APPENDIX D - COST EVALUATION DATA

D.1 RANGE OF POSSIBILITIES

A review of Cost Element 1 (Infrastructure Capital Costs – Civil/Structural) offers a prime example of the range of possibilities that exists for each option. A dedicated AHS facility with continuous barriers has been assigned a score of *10* based on the maximum level of complexity. However, this aspect of the system can be instituted several different ways, as dramatized in Figures D.1-1 through D.1-4.

Figure D.1-1 details a typical freeway and has been included to provide a point of reference when examining the AHS alternatives for a standard freeway configuration. Figure D.1-2 identifies a possible method of incorporating a single dedicated AHS lane while maintaining the existing paved area. The separation wall could be as simple as a jersey barrier, and the paved surface would require very few modifications. Right-of-way acquisition becomes an issue in this configuration only when constructing the AHS points of entry and exit. The scenario is simplified in this layout, but it is apparent from the sketch that the ramp work becomes extensive when applied to an interstate highway interchange.

Figures D.1-3 and D.1-4 display the two more-extensive efforts that produce a dedicated AHS facility. Most of the costs associated with the elevated highway option would be due to construction materials and labor. Right-of-way purchases would again be necessary only to supply access ramps. This option could become necessary in an urban environment, where widening the existing highway is not possible.

Right-of-way acquisition becomes the major cost attribute when considering the wide, single-elevation version of the AHS facility. The direct construction costs for the roadway in this scenario will be much lower when compared with those for the elevated highway, but available space may become a concern when applied to an urban environment.

The values applied in the scoring tables reflect potential cost and, as noted, should be reevaluated as the Concepts become more clearly defined. The preceding example is intended to identify alternatives for one specific dimensional option, as well as acknowledge the range of alternatives that exist for other dimensional options.

D.2 COST ELEMENT 1

Cost element 1 addresses the costs associated with building or modifying the physical portion of the highway. Two Dimensions were considered to envelop the costs associated with this element, as identified in Table D.2-I. The Dimension entitled "AHS and Non-AHS Mixing" identifies the requirements for interconnecting an AHS freeway with a non-AHS freeway. This Dimension was regarded as the major civil/structural cost element due to direct association with the physical infrastructure, and is weighted accordingly. The Dimension entitled "Class Mixing" outlines the necessity for class-specific lanes on the AHS freeway. This Dimension was considered to affect selective portions of the infrastructure only and, as a result, was weighted much lower. Table D.2-I defines the relative scores assigned to each of the dimensional options, as well as the relative weights applied to each Dimension when calculating the cost element rating. Table D.2-II summarizes the scoring for Cost Element 1 and calculates the relative ratings. Figure D.2-1 displays the results of this rating in bar graph format.

