

EDWARDS UNDERGROUND
WATER DISTRICT

Report 94-01

LEAK DETECTION / LOCATION SURVEY REPORT
FOR
FORT SAM HOUSTON
BEXAR COUNTY, TEXAS

July 22, 1993 - February 4, 1994

EDWARDS UNDERGROUND
WATER DISTRICT

6.25-7.5

March 11, 1994

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TREASURER

Mr. John L. Brenneman
Chief, Environmental and Natural
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AFZG-DE-ENRD, DEH
Fort Sam Houston, Texas 78234-5000

Dear Mr. Brenneman:

DIRECTORS

EXAR COUNTY
ANS R. F. HELLAND
COUNTY AREA CHAIR
ENE L. AMES, III
ANN S. DE HOYOS
GUENTER KRELLWITZ
AROL G. PATTERSON
ERNEST QUIROGA

We are pleased to submit this final report of the leak detection survey performed on the Fort Sam Houston water system. A summary of findings is reported in separate categories for your convenience.

OMAL COUNTY
ACK R. OHLRICH
COUNTY AREA CHAIR
CRAIG HOLLMIG
ENNETH G. IKELS

The Edwards Underground Water District (District) appreciates the cooperation and assistance you have provided during the leak detection survey. The District hopes that the information provided herein will be beneficial to the fort in identifying and targeting areas of water loss and potential loss.

AYS COUNTY
J. KAYLENE RAY
COUNTY AREA CHAIR
ARRY BISHOP
ERRI W. MARTIN

The Edwards Underground Water District would appreciate the opportunity to recheck the remaining 138 leak sites after repairs are completed.

ICK ILLGNER
CTING GENERAL MANAGER

This survey has demonstrated the water saving potential of the Leak Detection/Location Program. Maintaining the best possible program is vital in order to continue the successes that have been realized. For this reason, the District is soliciting your comments, both positive and negative, and any suggestions you may have on how to improve our program.

Please respond to this request candidly, as the District cannot improve on deficiencies or support positive measures without the knowledge of such conditions.

Mr. John L. Brenneman
March 11, 1994 - Page 2

Should you require additional information regarding this report or have any water related questions, please do not hesitate to call.

Sincerely,



Charles E. Ahrens
Water Resources Planner III



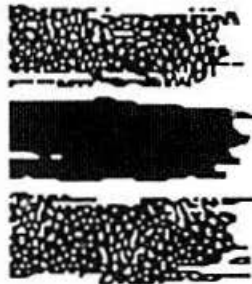
James R. Shipley
Leak Detection Technician II

CEA:JRS/bmc
Enclosures
cc: Lt. Col. Phil Jones

001jrs

**Leak Detection/Location Survey Report
For
Fort Sam Houston
Bexar County, Texas
July 22, 1993 - February 4, 1994**

By
James R. Shipley
of the
Edwards Underground Water District
Division of Planning and Environmental Management
Leak Detection/Location Program
February, 1994



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SUMMARY

On April 23, 1993, the Edwards Underground Water District (EUWD) received a completed application form from Fort Sam Houston requesting a leak detection/location survey on its water distribution system. Pre-survey conferences were held June 14, 1993 and June 21, 1993 at the Environmental and Natural Resources Division to discuss the work to be performed. It was agreed that EUWD would perform sonic leak detection on all available access points, computerized leak location as needed, record any unusual system conditions found, and submit to the Post a revised master water plat with the final report. It was further agreed that Fort Sam Houston would provide EUWD with one experienced utility service person and would repair all leaks detected in a timely manner.

Mark L. McGinnis of EUWD began the survey on July 22, 1993, and the survey was concluded on February 4, 1994. Over the course of the survey, Mr. McGinnis surveyed a total of 2,751 access points including 1,133 customer service connections, 447 fire hydrants, 1,064 main valves, and 107 other access points covering 68.3 miles of distribution and transmission mains. Computer leak sound correlation was performed on one location.

Mr. McGinnis detected a total of 177 leaks. This total included 42 service valve leaks, 42 main valve leaks, 42 fire hydrant leaks, 29 customer side leaks, and 22 main leaks. Additional leaks are suspected at many of these locations, but cannot be located until repairs are completed on all known leaks. As of February 4, 1994, 39 of the 177 leaks detected over the length of the survey have been repaired. EUWD estimates 170,580 gallons of water per day has been saved by the repairs to date. The leaks detected during this survey range from 144,000 gallons per day to numerous small service valve leaks.

As part of the survey, Mr. McGinnis located 249 service valves, 97 main valves of various types, 31 fire hydrants, and .89 miles of distribution main not shown on the master plats. EUWD staff was unable to locate 109 main line valves, 91 service valves, 24 fire hydrants and 24 assorted valves. An additional 194 valve stacks need cleaning and/or repair.

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DISCUSSION

- A. Total Access Points Surveyed..... 2,751

The following number of access points were used during the survey:

1. Customer Service Connections: 1,133
2. Main Valves: 1,064
3. Fire Hydrants: 447
4. Others: 107

- B. Total Miles of Distribution and Transmission Main..... 68.3
Surveyed

- C. Total Number of Suspected Leak Sounds Rechecked..... 195

- D. Total Estimated Water Saved by Repair of Detected
Leaks in Gallons per day as of February 4, 1994..... 170,580 GPD

Leakage estimates for all leaks are based on hole size and system pressure in P.S.I. This information was furnished by Fort Sam Houston personnel when EUWD was not on site at the time of repairs.

EUWD would appreciate a list of leakage estimates for all detected leaks repaired after February 4, 1994 for our records.

- E. Total Leaks Detected..... 177

Main line, service line, fire hydrant, and valve leaks were located by computer correlation of leak sounds or by visual inspection. Service valve leaks and customer side leaks were located through house to house surveying.

1. Service Valve Leaks..... 42

Leakage estimates of repaired leaks: 0
Leaks repaired with leakage estimate . 0
Leaks repaired without leakage estimates: 18
Leaks to be repaired: 24

A list of these leaks is included in Appendix D.

2. Main Valve Leaks..... 42

Leakage estimates of repaired leaks: 2,900 G.P.D.
Leaks repaired with leakage estimates: 3
Leaks repaired without leakage estimates: 6
Leaks to be repaired: 33

A list of these leaks is included in Appendix B.

3. Fire Hydrant Leaks..... 42

Some fire hydrants may be reseated by flushing, others will need repair and/or replacement.

Leakage estimate of repaired hydrants: 2,080 GPD

Leaks repaired with leakage estimates: 8

Leaks repaired without leakage estimates: 1

Leaks to be repaired: 33

A list of these leaks is included in Appendix A.

4. Customer Side Leaks..... 29

Customer side leaks noted, are leak sounds determined to be on the customer side of the building shutoff valve. The leak sounds cease when the water is turned off at the building shutoff valve. The leak sounds return when the water is turned back on.

Leakage estimates of repaired leaks: 0

Leaks repaired with leakage estimates: 0

Leaks repaired without leakage estimates: 0

Leaks to be repaired: 29

A list of these leaks is included in Appendix E.

5. Main Line Leaks..... 22

Leakage estimates of repaired leaks: 165,600 GPD

Leaks repaired with leakage estimates: 2

Leaks repaired without leakage estimates: 1

Leaks to be repaired: 19

6. Unresolved Suspect Areas

I. Water flowing from the storm drain behind building 8123 Birkhead. This water is believed to be coming from the indoor swimming pool in Building 2868 located at intersection of Scott Rd. and Hardee Rd.

II. Leak sounds on the 6" main running from Road No. S-3 to Artillery Post Loop behind buildings 167 and 168. This section is highlighted on Plat #49. This section is pending on repair of known leaks.

III. Leak sounds on the 6" main on Garden Ave. south of Zinn Road. This section is pending locating and cleaning of valves at Garden Ave. and Zinn Road by post personnel. See highlighted section on Plat #53.

IV. Leak sounds west of building 2000 and north of buildings 2000, 2001, and 2008. See highlighted section on Plat #55. This section is pending repair of known leaks.

- V. Leak sounds on the northern section of 15th street. See highlighted area of plats #68 and #76. This section is pending on repair of known leaks.
- VI. Leak sound on fire hydrant F-2005 on Brackenridge Road west of Building T-2054. Pending the locating of main valve M-2022 and fire hydrant valve on Plat 55.

Leaks recorded in the appendices are listed by plat number, date detected, and approximate location or address. Estimates of water saved and dates of repair are listed, if they were furnished by post personnel. Updated leak location lists were provided to post maintenance personnel on a routine basis over the course of the survey by Mr. McGinnis. Additionally, leak locations have been highlighted in yellow on the master water plats included with this report.

Water leakage loss rate charts have been provided to post maintenance personnel to assist them in accurately estimating the amount of water saved by each leak repaired.

Appendix A (Fire Hydrant Leak List) fire hydrants notated as reseated were flushed, reseated and estimated by Mr. McGinnis of EUWD.

All areas of known or suspected leakage should be resurveyed after all repairs are complete. It is conceivable that the leak sounds from known leaks are masking sounds from additional undetected leaks. It is only through the resurvey process that these leaks can be detected, located, and repaired.

As part of our continued assessment of the Leak Detection/Location Program, the District will require a complete status report on the leaks detected in this survey, prior to placing the Fort on the list for resurvey. This status report should contain the date each detected leak was repaired and leakage estimates in gallons per day for each leak repaired.

F. Survey Finding vs. Master Water Plat

- 1. Valves and fire hydrants shown on the plats that could not be located..... 248
 - I. Main Valves - 109
 - II. Service Valves - 91
 - III. Fire Hydrants - 24
 - IV. Fire Hydrant Valves - 14
 - V. Post Indicator Valves - 3
 - VI. Sprinkler Valves - 6
 - VII. Blow Off Valves - 1

Suspected locations were surveyed by EUWD with a ferromagnetic detector to locate buried valves. When successful, these locations were marked. It is conceivable that additional valves remain unlocated within the system. All valve box lids located were painted blue. These valves and hydrants are highlighted on the plats in blue.

A list of these valves and hydrants is included in Appendix G.

2. Valves, hydrants, and main located, but not shown on the plats.

- I. Main Valves - 82
- II. Fire Hydrants - 31
- III. Service Valves - 249
- IV. Post Indicator - 13
- V. Back Flow Preventers - 2
- VI. Hose Bibs - 8
- VII. Mains Footage - 4,700'

Valves, fire hydrants, hose bibs, and main located were hand drawn and highlighted in blue on the updated master water plats included with this project.

A list of these valves and hydrants is included in Appendix H.

G. Miscellaneous Maintenance Needed

1. Valves or valve stacks needing cleaning and/or repair..... 194

- I. Valve stacks to be raised to grade - 125
- II. Valve stacks needing repair - 27
- III. Valve stacks needing cleaning - 30
- IV. Valve stacks missing lids - 10
- V. Valve stacks missing boxes - 2

Valve stacks needing maintenance have been highlighted in blue on the master water plats.

A list of these valve stacks is included in Appendix F.

2. Fire Hydrants Needing Maintenance..... 4

- I. Hit by car, but not leaking - 1
- II. Missing hydrant caps - 2
- III. Fire Hydrant Valve Missing Lid - 1

A list of these hydrants is included in Appendix I.

The vast majority of all post fire hydrants need some type of maintenance such as pressure flushing of weep holes, cleaning, painting, lubrication, or general flushing. These hydrants are too numerous to list.

H. Sections of main that could not be surveyed, or were surveyed with a ground microphone.

Various reasons prevented the surveying of the sections: lack of access points, rights of way or easements cleaning needed, accurate main locations are not available, fenced off for demolition, or areas under construction, etc. These locations have been noted on the master water plats. Mains listed on the plats as abandoned in place were not surveyed unless otherwise noted.

A list of these locations are included in Appendix J.

I. General notes for updated master water plats included with this report:

1. All mains were surveyed from all available access points. When the spacing of access points were too great to survey, a ground microphone was used in combination if possible.
2. All valves located were surveyed. When direct contact could not be made, a probe rod was used.
3. Fire hydrants labeled on the plats as fire hydrants without lead valves are hydrants where the lead valve could not be located or does not exist.
4. Any item circled and highlighted in blue on the plats indicate that it was added, could not be located, or needs repair.
5. Leak locations have been highlighted on the plats in yellow.
6. Sections highlighted in green indicates areas suspected of having additional leaks. These sections should have the highest resurvey priority after preliminary leak repair.
7. Abbreviations Used on Revised Master Plats:

UTL - Unable to Locate
UTS - Unable to Survey
NC - Needs Cleaning
RTG - Raise to Grade
CCNH - Curb Cock Not Holding
FHWV - Fire Hydrant with Valve
FH - Fire Hydrant Without Valve
ARV - Air Relief Valve
PCV - Pressure Control Valve
SV - Service Valve
PIV - Post Indicator Valve
BFP - Back Flow Preventer
NR - Needs Repair

All mains, fire hydrants, water services, blow-offs, and main line valves hand drawn on the plats are for access point accounting. The location and placement of these items on the plat is intended to indicate what was actually found during the field survey. Placement of hand drawn main valves on the plat is the technicians best guess of what they control. Every effort was made to ensure the accuracy of these plats, but EUWD does not guarantee their accuracy.

RECOMMENDATIONS AND COMMENTS

- I. Accelerate rate of repair on all known system leaks and maintain an ongoing program to locate and repair leaks that become visible "on surface". Studies have generally shown that the life of a leak depends on the type of subsoil. In areas with sandy soil or limestone strata, for example, water from a leak may not surface near its source and may not surface at all. Clay soils are more likely to force leaking water to the surface but even this is not always the case. Leaks are often found to enter storm and sanitary sewers, as well as percolate down through soil. EUWD recommends that the post conduct periodic leak detection/location surveys, depending on the rate at which new leaks develop.
- II. Implement an ongoing fire hydrant preventive maintenance program in-house or in conjunction with the post fire department. All hydrants should be inspected, sounded for leakage, flushed, lubricated, and painted on a routine basis. Lead valves should be installed as part of the installation on all new or replacement fire hydrants.
- III. Implement an ongoing in-house main line valve preventive maintenance program for inspection and operation of all system valves on a routine basis. All distribution system valves should be located, cleaned, sounded for leakage, tested, repaired or replaced as needed. The use of valve markers are recommended on valves subject to being lost or buried.

Time spent searching for lost or buried valves, and flushing fire hydrants to reduce pressure or volume is a major source of water loss in leak repair.
- IV. All water mains listed as abandoned, should be inspected to ensure that these mains have been physically separated from the active water system instead of just being valved off. These locations are a potential source of water loss if valve leakage or failure occurs.
- V. A thorough evaluation of the water distribution systems air relief needs should be conducted. Air relief valves should be located, inspected, repaired, replaced, or installed as needed. Transmission, cross-country, and A.C. mains with moderate to major elevation differentials should have the highest priority.
- VI. Easements or rights-of-way on cross-country mains should be cleared, mowed, and maintained in order to expedite leak repair and allow access by post utility personnel for routine visual inspection.
- VII. Conduct a thorough evaluation of the irrigation systems and methods used to irrigate the golf course, National Cemetery and post common areas. Consider replacing or retrofitting the existing systems with state-of-the-art efficient equipment.

The new irrigation systems features are now available and have shown to pay for their initial cost in as few as two years and are as follows:

Moisture sensing devices, rain sensing devices, wind sensors, low precipitation sprinklers, matched precipitation sprinklers, excess flow sensors, devices to prevent low head drainage, master valves, special controller circuits to provide varying watering schedule, repeat cycling controllers, and solid state time accurate controllers for accuracy in timing.

The system features are costly, but if viewed in light of how much they will save in operational costs and the fact that this equipment can reduce the amount of water used by 5 or 10 percent, this could be a justifiable expense. When used in conjunction with basic exterior water conservation methods, a significant amount of precious water can be saved and long-term cost savings can be realized by the post. Backflow preventers should be installed on all irrigation systems to eliminate a potential source of contamination to the base potable water supply.

- VIII. During the course of the survey, the EUWD technicians observed numerous fire hydrants being used for landscape irrigation and the filling of water hauling equipment without the use of an approved reduced-pressure backflow assembly. This potentially dangerous cross connection could allow polluting or contaminating material to enter the post potable water supply. The post has the responsibility to prevent contamination of the public water system through the promulgating and enforcing laws, rules, regulations and policies necessary to protect the public health. A cross connection control program is essential to ensure that the post's water remains safe.
- IX. Revise master water distribution plats from "As built" plans, EUWD plat, and utilizing the knowledge and expertise of long-term field employees. Master plats should show locations of all main valves, fire hydrants, blow offs, drain or flush valves, air relief valves, and pressure regulating valves. Revised plats should be made available to field maintenance supervisors for use in the operation and maintenance of the water distribution system.
- X. Consider ductile iron pipe for the primary main line material used for new installations and main replacement. As the production costs of water increase, the need for routine systemwide leak detection surveys will also increase. Leak sounds generated in metallic pipe are louder and have a tendency to travel further than those developed in non-metallic pipe. Ductile iron has a proven history of long service life and its sound carrying characteristics for leak detection are far superior to any other type of pipe material.

Review the existing water distribution system and future water system improvements to ensure sufficient access points are in place to facilitate future leak detection/location surveys.

Highest priority should be given to creek crossings, transmission, cross country and A.C. mains.

- XI. Conduct a thorough evaluation of the water system's present and future maintenance and operational requirements to determine if the existing equipment and crew size is adequate to meet the needs of a system of this size, condition, and age.
- XII. Consider the consolidation of all water system components under one centralized command structure. This proposed command should be solely responsible for all water system management and operation. Water production, treatment, storage, distribution system operation and maintenance, water quality and sampling, cross connection control, metering, irrigation system operation, water system improvement plan approval, permitting and inspection, conservation, loss accounting, and record keeping should be included in this command.

The consolidation of these functions should simplify and strengthen the chain of command, improve efficiency, and enhance accountability.


XIII. Metering and Water Loss Accountability

- A. Install meters or approved flow measuring devices on all post production wells to measure the exact production yields and provide for the accumulative of accurate production data on the volume of water pumped from the Edwards aquifer. It is our understanding that the current pumpage figures are based on the estimated well G.P.M. multiplied by the minutes of well operation without regard for aquifer water levels, head pressure, or other conditions affecting pump performance. Accurate pumpage records are vital in water resource planning for the post and the Edwards Aquifer region.
- B. Install meters on all water services, even if the consumer is not to be billed. Set reasonable and prudent usage standards for each type of water use. There is no inducement to the consumer to conserve or use water wisely when water is supplied without charge or without usage limits. The potential benefits of metering to the post are numerous:
 - o Conservation of a precious and valuable resource.
 - o Potential reduction in water consumption and related water and wastewater treatment costs.
 - o Allows the post to identify and verify all water use and determine water system efficiency.
 - o Gives the post the tools needed to select and implement programs to enhance efficiency, prevent loss, and foster water conservation.

In Texas, as well throughout much of the country, water has become a precious commodity which must be used efficiently. Every utility should be a leader in promoting conservation and setting an example for its customers by reducing unaccounted for water to a minimal level. The post will benefit by saving the production cost of water lost through leakage while simultaneously increasing accountabilities through a comprehensive metering program.

