



No.



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

METROPOLITAN MANILA DEVELOPMENT AUTHORITY (MMDA)
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)
THE REPUBLIC OF THE PHILIPPINES

THE STUDY ON DRAINAGE IMPROVEMENT IN THE CORE AREA OF METROPOLITAN MANILA, REPUBLIC OF THE PHILIPPINES

FINAL REPORT DATABOOK I

MARCH 2005

PACIFIC CONSULTANTS INTERNATIONAL
NIKKEN CONSULTANTS, INC



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Chapter 1

DRAINAGE SURVEY

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Benchmark Survey

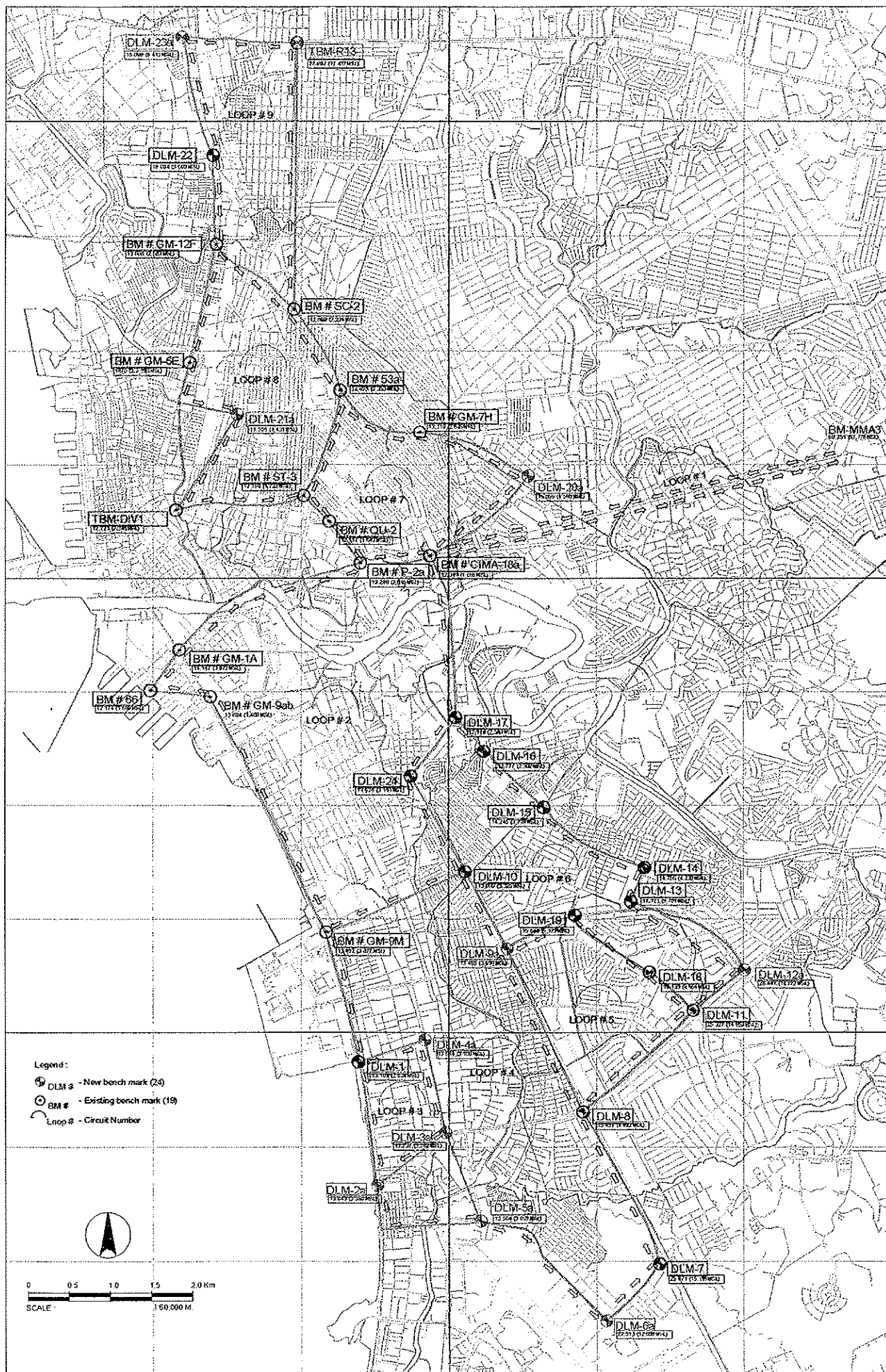


Figure LEVELING CIRCUIT

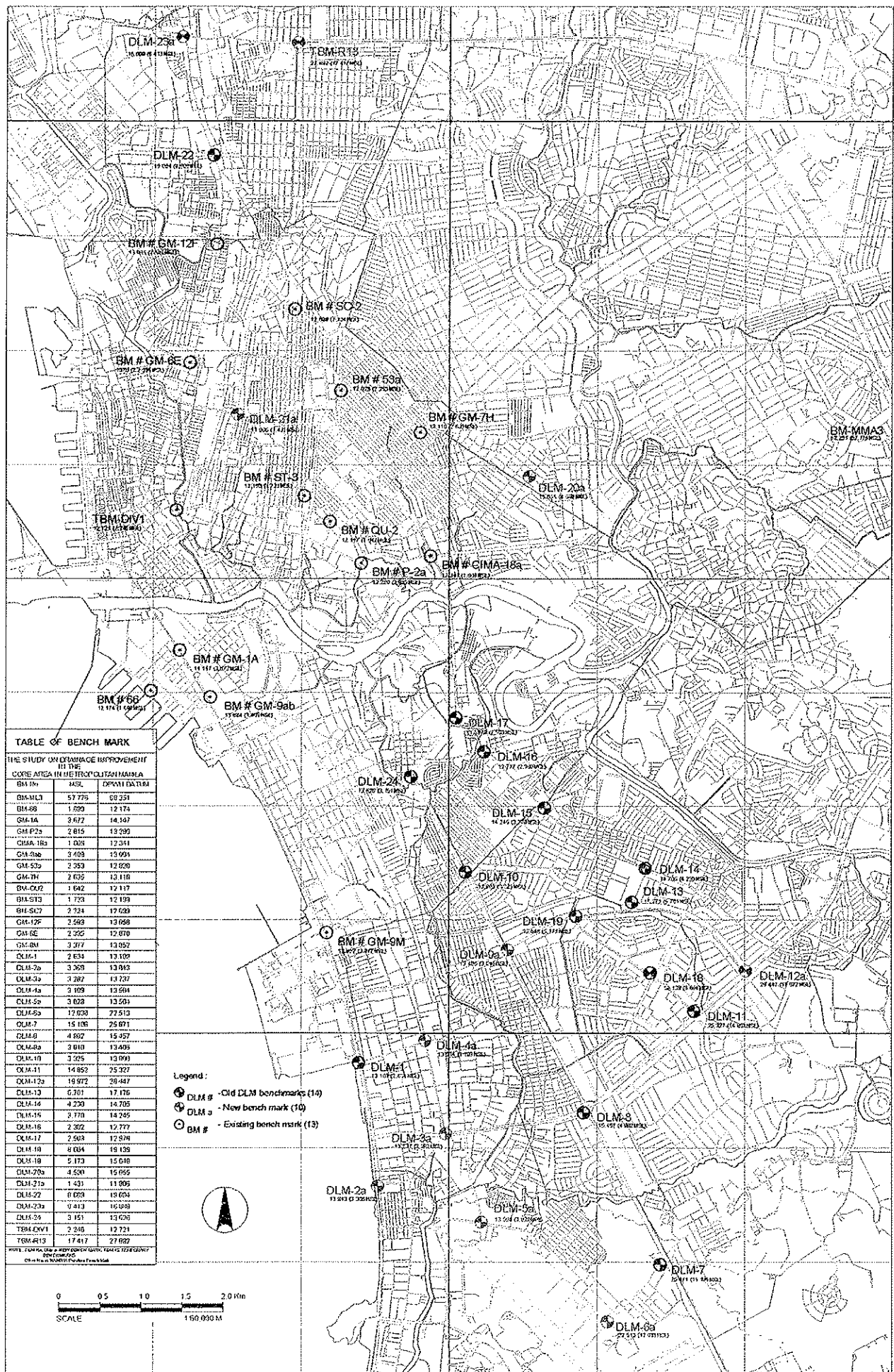


