EVALUATION CRITERIA DATA AND ANALYSIS MAPS
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Mobility
Transit
Traffic
Safety
Bike/Ped - Salem
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Community Affairs
Bike/Ped - Salem
Roadway
Roadway - Salem
Bike/Ped - Salem
District 2B
District 2C
Planning
Major Projects
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Hood River
City of Portland
City of Hillsboro
Oregon Health Authority
Cascade Locks
City of Beaverton
Clackamas County
City of Tigard
Multnomah County
Metro
Oregon Walks
Trimet
Washington County
Travel Oregon
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## Evaluation Criteria Maps

### CRASH HISTORY

<table>
<thead>
<tr>
<th>Pedestrian Crash History</th>
<th>FIG</th>
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<td>Bicycle Crash History</td>
<td>1a</td>
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<tr>
<td>Pedestrian Crash History Score</td>
<td>1c</td>
</tr>
<tr>
<td>Bicycle Crash History Score</td>
<td>1d</td>
</tr>
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### CRASH RISK

<table>
<thead>
<tr>
<th>Average Annual Daily Traffic</th>
<th>FIG</th>
</tr>
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<tbody>
<tr>
<td>Speed Limits</td>
<td>2a</td>
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<td>Crossings, Signals, and Lanes</td>
<td>2b</td>
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<tr>
<td>Pedestrian Crash Risk Score</td>
<td>2c</td>
</tr>
<tr>
<td>Bicycle Crash Risk Score</td>
<td>2d</td>
</tr>
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</table>

### ACCESS TO TRANSIT

<table>
<thead>
<tr>
<th>Region 1 Transit Stop Locations</th>
<th>FIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Access to Transit Score</td>
<td>3a</td>
</tr>
<tr>
<td>Bicycle Access to Transit Score</td>
<td>3b</td>
</tr>
</tbody>
</table>

### ACCESS TO ESSENTIAL DESTINATIONS

<table>
<thead>
<tr>
<th>Region 1 Essential Destinations Locations</th>
<th>FIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Access to Essential Destinations Score</td>
<td>4a</td>
</tr>
<tr>
<td>Bicycle Access to Essential Destinations Score</td>
<td>4b</td>
</tr>
</tbody>
</table>

### SERVES TRANSPORTATION DISADVANTAGED POPULATION

<table>
<thead>
<tr>
<th>Transportation Disadvantaged Population</th>
<th>FIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Disadvantaged Population Score</td>
<td>5a</td>
</tr>
</tbody>
</table>

### FILLS A GAP

<table>
<thead>
<tr>
<th>Pedestrian Facility Gaps</th>
<th>FIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Facility Gaps</td>
<td>6a</td>
</tr>
<tr>
<td>Pedestrian Fills A Gap Score</td>
<td>6b</td>
</tr>
<tr>
<td>Bicycle Fills A Gap Score</td>
<td>6c</td>
</tr>
</tbody>
</table>

### IN LOCAL PLAN

<table>
<thead>
<tr>
<th>Local Plan Needs</th>
<th>FIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Pedestrian Plan Needs</td>
<td>7a</td>
</tr>
<tr>
<td>Local Bicycle Plan Needs</td>
<td>7b</td>
</tr>
</tbody>
</table>
Crash History Index is a Pedestrian Equivalent Property Damage Score (EPDO Score) calculated by converting all crash severity levels to a property damage equivalent. In the calculation, fatal and injury A crashes are equivalent to 100 PDO crashes; injury B and C crashes are equivalent to 10 PDO crashes. The EPDO score is presented in average annual EPDO per mile.
Crash History Index is a Bicycle Equivalent Property Damage Score (EPDO Score) calculated by converting all crash severity levels to a property damage equivalent. In the calculation, fatal and injury A crashes are equivalent to 100 PDO crashes; injury B and C crashes are equivalent to 10 PDO crashes. The EPDO score is presented in average annual EPDO per mile.

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet
Sources: Esri, USGS, NOAA, Oregon Department of Transportation
Average Annual Daily Traffic

- <12,000
- 12,000 - 18,000
- >18,000

- Interstates and Expressways
- Other ODOT Highways
- Highways Under Local Jurisdiction
- Urban Areas
- Region 1

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet
Sources: Esri, USGS, NOAA, Oregon Department of Transportation

Figure 2a
Crossings, Signals, and Lanes

- **Crossings with Active Treatment**
- **ODOT Signals**

**Roadway Lanes**
- <4 Lanes
- >4 Lanes

- Interstates and Expressways
- Other ODOT Highways
- Highways Under Local Jurisdiction
- Urban Areas
- Region 1

Source: Esri, USGS, NOAA, Oregon Department of Transportation

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet

Figure 2c
The pedestrian crash risk index is based on methodology developed in the ODOT Pedestrian and Bicycle Safety Implementation Plan. It includes average daily traffic, vehicle speed limit, whether the roadway is four-lane undivided, presence of a traffic signal, and whether there is an enhanced midblock crossing.
The bicycle crash risk index is based on methodology developed in the ODOT Pedestrian and Bicycle Safety Implementation Plan. It includes average daily traffic, vehicle speed limit, whether the roadway is four-lane undivided, driveway density, and presence of a traffic signal.
ODOT Reg 1 Active Transportation Need Inventory

Figure 3a

Rail Stops
- Max Stops
- Streetcar / Tram Stops
- TriMet WES Commuter Rail

Bus Stops
- High-frequency bus lines (service every 15 minutes or less)
- Regular service bus lines (service every 16 minutes to 1 hour)
- Limited service bus lines (service less than every 1 hour)

Interstates and Expressways
Other ODOT Highways
Highways Under Local Jurisdiction
Urban
Region 1

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet
Source: Esri, USGS, NOAA, Oregon Department of Transportation
Pedestrian Access to Transit is calculated based on a 1/2-mile walking distance. Access to a higher number of transit lines and access to higher frequency lines increases "Access to Transit" score.
Bicycle Access to Transit is calculated based on a 3-Mile biking distance. Access to a higher number of transit lines and access to higher frequency lines increases "Access to Transit" score.
Essential destinations are defined as: hospitals and medical centers, major retail sites, grocery stores, elementary, middle and high schools, pharmacies, parks/open spaces, major social service centers, colleges and universities, employers with greater than 300 employees, sports and attraction sites and city halls.
Pedestrian Access to Essential Destinations

- Low (1 - 24)
- Mid-Low (25 - 62)
- Mid (63 - 109)
- Mid-High (110 - 220)
- High (221 - 380)

- Interstates and Expressways
- Other ODOT Highways
- Highways Under Local Jurisdiction
- Urban Areas
- Region 1

