SAINT PAUL STREETCAR FEASIBILITY STUDY

PHASE 1 SCREENING

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SAINT PAUL

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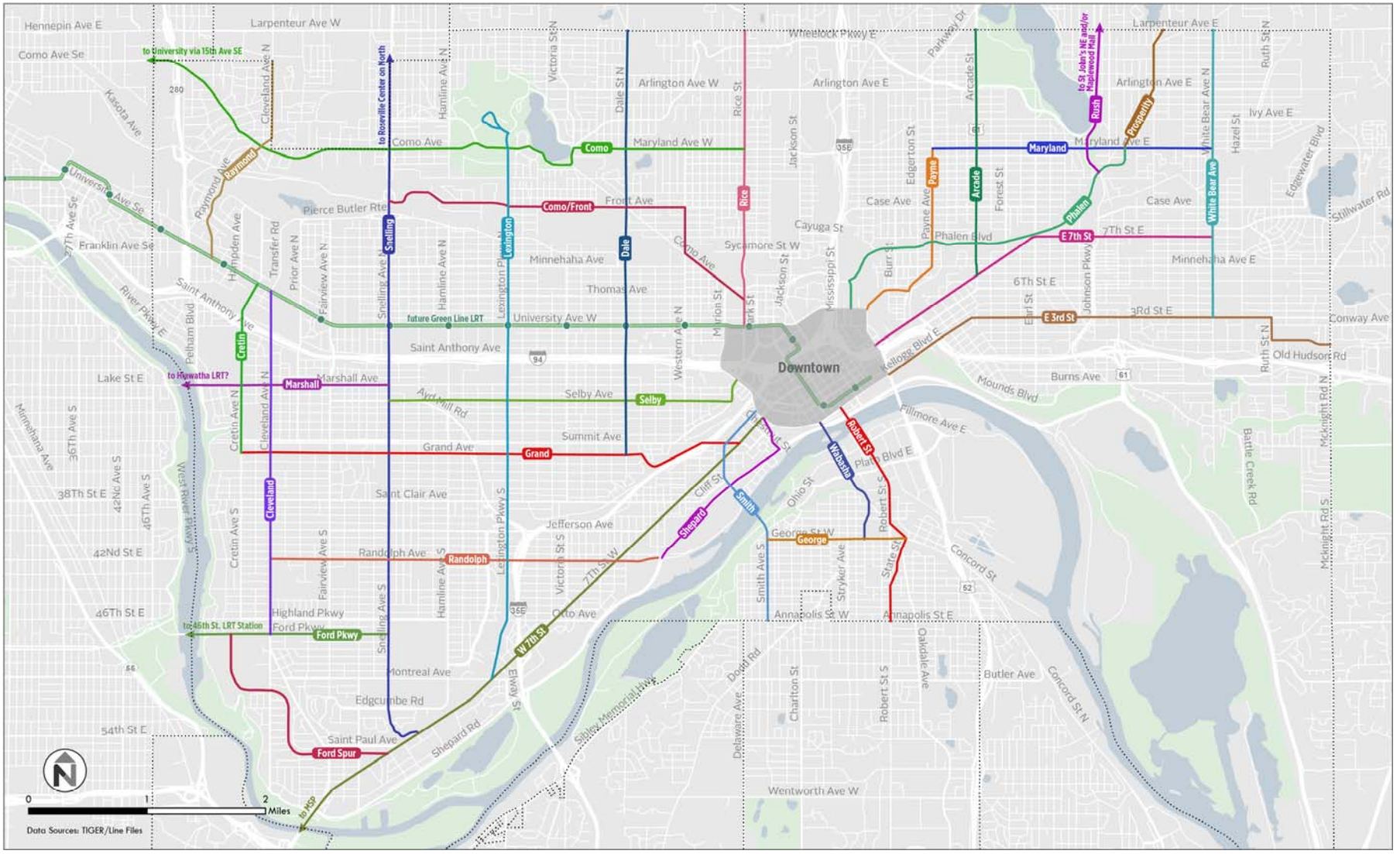
INTRODUCTION

This study is using a three-phase process to screen, evaluate, and prioritize the development of streetcar service, which is:

1. An initial Phase 1 screening process that focuses on narrowing a long list of potential corridors into a short list of alignments.
2. A Phase 2 evaluation in which short-listed alignments will be evaluated in more detail.
3. A Phase 3 determination that will identify the most effective lines/segments to be pursued as the first new streetcar lines.

Near the beginning of the study, the study team identified a long list of 30 potential streetcar corridors that included nearly all of the city's major arterials (see Figure 1). This document presents the results of the Phase 1 screening process. As discussed below, none of the corridors had fatal flaws that precluded their moving forward into Phase 2. Therefore, this process screened out corridors where it was clear that there were other significant drawbacks that would compromise feasibility.

Figure 1 – Phase 1 Corridors



SCREENING RESULTS

SCREENING PROCESS

The Phase 1 screening process used seven criteria (see also Table 1):

- **Grade.** Saint Paul has a number of steep grades that could inhibit streetcar operation, or make streetcar operation too expensive. While modern streetcars can climb grades as much as 9% for short distances (approximately 700-800 feet), sustained grades over 7% are generally discouraged, particularly in climates where snow and ice are regular occurrences. Thus, corridors with grades between 7 and 9% will be carried forward to Phase 2 only if they pass all other screening criteria.
- **Street Geometry.** Especially between downtown and the neighborhoods, there are a number of streets in Saint Paul where streetcars may be difficult to operate due to street geometry. This criterion identifies whether street geometry would *inhibit* streetcar operation, or require significant capital investments that make operation infeasible. These include major modifications to interchanges, exclusive right-of-way needs or other types of transit infrastructure that would be required (such as bridges, underpasses, etc.).
- **Other Physical Barriers.** Other physical barriers besides grade and street geometry may inhibit streetcar operations without significant capital expenses and will be identified. Examples include low bridges or skyways, streets that are too narrow and at-grade freight railroad crossings. As noted above, some bridges may exhibit steep grades, but will also be identified here if these bridges could inhibit streetcar operation.
- **Terminal Location.** As with any transit service, a strong destination–or terminal–helps improve the attractiveness of service. Thus, this criterion evaluates whether there is a reasonable location for a streetcar line to terminate where connections to other transit service can be made, such as a university/college, transit center, Green Line LRT station or other major activity center.
- **Transit Speed and Reliability.** As with any transit service, but especially for a transit investment like streetcar that will operate entirely or largely in mixed flow traffic, it is important to maintain adequate speed and operate reliably. Thus, corridors with substantial traffic congestion, and where exclusive ROW is not possible, may be unable to meet minimum service standards.
- **Other Transit Investments.** There are a number of new or potential additional transit investments that are currently being considered in Saint Paul. Additionally, some projects may already be under construction or in design, which could conflict with a potential streetcar alignment. This criterion is designed to determine the degree to which streetcar service could compliment those other efforts, duplicate them, or potentially replace them, without unfairly penalizing corridors that have not been studied or considered for transit investment.

Table 1 Phase 1 Screening Criteria and Measures

Criteria	Screening Measure
Grade	▪ Grades greater than 9%. *Tentative pass*: Grades between 7-9% over sustained lengths (only if corridor passes all other screening criteria)
Street Geometry	▪ Required turns greater than 90 degrees, or segments with required weaving or curvature that cannot be negotiated by a modern streetcar without significant impacts (to be evaluated on a case-by-case basis)
Other Physical Barriers	▪ Bridges or skyways less than 14' 0" of overhead clearance. *Tentative pass:* Clearances between 14'0" and 16'0" ▪ Curb-to-Curb width must provide adequate space for 11-foot lane widths for shared streetcar lane and 10 feet for autos. Tentative pass: 10-foot streetcar lanes. ▪ At-grade freight railroad crossing. At grade crossing of two tracks requires difficult FRA/RR approval and are not typically allowed without expensive additional signalization or grade separation
Terminal Location	▪ Corridor segments do not logically connect to a strong terminal location, or are too far away to be reasonable
Transit Speed and Reliability	▪ Assessment of AADT/lane ratios that could impact reliability and travel speed of streetcar in mixed flow corridors. *Tentative pass:* if right of way exists for dedicated streetcar operation
Other Transit Investments	▪ Assessment of how corridors could impact related transit investments, such as the potential for streetcar service to complement related transit services, the degree to which streetcar may duplicate related transit services, and the possibility of streetcar to replace other transit services.
Transit Supportive Land Use	▪ Significant areas of "low" transit-supportive land uses – including residential densities below 10 units per acre, low economic development potential, industrial land uses, low-scale commercial development and/or no significant area of mixed use development supporting bi-directional service

- **Transit Supportive Land Use.** As a major transit investment, it is important to ensure that any new streetcar investment serve areas that are as "transit supportive" as possible. Transit supportive land uses are generally medium or high intensity development, but could also be a major activity center such as a college or university. This criterion will evaluate planned land use types (by square footage or units per acre) within ½-mile of each potential streetcar corridor. A more detailed evaluation of development potential will be completed during the Phase 2 evaluation. This evaluation is based on 2010 land use and planned 2030 land use data.

The first three criteria–Grade, Street Geometry, and Physical Barriers–were used to ensure that there were no fatal flaws in the corridor that would preclude the development of streetcar service or make it prohibitively expensive. The second four criteria–Terminal Location, Transit Speed and Reliability, Other Transit Investments, and Transit-Supportive Land Use–were used for an initial screening of how well streetcar service would likely perform.

For each criterion, the screening was designed to evaluate corridors using both qualitative and quantitative data, as well as comparing and contrasting the corridors against each other. Based on the result, for each criterion, a rating of Best, Good, and Fair was assigned. The ratings reflect relative, rather an absolute scores.