Figure BENCH MARK NETWORK

Table BENCHMARK ELEVATION

No.	BM	MSL (m)	DPWH DATUM (m)
1	BM-ML3	57.776	68.251
2	BM-66	1.699	12.174
3	GM-1a	3.672	14.147
4	GM-P2a	2.815	13.29
5	CIMA-18a	1.866	12.341
6	DLM-17	2.503	12.978
7	GM-9ab	3.409	13.884
8	GM-53a	2.353	12.828
9	GM-7H	2.635	13.11
10	BM-QU2	1.642	12.117
11	BM-ST3	1.723	12.198
12	BM-SC2	2.224	12.699
13	GM-12F	2.583	13.058
14	DLM-22	8.609	19.084
15	DLM-19	5.173	15.648
16	DLM-18	8.664	19.139
17	GM-6E	2.395	12.87
18	DLM-24	3.151	13.626
19	DLM-10	3.325	13.8
20	DLM-8	4.982	15.457
21	DLM-7	15.196	25.671
22	DLM-1	2.634	13.109
23	GM-9M	3.377	13.852
24	DLM-16	2.302	12.777
25	DLM-15	3.77	14.245
26	DLM-14	4.23	14.705
27	DLM-13	6.701	17.176
28	DLM-11	14.852	25.327
29	DLM-2a	3.368	13.843
30	DLM-5a	3.029	13.504
31	DLM-6a	12.038	22.513
32	DLM-9a	3.01	13.485
33	DLM-3a	3.262	13.737
34	DLM-4a	3.109	13.584
35	DLM-12a	17.972	28.447
36	DLM-20a	4.58	15.055
37	DLM-23a	6.413	16.888
38	DLM-21a	1.431	11.906
39	TBM-R13	17.417	27.892
40	TBM-DIV1	2.246	12.721
NOTE: DLMs are old & new benchmark established by the Study Team; while others are those under NAMRIA. BMs elevation is measured from BM-ML3 (1977 NAMRIA data)			

Station Name: BM- ML3

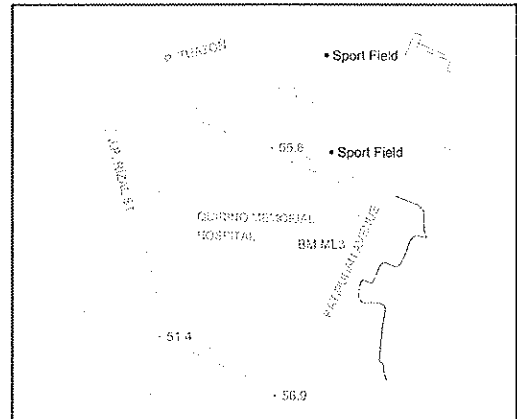
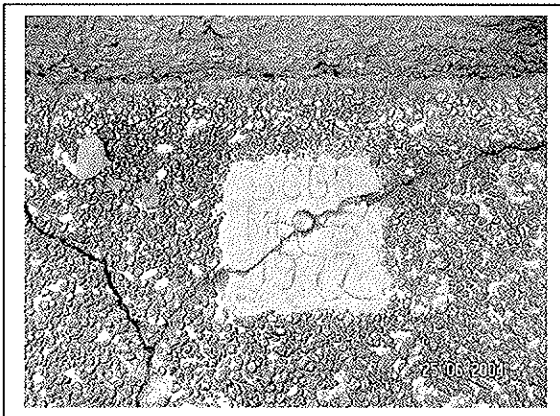
Location : Kalayaan Ave.

