Transportation Performance Measurement
Metrics and Case Studies

M-NCPPC

Fehr Peers
Serving DC and the Mid-Atlantic
Study Process

**Policy Goals**
- **TABLE 1** Goals Inventory
- **TABLE 2** Goals Summary

**Existing Metrics**
- **TABLE 3A** Existing Metrics
- **TABLE 3B** Existing Metrics Assessment

**Recommended Metrics**
- **TABLE 4** Metric Ideas
- **TABLE 5** Recommended Metrics

**Tools**
- Tools Evaluation

**Steps**
- **IDENTIFY GAPS**
- **ADDRESS GAPS**
- **EVALUATE TOOLS**
Overarching Transportation Policy Statement

“To enhance mobility while providing a safe and efficient transportation system offering a wide range of alternatives. To serve the needs of the County, which are environmental, economic, social, and land use. To provide a framework for development.”

General Plan Refinement of the Goals & Objectives for Montgomery County
NETWORK
“provides choices in mode and routes of travel”

USAGE
“Encourage non-auto travel”

LAND USE
Mix of uses and densities consistent with “Wedges and Corridors”

FUNCTION/QUALITY
Reduce delays without “eroding quality of life”

SAFETY
“Maximize safety”
Summary of Montgomery County Transportation Goals

Transportation System Aspects:
- Land Use
- Network
- Function / Quality
- Usage
- Safety
## Modal Goals

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Network</th>
<th>Function/Quality</th>
<th>Usage</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrate Development</td>
<td>Expand Street Network</td>
<td>Improve Efficiency/Capacity</td>
<td>Increase Carpool</td>
<td>Improve Safety</td>
</tr>
<tr>
<td>Encourage Transit-Oriented Development Opportunities</td>
<td>Viable Alternative to Driving Alone</td>
<td>Maximize Person Throughput</td>
<td>Increase Transit Use</td>
<td>Increase Non-Auto Mode Share</td>
</tr>
<tr>
<td></td>
<td>Implement Bus Rapid Transit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide Mixed Uses</td>
<td>Safe, Direct, and Convenient</td>
<td>Comfortable Facilities</td>
<td>Increase Non-Auto Mode Share</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improve Connectivity</td>
<td>Comfortable Facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variety of Skill Levels</td>
<td>Improve Access for People with Disabilities</td>
<td>Increase Non-Auto Mode Share</td>
<td></td>
</tr>
</tbody>
</table>
# Existing Metrics Assessment

**Applicability to Goals:** *Good Fair Poor*

<table>
<thead>
<tr>
<th><strong>Land Use</strong></th>
<th><strong>Network</strong></th>
<th><strong>Function/Quality</strong></th>
<th><strong>Usage</strong></th>
<th><strong>Safety</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Varied Auto Performance Standards by Area</td>
<td>None</td>
<td>Congested Speeds, Travel Time Index, Highway Capacity Manual Level of Service, Critical Lane Volume</td>
<td>Counts, Non-Auto Driver Mode Share, Vehicle Miles Traveled</td>
<td>None</td>
</tr>
<tr>
<td>None</td>
<td>Coverage</td>
<td>Peak Headway, All-Day Headways, Span of Service</td>
<td>Ridership, Non-Auto Driver Mode Share</td>
<td>None</td>
</tr>
<tr>
<td>None</td>
<td>Facility Inventory</td>
<td></td>
<td>Counts, Non-Auto Driver Mode Share</td>
<td>None</td>
</tr>
<tr>
<td>Land Use</td>
<td>Network</td>
<td>Function/Quality</td>
<td>Usage</td>
<td>Safety</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-----------------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Accessibility by Travel Time by Mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jobs accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person trips accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Access to transit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Traveler Experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Hours Traveled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* per capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* per person trip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span of Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicyclist Comfort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intersection Performance: Person Delay</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person Trips</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Raw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Per Capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Person Hour Traveled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Vehicle Mile Traveled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mode Share</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collisions per Person Trip</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Location efficiency and development quality*
Summary of Recommended Metrics

