

# How is Equity Calculated when Adding or Reducing Transit Service?

The proposed updates to the Service Guidelines would use equity as a factor when adding or reducing transit service. An equity score would be calculated for each bus stop and each route using the metrics described on the left. (A hypothetical example, for Imaginary Route #IR, is on the right.) The processes to prioritize additions or reductions of service are described at the bottom of the page.

## Equity Metrics

**EQUITY PRIORITY AREA SCORE (EPAS)**

**Scale:** 1-5 points **Based on:** Census block group surrounding each bus stop

**Used for:** The EPAS forms the basis for the other two equity scores (the EPS and OIS). The EPAS is also used to prioritize areas for flexible services.

**Calculated by:** Each bus stop is assigned a score of 1-5 based on weighting the demographic data of the census block group it is in:

Population that is non-white or Hispanic	40%
Population living 200% below the federal poverty level	30%
Population that is foreign-born	10%
Limited-English speaking households	10%
Population living with a disability	10%

A higher EPAS means a higher equity need.

**EQUITY PRIORITIZATION SCORE (EPS)**

**Scale:** 0-10 points **Based on:** Each bus route

**Used for:** The EPS is used as a factor in identifying the service level target for each route, as well as its priority level for investment when adding service as part of the Service Guideline's Priority #3 (Service Growth). The three factors used to prioritize service additions (equity, land use, and geographic value) are described below.

**Calculated by:** The EPS starts with the average EPAS for all stops on a bus route. This average is then ranked against all the averages from all other routes, and points of 0-10 are assigned to each route. The higher the EPS (average or points), the higher the equity need for that route.

See the next page for a list of route EPS averages from summer 2021.

**OPPORTUNITY INDEX SCORE (OIS)**

**Scale:** 1-5 points **Based on:** Each bus route

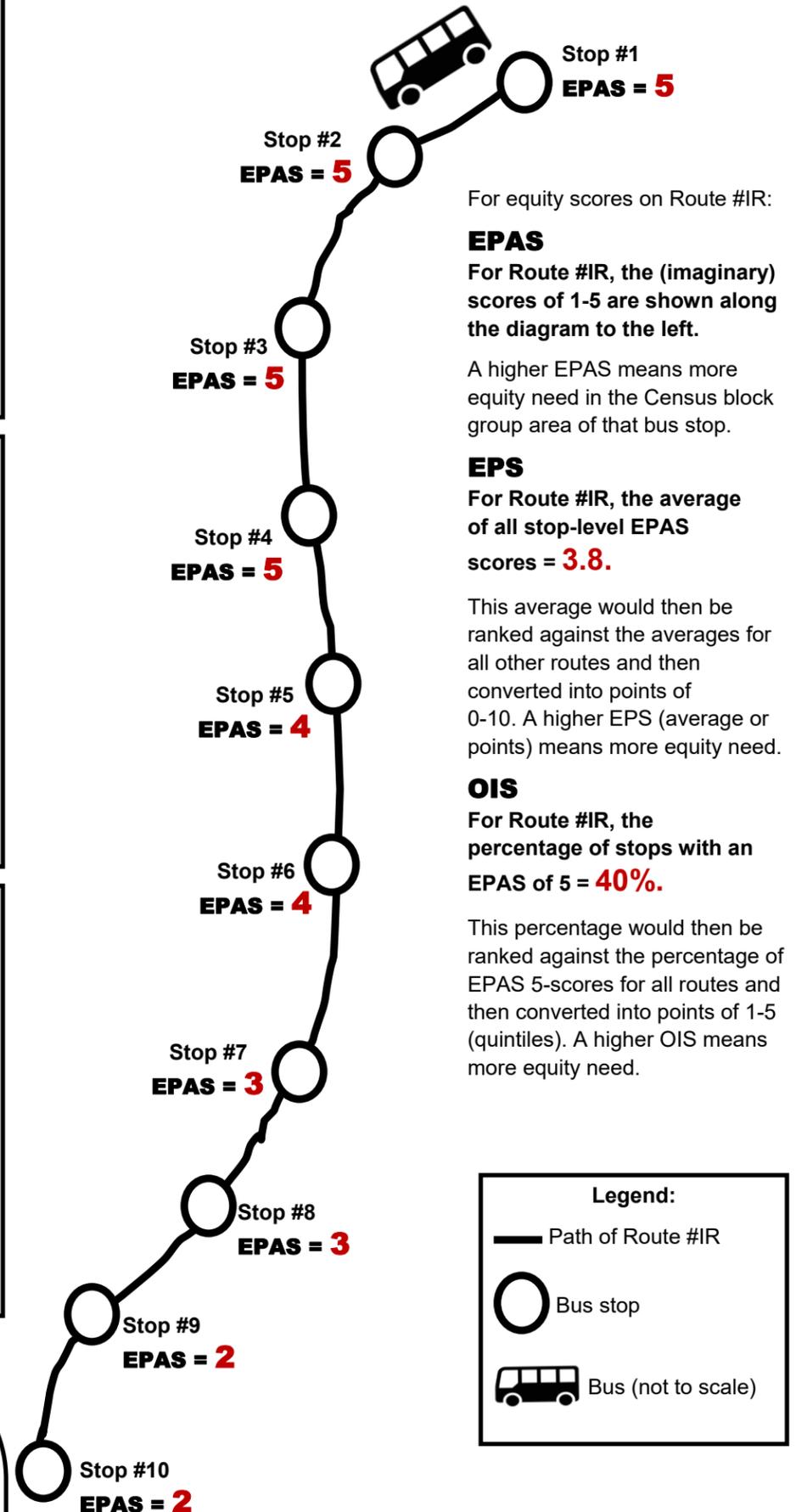
**Used for:** When transit service must be reduced, the OIS is used as the equity score when determining the reduction priority for a route. The factors used in prioritizing service reductions (productivity and equity) are described below.

