

Research Report
KTC-91-19

CONSTRUCTION EVALUATION OF
HYDRAWAY EDGE DRAIN AND OUTLET PIPES
ON INTERSTATE 64

by

L. John Fleckenstein
Engineering Geologist

and

David L. Allen
Chief Research Engineer

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

in cooperation with
Transportation Cabinet
Commonwealth of Kentucky

and

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16. Abstract This report documents the installation of the Hydraway edge drain (version two) on I-64 in Franklin-Woodford-Scott and Fayette Counties. The edge drain was placed on the back side of the trench against the shoulder and backfilled with a sand/slurry. From observations on this project and several previous projects, the sand/slurry backfill helps to insure the integrity of the drainage system during initial backfilling. It is apparent that the sand slurry backfill provides a better installation in comparison to previous methods using excavated trench material. Notable trench settlement did occur on this project. It is apparent that insufficient water was used to properly density the sand. From observations on other projects, it appears that approximately one gallon per linear foot is required to achieve proper density. It appears that the method of flushing the sand, the speed of the construction, and the amount of water needed to achieve proper density will vary on the contractors equipment and methods. The net result is to achieve proper density with out damaging the edge drain. It also appears that the initial asphalt plug is not being properly compacted. The Hydraway panel was reversed to minimize fabric intrusion into the core of the drain. Fabric intrusion into the inner core of the Hydraway drain appeared to be eliminated when the panel was reversed. When the panel was reversed and trench settlement occurred, the rigid back of the panel was forced to bend in the opposite direction it was designed. The net result was cracking occurring in the rigid backing. Information reported in Research Report KTC-91-10 "Evaluation of Headwalls and Outlets for Geocomposite Edge Drains on I-75 and I-71" indicates that 48 percent of the flexible outlet pipes that were inspected were less than 60 percent open. Approximately 10 percent of the rigid outlets inspected during this study were less than 60 percent open, thus showing a substantial increase in performance. A large amount of distress noted on I-64 was observed in the flexible 4-inch pigtail. If rigid pipe is used throughout the outlet pipe system, performance should increase.			
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EXECUTIVE SUMMARY

This report documents the installation of the Hydraway edge drain (Version 2) on Interstate-64 in Franklin-Woodford-Scott and Fayette Counties. The edge drain was placed on the back side of the trench against the shoulder and backfilled with a sand/slurry.

From observations on this project and several previous projects, the sand/slurry backfill helps to insure the integrity of the drainage system during initial backfilling. It is apparent the sand slurry backfill provides a better installation in comparison to previous methods using excavated trench material. Notable trench settlement did occur on this project. It appears an insufficient amount of water was used to properly densify the sand. From observations on other projects, it appears approximately one gallon per linear foot is required to achieve proper density. The method of flushing the sand, the speed of construction, and the amount of water needed to achieve proper density will vary depending on the contractors equipment and methods; however the desired end result is to achieve proper density without damaging the edge drain.

Fabric intrusion into the inner core of the Hydraway drain appeared to be eliminated when the panel was reversed. When the panel was reversed and trench settlement occurred, the rigid back was forced to bend in the opposite direction it was designed. The net result was cracking that occurred in the rigid backing.

Information reported in Research Report KTC-91-10 "Evaluation of Headwalls and Outlets for Geocomposite Edge Drains on Interstate 75 and Interstate 71" indicates that 48 percent of the flexible outlet pipes that were inspected were less than 60 percent open. Approximately 10 percent of the rigid outlets inspected during this study were less than 60 percent open, thus showing a substantial increase in performance. A large amount of distress noted on Interstate 64 was observed in the flexible 4-inch pigtail. If rigid pipe is used throughout the outlet pipe system, performance should increase.

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INTRODUCTION

Pavement edge drains (fin drains) were installed on Interstate 64, from Milepost 57.90 to 73.29 in the eastbound direction, and from Milepost 57.90 to 74.31 in the westbound direction. The edge drains were installed in both the outside and inside shoulders. Construction began in the fall of 1990 and was completed in the summer of 1991. Monsanto Hydraway edge drains (Version 2) were installed throughout the entire project.

CONSTRUCTION INSPECTION

Initially, the Hydraway drain (Version 2) was installed adjacent to the shoulder side of the trench and backfilled with a sand slurry. The drain was installed with the more rigid and less open back side facing the shoulder trench wall and the open side facing the sand. The edge drain was installed in this manner from Milepost 57.90 to approximately Milepost 60.22. The edge drain was borescoped shortly after installation. There was some intrusion of the filter fabric into the inner core. The Monsanto Corporation expressed some concern about this intrusion. For the remainder of the project, the drain was reversed. The less restricted side was placed towards the wall of the shoulder and the more restricted side towards the sand and the pavement. The framework of the open rigid backing decreased the amount of fabric intrusion.

The remainder of the project was inspected several times during construction with a borescope. No vertical or horizontal compression or any other distress was apparent in the core or the filter fabric immediately after installation.

Backfill Density and Trench Settlement

During several construction inspections in 1990 and 1991, it appeared (from visual observations) the sand slurry backfill was not as dense as it had been on previous construction projects. On July 15, 1991, noticeable trench settlement was observed in the initial asphalt plug on the eastbound side of Interstate 64. The contractor was installing the edge drains on the westbound side of Interstate 64. It was apparent that the sand was not properly compacted. The density of the sand is largely controlled by the amount of water used during the installation process. It appeared that an insufficient amount of water was being used to properly compact the sand backfill. On previous construction projects, water flowed freely on top of the sand for 20 to 30 feet before it dissipated into the sand backfill.

The installation of the initial asphalt plug was also observed. The asphalt was not sufficiently compacted to achieve adequate density. At the time of the inspection, the roller was resting on the driving lane and the asphalt shoulder at such an angle that it appeared to be bridging the asphalt being placed in the trench. It also appeared that loose uncompacted asphalt was not being mounded to a sufficient height above the trench to obtain adequate compaction. In addition, the underlying sand appeared to be of insufficient density.

On July 16, 1991, the inspector on the project had the contractor increase the volume of water. It appeared there was a 20 to 30 percent increase in density. It still appeared that the sand backfill was not sufficiently dense. The water was not flowing freely across the sand indicating

that the sand may have not been fully saturated. This was the contractor's first attempt at installing edge drains in this manner. It appears the method of flushing the sand, the speed of construction, and the amount of water needed to achieve proper density will vary depending on the contractor's equipment and methods. The net result is to achieve proper density without damaging the edge drain. Four Shelby tube samples were obtained from the sand backfill in random locations in the westbound outside shoulder. The void ratio, e , was determined for the four samples. The average void ratio was 0.70. The sand is considered uniform in particle size if the uniformity coefficient is less than 4 or 5. The uniformity coefficient was determined to be 3.2.

Trench Settlement and Borescope Inspection

The impact of trench settlement on the edge drain was examined on the eastbound shoulder on July 16, 1991. At milepost 60 (eastbound), the initial asphalt plug had settled approximately 1.5 inches. The edge drain was inspected with a borescope. The drain was uniform down to the 8th row of support columns. The 8th, 9th and 10th rows were angled toward the inside of the trench. The rigid backing was bent at the 8th row. No siltation or other distress was observed.

The asphalt plug had settled approximately 1.75-inches at Milepost 63.0. The drain was uniform down to the 7th row of support columns. Some compression was noticeable at the 7th row. The remainder of the panel was tilted toward the inside of the trench. The drain appeared to be clean and open.

Significant settlement was noticeable at Milepost 63.65. The initial asphalt plug had tilted and had settled approximately 3 to 4-inches toward the pavement side of the trench. The plug was resting directly on top of the edge drain panel on the shoulder side of the trench. The first and second row of support columns had tilted and compressed closer together. The 8th, 9th and 10th rows were angled toward the inside of the trench. The rigid backing had been bent at the 8th row. The drain appeared to be clean and open.

Trench settlement was measured in several areas on August 13, 1991. The measured settlement is listed in the following table. The final asphalt wedge had not been placed at the time of the inspection.