01 ACCESSIBILITY
- Jobs Accessible within 45 minutes by Mode
- Person Trips Accessible within 45 minutes by Mode
- Jobs Accessible by Travel Time by Mode
- Person Trips Accessible by Travel Time by Mode
- Person Trip Duration by Mode
- Access to Transit by Mode

02 TRAVELER EXPERIENCE
- Frequency of Service
- Span of Service
- Reliability
- Bicyclist Comfort
- Pedestrian Comfort

03 INTERSECTION PERFORMANCE
- Person Delay

04 ACTIVITY
- Raw Person Trips by Mode
- Person Trips Per Capita by Mode
- Vehicle Miles of Travel per Person Trip
- Vehicle Hours of Travel per Person Trip
- Person Trips per Collision
Case Study Objectives

Test the metrics in a specific sector plan setting to ensure applicability and identify gaps in data and tools

Provide a “recipe” in a form that’s digestible for the Board and Staff:

- What is the metric?
- Why are we interested?
- What data and tools are needed?
- How is it calculated?
- What is the output?
Base and Project Scenarios

2040 BASE

2040 Land Use

Existing Transportation Infrastructure

2040 PROJECT

2040 Land Use
(EXCEPT in Downtown Bethesda)

Existing Transportation Infrastructure
Study Area Population

2040 BASE

2040 PROJECT

CHANGE

+9,000

+11,700
Study Area Service Population

2040 BASE

2040 PROJECT

CHANGE

+11,500
D.C. tops list of nation’s worst traffic gridlock

The Washington Post

Washington rated the worst for traffic congestion — again

Texas A&M Transportation Institute

Travel Time Index (TTI):

Ratio of congested auto travel time to free-flow auto travel time
Congestion vs. Accessibility

**Travel Time Index: 1.35**

**Atlanta Travel Time**
57.4 minutes

- **Extra rush hour delay**: 14.8 mins
- **Travel time without traffic**: 42.5 mins

**Travel Time Index: 1.43**

**Chicago Travel Time**
35.6 minutes

- **Travel time without traffic**: 24.9 minutes
- **Extra rush hour delay**: 10.7 minutes

Source: Texas Transportation Institute via Smart Growth America
Congestion vs. Accessibility

**Denver 1982**
- Travel Time Index: 1.09
- Average travel time: 50.6 minutes
- Travel time without traffic: 46.4 mins
- Extra rush hour delay: 4.2 mins

**Denver 2007**
- Travel Time Index: 1.31
- Average travel time: 49.6 minutes
- Travel time without traffic: 37.9 minutes
- Extra rush hour delay: 11.7 minutes

Source: Texas Transportation Institute via Smart Growth America
1a/b. Jobs and Person Trip Accessibility by Mode

Evolved from: Congested Speeds, Travel Time Index, Highway Capacity Manual Level of Service, Critical Lane Volume, Transit Coverage, Pedestrian and Bike Facility Inventory

Emphasizes tripmaking possibilities over speed of travel

**Jobs Accessibility:** Number of jobs that can be reached within a fixed amount of time from each zone

**Person Trip Accessibility:** Total desired destinations (per travel demand model) that can be reached within a fixed amount of time

**Calculation approaches:**
- TRAVEL/4 Model (all modes)
- GIS-based analysis (transit, walk, and bike; for jobs)
1a/b. Jobs Accessible within 45 minutes