**Calculated by:** The OIS starts as the percentage of all EPAS bus stop scores of 5 for a given route. This percentage is then ranked against the percentage of EPAS 5-scores for all other routes, and points of 1-5 are assigned, dividing routes into quintiles. The higher the OIS, the higher the equity need for that route.

See the next page for a list of route OIS scores from summer 2021.

## Example: Imaginary Route #IR

This is a hypothetical of an imaginary route (#IR) with 10 stops, showing how the EPAS, EPS, and OIS scores are calculated.



For equity scores on Route #IR:

**EPAS**  
For Route #IR, the (imaginary) scores of 1-5 are shown along the diagram to the left.

A higher EPAS means more equity need in the Census block group area of that bus stop.

**EPS**  
For Route #IR, the average of all stop-level EPAS scores = **3.8**.

This average would then be ranked against the averages for all other routes and then converted into points of 0-10. A higher EPS (average or points) means more equity need.

**OIS**  
For Route #IR, the percentage of stops with an EPAS of 5 = **40%**.

This percentage would then be ranked against the percentage of EPAS 5-scores for all routes and then converted into points of 1-5 (quintiles). A higher OIS means more equity need.

## How is service added?

The proposed Service Guidelines include three priorities to add service:

- Priority #1 = Reduce Crowding:** add service to overcrowded routes
- Priority #2 = Improve Reliability:** add service to routes that run late
- Priority #3 = Grow Service:** add service to meet target service levels

When service is added under Priority #3, the proposed Service Guidelines would rank routes using three factors:

Factor & Measures	Weighting	Prioritization
<b>Equity</b> EPS	25% (10 points)	#1 (formerly #3)
<b>Land Use</b> * Households within 1/4 mile * P&R stalls within 1/4 mile * Jobs within 1/4 mile * Low-income jobs within 1/4 mile * Enrolled students at high school & college within 1/4 mile	50% (20 points)	#2 (formerly #2)
<b>Geographic Value</b> * Connection between regional growth centers or activity centers or manufacturing/industrial centers	25% (10 points)	#3 (formerly #1)

## How is service reduced?

The proposed Service Guidelines use productivity and equity to identify priorities for reduction when service must be reduced.

