SUGAR HOUSE TRANSIT PHASE 2

ALTERNATIVE ANALYSIS (AA)

JANUARY 2013

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Salt Lake City (the City), in cooperation with the Utah Transit Authority (UTA) and the Federal Transit Administration (FTA), is preparing an Alternatives Analysis (AA) for an extension of the planned Sugar House Streetcar in the Sugar House and surrounding areas of Salt Lake County, Utah.

In January 2007, UTA, representatives of the Cities of Salt Lake and South Salt Lake, the Utah Department of Transportation (UDOT), and the Wasatch Front Regional Council (WFRC) began a process to identify a range of potential transit projects that would serve South Salt Lake and the Salt Lake City community of Sugar House between about 1700 South and Interstate 80 (I-80). This process led to the *Sugar House Transit Corridor Alternatives Analysis* in 2008. The result of the 2008 AA study was selection of a two-mile streetcar route in an existing railroad right-of-way between the Central Pointe UTA light rail (TRAX) station and McClelland Street (1050 East) as the Locally Preferred Alternative (LPA). This is referred to as the Sugar House Streetcar Phase 1 Project. After the AA was completed, an environmental assessment (EA) was prepared. Based on the *Sugar House Streetcar Environmental Assessment* (SHSEA), FTA issued a Finding of No Significant Impact (FONSI) in February 2011. In October 2010, a $26-Million Federal TIGER II grant was awarded to help fund construction of the Sugar House Streetcar Phase 1 Project. An $11-million local match is being provided by the Cities and UTA.

With the first phase of the Streetcar set to begin construction in 2012 and open for passenger service in late 2013, the City has begun the process of examining alternatives to improve transit service to other areas in the city. The study was led by the City's Redevelopment Agency (RDA) with collaboration from the City Transportation, Planning, and Economic Development divisions and UTA. This new AA addresses a transit service extension from the eastern terminus of the Sugar House Streetcar Phase 1 Project to areas within the Study Area defined in Figure 1-1.1. The Study Area is bounded by 900 East on the west, 1700 East on the east, 1700 South on the north, and I-80 on the south. Additional consideration of areas outside of the Study Area has been made to understand broader travel patterns and demand for transit; this area is referred to as the Phase 2 Travel Shed, also shown in Figure 1-1.1.

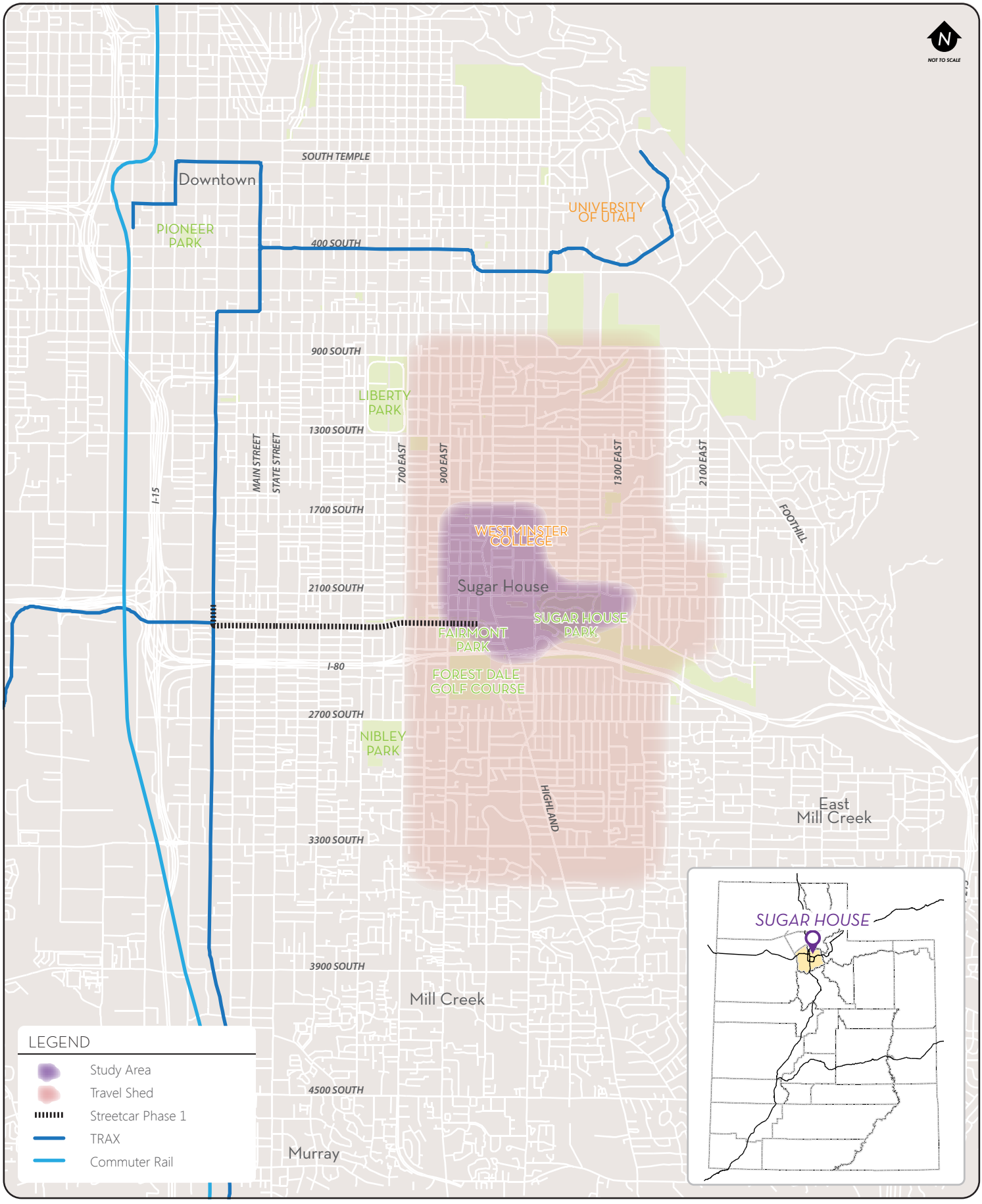
This AA document evaluates possible mode and alignment alternatives to extend the Sugar House Streetcar Phase 1 Project. The process used in this AA has been designed to meet the FTA Project Development Process in which a purpose and need are identified. A long list of potential alternatives is then developed, evaluated, and screened based on the defined project objectives and project's purpose and need. The process also has included a comprehensive public and agency outreach program over the course of the activities documented herein.

1.1.1 Public Process

The public process for this study was a multi-leveled approach to educate residents, business owners, developers, property owners, and city officials about the potential for a transit

REGIONAL CONTEXT

Figure 1.1-1 | Sugar House Phase 2 Alternatives Analysis



extension and receive input and comments. Outreach efforts consisted of stakeholder committee meetings, interviews with individual stakeholders, public scoping meetings, and presentations to area community councils and the RDA Board.

1.1.1.1 Committees

A Steering Committee was established to guide the process and assist in the analysis of alternatives. The Steering Committee consisted of representatives from the City's RDA, Planning, Housing and Neighborhood Development, Economic Development, and Transportation divisions, as well as UTA. This Steering Committee met bimonthly, beginning in April 2011 and ending in May 2012. The committee was responsible for reviewing and evaluating all project information and progress to be sure it was consistent with the project goals as well as meeting the Purpose & Need.

A separate stakeholder committee was also established consisting of community council members, special interest groups, and developers. This group participated in three interactive workshops at critical milestones over the course of the study. Meeting topics included project introduction, development of goals and objectives, alternatives evaluation, and project wrap-up.

The study team also conducted individual interviews with each stakeholder. Interviews occurred in July and August, and the study team used these interviews to gain an overall understanding of sentiments towards extending transit in the area.

1.1.1.2 Public Meetings

Three public open houses were conducted at critical points during the process. On July 28, 2011, Fehr & Peers hosted the first of three public open houses. The first open house was held from 4:30 to 6:30 p.m. at the Sprague Library located at 2131 Highland Drive in Sugar House. The open house was advertised in newspapers, through City email lists, on the City's and project websites, and through flyers mailed and hand delivered to individual residents and businesses in the Study Area. The open house was held in Sugar House at the Sprague Public Library from 5:30 to 7:30 PM. The open house provided boards with information about the project, combined with large aerial maps for attendees to indicate alignment ideas and destinations to which they would take transit. Boards included information on the purpose of the project, the relationship to the Phase 1 project, transit modes, project goals, the AA process, and travel trends. People had the opportunity to provide comments in writing at the open house. The public overwhelming supported the goals of the project, with the most supported goal being "Support regional goals for livability, air quality, and ridership." The map exercises indicated that the most popular transit extensions ran north and south on Highland Drive/1100 East and east along 2100 South. Frequent and notable comments were:

- Many attendees were excited about the Sugar House Phase 1 Streetcar and potential transit extension options to Sugar House area. In general, residents would be in favor of more streetcars throughout the city.
- Some residents would like transit extensions to Sugar House Park, Westminster College, The University of Utah, and Foothill Drive.

- Residents believe that the transit extension should have a stop at the Monument Plaza in Sugar House on 2100 South.
- Other concerns include pedestrian safety, parking, and noise into surrounding neighborhoods.

A second open house was held October 27, 2011. The open house was held at the Westminster College Special Events Room at the Eccles Health, Wellness, and Athletic Center located 1840 South 1300 East in Sugar House from 5 to 8 p.m. The purpose of the open house was to present the short list of alternative alignments that emerged from the first level screening to the public, and receive feedback for a preferred alignment. Information on the alignments included ridership, cost, economic development potential, mobility concerns, urban design issues, and timing information. Advertising for the event utilized the same strategies as the first event. Comments received from this open house included agreement with the benefits of the extension study, reiterated that a station at the plaza was an important component, and concern about funding issues.

A third open house was held March 1, 2012. The open house was held at the former Desert Industries Building at 2234 Highland Drive in Sugar House. The purpose of the open house was to present the preferred alternatives that emerged from the second level screening and receive feedback. Information included timeline of both Phase 1 and Phase 2 projects, an outline of the alternatives process, evaluation criteria used, actions and results since the previous open house, benefits of the locally preferred alternative, and conceptual renderings. A survey was utilized to gather feedback from attendees. Survey results showed support for the alignment and that the streetcar alignment would have a positive influence on the future of development in Sugar House and surrounding neighborhoods.

At each open house, educational materials were presented and project staff was available to answer questions and to instill a general understanding of the process and technical information being presented. A summary of comments from each of these open houses and comments received online are included in the appendix of this document. A total of 291 people attended the open houses. A total of 83 comments were received. In addition, Open City Hall, a City-sponsored on-line commenting forum was updated with project information and comments were received from the public.

1.2 STUDY AREA DESCRIPTION

1.2.1 Land Use

The Sugar House neighborhood is located in east-central Salt Lake City, Utah, along the Wasatch Front (the western slope of the Wasatch Mountain Range) (see Figure 1-1.1, Sugar House). Sugar House, one of the original streetcar communities of Salt Lake City and one of the oldest neighborhoods, includes a broad mix of land uses, including commercial, office, and residential. The Sugar House area residential density enables a convenient walk distance to many businesses. In addition, there are a number of potential redevelopment sites in the Study Area that could result in mixed-use development in areas surrounded by existing residential uses.

The north part of the Study Area is predominantly single-family residential with clusters of neighborhood commercial and a few mixed residential/business corridors, such as 1100 East and 2100 South. Several institutional uses, such as Westminster College and Highland High School, and parks are dispersed throughout the Study Area. The close proximity of many mixed uses, as well as their urban form characteristics, promotes walking as an attractive and viable mode of transportation.

In addition to the general land uses described above, the following specific major activity centers are located within the Study Area:

- Westminster College (1300 East)
- Highland High School (2100 South)
- Sugar House Park (2100 South)
- Sprague Library (Highland Drive)
- Sugar House Shopping Center (Highland Drive)
- Fairmont Park and Aquatic Center (Sugarmont)

Within 1 mile of the Study Area the following attractors also exist:

- Forest Dale Golf Course (900 East)
- Intermountain Health Center (900 East)

The Study Area and existing major activity centers are shown in Figure 1.2-1. In addition, five important improvements are recently completed, have started construction or are expected to soon be added to the Study Area:

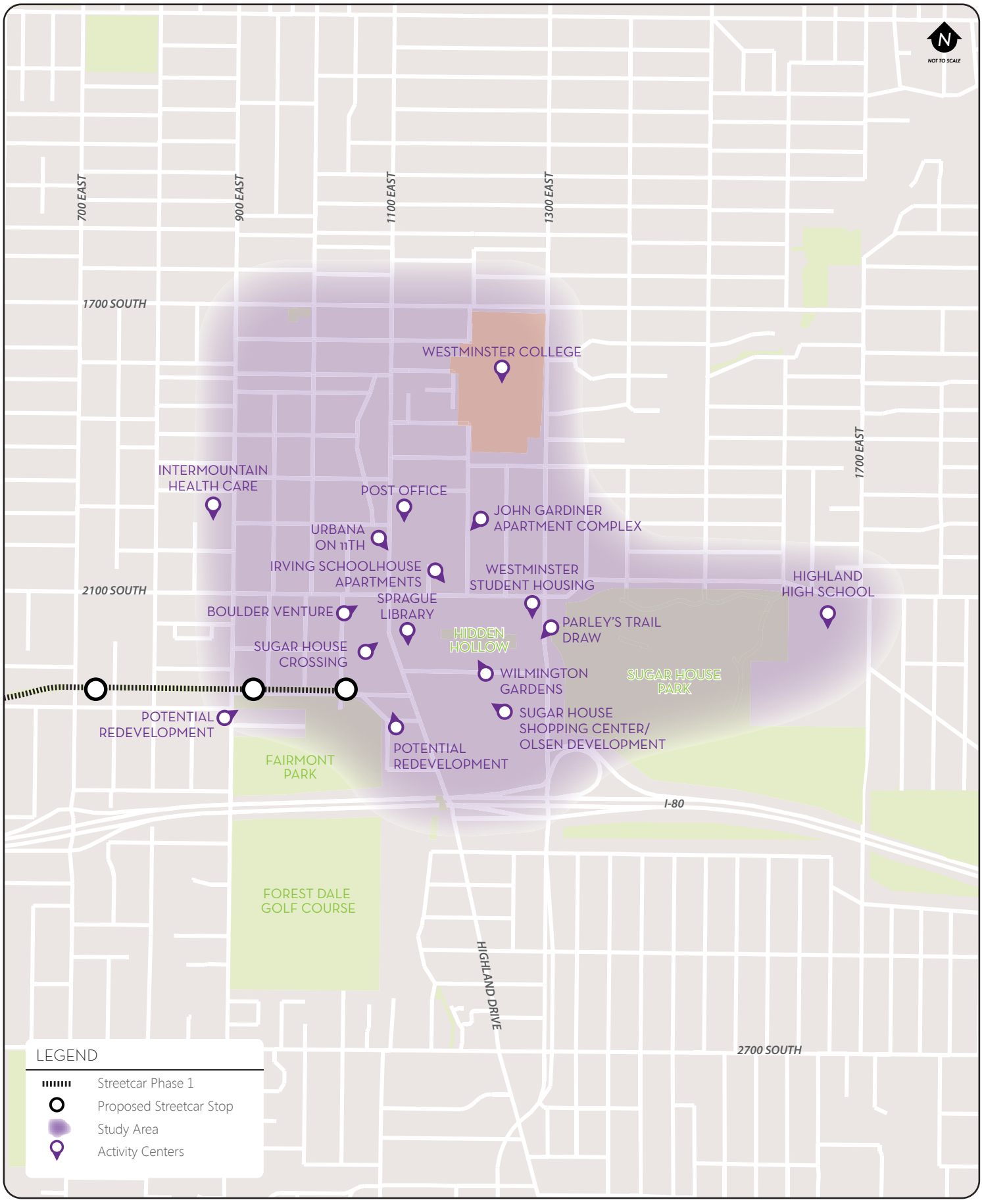
- Sugar House Crossing (on the south side of 2100 South at 1100 East). Sugar House Crossing in downtown Sugar House is a redevelopment project with a mix of residential, commercial, and office use. Development plans include 211 new residences and 200,000 square feet (SF) of commercial/office. The project broke ground in fall of 2012 with completion set for spring of 2014.

- Westminster Student Housing (on the west side of 1300 East between Wilmington Avenue and 2100 South). The Westminster Student Housing project is a mixed-use development with 16,000 SF of academic space; 14,000 SF of retail space; and 54,000 SF of housing. The project was completed in fall of 2012.

- Wilmington Gardens (Wilmington Avenue between Highland Drive and 1300 East). Wilmington Gardens in Sugar House is planned to be redeveloped with a mix of

STUDY AREA

Figure 1.2-1 | Sugar House Phase 2 Alternatives Analysis



residential, community space, commercial, and office use. Development plans include 100,000 SF of residential with 20% affordable units; approximately 84,000 SF of commercial/office; and 45,000 SF of community space. Plans for Wilmington Gardens incorporate academic space for Westminster College. The project will break ground in early spring 2013 and open in 2014.

- Boulder Venture - Granite Furniture Building (1050 East 2100 South). The former Granite Furniture building renovation is a mixed-use development with retail and office uses. The plans include 20,000 SF of retail and 30,000 SF of office. The development is fully leased and will open in late winter of 2013.

- The Parley's Trail Draw (1300 East on the south side of Westminster Student House). The Parley's Trail Draw project is a tunnel under 1300 East connecting Sugar House Park to Hidden Hollow, an integral part of the Parley's Trail.

1.2.2 Transportation

The urban pattern in the Study Area is built on a network of arterial and collector roads, generally running in a north-south/east-west grid pattern (see Figure 1.2-2).

1.2.2.1 Roadway Network

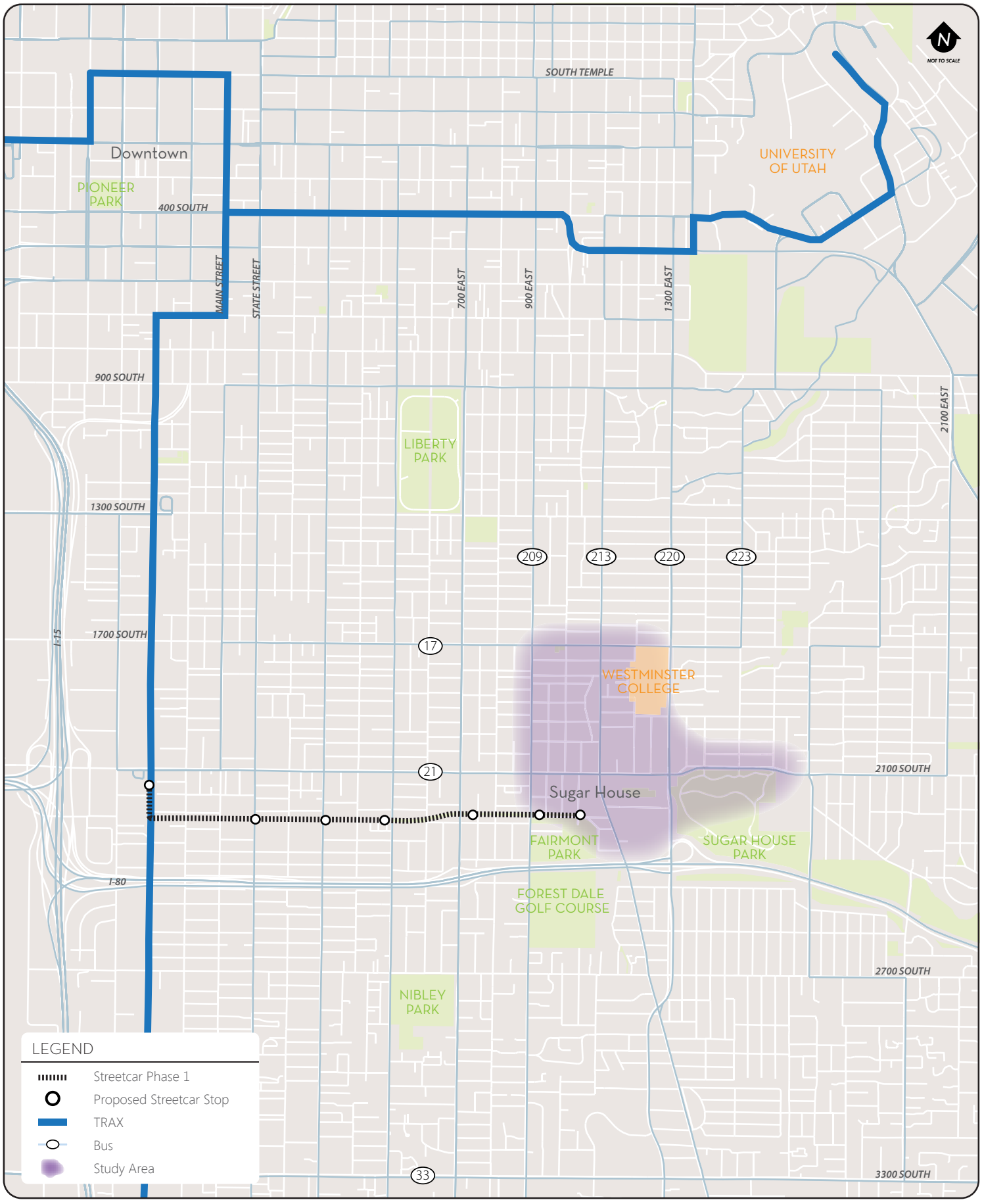
Important minor arterials are 1300 East, Highland Drive, 1700 East, 1700 South, 900 East, and 2100 South. Principal arterials are 700 East and 3300 South, both located just outside the Study Area. A network of local collector streets serves the communities between these major and minor roads. The primary roadways in the Study Area are described below:

- **1100 East/Highland Drive.** 1100 East becomes Highland Drive just south of 2100 South. 1100 East is a two-lane collector street with on-street parking. Intersections are full-movement, and major intersections have separated left-turn lanes. Highland Drive between 2100 South and Stringham Avenue is a four-lane arterial. South of Stringham Avenue, Highland Drive becomes a two-lane road with on-street parking and continues as such until the end of the Study Area. 1100 East/ Highland Drive has a posted speed limit of 30 mph.

- **1300 East.** 1300 East is a north-south arterial in the Salt Lake Valley. In the Study Area, north of 2100 South, 1300 East consists of a single travel lane in each direction with a continuous center two-way left-turn lane. South of 2100 South, it consists of three travel lanes in each direction, a center raised median, and single-lane protected left-turn lanes at intersections. It intersects with I-80 at about 2300 South. East of Highland Drive, 1300 East consists of two travel lanes in each direction with a center turn lane. The AADT on 1300 East is 22,000 north of 2100 South and 55,000 south of 2100 South. 1300 East has a posted speed limit of 35 mph.