Municipality : Quezon City

Description

BM-ML3 is in Quezon City, Metro Manila located inside the Quirino Memorial Hospital beside the foundation of flag pole, The inscription is "BCGS ML-3 1977".

PHOTOGRAPHS AND SKETCH



Station Name: BM-66

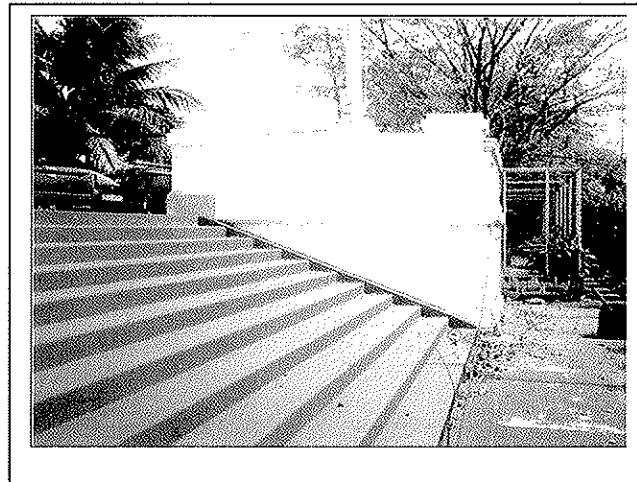
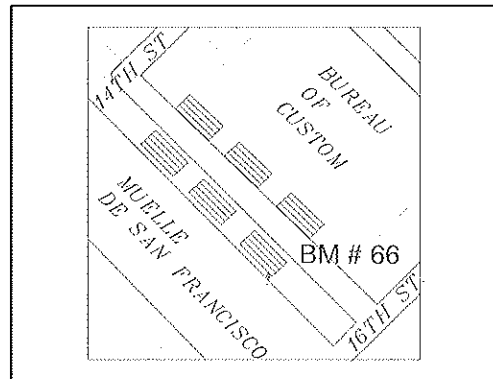
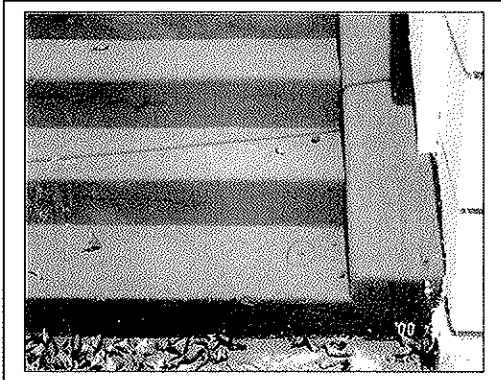
Location : South Harbor

Municipality : Manila

Description

BM-66 is set about 4.9 centimeters from the edge of the first concrete step near the S end of the stairway to the Custom House, Port Area, Manila, Mark is the rounded top of a $\frac{3}{4}$ -inch diameter brass rod protruding about 6.75 mm. above the step

