Transportation Advisory Board

of the Metropolitan Council of the Twin Cities

Information Item

DATE: September 22, 2015

TO: Transportation Committee

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SUBJECT: Sensitivity Analysis of Regional Solicitation Criteria

This information item presents a sensitivity analysis of the scoring criteria used in the 2014 Regional Solicitation. Criteria were evaluated on how they impacted project rankings, which ultimately contribute to the final funding decisions. These criteria should be reviewed to see if they are performing as intended.

Evaluation Method

While each criterion measures an important concept, some are more significant than others. Criteria were assigned point values relative to their policy importance. This point value reflects how the criterion is *intended* to perform.

Tables 1 through 8 present the criteria used to evaluate each project subcategory. The criteria are sorted based on their point allocations. Each criterion is presented with three measures:

1. Number of projects changing their ranked order if the criterion is removed
2. Number of projects that are pushed above or below the TAB-approved funding line if the criterion is removed
3. Standard deviation, or a measure of how clustered or spread out project scores are, for that criterion

Number of projects changing their ranked order if a criterion is removed, and ranked position relative to TAB-approved funding decisions

The primary measure for evaluating a criterion's actual impact in the 2014 Regional Solicitation was how many projects changed their rank position within a project subcategory if that criterion is removed. Criteria that have a large impact on how the projects score relative to each other have more potential to affect a funding decision. Changes in ranked order sometimes caused a project to move above or below the TAB-approved funding line, also indicated in the tables. However, criteria that have a mismatch between their point value and their effect on project rankings (e.g., high point value but minimal impact on rankings, or vice versa) may not be performing as intended. Future meetings will discuss possible solutions to address any issues identified.

Standard Deviation

To further explore the potential for a criterion to contribute to a project's funding decision, we calculated the standard deviation of each criterion's project scores. Higher standard deviations usually suggest scores that are widely spaced, though it is possible for outliers to skew standard deviations. Lower standard deviations indicate score clustering. Standard deviation also depends on the number of points allocated to a criterion; with higher-value criteria expected to have generally higher standard deviations.

Key Findings

Across most categories, criteria with higher point values such as usage generally had a larger impact on project rankings. This suggests that these higher point value measures, for the most part, are performing as intended. However, a few measures appeared to have a lower impact than intended, given their assigned point values.

Certain safety sub criteria measures underperformed relative to their assigned point values. "Geometric, Structural, or Infrastructure Deficiencies" had a low impact on rankings in two of the four roadway categories due to a tight clustering of scores. "Deficiencies corrected or safety problem addressed" had a low impact on rankings among non-motorized subcategories. In particular, for the multiuse trails and bicycle facilities subcategory, all projects scored at least 120 out of 150 points.

Some less distinguishing criteria reflected either nuances of the mode or of the particular applicant pool. For example, all 12 transit expansion submissions scored 33 out of 33 points for "Connections to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers". The criterion is evaluated such that a project connecting to a single job concentration, manufacturing / distribution location, or educational institution would receive full points. However, transit routes are by definition planned to connect these types of destinations. So the criterion is not distinguishing one project from the next. The housing performance score had a relatively low impact on roadway system management, bridge, and transit expansion projects. However, all of the bridge proposals were located in the cities of Minneapolis and St. Paul, so there was very little score variation. The housing criterion may have performed differently on a more diverse applicant pool.

Strategies for Under-performing Criteria

For lower impact criteria or criteria that are not distinguishing scores as intended, there are several strategies that can be employed:

- Do nothing
- Change the number of points allocated to the criterion
- Change the criterion's scoring guidelines or applicant instructions
- Change the criterion
- Convert to a required qualification instead of a scored criterion
- Remove the criterion

TAC Funding and Programming will be further examining these results over the next several months. They will recommend changes to the criteria for TAB's consideration that stem from this analysis. It should also be noted it may be difficult to draw definitive conclusions from application categories in which very few applications were submitted.

