12. CASE STUDIES

This chapter summarizes four "case studies" where the project team applied the connectivity tools and regression model to achieve the following outcomes:

- Verify the connectivity data collected from some of the jurisdictions
- Verify the output of the connectivity tools
- Calibrate and validate the regression model
- Evaluate 2035 conditions at the case study locations to provide guidance on how to apply the tools developed in this study and identify potential "blind spots" that must be considered when applying the tools for future studies.

CASE STUDY LOCATIONS

The project team selected the following four locations for the case study tool applications:

- Northgate Transit Center - Seattle
- Overlake Village - Redmond
- Mount Baker Transit Center/Link Station - Seattle
- Federal Way Transit Center – Federal Way

The project team chose these locations because they all have active transportation and land use planning efforts being undertaken by local jurisdictions, represent a variety of urban forms, and have varying degrees of existing non-motorized connectivity. Three of the four areas are future Link light rail stations (all but Mount Baker). The addition of Link substantially alters the transit service characteristics of the areas. All case study locations are expecting increased land use development intensities in the future. Understanding how well the model responds to these changes was an important element of the case studies.

EXISTING CONDITIONS DATA VERIFICATION

Given the large study area and number of jurisdictions from which the project team collected existing conditions data, a detailed verification of the GIS data was not possible across the entire region. These case studies provided the opportunity for the team to go into the field and compare the jurisdiction's GIS data against actual conditions. Below is a summary of the findings by case study area. In general, the project team found that the jurisdiction GIS data were a good match to actual field conditions.

Northgate Transit Center

Figures 34 through 37 show the connectivity surfaces calculated from the existing conditions data in the Northgate Transit Center area:

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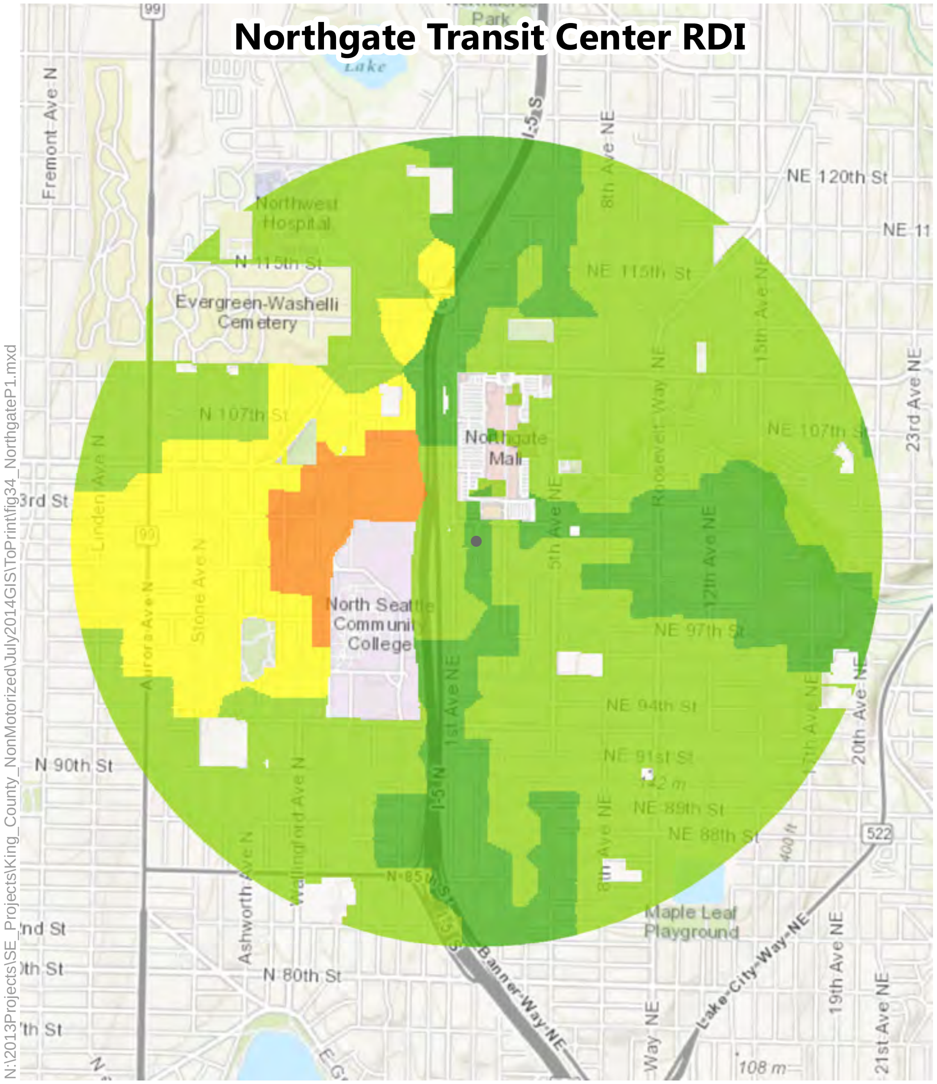
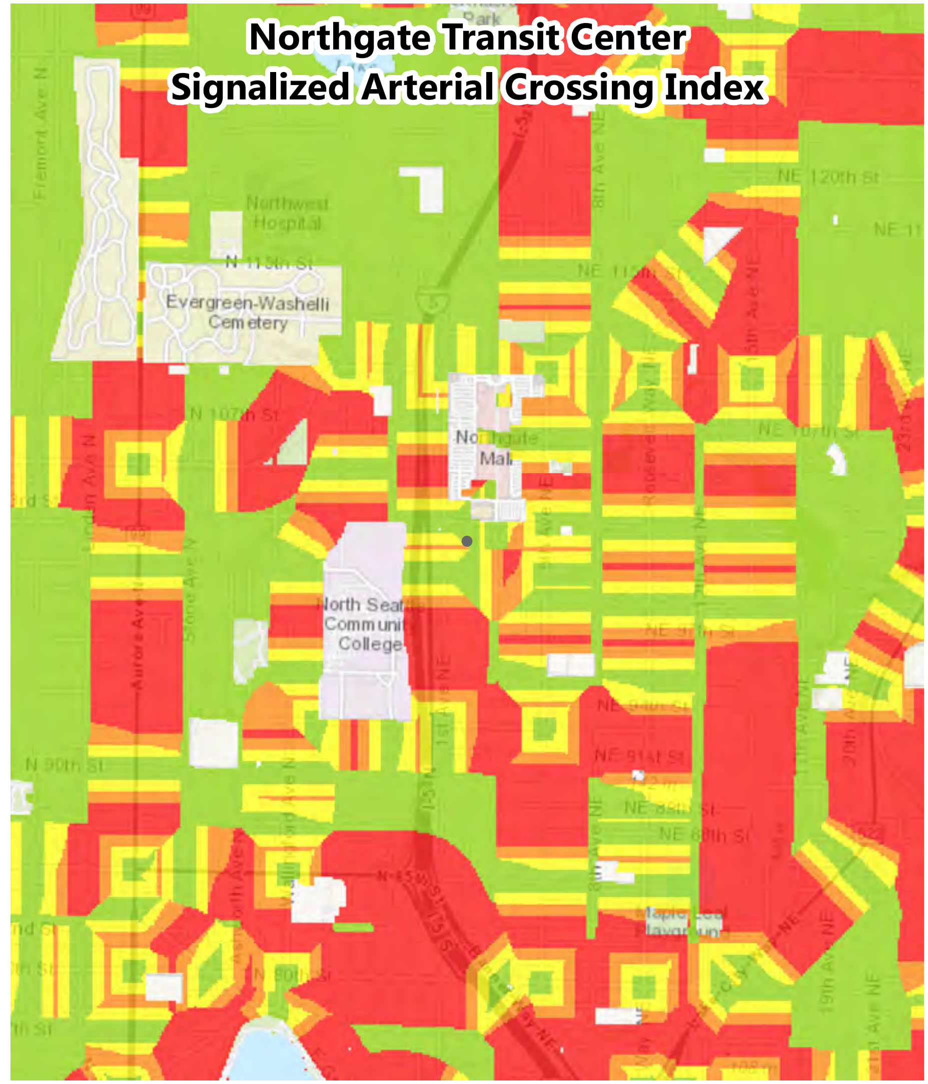


Route Directness

High

Low

● Study Stations



Ease of Crossing

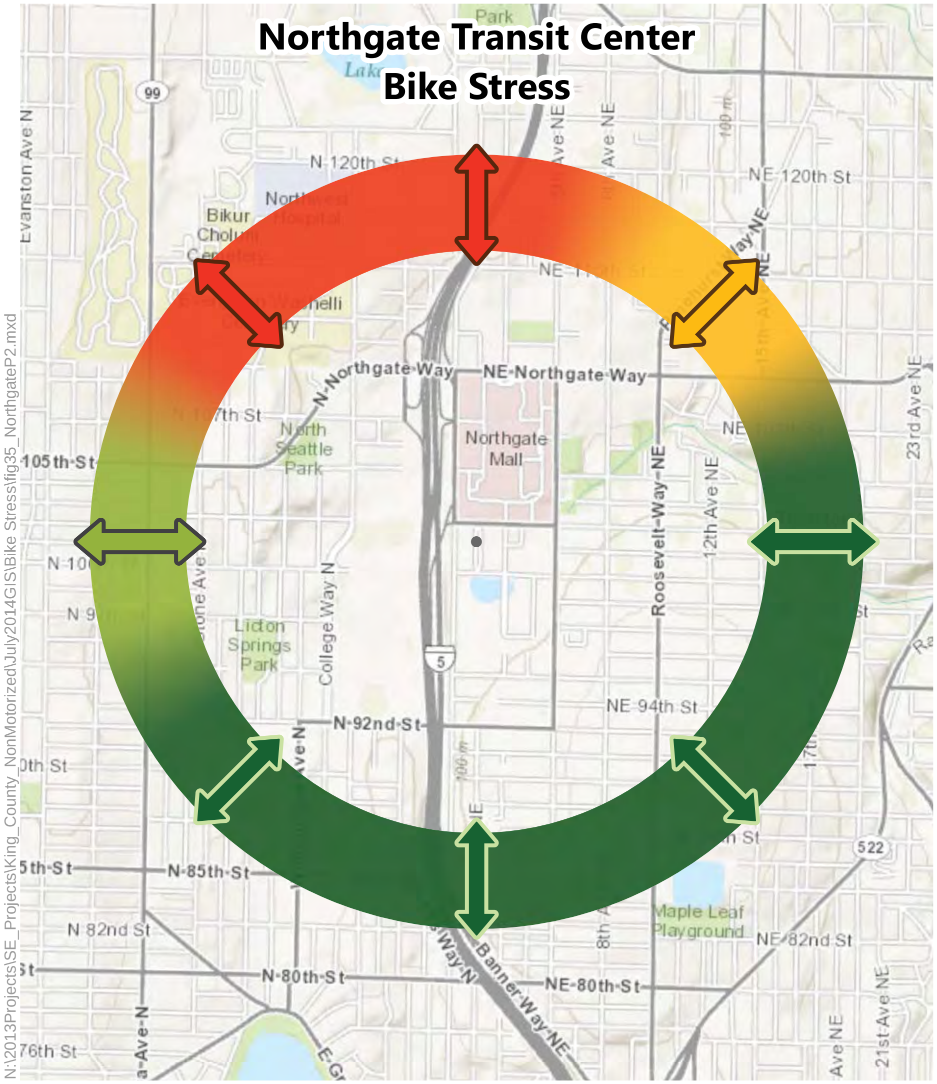
High

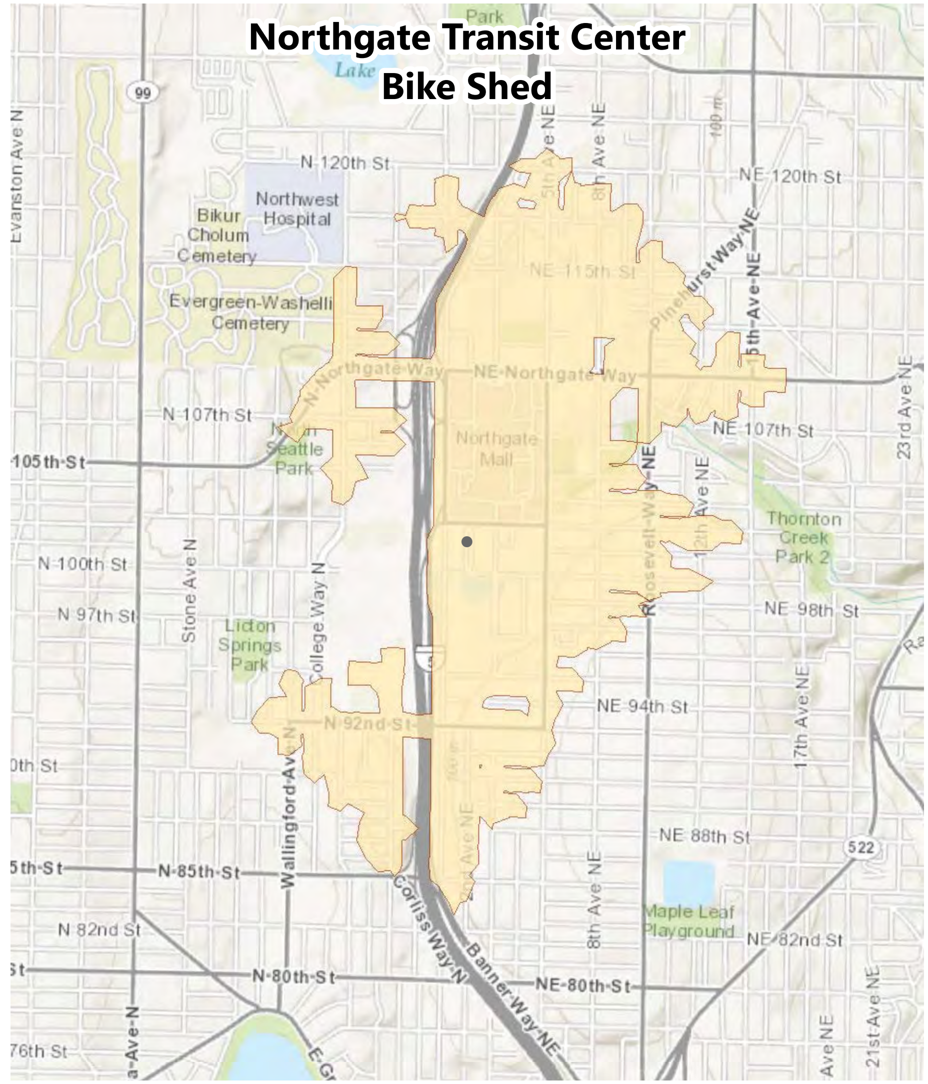
Low

0 0.25 0.5 1 Miles

Figure 34

Northgate Transit Center RDI and Signalized Arterial Crossing Index





N:\2013Projects\SE_Projects\King_County_NonMotorized\July2014GIS\Bike Stress\fig35_NorthgateP2.mxd