**Equity** uses the OIS. **Productivity** uses two measures:

- Rides/platform hour** measures the number of riders who board a bus relative to the total number of hours the vehicle operates.
- Passenger miles/platform mile** measures the total miles riders travel on a route relative to the total miles the vehicle operates.

There are six priorities for reduction (in order):

- Routes in bottom 25% on 2 productivity measures, OIS 3 or less
- Routes in bottom 25% on 2 productivity measures, OIS 4 or 5
- Routes in bottom 25% on 1 productivity measure, OIS 3 or less
- Routes in bottom 25% on 1 productivity measure, OIS 4 or 5
- Routes in bottom 50% on 1-2 productivity measures, OIS 3 or less
- Routes in bottom 50% on 1-2 productivity measures, OIS 4 or 5

## Equity Scores for Metro Routes

The tables below show the Equity Prioritization Scores (EPS, shown as averages) and Opportunity Index Scores (OIS) for each route. Because these scores are based on a ranking of all Metro routes, they change with each service change. The tables below show EPS and OIS metrics for the Spring 2021 service change. However, because of the number of routes temporarily suspended due to the COVID-19 pandemic, pre-pandemic scores are shown for suspended routes (routes suspended as of September 2021 are shaded, which indicates that older scores are shown). Routes that will be deleted as part of the upcoming North Link Connections Mobility Project (October 2021), as well as two school routes (980, 985) that will be deleted, are indicated with \*.

### Equity Prioritization Scores (EPS) Averages for Metro Routes

The EPS is calculated for each bus route. It is based on the average of the EPAS bus stop scores for each route. When Metro is adding service using Priority #3 (Service Growth), these averages for each route are then ranked and routes are assigned points of 0-10. The table below shows the averages that would be used to rank routes into the point system. The higher the average (or points, when the averages are ranked and converted into 0-10 points), the higher the equity need for that route.

Rte	EPS	Rte	EPS	Rte	EPS	Rte	EPS														
1	3.27	22	2.25	49	3.36	78*	3.00	124	3.25	177	3.96	218	4.27	255	2.74	347	3.89	894	2.25	987	2.40
2	2.87	24	2.86	50	2.71	97	3.67	125	4.13	178	4.00	219	4.15	257	3.56	348	3.00	895	3.00	988	2.15
3	3.03	26*	3.32	55	2.84	98	5.00	128	3.31	179	4.44	221	4.06	268	3.93	355*	3.50	901	4.36	989	3.11
4	3.28	27	2.33	56	2.56	101	4.00	131	3.34	181	4.29	224	4.20	269	4.08	372	3.60	903	4.21	994	3.46
5	2.61	28	3.07	57	2.21	102	3.73	132	3.55	182	4.29	225	3.52	271	3.19	373*	3.55	906	1.71	995*	3.29
7	4.05	29	3.27	60	3.36	105	4.46	143	3.09	183	4.52	226	3.72	301	3.46	628	1.00	907	2.89	A	4.91
8	3.61	31	3.38	62	3.37	106	4.66	148	3.90	184	3.38	230	3.80	303	3.35	629	2.13	914	4.62	B	4.60
9	4.54	32	3.70	63*	3.59	107	3.85	150	2.98	187	4.33	231	2.97	304	3.10	630	2.90	915	3.29	C	2.84
10	3.50	33	3.53	64	3.21	111	3.36	153	2.18	190	3.89	232	3.94	308*	2.50	631	3.27	917	3.90	D	3.85
11	2.89	36	4.10	65	2.13	113	3.24	154	2.31	193	4.11	237	3.18	309*	3.36	634	3.27	930	3.86	E	3.81
12	3.13	37	2.32	67	3.93	114	3.83	156	3.11	197	4.89	239	3.77	311	3.38	635	1.20	931	3.27	F	3.21
13	3.76	40	3.26	70	3.79	116	3.00	157	2.93	200	3.07	240	4.30	312*	3.90	636	3.00	973	NA		
14	3.88	41*	4.14	71*	3.57	118	2.75	160	4.35	204	2.48	241	4.60	316*	3.25	637	3.00	975	NA		
15	3.57	43	3.33	73	3.68	119	2.00	161	3.43	208	2.69	245	4.38	330	3.10	773	2.59	980*	2.78		
17	2.70	44	2.86	74*	3.35	120	4.19	162	4.50	212	4.24	246	3.66	331	3.18	775	1.88	981	2.88		
18	3.21	45	3.76	75	3.48	121	3.13	165	3.69	214	2.59	249	3.14	342	4.07	891	2.22	982	3.22		
19	3.34	47	3.58	76*	3.33	122	3.04	167	4.58	216	3.94	250	3.32	345	3.50	892	2.92	984	2.40		
21	2.69	48	2.00	77*	3.50	123	3.38	168	3.43	217	4.09	252	3.70	346	3.42	893	3.05	986	2.50		