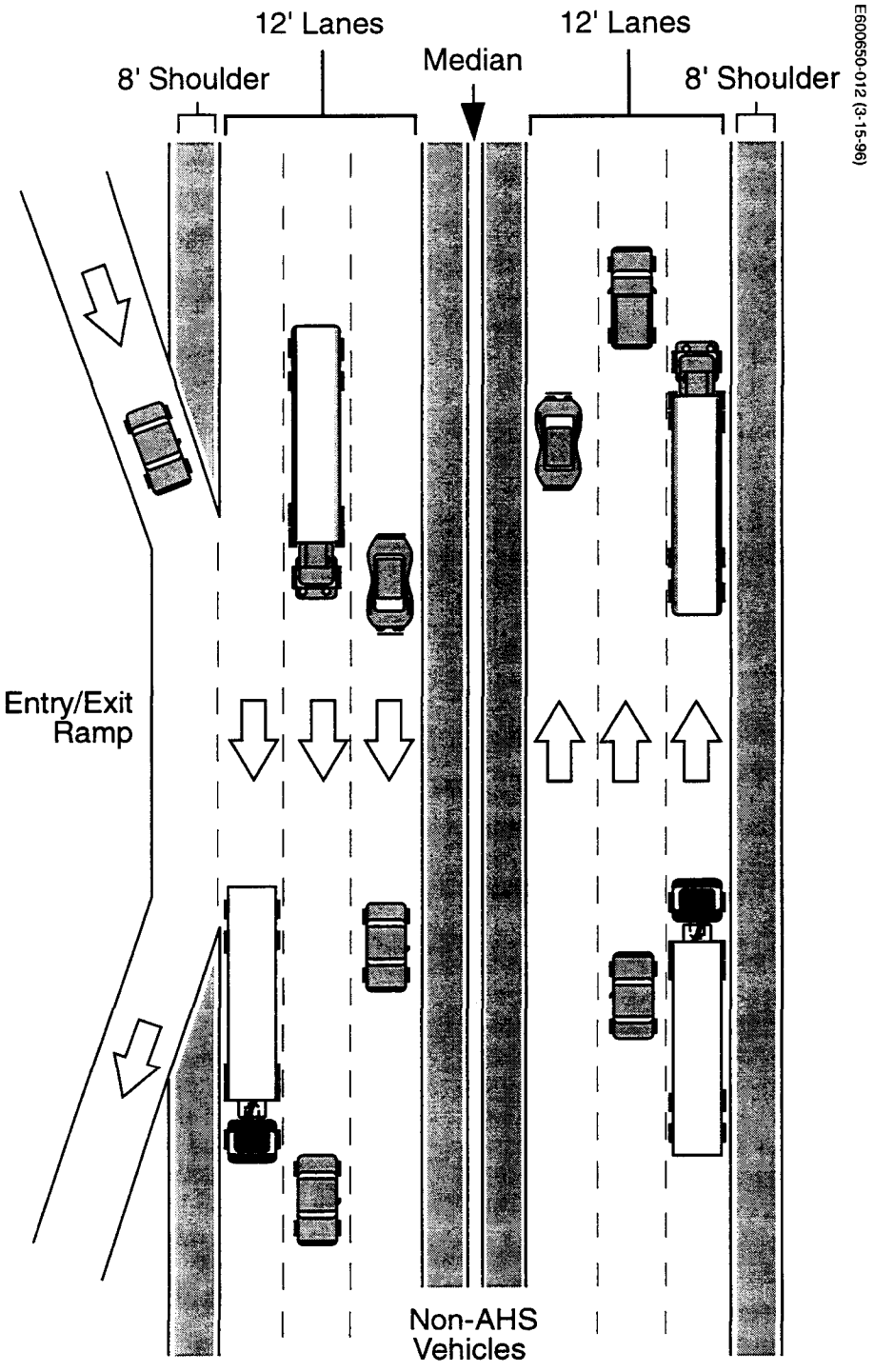

Figure D.1-1. Typical Freeway

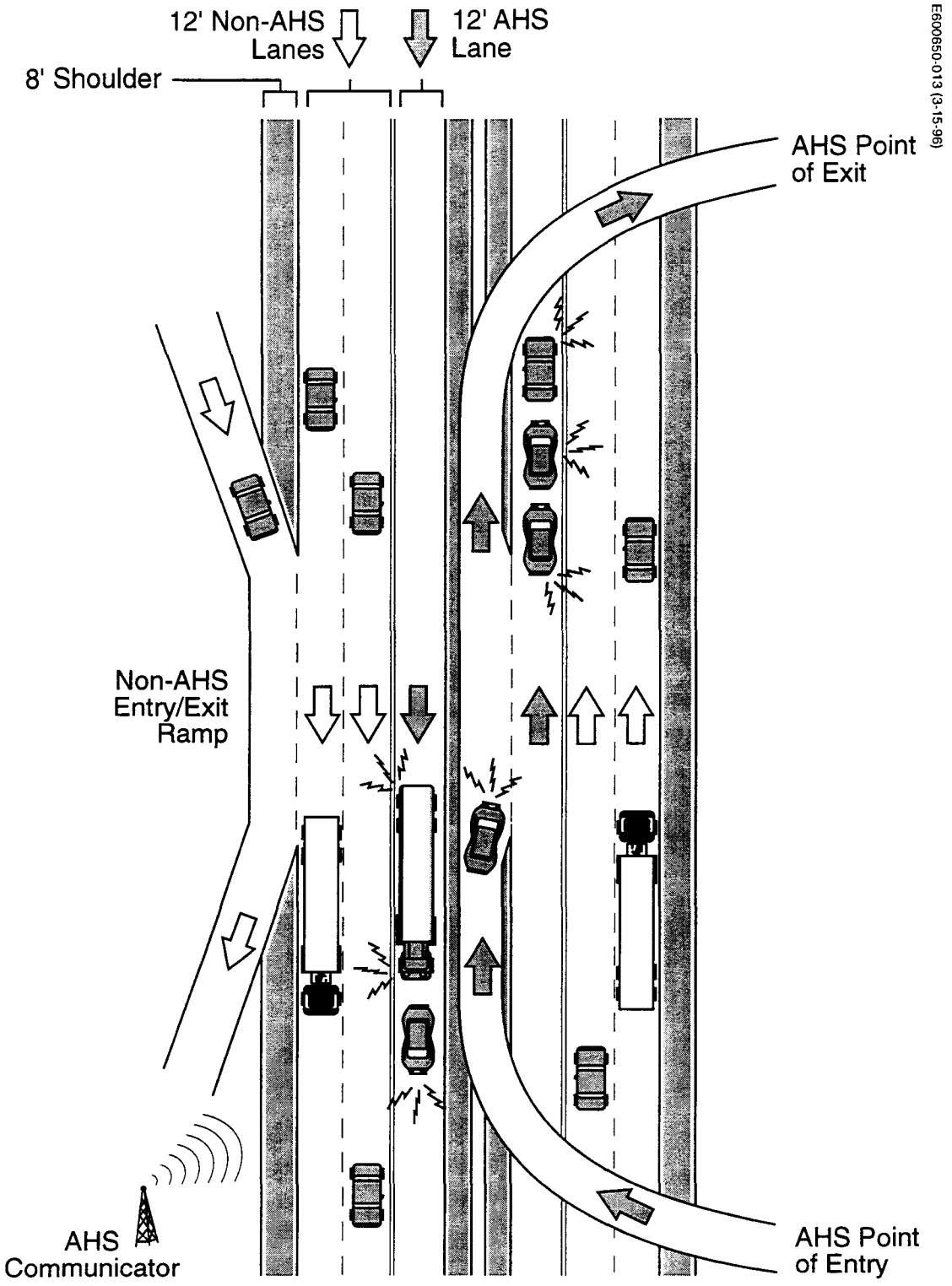

Figure D.1-2. Maintain Paved Area of Existing Highway and Reduce Number of Non-AHS Lanes

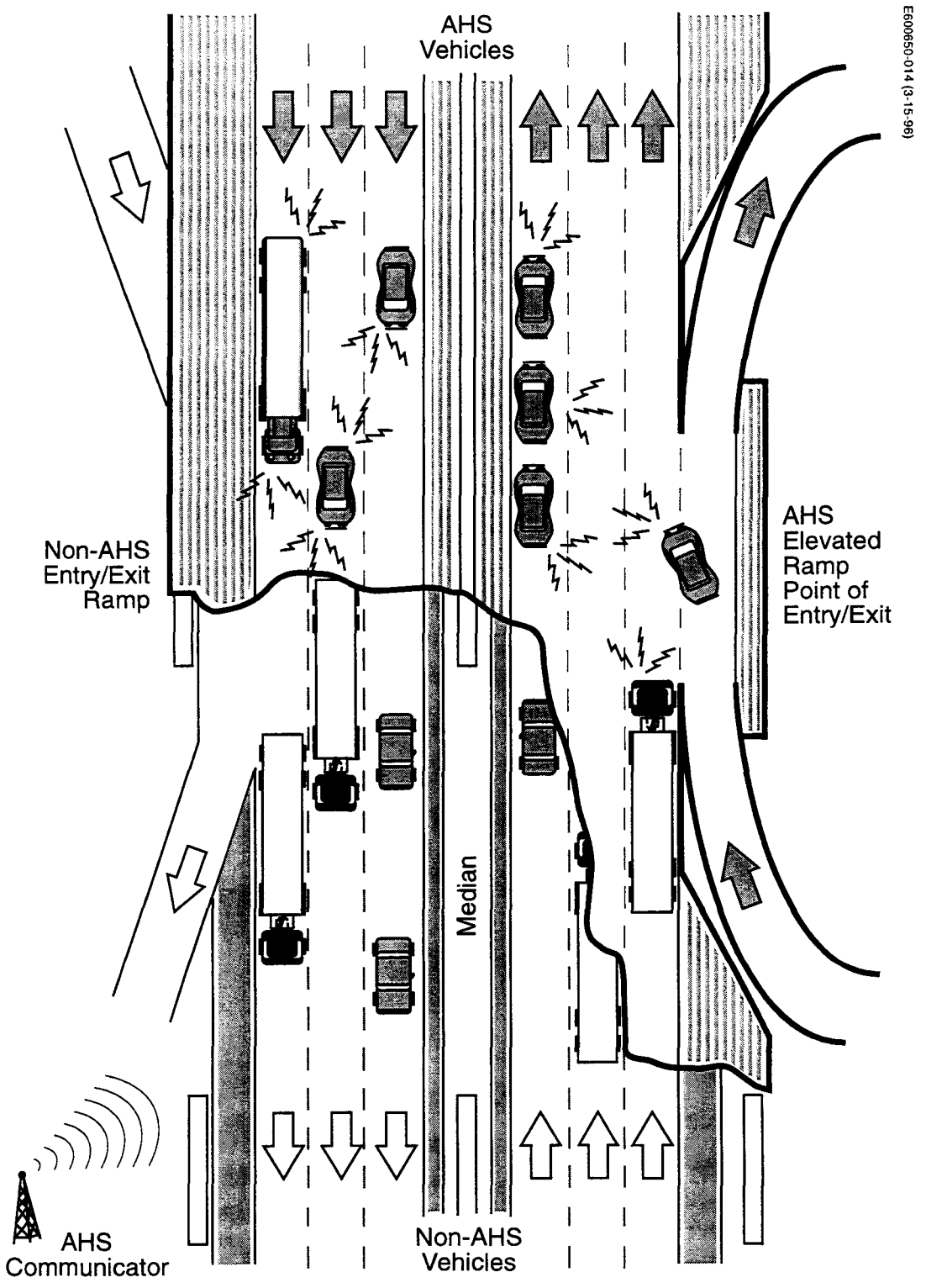

Figure D.1-3. AHS Lanes Elevated (Within Existing Width)

