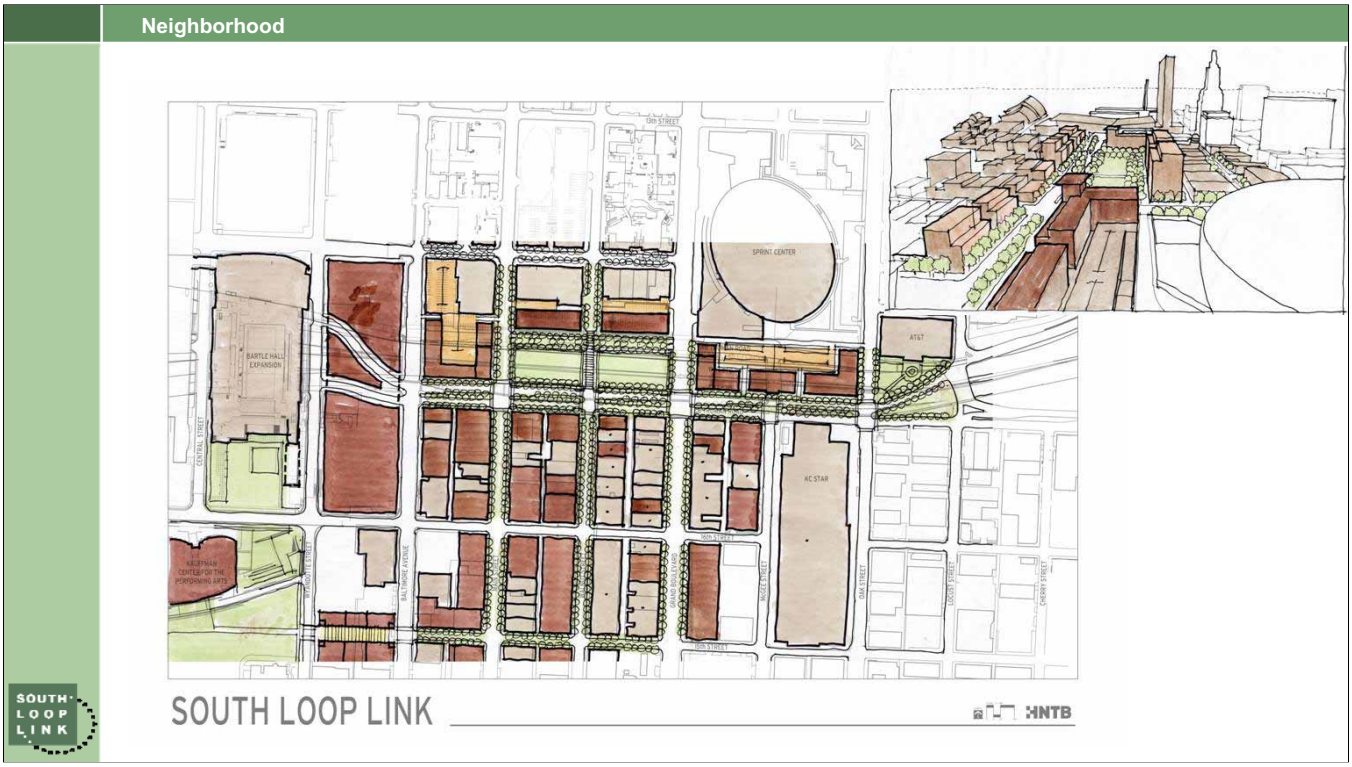
Another *Civic Gesture* concept takes a twist from a more traditional east-west approach to evaluate the corridor. Truman is consolidated and transitions from the south to the north as it moves west. Truman Road's prominence is minimized as a bold open space re-orients the corridor to an axis linking the Metropolitan Performing Arts Center with the Sprint Center. This civic open space is intended to not only provide a view corridor to these prominent facilities and pedestrian connections between but also enhance the development potential of the surrounding properties. This concept illustrates how a design solution could maintain the function of Truman Road while offering additional value to the surrounding neighborhoods. This solution would deck over I-670 from Baltimore to approximately McGee.

NEIGHBORHOOD

The next two concepts focus on the blending of the Downtown and Crossroads neighborhoods while mitigating the effects of I-670.



This concept maintains the current Truman Road but proposes buildings over the interstate between the westbound and eastbound lanes flanking Main, Walnut and Grand. This design also looks at creating open ventilation shafts between the backs of the buildings that may minimize potential tunnel characteristics. Noise mitigation measures such as noise walls would be installed along the ventilation shafts to minimize impacts to parcels fronting Truman. This concept also proposes a new park within the Crossroads neighborhood rather than over the interstate. The approach of buildings flanking a bridge over an interstate has been implemented in Columbus, Ohio (inset photo). One-story retail buildings are constructed over the interstate and provide continuity between the Short North Arts District and the Columbus Convention Center and Central Business District. The interstate impacts are greatly reduced and active ground level uses line the corridor.



This option creates an urban neighborhood fronting on open space over the interstate. A park is located between Main and Grand and new development (possibly residential uses) lines the park with parking behind (orange). Truman Road is combined to the south and treated like a boulevard with generous street tree plantings. This alignment and boulevard character can be continued to the east, promoting additional development opportunities. Between Grand and Oak, buildings front a re-aligned Truman Road and hide the loading docks of the Sprint Center. Development infill is shown throughout the Crossroads. This solution decks over I-670 from Baltimore to Locust.

Discussion

Should Downtown and the Crossroads be blended/merged?

Should they be left distinct?

Both? (Should they remain distinct while creating a shared space?)

SOUTH LOOP LINK

The following pages have questions that were asked of the public during a discussion. A comment card soliciting additional feedback was also distributed.

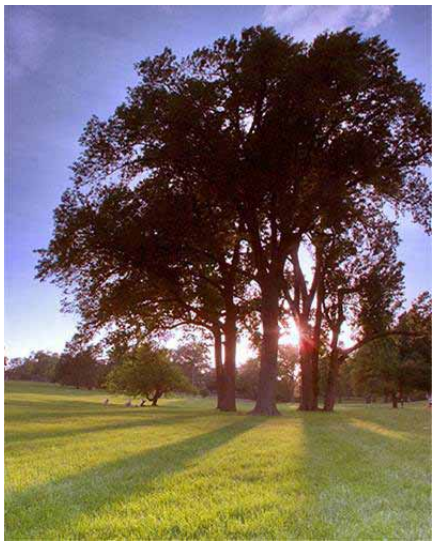
How do we improve walkability?

Truman Road as is?
Truman Road combined?

Does Downtown need a park?
Does the Crossroads need a park?

A civic space?
A festival park?

Where?

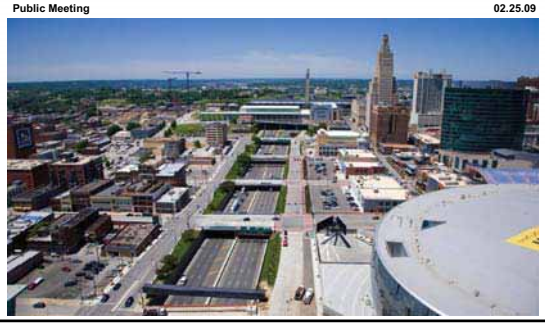


Should transit accommodations be further integrated into the corridor?

Presentation Recap

PUBLIC PRESENTATION - FEBRUARY 25, 2009

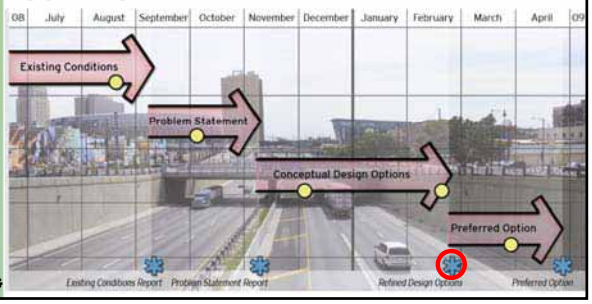
Public Meeting 02.25.09



AGENDA

- Schedule and Process
- Technical Evaluation
- Concepts
- Discussion

SCHEDULE



Charrette Preparation

GOALS / OPPORTUNITIES

- Pedestrian + Bike Connections
- Pedestrian Experience
- Vehicular Connections
- Transit Connections
- Green Space Connections
- Neighborhood Connections
- Real Estate Opportunities
- I-670 and Truman Road as a Gateway
- District Unification
- District Synergy
- Driving Experience
- Sustainability
- New Technology
- Environmental Mitigation
- Traffic Distribution

Charrette Feedback

STEERING COMMITTEE

- **Blend** the neighborhoods but **maintain their identities**.
- No preference of Truman Road Alignment.
- Need for **green space (park), pedestrian and bicycle connections**.
- Green space should only be part of the solution, with a **mix of development**.
- Truman should be more of an **urban street** (Michigan Avenue, Park Avenue).
- Interested in connections to the Eastside.
- Does Truman need to be 3 lanes? If Truman is narrowed, how will that impact adjacent streets?
- Interested in thinking of the corridor in a new and different way.
- Agreed that **Walnut** is a primary pedestrian street.
- Interested in strengthening Paseo as a route to access I-70 EB as opposed to the McGee on ramp.
- Interested in development facing Truman where possible.

Charrette Feedback

CITY STAFF

- Need to **study regional traffic impacts** if solutions alter Truman's current alignment or capacity.
- **Dog Parks** are highly desired/needed within Downtown and the Crossroads.
- Proposing open space could be in competition with the Power & Light District, would need to be **complementary**.
- There is a lack of green space for residential users near the South Loop, and proposed parks should have **programmed elements**.
- Would small concentrated neighborhood parks be more effective than one large space?