The pedestrian access to essential destinations score represents the number of destinations in “close proximity” to a network gap or deficiency, based on a ½ mile walking distance along the street network of ODOT and local jurisdiction roads. Essential destinations on ODOT facilities are weighted 4 times higher than destinations on local facilities.
The bicycle access to essential destinations score represents the number of destinations in “close proximity” to a network gap or deficiency, based on a 3 mile biking distance along the street network of ODOT and local jurisdiction roads. Essential destinations on ODOT facilities are weighted 4 times higher than destinations on local facilities.
The TDP index is calculated at the census block group level as the sum of people 65 and older, 17 and younger, under 200% of the poverty line, non-white or Hispanic, speak English “not well” or “not at all”, with a disability, or living in households with 0 vehicles. That sum is divided by total block population. People fitting into multiple vulnerability categories are counted multiple times. The higher the index number the more disadvantaged the population is with respect to transportation.
The TDP index is calculated at the census block group level as the sum of people 65 and older, 17 and younger, under 200% of the poverty line, non-white or Hispanic, speak English “not well” or “not at all”, with a disability, or living in households with 0 vehicles. That sum is divided by total block population. People fitting into multiple vulnerability categories are counted multiple times. The higher the index number the more disadvantaged the population is with respect to transportation.
Figure 6a
Pedestrian Facility Gaps

- Interstates and Expressways
- Other ODOT Highways
- Highways Under Local Jurisdiction
- Urban Areas
- Region 1

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet
Sources: Esri, USGS, NOAA, Oregon Department of Transportation

ODOT Reg 1 Active Transportation Need Inventory
May 2015
Bicycle Facility Gaps

Interstates and Expressways
Other ODOT Highways
Highways Under Local Jurisdiction
Urban Areas
Region 1

Figure 6b
The "fills a gap" score is based on the completeness of the facilities on the segment and surrounding highway segments. The higher the score, the more complete the surrounding pedestrian or bicycle facilities and the more isolated/noticeable the existing gap in the network. Filling a sidewalk or bike lane gap on a highway segment with a high "fills a gap" score will increase the potential walk/bikeshed along a highway more than filling a gap on a segment with a low "fills a gap" score.
The "fills a gap" score is based on the completeness of the facilities on the segment and surrounding highway segments. The higher the score, the more complete the surrounding pedestrian or bicycle facilities and the more isolated/noticeable the existing gap in the network. Filling a sidewalk or bike lane gap on a highway segment with a high "fills a gap" score will increase the potential walk/bikeshed along a highway more than filling a gap on a segment with a low "fills a gap" score.
Pedestrian and Bicycle Crossing, Intersection, and Segment Needs From Local Jurisdiction Plans

Figure 7a
Local Bicycle Plan Needs

Figure 7c
Appendix A: Detailed Methodology
**Proposed Evaluation Criteria Methodology**

Based on input from the Technical and Stakeholder Advisory Committees, Project Management Team, along with consideration of ODOT Active Transportation goals and national best practices, the following evaluation criteria are strongly recommended for use in Phase II. With each criterion is a proposed explanation of how the project team will approach the analysis along with any data needs.

1. **Pedestrian- and Bicycle-Involved Crash History**
   
a. **Purpose of measure:**
   Prioritize improvements on highway segments with a history of pedestrian or bicycle involved crashes to improve safety.

b. **Applicable Oregon Pedestrian and Bicycle Plan goals:**
   Safety

c. **Relation to other ODOT programs and processes:**
   Criterion will use the pedestrian and bicycle safety network screening methodology developed for ODOT’s All Roads Transportation Safety (ARTS) program. Weighting factors used are consistent with ODOT’s Safety Priority Index System (SPI).

d. **Data needs:**
   Will use the most current available five years of crash data (2009-2013) from the ODOT Crash Analysis Reporting unit as provided by ODOT Region 1. Crash data will include all pedestrian- and bicycle- involved crashes, as defined by ODOT Region 1, including fatal, injury, property damage only (PDO), and “involved” crashes (e.g. rear end collision involving vehicle stopping for pedestrian, but pedestrian was not hit). Kittelson already has all data and analysis for this criterion, as they are the ODOT consultant conducting the ARTS systemic safety analysis.

e. **Same method/data used for pedestrian and bicycle analysis?**
   The same methodology will be used for the bicycle and pedestrian analysis. Only pedestrian-involved crash data will be used for the pedestrian analysis. Only bicycle-involved crash data will be used for the bicycle analysis.

f. **Proposed methodology:**
   ODOT’s ARTS Program conducted pedestrian and bicycle Equivalent Property Damage Only (EPDO) safety analyses of all state and local roadways based on the frequency and severity of crashes. EPDO is one of 13 performance measures identified in the Highway Safety Manual and is applied independently to roadway intersections and segments. The equation used to develop the EPDO score is shown below:

\[
EPDO \ \text{Index} = W_K K + W_A A + W_B B + W_C C + P
\]

where:

\[
\begin{align*}
W &= \text{Weighting Factor} \\
K &= \# \text{ of fatal crashes} \\
A &= \# \text{ of severe injury crashes (Class A)} \\
B &= \# \text{ of moderate injury crashes (Class B)} \\
C &= \# \text{ of minor injury crashes (Class C)}
\end{align*}
\]
\[ P = \# \text{ of property damage only crashes (PDO)} \]

The weighting factors used are consistent with those used for ODOT’s Safety Priority Index System (SPIIS), with highest weight given to fatal or severe injury crashes and lowest weight given to PDO crashes.

i. Fatal and Injury A crashes are given a weight of 100,
ii. Injury B and C crashes are given a weight of 10,
iii. PDO crashes are given a weight of 1.

The resulting EPDO score is divided by five - the number of years of crash data - to develop an average annual EPDO score for each segment.