2040 Base
# Jobs Accessible within 45 minutes to an Average Resident of:

<table>
<thead>
<tr>
<th>Mode</th>
<th>2040 Base</th>
<th>Change</th>
<th>2040 Project</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Car</strong></td>
<td></td>
<td><strong>Bus</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Downtown Bethesda</strong></td>
<td>2,807,500</td>
<td>-12,100</td>
<td>2,795,500</td>
<td>-0.43%</td>
</tr>
<tr>
<td></td>
<td>657,700</td>
<td>+40,900</td>
<td>698,600</td>
<td>+6.22%</td>
</tr>
<tr>
<td><strong>Study Area</strong></td>
<td>2,787,400</td>
<td>-9,100</td>
<td>2,778,400</td>
<td>-0.33%</td>
</tr>
<tr>
<td></td>
<td>517,700</td>
<td>+50,600</td>
<td>568,300</td>
<td>+9.77%</td>
</tr>
<tr>
<td><strong>Montgomery County</strong></td>
<td>1,587,500</td>
<td>+9,200</td>
<td>1,596,700</td>
<td>+0.58%</td>
</tr>
<tr>
<td></td>
<td>157,800</td>
<td>+6,200</td>
<td>163,900</td>
<td>+3.93%</td>
</tr>
</tbody>
</table>

Includes all jobs, based on AM peak period (6-9am) accessibility.
## Person Trips Accomplishable within 45 minutes for an Average Resident of:

<table>
<thead>
<tr>
<th>Mode</th>
<th>2040 Base</th>
<th>Change</th>
<th>2040 Project</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Downtown Bethesda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>2,253,500</td>
<td>-6,100</td>
<td>2,247,400</td>
<td>-0.27%</td>
</tr>
<tr>
<td>Bus</td>
<td>460,000</td>
<td>+28,700</td>
<td>488,700</td>
<td>+6.24%</td>
</tr>
<tr>
<td><strong>Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>2,234,900</td>
<td>-2,700</td>
<td>2,232,200</td>
<td>-0.12%</td>
</tr>
<tr>
<td>Bus</td>
<td>359,700</td>
<td>+36,100</td>
<td>395,800</td>
<td>+10.04%</td>
</tr>
<tr>
<td><strong>Montgomery County</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>1,304,400</td>
<td>+10,400</td>
<td>1,314,900</td>
<td>+0.80%</td>
</tr>
<tr>
<td>Bus</td>
<td>116,800</td>
<td>+5,000</td>
<td>121,800</td>
<td>+4.28%</td>
</tr>
</tbody>
</table>

Includes all trip ends based on AM peak period (6-9am) accessibility.
Jobs (or Person Trips) Accessible by Transit

GIS / GTFS Approach | Existing Conditions

Places you can get to by transit:
- Within 30 min
- Within 45 min
- Within 60 min
- Within 75 min
1c/d. Jobs (or Person Trips) Accessible by Travel Time by Mode – TAZ 663

2040 Downtown Specific Plan

[Map of the study area with TAZ 663 highlighted]

- **Study Area**
- **Bethesda Downtown Plan**
- **Traffic Analysis Zones (TAZ)**

[Graph showing travel times for different modes of transportation]

- **Car**
- **Train**

Travel Times (Minutes):
- 0
- 10
- 20
- 30
- 40
- 50

- 45 mins
1e. Trip Duration

Evolved from: Congested Speeds, Travel Time Index, Highway Capacity Manual Level of Service, Critical Lane Volume

Accounts for both how fast and how far people travel
Reflects total amount of time people need to travel to accomplish their trip purposes
Calculation approaches:
  - Travel Demand Model
  - Household Travel Survey (tracking only)
1e. Average Trip Duration (minutes) for an Average Resident of:

<table>
<thead>
<tr>
<th>Mode</th>
<th>2040 Base</th>
<th>Change</th>
<th>2040 Project</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Downtown Bethesda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>41.5</td>
<td>-3.1</td>
<td>38.4</td>
<td>-7.4%</td>
</tr>
<tr>
<td>Bus</td>
<td>51.4</td>
<td>-2.3</td>
<td>49.0</td>
<td>-4.6%</td>
</tr>
<tr>
<td><strong>Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>35.2</td>
<td>-0.7</td>
<td>34.4</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Bus</td>
<td>53.6</td>
<td>-1.9</td>
<td>51.7</td>
<td>-3.5%</td>
</tr>
<tr>
<td><strong>Montgomery County</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>22.3</td>
<td>+0.1</td>
<td>22.4</td>
<td>+0.2%</td>
</tr>
<tr>
<td>Bus</td>
<td>69.4</td>
<td>-0.3</td>
<td>69.1</td>
<td>-0.4%</td>
</tr>
</tbody>
</table>