EXISTING TRANSPORTATION NETWORK

Figure 1.2-2 | Sugar House Phase 2 Alternatives Analysis



- **1700 East.** 1700 East is a two-lane, north-south arterial with bike lanes and on-street parking. 1700 East has a signalized intersection at 2100 South.

- **1700 South.** 1700 South is a two-lane, east-west arterial. Signalized intersections at 900 East, 1100 East, and 1300 East. Signalized intersections have separated turn lanes.

- **2100 South.** 2100 South is an east-west arterial in the Salt Lake Valley. In the Study Area, it consists of two travel lanes in each direction. Some intersections have left- and right-turn lanes. 2100 South has signalized intersections at 700 East, 900 East, 1100 East/Highland Drive, 1300 East, and 1700 East. The AADT along 2100 South is 26,400. 2100 South has a posted speed limit of 30 mph.

- **Wilmington Avenue.** Wilmington Avenue is an east-west local road with a posted speed limit of 30 mph. Wilmington Avenue has one travel lane in each direction with on-street parking and bicycle lanes on both sides.

- **Sugarmont Drive.** Sugarmont Drive is an east-west local road with a posted speed limit of 25 mph. Sugarmont Drive has one travel lane in each direction and bicycle lanes on both sides. The Sugar House Streetcar Phase 1 and Parley's Trail will run parallel with Sugarmont Drive to the north of the road. The eastern 500 feet of Sugarmont Drive is a westbound one-way street.

1.2.2.2 Pedestrian Network

Streets in the Study Area include sidewalks, which are the foundation of the pedestrian network, along with a good trail network in areas such as the large parks in and near the Study Area. Two regional trails are also planned in the Study Area. The 8-mile Parley's Trail will transect the Study Area east-west along Sugarmont Drive and Wilmington Avenue, while regionally connecting Parley's Canyon on the east side of the County to the Jordan River on the west side of the County. The proposed Jordan and Salt Lake Canal Trail will enter the Study Area along McClelland Street before curving around the east side of Fairmont Park. This trail is proposed to run from 800 South to 3300 South in Salt Lake City along an historic canal.

The grid pattern promotes good pedestrian connectivity, making the area a good candidate for transit investment. Although the small-grained road network supports a walkable community, major roads, large intersections (such as 1300 East and 2100 South) and freeway interchanges (1300 East and I-80) present barriers for the pedestrian and, therefore, the transit rider.

1.2.2.3 Transit Network

Existing transit service in the Study Area (see Figure 1.2-2) includes five bus routes and there are two TRAX lines located two miles west and north of the Study Area. Bus routes that operate in the Study Area are routes 17, 21, 209, 213, and 220. Table 1.2-1 shows nominal headways for each of the routes in the travel shed:

Table 1.2-1. Nominal Headways in Minutes

ROUTE	MODE	PEAK	OFF-PEAK	EVENINGS	SATURDAY	SUNDAY
17	Local Bus	30	30	0	0	0
21	Local Bus	15	15	30	30	80
209	Local Bus	15	15	30	30	60
213	Local Bus	30	30	30	60	0
220*	Local Bus	20	20	30	30	60

Source: UTA 2011, *During the study, this route's headways changed to a 15-minute headway in the peak and a 30-minute headway in the off-peak.

Route 21 travels along 2100 South within the Study Area. This route parallels the Sugar House Streetcar Phase 1 Project. The current bus runs one to three minutes late in the peak hour, but is still considered on-time for UTA performance (which is up to five minutes late for a local bus).

The Sugar House Streetcar Phase 1 Project will connect the existing TRAX mainline to the Sugar House area as far east as 1050 East/McClelland Street. This link will connect a thriving, regional commercial center (the Sugar House Business District) to the highly successful regional light rail and commuter rail systems, while further strengthening the extent and intensity of use of the existing public transportation infrastructure as an alternative to automobile trips.

1.2.3 Summary

Sugar House, one of the original streetcar communities of Salt Lake City and one of the oldest neighborhoods, includes a broad mix of land uses, including commercial, office, and residential. The north part of the Study Area is predominately single-family residential with clusters of neighborhood commercial and a few mixed residential/business corridors, such as 1100 East and 2100 South. Several parks and institutional uses are dispersed throughout the outer boundaries of the Study Area. The close proximity of many mixed uses promotes walking as a mode of transportation. Connecting existing development along 1100 East and 2100 South to the Sugar House Business District is an opportunity for improvement.

If the Study Area was divided into sections, several patterns become apparent: intersection densities and traffic volumes are greater to the west and southwest; traffic travels at higher speeds and intersection crossing distances are greater to the east. Several of Sugar House's CBD streets are approaching their effective motor vehicle capacity during the peak hours of the day, and there are few opportunities to expand capacity to accommodate more vehicles. Transit service can play a key role in the mobility of residents, businesses, and visitors to Sugar House. Buses along 2100 South, 1300 East, and 900 East have higher transit frequencies, while buses along 1700 South and 1100 East run less often. Existing transit service could be increased in capacity to serve changing land uses in the Study Area.

1.3 REGIONAL AND LOCAL PLANNING CONSIDERATIONS

This section provides an overview of the adopted regional and local land-use and transportation plans that apply in the Study Area. The applicable planning documents include:

- the Wasatch Front Regional Council (WFRC) Regional Transportation Plan (WFRC 2011),
- Envision Utah 3% Strategy,
- land-use and transportation plans prepared by Salt Lake City, and
- the Statewide Transportation Improvement Program.

1.3.1 WFRC Regional Transportation Plan

The Wasatch Front Regional Council is the designated metropolitan planning organization (MPO) for the greater Salt Lake City area, including the Study Area. WFRC works in partnership with UTA, UDOT, city and county governments, and other stakeholders to develop the Regional Transportation Plan (RTP), which is the region's plan for transportation-related improvements necessary to meet the area's growing travel demand over the next 30 years. WFRC adopted its most recent RTP in March 2011. The plan describes transportation improvements that are needed between 2011 and 2040. The planned improvements are prioritized into phases depending on need and funding. Additionally, the plan identifies a number of planned but unfunded projects and "illustrative" projects, projects that would be included if additional funding were available.

The RTP recommends a number of projects in and near the Study Area, one of which is a bus rapid transit line on 1300 East between the University of Utah and Draper (1300 East passes through the Study Area). Through the study area the alignment is shown on 1100 East.

The recommended transportation improvements specific to the Sugar House Streetcar Phase 1 Project include the construction of a community-level streetcar line from the 2100 South TRAX station to Highland Drive/Sugarmont. The RTP included an extension connecting Highland Drive/Sugarmont to 1700 South/1100 East.

1.3.2 Wasatch Choice for 2040 and Envision Utah 3% Strategy

The Wasatch Choice for 2040, which developed supporting land uses for input into the most recent RTP, illustrates growth principles to promote sustainable transportation and land use decisions. Growth is planned to be concentrated in a series of Centers to reduce demand on infrastructure, reduce congestion, improve air quality, and create more walkable centers. Sugar House is identified in this plan as a Town Center that is intended to be well served by transit and strong in community identity.

The 3% Strategy developed by the non-profit planning organization Envision Utah suggests a growth pattern whereby 33% of future development is concentrated on 3% of developable land near key transit stops and road corridors. Related to the Wasatch Choice for 2040

described above, the 3% strategy relies on the identification of neighborhood, town, and urban centers in which to develop. This approach responds to market trends and creates significant regional benefits, while leaving existing residential neighborhoods largely unchanged. Sugar House is identified as a town center, and is part of this overall strategy.

1.3.3 Local Land-Use and Transportation Plans

Salt Lake City has developed land-use and transportation plans that identify expected transportation improvements and describe the future land-use patterns desired by local leaders and the community.

Salt Lake City adopted the **Sugar House Community Master Plan in 2001** and amended it in 2005 to direct the future development of this community. The Master Plan contains a number of policies that directly address transit including supporting construction of light rail along the Sugar House rail corridor (that is, the UTA-owned right-of-way), directing land-use decisions to support a light-rail station in the Sugar House Business District and Brickyard Shopping Area, prohibiting development that would encroach on the UTA-owned right-of-way, and extending transit to Brickyard. Among its policies are to develop a pedestrian-oriented community, to maintain and protect Sugar House as a residential community with a vital supporting commercial core, to locate housing on or near public transportation routes, and to encourage development that strengthens the Business District focused at the Sugar House Plaza Monument. The Master Plan acknowledges that finding a viable alternative to the automobile is essential to the long-term economic success of the Business District. It lays out economic goals that emphasize using a mixed land use pattern and neighborhood amenities and facilities to support future transit stations, as well as providing for the strengthening of the tax base, economic health, and sustainability of the community. Establishing the Sugar House Monument Plaza as the community focal point is specifically listed as a goal of the Master Plan. In fact, the Master Plan states as a policy to "identify the location for a TRAX station as well as the preferred route through the business district for a future light rail alignment."

The **Sugar House Business District Mobility Guidelines (2003)** document states that the Sugar House Business District is "intent on transforming itself into a more transit-oriented area that relies less on the automobile." The Guidelines call for expanding existing bus service and implementing new rapid transit, either BRT or LRT.

The Study Area also borders to the north on the **Central Community Master Plan** area of Salt Lake City. Like the Sugar House Community Master Plan, the Central Community Master Plan includes policies that focus on supporting transit (and transit-oriented development) in this part of Salt Lake City, including minimizing vehicle congestion on 1700 South.

The **Salt Lake City Transportation Master Plan** (Salt Lake City 1996) includes a section that focuses on transit use and development. That plan includes a policy stating that the City "strongly supports measures that increase the convenience of transit usage." The Transportation Master Plan Action Plan Update (2000) states the City will "encourage a multi-modal transportation system" by "emphasizing other modes" than the automobile and will

"continue to advance transit solutions to travel demand needs in the community." The City's Major Transit Facility map (2006), shows potential long-range light rail or significant bus service corridors north-south in the area between 1100 East and 1300 East from TRAX to the southern border of the City, east-west in the area between 2100 South and I-80 from I-15 to Foothill, and north-south in the area between 2100 East and Foothill between the University of Utah and the south border of the City.

Westminster College is an important center of activity in the Study Area. The **Westminster College Master Plan** was completed in early 2011. One of its 11 priorities identified in the Westminster Master Plan is to work with the City to improve transportation facilities, including transit facilities, to the campus. The Sugar House Streetcar is seen as a way to provide connections between students, visitors, and the surrounding neighborhood. Additional streetcar connections would provide "a vital link between the core campus and extended campus locations near Hidden Hollow."

1.3.4 WFRC Transportation Improvement Program and UDOT Statewide Transportation Improvement Program

Consistent with federal law, WFRC compiles and publishes a list of state and local projects that it expects will be funded using U.S. Department of Transportation and other Funding sources over a five-year period. This list is published in the Transportation Improvement Program (TIP), which is then combined into UDOT's five-year Statewide Transportation Improvement Program (STIP). The STIP is a staged, multi-year, statewide, intermodal program of transportation projects that is consistent with the statewide plans and planning processes as well as other plans (such as the RTP and TIP) and processes of the local MPO (in this case, WFRC). The STIP guides the development of projects from conception through construction. The adopted 2012–2017 STIP lists Sugar House Transit Improvements (Phase 1) as a funded project and anticipates funding for the project in 2012.

1.3.5 Development Plans

Planning for the Sugar House Streetcar Phase 1 Project has generated interest in the development community. The following developments within the Study Area have recently been constructed, are underway, or are approved. These projects are located just beyond the end of the Phase 1 Project, and are shown in Figure 1.2-1.

- Urbana on Eleventh - 29 condominiums and 750 SF of ground floor retail. This project is 100 percent constructed.
- John Gardiner Apartment Complex - 70 apartment units. This project is currently under construction and will be complete by 2013.
- Westminster Mixed-Use Project - 44 three- and four-bedroom apartment units with a total of 164 beds, approximately 15,000 SF of office space, and 8,500 SF of retail space. Residential development associated with this project is part of the Westminster College expansion, and serves as student housing.

- Wilmington Gardens Project - 212 residential units, including 5 townhomes; approximately 30,000 SF of office; and 60,000 SF of retail development. This project will break ground in spring 2013 and open in 2014.
- Olsen Development - residential and retail space is planned to front Wilmington Avenue on the Olsen property, which is located directly across the street from Wilmington Gardens. This project is in partnership with Wilmington Gardens, and the developers are working together to implement a new vision for Sugar House over several acres. At the corner of Highland and Wilmington Avenues, the group is planning retail, office, and residential development. The group estimates that by 2015, an additional 100 residential units and 60,000 square feet of retail will be completed.
- Sugar House Crossing Development - 210 residential units and 56,000 SF retail space by 2014, with the addition of 50,000 SF of office space by 2030.
- Boulder Venture Project – 20,000 SF of retail and 30,000 SF of office. This project is currently under construction and will be complete in the winter of 2013.
- Cowboy Partners Project – 170 residential units and 1,200 SF of retail. This project will break ground in winter 2013 and be completed in 2014.

CHAPTER 2: PURPOSE OF AND NEED FOR THE PROJECT

The purpose and need of the project are identified in order to guide the analysis of the project and ensure the AA meets FTA Project Development Process.

2.1 Community Goals

Consultation with approximately 25 stakeholders during a set of interviews, along with a group workshop, to identify community goals and values resulted in development of a set of community goals for the study. Table 2.1-1 lists the stakeholders involved.

Table 2.1-1. Stakeholders

ORGANIZATION	NUMBER OF REPRESENTATIVES
Bike Community/Transportation Advisory Board	1
East Central Community Council	1
Gardiner Properties	1
Mecham Management	1
Olsen Properties	2
Boulder Ventures	1
Parley's Rails, Trails, and Tunnels Coalition	1
Salt Lake City Fire Department	1
South Salt Lake City	2
Sprague Library	1
Sugar House Community Council	4
Sugar House Merchants Association	1
Sugar House Park Authority	1
Utah Department of Transportation	1
Utah Transit Authority	2
Wasatch Front Regional Council	1
Westminster College	1
Woodbury Properties	3
Zions Bank	1

The draft goals and needs were presented for refinement and feedback at an Open House held in July 2011. The study goals include:

- Extend transit service to serve a greater number of households, employment, student trips, and transit connections.
- Provide an alternative to auto travel to accommodate the increase in trips resulting from future development in the Sugar House Business District and the surrounding area.
- Support economic development in Sugar House by catalyzing development consistent with the Sugar House Master Plan.

- Support regional goals for livability, connectivity, and the improvement of air quality, transit ridership, and transit-oriented development.
- Provide a safe, attractive, and functional pedestrian environment to promote a walkable community.
- Improve quality of life for residents and visitors to Sugar House; access to transit, jobs, and recreation centers; reduced expenditures on personal transportation; more housing choice; and improve health and air quality.

The purpose and need statements stem from the community goals, as noted above and established through the stakeholder and steering committee process. Community goals were supplemented by technical needs analysis using information from the travel demand model, master plans, and previous studies.

2.2 Purpose of the Project

The purpose of the Sugar House Phase 2 Project is to maximize the investment in Phase 1 by extending high-quality transit service further into the Sugar House Business District area, to provide alternatives to auto use, and to support community development (as defined in the regional and community goals), including a safe pedestrian environment, that will contribute to improving the quality of life for the area.

2.3 Need for the Project

The need for the Sugar House Phase 2 project is described below, along with supporting data and information to describe the associated problem or unique opportunity. The need for the project comes from the desire to improve access to the transit network; the desire to expand travel choices; expected growth of vehicle trips in the Study Area; and support for adopted plans, planned redevelopment, and changing land use patterns.

2.3.1 Extended transit service is needed to reach the center of Sugar House.

The Sugar House Streetcar Phase 1 Project is projected to serve 2,000 – 3,400 riders per weekday (depending on modeling methodology). The project has independent utility and, while is supports the larger system, can stand alone. However, extending the high-quality transit service of the Phase 1 Project to reach the center of the Sugar House Business District, rather than merely the edge of the District, would greatly improve the Phase 1 Project and enhance its success. The Phase 1 Project stops short of serving the anticipated 660 residential units, over 205,000 SF of retail, and 75,000 SF of office space expected to be added to the Study Area in the next five years.

2.3.2 Extended transit service is needed to reduce VMT and projected growth in auto trips associated with projected population and employment in the Study Area.

The Sugar House Master Plan has zoned the area for increased density, and several developments are planned or currently underway, as discussed in the previous section. The Phase 2 Study Area has experienced rapid growth in the past decade and is expected to continue this growth through 2040. Table shows the projected growth in population, households, and employment in the Study Area as used in the travel demand model.

Population, household, and employment data and projections are derived by the WFRC and are based on population and employment projections published by the Governor's Office of Planning and Budget. Demographic data are included in the WFRC travel demand model (Version 7.0 Beta) and are the basis for predicting travel patterns.

The WFRC travel demand model used for the Phase 2 Project is calibrated with 2007 as the base year. It is standard practice for travel demand models are typically calibrated to a base year that is at least two years earlier than the version release date. This is largely due to the extensive amount of data collection, data processing, and calibration necessary to develop and update travel demand models. Data availability can be important as well. Consider that data sets used for calibration, such as annual average daily traffic volumes, are not available for several months into the subsequent calendar year.

According to the data used in the model, the population of the Study Area in 2007 was about 6,100. At an average household size of 2.4 people, the number of households in the Study Area was about 2,600. The travel demand model calculated approximately 6,700 jobs in the Study Area in 2007.

Table 2.3-1. Population, Households, and Employment in the Study Area

DEMOGRAPHIC CHARACTERISTIC	*2000*	*2007 (model base year)*	*2040 (projected)*	*2007 – 2040 PROJECTED CHANGE*
Population	3,300	6,100	8,300	35%
Households	1,500	2,600	3,800	47%
Employment	N/A	6,700	8,100	21%

Source: US Census, WFRC

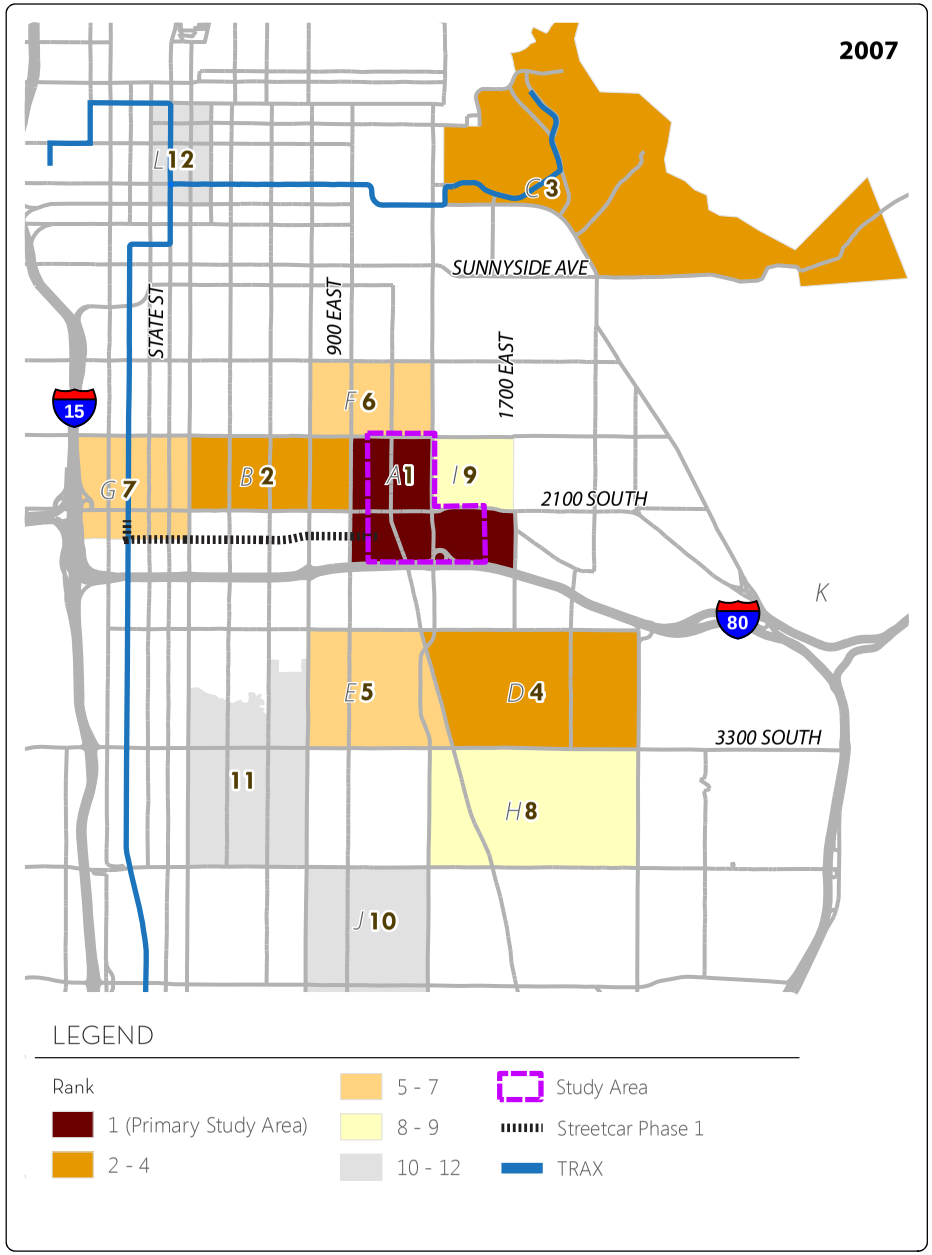
Continued population and employment growth in the Study Area has resulted in increased vehicle miles and congestion on Study-Area roadways.

Based on the socioeconomic and trip pattern information in the WFRC travel demand model, trip tables were developed that estimate the travel demand (that is, the anticipated trips) between various locations. Motorized and non-motorized trips in the Study Area currently total about 89,100 trips each day.

The highest demand for travel in 2040 is projected to be internal to the Study Area, between the Study Area and the University of Utah, or between the Study Area and South Salt Lake (see Figure 2.3-1). This demand analysis demonstrates the need to serve shorter trips for a variety of purposes.