Unaccounted for water is the difference between the amount of water a utility produces and the amount of water it can account for in sales and other known uses for a given period. Because water has been relatively cheap and easy to produce in the past, many utilities have not considered the reduction of unaccounted for water to be a cost effective way to lower operating costs. With the upward spiral of today's water production costs, the expense of funding unaccounted for water can often be made up within a short time. Reducing the amount of unaccounted for water provides other benefits as well. In effect, finding unaccounted for water recovers production capacity that has been lost to leaks or unauthorized uses. The additional capacity may allow the post to defer capital construction expenditures for new water supplies and water system expansion. The life of pumping and treatment equipment can be extended because the equipment will not be forced to work as hard to meet the demand. For the same reasons, maintenance and operating costs can also be reduced.

- XIV. The active participation of Richard Roland in this survey is greatly appreciated. His knowledge, experience, and professional work habits contributed to its completion. We commend your interest in water conservation and are grateful for the opportunity to survey your water system. Your efforts and the timely repair of the leaks recorded in this report will save a significant amount of precious Edwards aquifer water.


Mark L. McGinnis
Leak Detection Technician I


James R. Shipley
Leak Detection Technician II

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CONCLUSIONS

After a thorough review of the leak detection technicians field notes concerning the leaks detected versus leaks repaired, and the physical condition of the water distribution system, it is the opinion of the Edwards Underground Water District (EUWD) that Fort Sam Houston should increase its efforts toward system maintenance, water conservation, and leak repair. The vast majority of the leaks reported to the post as early as August of 1993 are still unrepaired as of February 4, 1994.

Numerous obvious leaks were located that have apparently been leaking for some time. Water standing, flowing down streets, flowing from closed fire hydrants, patches of bright green vegetation growth, growth of aquatic plants, and areas too wet to mow at or near water system appurtenance are obvious indicators of water system leakage. Numerous rusted and corroded leaking fire hydrants with obvious water scale and algae growth were encountered. Fire hydrant F-3506 on plat 95 located inside the horse stables has been transformed into a automatic horse water trough by post personnel as a result of an ongoing leak.

EUWD leak detection technicians have witnessed fire hydrants being removed, main valves stripped of operating equipment and plated, abandoned mains and services valved off instead of being physically separated from the active water system, and leaks reappearing at the same locations immediately after leak repair. Removal of fire hydrants and system valves make future leak repair and system flushing more difficult. Valved off abandoned mains and services are a potential source of water leakage.

Several areas of suspected leakage could not be located pending requested leak repair or valve excavation by post personnel.

The physical condition and operation of the Fort Sam Houston water distribution system is less than what we generally encounter during surveys. There is no indication of any ongoing programs or procedures for preventive maintenance, system-wide flushing, cross connection control, routine valve and fire hydrant maintenance, or general leak repair. Several fire hydrants thought to be in service were found to be inoperative or were valved off at the main. Numerous leaking hydrants flushed by EUWD surveyors in an attempt to reseal them were found to have heavy concentrations of interior rust from lack of flushing. Some distribution system main line valves that should be open were found to be partly or completely closed.

It is impossible to accurately estimate the amount of water currently being lost through leakage at Fort Sam Houston. Most connections are unmetered, metered connections are unread, unmetered water in unlimited amounts is furnished to contractors working on post, and some post irrigation systems are connected to fire hydrants. The only accurate way the actual losses can be determined is to compare accurate

water production totals with metered totals of water used for known beneficial purposes. Even without this information, it is obvious that a substantial amount of water is being lost. With each passing day that the leaks remain unrepaired the volume of leakage continues to increase. This is an unfortunate waste of a precious resource.

General conclusions are as follows:

- o Fort Sam Houston has lost large amounts of water through leakage.
- o System operational policies and procedures or the lack of same are a major contributing factor to the leakage.
- o System management should evaluate possibilities to improve conditions.
- o Fort Sam Houston personnel are urged to make the necessary water leak repairs.
- o There is an urgent need for a comprehensive and immediate leak repair program.

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APPENDIX A

Edwards Underground Water District Fire Hydrant Leak List 1993

System: Fort Sam Houston

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Fire hydrants listed without numbers are not numbered on plats.

Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
1	8/21/93	15	East of Bldg. 1026 F-1010			
2	8/20/93	21	Gorgas Circle near Bldg. 1005 F-1002			
3	9/16/93	30	Patch Rd. south of Hardee Rd. F-1301			
4	1/21/94	30	Forage Ave. @ Foulois Rd. FH-8005	100	100	Reseated
5	8/18/93	34	Graham Rd. near Bldg. 562			
6	9/15/93	43	North of Schoefield Rd. near Bldg. T-2622			
7	9/15/93	43	Harvey Rd. near Bldg. 2640			
8	9/15/93	52	West of Funston Rd. north of Allen Rd. F-2406			
9	8/23/93	52	Rd. No. S-21 Across from Bldg. 2376 F-2308	180	1/20/94	Reseated
10	1/30/94	53	Zinn Rd. @ Forage Ave. F-1109			
11	8/5/93	55	Dunston @ Buck Rd. F-2004	360	Unknown	Hydrant Removed
12	8/26/93	56	Road No. S-3 @ Bldg. 107 F-104	360	Unknown	Reseated
13	1/19/94	59	Scoth Rd. near Bldg. T-2383 F-2304			
14	8/6/93	64	Stanley Rd. near Bldg. 129			

APPENDIX A

Edwards Underground Water District Fire Hydrant Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
15	8/12/93	65	Sharpe Rd. behind Bldg. 4019 FH-4004			
16	8/12/93	65	3rd Street @ Sharpe Rd. FH-4024			
17	8/12/93	65	Wilson St. @ Meigs St. FH-4006	360	11/21/94	Repaired
18	1/24/94	65	3th street south of Wilson St. FH-4023			
19	1/25/94	66	Wilson St. @ Bldg. 369 F-306	360	Unknown	Hydrant Replaced
20	1/26/94	66	Wilson St. @ 6th St. FH-4044			
21	8/12/93	66	Wilson St. @ 5th St. F-4031			
22	8/30/93	67	15th Street @ Bldg. 4195 F-4126			
23	8/30/93	68	15th St. @ Bldg. 4196 F-4126			
24	7/27/93	71	Road No. S-2 near Water Plant F-2104	180	Unknown	Reseated
25	8/6/93	73	2nd Street @ Jessup Rd.			
26	8/6/93	73	2nd Street near Bldg. T-4003			
27	8/6/93	73	1st Street @ Jessup Rd.			
28	8/12/93	74	Jessup Rd. @ 5th St. F-4033	180	Unknown	Reseated

APPENDIX A

Edwards Underground Water District Fire Hydrant Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
29	8/12/93	74	Jessup Rd. @ 6th St. F-4040			
30	8/23/93	74	Jessup Rd. east of Bldg. T-4046 F-4039			
31	8/30/93	75	11th St. @ Bldg. 4195 F-4114			
32	1/19/94	75	Parker Rd. @ 8th St. F-4106			
33	1/19/94	75	Parker Rd. @ 10th St. F-4109			
34	8/30/93	76	13th St. @ Bldg. 4193 F-4114	N/A	Unknown	Reseated
35	8/30/93	83	Silbert Rd. @ 9th St. F-4225			
36	8/30/93	83	A Road @ 23rd St. F-4206			
37	1/25/94	83	A Road @ N.E. corner of Bldg. 4203 F-4203			
38	8/30/94	83	23rd St. @ C Road F-4207			
39	1/24/94	88	Winans Rd. near Bldg. 1521 F-1702			
40	1/25/94	95	Road S-26 @ Horse Stable F-3505			
41	1/30/94	95	North of S-26 F-3506			

APPENDIX B

Edwards Underground Water District Main Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
1	9/22/93	5	Behind Bldg. 9029 McMurray Rd.			6" Valve MV-1709
2	9/22/93	5	Behind Bldg. 9029 McMurray Rd.			6" Valve MV-1718
3	8/24/93	14	Gorgas Circle between between parking area			6" Valve MV-1017
4	8/23/93	14	Burr Rd. northeast of Bldg. 1059			6" Valve HV-1019
5	8/24/93	22	Stanley Rd. between Bldgs. T-1052 & T-1031			8" Valve MV-1042
6	12/17/93	30	Foulois Rd. @ Forage Ave.			6" Valve MV-8013
7	9/16/93	37	W.W. White Rd. between Bldgs. 1375-1374	1,440	12/20/93	FH Valve
8	9/16/93	45	Binz Engleman Rd. across from Bldg. 3896			Valve to FH F1401
9	8/12/93	50	New Braunfels Ave. across from Bldg. 180			6" Valve MV-401
10	8/12/93	51	Graham Rd. @ Henry Allen			6" Valve MV-420
11	8/12/93	51	Graham Rd. @ Henry Allen			6" Valve MV-423
12	8/12/93	51	Graham Rd. @ Henry Allen			6" Valve MV-424
13	7/26/95	55	Buck Rd. southeast of Bldg. 2003	N/A	Unknown	6" Valve MV-2006 Repaired

APPENDIX B
Edwards Underground Water District
Main Valve Leak List
1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
14	7/26/93	56	Road No. S-3 @ Road No. S-27			6" Valve L.H. MV-2001
15	8/23/93	59	Taylor Rd. @ Scott Rd.			8" Valve MV-2306
16	7/28/93	63	Artillery Post Rd. southwest of Bldg. 120	N/A	Unknown	6" Valve MV-101 Broken Valve
17	8/12/93	69	Meigs Rd. @ 3rd Rd.	N/A	Unknown	6" Valve MV-4013
18	1/25/93	65	Hancock Rd. west of Bldg. 2200	N/A	Unknown	Valve to FH F2206 Repaired
19	1/26/93	65	Road No. S-14-5 S.E. of Bldg. 2264			6" Valve MV-2219
20	1/25/93	67	7th St. @ Bldg. 4188 near F 4104			Post Indicator Valve
21	8/27/93	67	7th St. south of Bldg. 4015			6" Valve MV-4102
22	8/27/93	67	9th St. south of Bldg. 4168			12" Valve MV-4121
23	9/16/93	68	Southeast of Bldg. T-1134 & Wilson St.			6" Valve MV-4164
24	7/27/93	70	Water Plant			10" Valve MV-2111
25	7/27/93	71	Road to Water Plant			Sprinkler Valve near gate

APPENDIX B

Edwards Underground Water District Main Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
26	7/27/93	71	Road No. S-2 N.W. of Bldg. T-6B	N/A	Unknown	6" Valve MV-2103 Repaired
27	7/27/93	71	Road No. S-2 N.W. of Bldg. T-6B	N/A	Unknown	10" Valve MV-2102 Repaired
28	7/27/93	71	Road No. S-2 N.W. of Bldg. T-6B	N/A	Unknown	10" Valve MV-2104 Repaired
29	7/27/93	71	Road No. S-2 @ Stanley Rd.	1440	Unknown	4" Valve Abandoned Main
30	8/30/93	75	Parker Rd. @ 10th Street			? Valve Not Numbered
31	8/30/93	76	25th Street @ south corner of Bldg. 4217			Post Indicator Valve
32	8/30/93	83	Silbert Rd. @ 9th Street			6" Valve MV-4242
33	8/30/93	83	Silbert Rd. @ 9th Street			6" Valve MV=4241
34	1/26/93	88	Fort Sam Houston National Cemetery			2" Valve near MV-3003
35	1/26/93	88	Fort Sam Houston National Cemetery			4" Valve near MV-3002
36	1/26/93	88	Fort Sam Houston National Cemetery			6" Valve MV-3003

APPENDIX B

Edwards Underground Water District Main Valve Leak List 1993

System: Fort Sam Houston

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<u>Line #</u>	<u>Date #</u>	<u>Plat</u>	<u>Address</u>	<u>Loss G.P.D.</u>	<u>Date Repaired</u>	<u>Comments</u>
37	1/26/93	88	Fort Sam Houston National Cemetery			6" Valve near MV-3003
38	1/26/93	88	Fort Sam Houston National Cemetery			4" Valve MV-3002
39	9/22/93	88	Winans Rd. east of Nursery Rd.	20	1/26/94	6" Valve MV-1508 Repaired
40	1/24/93	88	North of Winans Rd. and west of Bldg. 1520			4" Valve Not Numbered
41	2/2/93	60	Forage Rd. @ McIdoe			6" Valve MV-1115
42	2/2/93	49	Behind 168 Artilley Rock Rd.			6" Vale MV-117

APPENDIX C
Edwards Underground Water District
Main Leak List
1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
1	9/22/93	5	Behind 9022 McMurray Rd.			6" main west of valve MV-1711 @ bend
2	12/7/93	26	Behind National Guard	21,600	12/15/93	Clamp leaking on 6" AC main
3	12/5/93	30	Near Bldg. 8144 Foulois Rd.			6" main near fire hydrant
4	12/14/93	32	In open field near horse stables	144,000	?	12" C-900 main
5	9/16/93	36	Southwest of Bldg. 1398 on Garden Ave.			6" A.C. main
6	2/2/94	36	Chaffee @ W.W. White			10' from valve
7	7/28/93	49	Road No. S-3 near Bldg. T-161B			6" main marked on ground
8	1/25/94	53	Forage Ave. south of services to Bldg. S-111			8" CI possible joint leaks
9	1/25/94	53	Forage Ave. north of services to Bldg. S-111			8" CI possible joint leaks
10	1/25/94	53	Forage Ave. south of Schofield Rd.			8" CI possible joint leaks

APPENDIX C
Edwards Underground Water District
Main Leak List
1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
11	9/15/93	60	6" main between Taylor Rd. and McIdoe Rd.			West of Bldg. T-1179
12	9/15/93	60	Forage @ McIdoe Rd.			6" CI main
13	9/15/93	60	6" main south of Taylor Rd. near Bldg. T-1194			6" CI main
14	1/25/94	67	9th street near Bldg. 4168 between MV-4119 - MV-4120			10" or 12" main
15	2/2/94	69	Bench stock yard next to T-4142			6" CI main
16	7/27/93	71	North of Staff Post Rd. between Bldgs. 9-10			6" CI main
17	8/6/93	73	Aimsworth Rd. between FH-4006 and FH-4017			6" CI main
18	9/22/93	88	Nursery Rd. south of MV-1807			6" main
19	9/22/93	83	Nursery Rd. south of Winans Rd.			4 joint leak on 6" main
20	1/24/93	88	North of Winans Rd. and west of Bldg. 1520			Leak behind F.H.
21	8/6/93	88	613 Infantry Post Rd.			

APPENDIX D

Edwards Underground Water District Service or Service Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
1	12/16/93	1	209 Clem Road	N/A	Unknown	Service valve repair
2	12/16/93	4	205 Clem Road	N/A	Unknown	Service valve repair
3	12/16/93	4	219 Clem Road			Service valve repair
4	12/16/93	4	214 Clem Road	N/A	Unknown	Service valve repair
5	1/24/94	22	Stanley Road Bldg. T-1053			Service valve repair
6	1/24/94	22	Stanley Road Bldg. T-1054	N/A	Unknown	Valve has been removed
7	1/20/94	23	8210 Birkhead Dr.			Service valve
8	1/20/94	23	8115 Birkhead Dr.			Next to service valve
9	8/18/93	28	5900 Old Austin Rd.	N/A	Unknown	Hose bob repaired
10	2/17/93	30	201 Foulois Rd.	N/A	Unknown	Service valve repaired
11	2/17/93	30	Foulois Rd. Bldg. 8142			Service valve repaired

APPENDIX D

Edwards Underground Water District Service or Service Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
12	2/17/93	30	233 Hardee Road			Service valve repaired
13	2/17/93	30	211 Hardee Road	N/A	Unknown	Service valve repaired
14	8/18/93	34	Graham Rd. Bldg. 566	N/A	Unknown	Service valve repaired
15	9/15/93	35	Bldg. 961	N/A	Unknown	Service valve repaired
16	12/22/93	36	Chaffee Road @ W.W. White Bldg. 1222			Service valve repaired
17	7/28/93	49	Road No. S-3 Bldg. 166			Service valve repaired
18	8/17/93	50	402 Dickman Road	N/A	Unknown	Service valve repaired
19	8/18/93	50	401 Dickman Road			Service valve repaired
20	8/17/93	51	464 Graham			Service valve repaired
21	8/17/93	51	413 Dickman	N/A	Unknown	Service valve repaired
22	9/15/93	52	Funston Road Bldg. T-2514			Under building

APPENDIX D

Edwards Underground Water District Service or Service Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
23	7/26/93	55	Buck Road Bldg. T-2052	N/A	Unknown	Service valve repaired
24	7/26/93	55	South of Bldg. 2017			Service valve repaired
25	7/25/93	55	Service valve to Bldg. 2000 south of Bldg. 2001			Service valve repaired
26	7/28/93	56	Between Stanley Rd. and Rd. No. S-4 to Bldg. 133			Service valve repaired
27	1/24/94	56	Rd. No. S-3 Bldg. 103			Service valve
28	8/13/93	58	Reynolds Road Bldg. 2266	N/A	Unknown	Service valve repaired
29	8/16/93	58	Road No. S-31-E Bldg. 325 South Valve			Service valve repaired
30	8/23/93	59	Scott Road Bldg. T-330			Service valve repaired
31	7/28/93	63	West of Artillery Post Road Bldg. 116	N/A	Unknown	Service valve repaired
32	7/29/93	63	189 Army Boulevard	N/A	Unknown	Service valve repaired
33	8/6/93	64	259 Liscum Rd.			60' from service valve

APPENDIX D

Edwards Underground Water District Service or Service Valve Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address	Loss G.P.D.	Date Repaired	Comments
34	7/28/93	64	Between Stanley Rd. and Rd. No. S-4 Bldg. 127			Service valve repaired
35	1/25/93	65	North of Wilson St. and west of Bldg. 2200			Service valve repaired
36	1/25/93	65	New Braunfels Ave. Bldg. 2248			Service
37	8/16/93	66	North of Wilson St. Bldg. T-374	N/A	Unknown	Service valve repaired
38	1/25/93	76	Silbert Rd. Bldg. 4298	N/A	Unknown	Valve has been removed
39	2/2/94	93	Pershing Rd. to dump area			Service valve
40	8/6/93	--	648 Hood St.			Service valve
41	8/6/93	--	603 Infantry Post Rd.	N/A	Unknown	Under building - Repaired
42	1/20/94	--	Naval/Marine Reserve Complex			Service valve to Maint. Bldg.

APPENDIX E

Edwards Underground Water District Customer Side Leak List 1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address
1	12/17/93	4	146 Clem Rd.
2	12/17/93	4	199 Clem Rd.
3	12/17/93	4	213 Clem Rd.
4	12/17/93	4	224 Clem Rd.
5	12/17/93	4	144 Twiggs Rd.
6	12/17/93	4	145 Twiggs Rd.
7	12/17/93	4	245 Twiggs Rd.
8	12/17/93	4	Twiggs Rd. Bldg. 9222
9	12/17/93	4	Twiggs Rd. Bldg. 9223
10	12/17/93	4	Twiggs Rd. Bldg. 9229
11	1/20/94	23	Birkhead Dr. Bldg. 8209
12	1/20/94	23	Ingram Rd. Bldg. 8259
13	12/17/93	30	Foulois Rd. Bldg. 8004
14	12/17/93	30	Foulois Rd. Bldg. 8102
15	12/17/93	30	205 Foulois Rd.
16	12/17/93	30	206 Foulois Rd.
17	8/18/93	34	531 Wheaton Rd.
18	8/18/94	42	438 Graham Rd.
19	8/17/94	50	457 Graham Rd.
20	8/17/94	50	460 Graham Rd.
21	8/17/94	51	

APPENDIX E
Edwards Underground Water District
Customer Side Leak List
1993

System: Fort Sam Houston

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Line #	Date #	Plat	Address
22	7/26/93	55	Building 2000
23	7/26/93	55	Building 2015
24	7/26/93	56	106 Road No. S-3
25	8/6/93	--	619 Infantry Road
26	8/6/93	--	621 Infantry Road
27	9/14/93	--	837 Chaffee Rd.
28	9/14/93	--	851 Chaffee Rd.

