

PHOTODOKUMENTATION

APPENDIX 6

Sarajevo, July 1999

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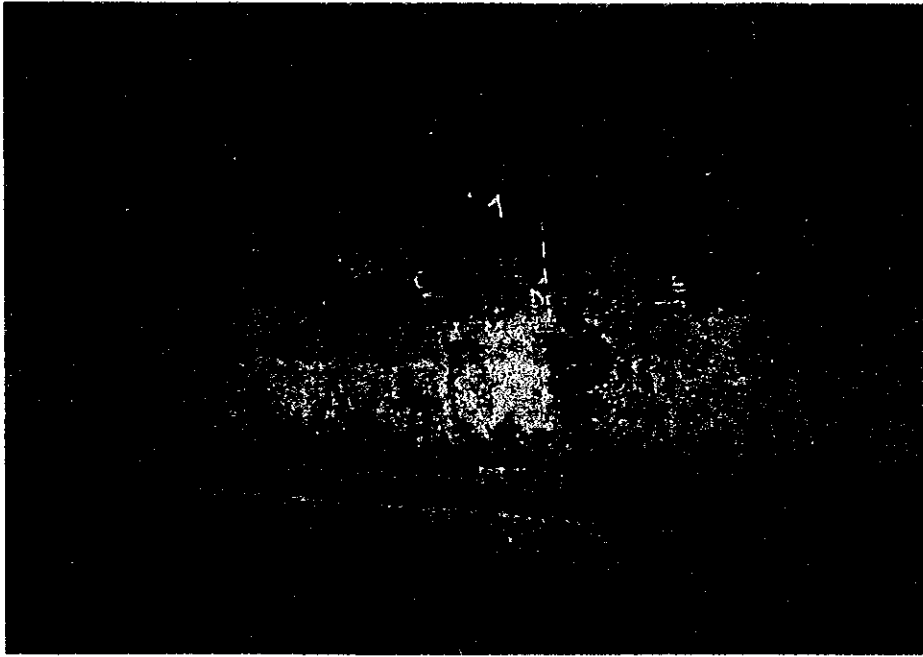