TRAVEL DEMAND TO/FROM STUDY AREA

Figure 2.3-1 | Sugar House Phase 2 Alternatives Analysis



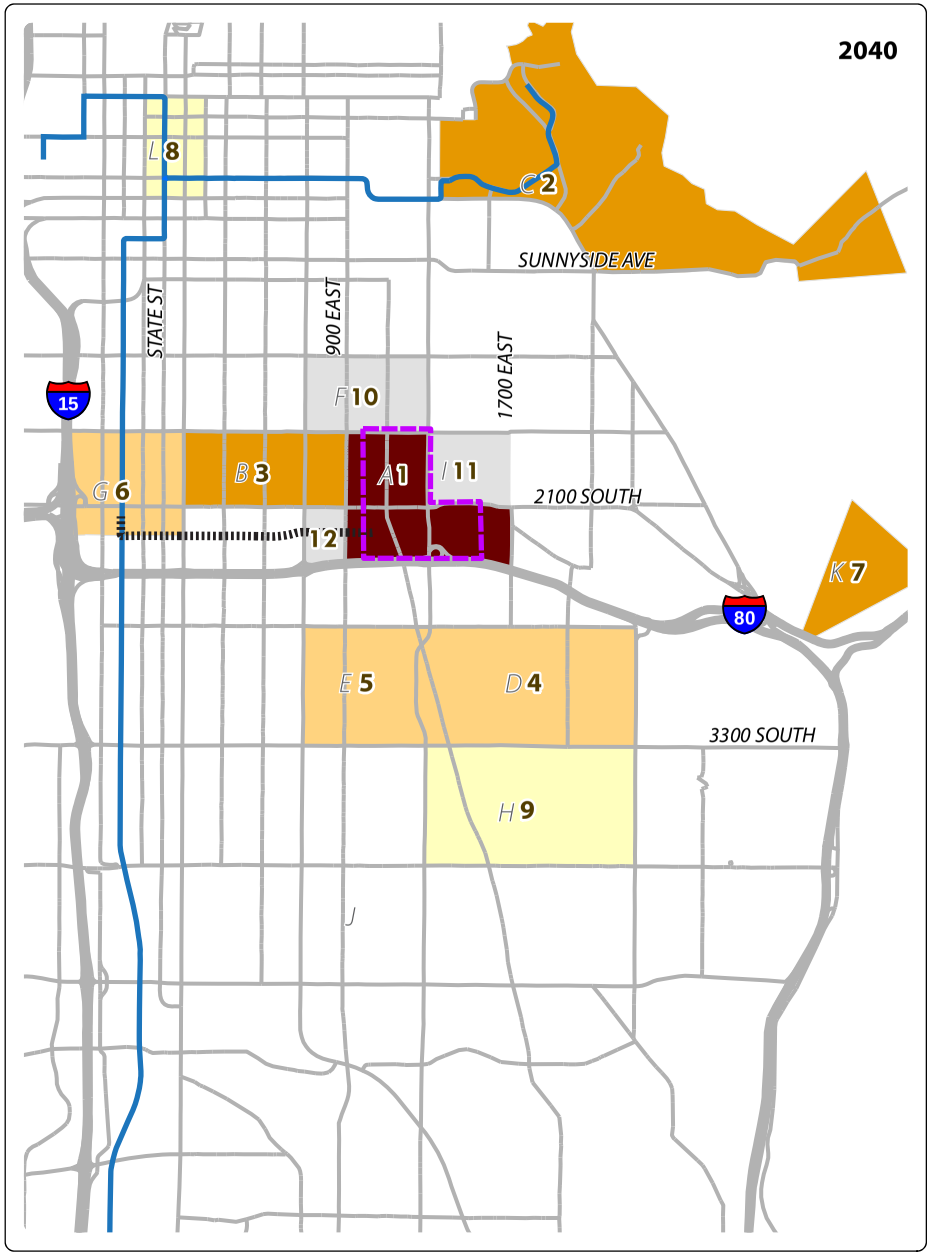


Table 2.3-2 summarizes the top areas for existing travel demand and future travel demand projections for trips to and from the Phase 2 Study Area, as shown in Figure 2.3-1.

Between now and 2040, the roadway network is not expected to increase in lane miles. This means there will be no additional capacity to accommodate future growth; the roadways will be able to accommodate the same number of vehicles as today.

In the 2007 scenario, there were roughly 17,290 vehicle-miles travelled (VMT) in the PM peak hour on Study Area roads. However, in 2040 there is estimated to be approximately 20,180 vehicle-miles in the PM peak hour on Study Area roads. This means more traffic on the same network as today, increasing the amount of vehicle-miles which will occur on heavily-congested roads. There is an expected 55.3% increase in Study Area traffic on congested roadways, as shown in Table 2.3-3. Figure 2.3-2 illustrates the volume-to-capacity of roadways in the Study Area for the existing conditions and future scenarios.

Table 2.3-2. Regional Travel Demand to and from the Study Area

ORIGIN OR DESTINATION	DAILY TRIPS[a] 2007	2040	PERCENT CHANGE
A. Within Sugar House Business District	4,800	6,500	35%
B. South Salt Lake	3,300	3,600	9%
C. University of Utah	2,800	4,100	46%
D. West Canyon Rim	2,500	2,700	8%
E. Brickyard Area	2,100	2,500	19%
F. Northwest Sugar House	1,700	1,900	12%
G. West South Salt Lake	1,700	2,400	41%
H. East Mill Creek	1,500	1,900	27%
I. Central East Sugar House	1,500	1,700	13%
J. Central Mill Creek	1,400	2,700	93%
K. Park City	800	2,000	150%
L. Downtown Salt Lake City	1,300	1,900	46%
Total to and from Study Area	90,500	117,100	29%

Source: WFRC, 2011

[a] The numbers reported are daily person-trips.

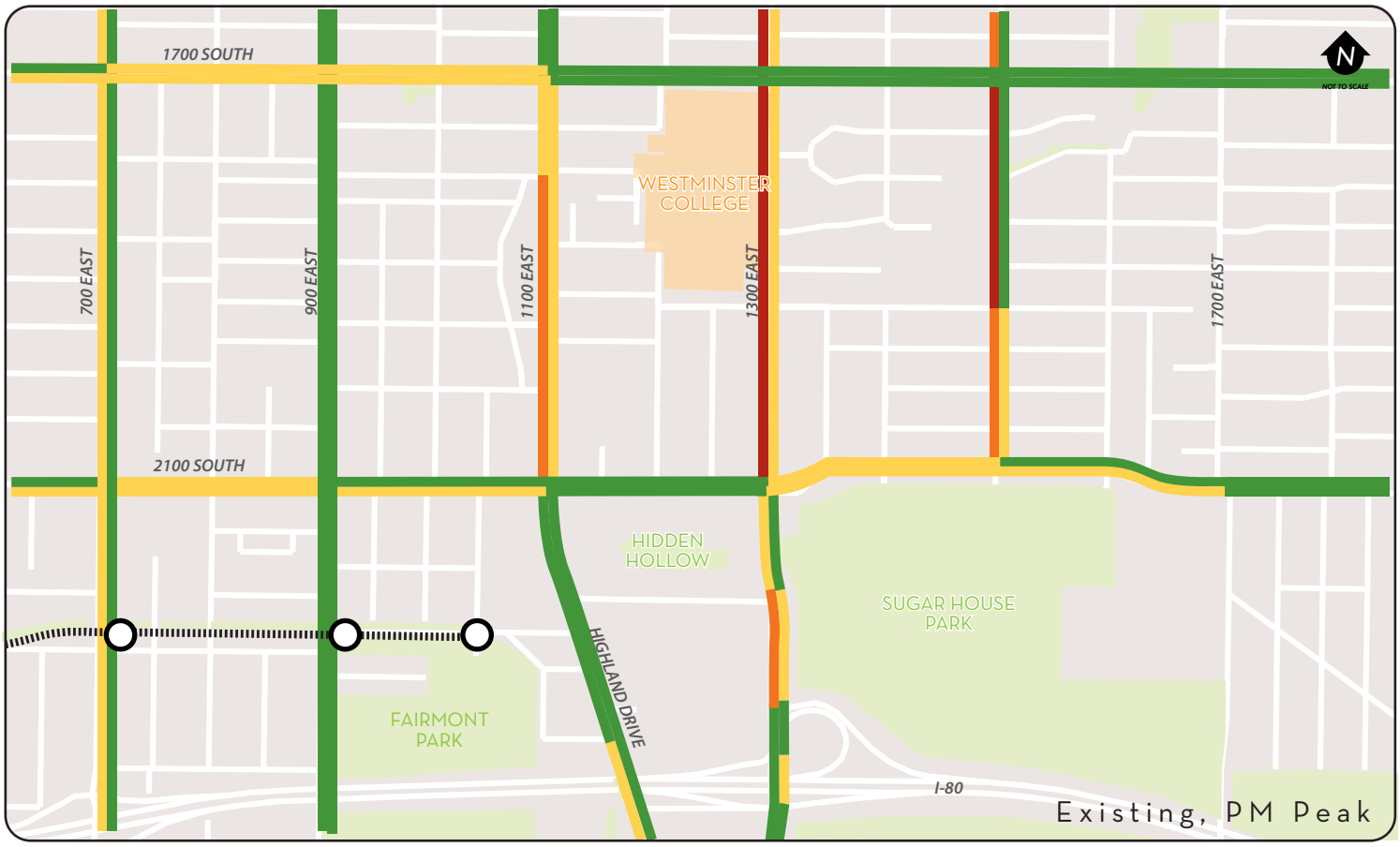
Table 2.3-3. Regional Travel Demand to and from the Study Area

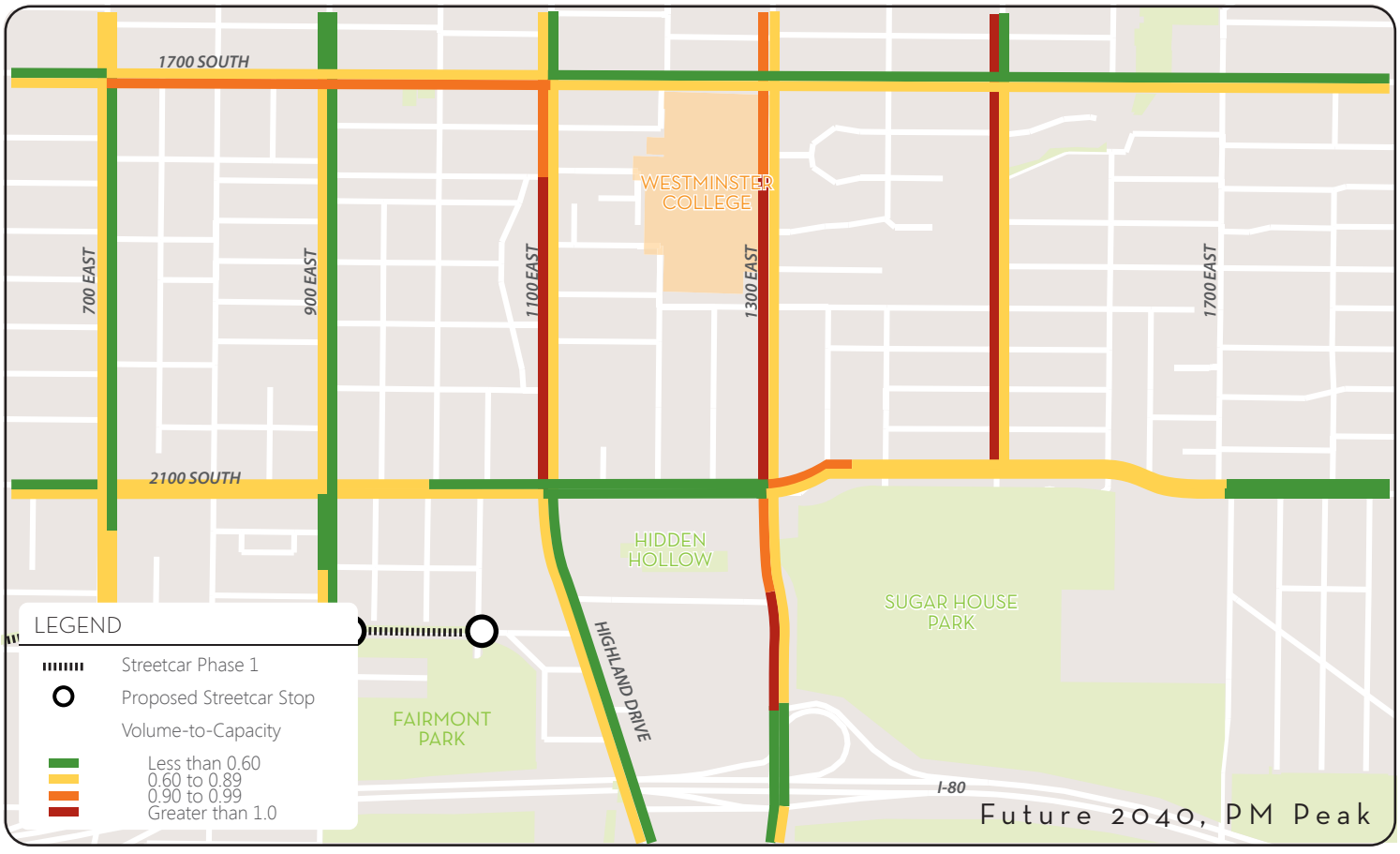
	ADT[1]	VMT OF TRIPS INTO THE STUDY AREA[1]	LANE MILES[2]	PM PEAK VMT[2]	% VMT[2] ON ROADS WITH PM PEAK V/C >= 0.9
2007	554,077	312,445	13.70	17,290	14.5%
2040	642,145	450,304	13.70	20,180	22.5%
Growth	88,068	137,860	-	2,891	8.0%
Percent Change	15.9%	44.1%	0.0%	16.7%	55.3%

1. Vehicle-miles traveled include auto travel outside the Study Area.
2. Average Daily Traffic (ADT) & Lane Miles do not include centroids (the modeled link that distributes trips to the roadway network) and only includes Study Area roads.

ROADWAY NETWORK VOLUME-TO-CAPACITY

Figure 2.3-2 | Sugar House Phase 2 Alternatives Analysis





In the future, there will be more travel on Study Area roads, even though there will be no additional lane miles to accommodate this growth. This results in an increased percentage of vehicle-miles occurring on congested roadways, potentially increasing user cost and delay and reducing air quality.

Further transit solutions are needed to reduce the automobile trips generated by overall population and employment growth resulting from the build-out of the area and as indicated in the model.

2.3.3 Extended transit service is needed to serve the imminent developments in the Sugar House Business District.

The growth in population, employment, and trips described above is in part due to the imminent developments planned in the Sugar House Business District. The plans for the Sugar House Streetcar Phase 1 Project have generated interest within the development community, and each development is being designed to contribute to the mixed use, walkable vision as described in the Sugar House Master Plan. Developments within the Study Area that have recently been constructed, are underway, or are approved are described in Section 1.3.5 above. Half of these projects are located just beyond the end of the Phase 1 Project, and are shown in Figure 1.2-1.

Extending transit deeper into the Sugar House Business District is needed to maximize the transit capture of trips generated as a result of these developments; thereby, providing support for transit-oriented development and economic development in the Study Area.

2.3.4 Extended transit service is needed to maximize the capture of college and work trips on transit as opposed to the automobile.

Work and college-related trips to the area are projected to increase between now and 2040, and these users are expected to create additional demand for transit as roadways become more congested. Westminster College is in the process of expanding its student housing and classroom space into the Sugar House Business District. With enrollment expected to increase over the next two decades, more students and faculty will travel to the Study Area, as shown in Table 2.3-4. Productions are trips starting at the home and attractions are trips destined for the college.

Table 2.3-4. Home-Based College Trips to the Study Area

TRIP END	*2007*	*2040*	*PERCENT CHANGE*
Attractions	3,600	5,600	55%
Productions	500	1,100	124%

Source: Fehr & Peers, 2011

The WFRC travel demand model was used to obtain data regarding trip purpose in the Study Area. The Study Area, which includes Westminster College, attracted roughly 3,600 daily trips in 2007. Home-based college productions are expected to grow by roughly 124% over the next two decades. A significant portion of this growth can be accounted for with the addition of Westminster off-campus student housing in the Sugar House Business District. The close proximity of the University of Utah and Salt Lake Community College, along with lifestyle amenities (restaurants, entertainment and shops), attracts many students to the area. The model used for the Phase 2 Project is calibrated to 2007.

In the study area, two to four percent of home-based college trips were by transit in 2007. This mode share is expected to increase as Westminster began a campus-wide paid parking program in the fall of 2011. In addition, Westminster has a program that provides free UTA premium transit passes to students, faculty, and staff.

Roughly twice as many home-based work trips and home-based other trips have Sugar House as their destination rather than their origin, in the area. This acknowledges Sugar House as a regional destination. With the addition of proposed mixed-use development projects, office and commercial space will increase, and with them, so will the number of trips to the area, as shown in Table 2.3-5.

Table 2.3-5. Non-College Trips to the Study Area

TRIP END	*2007*	*2040*	*PERCENT CHANGE*
Home-Based Work	10,800	14,700	36%
Home-Based Other	38,700	48,600	26%
Non-Home-Based	35,600	45,000	27%

Source: Fehr & Peers, 2011

The City Transportation Master Plan does not include expansion of existing roadways to accommodate traffic, described above. An extension of transit is needed to penetrate further into neighborhoods in order to provide better access to the regional system for residents, employees and students.

2.3.5 Extended transit service is needed to support regional and local goals for walkable, sustainable communities.

Land use in the Study Area is expected to change over time, primarily becoming denser and more diversified with multiple large-scale developments currently being planned, constructed or approved. Several development projects, as described in Section1.3.5, are planned ¼ to one mile beyond the planned end of the Sugar House Streetcar Phase 1 Project. The framework of a walkable community is already underway in this area, and an extension of transit is necessary to support several levels of planning goals. These planning goals are derived from adopted regional and local land-use and transportation plans (Sections 1.3.3 and 1.3.4) that apply in the Study Area.

Goal 1: Meet the objectives of the Wasatch Choice for 2040, which identifies Sugar House as a town center supported by transit. Town centers are characterized as being more walkable, transit-oriented communities. The quarter-mile walk shed of the current Sugar House Streetcar Phase 1 Project does not engage many of the planned walkable developments that would create a town center in Sugar House.

Goal 2: Concentrate development as proposed in the Envision Utah 3% strategy. Specifically, transit-oriented development provides an improvement to transit accessibility, and an opportunity for more concentrated development, consistent with regional goals.

Goal 3: Accommodate the expected future transportation demand and planned land-use development and livability goals and objectives of Salt Lake City as outlined in the Sugar House Business District Mobility Guidelines and the Salt Lake City Sustainable Codes project. The Mobility Guidelines state that the Sugar House Business District is "intent on transforming itself into a more transit-oriented area that relies less on the automobile."

Goal 4: Implement the Sugar House Master Plan which supports densification of the area, while promoting a walkable environment.

In addition to these goals, Westminster College has developed a campus plan that extends from 1700 South to Sugar House, as well as a paid parking policy to discourage cars accessing campus.

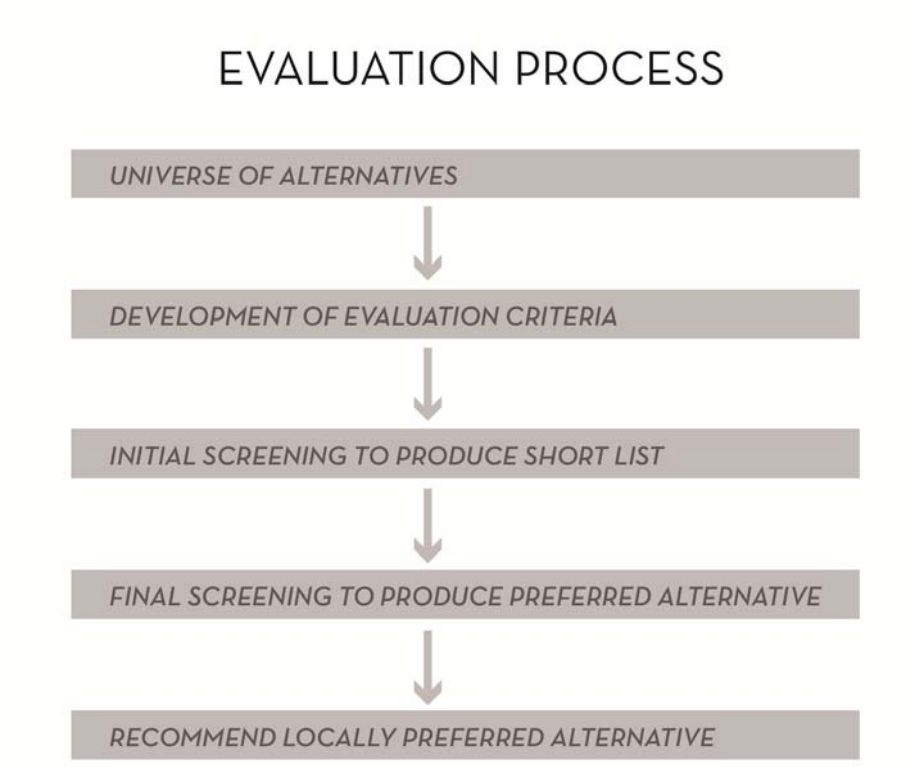
Providing opportunity for people to access the regional transit system will further UTA's goals for regional system ridership. The extension of transit is needed to serve the Study Area, where many pedestrian improvements will be made, and to support the multi-modal goals of the Sugar House Master Plan. The proximity of mixed land uses keeps walking distances short, ultimately promoting walking as a preferred mode of transportation. The critical missing element is a high-quality transit option that extends walking trips and acts as a 'pedestrian accelerator" to move people efficiently over longer distances.

CHAPTER 3: EVALUATION METHODOLOGY

This section describes the evaluation methodology for the project.

3.1 Evaluation Process

The Alternatives Analysis (AA) presents an evaluation of alternatives under consideration for the project. The alternatives were screened based on criteria developed by the Steering Committee, and based on the community goals, to identify a Locally Preferred Alternative (LPA). The AA provides decision-makers the information needed to advance the Phase 2 Project into the next phases, including environmental documentation in compliance with the National Environmental Policy Act (NEPA), design, and construction. The evaluation process, shown below, includes two screening phases, Initial Screening and Final Screening, which are described more fully in Chapters 4 and 5.



3.1.1 Definition of Alternatives

To be eligible for funding through the Federal Transit Administration's (FTA's) New Starts/Small Starts Program, the evaluation of alternatives for Sugar House Transit Study – Phase 2 has been conducted in accordance with FTA guidance, as described in the first chapter. This alternatives evaluation process is defined by three primary steps: project initiation, development, and

refinement of alternatives. A technical evaluation effort concludes with a locally preferred alternative recommendation, and will be presented in the following chapter.

