Research Report
KTC-96-17

EVALUATION OF EDGE DRAINS ON INTERSTATE 64 FAYETTE, SCOTT, AND WOODFORD COUNTIES

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EXECUTIVE SUMMARY

This report documents findings of the investigation of edge drains and their associated outlets on Interstate 64 from Milepost 65 to Milepost 75.6 in Fayette, Scott, and Woodford Counties. The study was initiated due to significant amounts of water and fines coming up through the AC surface. State and Federal Officials were concerned that possible failures in the edge drains were causing pumping and staining which will ultimately lead to premature pavement failure. Several factors appear to be contributing to the staining and pumping at the surface. These factors are discussed in the report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

In 1990, Hydraway panel edge drains were installed on Interstate 64 from Milepost 57.90 to 73.20 in the eastbound direction, and from Milepost 57.90 to 74.31 in the westbound direction. Construction began in the fall of 1990 and was completed in the summer of 1991. Research Report KTC-91-19 "Construction Evaluation of Hydraway Edge Drain and Outlet Pipes on Interstate 64" documents several problems encountered during and after the installation of the edge drain system. In 1995, the pavement was broken, seated, and overlaid. Round pipe edge drains were added in under cut areas on the east end, west of the I-64/I-75 Interchange. In the Spring of 1996, significant pumping and staining started to occur throughout the new overlay area (Figure 1 and 2). This report documents distress observed in the edge drain system during recent and prior inspections. This information is correlated to the current pavement distress. Due to time restraints of this project, the entire edge drain system was not evaluated but only the section in which significant staining and pumping were observed.

EDGE DRAIN OUTLET INSPECTION

The edge drain outlet system was inspected for signs of distress. The concrete headwalls were inspected for signs of tilting, clogging, and position above the ditch line. The outlet pipe was also inspected with a pipeline inspection camera. A total of 106 edge drain outlets were inspected.

Headwall Tilting

Of the 106 outlets inspected, approximately 19 percent were tilted backwards, 8 percent were level, and 73 percent had a positive slope (Figure 3). Figure 4 indicates that of the 73 percent that were tilted forward, 57 were below the recommended 4.1 % grade (½ inch drop per linear foot inside the headwall). Approximately 148 headwalls were inspected after construction in 1991. At the time of the inspection, approximately 57 percent of the outlets had a positive slope, 23 percent were level, and 20 percent had a negative slope. Headwall inspection information is contained in Appendix A. Backward tilting was also observed on an edge drain project on Pennyrile Parkway. A new headwall design was recommended in Research Report KTC-96-11.

The recommended headwall design has an inclined positive flow invert, which will allow the headwall to be placed on a level footing and increase the stability. The centroid of the headwall was moved from the rear to the middle of the headwall, which should help eliminate the backwards settling of the headwall The outlet was also raised off the base of the invert to allow for some accumulation of debris in the headwall. The current headwall design is shown in Figure 5 and the recommend

headwall is shown in Figure 6.

Debris in Headwalls

Significant amounts of debris were noted in ends of the outlet pipes and in the trough of the headwalls. Approximately 60 percent of the outlets were clean, 34 percent were partially open, and 6 percent were totally plugged. A significant amount of the material blocking the outlets in the shoulder drains was No. 8 stone which was used to dress outside the paved shoulder (Figure 7). Significant amounts of calcium carbonate were also observed in the headwalls and on the screens (Figure 8). Most of the material blocking median drains was soil and vegetation (Appendix A). It is also apparent from discussion with Federal and State Officials that several of the outlets had been cleaned prior to the investigation.

Rodent Screens

Approximately 12 percent of the outlets inspected did not have rodent screens. Approximately 50 percent of the screens were clean, 32 percent were partially blocked, and 6 percent were completely blocked. A significant portion of the material blocking the screens appears to be calcium carbonate from the broken concrete.

Ditch lines

In several areas, the ditch lines were not sufficiently deep to drain the water away form the headwalls (Figure 9).

Outlet Pipes

The edge drain outlet pipes were inspected for sags, siltation, standing water, compression, rips, and other noticeable distress. The edge drain system was inspected with a mini camera. The system was divided into sections for inspection and analysis. The assigned outlet pipe sections are shown in Figure 10. Detailed information from the inspection is contained in Appendix B. The inspection revealed that, on the average, approximately 32 percent of the 106 outlet pipes were not fully functional. Significantly more distress was observed on the backside of the headwall than any other place in the outlet pipe system. Table 1 shows the type and frequency of distress recorded in each pipe section. This information is also shown in Figures 11, 12, and 13.

Approximately 38 percent of the significant distress (compressed coupling, compressed pipe, backfill, separated coupling, and rips) that was recorded was occurring directly behind the headwall in pipe sections A (Figure 14).

Significant sagging was observed under the asphalt shoulder in section E of the outlet pipe system. This was also observed during the initial construction of the project (Figure 15).

The open area or area available to handle the flow had been reduced considerably in several areas due to vertical compression in the pipe. An estimate of the open area was documented during the inspection. On the average, only 68 percent of the outlet pipes were 90 to 100 percent open (Figure 16).

EXCAVATION OF PANEL DRAIN

The Hydraway panel drain was excavated in three areas around Milepost 68, in an area where pavement pumping had been occurring. A significant amount of water was observed standing in the pavement at the time of the excavation (Figure 17). At all three sites, the panel had been significantly compressed. It appears that the core area of the drain had been reduced by approximately 30 to 40 percent (Appendix C). The edge drains were inspected after installation and after significant settlement had occurred in the trench shortly after installation. Slight to moderate distress was observed after installation. The panel was inspected in several areas prior to and after break and seating and it appeared that the breaking was not causing additional distress to the panel. At this time, it is uncertain when the additional distress occurred in the panel. It could be isolated areas that were not identified during the previous borescopings.

A panel/outlet connection was extracted at milepost 67.916, it is apparent that the panel had been bent ninety degrees to connect to the outlet. The bend in the panel had reduced the flow going to the outlet (Figure 18).

ANALYSIS OF PAVEMENT DISTRESS AND PAVEMENT DRAINAGE

An analysis of pavement distress and pavement drainage was performed to correlate the condition of the drainage system to road surface distress. A surface distress survey was conducted on the pavement throughout the study area. This information along with outlets, connector type, standing water in ditch lines, and percent grade are shown in Appendix D.

The distress surveys in Appendix D, indicate there are several factors that could be contributing to the pavement distress. 1) Outlet T's appeared to have not been used in several sagged areas where you would expect T's. It is likely that a significant amount of water is remaining under the pavement. 2) A significant amount of staining appears to be contributed to debris in the headwalls which are blocking the outlet pipes. This appears to be occurring from Milepost 71 to 71.513. 3) In other areas, the data indicate problems are likely occurring due to reduction in flow in the panel drain, since the outlet pipes and headwalls were clean and open (These data may be skewed

since several of the outlets had been clean prior to this research).

INFRARED SCANS

Infrared scans were conducted on the east end of the project at the I-75 and I-64 Interchange. Significant staining was observed between the ramp and the mainline (Figure 19). Figure No. 20 shows a thermal scan of westbound I-64 on ramp. Significantly higher temperatures were observed in the ramp than the two driving lanes. It appears that there is water being held under the driving lanes and it is coming up at the construction joint between the ramp and the driving lane. The contractor and State Officials stated that edge drains were not installed through this area.

Infrared scans conducted throughout the study area indicates that water appears to be trapped in the broken concrete, and also in the AC overlay. Cooler temperatures were noted throughout the project in the driving lanes. Four-inch cores taken near the excavation sites confirmed that significant amounts of water were trapped within the pavement layers. Signs of stripping were also present in the AC layers.

CONCLUSIONS AND RECOMMENDATIONS

General Conclusions

Based on information gathered from this project, past edge drain projects, and laboratory testing, the following general conclusions can be made regarding edge drain systems.

It is apparent from recent analysis of pavement drainage systems that edge drains appear to increase the life of the pavement, but can also decrease the life of the pavement (at a much more rapid rate than pavements without drainage) if they are not properly installed and maintained.

It appears that all edge drains and outlets should be inspected with a mini camera after installation and prior to final acceptance.

It is recommended that the modified headwall design be considered. The new headwall should eliminate the rearward settling of the headwalls and decrease the percentage of failures of the outlet pipes. The new recommended 4:1 headwall is approximately two feet shorter than the current headwall. This should aid in the

placement of the headwall in narrow ditch lines.

It is recommended in cuts that the ditch lines should be under cut. A perforated pipe should be placed in the base of the ditch and backfilled with a permeable aggregate (Figure 22). If there is not sufficient room for the edge drain headwall on the slope, then the outlet should be tied into the pipe in the ditch drain (Figure 23).

Inspections conducted on the double-wall pipe on several projects indicated that sagging is still occurring. It is recommended that a stiffer landfill grade polyethylene be evaluated for future use by the Kentucky DOH for edge drain outlets.

Information from past installations and laboratory tests indicates that the more open panel drains including cuspated (Akwadrain, Prodrain, Contech) and post type panels (Hydraway), are more sensitive to the method and type of placement during construction than the closed type cores. It is also evident that their performance varies greatly with the density of the backfill, and it is also evident that some fabric intrusion will occur even with good installation techniques.

More stringent installation and density requirements need to be developed to insure proper installation. Until these steps are developed and in place, it is recommended that the more open type cuspated and post type cores not be used. The performance of the solid type cores such as Advanedge edge appears to be more stabile in the laboratory and the field. Flow tests indicate that the Advanedge panel will handle approximately 40 gallons per minute.

It is apparent that problems occurred on this project and past projects due to construction methods, materials, and lack of maintenance. It is evident that edge drains cannot be installed and forgotten. A pavement drainage task group should be formed. The task group should include members from design, construction and maintenance. The object of this task group would be to decide if drainage is needed on new or current pavements, and the type of drainage system to be installed, if needed. The task group would follow up on the construction inspection, make any changes to the current project, and make any changes in the specification. The task group would also follow maintenance activities to insure that the drains are properly maintained and make changes needed to the specification. A flow chart has been developed recommending the duties of this proposed Task Group (Figure 24).

Evidence of stripping was observed in the asphalts cores taken from this project. Similar observations have been made on previous projects. It appears that (at times) water is trapped in segregated and more permeable areas in the AC base coarse which may be overlying less permeable broken PCC layers and/or denser AC base layers. Permeability tests conducted on I-75 on a newly broken concrete section and on base material indicated that there was a considerable variation in permeabilities even within pavement sections.

Site Specific Conclusions

Approximately 38 percent of the edge drain outlets inspected had been significantly damaged. More problems were observed at the headwall and outlet pipe connection than at any other location in the drainage system.

It appears from recent compression flow tests conducted at the Kentucky Transportation Center that the capacity of the more open type core is likely being exceeded when moderate core reduction occurs. Preliminary analysis indicates under ideal conditions the capacity of the cuspated and post type cores are carrying approximately 20 to 23 gallons a minute. Preliminary analysis of inflow data indicates that the panels should be able to handle approximately 0.043 gallon per minute. This would be approximately 21 gallons per minute trying to exit the drain on a 500-foot run. It also appears that these flow values can be reduced substantially if the panel is not installed properly or is damaged after installation. From the limited inspection of the panel drain on this project, it is suspected that the capacity of the drains on this project has been significantly reduced, there by severely reducing their effectiveness..

At this time, it appears that the staining is largely due to lack of maintenance, poor construction of the outlets, and reduction of flow capacity in the panel. It is recommended that all the headwalls be cleaned and that all the outlet pipes be inspected with a pipeline camera. The outlets which are found damaged during the camera inspection should be repaired. The backward tilting headwalls should be reset. If more staining or other distresses appear (after cleaning and repairing headwalls and outlets) it will likely be necessary to replace all or parts of the edge drain.

FIGURE 1. SIGNS OF PUMPING AT SHOULDER CONSTRUCTION JOINT.

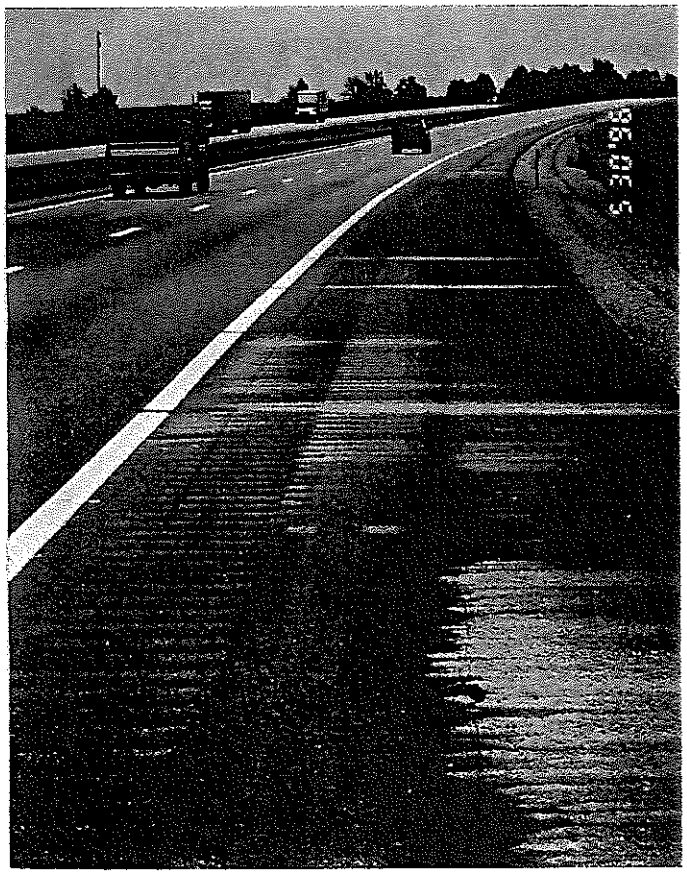


FIGURE 2. SIGNS OF PUMPING THROUGHOUT SHOULDER.

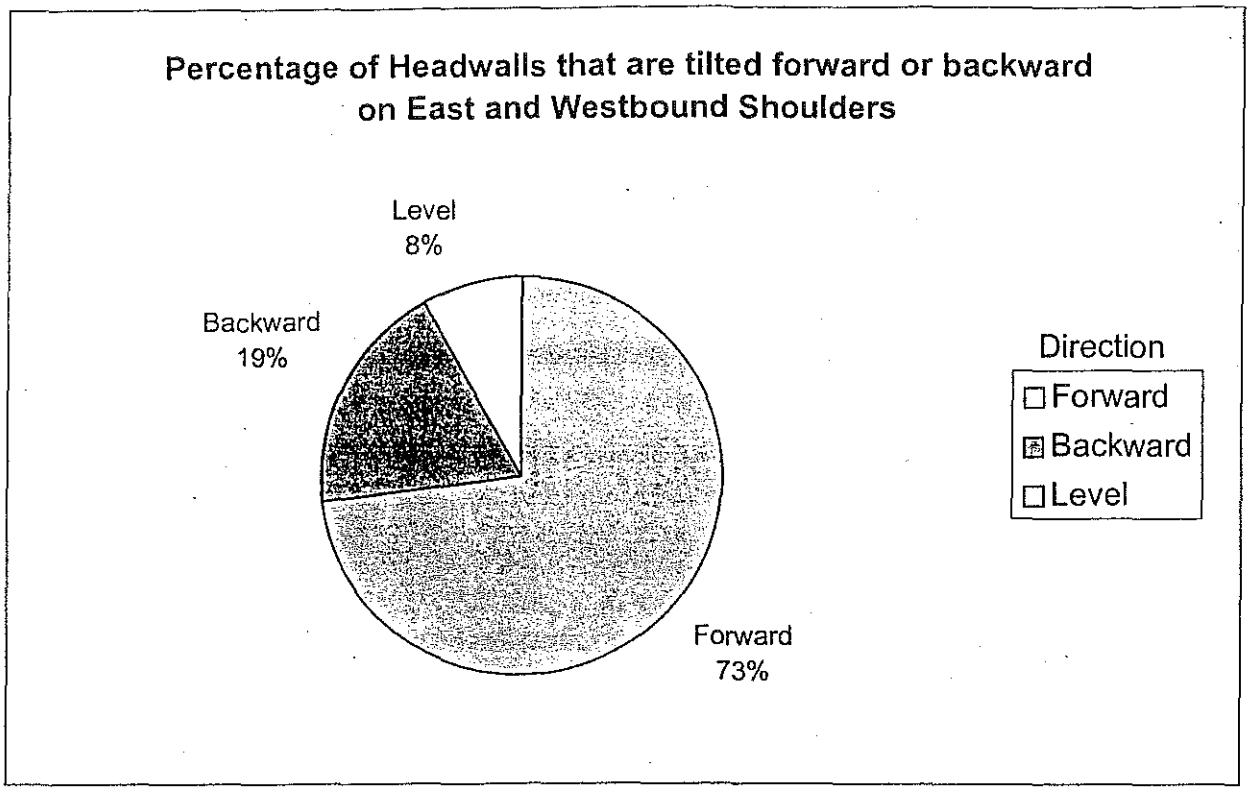


FIGURE 3. PERCENT OF HEADWALLS TILTED.

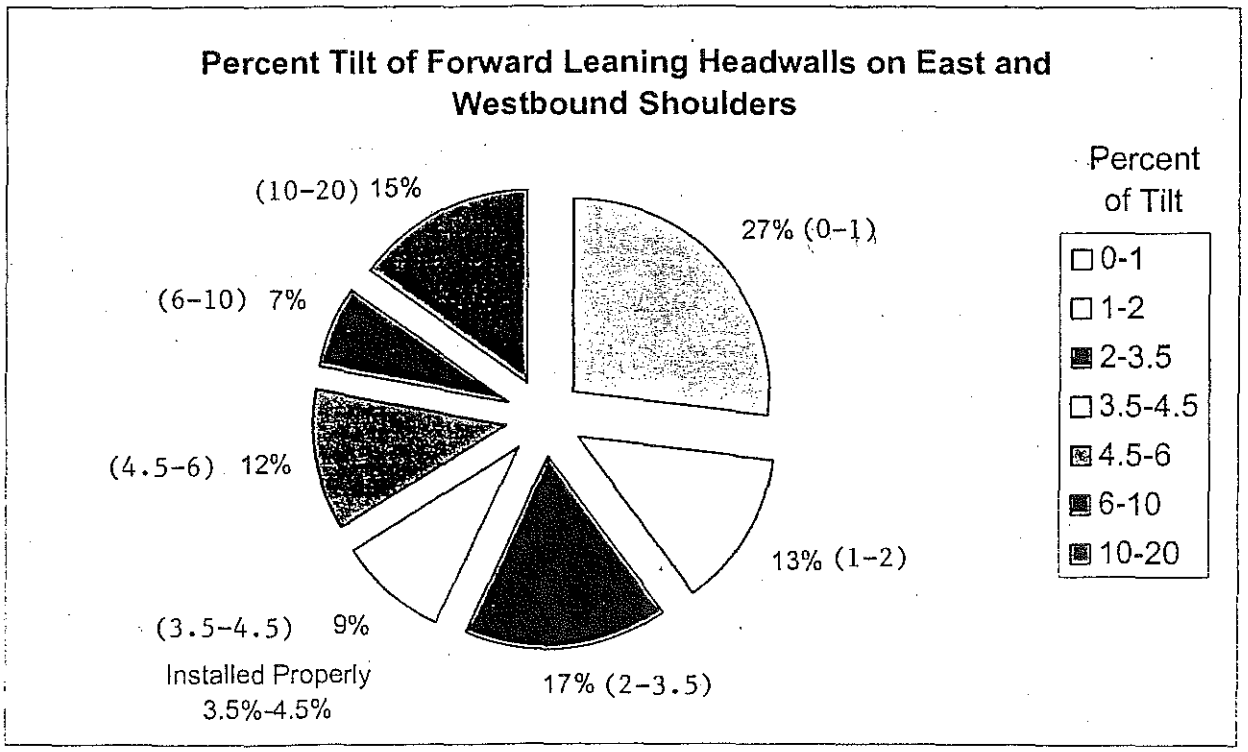
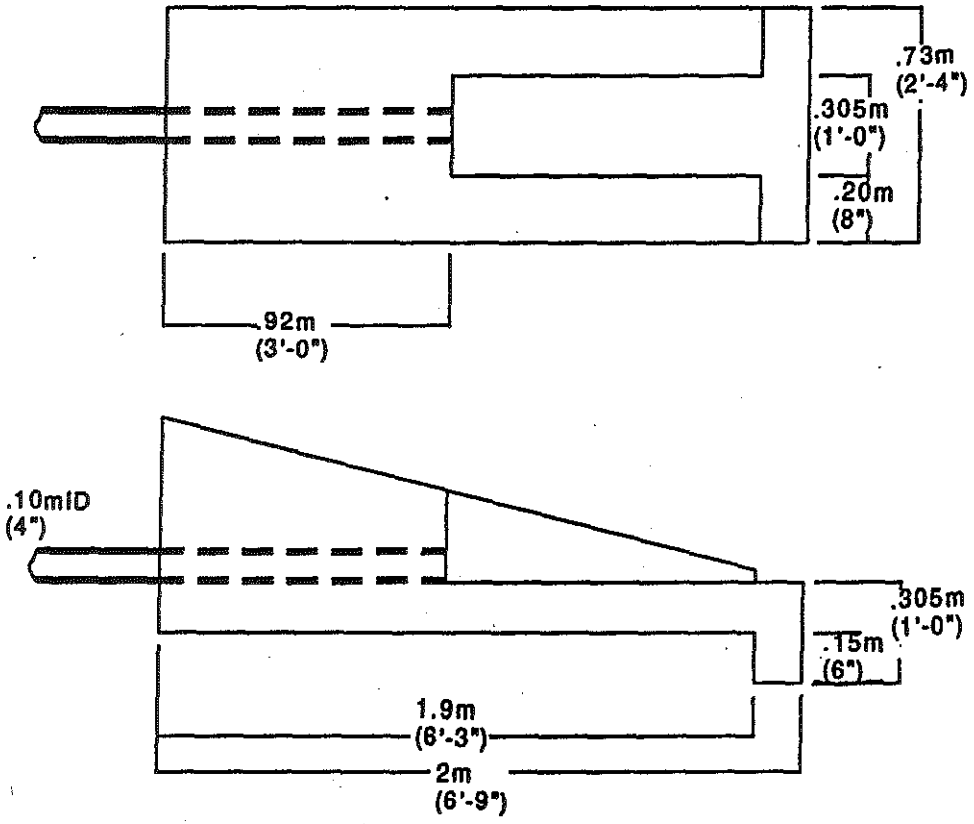
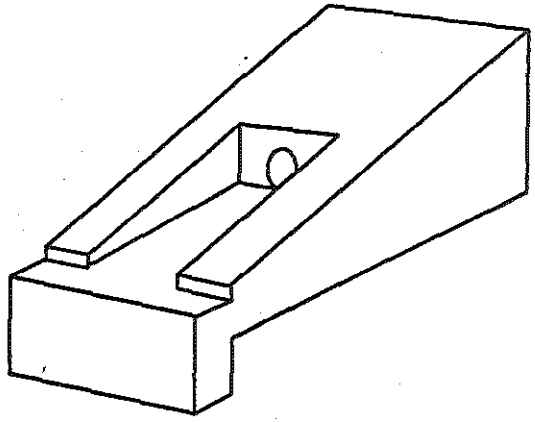


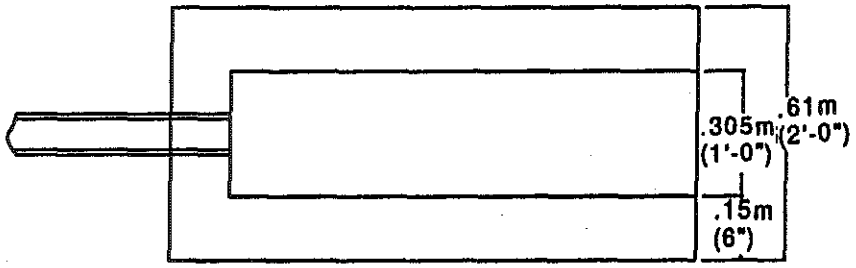
FIGURE 4. PERCENT OF TILT IN FORWARD LEANING HEADWALLS.

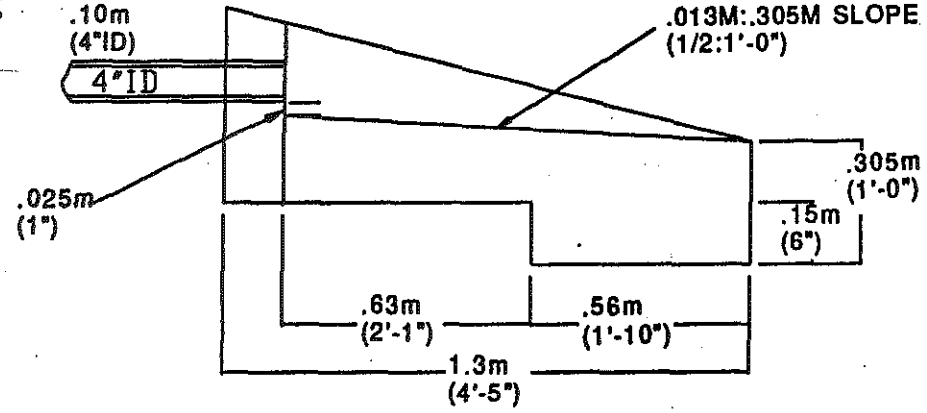




Kentucky

FIGURE 5. CURRENT HEADWALL DESIGN.





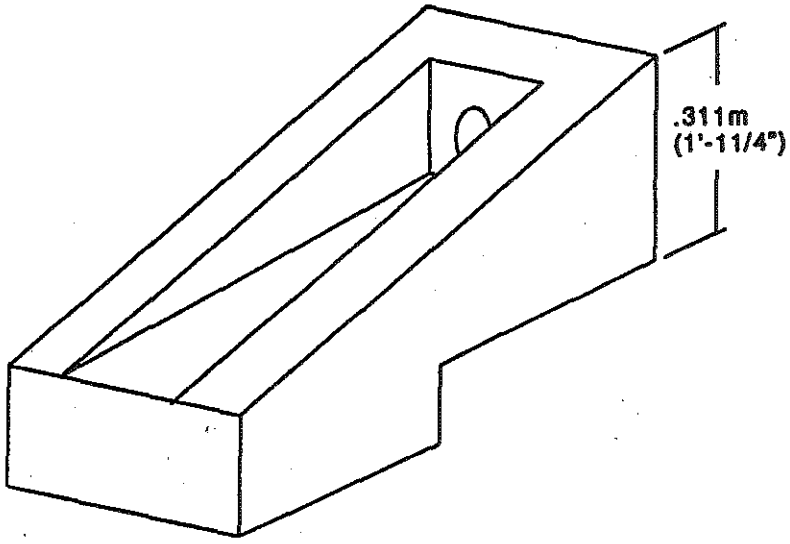


FIGURE 6. RECOMMENDED HEADWALL DESIGN.

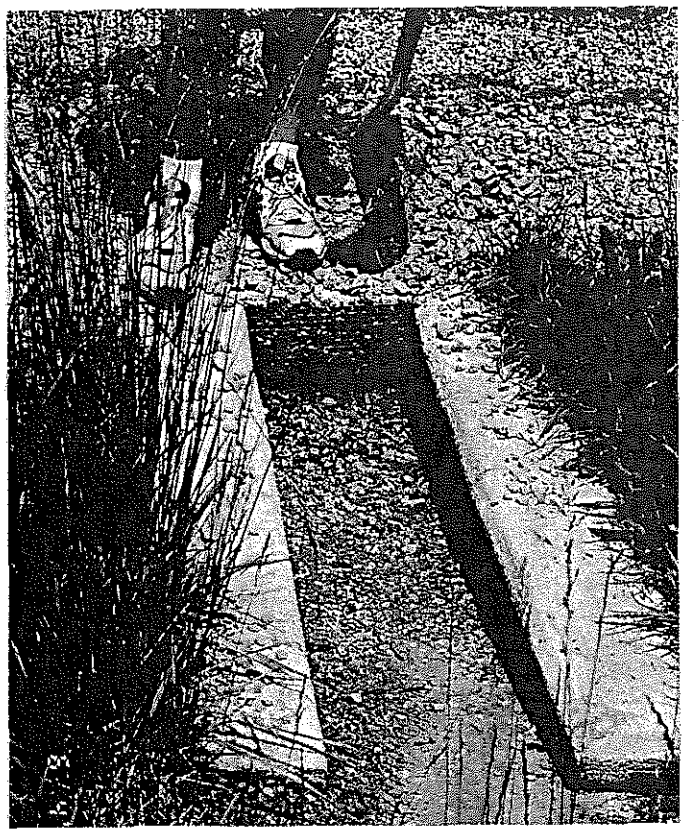


FIGURE 7. GRAVEL PARTIALLY BLOCKING OUTLET.

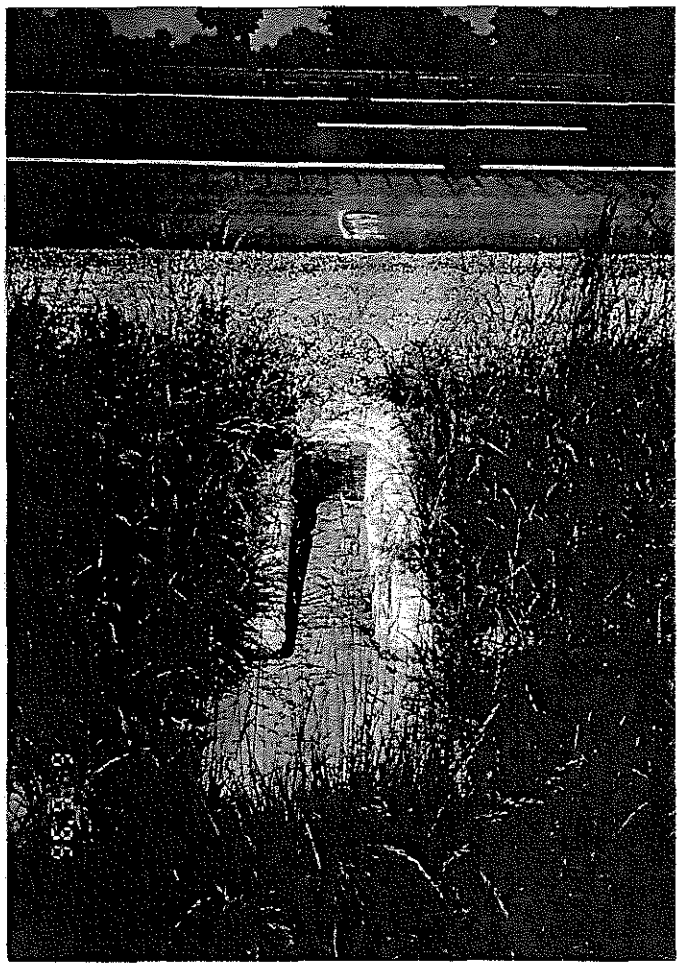


FIGURE 8. HEAVY AMOUNTS OF CALCIUM CARBONATE IN HEADWALL.

FIGURE 9. HEADWALL TOO LOW IN DITCH LINE, PARTIALLY UNDER WATER.