For consistency with the other evaluation criteria used for the ATNI, the ATNI analysis will develop an EPDO score for each 0.1 mile roadway segment. This is a deviation from the ARTS Program methodology, which uses a “sliding window” approach to develop a bicycle and pedestrian EPDO score for 0.5 mile roadway segment at 0.25 mile intervals.

g. **Scoring:**

Each pedestrian gap/deficiency will be assigned a score based on the pedestrian annual EPDO score for the 0.1 mile roadway segments that make up the gap or deficiency. Each bicycle gap/deficiency will be assigned a score based on the bicycle annual EPDO score for the 0.1 mile roadway segments that make up the gap or deficiency. Since gaps/deficiencies may be longer or shorter than the 0.1 mile segments used for the analysis, an average EPDO score of the 0.1 mile segments within the gap or deficiency (or covering the gap or deficiency) will be developed to allow a normalized “distance-weighted” comparison of gaps/deficiencies of different lengths.

h. **Example:**

<table>
<thead>
<tr>
<th>Gap/Deficiency Name</th>
<th>Fatal Bike Crashes</th>
<th>Injury A Bike Crashes</th>
<th>Injury B Bike Crashes</th>
<th>Injury C Bike Crashes</th>
<th>PDO Bike Crashes</th>
<th>Annual EPDO Score</th>
<th>Gap Length (miles)</th>
<th>Annual EPDO /mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>30</td>
<td>.75</td>
<td>40</td>
</tr>
<tr>
<td>Gap #2</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>58</td>
<td>.35</td>
<td>166</td>
</tr>
</tbody>
</table>

i. **Limitations**

Pedestrian and bicycle crash data used for this analysis will only include crashes that were reported to the Oregon Department of Motor Vehicles (DMV). Crashes that do not result in injury, death, or over $1,500 in property or vehicle damage are not required to be reported to the Oregon DMV and are not recorded by the ODOT Crash Analysis Reporting unit. As a result, not all pedestrian and bicycle crashes are represented in this data and the quality of crash data is limited by the amount of detail provided by the person completing the crash report form.

Additional bicycle and pedestrian crash data is collected by several local jurisdictions and non-profit organizations in Region 1; however, another consistent source of pedestrian and bicycle crash data that could be used for comparisons across ODOT Region 1 is not currently available. Data collected by Emergency Medical Services and trauma centers may contain information about bicycle and pedestrian crashes that are not documented in the ODOT
crash database; however, obtaining this data and developing a methodology to use it for roadway safety analysis is not possible within the timeline and scope of the current project.

Crash frequency is often normalized by a measure of exposure to develop crash rates. Pedestrian and bicycle count data is not currently available on a regionwide basis; therefore, pedestrian or bicycle exposure could not be accounted for in developing this criterion.
2. Pedestrian and Bicycle Crash Risk
   a. **Purpose of measure:**
      Prioritize improvements on highway segments with characteristics associated with increased pedestrian or bicycle crash risk, regardless of previous crash history, to proactively and systemically improve safety.

   b. **Applicable Oregon Pedestrian and Bicycle Plan goals:**
      Safety

   c. **Relation to other ODOT programs and processes:**
      Criterion will adapt the pedestrian and bicycle risk-based network screening methodologies developed for ODOT’s Pedestrian and Bicycle Safety Implementation Plan (PBSIP). Specifically, crash history, proximity to transit, and presence of bicycle facilities factors will be removed from the methodology to avoid “double counting” benefits/risk that will be measured by other ATNI evaluation criteria. Weightings used for risk factors included in the analysis will be consistent with the weights used for the PBSIP, unless an alternate weighting scheme is requested by the PMT or TAC/SAC.

   d. **Data Needs:**
      Will use the most current available inventory data provided by ODOT TDD Transportation Data Section for:
      
      i. AADT,
      
      ii. number of lanes,
      
      iii. speed limit,
      
      iv. driveway density,
      
      v. locations of traffic signals, and
      
      vi. locations of pedestrian activated flashers/beacons.

      Kittelson already has much of the data and analysis for this criterion, as they were the ODOT consultant for the PBSIP risk-based safety analysis. An updated inventory of crossings of ODOT Region 1 facilities with pedestrian activated flashers/beacons was conducted as part of an earlier task of the ATNI.

   e. **Same method/data used for pedestrian and bicycle analysis?**
      The PBSIP identified separate risk factors for pedestrian and bicycle crashes based on analysis of statewide pedestrian and bicycle crash data and roadway characteristics. Separate pedestrian and bicycle crash risk score will be calculated for each roadway segment using the pedestrian and bicycle specific risk factors identified in the PBSIP.

   f. **Proposed Methodology:**
      A pedestrian and bicycle risk score will be developed for each roadway segment based on the number and type of crash risk factors present. Each pedestrian and bicycle risk factor was assigned a point value in the PBSIP based upon the probability that the risk factor would lead to a crash, the degree to which the risk factor is met or exceeded (e.g., more points are given for higher speed limits and fewer points for lower speed limits), and the Project Management Team’s ranking of the relative importance of each risk factor. AADT thresholds were selected for the PBSIP based on input from ODOT and levels that correspond to other ODOT datasets and research.

      A segment’s score represents the sum of points awarded for all risk factors present. The higher the score, the greater the risk of a pedestrian or bicycle crash. The equation used to
develop the segment pedestrian crash risk scores is shown below:

\[
\text{Ped Crash Risk} = ADT + Lane + Speed + RFB + Sig
\]

where:

- \( ADT = 2 \) if AADT is between 12,000 and 18,000 vehicles
  
- \( ADT = 4 \) if AADT is above 18,000

- \( Lane = 2 \) if segment is an undivided 4-lane segment

- \( Speed = 2 \) if posted speed limit of 35 or 40 mph
  
- \( Speed = 4 \) if posted speed limits above 40

- \( RFB = -1 \) (rewarded) for the presence of an enhanced midblock crossing on a segment

- \( Sig = 1 \) if at least 1 signal is located on the segment or within 100’ of the segment

g. The equation used to develop the segment bicycle crash risk scores is shown below:

\[
\text{Bike Crash Risk} = ADT + Lane + Speed + Dwy + Sig
\]

where:

- \( ADT = 2 \) if AADT is between 12,000 and 18,000 vehicles
  
- \( ADT = 4 \) if AADT is above 18,000

- \( Lane = 2 \) if segment is an undivided 4-lane segment

- \( Speed = 2 \) if posted speed limit of 35 or 40 mph
  
- \( Speed = 4 \) if posted speed limits above 40

- \( Dwy = 2 \) if segment with 1 driveway
  
- \( Dwy = 3 \) if segment with 2-3 driveways
  
- \( Dwy = 4 \) if segment with 4-8 driveways
  
- \( Dwy = 5 \) if segment with more than 8 driveways

- \( Sig = 1 \) if at least 1 signal is located on the segment or within 100’ of the segment

h. **Scoring:**

The roadway network will be divided into 0.10-mile segments to identify locations where crash risk factors are present. Segments will be defined independent of intersection locations and may include one or more intersections. A average pedestrian crash risk and bicycle crash risk score will be calculated for each gap/deficiency based on the average pedestrian and bicycle crash risk score of the segments that make up the gap/deficiency.

i. **Example:**
### Table

<table>
<thead>
<tr>
<th>Gap</th>
<th># of Segments w/AADT &gt; 12,000</th>
<th># of Segments w/AADT &gt; 18,000</th>
<th># of Segments that are Undivided 4-lane</th>
<th># of Segments w/posted speed limit 35-40 mph</th>
<th># of Segments w/posted speed limit &gt; 40 mph</th>
<th># of Segments with Ped-activated beacon or flasher</th>
<th># of Segments with Traffic Signal within 100'</th>
<th>Pedestrian Crash Risk Score</th>
<th>Ped Length (miles)</th>
<th>Average Pedestrian Crash Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>4</td>
<td>21</td>
<td>25</td>
<td>24</td>
<td>1</td>
<td>0</td>
<td>13</td>
<td>207</td>
<td>2.51</td>
<td>8.28</td>
</tr>
<tr>
<td>#2</td>
<td>0</td>
<td>14</td>
<td>7</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>3</td>
<td>129</td>
<td>1.40</td>
<td>9.21</td>
</tr>
</tbody>
</table>

### j. Limitations:

Posted speed limit and AADT information is not available for all ODOT highway segments. For segments with missing speed and/or volume data, an assumed speed and/or volume was assigned based on the speed and volume of adjacent highway segments with the same functional classification.