Photo 1. Damages on the wall in axis 1, structure N° 5

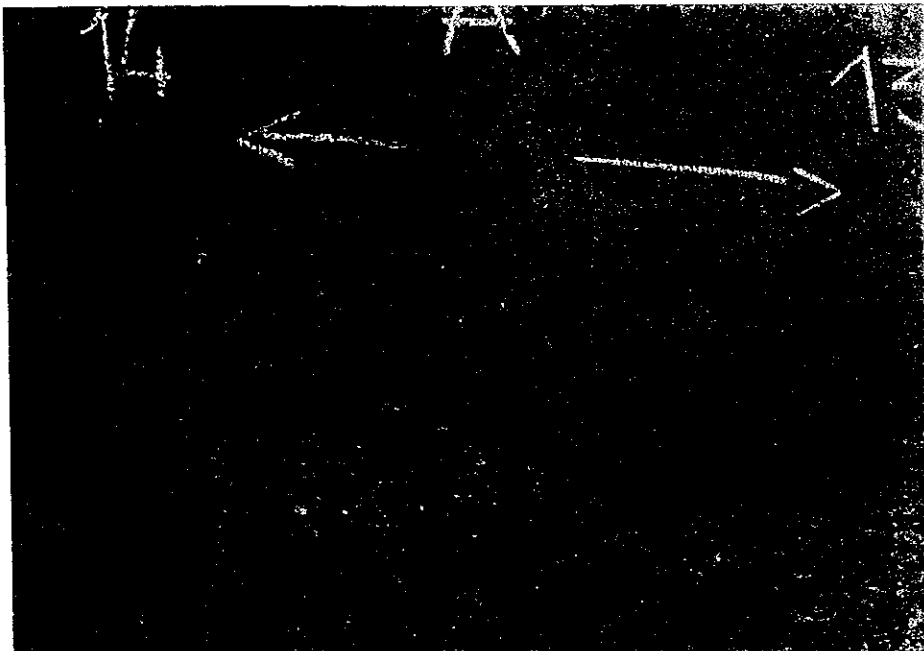


Photo 2. Damages on the wall in axis A, structure N° 5



Photo 3. Damages on the wall in axis A, structure N° 5

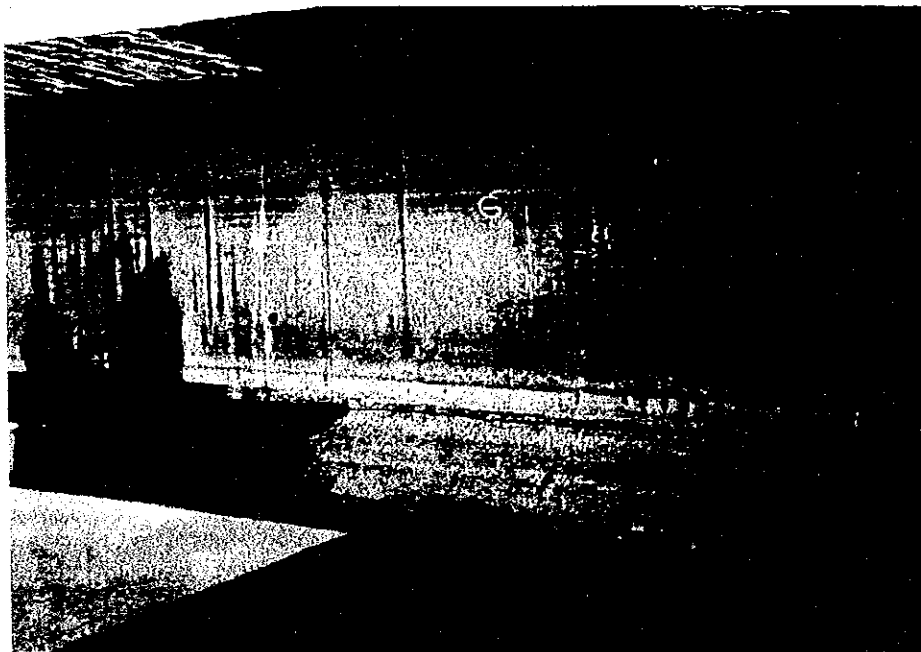


Photo 4. Damages on the wall in axis G, structure N° 5

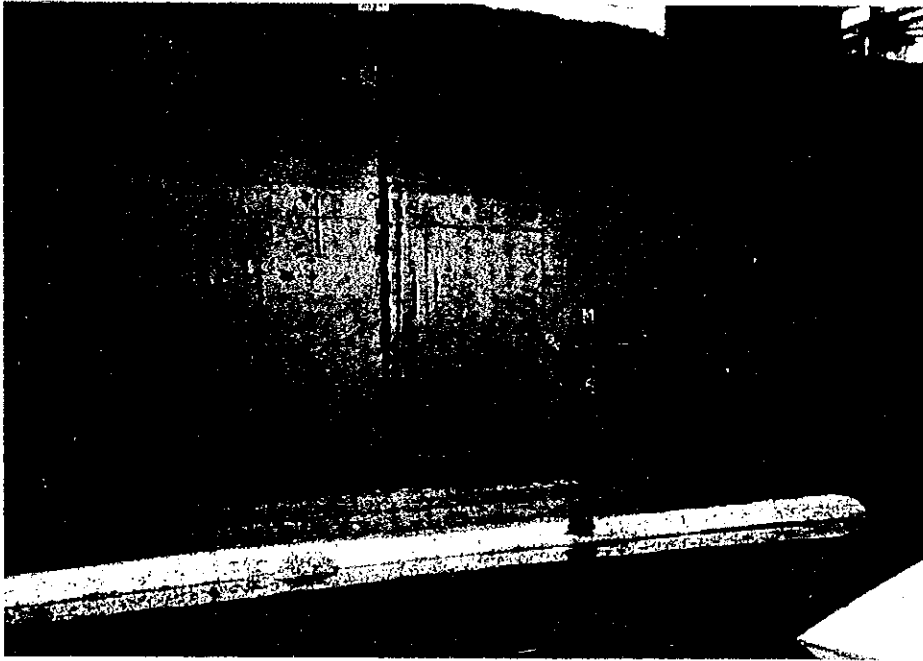


Photo 5. Damages on the wall in axis M, structure N° 5

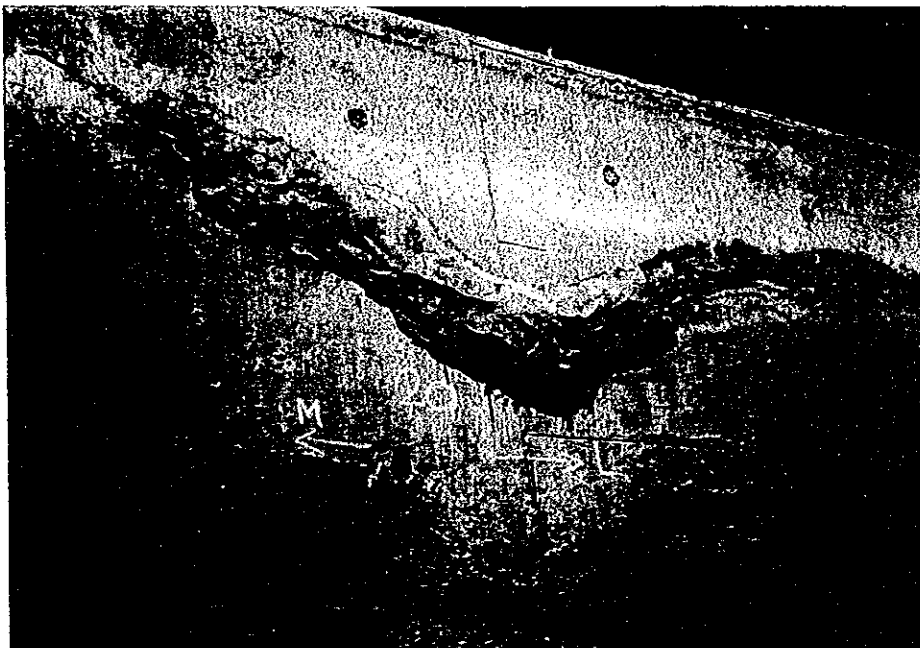


Photo 6. Wall in axis 20, structure N° 5

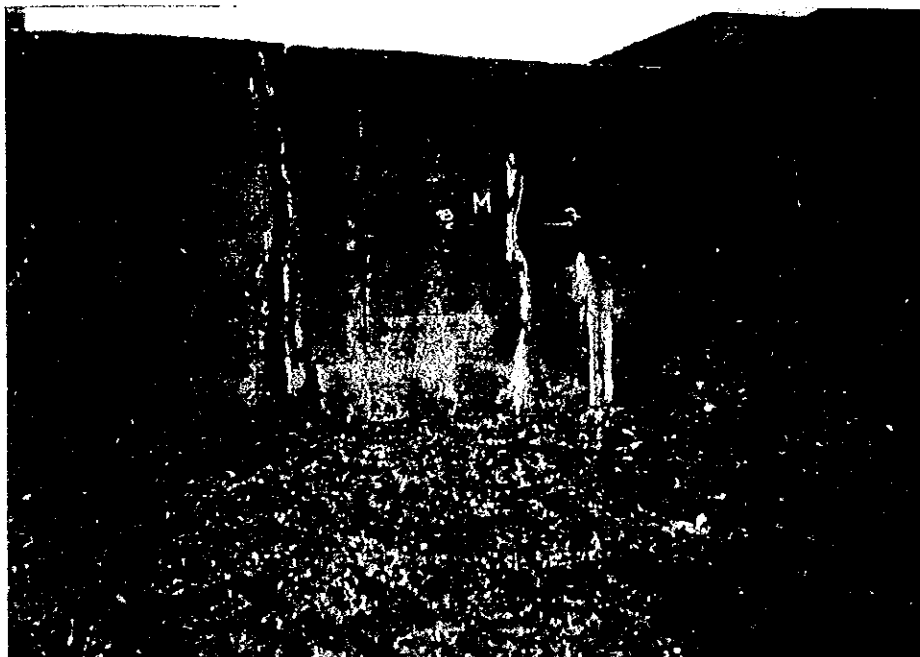


Photo 7. View from the outside on the wall in axis M, structure N° 5

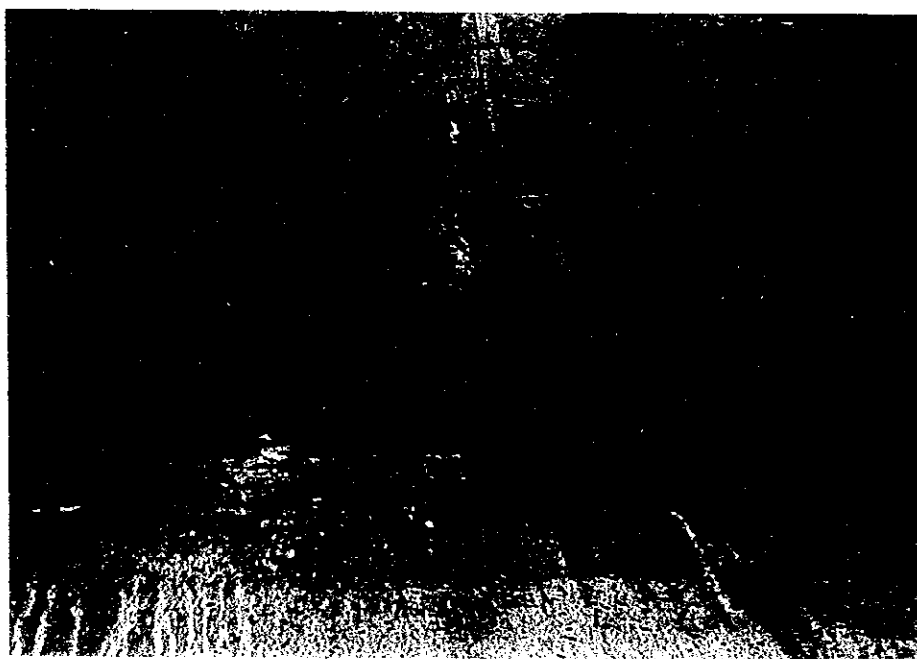


Photo 8. Detail of the wall in axis 2, structure N° 3

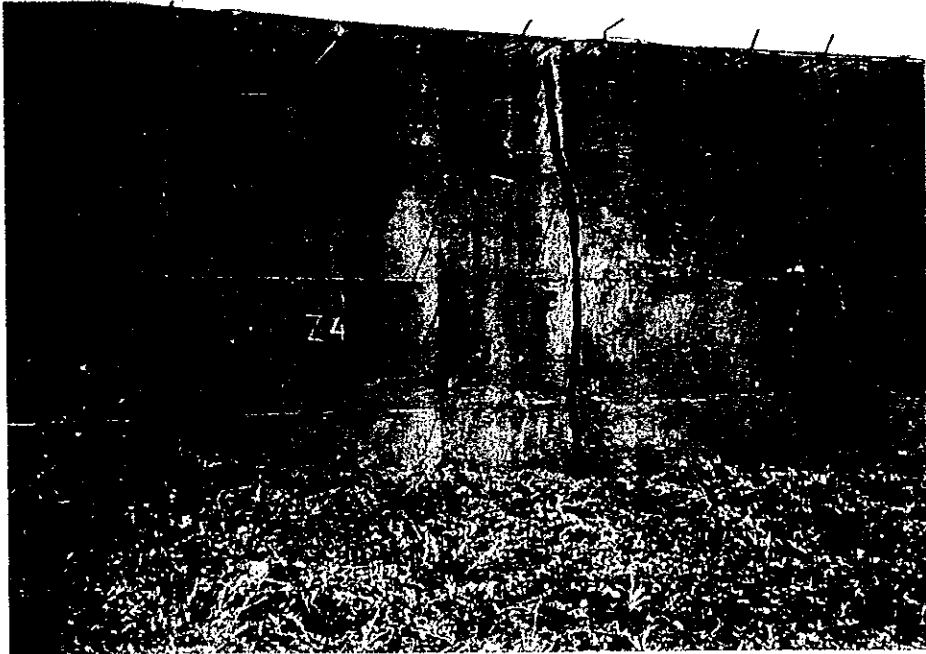


Photo 9. View from the outside on the wall in axis 4, structure N° 3

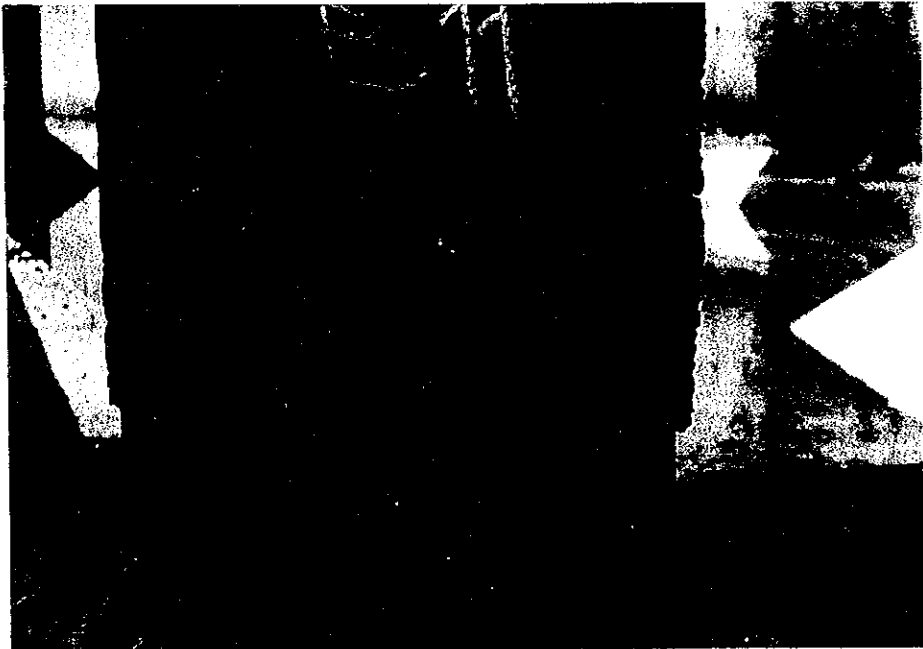


Photo 10. Detail of the column B11 in the bottom, structure N° 5

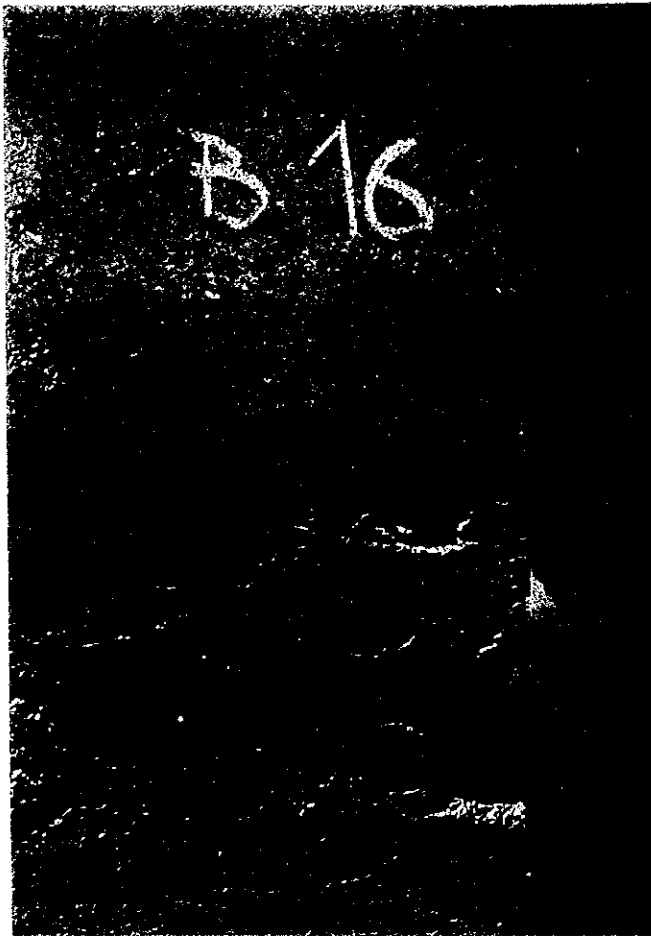


Photo 11. Detail of the column B16 in the bottom, structure N° 5

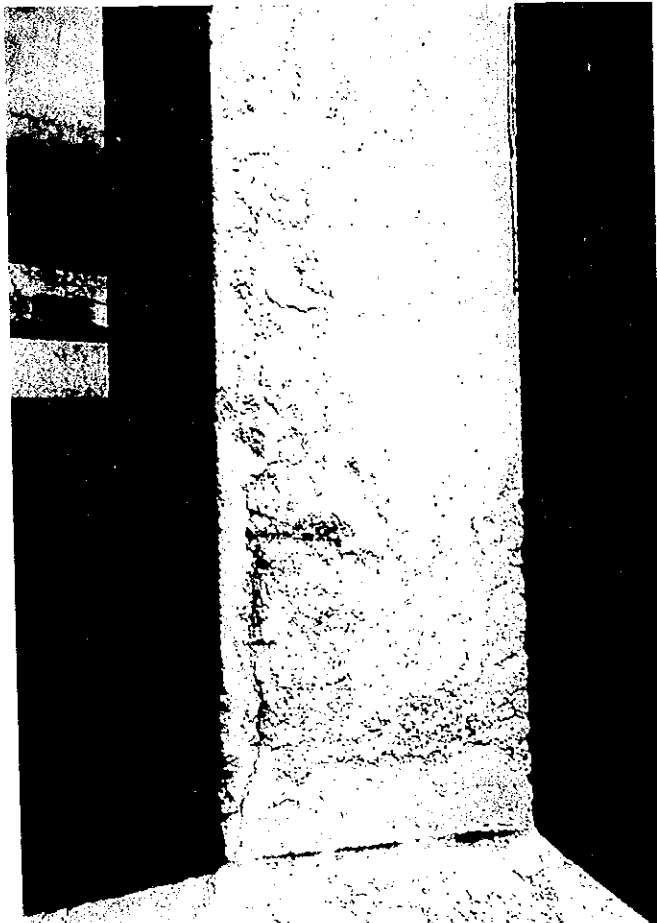


Photo 12. Detail of the column B18 in the bottom, structure N° 5



Photo 13. Detail of the column C18 in the bottom, structure N° 5

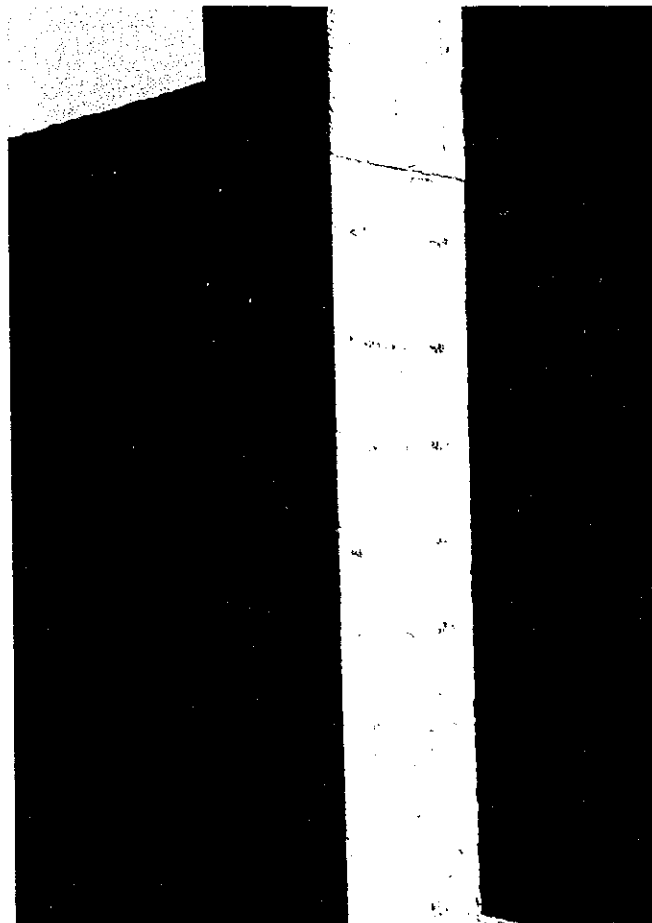


Photo 14. View on the column E10, structure N° 5
F - 59

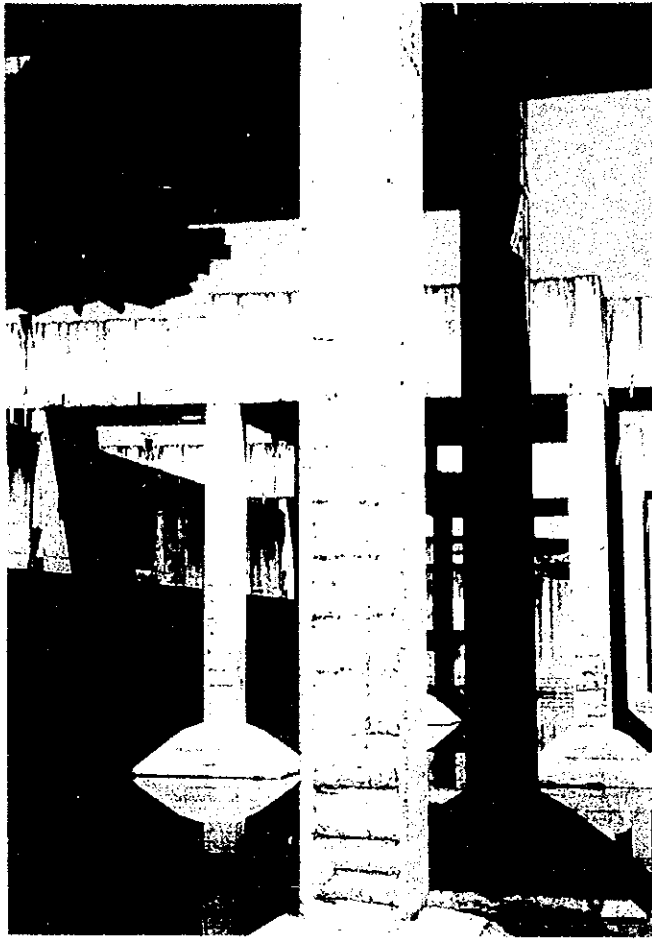


Photo 15. View on the column E12, structure N° 5

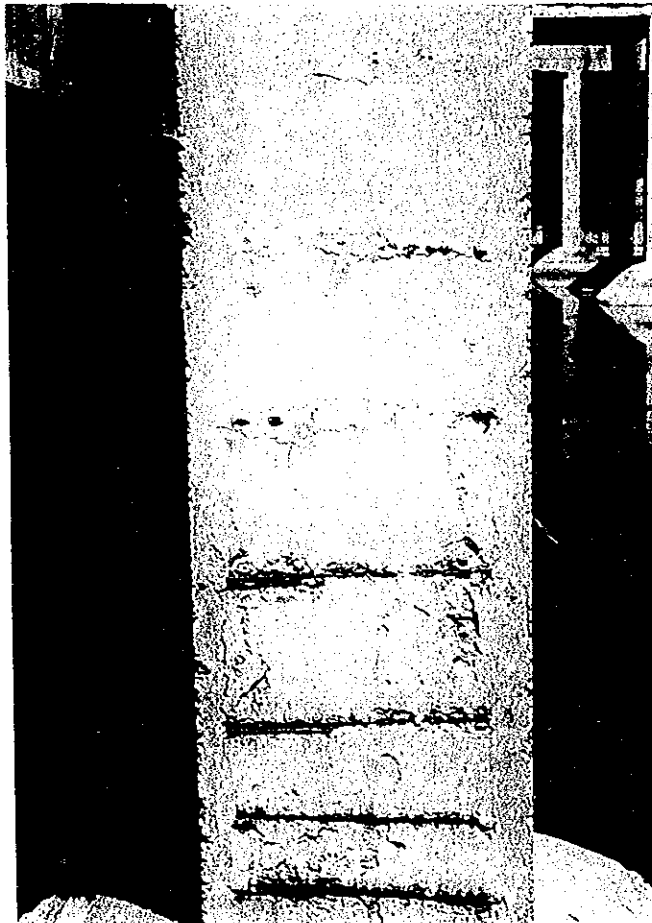


Photo 16. Detail of the column F12, structure N° 5



Photo 17. View on the column F16, structure N° 5

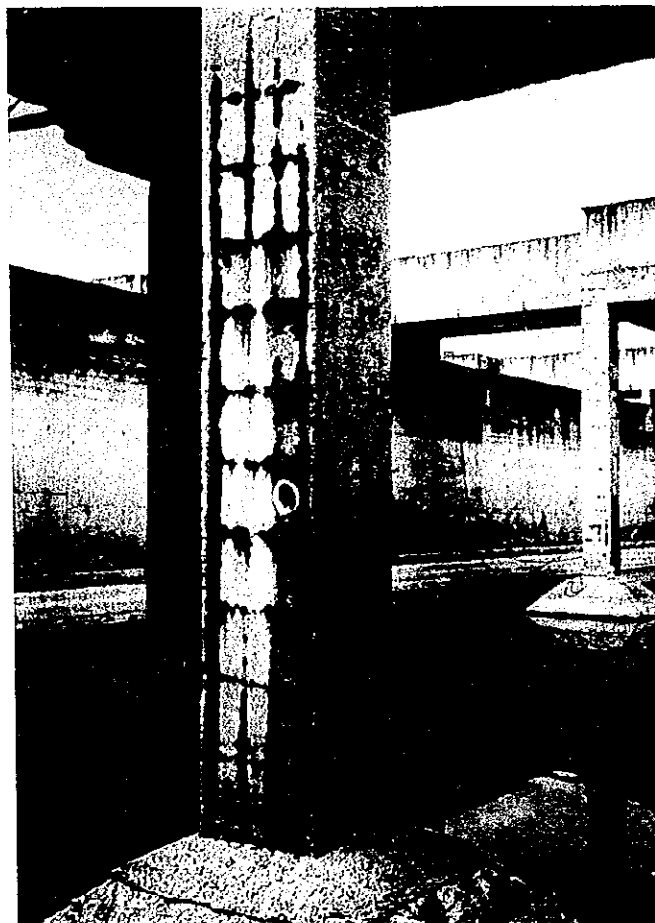


Photo 18. View on the column H10, structure N° 5
F - 61

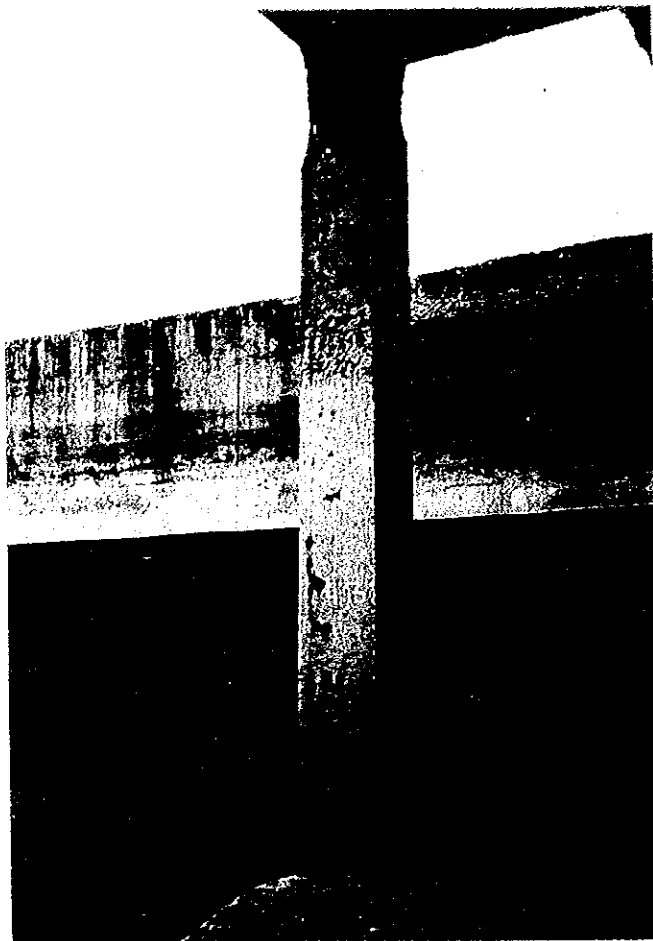


Photo 19. View on the column H13, structure N° 5

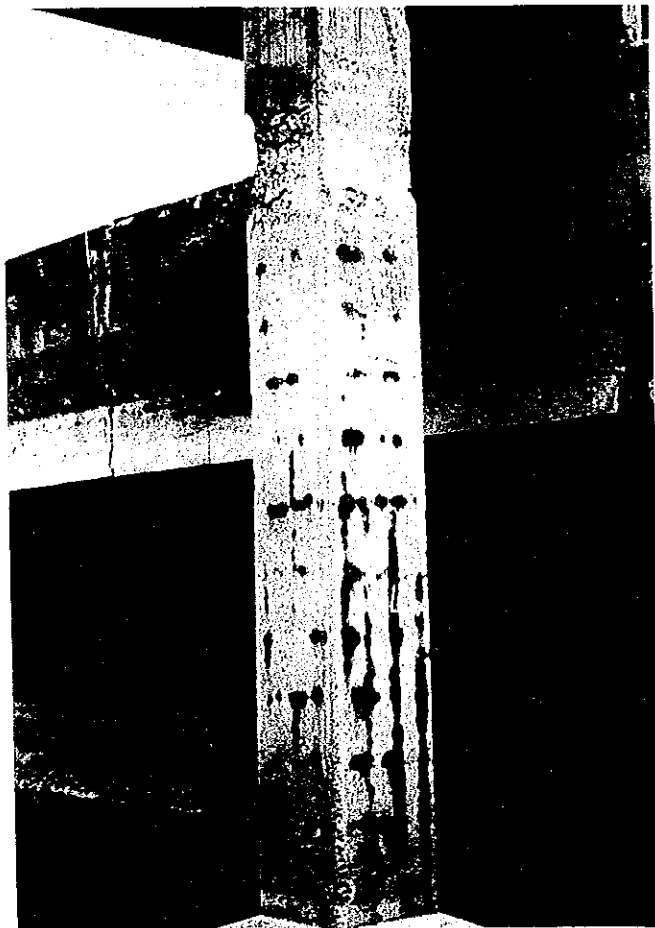


Photo 20. View on the column H14, structure N° 5