Measured Trench Settlement

Milepost	Direction	Settlement (inches)
68	WB	0.50
67	WB	0.75
66	WB	0.50
64	WB	0.75
62	WB	1.12
61	WB	2.25
59	WB	1.25
59	EB	1.25

60	EB	1.50
61	EB	0.75
62	EB	2.25
63	EB	2.00
64	EB	1.50
66	EB	0.50
67	EB	2.00
68	EB	1.25

AVERAGE=1.27 inches

Final Edge Drain Inspection

The edge drains were inspected again on October 29, 1991. At the time of the inspection, the final asphalt wedge had been placed. The edge drain was inspected with the borescope at five different locations. The locations are listed below.

Milepost	Direction	Location
72.868	WB	Outside Shoulder
72.524	WB	Outside Shoulder
72.000	WB	Outside Shoulder
61.000	WB	Outside Shoulder
63.650	EB	Outside Shoulder

Similar types of distresses were apparent in all panels. All edge drains were bent (angled) at the 8th or 9th row of support columns. They were angled toward the inside of the trench (toward the pavement side of the trench). The rigid backing of the inner core had cracked on approximately one-half of the panels where they had been bent. The bottom of the panels had been bent or pushed out from the trench wall due to settlement and/or the application of wheel loads on the asphalt plug. The Hydraway panel is very flexible when folded toward the open side of the panel, but deformation results in the inner core when the rigid backing is folded in the opposite direction.

Outlet Inspection

In the fall of 1990, it was observed that the outlet pipes were being bent instead of using couplings. The backfill material occasionally contained large clods of dirt and grass. In the spring of 1991, several outlet pipes that discharge into the median were inspected. The eastbound median drains were inspected between Station 2634+50 and Station 2695+29.71. Approximately 25 percent of the edge drain outlets that were inspected were damaged during installation. The following is a list of problems that were noted:

Station	Problem Encountered
2664+50	Coupling pulled apart (backfill in outlet pipe).
2667+00	Coupling pulled apart near panel (sand in outlet pipe).
2679+50	Outlet pipe crushed.
2691+00	Mouse nest between T-connector and outlet in median box.
2695+29.71	Crushed outlet pipe behind median box.

In October of 1991, outlet pipes were inspected approximately every one-half mile in both directions of Interstate 64. A total of 68 outlet pipes were inspected. Figure 1 shows designations for the outlet pipe sections. Section A is the 4-inch flexible pigtail that is precast into the headwall. Section B is a 4-inch rigid pipe that runs to the shoulder and Section D is a 4-inch rigid pipe that runs at a 45 degree angle through the shoulder. Sections C and E are connectors and Section F is the mainline (Hydraway edge drain).

The outlet pipes were inspected for sags, siltation, standing water, compression, rips, and other noticeable distress. As shown in Figure 2, approximately 69 percent of the outlet pipes inspected were more than 90 percent open, 20 percent were 60 to 90 percent open, 4 percent were 40 to 60 percent open, and approximately 6 percent were less than 40 percent open. Approximately 10 percent of the outlet pipes had been crushed significantly during installation. The amount of open area was controlled by the degree of compression in the pipe). Figure 3 indicates where the majority of the distress and the type of distress occurred throughout the outlet pipe section. Figure 3 indicates the largest amount of distress was observed in the 4-inch flexible pigtail (Pipe Section A) which is precast into the headwall. The pig tail is approximately 1 to 2 feet long on the back side of the headwall. Approximately 70 percent of the outlet pipes had noticeable sags in this area. Approximately 45 percent of the rigid outlet pipes had sags through the asphalt shoulder (Pipe Section D).

Figure 3 also indicates that significant compression had occurred in the flexible pigtail (Section A) during installation. Approximately 34 percent of the outlet pipes had noticeable compression in the flexible pigtail (Section A). It appears this is the weakest part of the outlet pipe system.

During the inspection, it appeared more distress was occurring in the outlet pipes that were connected to the median boxes than to the headwalls (Figure 4). Approximately 57 percent of the median outlets that were inspected were less than 60 percent open. More distress was observed in the eastbound shoulder headwalls than the westbound shoulder headwalls. A statistical summary and the field data base is contained in Appendix A.

Condition of Headwalls

Several of the outlet headwalls appeared to be sloped the wrong way. Approximately 148 headwalls were inspected in the westbound direction. The headwalls were inspected between Milepost 74.00 and Milepost 63.0 (shoulder drains only). As shown in Figure 5, approximately 43 percent of the headwalls were not properly sloped. According to the Kentucky Department of Highway Standard Drawing No. RDP-010-04, a 1/2-inch per linear foot of fall should be provided in the headwall to provide positive outlet flow. The headwalls were inspected with

a hand level. Approximately 57 percent of the outlets had a positive slope, 23 percent were level, and 20 percent had a negative slope.

A number of headwalls contained a considerable quantity of concrete in the outlet pipe. Flow from outlets was restricted by as much as 25 percent. Several of the outlet pipes had been precast partially below the elevation of the trough. It was also observed that the concrete patch which is placed over the dowel hole for the hoisting hook in the at the end of the trough is usually higher than the height of the trough. This allows material to accumulate at the toe of the headwall.

CONCLUSIONS

The sand slurry backfill helps to insure the integrity of the drainage system during initial backfilling. It is apparent that sand slurry backfill provides a better installation in comparison to previous methods using excavated trench material (1). More attention should be placed on insuring the proper density of the sand backfill by inspection personnel. It is apparent the density of the sand is controlled by the amount of water used during installation. It appears that approximately one gallon of water per linear foot is required to obtain proper density. The method of flushing the sand, the speed of construction, and the quantity of water needed to achieve proper density will vary depending on the equipment and construction procedures.

Fabric intrusion into the inner core of the Hydraway drain appeared to be eliminated when the panel was reversed. When the panel was reversed and trench settlement occurred, the rigid back was forced to bend in the opposite direction for which it was designed. The net result was cracking that occurred in the rigid backing.

Information reported in Research Report KTC-91-10 "Evaluation of Headwalls and Outlets for Geocomposite Edge Drains on I-75 and I-71" (2) indicates that 48 percent of the flexible outlet pipes that were inspected were less than 60 percent open. Approximately 10 percent of the rigid outlets inspected in this study were less than 60 percent open, thus showing a substantial increase in performance. A large amount of distress noted on I-64 was observed in the flexible 4-inch pigtail. If rigid pipe is used throughout the outlet pipe system, performance should increase.

RECOMMENDATIONS

From the results of this study, it is recommended that the more open side of the Hydraway panel be placed against the shoulder side of the trench.

A method should be developed for checking in place densities.

High density polyethylene pipe having a smooth interior should be used in outlet pipes which are precast into the headwalls instead of the flexible 4-inch single wall.

Headwalls should be inspected before they are accepted. Headwalls should be constructed so that the outlet pipe is free of concrete. The patching material in the hoisting dowel hole in the

trough of the headwall should be no higher than the height of the trough.

~~It is recommended that the slope of the headwall be checked after installation.~~

It is recommended that all the outlets (entire length of outlet pipe system, headwall to edge drain) be inspected with a remote video inspection device before final acceptance.

It is recommended that the outlet pipe be backfilled with a crushed stone or sand to insure a proper installation.

It is recommended that the rodent screens and the troughs of the headwalls be cleaned on a routine basis. Consideration should be given to raising the height of the pipe above the elevation of the trough to allow for some siltation and/or build up of material. headwall cleaning.

Rodent screens should be placed on all outlets, including median boxes.

REFERENCES

1. Fleckenstein, L. John, and Allen, David, L., Research Report KTC-90-25 "Evaluation of Geocomposite Pavement Panel Drains Installed in a Sand Backfill Under Revised Installation Specification", Kentucky Transportation Center, University of Kentucky, Lexington, Kentucky, August 1991.
2. Fleckenstein, L. John, and Allen, David, L., Research Report KTC-91-10 "Evaluation of Headwalls and Outlets for Geocomposite Edge Drains on I-75 and I-71", Kentucky Transportation Center, University of Kentucky, Lexington, Kentucky, August 1991.