Finally, potential streetcar alignments through downtown Saint Paul will be considered in Phase 2. For Phase 1, corridors that approach downtown Saint Paul are truncated at the edge of downtown in order to screen corridors exclusively on their non-downtown segments.

SCREENING RESULTS – PHYSICAL CRITERIA

Grade

Saint Paul has a number of steep grades that could inhibit streetcar operations, or make the development streetcar service prohibitively expensive. While some modern streetcar can climb grades as much as 9% for short distances (approximately 700 to 800 feet), sustained grades over 7% are generally discouraged, particularly in climates where snow and ice are regular occurrences. Thus, corridors with grades between 7 and 9% will be carried forward to Phase 2 only if they pass all other screening criteria.

Methodology

To conduct the Phase 1 Grade Screening a vehicle was driven along each potential route visually looking for any grades that appeared to be greater than 5%. At these locations further inspection was accomplished using an electronic level placed on the roadway in multiple locations. All locations with grades greater than 7% were then averaged and recorded. In addition, the approximate sustained length of the steep grades was determined using an electronic range finder. The following rating scale was used for grade screening:

Grade	Rating
Grades less than 7.0% — No major restrictions in vehicle type or operation.	✓✓ Best
Grades between 7.0% and 7.9% — Potential to eliminate some vehicles and reduce service life of the vehicles and infrastructure.	✓ Good
Grades between 8.0% and 9.0% — Further limit vehicles and reduce service life; or grades 7.0% and greater sustained for more than 500 feet in length.	⚠ Fair

Findings

Overall, there are grade issues along ten locations that span eight corridors (see Figure 2 and Table 2). However, none have grades that exceed the 9% that would preclude streetcar service:

- **Snelling**: An average 7.5% grade for 1,584 feet located on the south end of corridor through McDonough Park.
- **Selby**: An average 8.0% grade for 200 feet located on the east end of the corridor on Summit Avenue just north of Selby Avenue (on the east side of the Cathedral of Saint Paul).
- **Rice**: An average 7.5% grade for 300 feet located on the south end of corridor.
- **Payne**: An average 7.7% grade for 150 feet located near the mid-point of this corridor between the bridge over the rail right-or-way and Bush Avenue.

  East 3rd Street: Three locations: an average of 8.5% over 480 feet in the middle of the corridor between Bates Avenue and Middle Street; an average of 8.0% over 450 feet near the east end between Hazel and Ruth Streets; and an average of 7.0% for 100 feet just before the east end west of Howard Street.
- **Lexington**: Toward the south end of the Lexington corridor there is an approximate 300 foot 7.5% grade, which then transitions to a 6% grade for 700 feet to the crest of the hill at Juliet Avenue.
- **Shepard**: An average 8.2% grade over 450 feet is located at the eastern end of the corridor on Eagle Street near the intersection of Kellogg Boulevard and the Excel Energy Center. (This grade could be avoided by using North Chestnut Street instead of Eagle Street).

- **George**: An average 9.0% grade for 600 feet is located on the eastern end of the corridor between Robert Street and Cesar Chavez Street.

Figure 2 – Grade, Street Geometry, and Other Physical Barriers

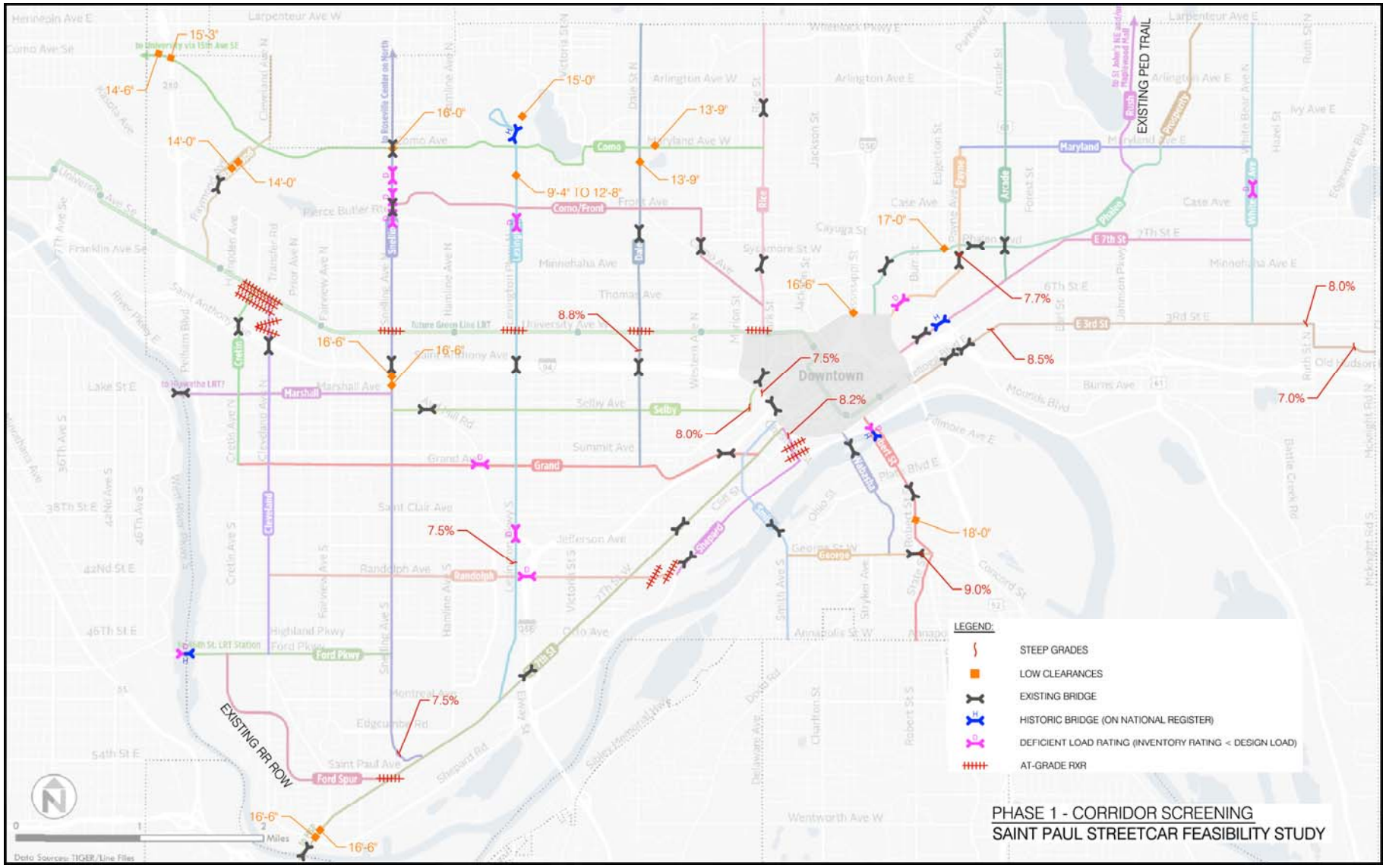


Table 2 – Grade Assessment

Corridor	Grade Assessment	Rating
Ford Pkwy	No significant steep grades observed on corridor.	✓✓ Best
Ford Spur	Corridor is an existing freight rail corridor.	✓✓ Best
Rush	Corridor is currently a pedestrian trail north of Maryland Avenue. No significant steep grades observed on corridor south of Maryland Avenue.	✓✓ Best
Snelling	An average 7.5% grade for 1,584 feet located on the south end of corridor through McDonough Park.	⚠ Fair
W 7th St	No significant steep grades observed on corridor.	✓✓ Best
Randolph	No significant steep grades observed on corridor.	✓✓ Best
Grand	No significant steep grades observed on corridor.	✓✓ Best
Selby	An average 8.0% grade for 200 feet located on the east end of corridor on Summit Avenue just before Selby Avenue.	⚠ Fair
Marshall	No significant steep grades observed on corridor.	✓✓ Best
Dale	An average 8.8% grade for 200 feet located near the southern end of corridor between Saint Anthony Avenue and Central Avenue.	⚠ Fair
Rice	No significant steep grades observed on corridor. (An average 7.5% grade for 300 feet in the downtown section of the corridor exists, though this was not considered in the Phase 1 rating).	✓✓ Best
E 7th St	No significant steep grades observed on corridor.	✓✓ Best
Payne	An average 7.7% grade for 150 feet located near the mid-point of this corridor between the bridge over the rail right-or-way and Bush Avenue.	✓ Good
Maryland	No significant steep grades observed on corridor.	✓✓ Best
Arcade	No significant steep grades observed on corridor.	✓✓ Best
E 3rd St	Within this corridor there are likely three locations with steep grades. From west to east they are approximately: 8.5% over 480 feet in the middle of the corridor between Bates Avenue and Maple Street, 8.0% over 450 feet near the east end between Hazel and Ruth Streets, and 7.0% for 100 feet just before the east end west of Howard Street.	⚠ Fair
White Bear	No significant steep grades observed on corridor.	✓✓ Best
Prosperity	No significant steep grades observed on corridor.	✓✓ Best
Phalen	No significant steep grades observed on corridor.	✓✓ Best
Como/Front	No significant steep grades observed on corridor.	✓✓ Best
Como	No significant steep grades observed on corridor.	✓✓ Best
Lexington	Toward the south end of the Lexington corridor there is an approximate 300 foot 7.5% grade, which then transitions to a 6% grade for 700 feet to the crest of the hill at Juliet Avenue.	✓ Good
Shepard	An average 8.2% grade over 450 feet is located at the eastern end of the corridor on Eagle Street near the intersection of Kellogg Boulevard and the Excel Energy Center (which could be avoided by using North Chestnut Street instead of Eagle Street).	⚠ Fair
Smith	No significant steep grades observed on corridor.	✓✓ Best
Robert St	No significant steep grades observed on corridor.	✓✓ Best
Wabasha	No significant steep grades observed on corridor.	✓✓ Best
George St	An average 9.0% grade for 600 feet is located on the eastern end of the corridor between Robert Street and Cesar Chavez Street.	⚠ Fair
Cretin	No significant steep grades observed on corridor.	✓✓ Best
Raymond	No significant steep grades observed on corridor.	✓✓ Best
Cleveland	No significant steep grades observed on corridor.	✓✓ Best

Street Geometry

Especially between downtown and the neighborhoods, there are a number of streets where street geometry would make streetcar service difficult to operate. This criterion identifies whether street geometry would degrade the functionality of the streetcar operation, or require significant capital investments that make operation feasible. These primarily include geometric features of the existing roadways that would potentially slow the streetcars' operating speed (such as turning vehicles, cars parking, etc.) as well as the effects a streetcar may have on auto capacity in a corridor.