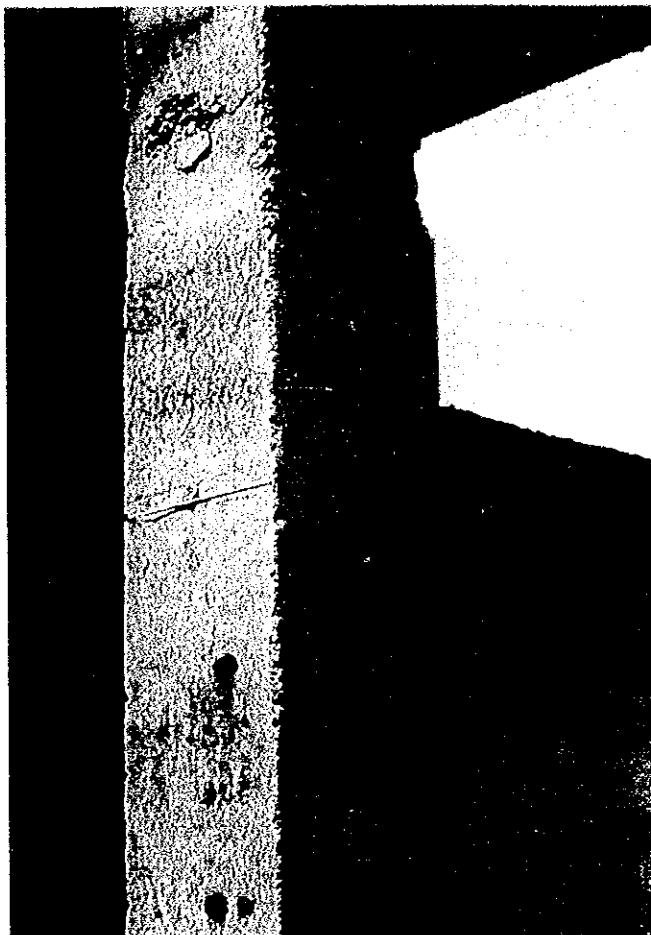


Photo 21. Detail of the column I12, structure N° 5

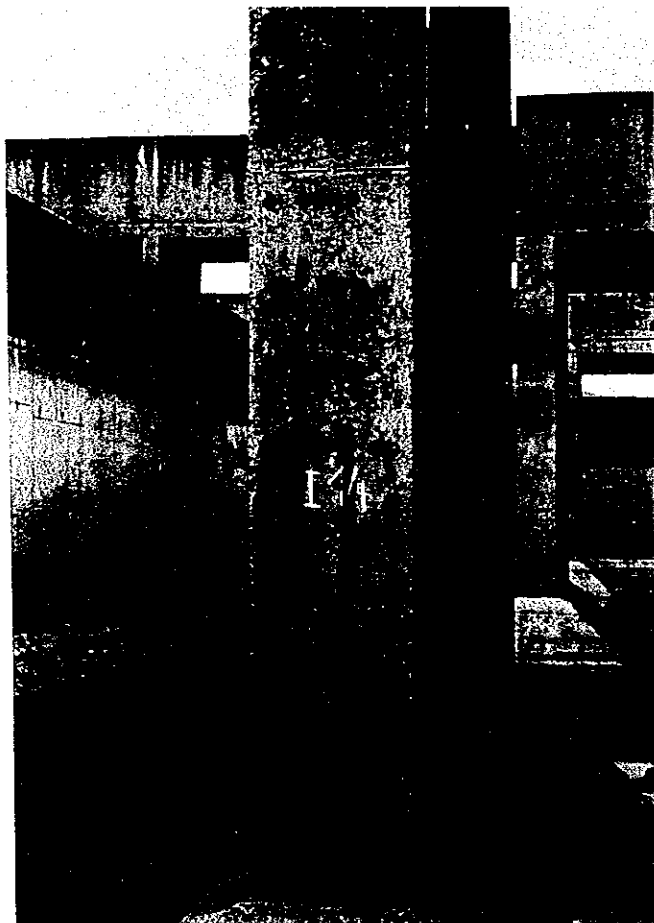


Photo 22. View on the column I14, structure N° 5

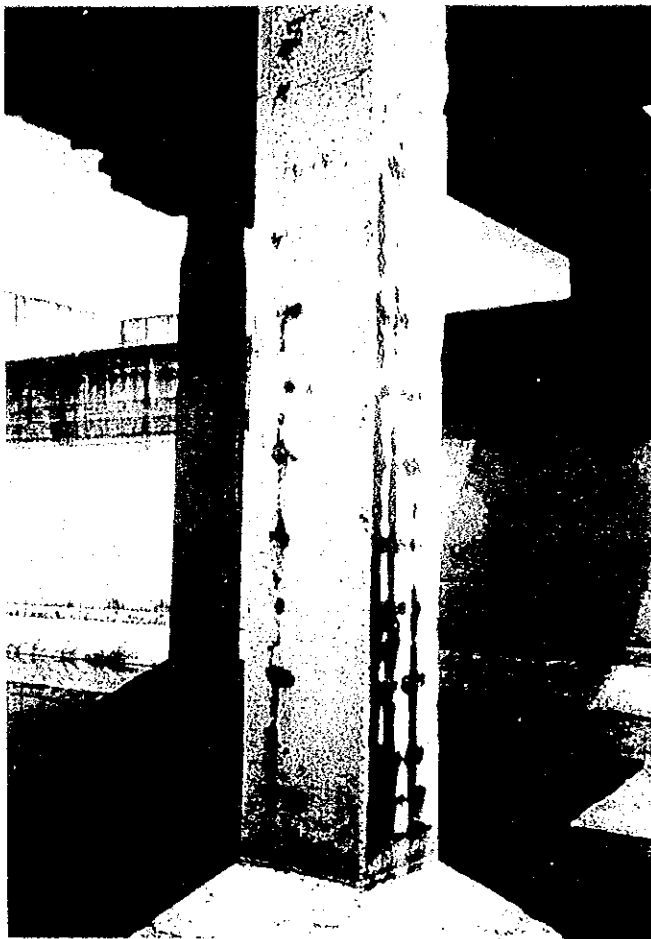


Photo 23. View on the column L14, structure N° 5

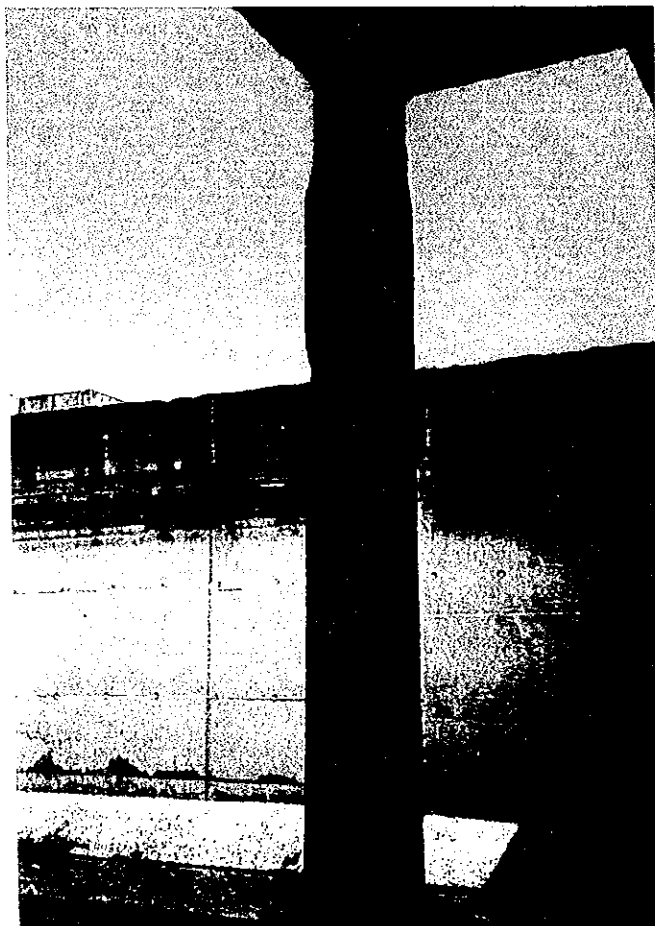


Photo 24. View on the column K15, structure N° 5

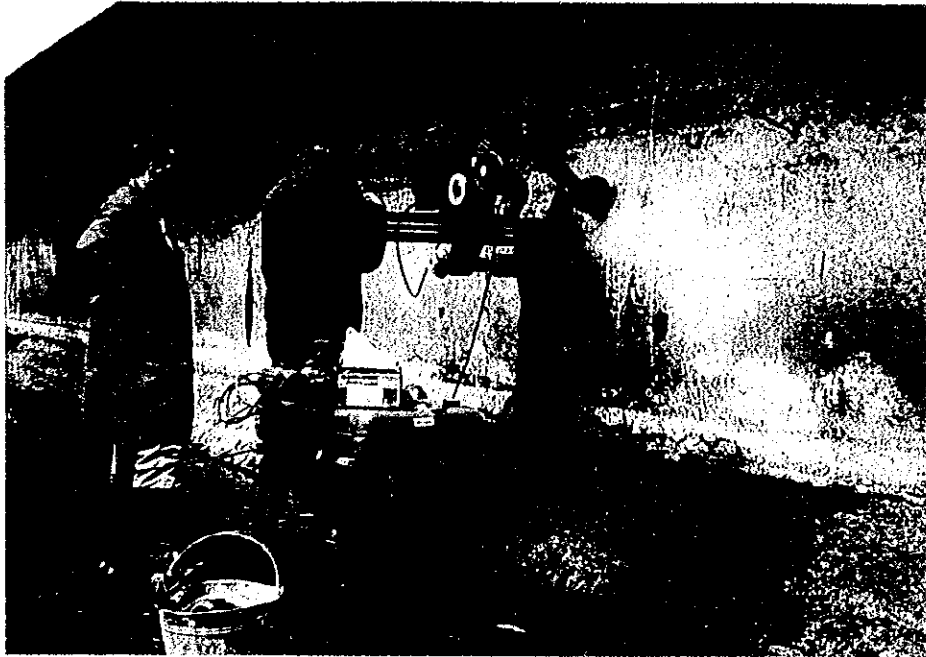


Photo 25. Extraction of the concrete specimen Z29



Photo 26. Extraction of the reinforcement specimen A4

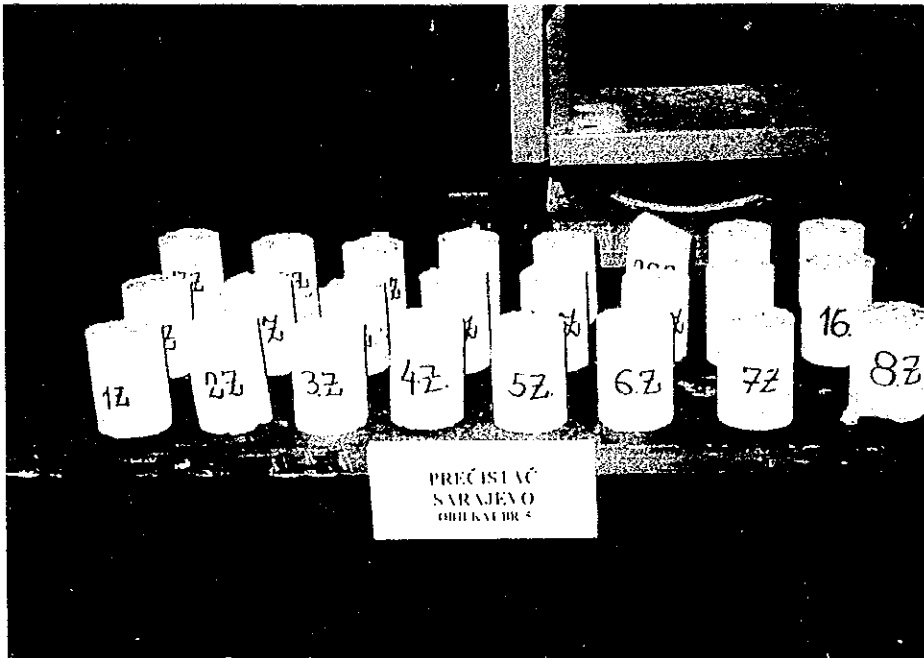


Photo 27. Concrete specimens from the outside wall before testing, structure N° 5

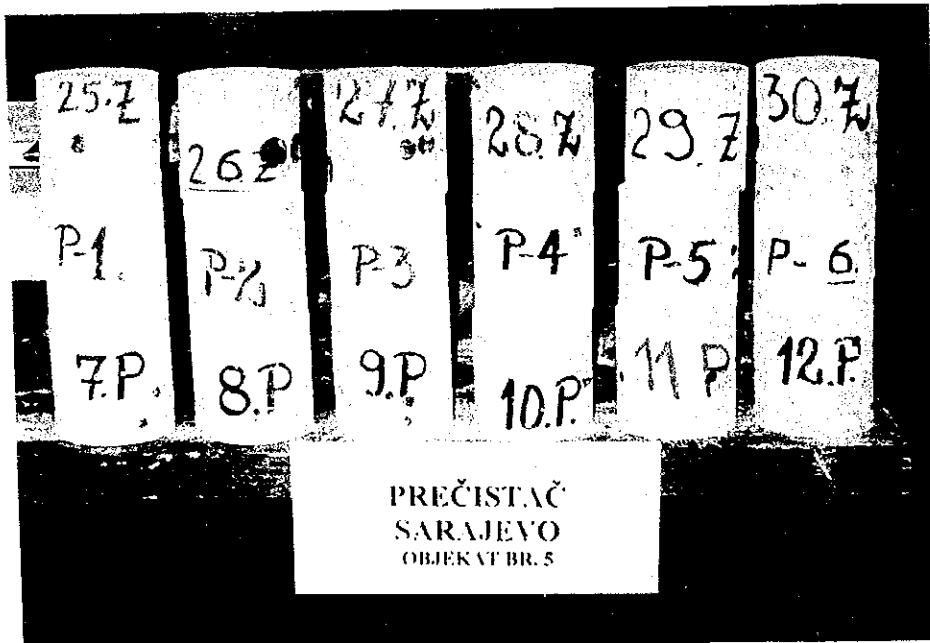


Photo 28. Concrete specimens from the wall in axis G and from the bottom plate before testing, structure N° 5

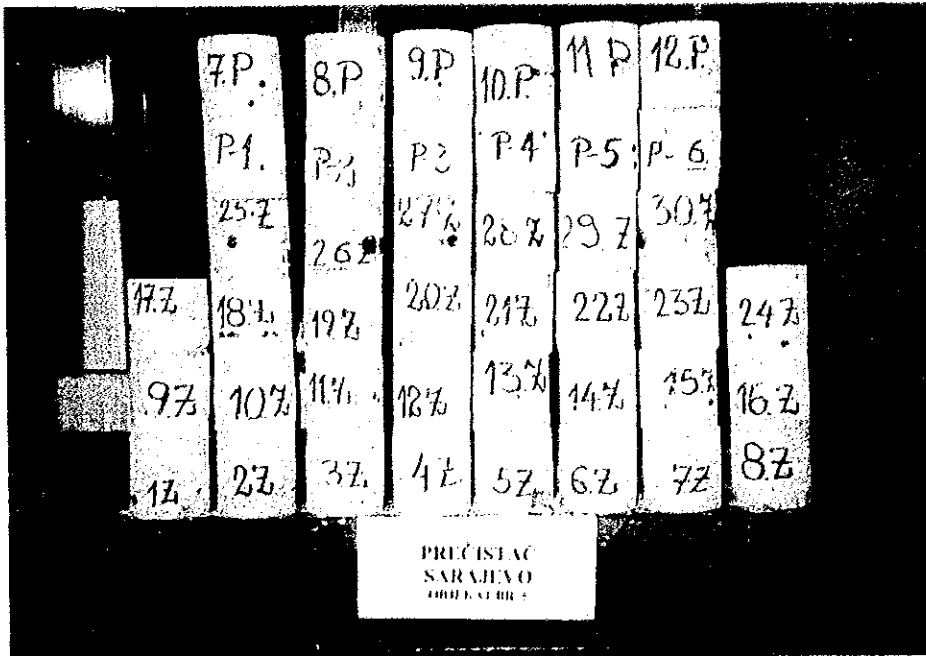


Photo 29. Concrete specimens from the structure N° 5 after testing

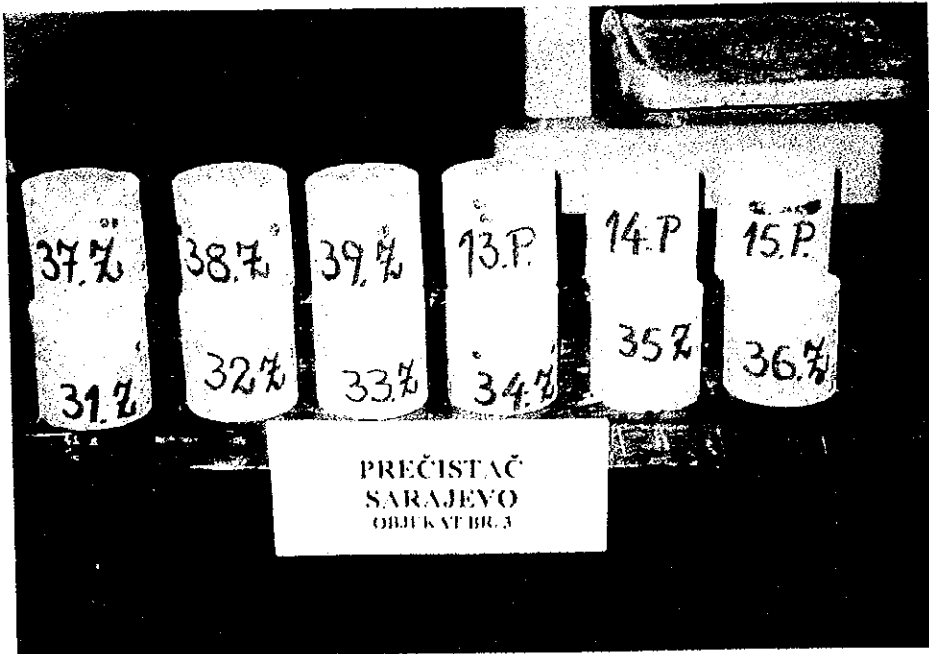


Photo 30. Concrete specimens from the structure N° 3 before testing

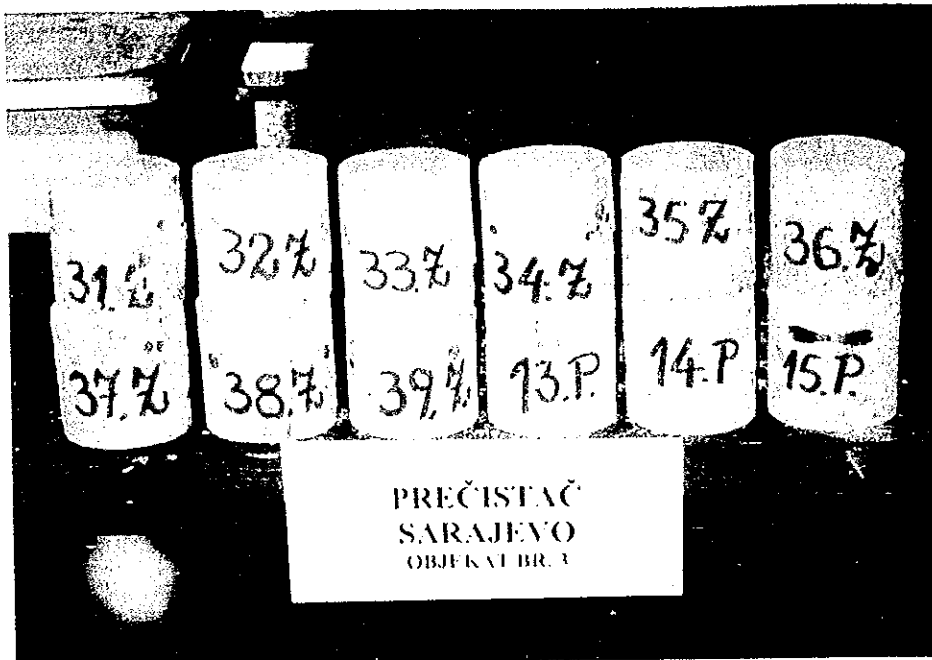


Photo 31. Concrete specimens from the structure N° 3 after testing

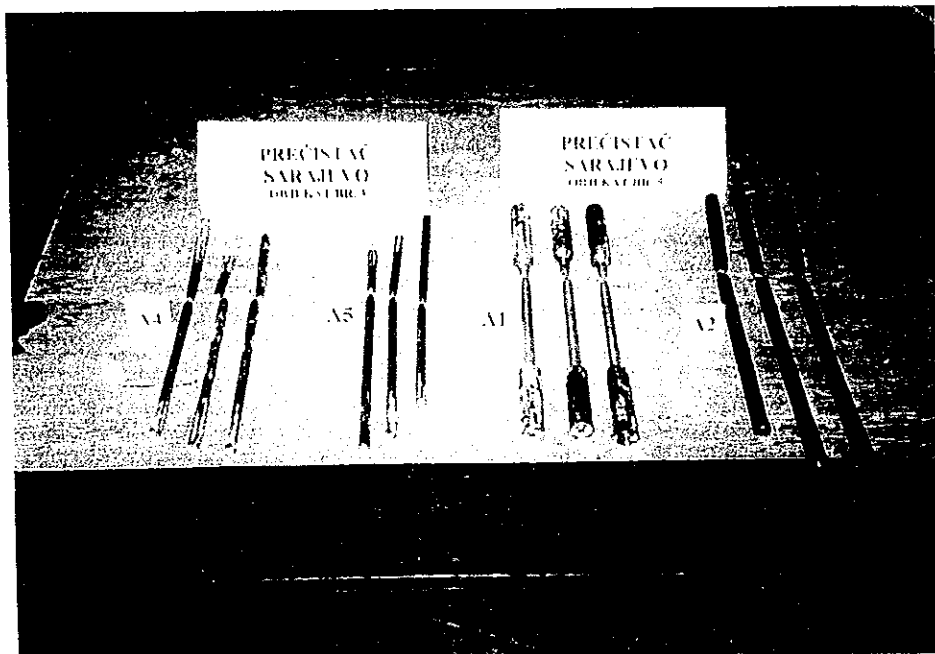


Photo 32. Reinforcement specimens A1, A2, A4 and A5 after testing

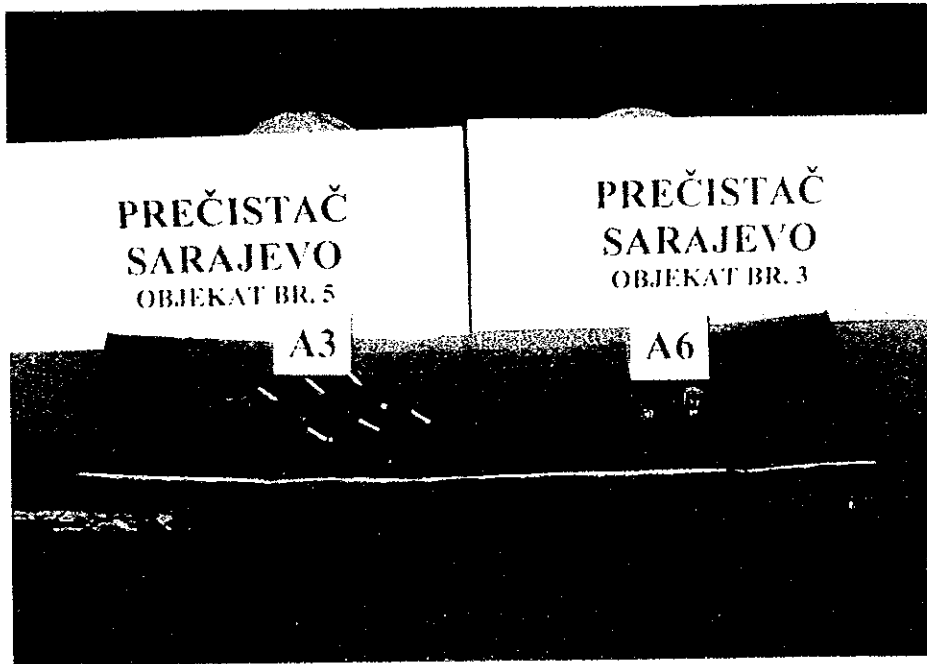


Photo 33. Reinforcement specimens A3 and A6 after testing



Photo 34. Specimens extracted from the pipeline after processing

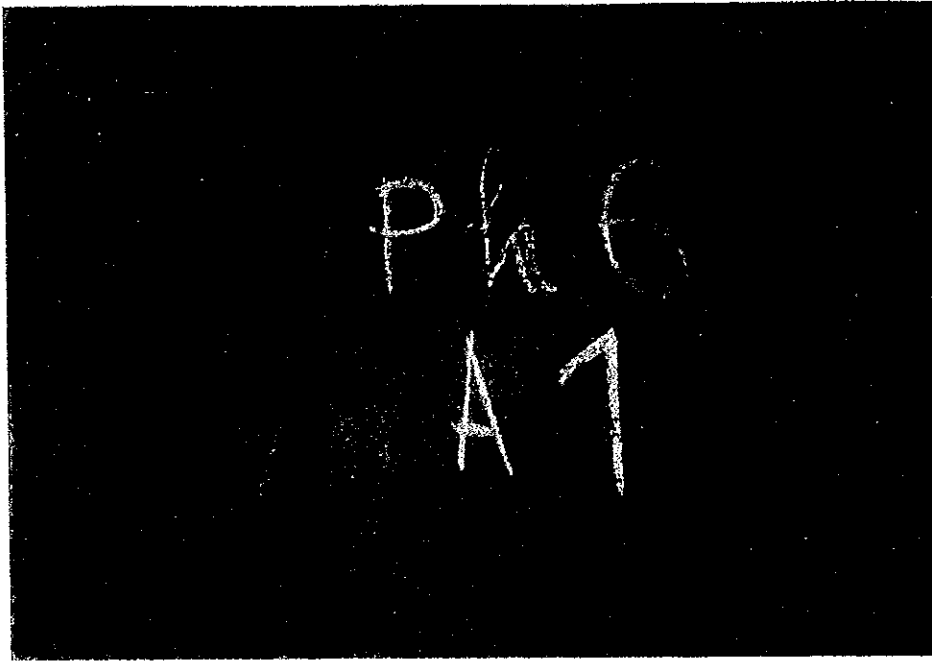


Photo 35. Testing of Ph value on the location Ph6 (wall in axis G)

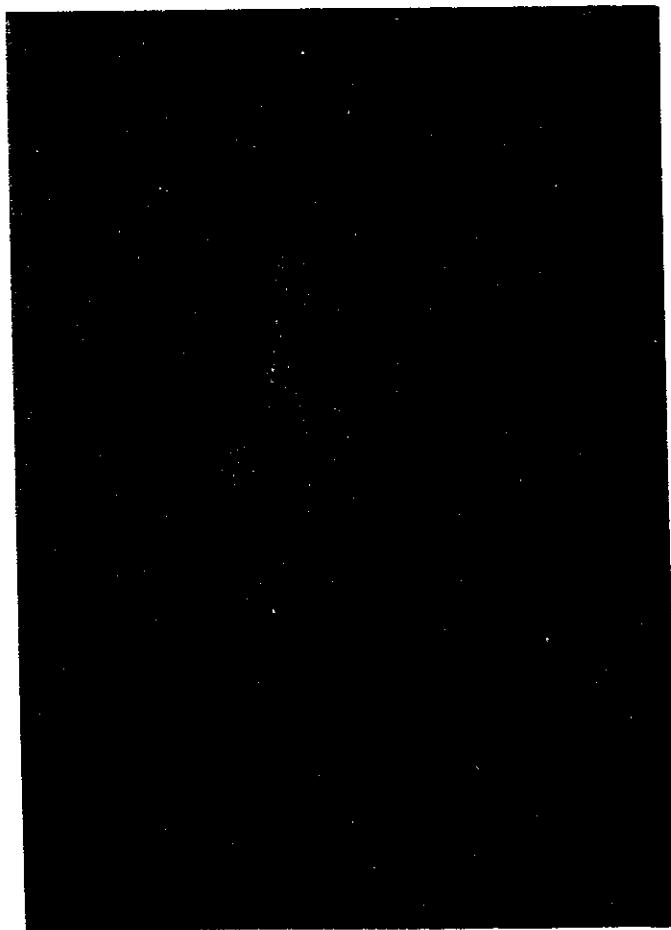


Photo 36. Testing of Ph value on the location Ph7 (wall in axis M)



Photo 37. Testing of Ph value on the location Ph5 (column E14)

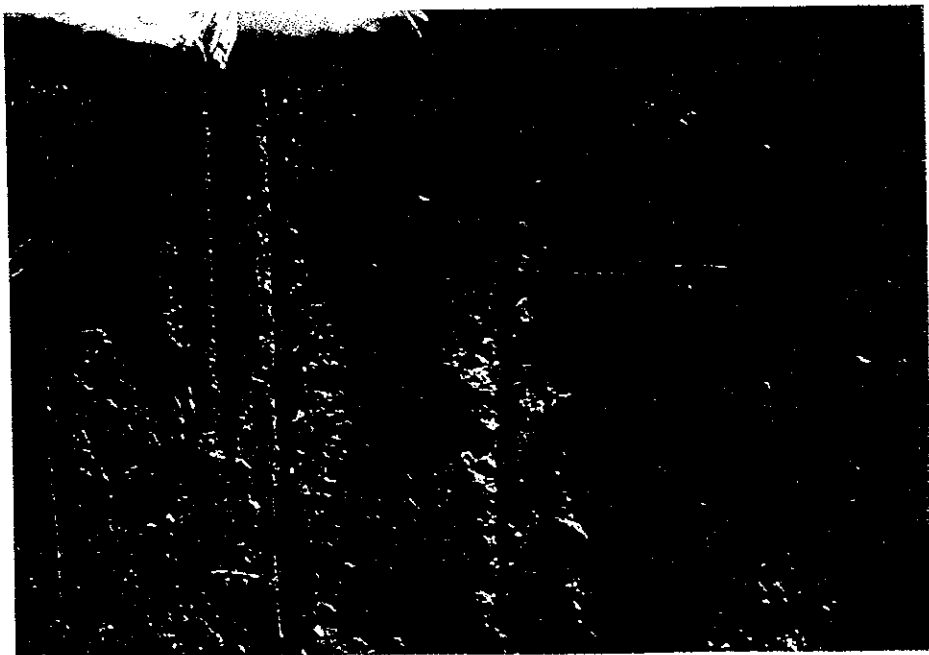


Photo 38. Testing of Ph value on the location Ph2 (wall in axis D)