FIGURE 1. OUTLET PIPE SECTION DESIGNATIONS

- A: 4-INCH FLEXIBLE PIGTAIL
- B: 4-INCH RIGID PIPE RUNNING TO SHOULDER
- C: COUPLING
- D: 4-INCH RIGID PIPE RUNNING 45 DEGREES TO SHOULDER
- E: COUPLING
- F: HYDRAWAY EDGE DRAIN PANEL

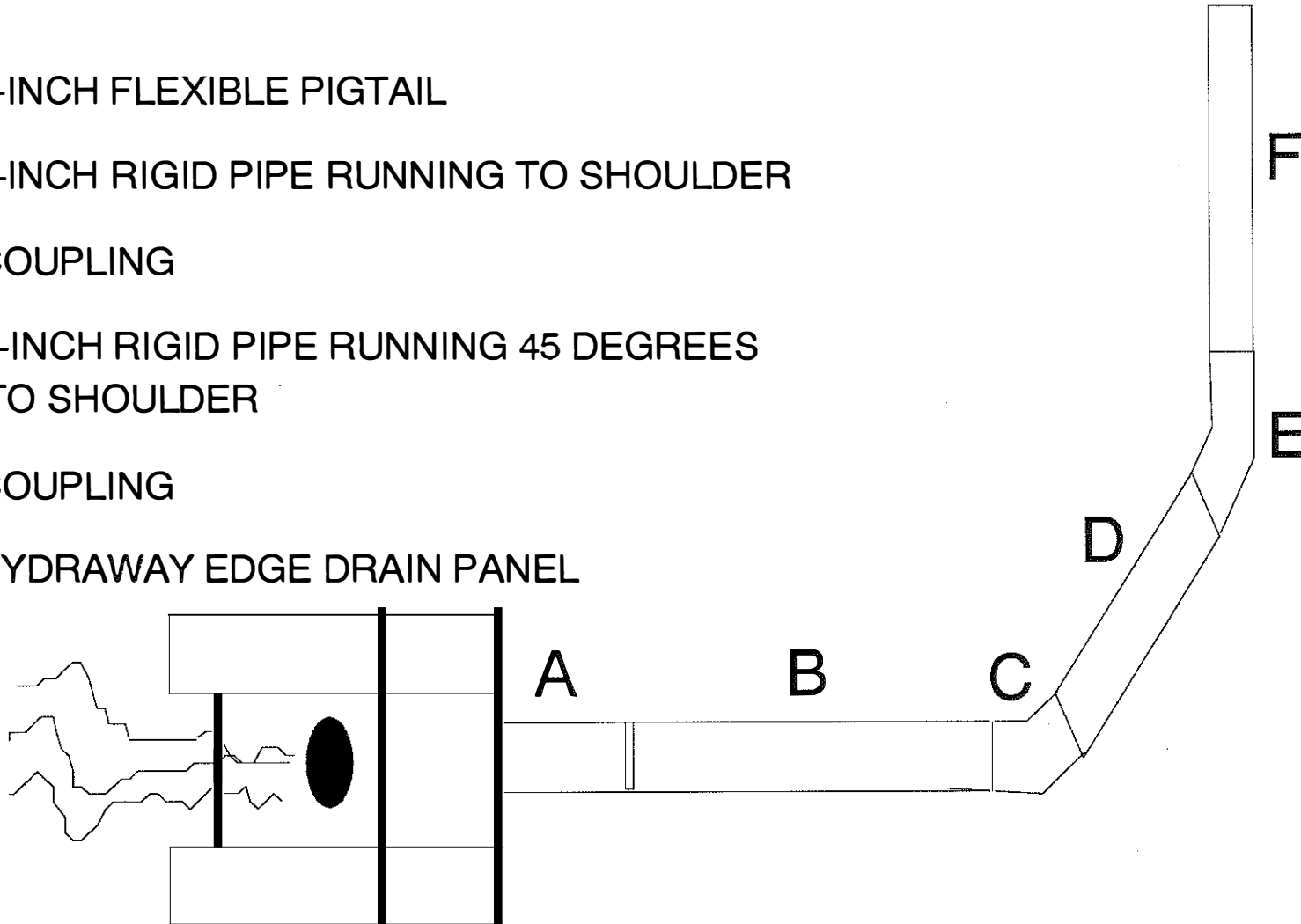
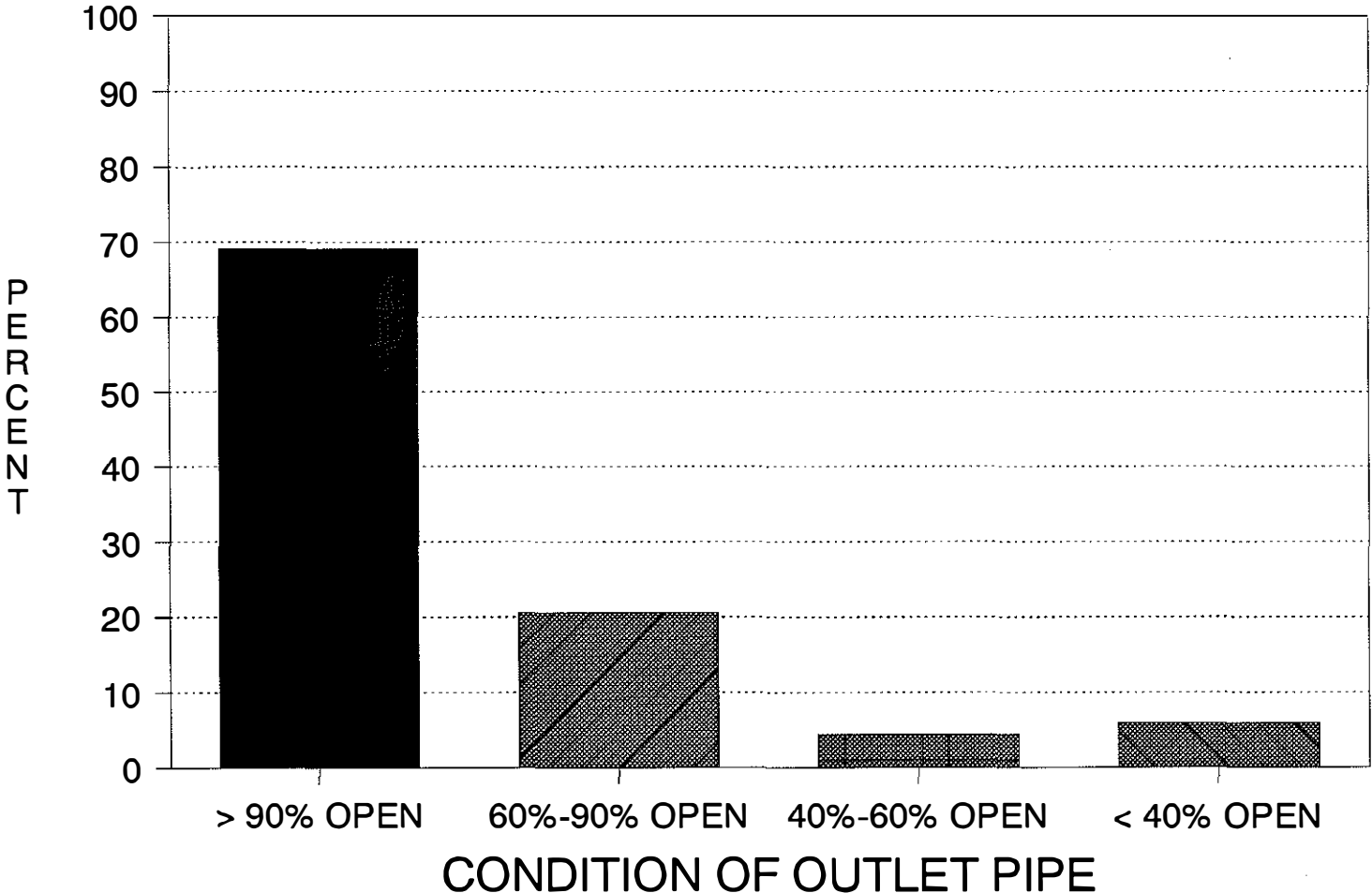
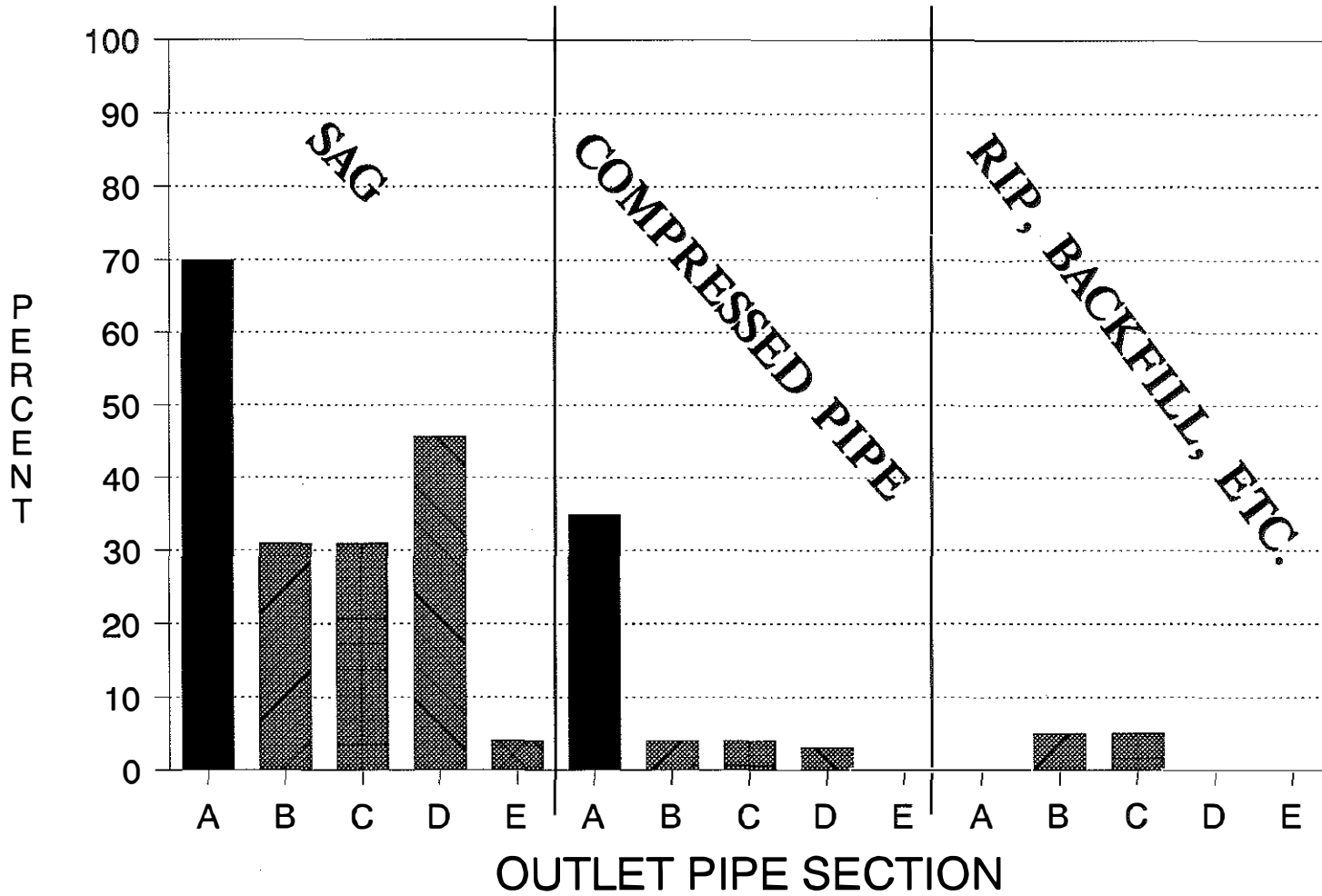