Charrette Feedback

PUBLIC

- **Walnut** as primary pedestrian street.
- This project should **blend** the two neighborhoods.
- Most important issues are **pedestrian connectivity** (15), **air pollution** (8), **noise pollution** (7).
- Preference to decking over the interstate to address these issues, also liked a combination of strategies, including decking and widening sidewalks on the bridges.
- Most preferred the existing Truman Road **split alignment** (10) with **combined south of I-670** (5).
- Split over a ***Civic Gesture*** or ***Neighborhood*** as a defining strategy.
- Liked the idea of a park over I-670 and in the Crossroads neighborhood, but were split over a new park in the downtown loop.
- They felt additional transit accommodations should be part of the Truman Road Corridor.
- Put Truman Road on a diet.
- Accommodate bicycles.
- Program any green open space or parks to make it successful.

Charrette Summary

PROCESS – Step 1

Idea Generation – Big Moves

Charrette Summary

PROCESS – Step 2

Full Deck | Partial Deck | No Deck

Charrette Summary

PROCESS – Step 3

Full Deck
Partial Deck
No Deck

Physical Framework

What is the *design strategy*?

Transportation
Connections
Civic Gesture
Neighborhood

Design Strategies

Charrette Summary

PROCESS – Step 4

Transportation | Connections | Civic Gesture | Neighborhood

Charrette Summary

PROCESS – Step 5

Physical Framework + Design Strategies + Feedback =

Proposed Concept Alternatives

Alternative 1 *Mitigation Measures (no deck)*
Alternative 2 *Mitigation/Deck Combination*
Alternative 3 *Full Deck*

Technical Evaluation

What is the role of Truman Road?

Technical Evaluation Summary

Market Analysis

- Increasing mitigation of the interstate results in increase of surrounding property values
- Full decking solutions can result in 15-20% Residential, 40% Office value increase

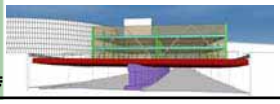
Utilities

- Utilities beneath WB Truman Road must remain due to system connections
- Utilities beneath EB Truman Road can be relocated if necessary
- Main and McGee utility bridges may be impacted by proposed solutions

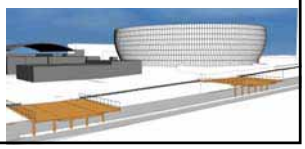
Technical Evaluation Summary

Structural Design

- Decks over I-670 can be designed to be level with the grade of Truman Road (minimized structure depth)
- Additional loads (increased soil depth for landscaping) may result in additional steel structural girders and more cost (+\- 30% premium)



- Buildings over the interstate incur significant additional cost
  - 1 story - $800/sf
  - 3 stories - $1,400/sf
  - Comparison of on-grade structure - $200/sf
- Bridge replacements (Baltimore, Main, Walnut, Grand) will cost approximately $10 million (includes widened sidewalk at back of curb).
  - Additional cost for landscape on bridges, decorative railings, etc.



Technical Evaluation Summary

Life Safety and Code Issues

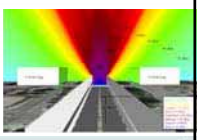
- What dictates a tunnel? (<300' / 300'-1,000' / >1,000')
- I-670 Median Wall Separation
  - Solid wall recommended for lighting consistency, ventilation efficiency, fire containment

Tunnel Ventilation

- Preferred solution is longitudinal ventilation with exhaust at ends of tunnels (ductless jet fans)
- Longer tunnels may require intermediate ventilation

Noise Mitigation

- Decks with openings can be effective for partial sound mitigation.

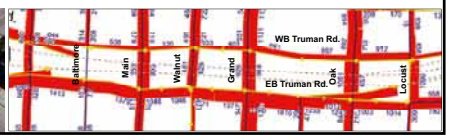


Technical Evaluation Summary

Traffic and Roadway Design

- Traffic counts conducted on January 21, 2009 (Sprint Event, Bartle, Midland)
  - AC/DC Concert (13,000+ attendance)
  - JC Superstar @ the Midland (1,200 attendance)
  - Fusion Center Tech Meeting (120 attendance)
- Counts considered evening peak hour + event (worst case scenario)
- KCMO Big XII Travel Demand model also used
- Pedestrian traffic also considered in the analysis

- If McGee on-ramp closing is proposed, alternative interstate access routes will need to be utilized/enhanced.
- Truman Road can be reduced to two through lanes as long as intersections maintain an acceptable level of service.



Technical Evaluation Summary

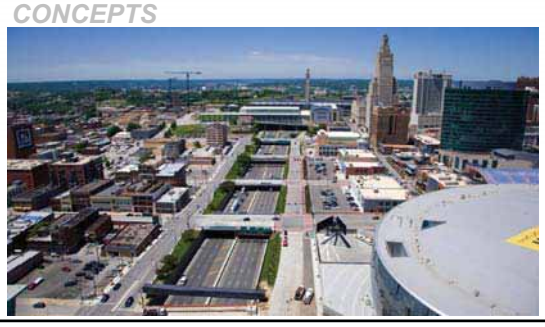
Traffic and Roadway Design

- Truman Road can function as a combined arterial as long as intersections maintain an acceptable level of service

- Must retain existing north-south stacking distance between WB and EB Truman Road (+/-200') – leads to **existing** or **combined** road alignment

Wyandotte-Baltimore Block

CONCEPTS



Payoffs

What is the value of decking over I-670?

- Improved Road Network
- Enhanced Pedestrian Connectivity
  - North / South
  - East / West
- New and/or Enhanced Real Estate
  - Park
  - Land for Development
- Sound/Air Mitigation
- Urban Design Character

Enhanced Bridges

Road Network
- Four new bridges
- No change to existing street network and interstate access

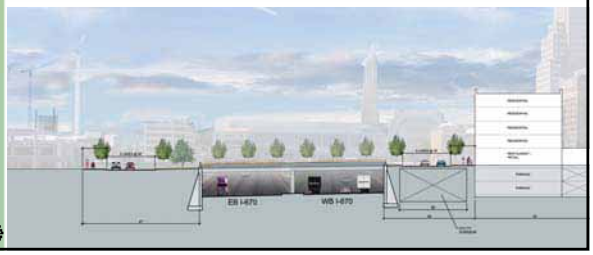
Connectivity
- Maintains current pedestrian patterns

Real Estate
- Does not create new real estate.
- The new bridges investment may only have a minimum effect on of existing real estate.

Mitigation
- Wider sidewalks may provide some sound relief but does not address air pollution

Urban Design
- Does not allow for new park space.
- Bridges enhanced with pedestrian and design amenities.

Enhanced Bridges



Enhanced Truman Road

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Does not create a tunnel.
- Daylight shafts would create bright spots on I-670.

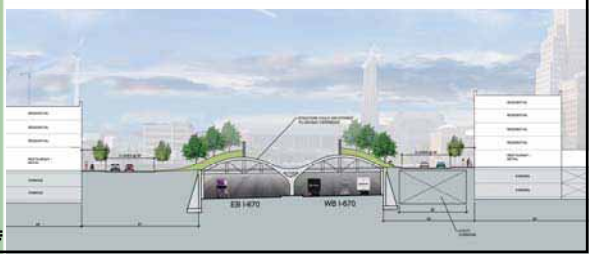
Connectivity
- Establishes enhanced landscape and pedestrian areas around the I-670 edges.

Real Estate
- Does not create new real estate.
- Provides some enhancement to existing parcels.

Mitigation
- Creates a platform along all four edges for sound and air quality mitigation measures.
- Partially solves noise and air pollution.

Urban Design
- Does not create a park.
- Screens I-670 from pedestrians and motorists.
- Platforms provide pedestrian and design amenities.

Enhanced Truman Road



Walnut Deck

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Creates a deck between Main and Grand.
- Main utility bridge requires relocation.

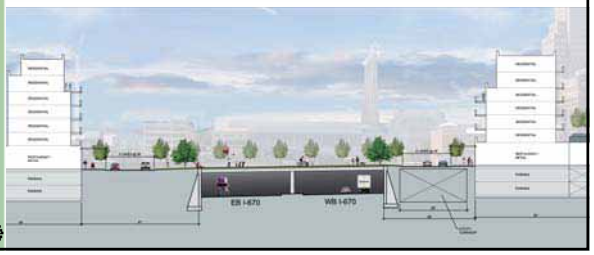
Connectivity
- Focuses pedestrian enhancements/amenities along Walnut Street.

Real Estate
- Does not create new real estate.
- Provides some enhancement to existing parcels, especially between Main and Grand.

Mitigation
- Partial mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New park over the interstate.
- Limits deck length to minimize tunnel characteristics.
- Connects existing Crossroads residential to Power & Light District.
- Bridge edges open to I-670 below enhanced with pedestrian and design amenities.

Walnut Deck



Existing Truman Road

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Creates a deck between Baltimore and Grand.
- Main utility bridge requires relocation.

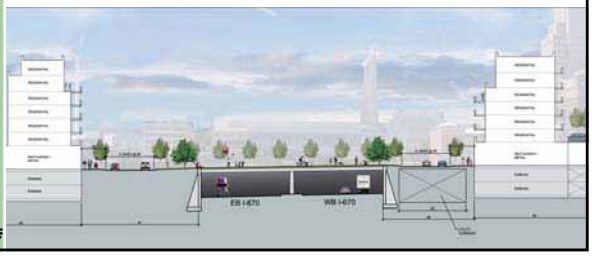
Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

Real Estate
- Does not create new real estate.
- Provides enhancement to existing parcels, especially between Baltimore and Grand.

Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park over the interstate.
- Sets up a civic gesture to Bartle Hall.
- Keeps Downtown and Crossroads as separate districts.

