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JAN 13 1984

MEMORANDUM FOR THE COMMANDING GENERAL

Via: (1) Assistant Chief of Staff, Facilities
(2) Chief of Staff

Subj: Report of Damage Due to Broken Pipes from Heavy Freeze 25-26 December 1983

Ref: (a) NAVFAC Specification N62470-81-B-1047

Encl: (1) Family Housing Units with Broken Pipes
(2) Computations

1. Background. On 25-26 December 1983 the temperature in Jacksonville dropped to 10°F accompanied by westerly winds up to 28 knots (wind-chill temperature -31°). This represented a 22-year low. Three hundred and thirty-six family housing units suffered frozen/broken pipes, and subsequent water damage. The purpose of this report is to explore the cause and make recommendations to minimize the effect of damage in future cold snaps.

2. Findings.

- a. 336 family housing units suffered broken pipes. See enclosure (1).
- b. 191 of these units were in Tarawa Terrace II. See enclosure (1).
- c. 39 of these units were in Tarawa Terrace I. See enclosure (1).
- d. 46 of these were at MCAS(H). See enclosure (1).
- e. 60 of these were in all other housing areas. See enclosure (1).
- f. The amount of damaged units by percentage: See enclosure (2).

<u>Area</u>	<u>% of Area Units</u>	<u>% of Breaks</u>
(1) Tarawa Terrace I	4.2%	11.6%
(2) Tarawa Terrace II	20.6%	56.8%
(3) MCAS(H)	10.5%	13.7%
(4) Paradise Point, Watkins Village, Capeharts, Midway Park, Rifle Range, Court-house Bay	2.7%	17.9%
(5) Base overall	7.5%	100.00%

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g. 52.8% of the breaks in Tarawa Terrace II were pipes in the attics and caused damage to the structure (enclosures (1) and (2)).

h. 82% of the Tarawa Terrace II units with structural damage due to broken pipes in the ceiling had been remodeled under Contract N62470-81-B-1047.

3. Opinions.

a. The breakage in most areas was within reasonable limits expected for the extreme low temperature (22-year low).

b. The breakage in Tarawa Terrace II is not within those limits. Over half of all the broken pipes were in an area that has only one-fifth of the housing units.

c. That the Tarawa Terrace units have an oversized air ventilation system in the attic.

4. Facts.

a. The reference required insulation on all above ground piping (page 15181-3).

b. The piping had not been insulated to comply with the design specification.

c. Documentation that the Contract N62470-81-B-1047 had been modified removing the requirement for insulation could not be obtained.

5. Conclusion.

a. That the primary cause of the damage was due to the cold and wind-chill.

b. That in Tarawa Terrace II the amount of damage was significantly increased by a lack of sufficient insulation on the pipes.

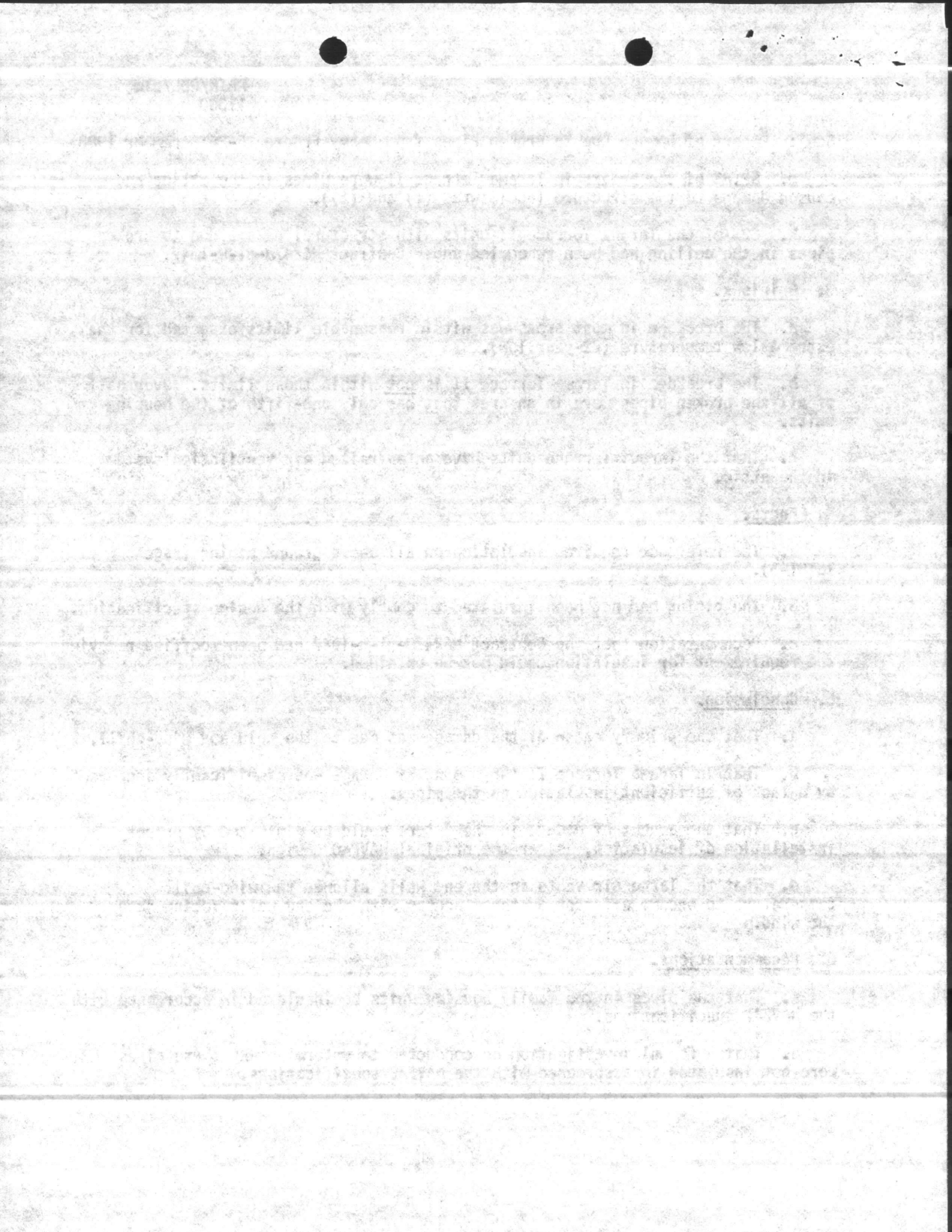
c. That the amount of damage in the future could be minimized by proper installation of insulation, as per the original NAVFAC design.

d. That the large air vents in the end walls allowed the wind-chill temperature to become a factor on those houses with the end walls facing into the wind.

6. Recommendations.

a. That the pipes in the family housing units be insulated in accordance with the NAVFAC specifications.

b. That a formal investigation be conducted to determine why these pipes were not insulated in accordance with the NAVFAC specifications.



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c. That the investigation further examine the following:

(1) Will the trusses that were cut to make room for duct work support the ceiling and roof with a snow load?

(2) Are pipes in the walls insulated only in places that are easy to inspect?

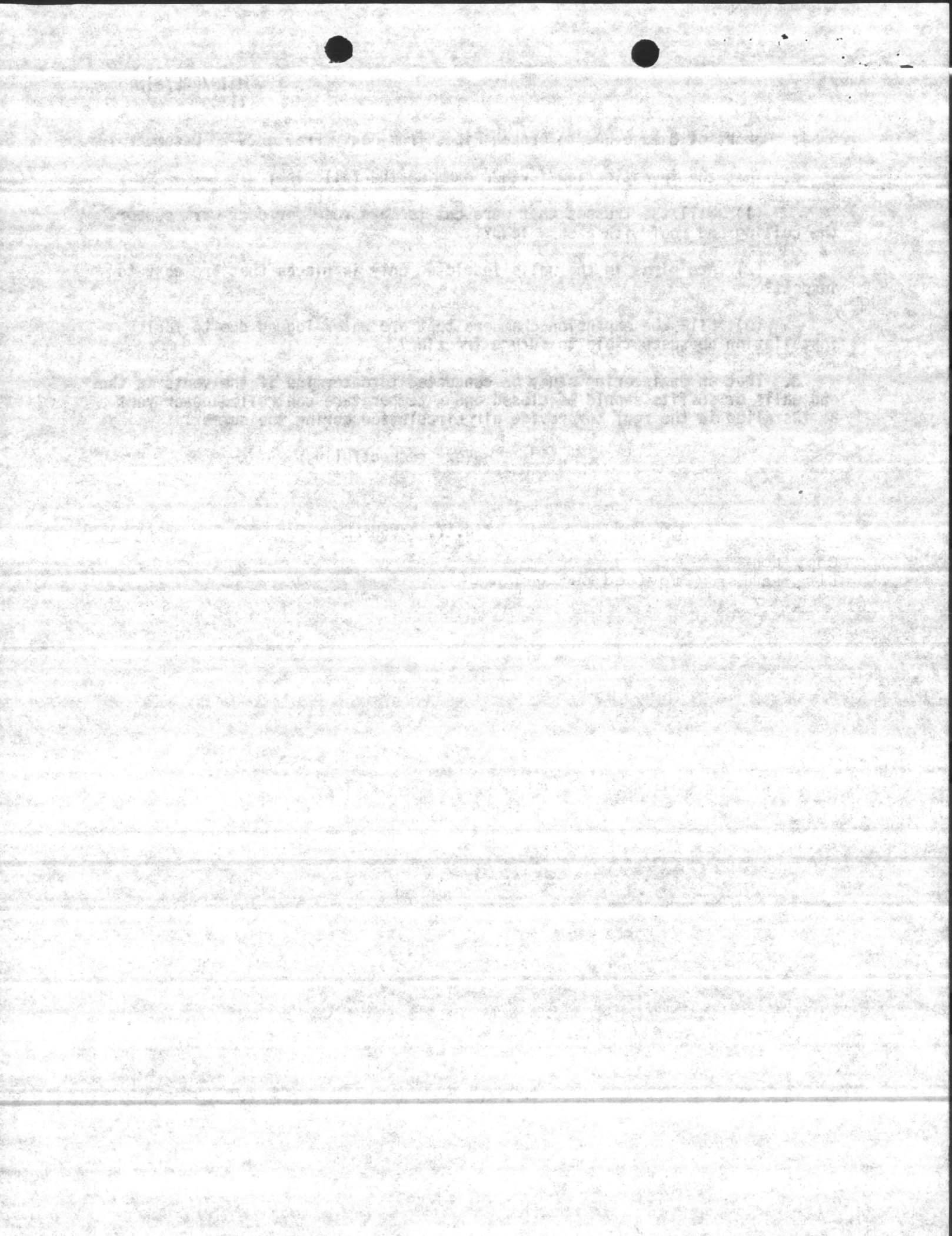
(3) Will the expansion chambers that are water logged due to faulty installation be susceptible to future freezing?