Other roadway characteristics beyond those included in the proposed methodology may have an influence on pedestrian and bicycle crash risk. The PBSIP evaluated a variety of weather, crash type, driver characteristics, roadway characteristics, traffic control, and temporal factors to identify crash trends. When a trend was observed in the data that could be tied to a roadway characteristic or location, that characteristic was identified as a potential risk factor. Some potential risk factors could not be included in the screening methodology because facility inventory data is not available to screen the regional network and indentify locations where this risk factor is present. For example, many crashes occurring at night may indicate that lack of street lighting could be a risk factor, but no inventory of street lighting is available for all ODOT Region 1 highways.
3. **Access to Transit**
   
a. **Purpose of Measure:** Prioritize improvements on highway segments that make walking and biking to transit more safe and convenient. Improve first/last mile connections between transit stops and surrounding destinations.

b. **Applicable Oregon Pedestrian and Bicycle Plan goals:**
   Safety, Mobility & Efficiency, Accessibility & Connectivity, Equity

c. **Relation to other ODOT programs and processes:**
   ODOT Region 1 has been partnering with TriMet to identify and complete gaps identified in TriMet’s Pedestrian Network Analysis to improve safety and access to transit. ODOT’s Pedestrian and Bicycle Safety Implementation Plan identified the presence of a transit stop within 100’ of a roadway segment as a characteristic associated with a higher potential for pedestrian and bicycle involved crashes. Metro’s Regional Active Transportation Plan identifies transit stops as one of several “essential destinations” for people walking and biking.

   Since transit plays an important role in active transportation safety, mobility, accessibility, and connectivity, the ATNI will evaluate proximity to transit as a stand-alone criteria, rather than as an element of of a larger “essential destinations” or “crash risk” index. This will avoid “double counting” benefits/risks and allow for independent weighting of the criteria during later phases of the needs evaluation, if desired.

d. **Data Needs:**
   Will use the most current available General Transit Feed Specification (GTFS) transit stop inventory data provided by ODOT Rail and Public Transit Division. The GTFS dataset defines a common format for public transportation schedules and associated geographic, fare, and service calendar information. The following transit stop locations are not currently included in the GTFS data, but should be included in the analysis:
   
   o Canby Area Transit
   o South Clackamas Transportation District (Mollalla)
   o Portland Milwaukie Light Rail (opens September 2015)

   GTFS data can be downloaded from ODOT’s website: [www.oregon-gtfs.com](http://www.oregon-gtfs.com). Metro’s RLIS transit data may also be used to supplement the GTFS data. CAT, SCTD, and PMLR stop location data has been acquired and uploaded to the ATNI project website.

e. **Same method/data used for pedestrian and bicycle analysis?**
   Separate pedestrian and bicycle access to transit scores will be calculated for each roadway segment. Different distances will be used for the bicycle and pedestrian network evaluations to determine whether or not a transit stop is within “close proximity” to a gap/deficiency. For the pedestrian network analysis, a distance of ½ mile will be used. For the bicycle network analysis, a distance of 3 miles will be used. These distances reflect the average length of the majority of trips for each mode. ESRI Network Analyst and the ARTS All Roads network plus shared-use paths will be used for this analysis to capture the bike and walk-sheds on all roads (not just ODOT facilities).

f. **Proposed Methodology:**
   A pedestrian and bicycle access to transit score will be developed for each roadway segment based on the number and type of transit lines serving nearby transit stops. The higher the score, the greater the potential access to transit. Since a segment may have multiple transit stops that only serve one transit line, the score will be based on the number of transit lines
with nearby stops, rather than the total number of stops. The equation used to develop the segment pedestrian and bicycle access to transit scores is shown below:

\[ \text{Transit Access} = W_H \times (W_R R_H + W_F F_H + W_B B_H) + W_L \times (W_R R_L + W_F F_L + W_B B_L) \]

where:

\( W = \) Weighting Factor  
\( R = \) # of MAX/WES lines with stops in proximity  
\( F = \) # of high frequency bus/streetcar lines with stops in proximity  
\( B = \) # of non-high frequency bus lines with stops in proximity  
\( H = \) Transit lines with stops on an ODOT facility  
\( L = \) Transit lines with stops on a local facility

“Proximity” will be defined as \( \frac{1}{2} \) mile for the pedestrian network analysis and 3 miles for the bicycle network analysis. Network Analyst will be used to identify the number of transit stops in proximity to each gap/deficiency based on network distance rather than straight line distance. Transit lines accessible via stops on an ODOT facility will be assigned a higher weight than other lines, because alternate routes may be available to access stops on the local network.

vii. On an ODOT facility = 4  
viii. On local facility = 1

Transit stops “on an ODOT facility” will be defined as points within a 100’ buffer of an ODOT highway centerline.

Separate weights will also be assigned to different transit service types to reflect the different attraction levels of higher capacity and/or higher frequency service. The frequency for each line is represented by its typical frequency during the peak period. The weighting factors used are consistent with the service priority ranking typically used by TriMet:

i. MAX and WES lines = 3  
ii. High-frequency bus lines (service every 15 minutes or less) = 3  
iii. Regular service bus lines (service every 16 minutes to 1 hour) = 2  
iv. Limited service bus lines (service less than every 1 hour) = 1

g. Scoring:  
Each pedestrian gap/deficiency will be assigned a score based on the pedestrian transit access score for that roadway segment. Each bicycle gap/deficiency will be assigned a score based on the bicycle transit access score for the segments that make up the gap/deficiency. A normalized “distance-weighted” score will also be developed to allow comparison of gaps/deficiencies of different lengths.
h. Example:

<table>
<thead>
<tr>
<th>Gap/Deficiency Name</th>
<th># of MAX, WES, and High Frequency bus lines with stops within ½ mile</th>
<th># of Regular Frequency bus lines (16 minute to 1 hour headway) with stops within ½ mile</th>
<th># of Limited Service (&gt;1 hour headway) bus lines with stops within ½ mile</th>
<th>Pedestrian Transit Access Score</th>
<th>Length (miles)</th>
<th>Pedestrian Transit Access/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>1 On ODOT Facility, 0 On Local Network</td>
<td>2 On ODOT Facility, 0 On Local Network</td>
<td>0 On ODOT Facility, 2 On Local Network</td>
<td>30</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Gap #2</td>
<td>0 On ODOT Facility, 0 On Local Network</td>
<td>0 On ODOT Facility, 1 On Local Network</td>
<td>1 On ODOT Facility, 4 On Local Network</td>
<td>10</td>
<td>.5</td>
<td>20</td>
</tr>
</tbody>
</table>

i. Limitations:
Several new high capacity transit lines are currently being planned in Region 1 (e.g. SW Corridor, Powell-Division BRT), but stop locations and service characteristics are not yet finalized. Multiple transit service providers are also currently in the process of revising their service plans and stop locations. The ATNI will attempt to use the most accurate information available reflecting stop locations and service characteristics as of Summer/Fall 2015. New transit line stops and service adjustments can be added to the ATNI evaluation as part of future updates.

Ridership will not be used as a measure of transit demand/access for this exercise because it is not available at stop level from all providers in Region 1. In addition, current ridership may not represent potential demand at a location that is currently not accessible or attractive to transit riders due to a gap/deficiency in the pedestrian or bicycle network. For example, transit riders with mobility devices may currently use a stop that is farther away from their destination because it has a sidewalk that enables them to more easily get on/off the bus. If a sidewalk gap were filled at the stop closer to their destination, some of the existing ridership would shift to that stop and new riders may begin to use the stop.
4. Proximity to essential destinations
   
   a. **Purpose of Measure:** Prioritize improvements on highway segments that make walking and biking for daily needs more safe and convenient. Connect people to schools, medical facilities, stores, and other important destinations.

   b. **Applicable Oregon Pedestrian and Bicycle Plan goals:**
      Mobility & Efficiency, Accessibility & Connectivity, Community & Economic Vitality

   c. **Relation to other ODOT programs and processes:**
      Criterion will use the definition of “essential destinations” developed by Metro for the Regional Active Transportation Plan and 2014-15 RFRA Equity Analysis (as documented in the Pedestrian Network Analysis report developed by Alta Planning + Design). Essential destinations are defined as: hospitals and medical centers, major retail sites, grocery stores, elementary, middle and high schools, pharmacies, parks/open spaces, major social service centers, colleges and universities, employers with greater than 300 employees, sports and attraction sites and city halls.

   d. **Data Needs:**
      The ATNI analysis will use existing GIS data layers to develop a regionwide essential destinations dataset that is comparable to the dataset developed for the Portland Metro area used for the RTP and RATP:

      i. **Essential Businesses.** Civic, health, food, essential retail, financial, and legal businesses with more than 1 employee. Essential businesses will be identified using the North American Industrial Classification System (NAICS) codes used by Metro for the RATP Pedestrian Network Analysis shown in the table below. The NAICS codes provide data for a wide range of businesses and services (more info is available here: [http://www.census.gov/cgi-bin/ssa/d/naics/search]. (Data source: Oregon Employment Department).

      Essential Businesses include the following destination types:

      1. **Regional shopping centers.**
      2. **Hospitals.** Major hospitals and medical centers
      3. **Education.** Colleges, universities and public schools
      4. **Social services.** See list below

      ii. **Regional employers.** Employment sites with 300 or more employees (Data source: Oregon Employment Department)

      iii. **State, regional, and local parks.** (Data source: ESRI)

      iv. **City Halls.** (Data source: RLIS, Cities outside metro)

      v. **Passenger Airports.** (Data source: ESRI)

      vi. **Libraries.** (Data source: ESRI)
e. **Same method/data used for pedestrian and bicycle analysis?**

Separate pedestrian and bicycle access to destinations scores will be calculated for each roadway segment. Different distances will be used for the bicycle and pedestrian network evaluations to determine whether or not a destination is within “close proximity” to a gap/deficiency. For the pedestrian network analysis, a distance of ½ mile will be used. For the bicycle network analysis, a distance of 3 miles will be used. These distances reflect the average length of the majority of trips for each mode. ESRI Network Analyst and the ARTS All Roads network plus shared-use paths will be used for this analysis to capture the bike and walk-sheds on all roads (not just ODOT facilities).

f. **Proposed Methodology:**

A pedestrian and bicycle access to destinations score will be developed for each roadway segment based on the number of destinations nearby. The higher the score, the greater the
potential access to destinations. The equation used to develop the segment pedestrian and bicycle access to destinations scores is shown below:

\[
\text{Dest\_Access} = W_H D_H + W_L D_L
\]

where:

- \( W \) = Weighting Factor
- \( H \) = \# of essential destinations on an ODOT facility
- \( L \) = \# of essential destinations on a local facility

“Proximity” will be defined as ½ mile for the pedestrian network analysis and 3 miles for the bicycle network analysis. Network Analyst will be used to identify the number of essential destinations in proximity to each gap/deficiency based on network distance rather than straight line distance.

Destinations on an ODOT facility will be assigned a higher weight than other lines, because alternate routes may be available to access destinations on the local network.

i. On ODOT facility weight = 4
ii. On local facility weight = 1

“Destinations on an ODOT facility” will be defined as points within a 200’ buffer of an ODOT highway centerline.

g. Scoring:
Each pedestrian gap/deficiency will be assigned a score based on the pedestrian destination access score for the segments that make up the gap/deficiency. Each bicycle gap/deficiency will be assigned a score based on the bicycle destination access score for that roadway segment. A normalized “distance-weighted” score will also be developed to allow comparison of gaps/deficiencies of different lengths.

h. Example:

<table>
<thead>
<tr>
<th>Gap/Deficiency Name</th>
<th># of destinations within ½ mile on ODOT facility</th>
<th># of destinations within ½ mile on local facility</th>
<th>Pedestrian Destination Access Score</th>
<th>Length (miles)</th>
<th>Pedestrian Destination Access/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>4</td>
<td>16</td>
<td>32</td>
<td>0.75</td>
<td>42.7</td>
</tr>
<tr>
<td>Gap #2</td>
<td>9</td>
<td>22</td>
<td>58</td>
<td>0.5</td>
<td>116.0</td>
</tr>
</tbody>
</table>

i. Limitations:
The proposed approach does not identify or assign separate weights for different types of destinations.
5. Transportation disadvantaged population index
   
a. **Purpose of Measure:** Prioritize improvements on highway segments that serve areas with high numbers of transportation disadvantaged residents and environmental justice communities. Improve pedestrian and bicycle facilities in areas that have been traditionally underserved.

b. **Applicable Oregon Pedestrian and Bicycle Plan goals:**
   Safety, Equity

c. **Relation to other ODOT programs and processes:**
   Transportation Disadvantaged Populations are populations who have historically had significant unmet transportation needs or who have experienced disproportionate negative impacts from the transportation system. Examples of people who historically have high unmet needs include people who: cannot drive (due to age or ability), are experiencing poverty (cannot afford the costs of a car and/or transit), and people with limited mobility.