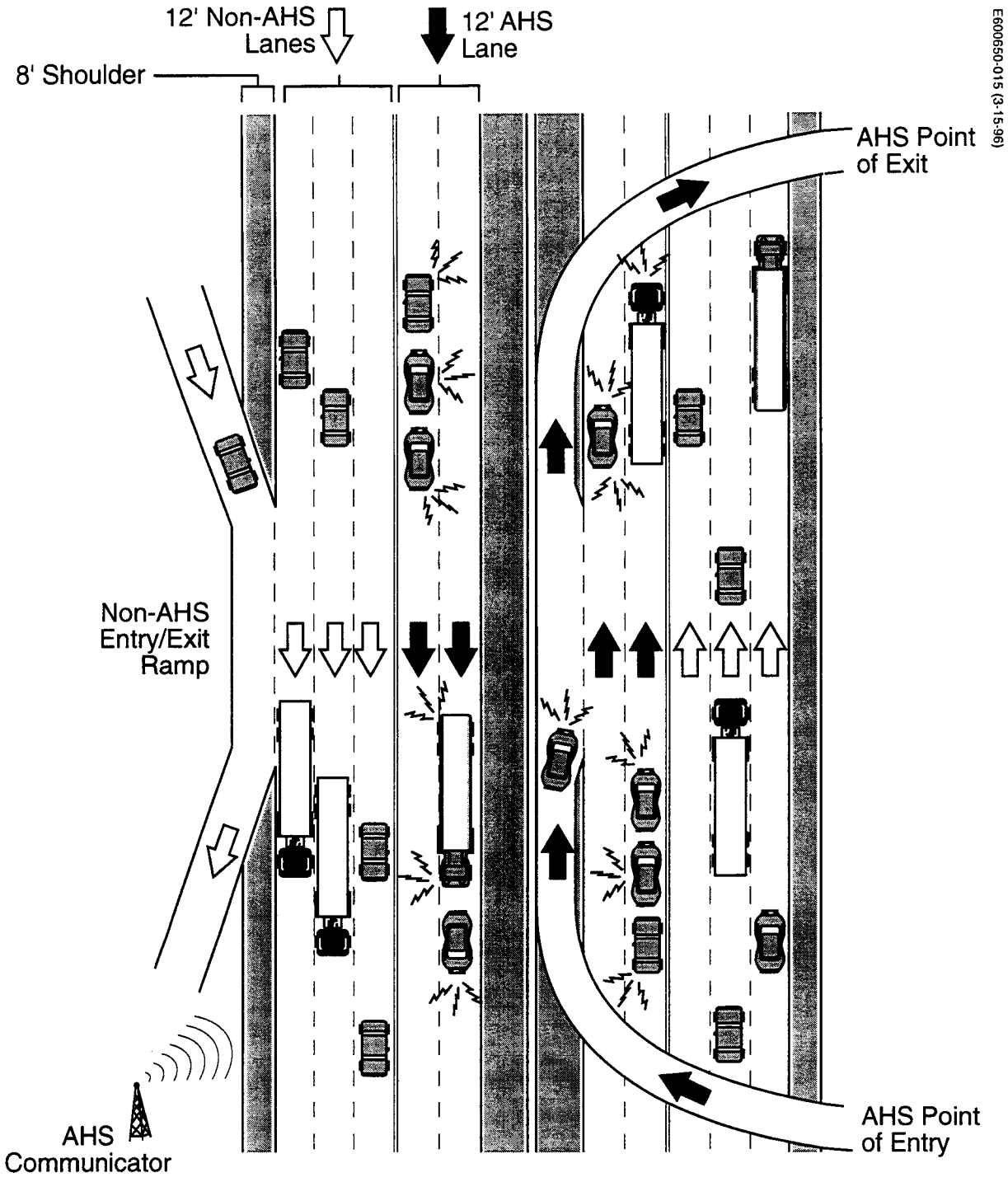

Figure D.1-4. Use More Highway Width (Right-of-Way Acquisition)

Table D.2-I. Cost Element 1–Infrastructure Civil/Structural Applicable Dimensions and Relative Scores

Weight	Dimension	Relative Score	Assumptions and Rationale
80%	AHS and non-AHS Mixing		
	• Dedicated with Continuous Barriers	10	Requires dedicated entry/exit interchanges Roadway is separated and segregated New/improved connections to local roadway network Addition of new lanes, possibility elevated
	• Dedicated with Gaps in Barriers	5	Allows use of existing interchanges for entry/exit Requires constructing physical barriers Likely utilization of existing/expanded right-of-way
	• Dedicated with Visual Barriers	4	Similar to above without need for physical barriers
	• Full Mixing	1	Potential requirement to upgrade pavement
20%	Class Mixing		
	• Mixed	0	No impact
	• Not Mixed	10	Additional lanes must be built to accommodate each class of AHS vehicles in a "non-mixed" environment Count require highly complex interchanges for entry/exit to independent "non-mixed" lane

Table D.2-II. Automated Highway System–Cost Evaluation Matrix Cost Element 1–Infrastructure and Support Capital Cost, Civil/Structural

Concept No.	I. Distribution of Intelligence Weight = 0					II. Separation Policy Weight = 0			III. AHS and non-AHS Mixing Weight = 8				IV. Class Mixing Weight = 2		V. Obstacle Detection Weight = 0			Element Rating
	Autonomous	Cooperative	Infrastructure Supported	Infrastructure Managed	Infrastructure Control	Free Agent	Platooning	Slot	Dedicated with continuous barriers	Dedicated with gaps in barriers	Dedicated with virtual barriers	Full mixing	Mixed	Not mixed	Manual sensing and avoidance	Automatic sensing, stop or manually avoid	Automatic sensing and avoidance	
1a												1	0					8
1b												1	0					8
2									10				0					80
3a									10					10				100
4										5			0					40
5										5			0					40
6										5			0					40
8a									10				0					80
8b									10					10				100
9									10				0					80
10										5			0					40
11										5			0					40
12a									10				0					80
12b									10					10				100
13									10					10				100
14										5			0					40
15												1	0					8
16											4		0					32
17											4		0					32
18									10				0					80
19									10				0					80
20									10					10				100