(EASTBOUND) TYPE OF DISTRESS OBSERVED (NUMBER) SHOULDER EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG	1						
SAG W/ STANDING WATER	4		9		12		2
SAG W/ SILTATION							
COMPRESSED COUPLING							
COMPRESSED PIPE	11						1
BACKFILL IN PIPE	10						
SEPARATION AT COUPLING		1					
RIP IN PIPE	2						
MOUSE NEST							

(EASTBOUND) TYPE OF DISTRESS OBSERVED (PERCENTAGE) SHOULDER EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG	3	0	0	0	0	0	0
SAG W/ STANDING WATER	14	0	31	0	41	0	7
SAG W/ SILTATION	0	0	0	0	0	0	0
COMPRESSED COUPLING	0	0	0	0	0	0	0
COMPRESSED PIPE	38	0	0	0	0	0	3
BACKFILL IN PIPE	34	0	0	0	0	0	0
SEPARATION AT COUPLING	0	3	0	0	0	0	0
RIP IN PIPE	7	0	0	0	0	0	0
MOUSE NEST	0	0	0	0	0	0	0

(WESTBOUND) TYPE OF DISTRESS OBSERVED (NUMBER) SHOULDER EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG	4		5				
SAG W/ STANDING WATER	10		13		38		
SAG W/ SILTATION	6		3				
COMPRESSED COUPLING							
COMPRESSED PIPE	3				1		
BACKFILL IN PIPE	6		5		1		
SEPARATION AT COUPLING		3					
RIP IN PIPE	2			2			
MOUSE NEST							

(WESTBOUND) TYPE OF DISTRESS OBSERVED (PERCENTAGE) SHOULDER EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG	6	0	7	0	0	0	0
SAG W/ STANDING WATER	15	0	19	0	56	0	0
SAG W/ SILTATION	9	0	4	0	0	0	0
COMPRESSED COUPLING	0	0	0	0	0	0	0
COMPRESSED PIPE	4	0	0	0	1	0	0
BACKFILL IN PIPE	9	0	7	0	1	0	0
SEPARATION AT COUPLING	0	4	0	0	0	0	0
RIP IN PIPE	3	0	0	3	0	0	0
MOUSE NEST	0	0	0	0	0	0	0

TABLE 1. DISTRESS OBSERVED IN PIPE EDGE DRAINS AND OUTLETS.

TABLE 1. CONTINUED

TYPE OF DISTRESS OBSERVED (NUMBER) MEDIAN EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG							
SAG W/ STANDING WATER	2				2		
SAG W/ SILTATION							
COMPRESSED COUPLING							
COMPRESSED PIPE	4						
BACKFILL IN PIPE	1						1
SEPARATION AT COUPLING							
RIP IN PIPE							
MOUSE NEST							

(WESTBOUND) TYPE OF DISTRESS OBSERVED (PERCENTAGE) MEDIAN EDGE DRAIN

LOCATION	A	B	C	D	E	F	G
SAG	0	0	0	0	0	0	0
SAG W/ STANDING WATER	22	0	0	0	22	0	0
SAG W/ SILTATION	0	0	0	0	0	0	0
COMPRESSED COUPLING	0	0	0	0	0	0	0
COMPRESSED PIPE	44	0	0	0	0	0	0
BACKFILL IN PIPE	11	0	0	0	0	0	11
SEPARATION AT COUPLING	0	0	0	0	0	0	0
RIP IN PIPE	0	0	0	0	0	0	0
MOUSE NEST	0	0	0	0	0	0	0

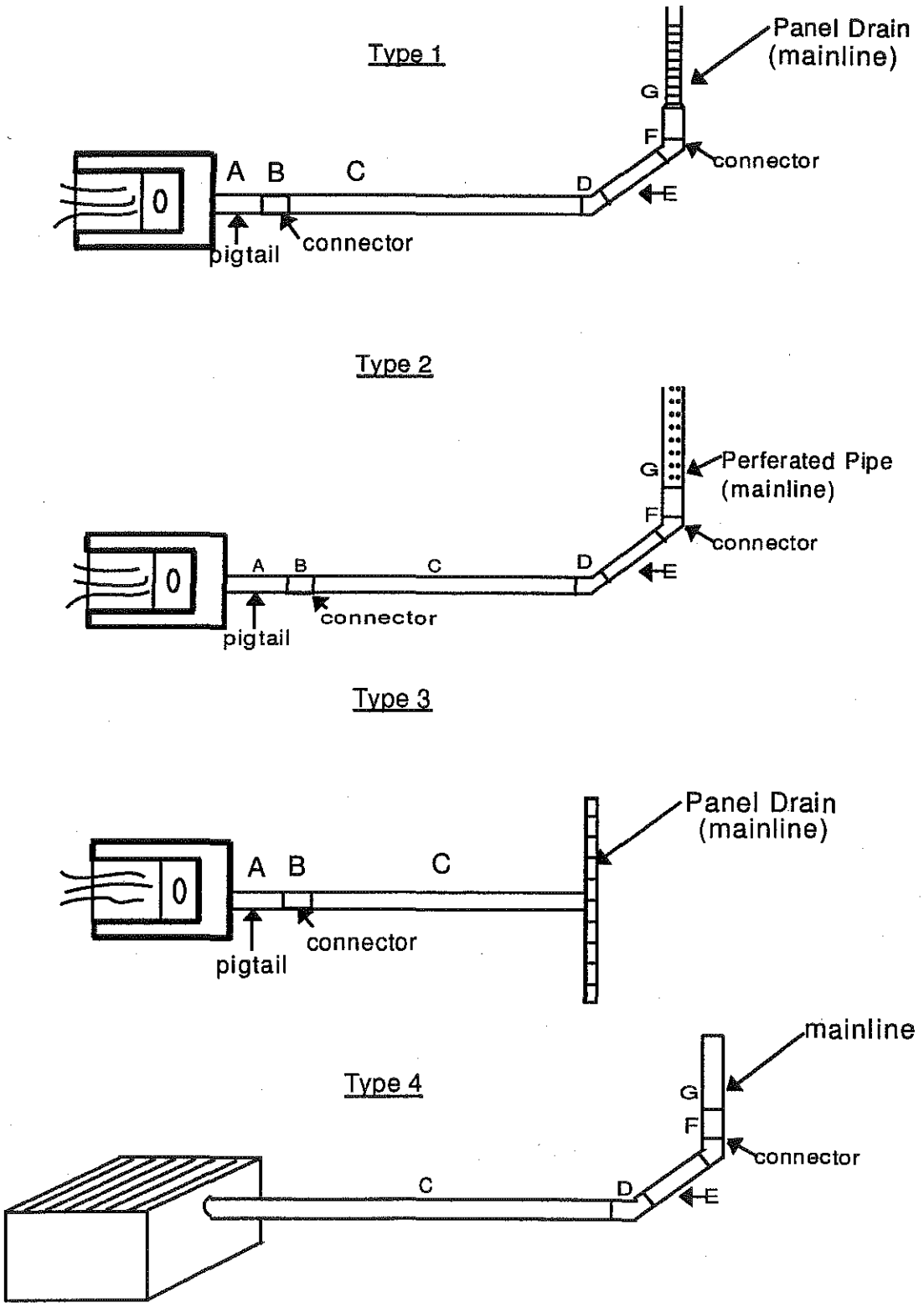


FIGURE 10. OUTLET PIPE TYPES AND SECTIONS.

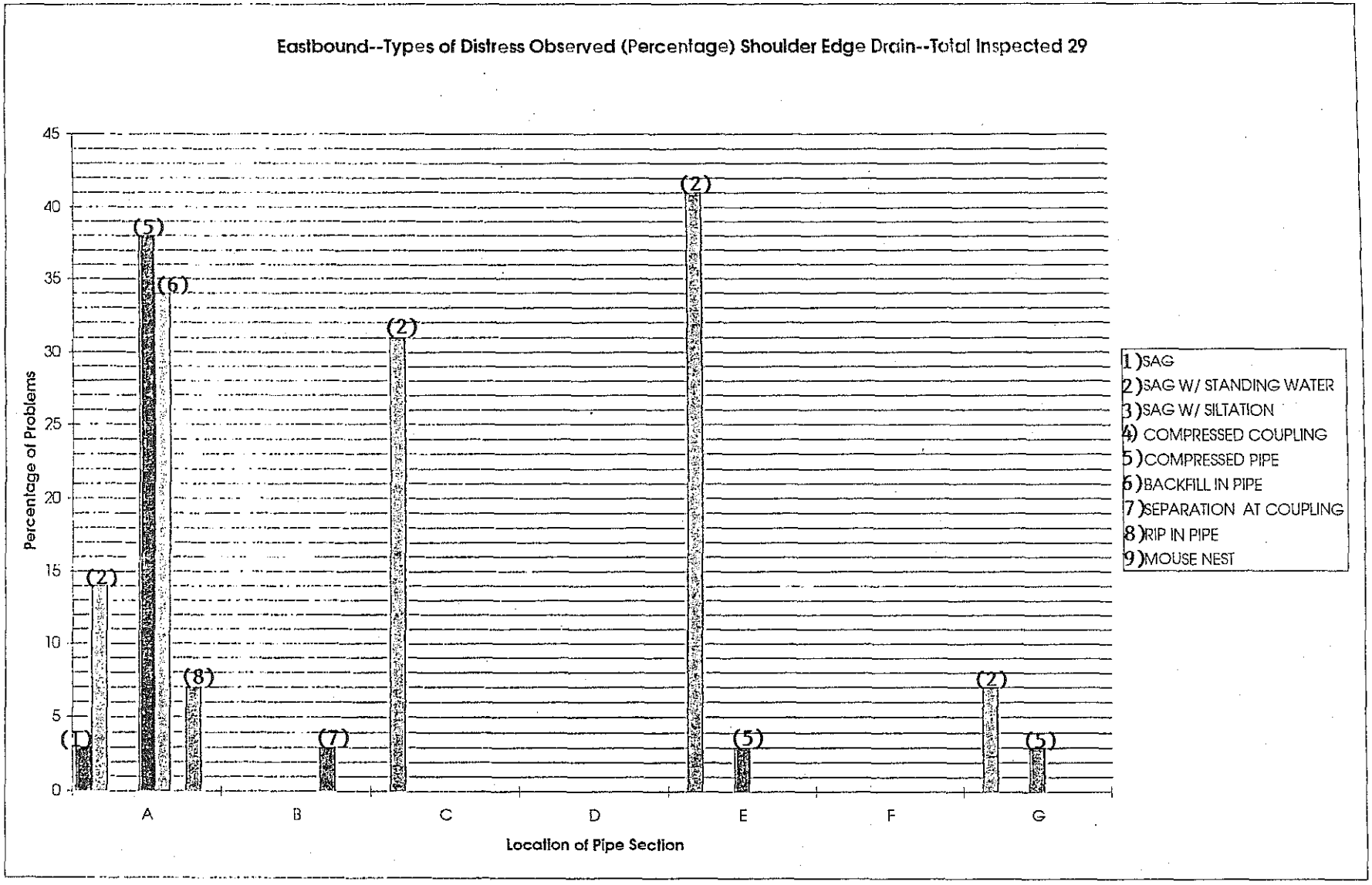


FIGURE 11. PROBLEMS OBSERVED IN EASTBOUND SHOULDER EDGE DRAINS.

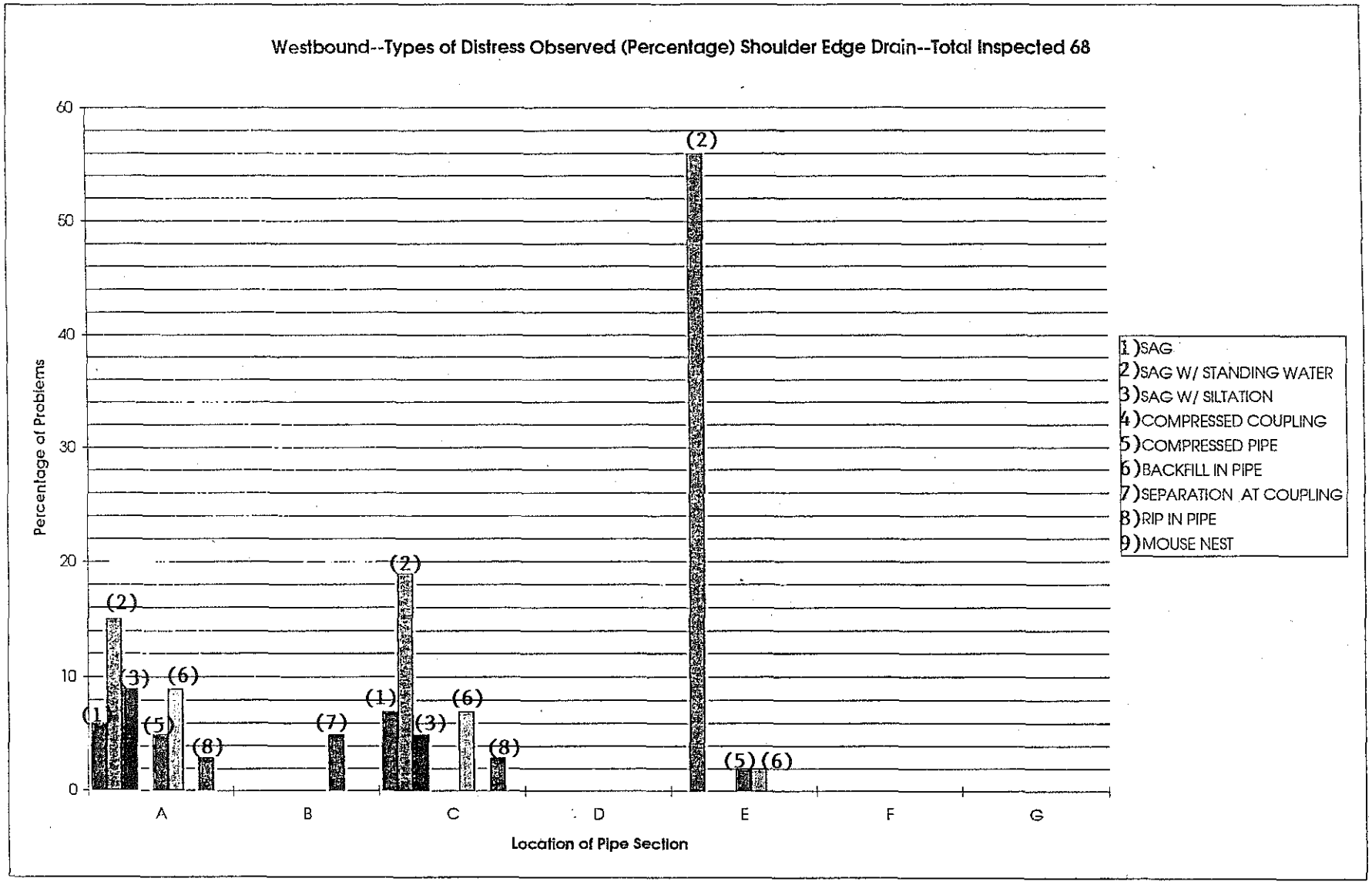


FIGURE 12. PROBLEMS OBSERVED IN WESTBOUND SHOULDER EDGE DRAINS.

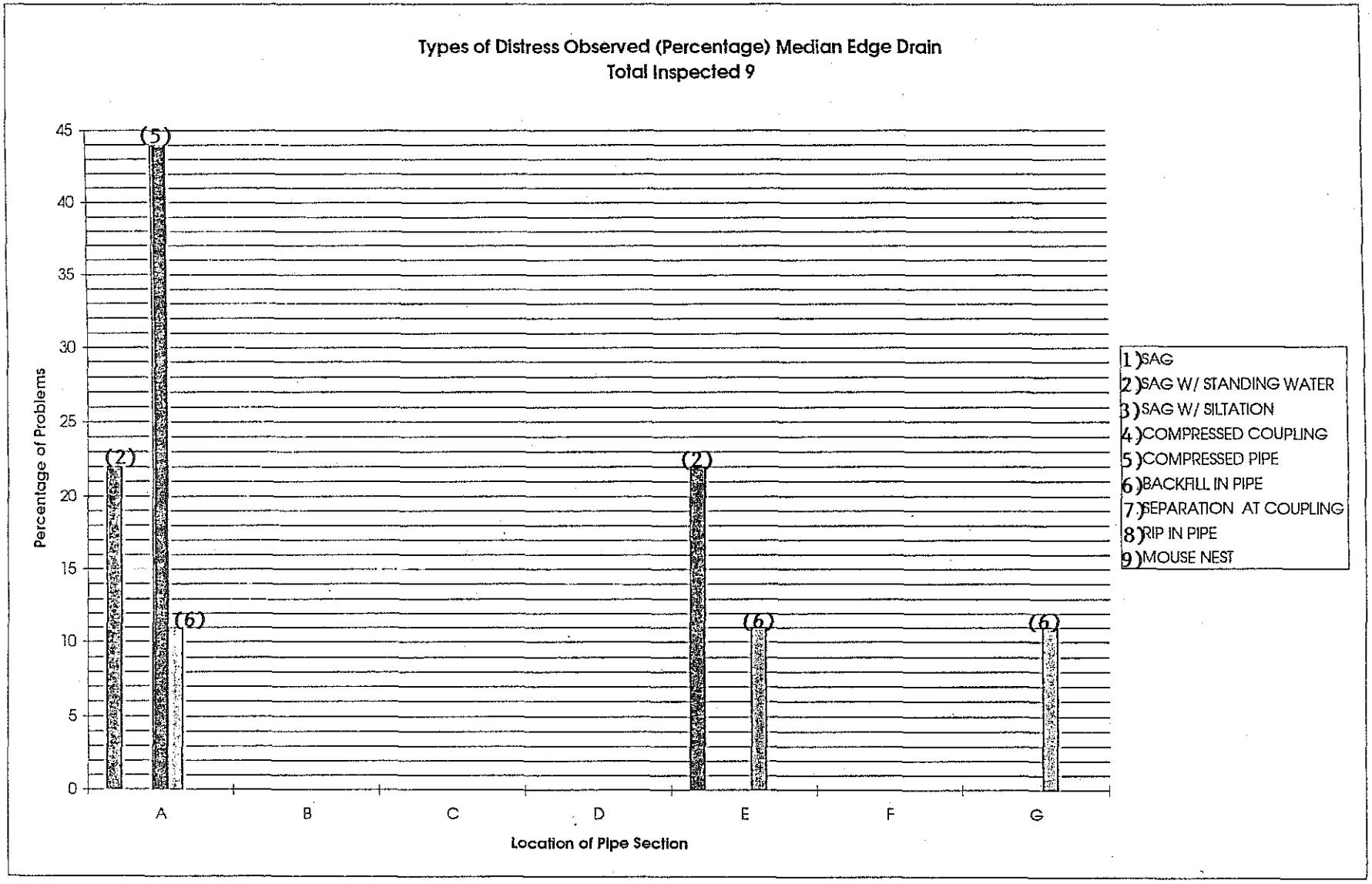


FIGURE 13. PROBLEMS OBSERVED IN MEDIAN DRAINS.

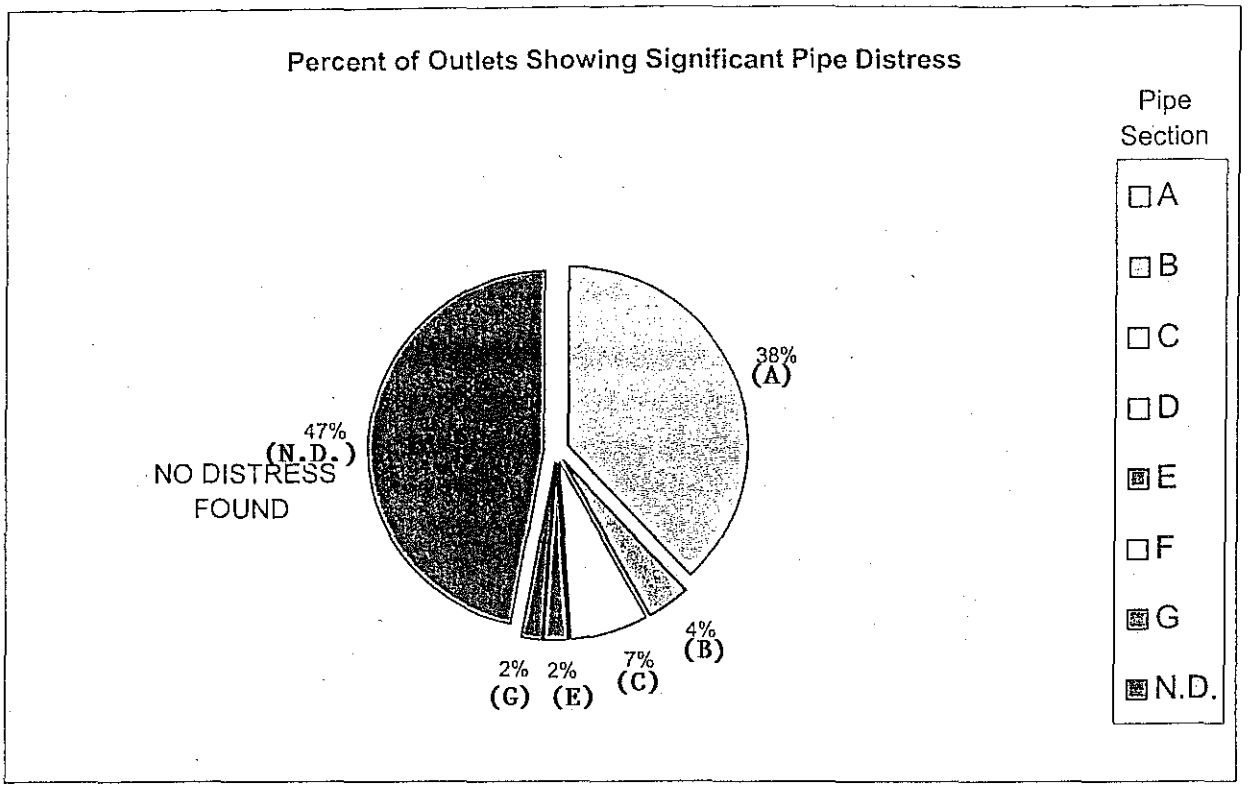


FIGURE 14. PERCENT OF OUTLET PIPES WITH SIGNIFICANT DISTRESS.

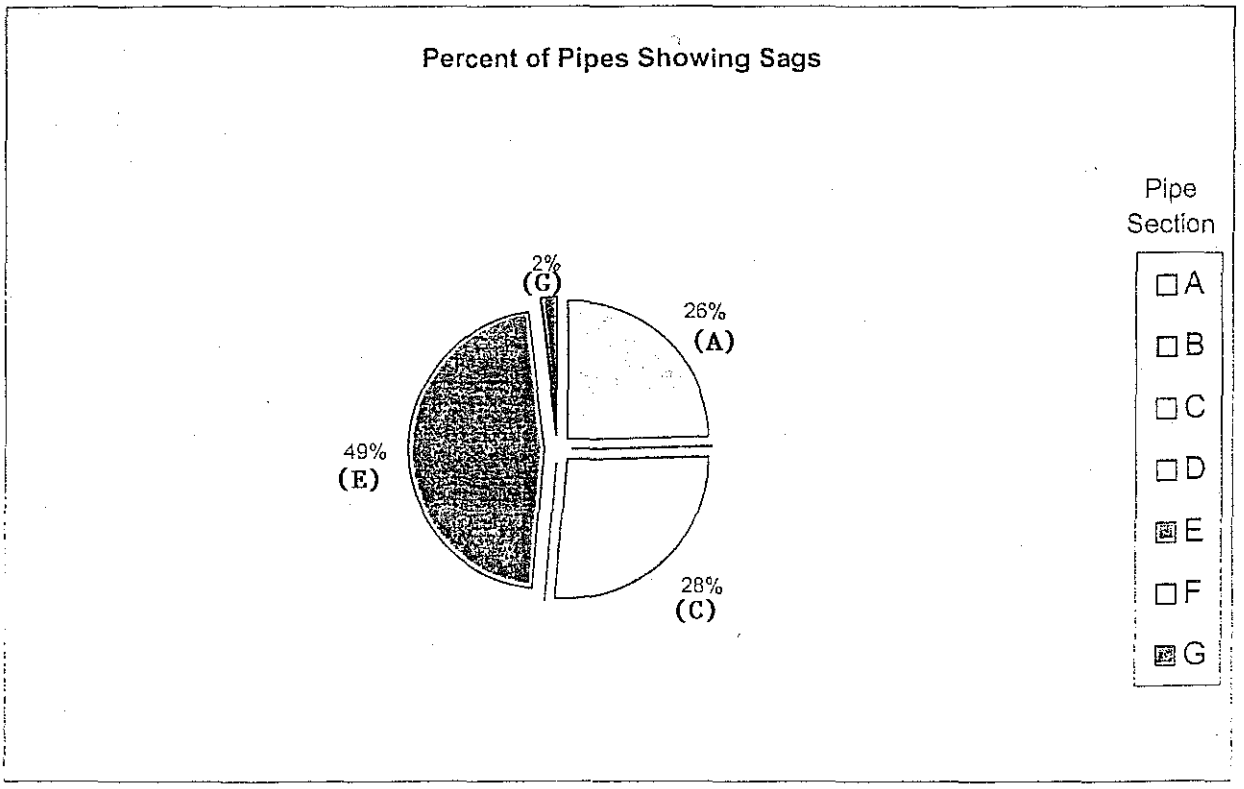


FIGURE 15. PERCENT OF OUTLET PIPES WITH SAGS.

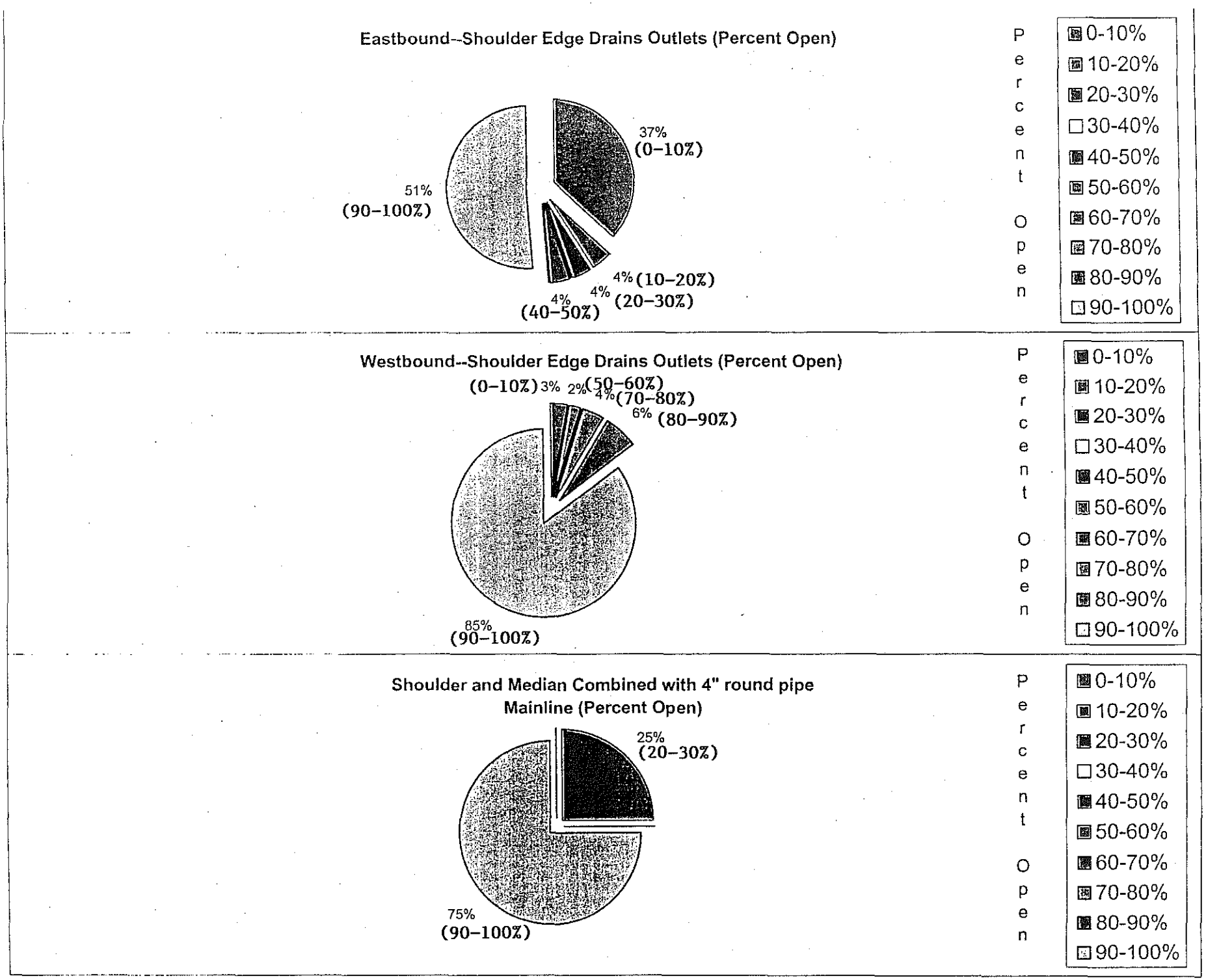


FIGURE 16. PERCENT OPEN AREA IN OUTLETS PIPES AND 4-INCH PIPE EDGE DRAINS.

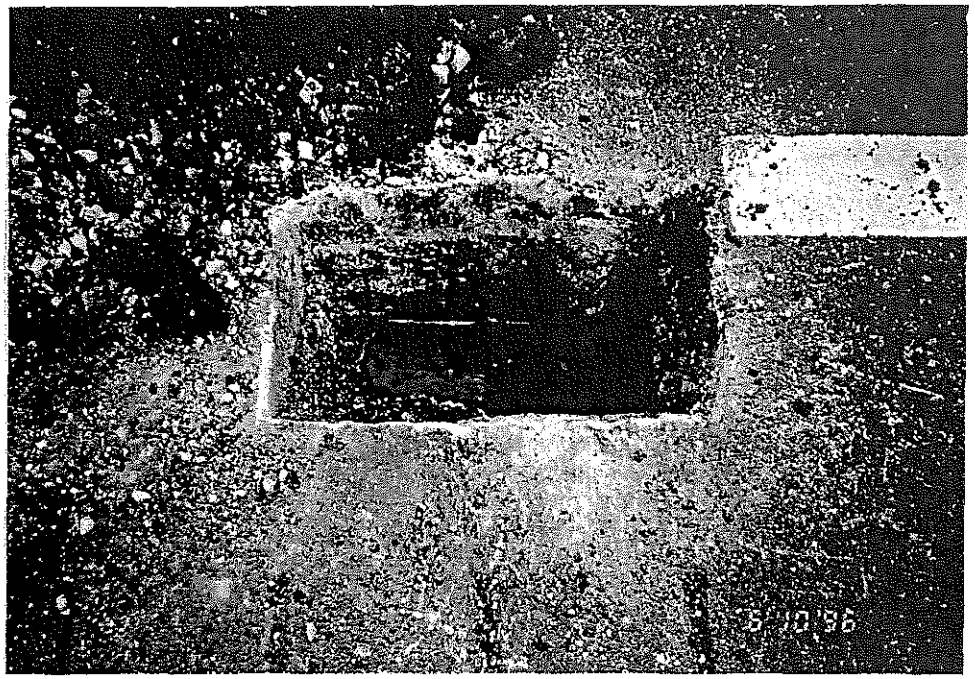
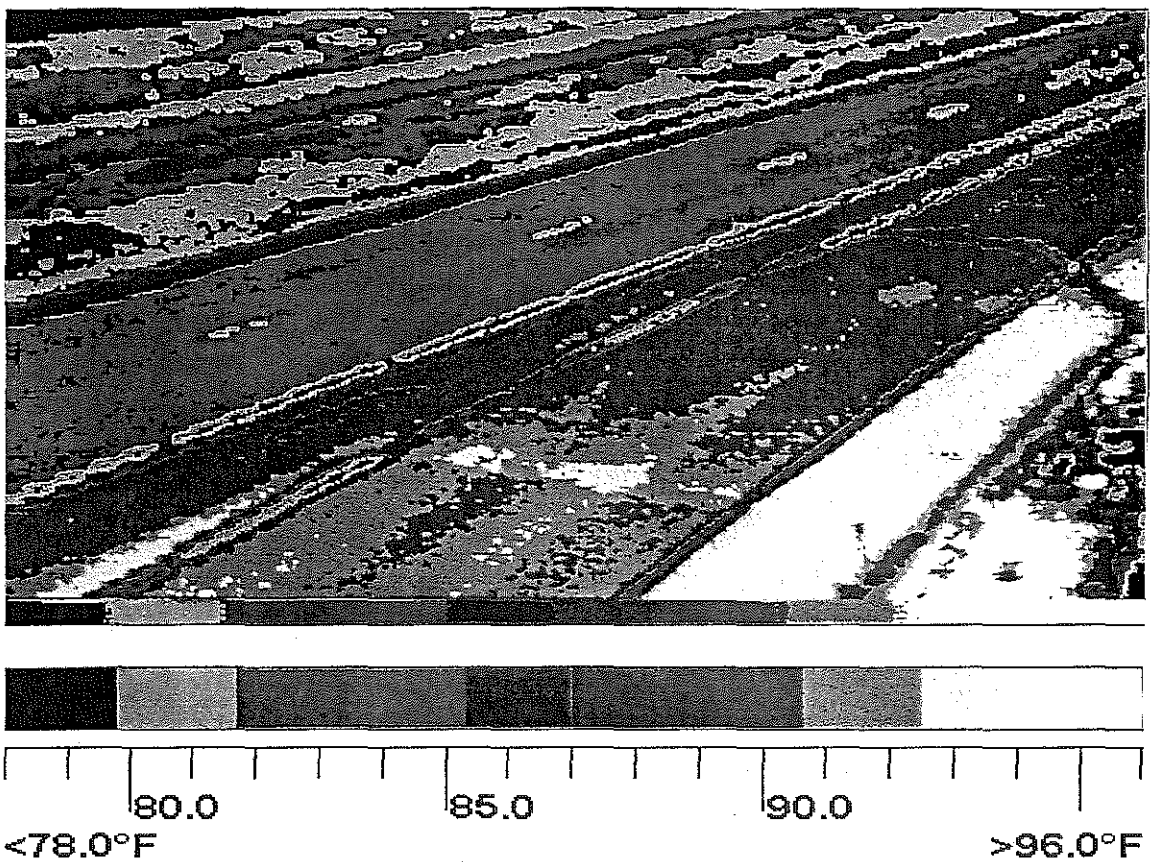


FIGURE 17. WATER STANDING WITHIN PAVEMENT LAYERS

FIGURE 18. BEND IN PANEL AT OUTLET CONNECTION.