Existing Truman Road



Realigned South Truman Boulevard

Road Network
- Four new bridges.
- Aligns Truman Road to the south to simplify traffic movements.
- Requires removal of the eastbound I-670 ramp at McGee Street.
- Requires access route from WB I-670 off ramp at Locust to Truman
- Creates a deck between Baltimore and Grand.
- Main and McGee utility bridges require relocation.

Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

Real Estate
- Creates approx. 35-70 feet of additional real estate on the south side of the corridor.

Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park on the north side, partially over the interstate.
- Creates a landscaped median roadway.
- Continues combined Truman from the east.
- Connects park space to Power & Light District.

Realigned South Truman Boulevard

Realigned North Truman Boulevard

Road Network
- Four new bridges.
- Aligns Truman Road to the north to simplify traffic movements.
- Creates a deck between Baltimore and Grand.
- Main and McGee utility bridges require relocation.
- McGee Ramp remains.

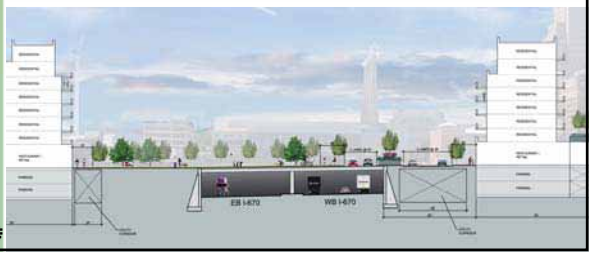
Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

Real Estate
- Creates approx. 70 feet of additional real estate on the south side of the corridor.

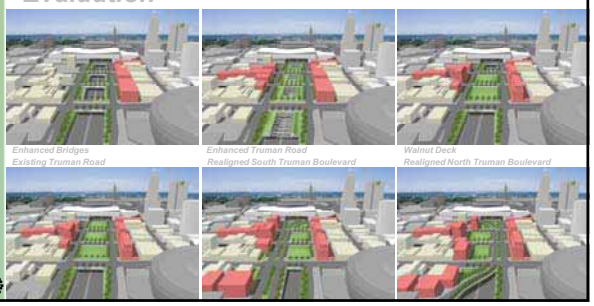
Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park on the south side, partially over the interstate.
- Creates a landscaped median roadway.
- Connects park space to Crossroads.

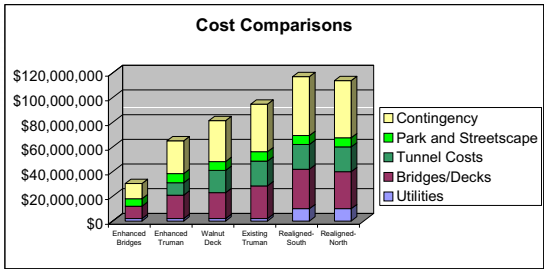
Realigned North Truman Boulevard



Evaluation



Cost Comparisons



NEXT STEPS

- **Review all of the comments from Public, Steering Committee, Stakeholders and Others**
- **Preferred Option Selection**
- **Report Completion / Final Presentation – End of May**

Presentation Recap

STEERING COMMITTEE PRESENTATION - OCTOBER 14, 2008

Steering Committee Meeting #2 10.14.08

Design Parameters

Clearance Issues

- 16'-6" desired vertical clearance
- Relationship of deck to Truman Rd
- Signage

Design Parameters

Air-rights over the Interstate

Design Parameters

Tunnel Designation

- Ventilation
- Emergency Access
- Signage
- Lighting
- Maintenance

Design Parameters

Utilities

- Combined Sewer beneath I-670 at Walnut
- Fiber Optics
- Other

Design Parameters

Freeway Retaining Walls to Remain

Design Parameters

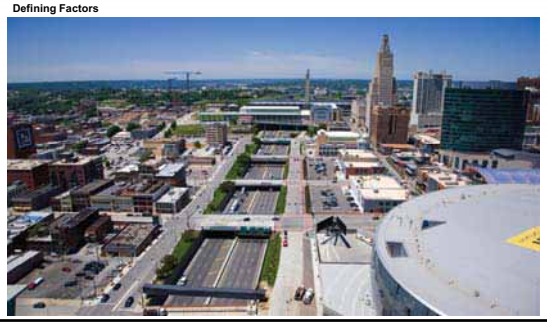
I-670 can't go away

Design Parameters

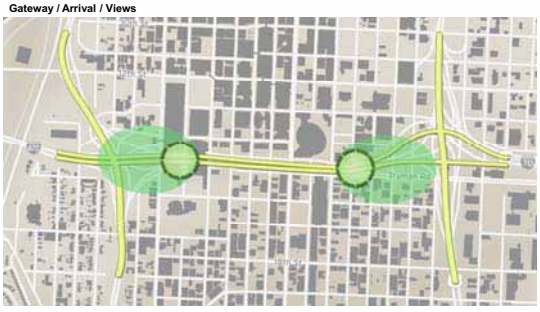
Bridges over the freeway need to be replaced

10 year life

Defining Factors



Gateway / Arrival / Views



Transportation

Economic Development

Open Space

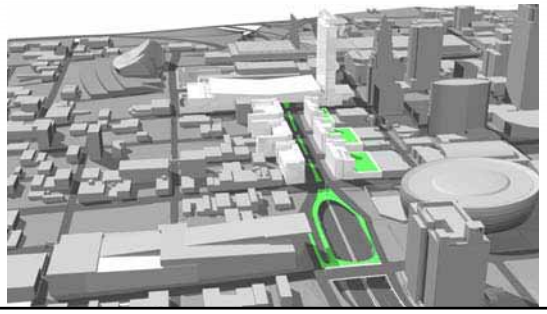
Connections

Transit

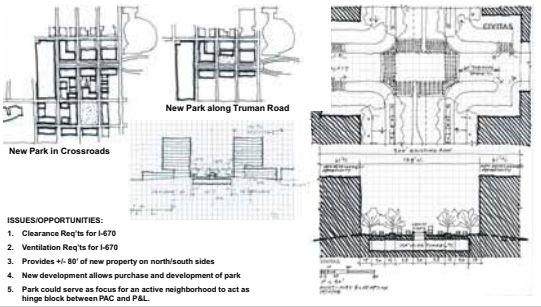
Defining Factors

Gateway / Arrival
Transportation
Economic Development
Open Space
Connections
Transit
Others?

Boulevard



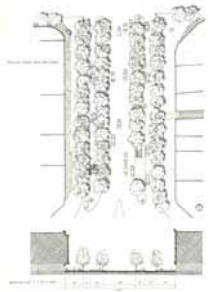
Boulevard



ISSUES/OPPORTUNITIES:

1. Clearance Req'ts for I-670
2. Ventilation Req'ts for I-670
3. Provides +/- 80' of new property on north/south sides
4. New development allows purchase and development of park
5. Park could serve as focus for an active neighborhood to act as hinge block between PAC and P&L.

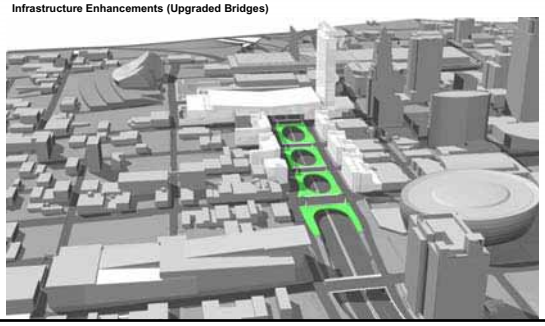
Boulevard



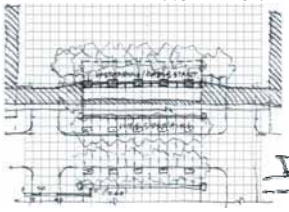
Boulevard

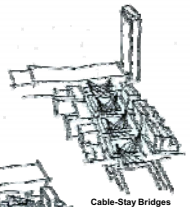
Boulevard

Infrastructure Enhancements (Upgraded Bridges)

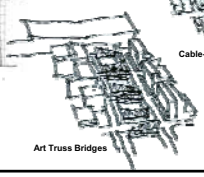


Infrastructure Enhancements (Upgraded Bridges)





Cable-Stay Bridges



Art Truss Bridges

ISSUES/OPPORTUNITIES:

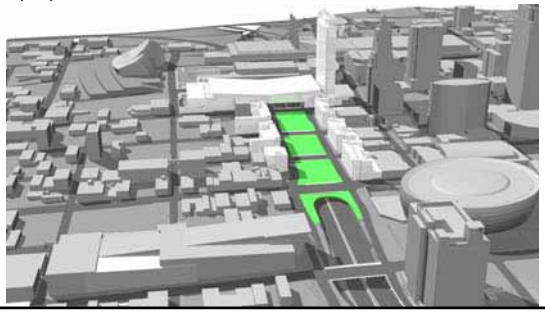
1. Architecturally significant bridges for unique look
2. Bridges could have wide sidewalks with possible landscape elements.
3. Does not address noise and expanse of I-670

Infrastructure Enhancements (Upgraded Bridges)

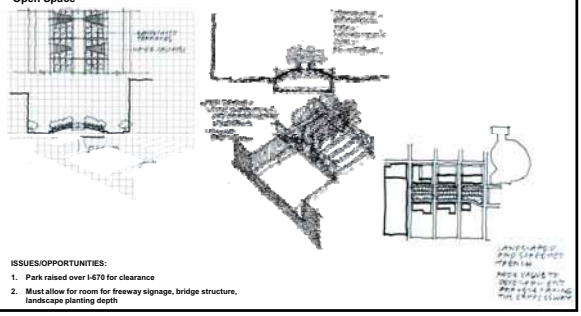
Fifth Street Pedestrian Plaza Bridge
Georgia Institute of Technology
Atlanta, Georgia