d. That an engineering study be conducted to determine if the vents in the end walls or soffits should be closed and a temperature controlled power vent be installed in the roof to provide air circulation during the summer.

Very respectfully,

J. T. MARSHALL

Copy to:
Dir, FamHsg (Provided on 26 Jan 84)



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W = Westminster

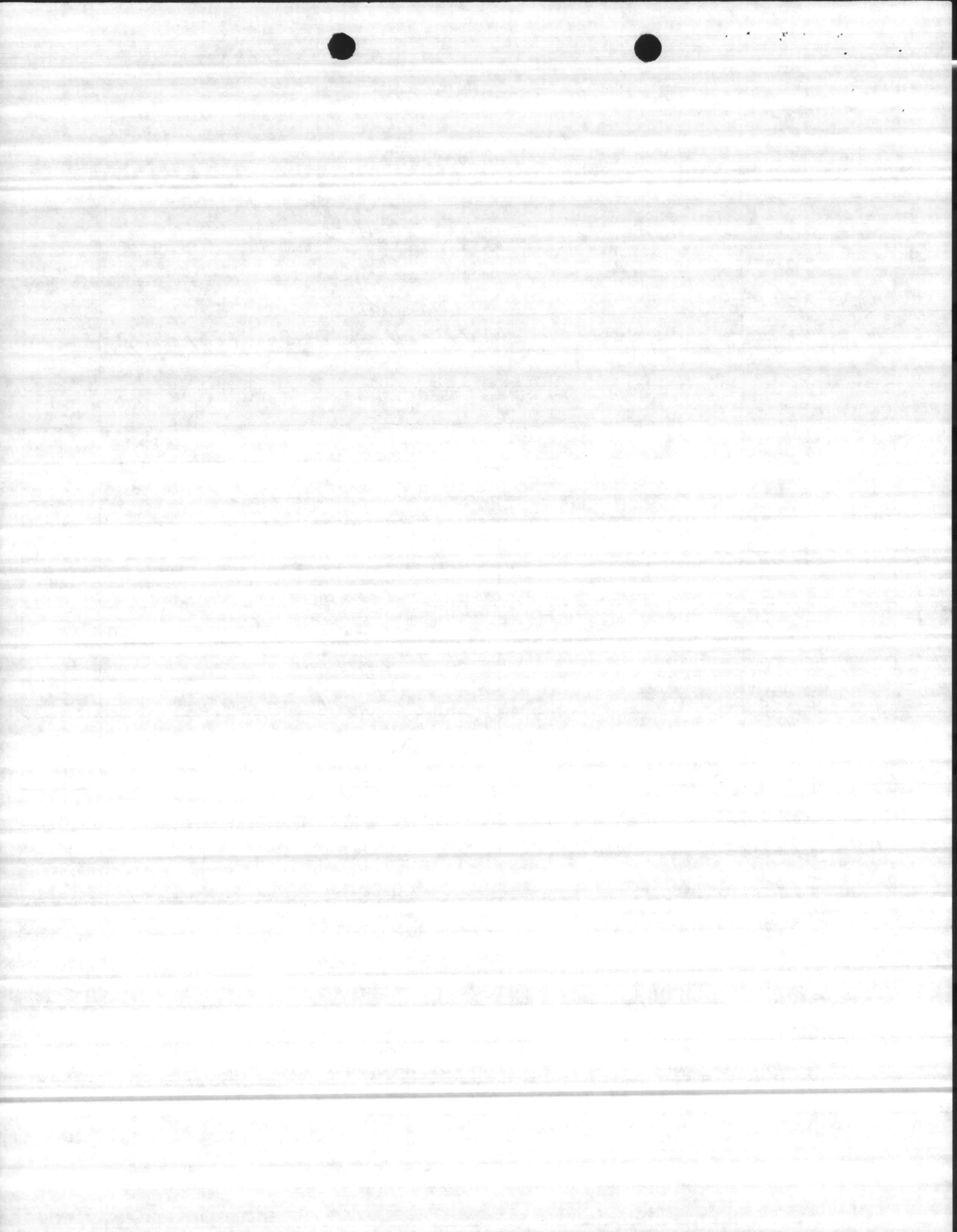
G = Guyton

Tarawa Terrace II

UNIT

CONT

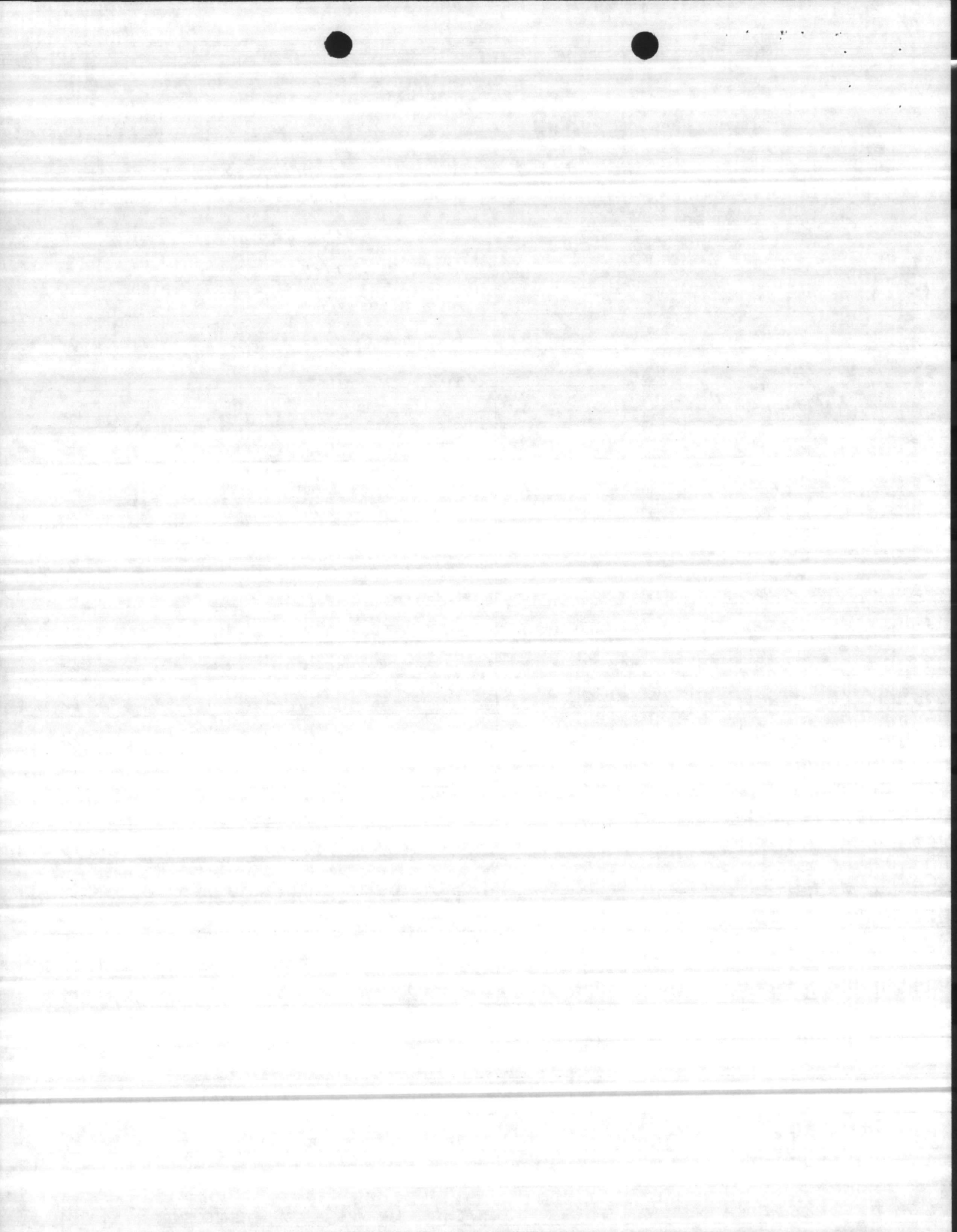
1	TT-II	2007	DIN + BATH ROOM ceiling	W
2	TT-II	2031	wall	W
3	"	2038	Kit Ceiling	W
4	"	2044	Kit Ceiling	W
5	"	2064	Ceiling	W
6	"	2066	sht Rock on wall in hall/ceiling	W
7	"	2068	wall	W
8	"	2113	wall	W
9	"	2120	wall	W
10	"	2146	wall	G
11	"	2164	Bath ceiling	G
12	"	2180	wall	G
13	"	2184	wall	G
14	"	2186	wall	G
15	"	2196	Bath ceiling	G
16	"	2202	wall	G
17	"	2210	wall	G
18	"	2212	Hall Kit + LR Ceiling	G
19	"	2214	wall / pipe	G
20	"	2228	wall / pipe	G
21	"	2234	wall / pipe	G
22	"	2236	wall	G
23	"	2259	wall	W
24	"	2272	Kit Ceiling	G
25	"	2276	sht Rock ceiling	G
26	"	2292	Tape + Finest sht Rock	G
27	"	2304	wall	G
28	"	2308	wall	G
29	"	2312	Kit Ceiling	G
30	"	2348	Kit Ceiling ENCLOSURE (11)	W