- **Project Initiation**. This initial phase engaged the public, stakeholders, and agency staff to clarify and define the reasons a transit investment is being pursued. The results of these efforts included statements regarding the project purpose and need, definition of conceptual alternatives, and preliminary evaluation criteria. This step also included creation of the Project Initiation Package.
- **Develop and Refine Alternatives**. The essence of this effort was to identify a range of transit modes and conceptual alignments and screen these transit scenarios against a set of evaluation criteria determined based on input from stakeholders and the public. This work lays the foundation for subsequent refinement and evaluation of alternatives by removing impractical or otherwise undesirable solutions from further consideration.
- **Evaluate Alternatives and Select LPA**. This phase entails a detailed and rigorous evaluation of alternatives using technical methodologies established in previous phases. This effort includes selection of a locally preferred alternative and preparation of a report to document the study process, evaluation, and recommendations.

3.1.2 Evaluation Criteria

Initial screening included a conceptual level evaluation that analyzed the advantages and disadvantages of the alternatives considered. The initial screening also encompassed an analysis of reasonable alternatives, which were developed cooperatively through the public process, Steering Committee, and Stakeholder Committee. The purpose of the initial screening was to determine which of the alternatives would be the most feasible, and thereby narrow the range of alternatives considered for more detailed analysis in the final screening phase. The initial screening evaluation criteria sought to eliminate alternatives that have fatal flaws, do not meet project goals, or do not have public support.

The final screening analyzed the list of alternatives that advanced from the initial screening.

The final screening evaluation criteria were more quantitative than the criteria used for initial screening and addressed ridership potential, cost, system configuration, design issues, environmental issues, land use and economic development opportunities, and community support. The results of the final screening culminate in the identification of a LPA.

The global evaluation criteria presented in Table 3.1-1 were developed based on the project objectives outlined in Chapter 1. The evaluation criteria were developed to objectively measure and compare various transit alternatives. The evaluation criteria from this table were applied selectively throughout the study, depending on the level of detail necessary to differentiate alternatives; for example, some criteria are more useful for initial conceptual screening, while others are better applied to subtle variations of route alignment. Specific evaluation criteria used to measure alternatives are presented in subsequent sections.

Table 3.1 -1. Evaluation Criteria

CONSISTENCY WITH PURPOSE AND NEED	*MEASURE*
Extended transit service is needed to reach the center of the Sugar House Business District	• Ridership • Access to current and planned development
Extended transit service is needed to reduce VMT and project growth in auto trips associated with projected population and employment in the Study Area	• Person capacity • Reduction in projected growth of auto trips
Extended transit service is needed to serve the imminent developments in the Sugar House Business District	• Access to current and planned development • Support for redevelopment and TOD plans • Number of work-related, home-based and non-home based trips on transit • Projected Ridership • Number of work-related trips on transit • Mode split
Extended transit service is needed to maximize the capture of college and work trips on transit as opposed to the automobile	• Demographic summary • Number of student, work, and other trips projected on transit. • Mode split • Ridership
Extended transit service is needed to support regional and local goals for walkable, sustainable communities	• Consistency with regional and local goals • Mode split for transit/walking • Connectivity to regional and local bicycle/pedestrian facilities
TECHNICAL FEASIBILITY	*MEASURE*
Cost Effectiveness	• Projected ridership • Riders per mile • New riders to the system • Cost • Cost effectiveness
Physical Aspects	• Right of way needs • Constructability issues • Traffic operations issues • Design considerations • Vehicle selection
Public Support	• Stakeholder and public support for alternatives
Environmental Review	• Environmental fatal flaw analysis

3.2 Initial Screening Evaluation Criteria

The initial screening evaluation analyzed the list of reasonable alternatives considered (which were developed by the RDA, Stakeholder Committee, and the public) using a set of qualitative and quantitative evaluation criteria. Its purpose was to eliminate alternatives that have fatal flaws, do not meet project goals, or do not have public support.

The bullets below describe the criteria used in the initial screening analysis to evaluate potential alternatives. All of the criteria were weighted equally for the initial screening.

- **Population and employment within ¼ mile from the corridor of study**. How many people and jobs would access the corridor within a short walk?
- **Preliminary estimate of ridership**. Using the WFRC Travel Demand Model Version 7, how many riders would be generated? What is the least or most productive alignment on a per-mile basis?
- **Travel markets served**. What proportion of student and work trips are served? How effectively does the alignment serve major generators of activity and higher learning institutions?
- **Consistency with adopted plans**. Does the alignment concur with previously adopted plans? To what degree?
- **Land Use and Economic Development**. Does the alignment serve areas where existing transit supportive land uses already exist? Does the alignment provide additional access to future potential for transit-oriented development?
- **Mobility benefits and connection to transportation system**. What is the anticipated traffic volume and capacity on each alignment (volume-to-capacity ratio)? What multi-modal connections can be made on this alignment? What mobility challenges exist today that would influence the effectiveness of transit?
- **Public support**. Based on stakeholder and public feedback, what is the popularity of the alignment?
- **Environmental and constructability fatal flaw analysis**. What are the environmental limitations of the alignment? Would these prohibit this alignment from construction?

3.3 Final Screening Evaluation Criteria

The purpose of the detailed level of screening is to further develop and evaluate remaining alternatives. The final screening evaluation criteria were more quantitative than the initial screening evaluation criteria and were intended to identify a Locally Preferred Alternative (LPA). The final screening evaluation criteria were based on the following categories:

- **Ridership**. Using a station-area approach to ridership evaluation, station area boardings, boardings per alignment, and boardings per mile are calculated. A direct ridership model (DRM) was created for the Sugar House Streetcar. The DRM used on this project is directly and quantitatively responsive to land use and transit service characteristics within the immediate vicinity and within the catchment area of transit stations. The model is predictive of ridership at individual stations based on local station area and system characteristics, and is based on empirical relationships found through statistical analysis of station ridership and local station characteristics of currently-operating systems in Portland, Seattle, and Tacoma. A DRM is different than a regional travel demand model, which often preclude detailed land use data collection and differentiation at the station-level. Because this study is focused at a local travel market, a DRM is better for analyzing ridership at the local level. In addition, the regional model does not have a streetcar mode calibrated.

- **Cost.** A preliminary estimate of cost is prepared, which includes any special circumstances for construction.
- **Engineering and operations**. Preliminary conceptual engineering is prepared in order to uncover physical constraints, right-of-way considerations, and any issues with the constructability of the alignment. Operations analysis is also considered to account for the inter-operability of Phase 1 and Phase 2 projects.
- **Environmental screening**. A preliminary environmental report prepared to identify potential environmental impacts and degree.
- **Support for economic development/redevelopment**. A measure of the available redevelopable area within ½ mile of each alignment, and an evaluation of existing assets, land use and zoning.
- **Timing**. The degree to which the alignment could be timed with the construction of the Phase 1 streetcar and with future proposed developments.
- **Public support**. Information gathered through a series of stakeholder meetings as well as a public open house.

The evaluation and comparison of the alternatives followed a screening structure where the data for each of the alternatives is assigned a low, medium, or high rating for each of the criteria. Quantitative and qualitative data are gathered for each alignment, and the following rating scale is applied:

Table 3.3-2. Screening Rating Scale

1 | WORST	*2 | MODERATE*	*3 | BEST*
Less effective	Effective	More effective
Greatest potential impacts	Moderate potential impacts	Least potential impacts
Least potential benefit	Moderate potential benefits	Greatest potential benefits
Least public/stakeholder support	Moderate support	Greatest public/stakeholder support

Detailed environmental analysis would take place during the environmental documentation phase to comply with the National Environmental Policy Act (NEPA). The environmental documentation phase would begin after adoption of the LPA. Service planning, stop configurations and effects to existing transit services due to streetcar implementation would also be examined during the environmental documentation phase.

CHAPTER 4: INITIAL SCREENING OF ALTERNATIVES

This section describes the initial screening of alternatives for the project. During the initial screening of alternatives, a range of modes are considered. The initial screening relies on a combination of technical and qualitative data. The evaluation provides the comparative benefits and disadvantages of each alternative, as well as the ability to meet elements of the Purpose and Need.

4.1 Preliminary Screening

The preliminary screening of alternatives consists of an evaluation of both mode and alignment. Preliminary screening includes the following levels of analysis:

- **Mode Evaluation.** Mode evaluation included the consideration of a 'universe' of modes, and then narrowed the list to the most applicable modes for this context.
- **Alignment Evaluation.** Preliminary alignment evaluation included a 'universe to long list' analysis and a 'long list to short list' evaluation.

4.1.1 Mode/Technology Evaluation

4.1.1.1 Mode Screening

The Study Area described in Chapter 1 is roughly one square mile beyond the terminus of the Phase 1 Sugar House Streetcar. Given this short distance, and the existing and planned transit service in the area, the steering committee initially narrowed the extension alternatives to three practical modes: streetcar/light rail (extend Phase 1 service), bus rapid transit (BRT), and standard bus.

The primary evaluation criterion is the ability of the mode to meet the stated project goals. Criteria for the evaluation of modes are listed below:

- Connect the Phase 1 streetcar to the active center of Sugar House.
- Compatibility – Does this technology fit within the land use, social, and cultural context of the study area? Is this technology compatible with the existing and planned transit system - specifically, the Phase 1 Sugar House Streetcar route?
- Support regional goals for livability, connectivity, and the improvement of air quality, transit ridership, and transit-oriented development.
- Support economic development in Sugar House by catalyzing development consistent with the Sugar House Master Plan.

To evaluate mode performance, a yes/no rating is used to evaluate the ability for each of the considered modes to meet the needs of the project. Results are shown in Table 4.1-2. All three modes were determined to be able to connect the Phase 1 streetcar with the active center of Sugar House. However, streetcar would be the most compatible as it would not require an additional transfer. Further, roadway right-of-way is highly constrained with the Study Area,

and dedicated transit lanes are not realistically feasible. Thus, dedicated lanes for BRT are not feasible and BRT service would operate much like a standard bus. Both streetcar and BRT can support transit-oriented development, while bus typically does not spur this type of development. The effects of economic development of streetcar are already being seen along the Phase 1 Streetcar. Developers in the Study Area cite streetcar as a leading reason for local redevelopment projects. The Sugar House Master Plan calls for multi-modal transportation options that include rail-based technology.

Table4.1-2. Level 1 Screening Results

ALTERNATIVE	DESCRIPTION	CONNECTION	COMPATIBILITY	REGIONAL GOALS	ECONOMIC DEVELOPMENT
Streetcar	Slow speed, more frequent stop rail, serving neighborhood and sub-regional riders.	Yes	Yes	Yes	Yes
Bus Rapid Transit (BRT)	Bus with enhanced features such as dedicated right of way and transit signal priority.	Yes	No	Yes	Yes
Bus	The most common technology for mass transit, and the most prevalent in the region.	Yes	No	No	No

In the context of the Sugar House Streetcar line and rail vehicle fleet currently used by UTA, the distinction between light rail and streetcar is a function of branding, vehicle styling, and operating characteristics. UTA is planning to operate Siemens S70 rail vehicles for the Sugar House Streetcar line (Phase 1), the same vehicle used on the West Valley and Mid-Jordan TRAX lines. The Sugar House line is distinguished as a modern streetcar, as opposed to conventional TRAX vehicles, based on:

- unique vehicle styling and branding,
- slower operating speed,
- shorter distance between stations, and
- one-vehicle train length.

Because this project is intended to address local transportation, the rail mode that was chosen for analysis was streetcar, although the technologies of streetcar and light rail could be viewed as interchangeable.

After evaluation of potential alignments, BRT was removed from further consideration because it was considered infeasible to provide dedicated service lanes. Roadway width is constrained within the study area; logical corridors for a transit extension generally have less than 50 feet of pavement. Dedicated transit lanes at the expense of vehicle travel lanes, storefronts, and/or sidewalks are not desirable based on the project goals to maintain mobility for all modes of travel. Without an exclusive operating way, BRT service would operate more like a standard bus or enhanced bus service.

Standard/enhanced bus is considered the Transportation System Management (TSM) alternative (no-guideway investment), and is carried forward as an alternative against which the mobility benefits of other alternatives are compared. A no-investment alternative is required by FTA in the AA process. Ultimately, streetcar and standard/enhanced bus was advanced for further consideration for extension of the Phase 1 Sugar House Streetcar route.

4.2 Preliminary Alignments Development

The initial screening of alternatives focuses on a set of conceptual alignments developed in consultation with the City-assembled Steering Committee, the Stakeholder Committee, and the general public. A public open house was held on July 28th, 2011 at the Sprague Library, which is in the Study Area near Highland Drive/2100 South. Over 70 participants were introduced to the project and gave feedback on specific alignments. The open house provided stations with information about the project, combined with large aerial maps for people to indicate alignment ideas and destinations to which they would take transit. There was no instruction or limitation of ideas for this map exercise. Key messages expressed pertaining to the alignment included:

- Logical termini of an extension are at Sugar House Park, Westminster College, Brickyard shopping center, the University of Utah, and Foothill Drive area.
- Provide a station/stop at the historic monument and plaza near the intersection of 2100 South/ Highland Drive.

The preliminary alternatives development process involves identification of reasonable transit modes, route alignments, and service termini for further consideration.

4.2.1 Termini and Alignment

The end-of-line station of the Phase 1 Sugar House Streetcar line at Sugarmont Drive (2225 South) and McClelland Street is a logical terminus for a transit extension. Existing activity centers to the south, east, and north within approximately 1.5 miles were considered as potential termini. A range of on-street alignments were considered for bus and fixed guideway routes. With the exception of the Granite Block, which is currently in redevelopment stages, most of the study area is built out leaving few opportunities for off-street routes.

Considerations in developing the preliminary alignment alternatives related to practical constructability concerns such as roadway and right-of-way width, adjacent infrastructure, and curb radii as it pertains to transit vehicle turning envelopes.

4.3 Initial Screening Alignments

The Build Alternatives include the proposed improvements to extend transit service in Sugar House. Multiple Build Alternatives were considered for the initial screening. To better evaluate the range of alternatives, the initial alternatives were divided into three directions: North, East, and South. Each direction had multiple alternatives, as shown in Figure 4.1-1.

INITIAL SCREENING ALIGNMENTS

Figure 4.1-1 | Sugar House Phase 2 Alternatives Analysis

Table 4.3-1 includes a description of the initial screening alternatives by segment.

Table 4.3-1. Description of Initial Screening Alignments by Segment

ALTERNATIVE	DESCRIPTION
North Alignments	
900 East	This alignment extends service from the 900 East Sugar House Streetcar station north to the 9th and 9th neighborhood commercial center, and continues to connect to the TRAX station at 900 East and 400 South. Future phases of this alignment could also continue south from the Sugar House Streetcar station to serve other areas of the City. The 900 East alignment assumes the Sugar House Phase 1 Streetcar would be extended to Highland; this would be an addition to the network.
1100 East	The 1100 East alignment extends from the end of the Sugar House Phase 1 alignment to Highland Drive), and would turn north on Highland Drive, which becomes 1100 East. For the purposes of this analysis, this alignment would continue to connect to the 9th and 9th neighborhood. This alignment would serve Westminster College.
1300 East	The 1300 East alignment would connect the Sugar House Business District to Westminster College and the UTA TRAX system. To reach 1300 East from the Sugar House Streetcar Phase 1, the transit extension would either use 2100 South or Wilmington and would continue service to 400 South.
East Alignments	
2100 South	This alignment would travel east on 2100 South to 2100 East. The streetcar would reach 2100 East by either turning north on Highland Drive and then east on 2100 East.
Wilmington (option)	This option is essentially the same as the 2100 South option; however, it would use Wilmington Avenue and 1300 East to reach 2100 South.
South Alignments	
Highland Drive	The Highland Drive alignment would extend transit service south along Highland Drive to the southern end of the City and would terminate near the Brickyard Plaza shopping center.
1300 East	This alignment would serve the southern portion of the City by extending transit south along 1300 East. Like the Highland Drive, this alignment would serve the Brickyard shopping center.

4.4 Initial Screening Evaluation

This section includes the initial screening evaluation for the North, East, and South alignments. The Steering Committee and stakeholders noted those criteria where one set of alignments performed relatively better or worse in an area, as shown in in Table 4.4-1. Table 4.4.-2 presents a comparison of the advantages and disadvantages of the alternatives. More detailed information is located in the appendix.

Ridership for the Initial Screening was modeled in the WRFC travel demand model using the rail transit mode. This more general approach was used because of the less detailed nature of the initial screening and longer lengths of the alternatives.

Table 4.4-1. Initial Screening

CRITERIA	DETAILS
Population/ Employment Served (1/4-mile buffer) (average)	• 1300 East north has the highest population (12,758 in ¼-mile buffer) served, followed closely by 1100 East (12,118). South alignments have lowest population served (7,353 on Highland Drive; 8,088 on 1300 East). • 1300 East alignments have the highest employment served (8,111 south of 2100 South; 7,434 north of 2100 South), while 900 East has the lowest (3,988). East alignments also have low employment served (5,575 on 2100 South; 5,872 on Wilmington).
Ridership	• 2100 South has highest new daily riders per track mile (410). • North alignments' highest ridership is between 1700 South and 2100 South. • South alignments receive the most new ridership from a final station at Brickyard.
Travel Markets Served	• North alignments have a slight increase in college ridership. • East alignment has a slight increase in work trips. • Overall, no real change in travel markets served.
Existing Transit-Supportive Land Uses	• East alignment is mostly residential. • 1300 East south would connect to Brickyard. • North alignments would connect two existing commercial nodes.
Economic Development	• Master plans call for protection of residential land uses along 1300 East. • No foreseeable redevelopment plans along South alignments. • 900 East, 1100 East and 2100 South have commercial mixed with residential.
Mobility and transportation connections	• 1100 East and 2100 South support walkability in the Sugar House Business District. • North alignments could connect to TRAX. • 1300 East north and 2100 South would impact major intersection. • 1300 East south would pass through the I-80 interchange. • Committees concerned with traffic congestion on 1300 East.
Public Support	• 1100 East north and 2100 South have the highest public support. • South alignments have the lowest support.

Table 4.4-2. Advantages/Disadvantages of Initial Screening Alternatives

ALTERNATIVE	ADVANTAGES	DISADVANTAGES
North Alignments		
900 East	• Would connect two commercial nodes • Could connect to TRAX	• Low employment served • Most of corridor is zoned residential • Would bypass the Sugar House Business District
1100 East	• Higher levels of population and employment • Would serve Westminster College • Mixed land uses • Serves the Sugar House Business District • High public support • Could connect to TRAX	• Would pass through somewhat narrow corridor
1300 East	• Higher levels of population and employment • Would serve Westminster College	• Little redevelopment opportunity • Master Plan calls for protection of residential land uses • Higher volume than other intersections at 2100 South and 1300 East, and this is a major access point to the freeway system
East Alignments		
2100 South	• Mid-level population and employment • High ridership numbers (410 new daily riders per new track mile) • Some commercial along alignment • Serves the Sugar House Business District • High public support	• Most of corridor is residential • Higher volume than other intersections at 2100 South and 1300 East, and this is a major access point to the freeway system
South Alignments		
Highland Drive	• Some high density housing • Possible future connection to a planned BRT line on 3300 South	• Low population served • Would bypass the Sugar House Business District • Low public support
1300 East	• High employment served • Possible future connection to a planned BRT line on 3300 South • Serves Brickyard	• Would bypass Sugar House commercial center • Crosses I-80 interchange ramps, which are controlled by UDOT • Low public support

4.5 Initial Screening Recommendations

Based on the results of the initial screening evaluation, the following recommendations were made for alternatives advancing into final screening. Of the North alignments, it was recommended that 1100 East advance and 900 East and 1300 East be eliminated from further consideration. It was recommended that 2100 South advance. It was also recommended that the South alignments be eliminated from further consideration. Table 4.5-1 summarizes the results of the initial screening. Figure 4.5-1 shows the alternatives that advanced from initial screening.

ALIGNMENTS ADVANCED FROM INITIAL SCREENING

Figure 4.5-1 | Sugar House Phase 2 Alternatives Analysis

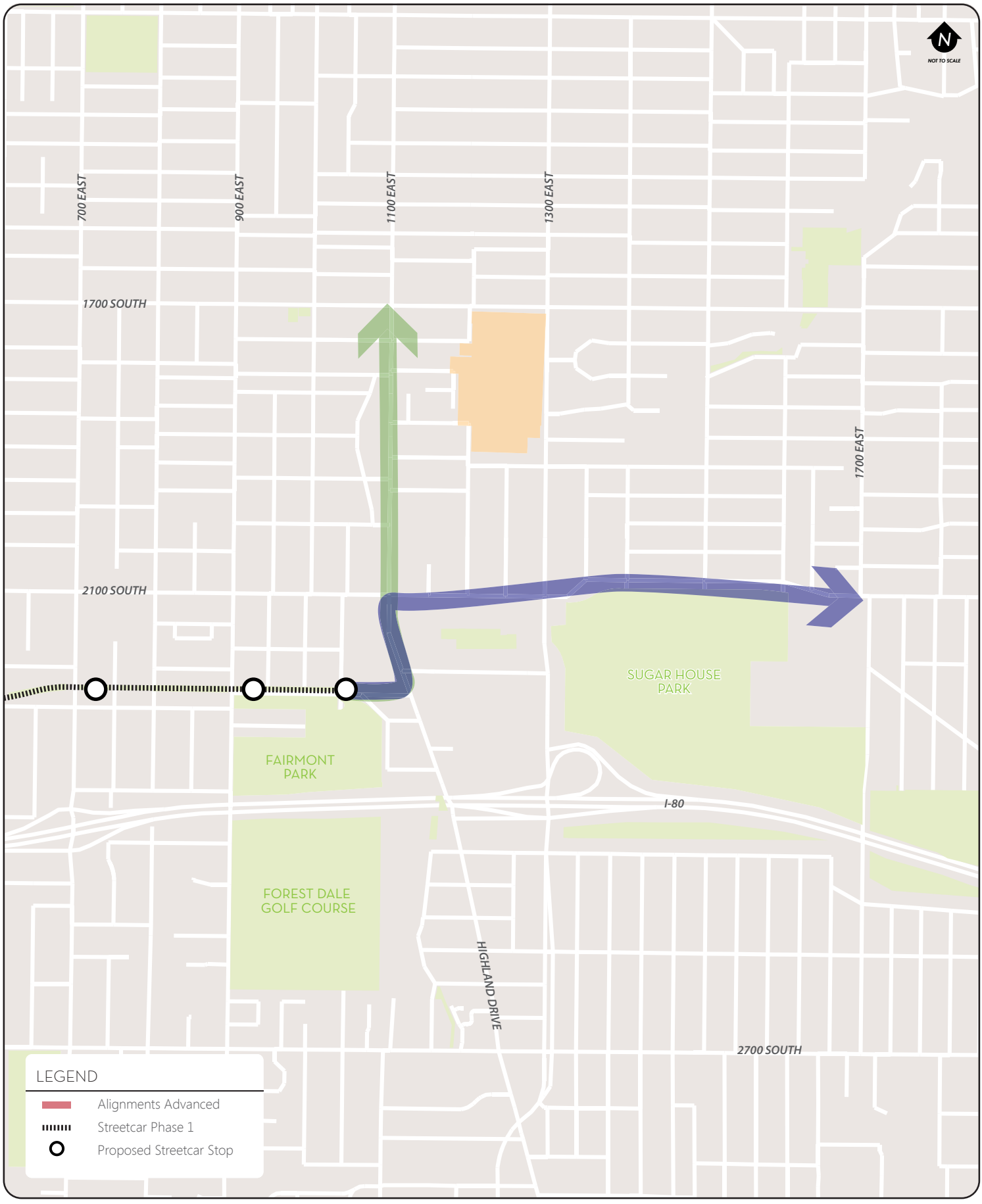


Table 4.5-1. Initial Screening Recommendations

ALTERNATIVE	RECOMMENDATION	NOTES
North Alignments		
900 East	Eliminate	900 East was eliminated because of low employment served and it would bypass the center of the Sugar House
1100 East	Advance	Would serve employment, residential, and Westminster college
1300 East	Eliminate	1300 East was eliminated because there are few economic development opportunities and proximity to major interchange access.
East Alignments		
2100 South	Advance	Would serve the center of Sugar House and performed well in ridership
South Alignments		
Highland Drive	Eliminate	Highland Drive was eliminated because it had low public support and would bypass the center of Sugar House
1300 East	Eliminate	1300 East was eliminated because of major traffic issues through the I-80 interchange and low public support

CHAPTER 5: FINAL SCREENING OF ALTERNATIVES

This section describes the final screening of alternatives for the project.