FIGURE 19. PHOTO SHOWING DISTRESS ON RAMP, AT I-64/1-75 INTERCHANGE.



Infrared Image

FIGURE 20. INFRARED IMAGE ON RAMP.

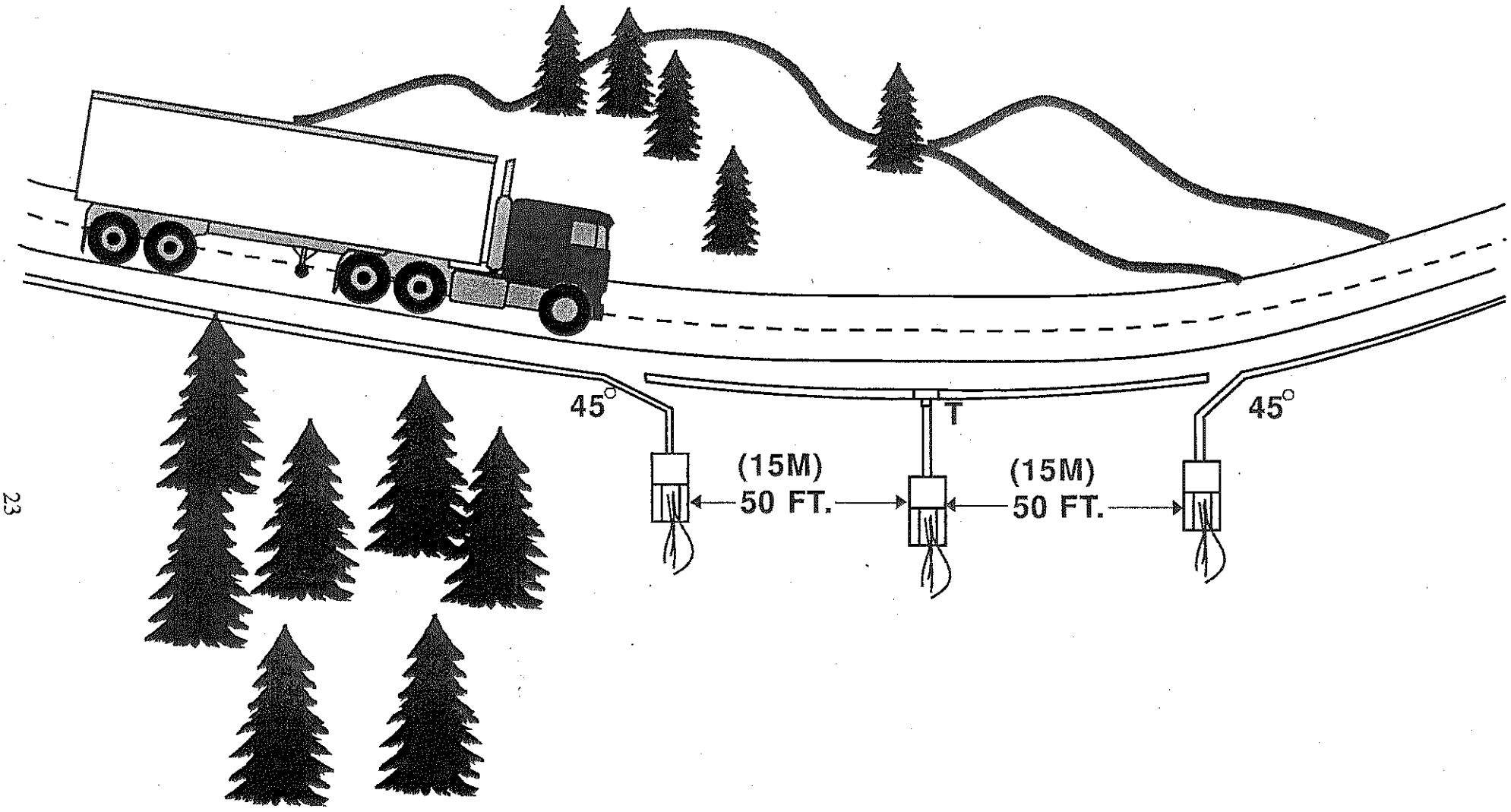


FIGURE 21. RECOMMENDED OUTLET SPACINGS AT SAGS.

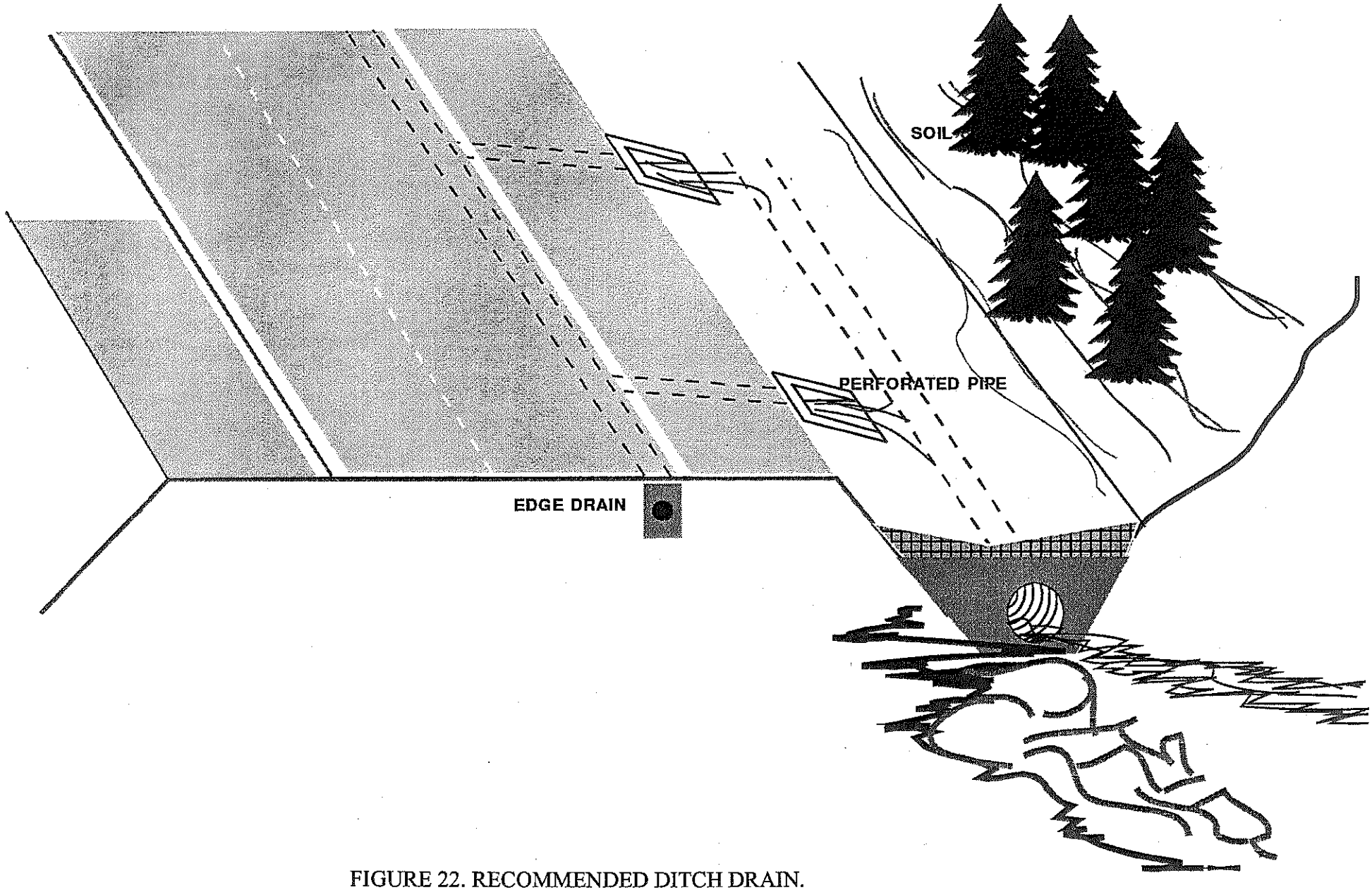


FIGURE 22. RECOMMENDED DITCH DRAIN.

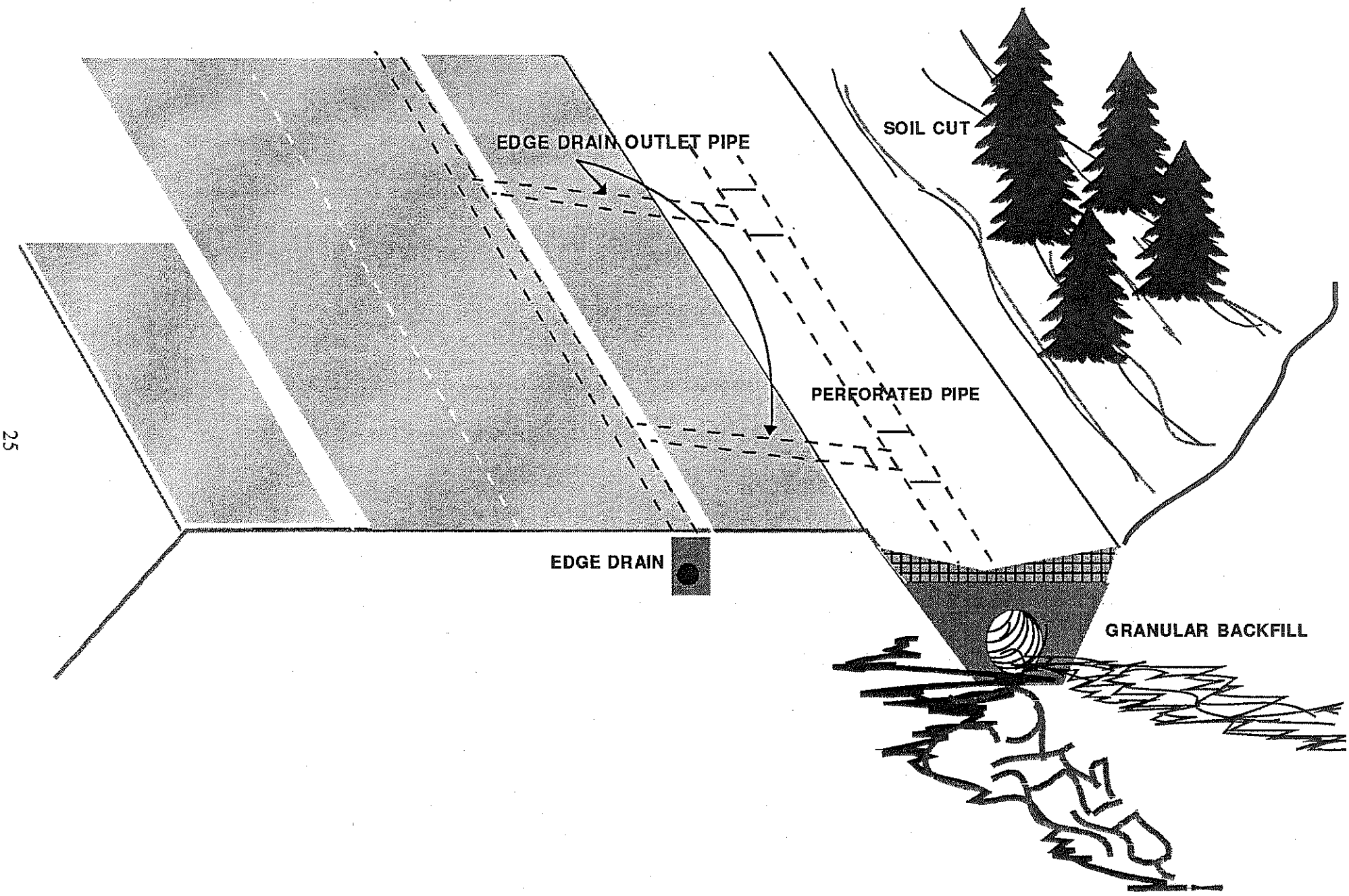


FIGURE 23. RECOMMENDED DITCH DRAIN AND EDGE DRAIN OUTLET.

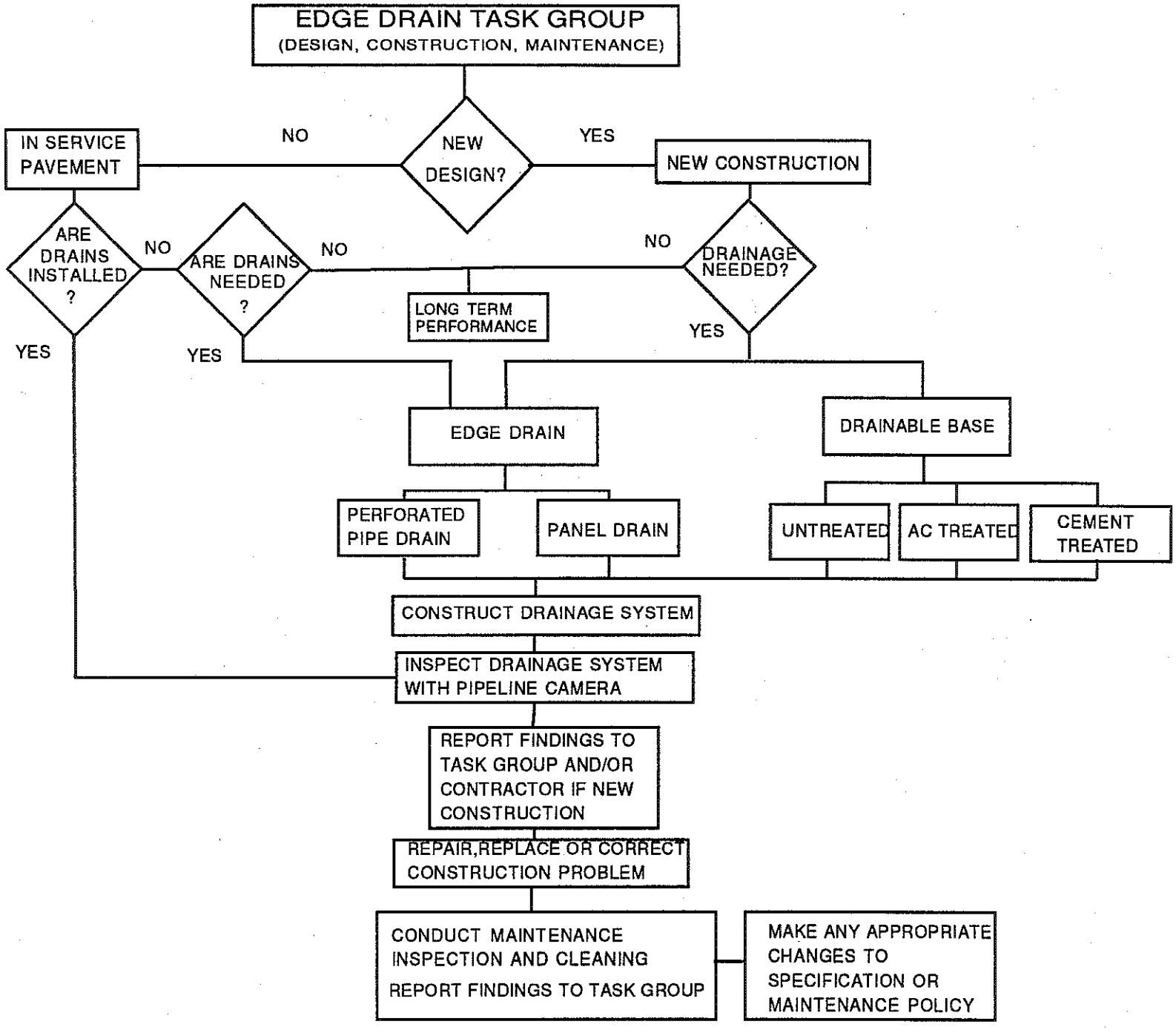


FIGURE 24. FLOW CHART SHOWING RECOMMENDED FORMATION FOR EDGE DRAIN TASK GROUP.

APPENDIX A
HEADWALL INSPECTION INFORMATION

I-64 HEADWALL INSPECTION WESTBOUND

OUTLET	(number)	(percentage)	COVER MAT.	(number)	(percentage)	SCREEN	(number)	(percentage)	SILT	(number)	(percentage)
1. clean	47	69	1.gravel	65	96	1. none	3	4	1. none	51	75
2. pt. cover.	21	31	2. dirt	3	4	2. open	44	65	2. slight	10	15
3. cover.	0	0	3. veg.	0	0	3. pt. open	21	31	3. mod.	4	6
4. plugged	0	0	4. concrete	0	0	4. blocked	0	0	4. sev.	4	6
FLOW	(number)	(percentage)	DRAINAGE	(number)	(percentage)						
1. yes	43	63	1. good	46	68						
2. no	25	37	2. poor	22	32						

I-64 HEADWALL INSPECTION EASTBOUND

OUTLET	(number)	(percentage)	COVER MAT.	(number)	(percentage)	SCREEN	(number)	(percentage)	SILT	(number)	(percentage)
1. clean	10	34	1.gravel	29	100	1. none	3	10	1. none	12	41
2. pt. cover.	17	59	2. dirt	0	0	2. open	9	31	2. slight	7	24
3. cover.	0	0	3. veg.	0	0	3. pt. open	15	52	3. mod.	3	10
4. plugged	2	7	4. concrete	0	0	4. blocked	2	7	4. sev.	7	24
FLOW	(number)	(percentage)	DRAINAGE	(number)	(percentage)						
1. yes	24	83	1. good	20	69						
2. no	5	17	2. poor	9	31						

I-64 HEADWALL INSPECTION MEDIAN

OUTLET	(number)	(percentage)	COVER MAT.	(number)	(percentage)	SCREEN	(number)	(percentage)	SILT	(number)	(percentage)
1. clean	7	78	1.gravel	0	0	1. none	2	22	1. none	5	56
2. pt. cover.	1	11	2. dirt	6	67	2. open	5	56	2. slight	1	11
3. cover.	0	0	3. veg.	3	33	3. pt. open	1	11	3. mod.	3	33
4. plugged	1	11	4. concrete	0	0	4. blocked	1	11	4. sev.	0	0
FLOW	(number)	(percentage)	DRAINAGE	(number)	(percentage)						
1. yes	7	78	1. good	9	100						
2. no	2	22	2. poor	0	0						

HEADWALL INSPECTION ON I-64 WESTBOUND

MILEPOST	DIR.	OUTLET TYPE 1. S.H. 2. S.B. 3. M.H. 4. M.B.	OUTLET 1. CLEAN 2. PT. COVER 3. COVER. 4. PLUGGED	COVER MAT. 1. GRAV 2. DIRT. 3. VEG. 4. CON.	SCREEN 1. NONE 2. OPEN 3. PT. OPEN 4. BLOCK	SILT 1. NONE 2. SLIGHT 3. MOD. 4. SEV.	FLOW 1. YES 2. NO	DRAINAGE 1. GOOD 2. POOR	COMMENTS	HEADWALLS % FOR.	TILTED % BKW.
74.671	w	1	1	1	2	2	2	1		1.05	
73.898	w	1	2	1	3	2	1	1	outlet 50% open, D.G.A.	0.17	
71.19	w	1	2	1	3	2	1	1	D.G.A. in flume	9.81	
71.144	w	1	2	1	3	4	1	2	outlet 25% open, D.G.A.		0.18
71.098	w	1	2	1	3	4	1	1	outlet 25% open clogged D.G.A.	0.35	
71.067	w	1	2	1	3	3	1	1	outlet 50% open clogged D.G.A.	2.44	
71.027	w	1	2	1	3	4	1	1	outlet 25% open clogged D.G.A.	11.22	
70.964	w	1	2	1	3	3	1	2	outlet 75% open, clogged D.G.A.		1.05
70.905	w	1	1	1	2	2	1	2		4.54	
70.738	w	1	1	2	1	1	1	1		2.62	
70.694	w	1	1	1	2	1	1	1			0.35
70.647	w	1	2	1	3	2	2	2	outlet 90% open, clogged D.G.A.	1.4	
70.589	w	1	1	2	1	1	1	1		1.22	
70.534	w	1	1	1	2	1	1	1		0.52	
70.491	w	1	2	1	3	3	1	1	outlet 80% open, clogged D.G.A.	1.75	
70.454	w	1	2	1	3	1	1	2	outlet 50% open clogged D.G.A.	0.52	
70.387	w	1	1	1	2	1	1	2		1.92	
70.32	w	1	1	1	2	1	1	1			2.27
70.242	w	1	1	1	2	1	1	2		3.5	
70.061	w	1	1	1	2	1	1	1		5.07	
69.974	w	1	1	1	2	1	1	1		0.17	
69.906	w	1	2	1	3	1	1	1	outlet 90% open, clogged D.G.A.	0.52	
69.81	w	1	1	1	2	1	2	1		0.35	
69.751	w	1	1	1	2	1	2	1			0.35
69.709	w	1	1	1	2	1	1	1		1.05	
69.674	w	1	1	1	2	1	2	1		0.35	
69.616	w	1	1	1	2	1	1	1		3.67	
69.559	w	1	1	1	2	1	1	1		3.32	

HEADWALL INSPECTION ON I-64 WESTBOUND

MILEPOST	DIR.	OUTLET TYPE 1. S.H. 2. S.B. 3. M.H. 4. M.B.	OUTLET 1. CLEAN 2. PT. COVER 3. COVER. 4. PLUGGED	COVER MAT. 1. GRAV 2. DIRT. 3. VEG. 4. CON.	SCREEN 1. NONE 2. OPEN 3. PT. OPEN 4. BLOCK	SILT 1. NONE 2. SLIGHT 3. MOD. 4. SEV.	FLOW 1. YES 2. NO	DRAINAGE 1. GOOD 2. POOR	COMMENTS	HEADWALLS % FOR.	TILTED % BKW.
69.52	w	1	1	1	2	1	1	1		2.1	
69.482	w	1	1	1	2	1	2	1			2.27
69.435	w	1	1	1	2	1	1	1		4.9	
69.388	w	1	1	1	2	1	2	1		2.97	
69.35	w	1	1	1	2	1	2	2		5.77	
69.311	w	1	1	1	2	1	1	1		0.69	
69.27	w	1	2	1	3	1	1	1	outlet 85% open, clogged D.G.A.	0.52	
69.223	w	1	2	1	3	1	1	1	outlet 70% open clogged D.G.A.	2.1	
69.058	w	1	2	1	3	1	1	2	outlet 70% open clogged D.G.A.	2.1	
69.002	w	1	2	1	3	1	1	2	outlet 70% open clogged D.G.A.		1.05
68.915	w	1	2	1	3	2	1	2	outlet 70% open, clogged D.G.A.		1.4
68.835	w	1	1	1	2	1	1	1		0	
68.774	w	1	2	1	3	1	1	2	outlet 70% open clogged D.G.A.	0.87	
68.656	w	1	1	1	1	1	1	1		0	
68.55	w	1	1	1	2	1	1	1		2.1	
68.476	w	1	2	1	3	1	1	2	outlet 90% open, clogged D.G.A.	0.52	
68.379	w	1	1	1	2	1	1	1		1.05	
67.971	w	1	1	1	2	1	2	1		0.7	
67.921	w	1	1	1	2	1	2	1		1.57	
67.865	w	1	2	1	2	1	2	1	outlet 85% open, clogged D.G.A.	2.1	
67.824	w	1	1	1	2	1	2	1		2.62	
67.653	w	1	1	1	2	1	2	2		0.87	
67.062	w	1	1	1	2	1	2	1		3.67	
67	w	1	1	1	2	1	2	1		6.5	
66.943	w	1	1	1	2	1	2	1		4.19	
66.894	w	1	1	1	2	1	2	1		0.35	
66.837	w	1	1	1	2	1	1	2			2.44
66.79	w	1	1	1	2	1	1	1			1.4
66.692	w	1	2	1	3	2	1	1	outlet 90% open, clogged D.G.A.		1.22

HEADWALL INSPECTION ON I-64 WESTBOUND

MILEPOST	DIR.	OUTLET TYPE 1. S.H. 2. S.B. 3. M.H. 4. M.B.	OUTLET 1. CLEAN 2. PT. COVER 3. COVER. 4. PLUGGED	COVER MAT. 1. GRAV 2. DIRT. 3. VEG. 4. CON.	SCREEN 1. NONE 2. OPEN 3. PT. OPEN 4. BLOCK	SILT 1. NONE 2. SLIGHT 3. MOD. 4. SEV.	FLOW 1. YES 2. NO	DRAINAGE 1. GOOD 2. POOR	COMMENTS	HEADWALLS % FOR.	TILTED % BKW.
66.623	w	1	1	1	2	1	1	1		0	
66.555	w	1	1	1	2	2	1	1			1.22
66.351	w	1	1	1	2	1	2	1		5.2	
66.272	w	1	1	1	2	1	2	2		0	
65.425	w	1	1	1	2	1	2	2		5.76	
65.386	w	1	1	1	2	1	2	1		2.96	
65.35	w	1	1	1	2	1	2	1		2.44	
65.299	w	1	1	1	2	1	2	2			0.7
65.249	w	1	2	1	3	3	2	2	outlet 25% open clogged D.G.A.	0.17	
65.201	w	1	1	1	2	1	2	2		4.2	
65.149	w	1	2	1	3	4	2	2	outlet 50% open clogged D.G.A	1.22	

HEADWALL INSPECTION ON I-64 EASTBOUND

MILEPOST	DIR.	OUTLET TYPE 1. S.H. 2. S.B. 3. M.H. 4. M.B.	OUTLET 1. CLEAN 2. PT. COVER 3. COVER. 4. PLUGGED	COVER MAT. 1. GRAV 2. DIRT. 3. VEG. 4. CON.	SCREEN 1. NONE 2. OPEN 3. PT. OPEN 4. BLOCK	SILT 1. NONE 2. SLIGHT 3. MOD. 4. SEV.	FLOW 1. YES 2. NO	DRAINAGE 1. GOOD 2. POOR	COMMENTS	HEADWALLS % FOR.	TILTED %BKW.
67.916	E	1	2	1	3	1	1	1	outlet 50% open, D.G.A.	5.6	
68.026	E	1	1	1	2	1	1	1		5.6	
68.136	E	1	1	1	2	1	1	2		5.77	
71.012	E	1	2	1	3	4	1	1	outlet 70% open, D.G.A.	N/A	
71.052	E	1	2	1	3	3	1	1	outlet 25% open, D.G.A.		1.75
71.086	E	1	1	1	2	4	1	1		3.84	
71.13	E	1	2	1	3	3	1	1	outlet 50% open, D.G.A.	9.1	
71.175	E	1	2	1	3	4	1	1	outlet 25% open, D.G.A.	1.04	
71.287	E	1	4	1	4	4	1	1	outlet 0% open, D.G.A.		0.7
71.396	E	1	4	1	4	4	1	1	outlet 0% open, D.G.A.		3.84
71.513	E	1	2	1	3	3	1	1	outlet 50% open, D.G.A.		3.84
73.053	E	1	2	1	3	2	1	1	outlet 50% open, D.G.A.		1.75
73.14	E	1	2	1	1	2	1	1	outlet 15% open, D.G.A.	13	
73.198	E	1	2	1	3	4	1	1	outlet 80% open, D.G.A.	12.1	
73.29	E	1	1	1	2	2	1	2		15.8	
73.351	E	1	2	1	3	2	1	2	outlet 90% open, D.G.A.,	3.5	
73.449	E	1	2	1	3	2	1	2	outlet 90% open, D.G.A.	3.32	
73.548	E	1	2	1	3	2	1	1	outlet 90% open, D.G.A.	12.6	
73.648	E	1	1	1	2	1	2	2		12.9	
73.746	E	1	2	1	3	1	1	1	outlet 70% open, D.G.A.	18.5	
73.844	E	1	2	1	2	1	1	1	outlet 90% open, D.G.A.	14.4	
73.953	E	1	1	1	1	1	2	2		7.7	
74.049	E	1	2	1	3	1	1	1	outlet 75% open, D.G.A.,	17.63	
74.144	E	1	2	1	3	2	1	2	outlet 90% open, D.G.A.,	7	
74.224	E	1	1	1	2	1	1	2		14.05	
74.301	E	1	1	1	2	1	2	1		12.5	
74.353	E	1	4	1	1	4	1	2	outlet 0% open, D.G.A.	N/A	
74.443	E	1	1	1	1	1	2	1		N/A	
74.587	E	1	1	1	2	1	2	1		N/A	

HEADWALL INSPECTION ON I-64 MEDIAN

MILEPOST	DIR.	OUTLET TYPE 1. S.H. 2. S.B. 3. M.H. 4. M.B.	OUTLET 1. CLEAN 2. PT. COVER 3. COVER. 4. PLUGGED	COVER MAT. 1. GRAV 2. DIRT. 3. VEG. 4. CON.	SCREEN 1. NONE 2. OPEN 3. PT. OPEN 4. BLOCK	SILT 1. NONE 2. SLIGHT 3. MOD. 4. SEV.	FLOW 1. YES 2. NO	DRAINAGE 1. GOOD 2. POOR	COMMENTS
67.815	E	3	1	2	2	1	2	1	
67.996	E	3	1	2	2	2	2	1	
74.298	E	3	1	2	2	1	1	1	
73.89	W	4	1	3	1	1	1	1	
74.135	W	3	4	2	4	3	1	1	outlet 0% open
74.35	W	4	1	3	1	1	1	1	
70.54	W	3	1	2	2	1	1	1	
70.28	W	3	1	2	2	3	1	1	
70.055	W	3	2	3	3	3	1	1	outlet 85% open