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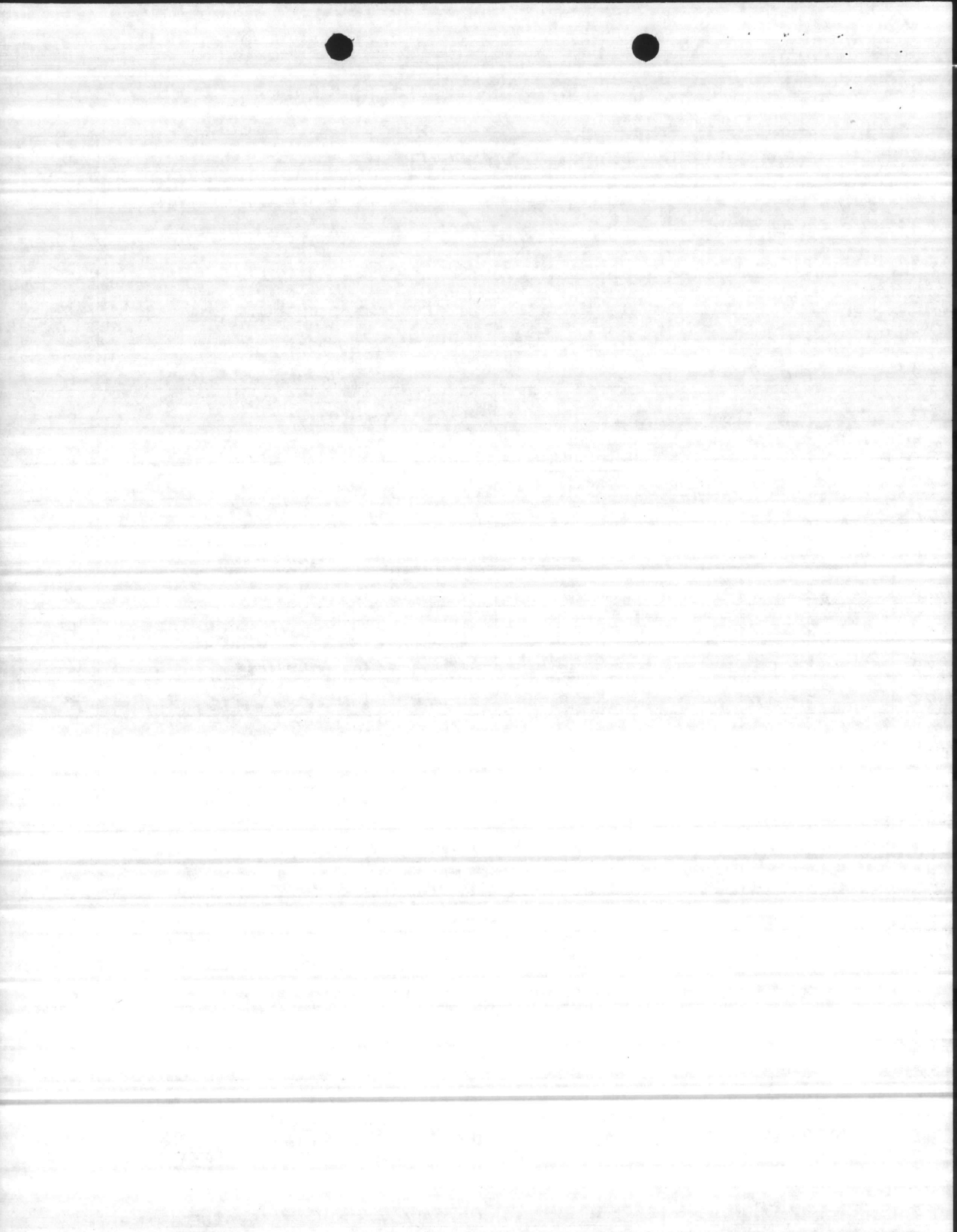
31	II-II	2356	Kit ceiling	w
32	"	2358	Kit ceiling	w
33	"	2362	Ceiling	w
34	"	2383	Kit Ceiling	w
35	"	2389	Kit Ceiling	w
36	"	2413	Kit Ceiling	w
37	"	2405	BATH Ceiling	w
38	"	2415	wall	w
39	"	2418	Ceiling	w
40	"	2422	Ceiling	w
41	"	2432	wall	w
42	"	2434	Kit Ceiling	w
43	"	2436	Bedroom Ceiling	w
44	"	2438	HALL closet ceiling	w
45	"	2440	wall	w
46	"	2442	wall	w
47	"	2421	Ceiling	w
48	"	2518	Bed Room Ceiling	w
49	"	2521	wall	w
50	"	2534	Kit + Hall Ceiling	w
51	"	2536	Kit ceiling	w
52	"	2538	Kit Ceiling	w
53	"	2542	wall	w
54	"	2548	Kit + LR Ceiling	w
55	"	2552	Kit, LR + BR Ceiling	w
56	"	2557	Ceiling	w
57	"	2562	Ceiling	w
58	"	2564	wall	w
59	"	2566	Ceiling	w
60	"	2572	Kit Ceiling	w

ENCLOSURE 118



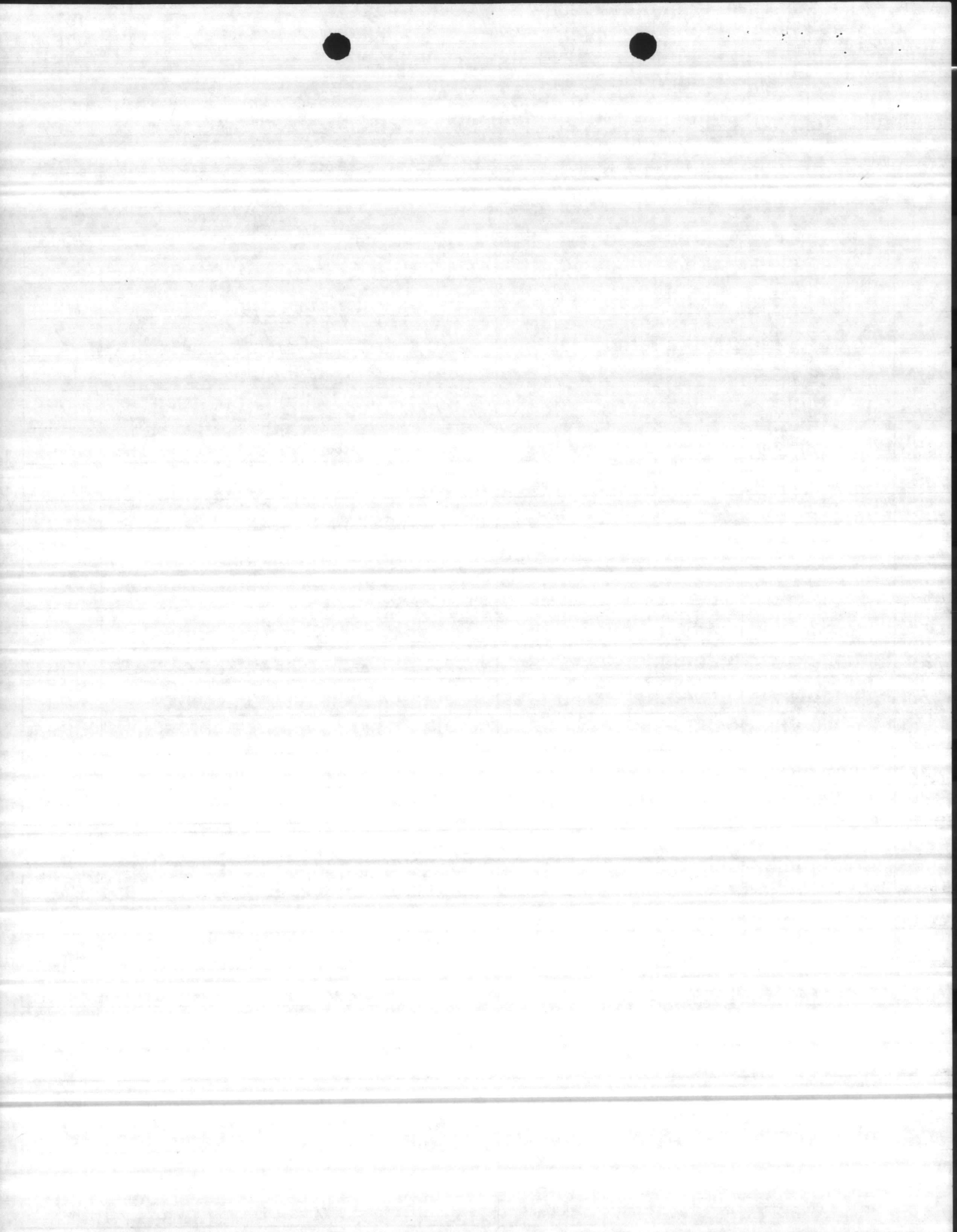
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61	II-II	2585	Kit Ceiling	W
62	"	2590	Ceiling	W
63	"	2599	Ceiling	W
64	"	2560	Kit + LR Ceiling	W
65	"	2618	Ceiling	W
66	"	2620	wall	W
67	"	2627	wall	W
68	"	2641	Kit Ceiling	W
69	"	2645	wall	W
70	"	2647	Ceiling	W
71	"	2657	Kit Ceiling	W
72	"	2664	wall	W
73	"	2687	wall	W
74	"	2697	wall	W
75	"	2703	Kit + BATH Ceiling	W
76	"	2708	Ceiling	W
77	"	2710	Ceiling	W
78	"	2715	Ceiling	W
79	"	2718	Kit Ceiling	W
80	"	2719	Kit Ceiling	W
81	"	2743	wall	W
82	"	2780	Kit Ceiling	W
83	"	2783	wall	W
84	"	2785	Ceiling	W
85	"	2808	DN RM Ceiling	W
86	"	2809	Ceiling	W
87	"	2832	Ceiling	W
88	"	2834	DN RM ceiling	W
89	"	2844	wall	W
90	"	2851	DN RM / LR ceiling ENCLOSURE III	W