Title VI and Environmental Justice (EJ) populations are a special focus in transportation planning and project development, and specific reporting requirements exist related to these federally recognized populations. Title VI and EJ regulations are intended to make participation in transportation planning and project development more inclusive of diverse communities in planning and project areas, as well as to make the analysis conducted for transportation planning and project development more inclusive of the needs of the groups and individuals that live in these communities. The Title VI federal regulations and EJ Executive Order are supported by Statewide Planning Goals in Oregon, particularly Goal 1 (Citizen Involvement).

This criterion adheres to the guidance provided in ODOT’s “Guidelines for Addressing Title VI and Environmental Justice in Transportation Planning” document, reviewed by FHWA and approved by ODOT in February 2015: “Develop and use evaluation criteria addressing impacts and/or benefits to Title VI and EJ populations in determining recommended projects and/or preferred alternative. Evaluation criteria should specifically address Title VI and EJ populations.”

Criterion will be based on the “Demographic Equity Index” developed by Metro for the 2014-15 RFFA Equity Analysis. This index has also been utilized for the Regional Active Transportation Plan, Washington County Pedestrian and Bicycle Prioritization Project, and adapted by the Oregon Public Health Institute into the “Transportation Disadvantaged Index” used for the Clackamas County TSP.

d. **Data Needs:**
   The ATNI analysis will build on the Transportation Disadvantaged Index developed by the Oregon Public Health Institute. The most recent 2010 census or 2013 American Community Survey data available at the block group level will be used for:
   
i. Elderly populations (over 65)
   ii. Youth populations (under 18)
   iii. Non-white and Hispanic populations
   iv. Low-income population (households earning less than 200% of the poverty level as determined by the census)
   v. Limited English proficiency population (aggregate of census populations who speak English “not well” or “not at all”)
   vi. Households with 0 vehicles
vii. Disabled population (severe or nonsevere disability)

e. Same method/data used for pedestrian and bicycle analysis?
The same methodology and data will be used for both the pedestrian and bicycle network analyses.

f. Proposed Methodology:
The index is calculated at the census block group level as the sum of people 65 and older, 17 and younger, under 200% of the poverty line, non-white or Hispanic, speak English “not well” or “not at all”, with a disability, or living in households with 0 vehicles. That sum is divided by total block population. People fitting into multiple vulnerability categories are counted multiple times. The higher the index number the more disadvantaged the population is with respect to transportation.

The equation used to develop the segment transportation disadvantaged score is shown below:

$$\text{TransDisadv} = \frac{(Eld + Yth + NH + LEP + Pov + HH \times Veh + Dis)}{Pop}$$

where:

- Eld = # of residents over 65
- Yth = # of residents under 18
- NH = # of residents who identify as non-white or Hispanic
- LEP = # of residents that speak English “not well” or “not at all”
- Pov = # of residents with income under 200% of poverty level
- HH = Average Oregon household size
- Veh = # of households with 0 vehicles
- Dis = # of residents with a disability
- Pop = Total population

Data at the household level is multiplied by 2.49 to convert it to a person unit. The number 2.49 is the average household size for Oregon.

Consistent with the methodology developed by the Oregon Public Health Institute, the methodology described above does not assign separate weights to any of the factors included in the transportation disadvantaged index. A weighting scheme could be developed and assigned to the factors if requested by the TAC/SAC/PMT.

g. Scoring:
Each segment will be assigned an equity index value based on the tract that it is in. A segment at the boundary of two tracts or touching multiple tracts will be assigned the average of those tracts.
h. Example:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>360</td>
<td>536</td>
<td>158</td>
<td>155</td>
<td>7</td>
<td>9</td>
<td>70</td>
<td>2084</td>
<td>0.63</td>
</tr>
<tr>
<td>Gap #2</td>
<td>160</td>
<td>241</td>
<td>200</td>
<td>71</td>
<td>0</td>
<td>9</td>
<td>12</td>
<td>1003</td>
<td>0.70</td>
</tr>
</tbody>
</table>

i. Limitations:

This criterion draws upon general trends identified through review of national census, safety, and health datasets to make assumptions about populations in Region 1 that may be transportation disadvantaged for one or more reason:

i. Neighborhoods with more low income households and communities of color tend to have been underserved by transportation investments in the past

ii. Low-income households, disabled residents, households without access to a vehicle, seniors, and youth tend to be more dependent upon walking, biking, and transit as a primary mode of transportation

iii. National crash data trends show that elders, youth, and communities of color are overrepresented in pedestrian crash fatalities

(http://www.smartgrowthamerica.org/research/dangerous-by-design/dbd2014/state/oregon/)

Adequate data is not available to determine if each of these trends hold true in Oregon and ODOT Region 1; however, the factors included in this criterion were identified as a priorities by many stakeholder groups during outreach for the ATNI.
6. In Local Jurisdiction Plan(s)
   a. Purpose of Measure:
      Prioritize improvements that are identified as needs in adopted local or regional plans and supported by local jurisdiction partners and residents.
   
b. Applicable Oregon Pedestrian and Bicycle Plan goals:
      Coordination, Cooperation, & Collaboration
   
c. Relation to other ODOT programs and processes:
      The Oregon Transportation Plan establishes the goals, policies, and performance measures that guide ODOT’s work. The OTP and other ODOT modal plans do not identify specific projects or needs on ODOT facilities. ODOT provides funding for local planning efforts through the Transportation Growth Management (TGM) program and partners with local jurisdictions to develop Transportation System Plans and other area/corridor plans that identify financially constrained and unconstrained project needs lists. Many of these plans identify recommended multimodal improvements to ODOT facilities. Recommended projects on ODOT facilities that are included in local adopted plans should (theoretically) reflect community/stakeholder input, be supported by the local jurisdiction, and have conceptual approval from ODOT staff.
   