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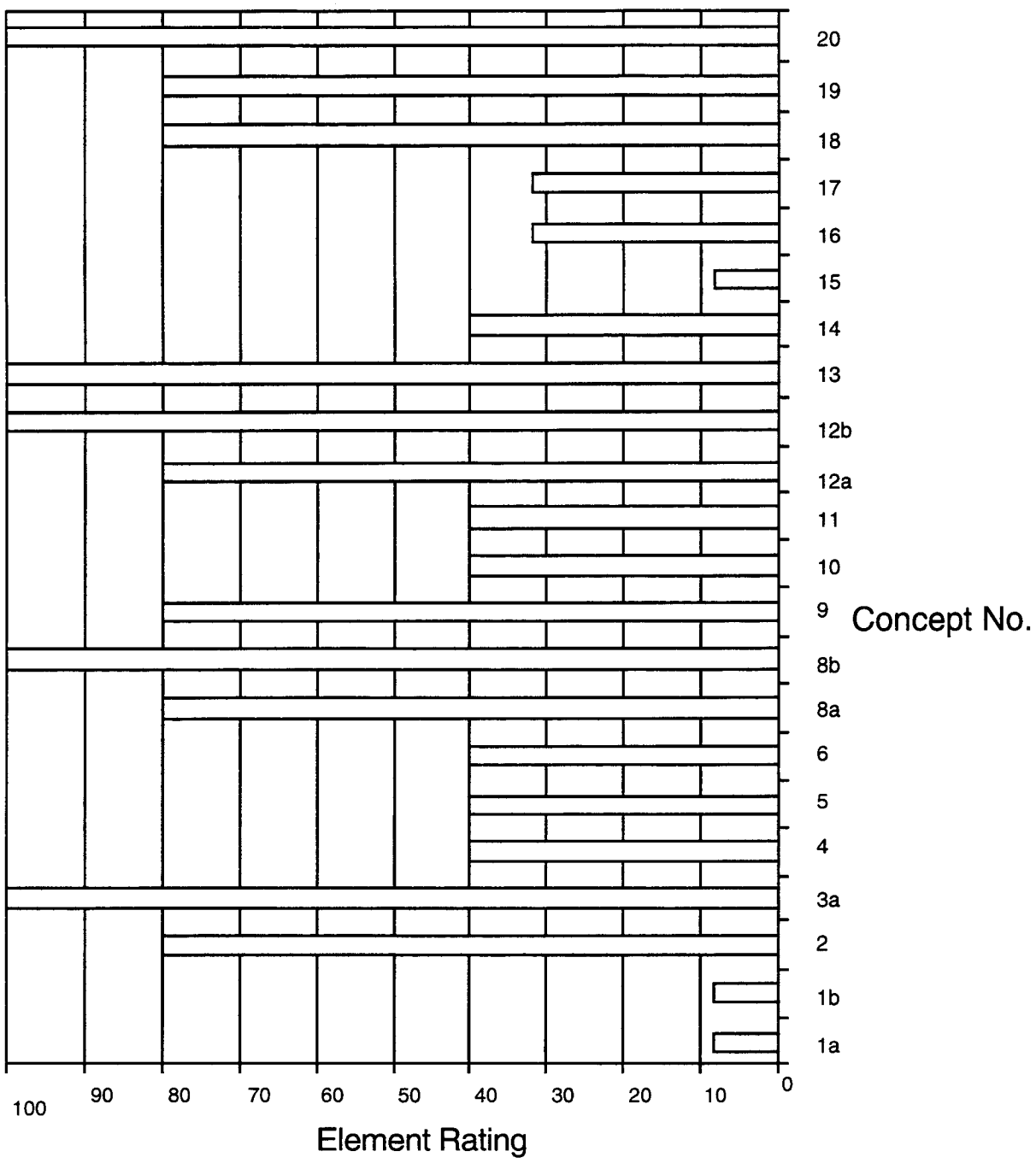

Figure D.2-1. Cost Element 1 Rating

D.3 COST ELEMENT 2

Cost Element 2 addresses the cost of instituting the systems and instrumentation network necessary to control the AHS environment. Three Dimensions were considered to envelop this cost element, as identified in Table D.3-I. The Dimension entitled "Distribution of Intelligence" identifies the level of participation the infrastructure has in controlling the operation of the AHS facility. This Dimension outlines the basic system functions of the infrastructure and, as a result, was weighted heavily. The Dimensions entitled "Obstacle Detection" and "Separation Policy" were considered to define specific parameters that enhance the system. These Dimensions were weighted lower, since the impact on the system cost depends entirely on the role of the infrastructure. The complexity required to adequately detect roadway obstacles warranted a slightly heavier weighting between these two Dimensions. Table D.3-I defines the relative scores assigned to each of the dimensional options, as well as the relative weights applied to each Dimension when calculating the cost element rating. Table D.3-II summarizes the scoring for Cost Element 2 and calculates the relative ratings. Figure D.3-1 displays the results of this rating in bar graph format.

D.4 COST ELEMENT 3

Cost element 3 addresses the cost of adding AHS-related sensors and intelligence to a vehicle. Two Dimensions were considered to envelop this cost element, as identified in Table D.4-I. The Dimension entitled "Obstacle Detection" specifies the most sophisticated sensor requirements on an AHS vehicle. This was weighted heavily due to the wide field of view required onboard the vehicle to adequately detect obstacles, plus the extensive coordination required to support automated evasive action. The Dimension entitled "Distribution of Intelligence" defines a much broader range of sensor requirements, but none as complicated as avoiding and detecting obstacles; thus, the lower weighting. Table D.4-I defines the relative scores assigned to each dimensional option, as well as the relative weights applied to each Dimension when calculating the cost element rating. Table D.4-II summarizes the scoring for Cost Element 3 and calculates the relative ratings. Figure D.4-1 displays the results of this rating in bar graph format.

D.5 COST ELEMENT 4

Cost element 4 addresses the relative costs attributed to infrastructure and vehicle O&M. By definition, these costs depend on the first three cost elements; therefore, three Dimensions were considered to envelop this cost element, as identified in Table D.5-I. The most dominant Dimension from each of Cost Elements 1, 2, and 3 was assumed to represent the O&M for that cost element. The dimensional scoring mirrors that applied to the Dimension in the previous ratings, for each respective cost element. The O&M for the infrastructure system was weighted the heaviest to reflect the relatively short service life of an electronic-based system and the extensive network of personnel required to prevent extended down times. The O&M for the physical infrastructure was weighted marginal to reflect the resources required for snow removal and other maintenance tasks along the extensive highway system. The O&M of the vehicle was weighted low, since the AHS-specific maintenance required for the vehicle will be minimal. Table D.5-I defines the relative scores assigned to each of the dimensional options, as well as the relative weights applied to each Dimension when calculating the cost element rating. Table D.5-II summarizes the scoring for Cost Element 4 and calculates the relative ratings. Figure D.5-1 displays the results of this rating in bar graph format.

Table D.3-I. Cost Element 2–Infrastructure Systems and Instrumentation Applicable Dimensions and Relative Scores

Weight	Dimension	Relative Score	Assumptions and Rationale
70%	Distribution of Intelligence		
	• Autonomous	1	Requires lateral sensing reference
	• Cooperative	1	Identical to Autonomous
	• Infrastructure Supported	4	Adds roadside capability to monitor traffic flow and broadcast traffic information to all AHS vehicles
	• Infrastructure Managed	7	Adds roadside responsibility for vehicle information and communicating traffic flow information to vehicles
	• Infrastructure Controlled	10	Requires infrastructure to control individual vehicles
10%	Separation Policy		
	• Free Agent	0	No impact
	• Platoon	0	Increase in roadside processing to coordinate maneuvering
		10	when maintained by infrastructure
	• Slot	10	Update slot offsets and maintain vehicle position database
20%	Obstacle Detection		
	• Manual Sense/ Manual Avoid	0	No impact
	• Auto Sense/Manual Avoid	0	No impact
	• Auto Sense/Auto Avoid	0	Infra-supported: sensing as an ITS feature - no impact
		5	Infra-managed: support emergency maneuver requests
		10	Infra-controlled: sense objects and coordinate maneuvers