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
1	4	Clem Rd. @ Bldg. 9114	MV-9020	Valve repair
2	5	Frazer Rd. south of McMurray Rd.	MV-1719	Valve stack repair
3	8	Softball Field #2	MV-1715	Raise to grade
4	8	Southeast of Softball Field #2	MV-1708	Cleaning and missing lid
5	10	Winans Rd. northeast corner of plat 12" valve	?	Cleaning
6	10	Winans Rd. east of Bldg. 153	F.H. Valve to F1701	Raise to Grade
7	10	Winans Rd. @ Bldg. 1524	F.H. Valve to F1702	Valve Repair
8	11	Winans Rd. east of Road S-43	MV-1701 MV-1702	Raise to Grade
9	14	Gorgas Circle Bldg. 1010	Service Valve	Raise to Grade
10	14	Gorgas Circle across from 1013B	Service Valve	Raise to Grade
11	14	Gorgas Circle Bldg. 1013	Service Valve	Missing Lid
12	14	Gorgas Circle Bldg. 1015	Service Valve	Cleaning and lid
13	14	Gorgas Circle Bldg. 1017	Service Valve	Needs Lid
14	14	Southeast of Bldg. 1002	Speaker Line Valve	Cleaning
15	14	Burr Rd. northwest of Bldg. 1058	Valve Stack	Repair and lid

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
16	14	North of Bldg. T-1028	F.H. Valve to F1011	Raise to Grade
17	21	Gorgas Circle Bldg. 1005	Service Valve	Raise to Grade
18	21	East of Gorgas Circle and Dickman	MV-1001	Raise to Grade
19	22	Stanley Road across from Bldg. 1029	MV-1037	Raise to Grade
20	23	Ingram Rd. @ Forage Ave.	MV-2087	Raise to Grade
21	23	Birkhead @ Forage Ave.	1 of 3	Raise to Grade
22	23	Birkhead @ Forage Ave.	MV-8020	Cleaning
23	28	Northeast of Bldg. 592 and Dickman Rd.	Main Valve	Raise to Grade
24	28	Southeast of Bldg. 592 and Dickman Rd.	Main Valve	Raise to Grade
25	28	Old Austin Road @ Worth Road	3 Main Valves	Raise to Grade
26	28	Wheaton Rd. Bldg. 542	Service Valve	Raise to Grade
27	30	Foulois Rd. @ Birkhead	Main Valve	Needs Box
28	30	Foulois Rd. Bldg. 8024	Service Valve	Cleaning
29	31	Koehler Road near Hardee Road	Main Valve	Missing Lid
30	31	Koehler Road Bldg. 1379	Service Valve	Lid labeled Gas

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
31	31	South of Koehler and west of 1377	Service	Repair
32	31	North of Bldg. 1377	Main Valve	Cleaning
33	32	Bldg. 3557	HV-3503	Raise to Grade
34	34	Wheaton Rd. Bldg. 536	Service Valve	Raise to Grade
35	34	Wheaton Rd. Bldg. 538	Service Valve	Raise to Grade
36	35	Scott Rd. north of Bldg. 906	2 Main Valves	Raise to Grade
37	35	Scott Rd. south of Bldg. 904	1 Main Valve	Repair
38	36	Garden Ave. east of Bldg. 1290	MV-1227	Repair
39	37	Williams Rd. east of Bldg. 1374	Main Valve	Raise to Grade
40	42	Wheaton Rd. Bldg. 520	Service Valve	Raise to Grade
41	42	Wheaton Rd. Bldg. 516	Service Valve	Raise to Grade
42	42	Wheaton Rd. Bldg. 490	Service Valve	Raise to Grade
43	42	Wheaton Rd. Bldg. 487	Service Valve	Raise to Grade
44	42	Graham Rd. Bldg. 546	Service Valve	Raise to Grade
45	42	Graham Rd. Bldg. 547	Service Valve	Raise to Grade

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
46	42	Stanley Rd. @ Schoefield Rd.	MV-2703	Cleaning
47	43	Schoefield Rd. @ Scott Rd.	MV-2601	Cleaning
48	44	South of Bldg. 1240	MV-1240	Cleaning
49	44	Binz Engleman Rd. @ Garden Ave.	MV-1213 MV-1214	Raise to Grade
50	44	Garden Ave. @ Schoefield Rd.	Main Valve	Cleaning
51	44	Forage Ave. @ Schoefield	Service Valve	Cleaning
52	45	Schoefield Rd. southeast of of Bldg. 3890	2 Main Valves	Repair and Cleanin
53	49	Road No. S-3 Bldg. 162	Service Valve	Raise to Grade
54	49	Road No. S-3 Bldg. T-164B	HV-116	Repair and Raise t Grade
55	49	Road No. S-3 Bldg. T-169	Service Valve	Cleaning
56	49	Road No. S-12 Bldg. 176	Service Valve	Raise to Grade
57	49	Road No. S-12 Bldg. T-183B	HV-125	Raise to Grade
58	49	Road No. S-12 Bldg. 177	Service Valve	Cleaning
59	49	Road No. S-12 Bldg. 176	Service Valve	Raise to Grade
60	50	Wheaton Rd. across from Bldg. 473	Service	Repair
61	50	Wheaton Rd. across from Bldg. 478	MV-446	Raise to Grade

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
62	50	Graham Rd. Bldg. 450	Service Valve	Raise to Grade
63	50	Dickman Rd. Bldg. 403	Service Valve	Raise to Grade
64	51	Henry T. Allen Road Bldg. 482	Service Valve	Raise to Grade
65	51	Graham Rd. Bldg. 432	Service Valve	Raise to Grade
66	51	Graham Rd. @ Henry T. Allen Road	HV-422	Raise to Grade
67	51	Dickman Bldg. 420	Service Valve	Raise to Grade
68	51	Dickman Bldg. 421	Service Valve	Raise to Grade
69	52	Road No. S-21 @ Scott Rd.	MV-2316	Repair
70	52	Funston Road across from Bldg. T-2510	MV-2410	Raise to Grade
71	53	Forage Ave. south of Bldg.	F.H. Valve	Needs Repair
72	53	Forage Ave. @ Crockett Rd.	MV-1124	Raise to Grade
73	53	Forage Ave. across from Bldg. S-1158	MV-1123	Repair
74	55	Beebe Loop	MV-2028	Raise to Grade
75	55	West of Bldg. 2007	MV-2028	Repair
76	56	Road No. S-3 Bldg. 103	Service Valve	Cleaning
77	56	Road No. S-3 Bldg. 108	Service Valve	Missing Lid

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Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

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Line #	Plat #	Address	#	Needed
78	56	Road No. S-3 Bldg. 109	Service Valve	Cleaning
79	56	Road No. S-3 Bldg. 108B	Main Valve	Missing Lid
80	57	Stanley Rd. Bldg. 146	Service Valve	Raise to Grade
81	57	New Braunfels Ave.	2" Globe Valve	Raise to Grade
82	58	Reynolds Rd. behind Bldg. 367	2 Main Valve	Raise to Grade
83	58	Stanley Rd. north of Bldg. T-300	MV-309	Missing Lid
84	58	Stanley Rd. north of of Bldg. T-300	MV-310	Raise to Grade
85	58	Road No. S-31-E southwest of Bldg. 325	MV-307	Repair
86	58	Road No. S-31-E southwest of Bldg. 325	HV-305	Cleaning
87	59	North of Bldg. T-330	MV-317 MV-318	Cleaning
88	60	McIdoe Rd. @ Bldg. T-1174	MV-1114	Cleaning
89	63	Artillery Post Road in rear between Bldg. 120-121	MV-101	Repair
90	63	Artillery Post Road Bldg. 118	Service Valve	Raise to Grade
91	64	Road No. S-4 Bldg. 140	Service Valve	Cleaning
92	65	New Braunfels Ave. Bldg. 147	Service	Missing Box

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

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Line #	Plat #	Address	#	Needed
93	65	New Braunfels Ave. @ Road No. S-4	MV-208	Cleaning
94	65	Connell Rd. @ Road No. S-145	MV-2217	Cleaning
95	65	Wilson Rd. west of 2nd Street	F.H. Valve FH-4006	Repair
96	65	Wilson Rd. east of 2nd Street	MV-4009	Raise to Grade
97	67	7th Street @ Bldg. 4188	F-4103	Repair
98	67	7th Street @ Bldg. 4115	MV-4102	Repair
99	68	Northeast of Bldg. T-1191	HV-1107	Raise to Grade
100	69	East of Ludington Road	MV-4176	Raise to Grade
101	72	Road No. S-6N	Service Valve	Cleaning
102	73	Road No. S-6 @ New Braunfels	MV-206	Cleaning
103	73	Jessup Road @ 1st Street	F.H. Valve	Repair
104	73	Greeley Rd. @ Bldg. 4011	F.H. Valve	Raise to Grade
105	78	Between Bldgs. 2 and 1 Staff Post Road	Main Valve	Raise to Grade
106	83	A Road north of Bldg. 4203	1 of 3 main valves	Repair
107	88	Winans Rd. southwest of Bldg. 1520	1 of 5 main valves	Cleaning
108	88	Winans Rd. southwest of Bldg. 1520	F.H. Valve to F1701	Raise to Grade

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
109	88	Winans Rd. @ Bldg. 1521	F.H. Valve to F1702	Repair
110	88	Winans Rd. east of Nursery Rd.	MV-1701 MV-1702	Raise to Grade
111	88	Nursery Rd. east of Bldg. 1874	Main Valve	Cleaning
112	90	Burr Road	Main Valve and MV-2902	Raise to Grade
113	90	Burr Road	MV-2913	Raise to Grade
114	93	Bldg. 350	Service Valve	Cleaning
115	93	Northeast of Bldg.	F.H. Valve to F3519	Repair
116	95	At Bldg. S-3404	2 Main Valves	Repair
117	95	Main to Naval and Marine Reserve Center	Valve Stack	Repair
118	FS84-0060 3 of 9	Patch Rd. Bldg. 717	Service Valve	Raise to Grade
119	FS84-0060 3 of 9	Patch Rd. Bldg. 713	Service Valve	Raise to Grade
120	FS84-0060 3 of 9	Patch Rd. Bldg. 716	Service Valve	Raise to Grade
121	FS84-0060 3 of 9	Patch Rd. Bldg. 714	Service Valve	Raise to Grade

APPENDIX F

Edwards Underground Water District Valve or Valve Stack Cleaning or Repairs Needed 1993

System: Fort Sam Houston

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Line #	Plat #	Address	#	Needed
121	FS84- 0060 3 of 9	Patch Rd. Bldg. 714	Service Valve	Raise to Grade
122	FS84- 0060 3 of 9	Patch Rd. Bldg. 712	Service Valve	Raise to Grade
123	FS84- 0060 3 of 9	Patch Rd. Bldg. 710	Service Valve	Raise to Grade
124	FS84- 0060 3 of 9	Patch Rd. Bldg. 708	Service Valve	Raise to Grade
125	FS84- 0060 3 of 9	Chaffee Rd. Bldg. 755	Service Valve	Raise to Grade
126	FS84- 0060 3 of 9	Chaffee Rd. Bldg. 754	Service Valve	Raise to Grade
127	FS84- 0060 3 of 9	Patch Rd. Bldg. 735	Service Valve	Raise to Grade
128	FS84- 0060 3 of 9	Patch Rd. Bldg. 731	Service Valve	Raise to Grade
129	FS84- 0060 3 of 9	Patch Rd. Bldg. 729	Service Valve	Raise to Grade
130	FS84- 0060 3 of 9	Patch Rd. Bldg. 727	Service Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
131	FS84-0060 3 of 9	Patch Rd. Bldg. 725	Service Valve	Raise to Grade
132	FS84-0060 3 of 9	Patch Rd. Bldg. 723	Service Valve	Raise to Grade
133	FS84-0060 3 of 9	Patch Rd. Bldg. 734	Service Valve	Raise to Grade
134	FS84-0060 3 of 9	Patch Rd. Bldg. 732	Service Valve	Raise to Grade
135	FS84-0060 3 of 9	Patch Rd. Bldg. 724	Service Valve	Raise to Grade
136	FS84-0060 3 of 9	Patch Rd. Bldg. 722	Service Valve	Raise to Grade
137	FS84-0060 3 of 9	Chaffee Bldg. 783	Service Valve	Raise to Grade
138	FS84-0060 3 of 9	Chaffee Bldg. 782	Service Valve	Raise to Grade
139	FS84-0060 3 of 9	Chaffee Bldg. 776	Service Valve	Raise to Grade
140	FS84-0060 3 of 9	Chaffee Bldg. 774	Service Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
41	FS84- 0060 4 of 9	Chaffee Bldg. 841	Service Valve	Raise to Grade
42	FS84- 0060 4 of 9	Chaffee Bldg. 843	Service Valve	Raise to Grade
43	FS84- 0060 4 of 9	Chaffee Bldg. 847	Service Valve	Raise to Grade
44	FS84- 0060 4 of 9	Chaffee Bldg. 855	Service Valve	Raise to Grade
45	FS84- 0060 4 of 9	Chaffee Bldg. 852	Service Valve	Raise to Grade
46	FS84- 0060 4 of 9	Chaffee Bldg. 850	Service Valve	Raise to Grade
47	FS84- 0060 4 of 9	Chaffee Bldg. 848	Service Valve	Raise to Grade
48	FS84- 0060 4 of 9	Chaffee Bldg. 846	Service Valve	Raise to Grade
49	FS84- 0060 4 of 9	Chaffee Bldg. 844	Service Valve	Raise to Grade
50	FS84- 0060 4 of 9	Chaffee Bldg. 844	Service Valve	Raise to Grade
51	FS84- 0060 4 of 9	Chaffee Bldg. 838	Service Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
52	FS84- 0060 4 of 9	Chaffee Bldg. 859	Service Valve	Raise to Grade
53	FS84- 0060 4 of 9	Chaffee Bldg. 861	Service Valve	Raise to Grade
54	FS84- 0060 4 of 9	Chaffee Bldg. 863	Service Valve	Raise to Grade
55	FS84- 0060 4 of 9	Chaffee Bldg. 865	Service Valve	Raise to Grade
56	FS84- 0060 4 of 9	Chaffee Bldg. 867	Service Valve	Raise to Grade
57	FS84- 0060 4 of 9	Chaffee Bldg. 869	Service Valve	Raise to Grade
58	FS84- 0060 4 of 9	Chaffee Bldg. 870	Service Valve	Raise to Grade
59	FS84- 0060 4 of 9	Chaffee Bldg. 868	Service Valve	Raise to Grade
60	FS84- 0060 4 of 9	Chaffee Bldg. 866	Service Valve	Raise to Grade
61	FS84- 0060 4 of 9	Chaffee Bldg. 864	Service Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
162	FS84- 0060 4 of 9	Chaffee Bldg. 862	Service Valve	Raise to Grade
163	FS84- 0060 4 of 9	Chaffee @ Crockett	Main Valve	Cleaning
164	FS84- 0060 4 of 9	Chaffee @ Bldg. 845	F.H. Valve	Raise to Grade
165	FS84- 0060 4 of 9	Patch Bldg. 827	Service Valve	Raise to Grade
166	FS84- 0060 4 of 9	Patch Bldg. 826	Service Valve	Raise to Grade
167	FS84- 0060 4 of 9	Patch Bldg. 821	Service Valve	Raise to Grade
168	FS84- 0060 4 of 9	Patch Bldg. 820	Service Valve	Raise to Grade
169	FS84- 0060 4 of 9	Patch Bldg. 808	Service Valve	Raise to Grade
170	FS84- 0060 4 of 9	Patch Bldg. 811	Service Valve	Raise to Grade
171	FS84- 0060 4 of 9	Patch Bldg. 813	Service Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
172	FS84-0060 4 of 9	Patch Bldg. 817	Service Valve	Raise to Grade
173	FS84-0060 4 of 9	Patch Bldg. 818	Service Valve	Raise to Grade
174	FS84-0060 4 of 9	Patch Bldg. 815	F.H. Valve	Raise to Grade
175	FS84-0060 4 of 9	Crockett @ Road No. S-22	2 Main Valves	Raise to Grade
176	FS84-0060 4 of 9	Road No. S-22 @ Bldg. 837B	Main Valve	Repair
177	FS84-0060 4 of 9	Chaffee Rd. @ Bldg. 845	F.H. Valve	Raise to Grade
178	FS84-0060 4 of 9	Chaffee Rd. @ Crockett	Main Valve	Cleaning
179	FS84-0060 5 of 9	Chaffee Rd. Bldg. 877	Service Valve	Raise to Grade
180	FS84-0060 5 of 9	Chaffee Rd. Bldg. 879	Service Valve	Raise to Grade
181	FS85-0060 3	Infantry Post Road Bldg. 642	F.H. Valve	Raise to Grade
182	34	Old Austin Highway north of	Main Valve	Raise to Grade

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Line #	Plat #	Address	#	Needed
83	65	North of Wilson Street west of Bldg. 2200	Main Valve	Raise to Grade / Repair

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Line #	Plat #	Address	Comments
1	4	Clem Rd. @ Bldg. 9109	Service Valve
2	4	Clem Rd. @ Bldg. 9257	Service Valve
3	4	Twiggs Road Bldg. 9220	Service Valve @ Street
4	4	McMurray Road @ Bldg. 9020	HV-9041
5	4	McMurray Road @ Bldg. 9013	HV-9040
6	4	McMurray Road @ Clem Rd.	MV-9032
7	4	McMurray Road @ Bldg. 9101	Service Valve
8	4	Clem Rd. @ Bldg. 9104	MV-9018
9	5	Frazer Rd. @ Bldg. 9241	Service Valve
10	7	6" main south of MV-1606	Service Valve
11	7	Southwest of Bldg. 1611	MV-1605
12	7	Southwest of Bldg. 1611	F.H. with Valve
13	7	Sulton Rd. northeast of Bldg. 1522	F.H. with Valve
14	10	Winans Rd. northeast corner of Plat 12" Valve	Main Valve 1 of 5
15	10	Winans Rd. southwest of Bldg. 1521 on 12" main	MV-1516
16	10	Winans Rd. southwest of Bldg. 152 on 6" main	Service Valve
17	10	South of Winans Rd. and south of MV-1513	4" Valve
18	10	Winans Rd. east of MV-1513	MV-1512
19	11	Winans Rd. to Bldg. 1702	Service Valve