Includes all trips in the AM peak period (6-9am) departing from TAZs in the indicated geography.
1f. Access to Transit

Evolved from: Transit Coverage

Minutes to access transit stations by mode
Walk, Bike, Auto
Can be differentiated by levels of transit service
Rail vs Bus
Frequency of Service
Informs statements like “70% of residents live within a 10-minute walk of Metrorail”
GIS-based analysis
1f. Access to Transit under Sector Plan
02 TRAVELER EXPERIENCE
Transit – Peak Headways and Span of Service – Current Practice

Route-by-Route Average Adequacy: Bethesda/Chevy Chase (BCC) in 2012

TPAR Report (2012)

Simple average of route-level frequency and span of service

Insensitive to land use context differences within policy area

Penalizes adding low-frequency service
Current Practice is Insensitive to Land Use Context (1)

Avg. Headway

\[ \frac{20 + 10}{2} = 15 \text{ mins} \]
Current Practice is Insensitive to Land Use Context (2)

Avg. Headway

\[
\frac{20 + 10}{2} = 15 \text{ mins}
\]

But the vast majority of residents and workers can access **10-minute headways**
Current Practice Penalizes Adding Low-Frequency Service (1)

Avg. Headway

\[ \frac{20 + 10}{2} = 15 \text{ mins} \]
Current Practice Penalizes Adding Low-Frequency Service (2)

Avg. Headway
= (20 + 10 + 30) / 3
= 20 mins

(5 mins worse than 15 mins with just two lines!)
2a. Transit – Frequency of Service

Evolved from: Peak Headways

Average of service frequency, weighted by service population

Within ½ mile of rail transit; ¼ mile of bus stop (as in TPAR)

Service population = residents + workers
2a. Transit – Frequency of Service (1)

Express Headways as Frequencies

20 min headway = 3 buses/hr

10 min headway = 6 buses/hr

30 min headway = 2 buses/hr
2a. Transit – Frequency of Service (2)

Sum All Frequencies Serving an Area

3 buses/hr

6 buses/hr

8 buses/hr

2 buses/hr
2a. Transit – Frequency of Service (3)

Consider Population and Employment

- 3 buses/hr for 100 Residents
- 8 buses/hr for 800 Residents and 200 Workers
2a. Transit – Frequency of Service (4)

Service Population = Residents + Workers

3 buses/hr

8 buses/hr

100 Service Population

1,000 Service Population
2a. Transit – Frequency of Service (5)

Weighted Avg. Frequency

\[ (3 \times 100) + (8 \times 1,000)/1,100 \]

= 7.5 buses/hr

vs.

Existing Approach

20 min headway

or 3 buses/hr

3 buses/hr

1,000 Service Population

100 Service Population

8 buses/hr

TRAVELER EXPERIENCE
2a. Transit Frequency – PM Peak

Existing Transportation Infrastructure
2b. Transit – Span of Service

Evolved from: Span of Service

Similar weighting to Frequency of Service

Average of service spans by population and workers served
2c. Transit – Reliability

Evolved from: Transit Adequacy

Measure of variability of travel time relative to average speed

Expressed at the segment level

Weight segments by passenger load to calculate a line-level or area-wide average
2d. Bicyclist Comfort

Evolved from: Bike Facility Inventory

Rather than listing bicycle facilities in a study area, evaluate them based on how stressful they are to navigate by bike.