Infrastructure Enhancements (Upgraded Bridges)

Open Space



Open Space

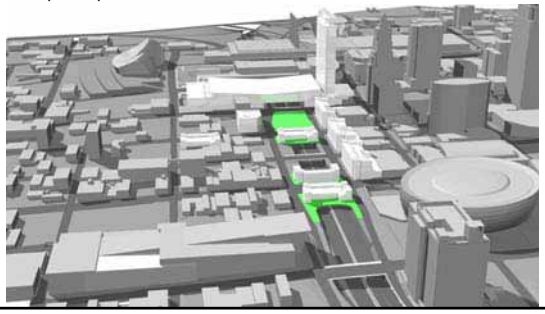


ISSUES/OPPORTUNITIES:

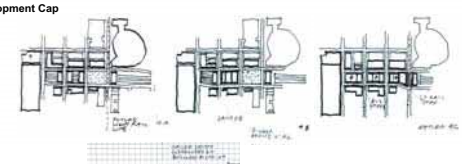
1. Park raised over I-670 for clearance
2. Must allow for room for freeway signage, bridge structure, landscape planting depth

Open Space

Development Cap



Development Cap



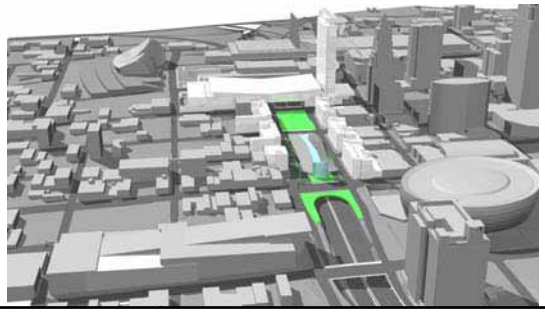
ISSUES/OPPORTUNITIES:

1. Park should be located where ground floor activities of facing buildings can activate the space.
2. Park could be most useful at Grand and Walnut to maximize street-level activation.
3. Buildings should be taller (at least 4 stories) to relate to the park, downtown, and justify costs of spanning I-670.
4. Possible idea to build greater density at Grand for possible light rail station and at Main for a major bus station.
5. Parking could be built over the highway to maximize real estate, but edge the structures with active uses.

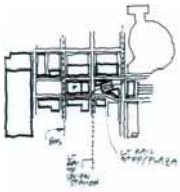
Development Cap

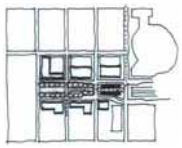
I-670 Cap
Columbus, Ohio

Public / Civic Destination



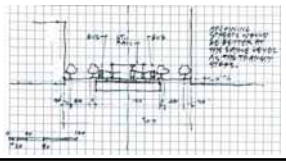
Public / Civic Destination



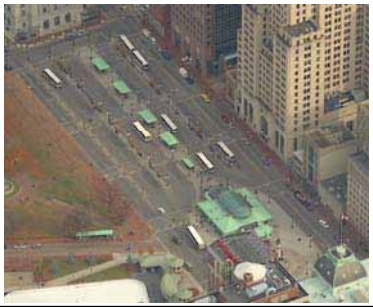


ISSUES/OPPORTUNITIES:

1. Transit Hub Components? – Light Rail / Regional Bus / Local Bus / Shuttles / Parking
2. Site Constraints – complex traffic movements, limited site area, expansion accommodations, impact to pedestrian movement
3. Negative impacts to cutting off north-south streets to accommodate larger hub footprint
4. Better solution could be enhanced transit station to attract greater development density



Public / Civic Destination



Public / Civic Destination

Feedback

Other Ideas?

Presentation Recap

STEERING COMMITTEE PRESENTATION - NOVEMBER 17, 2008

Steering Committee Meeting #3 11.17.08

- Agenda

- Summarize Ohio Case Study Visits
  - Fort Washington Way
  - I-670 Development Cap
- Discuss Problem Statement and Needs
- Discuss Goals
  - Prioritize
- Review Charrette Schedule
- Next Steps

- Fort Washington Way
  Cincinnati, Ohio

- Fort Washington Way
  Cincinnati, Ohio

Community Issues
- High Volume of Traffic
- Vehicular Safety
  - Reduce exiting/entry points
- Pedestrian Connections to Ohio River
  - Above ground tubes
- Aesthetics
- Economic Development
- Flood Plain

- Use of Design Manual to Control Aesthetics

- Use of Landscape and Streetscape


- Enhanced Bridges


- Integration of Transit Presence


- I-670 Development Cap
  Columbus, Ohio

- I-670 Development Cap
  Columbus, Ohio

Community Issues
- Widening of I-670
- Connections to Neighborhood from Convention Center Complex
  - Separated by Interstate Highway
  - Economic Development
- Historic Preservation Issues
  - Park with Civil War Encampment
  - Church
  - Neighborhood

- Decking to Avoid "Tunnel"


- Urban Fabric Infill


- Connections to Neighborhood and CBD


- Building had weight limitations
- 27,000 SF of Commercial Space
  - Restaurants
- Parking and Service constraints

Problem Statement

- The South Loop Link Project seeks to investigate design options for the I-670 corridor through downtown Kansas City that address safety, efficiency, and economic vitality through environmentally sound best design practices.

- **Specific Needs**

1 **Replace deteriorating infrastructure**
- Replace Baltimore, Main, Walnut and Grand bridges

2 **Improve traffic safety**
- Reduce pedestrian and vehicular conflicts through traffic calming devices, improved roadway design, and enhanced pedestrian accommodations

3 **Improve linkages over I-670 between downtown Kansas City and the Crossroads Arts District**
- Improve physical connectivity to maximize economic development opportunities

4 **Improve access to the Kansas City CBD**
- Improve ramps accessing the interstate and city

5 **Promote environmental sustainability**
- Mitigate environmental impacts cause by the interstate

Possible Goals/Opportunities

- **Pedestrian + Bike Connections**
  - Improve pedestrian and bike connections across and along Truman Rd. and I-670
- **Pedestrian Experience**
  - Enhance the pedestrian environment throughout the corridor

Possible Goals/Opportunities

- **Vehicular Connections**
  - Transform Truman Road from a highway frontage road to an urban street
  - Strengthen vehicular connections to north, south, east and west
  - Accommodate the expansion of I-670 within the existing retaining walls and establish the role of Truman Road as an expressway connector
- **Transit Connections**
  - Integrate transit on Truman Road and I-670

Possible Goals/Opportunities

- **Green Space Connections**
  - Capitalize on "found" real estate to create additional green space
- **Neighborhood Connections**
  - Connect Eastside, Westside, Crossroads Community and Downtown Neighborhoods

Possible Goals/Opportunities

- **Real Estate Opportunities**
  - Maximize real estate and economic development potential around and over the expressway
  - Create usable new public amenities in relation to the rethinking of I-670 and Truman Rd
- **I-670 and Truman Road as a Gateway**
  - Promote downtown and the entertainment district with respect on the convention center and Sprint Center by I-670 and Truman Rd

Possible Goals/Opportunities

- **District Unification**
  - Unify the entertainment venues on either side of I-670 by rethinking the expressway and Truman Road
- **District Synergy**
  - Create synergy between downtown and the Crossroads district by rethinking the expressway and Truman Road

Possible Goals/Opportunities

- **Driving Experience**
  - Express Kansas City and its downtown through the I-670 driving experience
- **Sustainability**
  - Introduce sustainable development practices and systems along the corridor
- **New Technology**
  - Investigate the implications on a tunnel design of 21st Century 'smart' roadway and vehicle technology as well as new vehicle power sources

Possible Goals/Opportunities

- **Environmental Mitigation**
  - Reduce noise and air pollution from I-670
- **Traffic Distribution**
  - Distribute or concentrate traffic on or from Truman Road.

DISCUSSION

Design Parameters

Air-rights over the Interstate

Design Parameters

Tunnel Designation

- **Ventilation**
- **Emergency Access**
- **Signage**
- **Lighting**
- **Maintenance**

Design Parameters

Utilities

- **Combined Sewer beneath I-670 at Walnut**
- **Fiber Optics**
- **Other**

Design Parameters

Freeway Retaining Walls to Remain

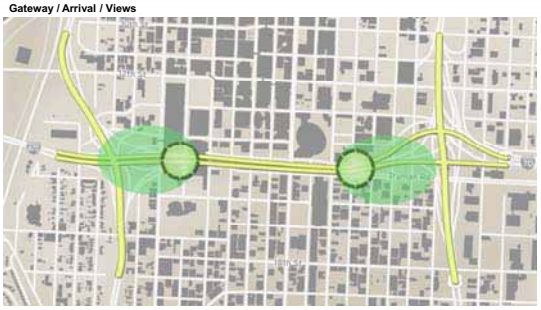
Bridges over the freeway need to be replaced

- **10 year life**

I-670 can't go away

Defining Factors

Gateway / Arrival / Views



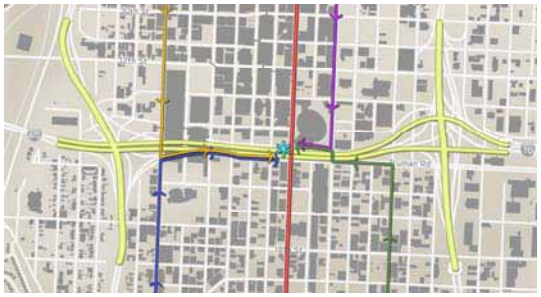
Transportation

Economic Development

Open Space

Connections

Transit



Feedback

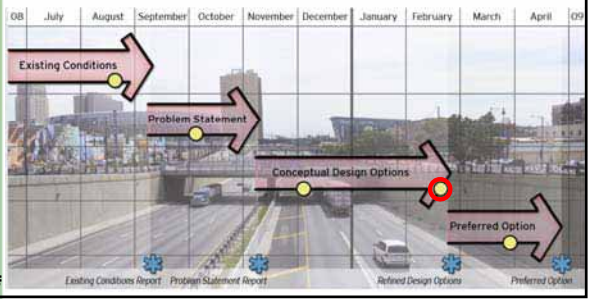
Other Ideas?