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Line #	Plat #	Address	Comments
20	12	Forbush Rd.	MV-9080
21	14	Gorgas Circle Bldg. 1011	Service Valve
22	15	Stanley Rd. south of Bldg. 1000	Sprinkler Valve
23	16	West of Bldg. 2901 near F-2901	Main Valve
24	17	Hardee Rd.	MV-3809 and 16" Valve
25	21	Gorgas Circle across from Bldg. 1007	Sprinkler Valve
26	21	Gorgas Circle Bldg. 1006	Service Valve
27	22	East of Stanley Rd. @ Bldg. T-1054	HV-1041
28	22	East of Stanley Rd. across from F-1017	Main Vales
29	22	Stanley Rd. south of Bldg. T-1031	MV-1046 & Service Valve
30	23	Birkhead Dr. in the street @ Bldg. 8170	Service Valve
31	23	Birkhead @ Forage Ave.	MV-8019
32	24	Hardee Rd. southeast of Bldg. 1384	4 main valves
33	26	Southeast of Bldg. 3505	Main Valve
34	28	Old Austin Rd. @ Dickman	MV-536 MV-513
35	29	Stanley Rd. Bldg. T-1035	Service Valve
36	30	Foulois Rd. Bldg. 8011-8012	Service Valve
37	30	Foulois Rd. Bldg. 8206	HV-8015
38	30	Hardee Rd. Bldg. 8032	Fire Hydrant
39	30	Hardee Rd. Bldg. 8023	Fire Hydrant

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Line #	Plat #	Address	Comments
40	30	Garden Ave.	F-1311 HV-1319
41	31	Koehler Rd. southwest of Bldg. 1385	Main Valve 1 of 3
42	31	Koehler east of Bldg. 1380	Main Valve 1 of 3
43	31	Koehler Rd. @ Williams Road	Main Valve 1 of 2
44	31	Southwest of Bldg. 1380	Main Valve
45	35	Scott Rd. Bldg. 905	Service Valve
46	35	Bldg. 931	Service Valve
47	35	West of Bldg. S-910	Main Valve
48	36	Patch Rd. north of Bldg. 834	Main Valve
49	36	Southeast of Bldg. 1395 near MV-1226	Main Valve
50	36	Chaffee Rd. Bldg. 1222	Service Valve
51	36	Northeast of Bldg. 1398	1 8" 1 12" Main Valves
52	36	Garden Ave. east of Bldg. 1398	F.H. with Valve
53	36	McGee Rd. @ Garden Ave.	Main Valve
54	36	W.W. White Rd. @ Garden Ave.	MV-1302
55	37	W.W. White Rd. south of 1375	Main Valve
56	37	Parrish Road Bldg. S-1445	Service Valve
57	37	Parrish Road Bldg. S-1444	Service Valve
58	37	Williams Rd. northeast of Bldg. 1374	Service Valve
59	41	Schoefield Road	Main Valve

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Line #	Plat #	Address	Comments
60	42	Schoefield Rd. @ Wheaton Rd.	MV-455
61	42	Schoefield Rd. east of Dickman	Main Valve
62	43	Stanley Rd. west of Bldg. 2750	F.H. F-2704
63	43	Harvey Rd. @ Scott Rd.	1 Main Valve 1 Fire Hydrant
64	43	Harvey Rd. @ Scott Rd.	MV-2729
65	43	Harvey Rd. north of Bldg. 2640	1 of 2 main valve
66	43	Harvey Rd. @ Bldg. 2653	2 main valves
67	43	Harvey Rd. across from Bldg. 2952	Main Valve
68	43	Harvey Rd. west of Bldg. 2653	Service Valve
69	43	Harvey Rd. Bldg. T-2795	Fire Hydrant
70	43	Stanley Rd. across from Bldg. 2750	Main Valve
71	43	South of Bldg. T-2622	Service Valve
72	43	Schoefield Rd. @ Bldg. T-2511	MV-2604
73	43	Schoefield Rd. Bldg. 2630	Main Valve
74	44	Harvey Rd. Bldg. T-1287	Service Valve
75	44	South of Bldg. 1240	MV-1210
76	44	Southwest of Bldg. 1279	Main Valve
77	44	East of Road No. S-23 and north of Schoefield	1 of 3 Main Valve
78	45	Bldg. S-1442	Service Valve
79	45	Bldg. S-1443	Service Valve

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Line #	Plat #	Address	Comments
80	45	Bldg. S-1440	Service Valve
81	45	Bldg. S-1441	Service Valve
82	45	Bldg. S-1447	Service Valve
83	45	Binz Engleman Rd. between Bldgs. 3896 - 3998	2 Main Valves
84	45	Binz Engleman Rd. @ Bldg. S-1440	Fire Hydrant
85	45	Schofield Rd. Bldg. 3840	Service Valve
86	45	South of Schofield Rd.	Service Valve
87	45	Schofield Rd. east of Bldg. 3890	Main Valve
88	49	Road No. S-3 Bldg. 165	Service Valve
90	49	Road No. S-3 Bldg. 170	Service Valve
91	49	Artillery Post Loop	Sprinkler Valve
92	49	Road No. S-12 Bldg. 180	Service Valve
93	49	Road No. S-3 Bldg. T-185	Service Valve
94	50	Wheaton @ New Braunfels	Sprinkler
95	51	Wheaton Rd. north of Bldg. 452	Main Valve
96	52	Wheaton Rd. north of Bldg. 477	Main Valve
97	52	Funston Rd. across from T-2512	MV-2411
98	52	Funston Rd. Bldg. T-2431	Service Valve
99	52	Funston Rd. Bldg. T-2512	Service Valve
100	52	Bldg. T-2513	P.I.V.
101	52	Funston Rd. northeast of Bldg. 2434	MV-2409

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Line #	Plat #	Address	Comments
02	53	Zinn Road @ Bldg. S-1159	2" Valve
03	55	Beebe Loop @ Bldg. 2017	Main Valve
04	55	Buck Rd. north of Bldg. 2061	MV-2026
05	55	Buck Rd. next to fire hydrant F-2002	Service Valve
06	55	Dunston Road across from Bldg. 2000	P.I.V.
07	56	Road No. S-3 Bldg. 106	Service Valve
08	56	Road No. S-4 Bldg. 141	F-116 HW-135
09	56	Road No. S-4 Bldg. 154	F-117 HW-134
10	57	New Braunfels Ave. Bldg. 147	Service Valve
11	57	New Braunfels Ave. Bldg. 2248 in rear	F-2203
12	57	Stanley Rd. Bldg. 2272	Service Valve
13	57	Stanley Rd. Bldg. 2271	3" Service Valve
14	57	Connell Rd. Bldg. 2264	MV-2233
15	57	Road No. S-4 Bldg. 157	Service Valve
16	58	Stanley Rd. @ Reynolds Rd.	MV-3229
17	58	Bldg. T-2383	Service Valve
18	58	Stanley Rd. northeast of Bldg. T-300	Sprinkler Valve
19	58	Road No. S-31E southwest of Bldg. 325	Main Valve
20	58	Road No. S-31E southeast of Bldg. 325	MV-314
21	59	Funston Rd. @ Bldg. 7357	F-304 HV-332
22	59	Funston Rd. @ Bldg. 7357	MV-333

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Line #	Plat #	Address	Comments
123	59	Bldg. T-358	4 Service Valves
124	59	Taylor Rd. @ Bldg. 2420	MV-2401
125	60	Taylor Rd. east of Road No. S-23	MV-1112 MV-1111
126	64	Road No. S-4 Bldg. T-201	Service Valve
127	64	Liscum Road north of Road No. S-4	F-115
128	65	Road No. S-4 west of Bldg. 149	1-122 MV-133
129	65	New Braunfels Ave. between Bldg. 2250 - 2240	F-2204
130	65	Road No. S-145 southwest of Bldg. T-2235	MV-2218 Service Valve
131	65	Connell Rd. @ Road No. S-145	MV-2216
132	65	New Braunfels Ave. in rear between Bldgs. 149-147	F-121
133	65	New Braunfels Ave. Bldg. 267	MV-207
134	66	Between Road No. S-14-5 and Road No. S-32W	MV-301
135	67	Wilson Street @ Moore Street	MV-4101
136	67	Wilson Street @ Moore Street	HV-324 F-310
137	67	Wilson Street east of 7th Street	1 Main Valve and MV-329
138	67	Wilson Street across from Bldg. S-2587	HV-2508
139	67	9th Street near Bldg. 4168	MV-4121
140	67	10th Street southwest of Bldg. S-2587	F-4113 HV-4124
141	68	Between Bldgs. T-1196 and T-1144	HV-1105 F-1101

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Line #	Plat #	Address	Comments
142	68	Wilson Street east of Road No. S-23	Main Valve
143	68	Southeast of Bldg. T-1191	Main Valve
144	68	13th Street northeast of Bldg. 4193	MV-4144
145	68	13th Street near Wilson St.	MV-4160
146	69	East of Ludington Road	MV-4178
147	69	East of Ludington Road	F-4138
148	72	Road No. S-6N	MV-204 F-212 HV-203
149	73	Jessup Rd. @ New Braunfels Ave.	MV-4001
150	73	Jessup Rd. @ 6th Street	Main Valve
151	75	11th Street @ Bldg. 4191	P.I.V.
152	76	Reed Road accross from Bldg. 4197	MV-4173
153	76	25th Street @ Bldg. 4217	MV-4234
154	77	Parking area northeast of Bldg. T-4128	MV-4174 MV-4175
155	78	Staff Post Rd. between Bldgs. 2 - 1	Sprinkler Valve
156	82	West of Bldg. T-4227	Main Valve
157	83	North of B Road	MV-4252
158	83	A Road	Main Valve MV-4246
159	83	Sibert Rd. @ Bldg. 4299	South Service Valve
160	83	Carroll Road Bldg. 4201	2 Service Valves MV-4249
161	83	9th Street @ Reed Rd.	Service Valve

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Line #	Plat #	Address	Comments
62	83	9th Street @ Carroll Road	F-4218 HV-4829
63	83	Carroll Road @ Bldg. 4200	North Service Valve/Main Valve
64	84	South of Bldg. 4209	Main Valve
65	87	East of Wurzbach Road Bldg. 3001	Service Valve
66	87	East of Wurzbach Road Bldg. 3002	Service Valve
67	88	Winans Road southwest of Bldg. 1520	1 of 5 Main Valves
68	88	Winans Road southwest of Bldg. 1521	MV-1516 and Main Valve
69	88	South of Winans Rd. and east of Bldg. 1521	4" Valve
70	88	Winans Rd. between Bldg. 1521 and Nursery Rd.	MV-1512
71	88	Winans Rd. to Bldg. 1702	Service Valve
72	93	Southeast of Bldg. 3540	Main Valve
73	FS84 0060 3 of 9	Patch Rd. @ 732	Main Valve
74	FS84 0060 3 of 9	Patch Rd. @ Bldg. 707	Service Valve
75	FS84 0060 4 of 9	Road No. S-22 @ Schofield Rd.	2 of 3 Main Valves

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Line #	Plat #	Address	Comments
176	FS84 0060 4 of 9	Road No. S-22 @ Harvey	2 of 4 Main Valves
177	FS84 0060 4 of 9	Chaffee Rd. @ Harvey	2 of 3 Main Valves
178	FS84 0060 5 of 9	Road No. S-22 @ Bldg.	Main Valve
179	FS85 0060 Sheet 2	Road No. S-35 Bldg. 677	Service Valve
180	FS85 0060 Sheet 2	Road No. S-7-S Bldg. 612	Service Valve
181	FS85 0060 Sheet 2	Hood Street Bldg. 647	Service Valve
182	FS85 0060 Sheet 2	Hood Street Bldg. 646	Service Valve
183	FS85 0060 Sheet 2	Hood Street Bldg. 648	Service Valve

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Line #	Plat #	Address	Comments
84	FS85 0060 Sheet 2	Hood Street Bldg. 601	2 Service Valves
85	FS85 0060 Sheet 2	Hood Street Bldg. 601A	Service Valve
86	FS85 0060 Sheet 2	Hood Street Bldg. 601B	Service Valve
87	FS85 0060 Sheet 2	Hood Street Bldg. 602B	Service Valve
88	FS85 0060 Sheet 2	Infantry Post Road Bldg. 610	Service Valve
89	FS85 0060 Sheet 2	Infantry Post Road Bldg. 609B	Service Valve
90	FS85 0060 Sheet 2	Infantry Post Road Bldg. 608	2 Service Valves
91	FS85 0060 Sheet 2	Infantry Post Road Bldg. 608B	Service Valves

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Line #	Plat #	Address	Comments
192	FS85 0050 Sheet 2	Infantry Post Road Bldg. 607	Service Valves
193	FS85 0060 Sheet 2	Infantry Post Road Bldg. 613	Service Valve
194	FS85 0060 Sheet 2	Infantry Post Road Bldg. 606	Service Valve
195	FS85 0060 Sheet 2	Infantry Post Road Bldg. 606A	2 Service Valves
196	FS85 0060 Sheet 2	Infantry Post Road Bldg. 605A	Service Valve
197	FS85 0060 Sheet 2	Infantry Post Road Bldg. 605	Service Valve
198	FS85 0060 Sheet 2	Infantry Post Road Bldg. 604A	Service Valve
199	FS85 0060 Sheet 2	Infantry Post Road Bldg. 603A	2 Service Valves

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Line #	Plat #	Address	Comments
200	FS85 0060 Sheet 2	Infantry Post Road Bldg. 620 Rear	Service Valve
201	FS85 0060 Sheet 2	Infantry Post Road Bldg. 622 Rear	Service Valve
202	FS85 0060 Sheet 2	Infantry Post Road Bldg. 624 Rear	Service Valve
203	FS85 0060 Sheet 2	Infantry Post Rd. between Bldgs. 626-628	2 Service Valves
204	63	Between Artillery Post Road and Stanley Rd.	Service Valve

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Line #	Plat #	Address	Added
1	4	McMurray Road Bldg. 9013	Service Valve
2	4	McMurray Road between Bldg. 9003-9004	Service Valve
3	4	South of Bldg. 9001 McMurray Rd.	2 Main Valves and Meter
4	5	Clem Rd. @ Bldg. 9119	Service Valve
5	5	Twiggs Rd. Bldg. 9216	Service Valve
6	5	McMurray Rd. Bldg. 9024/9023	Service Valve
7	5	McMurray Rd. bldg. 9025/9026	Service Valve
8	5	Frazer Rd. south of Bldg. 9027 McMurray Rd.	Meter
9	5	Near MV-1709 south of Bldg. 9029 McMurray Rd.	Service and Service Valve
10	7	Bldg. 1545 West Valve	Service Valve
11	7	South of Intermediate Football Field	Service and Service Valve
12	8	Southeast of Softball Field #1	F.H. with Valve
13	8	Southwest of Softball Field	Service Valve
14	10	South of Winans Rd. east of Bldg. 1520 on 6" main	2" Valve
15	10	Winans Rd. @ Nursery Rd.	6" Valve
16	10	Nursery Rd. @ MV-1806	Service and Service Valve
17	12	Forbush Rd.	2 Main Valves and meter
18	14	Northeast of Bldg. 1000	P.I.V.

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Line #	Plat #	Address	Added
19	22	Stanley Rd. Bldg. T-1052	Service Valve
20	22	Stanley Rd. Bldg. T-1031	Service Valve
21	23	Ingram Rd. Bldg. 8254	Service Valve
22	23	Ingram Rd. Bldg. 8253	Service Valve
23	23	Ingram Rd. Bldg. 8250	Service Valve
24	23	Ingram Rd. Bldg. 8249	Service Valve
25	23	Ingram Rd. Bldg. 8248	Service Valve
26	23	Ingram Rd. Bldg. 8247	Service Valve
27	23	Ingram Rd. Bldg. 8246	Service Valve
28	23	Ingram Rd. Bldg. 8256	Service Valve
29	23	Ingram Rd. Bldg. 8257	Service Valve
30	23	Ingram Rd. Bldg. 8258	Service Valve
31	23	Ingram Rd. Bldg. 8259	Service Valve
32	23	Ingram Rd. between Bldg. 8252-8256	F.H. with Valve
33	23	Lang Rd. Bldg. 8127	Service Valve
34	23	Lang Rd. Bldg. 8128	Service Valve
35	23	Lang Rd. Bldg. 8130	Service Valve
36	23	Lang Rd. Bldg. 8131	Service Valve
37	23	Lang Rd. Bldg. 8272	Service Valve
38	23	Lang Rd. Bldg. 8271	Service Valve
39	23	Lang Rd. Bldg. 8270	Service Valve

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Line #	Plat #	Address	Added
40	23	Lang Rd. Bldg. 8269	Service Valve
41	23	Lang Rd. Bldg. 8268	Service Valve
42	23	Lang Rd. Bldg. 8267	Service Valve
43	23	Lang Rd. Bldg. 8266	Service Valve
44	23	Lang Rd. Bldg. 8174	Service Valve
45	23	Lang Rd. Bldg. 8229	Service Valve
46	23	Lang Rd. Bldg. 8230	Service Valve
47	23	Lang Rd. Bldg. 8231	Service Valve
48	23	Lang Rd. Bldg. 8233	Service Valve
49	23	Lang Rd. Bldg. 8234	Service Valve
50	23	Lang Rd. Bldg. 8235	Service Valve
51	23	Birkhead Bldg. 8120	Service Valve
52	23	Birkhead Bldg. 8124	Service Valve
53	23	Birkhead Bldg. 8169	Service Valve
54	23	Birkhead Bldg. 8213	Service Valve
55	23	Birkhead Bldg. 8212	Service Valve
56	23	Birkhead Bldg. 8211	Service Valve
57	23	Birkhead Bldg. 8209	Service Valve
58	23	Birkhead Bldg. 8207	Service Valve
59	23	Birkhead Bldg. 8159	Service Valve
60	23	Birkhead Bldg. 8160	Service Valve

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Line #	Plat #	Address	Added
61	23	Birkhead Bldg. 8161	Service Valve
62	23	Birkhead Bldg. 8162	Service Valve
63	23	Birkhead Bldg. 8165	Service Valve
64	23	Birkhead Bldg. 8216	Service Valve
65	23	Birkhead Bldg. 8217	Service Valve
66	23	Birkhead Bldg. 8218	Service Valve
67	23	Birkhead Bldg. 8219	Service Valve
68	23	Forage Ave. Bldg. 8133	Service Valve
69	23	Forage Ave. Bldg. 8135	Service Valve
70	23	Forage Ave. Bldg. 8138	Service Valve
71	23	Forage Ave. Bldg. 8139	Service Valve
72	23	Forage Ave. Bldg. 8273	Service Valve
73	23	Forage Ave. Bldg. 8226	Service Valve
74	23	Forage Ave. Bldg. 8225	Service Valve
75	24	Northeast of Bldg. 8241 Ingram Road	8" Main Valve
76	24	Ingram Road Bldg. 8242	Service Valve
77	24	Ingram Road Bldg. 8241	Service Valve
78	24	Ingram Road Bldg. 8261	Service Valve
79	24	Ingram Road Bldg. 8261	Service Valve
80	24	Lang Road Bldg. 8265	Service Valve
81	24	Lang Road Bldg. 8264	Service Valve

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Line #	Plat #	Address	Added
82	24	Lang Road Bldg. 8238	Service Valve
83	24	Hardee Road west of Bldg. 1384	F.H. with Valve
84	24	Hardee Road south of Bldg. 1384	Main Valve
85	24	Northeast of Bldg. 1384	Service Valve
86	26	Bldg. 3504	Service Valve
87	26	Southeast of Bldg. 3505	Main Valve
88	26	North of Bldg. 3651	2 Main Valve
89	28	Old Austin Rd. @ Dickman Rd.	Main Valve
90	29	Hardee Rd. Bldg. 2842	Service Valve
91	29	Hardee Rd. Bldg. 2868	2 Service Valves
92	29	Scott Rd. Bldg. 8000	Service Valve
93	29	Scott Rd. Bldg. 8043	2 Service Valves
94	29	Scott Rd. Bldg. 8041	Service Valve
95	29	Scott Rd. Bldg. 8041	Service Valve
96	29	Foulois Bldg. 8104	Service Valve
97	29	Foulois Rd. Bldg. 8106	Service Valve
98	29	Foulois Rd. Bldg. 8002	Service Valve
99	29	Foulois Rd. Bldg. 8003	Service Valve
100	29	Foulois Rd. Bldg. 8004	Service Valve
101	29	Hardee Rd. Bldg. 8037	Service Valve
102	29	Hardee Rd. Bldg. 8036	Service Valve