Methodology

Phase 1 Street Geometry Screening was conducted by driving a vehicle along each potential route visually looking for the number of travel lanes on each potential corridor. The number of lanes was recorded for each corridor and verified with aerials. Based on these observations, an approximate number of lanes (average) was established for each corridor that represented the overall street configuration of the corridor.

Each corridor was rated per the scale below. If multiple street configurations were found within the same corridor an engineering judgment was made to determine the overall rating.

Physical Characteristics	Rating
Two lanes or more in each direction - provides greatest flexibility in accommodating both traffic and a streetcar allowing vehicles to pass the streetcar and enough street width to provide turn pockets for autos outside the streetcar lane to avoid delays to the streetcar.	✓✓ Best
One lane in each direction with turn lanes – The turn lanes will help reduce the number of potential conflicts between the streetcar and auto traffic but does not provide a way for autos to pass the streetcar.	✓ Good
One lane in each direction with parking or One lane in each direction without turn lanes – Least flexible from a design standpoint and creates the maximum number of conflicts between autos and the streetcar likely resulting in a slower streetcar operation.	⚠ Fair

Findings

Overall, and as summarized in Table 3, the majority of the corridors have minimal limitations with respect to street geometry (see also Figure 2 on page 6). Nearly half of the corridors have two lanes in each direction for a majority of their length, while others had multiple lane configurations within an individual corridor. However, there are variations within corridors, and the more detailed analysis in Phase 2 will assess some of the turns required to connect different corridors. In addition, tight radii curves at intersections were not evaluated during this phase due to the large number of potential turning movements and because the turns that will be introduced when corridors are connected in Phase 2 are not yet know. Thus, that assessment will be conducted in Phase 2.

Table 3 – Street Geometry Assessment

Corridor	Street Geometry Assessment	Rating
Ford Pkwy	Most of the corridor has two lanes in each direction; the eastern end has one lane with turn lanes and parking.	✓✓ Best
Ford Spur	This corridor is an existing freight rail corridor.	✓✓ Best
Rush	Currently a pedestrian trail north of Maryland Avenue; south generally has two lanes in each direction.	✓✓ Best
Snelling	Mostly Snelling is a two lane roadway in each direction. The southern end has one lane in each direction.	✓✓ Best
W 7th St	Most of the corridor has two travel lanes in each direction with a portion having one lane with a continuous two-way left-turn lane and parking.	✓✓ Best
Randolph	The corridor generally has one lane with parking in each direction. A few intersections have turn lanes.	⚠ Fair
Grand	Most of the corridor has one lane in each direction with a continuous two-way left-turn lane and parking. The eastern end of the corridor turns into a one-way couplet	✓ Good
Selby	Selby generally has one lane in each direction with parking; a few major intersections have turn lanes	⚠ Fair
Marshall	Most of the corridor has one lane in each direction with turn lanes and parking.	✓ Good
Dale	The corridor generally has two lanes in each direction.	✓✓ Best
Rice	Most of the corridor has two lanes in each direction.	✓✓ Best
E 7th St	Most the corridor has one lane in each direction with parking. The western portion has two lanes in each direction.	✓ Good
Payne	Corridor consists of a mix of two lanes in each direction on the southern end, one lane with turn lanes and parking near the middle, and one lane with parking to the north.	✓ Good
Maryland	This corridor generally has two lanes in each direction.	✓✓ Best
Arcade	Arcade has two lanes in each direction along most of its length; a small portion has one lane with parking.	✓✓ Best
E 3rd St	Majority of the corridor has one lane in each direction with on street parking. A portion to the west has two lanes in each direction.	⚠ Fair
White Bear	Generally two lanes in each direction.	✓✓ Best
Prosperity	Most of the corridor has one lane in each direction with parking.	⚠ Fair
Phalen	Phalen has a fair mix of two lanes in each direction, one lane with turn lanes, one lane with parking, and some locations with a center median.	✓ Good
Como/Front	In general, this corridor has one lane with on street parking, the far western section has two lanes in each direction, and the eastern most section has one lane with a continuous two-way left-turn lane.	✓ Good
Como	Large variety of lane configurations that range from two lanes in each direction to one lane with and without parking.	✓ Good
Lexington	The majority of the corridor has two lanes in each direction while the northern and southern ends have a mix of one lane with and without parking.	✓ Good
Shepard	The majority of the corridor has two lanes in each direction. To the north there is a portion that is a southbound one-way.	✓✓ Best
Smith	The majority of the corridor has one lane in each direction with turn lanes. Portions have one lane with on-street parking.	✓ Good
Robert St	The northern half of the corridor has two lanes in each direction. Portions of the south are generally mixed with one lane in each direction with and without parking and some turn lanes.	✓ Good
Wabasha	In general the northern portion of the corridor has two lanes in each direction, the middle has one lane with turn lanes, and the south has one lane with parking.	✓ Good
George St	The majority of the corridor has one lane in each direction with on-street parking.	⚠ Fair
Cretin	Most of the corridor has two lanes in each direction.	✓✓ Best
Raymond	Most of the corridor has one lane in each direction with on-street parking.	⚠ Fair
Cleveland	Most of the corridor has one lane in each direction with on-street parking.	⚠ Fair

Other Physical Barriers

Other physical barriers besides grade and street geometry may potentially impact streetcar operations or require significant capital expenses to address. Examples include low bridges or skyways, streets that are too narrow, streets that have significant snow impacts, and at-grade freight railroad crossings. As noted above, some bridges may exhibit steep grades, but are also identified here if these bridges are currently structurally deficient based on their current bridge inventory reports.

Methodology

To conduct the Phase 1 Other Physical Barrier Screening a vehicle was driven along each potential route visually looking for any at-grade railroad crossings, overpasses that appear to be less than 20 feet from the top of pavement, and bridges that are anticipated to carry the potential streetcar. At-grade railroad crossing locations were recorded and noted whether they carry freight traffic or Metro Transit's LRT Green Line.[1] Overpasses were measured with a laser from the apparent lowest clearance point that was feasible to measure safely in traffic. All heights 18 feet and lower were recorded. Lastly, the loading capacity of bridge structures was examined. Bridge numbers, capacity ratings, and historical register status were taken from MnDOT's Structure Inventory Reports on their website. Each corridor was rated per the scale below. If more than one deficiency was found, the lowest rating was used.

Physical Barriers	Rating
• Overpasses with clearance greater than 18 feet. • Bridges not currently on the historical register. • Bridges that do not currently have a deficient load rating (inventory rating is less than design load per MnDOT's Structure Inventory Reports).	✓✓ Best
• Overpasses with clearance between 16 and 18 feet. • Bridges that are currently on the historical register.	✓ Good
• Overpasses with clearance less than 16 feet. • Bridges that currently have a structurally deficient load rating (Inventory rating is less than design load per MnDOT's Structure Inventory Reports). • Current at-grade freight rail crossings.	⚠ Fair

Findings

Physical barriers such as at-grade freight rail crossings, low overpasses, and bridges were found on most of the proposed phase 1 streetcar corridors (see Table 4 and Figure 2 on page 6). None of these issues are expected to preclude streetcar service, but many likely impact capital costs. Nearly half of the corridors received a good or best rating while the other half were rated fair. The most significant issues were:

- **Snelling**: There are three bridges located near the northern end currently rated as structurally deficient. There are also two railroad overpasses with approximate clearances of 16'-6".
- **West 7th Street**: There are two roadway overpasses with an approximate clearance of 16'-6" located along the west end of the corridor.

[1] While at-grade LRT crossing locations were noted, their presence was not included in the scoring. Crossings between streetcar and LRT are not anticipated to be an issue but have not yet been discussed with Metro Transit.

- **Randolph**: There are two at-grade freight rail crossings located on the east end of corridor, and one structurally deficient bridge over I-35E.
- **Grand**: There are two bridges rated as structurally deficient.
- **Dale**: There is a railroad overpass with an approximate 13'-9" of clearance located on the northern part of the corridor.
- **Maryland**: This corridor has significant capacity degradation when there is snow.
- **White Bear**: There is one structurally deficient bridge located near the mid point of the corridor. The corridor has significant capacity degradation when there is snow.
- **Phalen**: There are two low clearance overpasses along the western end of the corridor. One is a roadway overpass with approximately 17'-0" of clearance and the other is a roadway overpass with approximately 16'-6" of clearance.
- **Como**: There are four low clearances located on this corridor. From west to east they are a 14'-6" railroad overpass, a 15'-3" roadway overpass, a 16'-0" roadway overpass, and a 13'-9" railroad overpass located on the eastern end.
- **Lexington**: There are two low clearances located near the north end of the corridor. One is an arched railroad overpass with approximately 12'-8" clearance for the northbound left lane and 9'-4" clearance for the northbound right lane. The other is a pedestrian overpass with approximately 15'-0" of clearance.
- **Shepard**: There is an at-grade rail crossing with two tracks on the north end of the corridor.
- **Robert**: The northernmost bridge on the corridor is historic and structurally deficient.
- **Cretin**: Two at-grade freight rail crossings are located on the northern end of this corridor.
- **Raymond**: There are two railroad overpasses with approximately 14'-0" of clearance.
- **Cleveland**: There are three at-grade freight rail crossings located along the northern end of this corridor, of which one is double track.