APPENDIX B
SUMMARY OF OUTLET PIPE INSPECTION

SHOULDER EDGE DRAIN INSPECTION ON I-64 EASTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
67.916	E	1	1	2		2					s.w. 0'-5', panel drain 17'	2	0:52:16-0:53:48
68.026	E	1	1	62							calc. buildup @ beginning of pipe, panel drain 23'	2	0:53:48-0:55:05
68.136	E	1	1			2		2			calc. buildup, s.w. 1/2 full 5'-21', panel drain 21'	2	0:55:05-0:57:09
71.012	E	1	1					2			s.w. 1/2 full 11'-20', panel drain 20'	1	0:34:27-0:35:50
71.052	E	1	1	2				2			s.w. 9.5'-21.5', panel drain 21.5	1	0:35:50-0:38:44
71.086	E	1	3	2				2			calc buildup, s.w. 8'-15', panel drain 16.4'	1	0:38:44-0:41:31
71.13	E	1	1	6				2			calc buildup, s.w. 1/2 full 8'-20', panel drain 22.1	1	0:41:31-0:43:31
71.175	E	1	1	6		2		2			d.g.a. blocking opening, s.w. 6'-20', panel drain 22'	1	0:43:31-0:45:59
71.287	E	1	1	6		2		2			d.g.a. blocking opening, s.w. 3'-20', panel drain 21'	1	0:45:59-0:49:33
71.396	E	1	1	6		2		2			d.g.a. blocking opening, s.w. 3'-17', panel drain 22'	1	0:49:33-0:51:08
71.513	E	1	?	68							resolute backfill @ .5',	1	0:51:08-0:52:55
73.053	E	1	3	6		2		2			d.g.a. blocking opening, s.w. 0'-15', panel drain 16'	1	0:52:55-0:54:36
73.14	E	1	1	6							d.g.a. blocking opening, panel drain 21'	1	0:54:36-0:56:05
73.198	E	1	3	6		2		2			d.g.a. blocking opening, s.w. 7'-22', panel drain 22'	1	0:56:05-0:58:15
73.29	E	1	?	5							resolute compression @ .6', 0% open	1	0:58:15-0:59:56
73.351	E	1	?	5							resolute compression @ .8', 0% open	1	0:59:56-1:00:43
73.449	E	1	?	5							resolute compression @ 1', 0% open	1	1:00:43-1:01:38
73.548	E	1	?	5							resolute compression @ .8', 0% open	1	1:01:38-1:02:11
73.648	E	1	?	5							resolute compression @ .7', 0% open	1	1:02:11-1:03:28
73.746	E	1	?	5							resolute compression @ 2.5', 50% open	1	1:03:28-1:04:34
73.844	E	1	2	5				2		2	pushed 170.4', s.w. 3'-10, 17'-45', 90'-112'	1	1:04:34-1:09:15
73.953	E	1	2			2		2		2	pushed 179.1', s.w. 8-35'	1	1:09:15-1:13:18

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Mileposts, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

SHOULDER EDGE DRAIN INSPECTION ON I-64 EASTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
74.049	E	1	?	5							resolute compression @ 1.7', 20% open	1	1:13:18-1:14:02
74.144	E	1	?	5							resolute compression @ .5', 0% open	1	1:14:02-1:14:39
74.224	E	1	2	1		2				5	pushed 201', s.w. 6'-15', comp 180'-200' 90% open	1	1:14:39-1:19:20
74.301	E	1	?	68							resolute rip in pipe @ .2', 30% open	1	1:19:20-1:20:07
74.353	E	1	?	5							resolute compression @ 2.5', 0% open	1	1:20:07-1:21:03
74.443	E	1	?	5							resolute compression @ 2.5', 0% open	1	1:21:07-1:21-46
74.587	E	1	?		7						separ. @ coupling, resolute backfill 8.3' 0% open	1	1:21:46-1:23:00

Note: Any numeric value, excluding distances and Mileposts, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

SHOULDER EDGE DRAIN INSPECTION ON I-64 WESTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
74.671	w	1	?	5	7	68					resolute backfill 10.4', ripe in pipe, 50% open	1	0:00:00-0:02:22
73.898	w	1	1	32		36					backfill 7.7', 90% open, panel drain 25.2'	1	0:02:22-0:16:32
71.19	w	1	1					2			s.w. 1/4" 11'-21.8', panel 21.8'	1	0:16:32-0:19:56
71.144	w	1	1	2		2		2			s.w. 1/2 full 0-21.9', panel 21.9'	1	0:19:56-0:21:47
71.098	w	1	1	2		2		2			s.w. 1/2 full 0-17.4', panel 17.4'	1	0:21:47-0:23:24
71.067	w	1	1					2			s.w. 1/4 full 10'-24', panel 24'	1	0:23:24-0:25:45
71.027	w	1	1					2			s.w. 1/4 full 9.3'-21.8', cal. dam, panel 21.8'	1	0:25:45-0:28:59
70.964	w	1	1	3				2			s.w. full 10'-22', panel 22'	1	0:28:59-0:31:25
70.905	w	1	1	58				2			s.w. full 10'-19', 0' 70% open, panel 23.4'	1	0:31:25-0:34:27
70.738	w	1	1			2					s.w. 2'-5' 1/4", panel drain 23'	1	1:23:00-1:23:55
70.694	w	1	1					2			s.w. 15'-20', panel drain 21.6'	1	1:23:55-1:25:00
70.647	w	1	1					2			s.w. 10'-20', panel drain 21.9'	1	1:25:00-1:26:01
70.589	w	1	1	1				2			s.w. 10'-18', panel drain 21.6'	1	1:26:01-1:27:09
70.534	w	1	3								panel drain 17.3'	1	1:27:09-1:27:59
70.491	w	1	1	2		2		2			s.w. 0-22', panel drain 22'	1	1:27:59-1:29:30
70.454	w	1	1					2			s.w. 10'-22', panel drain 21.4'	1	1:29:30-1:31:18
70.387	w	1	1	3				2			s.w 10'-22', panel drain 22.1'	1	1:31:18-1:32:27
70.32	w	1	1	3	7			2			s.w. 10'-22', panel drain 22.2'	1	1:34:27-1:34:29
70.242	w	1	1			2		2			s.w. 5'-17', panel drain 21.9'	1	1:34:29-1:35:38
70.061	w	1	1	3		2		2			silt 0'-1', s.w. 1/4" 7'-22', panel drain 22.8'	1	1:35:38-1:36:36
69.974	w	1	1	2				2			s.w. 0'-1', 10'-21.8', panel drain 21.8'	1	1:36:36-1:37:45
69.906	w	1	1					2			s.w. 1/4" 10'-20', panel drain 20.7'	1	1:37:45-1:38:40

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Mileposts, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

SHOULDER EDGE DRAIN INSPECTION ON I-64 WESTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
69.81	w	1	1		7	2		2			s.w. 6'-22.7' 1/2 full, panel drain 22.7'	1	1:38:40-1:38:51
69.751	w	1	1					2			s.w. 1/2" 13'-22', panel drain 22.2'	1	1:38:51-1:40:24
69.709	w	1	1					2			s.w. 1/4" 17'-23.3', panel drain 23.3'	1	1:40:24-1:41:40
69.674	w	1	1			2		2			s.w. 1/4 5'-7', 12'-22', panel drain 22.3'	1	1:41:40-1:42:53
69.616	w	1	1			3		2			silt 5'-7', s.w. 10'-22.8', panel drain 22.8'	1	1:42:53-1:44:14
69.559	w	1	1					2			s.w. 10'-22.8', panel drain 22.8'	1	1:44:14-1:45:43
69.52	w	1	1					2			s.w. 1/4" 15'-20', panel drain 22.8	1	1:45:43-1:46:52
69.482	w	1	1			2					s.w. 1/4" 1'-5', panel drain 22'	2	0:00:00-0:01:42
69.435	w	1	1	2				2			s.w. 1/2 full 1'-4', 1/4" 10'-20', panel drain 22'	2	0:01:42-0:02:54
69.388	w	1	1			2		2			s.w. 1/4" full 10'-20', panel drain 22.5'	2	0:02:54-0:04:00
69.35	w	1	1	2							s.w. 1/2 full 0'-3', panel drain 22'	2	0:04:00-0:05:10
69.311	w	1	1					2			panel drain 22.5'	2	0:05:10-0:06:26
69.27	w	1	1	6		6					90% open 1'-5', panel drain 20'	2	0:06:26-0:08:39
69.223	w	1	1			2		2			s.w. 10'-22', bad conn. @ panel drain 22'	2	0:08:39-0:10:19
69.058	w	1	1					2			s.w. 1/2" 7'-13', panel drain 23'	2	0:10:19-0:11:46
69.002	w	1	1					2			s.w. 7'-15', panel drain 22'	2	0:11:46-0:14:07
68.915	w	1	1					2			s.w. 1/2" 10', calc. dam @ 1', panel drain 22'	2	0:14:07-0:16:16
68.835	w	1	1			2		2			s.w. 1/2 full 10'-25', panel drain 25'	2	0:16:16-0:17:56
68.774	w	1	1	25							panel drain 23'	2	0:17:56-0:19:28
68.656	w	1	?					25			comp. pipe 10', 10% open	2	0:19:28-0:21:21
68.55	w	1	1								panel drain 14'	2	0:21:21-0:23:33
68.476	w	1	1	2							panel drain 21'	2	0:23:33-0:24:53

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Milepost, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

SHOULDER EDGE DRAIN INSPECTION ON I-64 WESTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
68.379	w	1	?	1							impassable bend 2', 80% open	2	0:24:53-0:25:30
67.971	w	1	1	1							panel drain 22'	2	0:25:30-0:26:49
67.921	w	1	1			2					s.w. 4'-8', panel drain 18'	2	0:26:49-0:28:08
67.865	w	1	1	6				2			s.w. 1/4" 15'-23', panel drain 23'	2	0:28:08-0:30:16
67.824	w	1	1					2			s.w. 1/4" 15'-22'	2	0:30:16-0:31:24
67.653	w	1	1	3		3					panel drain 23'	2	0:31:24-0:32:34
67.062	w	1	?	8							ripe in pipe 1', 80% open	2	0:32:34-0:33:16
67	w	1	1	6							mouse nest 1', panel drain 22'	2	0:33:16-0:34:17
66.943	w	1	1			1					panel drain 21'	2	0:34:17-0:35:14
66.894	w	1	1					2			s.w. 10'-15', panel drain 21'	2	0:35:14-0:36:15
66.837	w	1	1	2		1					s.w. 0'-2', panel drain 23'	2	0:36:15-0:37:30
66.79	w	1	1								panel drain 25'	2	0:37:30-0:38:28
66.692	w	1	1	6		6		6			pushed through backfill 90% open, panel drain 20'	2	0:38:28-0:40:17
66.623	w	1	1			1					panel drain 24'	2	0:40:17-0:41:32
66.555	w	1	1	6		6					pushed through backfill 90% open, panel drain 22'	2	0:41:32-0:43:11
66.351	w	1	1	1		8					panel drain 24'	2	0:43:11-0:44:29
66.272	w	1	1								panel drain 24'	2	0:44:29-0:45:35
65.425	w	1	1								panel drain 20'	2	0:45:35-0:46:28
65.386	w	1	1			1					panel drain 24'	2	0:46:28-0:47:23
65.35	w	1	1			1					panel drain 20'	2	0:47:23-0:48:24
65.299	w	1	?	6							resolute backfill @ 2', 0% open	2	0:48:24-0:49:09
65.249	w	1	1	6				2			s.w. 1/2" 10'-15', panel drain 21'	2	0:49:09-0:50:22

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Milepost, which has more than one digit means that more than one condition is applicable: i.e., a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

SHOULDER EDGE DRAIN INSPECTION ON I-64 WESTBOUND

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
65.201	w	1	1								panel drain 21'	2	0:50:22-0:51:13
65.149	w	1	1								panel drain 19'	2	0:51:13-0:52:16

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Milepost, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

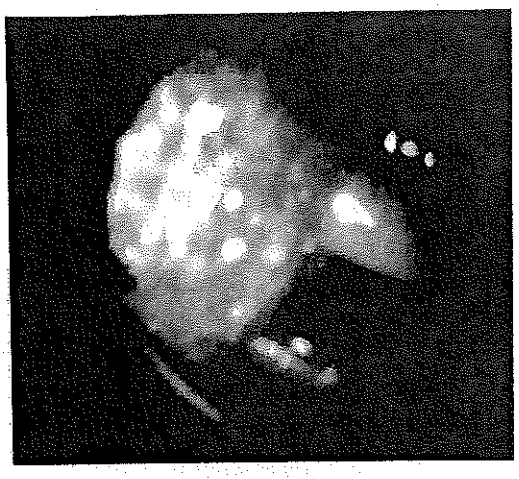
MEDIAN EDGE DRAIN INSPECTION ON I-64

		OUTLET PIPE	CONFIG.										
MILEPOST	DIR.	1.FLEX. 2.RIGID	TYPE	A	B	C	D	E	F	G	COMMENTS	VCR TAPE	LOCATION
67.815	E	1	1								panel drain 12'	2	0:57:09-0:58:28
67.996	E	1	1								panel drain 13'	2	0:58:28-1:02:24
74.298	E	1	?	5							resolute compression 2', 0% open	2	1:05:20-1:06:04
73.89	W	1	4	5							resolute compression 2', 20% open	2	1:02:24-1:03:26
74.135	W	1	?	5							resolute compression 5', 50% open	2	1:03:26-1:05:20
74.35	W	1	4	5						6	resolute backfill @ 30', 20% open	2	1:06:04-1:11:11
70.54	W	1	1	62				2			s.w. 1/2 full 0'-15', panel drain 17'	2	1:11:11-1:16:23
70.28	W	1	1					2			cal buildup, s.w. 10'-12', panel drain 15'	2	1:16:23-1:17:33
70.055	W	1	1	2							s.w. 1'-2', panel drain 17'	2	1:17:33-1:20:00

1: SAG
2: SAG W/ STANDING WATER
3: SAG W/ SILTATION
4: COMPRESSED COUPLING
5: COMPRESSED PIPE
6: BACKFILL IN PIPE
7: SEPARATION AT COUPLING
8: RIP IN PIPE
9: MOUSE NEST

Note: Any numeric value, excluding distances and Mileposts, which has more than one digit means that more than one condition is applicable: i.e.. a numeric value of 45 represents a compressed coupling and a compressed pipe.
s.w. = standing water