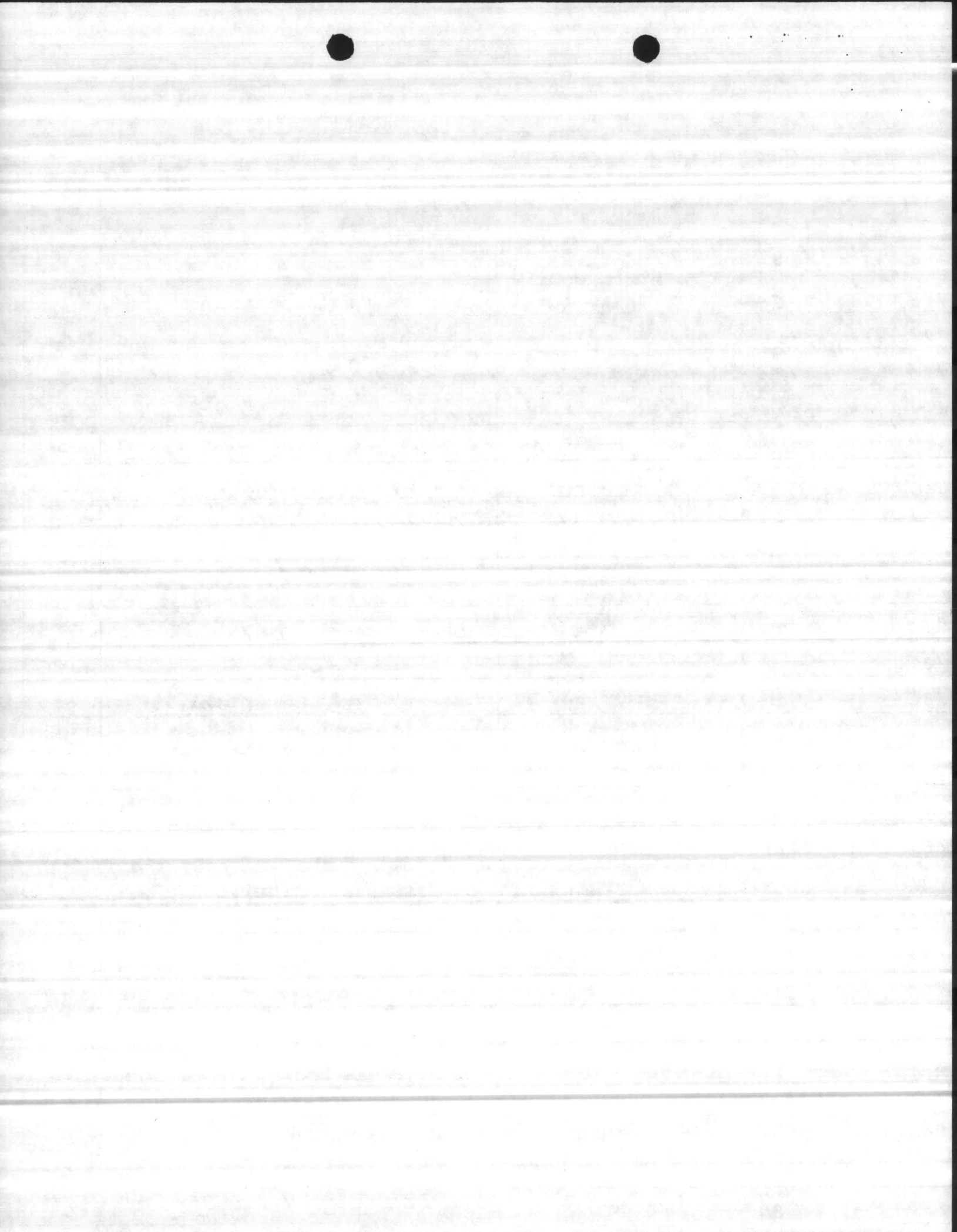
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91	II-II	2853	DN RM	Ceiling	W
92		2855		wall	W
93		2864		wall	W
94		2874	DN RM	Ceiling	W
95		2877		Ceiling	W
96		2915	BATH ROOM	Ceiling	W
97		2925		Ceiling	W
98		2928	L/R L/DN	Ceiling	W
99		2929		wall	W
100		2930	DN RM / L RM	Ceiling	W
101		2932	L-R	Ceiling	W
102		2934		wall	W
103		2939		wall	W
104		2947		Ceiling	W
105		2957	Dining + Living ROOM	Ceiling	W
106		2973		Ceiling	W
107		2989	Kit	Ceiling	W
108		2997		wall	W
109		2998		wall	W
110		2922	Kit	Ceiling	W
111		3007		Ceiling	W
112		3009		Ceiling	W
113		3012		wall	W
114		3016		wall	W
115		3018	DR	Ceiling	W
116		3023		Ceiling	W
117		3028		Ceiling	W
118		3030		Ceiling	W
119		3032		Ceiling	W
120		3034		wall	W