Table 4 – Other Physical Barriers Assessment

Corridor	Other Physical Barriers Assessment	Rating
Ford Pkwy	No at-grade rail crossings or low clearances currently on corridor. An existing structurally deficient historic bridge is located on the far west end of this corridor. However, the structurally deficient rating is due to a low clearance for Mississippi River Boulevard beneath the bridge, which would not impact streetcar service.	✓✓ Best
Ford Spur	Corridor is an existing freight rail corridor.	⚠ Fair
Rush	Corridor is currently a pedestrian trail north of Maryland Avenue. From Maryland Avenue south there are no anticipated at-grade rail crossings, low clearances, or bridges on corridor.	✓ Good
Snelling	A future at-grade LRT crossing is located at University Avenue. Two railroad overpasses with approximate clearances of 16'-6". Three bridges located near the northern end are currently rated at structurally deficient (inventory rating less than design)	⚠ Fair
W 7th St	Currently an at-grade rail crossing and two roadway overpasses with an approximate clearance of 16'-6" are located on the west end of the corridor. Three bridges are also located along the corridor.	⚠ Fair
Randolph	Two at-grade rail crossings are currently located on the east end of corridor. No low clearances are currently on the corridor, but there is one structurally deficient bridge over I-35E.	⚠ Fair
Grand	No at-grade rail crossings or low clearances are likely on this corridor. Two bridges are located along the corridor with the one near the mid point, which is structurally deficient. Also the east end of the corridor is currently constructed as a one-way couplet. If the proposed streetcar maintains this geometry, then an additional bridge would be required.	⚠ Fair
Selby	No at-grade rail crossings or low clearance points are anticipated to be located along corridor. There is one bridge located on the corridor near the west end.	✓✓ Best
Marshall	No at-grade rail crossings or low clearances are likely located along the corridor. There is one bridge located on the western end of the corridor.	✓✓ Best
Dale	A future at-grade LRT crossing is located at University Avenue. A railroad overpass with an approximate 13'-9" of clearance is located on the northern part of the corridor. Two bridges are located on this corridor.	⚠ Fair

Table 4 (Continued) – Other Physical Barriers Assessment

Corridor	Other Physical Barriers Assessment	Rating
Rice	A future at-grade LRT crossing is located at University Avenue. No low clearances are expected on the corridor. Six bridges are located along the corridor.	✓✓ Best
E 7th St	No at-grade rail crossings or low clearances are likely located on this corridor. Two bridges are located on the west end of the corridor with the eastern most being on the historical register.	✓ Good
Payne	No at-grade rail crossings or low clearances are anticipated on this corridor. Two bridges are on the corridor with one on the southern end that is structurally deficient.	⚠ Fair
Maryland	It is anticipated that no at-grade rail crossings, low clearances, or bridges on corridor. However, this corridor has significant capacity degradation when snow is present.	⚠ Fair
Arcade	No at-grade rail crossings or low clearances are expected on this corridor. One bridge is located near the southern end of the corridor.	✓✓ Best
E 3rd St	No at-grade rail crossings or low clearances are likely on the corridor. Two bridges are located on the west end of the corridor.	✓✓ Best
White Bear	No at-grade rail crossings or low clearances are likely on the corridor. One structurally deficient bridge is located near the mid point of the corridor. In addition, this corridor has significant capacity degradation when snow is present.	⚠ Fair
Prosperity	It is anticipated that no at-grade rail crossings, low clearances, or bridges on corridor.	✓✓ Best
Phalen	No at-grade rail crossings are currently located on the corridor. Two low clearances are located on the western end of the corridor. One is a roadway overpass with approximately 17'-0" of clearance and the other is a roadway overpass with approximately 16'-6" of clearance. There are also two bridges located on this corridor.	✓ Good
Como/Front	No at-grade rail crossings or low clearances are anticipated on this corridor. One bridge is located on this corridor.	✓✓ Best
Como	No at-grade rail crossings are currently located on this corridor. Four low clearances are located on this corridor from west to east they are likely a 14'-6" railroad overpass, a 15'-3" roadway overpass, a 16'-0" roadway overpass, and the most restrictive, a 13'-9" railroad overpass located on the eastern end. No bridges are located on this corridor.	⚠ Fair
Lexington	Future at-grade LRT crossing is located at University Avenue. Two low clearances are located near the north end of the corridor. One is an arched railroad overpass with approximately 12'-8" clearance for the northbound left lane and 9'-4" clearance for the northbound right lane. The other is a pedestrian overpass with approximately 15'-0" of clearance. Five bridges are located on the corridor of which one is on the historical register with an unknown structural rating, and two are structurally deficient.	⚠ Fair
Shepard	There is an at-grade rail crossing with two tracks on the north end of the corridor. No low clearances are likely on this corridor. One bridge is located on the southern end of the corridor.	⚠ Fair
Smith	It is anticipated that no at-grade rail crossings or low clearances will be on this corridor. There is one bridge currently located on this corridor.	✓✓ Best
Robert St	No at-grade rail crossings are currently located on this corridor. It is expected that a pedestrian overpass with an approximate height of 18'-0" will be located on the corridor. There are two bridges on the current corridor with the northern-most on the historical register and structurally deficient.	⚠ Fair
Wabasha	No at-grade rail crossings or low clearances are anticipated on this corridor. Two bridges are currently located on the northern end of the corridor.	✓✓ Best
George St	No at-grade rail crossings or low clearances are likely on this corridor. One bridge is currently located on the eastern end of the corridor.	✓✓ Best
Cretin	Future at-grade LRT crossing is located at University Avenue. Two more at-grade rail crossings are also located on the northern end of this corridor. No low clearances are likely to be located on the corridor. There are currently two bridges located on this corridor.	⚠ Fair
Raymond	Future at-grade LRT crossing is located at University Avenue. Two railroad overpasses are expected to be low with approximately 14'-0" of clearance. There is currently one bridge located on this corridor.	⚠ Fair
Cleveland	A future at-grade LRT crossing is located at University Avenue. Three additional at-grade rail crossings are also located on the northern end of this corridor, of which one is currently double track. No low clearances are likely on the corridor. One bridge is currently located on this corridor.	⚠ Fair

SCREENING RESULTS – OTHER CRITERIA

Terminals and Anchors

As with any transit service, strong destinations and terminals improve the attractiveness of service. Thus, this criterion evaluates whether there is a reasonable location for a streetcar line to terminate where connections to other transit service can be made, such as a university/college, transit center, Green Line LRT station or other major activity center.

Methodology

Each corridor was assessed based on its ability to terminate at strong transit anchors on either end of the corridor, based on current conditions. The most favorable anchors were downtown Saint Paul, colleges or universities, transit centers, planned light rail stations, the airport, and to a lesser extent, key transit corridors. Corridors anchored by very strong anchors at both ends were rated best, corridors that could end at strong anchors on at least one end were rated good, and corridors that would lack a strong anchor at either end were rated fair.

Although the Phase 1 corridors are treated as independent corridors and evaluated on their own merits, in Phase 2, many of the segments will be combined to create a more complete streetcar alignment. For example, Marshall could be combined with Selby to connect with downtown, and Ford Parkway could be combined with Snelling to create a more comprehensive streetcar alignment. For the Phase 1 screening, the corridors were considered independently; however opportunities to combine corridors are noted in the table narrative.

Findings

The results of the Terminal Location screening are shown in Table 5. Five corridors have the potential to end at very strong transit anchors and were rated best:

- **Snelling**, which would connect to the Green Line, major east-west bus routes, and universities.
- **Grand**, which could run between the University of St. Thomas and downtown.
- **Selby**, which could run between Snelling, which is a key north-south transit line, and downtown.
- **West 7th Street**, which could run between the Minneapolis-Saint Paul Airport and downtown.
- **Lexington**, which would also connect to the Green Line, major east-west bus routes, and universities.

Nine others were rated as good:

- **Ford Parkway**
- **Randolph**
- **Marshall**
- **East 7th Street**
- **Payne**
- **East 3rd Street**
- **Cretin**
- **Raymond**
- **Cleveland**