**LEVEL OF TRAFFIC STRESS**

Based on built environment factors:

- Number of travel lanes
- Speed of traffic
- Number of vehicles
- Presence of bike lanes
- Width of bike lanes
- Presence of physical barrier

Ease of intersection crossings is also considered.
2d. Bicyclist Comfort

Different bicyclist groups will feel safe while bicycling:

**LTS 4**
only those characterized as “strong and fearless”, which comprises just 0.5 percent of the population.

**LTS 3**
cyclists who are considered “enthused and confident” but still prefer having their own dedicated space for riding

**LTS 2**
mainstream adult population

**LTS 1**
most children
2d. Bicyclist Comfort

Low-Stress Access to Transit Example

[Maps showing different levels of traffic stress]
2d. Bicyclist Comfort

Evolved from: Bicycle Facility Inventory

Expands access-to-transit concept to include access to jobs and access to total person trips

Calculates accessibility clusters

Allows targeted bicycle facility improvements to connect the most potential trips

Image: Mekuria Furth & Nixon
2e. Pedestrian Comfort

Evolved from: Pedestrian Facility Inventory

Establishes levels based on built environment factors from:
Pedestrian Environmental Quality Index (PEQI) and Pedestrian Level of Service (PLOS) method from 2010 Highway Capacity Manual

Sought simpler measure without onerous data needs
Sought overlap with data collection for bicycle Level of Traffic Stress measure
Can be applied to develop accessibility networks like bicycle Level of Traffic Stress (LTS)
2e. Pedestrian Comfort

Evolved from: Pedestrian Facility Inventory

**Segments** defined by changes in corridor characteristics, e.g. Speed, # of lanes

**Unsignalized crossings** are assessed and included as a component of segment characteristics

**Signalized intersections** scored separately
3a. Person Delay

Evolved from: Highway Capacity Manual Level of Service, Critical Lane Volume

Highway Capacity Manual Level of Service (LOS) and Critical Lane Volume (CLV) measure delay for automobiles.

Person Delay adds similar measures for transit passengers, people walking, and people riding bikes.

Modest additional effort

Allows:
- Comparisons of delay across modes
- Aggregations of delay for all modes

Policies can be set specific to each mode and/or in aggregate.
3a. Person Delay
Wisconsin Ave at Cheltenham Rd
PM Peak Hour; Existing Conditions

Average
100%
13.0s

seconds of delay/trip
% of person trips

26.9s
5.3%

11.9s
1.3%

16.4s
7.4%

11.9s
86%
Person Trips by Mode

Evolved from: Counts

4a. Raw
4b. Per Capita
4c. Per Vehicle Mile of Travel
4d. Per Vehicle Hour of Travel
4e. Per Collision
4a. Daily Raw Person Trips by Mode

2040 Base; Downtown Bethesda

<table>
<thead>
<tr>
<th>Mode</th>
<th>Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>108,600</td>
</tr>
<tr>
<td>Train</td>
<td>25,000</td>
</tr>
<tr>
<td>Bike/Ped</td>
<td>28,300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>161,800</td>
</tr>
</tbody>
</table>
4a. Change in Daily Raw Person Trips by Mode

Downtown Bethesda Plan vs. 2040 Base

- Car: +17,700 (+16%)
- Train: +2,900 (+12%)
- Bike: +8,400 (+30%)

Total: +29,000 (+18%)

Map showing changes in raw person trips by mode with color-coding for study area, Bethesda downtown plan, and traffic analysis zones (TAZ).