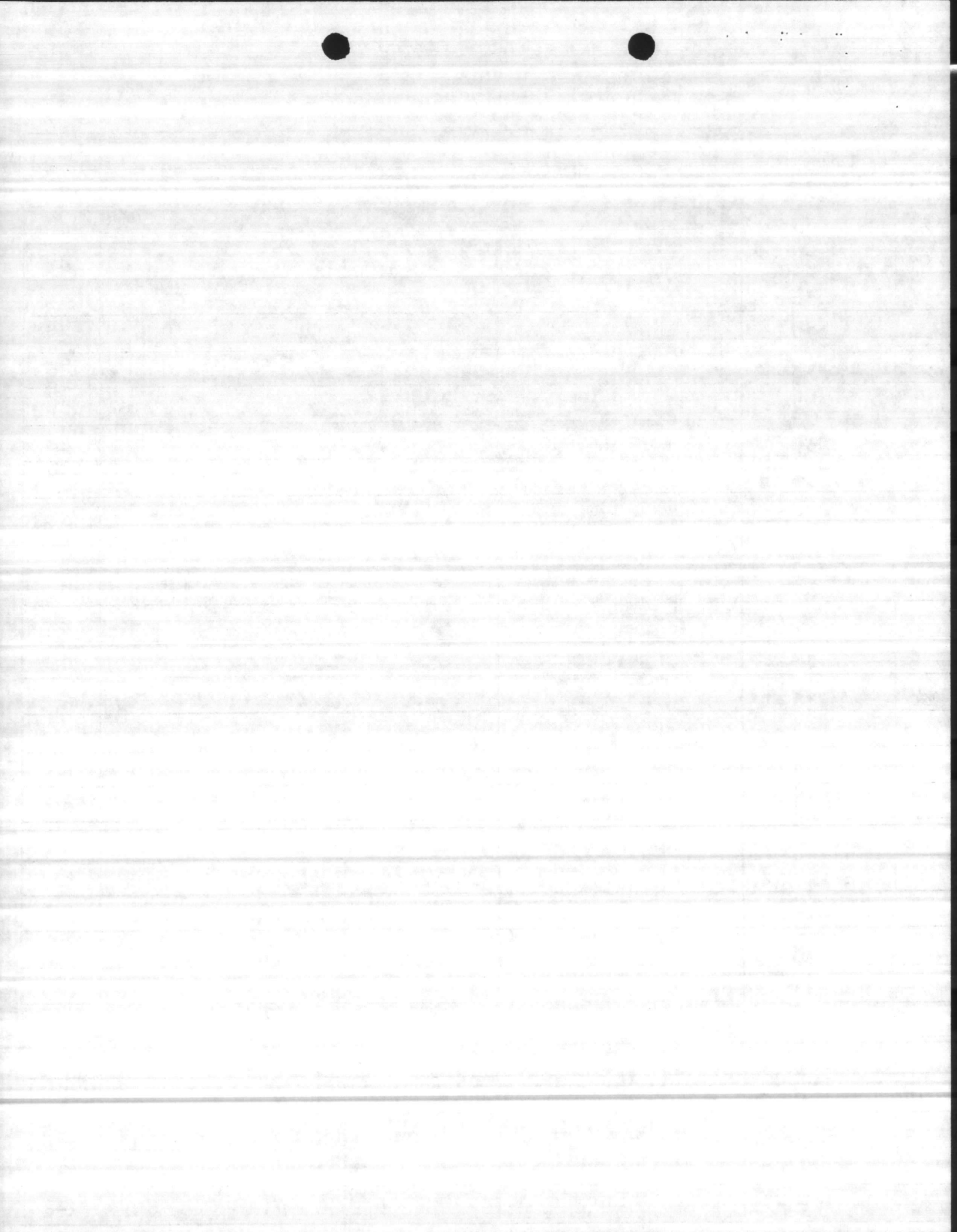
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121	TT-II	3040	Ceiling	W
122		3042	wall	W
123		3045	wall	W
124		3048	wall	W
125		3154	wall	G
126		3156	wall	G
127		3170	Kit + Hall Ceiling	G
128		3206	Kit ceiling	G
129		3222	Dining Room Ceiling	G
130		3227	Dining Room Ceiling	G
131		3231	BATH ROOM ceiling	G
132		3235	wall	G
133		3239	wall.	G
134		3244	BATH ROOM ceiling	W
135		3301	wall	W
136		3304	Kit & Liv Rm Ceiling	W
137		3305	BR + BATH Ceiling	W
138		3307	Ceiling	W
139		3309	wall	G
140		3310	wall	G
141		3311	ceiling	G
142		3313	wall	G
143		3316	wall	G
144		3317	wall	G
145		3319	wall	G
146		3321	wall	G
147		3342	wall	G
148		3325	wall	G
149		3327	wall	G
150		3329	wall	G



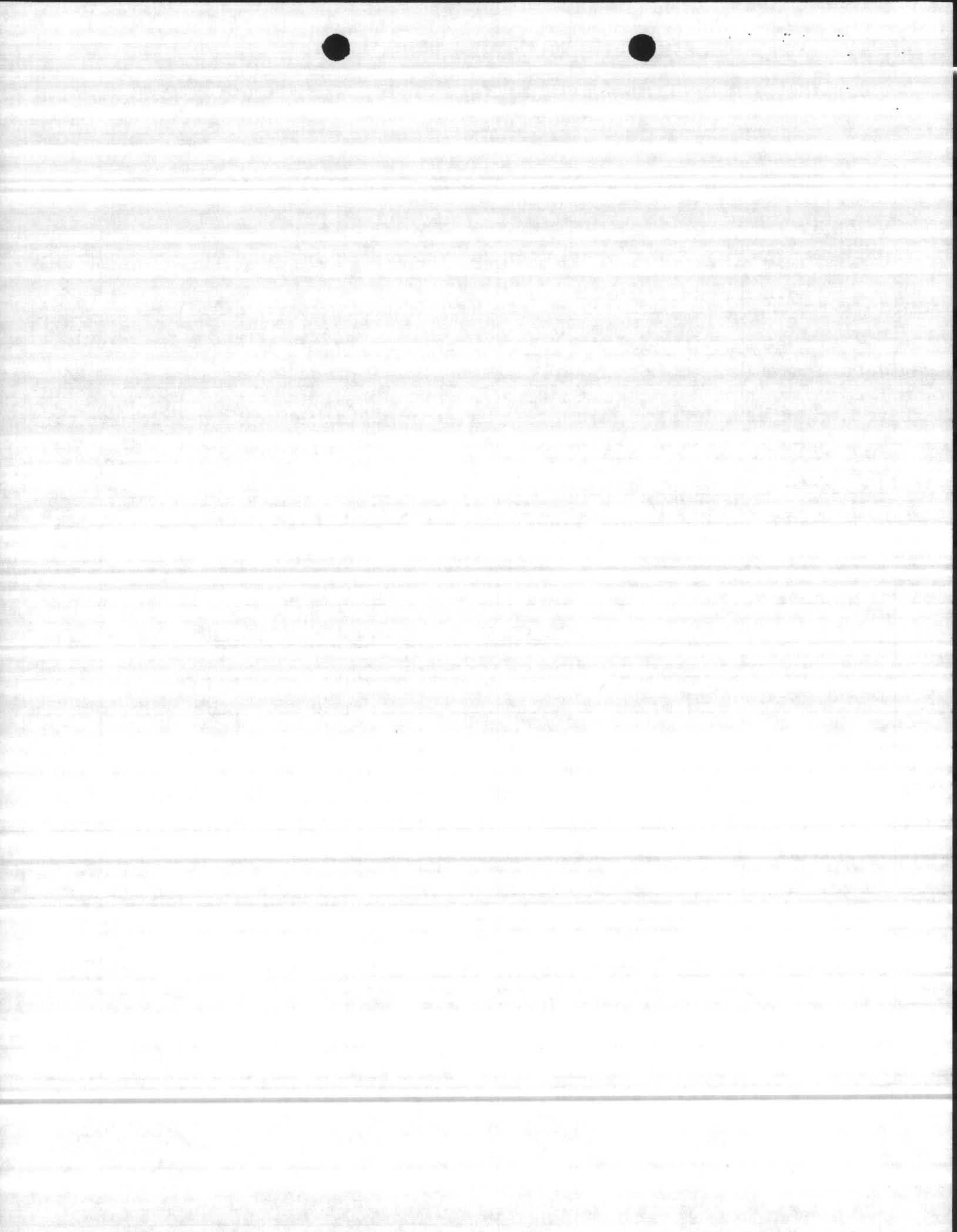
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151	TT-II	3361	wall	G
152		3371	wall	G
153		3375	Bed Room Ceiling	G
154		3376	wall	G
155		3385	wall	G
156		3386	wall	G
157		3388	wall	G
158		3390	wall	G
159		3312	wall	G
160		3407	wall	G
161		3408	wall	G
162		3411	Hall + Ln Ceiling	G
163		3412	wall	G
164		3413	Ceiling	G
165		3420	Wall	G
166		3422	wall	G
167		3427	wall	G
168		3428	Bed Room Ceiling	G
169		3429	wall	G
170		3431	wall	G
171		3432	Closet Ceiling	G
172		3435	wall	G
173		3436	wall	G
174		3438	wall	G
175		3440	Ceiling	G
176		3500	wall	G
177		3528	wall	G
178		3536	wall	G
179		3545	wall	G
180		3552	wall	G