Table 5 – Terminal Location and Activity Center Assessment

Corridor	Terminal Location and Activity Center Assessment	Rating
Ford Pkwy	Western end could connect to the 46th Street LRT station in Minneapolis. In addition, the corridor could connect to a future redevelopment site at the old Ford plant. Eastern end could terminate at Snelling Avenue, a key transit corridor.	✓ Good
Ford Spur	Eastern and western ends would lack a strong anchor. Eastern end could terminate at 7th Street W, a key transit corridor. Western end could terminate at Ford Parkway.	⚠ Fair
Rush	The southern end would lack a strong anchor. The northern end could terminate at St. John's Healtheast or Maplewood Mall.	⚠ Fair
Snelling	Northern end could connect to the Roseville Center Transit Center. Southern end could terminate at 7th Street W, a key transit corridor. Also could include strong mid-corridor connections with the future Green Line LRT station at University Avenue W, multiple colleges (Hamline and Macalester), and significant mid-corridor connections with Metro routes running east-west.	✓✓ Best
W 7th St	Both ends could have strong transit anchors. Southern end could connect to Minneapolis Saint Paul International Airport. Eastern end could terminate in downtown Saint Paul.	✓✓ Best
Randolph	Western end could terminate at College of St. Catherine at Cleveland Street. Eastern end would lack a strong anchor at Shepard Road, though it could terminate instead at 7th Street W, a key transit corridor.	✓ Good
Grand	Western end could terminate at the University of St. Thomas and the Saint Paul Seminary at Cretin Ave. Eastern end could terminate at 7th Street W, a key transit corridor, or easily continue into downtown Saint Paul for a strong anchor.	✓✓ Best
Selby	Western end could terminate at Snelling Avenue, a key transit corridor. Eastern end would terminate in downtown Saint Paul.	✓✓ Best
Marshall	Western end could connect to Hiawatha LRT station in Minneapolis. Eastern end could terminate at Snelling Avenue, a key transit corridor, or easily continue into downtown Saint Paul.	✓ Good
Dale	Northern end would lack a strong anchor, though the southern end could continue into downtown Saint Paul. Could include a strong mid-corridor connection with a future Green Line LRT station at University Avenue W.	⚠ Fair
Rice	Northern end would lack a strong anchor at Larpenteur Avenue W, though it could terminate south of Larpenteur at the Washington Technology Magnet School, a minor anchor. Southern end would terminate in downtown Saint Paul.	⚠ Fair
E 7th St	Eastern end would lack a strong anchor at White Bear Avenue, though it could terminate at a redeveloped site at Arcade Street. Western end would terminate in downtown Saint Paul.	✓ Good
Payne	Northern end could terminate at Maryland Avenue E, a key transit corridor. Southern end would terminate in downtown Saint Paul.	✓ Good
Maryland	Eastern end would lack a strong transit anchor. Western end could terminate at Payne Avenue, a key transit anchor, but could easily continue into downtown Saint Paul.	⚠ Fair
Arcade	Northern and southern ends would lack a strong transit anchor, though the southern end could easily continue into downtown Saint Paul.	⚠ Fair
E 3rd St	Eastern end could have anchor at the Sun Ray Transit Center, though activity at this center is low, or at the nearby 3M site, a major employment cluster. Western end would have strong anchor in downtown Saint Paul.	✓ Good
White Bear	Both northern and southern ends would lack a strong transit anchor, though the southern end could continue to the Sun Ray Transit Center.	⚠ Fair
Prosperity	The northern end would lack a strong transit anchor, though the southern end could continue into downtown Saint Paul.	⚠ Fair
Phalen	The northern end would lack a strong anchor. The southern end would have a strong anchor in downtown Saint Paul.	⚠ Fair
Como/Front	Western end could terminate at Snelling Avenue, a key transit corridor. Eastern end would lack a strong anchor at Rice Street.	⚠ Fair
Como	Western end could terminate at the University of Minnesota – Twin Cities via 15th Avenue SE. Eastern end would lack a strong transit anchor.	⚠ Fair

Table 5 (Continued) – Terminal Location and Activity Center Assessment

Corridor	Terminal Location and Activity Center Assessment	Rating
Lexington	Northern end could terminate at Como Regional Park, a strong transit anchor. Southern end could terminate at 7th Street W, a key transit corridor. Also could include strong mid-corridor connections with the future Green Line LRT station at University Avenue W and significant mid-corridor connections with Metro routes running east-west.	✓✓ Best
Shepard	Southern end would lack a strong anchor. Northern end would have strong anchor in downtown Saint Paul.	⚠ Fair
Smith	Southern end would lack a strong anchor. Northern end would have strong anchor in downtown Saint Paul.	⚠ Fair
Robert St	Southern end would lack a strong anchor. Northern end would have strong anchor in downtown Saint Paul.	⚠ Fair
Wabasha	Southern end would lack a strong anchor. Northern end would have strong anchor in downtown Saint Paul.	⚠ Fair
George St	Both western and eastern ends would lack a strong transit anchor.	⚠ Fair
Cretin	Northern end could terminate at University Avenue W, a key transit corridor (though there is no Green Line LRT station planned for this location). Southern end could terminate at Grand Avenue and offer a connection to Saint Paul Seminary and University of St. Thomas.	✓ Good
Raymond	Northern end could have a strong anchor at University of Minnesota. Southern end could terminate at University Avenue W, a key transit corridor that offers a future connection to the Green Line LRT.	✓ Good
Cleveland	Northern end could terminate at University Avenue W, a key transit corridor that offers a connection the future Green Line LRT (though not directly at a LRT station). Southern end would lack a strong transit anchor but could end at new development a former Ford plant.	✓ Good

Transit Speed and Reliability

Adequate speed and reliable operation are important for any transit service, but especially streetcar service, which would operate entirely or largely in mixed flow traffic. Thus, corridors with substantial traffic congestion may be unable to meet minimum service reliability standards. Though traffic congestion is often a clear indication of where people need to travel, in this first phase of analysis, the study team focused on the need to avoid congestion that would result in unreliable service by examining daily traffic flows along short segments of road. This provided a generalized view of congestion along the entire length of the potential corridors and highlighted areas where streetcar service may be infeasible due to congestion or slow downs, and facilitate a more in-depth view of traffic in the subsequent phases of this study.

Methodology

The Minnesota Department of Transportation compiles traffic data from across Minnesota and provides data on annual average daily traffic (AADT) for Hennepin, Dakota, and Ramsey counties. The AADT counts are from the most current year available for each segment, which can be as far back as the mid-2000s, though most are within the past three years. The AADT data are broken down by segment, with each segment's number of lanes recorded. To obtain a simple measure of congestion, the AADT counts were divided by the number of lanes. Utilizing GIS, the study team selected the segments contained within each potential corridor and computed the minimum and maximum AADT per lane (see Table 6). In addition, the team found a weighted mean for each corridor, which involved multiplying the AADT per lane for each segment by the segment's length, summing the results, and diving by the total corridor length. This helps to account for the wide range of segment lengths contained in the data.

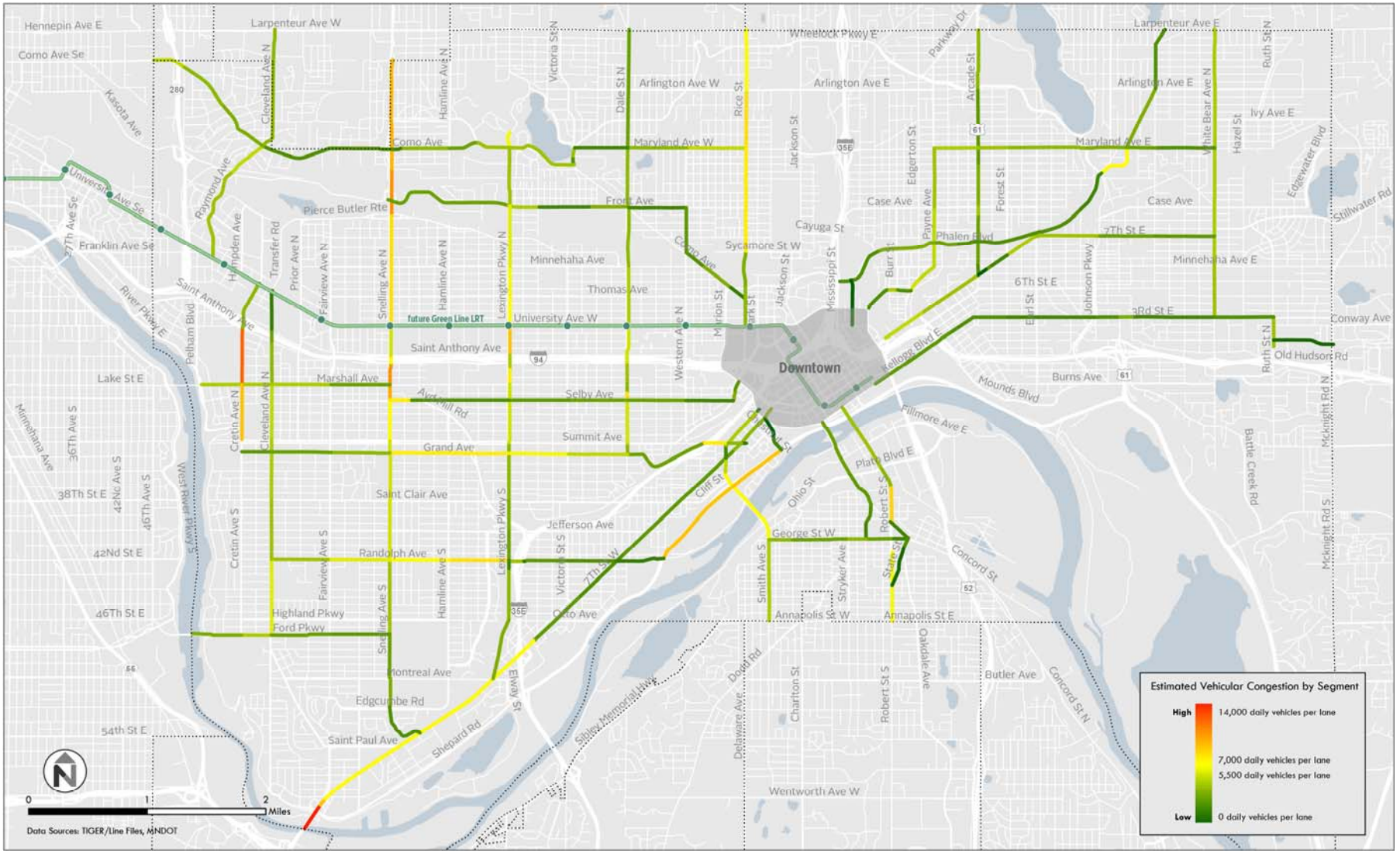
The Texas Transportation Institute's (TTI) Urban Mobility Report[2] defines five classifications of AADT per lane for urban arterials to indicate the vulnerability of a road segment to congestion: the higher the traffic volume per lane, the higher the vulnerability. While these indicator measures are generalizations, they provide an idea of how each segment and corridor is performing. TTI's classifications are adapted to fit this analysis in the following way based on the weighted mean:[2]

Daily Traffic Volume per Lane	Vulnerability to Congestion	Rating
Top 3 corridors with the least amount of traffic*	Low Vulnerability	✓✓ Best
Less than 5,500 (Very Low to Low Traffic)	Low Vulnerability	✓ Good
5,500 - 7,000 (Medium to Medium-High Traffic Volume)	Vulnerable	✓ Good
Greater than 7,000 (High Traffic Volume)	High Vulnerability	⚠ Fair

**Note: To ensure consistency in the final ratings, Ford Spur and Rush also received best ratings since they have no traffic speed or reliability conflicts.*

[2] Texas Transportation Institute. (2002). Urban Mobility Report. Texas A&M University. College Station, Texas. (Appendix A, Exhibit A-17, 2000 Roadway Congestion Index). http://ntl.bts.gov/lib/11000/11200/11296/mobility_report_2002.pdf.