Table D.3-II. Automated Highway System–Cost Evaluation Matrix Cost Element 2–Infrastructure and Support Capital Cost, Systems and Instrumentation Concept Scoring Matrix

Concept No.	I. Distribution of Intelligence Weight = 7					II. Separation Policy Weight = 1			III. AHS and non-AHS Mixing Weight = 0				IV. Class Mixing Weight = 0		V. Obstacle Detection Weight = 2			Element Rating
	Autonomous	Cooperative	Infrastructure Supported	Infrastructure Managed	Infrastructure Control	Free Agent	Platooning	Slot	Dedicated with continuous barriers	Dedicated with gaps in barriers	Dedicated with virtual barriers	Full mixing	Mixed	Not mixed	Manual sensing and avoidance	Automatic sensing, stop or manually avoid	Automatic sensing and avoidance	
1a	1					0									0			7
1b	1					0											0	7
2					10	0											10	90
3a				7				10									10	79
4		1				0											0	7
5		1					0										0	7
6			4			0											0	28
8a			4			0											0	28
8b			4			0											0	28
9			4				10										0	38
10				7		0											5	59
11				7			10										5	69
12a				7		0											5	59
12b				7		0											5	59
13				7			10										5	69
14			4				10										0	38
15				7		0											5	59
16			4			0											0	28
17		1					0										0	7
18		1				0										0		7
19				7			10									0		59
20			4			0										0		28

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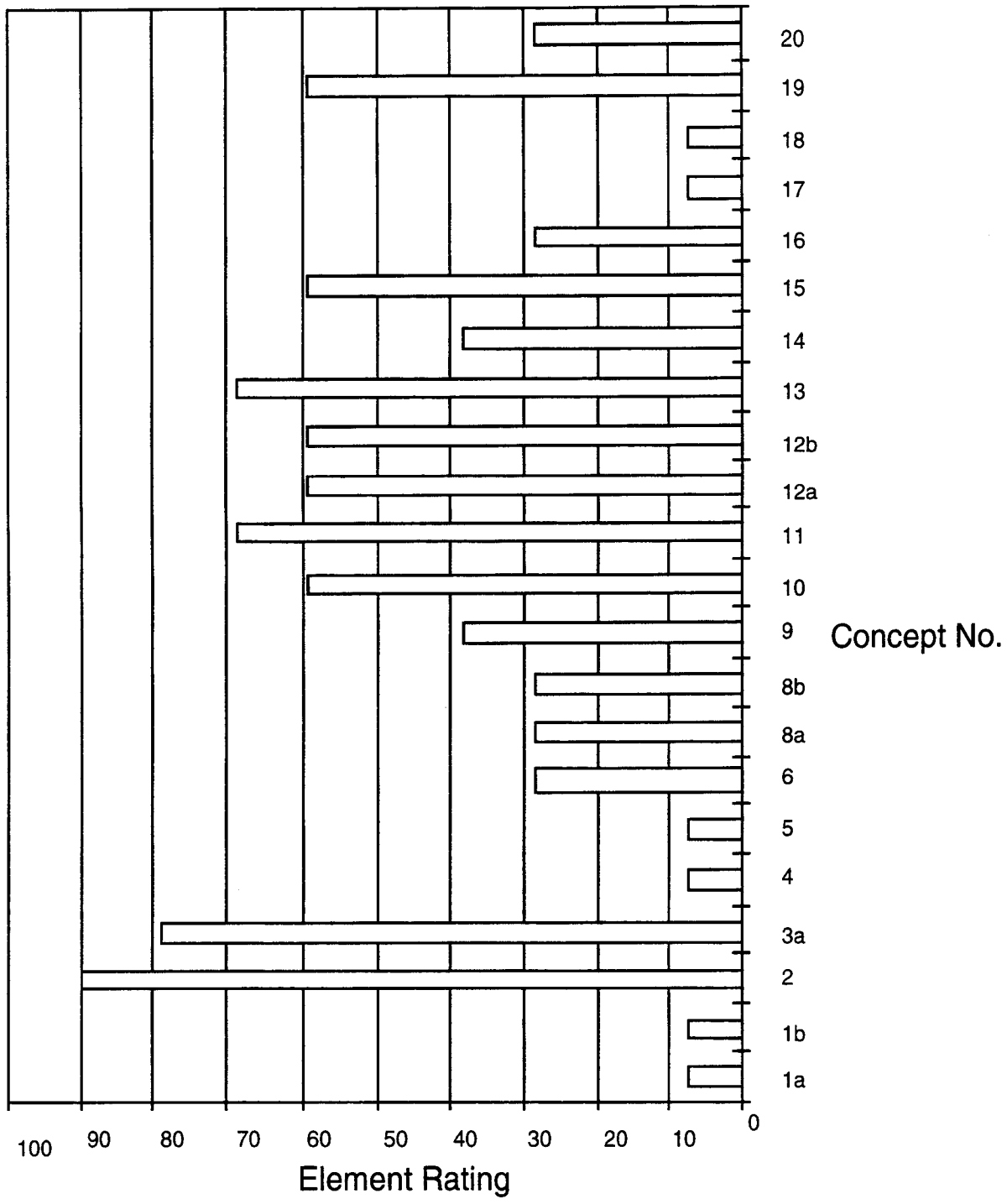

Figure D.3-1. Cost Element 2 Rating

Table D.4-I. Cost Element 3–Vehicle-Based Instrumentation Applicable Dimensions and Relative Scores

Weight	Dimension	Relative Score	Assumptions and Rationale
30%	Distribution of Intelligence		
	• Autonomous	10	All intelligence and sensing is required from the vehicle when coupled with automatic obstacle sensing
		3	Reduced functionality and significantly lower cost when associated with manual obstacle sensing
	• Cooperative	6	Maneuver coordination can be shared between vehicles
	• Infrastructure Supported	3	Vehicle intelligence and sensing aided by infrastructure
	• Infrastructure Managed	3	Identical to Infrastructure Supported
	• Infrastructure Controlled	1	High bandwidth communication required, but majority of functions are relegated to the infrastructure
70%	Obstacle Detection		
	• Manual Sense/Manual Avoid	0	No impact
	• Auto Sense/Manual Avoid	6	Forward obstacle detection sensors required
	• Auto Sense/Auto Avoid	5	Majority of sensory functions relegated to infrastructure when intelligence is infrastructure controlled
		10	Otherwise, sophisticated communication and intelligence, plus a wide field of view, is required for obstacle sensors

Table D.4-II. Automated Highway System–Cost Evaluation Matrix Cost Element 3–Vehicle-Based Capital Cost Concept Scoring Matrix