APPENDIX C
PANEL DRAIN INSPECTION



PARTIAL OPEN CORE AREA

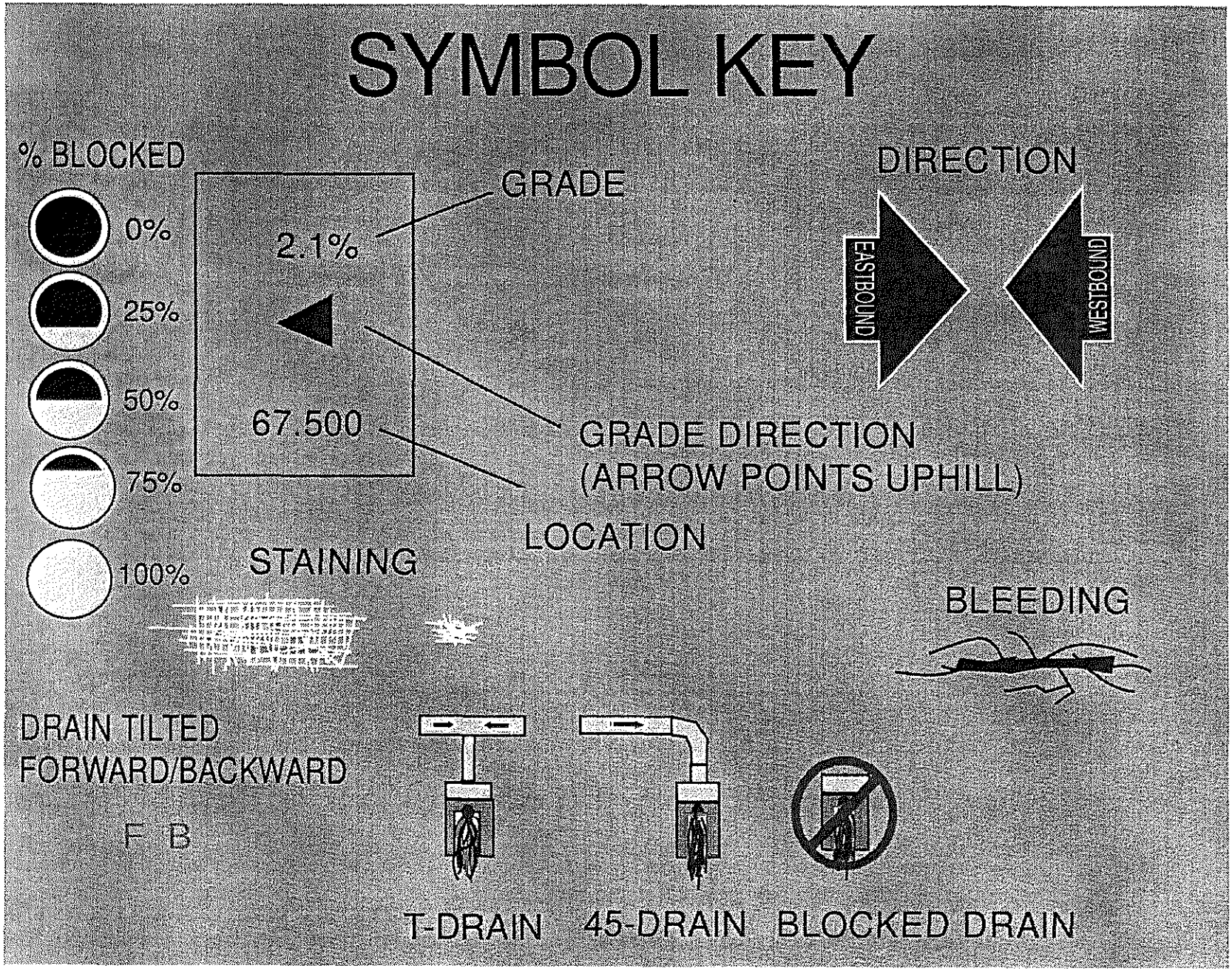
FOLDING AT BASE OF DRAIN

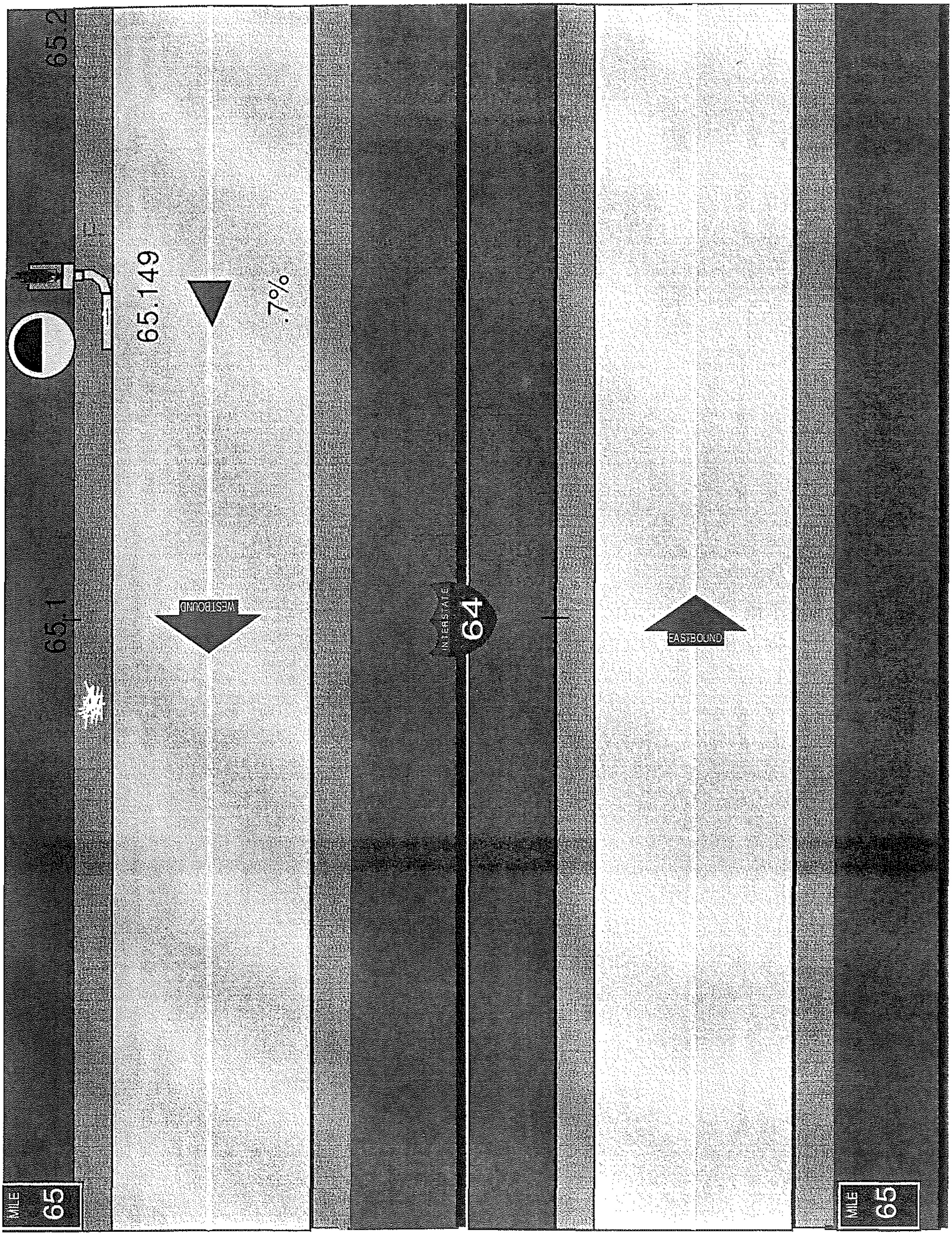
PARTIALLY CORE COLLAPSE

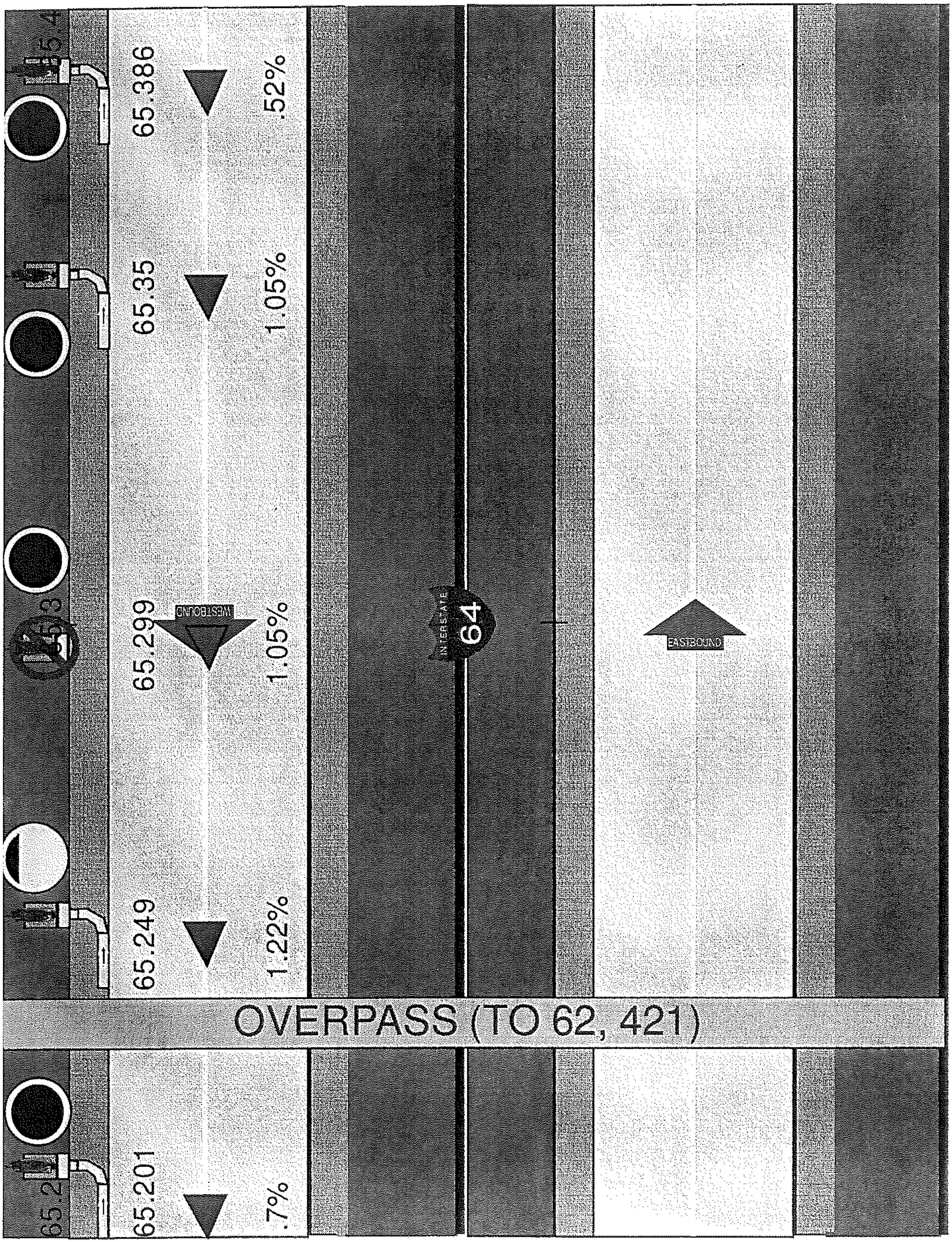
PARTIAL CORE COLLAPSE

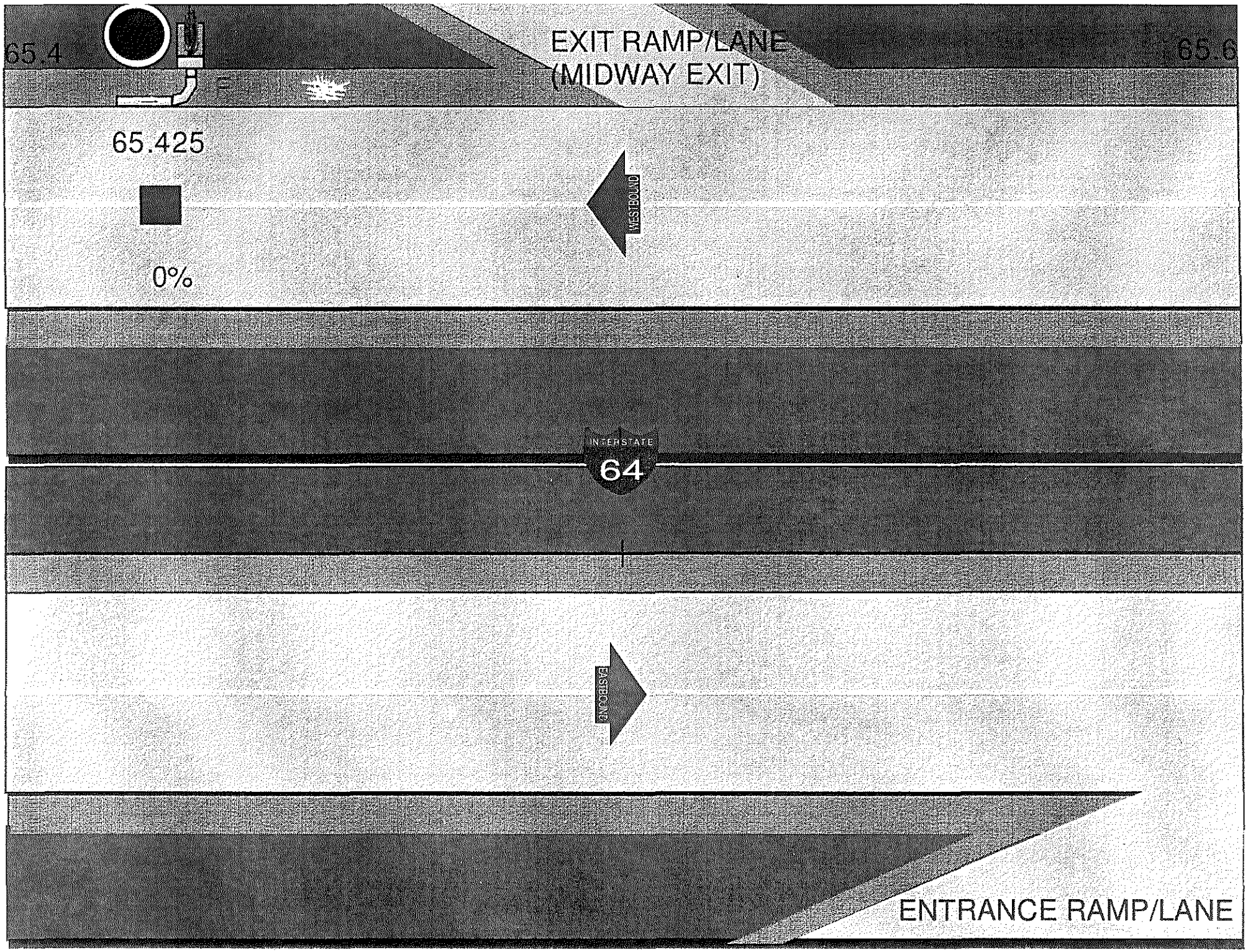
COMPLETE CORE COLLAPSE

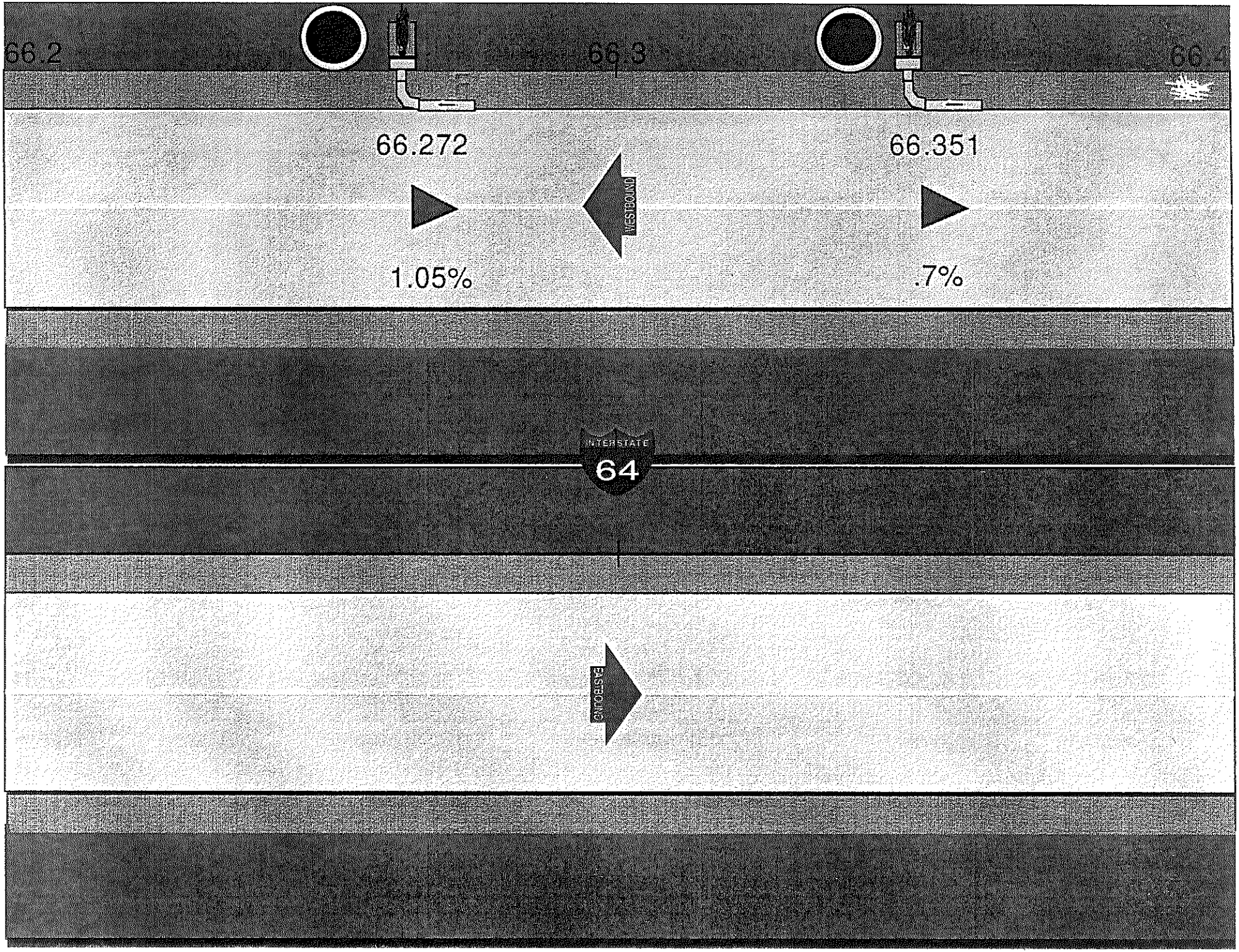
APPENDIX D
VISUAL DISTRESS SURVEY

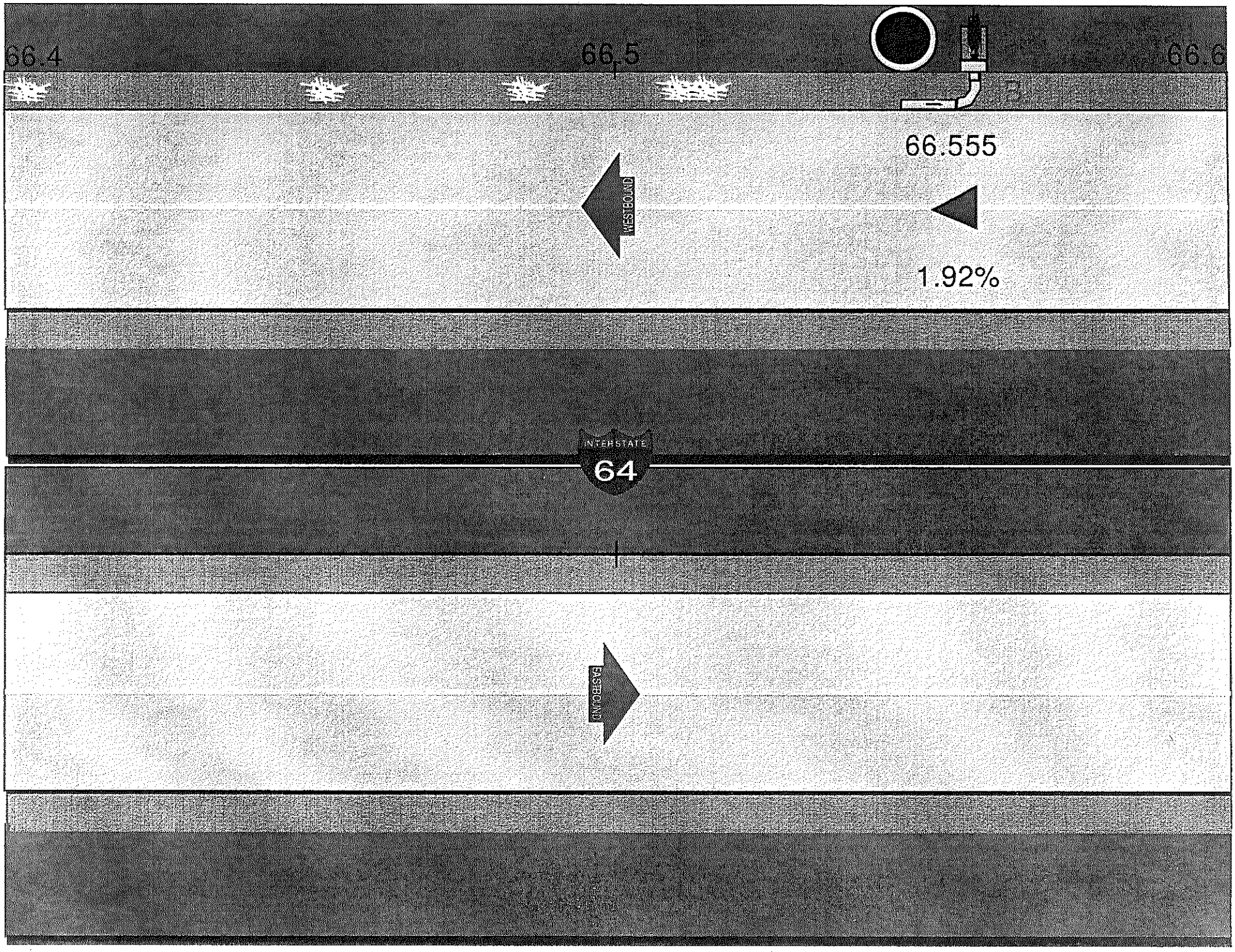

SYMBOL KEY
% BLOCKED
0%
25%
50%
75%
100%
GRADE
2.1%
67.500
DIRECTION
EASTBOUND
WESTBOUND
GRADE DIRECTION
(ARROW POINTS UPHILL)
LOCATION
STAINING
BLEEDING
DRAIN TILTED
FORWARD/BACKWARD
F B
T-DRAIN
45-DRAIN
BLOCKED DRAIN

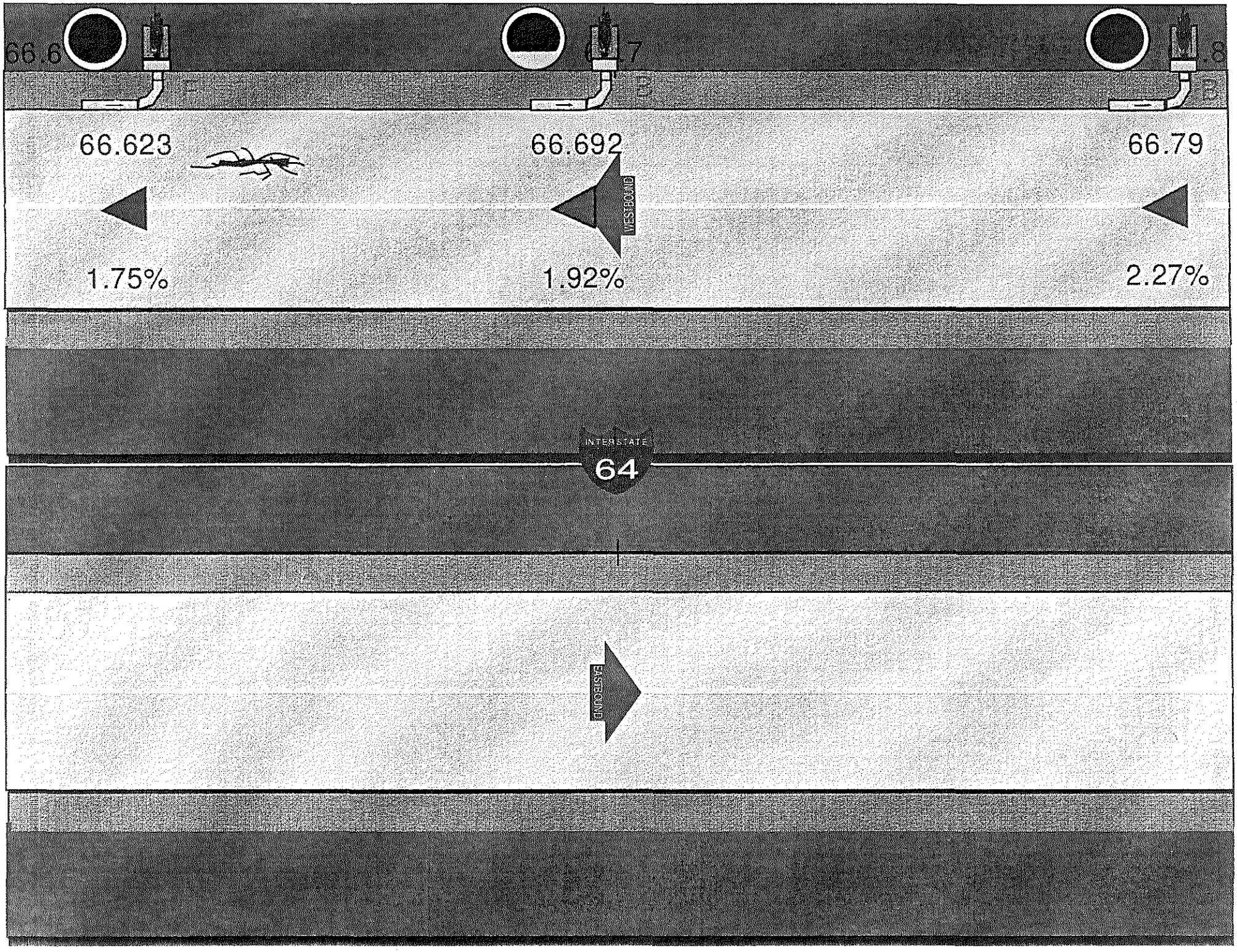

MILE
65
65.1
65.149
.7%
65.2
WESTBOUND
INTERSTATE
64
EASTBOUND
MILE
65

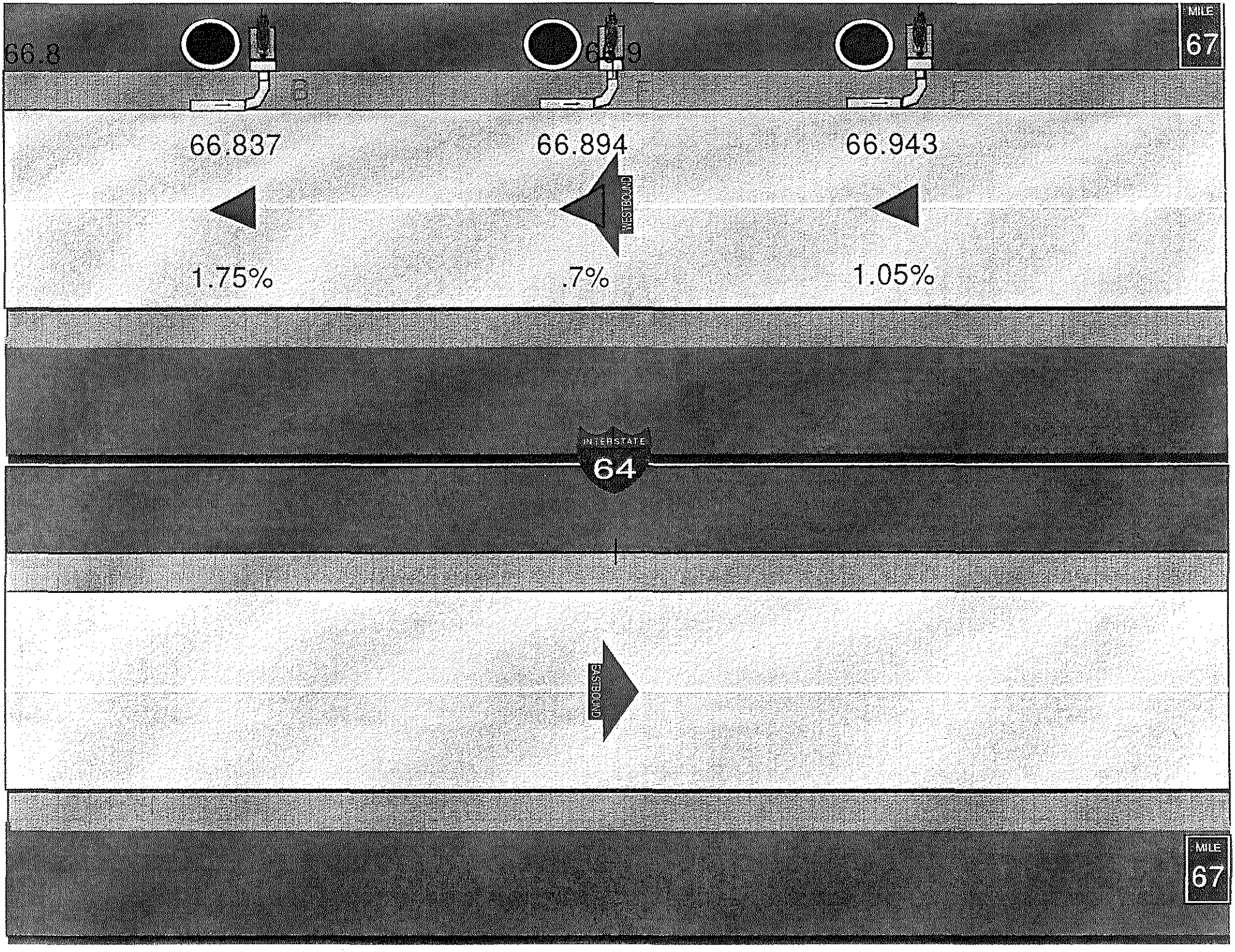

65.4
65.386
.52%
65.35
1.05%
WESTBOUND
65.299
1.05%
INTERSTATE
64
EASTBOUND
65.249
1.22%
OVERPASS (TO 62, 421)
65.2
65.201
.7%