5.1 *Final Screening Alternatives*

Final screening considered the alternatives that advanced from initial screening, which were recommended for the North and East alignments. The alternatives for final screening were refined to provide more detail within the Study Area. These alternatives are shown on one map in Figure 5.1-1 and shown in individual maps in Figures 5.1.-2 through 5.1-9.

The short list of alternatives consisted of a baseline alternative (the best that can be done without a major capital investment) and eight build alternatives. The baseline is a requirement of the Federal Transit Administration during this level of study. Each of the build alternatives had similar service characteristics, although other attributes differed. For the purposes of this study, the western terminus was the same for each build alternative: the eastern terminus for the Phase 1 Sugar House Streetcar Project (1050 East). The eastern terminus varied somewhat between alternatives. Each alternative would essentially function as a shuttle route between the termini, which means that service would run between the two points. It is important to note that no existing bus routes were modified during this analysis.

5.1.1 No-Action and Baseline Alternatives

In the No-Action Alternative, it was assumed that the Sugar House Streetcar will terminate on Sugarmont Avenue near McClelland Street. No notable roadway improvements are planned within the Study Area by 2020. Light rail and bus transit system is expected to operate much as it does today, with bus routes on most primary roadways. The study area will be served by bus routes on 1300 East, Highland Drive, 900 East, 2100 South, and 1700 South.

The Baseline Alternative is a low capital-cost approach to addressing the transit needs in the Study Area. The Baseline Alternative includes the transit network in the No-Action Alternative, plus a lower cost transit improvement that could meet the criteria established in the Purpose and Need statements. In this case, a shuttle or bus could be used to provide an extension of the Sugar House Streetcar.

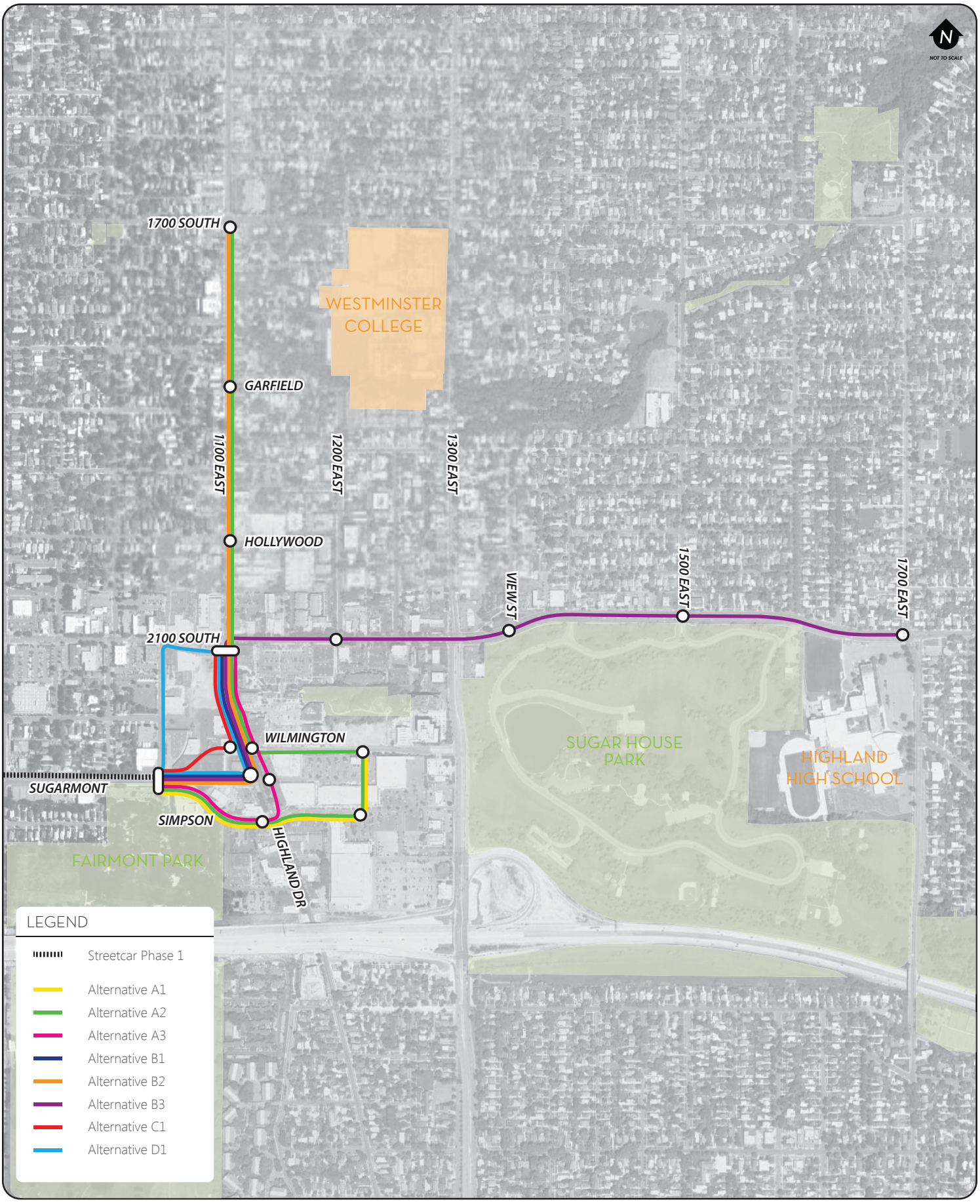
The following characteristics are planned for the shuttle option:

- Headways of 15 minutes in the peak hour, 30 minutes in the off peak (timed with streetcar schedule)
- Four stops: Granite Block, 2200 South/Highland Drive, Hollywood/Highland Drive, Garfield/Highland Drive

Travel forecasts from the WFRC regional travel demand model indicate poor ridership performance for the shuttle service in the baseline alternative, which competes with bus service that serves the same destinations within the Study Area, as well as areas outside the