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Line #	Plat #	Address	Added
103	29	Hardee Rd. Bldg. 8035	Service Valve
104	29	Hardee Rd. south of Bldg. 8040	Main Valve
105	30	Birkhead Dr. Bldg. 8112	Service Valve
106	30	Foulois Road Bldg. 8107	Service Valve
107	30	Foulois Road Bldg. 8149	Service Valve
108	30	Foulois Road Bldg. 8147	Service Valve
109	30	Foulois Road Bldg. 8146	Service Valve
110	30	Foulois Road Bldg. 8145	Service Valve
111	30	Foulois Road Bldg. 8144	Service Valve
112	30	Foulois Road Bldg. 8143	Service Valve
113	30	Foulois Road Bldg. 8142	Service Valve
114	30	Foulois Road Bldg. 8141	Service Valve
115	30	Foulois Road Bldg. 8222	Service Valve
116	30	Foulois Road Bldg. 8221	Service Valve
117	30	Foulois Road Bldg. 8220	Service Valve
118	30	Foulois Road Bldg. 8017	Service Valve
119	30	Foulois Road Bldg. 8018	Service Valve
120	30	Foulois Road Bldg. 8202	Service Valve
121	30	Foulois Road Bldg. 8203	Service Valve
122	30	Foulois Road Bldg. 8206	Service Valve
123	30	Foulois Road Bldg. 8107	F.H. with Valve

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Line #	Plat #	Address	Added
124	30	Foulois Road Bldg. 8017	F.H. with Valve
125	30	Foulois Road Bldg. 8021	Service Valve
126	30	Patch Road Bldg. 8008	Service Valve
127	30	Hardee Road Bldg. 8032	Service Valve
128	30	Hardee Road Bldg. 8031	Service Valve
129	30	Hardee Road Bldg. 8030	Service Valve
130	30	Hardee Road Bldg. 8026	Service Valve
131	30	Hardee Road Bldg. 8025	Service Valve
132	30	Hardee Road Bldg. 8024	Service Valve
133	30	Hardee Road Bldg. 8023	Service Valve
134	30	East of Garden Ave. and south of Hardee Rd.	4 Service Valves 1 Fire Hydrant 1 Back Flow Preventor
135	30	Garden Ave. north of Bldg. 1396	Main Valve
136	30	Garden Ave. south of Bldg. 1396	Service Valve
137	31	Hardee Rd. @ Koehler Rd.	Main Valve
138	31	Koehler Rd. west of Bldg. 1380	Main Valve
139	31	Koehler Rd. Bldg. 1380	Main Valve
140	31	Koehler Rd. east of Bldg. 1380	Main Valve
141	31	South of Koehler and west of Bldg. 1380	4 Service Valves Fire Hydrant
142	31	South of Koehler and west of 1377	Service Valve

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Line #	Plat #	Address	Added
143	31	Williams Rd. north of Koehler Rd.	P.I.V. and Service Valve
144	31	South of Bldg. 1379	1 Main Valve 3 Hose Bibs 475' Main
145	32	Paddocks east of Bldg. 3533	2 Service Valves
146	32	Paddocks east of Bldg. 3556	3 Main Vales 1 Service Valve
147	32	Paddocks	850' 12" C-901
148	35	Stanley Rd. @ Harvey Road	F.H. with Valve
149	35	Scott Rd. south of Bldg. 904	F.H. with Valve
150	35	Bldg. S-911	Service Valve
151	35	Bldg. 902	Service Valve
152	36	Patch Road north of Bldg. 834	6" Main Valve
153	36	Chaffee Rd. Bldg. 1222	Service Valve P.I.V.
154	36	Bldg. 1395	Service Valve
155	36	Bldg. T-1464	Service Valve
156	37	West of Bldg. 1377	2 Service Vale
157	43	Harvey Road Bldg. T-2795	Service Valve
158	43	Schofield Rd. Tennis Court	1 Service Valve 2 Hose bibs
159	43	Bldg. 2658	Service Valve
160	43	Bldg. 2655	Service Valve

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Line #	Plat #	Address	Added
161	43	Schofield Bldg. S-2410	Service Valve
162	43	Schofield Bldg. 2630	Service Valve
163	43	Schofield east of Bldg. 2630	Service Valve
164	44	Patch Rd. Bldg. T-2650	Service Valve
165	44	Harvey Rd. Bldg. 1240	Service Valve
166	44	Harvey Rd. across from Bldg. T-1287	Service Valve
167	44	Bldg. 1278	Service Valve
168	44	Schofield Bldg. S-1164	Service Valve
169	44	Bldg. 1279	P.I.V.
170	44	Southwest of Bldg. 1279	F.H. with Valve
171	45	Schofield Rd. southeast of Bldg. 3890	2 Main Valves
172	49	Road No. S-3 Bldg. 166	Service Valve
173	49	Road No. S-3 Bldg. 167	Service Valve
174	49	Road No. S-3 Bldg. 168	Service Vale
175	49	Road No. S-3 Bldg. T-168B	F.H. with Valve
176	49	Road No. S-3 Bldg. T-169	Service Valve
177	49	Road No. S-28W	F.H. with Valve
178	49	Road No. S-12 Bldg. 174	Service Valve
179	49	Road No. S-12 Bldg. 176	Service Valve
180	49	Road No. S-12 Bldg. 177	Service Valve
181	50	Graham Road Bldg. 469	Service Valve

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Line #	Plat #	Address	Added
182	50	Graham Road Bldg. 468	Service Valve
183	50	Graham Road Bldg. 454	Service Valve
184	50	Dickman Road Bldg. 400	Service Valve
185	51	Wheaton Road Bldg. 480	Service Valve
186	51	Wheaton @ Henry T. Allen	F.H. with Valve
187	52	Funston Rd. across from Bldg. T-2510	F.H. with Valve
188	52	Bldg. T-2511	P.I.V.
189	52	Bldg. T-2512	Service Valve
190	52	Funston southwest of Bldg. T-2513	Service Valve
191	52	Scott Rd. east of Bldg. 2376	P.I.V.
192	52	Funston Rd. Bldg. S-2516	Service Valve
193	53	Forage Ave. @ Zinn Road	Main Valve
194	53	Zinn Rd. Bldg. S-1160	Service Valve
195	55	Beebe Loop Bldg. 2014	Service Valve
196	55	Beebe Loop Bldg. 2017	Service Valve
197	55	Bldg. 2002	Service Valve
198	55	Bldg. T-2062	Service Valve
199	55	Road No. S-3 Bldg. T-115B	Service Valve
200	56	Stanley Rd. between Bldg. 131-134	Service Valve
201	56	Stanley Rd. between Bldg. 134-142	2 Main Valves
202	56	Stanley Rd. Bldg. 142	F.H. with Valve

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Line #	Plat #	Address	Added
203	56	Stanley Rd. Bldg. 144	Service Valve
204	56	Stanley Rd. Bldg. 145	Service Valve F.H. with Valve
205	56	Road No. S-4 Bldg. 155	Service Valve
206	57	Stanley Rd. @ New Braunfels	8" Main Valve
207	57	New Braunfels Ave. Bldg. 156	Main Valve and Service Valve
208	57	Stanley Rd. @ Connell Road	Main Valve
209	59	West of T-357	F.H. with Valve
210	59	West of T-357	Main Valve
211	59	Taylor Rd. west of Bldg. 2420	Main Valve 300" Main
212	59	North of Bldg. 2420	3 Hose Bibs 750' Main/Service Valve
213	59	Taylor Rd. @ Bldg. 2420	800' Main 2 PIV 1 Main Valve
214	59	Funston Rd. northeast of Bldg. 2420	Main Valve
215	59	Funston Rd. @ Taylor Rd.	Main Valve
216	60	Funston Rd. north of Bldg. T-1174	F.H. Valve
217	60	Road No. S-23 Bldg. T-1194	P.I.V. Service Valve
218	60	Road No. S-23 Bldg. T-1195	Service Valve
219	63	Army Boulevard Bldg. 189	Service Valve
220	64	Bldg. 123 Road No. S-4	Service Valve

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Line #	Plat #	Address	Added
221	64	Stanley Rd. between Bldg. 124-125	Service Valve
222	64	Road No. S-4 Bldg. 127	Service Valve
223	64	Stanley Rd. Bldg. 128	F.H. with Valve
224	64	Road No. S-4 Bldg. 130	Service Valve
225	64	Road No. S-4 Bldg. 252	Service Valve
226	64	Wilson Street	F.H. 100' Main
227	65	North of Road No. S-4 Bldg. 2256	Service Valve
228	65	North of Road No. S-4 Bldg. 2267	Service Valve
229	65	Across from Bldg. 2284	Service Valve
230	65	Connell Rd. Bldg. T-2235 @ rear	Service Valve
231	65	Road No. S-4 @ New Braunfels Ave.	F.H. with Valve
232	65	Wilson St. west of New Braunfels Ave.	Main Valve 150' Main
233	66	Wilson Street @ 6th Street	Service Valve
234	67	Wilson Street northeast of Moore	Service Valve
235	67	7th Street Bldg. 4188	Service Valve
236	67	Between 9th and 10th Street	2 Main Valves
237	67	10th Street	325' Main
238	67	11th Street	Main Valve
239	68	Northeast of Bldg. 4197	Main Valve
240	68	Wilson @ 16th Street	Main Valve
241	68	16th Street	325' Main

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Line #	Plat #	Address	Added
242	68	Bldg. T-1195	P.I.V.
243	71	Road No. S-2 @ Stanley Rd.	Main Valve
244	71	Road No. S-3 behind Bldg. T-613	3 Service Valves
245	71	Road No. S-2 Bldg. 2187	Service Valve
246	71	Road No. S-2 Bldg. 2187	Service Valve
247	71	Road No. S-2 across from Bldg. 2187	Service Valve
248	71	Pine St. Bldg. 36	Service Valve
249	71	Staff Post Road Bldg. 6	Service Valve
250	71	Staff Post Road Bldg. 5	Service Valve
251	72	Liscum Rd. Bldg. 298	Service Valve
252	72	Road No. S-6-3 Bldg. T-88	Service Valve
253	72	East side of the Quadrangle Area	F.H. with Valve Service Valve
254	72	West side of the Quadrangle Area	F.H. with Valve
255	72	Road No. S-6-3 east of Liscum Rd.	F.H. with Valve
256	73	Jessup Rd. @ New Braunfels Ave.	4 Main Valves
257	73	Jessup Rd. @ 2nd Street	Main Valves
258	75	9th Street @ Parker Rd.	Main Valve
259	75	9th Street @ Bldg. 4190	Service Valve
260	75	10th Street @ Bldg. 4190	F.H. with Valve 550' 12" C-900
261	75	10th Street @ Parker Rd.	2 Main Valves

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Line #	Plat #	Address	Added
262	75	Jadwin Rd. @ Meyer Rd.	F.H. with Valve
263	76	13th Street @ Bldg. 4194	Service Valve
264	76	15th Street @ Bldg. 4195	2 Service Valves
265	76	15th Street @ Bldg. 4196	Service Valve
266	76	Parker Road to Reed Rd.	Main Valve 175' Main
267	76	Northeast of Carroll Rd.	Service Valve
268	78	Behind Bldg. 3 on Staff Post Rd.	F.H. with Valve
269	78	Behind Bldg. 2 on Staff Post Rd.	Service Valve
270	78	Between Bldgs. 2 and 1 Staff Post Rd.	Service Valve Fire Hydrant
271	78	Behind Bldg. 1 on Staff Post Road	Service Valve
272	78	Staff Post Rd. @ Tennis Court	Hose Bib
273	79	South of the Quadrangle	Fire Hydrants 2 with Valve
274	79	South of the Quadrangle	4 Service Valves
275	79	South of the Quadrangle	3 Main Valves
276	80	Southeast of the Quadrangle	2 Main Valves 1 F.H. with Valve
277	83	South of Bldg. 4209	Service Valve
278	83	Sibert Rd. south of Bldg. 4299	Main Valve
279	84	Carroll Rd. @ 9th Street	P.I.V.
280	85	Carroll Rd. @ 9th Street	Service Valve

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Line #	Plat #	Address	Added
281	86	Carroll Rd. @ Bldg. 4200	P.I.V.
282	85	Carroll Rd. @ Bldg. 4201	2 Service Valves
283	87	East of Harry Wurzbach Rd. Bldg. 3001	Service Valve
284	87	East of Harry Wurzbach Rd. Bldg. 3002	Service Valve
285	88	Winans Rd. south of Bldg. 1520	6" Main Valve
286	88	Winans Rd. southeast of Bldg. 1520	2" Main Valve
287	88	Winans Rd. Bldg. 1701	Service Valve
288	88	Nursery Rd. Bldg. 1874	Service Valve
289	88	Nursery Rd. west of Bldg. 1874	12" Main Valve
290	88	Nursery Rd. southwest of Bldg. 1874	2 Main Valves
291	89	Forbush Road	2 Main Valves 1 Service Valve
292	89	Winans Rd. to Bldg. 1900	2 Main Valves
293	89	Winans Rd. southwest of Bldg. 1900	2 Main Valves
294	91	12" Transmission Main south of Well #7	Service Valves
295	92	Hardee Road north of Bldg. 337	2 Service Valves
296	93	North of W.W. White and Pershing Road	Backflow Preventors, Main Valve and Service Valve
297	93	South of W.W. White	Service Valve
298	94	Bldg. 3651	6" Main Valve
299	95	North of W.W. White Rd.	1 Service Valves 2 Main Valves

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Line #	Plat #	Address	Added
300	95	South of Bldg. S-3404	Service Valve
301	95	North of Bldg. 355-1	8" Main Valve
302	95	West of Bldg. 3551	8" Main Valve
303	95	Main to Naval, Maine Reserve Center	Main Valve
304	FS84 0060 3 of 9	Wilson @ Road No. S-22	6" Main Valve
305	FS84 0060 3 of 9	Chaffee Rd. @ Wilson	F.H. with Valve
306	FS84 0060 4 of 9	Chaffee Rd. @ Crockett	F.H. with Valve
307	FS84 0060 5 of 9	Patch Rd. @ W. W. White	3 Main Valves
308	FS85 0060 2	Hood St. Bldg. 647	Service Valve
309	FS85 0060 2	Hood St. Bldg. 646	Service Valve
310	FS85 0060 2	Hood St. Bldg. 648	Service Valve
311	FS85 0060 2	Hood St. Bldg. 601B	Service Valve

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Line #	Plat #	Address	Added
B12	FS85 0060 2	Hood St. Bldg. 602B	Service Valve
B13	FS85 0060 3	Infantry Post Road Bldg. 615	P.I.V.
B14	FS85 0060 3	Infantry Post Road Bldg. 626	Service Valve
B15	FS85 0060 3	Infantry Post Road Bldg. 617	Service Valve
B16	34	Old Austin Highway	2 Service Valves
B17	34	Old Austin Highway	Main Valve
B18	35	Scott Road @ Bldg. 2788	Main Valve
B19	50	Dickman Road between Bldgs. 404-405	Service Valve
B20	57	South of Stanley Road @ Bldg. 2278	2 Main Valves
B21	65	North of Wilson St. west of Bldg. 2200	Main Valve
B22	90	Burr Road	100' Main

APPENDIX I

Edwards Underground Water District Fire Hydrant/Repairs Needed 1993

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Line #	Plat #	Address	Hydrant Number	Comments
1	8	Road S-43	F-1708	Hit by car
2	8	Road S-43	F-1707	Missing Cap
3	45	Binz Engleman east of S-1449	---	Missing Cap
4	72	Road S-65	---	Valve Lid

APPENDIX J

Edwards Underground Water District Mains That Could Not Be Surveyed, or Were Surveyed with a Ground Microphone 1993

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Line #	Plat #	Survey Status	Problem
1	2	Unable to Survey	Fenced off for demolition
2	3	Unable to Survey	Fenced off for demolition
3	5	Unable to Survey	Fenced off for demolition
4	9	Unable to Survey	Fenced off for demolition
5	8	Ground Microphone	Lack of access points
6	10	Ground Microphone	Lack of access points
7	11	Unable to Survey	Lack of access points
8	12	Ground Microphone	Lack of access points
9	25	Unable to Survey	Right-of-way needs cleaning
10	26	Unable to Survey	Right-of-way needs cleaning
11	29	Unable to Survey	Lack of access points/traffic noise
12	32	Unable to Survey	Right-of-way needs cleaning
13	35	Unable to Survey	Lack of access points/traffic noise
14	41	Ground Microphone	Lack of access points
15	42	Ground Microphone	Lack of access points
16	43	Ground Microphone	Lack of access points
17	51	Ground Microphone	Lack of access points
18	71	Unable to Survey	Unable to trace main
19	71	Ground Microphone	Lack of access points
20	91	Ground Microphone	3 mains - Lack of access points

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Edwards Underground Water District Mains That Could Not Be Surveyed, or Were Surveyed with a Ground Microphone 1993

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Line #	Plat #	Survey Status	Prob'lem
21	91	Unable to Survey	Unable to trace main
22	94	Unable to Survey	Unable to trace main
23	94	Ground Microphone	Lack of access points
24	95	Unable to Survey	Rights-of-way need cleaning
25	New Brook Army Hosp.	Unable to Survey	Under construction

APPENDIX K

Photographs

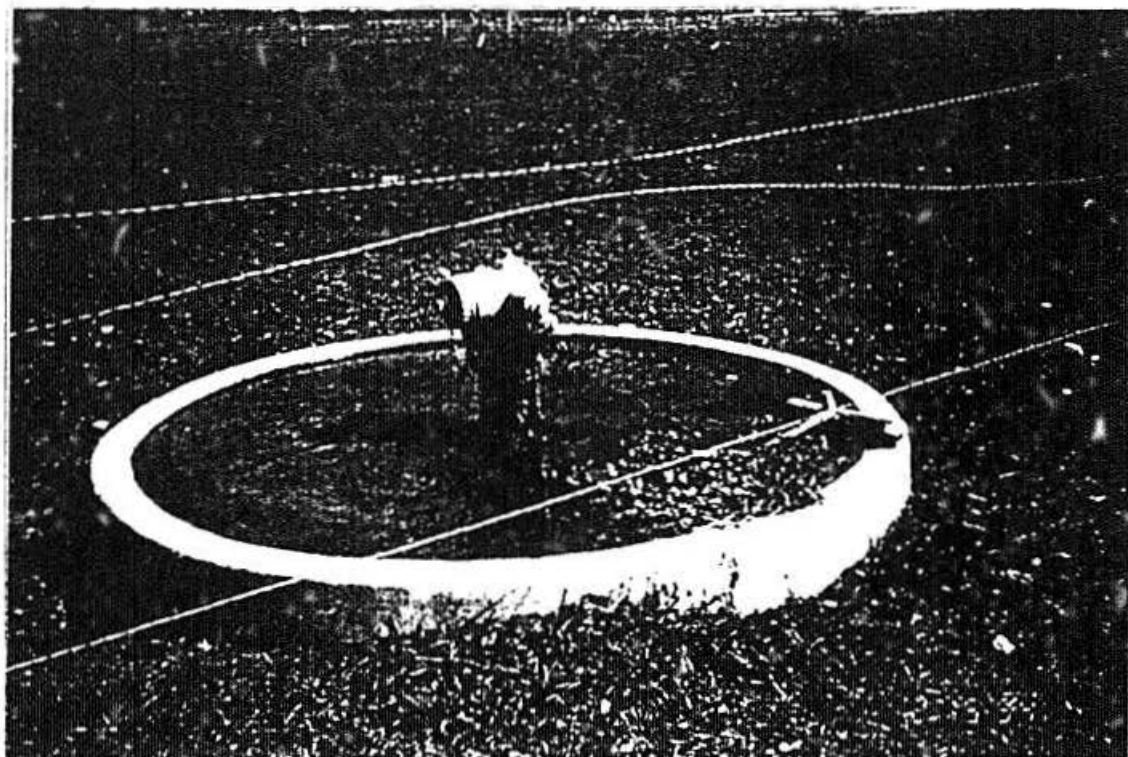
The following forty-six photographs are examples of the scope and types of leakage occurring on Fort Sam Houston. The photographs illustrate the general condition of the water distribution system and the age of the leaks shown. These photographs have been grouped into the following five categories:

- Fire Hydrant Leaks
- Main Valve Leaks
- Main Leaks
- Service Valve Leaks
- General

NOTICE

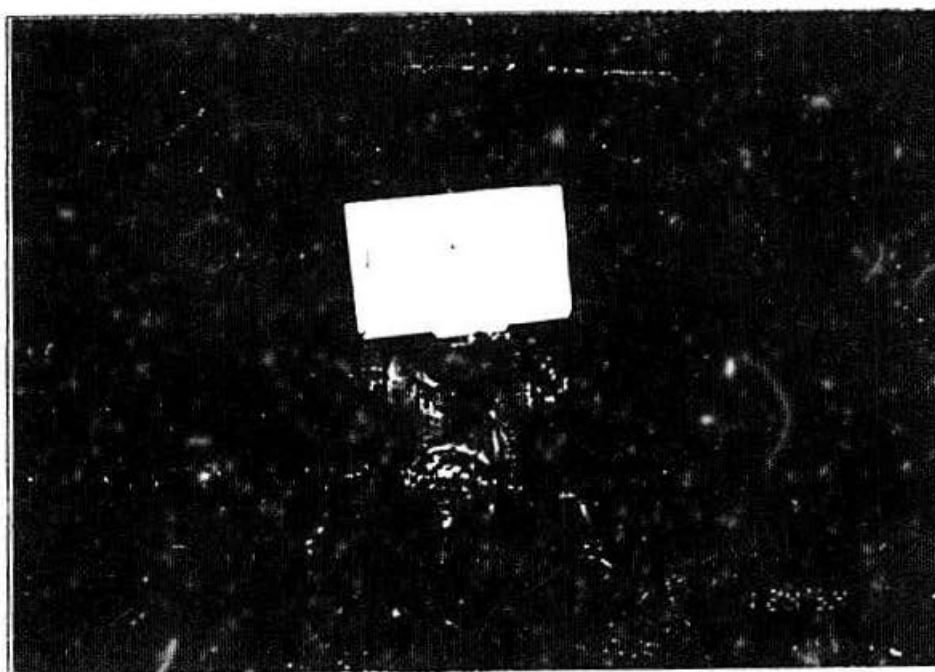
REGARDING DOCUMENT QUALITY

THE QUALITY OF THE FOLLOWING
DOCUMENTS IS SUCH THAT ALL
OR PORTIONS OF THE MICROFILMED
IMAGE MAY BE DIFFICULT TO
READ OR ILLEGIBLE.





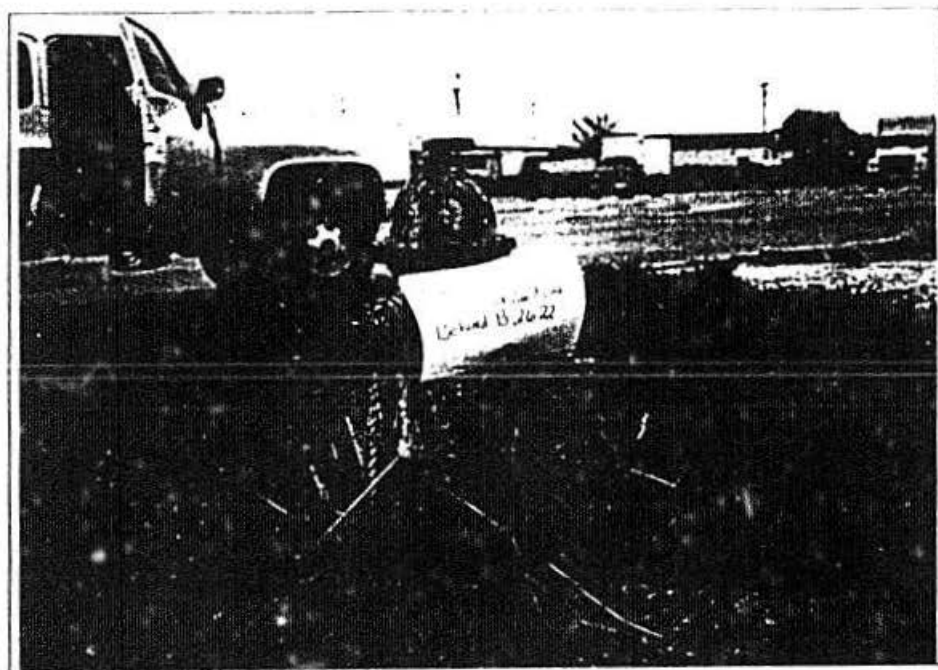
Photograph 3. Leaking fire hydrant. Note height and appearance.



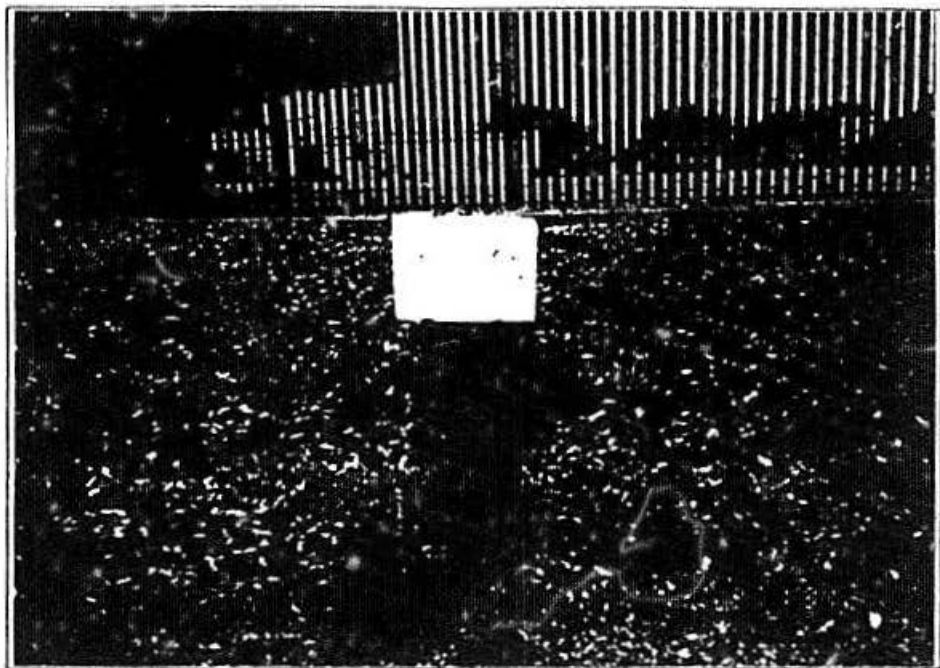
Photograph 4. Leaking fire hydrant.



Photograph 5. Fire hydrant leaking from caps and operating nut.



Photograph 6. Fire hydrant leak. Note ground cover.



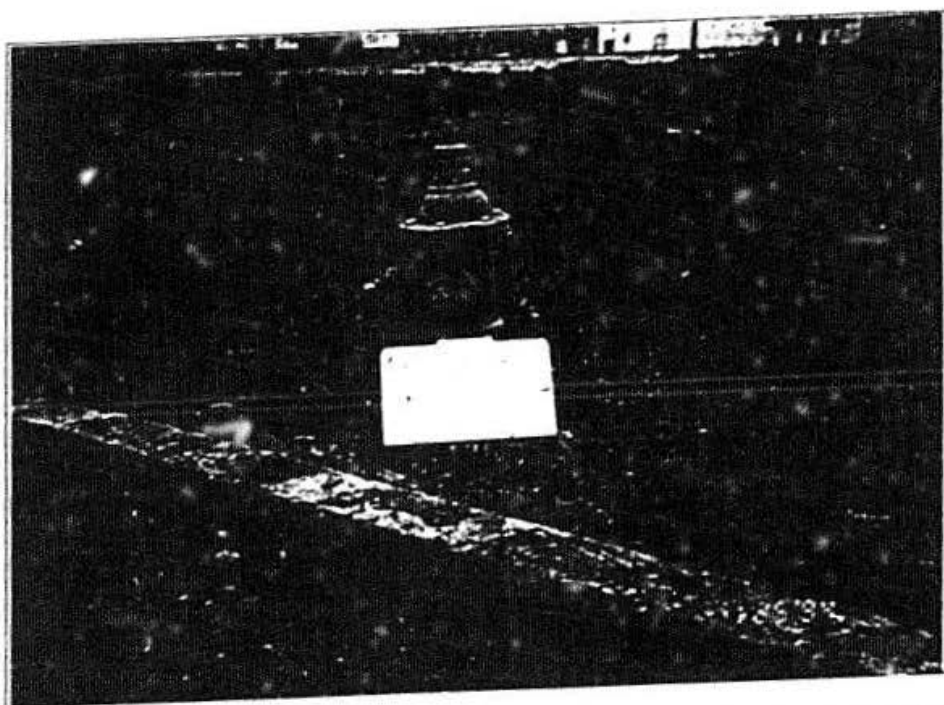
Photograph 7. Fire hydrant leak. Note scale buildup at caps.



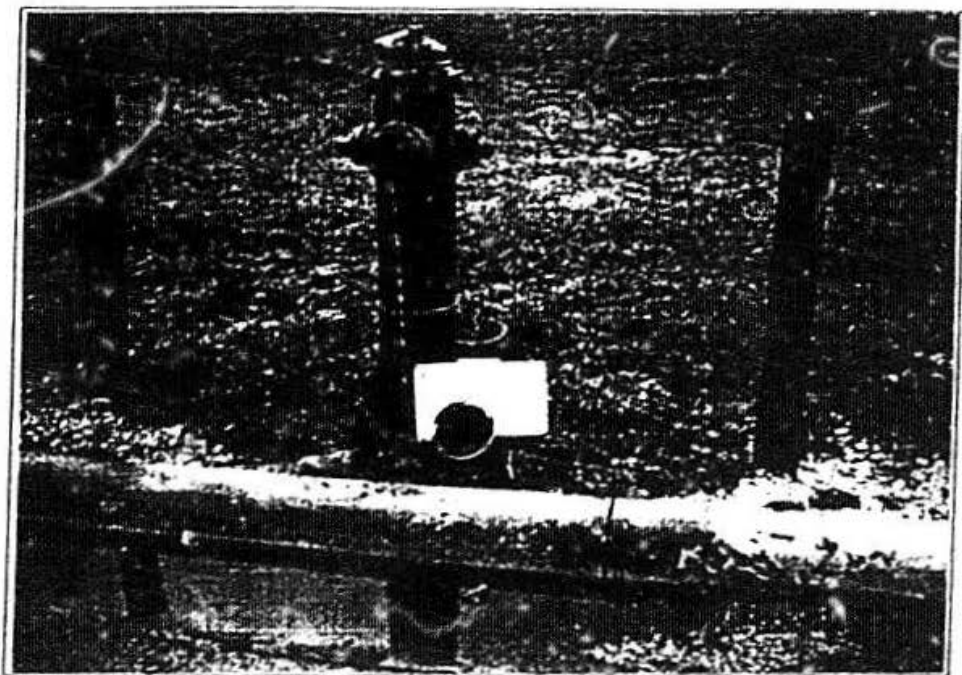
Photograph 8. Fire hydrant leak. Note ground cover and condition of hydrant.



Photograph 9. Fire hydrant 1288.



Photograph 10. Fire hydrant 1288. 1/2 to 1/4 mile from station.



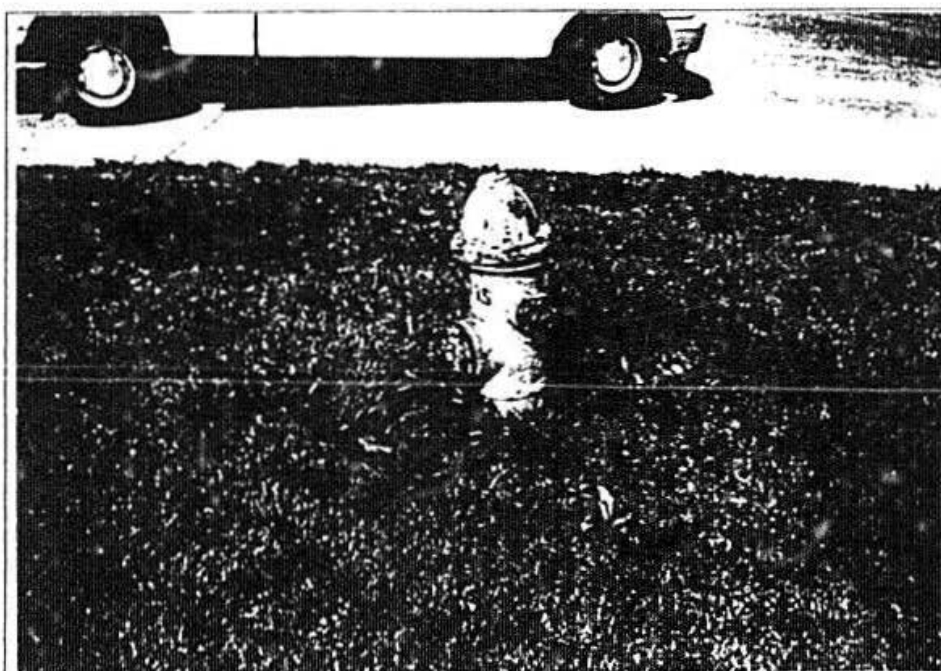
Photograph 11 Fire hydrant leak. Note missing hydrant valve [5].



Photograph 12, Fire hydrant leak.



Photograph 13. Leaking fire hydrant being repaired to reset.



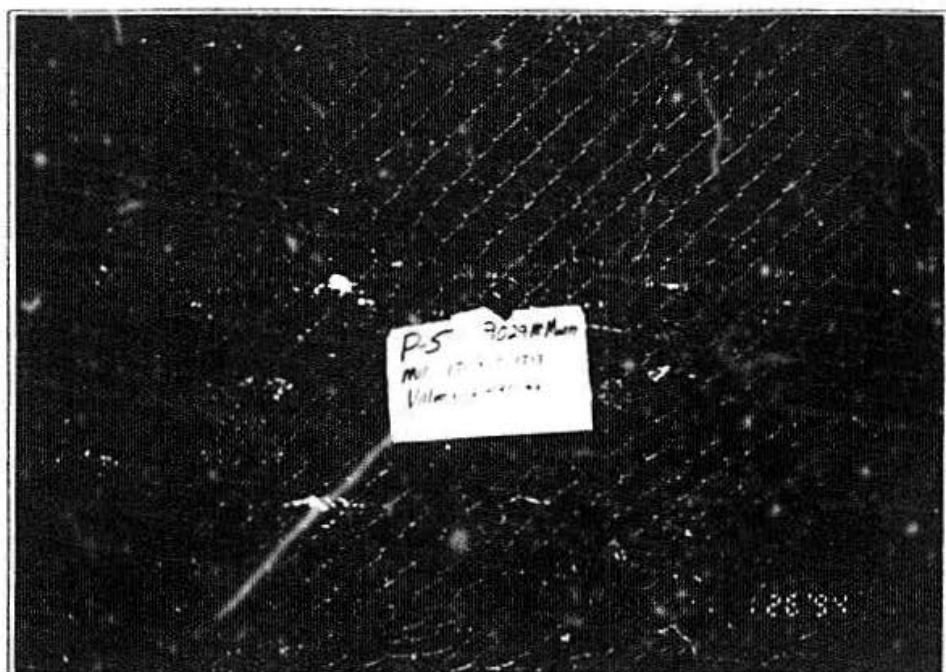
Photograph 14. Fire hydrant being reset to a new location.



Fig. 1. Field of low-lying vegetation. The sign in the foreground indicates the location of the study area.



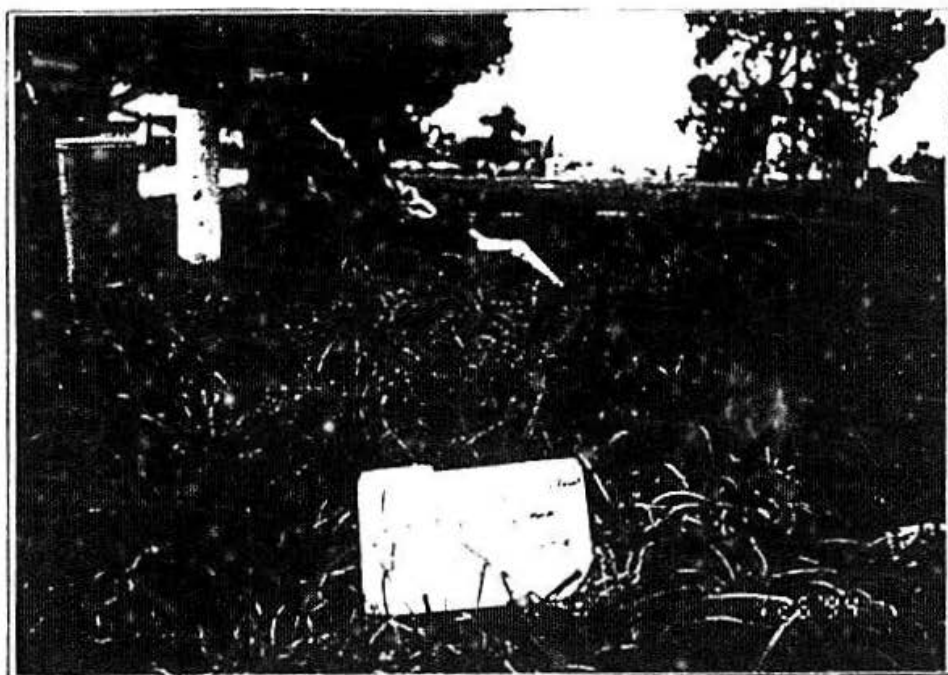
Fig. 2. Field of low-lying vegetation. The sign in the foreground indicates the location of the study area.