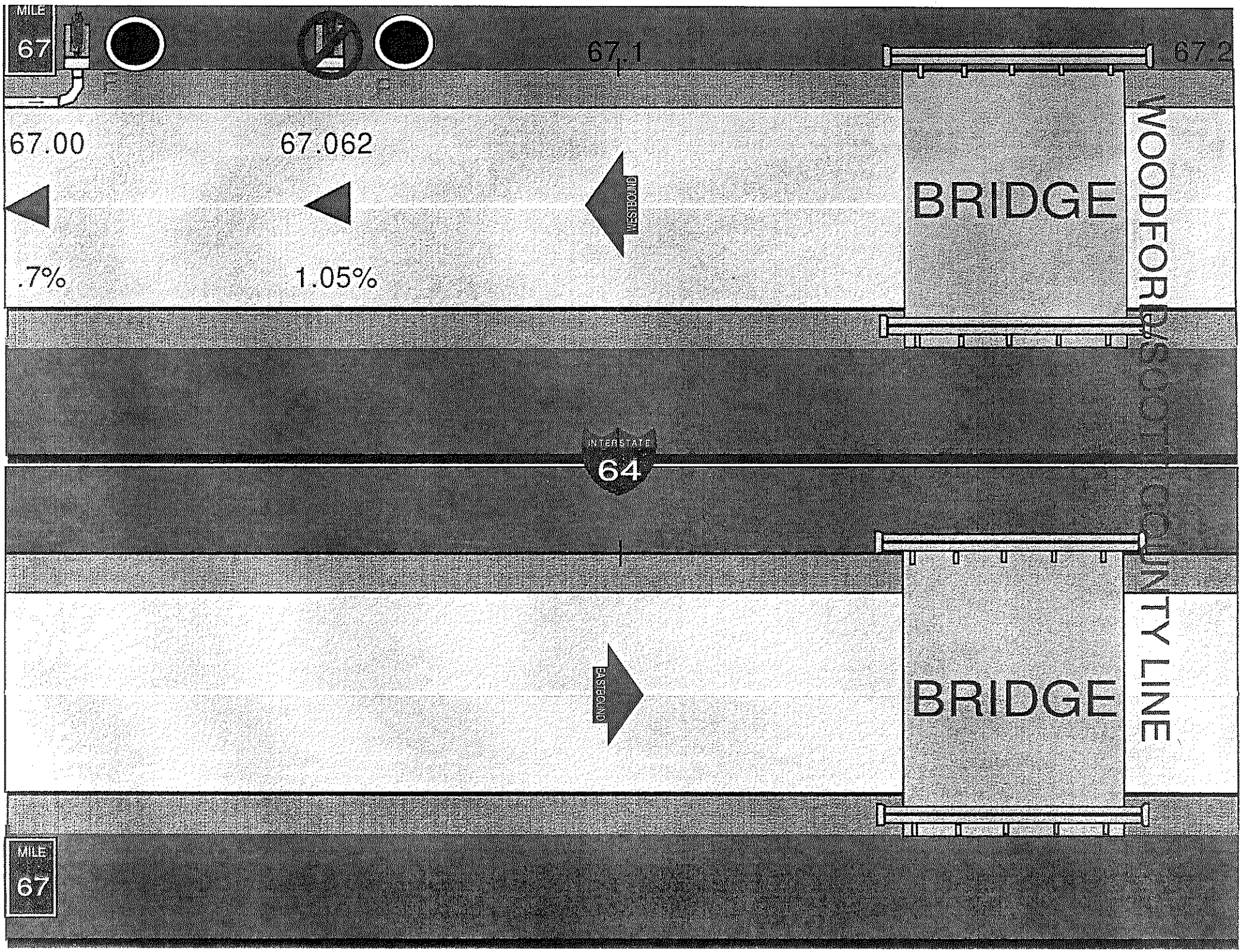

65.4
EXIT RAMP/LANE
(MIDWAY EXIT)
65.6
65.425
0%
WESTBOUND
INTERSTATE
64
EASTBOUND
ENTRANCE RAMP/LANE

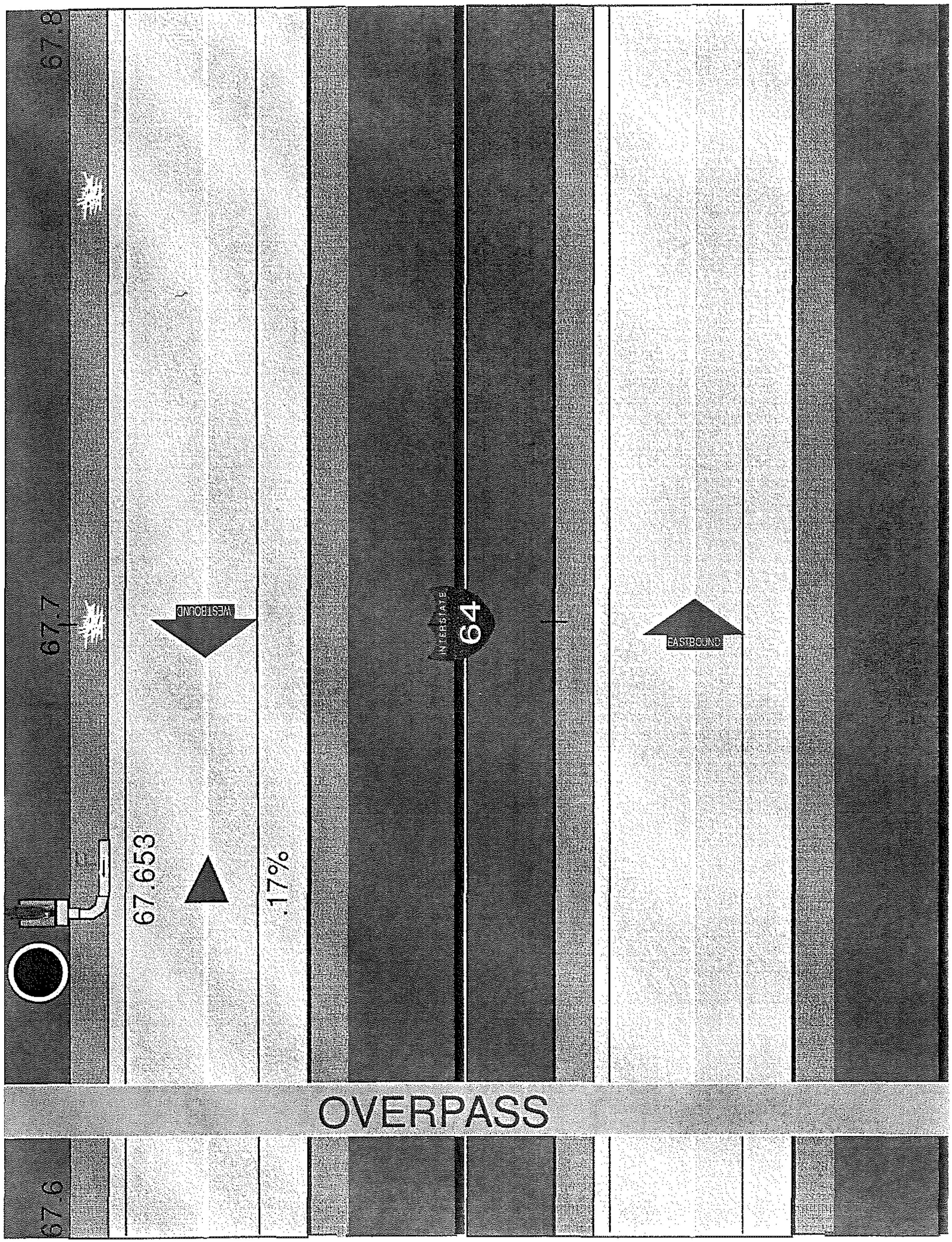

66.2
66.3
66.4
66.272
66.351
WESTBOUND
1.05%
.7%
INTERSTATE
64
EASTBOUND

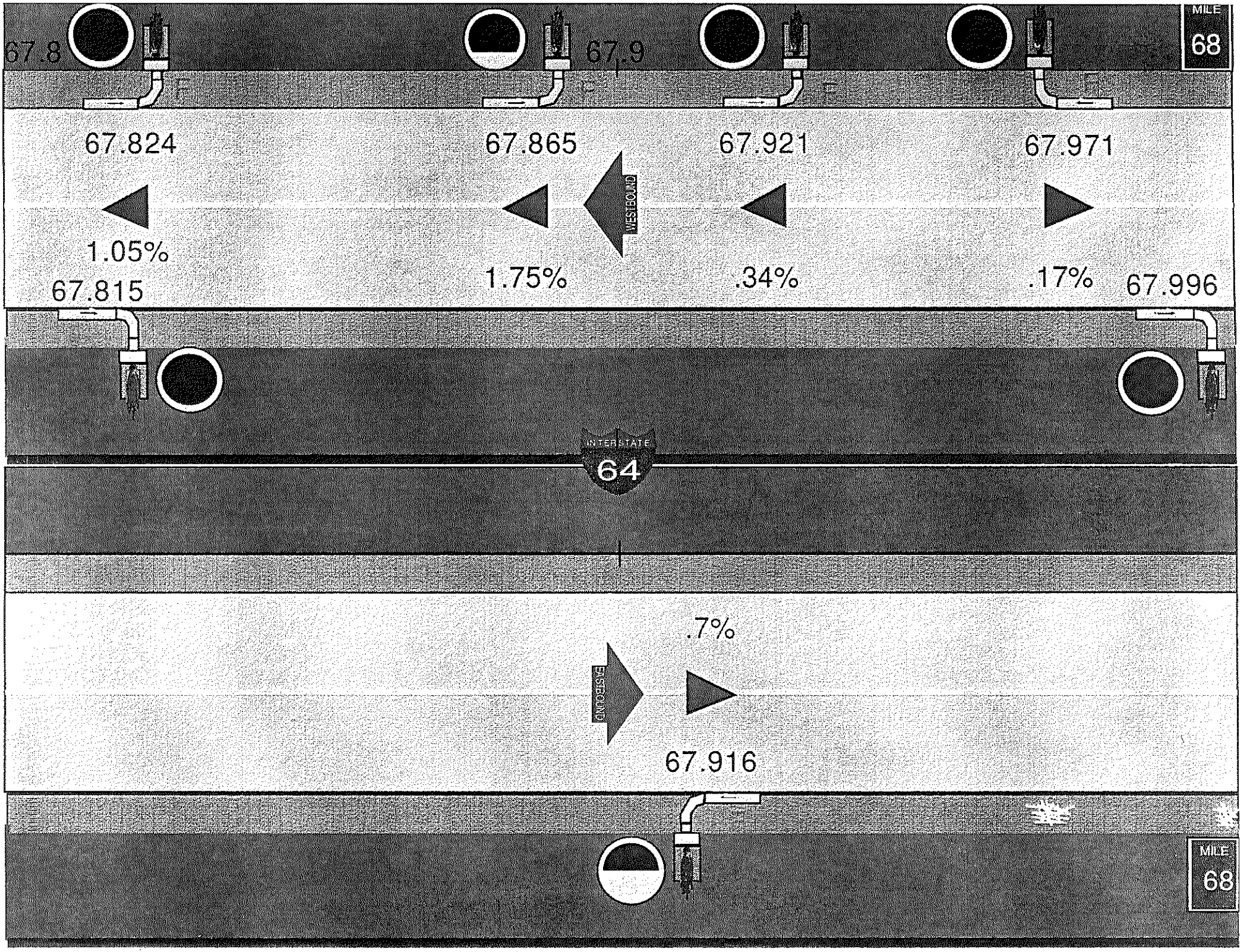

66.4
66.5
66.6
66.555
WESTBOUND
1.92%
INTERSTATE
64
EASTBOUND

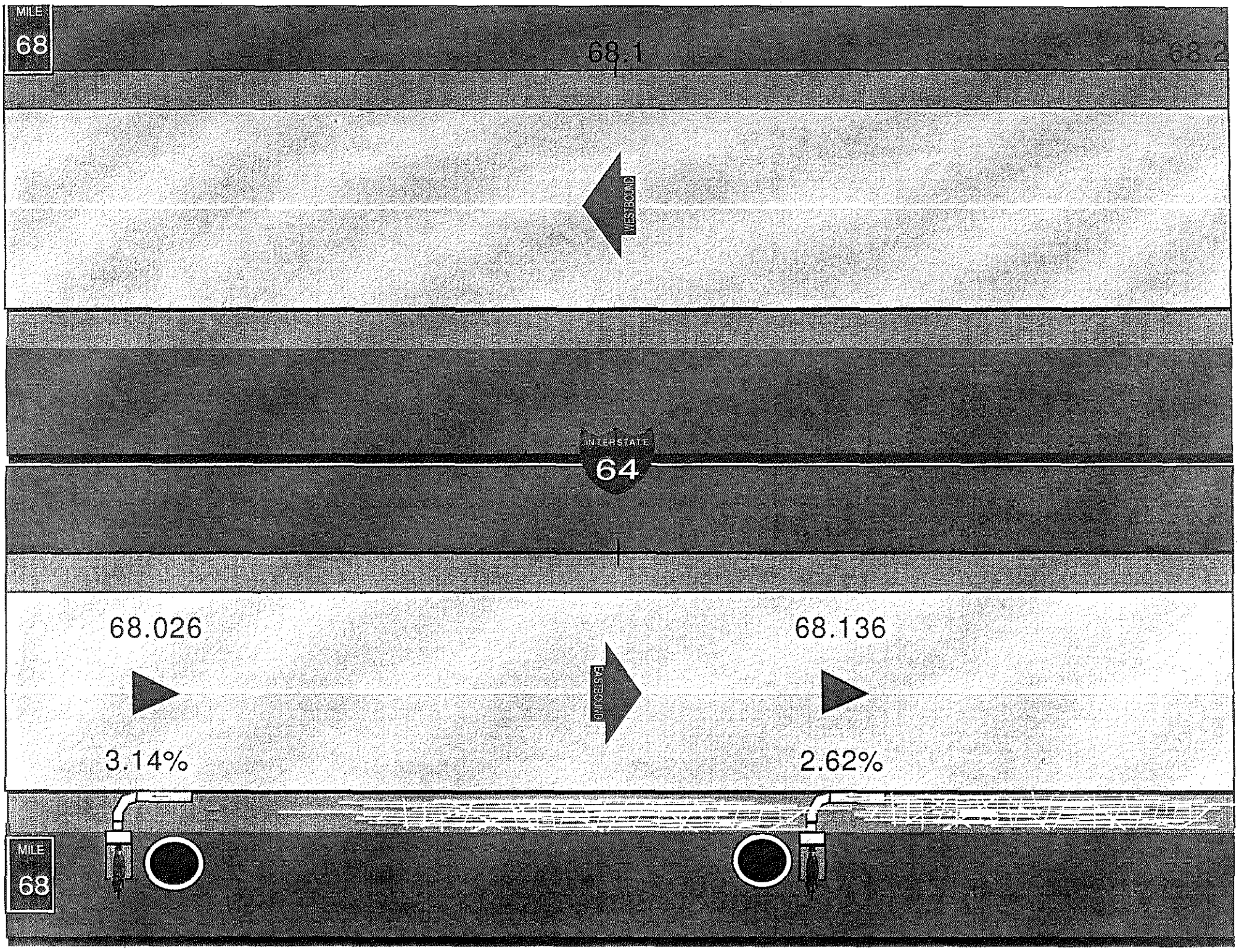

66.6
66.7
66.8
66.623
66.692
66.79
WESTBOUND
1.75%
1.92%
2.27%
INTERSTATE
64
EASTBOUND

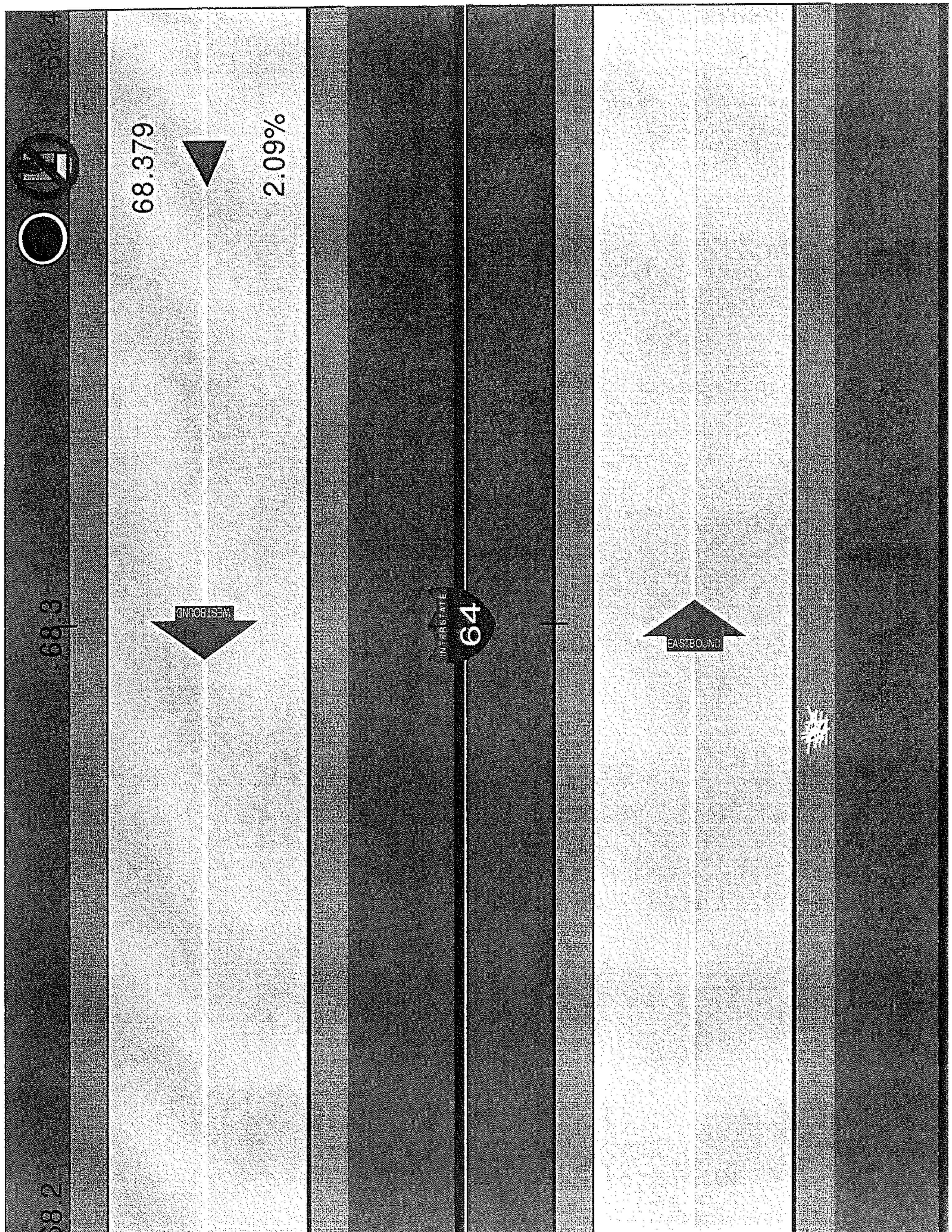

MILE
67
66.8
66.837
66.894
66.943
WESTBOUND
1.75%
.7%
1.05%
INTERSTATE
64
EASTBOUND
MILE
67

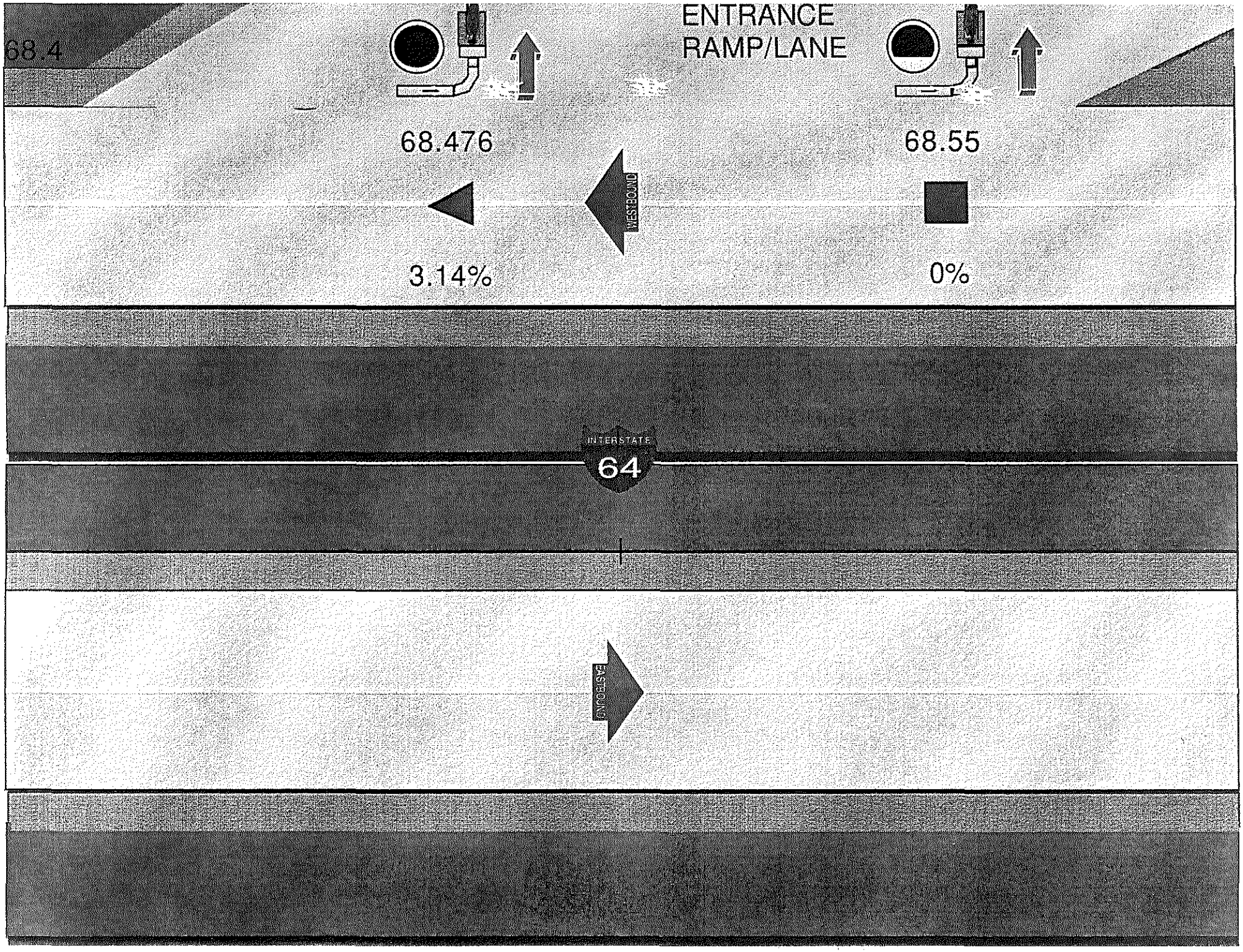

MILE
67
67.1
67.2
67.00
67.062
WESTBOUND
BRIDGE
WOODFORD COUNTY LINE
.7%
1.05%
INTERSTATE
64
EASTBOUND
BRIDGE
MILE
67

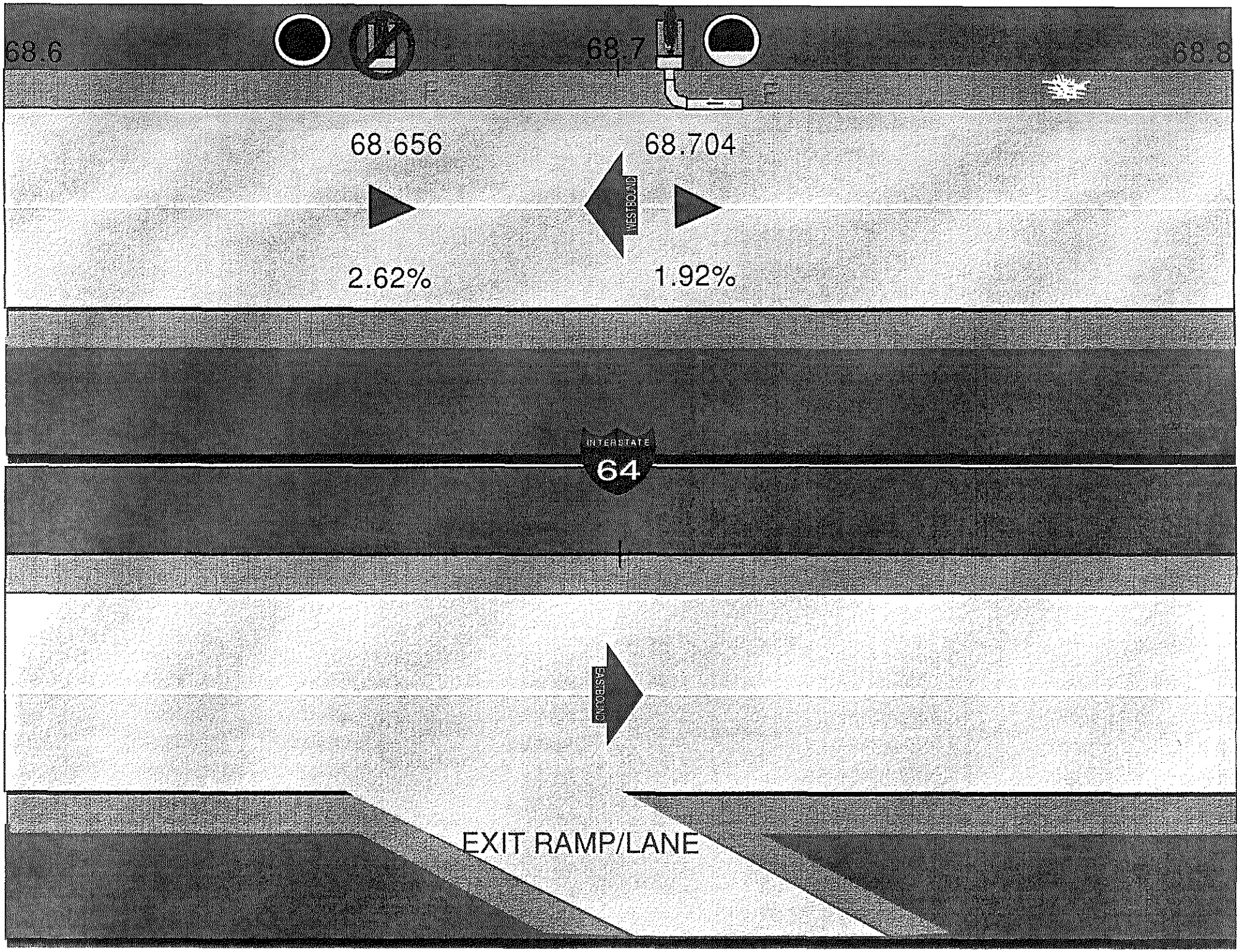

67.8
67.7
67.653
.17%
WESTBOUND
INTERSTATE
64
EASTBOUND
OVERPASS
67.6

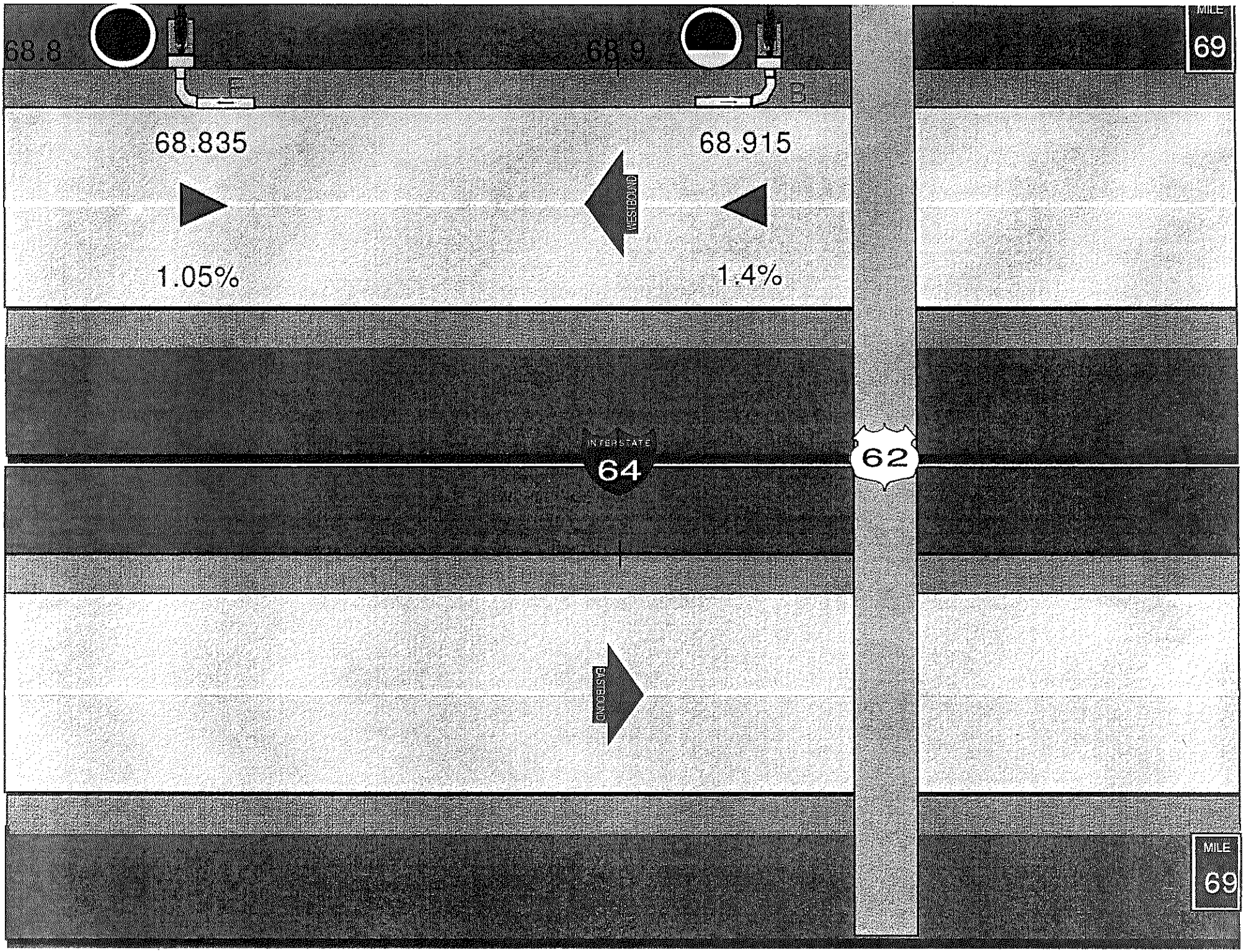

67.8
67.9
MILE
68
67.824
67.865
67.921
67.971
WESTBOUND
1.05%
1.75%
.34%
.17%
67.815
67.996
INTERSTATE
64
.7%
EASTBOUND
67.916
MILE
68