Concept No.	I. Distribution of Intelligence Weight = 3					II. Separation Policy Weight = 0			III. AHS and non-AHS Mixing Weight = 0				IV. Class Mixing Weight = 0		V. Obstacle Detection Weight = 7			Element Rating
	Autonomous	Cooperative	Infrastructure Supported	Infrastructure Managed	Infrastructure Control	Free Agent	Platooning	Slot	Dedicated with continuous barriers	Dedicated with gaps in barriers	Dedicated with virtual barriers	Full mixing	Mixed	Not mixed	Manual sensing and avoidance	Automatic sensing, stop or manually avoid	Automatic sensing and avoidance	
1a	3														0			9
1b	10																10	100
2	1				1												5	38
3a				3													10	79
4		6															10	88
5		6															10	88
6			3														10	79
8a			3														10	79
8b			3														10	79
9			3														10	79
10				3													10	79
11				3													10	79
12a				3													10	79
12b				3													10	79
13				3													10	79
14			3														10	79
15				3													10	79
16			3														10	79
17		6															10	88
18		6														6		60
19				3												6		51
20			3													6		51

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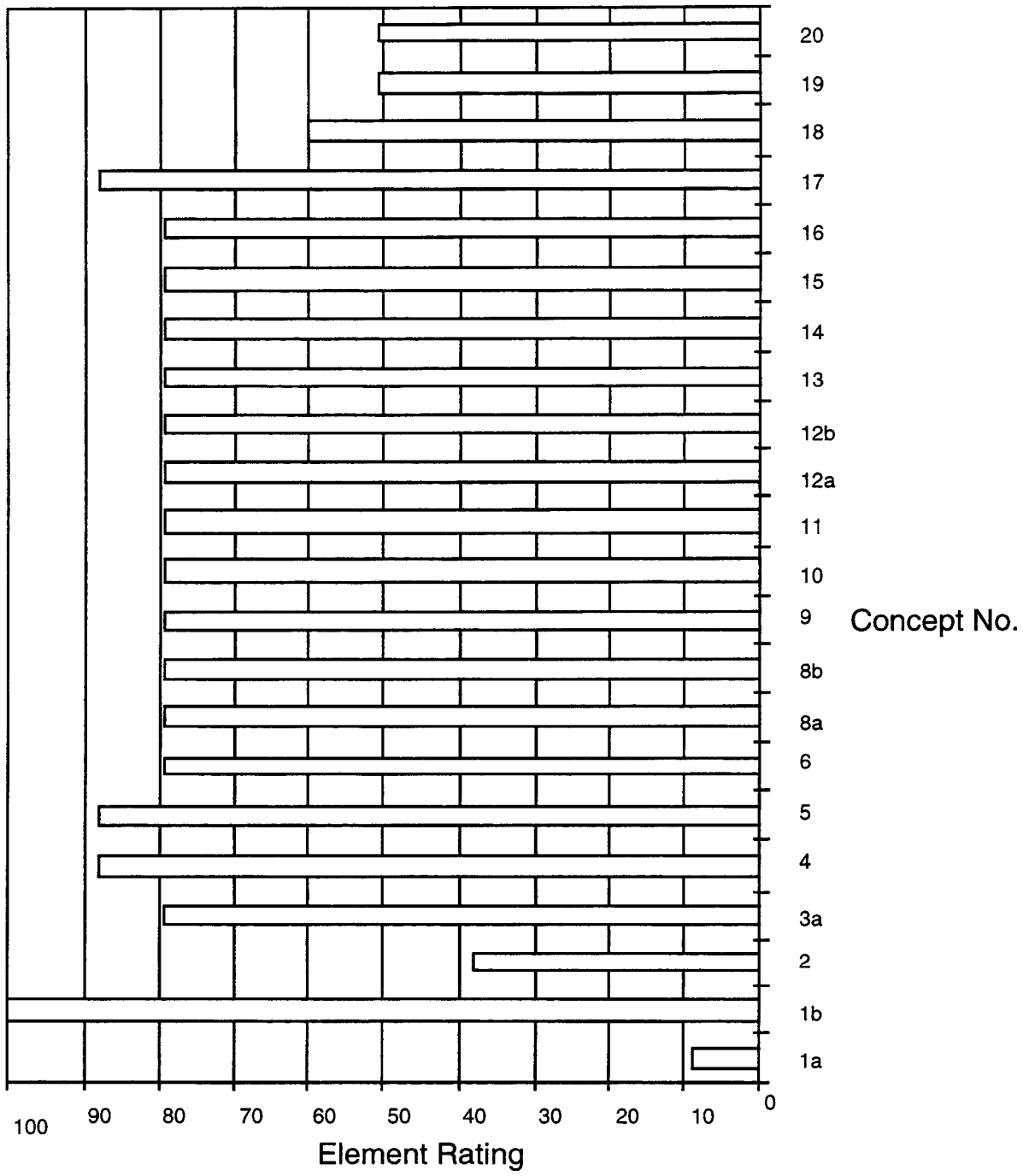

Figure D.4-1. Cost Element 3 Rating

Table D.5-1. Cost Element 4–Operation and Maintenance Applicable Dimensions and Relative Scores

Weight	Dimension	Relative Score	Assumptions and Rationale
60%	Distribution of Intelligence		Assumed to be a proxy for maintenance costs of the Infrastructure Systems and Instrumentation.
	• Autonomous	1	Relative scoring mirrors that of Cost Element No. 2.
	• Cooperative	1	
	• Infrastructure Supported	4	
	• Infrastructure Managed	7	Weighting reflects high relative O & M costs of electronic-based infrastructure system compared to O & M costs of physical infrastructure and AHS-equipped vehicles.
	• Infrastructure Controlled	10	
30%	AHS and non-AHS Mixing		Assumed to be a proxy for maintenance costs of the Infrastructure Civil/Structural. Relative scoring mirrors that of Cost Element No. 1.
	• Dedicated with Cont. Barriers	10	
	• Dedicated with Gaps in Barriers	5	
	• Dedicated with Virtual Barriers	4	Weighting reflects mid-range impact of O & M costs of the physical infrastructure.
	• Full Mixing	1	
10%	Obstacle Detection		Assumed to be a proxy for maintenance costs of the AHS-equipped vehicle. Relative scoring mirrors that of Cost Element No. 3.
	• Manual Sense/Manual Avoid	0	
	• Auto Sense/Manual Avoid	6	Weighting reflects low relative O & M costs of vehicles compared to the net O & M costs of a freeway system.
	• Auto Sense/Auto Avoid	5	
		10	

Table D.5-II. Automated Highway System–Cost Evaluation Matrix Cost Element 4–Operation and Maintenance Costs Concept Scoring Matrix

Concept No.	I. Distribution of Intelligence Weight = 6					II. Separation Policy Weight = 0			III. AHS and non-AHS Mixing Weight = 3				IV. Class Mixing Weight = 0		V. Obstacle Detection Weight = 1			Element Rating
	Autonomous	Cooperative	Infrastructure Supported	Infrastructure Managed	Infrastructure Control	Free Agent	Platooning	Slot	Dedicated with continuous barriers	Dedicated with gaps in barriers	Dedicated with virtual barriers	Full mixing	Mixed	Not mixed	Manual sensing and avoidance	Automatic sensing, stop or manually avoid	Automatic sensing and avoidance	
1a	1											1			0			9
1b	1											1					10	19
2					10				10								5	95
3a				7					10								10	82
4		1								5							10	31
5		1								5							10	31
6			4							5							10	49
8a			4						10								10	64
8b			4						10								10	64
9			4						10								10	64
10				7						5							10	67
11				7						5							10	67
12a				7					10								10	82
12b				7					10								10	82
13				7					10								10	82
14			4							5							10	49
15				7								1					10	55
16			4								4						10	46
17		1									4						10	28
18		1							10							6		42
19				7					10							6		78
20			4						10							6		60