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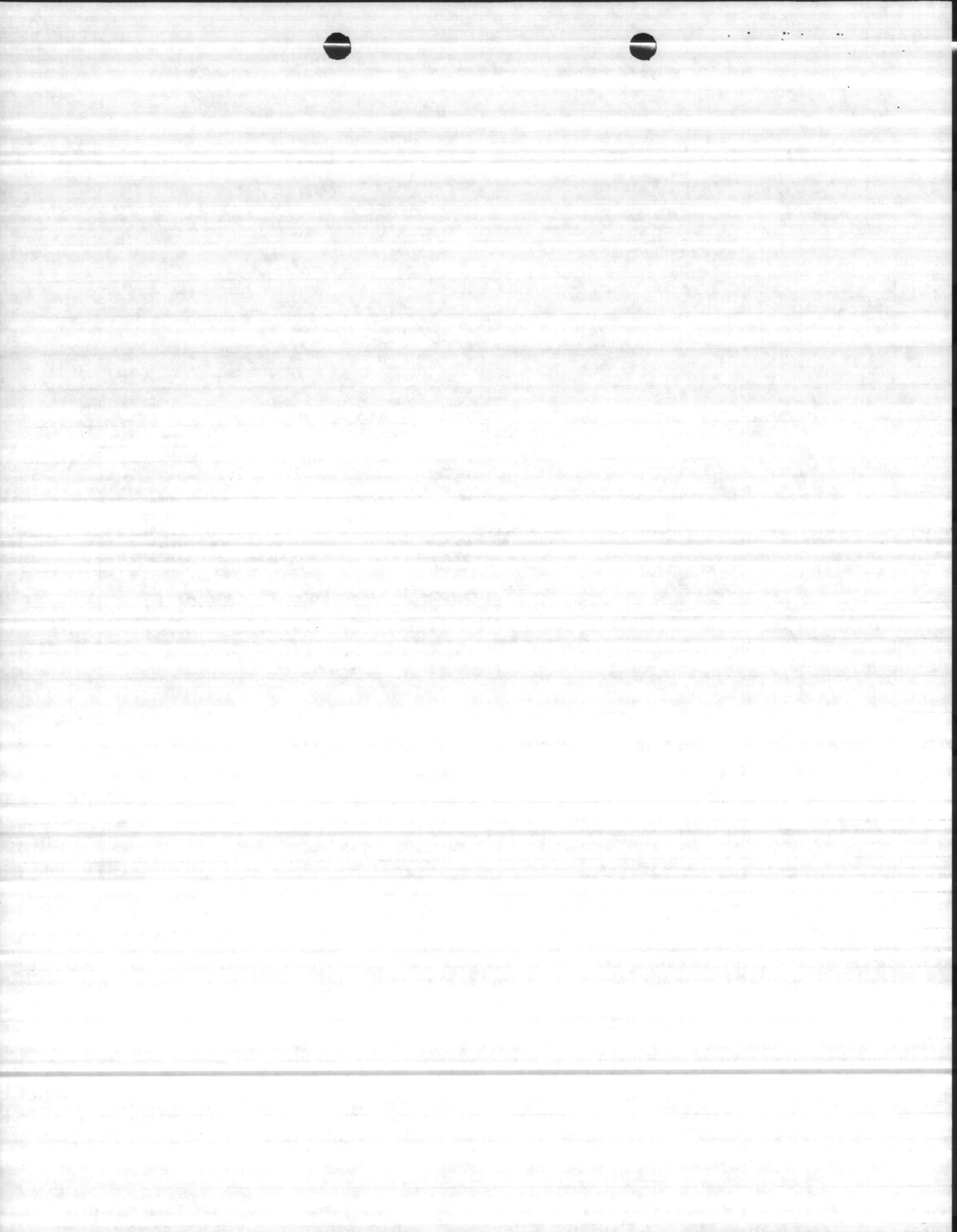
181	π -II	3556		wall	G
182	π -II	3566		wall	G
183	π -II	3099		ceiling	W
184	π -II	3266		ceiling	W
185	π -II	3522	HALL	ceiling	G
186	π -II	2580		ceiling	W
187	π -II	2309		ceiling	W
188	π -II	2614		ceiling	W
189	π -II	2925		ceiling	W
190	π -II	2138		ceiling	G
191	π -II	2599		ceiling	W



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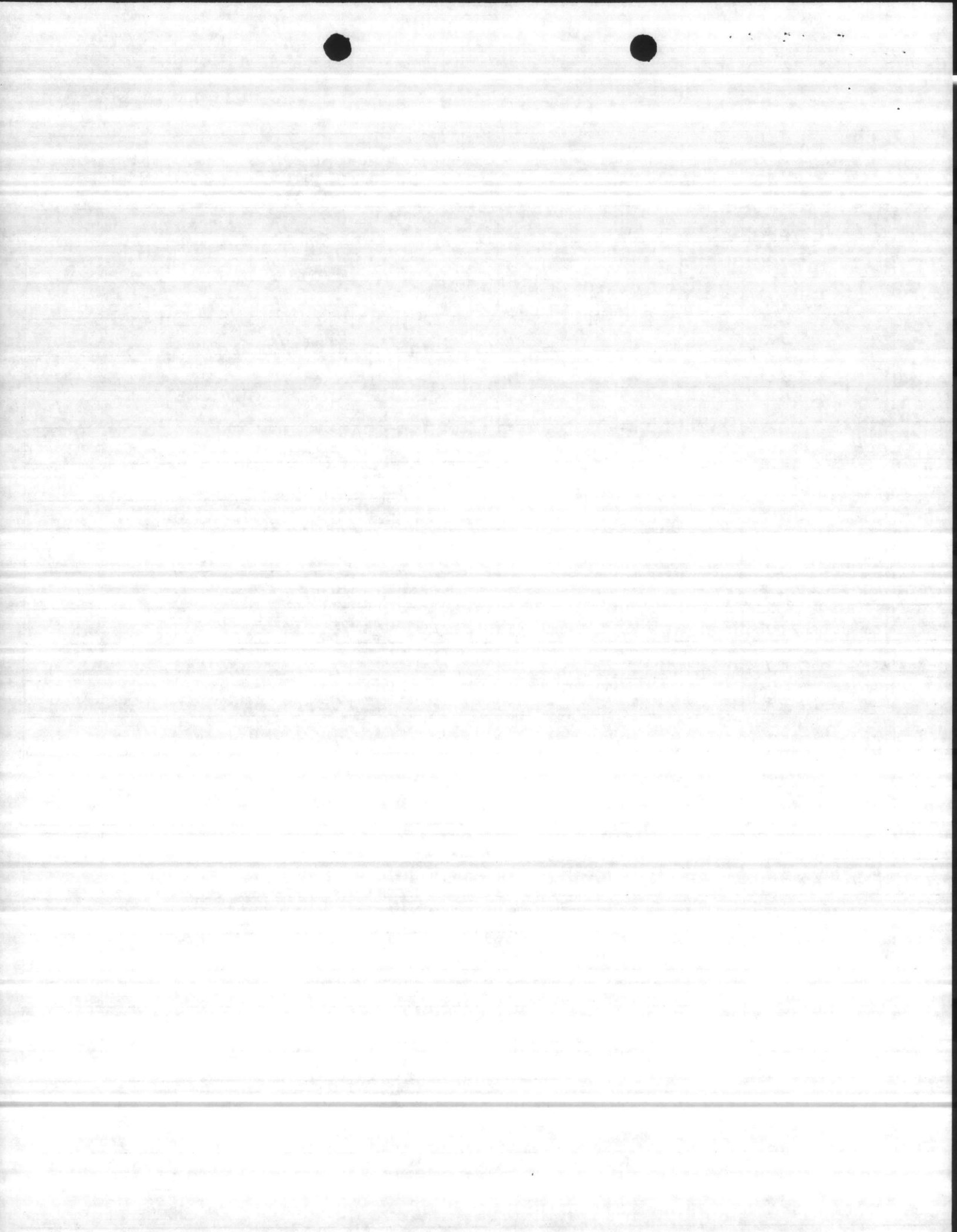
Taram Terrace I

UNIT			CONST
1.	TT-1	137	wall
2.	"	141	Ceilings
3.	"	147	wall
4.	"	181	Ceilings
5.	"	185	wall
6.	"	245	Bath Ceiling
7.	"	251	wall
8.	"	663	Kitt + LR Ceiling
9.	"	708	wall
10.	"	751	wall
11.	"	755	Hall Ceiling
12.	"	794	1st Sht Rock ceiling
13.	"	948	BATH + HALL closet ceiling
14.	"	950	Ceiling shoot rock + insul ^{+ Paint}
15.	"	955	wall
16.	"	978	wall
17.	"	980	wall
18.	"	991	wall
19.	"	1014	Bedroom Ceiling
20.	"	1016	Bedroom Ceiling
21.	"	1059	wall
22.	"	1086	Bedroom Ceiling
23.	"	1088	wall
24.	"	1106	wall
25.	"	1202	wall
26.	"	1208	wall
27.	"	1283	wall
28.	"	1305	wall
29.	"	1321	Ceiling (sht rock)
30.	"	1343	wall



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31	TI-1	1367	Dining Room Ceiling
32	TI-1	1379	Ceiling
33	TI-1	1429	wall
34	TI-1	1518	wall
35	TI-1	1524	wall
36	TI-1	1532	wall
37	TI-1	1530	wall
MOWY PARK			
1	LCH	1530	Pipes
2	LCH	1432	Pipes
3	LCH	1524	Handwood floor / Pipes / PLASTER W/ wall
4	LCH	1367	Pipes
5	LCH	702	Pipes
6	LCH	774	Pipes
7	LCH	1701	Pipes
8	LCH	1702	Pipes
9	LCH	1713	Pipes
38	TI-1	832	Ceiling
39	TI-1	1302	wall