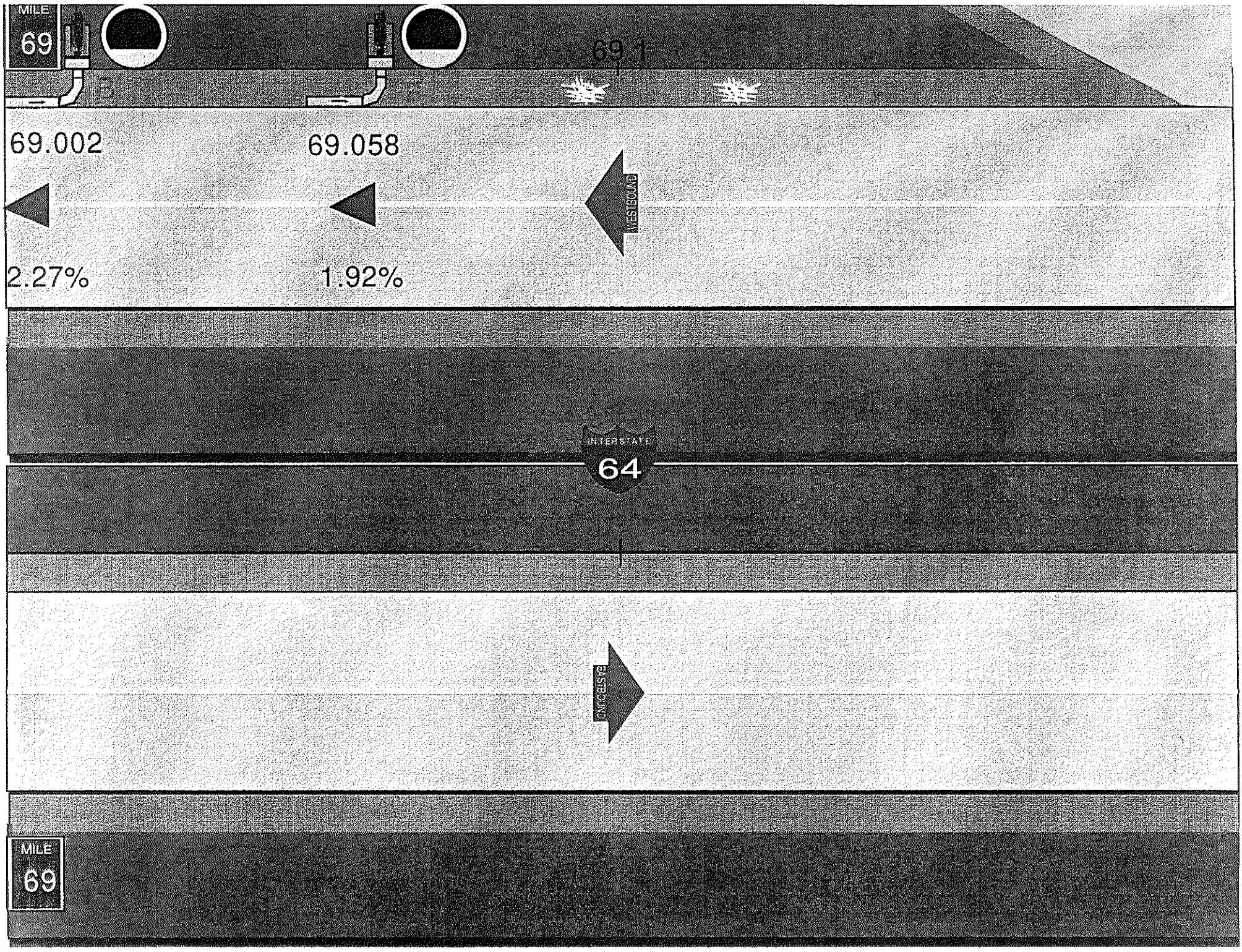

MILE
68
68.1
68.2
WESTBOUND
INTERSTATE
64
68.026
68.136
EASTBOUND
3.14%
2.62%
MILE
68

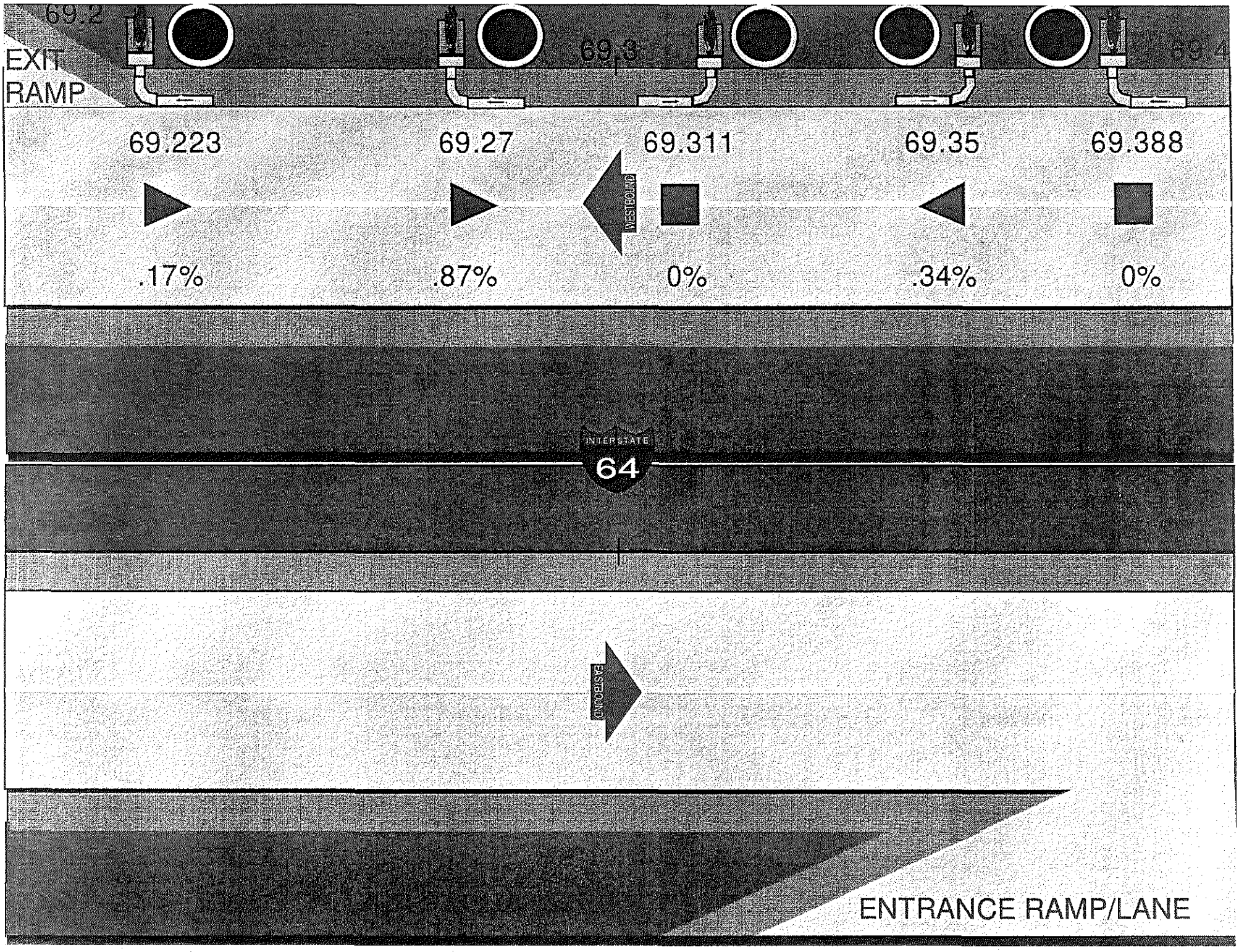

68.2
68.3
68.379
2.09%
WESTBOUND
INTERSTATE
64
EASTBOUND

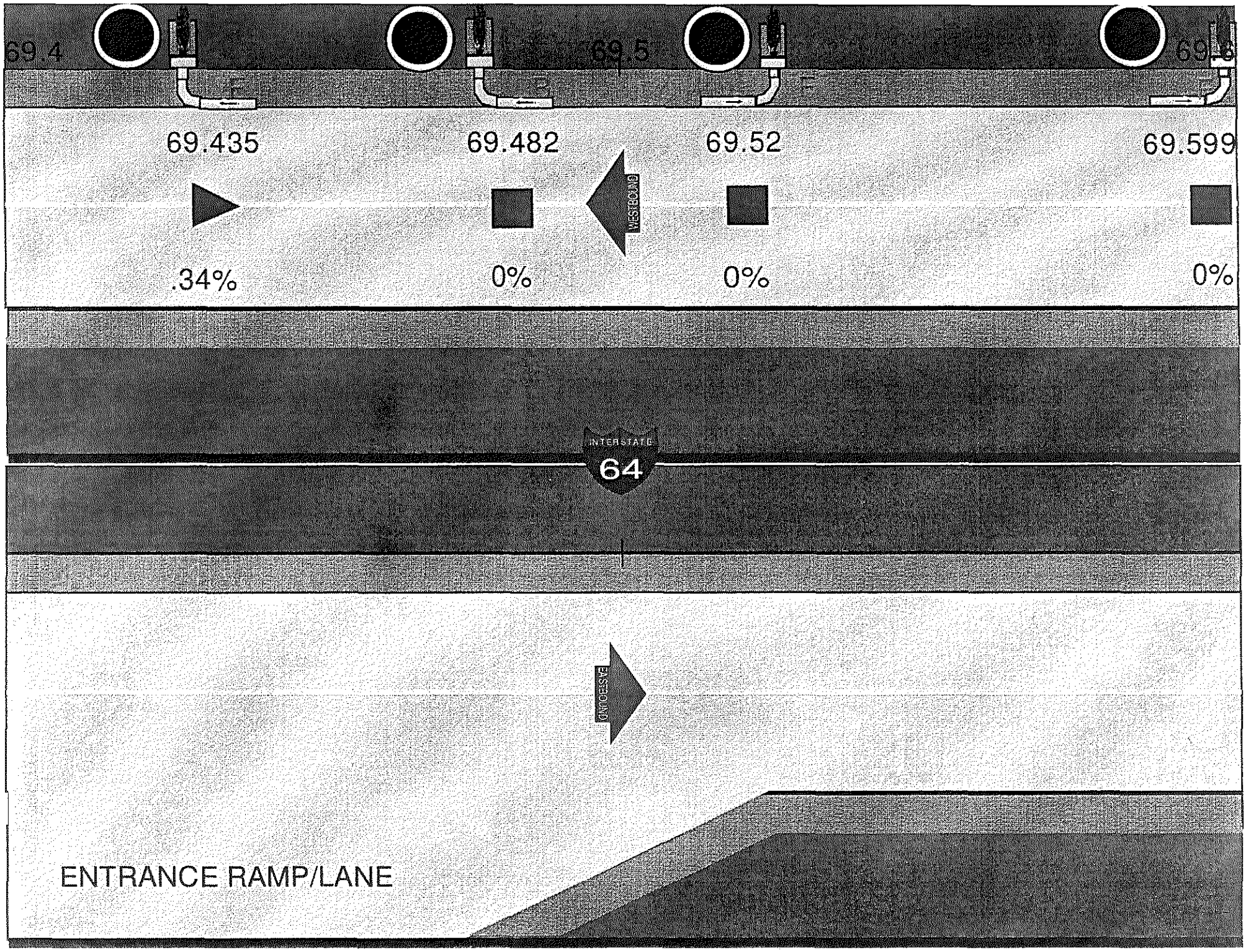

68.4
ENTRANCE
RAMP/LANE
68.476
68.55
WESTBOUND
3.14%
0%
INTERSTATE
64
EASTBOUND

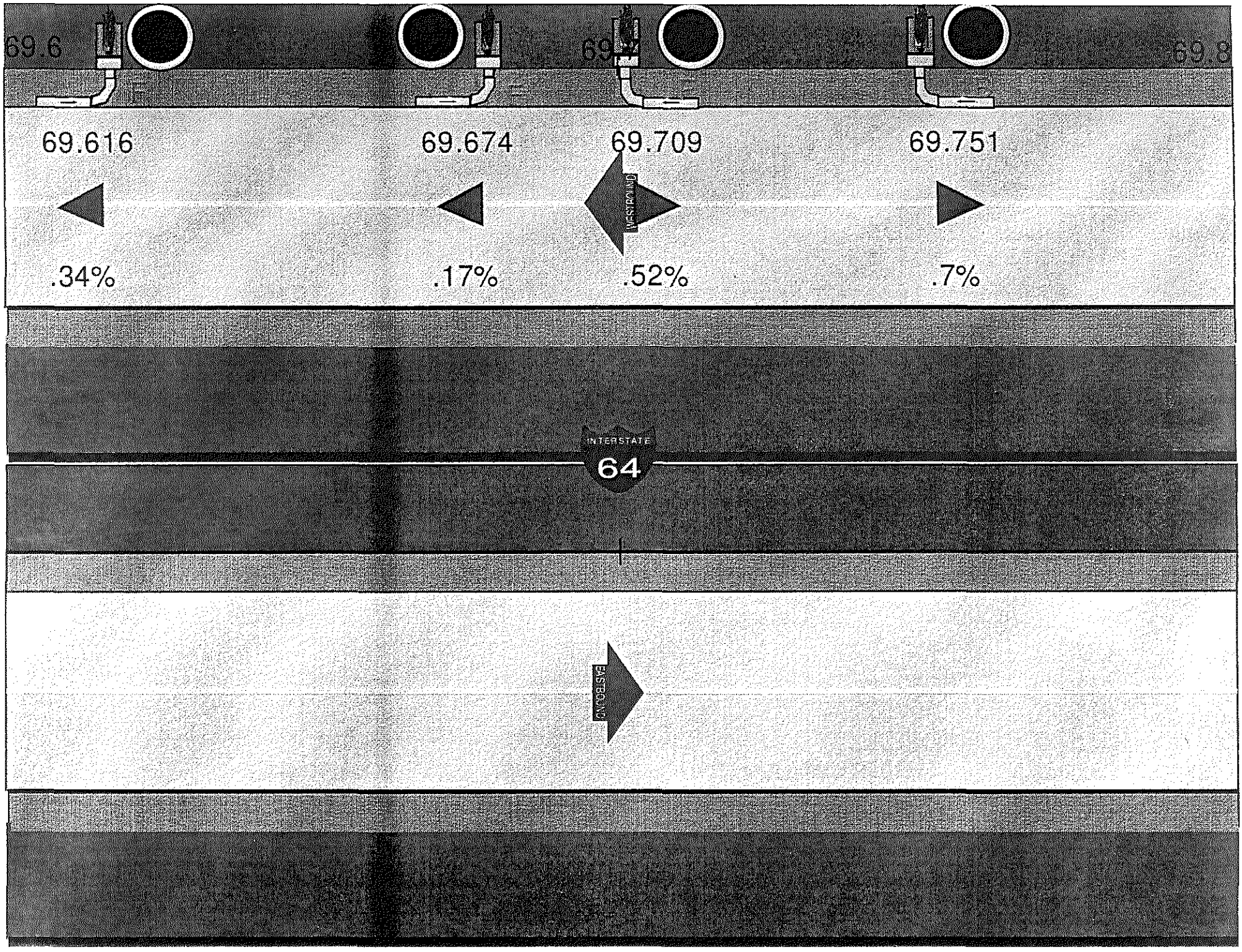

68.6
68.7
68.8
68.656
68.704
WESTBOUND
2.62%
1.92%
INTERSTATE
64
EASTBOUND
EXIT RAMP/LANE

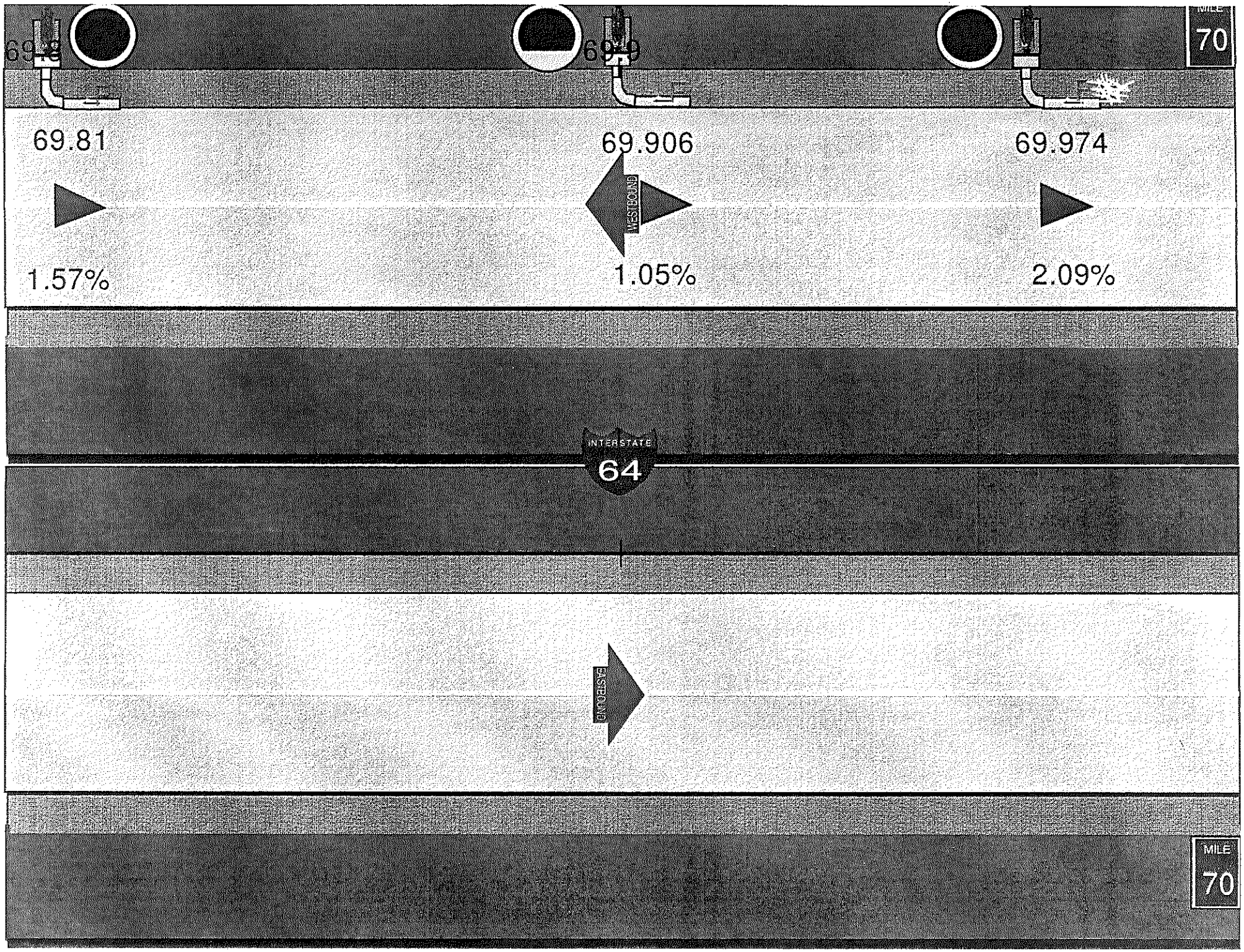

68.8
68.9
MILE
69
68.835
68.915
WESTBOUND
1.05%
1.4%
INTERSTATE
64
62
EASTBOUND
MILE
69

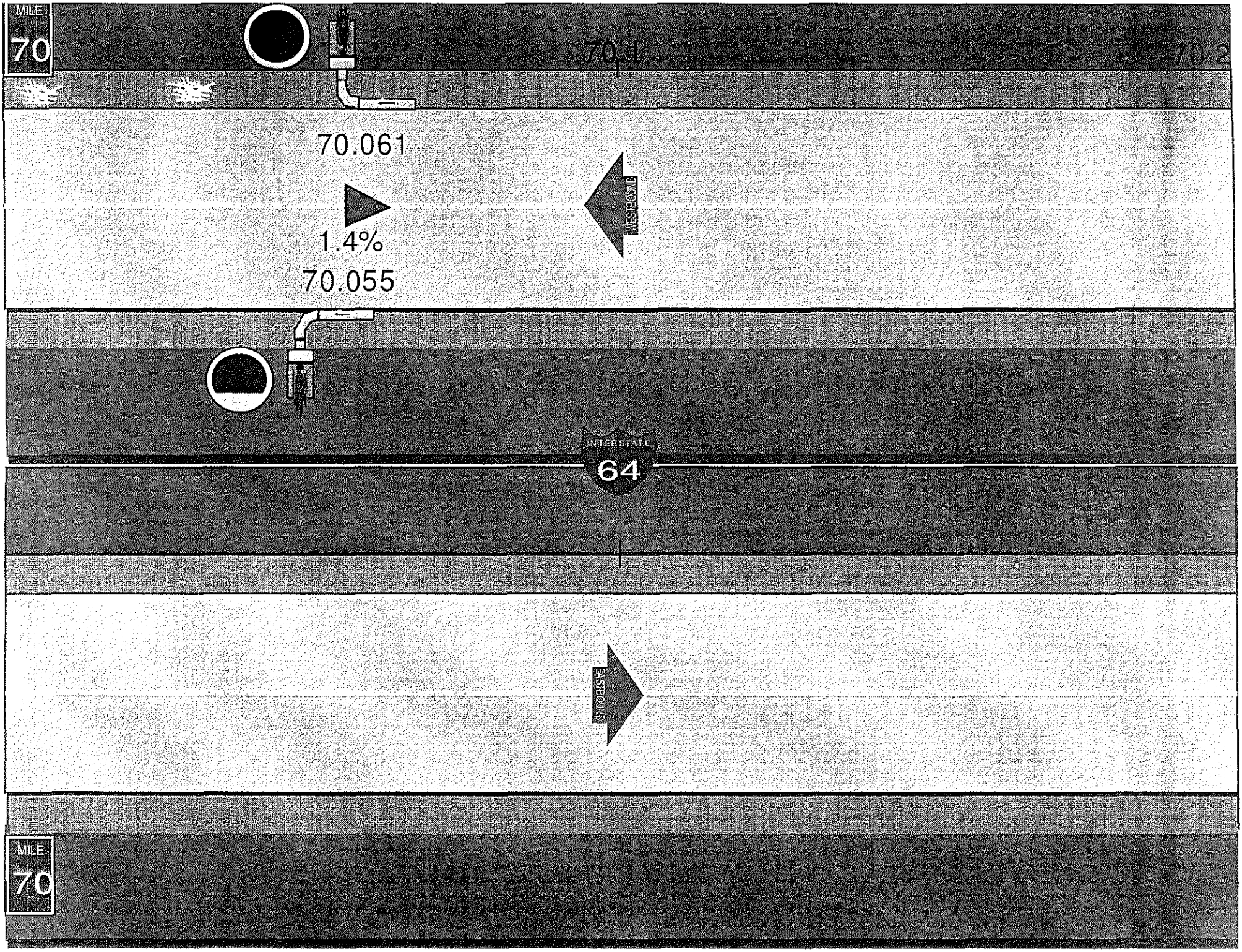

MILE
69
69.1
69.002
69.058
WESTBOUND
2.27%
1.92%
INTERSTATE
64
EASTBOUND
MILE
69

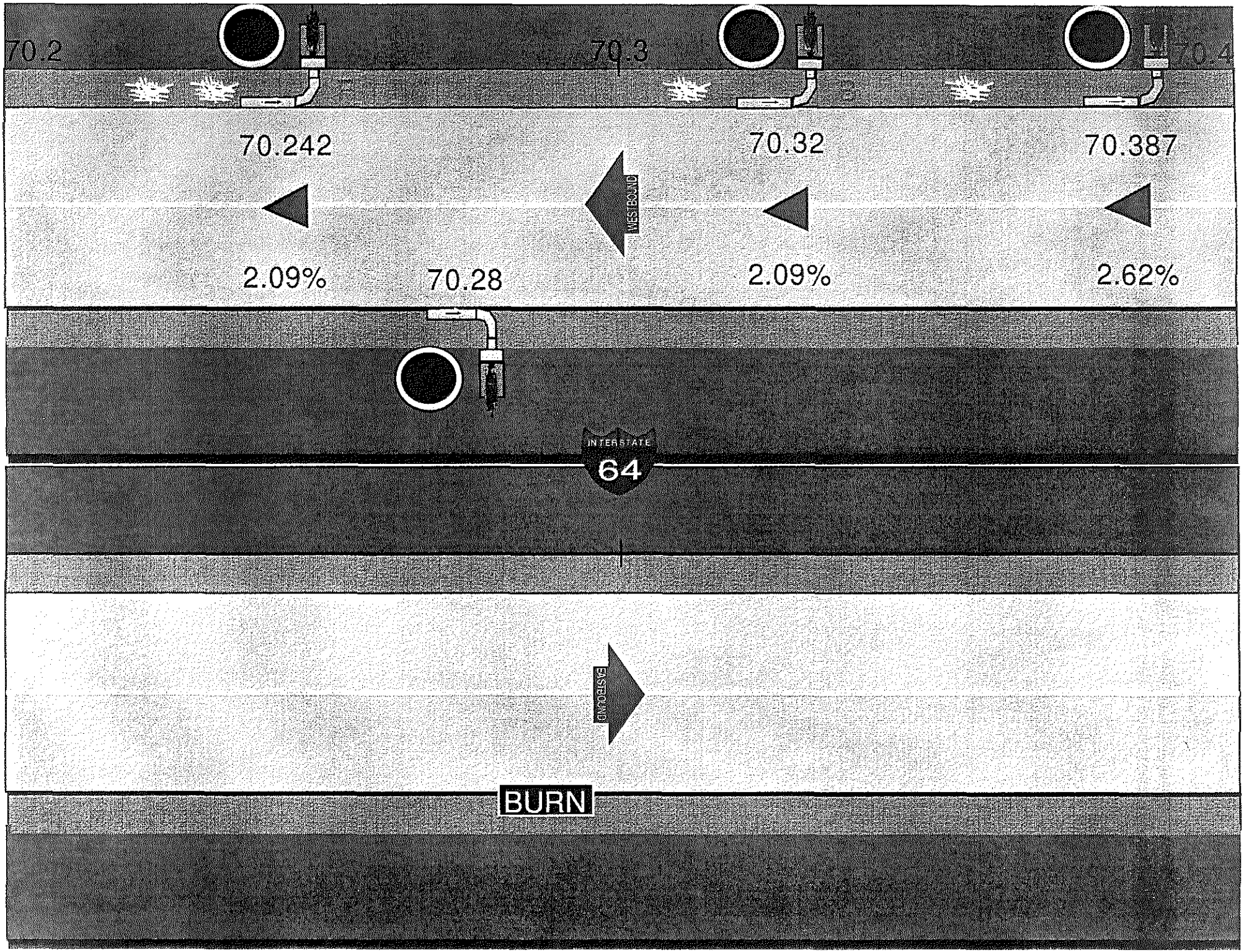

69.2
69.3
69.4
EXIT
RAMP
69.223
69.27
69.311
69.35
69.388
WESTBOUND
.17%
.87%
0%
.34%
0%
INTERSTATE
64
EASTBOUND
ENTRANCE RAMP/LANE