Figure 3 – Estimated Traffic Congestion by Segment



Findings

Traffic congestion in Saint Paul is very low or low on all but two of the 30 corridors (see Table 6 and Figure 3). Due to low congestion, 26 corridors are in the "low vulnerability" group and two corridors are in the "vulnerable" group. The corridors with the least amount of traffic on average, and that were rated as best, are:

- East 3rd Street
- Phalen Boulevard
- Wabasha Street
- Ford Spur
- Rush

Most of the other corridors rated were rated as good. The only exceptions were Shepard Road and Cretin Avenue, which have daily traffic volumes per lane above 7,000 and were rated fair. This does not mean that these segments experience congestion throughout the day or even every day, but instead that they have a high sensitivity to congestion.

Table 6 – Transit Speed and Reliability Assessment

	Daily Traffic Volume per Lane			
Corridor	Minimum	Maximum	Weighted Mean	Rating
Ford Pkwy	2,800	4,875	3,494	✓ Good
Ford Spur	No traffic data (protected ROW)			✓✓ Best
Rush	No traffic data (protected ROW)			✓✓ Best
Snelling	2,378	10,540	6,605	✓ Good
W 7th St	2,455	13,668	5,253	✓ Good
Randolph	1,450	7,800	4,800	✓ Good
Grand	1,417	7,540	5,119	✓ Good
Selby	1,796	7,540	2,907	✓ Good
Marshall	3,275	4,750	4,290	✓ Good
Dale	3,275	7,750	4,307	✓ Good
Rice	3,800	7,700	6,605	✓ Good
E 7th St	2,100	5,431	4,018	✓ Good
Payne	2,454	5,800	4,581	✓ Good
Maryland	2,500	4,825	3,710	✓ Good
Arcade	2,455	4,497	3,448	✓ Good
E 3rd St	759	4,605	2,178	✓✓ Best
White Bear	4,525	4,850	4,730	✓ Good
Prosperity	2,400	3,550	2,993	✓ Good
Phalen	413	7,000	2,791	✓✓ Best
Como/Front	1,375	4,700	2,863	✓ Good
Como	2,024	5,263	3,631	✓ Good
Lexington	1,975	8,625	5,068	✓ Good
Shepard	413	8,600	7,212	⚠ Fair
Smith	2,075	6,895	5,382	✓ Good
Robert St	708	8,283	4,583	✓ Good
Wabasha	1,974	3,112	2,741	✓✓ Best
George St	1,999	4,149	3,267	✓ Good
Cretin	4,200	11,942	8,464	⚠ Fair
Raymond	4,200	5,200	4,474	✓ Good
Cleveland	1,544	6,100	4,607	✓ Good

Other Transit Investments

There are a number of new or potential additional transit investments that are currently being considered in Saint Paul. Additionally, some projects may already be under construction or in design, which could conflict with a potential streetcar alignment. This criterion is designed to determine the degree to which streetcar service could compliment those other efforts, duplicate them, or potentially replace them, without unfairly penalizing corridors that have not been studied or considered for transit investment.

Methodology

At the beginning of the study, the study team conducted a document review of all existing plans, studies, reports, etc. for the Saint Paul region. To determine areas currently targeted for transit investments, the team used this document review and, if needed, went back to the plans and studies to find specific information on planned investments.

Findings

One of the most pertinent studies to this analysis is the Central Corridor Transit Service Plan, which is a comprehensive restructuring plan for bus service that will occur in conjunction with the opening of the Green Line. Bus service will increase in many of the Phase 1 corridors. Future streetcar planning will need to determine how best to integrate streetcar and local bus service, but none of the proposed changes in the Central Corridor Transit Service Plan are incongruous with future streetcar service.

The second most important area-wide study is Metro Transit's recently completed Arterial Transitways Corridor Study (ATCS). This study recommended implementation of arterial BRT service in a number of corridors throughout the Twin Cities area, five of which are Phase 1 corridors (see Figure 4):

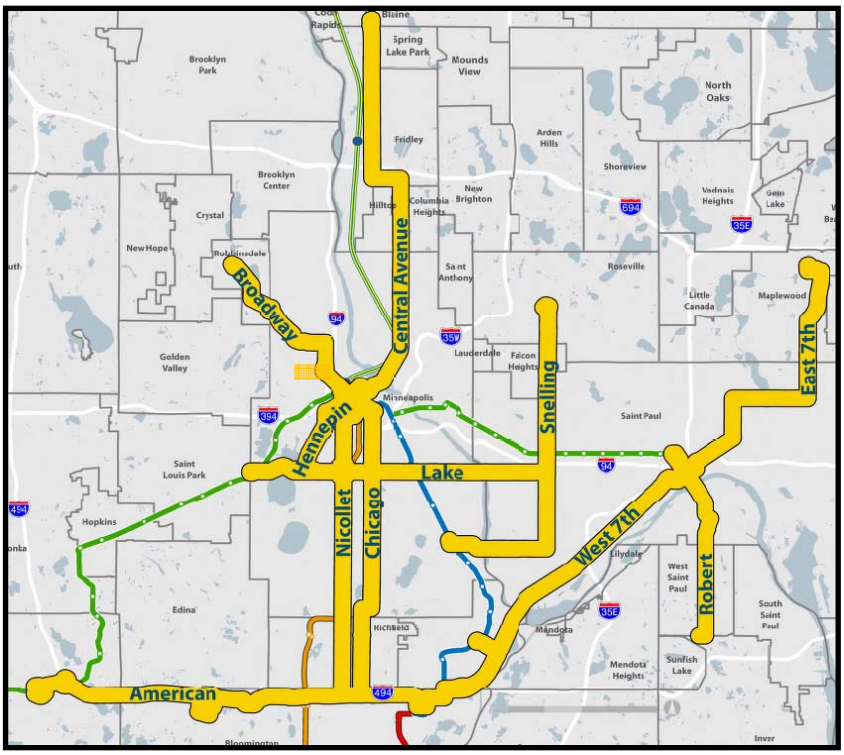
- **Snelling** (including **Ford Parkway** in the ATCS)
- **West 7th Street**
- **Marshall** (called Lake in the ATCS)
- **East 7th Street**
- **Robert**

As evidenced by recent work on Minneapolis' Nicollet-Central Alternative Analysis, there are challenges in integrating streetcar and arterial BRT service. However, with arterial BRT used to primarily provide regional service and streetcar to provide local circulator service, it is possible to design both so that they work together in a complementary manner. Corridors with high potential for arterial BRT service would also likely have high levels of local travel that could be served by streetcar. Because of this, and to leverage the work conducted as part of the ATCS, the corridors that were ranked as best were the ATCS Saint Paul corridors, plus Grand, which the District 14 Summit Hill plan recommends for trolley service.

There are also two other studies current underway related to the East 7th, White Bear, and Robert corridors. However, these are regional studies that would have limited to no impacts on Saint Paul streetcar service (see also Table 7):

- **East 7th Street** and **White Bear**: The Gateway Corridors Alternatives Analysis, which is currently underway, has recommended the implementation of BRT service between Saint Paul and Eau-Claire, WI. However, this would be a long distance regional service while streetcar service would be designed to meet local needs.
- **Robert**: The Robert Street Transit Alternatives Study, which began in 2012, is evaluating the potential for transit service improvements in the Roberts corridor between Rosemount and downtown Saint Paul. Alternatives have yet to be developed, but the focus of the study is to improve service between Dakota County and Saint Paul, where as streetcar service primarily improves service within Saint Paul (although it could extend into Dakota County).

Figure 4 – Arterial Transitways Corridor Study Arterial BRT Corridors



Source: Arterial Transitways Corridor Study Final Report, April 2012

Table 7 – Other Transit Investments Assessment

Corridor	Other Transit Investments Assessment	Rating
Ford Pkwy	As the Green Line becomes operational in 2014, Metro plans to increase bus service along Ford Parkway between Cleveland Avenue and Fairview Avenue. The Arterial Transitway Corridors Study, published in April 2012, identified Snelling Avenue (including Ford Parkway) as a corridor ready for near-term implementation of Rapid Bus (arterial BRT) services.	✓✓ Best
Ford Spur	None; viability depends upon future of the former Ford plant, which is not yet known.	⚠ Fair
Rush	None; was converted to trail.	⚠ Fair
Snelling	The Macalaster-Groveland neighborhood desires to study trolley service, as well as improved bus service, along north/south corridors, according to a 2001 neighborhood plan. As the Central Corridor light rail becomes operational in 2014, Metro plans to increase bus service along Snelling Avenue. The Arterial Transitway Corridors Study, published in April 2012, identified Snelling Avenue as a corridor ready for near-term implementation of Rapid Bus (arterial BRT) services.	✓✓ Best
W 7th St	The Arterial Transitway Corridors Study identified West 7th Street as a corridor ready for near-term implementation of Rapid Bus (arterial BRT) services. These upgrades can be coordinated with Central Corridor light rail restructuring activities.	✓✓ Best
Randolph	None.	✓ Good
Grand	Grand Avenue is the Summit Hill neighborhood's candidate corridor for trolley service due to its proposal of becoming a mixed-use corridor. The district also calls for the consideration of increasing transit service on both Grand and Saint Clair Avenues in order to best connect the neighborhood to destinations (2005 neighborhood plan). As the Central Corridor light rail becomes operational in 2014, Metro Transit plans to increase bus service along Grand Avenue.	✓✓ Best