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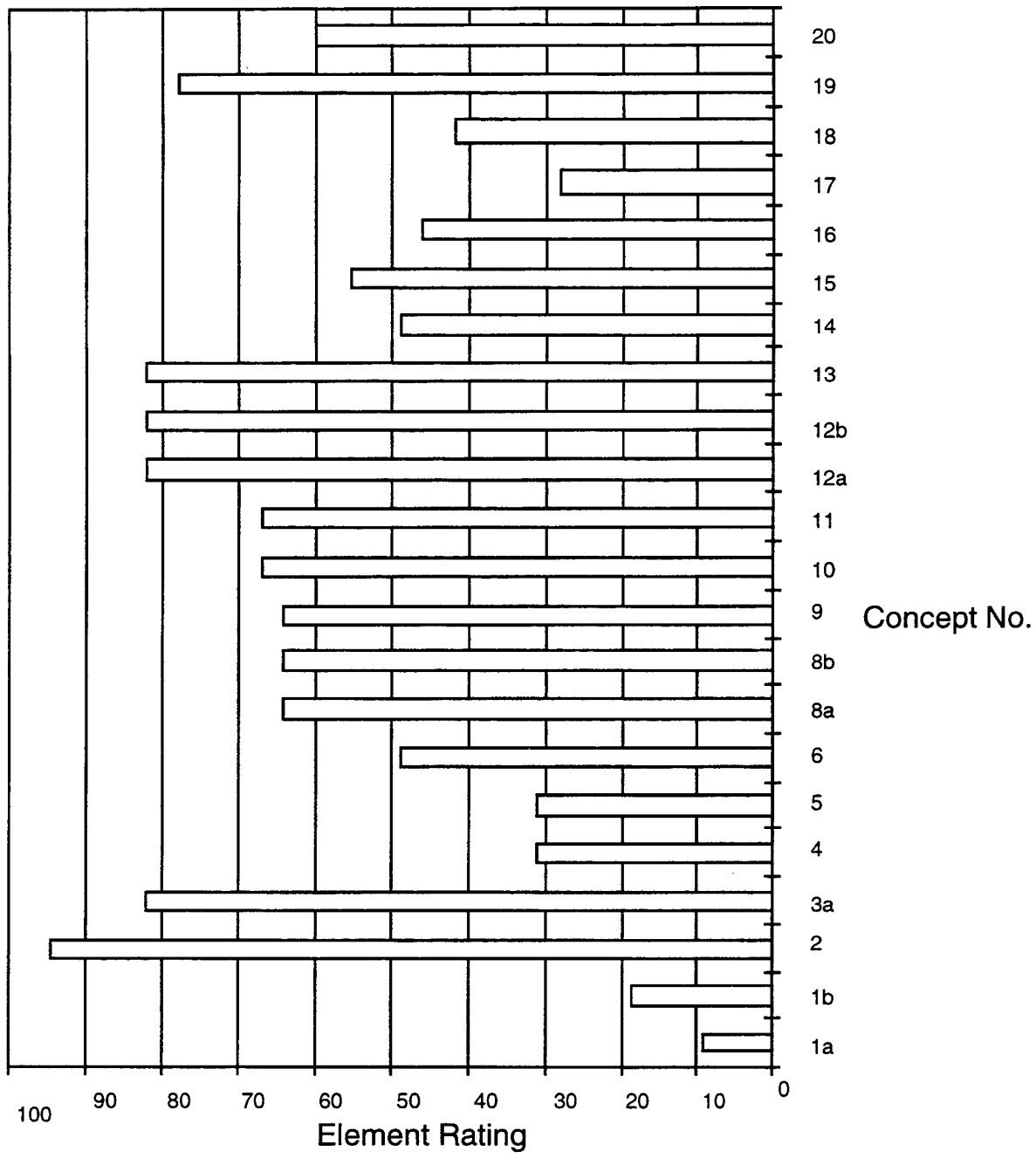

Figure D.5-1. Cost Element 4 Rating

D.6 SENSITIVITY ANALYSES

The sensitivity analyses were considered essential in determining the consistency of the evaluation results. The weights applied when rating each of the cost elements, as well as when performing the composite ranking, were the focus of these analyses. Various composite percentages were applied to recalculate the rankings and these results were compared with the original data. A similar comparison was made with each of the four cost elements. The goal of these analyses was to identify common results that would support a reasonable conclusion. The ranking of individual Concepts from high to low with respect to cost was not intended to identify the single most-expensive Concept. It is impossible to accurately perform this task given the current high level of the Concepts. Instead, grouping the Concepts into high-, medium-, and low-cost groups would be possible if the results were consistent throughout these sensitivity analyses. This grouping could then be used to identify the AHS characteristics with the highest potential cost and possibly to support a cost-benefit analysis.

The first step in determining sensitivity involved modifying the percentages that were applied in the composite ranking. This process could be used to determine if one cost element is able to control the results. Table D.6-I identifies the seven alternate ratios used to recalculate the composite rankings and summarizes the results of this effort. The original composite distribution and the associated ranking are also included in this table for comparison purposes. It is clear that Concept positions fluctuate for each composite ranking, but not excessively. In fact, the basis for cost-related groupings can begin with this comparison. It is apparent, after reviewing this table, that specific Concepts remain on the higher end of the cost ranking regardless of the composite percentages; the same also holds true at the lower end. This consistency indicated that cost groupings exist, but it was necessary to determine the divisions between each of the groupings. More data was necessary to make this determination, and this data could be generated by exploring the internal cost element weightings.

Independently modifying the applied weights from each cost element formed the basis of the next step of the analysis. Adjusting the composite percentages did not significantly affect the results; therefore, the original percentages were considered to be acceptable or ,as a minimum, representative. Changing the internal weights of a cost element without modifying any other parameters isolated the direct impact of this change and more clearly defined the significance of each cost element in the composite ranking. This also generated more data to support the creation of cost-groups and help define their alignments. Four alternative weighting schemes were generated for each cost element, and their direct impact on the composite rankings was evaluated. Tables D.6-II through D.6-V summarize this exercise for cost elements 1 through 4, respectively. The original weightings and the associated composite rankings from Table D.6-I are included in each table for ease of comparison. Reviewing each of these tables indicates that the original composite ranking does not fluctuate excessively and that the Concepts at the high and low end of the spectrum remain fairly uniform.