Source: King County Metro Transit, August 2021 (Note that shaded routes are suspended, pre-pandemic EPS used, \* = route to be deleted October 2021)

### Opportunity Index Scores (OIS) for Metro Routes

The OIS is calculated for each bus route. It is based on the percentage of EPAS bus stop scores of 5 for each route. These percentages for each route are then ranked and routes are assigned points of 1-5. The OIS is used as the equity factor when prioritizing routes for service reductions. The higher the OIS, the greater the equity need for that route.

Rte	OIS	Rte	OIS	Rte	OIS	Rte	OIS														
1	4	22	2	49	2	78*	1	124	2	177	5	218	5	255	1	347	2	894	1	987	2
2	3	24	3	50	2	97	2	125	3	178	5	219	3	257	2	348	3	895	2	988	2
3	2	26*	4	55	1	98	5	128	4	179	4	221	2	268	4	355*	3	901	5	989	2
4	2	27	1	56	1	101	4	131	3	181	4	224	5	269	3	372	4	903	5	994	4
5	2	28	3	57	1	102	3	132	2	182	5	225	2	271	1	373*	4	906	2	995*	3
7	4	29	2	60	3	105	4	143	4	183	5	226	1	301	3	628	1	907	4	A	5
8	4	31	2	62	2	106	5	148	4	184	1	230	4	303	5	629	1	914	5	B	5
9	4	32	3	63*	4	107	4	150	4	187	3	231	1	304	2	630	2	915	2	C	2
10	1	33	4	64	2	111	2	153	3	190	4	232	5	308*	2	631	3	917	2	D	4
11	1	36	3	65	1	113	1	154	3	193	5	237	1	309*	3	634	1	930	2	E	3
12	1	37	1	67	4	114	2	156	1	197	4	239	3	311	3	635	1	931	2	F	5
13	4	40	2	70	4	116	1	157	3	200	3	240	5	312*	5	636	1	973	2		
14	5	41*	3	71*	3	118	1	160	4	204	1	241	5	316*	2	637	1	975	2		
15	4	43	1	73	4	119	1	161	5	208	1	245	5	330	1	773	1	980*	2		
17	2	44	2	74*	3	120	5	162	5	212	5	246	3	331	3	775	2	981	2		
18	2	45	3	75	2	121	2	165	3	214	1	249	3	342	5	891	1	982	5		
19	4	47	1	76*	2	122	2	167	5	216	3	250	4	345	3	892	1	984	2		
21	1	48	1	77*	2	123	2	168	3	217	5	252	3	346	4	893	1	986	2		

Source: King County Metro Transit, August 2021 (Note that shaded routes are suspended, pre-pandemic OIS used, \* = route to be deleted October 2021)