FIGURE 2. OUTLET PIPE FLOW INFORMATION
(I-64, RIGID OUTLET PIPE)



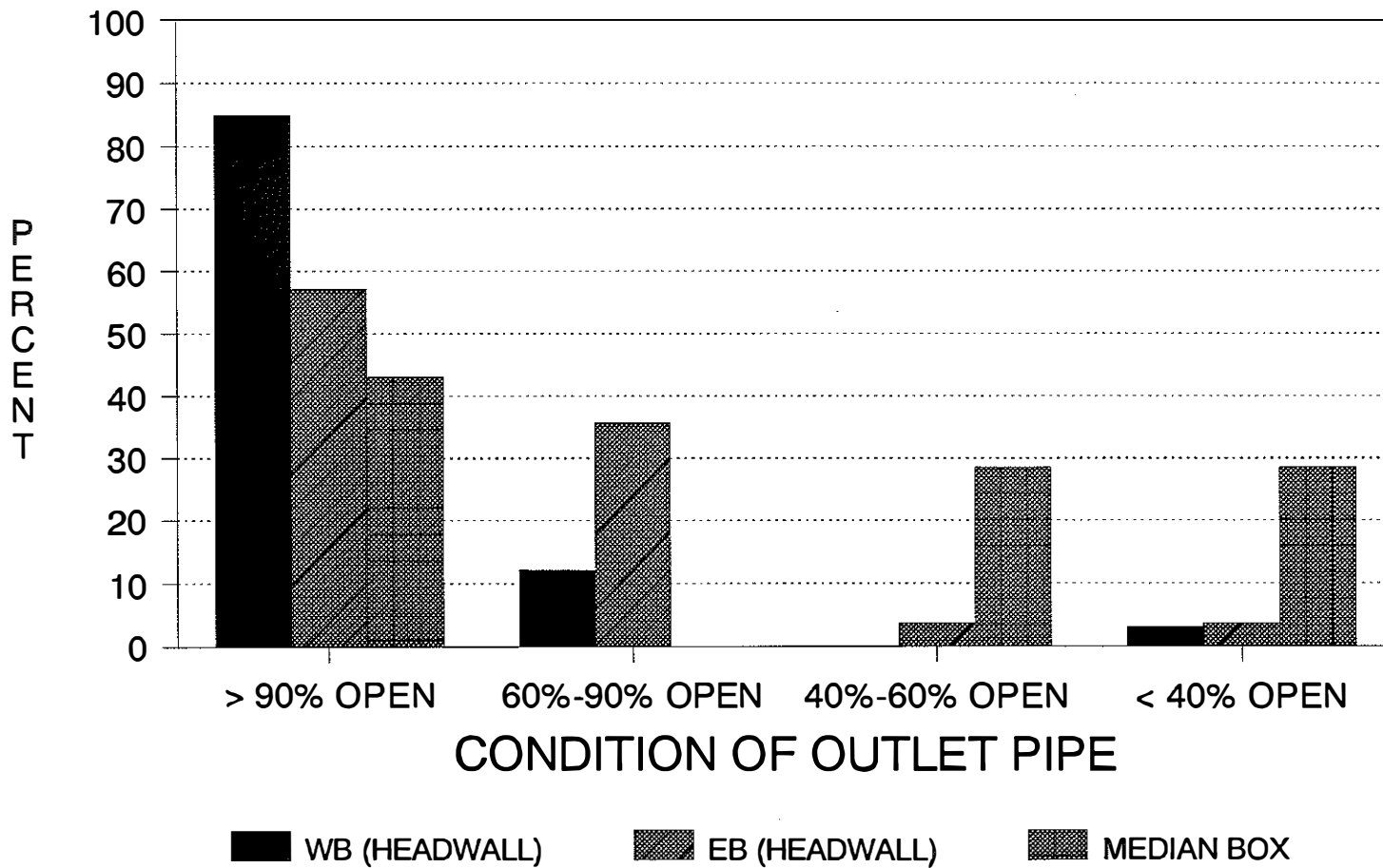
FLEXIBLE PIPE USED IN HEADWALL

FIGURE 3. RIGID OUTLET PIPE DISTRESS
(INTERSTATE 64)