Table 1. Summary of Roadway Expansion criteria performance (23 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Safety	6	Cost effectiveness (project cost/crashes reduced)	150	18	1	37	
Usage	2A	Current daily person throughput	110	20	3	34	
Congestion / Air Quality	5A	Cost effectiveness (project cost/vehicle delay reduced)	100	16	1	34	
Regional Role	1A	Role in Regional Economy	90	17	1	30	
Infrastructure Age	4	Date of construction and remaining useful life	75	17	1	29	
Risk	8	Risk Assessment Form	75	10	0	11	
Equity and Housing	3B	Housing Performance Score	70	10	0	12	
Regional Role	1B	Current daily heavy commercial traffic	65	13	0	16	
Usage	2B	Forecast 2030 average daily traffic volume	65	13	0	17	
Congestion / Air Quality	5B	Cost effectiveness (project cost/kg per day reduced)	50	14	0	16	
Multimodal	7A/B	Ridership of transit routes directly and indirectly connected to the project; Bicycle and pedestrian connections	50	9	0	12	
Multimodal	7C.	Transit, bicycle, or pedestrian elements of the project	50	11	0	11	
Equity and Housing	3A	Connection to disadvantaged populations and project's benefits, impacts, and mitigation	30	6	0	5	
Regional Role	1C	Connection to Job Concentrations, Manufacturing/Distribution Locations, Educational Institutions, and local activity centers	20	4	0	5	The only possible values were 0, 12, or 20.
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 2. Summary of Roadway Reconstruction / Modernization criteria performance (21 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Safety	6.	Cost effectiveness (project cost / crashes reduced)	150	12	2	44	
Usage	2A.	Current daily person throughput	110	14	0	31	
Infrastructure Age / Condition	4B.	Geometric, structural, or infrastructure deficiencies	100	8	0	5	*All projects scored ≥ 80*
Regional Role	1A.	Role in Regional Economy	90	15	1	26	
Risk	8.	Risk Assessment Form	75	12	0	19	
Equity / Housing	3B.	Housing Performance Score	70	10	1	17	
Regional Role	1B.	Current daily heavy commercial traffic	65	13	0	18	
Usage	2B.	Forecast 2030 average daily traffic volume	65	9	0	16	
Infrastructure Age / Condition	4A.	Date of construction and remaining useful life	50	11	0	13	
Congestion / Air Quality	5A.	Cost effectiveness (project cost/vehicle delay reduced)	50	5	1	13	
Multimodal	7A/B.	Ridership of transit routes directly and indirectly connected to project; Bicycle and pedestrian connections	50	12	1	12	
Multimodal	7C.	Transit, bicycle, or pedestrian elements of the project	50	12	0	13	
Equity / Housing	3A.	Connection to disadvantage populations and project's benefits, impacts, and mitigation	30	6	0	8	
Congestion / Air Quality	5B.	Cost effectiveness (project cost/kg per day reduced)	25	7	0	8	
Regional Role	1C.	Connection to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers	20	4	0	6	*Scores are tightly clustered at 0, 12, and 20.*
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 3. Summary of Roadway System Management criteria performance (10 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Safety	6	Cost effectiveness (project cost / crashes reduced)	200	8	0	73	
Congestion / Air Quality	5A	Cost effectiveness (project cost/vehicle delay reduced)	150	8	0	57	Most scores are either over 100 or below 30.
Usage	2A	Current daily person throughput	85	2	0	16	
Infrastructure Age / Condition	4	Date of construction and remaining useful life	75	2	0	10	
Risk	8	Risk Assessment Form	75	3	0	22	
Equity / Housing	3B	Housing Performance Score	70	0	0	9	Scores are clustered in the top half of the score range
Regional Role	1A	Role in Regional Economy	65	4	0	24	
Congestion / Air Quality	5B	Cost effectiveness (project cost/kg per day reduced)	50	4	0	16	
Multimodal	7A/B	Ridership of transit routes directly and indirectly connected to the project; Bicycle and pedestrian connections	50	2	0	11	
Multimodal	7C	Transit, bicycle, or pedestrian elements of the project	50	4	0	18	
Regional Role	1B	Current daily heavy commercial traffic	40	0	0	10	
Usage	2B	Forecast 2030 average daily traffic volume	40	0	0	7	
Equity / Housing	3A	Connection to disadvantaged populations and project's benefits, impacts, and mitigation	30	0	0	9	
Regional Role	1C	Connection to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers	20	2	0	3	The only possible values were 0, 12, or 20.
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 4. Summary of Bridges criteria performance (6 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Infrastructure Age / Condition / Safety	4A	Date of construction and remaining useful life	300	4	1	24	
Infrastructure Age / Condition / Safety	4B	Geometric, structural, or infrastructure deficiencies	100	0		4	The lowest score is 90.
Usage	2A	Current daily person throughput	95	2	1	27	
Risk	6	Risk Assessment Form	75	0	0	27	One outlier score (5); others scored 68 to 75.
Cost Effectiveness	7	Cost effectiveness (total project cost / total points awarded)	75	2		30	Two low scores and the rest 43 to 75
Equity / Housing	3B	Housing Performance Score	70	0	0	12	
Regional Role	1A	Role in Regional Economy	65	2	1	20	
Multimodal	5A/B	Ridership of transit routes directly and indirectly connected to the project; Bicycle and pedestrian connections	50	0	0	17	
Multimodal	5C	Transit, bicycle, or pedestrian elements of the project	50	0	0	18	
Regional Role	1B	Current daily heavy commercial traffic	40	2	1	13	
Usage	2B	Forecast 2030 average daily traffic volume	30	0	0	6	
Equity / Housing	3A	Connection to disadvantage populations and project's benefits, impacts, and mitigation	30	0	0	8	
Regional Role	1C	Connection to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers	20	0	0	4	The only possible values were 0, 12, or 20.
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 5. Summary of Multiuse Trails and Bicycle Facilities criteria performance (31 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Regional Role	1	Identify location of project relative to Regional Bicycle Transportation Network	200	26	2	61	
Usage	2	Cost effectiveness per population and employment	200	25	3	53	
Safety	4B	How project will correct deficiencies or address safety problem	150	17	1	8	All projects scored between 120 and 150.
Risk / Public Engagement	6	Risk Assessment Form	130	19	3	15	
Safety	4A	Gaps closed, barriers removed, and / or connectivity between jurisdictions improved by the project	100	24	2	12	
Equity / Housing	3B	Housing Performance Score	70	13	1	13	
Equity / Housing	3A	Connection to disadvantage populations and project's benefits, impacts, and mitigation	50	17	1	13	
Multimodal	5A/B	Ridership of transit routes directly and indirectly connected to the project; Pedestrian connections	50	10	0	10	
Multimodal	5C	Transit or pedestrian elements of the project	50	19	1	8	
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 6. Summary of Pedestrian Facilities criteria performance (9 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Usage	2	Cost effectiveness per population and employment	200	6	1	47	
Safety	4B	Deficiencies corrected or safety problem addressed	180	0	0	44	
Risk	6	Risk Assessment Form	130	4	1	25	
Safety	4A	Barriers overcome, gaps filled, or system connections	120	2	0	27	
Regional Role	1	Connection to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers	100	6	1	43	
Multimodal s	5A/B	Ridership of transit routes directly and indirectly connected to project; Bikeway connections	75	4	1	13	All projects scored at least 45
Multimodal	5C	Transit or bicycle elements of the project	75	0	0	14	
Equity / Housing	3B	Housing Performance Score	70	4	1	18	
Equity / Housing	3A	Connection to disadvantaged populations and project's benefits, impacts, and mitigation	50	2	0	12	7 (of 9) submissions scored 30 or 40
	TOTAL		**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are