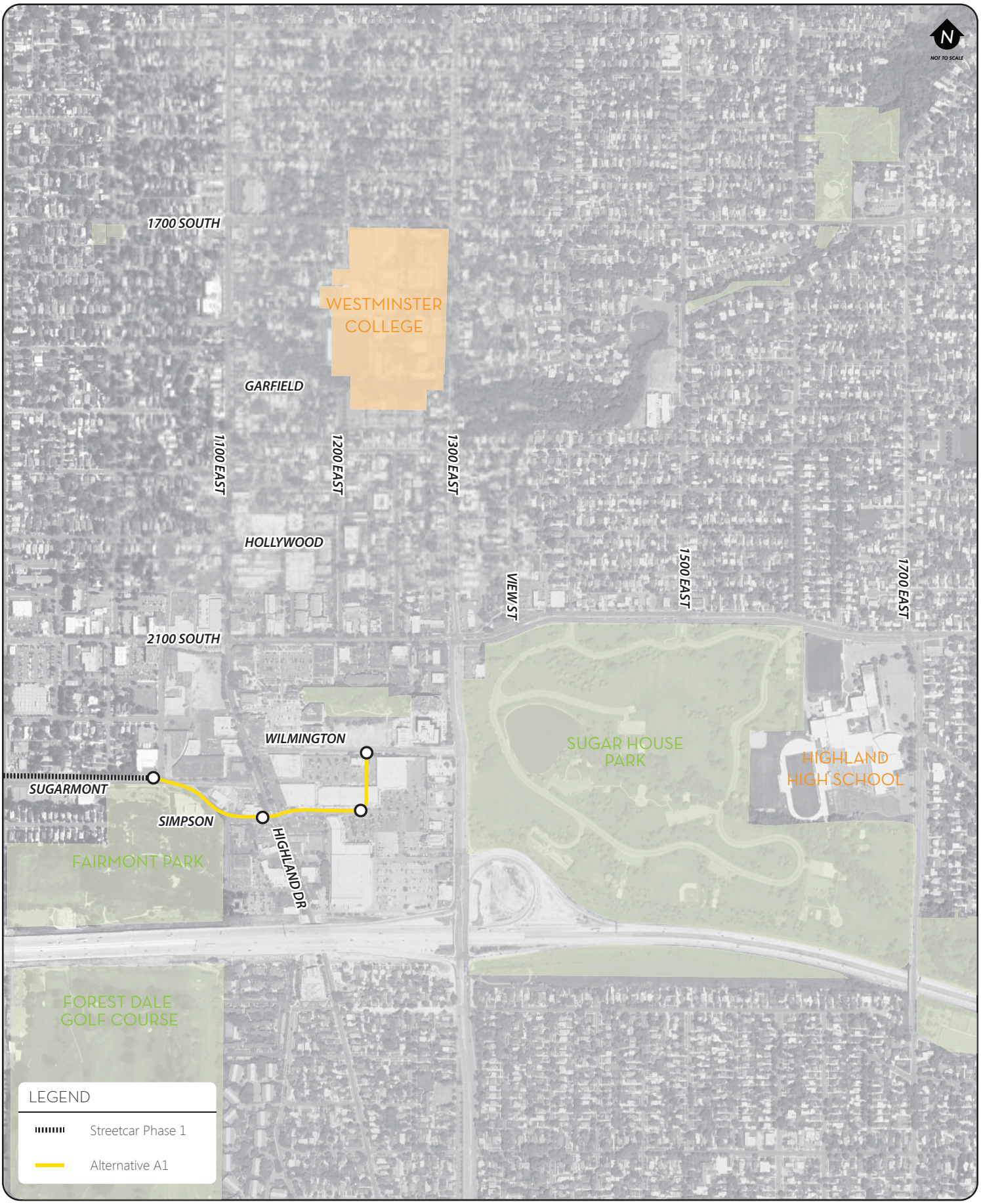
FINAL SCREENING ALTERNATIVES

Figure 5.1-1 | Sugar House Phase 2 Alternatives Analysis



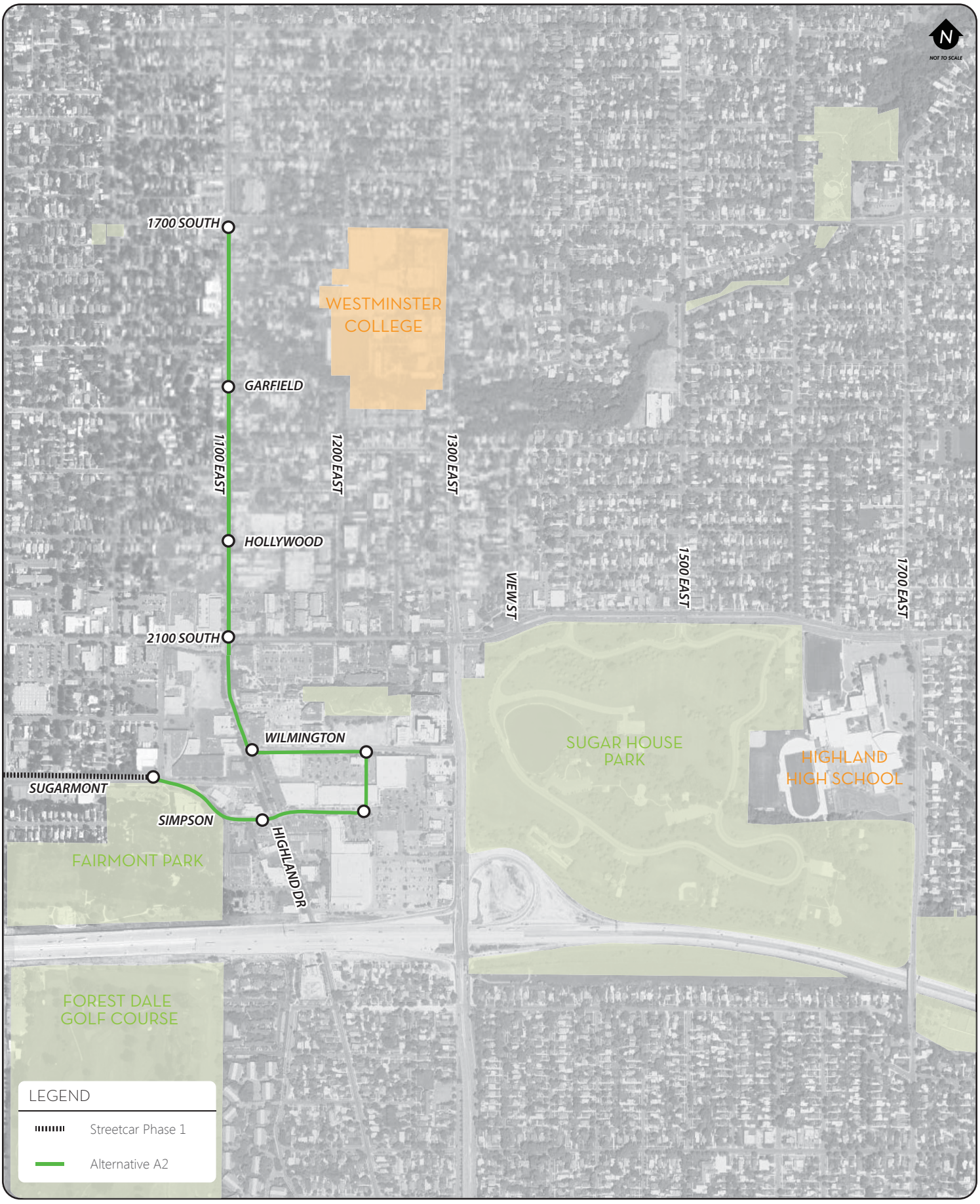
ALTERNATIVE A1

Figure 5.1-2 | Sugar House Phase 2 Alternatives Analysis



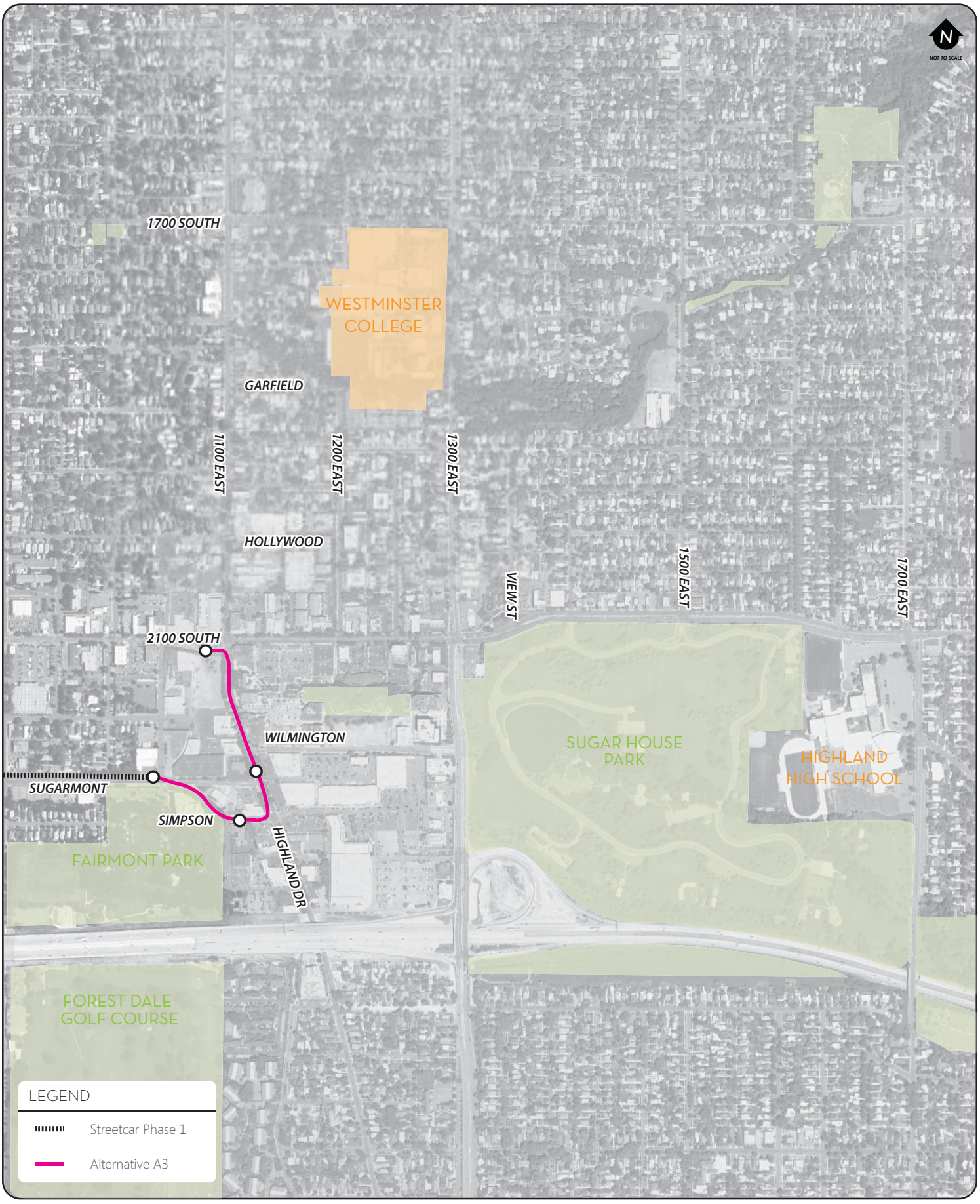
ALTERNATIVE A2

Figure 5.1-3 | Sugar House Phase 2 Alternatives Analysis



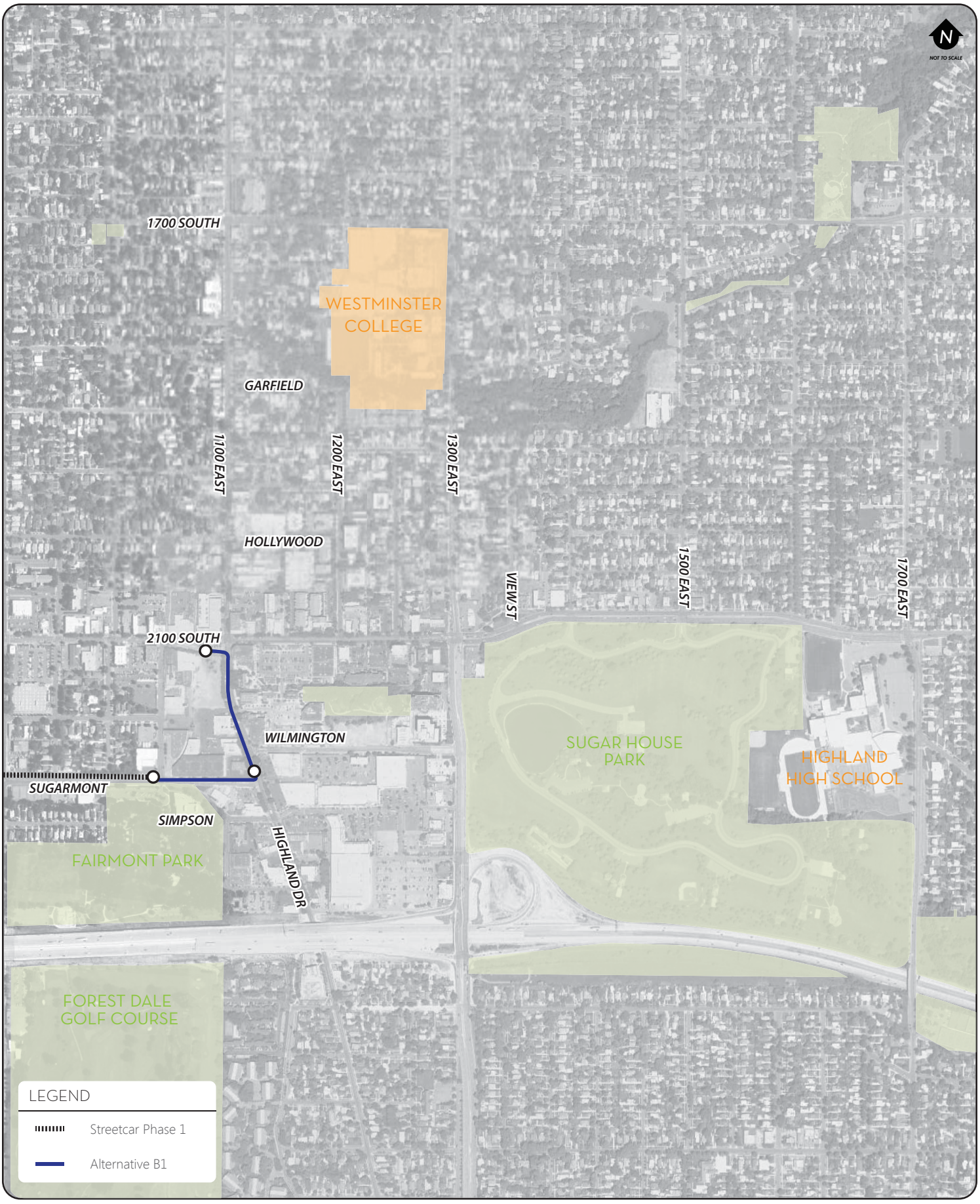
ALTERNATIVE A3

Figure 5.1-4 | Sugar House Phase 2 Alternatives Analysis



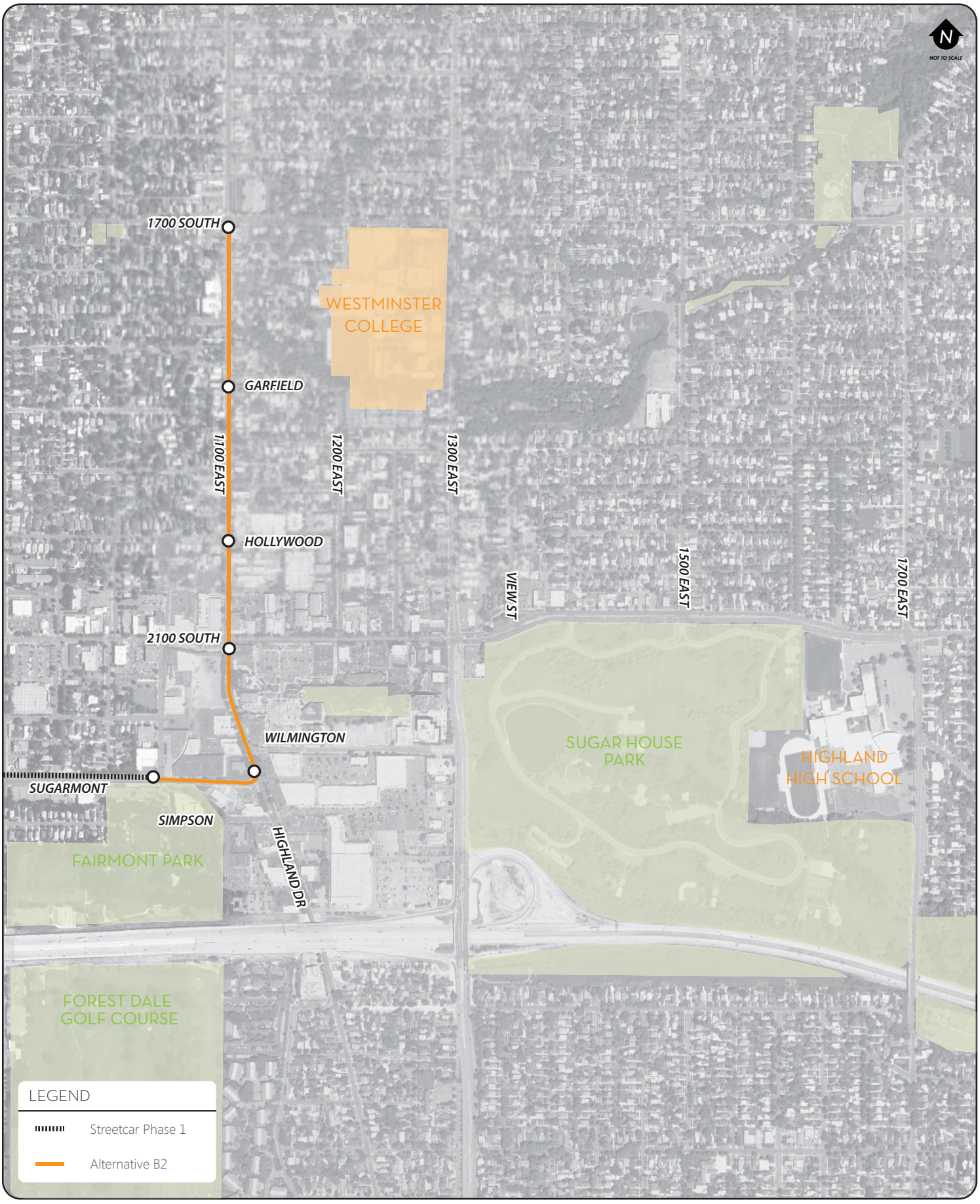
ALTERNATIVE B1

Figure 5.1-5 | Sugar House Phase 2 Alternatives Analysis



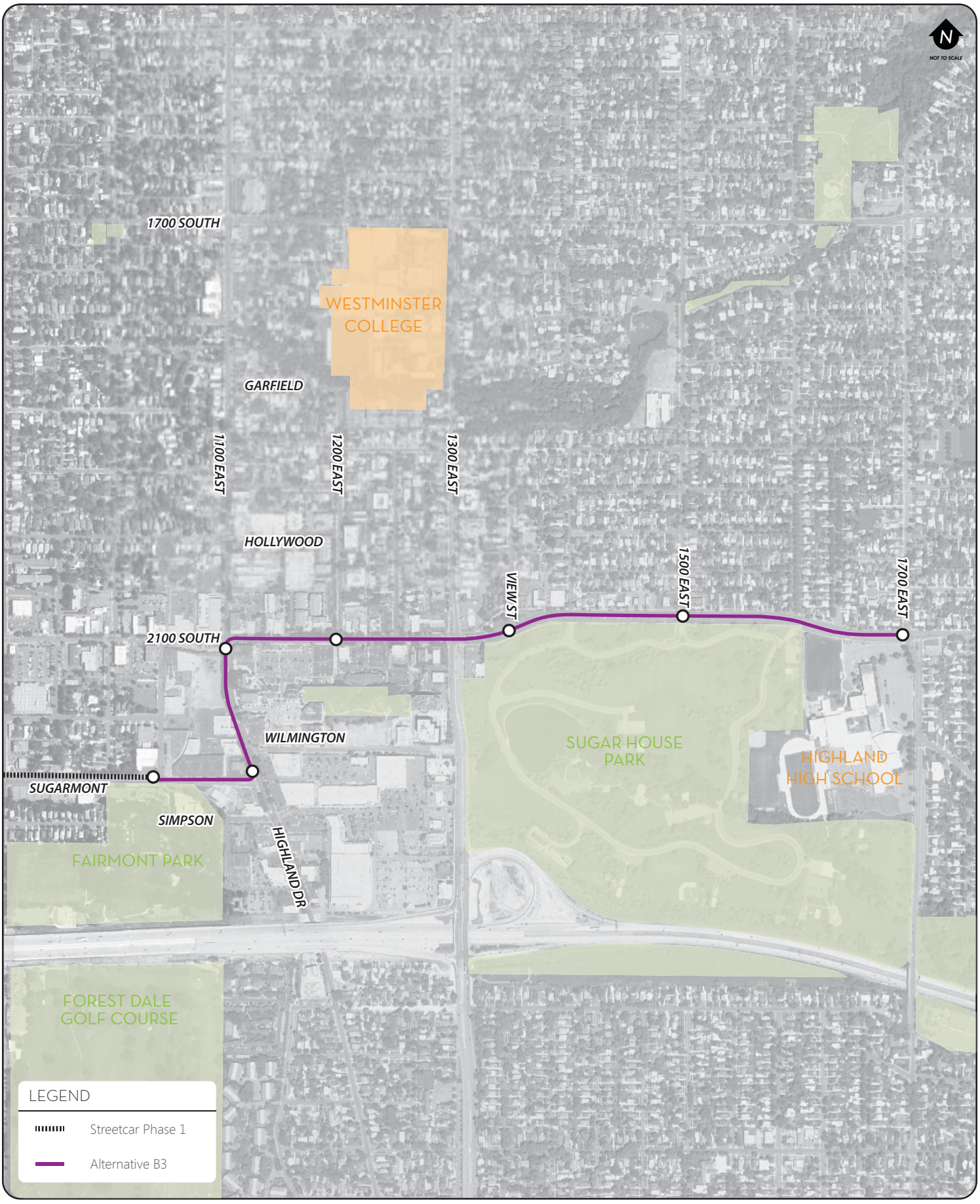
ALTERNATIVE B2

Figure 5.1-6 | Sugar House Phase 2 Alternatives Analysis



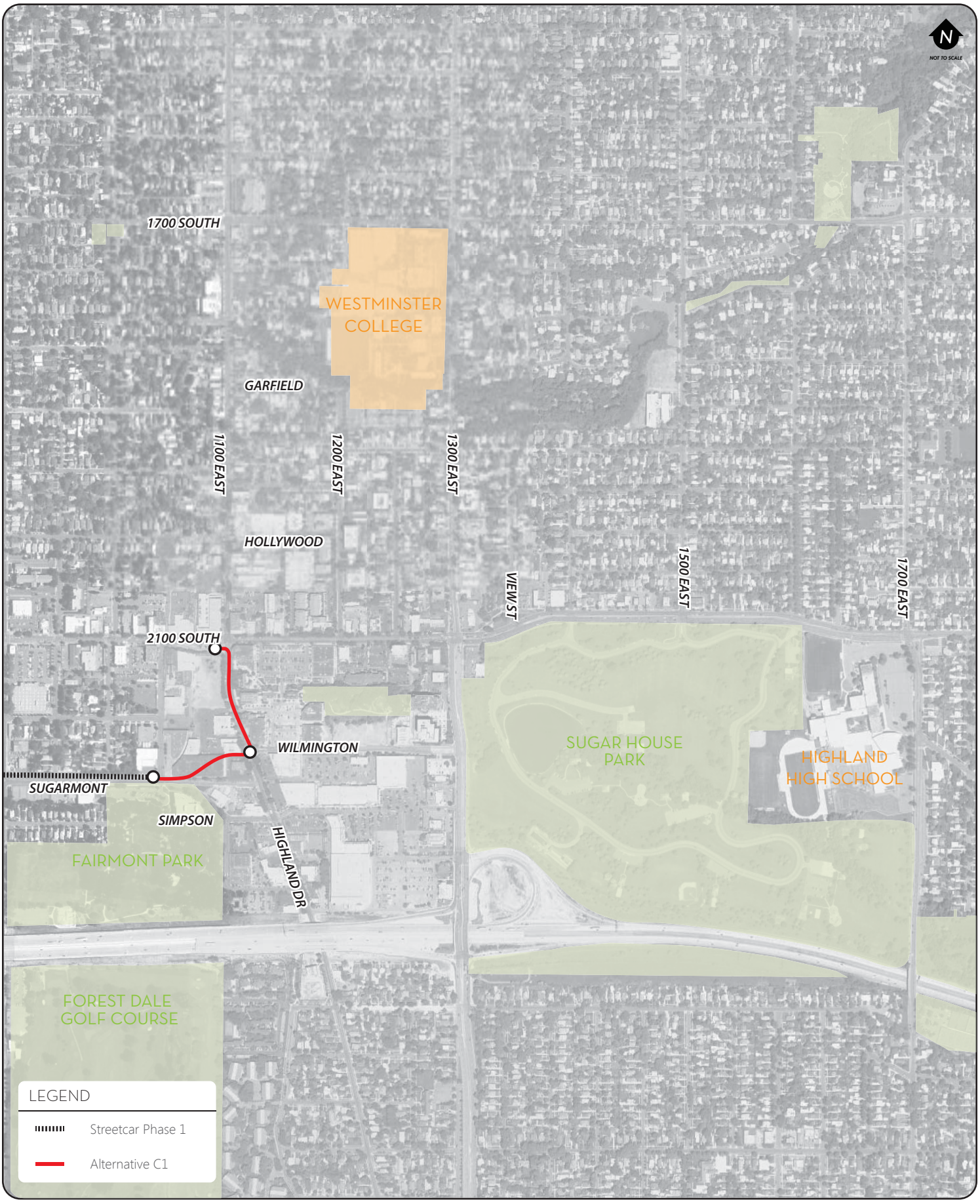
ALTERNATIVE B3

Figure 5.1-7 | Sugar House Phase 2 Alternatives Analysis



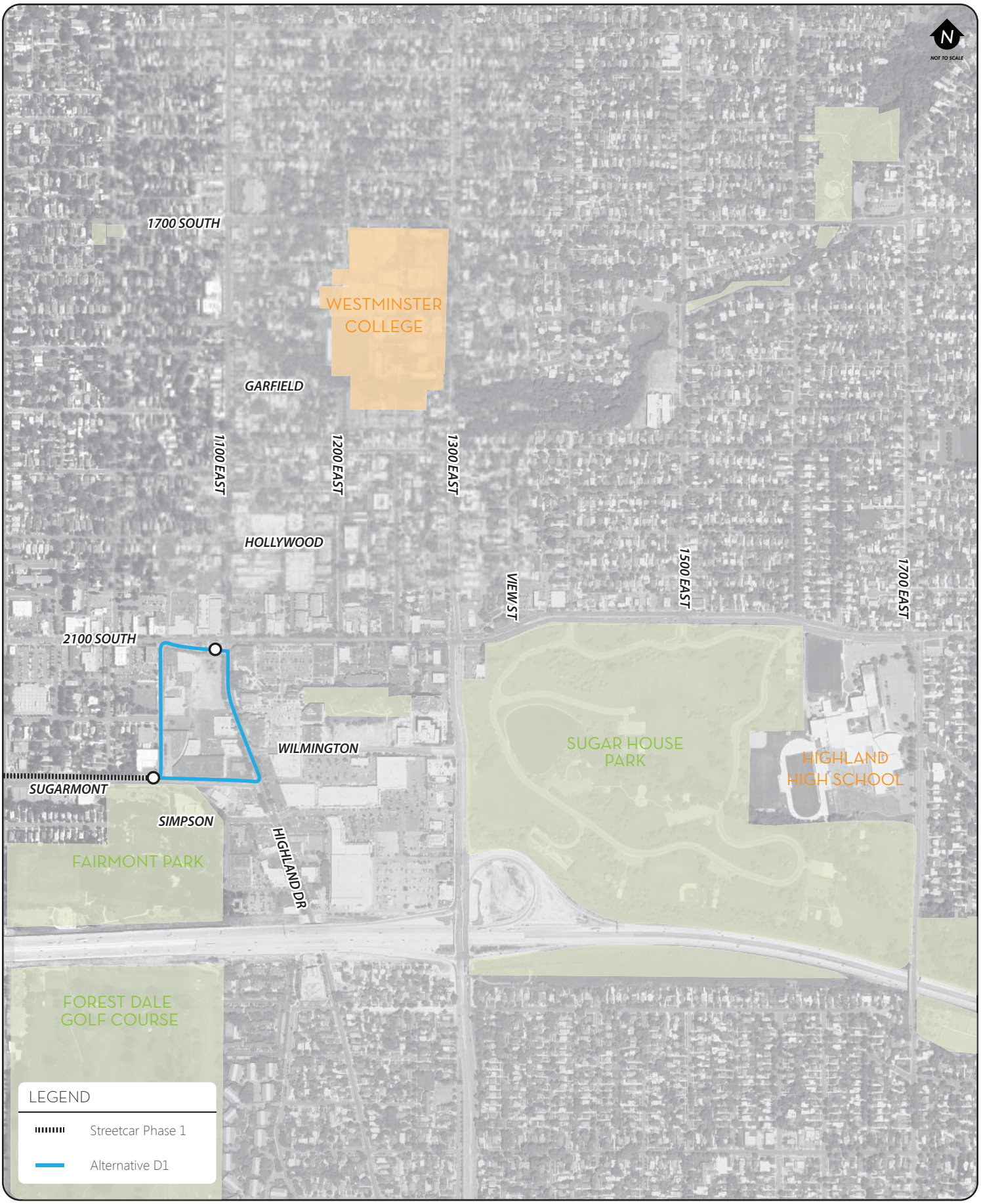
ALTERNATIVE C1

Figure 5.1-8 | Sugar House Phase 2 Alternatives Analysis



ALTERNATIVE D1

Figure 5.1-9 | Sugar House Phase 2 Alternatives Analysis



Study Area. Given the scale of the regional model, it is not surprising that ridership for the shuttle is very low – however, it is notable that the presence of this bus extension had no noticeable positive benefit to the Phase 1 Sugar House Streetcar. In comparison, extension of the streetcar (using rail transit) for the same alignment and stops results in a 17% increase in daily ridership. Thus, based on travel forecasts, if the Sugar House Streetcar is not extended using continuous rail service, it makes more sense to rely on the underlying bus system to serve linked transit trips rather than provide a shuttle.

5.1.2 Build Alternatives

The alternatives shown in individual maps in Figures 5.1.-2 through 5.1-9 consist of a streetcar extension from the Sugar House Streetcar Phase 1 eastern terminus. Potential stations, with the exception of end-of-the-line station in Monument Plaza, are projected to be curbside. Operations would be in mixed-flow traffic.

5.2 EVALUATION CRITERIA AND ANALYSIS FOR SHORT LIST ALTERNATIVES

The level of screening for the short list of alternatives consisted of a combination of quantitative and qualitative criteria. Quantitative criteria included ridership, cost, right-of-way needed, and support for economic development/redevelopment, while qualitative criteria focused on community compatibility and public support. Although ridership is an important factor, other factors such as environmental impacts, constructability, development/redevelopment, and cost are also deciding factors on when recommending a preferred alignment.

5.2.1 Ridership

Ridership forecasts were generated for the seven alternatives in final screening using a Direct Ridership Model (DRM). Traditional methods of forecasting transit ridership often employ regional travel demand models to predict ridership. Such models are relatively unresponsive to changes in station-level land use and transit service characteristics, as well as local circulation patterns. Large sizes of traffic analysis zones in the travel demand model preclude detailed land use data collection and differentiation at the station-level. Because streetcars serve a local travel market, DRMs are better at analyzing ridership at the local level versus traditional regional travel demand models. Furthermore, the WFRC travel demand model does not have a streetcar calibrated mode, meaning its use would require calibration and validation of a new streetcar mode of travel in the model. Alternatively, the streetcar would have to be classified using a mode that currently exists in the model such as bus or light rail, which have different ridership characteristics than streetcar.

Recognizing that variables affecting streetcar ridership are different than those for regional rail systems, the basis for analysis draws from the characteristics of existing streetcar systems in Portland, Seattle, and Tacoma. These systems were chosen because they are similar to the proposed streetcar. Ridership data was collected for each system at the system level, and

where available, at the individual stop level. Variables were collected at the system level including route length, opening year, frequency of service, train capacity, fare (including presence of free stops), and transfer policy. At the stop level, data were gathered for the area within a quarter-mile (5 minute walk) of the stop and included, intersecting transit, retail and general employment density, household density, street connectivity, distance between stops, number of hotels and number of entertainment or cultural centers. Table 5.2-1 shows some of the characteristics of existing streetcar systems.

Table 5.2-1. Existing Streetcar Systems

SYSTEM	ROUTE LENGTH (BOTH DIRECTIONS)	NUMBER OF STOPS
Portland Streetcar System	8.0 Miles	47
Seattle South Lake Union Line	2.6 Miles	12
Tacoma Streetcar System	2.7 Miles	8

The stop level data collected from Portland, Seattle, and Tacoma were used to perform ordinary least squares (OLS) regression analysis to predict daily boardings. This analysis was based on empirical relationships found through statistical analysis of stop ridership and local stop characteristics. Multiple iterations of all collected data were tested in the regression model, but the variables that entered into the DRM model as statistically significant (at least to the 0.05 level), meaning the variable has a relational significance to the dependent variable, boardings, were the following:

- Urban Density: Sum of Retail Employment and Households within ¼-mile radius of station
- Start of Line: Binary variable indicating station is the first stop on the line (0/1)
- Stops to Line Terminus: Number of stations until the terminus of the line
- Rail Transfer: Number of intersecting rail lines within one block of the station
- Distance to Closest Station: Closer spaced stations have a smaller catchment area than further spaced stations

Data for each of these variables were collected for potential stop locations along the Sugar House alternatives. These variables were used to predict daily boardings at each stop and were summed for each configuration to estimate daily boardings.

5.2.1.1 Ridership Results

The expected daily ridership and performance (boardings per mile) of each alternative is summarized in Table 5.2-2. Each table shows ridership information for the extension and the entire line. Figure 5.1-1 shows each of the alignments considered. Two scenarios were analyzed – opening day and opening day with land use changes. Opening day with land use changes accounts for known planned developments within the Sugar House Business District, as described in Chapter 1.

This includes the results of the DRM model. A technical memorandum on ridership is included as Appendix A.

Table 5.2-2. Ridership

ALTERNATIVE	NUMBER OF STOPS	TRACK MILES	DAILY BOARDINGS	BOARDINGS PER MILE
A1	3	0.8	820 - 970	1,079 – 1,276
A2	5	2.7	2,490 – 2,790	988 – 1,107
A3	2	0.9	995 – 1,105	1,156 – 1,285
B1	2	0.7	835 - 970	1,228 – 1,426
B2	5	2.0	1,680 – 1,830	933 – 1,017
B3	5	2.5	2,280 – 2,493	905 – 989
C1	2	0.6	835 - 970	1,440 – 1,672
D1	2	0.6	655 - 735	1,129 – 1,267

In general, the higher the number of stops (assuming the stop is located near factors that influence ridership), the higher the ridership. Longer alignments have higher ridership because of more access. Therefore, ridership per mile was used to compare the alignments regardless of length. Using ridership per mile, versus total ridership measures, is standard practice for transit planning. Shorter alignments having higher per mile ridership indicates high ridership in the Sugar House Business District. Overall, Alternatives C1, B1, and A3 perform the best in terms of ridership with a high number of boardings per mile for alignments stopping at the Sugar House Monument. For longer alignments, A2 and B2 performs the best in terms of ridership with a high number of boardings per mile for alignments. Alternative B3 has among the highest number of daily boardings, but also the lowest boardings per mile.

5.2.2 Capital Costs

5.2.2.1 Methodology

Capital costs were generated for each of the alternatives in final screening using the FTA Standard Cost Category (SCC) workbooks. The SCC workbook methodology includes the following categories:

Construction categories:

- **Guideway and track elements**: Guideway (at-grade or aerial), track, and special trackwork (turnouts).
- **Stops**: Stops, shelters, platforms, and passenger amenities.
- **Support facilities**: Maintenance and storage facility, shops, and administration buildings.
- **Sitework and special conditions**: Demolition, clearing, earthwork, utilities, civil improvements, roadway improvements, curb, gutter, sidewalk, and paving.
- **Systems**: Train control, train signals, automatic train protection, traction power (substations and equipment), traffic signals, communications, and fare collection.