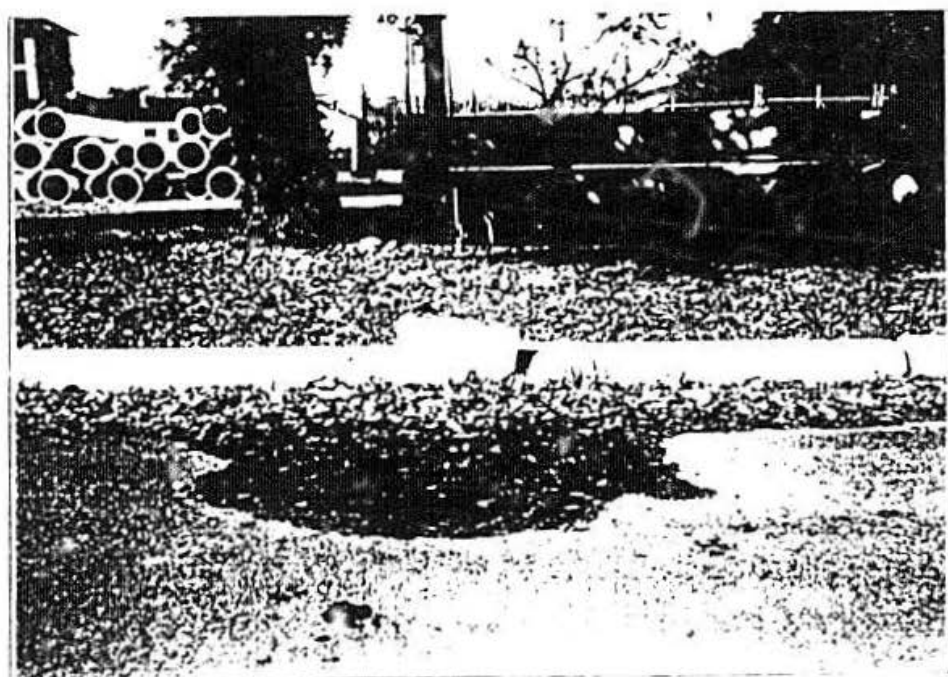
9029R Mun. Main storage tank. Note of tilted water.



9029R Mun. Main storage tank. Note of tilted water.



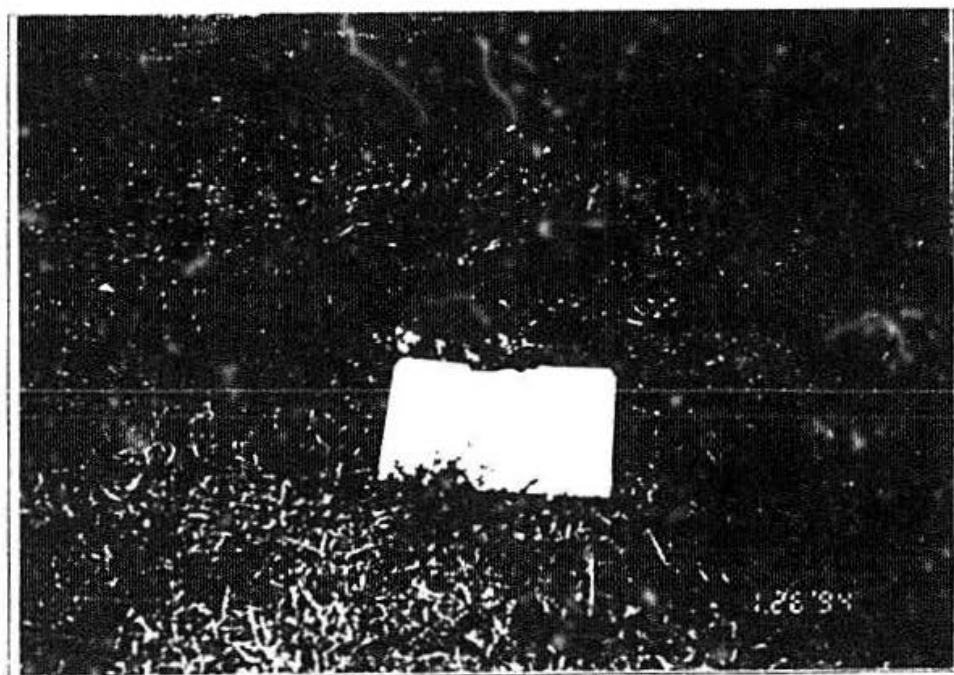
Photograph 1. Fire Hydrant Valve Look. Note fire hydrant used for irrigation without the aid of pump, in previous days.



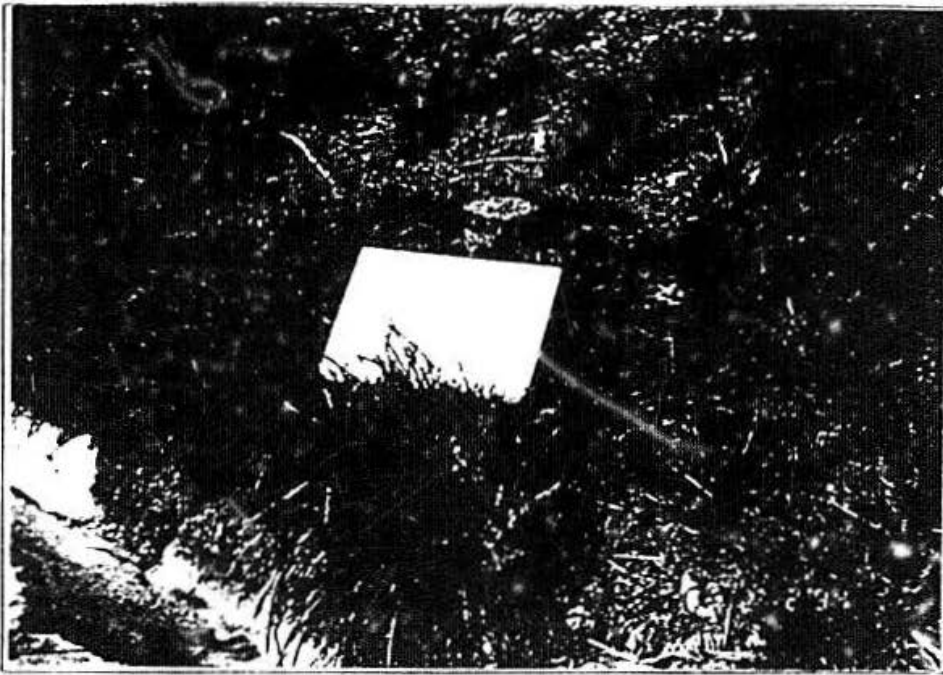
Photograph 2. Water Pit. (See page 10 for details.)



13.47 100 yds. 100 yds. 100 yds. 100 yds.



13.48 100 yds. 100 yds. 100 yds. 100 yds.



Photograph 7. Main valve to flow. Note dense growth and water flowing from the pipe.



Photograph 8. Main valve to flow.



Fig. 1. Photograph of the main valve lead in the upper.

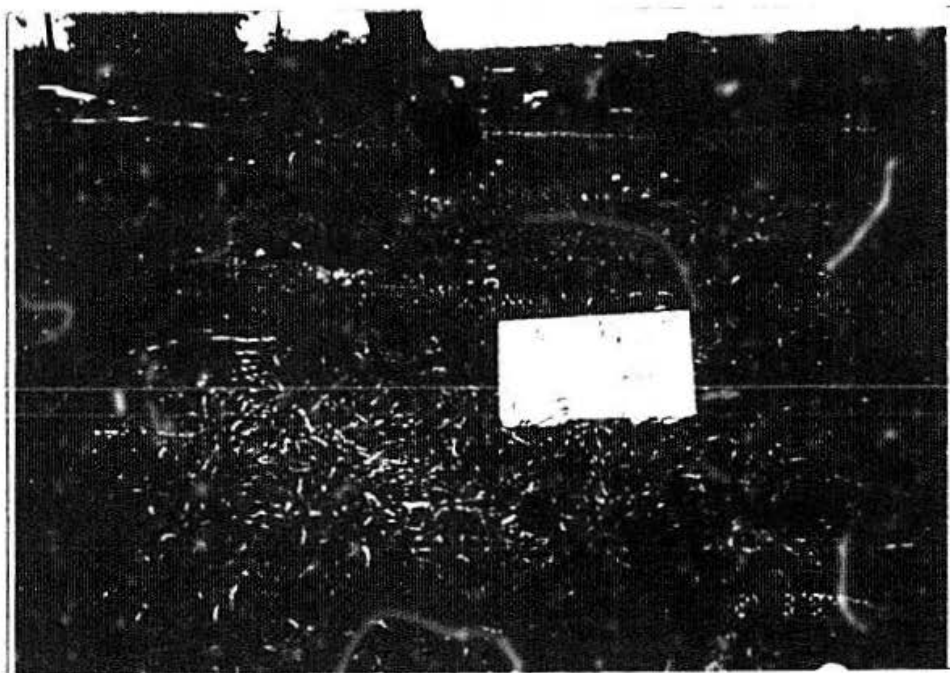
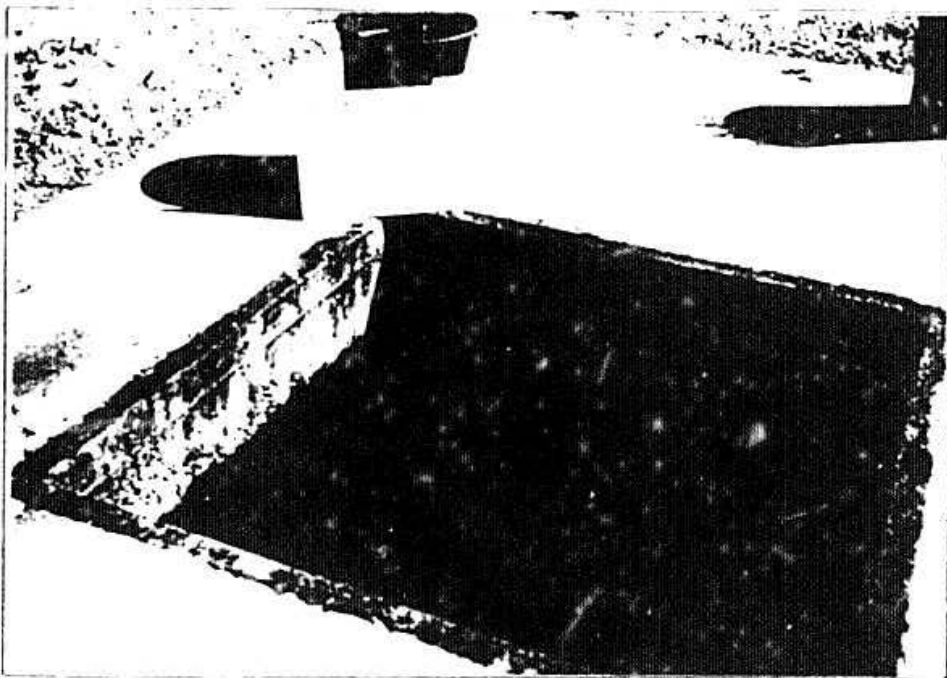
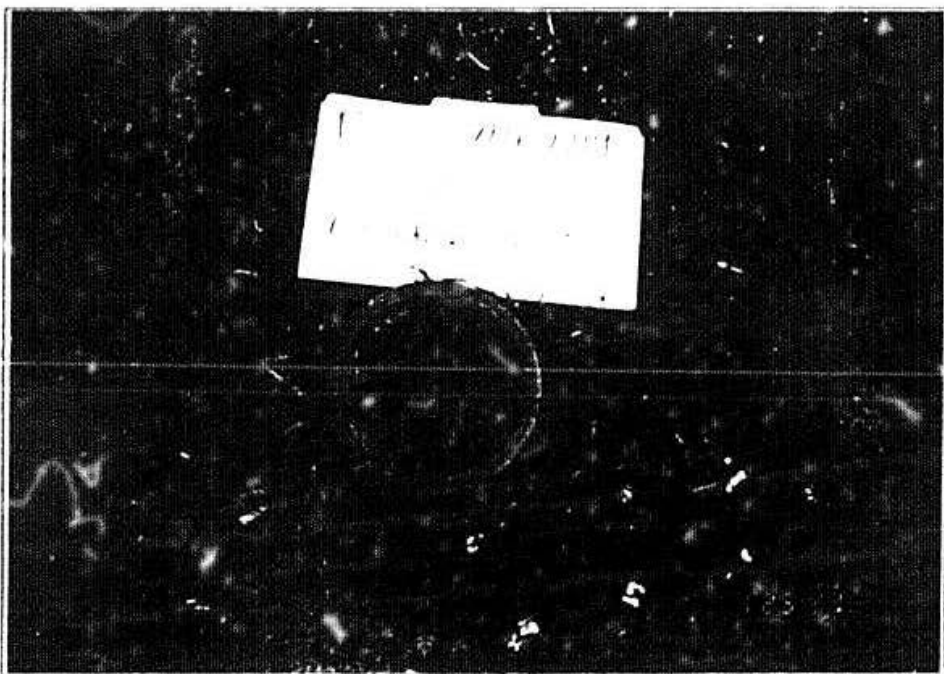


Fig. 2. Photograph of the main valve lead in the lower.



Photograph 10. Back-up look on wheel type site marker.



Photograph 11. Back-up look on wheel type site marker.

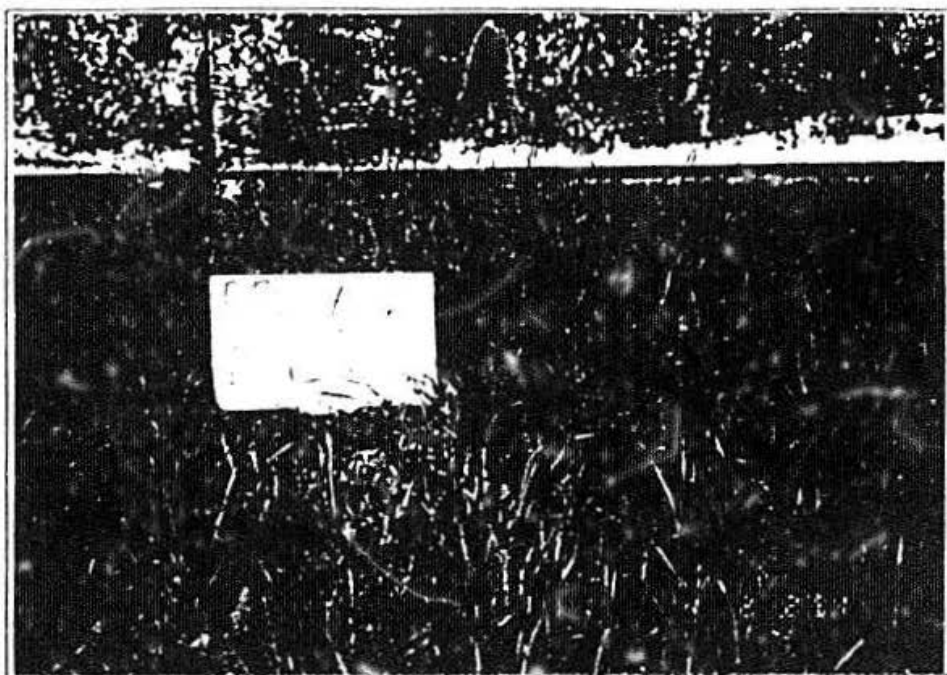
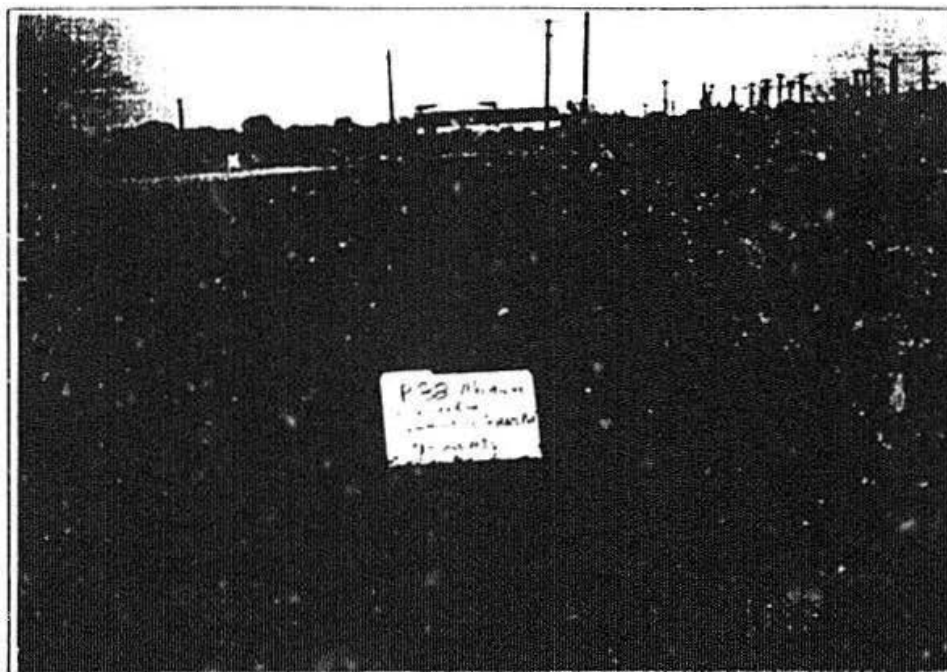


Photo graph 13. Root indicator value (ok).



Photo graph 14. Root indicator value (ok).



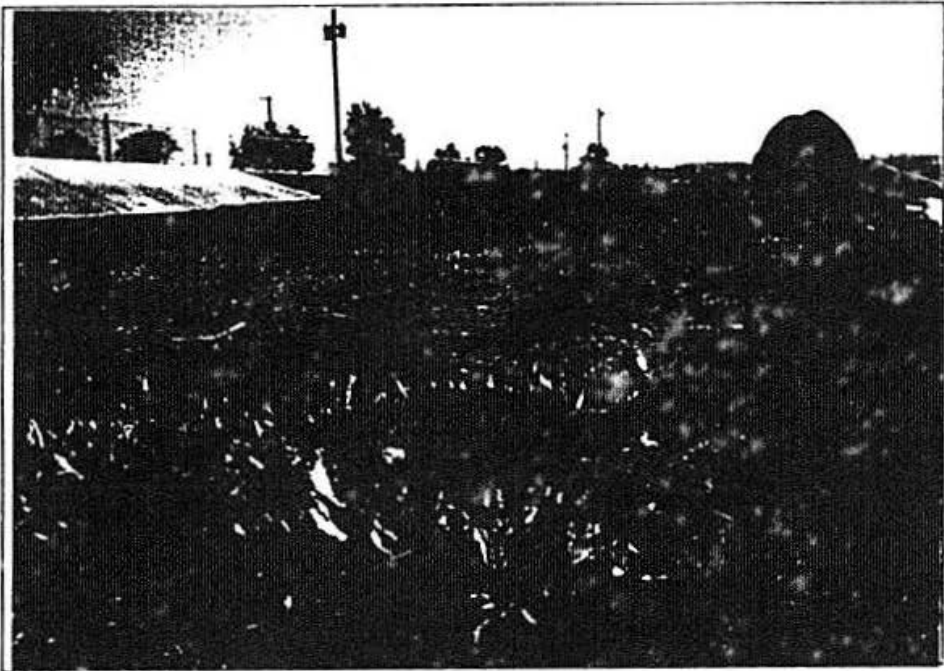
Photograph 3. Main leak.