FLEXIBLE PIPE USED IN HEADWALL

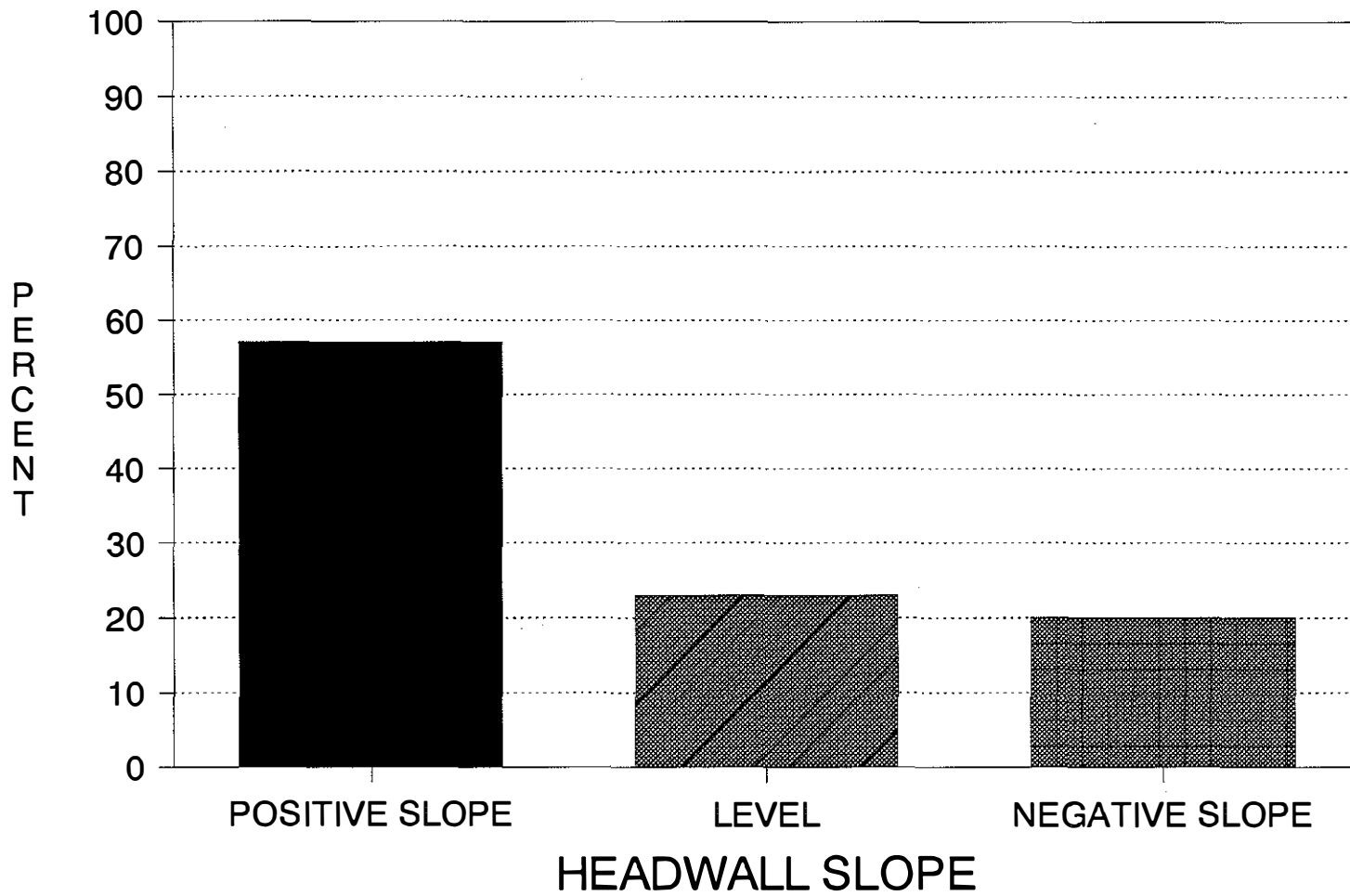
FIGURE 4. OUTLET PIPE FLOW INFORMATION
(I-64, RIGID OUTLET PIPE)



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FLEX. PIPE USED IN H.W. AND MEDIAN BOXES

FIGURE 5. HEADWALL SLOPE
(INTERSTATE 64)



HEADWALL SLOPE=1/2" PER LINEAR FOOT

APPENDIX
SUMMARY OF OUTLET INSPECTION ON I-64

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 HEADWALL/BOX & OUTLET PIPE

ROUTE = I-64
 DIRECTION = BOTH + MEDIAN
 INSP.DATE = OCTOBER 91

	NUMBER	PERCENTAGE
1. CLEAN HEADWALL/BOX	42	62.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	37	54.50
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	3	4.50
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	2	3.00
2. PT. COVERED HEADWALL	25	37.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	23	34.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	2	3.00
3. COVERED HEADWALL	1	1.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	1	1.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
4. PLUGGED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
5. HEADWALL/BOX & OUTLET PIPE CONDITION :		
* INSPECTED HEADWALL/BOX & PIPE	68	
* FULLY IN SERVICE	37	54.00
* PT. IN SERVICE	27	40.00
* OUT OF SERVICE	4	6.00

Note : -Fully in Service = headwall is clean with pipe > 60% open
 -PT. in service = clean headwall with pipe 40-60% open, or
 PT. covered/covered headwall with pipe < 60% open.
 -Out of service = Plugged headwall, or outlet with pipe <
 40% open.

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 OUTLET

ROUTE = I-64
 DIRECTION = BOTH + MEDIAN
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. INSPECTED OUTLET	68	
2. OUTLET CONDITION :		
CLEAN OUTLET	42	62.00
PT. COVERED OUTLET	25	37.00
COVERED OUTLET	1	1.00
PLUGGED OUTLET	0	0.00
3. COVERING MATERIAL :		
GRAVEL OR GRAVEL +...	18	26.00
DIRT. OR DIRT.+.....	5	7.00
VEG. OR VEG. +	0	0.00
CON. OR CON. +	7	10.00
4. SCREEN :		
NONE	9	13.00
OPEN	52	76.50
PARTIALLY OPEN	6	9.00
BLOCK	1	1.50
5. SILTATION :		
NONE	58	85.00
SLIGHTLY	8	12.00
MODERATELY	2	3.00
SEVERLY	0	0.00
6. FLOW :		
YES	68	100.00
NO	0	0.00
7. DRAINAGE :		
GOOD	48	71.00
POOR	20	29.00

***** SUMMARY *****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 ***** OUTLET PIPE *****

ROUTE = I-64
 DIRECTION = BOTH + MEDIAN
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
I. INSPECTED OUTLET PIPE	68	
II. OPEN PIPE (>90% OPEN)	47	69.10
III. COMPRESSED/BLOCKED PIPE	21	30.90
* 60% - 90% OPEN	14	20.60
* 40% - 60% OPEN	3	4.40
* < 40 % OPEN OR BLOCKED	4	5.90
IV. PIPE WITH PROBLEM AT/NEAR OUTLET/ HEADWALL (AT A)	56	82.00
1. SAG	23	34.00
2. SAG W/ STANDING WATER	24	35.00
3. SAG W/ SILTATION	1	1.00
4. COMPRESSED COUPLING	4	6.00
5. COMPRESSED PIPE	20	29.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	0	0.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
V. PIPE WITH PROBLEM AT B :	26	38.00
1. SAG	3	4.00
2. SAG W/ STANDING WATER	18	26.00
3. SAG W/ SILTATION	1	1.00
4. COMPRESSED COUPLING	1	1.00
5. COMPRESSED PIPE	2	3.00
6. BACKFILL IN PIPE	1	1.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	3	4.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
VI. PIPE WITH PROBLEM AT C :	12	17.60
1. SAG	1	4.00
2. SAG W/ STANDING WATER	10	26.00
3. SAG W/ SILTATION	1	1.00
4. COMPRESSED COUPLING	0	1.00
5. COMPRESSED PIPE	0	3.00
6. BACKFILL IN PIPE	0	1.00
7. SEPARATION AT COUPLING	0	0.00

..CONT' ED

8.	RIP IN PIPE	1	4.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VII. PIPE WITH PROBLEM AT D :		37	54.50
1.	SAG	4	5.90
2.	SAG W/ STANDING WATER	27	39.70
3.	SAG W/ SILTATION	4	5.90
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	2	3.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VIII. PIPE WITH PROBLEM AT E :		3	4.00
1.	SAG	2	3.00
2.	SAG W/ STANDING WATER	1	1.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
IX. PIPE WITH PROBLEM AT F :		0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 HEADWALL & OUTLET PIPE

ROUTE = I-64
 DIRECTION = WEST
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. CLEAN HEADWALL	19	58.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	19	58.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
2. PT. COVERED HEADWALL	13	39.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	12	36.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	1	3.00
3. COVERED HEADWALL	1	3.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	1	3.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
4. PLUGGED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
5. HEADWALL & OUTLET PIPE CONDITION :		
* INSPECTED HEADWALL & PIPE	33	
* FULLY IN SERVICE	19	58.00
* PT. IN SERVICE	13	39.00
* OUT OF SERVICE	1	3.00

Note : -Fully in Service = headwall is clean with pipe > 60% open
 -PT. in service = clean headwall with pipe 40-60% open, or
 PT. covered/covered headwall with pipe < 60% open.
 -Out of service = Plugged headwall, or outlet with pipe <
 40% open.