APPENDIX

G

VISUAL SURVEY

CIVIL

ASPECTS

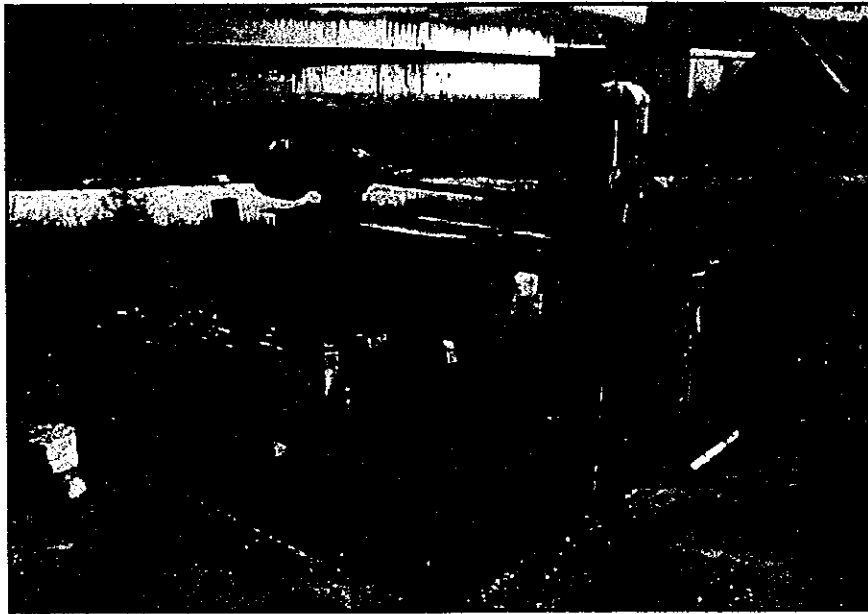
Liquid Retaining Structures

Facility Name	Photo Survey	Sheet No.	Detailed Survey Report	Sheet No.
1. Raw Water Pumping Station	√	1 to 3		
2. Screening Station	√	4		
3. Aerated Grit Chamber	√	5 to 7	√	33 to 34
4. Primary Sedimentation Tanks	√	8 to 13	√	35 to 37
5. Aeration Tank	√	14 to 17	√	38 to 41
6. Secondary Sedimentation Tanks	√	18 to 19	√	42 to 43
7. Flow Metering	√	20		
8. Recycle Sludge Pumping Station	√	21		
9. Primary Sludge Pumping Station	√	22		
10. Sludge Thickeners	√	23 to 25	√	44 to 45
11. Thickened Sludge Pumping Station	√	26		
12. Sludge Digester	√	27 to 28		
15. Gas Storage Tank	√	29	√	46
16. Sludge Holding Tank	√	30 to 32	√	47 to 48

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	1	Name:	Pump Station
Location	Inlet gate		

Photo No.

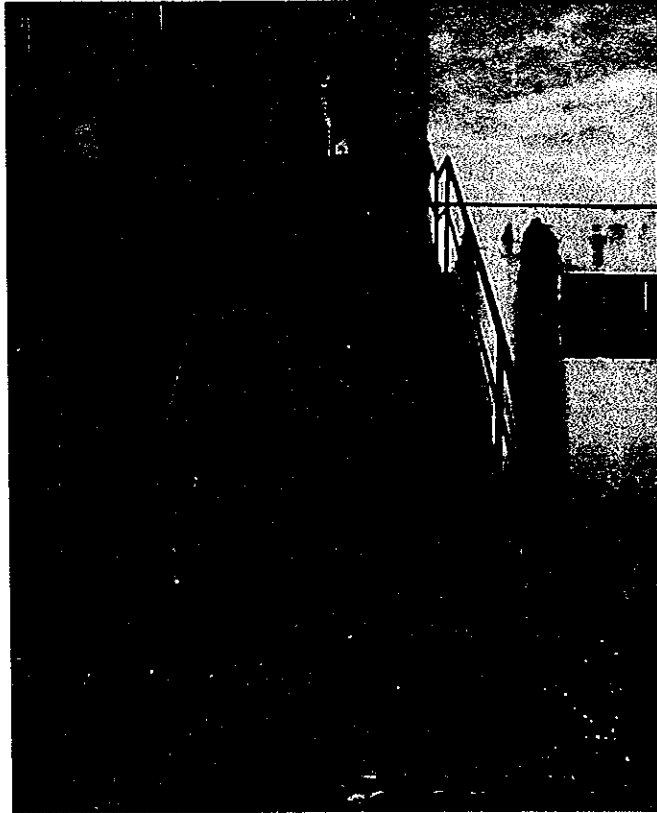


C1-1 It is impossible to close the gate completely because the guides are bent. This results in flooding of the wet well when screw pumps are stopped.

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	1	Name:	Pump Station
Location	Stairs going up to motor room and screening station		

photo No.

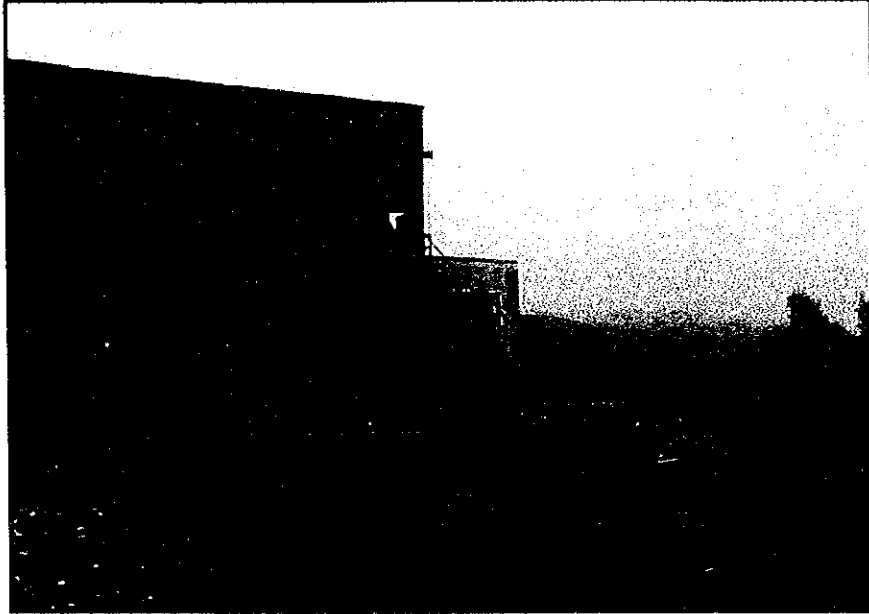


C1-2 Extreme weathering caused by freezing and thawing of water retained by porous concrete.
Note exposed and corroded reinforcement.

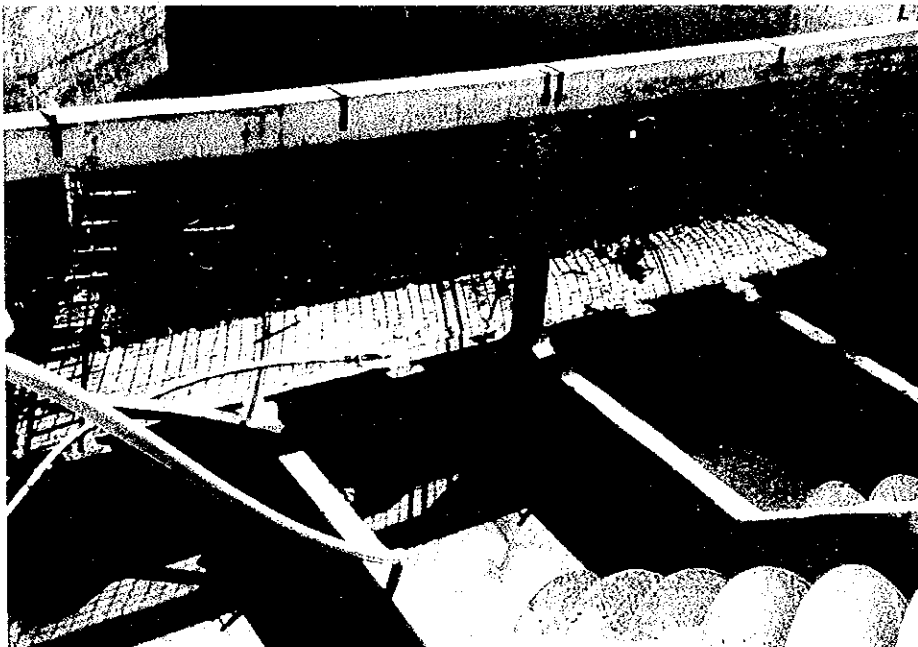
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	1	Name:	Pump Station
Location	Wet Well		

Photo No.



C1-3 Note damaged and missing handrails



C1-4 Note makeshift screens that trap debris and block flow to pumps
Note concrete pillars behind screens that also trap debris

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	2	Name:	Screening station
Location	Inlet to screens		

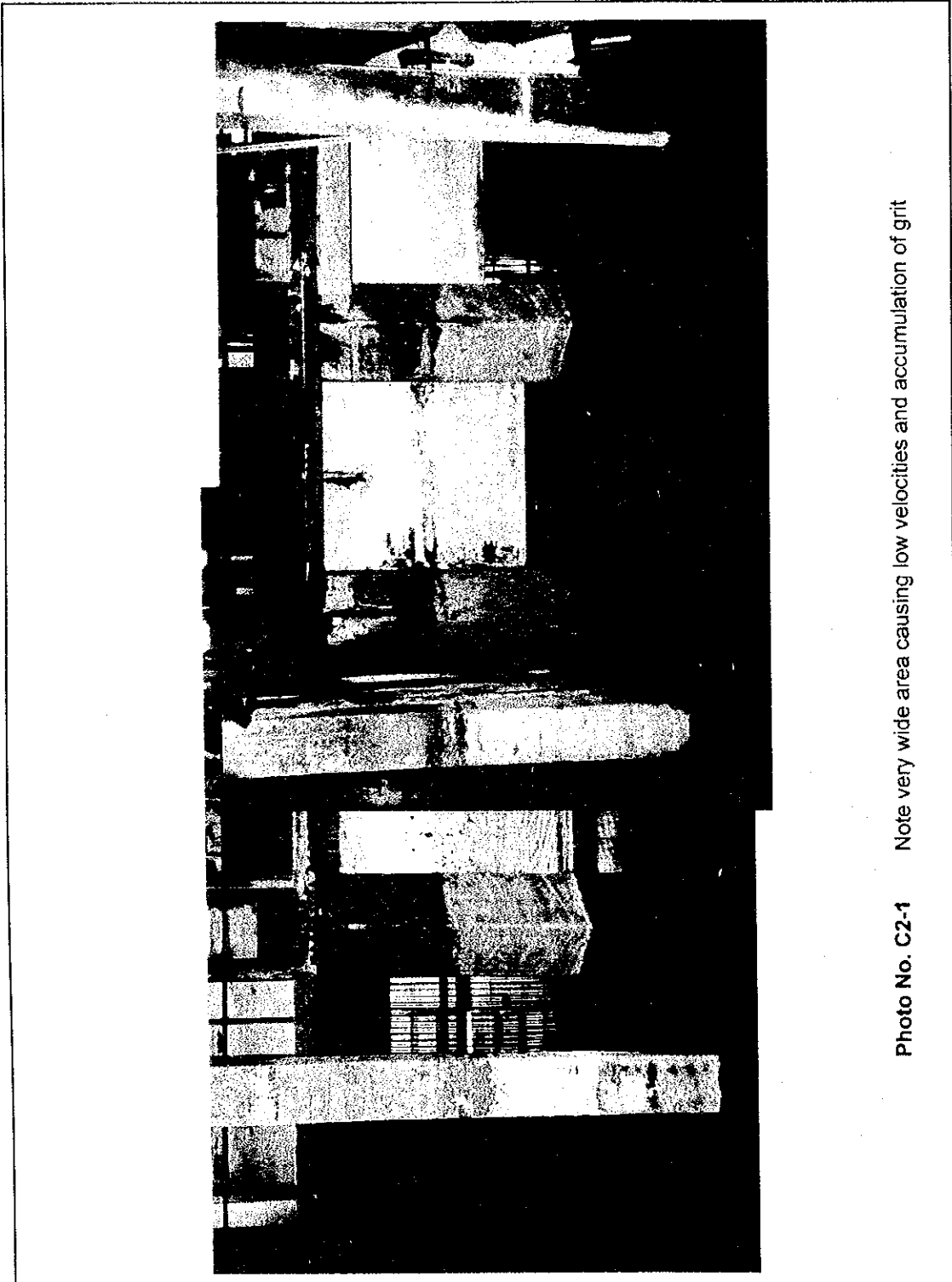
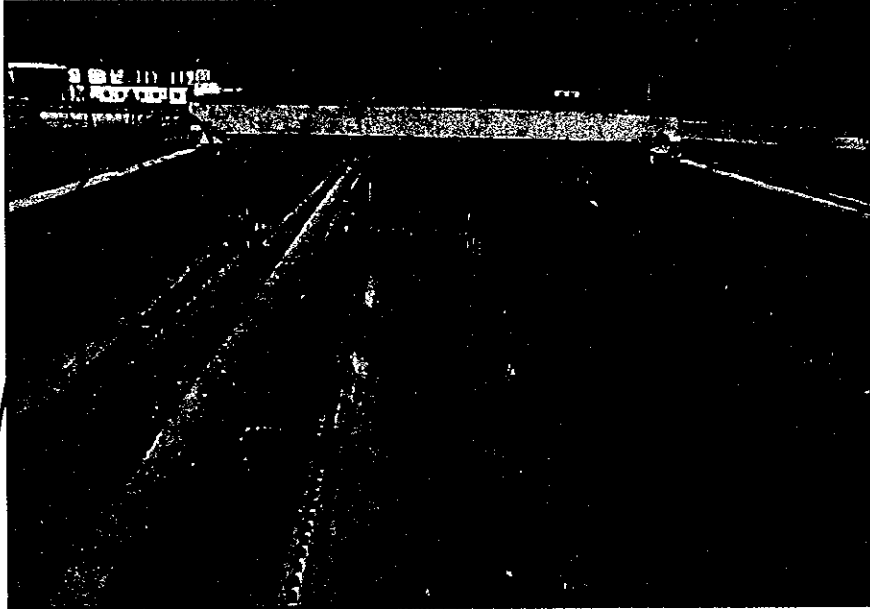


Photo No. C2-1 Note very wide area causing low velocities and accumulation of grit

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	3	Name:	Aerated Grit Chamber
Location	Inlet and outlet, looking North		

Photo No.



C3-1

Note lack of railings and protection against freezing along the running surface of the travelling brige



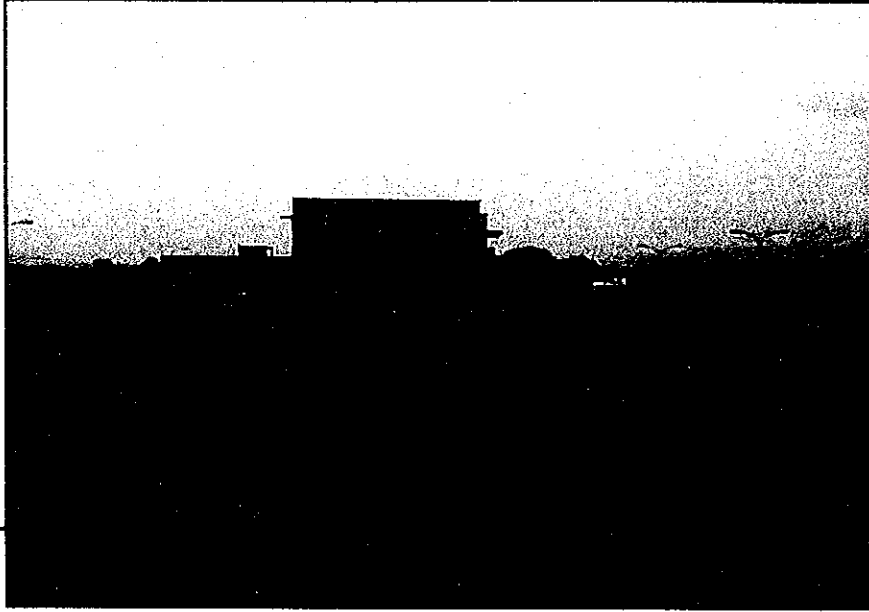
C3-2

Note scrapper in front of wheel and rough surface of concrete

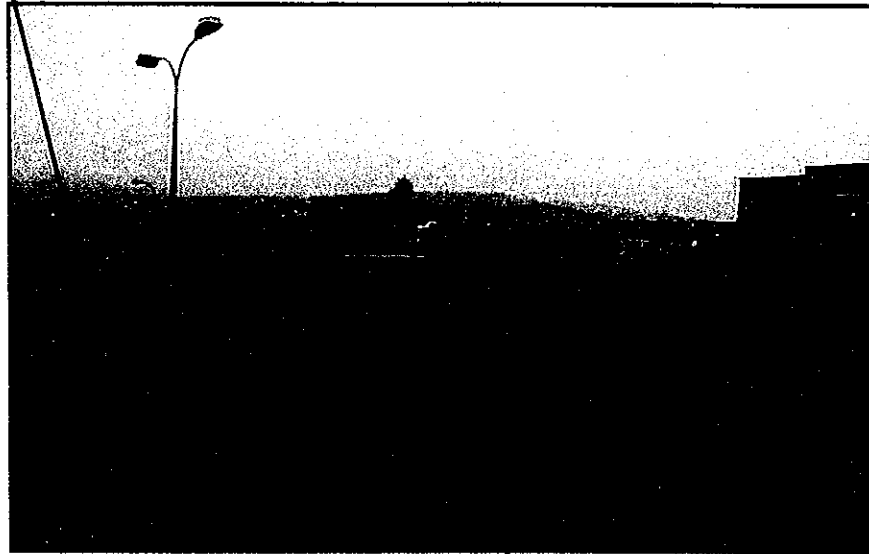
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	3	Name:	Aerated Grit Chamber
Location	Outlet		

Photo No.



C3-3 Note horizontal construction joint that has been previously patched to stop leakage

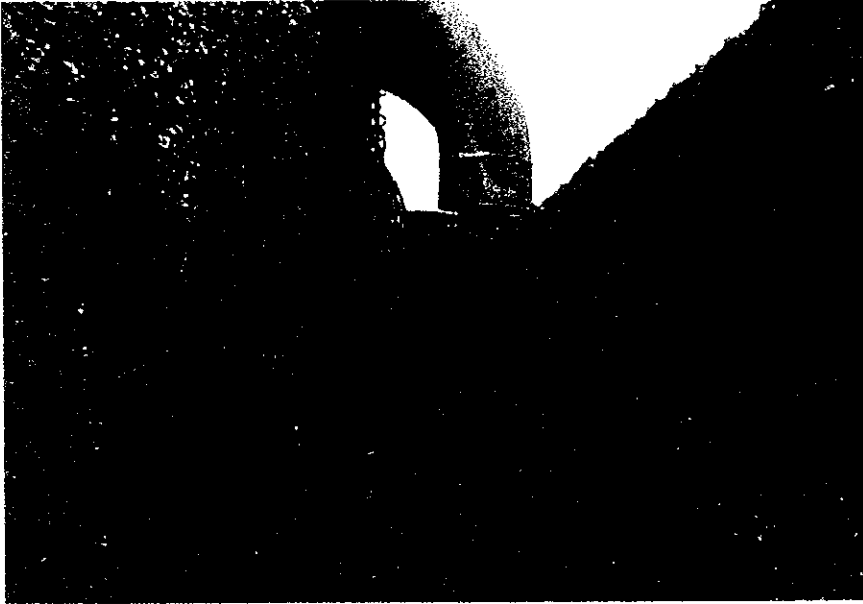


C3-4 Note previously repaired vertical cracks

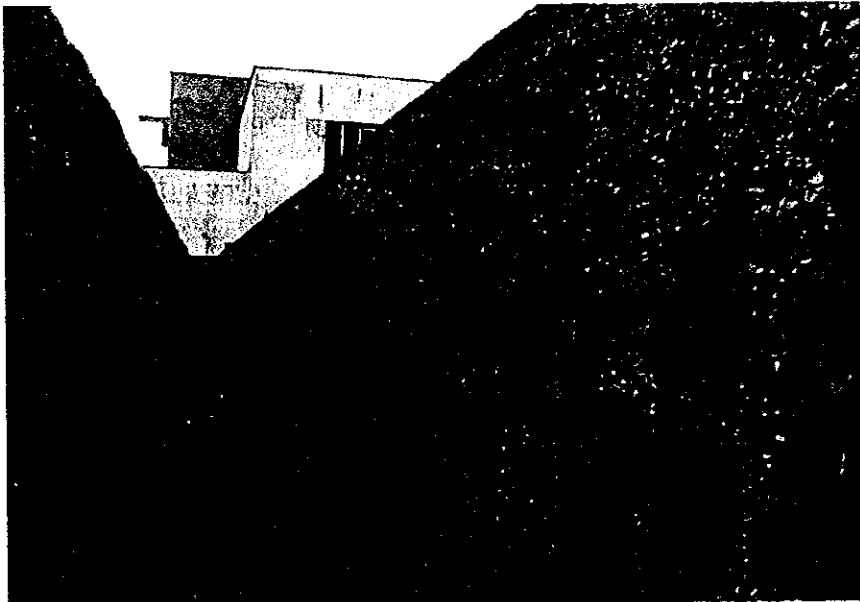
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	3	Name:	Aerated Grit Chamber
Location	Grit discharge channel		

Photo No.