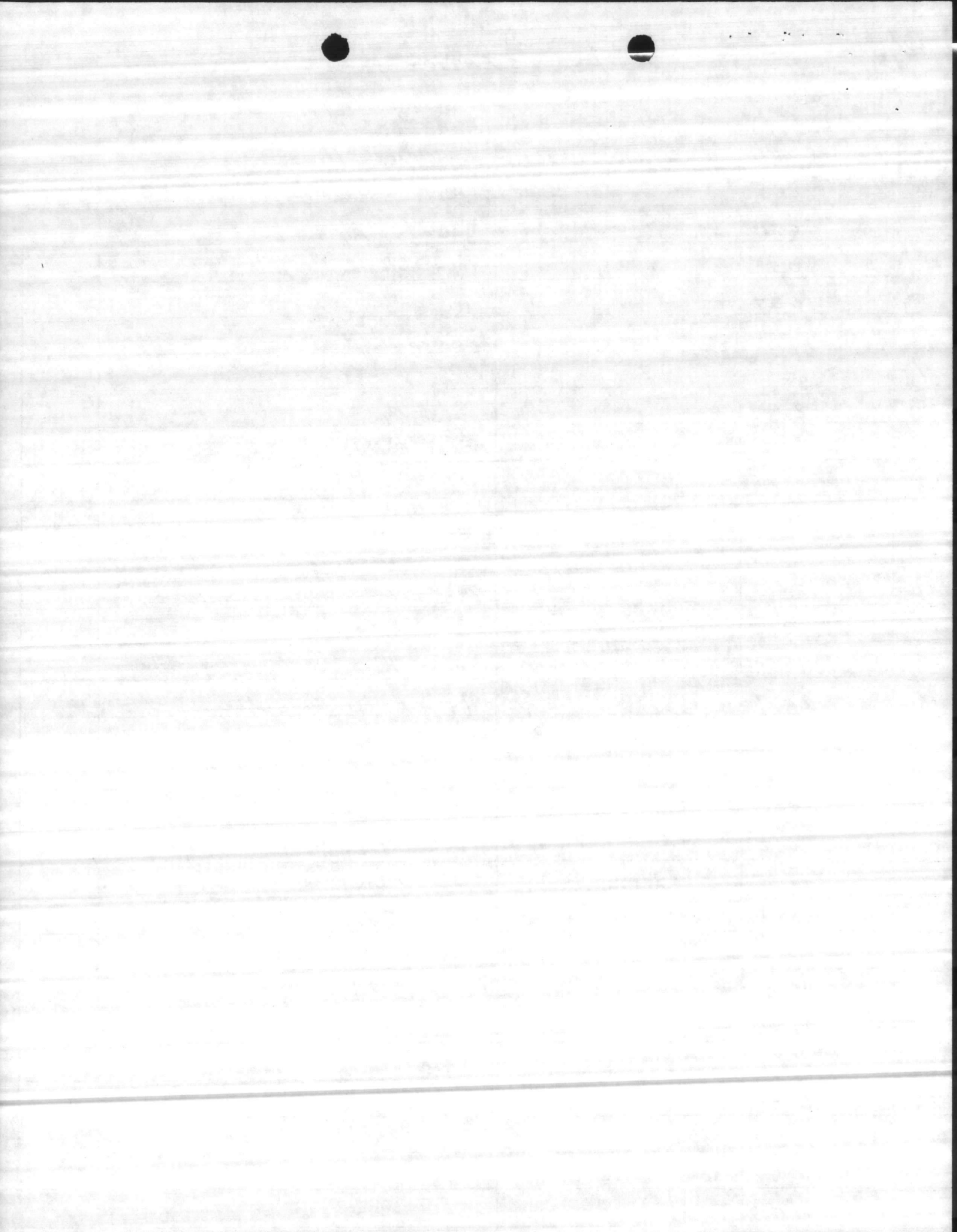


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AIR STATION

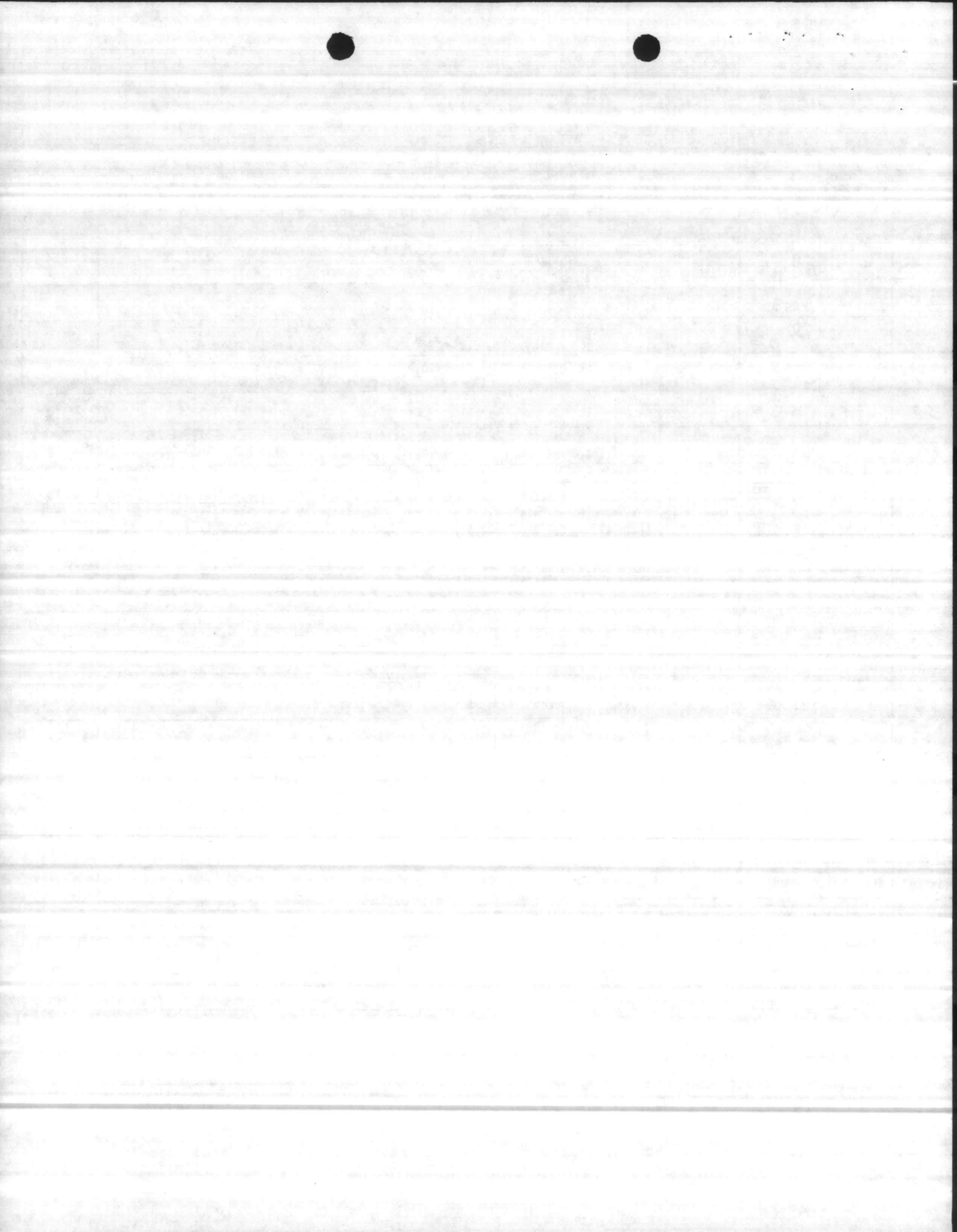
DAMAGE

1	AS	2051	Carport Ceilings
2	AS	2099	Kit Ceiling
3	"	1051	only pipes
4	"	1059	insulation replacement
5	"	1087	only pipes
6	"	2031	Carport Ceilings
7	"	2047	Pipes
8	"	2077	Pipes
9	"	2080	Pipes
10	"	2120	Kit Ceiling
11	"	2086	ceiling in hallway
12	"	2094	Pipes
13	"	2081	Plywood over & by front door
14	"	2066	Pipes
15	"	1254	Laundry Room Ceiling & Floor tiles
16	"	2071	Plywood by front door
17	"	1132	Pipes
18	"	2048	Pipes
19	"	1245	Pipes
20	"	2052	Pipes
21	"	1094	Pipes
22	"	2021	Pipes
23	"	1045	Ceiling Plaster
24	"	1314	LR Ceiling & Floor
25	"	1176	Ceiling in furnace Room
26	"	1165	insulation joints replaus
27	"	1293	Pipes
28	"	1129	Pipes
29	"	1272	Pipes
30	"	1103	Pipes



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31	AS	2017	LR + FURNACE room Ceiling
32	"	1256	Pipes
33	"	1208	Pipes
34	"	1234	Pipes
35	"	1131	Pipes
36	"	1203	insulation + FLOOR TILE
37	"	2039	wall behind washer
38	"	1037	Pipes
39	"	2076	Pipes
40	"	2072	Pipes
41	"	1274	Pipes
42	"	1173	Pipes
43	"	1202	Kitchen Ceiling + Floor tile
44	"	1056	Pipes
45	"	2119	FLOOR TILE + insulation
46	"	2065	Pipes