Presentation Recap

STEERING COMMITTEE PRESENTATION - FEBRUARY 19, 2009

Steering Committee 02.19.09

SCHEDULE



Charrette Preparation

GOALS / OPPORTUNITIES

- Pedestrian + Bike Connections
- Pedestrian Experience
- Vehicular Connections
- Transit Connections
- Green Space Connections
- Neighborhood Connections
- Real Estate Opportunities
- I-670 and Truman Road as a Gateway
- District Unification
- District Synergy
- Driving Experience
- Sustainability
- New Technology
- Environmental Mitigation
- Traffic Distribution

Charrette Feedback

STEERING COMMITTEE

- **Blend** the neighborhoods but **maintain their identities**.
- No preference of Truman Road Alignment.
- Need for **green space (park), pedestrian and bicycle connections**.
- Green space should only be part of the solution, with a **mix of development**.
- Truman should be more of an **urban street** (Michigan Avenue, Park Avenue).
- Interested in connections to the Eastside.
- Does Truman need to be 3 lanes? If Truman is narrowed, how will that impact adjacent streets?
- Interested in thinking of the corridor in a new and different way.
- Agreed that **Walnut** is a primary pedestrian street.
- Interested in strengthening Paseo as a route to access I-70 EB as opposed to the McGee on ramp.
- Interested in development facing Truman where possible.

Charrette Feedback

CITY STAFF

- Need to **study regional traffic impacts** if solutions alter Truman's current alignment or capacity.
- **Dog Parks** are highly desired/needed within Downtown and the Crossroads.
- Proposing open space could be in competition with the Power & Light District, would need to be **complementary**.
- There is a lack of green space for residential users near the South Loop, and proposed parks should have **programmed elements**.
- Would small concentrated neighborhood parks be more effective than one large space?

Charrette Feedback

PUBLIC

- **Walnut** as primary pedestrian street.
- This project should **blend** the two neighborhoods.
- Most important issues are **pedestrian connectivity** (15), **air pollution** (8), **noise pollution** (7).
- Preference to decking over the interstate to address these issues, also liked a combination of strategies, including decking and widening sidewalks on the bridges.
- Most preferred the existing Truman Road **split alignment** (10) with **combined south of I-670** (5).
- Split over a ***Civic Gesture*** or ***Neighborhood*** as a defining strategy.
- Liked the idea of a park over I-670 and in the Crossroads neighborhood, but were split over a new park in the downtown loop.
- They felt additional transit accommodations should be part of the Truman Road Corridor.
- Put Truman Road on a diet.
- Accommodate bicycles.
- Program any green open space or parks to make it successful.

Charrette Summary

PROCESS – Step 1

Idea Generation – Big Moves

Charrette Summary

PROCESS – Step 2

Full Deck | Partial Deck | No Deck

Charrette Summary

PROCESS – Step 3

- Full Deck
- Partial Deck
- No Deck

Physical Framework

What is the *design strategy*?

- Transportation
- Connections
- Civic Gesture
- Neighborhood

Design Strategies

Charrette Summary

PROCESS – Step 4

Transportation | Connections | Civic Gesture | Neighborhood

Charrette Summary

PROCESS – Step 5

Physical Framework + Design Strategies + Feedback =

Proposed Concept Alternatives

Concept 1
Mitigation Measures (no deck)

Concept 2
Mitigation/Deck Combination

Concept 3
Full Deck

Technical Evaluation

What is the role of Truman Road?

Market Analysis

- Market Alternatives
  - LOW - Minimal Public investment, baseline conditions
  - MEDIUM - Deck, partial deck, minimally intense investment
  - HIGH – Full deck, some or all public open space (15-20% Residential, 40% Office value increase)
- Address is negatively impacted when exposed to interstate
- Higher tax increment of surrounding development can act as a payback for decking over the interstate
- Altering the road alignment can maximize developable real estate
- Distance between destinations is not the main issue, it is more about the experience between

Utilities

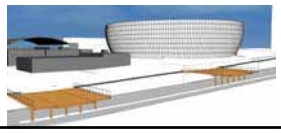
- Cannot modify (lower) profile of I-670, will impact combined sewer and 20" transmission water line.
- Utility bridge east of Main (KCPL, AT&T utilities) will need to be accommodated.
- All wet utilities along WB Truman feed into combined sewer at Walnut.
- Other utilities along WB Truman are (16) 4" and (4) 2" underground telecommunication lines, underground KCPL/SBC ducts and manholes.
- WB Truman east of Grand has additional utilities.
- Manipulating the Truman Road alignment will require additional costs for road infrastructure (storm drainage, curbs, etc.).
- EB Truman – more flexibility than WB Truman – could develop over gained real estate, could consolidate utilities to a designated corridor.

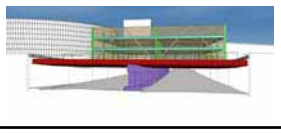
Structural Design

- Steel Girders – preferred structure type
  - Minimize structure depth (+/- 43"), allows utility penetrations, will need fireproofing.
- Deck Loads (175-200 lbs/sf) – will need to treat landscape as a roof garden to minimize loads on structure.
- Additional loads may result in additional girders or increase in structure depth.

Structural Design

- Bridge replacements (Baltimore, Main, Walnut, Grand) will cost approximately $10 million (includes widened sidewalk at back of curb).
  - Additional cost for landscape on bridges, decorative railings, etc.
- Buildings spanning the interstate (Warm Shell)
  - 1 story - $800/sf
  - 3 stories - $1,400/sf
  - Comparison of on-grade structure - $200/sf



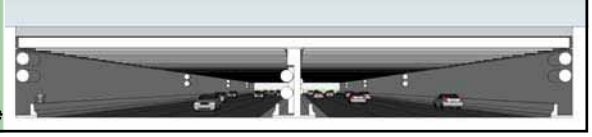


Life Safety and Code Issues

- What dictates a tunnel? (<300' / 300'-1,000' / >1,000')
- Openings in decks and partial decks minimize tunnel implications.
- Will need to coordinate with Fire Department for impacts on deck options
  - Standpipe connections required?
- Convention Center Expansion – would create a tunnel, may need to retrofit additional tunnel accommodations
- I-670 Median Wall Separation
  - Solid wall recommended for lighting consistency, ventilation efficiency

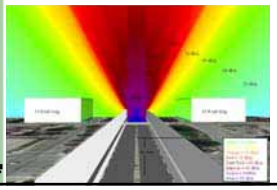
Tunnel Design

- Ventilation – proposed solution - ductless jet engine fans, piston effect with flow of traffic
- Long tunnels may require intermediate ventilation
- Concentration of emissions may affect air quality at openings
- Daylight from openings in the decks impact lighting efficiency
- Additions to the SCOUT system are required for a tunnel



Noise Mitigation

- Noise walls, if used on grade, will need to be 10'+ height, to be effective.
- Other solutions that channel and deflect noise can be effective sound mitigation of I-670 for adjacent parcels and the pedestrian environment.

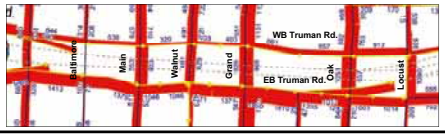


Traffic and Roadway Design

- Traffic counts conducted on January 21, 2009 (Sprint Event, Bartle, Midland)
  - AC/DC Concert (13,000+ attendance)
  - JC Superstar @ the Midland (1,200 attendance)
  - Fusion Center Tech Meeting (120 attendance)
- Counts considered evening peak hour + event scenarios (worst case scenario)
- KCMO Big XII Travel Demand model also used for analysis
- Pedestrian traffic also considered in the analysis

Traffic and Roadway Design

- EB Truman Road has the highest volume at the McGee on-ramp to I-670
- Closing the McGee on-ramp
  - Would not negatively impact the function of Truman Road (vehicles would utilize alternate routes for interstate access)
  - Additional accommodations might be needed for alternate routes
- Stacking distance between WB and EB Truman cannot be reduced



Traffic and Roadway Design

- Few vehicles divert when Truman is reduced to two-lanes
- If Truman is reduced, then improvements are necessary, but several intersections still operate at an acceptable level of service
- If Truman becomes a two-way arterial (combined Truman), traffic can operate at an acceptable level of service

Technical Evaluation Summary

Market Analysis
- Increasing mitigation of the interstate results in increase of surrounding property values

Utilities
- Utilities beneath WB Truman Road must remain due to system connections
- Utilities beneath EB Truman Road can be relocated if necessary
- Main and McGee utility bridges may be impacted by proposed solutions

Structural Design
- Decks over I-670 can be designed to be level with the grade of Truman Road
- Buildings over the interstate incur significant additional cost

Life Safety and Code Issues
- Wider sidewalks may provide some sound relief but does not address air pollution

Tunnel Design
- Preferred solution is longitudinal ventilation with exhaust at ends of tunnels

Noise Mitigation
- Decks with openings can be effective for partial sound mitigation.

