

APPENDIX D

Quality Functional Deployment Methodology

The following discussion is abstracted from the TRB report, “Improved Traffic Signal Priority for Transit” (1998).

To establish the relationships between system objectives, performance measures, and different strategy characteristics the Quality Functional Deployment (QFD) methodology was followed. QFD is a technique that was created primarily to improve the quality of manufacturing processes and was introduced by American automobile manufacturing companies in the early 1980s. The main idea of the QFD is to use matrix representation of available data or characteristics to identify interrelationships. The QFD method can be applied to any area or to any aspect where interrelationships between different system characteristics, objectives, or measures of effectiveness are to be discovered.

The QFD representation is based on a waterfall chart where *hows* of an upper level become *whats*, of the lower level of the chart (see Figure D1). After defining all *hows* and *whats*, the next step in QFD analysis is to determine the strength of relationships (or degree of correlation) between the *whats* and the *hows*. For our application, a checkmark is used to indicate that a relationship exists, but no attempt was made to establish the strength of this relationship. If any row of a matrix is blank, it should be removed or another characteristic (*how*) should be added.

For the purposes of this investigation, the initial *whats* are the stakeholder objectives. The stakeholders are the

owners/operators/users of the system(s) that will ultimately be affected by transit priority strategies. Each of the stakeholder objectives is addressed by one or more of the system characteristics. These characteristics determine how the ultimate system will attempt to meet the objectives. For example, one way that the transit operators’ objective to reduce operating costs can be satisfied is through route selection and scheduling.

The system characteristics then “waterfall” to become the *whats* in the next level of the QFD methodology. The *hows* in this case address how well the ultimate system performs these characteristics by defining measures of effectiveness that reflect the level of performance. For example, the schedule of a transit system is effected by the running times between time points, which is directly effected by the delay incurred at traffic signals and the level of traffic congestion along the transit route.

Continuing with the QFD methodology, these performance measures then “waterfall” to become the next level of *whats*. The *hows* then identify the important transit priority characteristics that should be addressed in the development of strategies to satisfy the original stakeholder objectives. It should be noted that the QFD process is being applied as a tool to establish the relationship between stakeholder objectives and transit priority strategy characteristics, but there may be additional considerations that could be addressed in the strategy development and evaluation.

The report provides a process for identifying transit priority strategy characteristics based on this methodology.

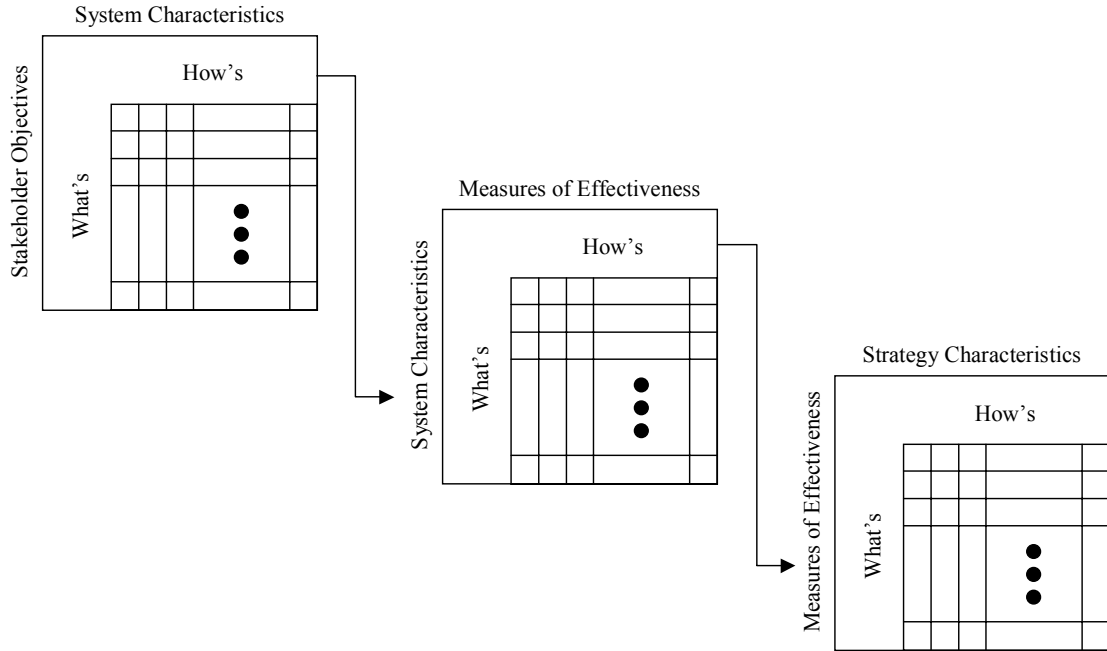


FIGURE D1 QFD "waterfall" relationships (*Improved Traffic Signal Priority for Transit* 1998).