C3-5 Note deteriorated concrete and exposed reinforcement

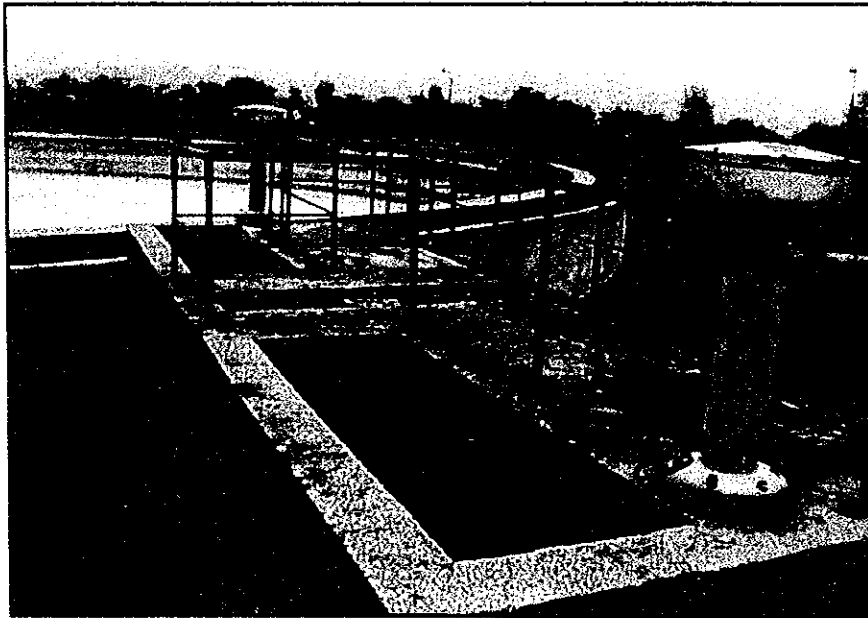


C3-6 Note deteriorated concrete and exposed reinforcement

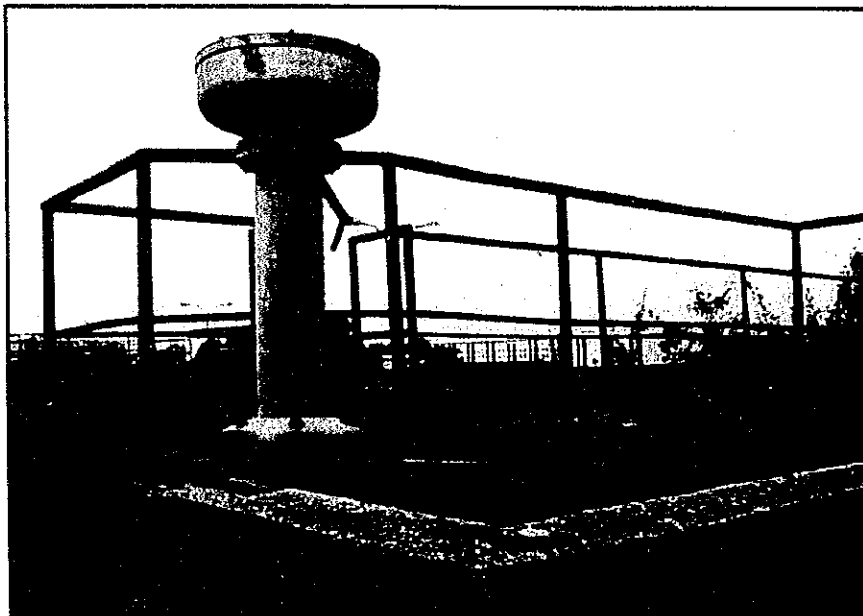
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	Inlet gates		

Photo No.



C4-1 Note poor access, lack of operating space and poor condition of railings

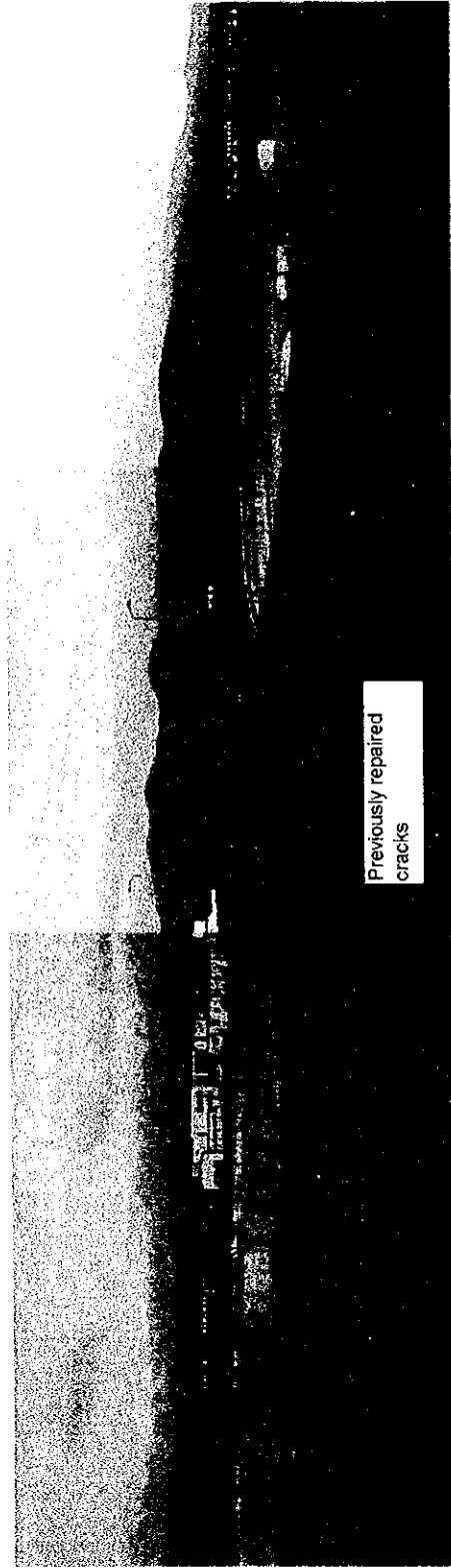


C4-2 Note failure of slab caused by uplift force

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	View looking North		

Photo No.



C4-3 Tank No 4.2

note difficult access to travelling bridge and effluent launders

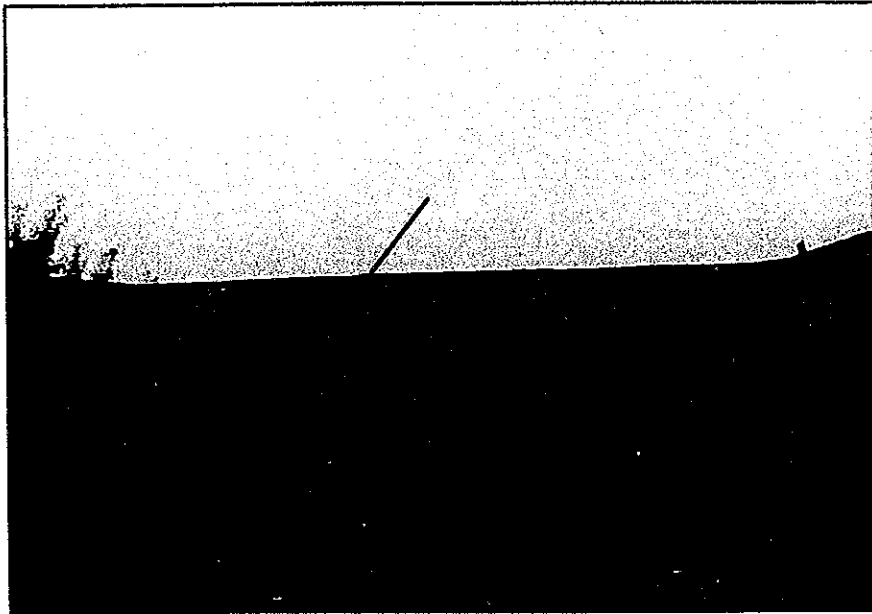
C4-4

Tank No. 4.1

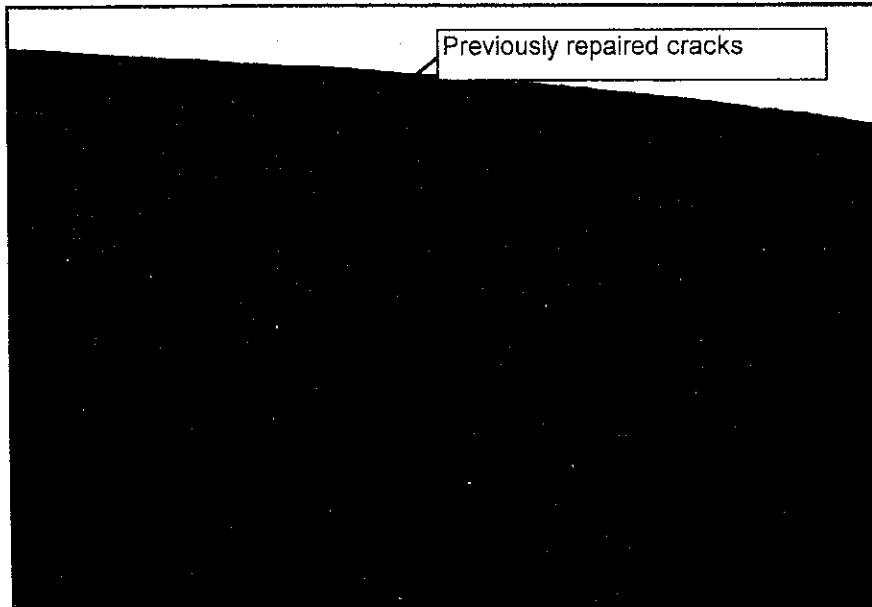
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	Typical Exterior Wall		

Photo No.



C4-5 Outlet Structure - Note leakage along horizontal construction joint

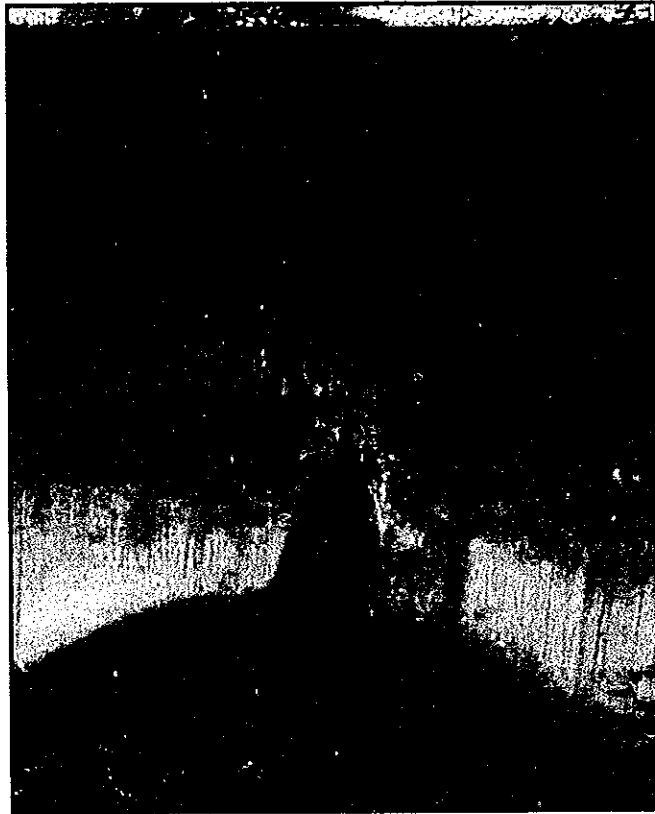


C4-6 Typical tank wall - Note leakage along horizontal construction joint

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	Exterior wall of tank no.4.1		

Photo No.



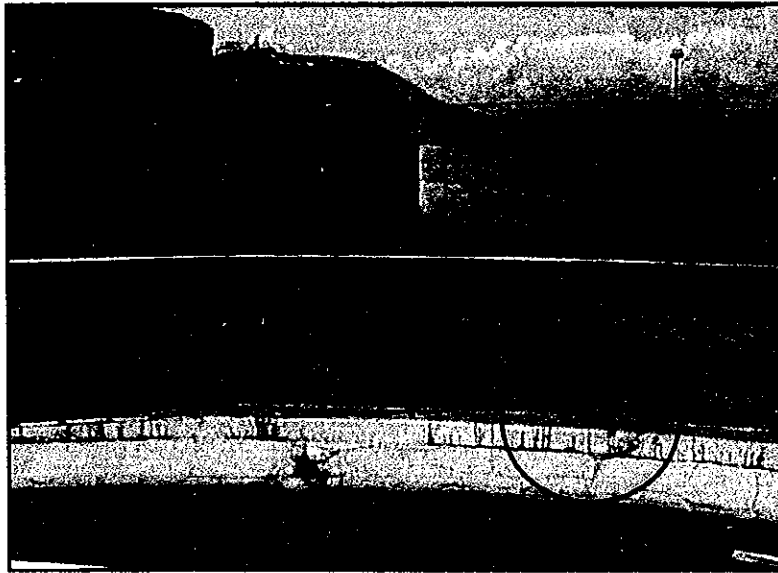
C4-7

Leakage through expansion joint

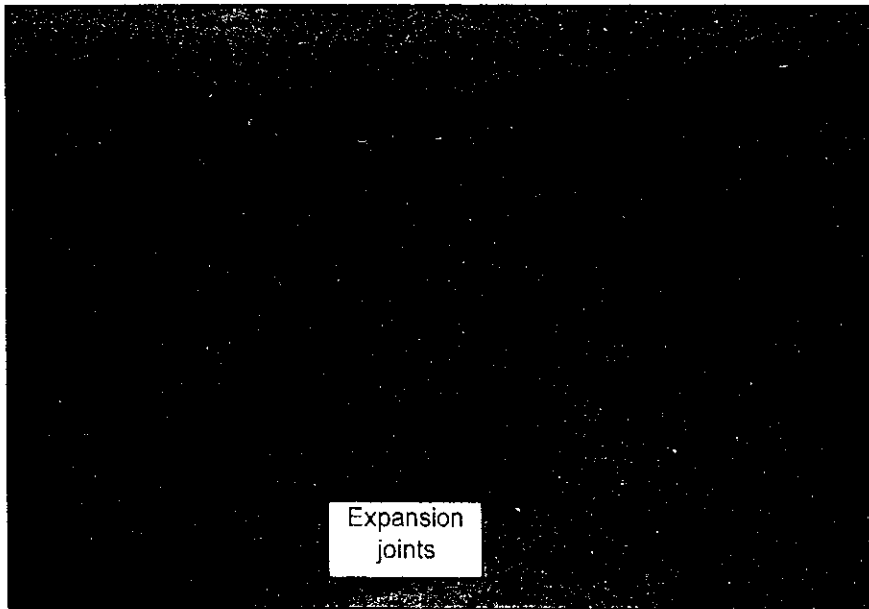
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	Typical interior condition		

Photo No.



C4-8 Note reinforcement corrosion on wall and grass growing in expansion joint



C4-9 Note cracking of slab finish and along expansion joints

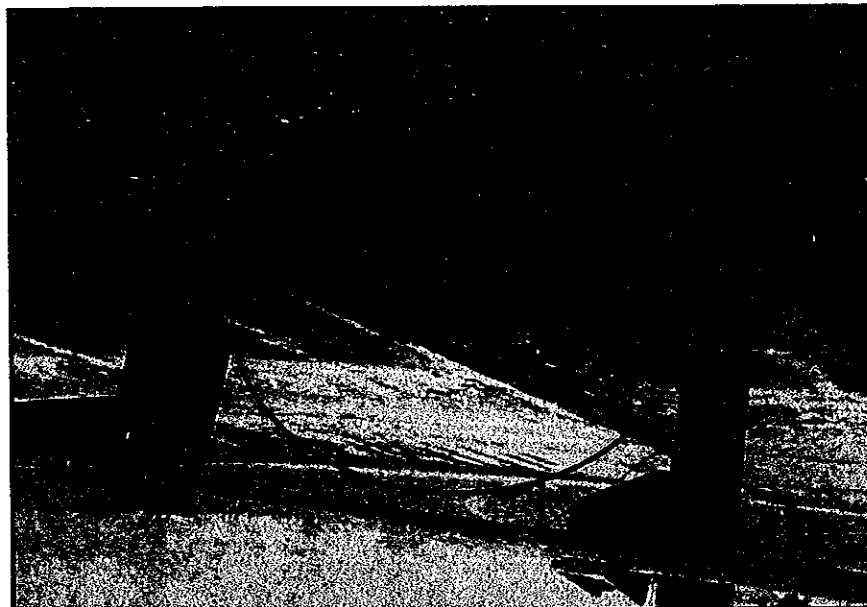
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	4	Name:	Primary Sedimentation Tank
Location	column supporting travelling bridge		

Photo No.



C4-10 View from effluent launder - Note failure along edge of expansion joint and exposed reinforcement

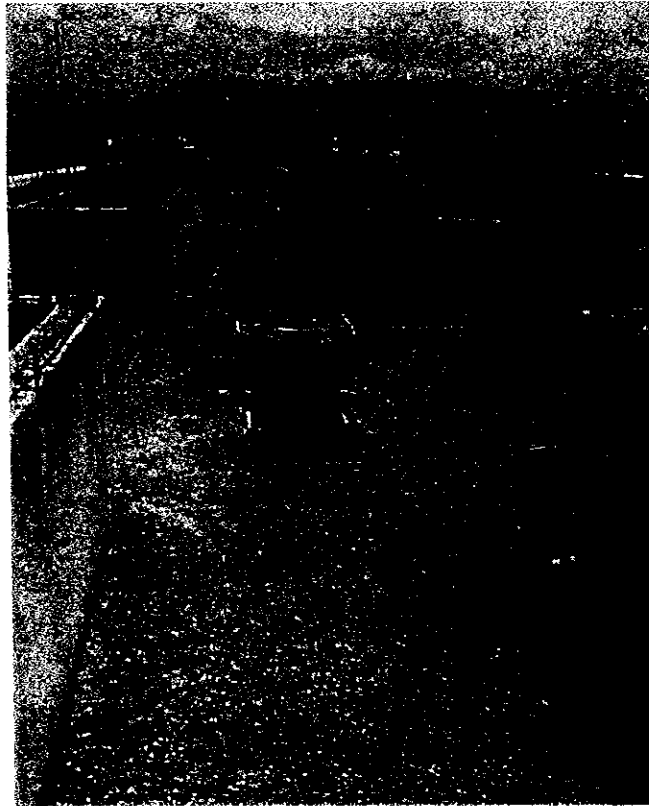


C4-11 View of failure from inside of tank, note crack and exposed steel.

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	5	Name:	Aeration Tank
Location	walkway to aerators		

Photo No.



C5-1

note deterioration of slab and walls

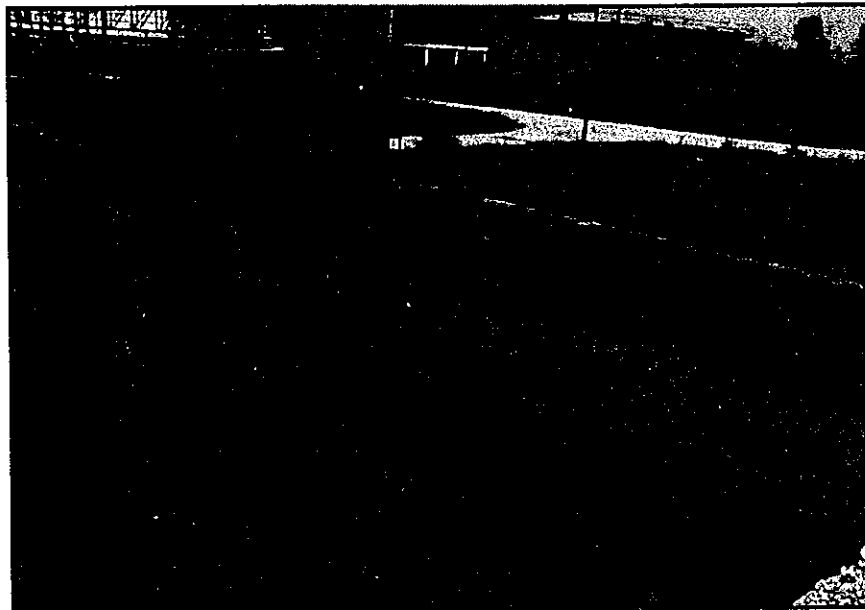
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	5	Name:	Aeration Tank
Location	interior of aeration tank		

Photo No.