Traffic and Roadway Design
- If McGee on-ramp closing is proposed, alternative interstate access routes will need to be utilized/enhanced
- Truman Road can be reduced to two through lanes as long as intersections maintain an acceptable level of service
- Truman Road can function as a combined arterial as long as intersections maintain an acceptable level of service
- Must retain existing north-south stacking distance between WB and EB Truman Road (+/-200') – leads to **existing** or **combined** road alignment

Wyandotte-Baltimore Block

Payoffs

What is the value of decking over I-670?
- Improved Road Network
- Enhanced Pedestrian Connectivity
  - North / South
  - East / West
- New and/or Enhanced Real Estate
  - Park
  - Land for Development
- Sound/Air Mitigation
- Urban Design Character

Enhanced Bridges

Road Network
- Four new bridges
- No change to existing street network and interstate access

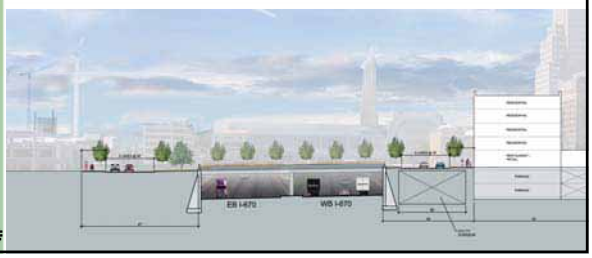
Connectivity
- Maintains current pedestrian patterns

Real Estate
- Does not create new real estate.
- The new bridges investment may only have a minimum effect on of existing real estate.

Mitigation
- Wider sidewalks may provide some sound relief but does not address air pollution

Urban Design
- Does not allow for new park space.
- Bridges enhanced with pedestrian and design amenities.

Enhanced Bridges



Enhanced Truman Road

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Does not create a tunnel.
- Daylight shafts would create bright spots on I-670.

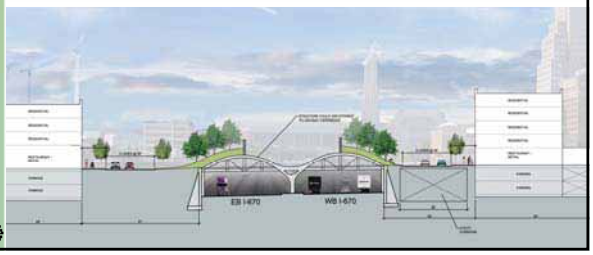
Connectivity
- Establishes enhanced landscape and pedestrian areas around the I-670 edges.

Real Estate
- Does not create new real estate.
- Provides some enhancement to existing parcels.

Mitigation
- Creates a platform along all four edges for sound and air quality mitigation measures.
- Partially solves noise and air pollution.

Urban Design
- Does not create a park.
- Screens I-670 from pedestrians and motorists.
- Platforms provide pedestrian and design amenities.

Enhanced Truman Road



Walnut Deck

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Creates a deck between Main and Grand.
- Main utility bridge requires relocation.

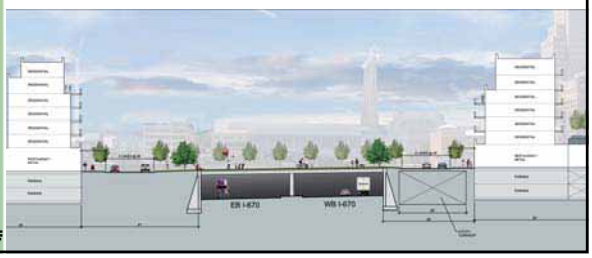
Connectivity
- Focuses pedestrian enhancements/amenities along Walnut Street.

Real Estate
- Does not create new real estate.
- Provides some enhancement to existing parcels, especially between Main and Grand.

Mitigation
- Partial mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New park over the interstate.
- Limits deck length to minimize tunnel characteristics.
- Connects existing Crossroads residential to Power & Light District.
- Bridge edges open to I-670 below enhanced with pedestrian and design amenities.

Walnut Deck



Existing Truman Road

Road Network
- Four new bridges.
- No change to existing street network and interstate access.
- Creates a deck between Baltimore and Grand.
- Main utility bridge requires relocation.

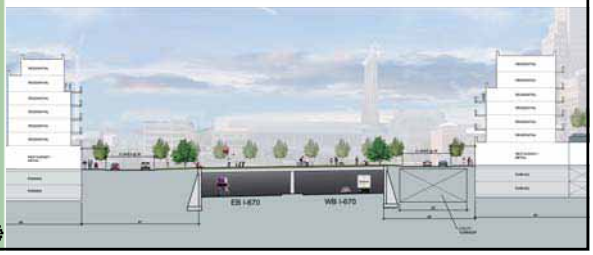
Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

Real Estate
- Does not create new real estate.
- Provides enhancement to existing parcels, especially between Baltimore and Grand.

Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park over the interstate.
- Sets up a civic gesture to Bartle Hall.
- Keeps Downtown and Crossroads as separate districts.

Existing Truman Road



Realigned South Truman Boulevard

Road Network
- Four new bridges.
- Aligns Truman Road to the south to simplify traffic movements.
- Requires removal of the eastbound I-670 ramp at McGee Street.
- Requires access route from WB I-670 off ramp at Locust to Truman
- Creates a deck between Baltimore and Grand.
- Main and McGee utility bridges require relocation.

Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

Real Estate
- Creates approx. 35-70 feet of additional real estate on the south side of the corridor.

Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park on the north side, partially over the interstate.
- Creates a landscaped median roadway.
- Continues combined Truman from the east.
- Connects park space to Power & Light District.

Realigned South Truman Boulevard

Realigned North Truman Boulevard

Road Network
- Four new bridges.
- Aligns Truman Road to the north to simplify traffic movements.
- Creates a deck between Baltimore and Grand.
- Main and McGee utility bridges require relocation.
- McGee Ramp remains.

Connectivity
- Enhanced pedestrian movements and connections between Crossroads and Downtown.

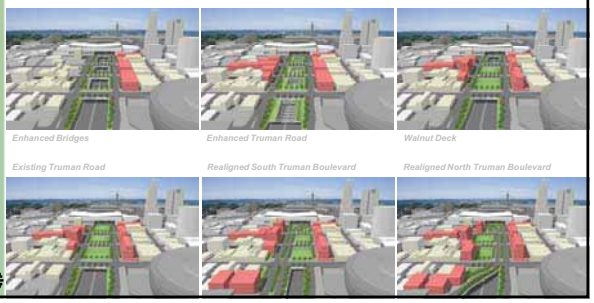
Real Estate
- Creates approx. 70 feet of additional real estate on the south side of the corridor.

Mitigation
- Sound and air mitigation measures for the pedestrian and adjacent properties.

Urban Design
- New large park on the south side, partially over the interstate.
- Creates a landscaped median roadway.
- Connects park space to Crossroads.

Realigned North Truman Boulevard

Evaluation



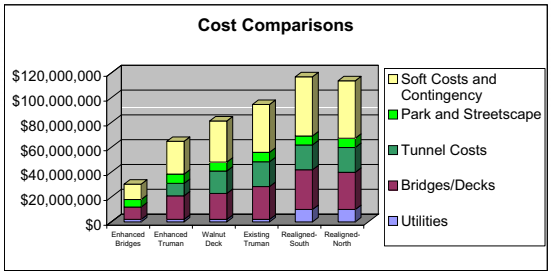
Evaluation

Steering Committee Concept Scorecard

		Enhanced Bridges	Enhanced Truman Road	Walnut Deck	Existing Truman Road	Realigned South Truman Boulevard (Tunnel)	Realigned North Truman Boulevard (Tunnel)
Road Network	Maintains Functionality of Truman Road	⊕	⊕	⊕	⊕	⊕	⊕
	Ability to Phase	⊕	⊕	⊕	⊕	⊕	⊕
Connectivity	Enhances Pedestrian Connectivity	⊕	⊕	⊕	⊕	⊕	⊕
Real Estate	Creates New Real Estate	⊕	⊕	⊕	⊕	⊕	⊕
	Enhances Existing Real Estate	⊕	⊕	⊕	⊕	⊕	⊕
Mitigation	Provide Sound and Air Mitigation	⊕	⊕	⊕	⊕	⊕	⊕
Urban Design	Creates New Park Land	⊕	⊕	⊕	⊕	⊕	⊕
	Creates a Place	⊕	⊕	⊕	⊕	⊕	⊕
	Creates a Sense of Arrival	⊕	⊕	⊕	⊕	⊕	⊕
	Interstate Driving Experience	⊕	⊕	⊕	⊕	⊕	⊕
Blends Downtown and the Crossroads or Keeps Them Distinct (circle one)		Blends Distinct	Blends Distinct	Blends Distinct	Blends Distinct	Blends Distinct	Blends Distinct

Scoring: ⊕ Best, ◔ Fair, ◑ Poor, ◕ Very Poor, ● Excellent

Cost Comparisons



NEXT STEPS

- **Public Meeting – Wednesday, Feb. 25th**
  - **[5:00-7:00pm, Kansas City Design Center]**
- **Preferred Option Selection**
- **Steering Committee Meeting – late March**
- **Report Completion – End of April**

Presentation Recap

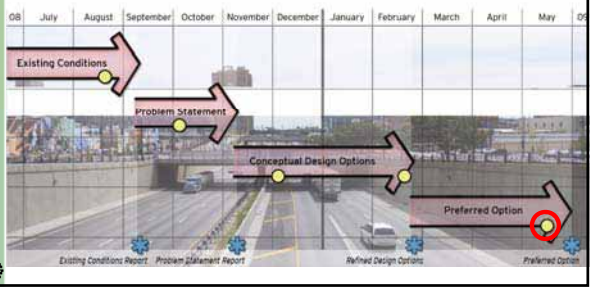
STEERING COMMITTEE PRESENTATION - MAY 21, 2009

Steering Committee Meeting 05.21.09

AGENDA

- Recommended Concept
  – Alternatives
- Technical Refinement
- Implementation

SCHEDULE



DESIGN CONSIDERATIONS

Feasibility Restrictions

- Utilities under current WB Truman Road cannot be relocated
- EB I-670 on-ramp at McGee must remain
- Existing retaining walls along I-670 are fixed
- Truman Road can remain in its current split configuration or be combined in a "boulevard-like" alignment

GOALS

Design Strategy

- Maximize the City's investment in the Power & Light District, Sprint Arena, Convention Center and the Metropolitan Performing Arts Center.
- Blend the Downtown and Crossroads neighborhoods but maintain their respective identities.
- Increase open space to serve the needs of the Convention and Entertainment district as well as the Crossroads district. Open space should include pedestrian and bicycle connections.
- Redesign Truman Road to include more urban characteristics like Michigan Avenue in Chicago or Park Avenue in New York while accommodating long term capacity needs.
- Strengthen the connection to the east.
- Emphasize the pedestrian qualities of Walnut Street.
- Provide opportunities to increase development along Truman Road.
- Mitigate the environmental impacts of the 1-670 corridor through downtown. This includes addressing pedestrian connectivity, air pollution and noise pollution.