Table 7 (Continued) – Other Transit Investments Assessment

Corridor	Other Transit Investments Assessment	Rating
Selby	Metro Transit will decrease bus service along Selby Avenue east of Dale Street as the Central Corridor light rail becomes operational in 2014.	⚠ Fair
Marshall	The Arterial Transitway Corridors Study identified Lake Street, which becomes Marshall Avenue in Saint Paul, as one of the eleven ATCS corridors.	✓✓ Best
Dale	As the Central Corridor light rail becomes operational in 2014, Metro Transit plans to introduce new bus route coverage and increase existing bus service along Dale Street.	✓ Good
Rice	As the Central Corridor light rail becomes operational in 2014, Metro plans to increase bus service along Rice Street.	✓ Good
E 7th St	The Arterial Transitway Corridors Study identifies East 7th Street as one of the eleven ATCS corridors. The Gateway Corridors Project has proposed the development of BRT service between Eau-Claire, WI and downtown Saint Paul. This would be a regional service that would serve a very different market from streetcar. The Rush Line Alternative Analysis, published in June 2009, selected two alternatives to connect Saint Paul with Hinckley to the north. The preferred alignment may run parallel to portions of East 7th Street or require changes to existing bus service.	✓✓ Best
Payne	None; Payne could fill a gap in the city transit network.	✓ Good
Maryland	The Rush Line Alternative Analysis, published in June 2009, selected two alternatives to connect Saint Paul with Hinckley to the north. However, these alternatives are generally unrelated to local travel.	✓ Good
Arcade	The Rush Line Alternative Analysis, published in June 2009, selected two alternatives to connect Saint Paul with Hinckley to the north. However, these alternatives are generally unrelated to local travel.	✓ Good
E 3rd St	None; transit center on eastern end, but only minor facility with few connections and no future plans for significant increase.	⚠ Fair
White Bear	The Gateway Corridors Project has proposed the development of BRT service between Eau-Claire, WI and downtown Saint Paul. This would be a regional service that would serve a very different market from streetcar	✓ Good
Prosperity	None.	✓ Good
Phalen	The 2009 neighborhood plan for the Greater East Side supports bus rapid transit lines along Phalen Boulevard and seeks to make general traffic improvements along Phalen Boulevard, White Bear Avenue, and around Phalen Village.	✓ Good
Como/Front	As the Central Corridor light rail becomes operational in 2014, Metro Transit plans to increase bus service along Front Avenue between Snelling Avenue and Lexington Parkway.	✓ Good
Como	The Como district intends to work with Metro Transit to provide bus access from the neighborhood to future light rail stations and hopes to construct park-and-ride lots in north Saint Paul, according to a 2007 neighborhood plan for Como. The plan also calls for an increase in shuttle service during special events at the fairgrounds and zoo. A 2008 neighborhood plan for the Saint Anthony Park district calls for "Green Connector" shuttles that provide feeder service to the light rail stations, and the district promotes the extension of the commuter rail to include a station at the University of Minnesota. In addition, Saint Anthony Park wants to evaluate the current bus routes through the neighborhood to ensure they are increasing connectivity and ridership to major employment and business areas.	✓ Good
Lexington	Metro Transit will add new bus route coverage along Lexington Parkway between West 7th Street and Front Avenue as the Central Corridor light rail becomes operational in 2014.	✓ Good
Shepard	None.	✓ Good

Table 7 (Continued) – Other Transit Investments Assessment

Corridor	Other Transit Investments Assessment	Rating
Smith	None.	✓ Good
Robert St	There is an ongoing Alternatives Analysis to evaluate the potential for high-capacity transit along the Robert Street corridor by Dakota and Ramsey Counties. This study is focusing on service between Dakota County and Saint Paul rather than circulator service within Saint Paul. The Arterial Transitways Corridors Study identified Robert Street as one of the eleven ATCS corridors. In November 2008, the Robert Street Corridor Transit Feasibility Study identified enhancements to existing bus services along Robert Street as a short-term goal. The report suggests development of an advanced East Metro streetcar feasibility study, refined transitway, and improved bus stop locations as long-term goals.	✓✓ Best
Wabasha	None.	✓ Good
George St	None.	✓ Good
Cretin	As the Central Corridor light rail becomes operational in 2014, Metro Transit plans to introduce new bus route coverage and increase existing bus service along Cretin Avenue between Summit Avenue and University Avenue.	✓ Good
Raymond	Metro Transit will increase bus service along Raymond Avenue and through the University of Minnesota – Saint Paul Campus as the Central Corridor light rail becomes operational in 2014.	✓ Good
Cleveland	As the Central Corridor light rail becomes operational in 2014, Metro Transit plans to increase bus service along Cleveland Avenue between Saint Paul Avenue and Marshall Avenue.	✓ Good

Transit-Supportive Land Use

As a major transit investment, it is important to ensure that any new streetcar investment serve areas that are as "transit supportive" as possible. Transit supportive land uses are generally medium or high intensity development, including major activity centers such as colleges and universities. This criterion evaluates planned land use types (by square footage) within ½-mile of each potential streetcar corridor. A more detailed evaluation of development potential will be completed during the Phase 2 evaluation.

Methodology

The analysis was based on Met Council 2030 projected land use data for the Saint Paul-Minneapolis Metropolitan Area, with land uses assigned a rating of low, medium, or high based on their propensity to support transit:

Low	Medium	High
▪ Established Neighborhoods ▪ Industrial ▪ Parks	▪ Residential Corridor	▪ Downtown ▪ Major Institutional ▪ Mixed Use Corridor

To do this, the total amount of low, medium, and high land use area within ½-mile of each corridor was compiled. Downtown areas were excluded from all corridors in order to achieve results that didn't unfairly favor short alignments near downtown. Then, a summary index value for each corridor was created by weighting the land uses by an increasing factor for low, medium, and high. The sum value for each corridor was then divided by the average score to produce an index value. Therefore, an index of 100 is average; a score below 100 indicates a corridor with a lower propensity to support transit, while a score above 100 indicates a higher propensity to support transit. Ratings were based on the following:

Index Score	Rating
110 or higher	✓✓ Best
Between 100 and 110	✓ Good
100 or lower	⚠ Fair

However, two exceptions were made to this process. The first was for Snelling, which ranked 109, or slightly short of the 110 threshold. This exception was made to reflect that transit supportive uses thin out at the northern and southern ends of the corridor, but are above the threshold for most of the corridor, and was thus ranked as best. The second was for Shepard, which ranked 116. Most of the high transit supportive development within ½ miles of Shepard is located along West 7th Street, and is inaccessible from Shepard. Because of this, Shepard was rated as fair.

Findings

The corridors that ranked as best are (see Table 8 and Figure 5):

- **Snelling**, due to highly supportive land uses between Energy Park Drive and Ford Parkway.
- **Selby**, due to a high proportion of highly supportive land uses along much of its length, but particularly east of Snelling.
- **Wabasha**, which has high supportive land uses along most of its short length.
- **Raymond**, due to a large proportion of highly supportive land uses along its length.
- **Cleveland**, largely because it would serve the University of Saint Thomas and Saint Catherine University.