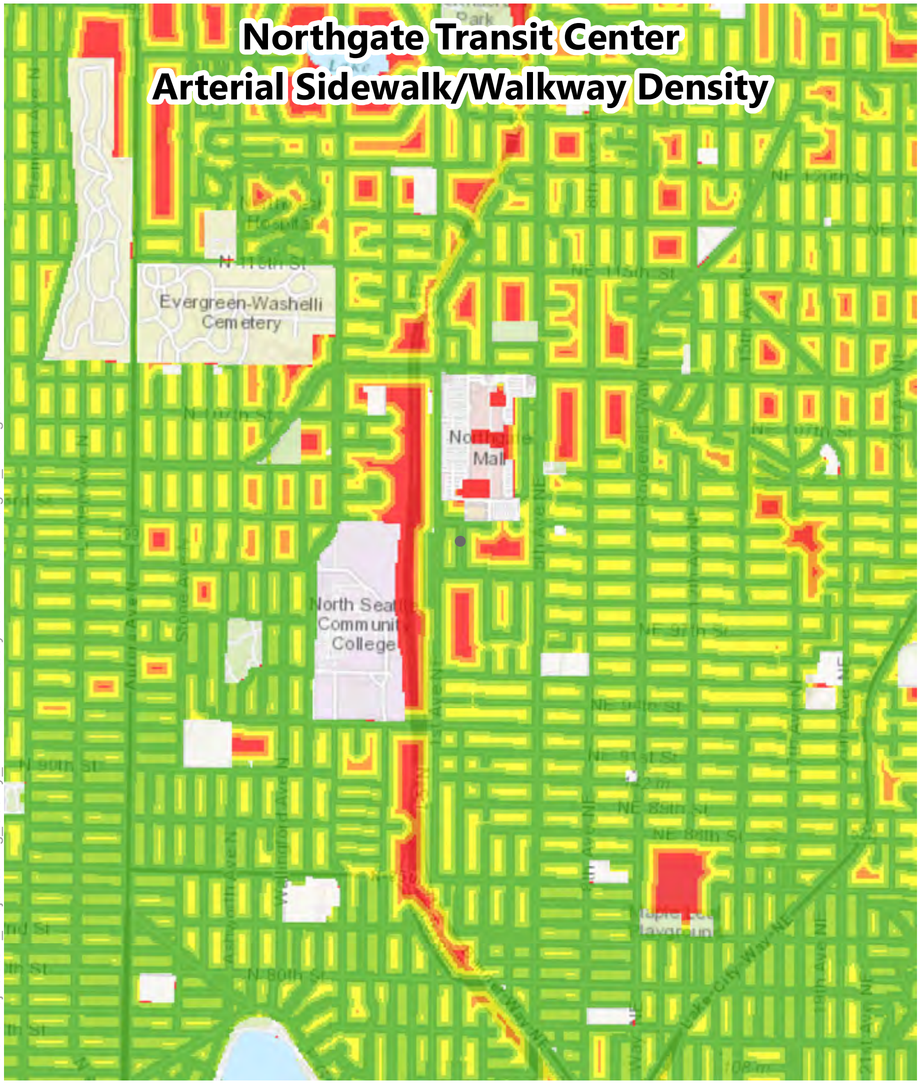
Bike Stress
- Low
- Medium
- High

- Study Stations
- 15-Minute Bike Shed

0 0.25 0.5 1 Miles

Figure 35

Northgate Transit Center Bike Stress and Bike Shed



Density
High
Low

● Study Stations

0 0.25 0.5 1 Miles

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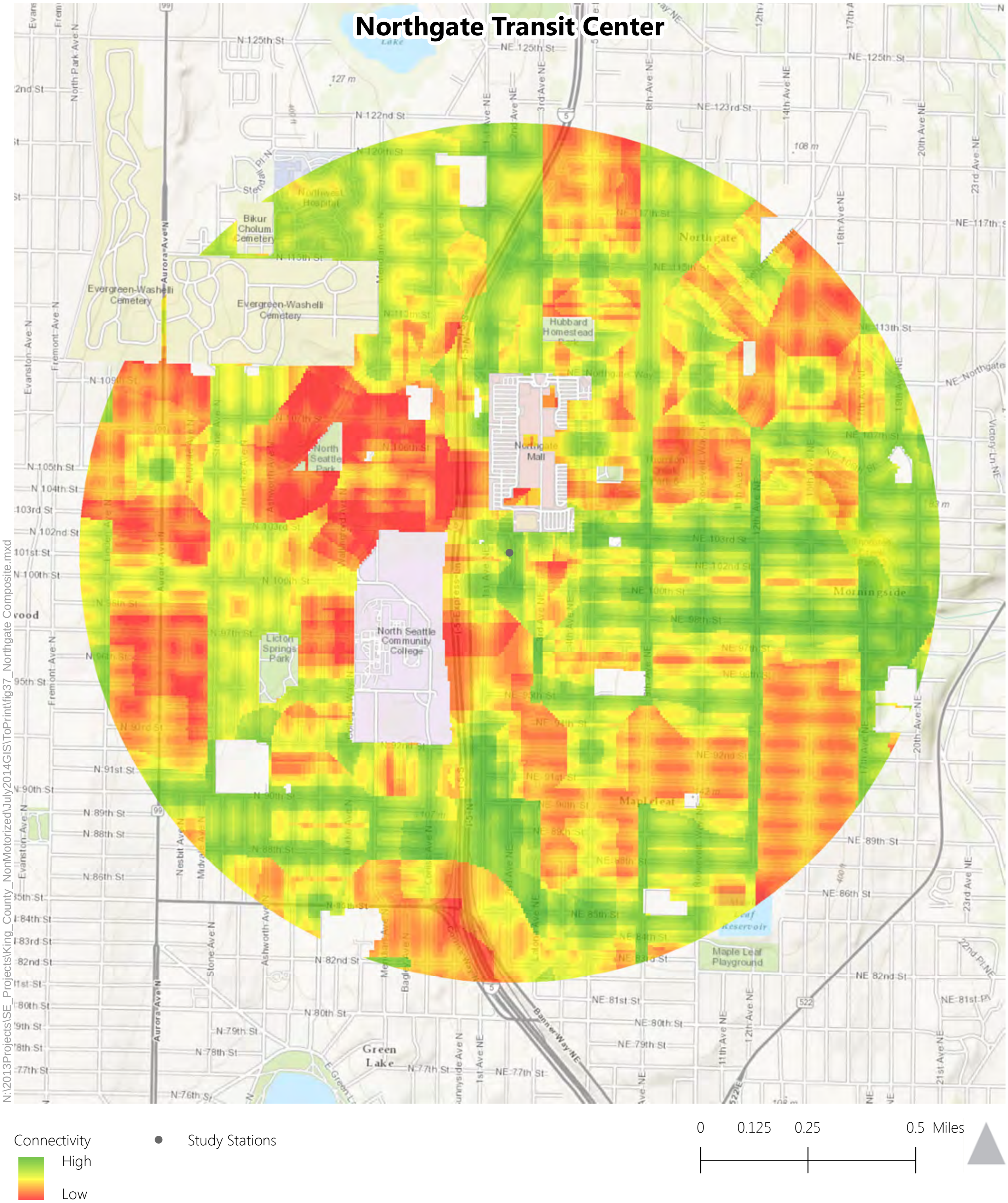
Figure 36

Northgate Transit Center
Arterial Sidewalk/Walkway Density and Intersection Density



N:\2013Projects\SE_Projects\King_County_NonMotorized\July2014\GIS\ToPrint\fig37_Northgate Composite.mxd

Figure 37

Northgate Transit Center
Composite Connectivity Scores

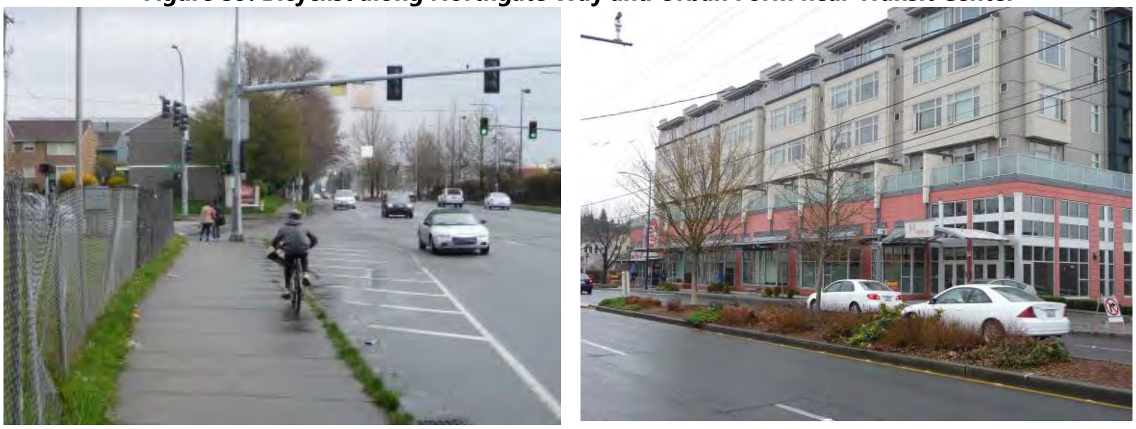
Based on the field work, the data shown in the connectivity surfaces generally matched our observations. Below are a few highlights for the Northgate area:

- The poor scoring area on the RDI map reflects the lack of connections across I-5 from the transit center.
- The field work verified the signalized arterial crossings; however, there were several flashing crosswalk beacons along College Way that were not accounted for since they are not traffic signals as defined by the City of Seattle. While unavailable in a standard data format, they act as signalized arterial crossings.
- Field data verified a lack of signalized crossings along Roosevelt Ave and 92nd Street, as shown; however, these are relatively narrow and low volume arterials compared to the "average" arterial in the county and crossing these streets is less challenging than wider arterials like Northgate Way.
- The bike stress results were confirmed. Traveling from the north and northwest requires traversing the I-5/Northgate interchange, which has no bicycle facilities and clearly meets the definition of a high stress route. When traveling from the south, there are several routes to choose from, many of them being lower-stress local streets. The bicycle travel shed does identify the terrain to the south and east, which limits the practicality of bicycling for many cyclists.

Below are some pictures taken during the field visit:

Figure 38: Pedestrian Underpass of I-5 and Unsignalized Crossing of Roosevelt Ave

Figure 39: Bicyclist along Northgate Way and Urban Form near Transit Center

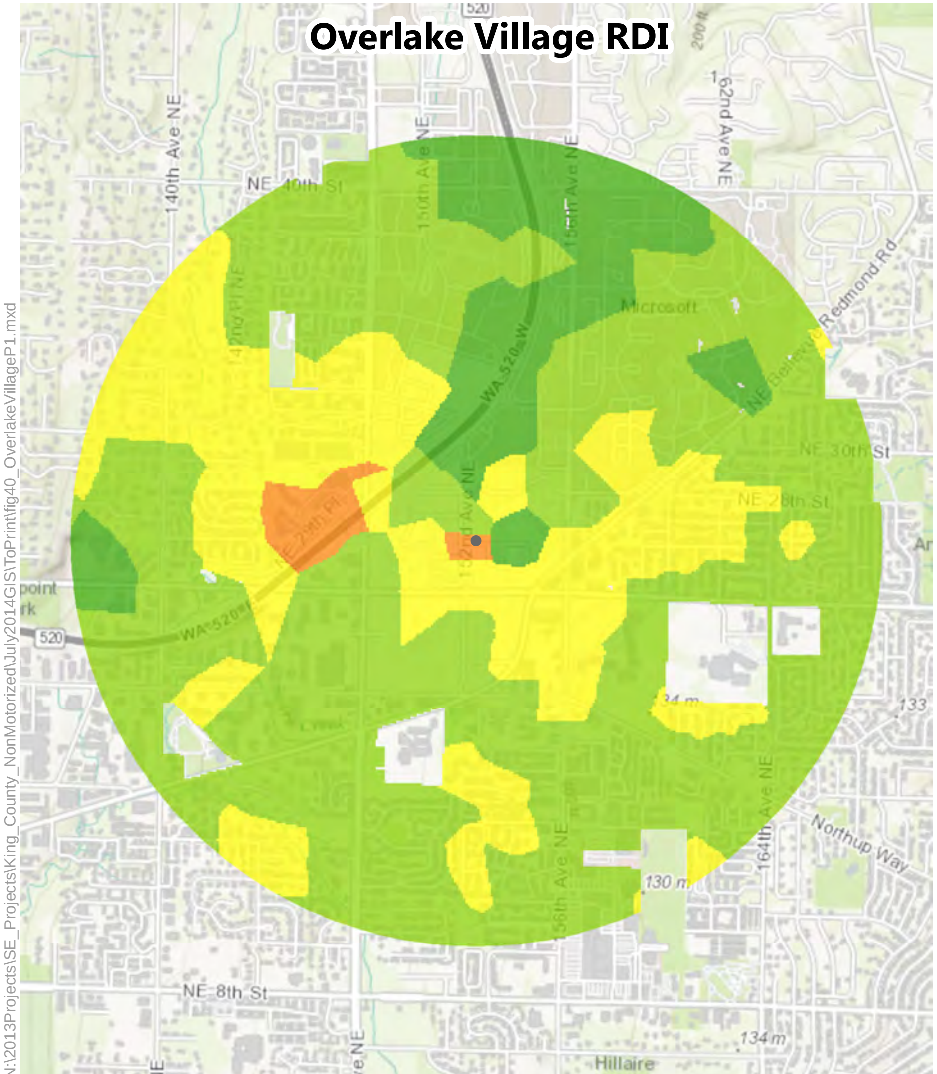


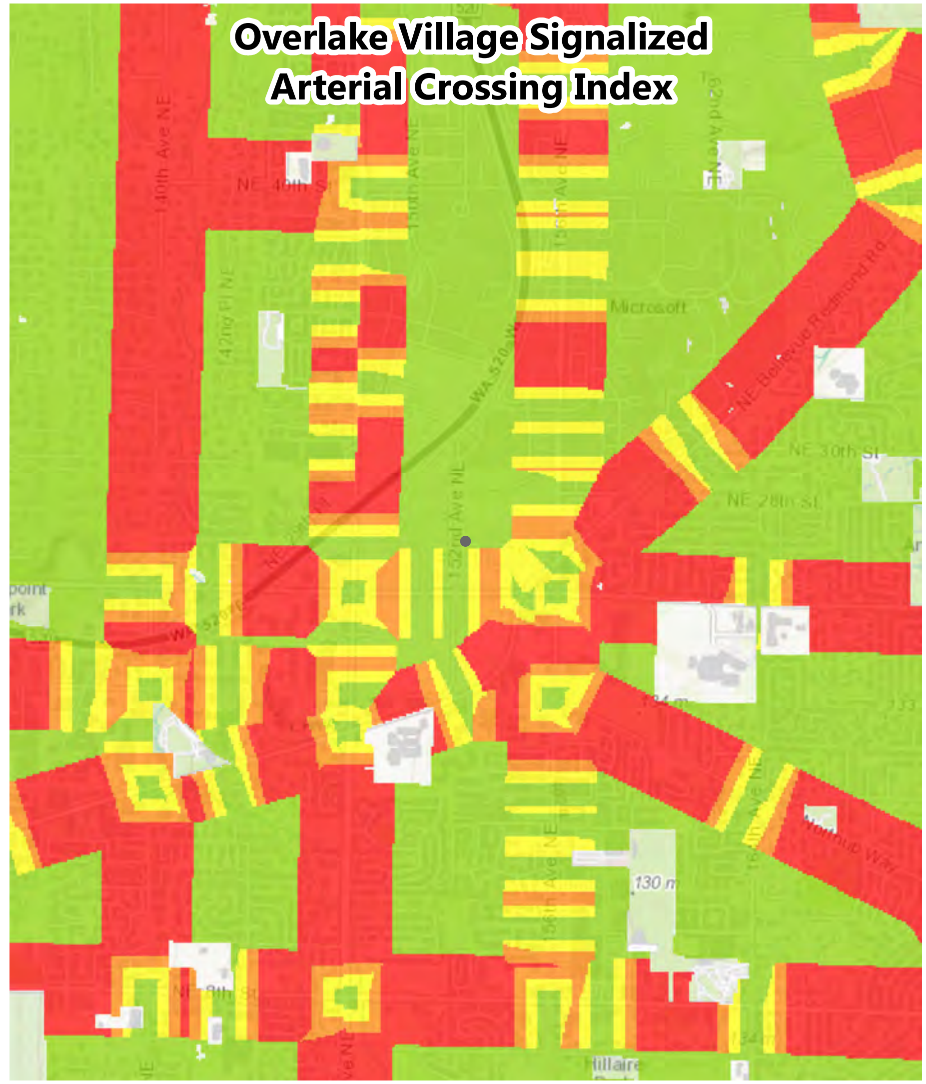
While the GIS data from the City of Seattle matched our observations, the field work highlighted some additional considerations that were not captured in the GIS information:

- Sidewalk conditions are poor in some locations with broken panels that would be difficult to traverse by those with mobility limitations. Overgrowth in certain areas narrows the sidewalk as well.
- Urban form around the station is mixed with good pedestrian-scaled uses along portions of Northgate Way and 5th Avenue. 1st Avenue is not a great pedestrian environment, being adjacent to parking lots and retaining walls near the transit center.
- Street light coverage is generally good in the area, although vegetation blocks lighting in some of the neighborhoods to the east.

Overlake Village

Figures 40 through 43 show the connectivity surfaces calculated from the existing conditions data in the Overlake Village area:





Route Directness
High
Low

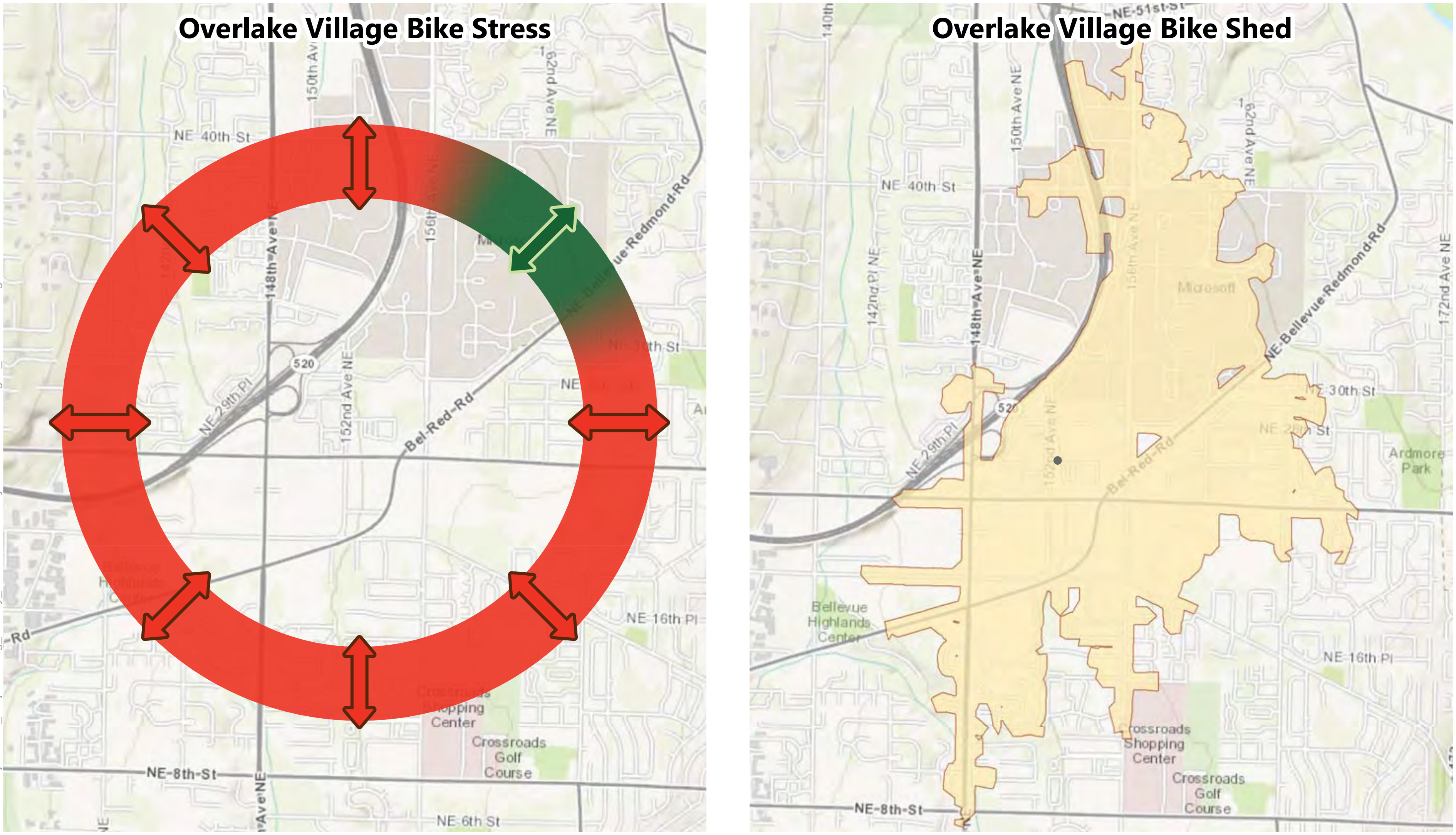
● Study Stations

Ease of Crossing
High
Low

0 0.25 0.5 1 Miles

Figure 40

Overlake Village RDI and Signalized Arterial Crossing Index



Bike Stress
- Low
- Medium
- High

- Study Stations
- 15-Minute Bike Shed

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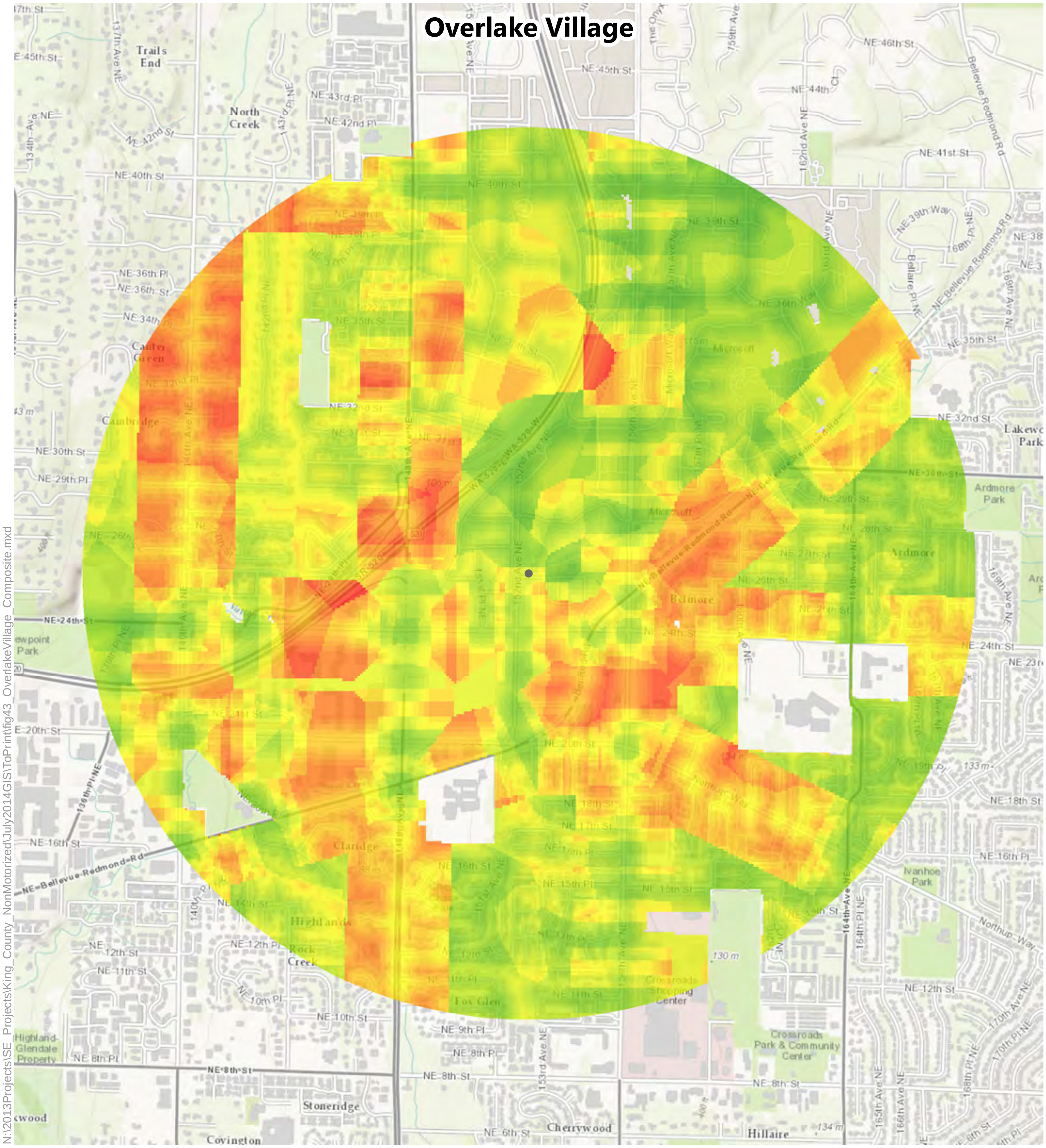
Figure 41

Overlake Village Bike Stress and Bike Shed

Figure 42

Overlake Village

Arterial Sidewalk/Walkway Density and Intersection Density



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Connectivity
High
Low

● Study Stations

0 0.125 0.25 0.5 Miles

Figure 43

Overlake Village
Composite Connectivity Scores

Similar to Northgate, the field observations were a close match to the GIS data in Overlake Village. Below are some general observations:

- There are additional pedestrian/bicycle connections coded in the dataset through some private parking lots that may not be obvious to some transit patrons. This could bias the existing conditions connectivity score higher than it would otherwise be.
- The high bike stress in the area was confirmed since there are few low stress routes that provide direct access to the station area. City of Redmond staff observed that bicycling through the Microsoft Campus could be higher stress than is indicated on the map since some of the private roads internal to the campus have traffic volume characteristics more similar to arterials elsewhere in the City.

Below are some pictures taken during the field visit:

Figure 44: Narrow Sidewalk along 148th Ave and Wide Sidewalks with Signalized Crossings along 156th Ave

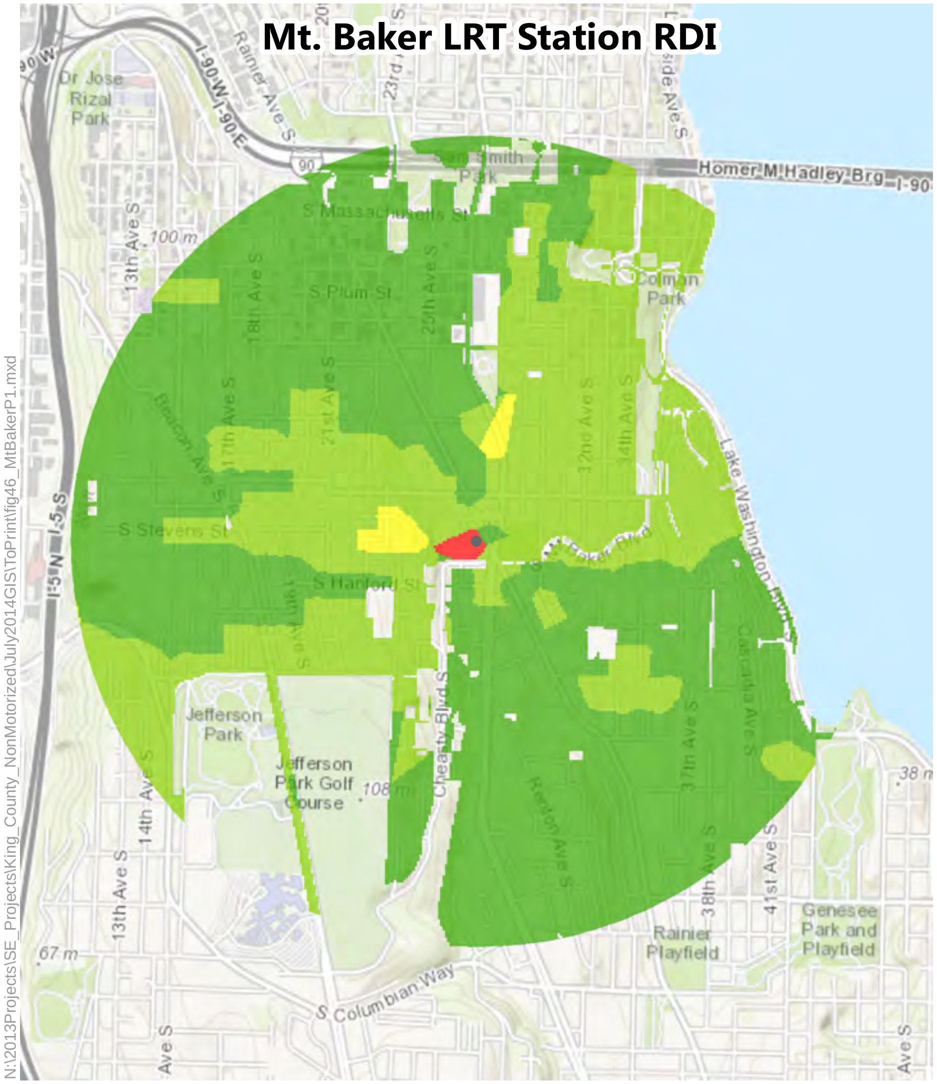
Figure 45: Bicyclist along NE 24th St and New Bike Lanes along 152nd Ave

Below are some additional observations of factors not captured in the GIS data:

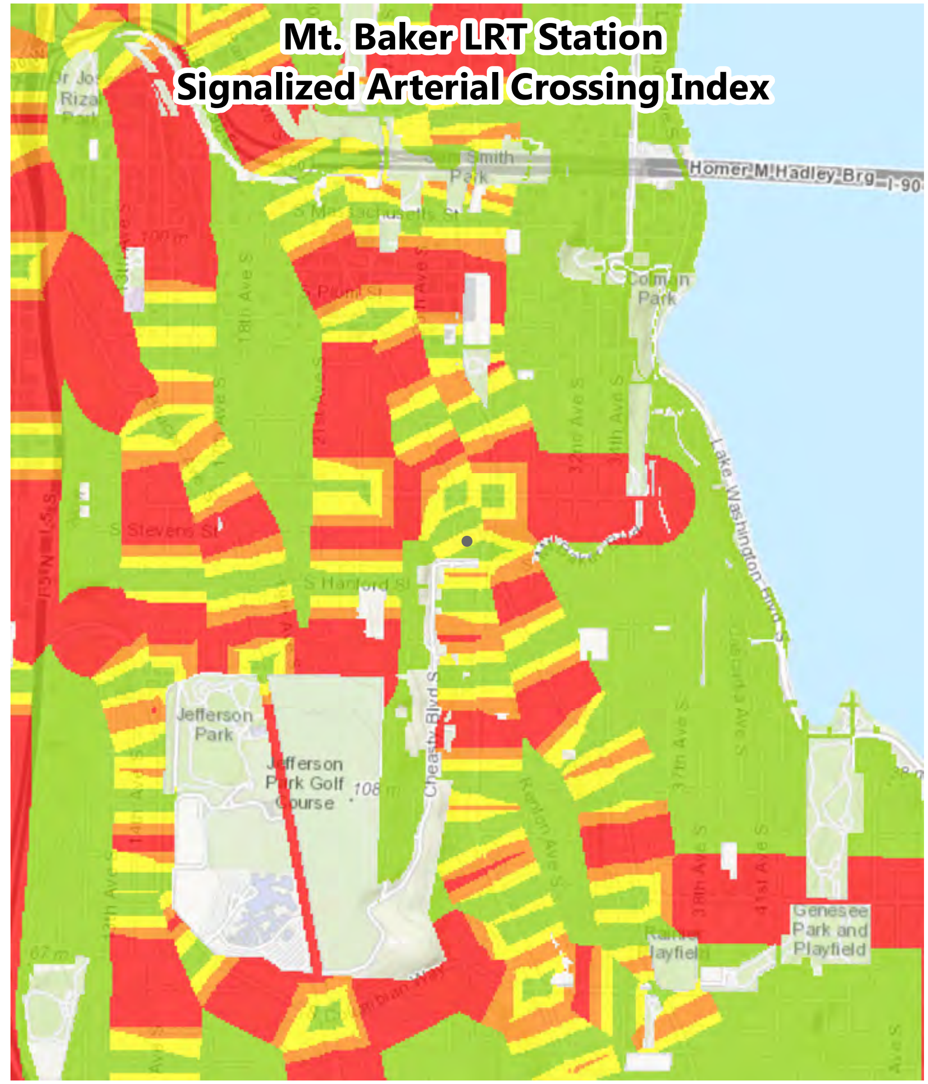
- The Microsoft Campus generally has good pedestrian and bicycle facilities; however, there is little pedestrian or bicycle activity in the area due to the homogeneity of land use on the Campus.
- The urban form of the station area south of SR-520 is very auto oriented with large blocks and parking lots along most street frontages. High levels of pedestrian and bicycle activity were observed; however, a reflection of the diversity of land uses in the area.
- Street illumination is good.
- Sidewalks are narrow in some places, but coverage and maintenance is generally good.

Mount Baker Transit Center and Link Station

Figures 46 through 49 show the connectivity surfaces calculated from the existing conditions data in the Mount Baker Transit Center area:



Route Directness
High
Low
● Study Stations



Ease of Crossing
High
Low

0 0.25 0.5 1 Miles

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Figure 46

Mt. Baker LRT Station RDI and Signalized Arterial Crossing Index

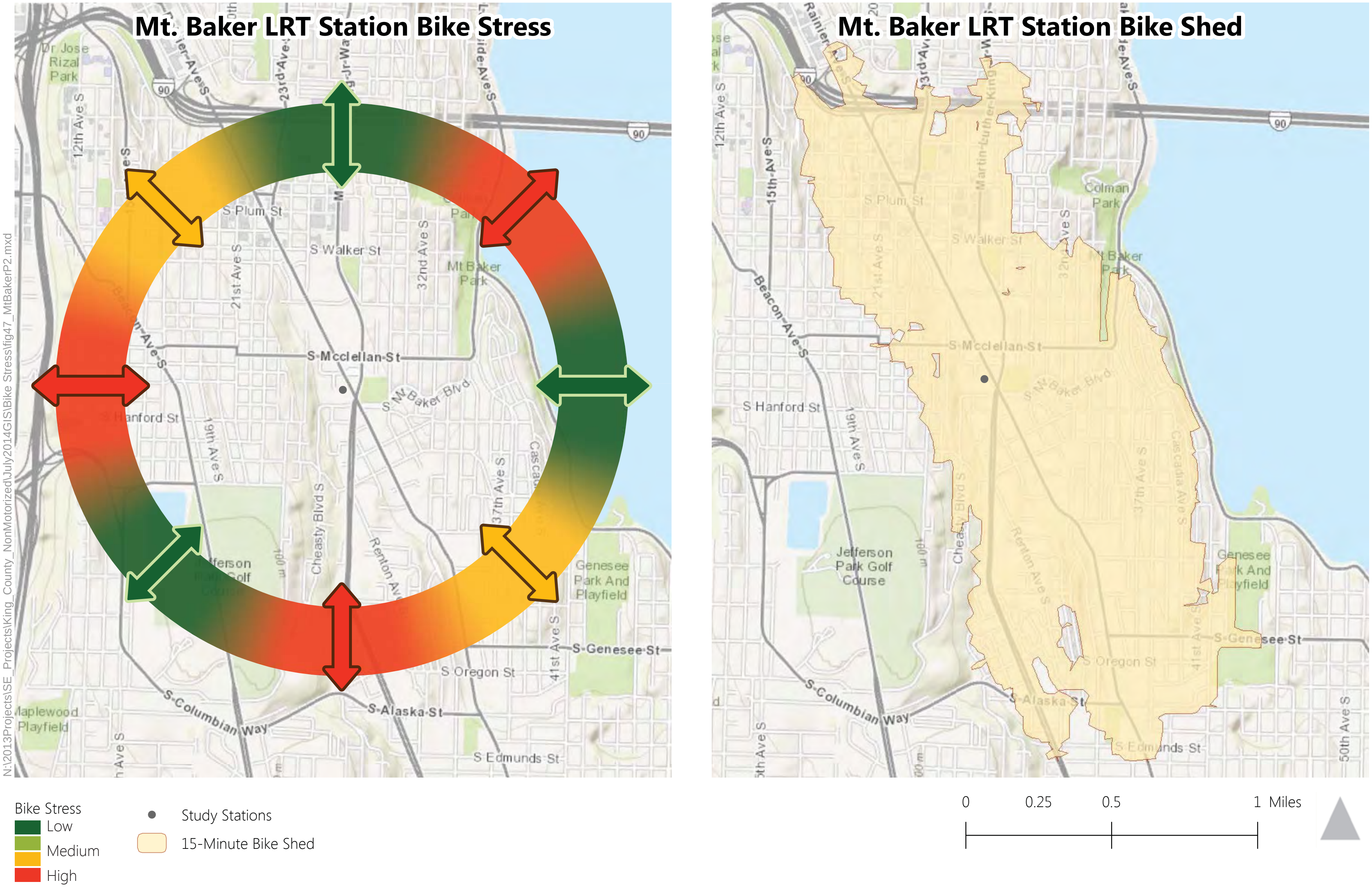


Figure 47

Mt. Baker LRT Station Bike Stress and Bike Shed

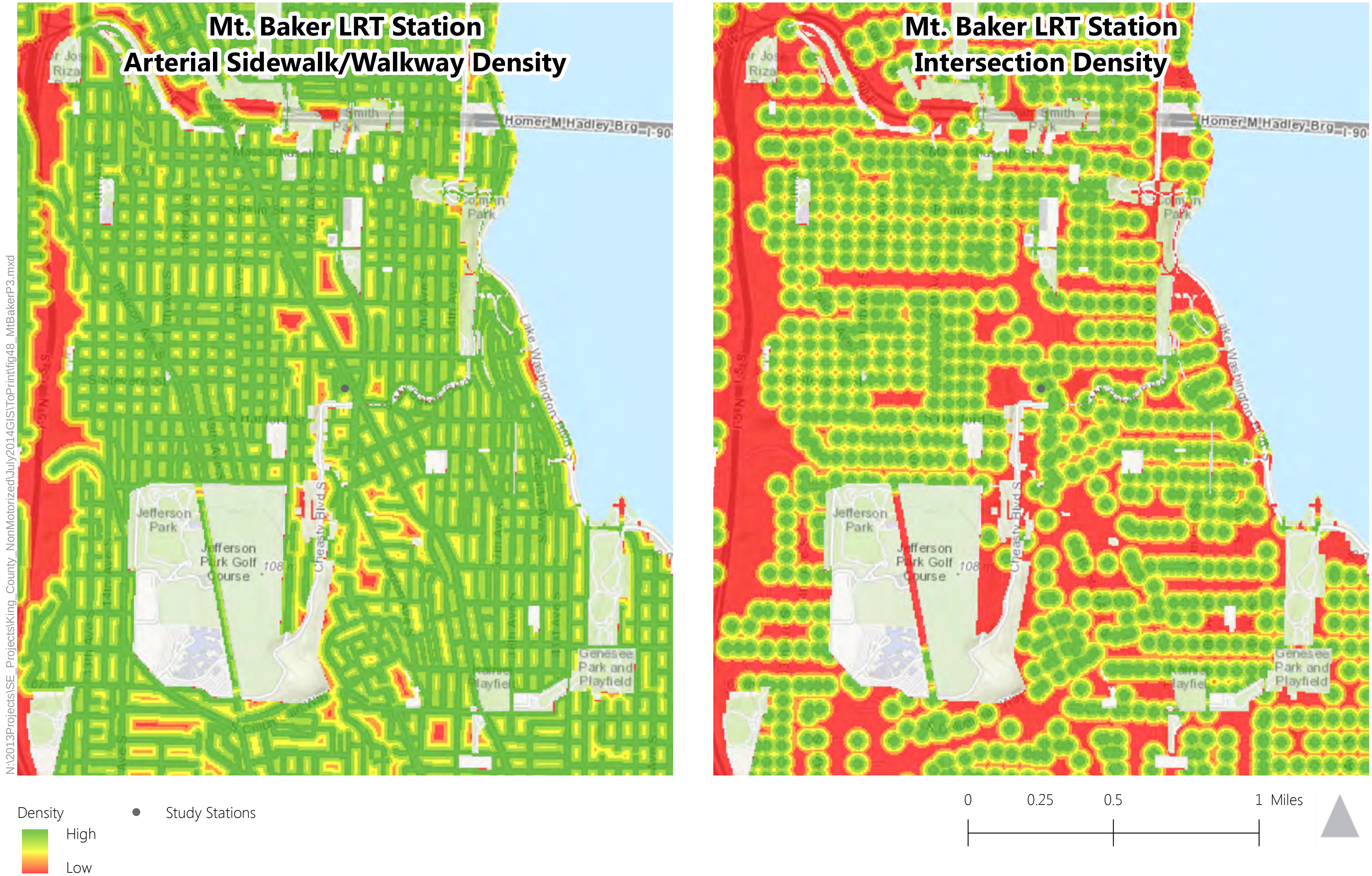
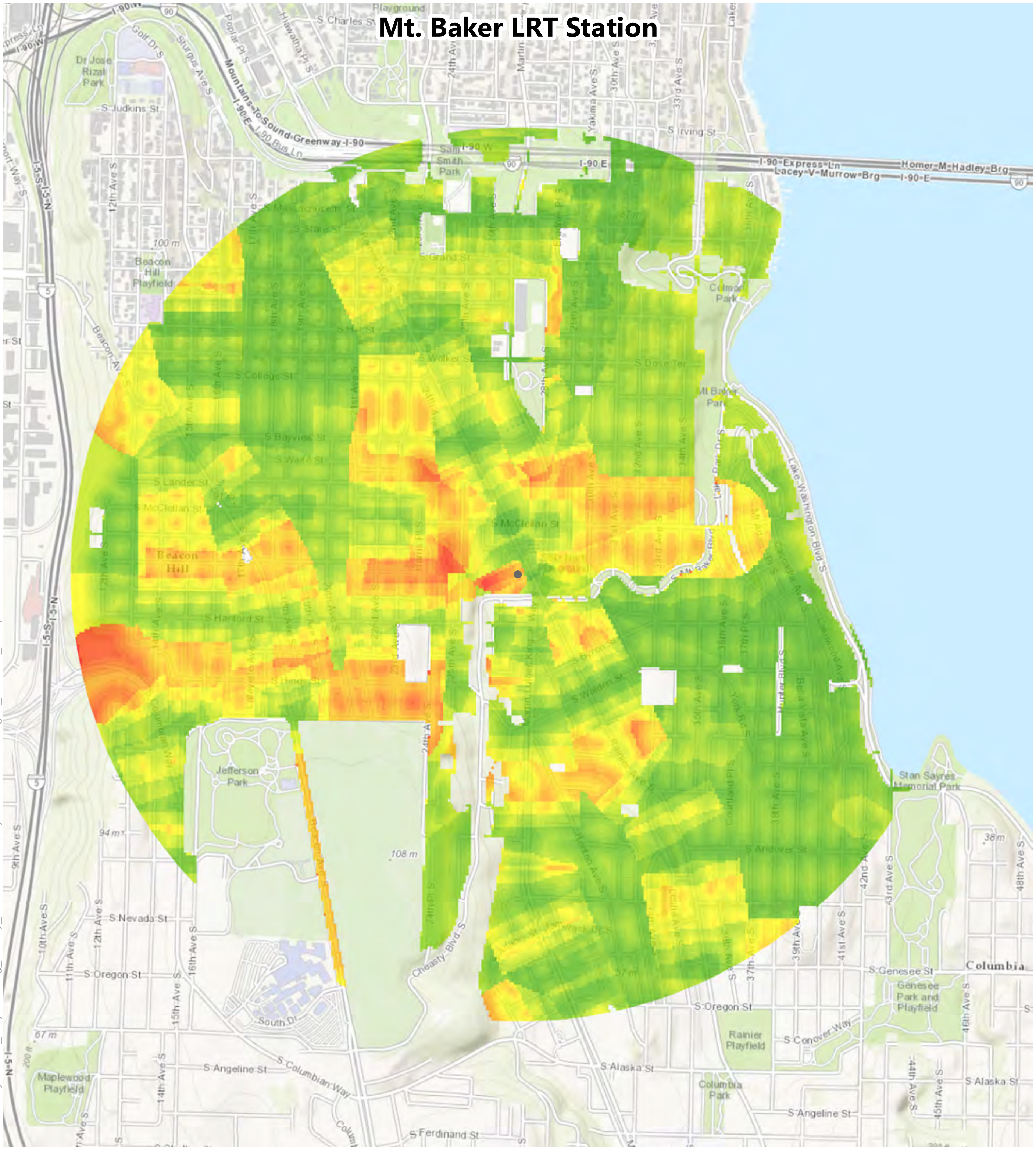


Figure 48

Mt. Baker LRT Station Arterial Sidewalk/Walkway Density and Intersection Density



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Connectivity
High
Low

● Study Stations

0 0.125 0.25 0.5 Miles

Figure 49

Mt. Baker LRT Station
Composite Connectivity Scores

Consistent with the other case study areas, the field observations were a close match to the GIS data in the Mount Baker area. Below are some general observations:

- The RDI score matches the steep terrain to the west of the Link station.
- Bike stress is generally high in the area since many bike trips would have to travel along Rainier Avenue or MLK Jr. Way to reach the station.
- The arterial crossing data is correct; however, as in other areas of Seattle, some of the arterials, such as McClellan east of MLK Jr. Way or 23rd Avenue south of Rainier Avenue are relatively narrow, low volume streets that do not present a major barrier to crossing. Four-way stops are also not included in the signalized crossing dataset.

Below are some pictures taken during the field visit:

Figure 50: Pedestrians along MLK Jr. Way and Poor Sidewalk Quality

Figure 51: Bicyclist along Rainier Avenue and Steep Terrain West of the Station

Below are some additional observations of factors not captured in the GIS data:

- The pedestrian/bicycle bridge across MLK Jr. Way and Rainier Avenue south of the station is not heavily used. The steep spiral ramps and narrow bridge width may discourage use.
- Much of the area has sidewalk coverage, but the sidewalk quality is poor in spots with broken or heaved sections. Some sidewalks near the Link station are very narrow and have poles and other obstructions.
- Perceptions about crime and safety issues may be a concern to some potential transit riders.
- There are good bicycle amenities at the Link station, but the terrain and high bike stress may discourage use.

Federal Way Transit Center

Figures 52 through 55 show the connectivity surfaces calculated from the existing conditions data in the Federal Way Transit Center area:

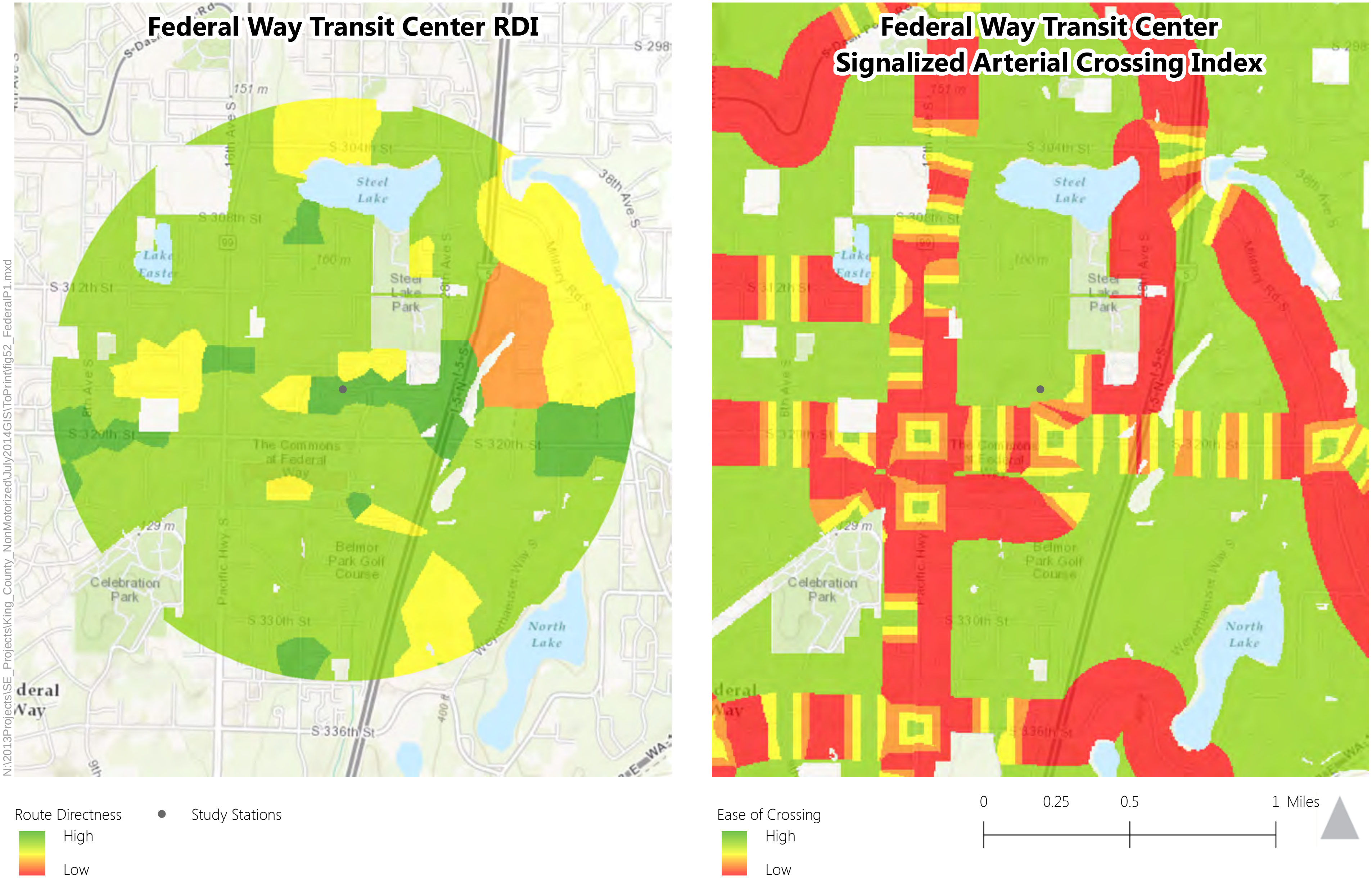


Figure 52

Federal Way Transit Center RDI and Signalized Arterial Crossing Index

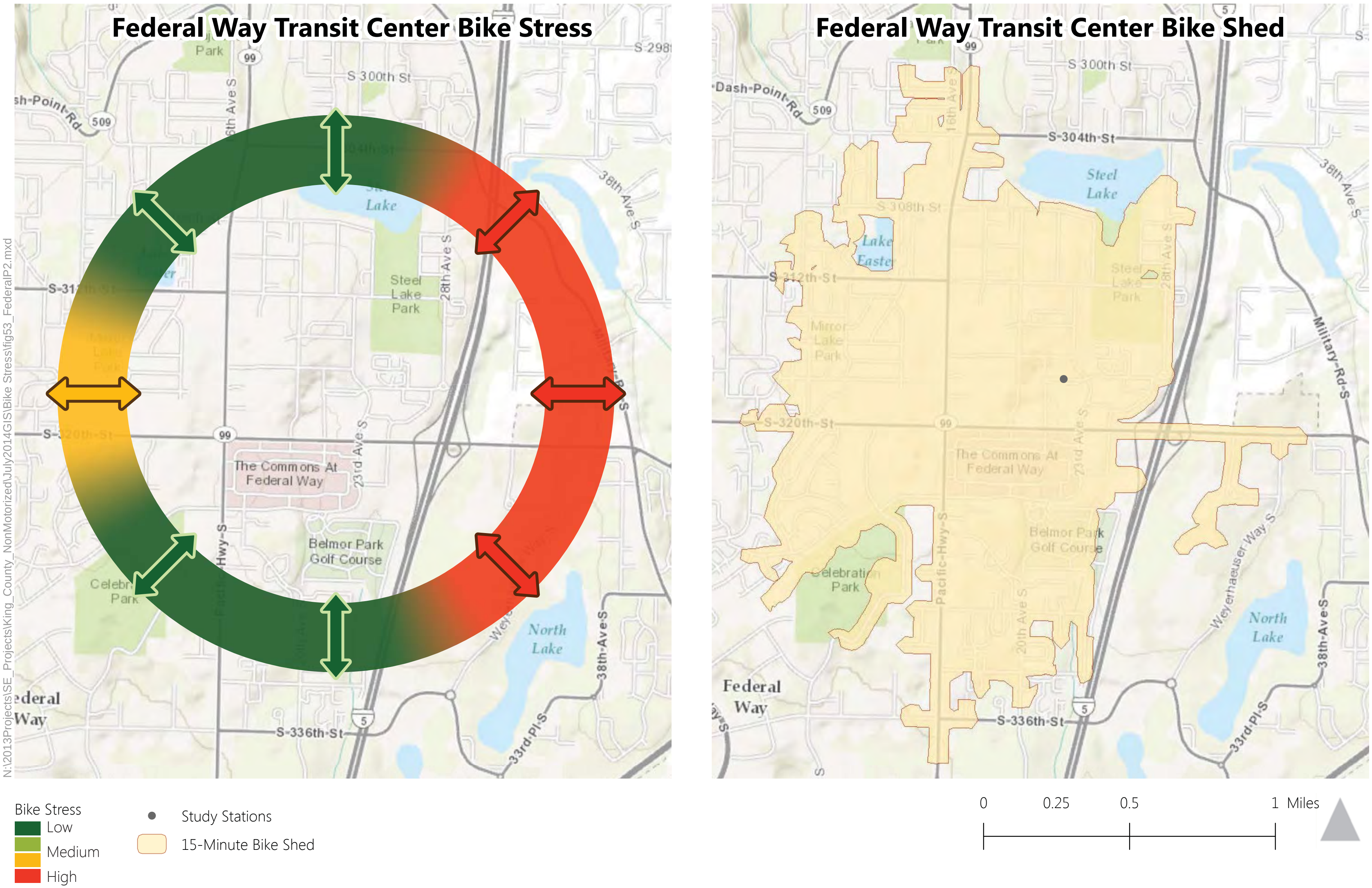
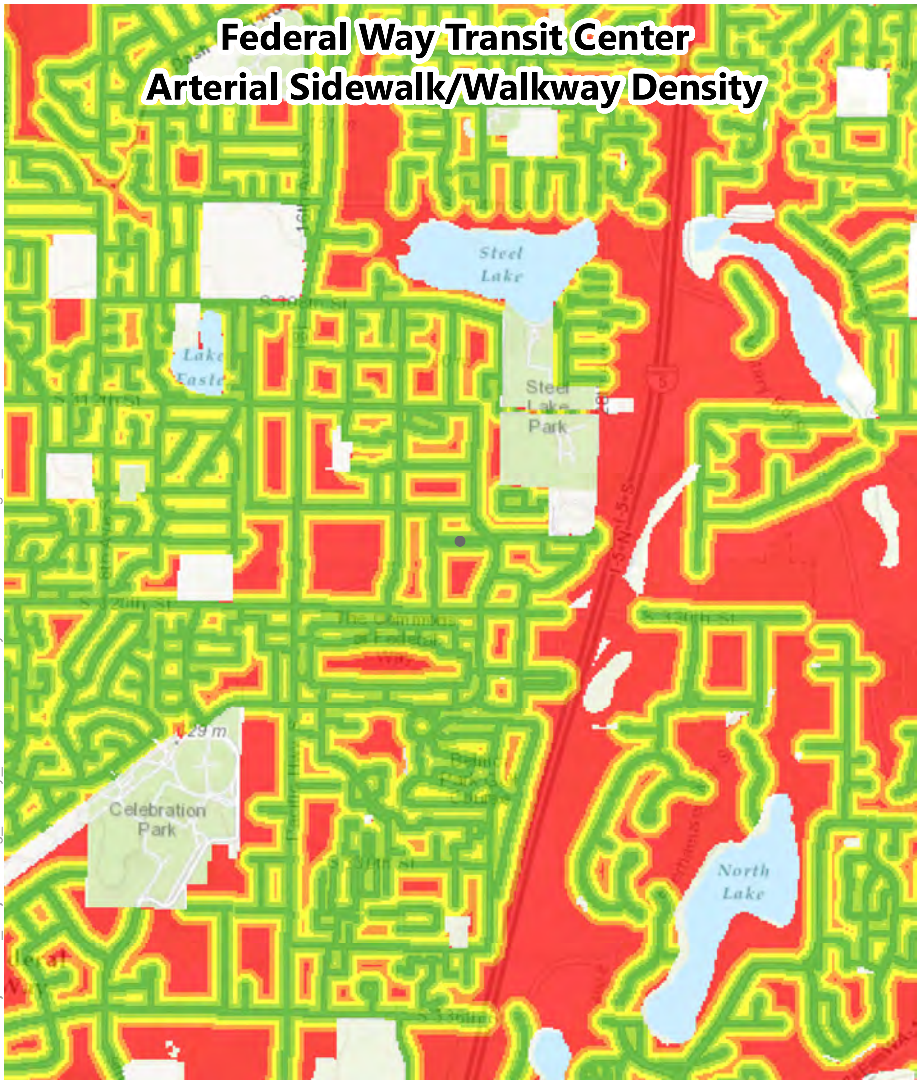
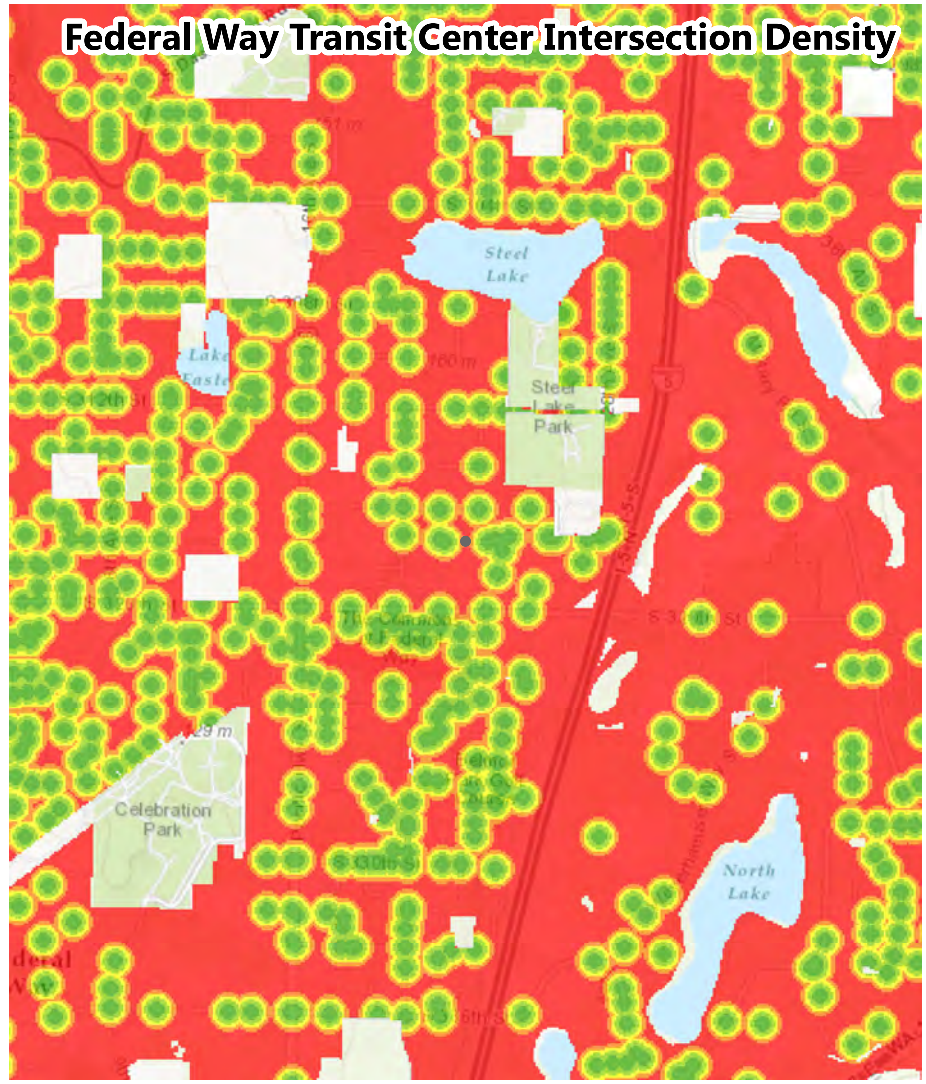


Figure 53

Federal Way Transit Center Bike Stress and Bike Shed





Density
High
Low

● Study Stations

0 0.25 0.5 1 Miles

Figure 54

Federal Way Transit Center Arterial Sidewalk/Walkway Density and Intersection Density

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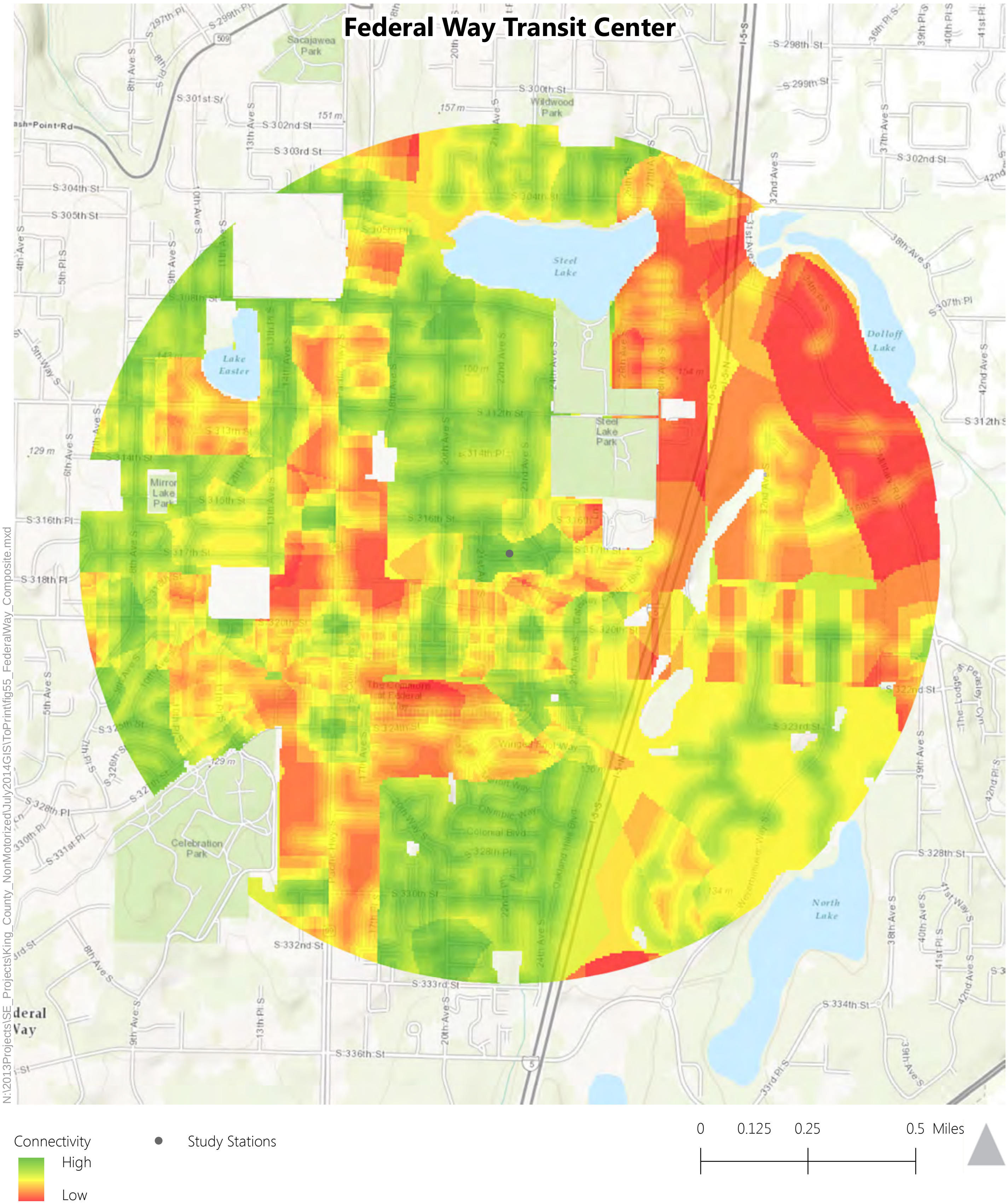


Figure 55

Federal Way Transit Center
Composite Connectivity Scores

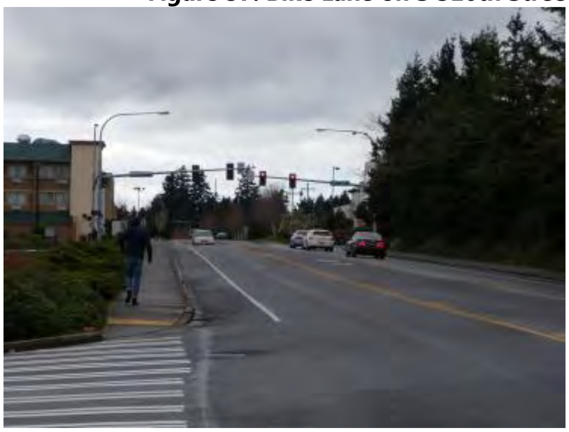
Below are observations of the Federal Way Transit Center data, which generally matched the field observations:

- The RDI score highlights the barriers created by I-5 and some of the large parcels/blocks near the transit center.
- There are some large gaps in signalized arterial crossings in the area, particularly on Pacific Highway. The map shows a stretch of S 324th that lacks crossings, but field visits indicated the presence of flashing pedestrian beacons in this segment.
- Bike stress is high to the east due to the lack of connections across I-5, but the bike shed is not extensive in that direction due to the terrain. There is moderately high bike stress approaching from due west because of the need to cross Pacific Highway at either S 312th or S 320th Streets, which are high stress routes.
- The area generally has good arterial sidewalk coverage, but as shown on the map, there are gaps along portions of S 312th Street, 28th Avenue, and S 320th Street (across I-5).
- Intersection density and street density is low due to the large block and parcel sizes.

Below are some pictures taken during the field visit:

Figure 56: Buffered Sidewalks with Strip Commercial and Flashing Pedestrian Crossing

Figure 57: Bike Lane on S 316th Street and Bike Parking at the Transit Center



Below are some additional observations of factors not captured in the GIS data:

- While the area around the transit center generally has good sidewalk coverage, the urban form is very auto-oriented with large streets and parking lots adjacent to the sidewalks.
- Some streets in the area lack street lights, although lights from adjacent parking lots may provide some level of illumination. The streets lacking lighting include S 316th Street between 21st Avenue and Pacific Highway, and S 317th Street between 23rd Avenue and 25th Place.
- The bike racks in the transit center are well utilized.

GIS DATA BLIND SPOTS

As described above, the jurisdiction GIS data matched field conditions well. However, the project team identified several "blind spots" where the GIS data were either not available across the entire region or where the GIS data were too general. Based on the research and the team's observations, these blind spots are important to consider when applying the connectivity tools to evaluate non-motorized access to transit. The key blind spots are listed below:

- Low volume/speed arterial streets: Since general functional class information was used to identify arterials, some cities like Seattle include low volume/speed arterial streets that would be classified as collector streets in other jurisdictions. These streets may be easier to cross, so the lack of signalized arterial crossings may be less of an impediment to accessing transit.

- Sidewalk width and quality: Only a handful of jurisdictions keep information on sidewalk quality, and the data do not appear to be comprehensive. About half of the jurisdictions had sidewalk width and presence of planter strip data.
- Illumination: Most cities have GIS data on where city-owned street lights are, but in many cities Puget Sound Energy owns most of the street lights and this information was not generally available.
- All-way stop signs and flashing crossing beacons: All-way stop signs and flashing crosswalk beacons can make it easier to cross arterial streets. Only a handful of cities have these types of signs/crossing treatments identified in their GIS data.
- Urban form: There is no uniform method to measure and code the quality of the urban form along a street or bikeway. Research shows that traveling along a street that is fronted by parking lots or that is adjacent to the side of a warehouse is less appealing than a street with smaller-scale street oriented businesses or homes[16].

[16] "Evaluating Transportation Land Use Impacts". Litman, T,. June 11, 2014.

USING THE TOOLS TO EVALUATE 2035 CONDITIONS

This section presents how the project team used the connectivity tools and regression model to evaluate 2035 conditions at each of the case study locations. In each case, the following changes were considered in the evaluation:

- 2035 population and employment growth from either the PSRC regional travel model or local travel model
- Changes to the transportation system from city and regional plans, including the following types:
  - Roads
  - Transit service
  - Off-street trails or cycletracks
  - Sidewalks
  - Bike lanes
  - Greenways
  - Signalized arterial crossings

To obtain accurate information, the project team met with Seattle, Redmond, and Federal Way planning staff. Based on these meetings, the team collected detailed information such as Urban Design Frameworks, subarea plans, and the most up-to-date bicycle and pedestrian plans. Using this information, the 2035 transportation system information was coded into GIS and the connectivity tools were run[17]. The connectivity tool results were combined with updated land use and transit service characteristics in the regression model and new ridership estimates were generated.

Table 28 shows the change in population and employment expected under 2035 conditions and **Figures 58 through 61** show the new transportation projects coded into GIS for each of the case study areas.

[17] It is important to keep in mind that many of the projects in the pedestrian/bicycle plans are not currently funded and may or may not be implemented under 2035 conditions.

Table 28: 2035 Employment and Population in Case Study Locations

Case Study	Employment			Population		
	Existing	**Future**	**% Diff**	**Existing**	**Future**	**% Diff**
Northgate TC	10,050	12,250	22%	9,140	11,320	24%
Overlake Village	23,420	36,470	56%	4,040	10,300	155%
Mt Baker	4,450	5,440	22%	6,760	8,450	25%
Federal Way TC	4,180	6,470	55%	4,740	6,690	41%