d. Data Needs:
      The plans reviewed for each jurisdiction and their adoption date are listed in the table below.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>ODOT Ped/Bike Needs in Local Plan(s)?</th>
<th>Plan Name &amp; Adoption Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barlow</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Canby</td>
<td>Y</td>
<td>Canby TSP (2010)</td>
</tr>
<tr>
<td>Cascade Locks</td>
<td>Y (completed)</td>
<td>Cascade Locks TSP (2001)</td>
</tr>
<tr>
<td>Cornelius</td>
<td>Y (some removed/revised per City staff)</td>
<td>Cornelius TSP (2005)</td>
</tr>
<tr>
<td>Damascus</td>
<td>Y</td>
<td>Damascas TSP (pending adoption)</td>
</tr>
<tr>
<td>Durham</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Estacada</td>
<td>Y</td>
<td>Estacada TSP (2007)</td>
</tr>
<tr>
<td>Forest Grove</td>
<td>Y</td>
<td>Forest Grove TSP (2014)</td>
</tr>
<tr>
<td>Gladstone</td>
<td>NA</td>
<td>Gladstone TSP (1995)</td>
</tr>
<tr>
<td>Government Camp</td>
<td>Y</td>
<td>Mt Hood Community Plan Mt Hood Multimodal Transportation Plan (2014)</td>
</tr>
<tr>
<td>Gresham</td>
<td>N</td>
<td>Gresham TSP (2013)</td>
</tr>
<tr>
<td>Happy Valley</td>
<td>N</td>
<td>Happy Valley TSP (2014)</td>
</tr>
<tr>
<td>Jurisdiction</td>
<td>ODOT Ped/Bike Needs in Local Plan(s)?</td>
<td>Plan Name &amp; Adoption Date</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hillsboro</td>
<td>Y (RTP only)</td>
<td>Hillsboro TSP Update (2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Hood River</td>
<td>Y</td>
<td>Hood River TSP (Amended 2003)</td>
</tr>
<tr>
<td>Johnson City</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>King City</td>
<td>Y</td>
<td>King City Comprehensive Plan (Adoption Pending)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>King City Town Center Plan (draft)</td>
</tr>
<tr>
<td>Lake Oswego</td>
<td>Y</td>
<td>Lake Oswego TSP (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Maywood Park</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Milwaukie</td>
<td>Y</td>
<td>Milwaukie TSP (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Molalla</td>
<td>N</td>
<td>Molalla TSP (2001)</td>
</tr>
<tr>
<td>North Plains</td>
<td>N</td>
<td>North Plains TSP (2005)</td>
</tr>
<tr>
<td>Oregon City</td>
<td>Y</td>
<td>Oregon City TSP (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>East Portland in Motion (2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outer Powell Blvd Conceptual Design Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inner Powell Streetscape Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>St Johns/Lombard Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barbur Concept Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sullivan’s Gulch Trail Concept Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Rivergrove</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sandy</td>
<td>Y</td>
<td>Sandy TSP (2011)</td>
</tr>
<tr>
<td>Sherwood</td>
<td>Y</td>
<td>Sherwood TSP (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Tigard</td>
<td>Y</td>
<td>Tigard 2035 TSP (2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Troutdale</td>
<td>N</td>
<td>Troutdale TSP (2014)</td>
</tr>
<tr>
<td>Tualatin</td>
<td>Y</td>
<td>Tualatin TSP (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Villages of Mt Hood</td>
<td>Y</td>
<td>Mt Hood Multimodal Transportation Plan (2014)</td>
</tr>
<tr>
<td>West Linn</td>
<td>Y</td>
<td>West Linn TSP (2008) - currently being updated, but project list not yet available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Highway 43 Concept Plan</td>
</tr>
<tr>
<td>Jurisdiction</td>
<td>ODOT Ped/Bike Needs in Local Plan(s)?</td>
<td>Plan Name &amp; Adoption Date</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Wilsonville</td>
<td>Y</td>
<td>Wilsonville TSP (2012)</td>
</tr>
<tr>
<td>Washington County</td>
<td>Y</td>
<td>Washington County 2035 TSP Update (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TV Highway Corridor Plan (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Washington County Neighborhood Bikeway Plan (Adoption pending)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td>Clackamas County</td>
<td>Y</td>
<td>Clackamas County TSP/Comprehensive Plan (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clackamas County Active Transportation Plan (pending adoption)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE McLoughlin Blvd Active Transportation Road Safety Audit &amp; Health Impact Assessment (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metro RTP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunrise Hwy Project FEIS</td>
</tr>
<tr>
<td>Hood River County</td>
<td>Y</td>
<td>Hood River County Bike Plan (2010)</td>
</tr>
<tr>
<td>Multnomah County</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Metro</td>
<td>Y</td>
<td>Metro RTP</td>
</tr>
</tbody>
</table>

e. **Same method/data used for pedestrian and bicycle analysis?**
   The same methodology will be used for both the pedestrian and bicycle network analyses. A list of pedestrian projects identified in local plans will be used for the pedestrian network analysis. A list of bicycle projects identified in local plans will be used for the bicycle network analysis. Multi-use paths and other projects intended to serve both pedestrians and bicyclists will be included in both analyses.

f. **Proposed Methodology:**
   ODOT staff reviewed the adopted Transportation System Plans and relevant corridor/area plans of the 35 cities and 4 counties within ODOT Region 1, as well as the 2014 Metro Regional Transportation Plan project list. ODOT staff developed a list of all pedestrian and bicycle projects on ODOT facilities that were identified in each plan. The project list was e-mailed to staff from each local jurisdiction with a request for review for:
   i. any missing ped/bike needs (e.g. active transportation needs we overlooked, projects from other adopted plans we haven’t reviewed)
   ii. inaccurate information
   iii. projects that should be removed from the list (e.g. have been completed, are no longer a need)

   Based on feedback received from local agency partners the plan project list was revised.

   Each project in the revised list was assigned an LRS and beginning/end milepoints so they could be mapped in GIS. This layer will be shown in the ATNI pedestrian and bicycle facility atlases as “Tier III – Plan Deficiencies”.

g. **Scoring:**
Each highway segment will be assigned an extra “point” if it is a location with a pedestrian or bicycle need identified in an adopted local plan.

h. **Example:**

<table>
<thead>
<tr>
<th>Gap/Deficiency Name</th>
<th>Need in local plan? (yes = 1, no=0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>1</td>
</tr>
<tr>
<td>Gap #2</td>
<td>0</td>
</tr>
</tbody>
</table>

i. **Limitations:**
Several local jurisdictions are currently in the process of updating their TSP. If a draft TSP project list was available, the draft project list was used to identify local plan needs rather than the project list from the previously adopted TSP. ODOT pedestrian and bicycle needs may be added or removed from these draft lists before final plan adoption. Resulting changes to the network evaluation and “scoring” may need to be made during a later phase of the ATNI.

Local jurisdictions across Region 1 do not consistently identify needs in their TSP as “high – medium – low priority” or “short – medium – long term”. As a result, it is not possible to assign a higher score to “high priority” or “short term” needs and lower score for “low priority” or “long term” needs.