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 OUTLET

ROUTE = I-64
 DIRECTION = WEST
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. INSPECTED OUTLET	33	
2. OUTLET CONDITION :		
CLEAN OUTLET	19	58.00
PT. COVERED OUTLET	13	39.00
COVERED OUTLET	1	3.00
PLUGGED OUTLET	0	0.00
3. COVERING MATERIAL :		
GRAVEL OR GRAVEL +...	13	39.00
DIRT. OR DIRT.+.....	3	9.00
VEG. OR VEG. +	0	0.00
CON. OR CON. +	0	0.00
4. SCREEN :		
NONE	1	3.00
OPEN	28	85.00
PARTIALLY OPEN	3	9.00
BLOCK	1	3.00
5. SILTATION :		
NONE	25	76.00
SLIGHTLY	7	21.00
MODERATELY	1	3.00
SEVERLY	0	0.00
6. FLOW :		
YES	33	100.00
NO	0	0.00
7. DRAINAGE :		
GOOD	20	61.00
POOR	13	39.00

***** SUMMARY *****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 ***** OUTLET PIPE *****

ROUTE = I-64
 DIRECTION = WEST
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
I. INSPECTED OUTLET PIPE	33	
II. OPEN PIPE (>/ 90% OPEN)	28	84.80
III. COMPRESSED/BLOCKED PIPE	5	15.20
* 60% - 90% OPEN	4	12.20
* 40% - 60% OPEN	0	0.00
* < 40 % OPEN OR BLOCKED	1	3.00
IV. PIPE WITH PROBLEM AT/NEAR OUTLET/ HEADWALL (AT A)	24	73.00
1. SAG	12	36.00
2. SAG W/ STANDING WATER	10	30.00
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	1	3.00
5. COMPRESSED PIPE	8	24.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	0	0.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
V. PIPE WITH PROBLEM AT B :	9	27.00
1. SAG	3	9.00
2. SAG W/ STANDING WATER	6	18.00
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	0	0.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	0	0.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
VI. PIPE WITH PROBLEM AT C :	7	21.00
1. SAG	0	0.00
2. SAG W/ STANDING WATER	7	21.00
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	0	0.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00

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...I64-W

8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VII.	PIPE WITH PROBLEM AT D :	18	54.50
1.	SAG	3	9.00
2.	SAG W/ STANDING WATER	13	39.50
3.	SAG W/ SILTATION	1	3.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	1	3.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VIII.	PIPE WITH PROBLEM AT E :	3	9.00
1.	SAG	2	6.00
2.	SAG W/ STANDING WATER	1	3.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
IX.	PIPE WITH PROBLEM AT F :	0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00

***** PAVEMENT SUBDRAIN EVALUATION *****
 *** ALL INSPECTED HEADWALL ***

ROUTE = I-64
 DIRECTION = WEST
 INSP.DATE = OCTOBER 1991

MILEPOST	OUTLET TYPE/LOC./COND	COVER MATR.	SCREEN	SILT.	FLOW	DRAINAGE /NOTE
57.950	S-H / PT.COV.	G+D	PT.OPEN	SLIGHT	YES	POOR HW slanted BW
58.526	S-H / CLEAN		OPEN	NONE	YES	GOOD
58.985	S-H / CLEAN		OPEN	NONE	YES	GOOD
59.460	S-H / CLEAN		NONE	NONE	YES	GOOD HW slanted SW
59.899	S-H / CLEAN		OPEN	NONE	YES	POOR
60.543	S-H / CLEAN		OPEN	SLIGHT	YES	POOR HW slanted BW
61.050	S-H / CLEAN		OPEN	NONE	YES	GOOD
61.582	S-H / CLEAN		OPEN	NONE	YES	POOR HW slanted BW
62.058	S-H / PT.COV.	G	OPEN	NONE	YES	GOOD
62.548	S-H / CLEAN		OPEN	NONE	YES	POOR HW slanted BW
63.035	S-H / CLEAN		OPEN	NONE	YES	GOOD
63.531	S-H / CLEAN		OPEN	NONE	YES	GOOD
63.957	S-H / CLEAN		OPEN	NONE	YES	GOOD HW tilted SW
64.471	S-H / CLEAN		OPEN	SLIGHT	YES	POOR HW slanted BW
65.078	S-H / PT.COV.	G	PT.OPEN	SLIGHT	YES	POOR Outlet <4" pipe
65.574	S-H / PT.COV.	G	PT.OPEN	MOD.	YES	POOR HW slanted BW
66.052	S-H / PT.COV.	G	OPEN	NONE	YES	GOOD HW tilted SW
66.536	S-H / COVER.	G	BLOCK	NONE	YES	POOR HW tilted SW
66.974	S-H / CLEAN		OPEN	NONE	YES	GOOD
67.532	S-H / PT.COV.	G	OPEN	NONE	YES	GOOD

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68.065	S-H / PT.COV.	G	OPEN	NONE	YES	POOR
				HW tilted	BW	
68.582	S-H / PT.COV.	G	OPEN	NONE	YES	POOR
				HW tilted		
68.990	S-H / PT.COV.	D	OPEN	NONE	YES	GOOD
				Concrete in HW		
69.543	S-H / PT.COV.	G+D	OPEN	NONE	YES	GOOD
				Concrete in HW		
70.053	S-H / CLEAN		OPEN	NONE	YES	GOOD
70.474	S-H / PT.COV.	G	OPEN	NONE	YES	GOOD
				HW tilted		
71.010	S-H / PT.COV.	G	OPEN	NONE	YES	GOOD
				HW tilted		
71.504	S-H / CLEAN		OPEN	NONE	YES	GOOD
72.012	S-H / PT.COV.	G	OPEN	SLIGHT	YES	GOOD
72.493	S-H / CLEAN		OPEN	NONE	YES	GOOD
				Concrete in HW		
73.047	S-H / CLEAN		OPEN	NONE	YES	GOOD
				HW tilted		
73.576	S-H / CLEAN		OPEN	SLIGHT	YES	POOR
				HW slanted		
74.010	S-H / CLEAN		OPEN	SLIGHT	YES	POOR
				HW slanted		

NOTE : COVER MATR --> G=GRAVEL; D=DIRT.; V=VEG.; C=CONCRETE

***** PAVEMENT SUBDRAIN EVALUATION *****
 ** ALL INSPECTED PIPE **
 ROUTE = I-64
 DIRECTION = WEST
 INSP. DATE= OCTOBER 1991

MILEPOST	PIPE TYPE	PIPE CONDITION						REMARK
		A	B	C	D	E	F	
57.950	RIGID 2							PIPE OPEN 24' panel
58.526	RIGID 1	2						PIPE OPEN 22.5' panel
58.985	RIGID 1							PIPE OPEN 21' panel
59.460	RIGID					2		PIPE OPEN 24.5' panel
59.899	RIGID 2/5	2			2			80-100% OPEN 24' panel
60.543	RIGID 2				2			PIPE OPEN 22.5' panel
61.050	RIGID				3			PIPE OPEN 22' panel
61.582	RIGID 2				2			PIPE OPEN 25' panel
62.058	RIGID		2		2			PIPE OPEN 22.5' panel
62.548	RIGID 1				2			PIPE OPEN 22' panel
63.035	RIGID 1							PIPE OPEN 21' panel
63.531	RIGID 1/5							60-80 % OPEN 23' panel
63.957	RIGID				2			PIPE OPEN 24.5' panel
64.471	RIGID 2				2			PIPE OPEN 24' panel
65.078	RIGID 1							PIPE OPEN 14' panel
65.574	RIGID 2/4		2		2			60-80 % OPEN 23' panel
66.052	RIGID 1/5				1			80-100% OPEN 25' panel
66.536	RIGID 1/5				1	1		80-100% OPEN 23' panel
66.974	RIGID	1			1			PIPE OPEN 22' panel
67.532	RIGID 1				2			PIPE OPEN 23' panel
68.065	RIGID 1/5	1			2			80-100% OPEN 21' panel
68.582	RIGID	2			5			0 % OPEN AT 13'
68.990	RIGID 1	1				1		PIPE OPEN sharp sag, 23' panel
69.543	RIGID 1							PIPE OPEN 24' panel
70.053	RIGID 2/5							80-100% OPEN 24.5' panel
70.474	RIGID				2			PIPE OPEN 22' panel