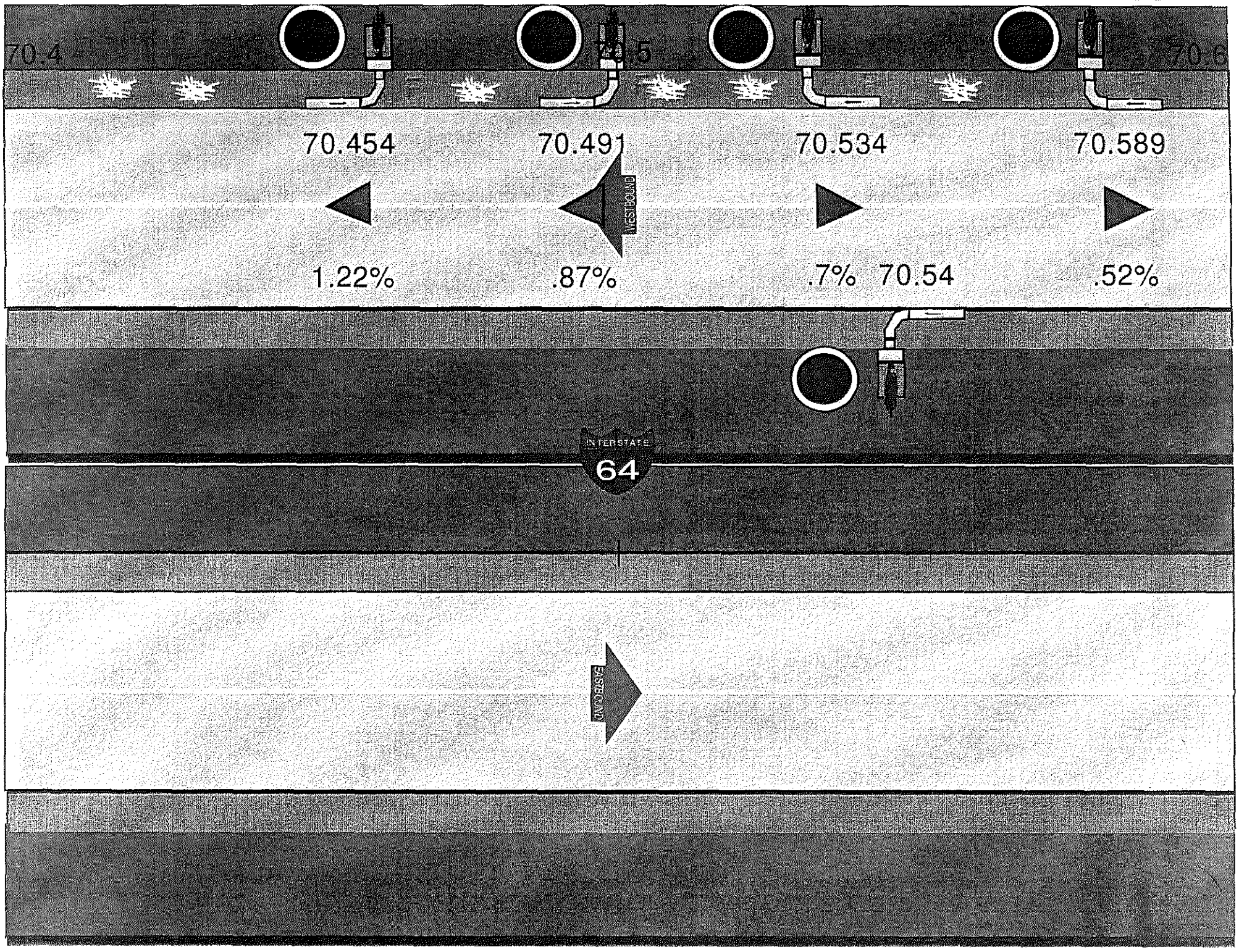

69.4
69.5
69.6
69.435
69.482
69.52
69.599
WESTBOUND
.34%
0%
0%
0%
INTERSTATE
64
EASTBOUND
ENTRANCE RAMP/LANE

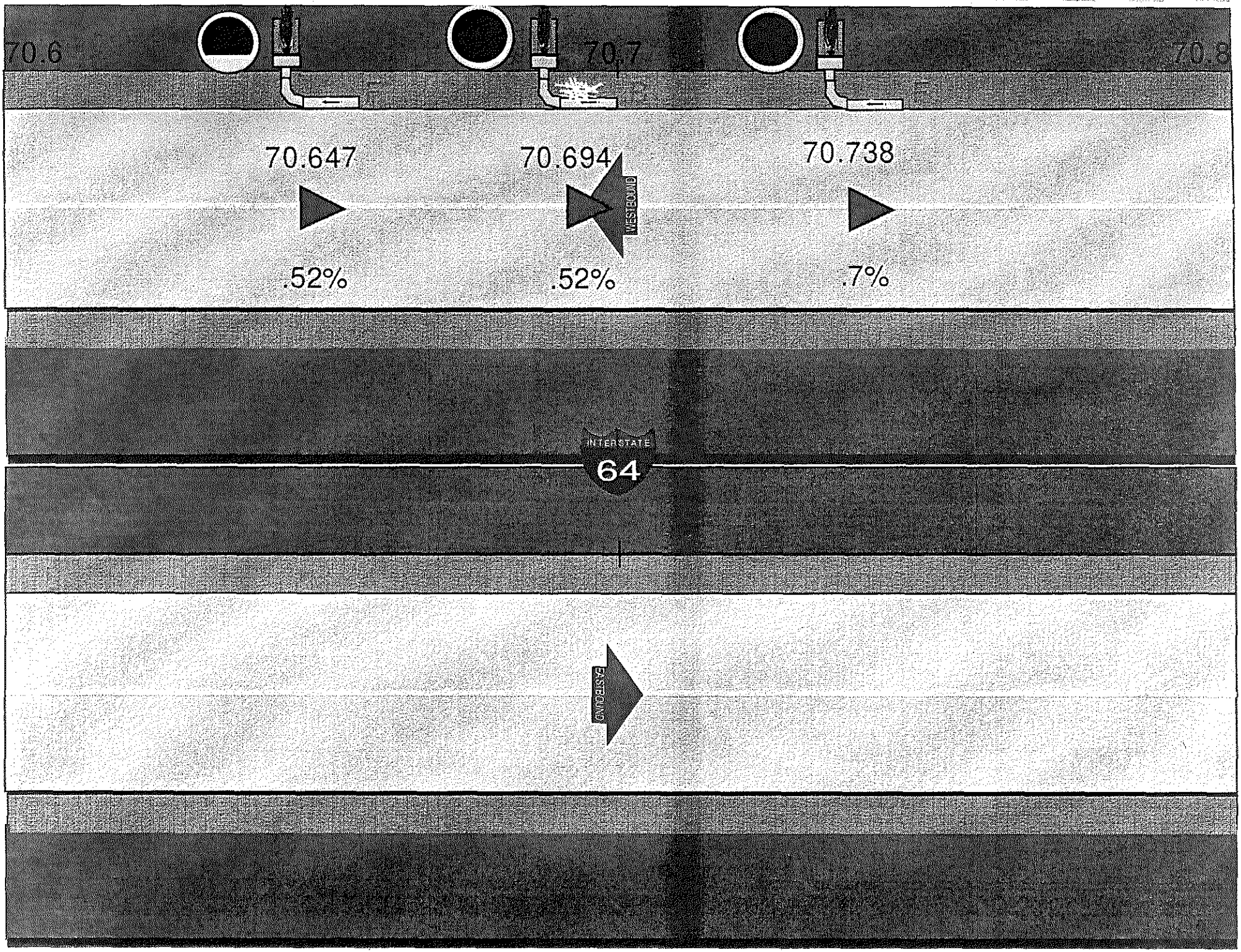

69.6
69.8
69.616
69.674
69.709
69.751
.34%
.17%
.52%
.7%
WESTBOUND
EASTBOUND
INTERSTATE
64

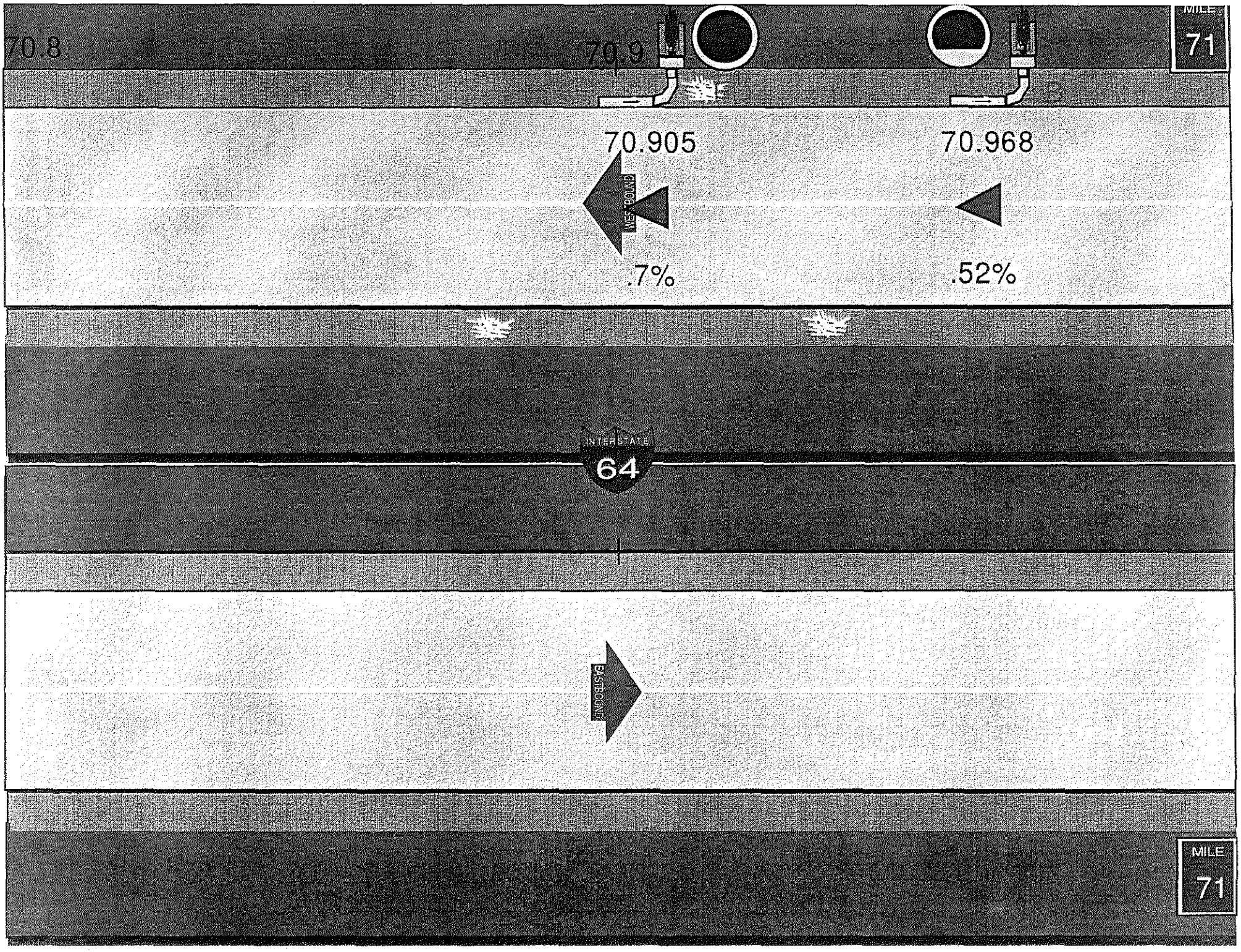

69.81
69.906
69.974
WESTBOUND
1.57%
1.05%
2.09%
INTERSTATE
64
EASTBOUND
MILE
70
MILE
70


MILE
70
70.1
70.2
70.061
1.4%
70.055
WESTBOUND
INTERSTATE
64
EASTBOUND
MILE
70

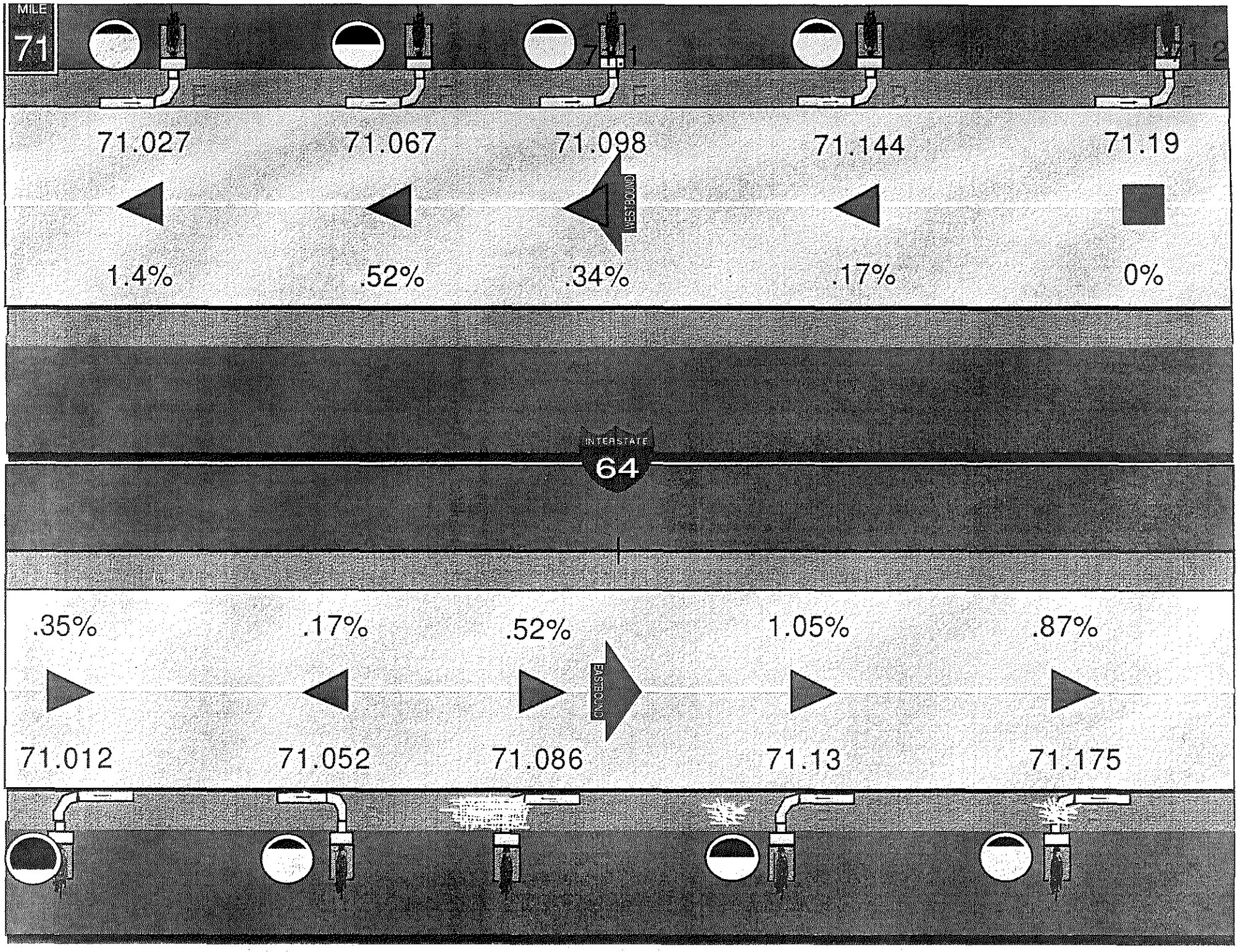

70.2
70.3
70.4
70.242
70.32
70.387
WEST BOUND
2.09%
70.28
2.09%
2.62%
INTERSTATE
64
EASTBOUND
BURN

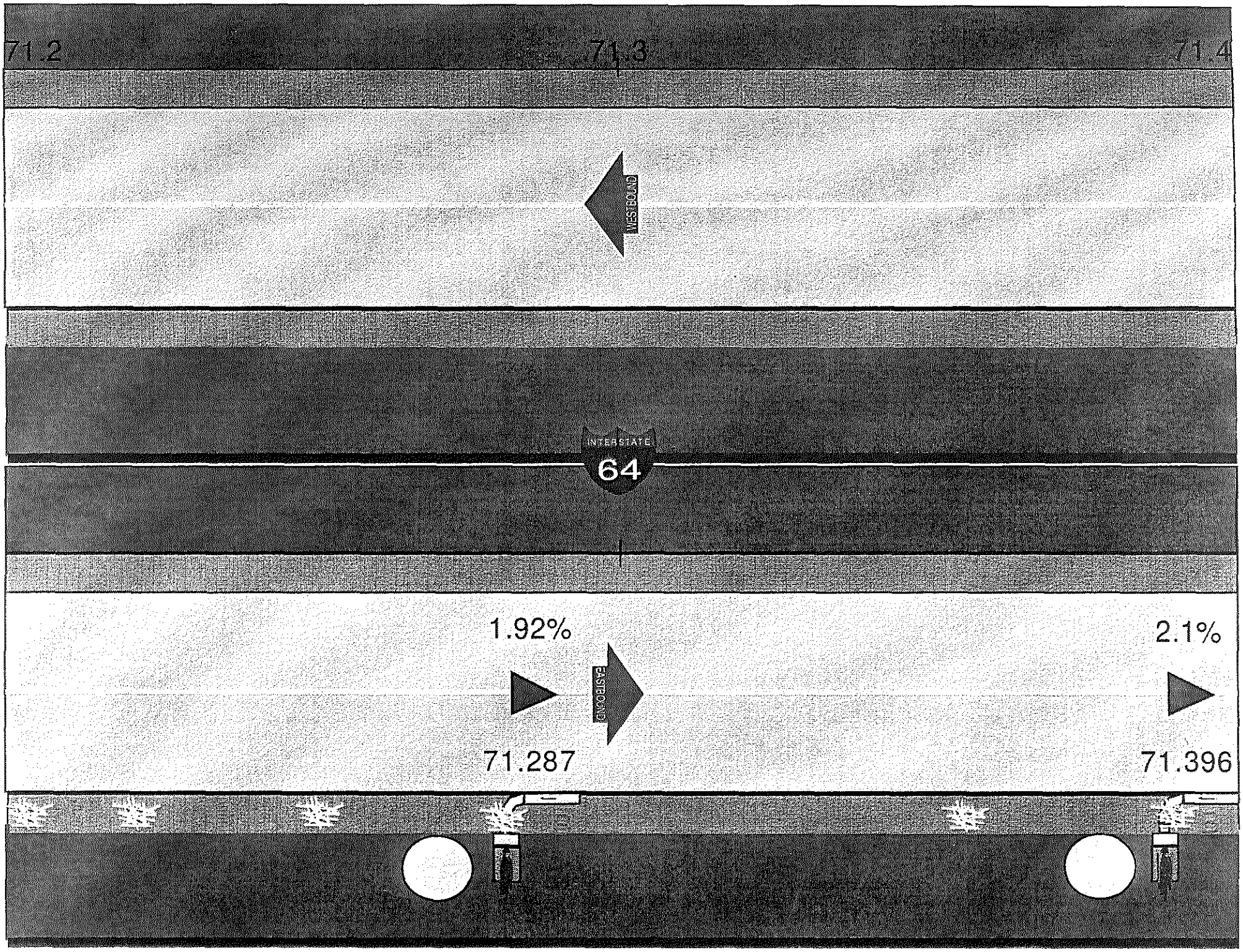

70.4
70.5
70.6
70.454
70.491
70.534
70.589
WESTBOUND
1.22%
.87%
.7%
70.54
.52%
INTERSTATE
64
EASTBOUND

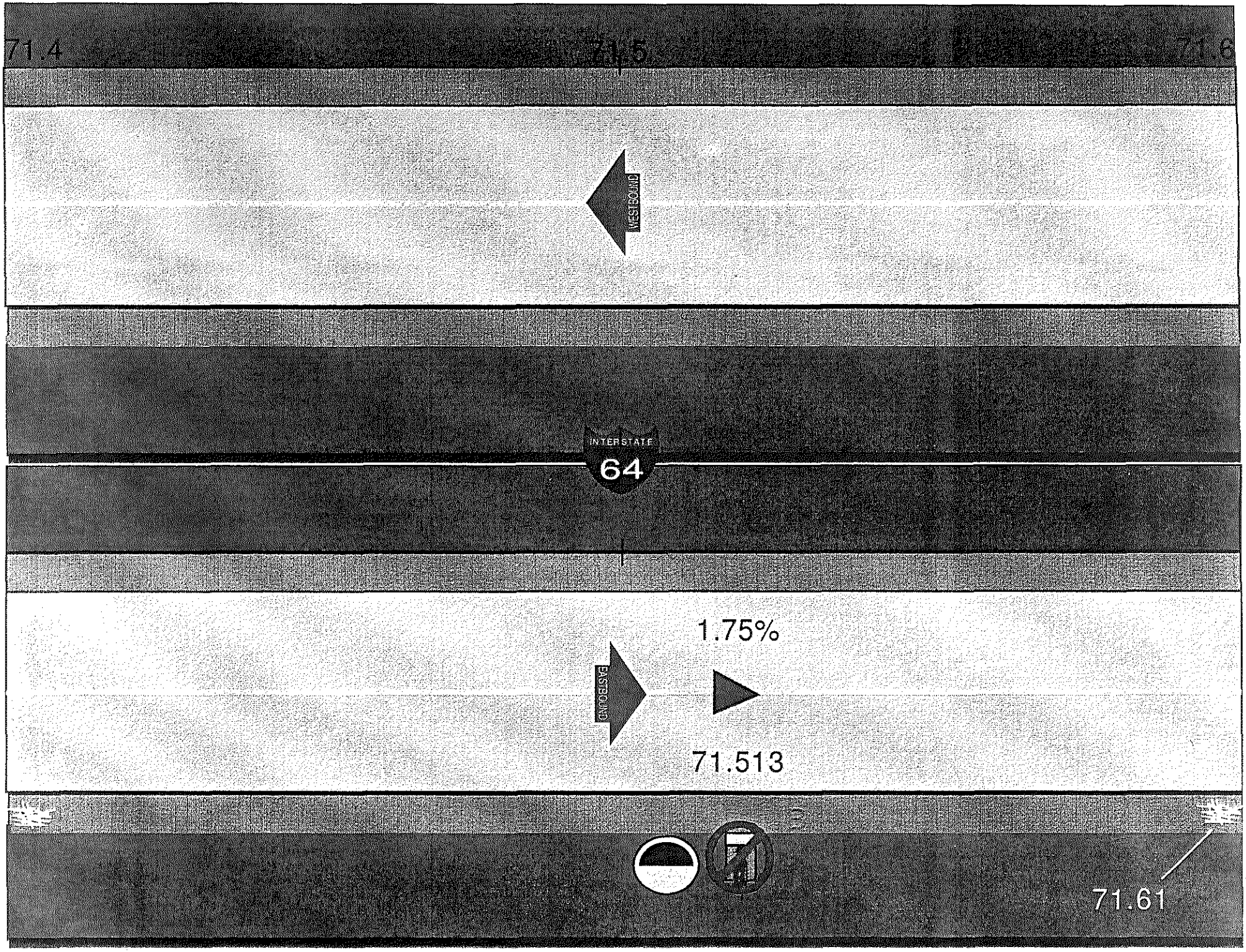

70.6
70.7
70.8
70.647
70.694
70.738
WEST BOUND
.52%
.52%
.7%
INTERSTATE
64
EAST BOUND

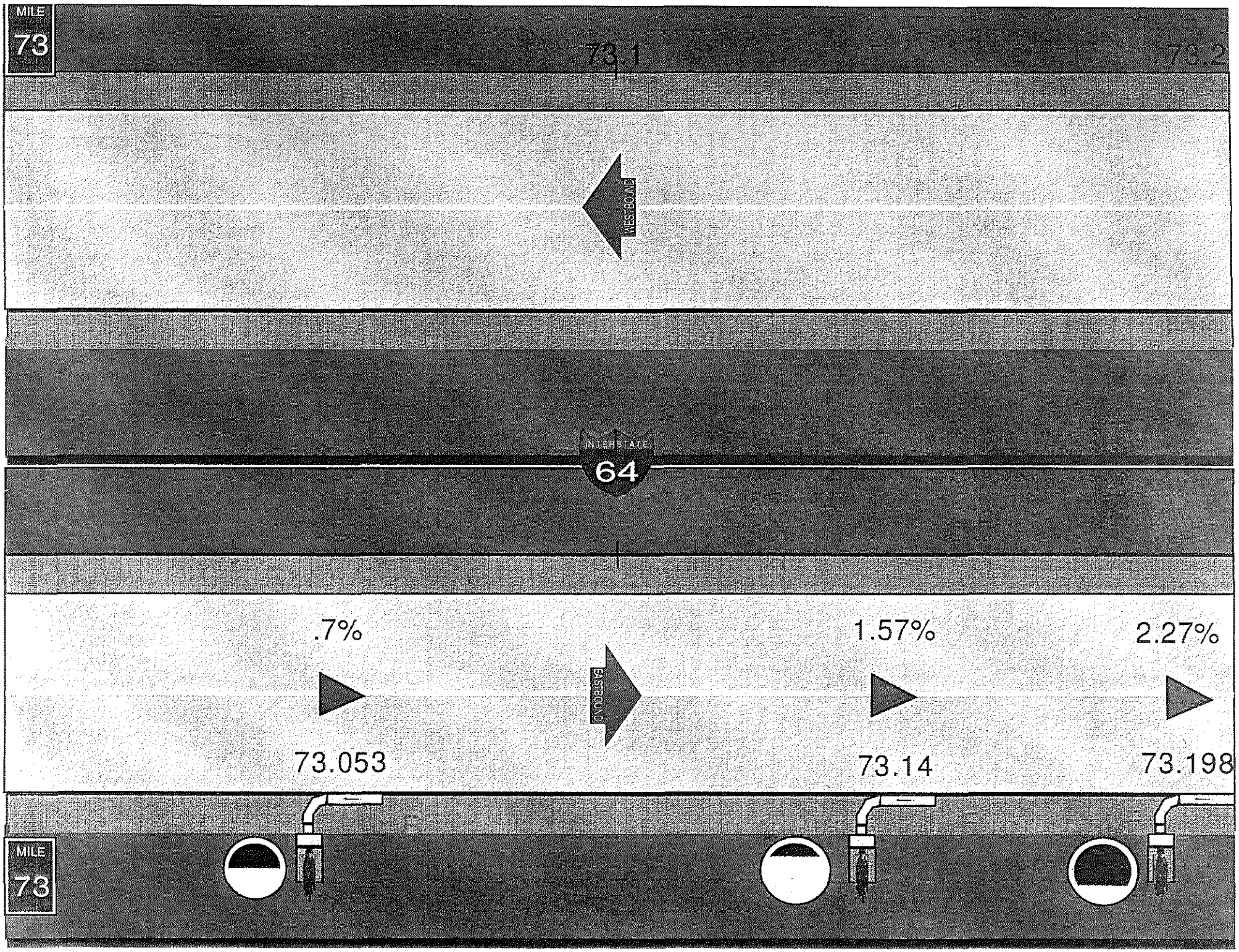

70.8
70.9
MILE
71
70.905
70.968
WEST BOUND
.7%
.52%
INTERSTATE
64
EASTBOUND
MILE
71

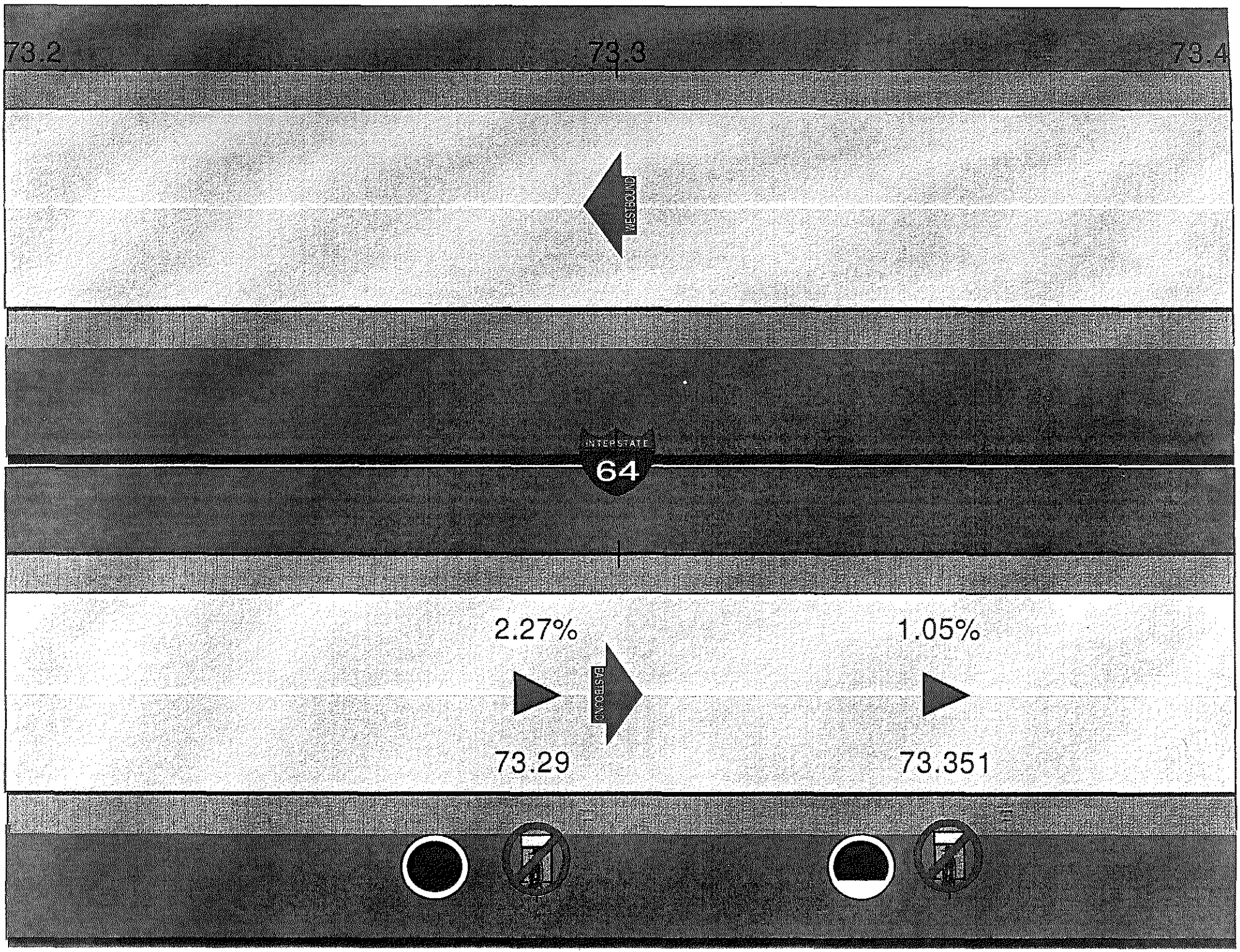
70

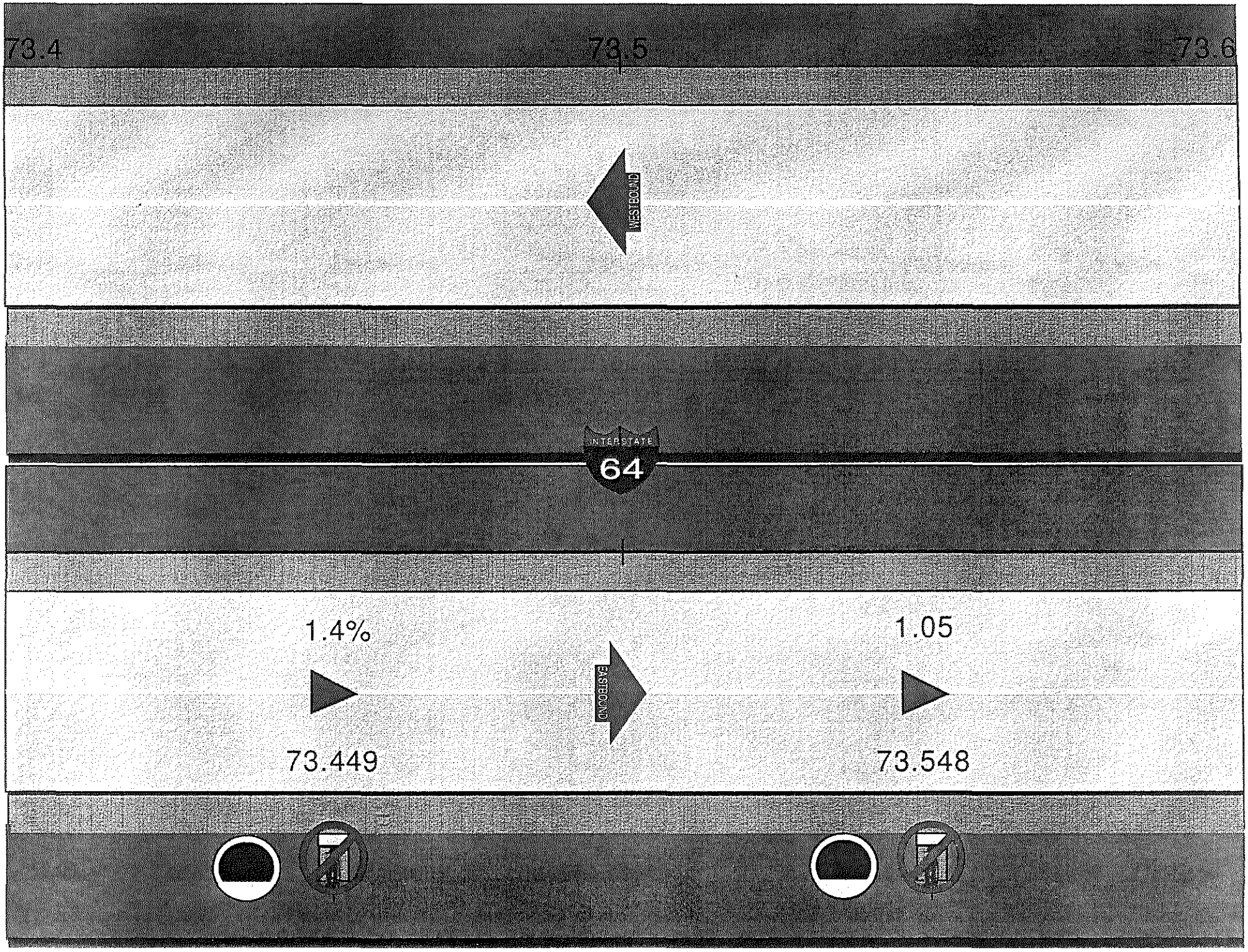

MILE
71
71.027
71.067
71.098
71.144
71.19
WESTBOUND
1.4%
.52%
.34%
.17%
0%
INTERSTATE
64
.35%
.17%
.52%
1.05%
.87%
EASTBOUND
71.012
71.052
71.086
71.13
71.175

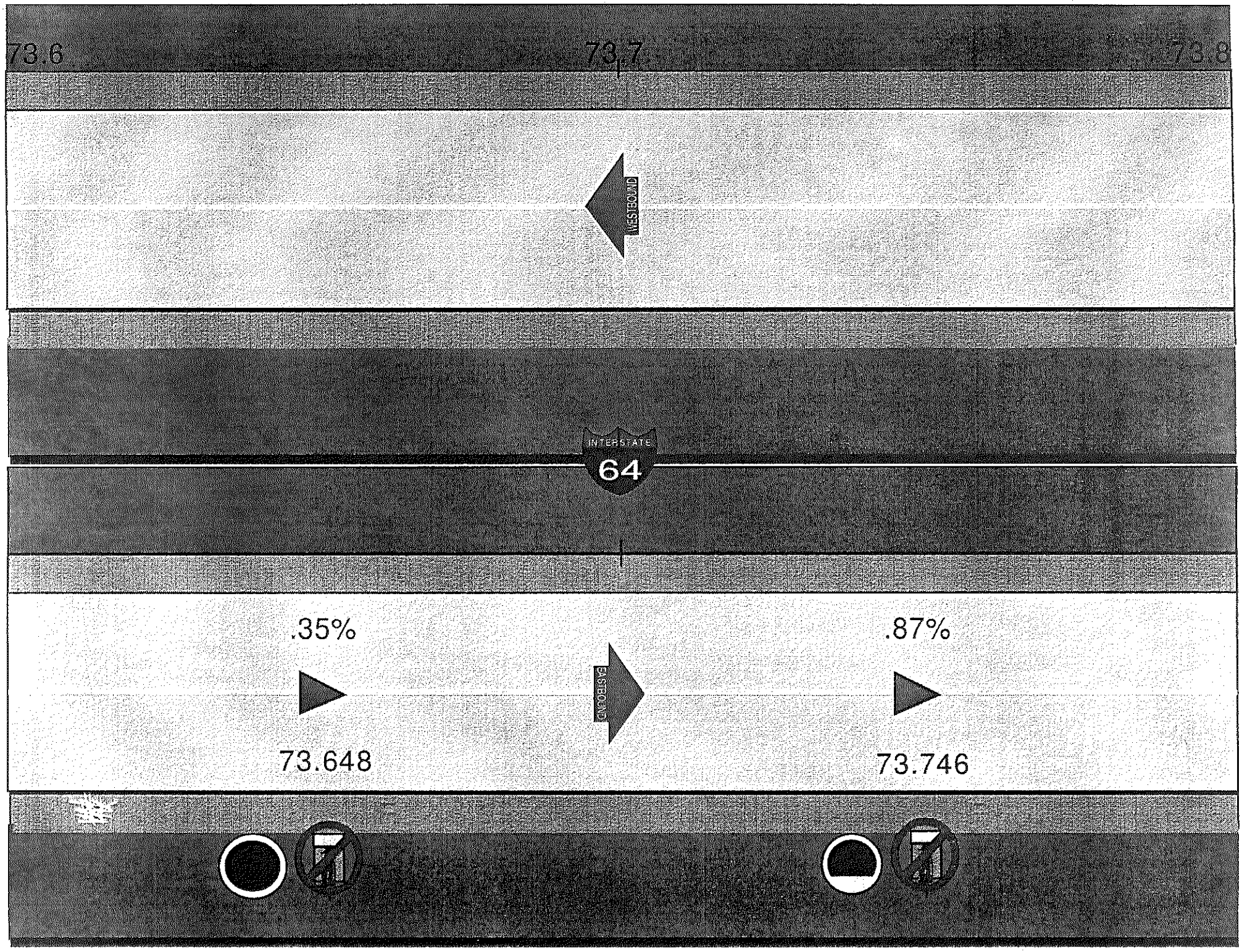

71.2
71.3
71.4
WESTBOUND
INTERSTATE
64
1.92%
2.1%
EASTBOUND
71.287
71.396

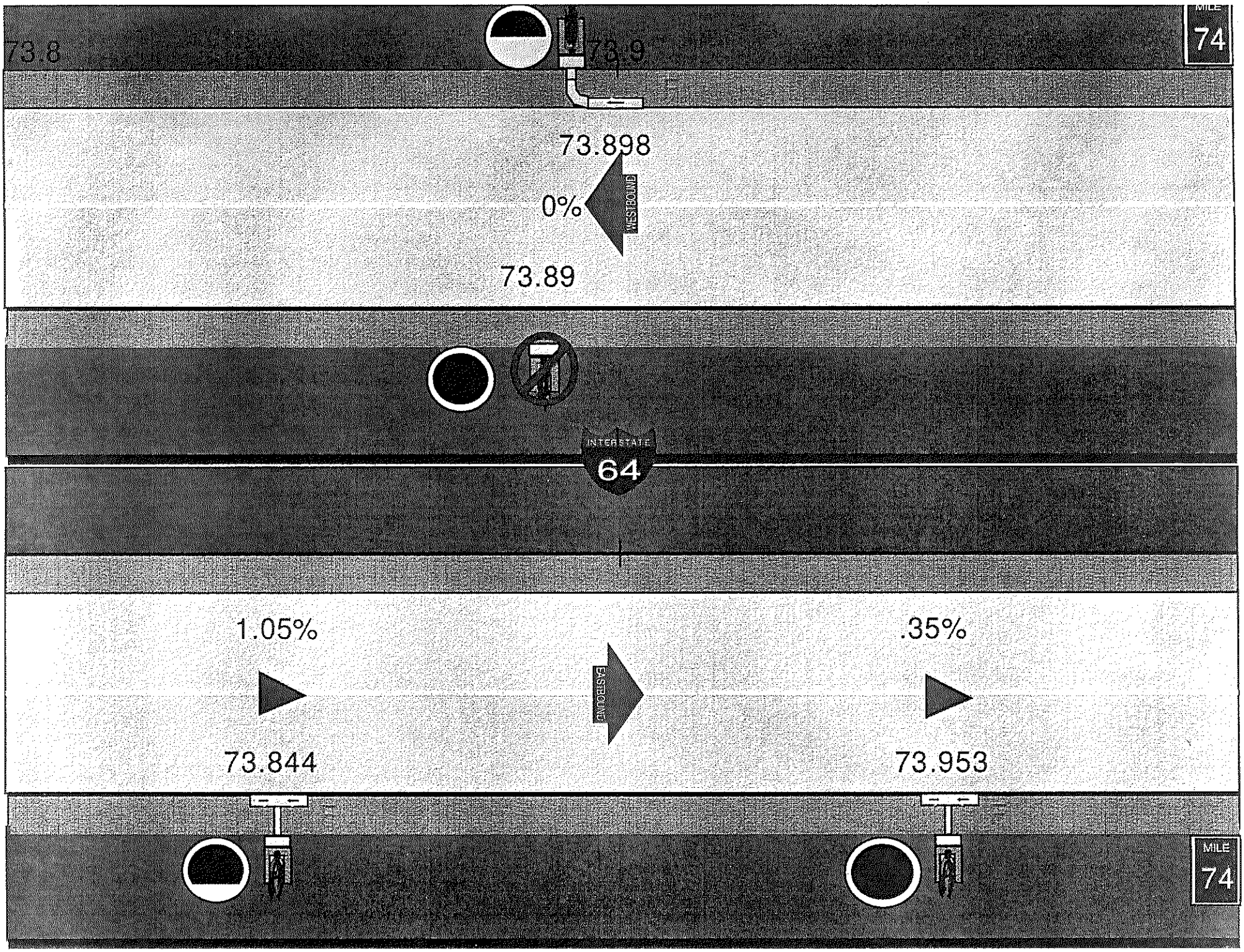

71.4
71.5
71.6
WESTBOUND
INTERSTATE
64
1.75%
EASTBOUND
71.513
71.61

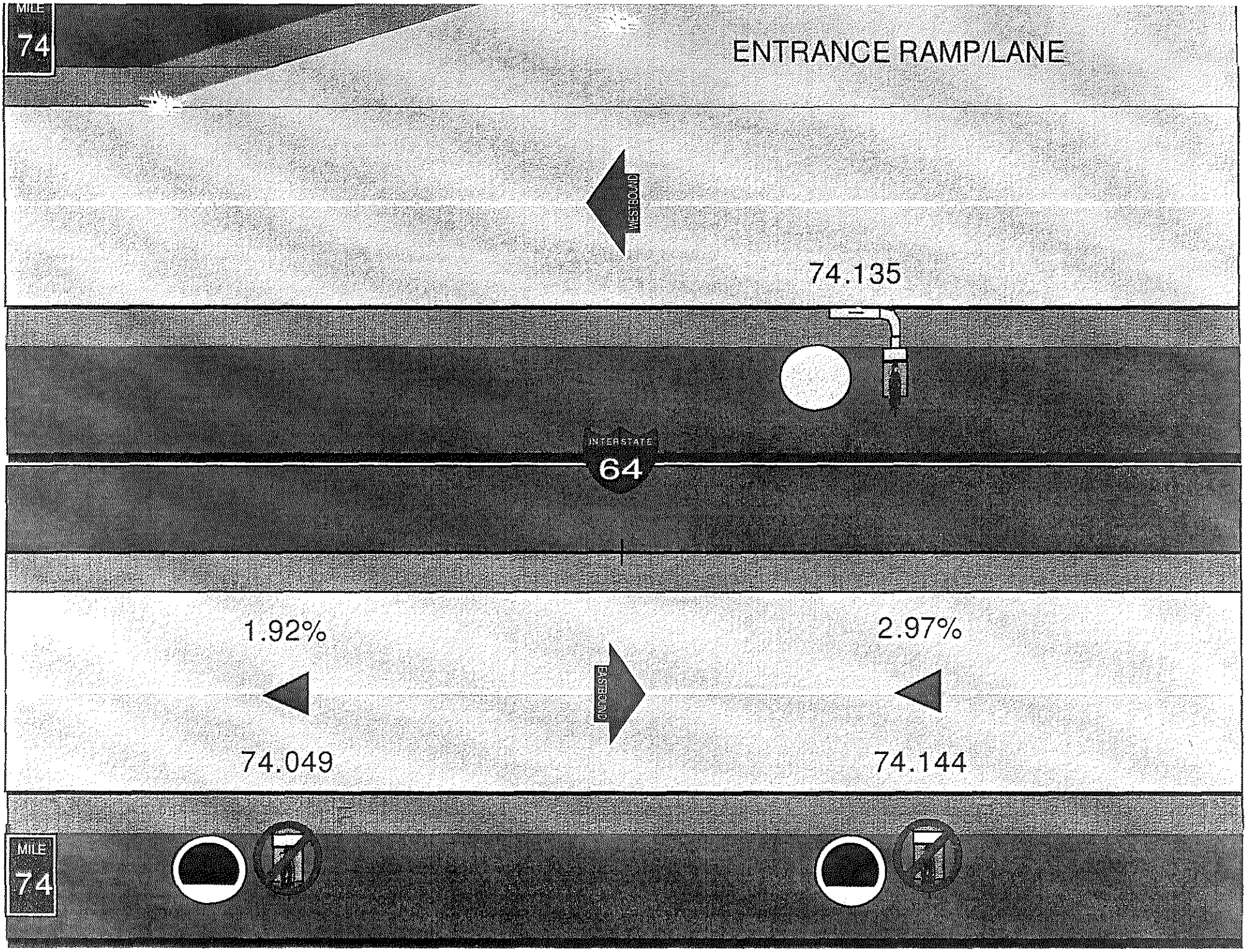

MILE
73
73.1
73.2
WESTBOUND
INTERSTATE
64
EASTBOUND
.7%
1.57%
2.27%
73.053
73.14
73.198
MILE
73

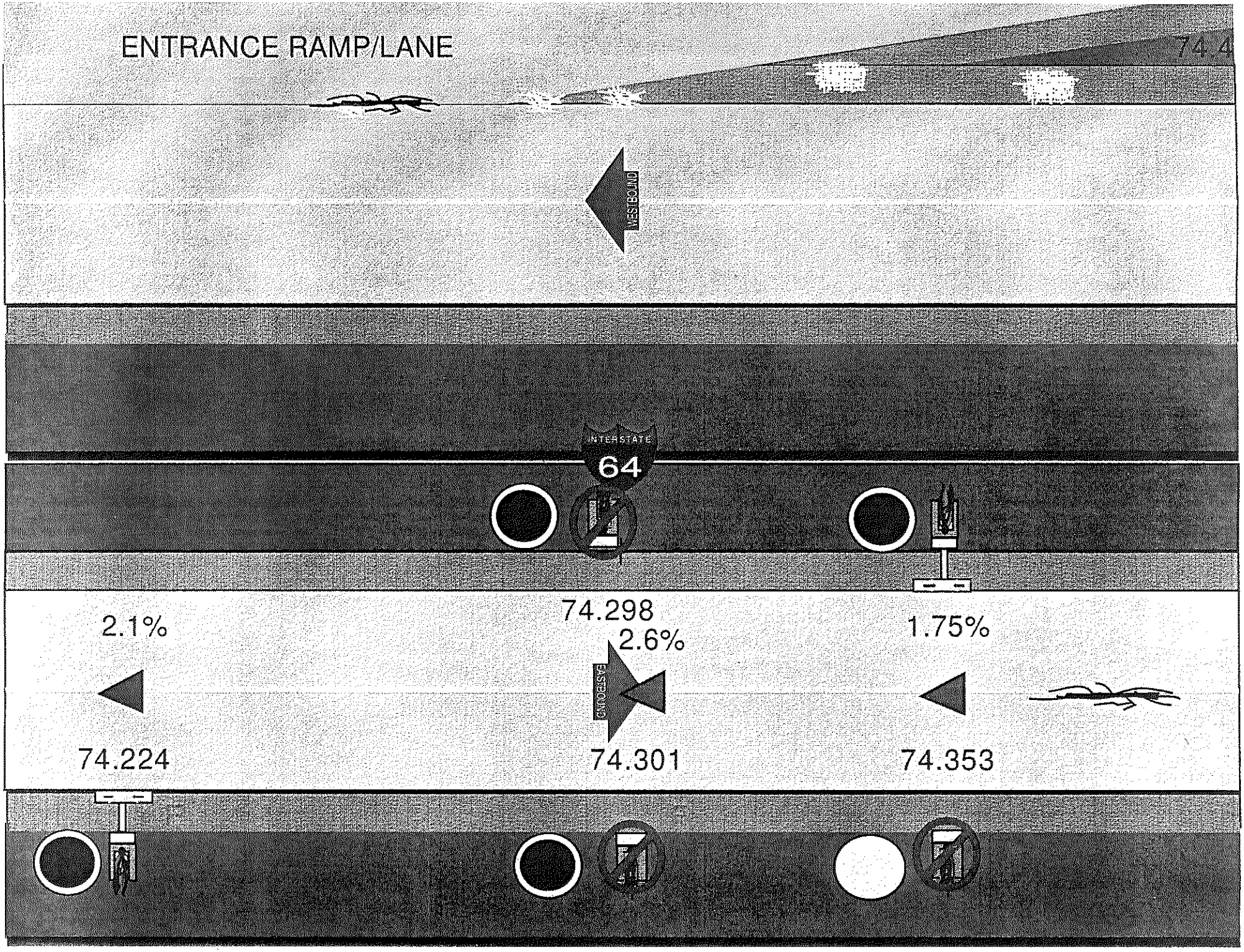

73.2
73.3
73.4
WESTBOUND
INTERSTATE
64
2.27%
1.05%
EASTBOUND
73.29
73.351

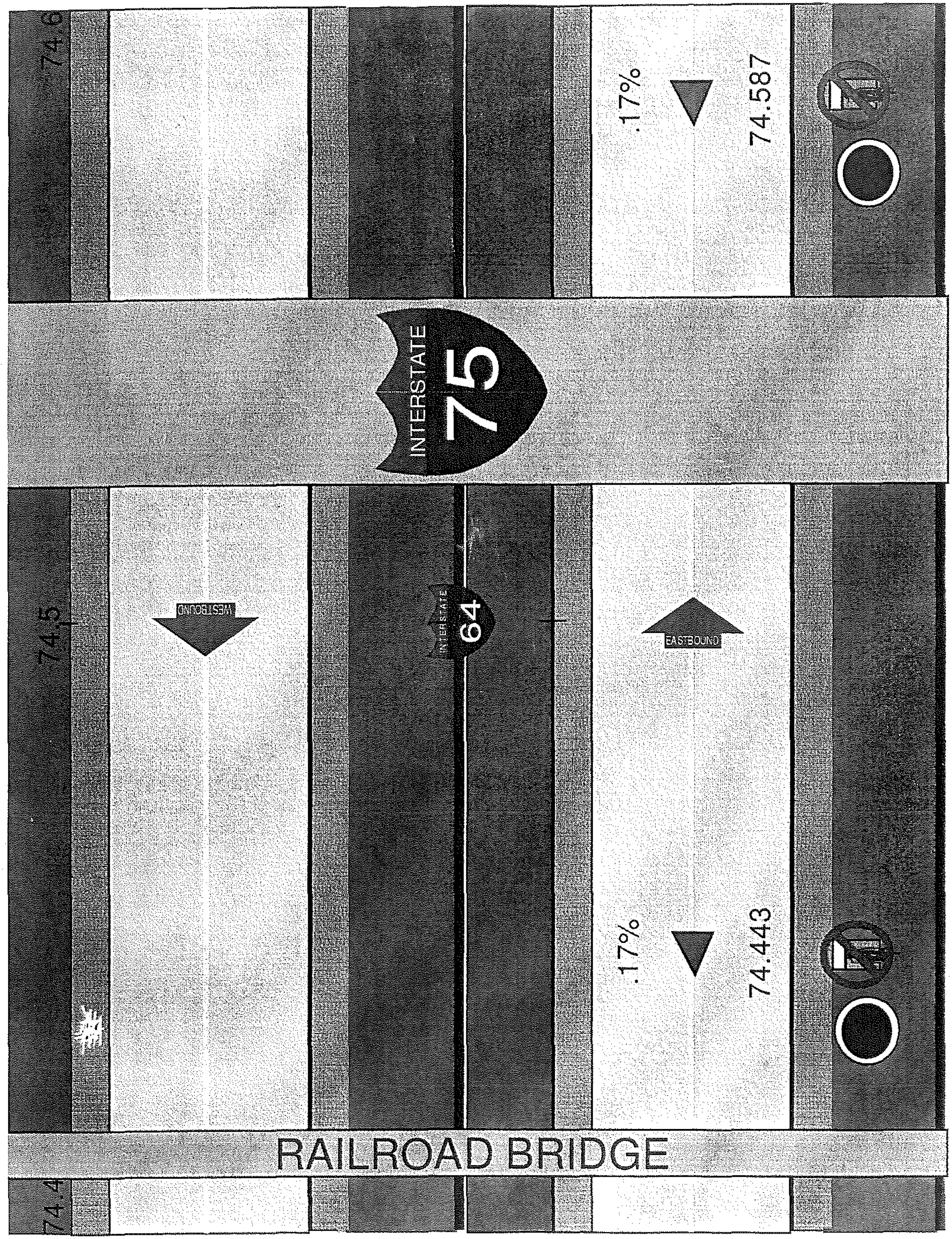

73.4
73.5
73.6
WESTBOUND
INTERSTATE
64
1.4%
1.05
EASTBOUND
73.449
73.548


73.6
73.7
73.8
WESTBOUND
INTERSTATE
64
.35%
.87%
EASTBOUND
73.648
73.746


73.8
73.9
MILE
74
73.898
0%
WESTBOUND
73.89
INTERSTATE
64
1.05%
.35%
EASTBOUND
73.844
73.953
MILE
74


MILE
74
ENTRANCE RAMP/LANE
WESTBOUND
74.135
INTERSTATE
64
1.92%
2.97%
EASTBOUND
74.049
74.144
MILE
74


ENTRANCE RAMP/LANE
74.4
WESTBOUND
INTERSTATE
64
74.298
2.6%
2.1%
1.75%
EASTBOUND
74.224
74.301
74.353


RAILROAD BRIDGE
74.4
74.5
74.6
WESTBOUND
INTERSTATE 64
EASTBOUND
.17%
74.443
INTERSTATE 75
.17%
74.587