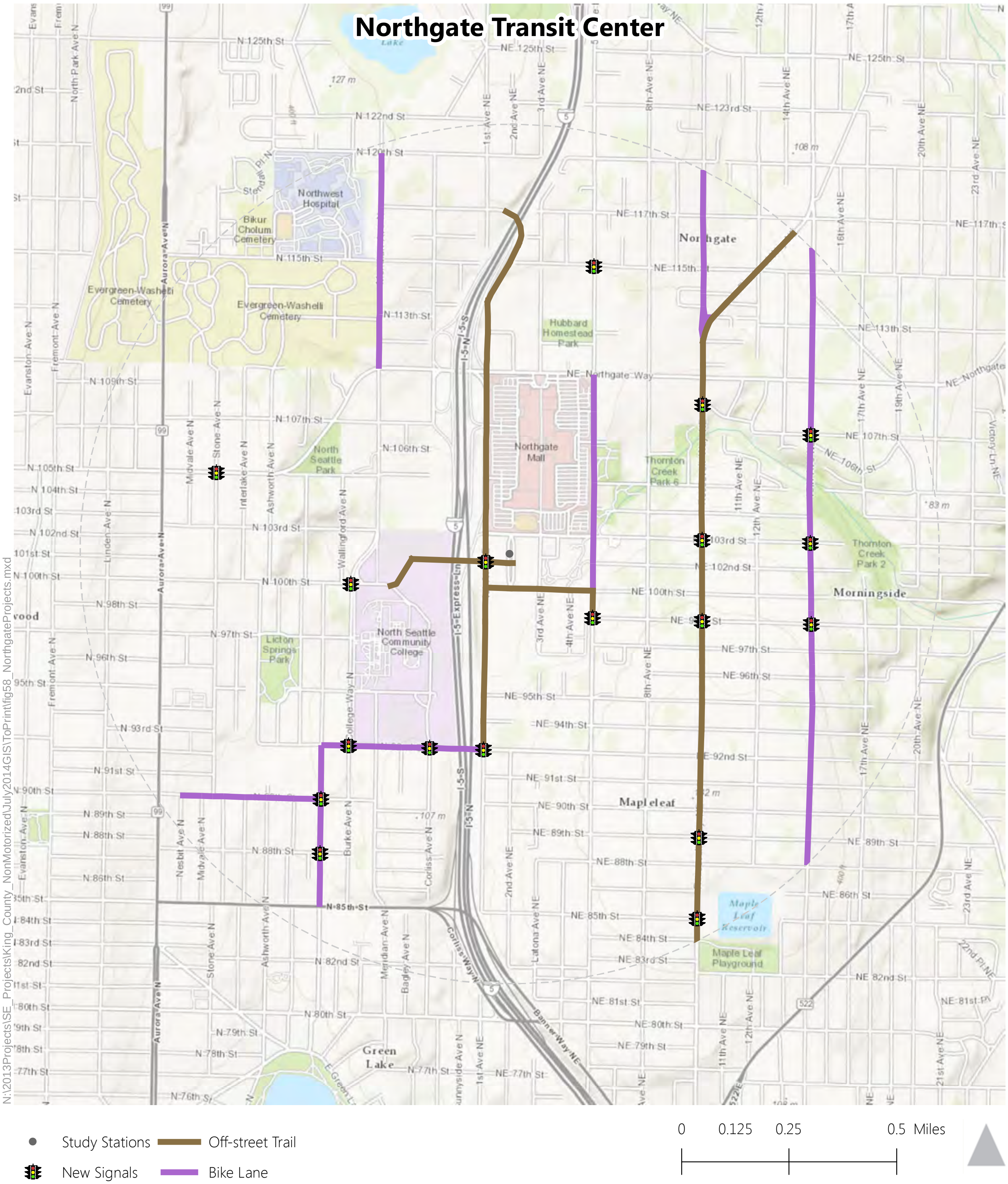
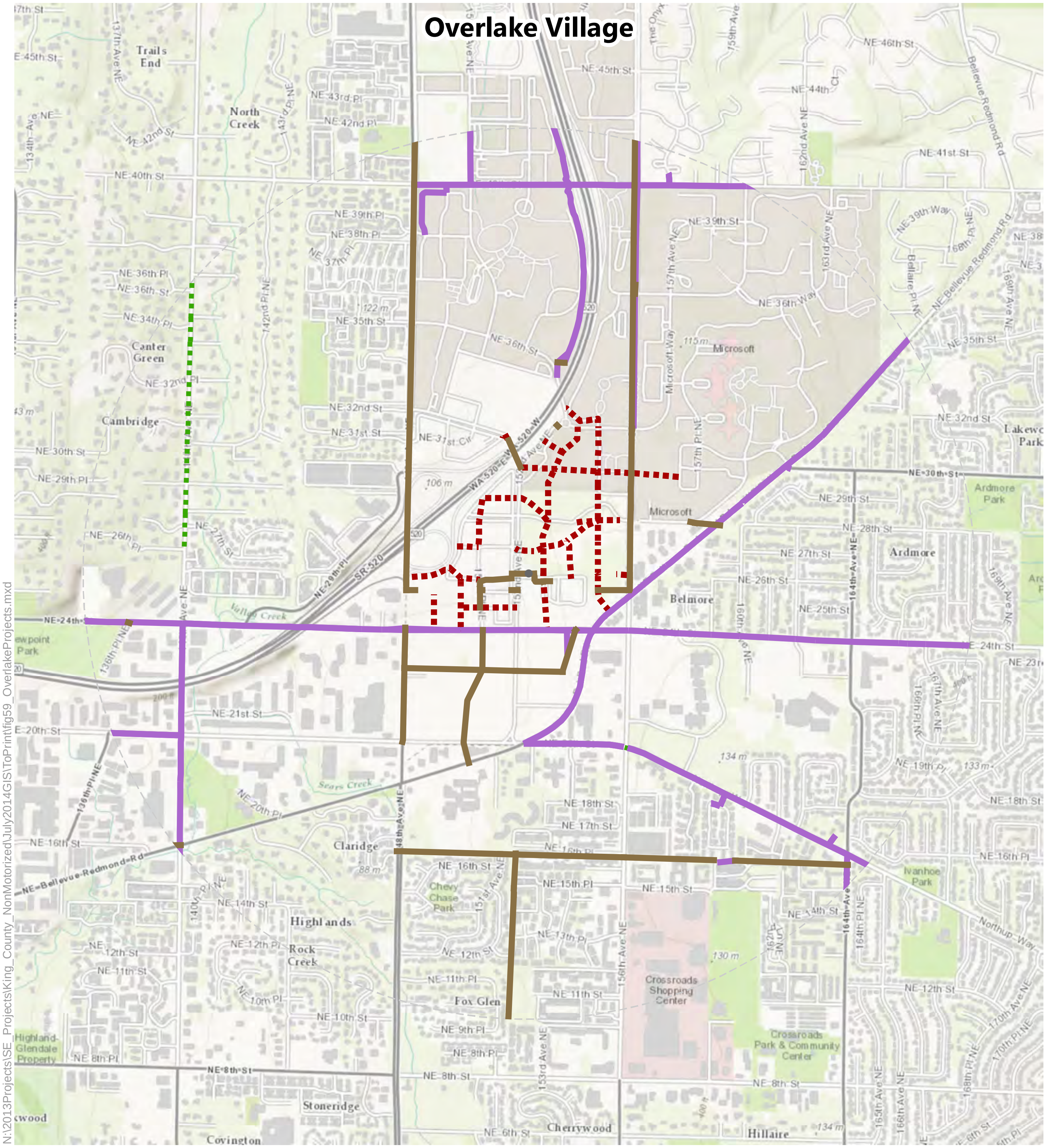


Figure 58

Northgate Transit Center
New Transportation Projects



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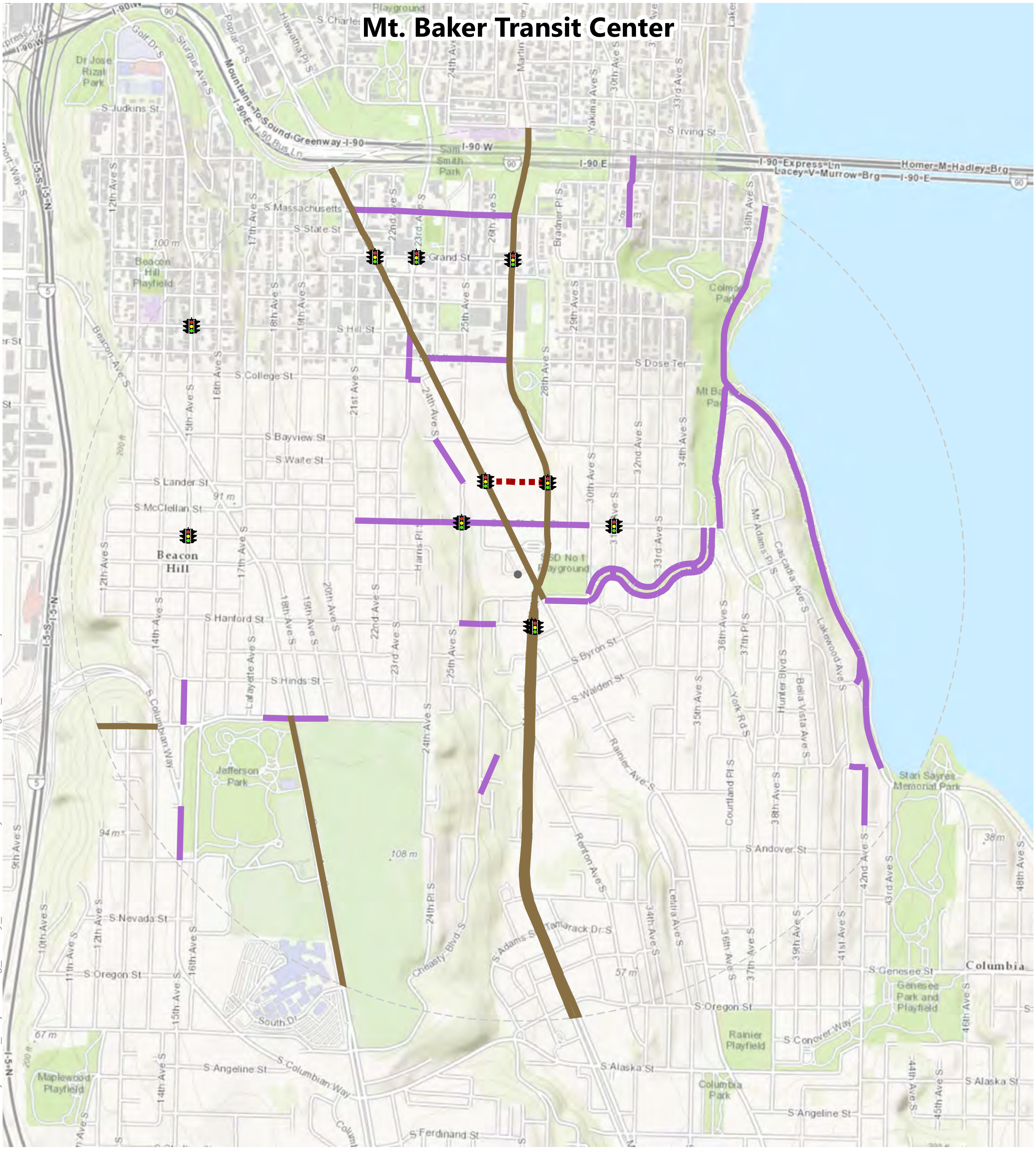
Study Stations
New Street
Off-street Trail
New Sidewalk
Bike Lane

0 0.125 0.25 0.5 Miles

Figure 59

Overlake Village
New Transportation Projects



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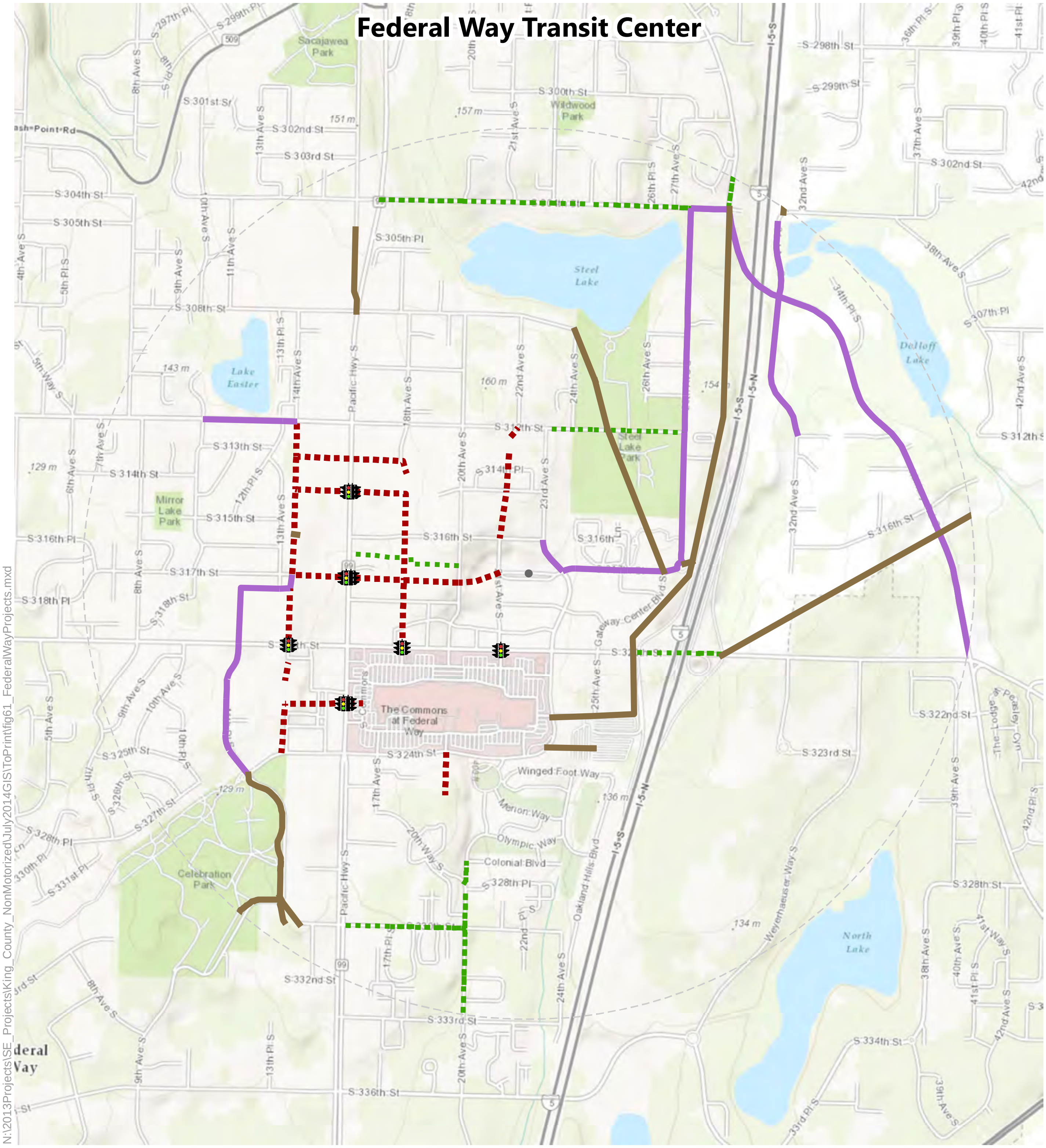
Study Stations | New Signals
Off-street Trail | New Street
Bike Lane

0 | 0.125 | 0.25 | 0.5 Miles

Figure 60

Mt. Baker Transit Center
New Transportation Projects



●	Study Stations	🚦	New Signals
▬	Off-street Trail	▪▪▪	New Street
▬	Bike Lane	▪▪▪	New Sidewalk

0 0.125 0.25 0.5 Miles

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Figure 61

Federal Way Transit Center
New Transportation Projects

Below is a list of some of the more significant changes at each of the case study locations:

- Northgate Transit Center:
    - Link light rail extension
    - Pedestrian and bicycle bridge across I-5
    - Cycletrack/major separated bicycle facility along 1st Avenue and Roosevelt Way
    - New bicycle lanes and signalized arterial crossings at proposed greenways throughout the study area
- Overlake Village
    - Link light rail
    - New pedestrian bridge across SR-520
    - New street grid in Overlake Village redevelopment area
    - Off-street trails/cycletracks on 148th Avenue and 156th Avenue
    - Bicycle lanes on NE 24th Street and Bel-Red Road
- Mount Baker TC and Link Station
    - New cycletrack/major separated bicycle facility on Rainier Avenue north of MLK Jr. Way and on MLK Jr. Way
    - Bicycle lanes on McClellan Street, S Mt. Baker Boulevard, and Lake Washington Boulevard
    - New street through the Lowes site
- Federal Way TC
    - Link light rail
    - New street grid in the Town Center area
    - New signalized arterial crossings of Pacific Highway and S 320th Street
    - New bicycle lanes and off-street trails throughout the study area

In addition to the new transportation infrastructure planned, each of the case study areas is expecting substantial growth in population and employment between now and 2035.

Given relatively up-to-date urban design guidelines in each of the cities, as new development progresses, the overall urban form of the case study areas is likely to become more conducive to walking and biking. These urban form improvements will complement the non-motorized improvements described above.

Results

The results of the regression model run on 2035 conditions are shown in **Table 29**[18] below. The new composite connectivity index surfaces are shown in **Figures 62 through 65**.

Table 29: Daily Ridership Estimates

Case Study	*Existing*	*Future without non-motorized improvements*	*Future with non-motorized improvements**	*Ridership attributable to non-motorized improvements*
Northgate TC	6,469	18,410	20,239	1,829
Overlake Village	392	946	998	52
Mt Baker	4,300	4,460	4,839	379
Federal Way TC	2,341	6,305	7,006	701

* Non-motorized improvements include new street grid projects, but not new Link light rail extensions. Ridership includes all bus and light rail service

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[18] In 2013, Sound Transit performed an analysis of the potential new transit riders that would access the Northgate Transit Center via the proposed pedestrian bridge over I-5. This analysis was performed using the best data available at the time, as summarized in TCRP Report 153. There are several important differences between the 2013 study and this new analysis. The key differences are:

- it used fewer and less-detailed connectivity variables;
- it had a 2030 analysis horizon (rather than 2035);
- it used national data on travel and access to transit, along with local population and employment data to assess station typologies; and
- it evaluated bridge users based on light-rail boardings only (as opposed to rail and bus boardings).

Given these differences, it is not surprising that this new analysis indicates that the I-5 Bridge may attract additional people accessing transit. To provide a more direct comparison to the prior study, the project team applied the new model to only the light rail boardings and estimated a result that was within 8 percent of the 2013 study, which is comparable given the difference in analysis horizons (2030 versus 2035). A similar analysis using the TCRP Report 153 analysis methods was also performed for Sounder stations (Sounder Station Access Study). Similar differences should be expected the new tool is used to analyze Sounder access/boardings as well.

As shown in the table above, much of the ridership gains expected between 2014 and 2035 stem from increased land use growth and major transit investments, like Link light rail extensions. However, the non-motorized connectivity improvements do have a meaningful impact on helping to achieve overall ridership. Note that the future ridership forecasts shown in **Table 29** are based on the model developed for this project. Given the model's limitations mentioned above, more sophisticated ridership models may be appropriate to use for "base" future ridership forecasting, if the data are available. Using these base ridership data, the percent change in ridership estimated by the connectivity tools and model can be applied to calculate a refined estimate of ridership associated with improved pedestrian and bicycle infrastructure.

With this in mind, the Sound Transit Incremental Travel Model's 2035 forecasts were evaluated at each of the study locations. In each case (except for Mt. Baker, as noted in the footnote for **Table 30** below), the Sound Transit's model estimated daily boardings for both rail and buses were extracted and the connectivity model results were applied to the combined rail/bus boardings. The results are shown in **Table 30**.