Other categories:

- **Right-of-way**: Purchase or lease of land.
- **Vehicles**: Vehicles and spare parts.
- **Professional services**: Preliminary engineering, final design, program management, construction management, insurance, permits, and inspections.
- **Project reserve**: Unallocated contingency.

Support facilities and vehicles were not included into Capital Costs because these costs were incorporated into the Sugar House Streetcar Phase 1 cost.

5.2.2.2 Capital Costs

The capital costs for each alternative are summarized in Table 5.2-3. The full capital cost estimate is included as Appendix B.

Table 5.2-3. Capital Costs

ALTERNATIVE	TOTAL	TRACK MILES	COST PER TRACK MILES	COST PER RIDER
A1	$9,632	0.8	$12,040	$9.93 - $11.75
A2	$37,144	2.7	$13,757	$13.31 - $14.92
A3	$13,018	0.9	$14,464	$11.78 - $13.08
B1	$10,638	0.7	$15,197	$10.91 - $12.74
B2	$27,858	2.0	$13,929	$15.22 - $16.58
B3	$32,617	2.5	$13,046	$13.08 - $14.31
C1	$10,640	0.6	$17,733	$10.97 - $12.74
D1	$10,574	0.6	$17,624	$14.39 - $16.14

Note: All costs in thousands and $2012.

The capital cost is generally a function of the route length, number of stops, and right-of-way needed. For example, the longer the route the higher the capital cost. Similar to ridership, it is important to understand cost per track mile, versus total cost. The cost per track mile is lowest for Alternative A1 ($12 million) and highest for Alternative C1 ($17.7 million). The majority of alternatives are between $13 million and $15 million per track mile.

5.2.3 Circulation

This section addresses circulation issues associated with the alternatives evaluated in the final screening. Potential circulation issues were grouped related to traffic, bicycle/pedestrian, and parking. The following highlights the circulation issues associated with each alternative. Table 5.2-4 provides a summary of circulation issues for each alternative.

5.2.3.1 Traffic Operations:

- Alternative A2 would need to cross from the outside lane to the inside land on Highland Drive at Wilmington to make the southbound left turning movement, potentially causing southbound vehicular delay. If the streetcar remained in the

outside lane, it would require an additional signal phase at the intersection of Wilmington / Highland.

- Alternatives A2 and B2 potentially would increase delay at the intersection of 1700 South / 1100 East for the southbound streetcar to cross to the west side of the road.

- Alternatives A3, B1, and C1 require the signal at the intersection of 2100 South / 1100 East to need additional phases and a slight reconfiguration, as well as potential added delay due to the elimination of the exclusive eastbound right turn and streetcar traveling in the inside lane, for the streetcar to enter the Sugar House Monument Plaza.

- Alternatives B1, B2, and B3 require Sugarmont to be abandoned or reconfigured, distributing more traffic to the intersections of Simpson / Highland Drive and/or 2100 South / 1100 East and require the intersection of Sugarmont/Highland Drive to be signalized, creating more delay and travel time for traffic on Highland Drive.

- Alternative B3 potentially would increase delay to 2100 South near 1700 East for the streetcar crossover from eastbound to westbound. It would also potentially add delay to the intersection of 2100 South / 1700 East if an all-red phase is needed for the streetcar crossover.

- Alternative B3 would potentially add delay to 2100 South at 1100 East for the westbound streetcar to crossover to the inside lane to make a westbound left.

- Alternative D1 may increase delay at the intersection of 2100 South / 1100 East due to the elimination of the exclusive eastbound right turn for the streetcar to enter the Sugar House Monument Plaza.

5.2.3.2 Pedestrian and Bicycle

- All alternatives have potential conflict with bicycles because of the inherent conflict between bicycle tires and tracks, particularly at side stops where the distance between the track and the stop narrows and locations where the streetcar curves or turns at an intersection.

5.2.3.3 Parking

- Alternatives A1 and A2 would impact parking in the Sugar House Center.
- Alternatives A2 and B2 require removal of on-street parking at station locations on Highland Drive and 1100 East.
- Alternatives A3, B1, C1, and D1 require removal of on-street parking at the Sugar House Monument Plaza.
- Alternative B1, B2, and B3 require the removal of some off-street parking at a private bank.

- Alternative B3 potentially requires removal of on-street parking at station locations on 2100 South.
- Alternative C1 requires removal of some on-street parking on Highland Drive due to the Wilmington realignment.

Table 5.2-4. Circulation Issues

ALTER-NATIVE	TRAFFIC OPERATIONS	MULTI-MODAL	PARKING
A1	• No issues identified	• Potential conflict with bicycle and tracks	• Impact to parking in Sugar House Center
A2	• Streetcar would need to cross from outside lane to inside lane on Highland at Wilmington to do SBL. This could cause SB vehicular delay. Or, if streetcar remained in outside lane it would require additional signal phase at intersection of Wilmington/Highland. • Added delay to the 1700 S/1100 E	• Potential conflict with bicycle and tracks	• Impact to parking in Sugar House Center • Removal of parking on 1100 East
A3	• Added delay to 2100 S/1100 E	• Potential conflict with bicycle and tracks	• Removal of parking at Monument Plaza
B1	• Would require Sugarmont to be abandoned or reconfigured • Intersection of Sugarmont/Highland would need to be signalized • Added delay to 2100 S/1100 E	• Potential conflict with bicycle and tracks	• Removal of parking at Monument Plaza
B2	• Would require Sugarmont Drive to be abandoned or reconfigured • Intersection of Sugarmont/Highland would need to be signalized • Added delay to the intersection of 1700 South /1100 East	• Potential conflict with bicycle and tracks	• Removal of parking on 1100 East
B3	• Would require Sugarmont Drive to be abandoned or reconfigured distributing more traffic to Simpson/Highland and/or 2100 S/1100 E. • Intersection of Sugarmont/Highland would need to be signalized creating more delay and travel time for traffic on Highland. • Added delay to 2100 S near 1700 E for the streetcar crossover from EB to WB. Potentially adding delay to the 2100 S/1700 E if an all-red phase is needed for the streetcar crossover. • Added delay to 2100 S for WB streetcar to make WBL at 1100 E.	• Potential conflict with bicycle and tracks	• Removal of parking on 2100 South
C1	• Added delay to 2100 S/1100 E	• Potential conflict with bicycle and tracks	• Removal of parking at Monument Plaza • Removal of some parking on Highland
D1	• Added delay to 2100 S/1100 E	• Potential conflict with bicycle and tracks	• Removal of parking at Monument Plaza

5.2.4 Engineering Issues

This section addresses potential design issues associated with the alternatives evaluated in the final screening. These are issues that would need to be addressed in the next phase after the LPA is selected. Table 5.2-5 provides a summary of engineering issues for each alternative. The number of left turns is included in the table because they are considered a traffic constraint and can sometimes require a transit only signal.

Table 5.2-5. Engineering Issues

ALTERNATIVE	ENGINEERING CONSTRAINTS	RIGHT-OF-WAY	LEFT TURNS
A1	• Existing buildings would need to be removed.	• 33,750 sq ft – private street and existing commercial buildings	1left turn
A2	• Existing buildings would need to be removed.	• 33,750 sq ft – private street and existing commercial buildings	3 left turns
A3	• Tight radius at Highland Drive. Existing building would need to be removed.	• 1,200 sq ft – existing abandoned building	2 left turns
B1	• Tight radius at Highland Drive.	• 1,525 sq ft – Bank parking stalls	2 left turns
B2	• Tight radius at Highland Drive.	• 1,525 sq ft – Bank parking stalls	1 left turn
B3	• Tight radius at Highland Drive at Sugarmont and 2100 South.	• 5,850 sq ft – Bank parking stalls and church green space	2 left turns
C1	• Tight radius at Highland Drive.	• 34,760 sq ft - existing commercial buildings and abandoned buildings	2 left turns
D1	• Tight radius at Sugarmont and at 2100 South.	• 3,025 sq ft – existing abandoned building and Bank parking stalls	1 left turn

All of the alternatives have tight radii along their alignments as the Study Area is a dense, constrained area. Alternatives A1, A2, and C1 require existing, occupied commercial buildings to be removed. While these buildings may undergo redevelopment in the future, the exact date is uncertain and could affect timing of the streetcar. The existing building required for removal by Alternative A3 is currently an abandoned building owned by the City and will most likely be demolished with or without the streetcar. Alternatives B1, B2, B3, and D1 require parking stalls at a local bank to be removed in order to make the right turn from Highland Drive to Sugarmont. Alternative B3 requires additional right-of-way at the eastern termini. Alternative D1 would require a right-of-way through existing, occupied building which recently underwent redevelopment.

In summary, Alternatives A1, A2, C1, and D1 have the most impactful engineering issues and these issues have the potential to affect current businesses and timing of the streetcar.

5.2.5 Environmental

This section identifies potential environmental issues related to each alternative in the final screening. Table 5.2-6 provides a summary of potential environmental issues for each alternative. The goal was to determine if there were differences between the alternatives relative to the environmental impact categories. Because the eight alternatives overlap in many

locations and there has been limited conceptual design work completed for the alternatives, this table only identified the potential major issues that differentiated the alternatives. Detailed environmental analysis would take place during the subsequent environmental documentation phase to comply with the National Environmental Policy Act (NEPA). The environmental documentation phase would begin after adoption of the LPA.

There are very few notable differences regarding environmental issues between the alignments. Some differences occur on Alternative B3, which would operate along a higher-traffic volume road that could be difficult for pedestrians to cross and near a high school which may increase noise and cause pedestrian safety issues.

Potential environmental issues were identified for each alternative relative to the environmental impact categories:

- Transportation
- Land Use
- Agriculture and Farmlands
- Social Environment
- Air Quality
- Noise and Vibration
- Visual and Aesthetics
- Historic Properties
- Ecosystem and Natural Environment
- Geology and Soils
- Paleontological Resources
- Water Resources and Water Quality
- Floodplains
- Hazardous Materials and Hazardous Waste Sites
- Public Services and Utilities
- Energy
- Section 4(f) and Section 6(f) Resources
- Construction

Table 5.2-6. Potential Environmental Impacts

		ALTERNATIVE							
		A1	A2	A3	B1	B2	B3	C1	D1
Transportation	*No Issues*	X							X
	Crossing of 2100 South		X			X			
	Crossing of 1300 East						X		
	Realignment of Wilmington Avenue							X	

Table 5.2-6. Potential Environmental Impacts

		ALTERNATIVE							
		A1	A2	A3	B1	B2	B3	C1	D1
	Other						2100 South and 1300 East intersection is high-traffic volume, more so than other intersections Difficult for pedestrians.		
Land Use	*Serves Proposed New Developments*	X	X	X	X	X	X	X	X
	Serves Existing Residential			X	X	X	X	X	X
	Serves Westminster College		X			X			
	Serves Sugar House Park						X		
Agriculture and Farmlands	*No Issues*	X	X	X	X	X	X	X	X
Social Environment (including Environmental Justice)	*Possible Strip Takes*		X	X	X	X	X		
	Property Acquisition	X	X					X	X
	Greater access to Westminster College		X			X			
	Greater access to Sugar House Park						X		
	School Safety Issue						X		
Air Quality	*No Issues*	X	X	X	X	X	X	X	X
Noise and Vibration	*First-row Receptors Close to Street*		X			X	X		
	Proximity to Highland High School						X		
Visual and Aesthetic Resources	*Overhead Wires and Poles*	X	X	X	X	X	X	X	X
Historic Properties	*Proximity to Historic Districts*	X	X	X	X	X	X	X	X
Ecosystems and Natural Environment	*No Issues*	X	X	X	X	X	X	X	X
Paleontological Resources	*No Issues*	X	X	X	X	X	X	X	X
Water Resources and Water Quality	*May extend into drinking water source protection zone*	X	X	X					
	No Issues				X	X	X	X	X
Floodplains	*Does not traverse any regulator floodplains*	X							
	In a 0.2% annual chance flood zone		X	X	X	X	X	X	X
Hazardous Materials and Hazardous Waste Sites	*No Issues*	X	X	X	X	X	X	X	X
Public Services and Utilities	*Possible Issues*	X	X	X	X	X	X	X	X
Energy	*No Issues*	X	X	X	X	X	X	X	X
Section 4(f) and Section 6(f) Resources	*Unlikely Section 4(f) or Section (6) use*	X	X	X	X	X	X	X	X

5.2.6 Economic Development

5.2.6.1 Imminent Projects

The following developments within the Study Area have recently been constructed, are underway, or are approved. These imminent projects, residential units, and square footage of office and retail are shown with the alternatives in Figure 5.2-1.

Developments recently constructed include:

- Urbana on Eleventh - 29 condominiums and 750 SF of ground floor retail. This project is 100 percent constructed.

- Westminster Mixed-Use Project—44 three- and four-bedroom apartment units with a total of 164 beds, approximately 15,000 SF of office space, and 8,500 SF of retail space. Residential development associated with this project is part of the Westminster College expansion, and will serve as student housing. This project was completed in fall 2012.

- John Gardiner Apartment Complex—70 apartment units. This project completed construction in late 2012.

Developments currently under construction include:

- Sugar House Crossing (on the south side of 2100 South at 1100 East). Sugar House Crossing in downtown Sugar House is planned for redevelopment with a mix of residential, commercial, and office use. Development plans include 211 new residences and 200,000 square feet (SF) of commercial/office. Construction commenced in fall 2012 with completion in 2014.

- Boulder Venture Project – 20,000 SF of retail and 30,000 SF of office. This project is currently under construction and will be complete in the winter of 2013. Some occupancy has already occurred.

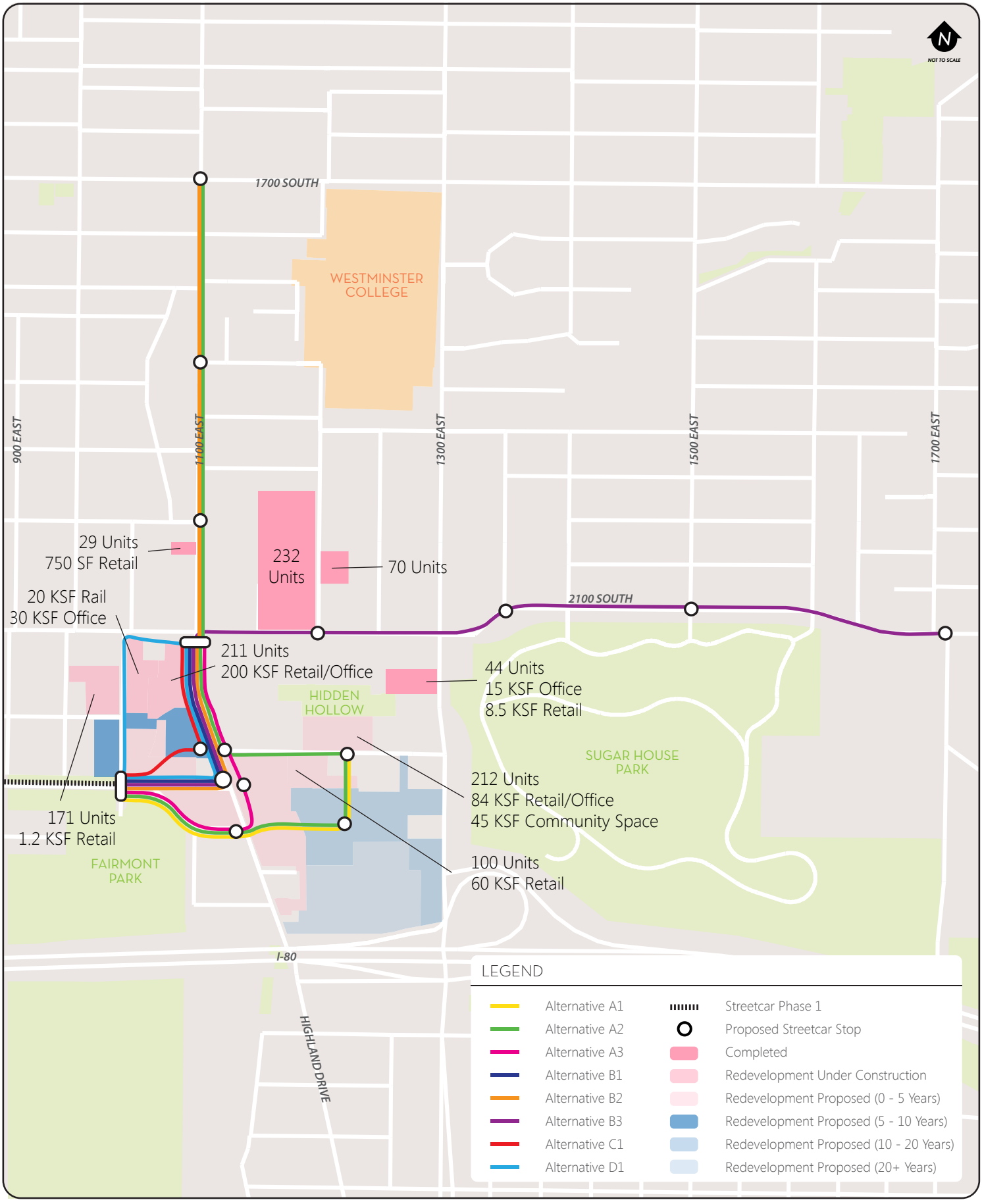
- Cowboy Partners Project – 170 residential units and 1,200 SF of retail. This project will start construction in winter 2013 and will be completed in 2014.

The following projects are in the planning stage, or close to construction:

- Wilmington Gardens (Wilmington Avenue between Highland Drive and 1300 East). Wilmington Gardens in Sugar House is planned to be redeveloped with a mix of residential, community space, commercial, and office use. Development plans include 100,000 SF of residential with 20% affordable units; approximately 84,000 SF of commercial/office; and 45,000 SF of community space. Plans for Wilmington Gardens incorporate academic space for Westminster College.

TRANSIT SUPPORTIVE DEVELOPMENT

Figure 5.2-1 | Sugar House Phase 2 Alternatives Analysis



- Olsen Development—residential and retail space is planned to front Wilmington Avenue on the Olsen property, which is located directly across the street from Wilmington Gardens. This project is in partnership with Wilmington Gardens, and the developers are working together to implement a new vision for Sugar House over several acres. At the corner of Highland Drive and Wilmington Avenue, the group is planning retail, office, and residential development. The group estimates that by 2015, an additional 100 residential units and 60,000 square feet of retail will be completed.

5.2.6.2 Existing Zoning and Land Use

Much of the core Sugar House Business District is comprised primarily of commercial land use, with a number of office buildings and retail shops. More residential land uses appear as one moves away from the intersection of 2100 South and 1100 East. The Study Area's existing zoning is shown in Figure 5.2-2, along with each alignment.

North of 2100 South, 1100 East is zoned commercial until Hollywood Avenue. The area between Hollywood and Wilson Avenues and within walking distance of 1100 East, is mostly single family homes, duplexes, and small apartment building. The area south of Westminster has larger apartment buildings to serve the College. North of Wilson Avenue through the intersection with 1700 South again becomes commercial with office space, retail stores, and restaurants.

Commercial is the predominant land use on 2100 South from 1100 East to 1300 East. This commercial is retail-oriented and more auto-oriented (drive-through fast food and auto repair) than 1100 East. North of 2100 South along the corridor is predominately multi-family housing. The southern portion of the corridor east of 1300 East is Sugar House Park and Highland High School. The northern portion of the corridor is fronted by commercial uses until 1500 East. East of 1500 East and within walking distance of the corridor is single-family residential.

Traditionally, residential neighborhoods, characterized by single-family residential units on small parcels, are very hard to redevelop. The Sugar House Master Plan calls for protection of single-family residential uses converting to commercial uses. Thus, the existing residential uses in the Study Area are unlikely to redevelop into commercial or denser residential land uses. It is also very uncommon to develop on current open space. The Sugar House Park Authority prohibits any loss of park land. Therefore, the redevelopment potential of alignments east along 2100 South are contained to the northern side of the road.

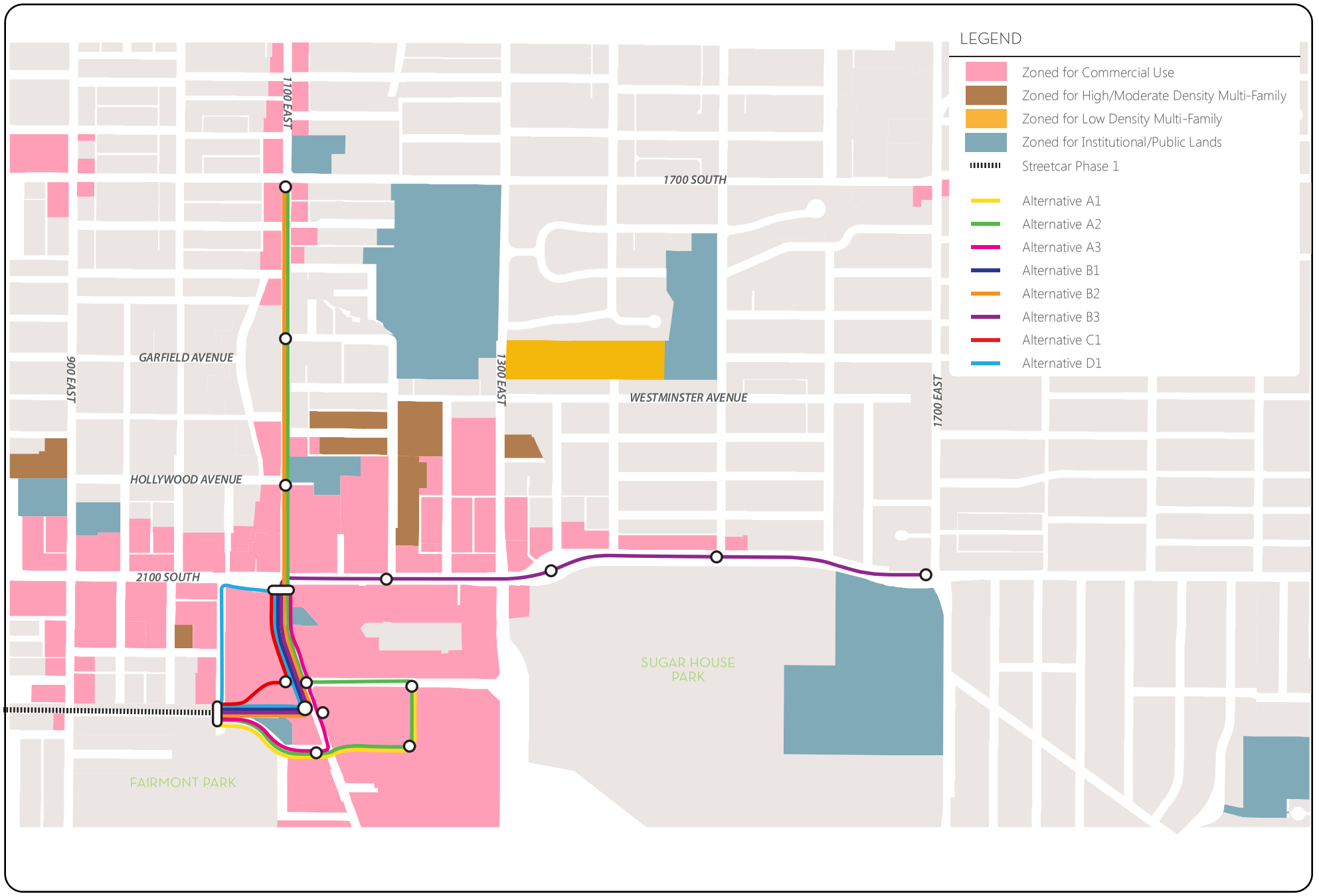
5.2.6.3 Potential for Redevelopment

This section details the economic development potential for each alternative in final screening. The analysis focused on the potential for new development for the Study Area, while also considering existing assets. Most of the large redevelopment sites are located in the center of the Sugar House Business District. While most are under construction, the remaining development areas will be influenced in terms of design and program by the preferred alignment. In other areas of the Study Area, there are limited opportunities for new development or redevelopment, as most of the corridors are built out.