C5-2 Note corrosion stains on columns

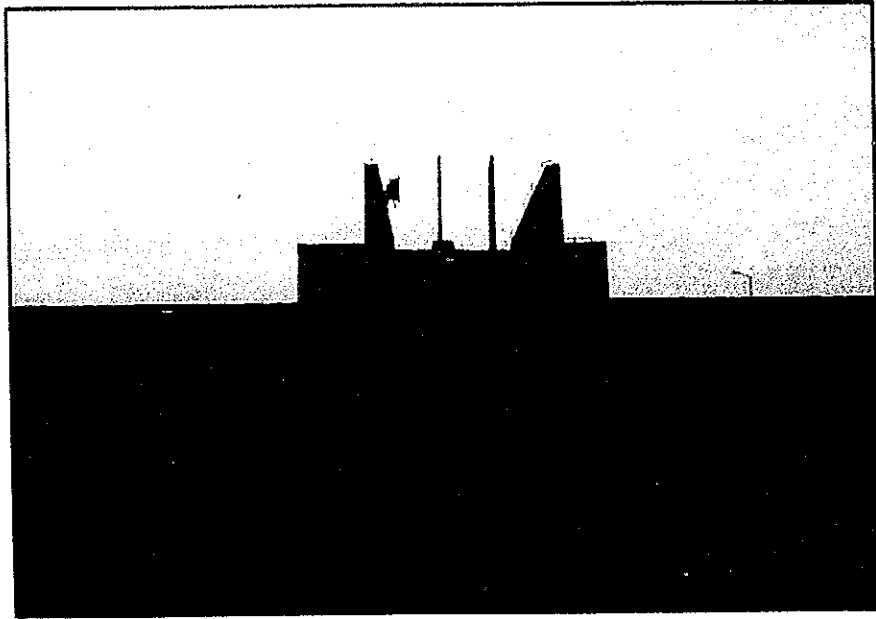


C5-3 Note corrosion stains on wall

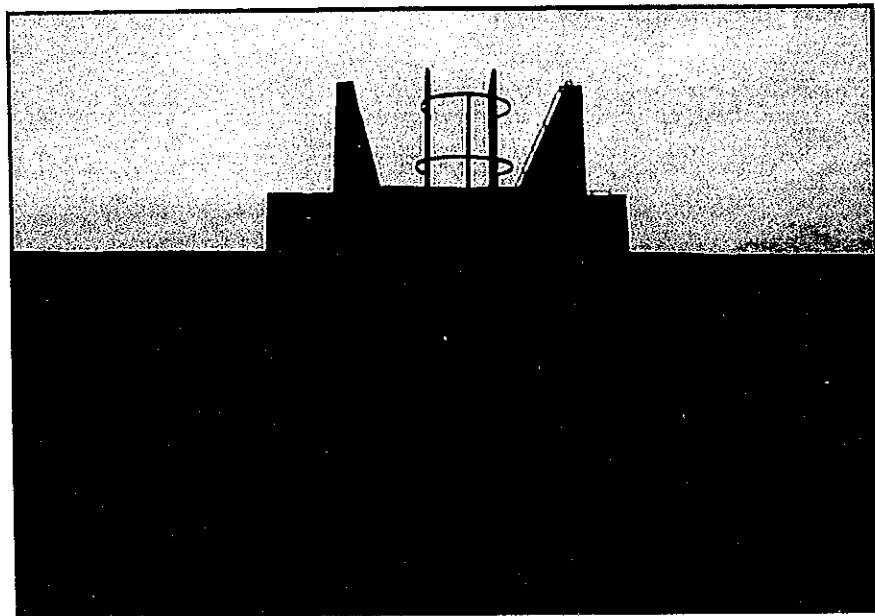
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	5	Name:	Aeration Tank
Location	East wall - exterior		

Photo No.



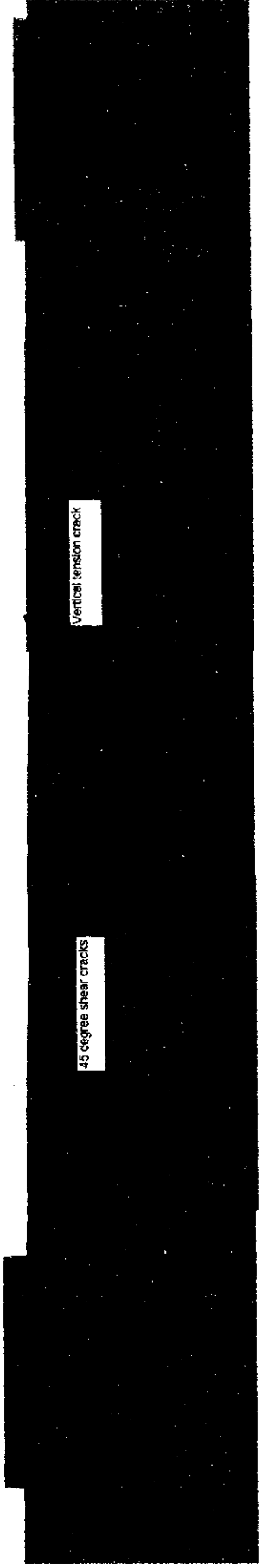
C5-4



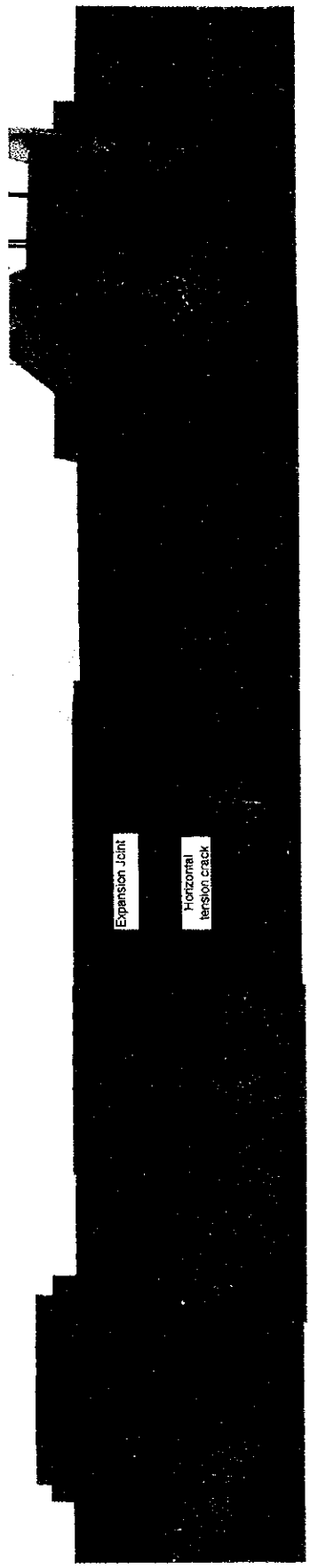
C5-5

Facility No: 5
Location: View of East wall-Grid line A12 to A17
Name: Aeration Tank

Photo No. C5-6



Exterior wall grid line A12 to A14

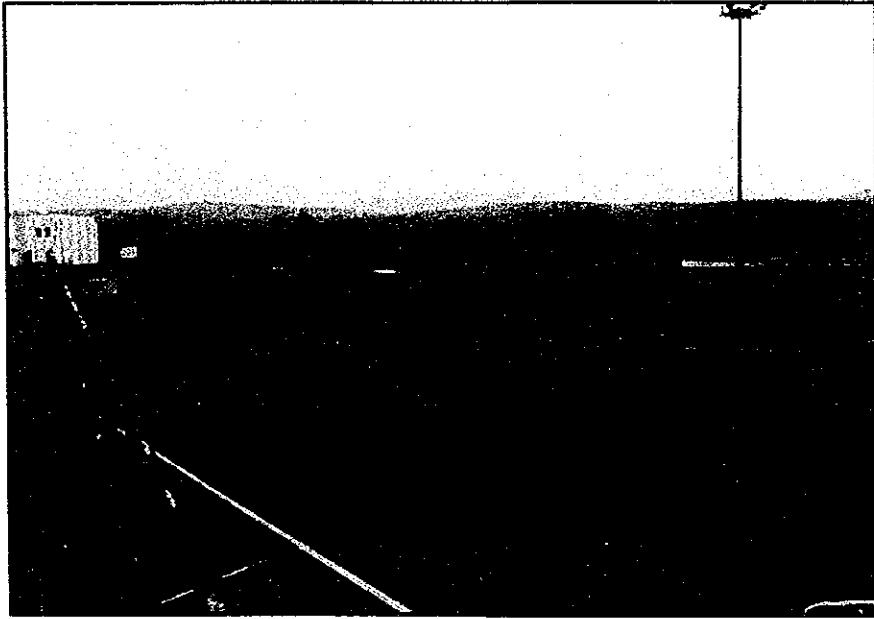


Exterior wall grid line A15 to A17

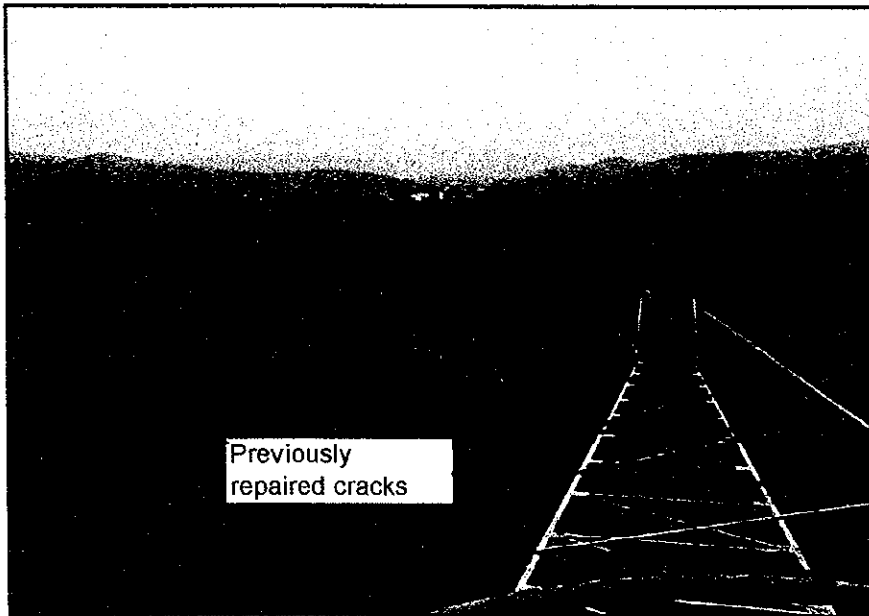
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	6	Name:	Secondary Sedimentation Tank
Location	View of inside wall - looking from West to East.		

Photo No.



C6-1 Note corrosion stains above water line



C6-2 Note several cracks

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	6	Name:	Secondary Sedimentation Tanks
Location	Exterior of effluent launder		

Photo No.



C6-5 Note cracks in effluent launder at regular intervals

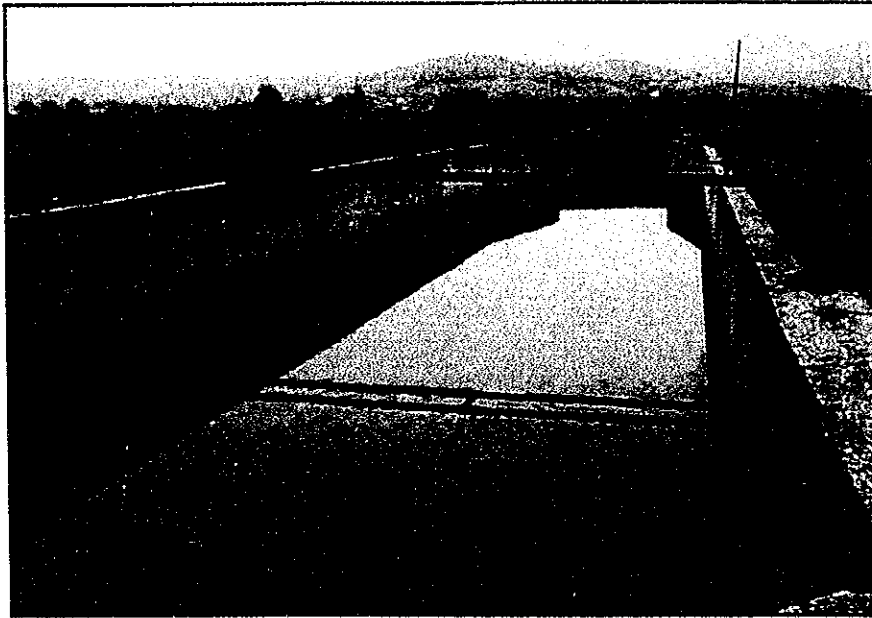


C6-6 Note deep crack in effluent launder

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	7	Name:	Parshall Flume
Location	At technical water pumping station looking North		

Photo No.

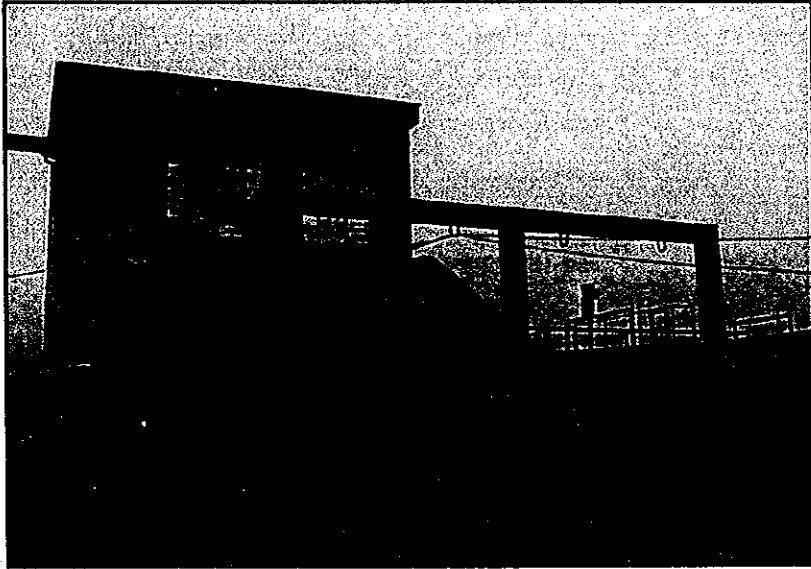


C7-1 No signs of leakage at expansion joints and cracks

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	8	Name:	Recycled Sludge Pump Station
Location	Stairs going up to motor room		

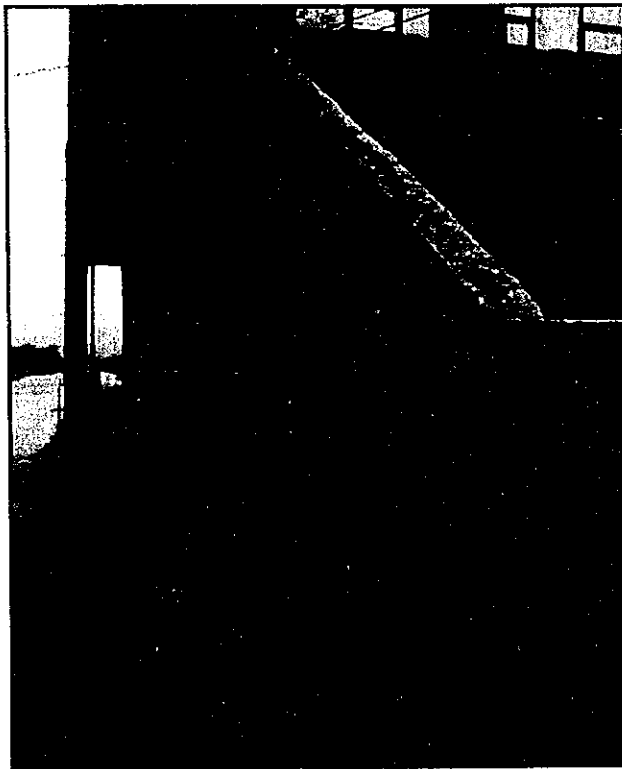
Photo No.



C8-1

Note condition of railings and deterioration of concrete stairs

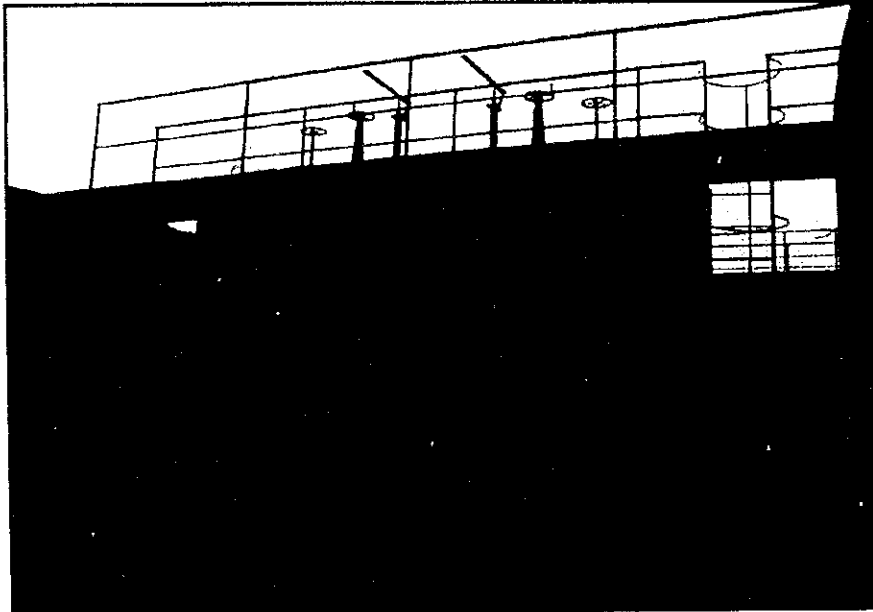
C8-2



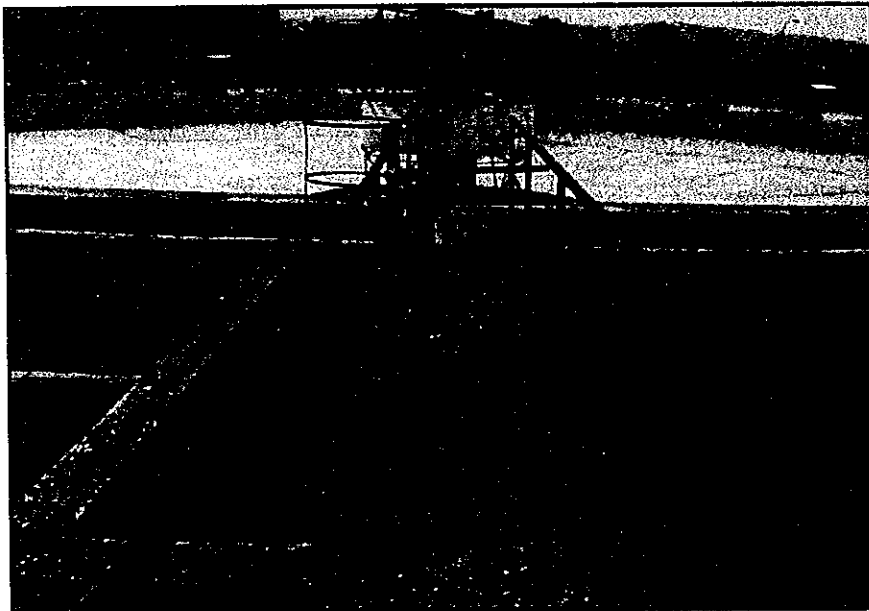
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	9	Name:	Primary Sludge Pump Station
Location	Between two primary sedimentation tank		

Photo No.



C9-1 Note cracks in wet well

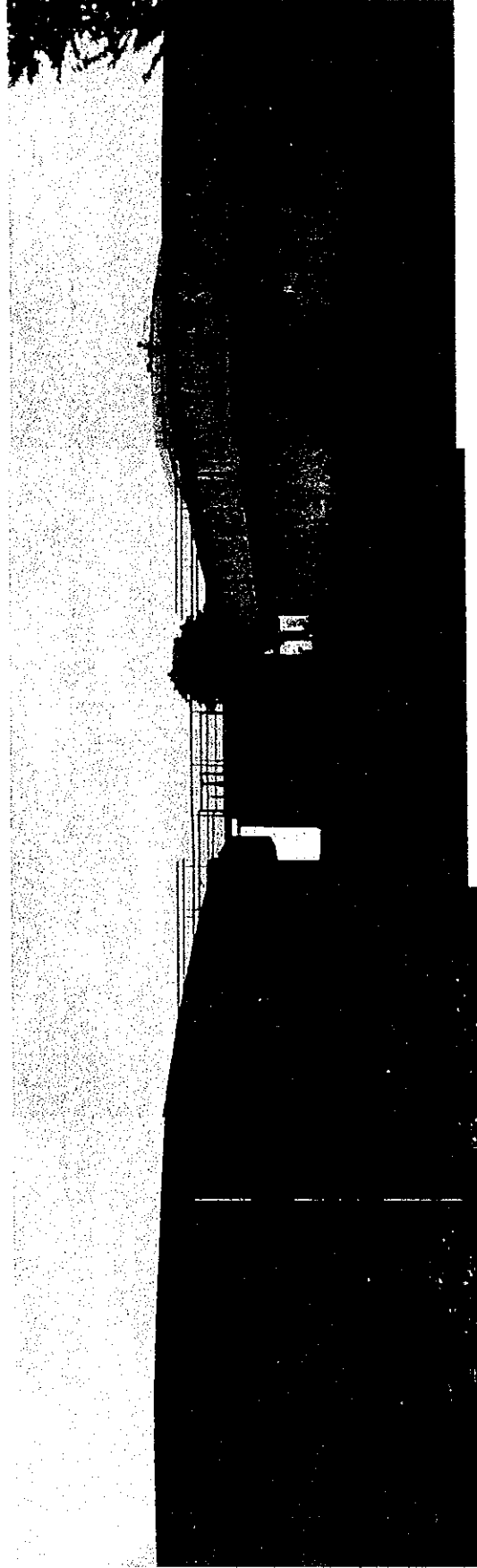


C9-2 Valves and walkway over wet well. Note lack of space for operations

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	10	Name:	Sludge thickeners
Location	View facing West		

Photo No.