Table D.6-I. Sensitivity Comparison–Composites*

Composite Rankings	Alternate Composite Percentages							
	Cost Element No. 1 = 30% Cost Element No. 2 = 30% Cost Element No. 3 = 20% Cost Element No. 4 = 20%	Cost Element No. 1 = 40% Cost Element No. 2 = 40% Cost Element No. 3 = 10% Cost Element No. 4 = 10%	Cost Element No. 1 = 40% Cost Element No. 2 = 30% Cost Element No. 3 = 20% Cost Element No. 4 = 10%	Cost Element No. 1 = 40% Cost Element No. 2 = 30% Cost Element No. 3 = 10% Cost Element No. 4 = 20%	Cost Element No. 1 = 30% Cost Element No. 2 = 40% Cost Element No. 3 = 20% Cost Element No. 4 = 10%	Cost Element No. 1 = 30% Cost Element No. 2 = 40% Cost Element No. 3 = 10% Cost Element No. 4 = 20%	Cost Element No. 1 = 30% Cost Element No. 2 = 30% Cost Element No. 3 = 30% Cost Element No. 4 = 10%	Cost Element No. 1 = 25% Cost Element No. 2 = 25% Cost Element No. 3 = 25% Cost Element No. 4 = 25%
HIGHER ▲	3a	3a	3a	3a	3a	3a	3a	3a
	13	13	13	13	13	2	13	13
	12b	2	12b	12b	12b	13	12b	12b
	2	12b	2	2	2	12b	12a	2
	12a	12a	12a	12a	12a	12a	2	12a
	19	19	8b	19	19	19	8b	8b
	8b	8b	19	8b	8b	8b	9	19
	9	20	9	20	11	11	19	9
	11	9	20	9	9	9	11	11
	8a	11	8a	8a	10	20	8a	8a
	20	8a	11	11	20	10	10	10
	10	10	10	10	8a	8a	20	20
	14	18	18	18	14	14	14	14
	15	14	14	14	15	15	15	15
	18	15	6	6	6	18	6	6
	6	6	15	15	18	6	18	18
	16	16	16	16	16	16	16	16
	5	5	5	5	5	5	5	5
	4	4	4	4	4	4	4	4
	17	17	17	17	17	17	17	17
	1b	1b	1b	1b	1b	1b	1b	1b
LOWER ▼	1a	1a	1a	1a	1a	1a	1a	1a

*Note: The combination at far left repeats the ranking from Table III-3 and serves as a baseline for comparison purposes

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Table D.6-II. Sensitivity Comparison–Cost Element 1*

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Composite Rankings	Alternate Weighting Schemes				
	AHS and Non-AHS Mixing (8) Obstacle Detection (2)	AHS and Non-AHS Mixing (9) Obstacle Detection (1)	AHS and Non-AHS Mixing (7) Obstacle Detection (3)	AHS and Non-AHS Mixing (6) Obstacle Detection (4)	AHS and Non-AHS Mixing (5) Obstacle Detection (5)
HIGHER ▲	3a	3a	3a	3a	3a
	13	13	13	13	13
	12b	2	12b	12b	12b
	2	12b	2	2	2
	12a	12a	12a	12a	8b
	19	19	8b	8b	12a
	8b	8b	19	19	20
	9	9	9	20	19
	11	8a	20	11	11
	8a	11	11	9	9
	20	20	8a	10	10
	10	10	10	8a	8a
	14	14	14	15	15
	15	18	15	14	14
	18	6	6	6	6
▼ LOWER	6	15	18	16	16
	16	16	16	18	18
	5	5	5	5	5
	4	4	4	4	4
	17	17	17	17	17
	1b	1b	1b	1b	1b
	1a	1a	1a	1a	1a

*Note: The combination at far left repeats the ranking from Table III-3 and serves as a baseline for comparison purposes

Table D.6-III. Sensitivity Comparison–Cost Element 2*

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Composite Rankings	Alternate Weighting Schemes				
	Distribution of Intelligence (7) Separation Policy (1) Obstacle Detection (2)	Distribution of Intelligence (6) Separation Policy (2) Obstacle Detection (2)	Distribution of Intelligence (8) Separation Policy (1) Obstacle Detection (1)	Distribution of Intelligence (6) Separation Policy (1) Obstacle Detection (3)	Distribution of Intelligence (7) Separation Policy (2) Obstacle Detection (1)
HIGHER ▲	3a	3a	3a	3a	3a
	13	13	13	13	13
	12b	12b	12b	12b	12b
	2	2	2	2	2
	12a	12a	12a	12a	12a
	19	19	19	8b	19
	8b	8b	8b	19	8b
	9	9	9	9	9
	11	11	11	11	11
	8a	8a	8a	8a	8a
	20	20	20	20	20
	10	10	10	10	10
	14	14	14	14	14
	15	18	15	15	18
	18	15	6	18	6
	6	6	18	6	15
	16	16	16	16	16
	5	5	5	5	5
	4	4	4	4	4
	17	17	17	17	17
	1b	1b	1b	1b	1b
LOWER ▼	1a	1a	1a	1a	1a

*Note: The combination at far left repeats the ranking from Table III-3 and serves as a baseline for comparison purposes

Table D.6-IV. Sensitivity Comparison–Cost Element 3*

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Composite Rankings	Alternate Weighting Schemes				
	Distribution of Intelligence (3) Obstacle Detection (7)	Distribution of Intelligence (4) Obstacle Detection (6)	Distribution of Intelligence (1) Obstacle Detection (9)	Distribution of Intelligence (2) Obstacle Detection (8)	Distribution of Intelligence (5) Obstacle Detection (5)
HIGHER ▲	3a	3a	3a	3a	3a
	13	13	13	13	13
	12b	12b	12b	12b	12b
	2	2	2	2	2
	12a	12a	12a	12a	12a
	19	19	8b	8b	19
	8b	8b	19	19	8b
	9	9	9	9	9
	11	11	11	11	20
	8a	20	8a	8a	11
	20	8a	20	20	8a
	10	10	10	10	10
	14	14	14	14	18
	15	18	15	15	14
	18	15	6	6	15
	6	6	18	18	6
	16	16	16	16	16
	5	5	5	5	5
	4	4	4	4	4
	17	17	17	17	17
	1b	1b	1b	1b	1b
LOWER ▼	1a	1a	1a	1a	1a

*Note: The combination at far left repeats the ranking from Table III-3 and serves as a baseline for comparison purposes

Table D.6-V. Sensitivity Comparison–Cost Element 4*

Composite Rankings	Alternate Weighting Schemes				
	Distribution of Intelligence (6) AHS and Non-AHS Mixing (3) Obstacle Detection (1)	Distribution of Intelligence (8) AHS and Non-AHS Mixing (1) Obstacle Detection (1)	Distribution of Intelligence (7) AHS and Non-AHS Mixing (2) Obstacle Detection (1)	Distribution of Intelligence (6) AHS and Non-AHS Mixing (2) Obstacle Detection (2)	Distribution of Intelligence (5) AHS and Non-AHS Mixing (3) Obstacle Detection (2)
HIGHER ▲	3a	3a	3a	3a	3a
	13	13	13	13	13
	12b	12b	12b	12b	12b
	2	2	2	2	2
	12a	12a	12a	12a	12a
	19	19	19	8b	8b
	8b	8b	8b	19	19
	9	9	9	9	9
	11	11	11	11	11
	8a	8a	8a	8a	8a
	20	20	20	10	20
	10	10	10	20	10
	14	14	14	14	14
	15	15	15	15	15
	18	18	6	6	18
	6	6	18	18	6
	16	16	16	16	16
	5	5	5	5	5
	4	4	4	4	4
	17	17	17	17	17
	1b	1b	1b	1b	1b
LOWER ▼	1a	1a	1a	1a	1a

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*Note: The combination at far left repeats the ranking from Table III-3 and serves as a baseline for comparison purposes