This map looks at development potential by first removing all parcels zoned for single family residential (R-1-12000, R-1-5000, R-1-7000). It also removed all parcels zoned as Open Space. Traditionally, residential neighborhoods, characterized by single family residential units on small parcels, are very hard to redevelop. It is also very uncommon to develop current open space.

DEVELOPMENT POTENTIAL - STUDY AREA

Figure 5.2-2 | Sugar House Phase 2 Alternatives Analysis



The economic development analysis is focused on developments recently completed are in construction , planned/proposed real estate activity, as well as the apparent capacity for other future (re-) development. Development capacity is said to exist on zoned, vacant land and, to a lesser extent, on zoned land that is currently underutilized. The analysis focused primarily on parcels within 1,000 feet (approximately a 3-4 minute walk) of station alternatives, with special attention given to property within 500 feet of proposed stops. Assessor's estimates of improvement (building) values in relation to land values are used as an indicator of land utilization. Properties for which improvements account for less than 10 percent of total value are effectively vacant, while those at 25 percent are very likely underutilized.

Figure 5.2-3 highlights those properties within the Study Area that considered vacant or underutilized. Vacant and underutilized properties are shaded while existing and planned developments are labeled.

Table 5.2-7. Economic Development Potential (Acres)

ALTERNATIVE	*500-FOOT BUFFER*	*1,000-FOOT BUFFER (additional to the 500-ft buffer)*
A1	25.6	5.3
A2	32.3	11.9
A3	26.2	9.2
B1	14.0	7.7
B2	18.6	9.8
B3	21.0	11.1
C1	43.2	8.3
D1	43.2	8.3

5.2.6.4 Summary

In summary, the alignments that remain south of 2100 South (A1, A3, B1, C1, and D1) serve mostly commercial and high-density residential land uses. Much of this service area has recently redeveloped, is currently under construction, or has begun the planning process to redevelop into denser land uses. The longer alignments serve additional retail uses and a mixture of residential types.

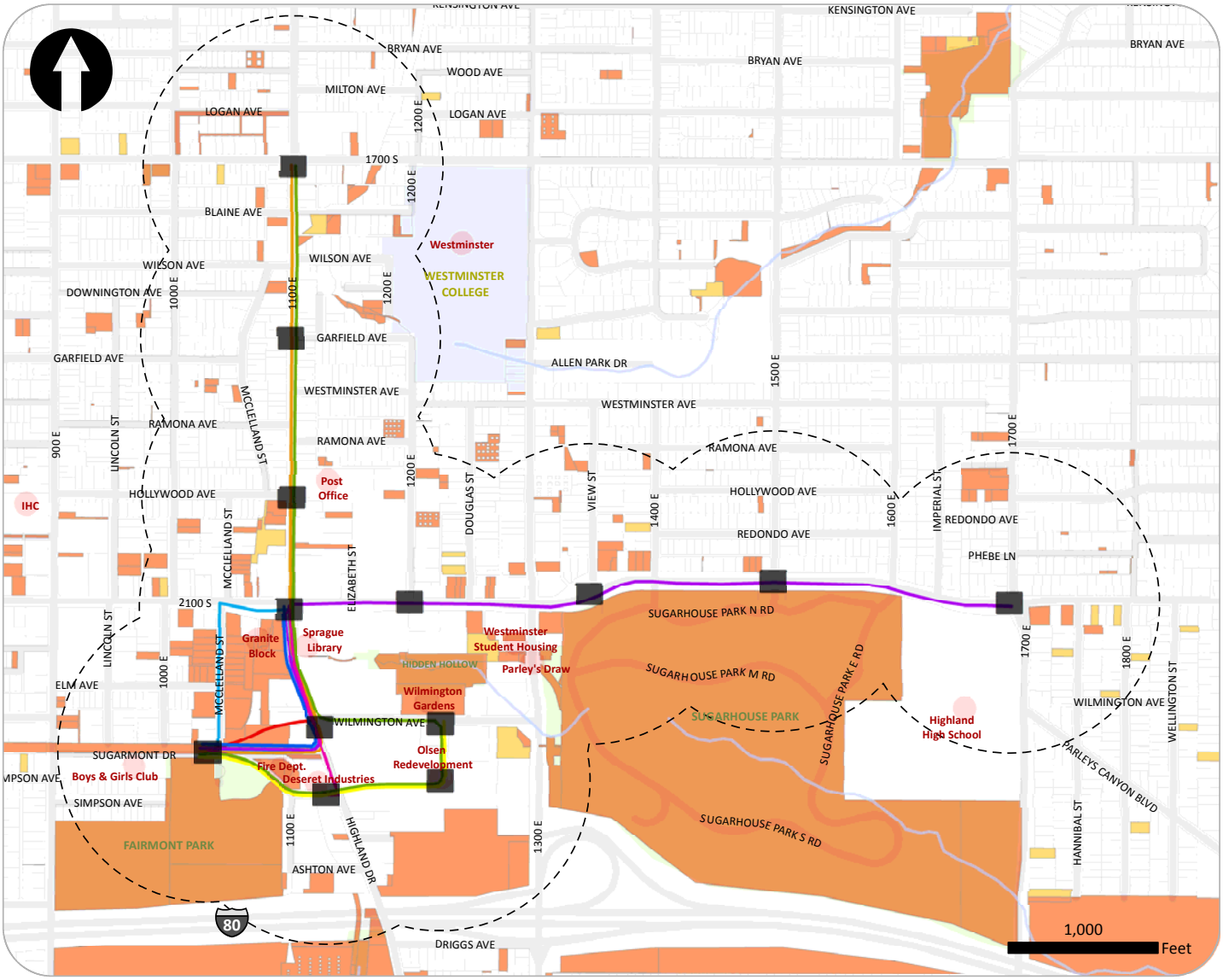
Most of the economic redevelopment potential is within the Sugar House CBD. Thus, the shorter alignments which remain completely within the CBD have higher development potential per route mile than the longer alignments. However, between the longer alignments, those which serve 1100 East have a higher potential per route mile than along 2100 South.

5.2.7 Timing and Expandability

This section addresses timing and expandability issues associated with the alternatives evaluated in the final screening. Timing is the degree to which the alignment could be timed with the construction of the Phase 1 streetcar, as well as timing with proposed redevelopments. Expandability is the degree to which the alignment could be expanded in the future. Table 5.2-8 indicates the timing and expandability issues for each alignment.

UNDERUTILIZED LAND

Figure 5.2-3 | Sugar House Phase 2 Alternatives Analysis



LEGEND

- Streetcar Phase 1
- Alternative A1
- Alternative A2
- Alternative A3
- Alternative B1
- Alternative B2
- Alternative B3
- Alternative C1
- Alternative D1

Utilization Ratio
improvement/land value

- 0% - 10%
- 11% - 25%
- 1,00 ft. buffer

Table 5.2-8. Economic Development Potential

ALTERNATIVE	TIMING	EXPANDABILITY
A1	• Only possible with redevelopment, which would need to occur in the short- to mid-term.	• Could be expanded relatively easily north or east
A2	• Only possible with redevelopment, which would need to occur within the short- to mid-term.	• Could be expanded relatively easily north
A3	• No issues	• Could be expanded east or north, but would probably create some throwaway track
B1	• No issues	• Could be expanded east or north, but would probably create some throwaway track
B2	• Could be easily timed with Phase 1, however distance of the line could be an issue for cost and quick implementation	• Could be expanded relatively easily north
B3	• Could be easily timed with Phase 1, however distance of the line could be an issue for cost and quick implementation	• Could be expanded relatively easily east
C1	• Alignment would require existing roadway to be realigned • Realignment would require multiple buildings to be demolished	• Could be expanded east or north, but would probably create some throwaway track
D1	• No issues	• Could be problematic to expand in any direction but south

Alternatives A3, B1, and D1 have no issues with timing. Alternatives A1 and A2 would best be timed with the redevelopment of the Sugar House Center, which is unlikely to happen in the very near-term. Alternative C1 requires Wilmington to be realigned, but would require a number of buildings to be demolished. The property owner is not likely to sell these properties in the near term.

Most of the alignments can be expanded relatively easily. Alternatives A3, B1, and C1 may have track throwaway if expanded due to the planned terminus in the Sugar House Monument Plaza, which potentially would be not utilized if the streetcar was expanded. Alternative D1 is a loop around the Granite Block and would require engineering and signal timing changes to be expanded north or east. This could have potential major negative impacts to the intersection of 1100 East / 2100 South.

5.2.8 Public Support

This section addresses public support associated with the alternatives evaluated in the final screening. Support was determined based on public and private financial support.

Public support information was gathered through a series of stakeholder meetings as well as public open houses and comments from Open City Hall. Stakeholder interviews yielded valuable insights on expectations and preferences for alignments. Open City Hall comments supported extending the streetcar to at least Highland Drive, supported an alignment that served residents and businesses further east of the Study Area; supported an alignment on 1100 East that served businesses, Westminster, and completed a transit loop around the City; and supported a city-wide streetcar plan. Public open houses were held on July 28, 2011 to determine initial alignments and October 27, 2011 for the public to indicate which of the alignments they prefer most. This was one of several criteria used to determine the Locally Preferred Alternative. In the open houses, alignments that served the Sugar House Monument Plaza, the center of Sugar House, were favorably viewed. Longer alignments were the most preferred alignments with Alternative B3 at 35% preferred, Alternative B2 with 27% preferred, and Alternative A2 with 24% preferred. Combined, the alignments along 1100 East were 51% preferred compared to 35% for 2100 South.

Private financial support was determined through interviews with individual developers and the likelihood of these developers to agree to an assessment district to help finance the extension. Alternatives A1 serves primarily the Sugar House Center and did not perform well with private financial support. Likewise, Alternative C1 did not provide a station to directly serve the Sugar House Center. Alternative A3 was viewed as serving most private development needs. Figure 5.2-1 shows the alignments with completed and planned redevelopments.

5.2.9 Results of Final Screening

The following summarizes the results of the final screening for each alternative. Table 5.2-10 shows the results of the final screening using the final screening criteria. Each steering committee member was provided a table and they each provided their own ranking. The alternatives were rated Best (3), Moderate (2), or Worst (1) for each criterion, with Best (3) meaning best performance and Worst (1) indicating worst performance. All of the criteria were weighted equally for the final screening. The highest score equals the higher the performance of the alternative.

Table 5.2-11. Final Screening Results

Criteria	ALTERNATIVE A1	A2	A3	B1	B2	B3	C1	D1
Ridership[1]	2	2.5	2	2	2	1.5	2.5	1.5
Cost[2]	3	2	2.5	2.5	1.5	2	2	1
Traffic Operations Issues	3	2	2	1	2	1	2	3
Additional ROW Needed	1	1	2	3	3	2	1	2
Parking Impacts	1	1	2	2	3	3	2	2
Multi-Modal Mobility	2	2	2	2	2	2	2	1
Economic Development	2	2	3	2	2	2	2	2
Environmental Screening	2	2	3	3	2	2	2	3
Timing	1	1	3	3	2	2	1	3
Expandability	3	2	2	2	2	2	2	1
Support[3]	1.5	2.5	2.5	3	3	3	2	2
Total	**21.5**	**20**	**26**	**25.5**	**24.5**	**22.5**	**20.5**	**21.5**

1. Average of boardings per mile – Phase 2 and boardings per mile – Total
2. Average of cost per mile and cost per rider
3. Average of public and private financial support

Best (3) = Optimal Performance, Moderate (2) = Moderate Performance, Worst (1) = Substandard Performance

The alternatives with the highest scores were Alternatives A3, B1, and B2, in that order.

5.3 Locally Preferred Alternative (LPA) Recommendation

Based on the results of the final screening evaluation, the Locally Preferred Alternative (LPA) selected was streetcar service operating between the Sugar House Streetcar Phase 1 end-of-line and Monument Plaza. The recommended LPA was divided into two phases (2A and 2B), with a potential third phase (2C) to account for potential funding and timing constraints. Timing is determinant on momentum from Phase 1, redevelopment opportunities associated with phase 2A and 2B, and public support. Each phase is described in more detail below:

5.3.1 Phase 2A

Phase 2A continues the Sugar House Streetcar to Highland along the Sugarmont corridor. This extension would increase the visibility of the streetcar. To accommodate two-way streetcar service, the section of Sugarmont between McClelland and Highland would be closed to vehicular access, with the exception of continued fire department access. This closure would allow a pedestrian and streetcar plaza to be created along the Sugarmont corridor, which may also provide an alignment for the Parley's Trail and better connections from the business district to Fairmont Park.

The route length to the Monument is approximately 0.4 miles. Figure 5.3-1 shows the route and stations. The estimated cost for Phase 2A is $3.7 million.

RECOMMENDED LPA PHASE 2A

Figure 5.3-1 | Sugar House Phase 2 Alternatives Analysis

5.3.2 Phase 2B

A couplet is purposed for the Phase 2B, as shown in the Figure 5.3-2, that would combine the two highest scoring alternatives – Alternatives A3 and B1. Although C1 has the highest ridership per mile, the right-of-way needed and construction impacts were seen as prohibitive.

Phase 2B would operate as follows: from the end-of-line Phase 1 Streetcar, the extension will travel eastbound on Simpson Avenue between McClelland Street and Highland Drive and northbound on Highland Drive to the Sugar House Monument Plaza. On the return from Monument Plaza, the streetcar will travel southbound on Highland Drive between the Plaza and Sugarmont Drive and westbound on Sugarmont Drive to the Phase 1 end of line.

A streetcar left turn from Sugarmont to Highland Drive, or a through movement across Highland Drive was seen as problematic due to the need to install an additional signal at this intersection, which would create more traffic congestion. A left turn at Sugarmont would also forfeit an opportunity for a station to be at the Sugar House Center development. Therefore, Simpson was seen as a viable alternative for the streetcar's eastbound-to-northbound movement. There are three primary benefits to using a Simpson alignment:

- Increased opportunity for redevelopment of the southern area of Sugar House, and
- Improved traffic operations by eliminating the need for a signal at Sugarmont and Highland.

The estimated cost for Phase 2B (including the cost of Phase 2A) is $12.1 million.

5.3.3 Potential Phase 2C

Phase 2C extends streetcar service north along 1100 East to 1700 South, as shown in the Figure 5.3-3. This extension provides better access for Westminster students and staff to get to the Sugar House Business District, and the greater UTA system network via the Sugar House Phase 1 line. While taking the streetcar through neighborhoods that were historically served by trolleys in the shorter term, future extensions could connect the north alignment to the 900 South and 900 East commercial district, TRAX on 400 South, the potential downtown streetcar network, and the University of Utah.

The Phase 2C alignment is recommended because:

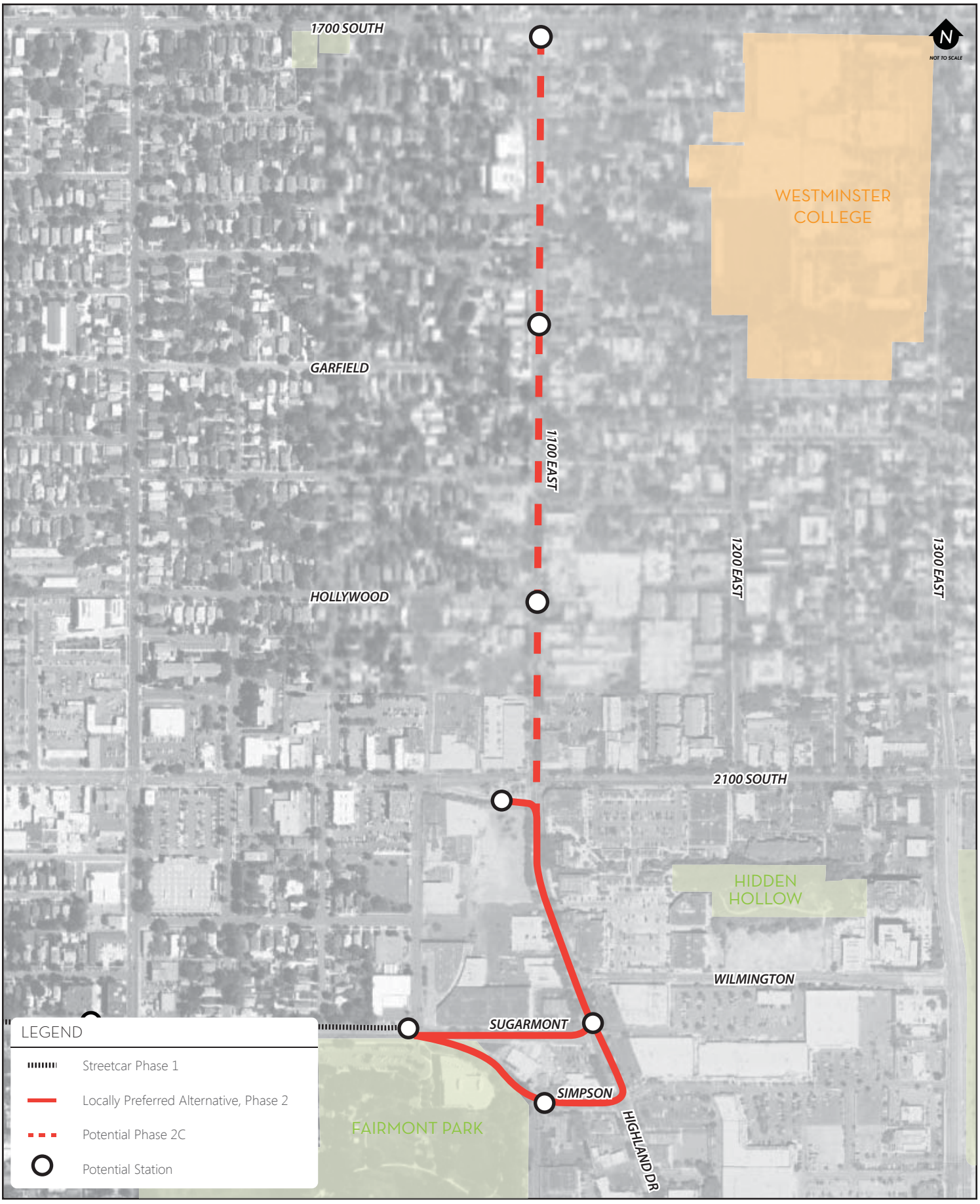
- Westminster provides a greater potential ridership due to size of enrollment and likelihood of transit usage (college vs. high school ridership).
- Modeled results show greater boardings per mile.
- It has less property acquisition.
- There are opportunities for economic development along both sides of alignment.
- Consistent with Wasatch Front Regional Council Long Range Transportation Plan.

RECOMMENDED LPA PHASE 2B

Figure 5.3-2 | Sugar House Phase 2 Alternatives Analysis

POTENTIAL PHASE 2C

Figure 5.3-3 | Sugar House Phase 2 Alternatives Analysis



5.4 Next Steps

5.4.1 Federal Process

The next phase of study for this project is a federally-guided environmental document. Typically, these documents range from a full environmental impact study (EIS) to an environmental assessment (EA) or, in some cases, a categorical exclusion (CATEX). The decision about which level of environmental analysis to pursue is determined by the known and potential environmental risks along the alignment. The more risk that is assumed to exist within the corridor, the higher the level of analysis that would be expected by the FTA before they would be willing to grant federal funds for the construction of the project. Within this next environmental document, all of the impacts of the LPA will be assessed. The following tasks that were initiated in the Sugar House Phase 2 AA will be further analyzed and refined:

- Ridership, including the overall system user benefit (cost effectiveness)
- Station Locations
- Engineering & design constraints and/or opportunities
- Traffic analysis and determination of consequences

In addition to the further study of the topics listed above, some of the other environmental issues that will be evaluated include:

- Noise and vibration impacts
- Cultural and historic impacts
- Air quality impact
- Impacts to public parks and recreation lands
- Wetland, waterway, or aquifer impacts
- Vegetation and wildlife

5.4.2 Development of a Network Plan

The Sugar House Streetcar Phase 1 Project is currently under construction and has garnered City-wide support for streetcars. In addition to this study, the City has studied the feasibility of a streetcar in Downtown Salt Lake City. It is recommended that the City develop a City-wide network plan that will look at future connections on system-wide level.

5.4.3 Future Extension along 2100 South

There remains strong support for a connection along 2100 South to Sugar House Park and Highland High School (as shown in Alternative B3). Therefore, it is recommended that an extension to 1700 East along 2100 South be evaluated in a future study, perhaps as part of the City-wide streetcar network plan.

REFERENCES

Salt Lake City

1987 East Bench Master Plan. April.

1996 Salt Lake City Transportation Master Plan. April 16.

2000 Transportation Master Plan Action Plan Update. January.

2000 Sugar House Master Plan

2003 Sugar House Business District Design & Mobility Guidelines. November.

2005 Central Community Master Plan. November.

2006 Salt Lake City Transportation Master Plan Major Transit Facilities. July 17.

Utah Transit Authority [UTA]

2008 Sugar House Transit Corridor Alternatives Analysis. Draft final report. January.

Wasatch Front Regional Council [WFRC]

2007 2007–2030 Regional Transportation Plan. May.

Westminster

2011 Westminster College Master Plan. February.