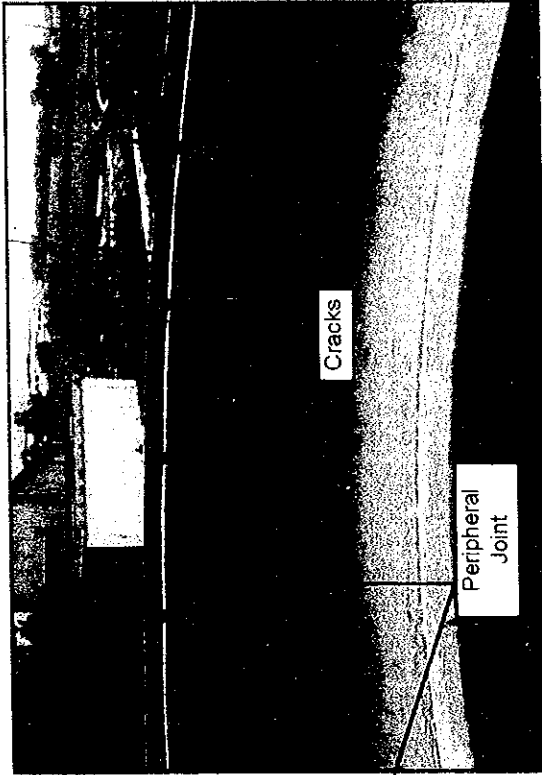
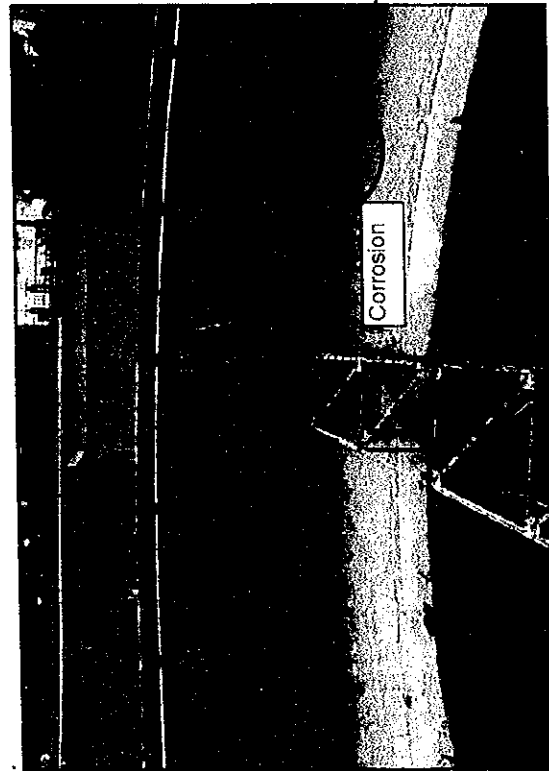


C10-1 Note previously repaired cracks in walls of tank

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	10	Name:	Sludge thickeners
Location	Inside wall facing East		

Photo No.

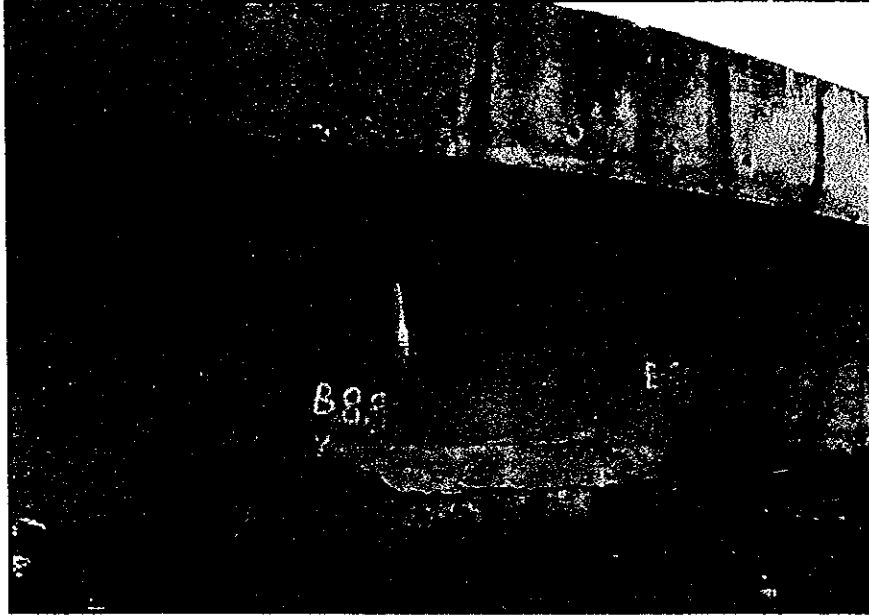


C10-2 Note previously repaired cracks, corroded steel reinforcement and horizontal construction joint

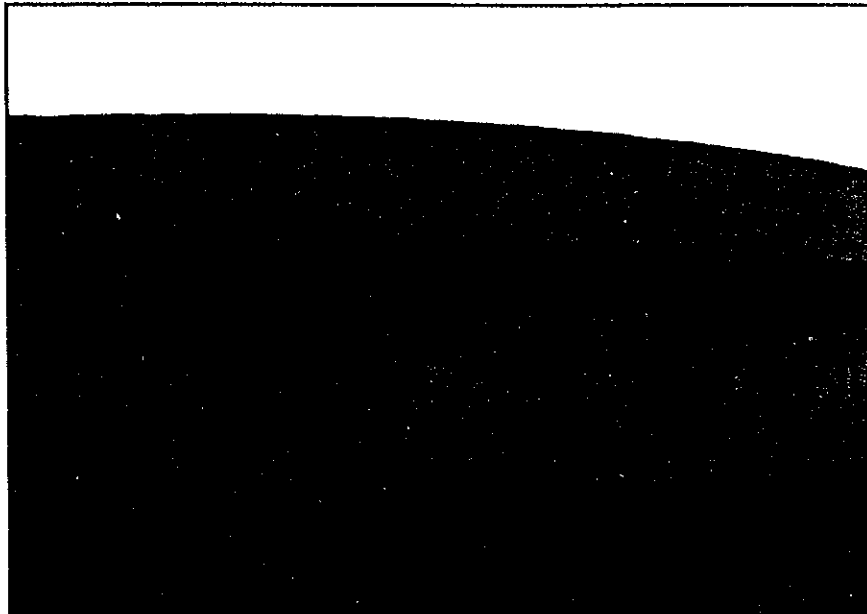
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	10	Name:	Sludge thickeners
Location	Exterior walls looking East		

Photo No.



C10-3 Tank no. 10.1 - Note signs of leakage at vertical and horizontal cracks

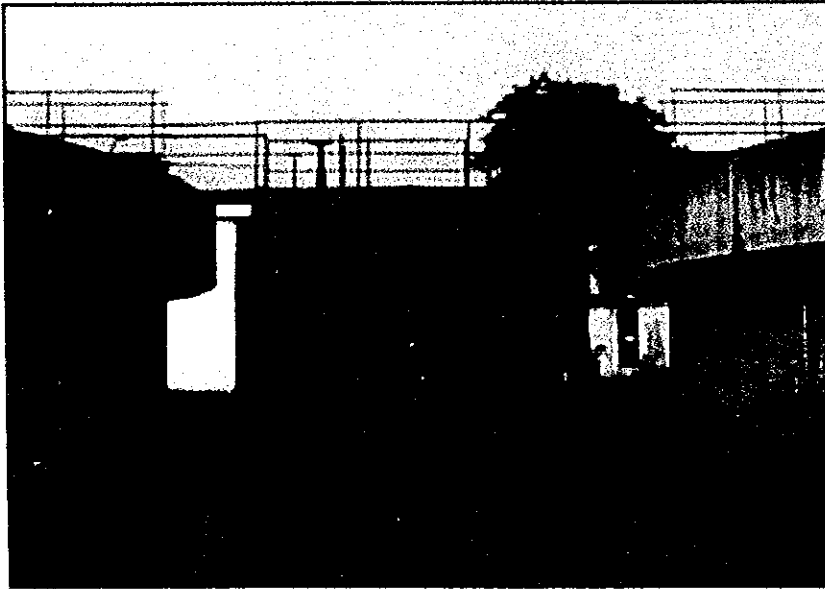


C10-4 Tank no. 10.2 - Note signs of leakage at vertical and horizontal cracks

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	11	Name:	Thickened sludge pumping station
Location	View looking West		

Photo No.

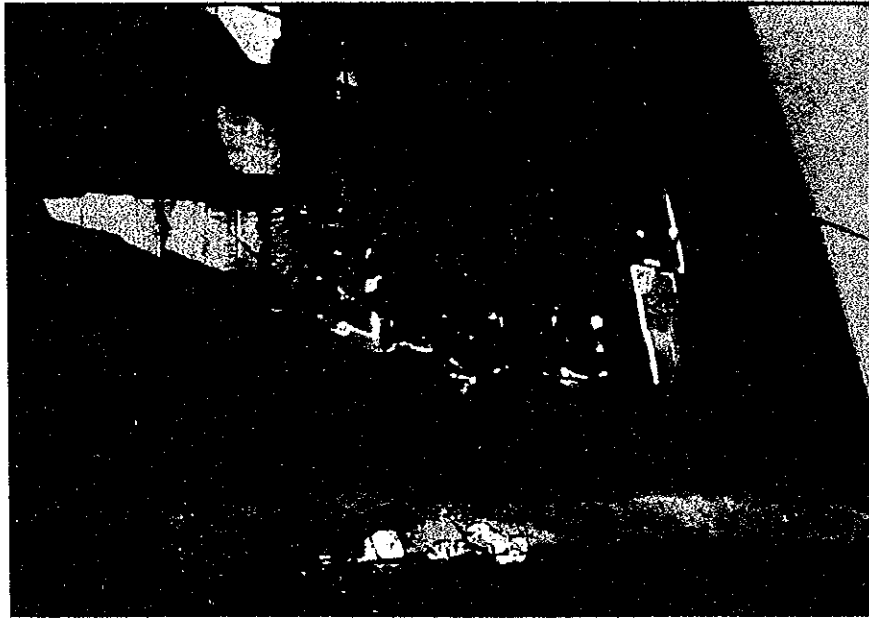


C11-1 Note many surface cracks but no signs of previous leakage.

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	12	Name:	Digesters
Location	Exterior		

Photo No.



C12-1 Note loose and damaged insulation

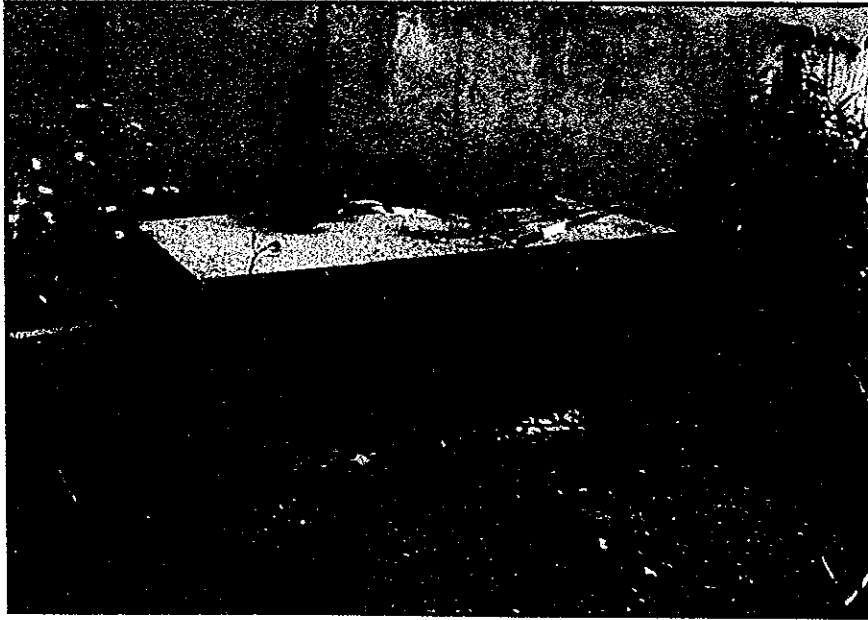


C12-2 Note damage to roofing membrane and corroded access platform

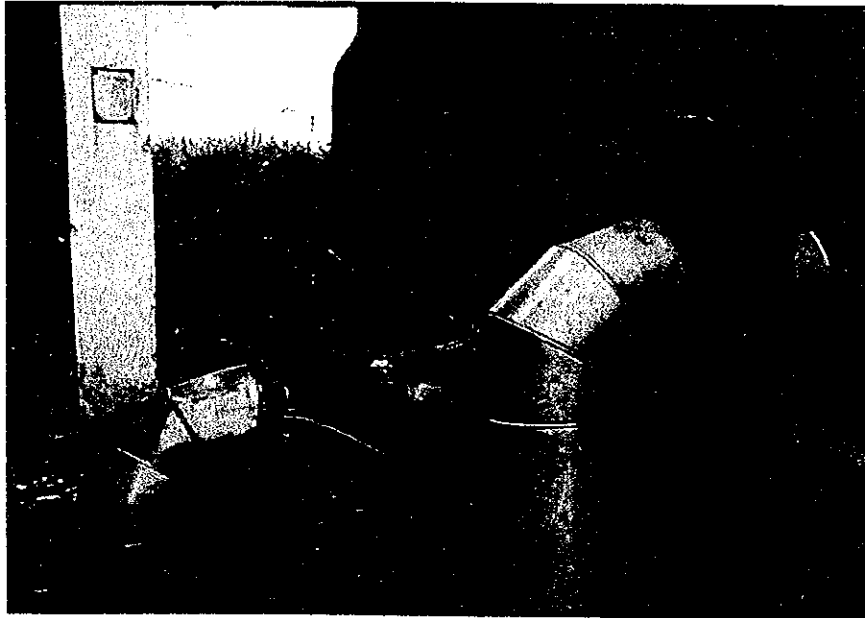
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	12	Name:	Digesters
Location	Exterior		

Photo No.



C12-1 Note valves exposed to cold weather and dried sludge on ground



C12-2 Note that valves are broken and sludge is leaking on ground

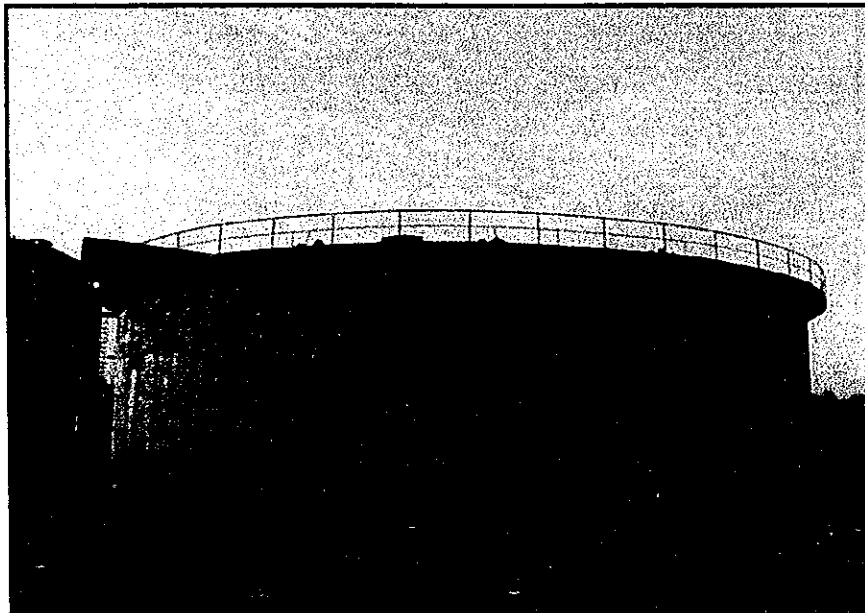
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	15	Name:	Gas Storage Tank
Location	Exterior view		

Photo No.



C15-1 Note dampness at construction joints and good condition of roof



C15-2 Note dampness at construction joints

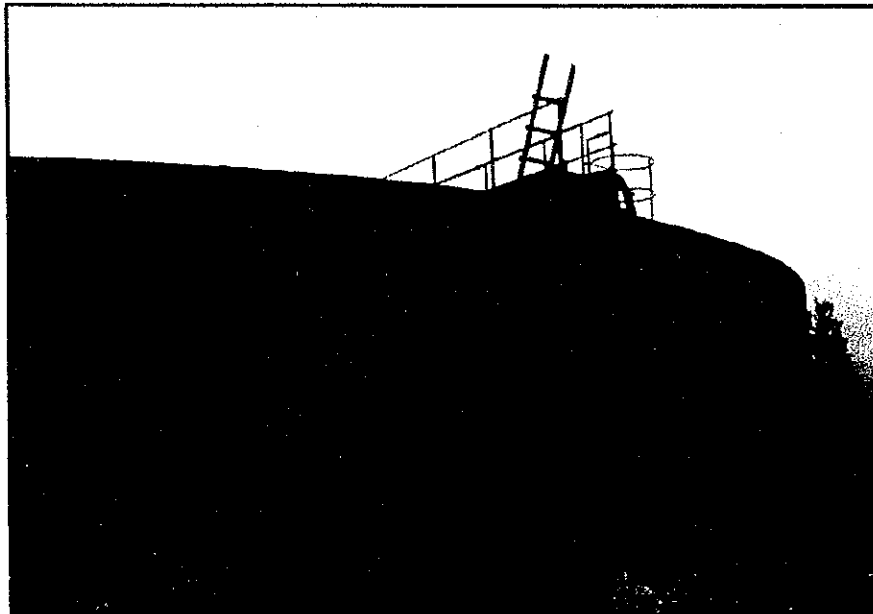
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	16	Name:	Sludge Holding Tank
Location	Exterior view		

Photo No.



C16-1 View facing West - Note vertical cracks with signs of previous leakage



C16-2 View facing South - Note vertical cracks and horizontal construction joint.

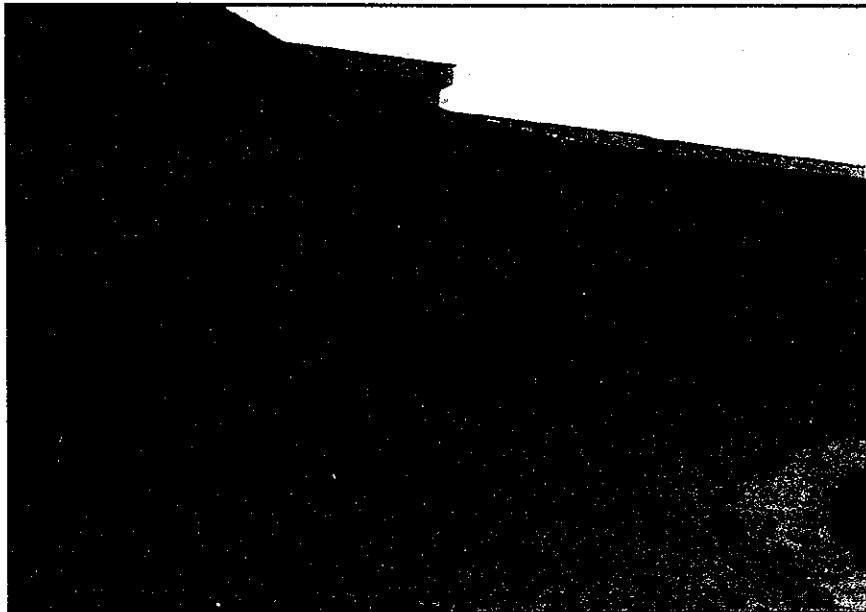
Civil Structures - Photo documentation of rehabilitation needs

Facility No:	16	Name:	Sludge Holding Tank
Location	Interior wall looking East		

Photo No.



C16-3 Note corroded and exposed reinforcement

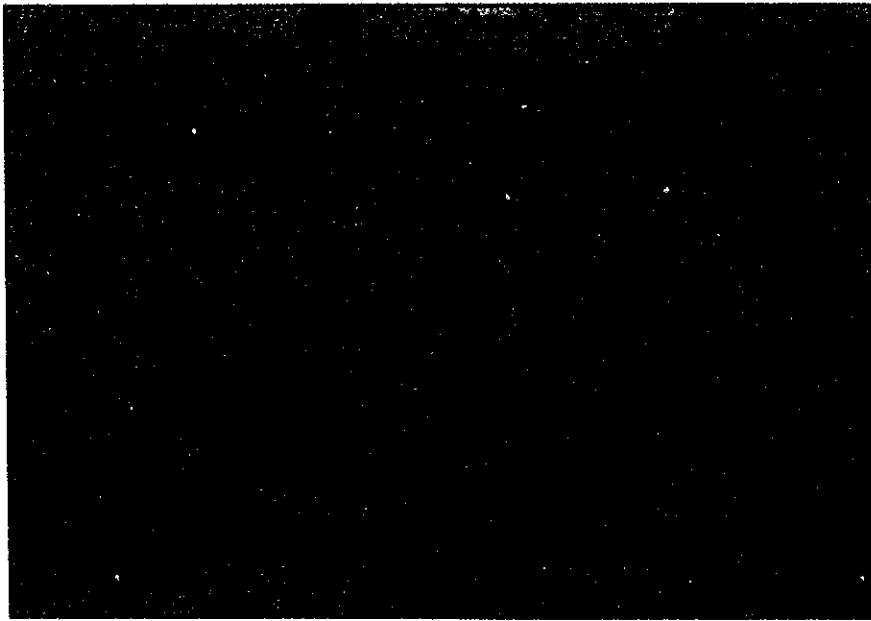


C16-4 Note corroded and exposed reinforcement

Civil Structures - Photo documentation of rehabilitation needs

Facility No:	16	Name:	Sludge Holding Tank
Location	Interior wall looking East		

Photo No.