Local jurisdictions across Region 1 do not consistently include ODOT facilities in analysis and/or project lists included in their local TSP. Some jurisdictions include only ramp termini and highways that function as urban arterials, some exclude all ODOT facilities and interchange areas. As a result, the ODOT needs list developed based on review of local adopted plans may not include all locally desired improvements on ODOT facilities.

Metro’s Regional Active Transportation Plan identifies a regional bicycle and pedestrian active transportation network concept for the Portland Metro area. The RATP does not evaluate facilities in portions of Region 1 outside the Portland Metro. The plan includes implementation and project prioritization strategy recommendations, but does not recommend a financially constrained project list or prioritized needs list. The ATNI project generally follows the project prioritization recommendations included in the RATP and will use the network designations in the plan as an important reference. For the purpose of the ATNI evaluation, however, only highway segments that are identified as needs in Metro’s constrained Regional Transportation Plan, local jurisdiction TSPs, and other adopted plans will be given points for the “Priority in Local Plans” criterion.
7. Fills gap in the network
   
a. **Purpose of Measure**: Prioritize sidewalk and bike facility infill that fills a gap or connects to the surrounding active transportation network, in order provide increased access to destinations, address barriers, and support increased levels of walking and biking.

b. **Applicable Oregon Pedestrian and Bicycle Plan goals**: Mobility & Efficiency; Accessibility & Connectivity; Coordination, Cooperation, & Collaboration

c. **Relation to other ODOT programs and processes**: ODOT’s sidewalk and bicycle facility inventories identify locations with existing facilities and locations with sidewalk or bicycle facility “needs” – gaps in the network where ODOT standards would recommend a sidewalk or bicycle facility, but none is present. During project scoping and development, bicycle and pedestrian improvements are qualitatively assessed to determine potential opportunities to fill gaps and make connections to the surrounding network. ODOT does not currently have a methodology for screening the regional network to identify the amount of “capacity” filling a gap in the active transportation network or the relative cost/benefit of filling gaps of different lengths.

d. **Data Needs**: This criterion will rely on the updated ODOT bicycle and pedestrian facility inventory developed in phase 1 of the ATNI project.

e. **Same method/data used for pedestrian and bicycle analysis?** Separate pedestrian and bicycle connectivity scores will be calculated for each roadway segment using a similar methodology. To reflect the different average length of walking and biking trips, a ½ mile analysis area will be used for the pedestrian network and a 3 mile analysis will be conducted for the bicycle network.

f. **Proposed Methodology**: A pedestrian and bicycle connectivity score will be developed for each roadway segment based on the completeness of the facilities on the segment and surrounding highway segments. The higher the score, the more complete the surrounding pedestrian or bicycle network and the more isolated/noticeable the existing gap in the network. Filling a sidewalk or bike lane gap on a highway segment with a high connectivity score will increase the potential walk/bikeshed along a highway more than filling a gap on a segment with a low connectivity score. The basic equation used to develop the segment pedestrian and bicycle connectivity scores is shown below:

\[
Connectivity = C_N + W_1 C_{N+1} + W_1 C_{N-1} + W_2 C_{N+2} + W_2 C_{N-2}
\]

where:

- \( W = \) Weighting Factor
- \( C = \% \) facilities complete on highway segment
- \( N = \) the 0.1 mile highway segment being evaluated
A half mile analysis will be conducted for the pedestrian network - the two tenth mile highway segments upstream and downstream from the segment being evaluated will be included in the calculation. A 3 mile analysis will be conducted for the bicycle network – 1.5 mile (15 tenth mile highway segments) upstream and downstream from the segment will be included in the calculation.

Highway segments directly adjacent to the segment being evaluated will be assigned a higher weight than highway segments on the edge of the analysis area.

- Adjacent highway segments = 2
- Non-adjacent highway segments = 1

“Adjacent” segments will be defined as segments within 0.1 mile for the pedestrian analysis, and within 0.5 miles for the bicycle analysis. “Non-adjacent” segments will be defined as segments 0.1-0.2 miles away for the pedestrian analysis, and 0.5-1.0 mile away for the bicycle analysis.

g. Scoring:
Each pedestrian gap/deficiency will be assigned a score based on the pedestrian connectivity score for that roadway segment. Each bicycle gap/deficiency will be assigned a score based on the bicycle connectivity score for that roadway segment. A normalized “distance-weighted” score will also be developed to allow comparison of gaps/deficiencies of different lengths.

h. Example:

<table>
<thead>
<tr>
<th>Milepost: 0</th>
<th>Sidewalk Complete</th>
<th>Gap #1</th>
<th>Complete</th>
<th>Gap #2</th>
<th>Complete</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gap/Deficiency Name</th>
<th>% complete within segment</th>
<th>% complete adjacent segments (0 - 0.1 mile)</th>
<th>% complete non-adjacent segments (0.1 - 0.2 miles)</th>
<th>Pedestrian Connectivity Score</th>
<th>Gap Length (miles)</th>
<th>Distance Weighted Pedestrian Connectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap #1</td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td>6</td>
<td>0.1</td>
<td>60.0</td>
</tr>
<tr>
<td>Gap #2</td>
<td>0%</td>
<td>100%</td>
<td>50%</td>
<td>7</td>
<td>0.2</td>
<td>35.0</td>
</tr>
</tbody>
</table>

i. Limitations:
The project TAC/SAC expressed interest in expanding the criterion to prioritize gaps in the network where no alternative route is available. The project team explored using ODOT’s Bicycle Level of Traffic Stress (LTS) methodology ([http://www.oregon.gov/ODOT/TD/TP/APM/APMV2_Ch14_Multimodal_Excerpt.pdf](http://www.oregon.gov/ODOT/TD/TP/APM/APMV2_Ch14_Multimodal_Excerpt.pdf)) to identify locations where completing a network gap would result in a lower LTS for the larger corridor and/or where a parallel/alternate route exists with a lower LTS. The project team determined that LTS should be considered for future rounds of evaluation, but is not currently an appropriate network screening measure for the ATNI due to several factors:

- An equivalent LTS methodology is not currently available for evaluating the pedestrian network.
- The amount of additional data and processing time required to calculate LTS for all ODOT facilities and potential alternate/parallel routes is beyond the scope, schedule, and budget of the current project effort.
iii. The majority of ODOT facilities have a fairly high level LTS due to the high number of lanes and speeds common on state highways. LTS may not be sensitive enough to show the impacts of filling gaps in the active transportation network and serve as a differentiating factor when evaluating potential investments along ODOT facilities. Availability of alternate routes may be applied as a qualitative screening measure during future rounds of analysis.