Table 30: Daily Ridership Estimates Based on Sound Transit Model Forecasts

Case Study	Existing	Future without non-motorized improvements	Future with non-motorized improvements	Ridership attributable to non-motorized improvements
Northgate TC	6,469	27,000	29,700	2,700
Overlake Village	392	2,600	2,900	300
Mt Baker	4,300	4,500*	4,800	300
Federal Way TC	2,341	18,500	20,600	2,100

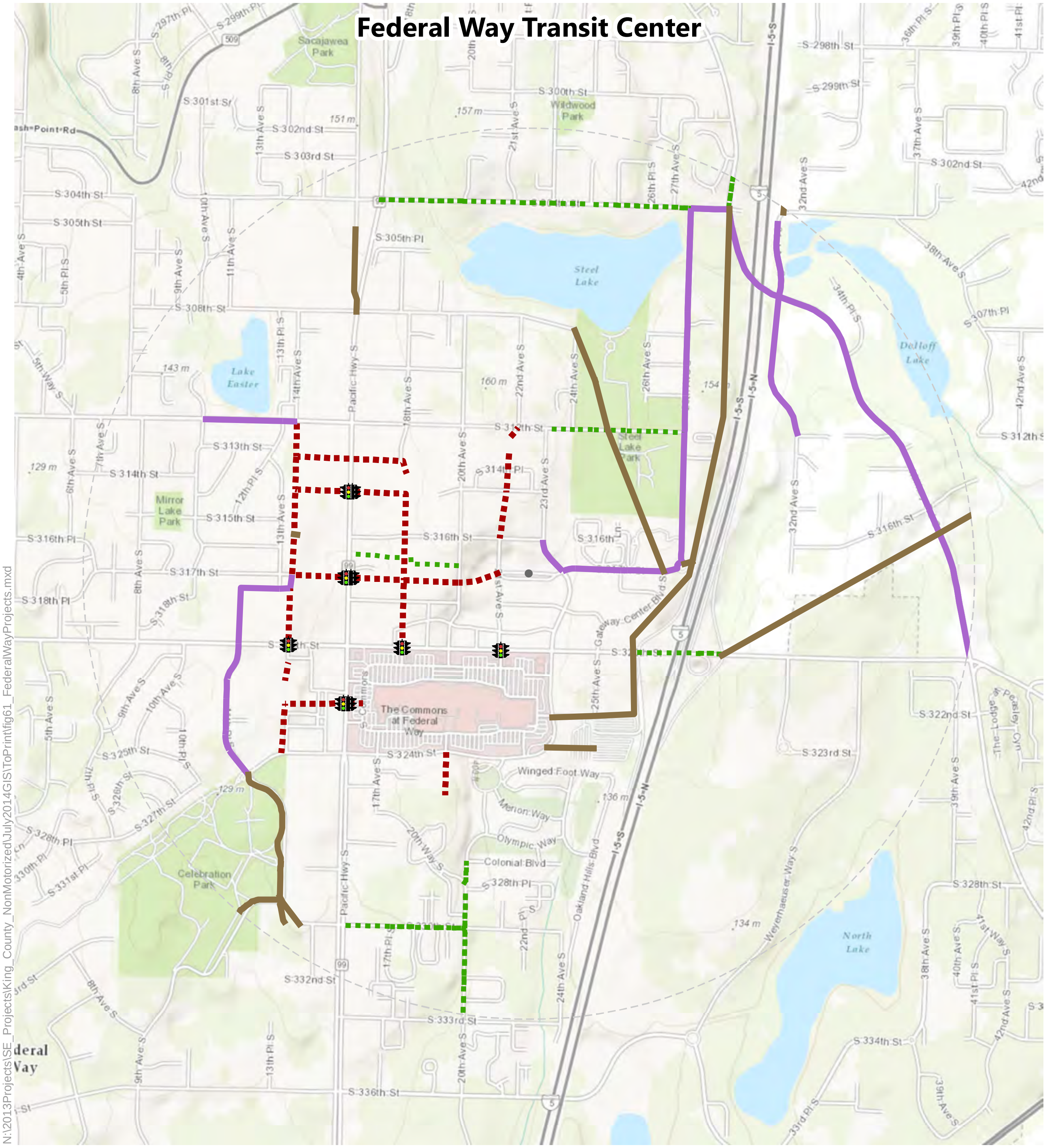
*Note the ST model did not assume the planned rezoning at the Mt. Baker station area and there was no increase in ridership over 2014 existing conditions. Therefore, the results of the connectivity analysis model were used for this location.

In general, Sound Transit's model estimated higher bus/rail boardings than did the non-motorized connectivity model. These higher future year ridership estimates translate into higher estimates of boardings attributable to the planned non-motorized investments in the areas. In general, it is the project team's recommendation that the most accurate base ridership information be used when applying the results of the connectivity tools and model. In the Project Prioritization chapter, the connectivity model was applied to observed boardings, which are clearly more accurate than the basic connectivity model's estimate of ridership. For future conditions, using Sound Transit's Federal Transit Administration approved model may be most appropriate[19], except when this model is not applicable or results are not available.

CASE STUDIES: FINAL CONNECTIVITY MAPS AND TRAVEL SHEDS

The following maps highlight the 2035 conditions for the four case study locations, including the future connectivity index along with the 15-minute bike and walk travel sheds.

[19] Sound Transit's ridership model covers all of urban Snohomish, King, and Pierce County; even areas outside of the Sound Transit taxing district and is generally a good source for accurate transit ridership data.



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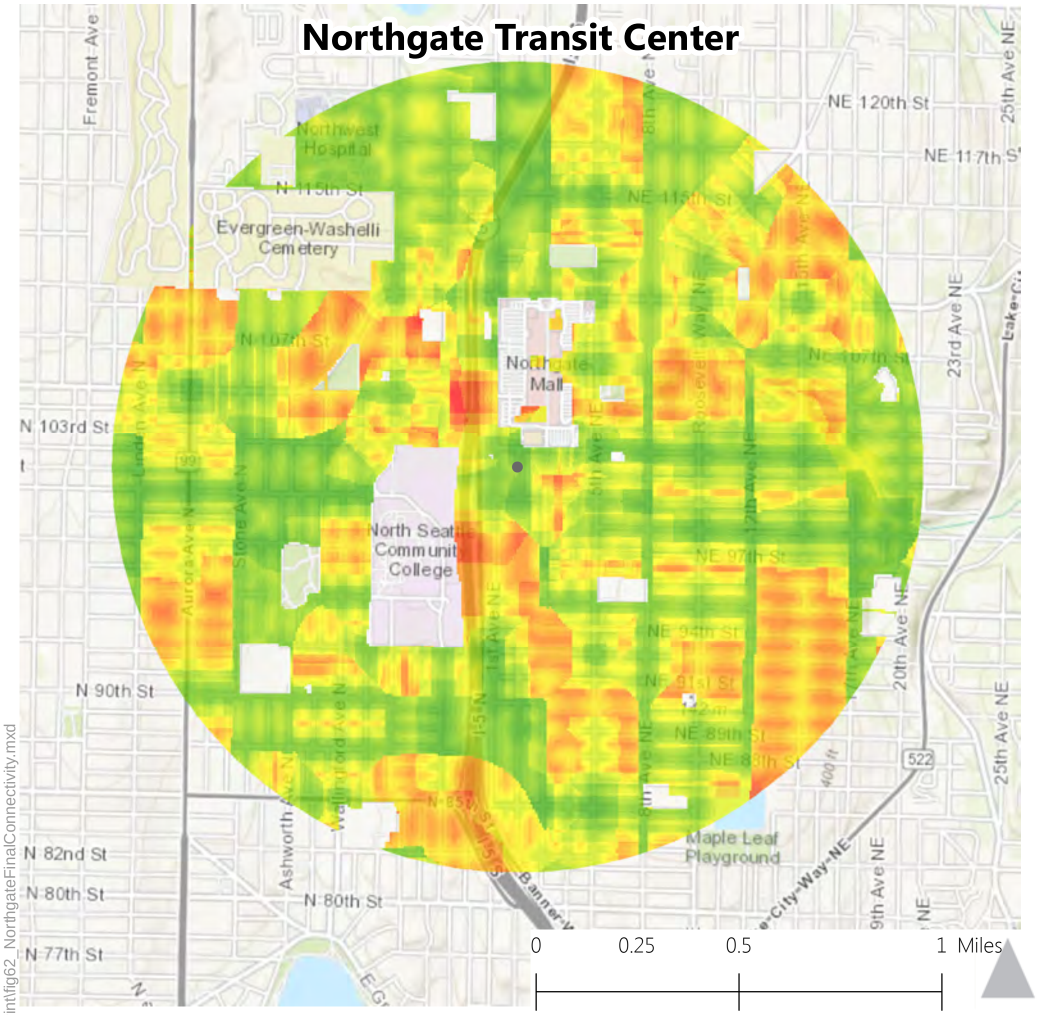
- Study Stations
- New Signals
- Off-street Trail
- New Street
- Bike Lane
- New Sidewalk

0 0.125 0.25 0.5 Miles

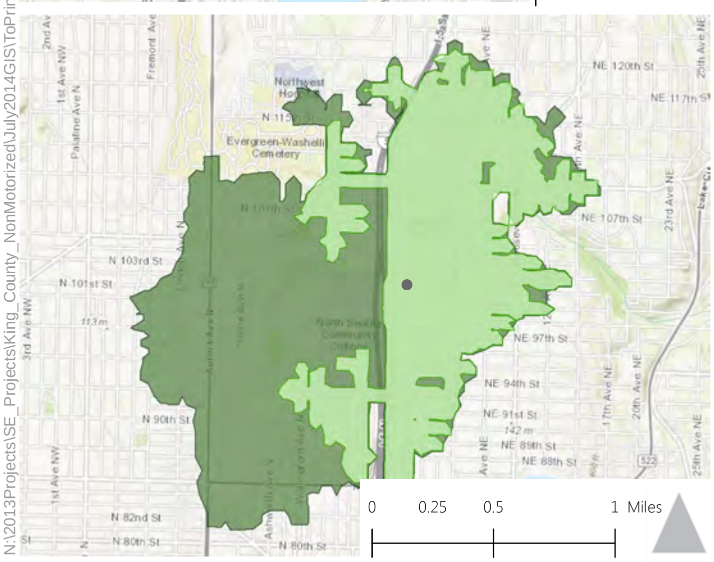
Figure 61

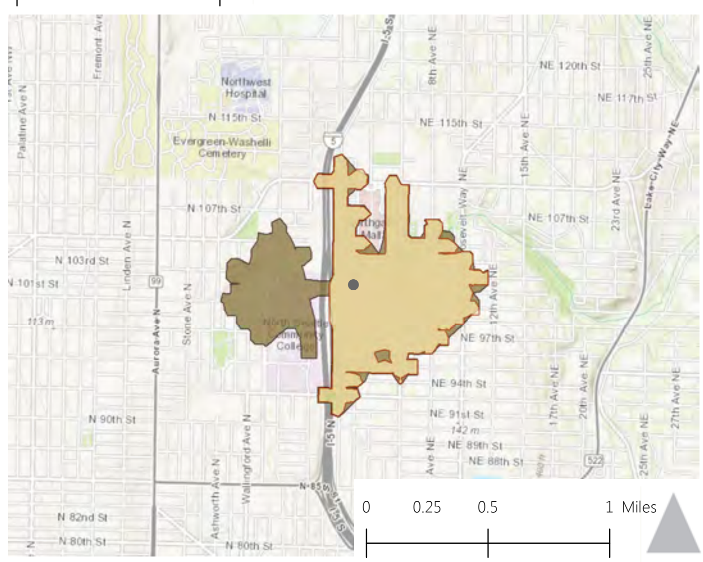
Federal Way Transit Center New Transportation Projects



Connectivity Improvements

The primary improvement in connectivity in the Northgate area was due to the non-motorized bridge across I-5. Additionally, the greenway signals and cycle tracks proposed in the area helped improve the arterial crossing score and the bicycling stress environment. The impact of the bridge can be seen in the large increase in both the 15-minute walk and bike sheds from the station.





Connectivity
High
Low

Study Stations

Existing 15-Minute Bike Shed
Future 15-Minute Bike Shed

Existing 15-Minute Walk Shed
Future 15-Minute Walk Shed

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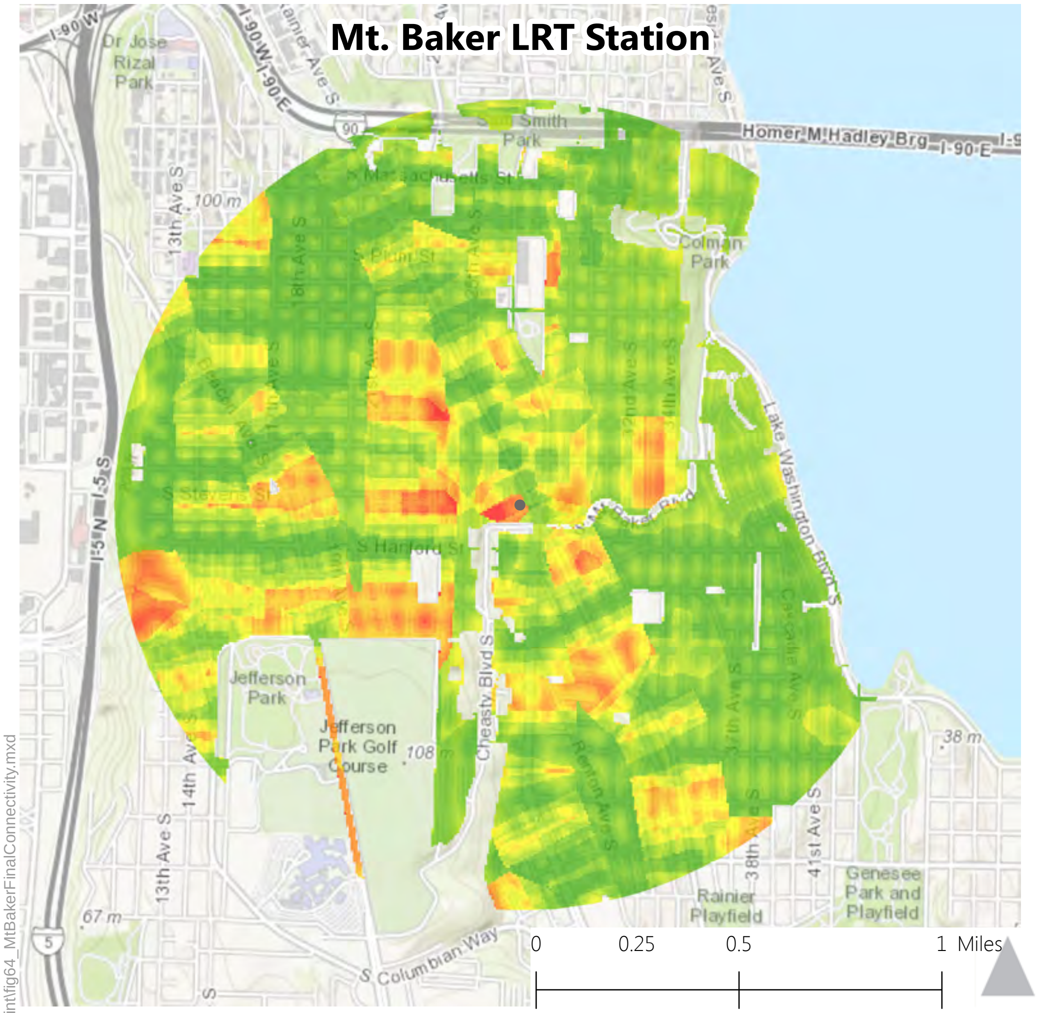
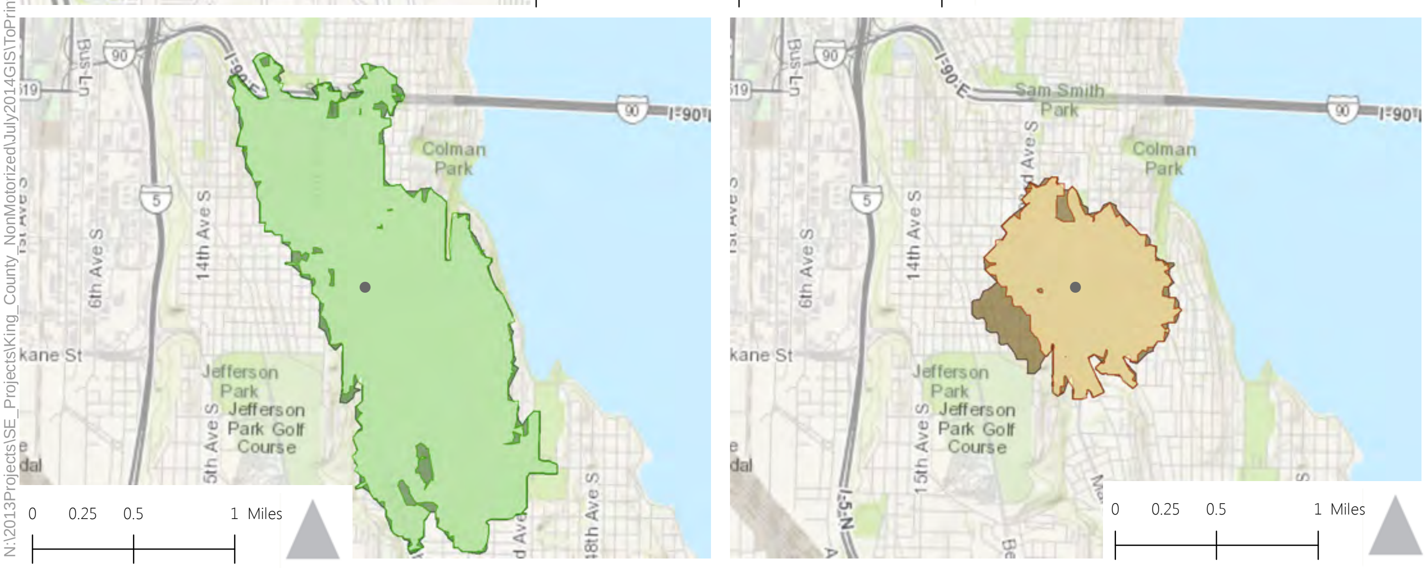
Figure 62

Northgate Transit Center Future Connectivity Map and 15-Minute Travel Sheds



Connectivity Improvements

Connectivity around the Mt. Baker LRT station area improved primarily due to cycletrack installations and new greenway signals. This improved both the bike stress and arterial crossing feasibility in the area while there were limited gains in the 15-minute travel sheds due to the present density of the street network.