Table 8 – Transit-Supportive Land Use Assessment

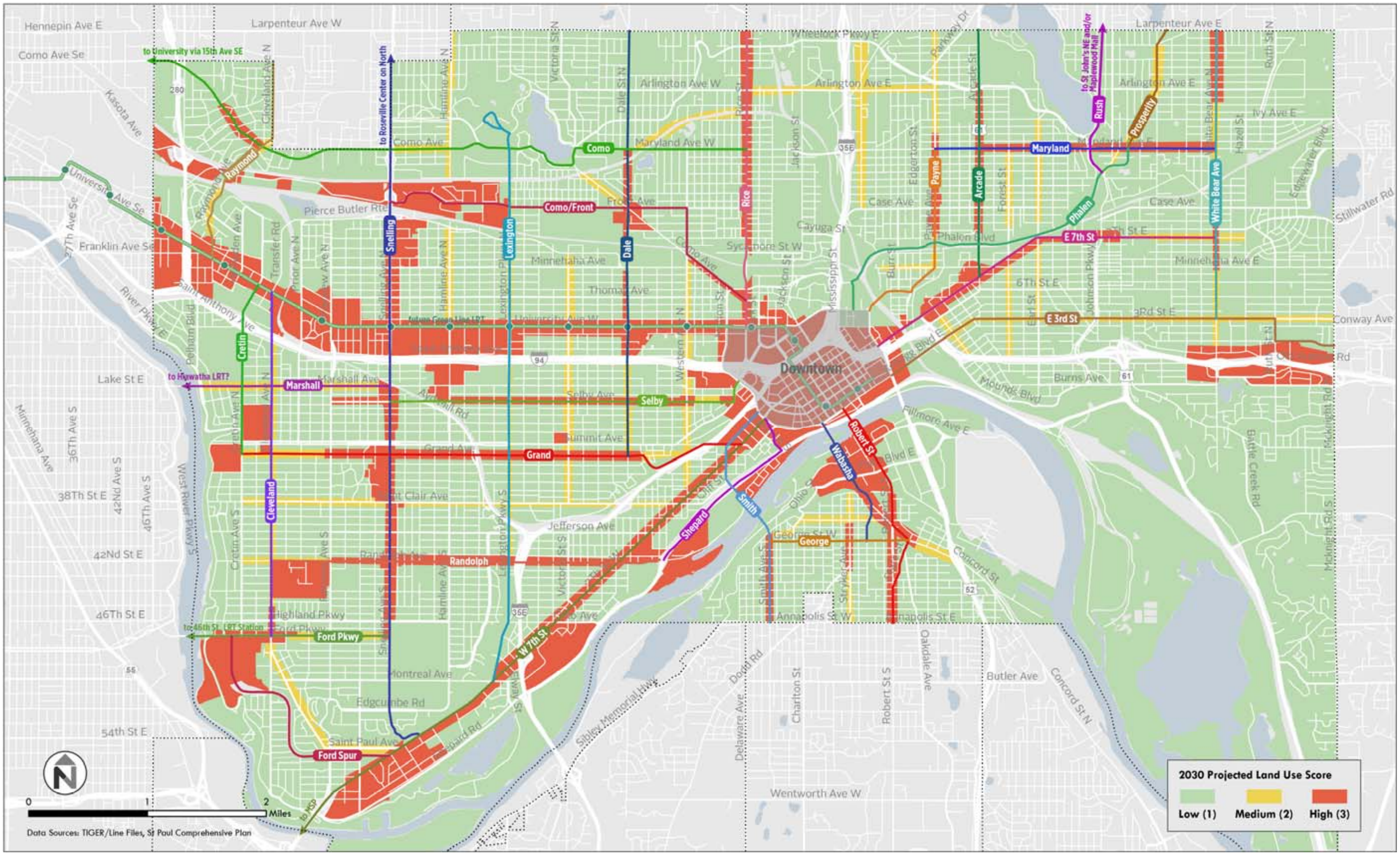
Corridor	Percent of Transit-Supportive Land Use (2030 Projected) Within ½-Mile of Corridor Low	Med	High	Transit-Supportive Land Use Index (Base = 100)	Rating
Ford Pkwy	77%	4%	19%	102	✓ Good
Ford Spur	74%	5%	21%	106	✓ Good
Rush	89%	6%	5%	84	⚠ Fair
Snelling[3]	72%	4%	24%	109	✓✓ Best
W 7th St	75%	2%	23%	106	✓ Good
Randolph	77%	4%	18%	101	✓ Good
Grand	71%	8%	21%	107	✓ Good
Selby	67%	6%	26%	114	✓✓ Best
Marshall	72%	7%	21%	107	✓ Good
Dale	84%	6%	10%	90	⚠ Fair
Rice	84%	3%	13%	93	✓ Good
E 7th St	84%	7%	9%	89	⚠ Fair
Payne	83%	3%	14%	93	⚠ Fair
Maryland	85%	6%	9%	89	⚠ Fair
Arcade	80%	8%	12%	95	⚠ Fair
E 3rd St	81%	7%	12%	94	⚠ Fair
White Bear	84%	7%	9%	89	⚠ Fair
Prosperity	85%	6%	9%	89	⚠ Fair
Phalen	85%	5%	10%	90	⚠ Fair
Como/Front	79%	3%	17%	99	⚠ Fair
Como	87%	3%	10%	89	⚠ Fair
Lexington	81%	4%	15%	96	⚠ Fair
Shepard[4]	68%	2%	30%	116	⚠ Fair
Smith[5]	75%	4%	21%	105	⚠ Fair
Robert St	73%	4%	23%	108	✓ Good
Wabasha	64%	4%	32%	120	✓✓ Best
George St	81%	5%	14%	96	⚠ Fair
Cretin	71%	8%	21%	107	✓ Good
Raymond	71%	2%	26%	111	✓✓ Best
Cleveland	69%	9%	22%	110	✓✓ Best

[3] In spite of falling slightly short of the 110 threshold, Snelling was rated as Best to reflect that transit supportive uses thin out at the northern and southern ends of the corridor, but are above the threshold for most of the corridor.

[4] Although Shepard ranked 116, most of the high transit supportive development within ½ mile is located along West 7th Street, which is inaccessible from Shepard. Because of this, Shepard was rated as fair.

[5] Although Smith ranked 105, most of the high transit supportive development is concentrated within ½ mile along West 7th Street. The remainder of the corridor shows fairly low transit supportiveness, so Smith was rated fair.

Figure 5 – Transit-Supportive Land Use



The corridors that were ranked as good are:

- **Ford Parkway**
- **Ford Spur**
- **West 7th Street**
- **Randolph**
- **Grand**
- **Marshall**
- **Smith**
- **Robert**
- **Cretin**
- **Rice** (Based on projected 2030 land use and the methodology used, Rice ranked only fair. The corridor currently has transit supportive land uses located directly along the corridor but little within the surrounding ½ mile, which benefited other potential corridors. Due to a combination of the current transit supportiveness and strong potential for new in-fill development, Rice's ranking was increased to good.)

SUMMARY/RECOMMENDATIONS

As described previously, the first three Phase 1 criteria–Grade, Street Geometry, and Physical Barriers–were used to ensure that there were no fatal flaws in the corridor that would preclude the development of streetcar service or make it prohibitively expensive. While a number of issues were identified, none are considered to be significant enough to preclude a corridor.

The second four criteria–Terminal Location, Transit Speed and Reliability, Other Transit Investments, and Transit-Supportive Land Use–were used as an initial screening of how well streetcar service would likely perform. Since none of the corridors had construction-related fatal flaws, the Phase 1 recommendations were based on the four effectiveness criteria, with the methodology used that all corridors that received at least three best or good rankings should be brought forward into Phase 2. On this basis, and as summarized in Table 9, the following corridors should be brought forward into Phase 2:

- Ford Parkway
- Snelling
- West 7th Street
- Randolph
- Grand
- Selby
- Marshall
- Rice
- East 7th Street
- Payne
- Lexington
- Robert
- Wabasha
- Cretin
- Raymond
- Cleveland

After meeting with the Working Group and considering other ongoing transit studies and efforts, two additional corridors will be brought forward as well, and are illustrated in Figure 6:

- Ford Spur
- CP Rail Spur*

*The CP Rail Spur was not included in Phase 1 evaluation, but is being included in a future study of the Riverview Corridor for all modes of transportation, and so will be included in this Streetcar Feasibility Study for phase 2.

Table 9 – Summary of Phase I Screening Ratings

	Physical Criteria			Other Criteria				
Corridor	Grade	Street Geometry	Physical Barriers	Terminal Location	Transit Speed and Reliability	Other Transit Investments	Transit-Supportive Land Use	Carry Forward
Ford Pkwy	✓✓ Best	✓✓ Best	⚠ Fair	✓ Good	✓ Good	✓✓ Best	✓ Good	Yes
Ford Spur	✓✓ Best	✓✓ Best	⚠ Fair	⚠ Fair	✓✓ Best	⚠ Fair	✓ Good	
Rush	✓✓ Best	✓✓ Best	✓ Good	⚠ Fair	✓✓ Best	⚠ Fair	⚠ Fair	
Snelling	⚠ Fair	✓✓ Best	⚠ Fair	✓✓ Best	✓ Good	✓✓ Best	✓✓ Best	Yes
W 7th St	✓✓ Best	✓✓ Best	⚠ Fair	✓✓ Best	✓ Good	✓✓ Best	✓ Good	Yes
Randolph	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	✓ Good	✓ Good	Yes
Grand	✓✓ Best	✓ Good	⚠ Fair	✓✓ Best	✓ Good	✓✓ Best	✓ Good	Yes
Selby	⚠ Fair	⚠ Fair	✓✓ Best	✓✓ Best	✓ Good	⚠ Fair	✓✓ Best	Yes
Marshall	✓✓ Best	✓ Good	✓✓ Best	✓ Good	✓ Good	✓✓ Best	✓ Good	Yes
Dale	⚠ Fair	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Rice	✓✓ Best	✓✓ Best	✓✓ Best	⚠ Fair	✓ Good	✓ Good	✓ Good	Yes
E 7th St	✓✓ Best	✓ Good	✓ Good	✓ Good	✓ Good	✓✓ Best	⚠ Fair	Yes
Payne	✓ Good	✓ Good	⚠ Fair	✓ Good	✓ Good	✓ Good	⚠ Fair	Yes
Maryland	✓✓ Best	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Arcade	✓✓ Best	✓✓ Best	✓✓ Best	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
E 3rd St	⚠ Fair	⚠ Fair	✓✓ Best	✓ Good	✓✓ Best	⚠ Fair	⚠ Fair	
White Bear	✓✓ Best	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Prosperity	✓✓ Best	⚠ Fair	✓✓ Best	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Phalen	✓✓ Best	✓ Good	✓ Good	⚠ Fair	✓✓ Best	✓ Good	⚠ Fair	
Como/Front	✓✓ Best	✓ Good	✓✓ Best	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Como	✓✓ Best	✓ Good	⚠ Fair	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Lexington	✓ Good	✓ Good	⚠ Fair	✓✓ Best	✓ Good	✓ Good	⚠ Fair	Yes
Shepard	⚠ Fair	✓✓ Best	⚠ Fair	⚠ Fair	⚠ Fair	✓ Good	⚠ Fair	
Smith	✓✓ Best	✓ Good	✓✓ Best	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Robert St	✓✓ Best	✓ Good	⚠ Fair	⚠ Fair	✓ Good	✓✓ Best	✓ Good	Yes
Wabasha	✓✓ Best	✓ Good	✓✓ Best	⚠ Fair	✓✓ Best	✓ Good	✓✓ Best	Yes
George St	⚠ Fair	⚠ Fair	✓✓ Best	⚠ Fair	✓ Good	✓ Good	⚠ Fair	
Cretin	✓✓ Best	✓✓ Best	⚠ Fair	✓ Good	⚠ Fair	✓ Good	✓ Good	Yes
Raymond	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	✓ Good	✓✓ Best	Yes
Cleveland	✓✓ Best	⚠ Fair	⚠ Fair	✓ Good	✓ Good	✓ Good	✓✓ Best	Yes

Figure 9 Proposed Phase 2 Corridors