C16-5 Corroded and exposed reinforcement typical of all interior walls



C16-6 Note lack of cover.

Visual Condition Survey - Liquid Retaining Structures

Structure No: 3 **Date Inspected:** 24-Jun-99
Name: Aerated Grit Removal Chamber

Reference drawings

Plan view and sections: Degremont dwg. No. 551-9-1016-1

Dimensions	Grit tank		Outlet structure
	Exterior wall length (m)	29	Length (m) 4.6
	Exterior wall height (m)	4.8	Width (m) 16
	Channel depth (m)	4.2	
	Channel width (m)	3.9	
	Total width (m)	12.8	
			Elevations
			Top of wall 490.95
			top of floor slab 486.16
			normal water level 490.28
			maximum water level 490.36

Viewed from exterior

Location	Expansion joints - walls		Construction joints - outlet structure			
	Condition	Length to be repaired (m)	Condition	number of joints	Length to be repaired (m)	
					V	H
E	1	4.8	1	2	4.8	6.8
S			1	1		4.8
W	1	4.8	1	2	4.8	6.8
N			1	3		4.8
Total		9.6			9.6	66.4
	x	no visible leakage	x	no visible leakage		
	1	visible leakage	1	visible leakage		
	0	no joint	0	no joint		

- Notes:**
1. Expansion joints did not leak during hydraulic tests.
 2. Mastic seal in most expansion joints is loose and needs to be replaced
 3. Construction joints at the outlet structure are leaking extensively

Visual Condition Survey - Liquid Retaining Structures

Structure No: 3

Date Inspected: 24-Jun-99

Name: Aerated Grit Removal Chamber

Reference drawings

Plan view and sections: Degremont dwg. No. 551-9-1016-1

Aerated Grit Removal Chamber

Location	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	V Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
Walls									
N	1	1	a	4.8	4.8	x		x	
E	1	2	a	4.8	9.6	x		x	
S	x	0			0	x		x	
W	1	4	a	4.8	19.2	x		x	
						x		x	
Total		7			33.6				

- | | | | |
|---|--|---|-------------------------------|
| x | no visible defects | x | no visible defects |
| 1 | active leakage or evidence of previous leakage | d | Spalling concrete |
| | a through section | e | Frost damage |
| | b shallow | f | Delamination |
| | c deep | | Exposed steel g |
| | | | Corrosion marks on concrete h |

Notes

1. Most of the cracks have been previously repaired from the outside (dry) face.

Cracks did not leak during the hydraulic test, nevertheless, all cracks should be repaired again from the inside (wet) face

2. The inside of the tank is in good condition.

Visual Condition Survey - Liquid Retaining Structures

Structure No: 4.1 **Date Inspected:** 1-Jun-99
Name: Primary Sedimentation Tank

Reference drawings

Plan view and sections: G P Bosna Sarajevo Dwg. No. 1 -- Bazen 4
 Degremont: Ref. No. 551-9-1016-1, Dwg. No. 201

Dimensions

Inside Diameter (m)	52	Hydraulic Surface (m ²)	2,123
Inside Circumference (m)	82	Volume (m ³)	7,510
Floor slab surface area (m ²)	2,095	Perimeter Depth (m)	2.9
Interior wall surface (m ²)	234	Depth at Center (m)	6.3

Elevations

Top of wall	490.13	Normal water level	489.67
Top of footing	486.20	Maximum water level	489.68

Expansion Joints

Location	Walls			Effluent launder			
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)		
		V	H		V dry side	V wet side	H
NE	1	2.86	1.38	1	1.8	1.5	1.1
SE	1	2.86	1.38	1	1.8	1.5	1.1
SW	x	2.86	1.38	1	1.8	1.5	1.1
NW	x	2.86	1.38	1	1.8	1.5	1.1
Total	2	11.44	5.52	4	7.2	6	4.4

Location	Floor (circumferential)			Floor (radial)			
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)		
		inner ring	outer ring				H
NE	1	2.55	19.33	1			24.7
SE	1	2.55	19.33	1			24.7
SW	1	2.55	19.33	1			24.7
NW	1	2.55	19.33	1			24.7
Total	4	10.2	77.3	4			98.8

x	no visible leakage	x	no visible defect
1	visible or probable leakage	1	visible or probable defect

- Notes:**
1. Expansion joints and construction joints leaked extensively during hydraulic test
 2. Mastic seal in all wall joints is loose and needs to be replaced
 3. There is no visible leakage of ground water into the structure at expansion joints in the floor slab, however the probability of leakage is high.
 4. Construction joints in the outlet structure leak extensively

Visual Condition Survey - Liquid Retaining Structures

Structure No: 4.1 Date Inspected: 1-Jun-99
 Name: Primary Sedimentation Tank

Viewed from Exterior

Location	Cracks						Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	V Crack length (m)	H Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
Walls										
NE to SE	1	5	a	2		10	x		x	
SE to SW	x	0	a	2		0	x		x	
SW to NW	1	13	a	2		25	x		x	
NW to NE	1	13	a	2		25	x		x	
total		31				59				
Effluent launder										
NE to SE	1	7	a	2	1	22	x		x	
SE to SW	1	12	a	2	1	38	x		x	
SW to NW	1	11	a	2	1	35	x		x	
NW to NE	1	15	a	2	1	48	x		x	
total		45				144				

x	no visible defects	x	no visible defects
1	active leakage or evidence of previous leakage	d	Spalling concrete
a	through section	e	Frost damage
b	shallow	f	Delamination
c	deep		no visible defects
			exposed steel
			Corrosion marks on concrete
			g
			h

Notes

1. Overflow channel was not subjected to leakage test
2. Foundation has inadequate cover for frost protection
3. Previously repaired cracks should be repaired again

Visual Condition Survey - Liquid Retaining Structures

Structure No: 4.1 **Date Inspected:** 1-Jun-99
Name: Primary Clarifier

Viewed from Interior

Location	Surface deterioration			Condition of Reinforcing steel		
	Type of defect	Length (m)	Surface area (m2)	Type of defect	Surface area (m2)	height (m)
Walls						
NE to SE	e		82	h, i	58	2.86
SE to SW	e		82	h, i	58	2.86
SW to NW	e		82	h, i	58	2.86
NW to NE	e		82	h, i	58	2.86
			327		234	
Effluent launder						
bottom of channel	e, f		99	x		
top of wall	d, e		35	x		
			134			

- | | | | |
|---|--------------------|---|-----------------------------|
| x | no visible defects | x | no visible defects |
| d | Spalling concrete | h | exposed reinforcing steel |
| e | Frost damage | i | Corrosion marks on concrete |
| f | Delamination | | |
| g | Cracking | | |

Notes

1. Reinforcing steel on all interior wall surfaces has inadequate cover less than 25mm.
2. Bottom screed has cracked along expansion joints but is not delaminated; cracks should be sealed to prevent further deterioration

Visual Condition Survey - Liquid Retaining Structures

Structure No: 5 **Date Inspected:** 05-Jul-99
Name: Aeration tank

Reference drawings
 Plan & section - structural: Bosna Dwg numbers: 2, 3, and 8

Dimensions		Aeration tank	Inlet structure	Outlet structure	
Exterior wall length (m)	121	Length (m)	61.5	Length (m)	4
Exterior wall height (m)	4.7	Width (m)	3.2	Width (m)	53.95
Exterior wall thickness	350	Channel width (m)	1.35		
Dividing center wall length (m)	120.3	Channel height (m)	2.01	Partition wall	
Dividing wall height (m)	2.39			length (m)	113.68
				thickness (mm)	200

Elevations

top of wall	489.2	max water level	488.77
top of aerator slab	489.75		
top of footing	484.9		
ground elevation	486.2		

Viewed from exterior

Expansion joints - walls			Expansion joints - floor			Construction joints			
Location	Condition	Length to be repaired (m)	Location	Condition	Length to be repaired (m)	Location	Condition	Length to be repaired (m)	
								V	H
East wall			Floor			Inlet structure (south)			
Grid line (5-6)	x	7.7	Grid line 1	x	49	E face	x		
Grid line (11-12)	1	7.7	Grid line (5-6)	x	49	S face	x		5
Grid line (15-16)	x	7.7	Grid line (11-12)	x	49	W face	1	4.75	
Grid line (20)	x	7.7	Grid line (15-16)	x	49				
West wall			Grid line (20)	x	49				
Grid line (5-6)	x	7.7							
Grid line (11-12)	x	7.7	Grid line A-B	x	115				
						Outlet structure (North)			
Grid line (15-16)	x	7.7	Grid line (D)	x	115	E face	1	4.2	4
Grid line (20)	x	7.7	Grid line (G-F)	x	115				
South wall			Grid line (G-H)	x	115	N face	1		107.9
Grid line (B1)	x	7.7	Grid line (J)	x	115	W face	1	4.2	4
Grid line (F1)	x	7.7	Grid line (L-M)	x	115				
Grid line (H1)	x	7.7				Channel - east	1		61.5
Grid line (L1)	x	7.7				Channel - west	1		61.5
Total	1	92.4			935			13.15	243.9

x	no visible leakage	x	no visible leakage	x	no visible leakage
1	visible leakage	1	visible leakage	1	visible leakage

Notes:

Visual Condition Survey - Liquid Retaining Structures

Structure No: 5 Date Inspected: 5-Jul-99
 Name: Aeration tank

Exterior

Location	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
East Wall									
1 to 3	1	1	b	6	6	x		x	
3 to 5	1	2	a	4.7	9.4	x		x	
	1	4	b	6	24	x		x	
5 to 7	1	1	a	4.7	4.7	x		x	
	1	2	b	6	12	x		x	
7 to 9	1	5	a	4.7	23.5	x		x	
	1	1	b	6	6	x		x	
9 to 11	1	3	a	4.7	14.1	x		x	
	1	2	b	6	12	x		x	
11 to 13	1	2	a	4.7	9.4	x		x	
	1	1	b	6	6	x		x	
13 to 15	1	2	a	4.7	9.4	x		x	
	1	2	b	6	12	x		x	
15 to 17	1	1	a	4.7	4.7	x		x	
	1	2	b	6	12	x		x	
17 to 19	1	3	a	4.7	14.1	x		x	
	1	4	b	6	24	x		x	
19 to 20	x								
Total		38			203.3				

- | | | | |
|---|--|---|--------------------|
| x | no visible defects | x | no visible defects |
| 1 | active leakage or evidence of previous leakage | d | Spalling concrete |
| | a vertical through section | e | Frost damage |
| | b 45° through section | f | Delamination |
| | c shallow | g | Inadequate cover |
| | | h | Visible corrosion |

Notes

Visual Condition Survey - Liquid Retaining Structures

Structure No: 5 Date inspected: 05-Jul-99
 Name: Aeration tank

Exterior

Location	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
West Wall									
1 to 3	1	1	a	4.7	4.7	x		x	
3 to 5	1	2	a	4.7	9.4	x		x	
3 to 5	1	2	b	6	12	x		x	
5 to 7	1	1	a	4.7	4.7	x		x	
7 to 9	1	2	a	4.7	9.4	x		x	
9 to 11	1	2	a	4.7	9.4	x		x	
11 to 13	1	2	a	4.7	9.4	x		x	
13 to 15	1	3	a	4.7	14.1	x		x	
15 to 17	1	1	a	4.7	4.7	x		x	
17 to 19	1	4	a	4.7	18.8	x		x	
17 to 19	1	1	b	6	6	x		x	
19 to 20	x				0	x		x	
Total		21			102.6				

- | | | | |
|---|--|---|--------------------|
| x | no visible defects | x | no visible defects |
| 1 | active leakage or evidence of previous leakage | d | Spalling concrete |
| | a vertical through section | e | Frost damage |
| | b 45° through section | f | Delamination |
| | c shallow | g | Inadequate cover |
| | | h | Visible corrosion |

Notes west side has fewer cracks than east side
 45 degree cracks on west side are not as pronounced as east side

Visual Condition Survey - Liquid Retaining Structures

Structure No: 5 Date Inspected: 5-Jul-99
 Name: Aeration tank

Aeration tank	Exterior					Interior			
	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
North Wall (outlet)									
Grid line a to d	1	3	a	4.7	14.1	x		x	
Grid line d to g	x					x		x	
Grid line g to j	1	2	a	4.7	9.4	x		x	
Grid line j to m	x					x		x	
sub-total					23.5				
South wall									
Grid line a to d	1	2	a	2.1	4.2	x		x	
Grid line d to g	1	2	a	2.1	4.2	x		x	
Grid line g to j	1	2	a	2.1	4.2	x		x	
Grid line j to m	1	2	a	2.1	4.2	x		x	
sub-total					16.8	x		x	
Total					80.6				

- | | | | |
|---|--|---|-------------------|
| x | no visible defects | x | |
| 1 | active leakage or evidence of previous leakage | d | Spalling concrete |
| | a vertical through section | e | Frost damage |
| | b 45° through section | f | Delamination |
| | c shallow | g | Inadequate cover |
| | | h | Visible corrosion |

Notes west side has fewer cracks than east side
 45 degree cracks on west side are not as pronounced as east side

Visual Condition Survey - Liquid Retaining Structures

Structure No: 6.4

Date Inspected: 29-Jun-99

Name: Secondary Clarifier

Reference drawings

Plan and sections: Degremont Ref No. 551-9-1016-1, Dwg No. 401 & 402

Dimensions

Inside Diameter (m)	52.0	Hydraulic Surface (m2)	2,124
Inside Circumference (m)	81.7	Volume (m3)	7,390
Floor slab surface area (m2)	2,119	Perimeter Depth (m)	3.00
Interior wall surface (m2)	245.1	Depth at Centre (m)	4.27

Elevations

top of wall	488.16	normal water level	487.7
top of footing	484.7	maximum water level	487.69

Expansion joints

Location	Walls			Effluent launder		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		V	H		V	H
E	1	3	2	1	2.21	0.8
S	1	3	2	1	2.21	0.8
W	1	3	2	1	2.21	0.8
N	1	3	2	1	2.21	0.8
Total	4	12	8	4	8.84	3.2

Location	Floor (circumferential)			Floor (radial)		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		inner ring	outer ring		V	H
E	1	2.55	19.33	1		25
S	1	2.55	19.33	1		25
W	1	2.55	19.33	1		25
N	1	2.55	19.33	1		25
Total	4		77.32			100

x	no visible leakage	x	no visible leakage
1	visible or probable leakage	1	visible or probable leakage

Notes

1. Leakage through expansion joints could not be visually assessed because the tanks are buried
2. Mastic seals in all wall joints need to be replaced
3. There is no visible leakage of groundwater into the tank at expansion joints
4. Expansion joints in effluent launders have failed and will not hold water
5. Deep cracking along walls of effluent launder at regular intervals

Visual Condition Survey - Liquid Retaining Structures

Structure No: 6.4 Date Inspected: Jun-30
 Name: Secondary Clarifier

Interior elevations

Location	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	V Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
Walls									
N to E	1	2	a	3	6	d	61.28	g, h	45.96
E to S	1	4	a	3	12	d	61.28	g, h	45.96
S to W	1	3	a	3	9	d	61.28	g, h	45.96
W to N	1	3	a	3	9	d	61.28	g, h	45.96
		12			36		245.1		183.83
Floor slab									
N to E						d		x	
E to S						d		x	
S to W						d		x	
W to N						d		x	
Overflow channel									
bottom						d		x	
top of wall						f		x	
N to E	1	6	a	0	0				
E to S	1	11	a	1.37	15.07				
S to W	1	5	a	1.37	6.85				
W to N	1	12	a	1.37	16.44				
		34			38.36				

x no visible defects
 d Spalling concrete
 e Frost damage
 f Delamination
 exposed steel g
 corrosion marks on concrete h

Notes

1. Reinforcing steel on all interior wall surfaces has inadequate cover (less than 25 mm)
2. Corrosion starts from water line extending to base of wall
3. Concrete is spalling along line of reinforcement

Visual Condition Survey - Liquid Retaining Structures

Structure No: 10 Date Inspected: 1-Jul-99
 Name: Sludge thickener

Reference drawings

Plan and sections: Degremont Ref No. 551-9-1016-1, Dwg No. 501

Dimensions

Inside Diameter (m)	30	Hydraulic Surface (m ²)	707
Inside Circumference (m)	47.1	Volume (m ³)	3110
Interior wall surface (m ²)	164.9	Perimeter Depth (m)	3.5
floor slab surface area (m ²)	713.6	Depth at Centre (m)	6.2
Overflow Channel			
width (mm)	600		
depth (mm)	1100		

Elevations

top of wall	490.4	normal water level	488.3
top of footing	486.2		
ground elevation	486.4		

Expansion Joints

Location	Walls			Effluent launder		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		V	H		V	H
N to E						
E to S						
S to W						
W to N						
Total	0	0	0	0	0	0
Location	Floor (circumferencial)			Floor (radial)		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		inner ring	outer ring		V	H
N to E	1	0	143.1			
E to S	1	0	143.1			
S to W	1	0	143.1			
W to N	1	0	143.1			
Total	4		573	0		0

1 probable leakage but no hydraulic test

Notes There are no expansion joints on this structure

Visual Condition Survey - Liquid Retaining Structures

Structure No: 10 Date Inspected: Jun-30
 Name: Sludge thickener

Interior elevations

Location	Cracks						Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	V Crack length (m)	H Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m ²)	Type of defect	Surface area (m ²)
Walls										
N to E	1	15	a	3.5		52.5	d,e	41.23	g, h	41.23
E to S	1	15	a	3.5		52.5	d,e	41.23	g, h	41.23
S to W	1	15	a	3.5		52.5	d,e	41.23	g, h	41.23
W to N	1	15	a	3.5		52.5	d,e	41.23	g, h	41.23
		60				210		164.93		164.93
Floor slab										
N to E							d		x	
E to S							d		x	
S to W							d		x	
W to N							d		x	
Effluent launder										
bottom							d		x	
top of wall							f		x	
N to E	1	13	a	1	0.6	20.8				
E to S	1	10	a	1	0.6	16				
S to W	1	16	a	1	0.6	25.6				
W to N	1	9	a	1	0.6	14.4				
		48				76.8				

- x no visible defects
- d Spalling concrete
- e Frost damage
- f Delamination
- g exposed steel
- h inadequate cover with visible corrosion

Notes

1. Reinforcing steel on all interior wall surfaces has inadequate cover (less than 25 mm)
2. Bottom rendering screed is not delaminated

Visual Condition Survey - Liquid Retaining Structures

Structure No: 16 **Date Inspected:** 1-Jul-99
Name: Sludge holding

Reference drawings

plan and sections: Degremont Ref No. 551-9-1016-1, Dwg No. 601

Dimensions

Inside Diameter (m)	30.0	Hydraulic Surface (m2)	707
Inside Circumference (m)	47.1	Volume (m3)	3,675
Interior wall surface (m2)	203	Perimeter Depth (m)	4.3
floor slab surface area (m2)	713.6	Depth at Centre (m)	

Elevations

top of wall	491.3	normal water level	490.8
top of footing	486.5		
ground elevation	486.5		

Expansion joints

Location	Expansion joints - walls			Effluent launder		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		V	H		V	H
NE 45 ⁰	x	4.3	1.5			
165 ⁰	x	4.3	1.5			
285 ⁰	x	4.3	1.5			
Total	0	12.9	4.5	0	0	0
Location	Floor (circumferencial)			Floor (radial)		
	Condition	Length to be repaired (m)		Condition	Length to be repaired (m)	
		inner ring	outer ring		V	H
NE 45 ⁰	x		14.1	x		13.5
165 ⁰	x		14.1	x		13.5
285 ⁰	x		14.1	x		13.5
				x		
Total	0		42.4	0		40.5

x	no visible leakage	x	no visible defect
1	visible defect but no hydraulic test	1	visible defect but no hydraulic test

Notes

1. There is no effluent launder on this structure
2. This structure was not tested for water-tightness
3. Expansion joints need new seal

Visual Condition Survey - Liquid Retaining Structures

Structure No: 16 Date Inspected: Jun-30
 Name: Sludge holding

Interior elevations

Location	Cracks					Surface deterioration		Condition of Reinforcing steel	
	Condition	Qty.	Crack depth	V Crack length (m)	Total length to be repaired (m)	Type of defect	Surface area (m2)	Type of defect	Surface area (m2)
Walls									
45 to 165	1	15	a	4.3	64.5	d,e	67.54	g, h	67.54
165 to 285	1	15	a	4.3	64.5	d,e	67.54	g, h	67.54
285 to 45	1	15	a	4.3	64.5	d,e	67.54	g, h	67.54
					193.5		202.63		202.63
Floor slab									
45 to 165						d		x	
165 to 285						d		x	
285 to 45						d		x	

x	no visible defects	no visible defects	x
1	visible or previous leakage	d	Spalling concrete
	a deep cracks	e	Frost damage
		f	Delamination
			exposed steel
			inadequate cover with visible corrosion
			g
			h

Notes
 1. Reinforcing steel on all interior wall surfaces has inadequate cover (less than 25 mm)
 2. bottom rendering screed is not delaminated