Connectivity
High
Low

Study Stations

Existing 15-Minute Bike Shed
Future 15-Minute Bike Shed

Existing 15-Minute Walk Shed
Future 15-Minute Walk Shed

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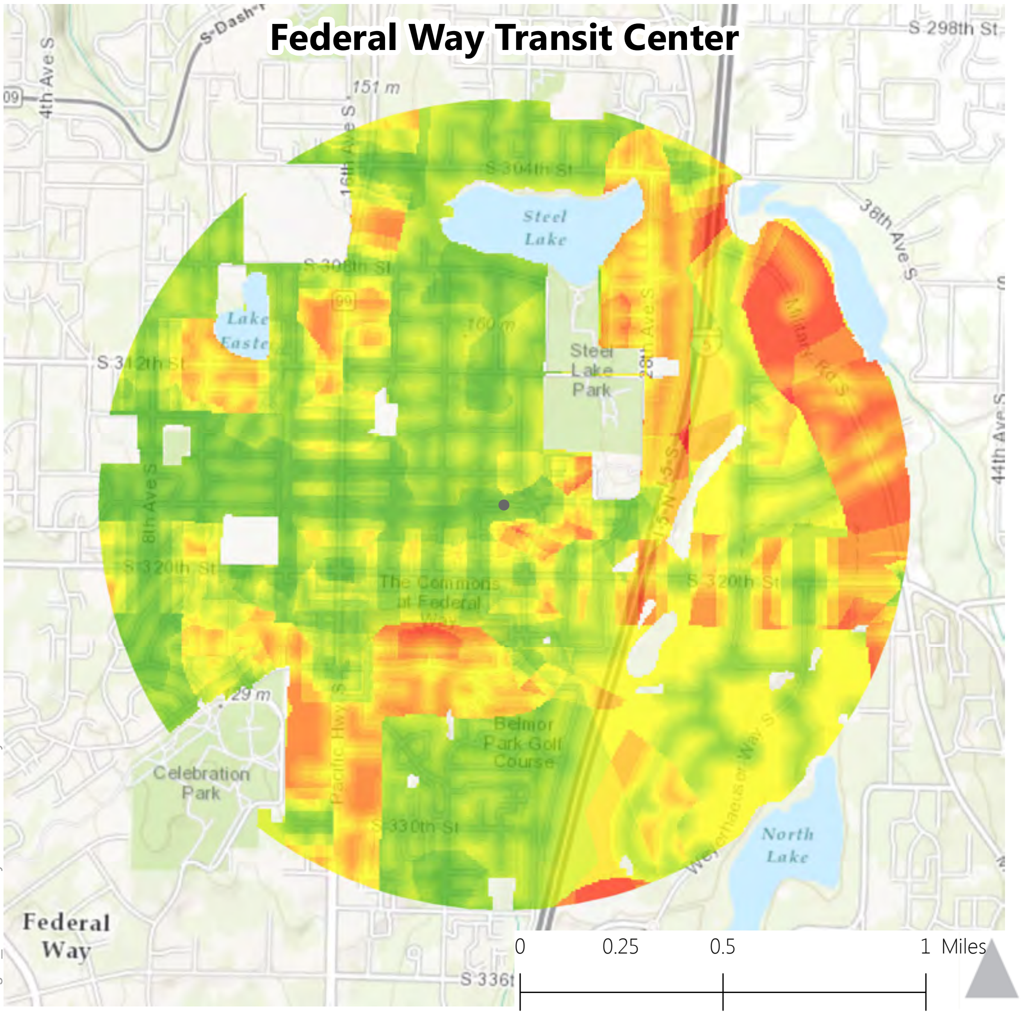
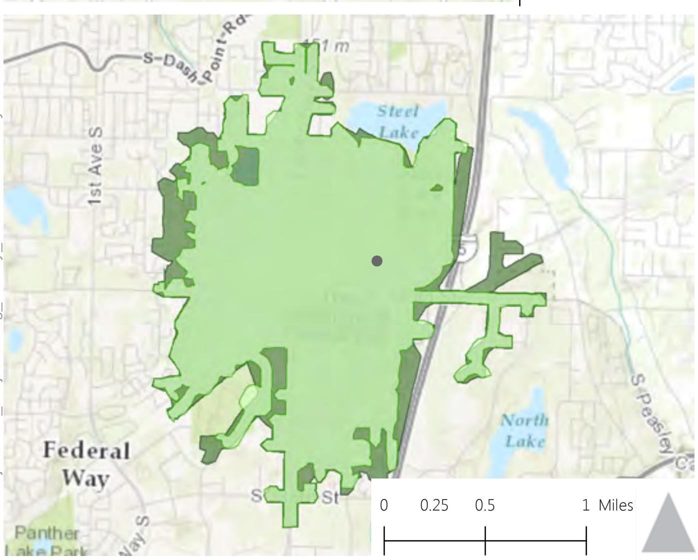
Figure 64

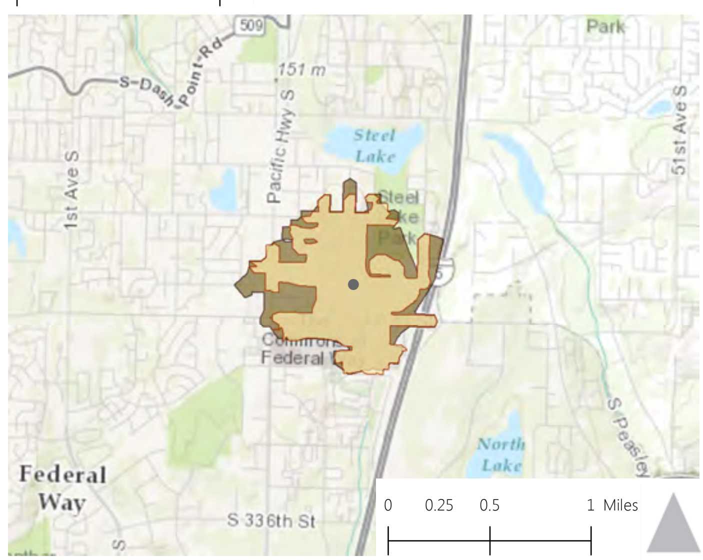
Mt. Baker LRT Station Future Connectivity Map and 15-Minute Travel Sheds



Connectivity Improvements

Connectivity in the Federal Way Transit Center area improved primarily from the new Federal Way Commons street grid and enhanced pedestrian crossings of arterials, particularly Pacific Highway and S 320th Street. These improvements provided a moderate expansion to the walk and bike sheds and helped enable a lower bicycling stress environment.





Connectivity: High / Low

- Study Stations
- Existing 15-Minute Bike Shed
- Future 15-Minute Bike Shed
- Existing 15-Minute Walk Shed
- Future 15-Minute Walk Shed

N:\2013Projects\SE_Projects\King_County_NonMotorized\July2014GIS\ToPrint\fig65_FederalWayFinalConnectivity.mxd

Figure 65

Federal Way Transit Center Future Connectivity Map and 15-Minute Travel Sheds

PRIORITIZING PROJECTS WITHIN THE CASE STUDY AREAS

An earlier chapter presented a methodology to prioritize projects within station areas across the entire region. This generalized analysis of project types was performed for the four case study locations and the results are shown in **Appendix B**. While the generalized project ranking is valuable to consider, the case studies give us the opportunity to evaluate some types of projects more specifically. Therefore, several projects were broken out from the generalized categories and evaluated/prioritized separately as part of the case study analysis. The projects were chosen utilizing the following steps:

- The existing surfaces were evaluated to identify poor scoring areas such as portions of a station area with low RDI scores or poor bike stress
- Within these poor scoring areas, the future projects were reviewed to determine if any would provide a substantial improvement to the existing poor connectivity

These projects include:

- Northgate Transit Center
  - I-5 pedestrian and bicycle bridge
  - 1st Avenue cycletrack
- Overlake Village
  - SR-520 pedestrian and bicycle bridge
  - New street grid
- Mount Baker Transit Center and Link Station
  - Cycletracks Rainier Avenue north of MLK Jr. Way and on MLK Jr. Way
- Federal Way Transit Center
  - New street grid in the Town Center area

The results of the connectivity analysis, along with the total project costs are shown in **Table 31**.

Table 31: Case Study "Selected Projects" Evaluation Results

Project	Area	2035 Daily Boardings	Connectivity Score Change	Change in Daily Boardings from Connectivity	Total Project Cost	Annual Cost per Rider
I-5 Pedestrian Bridge	Northgate	27,000	0.27	1,800	$ 25 M	$4
1st Avenue Cycletrack	Northgate	27,000	0.05	340	$ 1.1 M	$1
SR520 Pedestrian Bridge	Overlake	2,600	0.21	140	$ 13 M	$25
Overlake Village Street Grid	Overlake	2,600	0.30	200	$ 10.9 M	$15
MLK and Rainier Ave. Cycletrack	Mt. Baker	4,500	0.07	80	$ 3.2 M	$11
Federal Way Street Grid	Federal Way	18,500	0.42	1,900	$ 12.4 M	$2

As shown above, the I-5 Pedestrian Bridge at Northgate and the new street grid at Federal Way are expected to result in the most new daily transit riders. This result is due to the large increase in connectivity scores generated by these projects combined with the high future ridership levels expected at these station areas. The Overlake Village street grid results in a large connectivity change as well, but the ridership levels at the Overlake Village are expected to be lowest amongst the case studies.

When considering cost per new rider, the Northgate cycletrack rates the highest, while the street grid in Federal Way rates second best.

A review of **Table 22**, which summarized the demographic and transit service proximity rating, shows that only the Federal Way Transit Center was rated within the top 25 of the demographic and transit service metric developed for the entire study area project prioritization. Given the Federal Way street grid's strong performance with respect to cost per rider, this project would rate best when considering the aggregate performance measure developed earlier.

Other Projects to Enhance Non-Motorized Transit Access in the Case Study Locations

In addition to evaluating the non-motorized projects planned by local jurisdictions, the connectivity tool allows users to identify additional projects that could benefit access to transit. This project identification method is typically a two-step process:

1. Identify areas within a station that exhibit poor connectivity scores.
2. Determine the reason for the poor scores (RDI, signalized crossing, bike stress, sidewalk gaps, etc.)
3. Test various project type and project locations within the station-area to improve the score (For example, if a clear barrier is causing a poor RDI score for an area, test the result of adding a link across that barrier)

As part of the case study applications, the project team performed this analysis at two levels. 1) Evaluating the future 2035 composite connectivity score and individual connectivity surfaces to look for poor scoring areas that could be addressed through additional projects, and 2) identifying smaller-scale projects and other projects that cannot be readily evaluated with the connectivity tools. The findings of the team are listed below and summarized in **Table 32**.

Northgate Transit Center

A review of the final composite connectivity score map shown in **Figure 62** shows that that many of the remaining low-scoring areas in the Northgate Transit Center area are due to gaps in signalized arterial crossings (note the "corridors" of orange/red colors along streets such as Roosevelt Avenue and 92nd Street). However, as discussed earlier, these streets are relatively low volume/low speed streets and feature other crossing amenities such as marked (but unsignalized) crosswalks and four-way stops. Considering this limitation of the data, the project team identified the following improvements in the area:

- If the Northgate Mall parcel were ever to redevelop, additional street grid or pedestrian/bicycle pathways through the redeveloped site could improve access between the transit center and the dense uses along Northgate Way. This improvement would have a moderate benefit on improving the connectivity score and generating potential new transit riders.
- Field observations revealed that the pedestrian environment on Northgate Way under I-5 is poor. There are high-speed ramps on either side of the underpass, the sidewalk is adjacent to the traffic lanes (no buffer), and despite the presence of lights, it feels dark. Even with a new pedestrian/bike bridge to the south, the project

team expects Northgate Way to continue to be heavily traveled by pedestrians wishing to access the transit center from the northwest. The pedestrian (and to a lesser extent bicycle) environment could be substantially improved if these issues were addressed. These sorts of detailed improvements cannot be evaluated by the connectivity model, but they are complementary to the other improvements the model was able to evaluate.

- Given the large increase in non-motorized access forecasted under 2035 by this analysis and Sound Transit's Link light rail ridership forecasts, it will be important to monitor and meet the demand for bicycle parking. There are provisions for high-capacity bicycle parking in the Sound Transit station design. This analysis suggests that high-capacity bicycle parking will be important, along with good wayfinding so that potential users know where the parking is located.

Overlake Village

Based on plans obtained from the City of Redmond, the Overlake Village area is expected to change dramatically over the next 20 years. With the arrival of East Link, the City envisions the area transforming from the existing auto-oriented retail/office development form to more traditional transit-oriented development. To support this change, the City has developed a robust plan that includes new street connections, standards for wide sidewalks, and low-stress bicycle links to the station. The final composite connectivity score map shows relatively good scores throughout much of the station, however gaps still exist within the southeast portion of the station-area that is located in the City of Bellevue. With this in mind, the project team identified the following types of improvements for non-motorized connectivity in the area:

- Extend the off-street trails along 148th and 156th Avenues south into Bellevue to extend the low-stress bicycle catchment area of the station. As shown in **Table 32**, this improvement would provide a substantial boost to the connectivity score and a credible increase in ridership.
- If the City of Bellevue were to adopt similar pedestrian design standards as Redmond, then there would be a consistent and high quality pedestrian

environment in both cities. This would improve the overall pedestrian access to the station.

Mt. Baker

Amongst the case studies, Mt. Baker is expected to experience the least amount of change over the next 20 years, in large part because it already has Link light rail. The City of Seattle is pursuing a modest rezone of the area, but nothing on the scale of the other three case study areas. A review of the final composite connectivity score map shows that the planned improvements in the area results in good overall connectivity. Given this background, the project team focused more on small-scale improvements that were revealed through the field visits and our earlier work in the area:

- Some gaps in signalized crossings of Rainier Avenue continue to exist, particularly south of the transit center. Providing additional crossing opportunities will aid pedestrians and cyclists accessing the Link station and transit center.
- As mentioned earlier, while the Mt. Baker area generally has good sidewalk coverage, the sidewalks are old and are not constructed to a standard one would now expect in a Hub Urban Village. Additionally, sidewalk maintenance is an issue with many sidewalks in a state of poor repair. The City of Seattle will likely require new development to upgrade the sidewalks in the area and these types of improvements will improve the walking environment in the area and address some existing challenges for people with limited mobility.
- A long-standing critique of the Mt. Baker Transit Center and Link station is the difficult connections between buses and rail. For example, the busy southbound Route 7 stop is located a couple of blocks north of the Link station. While this is not a simple problem to address, the project team feels that additional ridership benefits could be gained by more closely linking the connections between bus and rail.
- The field visits found that there are pedestrian connections up the hill to the west of the Link station, which provides access to the neighborhoods to the west. However, many of these paths are heavily vegetated and the street lighting is obscured by trees. Given these conditions, some people may hesitate to use these paths. Better

landscaping or vegetation maintenance could help to address these issues and make these areas more attractive to a greater pool of users.

Federal Way Transit Center

Similar to Overlake Village, a major transformation of urban form and transportation is being planned for around the Federal Way Transit Center. The City of Federal Way has developed a robust plan to increase densities add street grid connections, and improve bicycle access to the Transit Center area. A look at the final composite connectivity score map shows good non-motorized access immediately around the station area. There are low-scoring areas east of I-5, but as noted earlier, low population/employment densities and steep terrain limit the utility of providing additional infrastructure in that area. The team's suggestions for additional connectivity improvements are listed below:

- The Commons at Federal Way Mall is a barrier to accessing the residential areas south of the mall. If this mall were ever to redevelop, extending the City's planned street grid south of 320th Street would improve access to the station.
- The field work indicated that several streets around the transit center lack street lighting. While it is likely that this lighting will be added in conjunction with adjacent redevelopment, the research indicated that adequate lighting is important in encouraging non-motorized access to transit.
- Similar to Northgate, the large increase in transit ridership forecast at the Federal Way Transit Center may spur the need for high-capacity bicycle parking facilities and wayfinding signage. The existing facilities were well utilized. This analysis suggests that bicycle parking will be important to meeting the overall non-motorized access needs at this station.

Table 32: Case Study Project Evaluation

Project	Area	Additional Connectivity Score Change	Additional Daily Ridership
Grid through Northgate Mall parcel	Northgate	0.007	50
Southerly extension of proposed off-street trails along 148th and 156th Avenue	Overlake Village	0.120	80

Table32: Case Study Project Evaluation (cont'd)

Project	Area	Additional Connectivity Score Change	Additional Daily Ridership
Additional Signal Crossings along Rainier Ave	Mt. Baker	0.051	60
Grid through Federal Way Commons	Federal Way	0.017	80
Improved lighting/sidewalks along Northgate Way underneath I-5	Northgate	*	*
Additional bicycle parking; bicycle wayfinding	Northgate	*	*
Wider sidewalks in City of Bellevue	Overlake Village	*	*
Wider sidewalks, sidewalk repairs	Mt. Baker	*	*
Direct connection between bus bays and Link light rail station	Mt. Baker	*	*
Vegetation control/new landscaping along hillclimbs	Mt. Baker	*	*
Fill gaps in street lighting	Federal Way	*	*
Additional bicycle parking; bicycle wayfinding	Federal Way	*	*

*The connectivity model is not able to evaluate these types of projects

Sidewalk Gap Evaluation

While not an issue for the case study locations, the project team recommends that any detailed analysis of stop/station areas begin with a search of sidewalk gaps within 200 feet of a stop location. This is important because these gaps could be missed in an area with generally good sidewalk coverage but no sidewalks immediately near the transit stop.