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... I-64 W

71.010 RIGID		2	2	PIPE OPEN mouse nest, 22' panel
71.504 RIGID 5		2		80-100% OPEN 24.5' panel
72.012 RIGID 2	2	2	2	PIPE OPEN 22.5' panel
72.493 RIGID	2	2		PIPE OPEN Large sag/22' panel
73.047 RIGID 2	2	2		PIPE OPEN 17'Cont w/ drain
73.576 RIGID 5				80-100% OPEN 24' panel
74.010 RIGID 2				PIPE OPEN 25' panel

NUMBER OF OPEN PIPE	=	23
% OF OPEN PIPE	=	70
NUMBER OF COMPRESSED/BLOCKED PIPE	=	10
% OF COMPRESSED/BLOCKED PIPE	=	30

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 HEADWALL & OUTLET PIPE

ROUTE = I-64
 DIRECTION = EAST
 DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. CLEAN HEADWALL	16	57.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	15	53.50
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	1	3.50
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
2. PT. COVERED HEADWALL	12	43.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	11	39.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	1	4.00
3. COVERED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
4. PLUGGED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
5. HEADWALL & OUTLET PIPE CONDITION :		
* INSPECTED HEADWALL & PIPE	28	
* FULLY IN SERVICE	15	53.50
* PT. IN SERVICE	12	43.00
* OUT OF SERVICE	1	3.50

Note : -Fully in Service = headwall is clean with pipe > 60% open
 -PT. in service = clean headwall with pipe 40-60% open, or
 PT. covered/covered headwall with pipe < 60% open.
 -Out of service = Plugged headwall, or outlet with pipe
 < 40% open

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 OUTLET

ROUTE = I-64
 DIRECTION = EAST
 DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. INSPECTED OUTLET	28	
2. OUTLET CONDITION :		
CLEAN OUTLET	16	57.00
PT. COVERED OUTLET	12	43.00
COVERED OUTLET	0	0.00
PLUGGED OUTLET	0	0.00
3. COVERING MATERIAL :		
GRAVEL OR GRAVEL +...	5	18.00
DIRT. OR DIRT.+.....	2	7.00
VEG. OR VEG. +	0	0.00
CON. OR CON. +	7	25.00
4. SCREEN :		
NONE	1	3.50
OPEN	24	85.70
PARTIALLY OPEN	3	10.80
BLOCK	0	0.00
RUSTED SCREEN	0	0.00
5. SILTATION :		
NONE	26	93.00
SLIGHTLY	1	3.50
MODERATELY	1	3.50
SEVERLY	0	0.00
6. FLOW :		
YES	28	100.00
NO	0	0.00
7. DRAINAGE :		
GOOD	21	75.00
POOR	7	25.00

***** SUMMARY *****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 ***** OUTLET PIPE *****

ROUTE = I-64
 DIRECTION = EAST
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
I. INSPECTED OUTLET PIPE	28	
II. OPEN PIPE (>90% OPEN)	16	57.10
III. COMPRESSED/BLOCKED PIPE	12	42.90
* 60% - 90% OPEN	10	35.70
* 40% - 60% OPEN	1	3.60
* < 40 % OPEN OR BLOCKED	1	3.60
IV. PIPE WITH PROBLEM AT/NEAR OUTLET/ HEADWALL (AT A)	25	89.30
1. SAG	11	39.50
2. SAG W/ STANDING WATER	10	35.70
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	3	10.70
5. COMPRESSED PIPE	9	32.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	0	0.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
V. PIPE WITH PROBLEM AT B :	14	50.00
1. SAG	0	0.00
2. SAG W/ STANDING WATER	11	39.50
3. SAG W/ SILTATION	1	3.50
4. COMPRESSED COUPLING	1	3.50
5. COMPRESSED PIPE	0	0.00
6. BACKFILL IN PIPE	1	3.50
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	2	7.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
VI. PIPE WITH PROBLEM AT C :	5	18.00
1. SAG	1	3.50
2. SAG W/ STANDING WATER	3	10.70
3. SAG W/ SILTATION	1	3.50
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	0	0.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00

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8.	RIP IN PIPE	1	3.50
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VII. PIPE WITH PROBLEM AT D :		18	64.00
1.	SAG	1	3.50
2.	SAG W/ STANDING WATER	14	50.00
3.	SAG W/ SILTATION	2	7.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	1	3.50
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VIII. PIPE WITH PROBLEM AT E :		0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
IX. PIPE WITH PROBLEM AT F :		0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00

***** PAVEMENT SUBDRAIN EVALUATION *****
 *** ALL INSPECTED HEADWALL ***

ROUTE = I-64
 DIRECTION = EAST
 INSP.DATE = OCTOBER 1991

MILEPOST	OUTLET TYPE/LOC./COND	COVER MATR.	SCREEN	SILT.	FLOW /NOTE	DRAINAGE
58.987	S-H / CLEAN		OPEN	NONE	YES	POOR
59.577	S-H / CLEAN		OPEN	NONE	YES	GOOD
59.990	S-H / PT.COV.	C	OPEN	NONE	YES	GOOD
60.565	S-H / PT.COV.	G+D	PT.OPEN	MOD.	Concrete in HW YES	POOR
60.960	S-H / PT.COV.	G	PT.OPEN	NONE	Hws Toe Blocked YES	POOR
61.520	S-H / CLEAN		OPEN	NONE	HW slanted BW YES	GOOD
61.957	S-H / CLEAN		OPEN	NONE	YES	GOOD
62.510	S-H / CLEAN		OPEN	NONE	YES	POOR
62.951	S-H / PT.COV.	C	OPEN	NONE	YES	GOOD
63.483	S-H / PT.COV.	C	OPEN	NONE	concrete 1/4 HW YES	GOOD
63.984	S-H / CLEAN		OPEN	NONE	con.;tilted sw YES	GOOD
64.567	S-H / CLEAN		OPEN	NONE	YES	GOOD
64.900	S-H / PT.COV.	C	OPEN	NONE	Con.block pipe YES	GOOD
65.727	S-H / CLEAN		OPEN	NONE	YES	GOOD
65.969	S-H / CLEAN		OPEN	NONE	YES	GOOD
66.549	S-H / PT.COV.	C	OPEN	NONE	YES	GOOD
66.980	S-H / PT.COV.	G	OPEN	NONE	pp blk w/ con. YES	GOOD
67.510	S-H / CLEAN		OPEN	NONE	YES	GOOD
67.991	S-H / CLEAN		OPEN	NONE	HW slanted SW YES	GOOD

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...I-64 E

68.617	S-H / PT.COV.	G+D	PT.OPEN	SLIGHT	YES	POOR
				HW slanted	SW	
69.650	S-H / CLEAN		OPEN	NONE	YES	GOOD
70.000	S-H / CLEAN		OPEN	NONE	YES	GOOD
70.550	S-H / CLEAN		OPEN	NONE	YES	GOOD
70.977	S-H / PT.COV.	C	OPEN	NONE	YES	GOOD
				HW slanted	BW	
71.532	S-H / PT.COV.	G	OPEN	NONE	YES	POOR
				HW slanted	BW	
71.995	S-H / PT.COV.	C	OPEN	NONE	YES	GOOD
				1/2 full of con		
72.508	S-H / CLEAN		OPEN	NONE	YES	POOR
				slanted SW&BW		
72.994	S-H / CLEAN		NONE	NONE	YES	GOOD

NOTE : COVER MATR --> G=GRAVEL; D=DIRT.; V=VEG.; C=CONCRETE

***** PAVEMENT SUBDRAIN EVALUATION *****
 ** ALL INSPECTED PIPE **
 ROUTE = I-64
 DIRECTION = EAST
 INSP. DATE= OCTOBER 1991