CONCEPT RECOMMENDATION

- Tunnel from Baltimore to Grand
  - Segment between Wyandotte and Baltimore
  - Segments east of Grand
- Truman Road Realignment
  - North Side to Grand
  - North Side to Oak
  - South Side
- Land Use and Development
  - Park
  - Residential
  - Convention Hotel(s)
  - Convention Center Expansion
  - Commercial—Office and Retail
- Sustainable and Environmental Practices

CONCEPT RECOMMENDATION

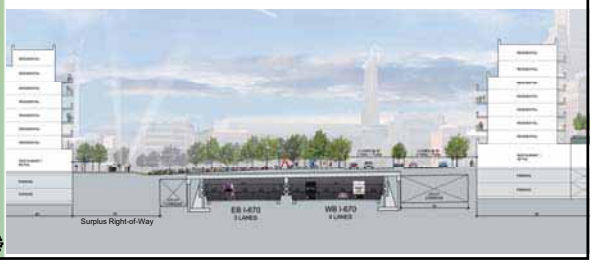
- Wyandotte-Baltimore
  - Convention Center Expansion
  - Terraced Park Deck

CONCEPT RECOMMENDATION

- Concept 1 – North Truman Alignment

CONCEPT RECOMMENDATION

- Concept 1 – North Truman Alignment



CONCEPT 1 – North Truman

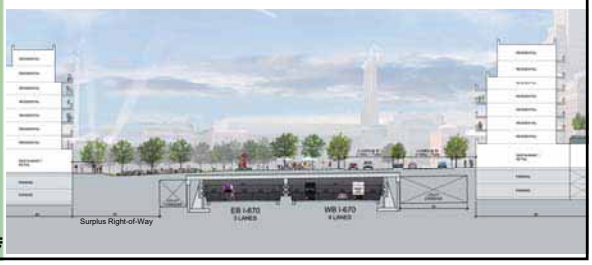
- Concept Benefits
  - Vehicular circulation flows along the north end of the corridor where the majority of the total traffic is heading to and from the Central Business District.
  - Road transitions for Eastbound Truman (highest volume), serving as a traffic calming device.
  - Development parcels north of Truman have frontage on a new urban boulevard.
  - Additional real estate becomes available for park space or development with frontage on the park.
  - Park space becomes viewed as more connected to the Crossroads, acting as a gateway into the neighborhood from the north.
  - Deck continues to Oak Street, providing park space adjacent to the Sprint Center and further connecting to the eastern portion of the Crossroads.

CONCEPT RECOMMENDATION

- Concept 1A – North Truman Alignment

CONCEPT RECOMMENDATION

- Concept 1A – North Truman Alignment



CONCEPT 1A – North Truman

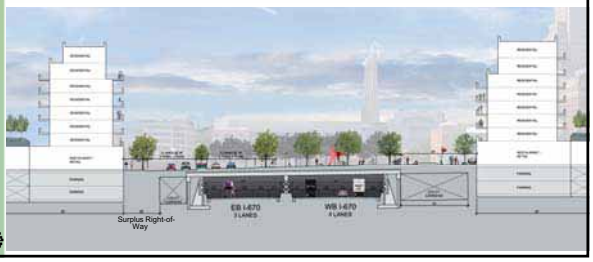
- Concept Benefits
  - Vehicular circulation flows along the north end of the corridor where the majority of the total traffic is heading to and from the Central Business District.
  - Road transitions for Eastbound Truman (highest volume), serving as a traffic calming device.
  - Development parcels north of Truman have frontage on a new urban boulevard.
  - Additional real estate becomes available for park space or development with frontage on the park.
  - Park space becomes viewed as more connected to the Crossroads, acting as a gateway into the neighborhood from the north.
  - Concept is value-engineered to reduce the decking from Grand to Oak to Grand to McGee (road transition occurs just east of Grand).

CONCEPT RECOMMENDATION

- Concept 2 – South Truman Alignment

CONCEPT RECOMMENDATION

- Concept 2 – South Truman Alignment



CONCEPT 2 – South Truman

- Concept Benefits
  - Road alignment is more aligned with historical 15th Street, creates a more direct connection to the east along Truman.
  - Development parcels north of Truman have frontage on new park space.
  - Contiguous park spaces are created between Wyandotte and Grand.
  - Park space is adjacent to the Power and Light District, acting as a gateway into to the south.
  - Additional real estate fronting the new park space may be developed by one corporate entity, that could simplify park programming and maintenance efforts.
  - Concept does not require full decking from Grand to Oak, only over the Eastbound I-670 lanes.

TECHNICAL REFINEMENT

- Utilities
  - Utilities along existing WB Truman remain in a dedicated utility corridor
  - Utilities along existing EB Truman relocated/consolidated along south retaining wall of I-670
  - Utility bridges will need to be relocated

TECHNICAL REFINEMENT

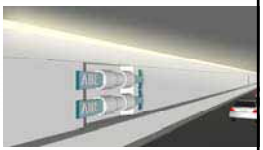
- Structural
  - Decks designed to support 3' of soil plus pedestrian loads and small service truck
  - Maintains existing vertical clearance
  - Steel Girders
    - Supporting park decks spaced at 6'-9" O.C
    - Supporting bridge decks spaced at 9'-0" O.C.
    - Span over existing retaining walls, rest on driven piles located behind walls

TECHNICAL REFINEMENT

- Interstate Lane Configuration
  - Center support wall shifted 5'-6" south to accommodate future lane needs
  - Shoulders accommodated for current lane configuration
  - Allows for future expansion with limited shoulders
    - Eastbound Lanes – 3 to 4
    - Westbound Lanes – 4 to 5

TECHNICAL REFINEMENT

- Ventilation
  - Constraints
    - Limited overhead and lateral space (no ducts)
    - Planned land uses above
  - Design Recommendations – Longitudinal Jet Fan System
    - Requires full-height separation walls for WB and EB traffic
    - Partially-recessed in walls due to space and clearance constraints
    - Requires capacity of ~120,000 cfm per direction
    - Number of booster fans dependent on length of tunnel

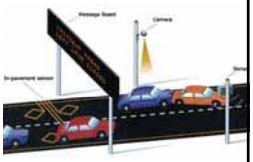


TECHNICAL REFINEMENT

- Lighting
  - Full-height separation walls reduces lighting level requirements
  - Design Recommendations
    - 480 V High Pressure Sodium
    - Continuous lighting, mounted in corner chamfers of tunnel
    - Photo sensor controls
    - Separate control and power supply from Bartle Hall
    - 20% reduction level maintenance alerts

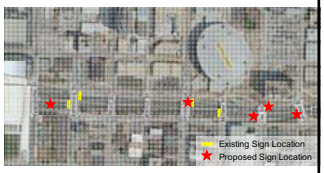
TECHNICAL REFINEMENT

- KC Scout ITS System
  - Relocation of fiber optic trunk line for length of tunnel
  - Communication interconnect with emergency monitoring sensory system
    - Feed back to District 4 Traffic Operations Center
    - Travelers' Information and Traffic Diversion Response - Primary
    - Emergency Response - Secondary
  - Replacement of CCTV cameras at Baltimore with 8 CCTV cameras in tunnel
  - In-pavement traffic data collection points at up to 8 locations (two in each direction)



TECHNICAL EVALUATION

- Interstate Directional Signing
  - Space constraints for placement of signs in tunnel
  - 500' visibility preferred for Advanced Guide Signing
  - **Eastbound I-670** (existing signage at Baltimore and McGee)
    - Supplemental overhead signing under Bartle
    - Relocate McGee Sign to Oak or Locust
  - **Westbound I-670** (existing signage at Grand and Baltimore)
    - Keep at existing Grand location (Concept 2)
    - Relocate to Oak (Concept 1 and 1a)
  - **Other Potential Solutions**
    - Supplemental Advanced Signage
    - Supplemental Ceiling Markings
      - Limited Visibility Behind Semis
    - Supplemental Pavement Markings
      - Limited Visibility and Effectiveness in Heavy Traffic



TECHNICAL REFINEMENT

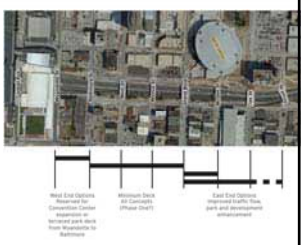
- Transportation
  - Traffic Analysis
    - Public Works agrees that both alignments are feasible for purposes of this study
    - Concepts studied for 6 lanes (3 in each direction)
      - 2 through lanes each direction + through/off-peak parking lane
    - Concepts studied for 4 lanes (preferred)
      - 2 through lanes each direction + dedicated on-street parking lane
  - North Truman – 4 lanes
    - Traditional Peak Hour operates successfully
    - Event Peak Hour has issues at Truman and Walnut
    - Separates access to eastbound McGee on-ramp from other Truman Road access to improve traffic operations in the study area.