Legend:
- Study Area
- Bethesda Downtown Plan
- Traffic Analysis Zones (TAZ)

Change in Total Person Trips:
- Min: -10,700 Trips
- Zero
- Max: +31,600 Trips
4a. Mode Share

Downtown Bethesda (% of Person Trips by Mode)

- **2040 Base**
  - Car: 17.5%
  - Bicycle: 15.4%
  - Public Transport: 67.1%

- **Bethesda Downtown Plan**
  - Car: 19.2%
  - Bicycle: 14.6%
  - Public Transport: 66.2%

**Comparison**

- Car: -0.9%
- Bicycle: +1.8%
- Public Transport: -0.8%
4a. Sector Plan Mode Share (% of Person Trips by Mode)
4b. Daily Person Trips Per Capita by Mode

Number of trips completed per person served

Includes residents and workers
VMT per Capita

Reflects average amount of vehicle travel per person served

Includes residents and workers
VMT per Capita

Includes:

100% of mileage from trips completely within the zone

50% of mileage from trips that begin OR end in the zone

0% of mileage from trips that only pass through the zone
### VMT per Capita

<table>
<thead>
<tr>
<th>Location</th>
<th>2040 Base</th>
<th>Change</th>
<th>2040 Project</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown Bethesda</td>
<td>10.3</td>
<td>-0.8</td>
<td>9.5</td>
<td>-8.2%</td>
</tr>
<tr>
<td>Study Area</td>
<td>10.2</td>
<td>-0.5</td>
<td>9.7</td>
<td>-5.5%</td>
</tr>
<tr>
<td>Montgomery County</td>
<td>11.0</td>
<td>-0.1</td>
<td>10.9</td>
<td>-0.7%</td>
</tr>
</tbody>
</table>

**Legend:**
- Blue: Bethesda Downtown Plan
- Purple: Study Area
- Green: Traffic Analysis Zones (TAZ)
- Green and Grey: Project VMT per Service Population
  - Low: 1.1
  - High: 31.1
4c. VMT per Person Trip

Reflects average amount of vehicle travel needed to accomplish each trip
4c. VMT per Person Trip

5 VMT = 5 VMT
5 Person Trips > 1 Person Trip
1 VMT per Person Trip < 5 VMT per Person Trip
4c. VMT per Person Trip

5 VMT = 5 VMT
10 Person Trips > 1 Person Trip
0.5 VMT per Person Trip < 5 VMT per Person Trip
4c. VMT per Person Trip (All Modes) – Downtown Bethesda

2040 BASE

Base VMT per Person Trip
Min: 3.20
Max: 6.80

2040 PROJECT

Project VMT per Person Trip
Min: 1.71
Max: 3.99

CHANGE

% Change in VMT per Person Trip
Min: 9%
Max: 24%

-10.1%
4d. Vehicle Hours of Travel per Person Trip

Downtown Bethesda (All Modes)

Reflects average amount of time spent in an automobile to accomplish each trip

Base: 9.9 mins
Project: 8.9 mins
% Change: -9.5%
4e. Collisions per Person Trip

(All Modes)

Normalizes number of collisions by number of person trips accomplished

Removes bias in collision counts toward high-activity areas
Summary: Transportation Performance Metrics

01 ACCESSIBILITY
- Jobs Accessible within 45 minutes by Mode
- Person Trips Accessible within 45 minutes by Mode
- Jobs Accessible by Travel Time by Mode
- Person Trips Accessible by Travel Time by Mode
- Person Trip Duration by Mode
- Access to Transit by Mode

02 TRAVELER EXPERIENCE
- Frequency of Service
- Span of Service
- Reliability
- Bicyclist Comfort
- Pedestrian Comfort

03 INTERSECTION PERFORMANCE
- Raw Person Trips by Mode
- Person Trips Per Capita by Mode
- Vehicle Miles of Travel per Person Trip
- Vehicle Hours of Travel per Person Trip
- Person Trips per Collision

04 ACTIVITY
- Person Delay
Next Steps

Tools Evaluation and Metrics and Tools Strategic Plan

Policy Goals

Existing Metrics

Recommended Metrics

Tools

TABLE 1 Goals Inventory

TABLE 3A Existing Metrics

TABLE 4 Metric Ideas

TABLE 2 Goals Summary

TABLE 3B Existing Metrics Assessment

TABLE 5 Recommended Metrics

IDENTIFY GAPS

ADDRESS GAPS

EVALUATE TOOLS