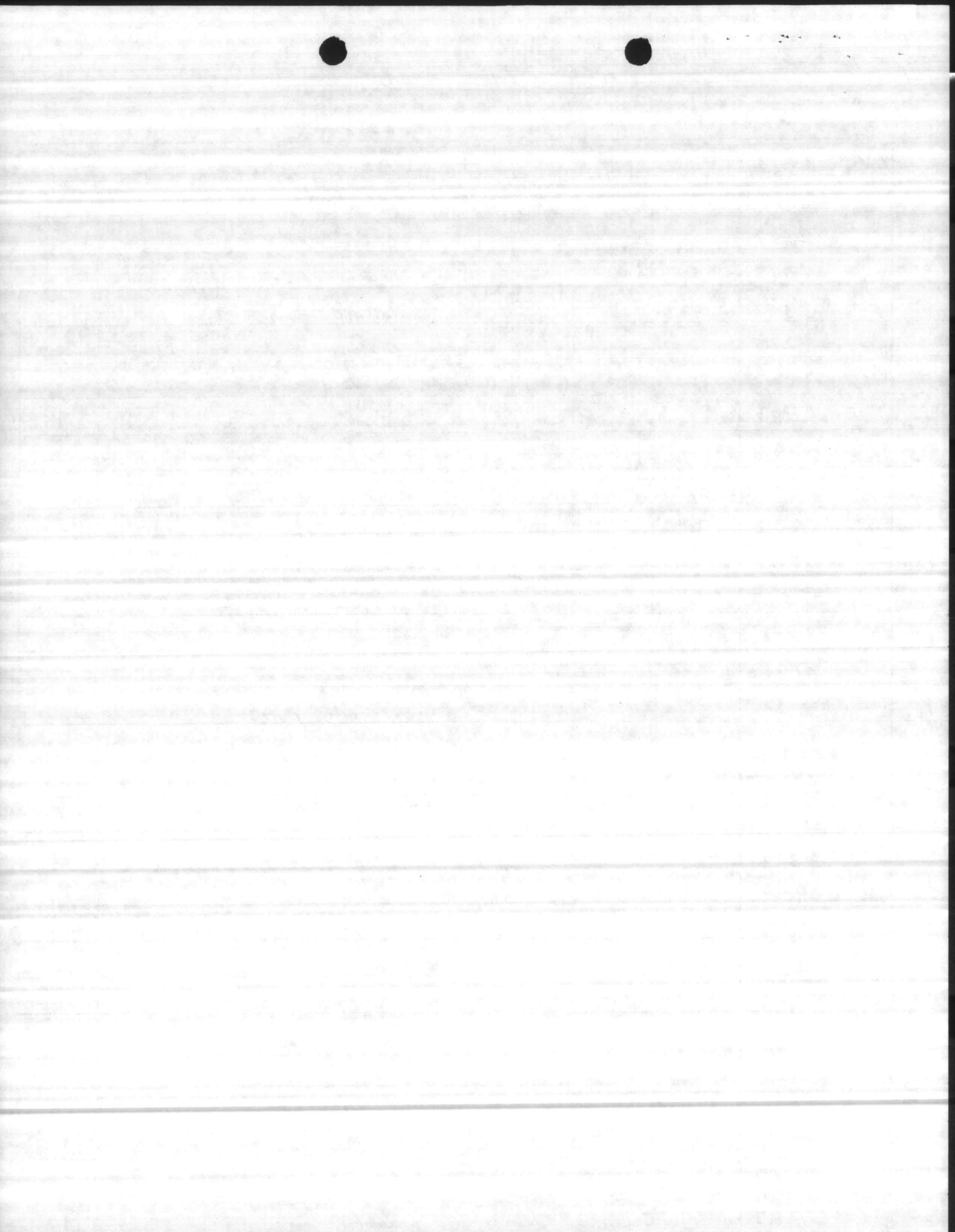


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ALL OTHER AREAS

DAMAGE

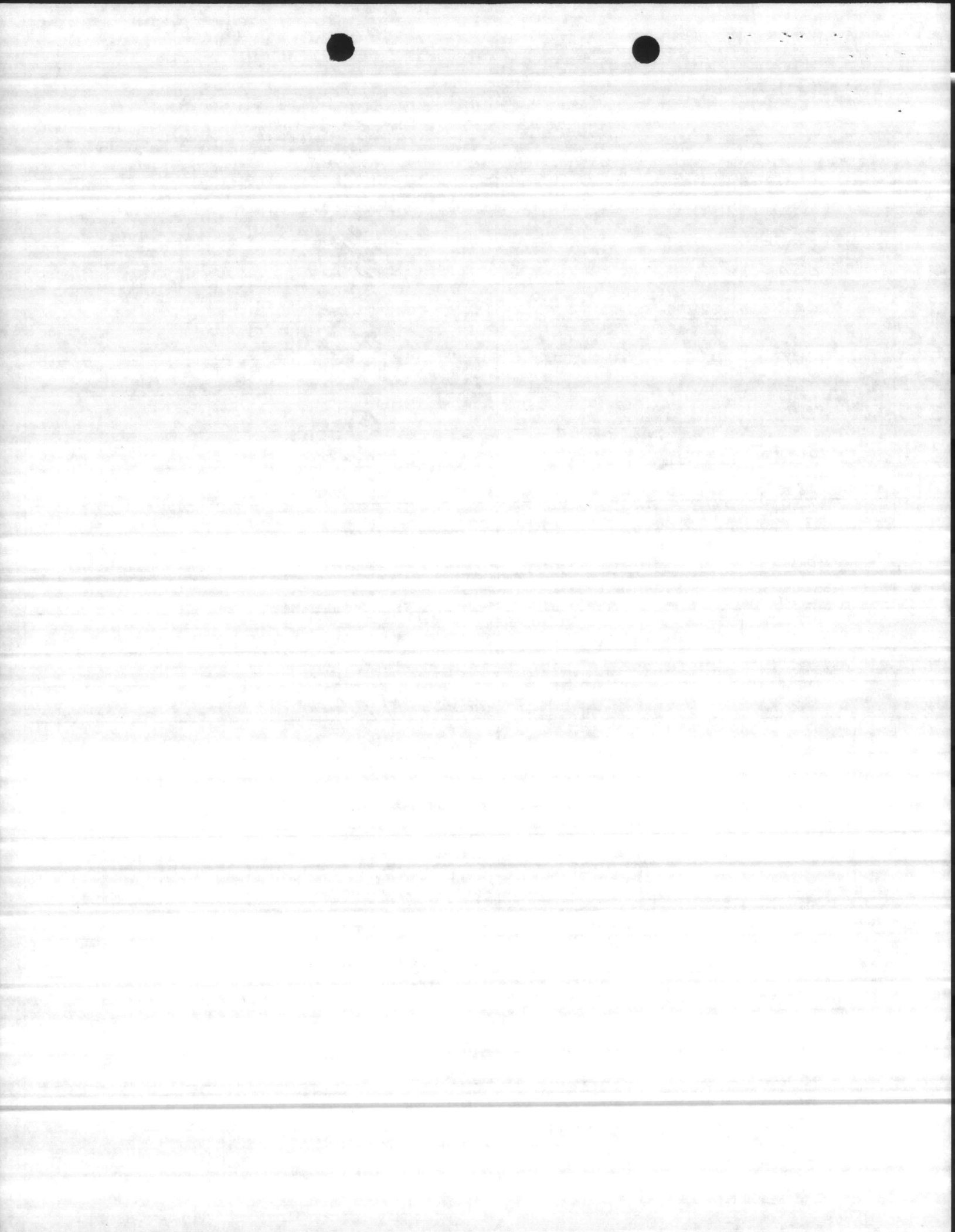
1	PP	2412	BROKEN PIPE
2		2613	BROKEN PIPE
3		2622	BROKEN PIPE
4		2719	BROKEN PIPE
5		3346	BROKEN PIPE
6		5225	BROKEN PIPE
7		3000	BROKEN PIPE
8		5082	BROKEN PIPE
9		2520	BROKEN PIPE
10		3365	BROKEN PIPE
11		5752	BROKEN PIPE
12		5702	BROKEN PIPE
13		5067	BROKEN PIPE
14		5818	BROKEN PIPE
15		6189B	BROKEN PIPE
16		3361	BROKEN PIPE
17		5581	BROKEN PIPE
18		6167B	BROKEN PIPE
19		5143	BROKEN PIPE
20		5825	BROKEN PIPE
21		3022	BROKEN PIPE
22		3019	BROKEN PIPE
23		3313	BROKEN PIPE
24		2703	BROKEN PIPE
25		2711	BROKEN PIPE
26		2619	BROKEN PIPE
27		2311	BROKEN PIPE
28		2229	BROKEN PIPE
29		2225	BROKEN PIPE
30		2223	BROKEN PIPE



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31	2112		Pipes
32	2115		Pipes
33	2303		Pipes
34	2510		Pipes
35	2122		Pipes
36	5238		Pipes
37	2217		Pipes
38	2717		Pipes
39	3345		Pipes
40	3372	FLOOR TILE IN KITCHEN/WASHROOM	LR HANDWASH FLOOR
41	3361		Pipes
42	3324		Pipes
43	2917		Pipes

1	BB	27	minor / Pipes
2	BB	18	minor / Pipes
3	BB	21	minor / Pipes
4	BB	17	minor / Pipes
5	RR	41	minor / Pipes
6	RR	40	minor / Pipes
7	RR	43	minor / Pipes
8	RR	42	minor / Pipes



COMPUTATIONS

Tarawa Terrace I	922 units	39 breaks
	$\frac{39}{922} \times 100 =$	4.23%
	$\frac{39}{336} \times 100 =$	11.6%
Tarawa Terrace II	924 units	191 breaks
	$\frac{191}{924} \times 100 =$	20.67%
	$\frac{191}{336} \times 100 =$	56.8%
MCAS(H)	435 units	46 breaks
	$\frac{46}{435} \times 100 =$	10.57%
	$\frac{46}{336} \times 100 =$	13.7%
Other Areas	2173 units	60 breaks
	$\frac{60}{2173} \times 100 =$	2.7%
	$\frac{60}{336} \times 100 =$	17.9%
Base-wide	4454 units	336 breaks
	$\frac{336}{4454} \times 100 =$	7.5%