TECHNICAL REFINEMENT

- Transportation
  - South Truman – 4 lanes
    - Traditional Peak Hour has issue at Truman and Walnut
    - Event Peak Hour has issues at Truman and Main, Walnut, & Grand
      - Would require 6 through lanes between Main and Grand
    - Does not separate access to eastbound McGee on-ramp from other Truman Road access, thus contributing to capacity problems along Truman Road.
  - Traffic Mitigation Options
    - Issues during event peak hours
      - Capital Capacity Improvements
      - Event Traffic Management

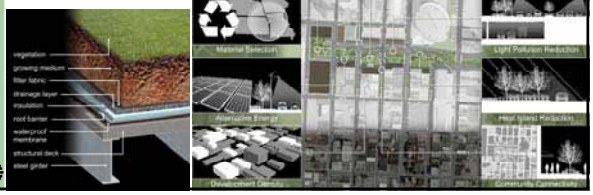
TECHNICAL REFINEMENT

- Constructability/Phasing
  - Concept 1 – North Truman: 3-4 years
  - Concept 1A – North Truman: 2-3 years
  - Concept 2 – South Truman: 3-4 years
  - Sequencing
    - I-670 improvements and abutments behind retaining walls
    - Grand and areas east
    - Walnut to Grand
    - Main to Walnut
    - Baltimore to Main



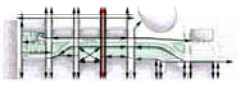
DESIGN

- Sustainability

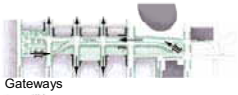


DESIGN

Concept 1
North Truman Alignment

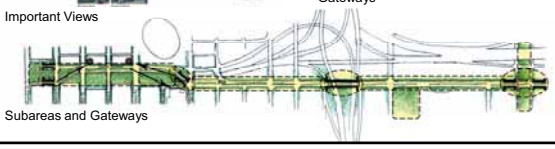


Pedestrian Connections



Gateways

Important Views



Subareas and Gateways

CONCEPT RECOMMENDATION

- Concept 1 – North Truman Alignment *(ART PARK)*

DESIGN

- North Alignment
  Park Character

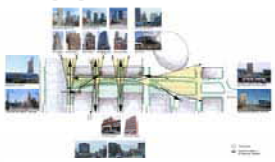
DESIGN

SCULPTURE

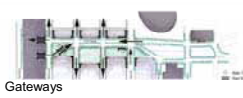
FLEX OPEN SPACE

DESIGN

Concept 1A
North Truman Alignment



Pedestrian Connections



Gateways

Important Views

Subareas and Gateways

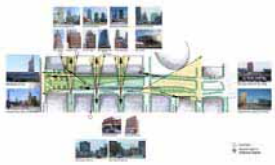
CONCEPT RECOMMENDATION

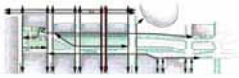
- Concept 1A – North Truman Alignment *(FESTIVAL PARK)*

DESIGN

DESIGN

Concept 2
South Truman Alignment

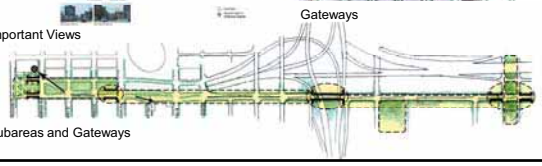




Pedestrian Connections

Gateways

Important Views



Subareas and Gateways

CONCEPT RECOMMENDATION

- Concept 2 – South Truman Alignment *(PROGRAM PARK)*

DESIGN

- South Alignment
  Park Character

DESIGN

DESIGN

- Streetscape Character

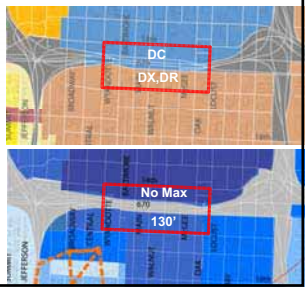
MARKET

- More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor

– Residential
  - Residential Units Potential--1,800 after ten years (1,200 years, 7% vacant)
– Office Space
  - Office Employment in Corridor, 1,000 after ten years (300 sf/ employee)
– Retail Space
  - South Loop Link Study Area Corridor--20,000 Square Feet over 10 years

TECHNICAL REFINEMENT

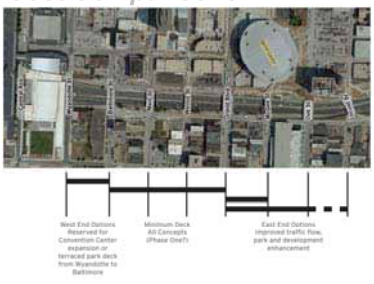
- Land Use and Development
  – (From Greater Downtown Area Plan)
- Proposed Land Use
  – Downtown Core (DC)
  – Downtown Mixed-Use (DX, DR)
- Proposed Building Heights
  – No Max
  – 130'



TECHNICAL REFINEMENT

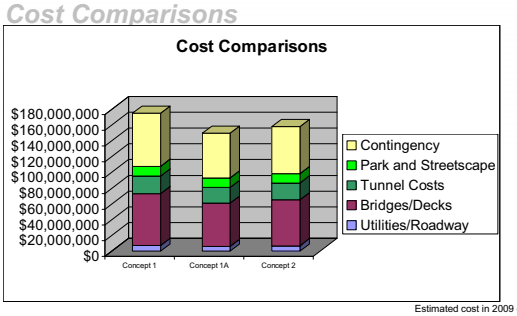
- Land Use and Development
  – (From Greater Downtown Area Plan)
- South Loop Link Improvements
  – identified as a 'Catalyst Project'
- Overlay District
  – Possible tool that can be used to alter zoning regulations to special areas to control development

Cost Comparisons



New Costs
- Deck between Wyandotte and Baltimore
- Deck and transportation options between Grand and Oak

Cost Comparisons



Estimated cost in 2009 dollars

COST AND BENEFIT OPPORTUNITIES

Benefits

- Improved Road Network
  - Sizes road for daily needs
  - Eliminates three or more traffic signals
- Enhanced Pedestrian Connectivity
  - North / South
  - East / West
  - Connections east of the KC Star Site
- New and/or Enhanced Real Estate
  - Park
  - Land for Development
  - Opportunities for "New" Neighborhood
- Enhances Convention Center
  - Potential Hotel Sites
  - Entry and Visibility
- Mitigation
  - Visual
  - Sound
- Urban Design Character
  - New entry into Downtown and Crossroads
  - Reinforces Grid network
  - Park and Open Space
  - Pedestrian Sensitivity
- Opportunities for Additional Green Solutions
  - Reduced Impervious Surface
  - Reduced Heat Island
  - Rain Water Collection and Reuse
  - Solar Technologies for Lighting
  - Opportunities for Transit Connections

IMPLEMENTATION STRATEGY

May-July, 2009

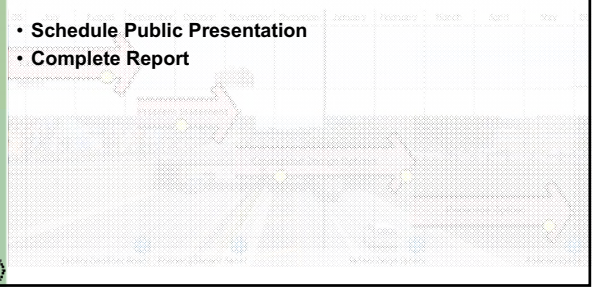
- Gain Steering Committee recommendation
- Gain Support from Public
- Complete Feasibility Study
- Enlist Champions
- Coordinate with adjacent property owners
- Present recommendation to Planning Commission
- Present recommendation to Mayor and City Council

August-December, 2009

- Coordinate with Client and Public Agencies to gain support and funding
- Begin NEPA Process to Select Locally Preferred Alternative

NEXT STEPS

- **Schedule Public Presentation**
- **Complete Report**



MARKET

- Market Potential – Residential
  - Residential Unit Absorption
    - Downtown CBD and Crossroads Combined — 900 Units per year
    - South Loop Link Study Area Corridor — 120 Units per year

    * More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor

    - Residential Population in Corridor — 1,800 after ten years (1,200 units, 7% vacant)
    - Average Household Income — $90,000

MARKET

- Market Potential – Office
  - Office Space Absorption
    - Downtown CBD and Crossroads Combined — 1,800,000 Square Feet over 10 years
    - South Loop Link Study Area Corridor — 300,000 Square Feet over 10 years

    * More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor

    - Office Employment in Corridor — 1,000 after ten years (300 sf/ employee)
    - Average Wage or Salary — $65,000

MARKET

- Market Potential – Retail
  - Retail Space Absorption
    - Downtown CBD and Crossroads Combined — 100,000 Square Feet over 10 years
    - South Loop Link Study Area Corridor — 20,000 Square Feet over 10 years

    * More absorption is possible in the South Loop Corridor if Downtown/Crossroads demand is redirected at higher densities into the Corridor

    - Retail Employment in Corridor — 80 after ten years (250 sf/ employee)
    - Average Wage or Salary — $28,000