Table 7. Summary of Safe Routes to School criteria performance (3 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
SRST Elements	1	Describe how the project addresses 5 E's* of SRST Program	250	0	0	15	
Safety	4B	Deficiencies corrected or safety or security addressed	150	0	0	25	
Usage	2A	Average share of student population that bikes or walks	120	0	0	46	
Safety	4A	Barriers overcome, gaps filled, or system connections	100	0	0	2	All submissions scored at least 96.
Public Engagement / Risk	6B	Risk Assessment Form	85	0	0	26	
Usage	2B	Student population within school's walkshed	80	0	0	34	
Equity / Housing	3B	Housing Performance Score	70	0	0	10	
Equity / Housing	3A	Connection to disadvantage populations and project's benefits, impacts, and mitigation	50	0	0	6	
Multimodal	5	Ridership of transit routes directly connected to the project	50	0	0	26	
Public Engagement / Risk	6A	Public engagement process	45	0	0	4	All submissions scored between 38 and 45.
	TOTAL		**1,000**				

**The 5 Es of Safe Routes to School include Evaluation, Engineering, Education, Encouragement, and Enforcement.*

Key:	Number changed rank order: How many projects changed their ranked order by including that criterion	Number crossed funding line: How many projects would have flipped across the TAB-approved funding line by including that criterion	St. Dev. Standard deviation, a measure of how clustered or spread out project scores are

Table 8. Summary of Transit Expansion criteria performance (12 projects submitted).

Criteria	#	Measures	Max Points	# of projects: Rank order changed	# of projects: Crossed funding line	St. Dev.	Comments
Usage	2C	Service (operating) cost effectiveness of project (per new rider)	175	2	0	45	
Emissions	4A	Total emissions reduced	133	2	0	41	
Equity / Housing	3A	Connection to disadvantage populations and project's benefits, impacts, and mitigation	130	4	1	47	
Usage	2A	Cost effectiveness of project (per rider)	105	5	0	29	
Usage	2B	Cost effectiveness of project (per new rider)	70	2	0	16	
Equity / Housing	3B	Housing Performance Score	70	0	0	9	All submissions scored above 42
Emissions	4B	Cost effectiveness (project cost / kg of emissions reduced)	67	4	0	17	
Multimodal	5A	Bicycle and pedestrian connections	50	2	0	8	
Multimodal	5B	Multimodal elements of the project	50	0	0	10	
Risk	6	Risk Assessment Form	50	0	0	11	
Regional Role	1C	Ridership of transit routes directly connected to the project	34	0	0	11	
Regional Role	1A	Connection to Job Concentrations, Manufacturing / Distribution Locations, Educational Institutions, and local activity centers	33	0	0	0	All submissions scored 33 (100%)
Regional Role	1B	Existing population within ¼ mile (bus stop) or ½ mile (transitway)	33	0	0	10	
TOTAL			**1,000**				

Key:	**Number changed rank order:** How many projects changed their ranked order by including that criterion	**Number crossed funding line:** How many projects would have flipped across the TAB-approved funding line by including that criterion	**St. Dev.** Standard deviation, a measure of how clustered or spread out project scores are