MILEPOST	PIPE TYPE	PIPE CONDITION						REMARK
		A	B	C	D	E	F	
58.987	RIGID 1+5							60-80 % OPEN 20' panel
59.577	RIGID		2		2			PIPE OPEN 23' panel
59.990	RIGID 1+5				2			60-80 % OPEN 24' panel
60.565	RIGID 2		2					PIPE OPEN 22.5' panel
60.960	RIGID 5							0 % OPEN AT 2 pp. 5% open
61.520	RIGID 2							PIPE OPEN 23' panel
61.957	RIGID 5				2			60-80 % OPEN 20' panel
62.510	RIGID 2				3			PIPE OPEN pp. 1/2 full at D
62.951	RIGID 1				2			PIPE OPEN 22' panel
63.483	RIGID 2		2		2			PIPE OPEN full of water at 5'
63.984	RIGID 1		8		5			80-100% OPEN 21' panel; rip at 4'
64.567	RIGID 2+5		2		2			80-100% OPEN 25' panel
64.900	RIGID 1				2			PIPE OPEN 24' panel; 1/4 water
65.727	RIGID 5							60-80 % OPEN 22' panel
65.969	RIGID 1		2		2			PIPE OPEN 22' panel
66.549	RIGID 1+5		2		2			60-80 % OPEN Mouse nest
66.980	RIGID 1+4		2	1	1			60-80 % OPEN 20' panel; coup. com
67.510	RIGID 1+4							40-60 % OPEN AT 18" sharp bend
67.991	RIGID 1							PIPE OPEN 23' panel
68.617	RIGID 2			2	2			PIPE OPEN 18' panel
69.650	RIGID 2+5			2	2			80-100% OPEN 25' panel; full at D
70.000	RIGID 2		2					PIPE OPEN
70.550	RIGID 2		2					PIPE OPEN 16' panel
70.977	RIGID		6/8		2			PIPE OPEN 22' panel

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...I-64 E

71.532 RIGID 2+4	3/4	3/8	3	60-80 % OPEN
71.995 RIGID				22.5' panel
72.508 RIGID 5	2		2	PIPE OPEN
72.994 RIGID 1	2	2	2	Outlet 1/2 of con.
				80-100% OPEN
				19.5' panel
				PIPE OPEN
				21.5' panel

NUMBER OF OPEN PIPE	=	15
% OF OPEN PIPE	=	54
NUMBER OF COMPRESSED/BLOCKED PIPE	=	13
% OF COMPRESSED/BLOCKED PIPE	=	46

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 HEADWALL & OUTLET PIPE

ROUTE = I-64
 LOCATION = MEDIAN
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. CLEAN HEADWALL	7	100.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	3	43.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	2	28.50
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	2	28.50
2. PT. COVERED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
3. COVERED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (> = 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
4. PLUGGED HEADWALL	0	0.00
* WITH OPEN OUTLET PIPE (>= 60% OPEN)	0	0.00
* WITH PARTIALLY OPEN OUTLET PIPE (40-60% OPEN)	0	0.00
* WITH BLOCKED OUTLET PIPE (< 40% OPEN)	0	0.00
5. HEADWALL & OUTLET PIPE CONDITION :		
* INSPECTED HEADWALL & PIPE	7	
* FULLY IN SERVICE	3	43.00
* PT. IN SERVICE	2	28.50
* OUT OF SERVICE	2	28.50

Note : -Fully in Service = headwall is clean with pipe > 60% open
 -PT. in service = clean headwall with pipe 40-60% open, or
 PT. covered/covered headwall with pipe < 60% open.
 -Out of service = Plugged headwall, or outlet with pipe <
 40% open.

***** SUMMARY*****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 OUTLET BOX

ROUTE = I-64
 LOCATION = MEDIAN
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
1. INSPECTED OUTLET BOX	7	
2. OUTLET CONDITION :		
CLEAN OUTLET	7	100.00
PT. COVERED OUTLET	0	0.00
COVERED OUTLET	0	0.00
PLUGGED OUTLET	0	0.00
3. COVERING MATERIAL :		
GRAVEL OR GRAVEL +...	0	0.00
DIRT. OR DIRT.+.....	0	0.00
VEG. OR VEG. +	0	0.00
CON. OR CON. +	0	0.00
4. SCREEN :		
NONE	7	100.00
OPEN	0	0.00
PARTIALLY OPEN	0	0.00
BLOCK	0	0.00
5. SILTATION :		
NONE	7	100.00
SLIGHTLY	0	0.00
MODERATELY	0	0.00
SEVERLY	0	0.00
6. FLOW :		
YES	7	100.00
NO	0	0.00
7. DRAINAGE :		
GOOD	7	100.00
POOR	0	0.00

***** SUMMARY *****
 ***** PAVEMENT SUBDRAIN EVALUATION *****
 ***** OUTLET PIPE *****

ROUTE = I-64
 DIRECTION = MEDIAN
 INSP.DATE = OCTOBER 1991

	NUMBER	PERCENTAGE
I. INSPECTED OUTLET PIPE	7	
II. OPEN PIPE (>90% OPEN)	3	43.00
III. COMPRESSED/BLOCKED PIPE	4	57.00
* 60% - 90% OPEN	0	0.00
* 40% - 60% OPEN	2	28.50
* < 40 % OPEN OR BLOCKED	2	28.50
IV. PIPE WITH PROBLEM AT/NEAR OUTLET/ HEADWALL (AT A)	7	100.00
1. SAG	0	0.00
2. SAG W/ STANDING WATER	4	57.00
3. SAG W/ SILTATION	1	14.00
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	3	43.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	0	0.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
V. PIPE WITH PROBLEM AT B :	3	43.00
1. SAG	0	0.00
2. SAG W/ STANDING WATER	1	14.00
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	2	29.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00
8. RIP IN PIPE	1	14.00
9. COMPRESSED PANEL	0	0.00
10. COMPRESSED AND SILTED PANEL	0	0.00
VI. PIPE WITH PROBLEM AT C :	0	0.00
1. SAG	0	0.00
2. SAG W/ STANDING WATER	0	0.00
3. SAG W/ SILTATION	0	0.00
4. COMPRESSED COUPLING	0	0.00
5. COMPRESSED PIPE	0	0.00
6. BACKFILL IN PIPE	0	0.00
7. SEPARATION AT COUPLING	0	0.00

...CONT'ED

8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VII. PIPE WITH PROBLEM AT D :		1	14.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	1	10.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
VIII. PIPE WITH PROBLEM AT E :		0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00
IX. PIPE WITH PROBLEM AT F :		0	0.00
1.	SAG	0	0.00
2.	SAG W/ STANDING WATER	0	0.00
3.	SAG W/ SILTATION	0	0.00
4.	COMPRESSED COUPLING	0	0.00
5.	COMPRESSED PIPE	0	0.00
6.	BACKFILL IN PIPE	0	0.00
7.	SEPARATION AT COUPLING	0	0.00
8.	RIP IN PIPE	0	0.00
9.	COMPRESSED PANEL	0	0.00
10.	COMPRESSED AND SILTED PANEL	0	0.00

***** PAVEMENT SUBDRAIN EVALUATION *****
 *** ALL INSPECTED HEADWALL ***

ROUTE = I-64
 LOCATION = MEDIAN
 INSP.DATE = OCTOBER 1991

MILEPOST	OUTLET TYPE/LOC./COND	COVER MATR.	SCREEN	SILT.	FLOW /NOTE	DRAINAGE
73.180	M-B / CLEAN		NONE	NONE	YES	GOOD
73.376	M-B / CLEAN		NONE	NONE	YES	GOOD
73.515	M-B / CLEAN		NONE	NONE	YES	GOOD
73.622	M-B / CLEAN		NONE	NONE	YES	GOOD
73.630	M-B / CLEAN		NONE	NONE	YES	GOOD
73.740	M-B / CLEAN		NONE	NONE	YES	GOOD
74.050	M-B / CLEAN		NONE	NONE	YES	GOOD

NOTE : COVER MATR --> G=GRAVEL; D=DIRT.; V=VEG.; C=CONCRETE

***** PAVEMENT SUBDRAIN EVALUATION *****
 ** ALL INSPECTED PIPE **
 ROUTE = I-64
 LOCATION = MEDIAN
 INSP. DATE= OCTOBER 1991

MILEPOST	PIPE TYPE	PIPE CONDITION AT						REMARK
		A	B	C	D	E	F	
73.180	RIGID 2							PIPE OPEN
73.376	RIGID 2		5+8					0 % OPEN AT
73.515	RIGID 3+5							40-60 % OPEN AT 3
73.622	RIGID 2		5		3			80-100% OPEN 36' panel
73.630	RIGID 5							10-20 % OPEN AT 2
73.740	RIGID 2		2					PIPE OPEN Sharp sag at A & B
74.050	RIGID 5							40-60 % OPEN AT 2

 NUMBER OF OPEN PIPE = 2
 % OF OPEN PIPE = 29
 NUMBER OF COMPRESSED/BLOCKED PIPE = 5
 % OF COMPRESSED/BLOCKED PIPE = 71