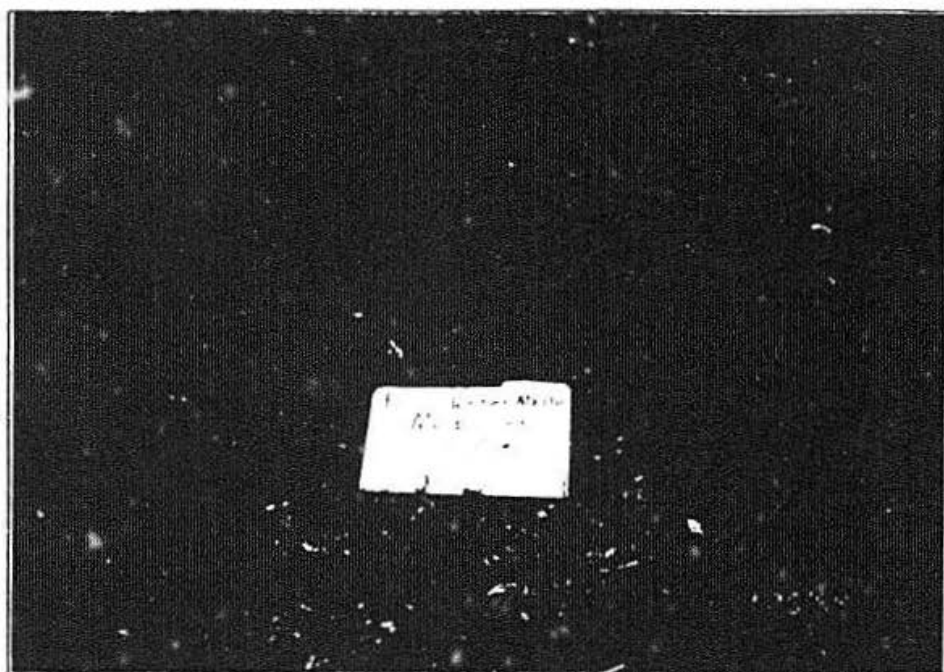
Photograph 4. Main leak with water flowing down 5th St. Road.



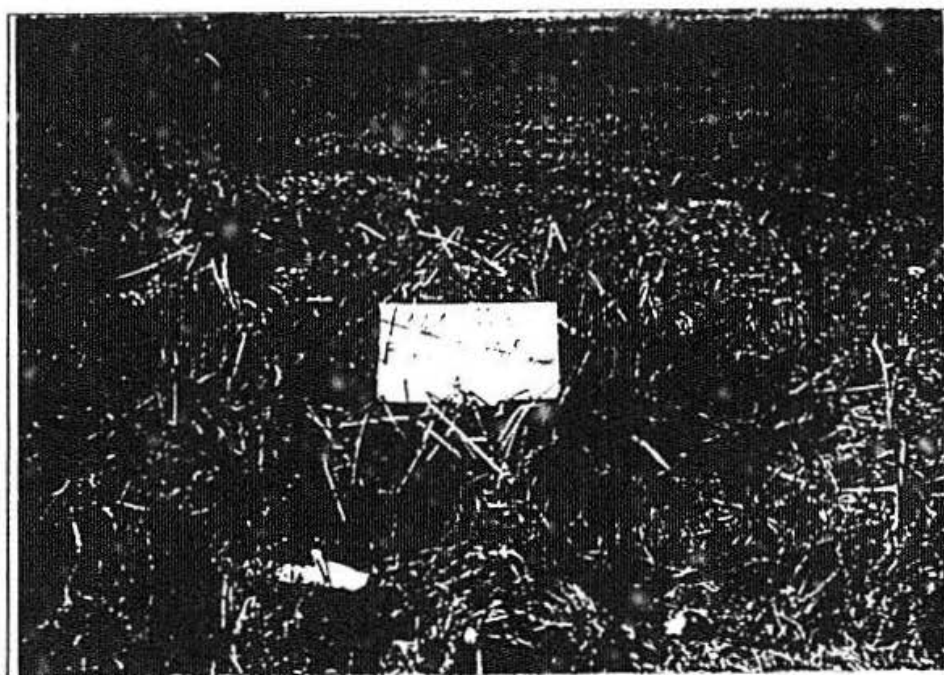
Photograph 5. Main leak. Note height and type of ground cover.



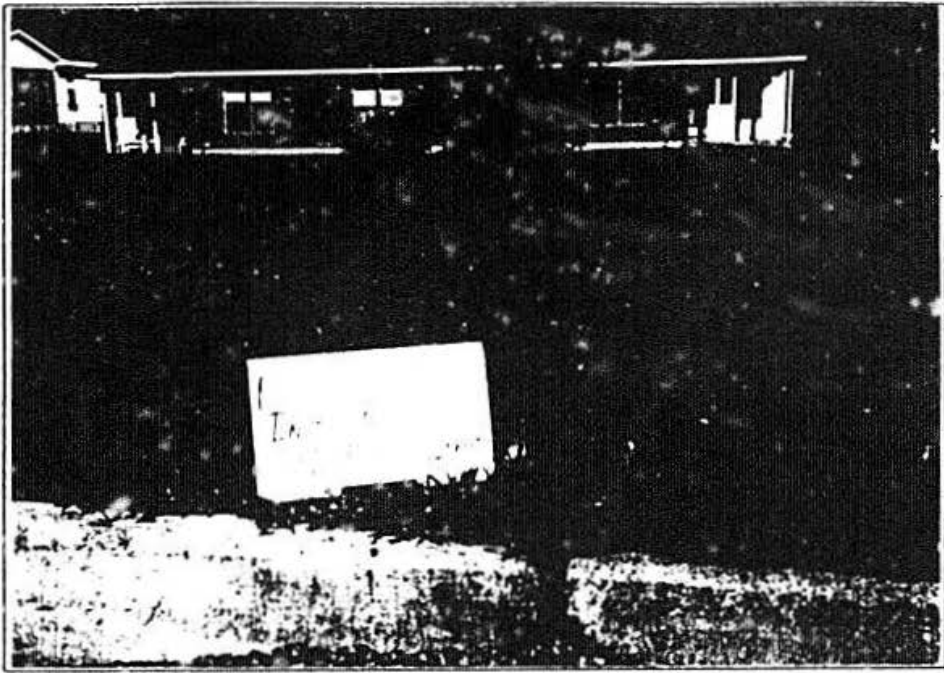
Photograph 6. Main leak. Note standing water and growth of aquatic plants.



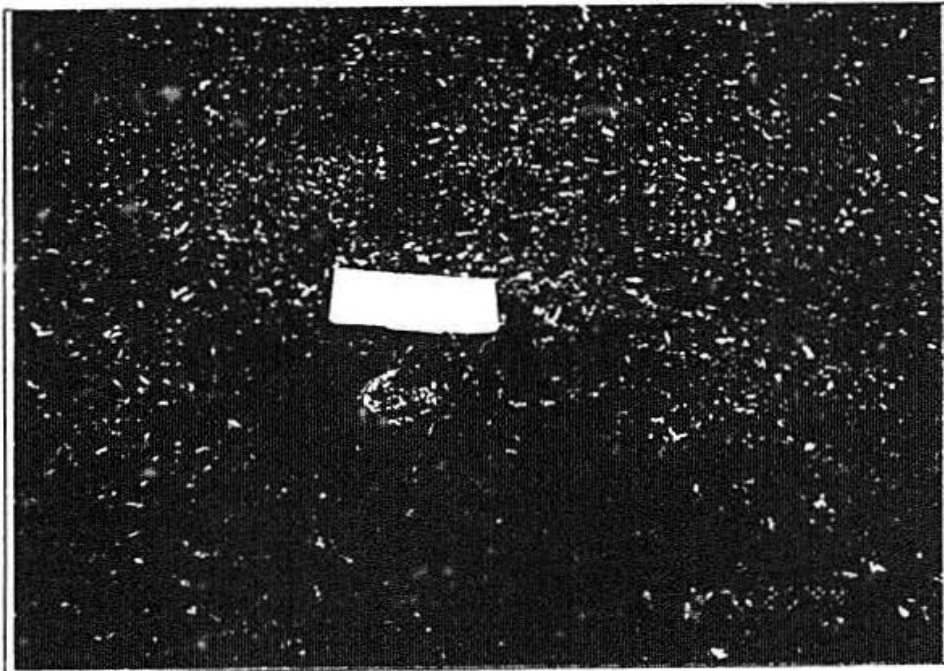
Photograph 7. Main leak.



Photograph 8. Main leak. Note type of cover.



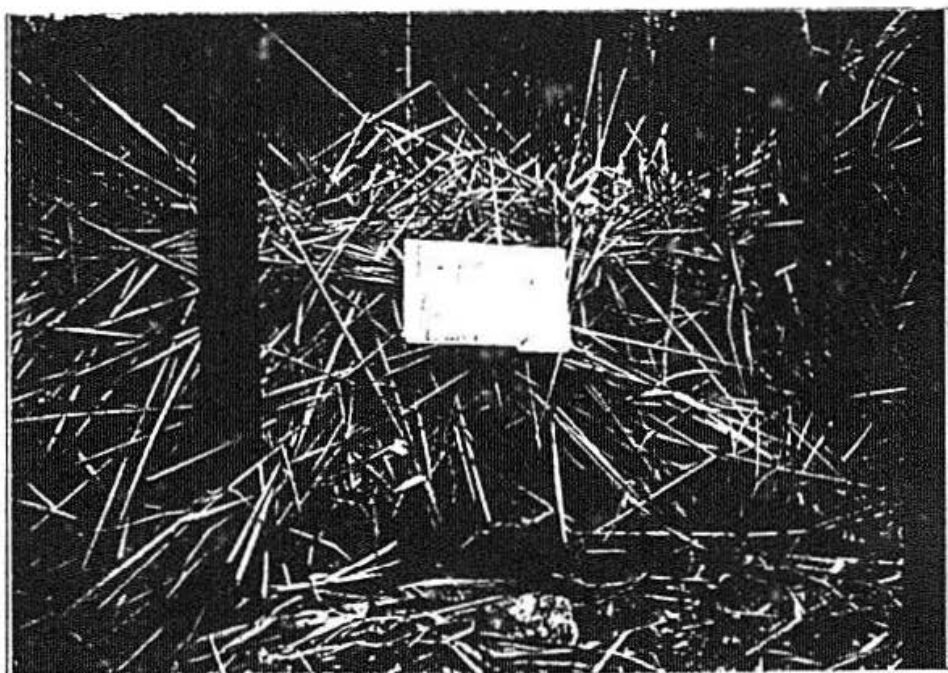
Photograph 1. Service valve leak. Note ground cover.



Photograph 2. Service valve leak. Note standing water.



Photograph 3. Service valve.



Photograph 4. Service valve look. Note ground cover.

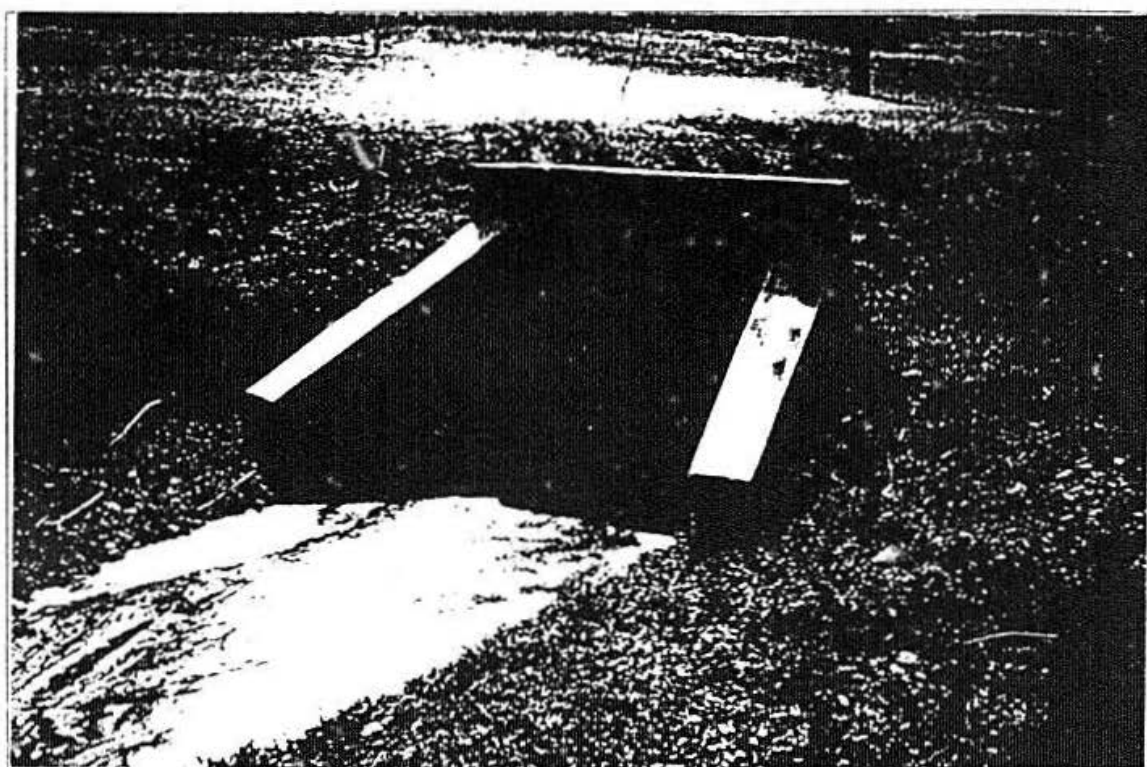


Fig. 1. View of the concrete structure from the side of the bridge.



Fig. 2. View of the concrete structure from the side of the bridge.

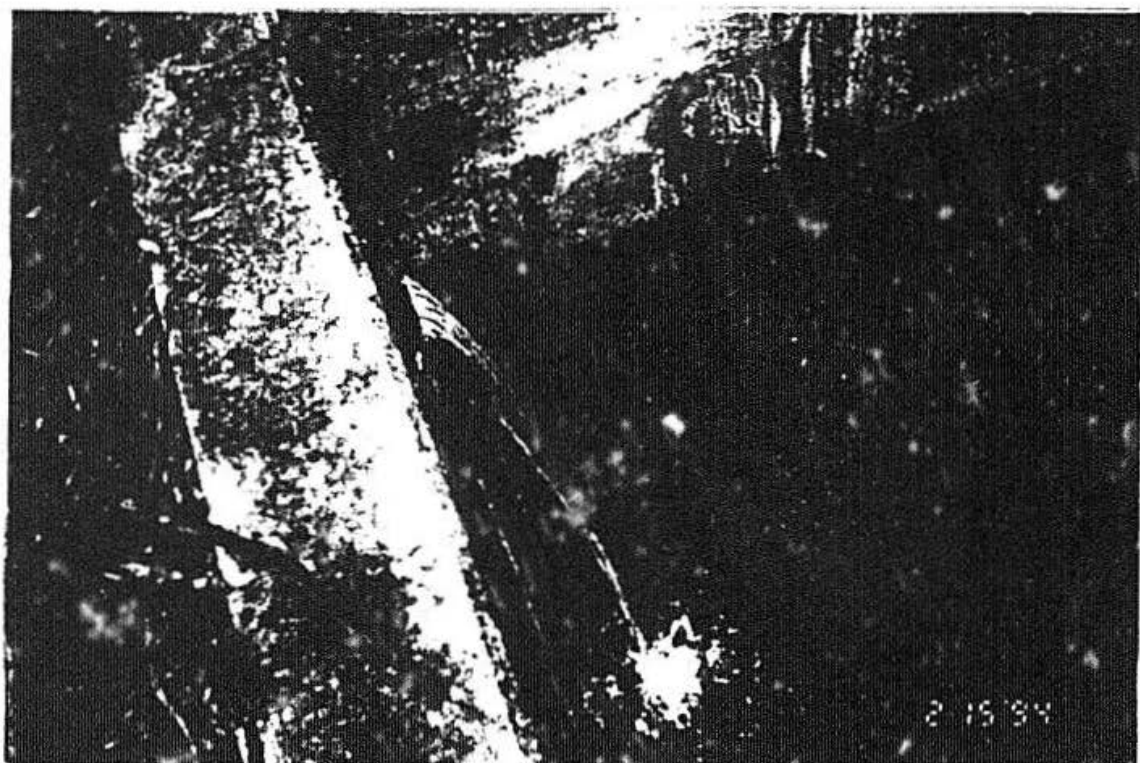


Figure 1. A close-up view of the textured surface of the rock, showing the bright, vertical light source on the left.

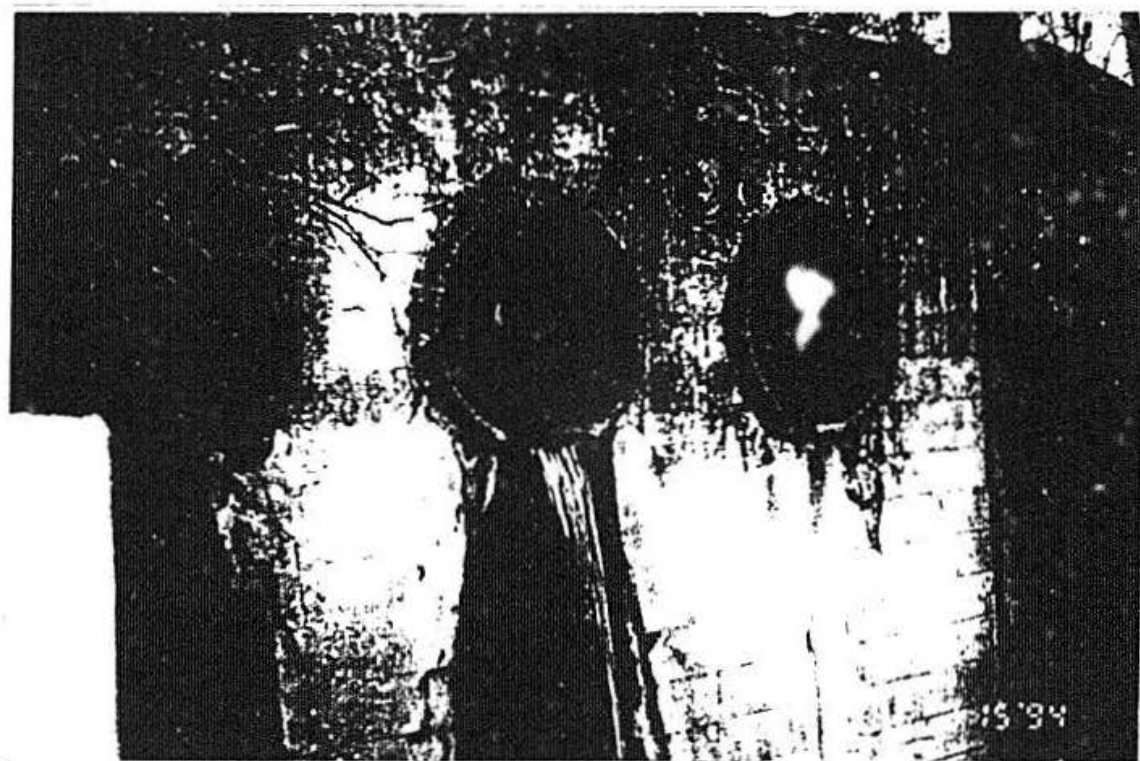


Figure 2. A close-up view of the textured surface of the rock, showing the bright, vertical light source on the left.