PHOTOGRAPHS AND SKETCH



Station Name: BM CIMA-18a

Location : Sampaloc

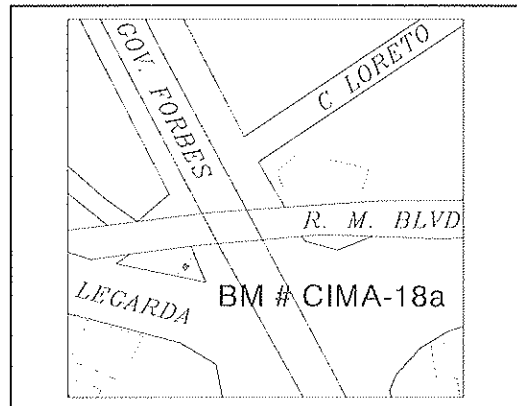
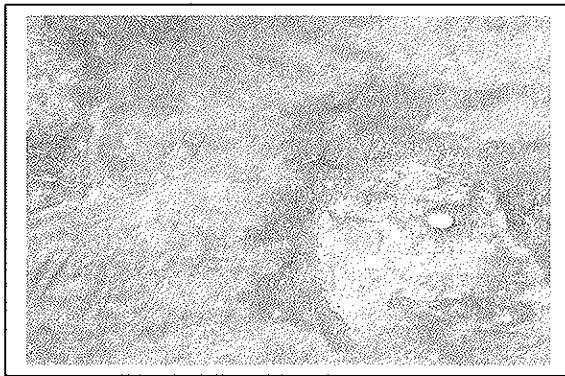
Municipality : Manila

Description

BM CIMA-18a is in Sampaloc, Manila, at the SW side of A. Mendoza Avenue, near the intersection below the fly-over

Mark is the top of a 3/8-inch diameter brass rod cemented in a drilled hole at the concrete sidewalk of triangular island

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-12F

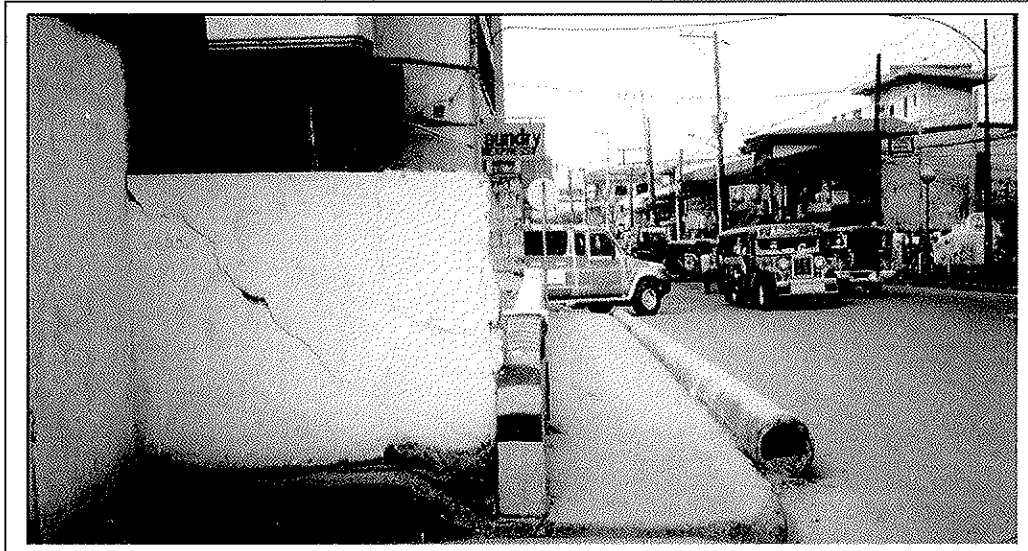
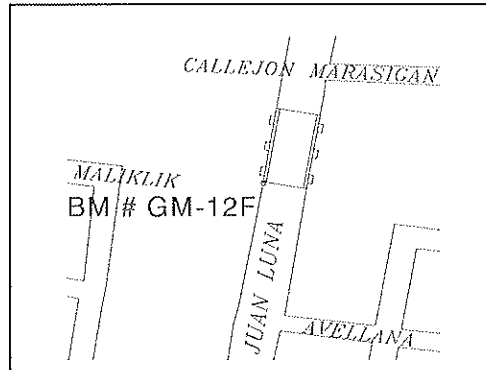
Location : Tondo

Municipality : Manila

Description

BM GM-12F is in Gagalangin, Tondo, Metro Manila at the west sidewalk of the concrete bridge over the Estero de Maypajo. Bench mark is located 0.20 meter from the south end of the sidewalk and 0.13 meter from the face of the railing. Mark is the top of a 3/8-inch diameter iron rod, cemented in a drilled hole and with inscription on the cement putty around

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-1A

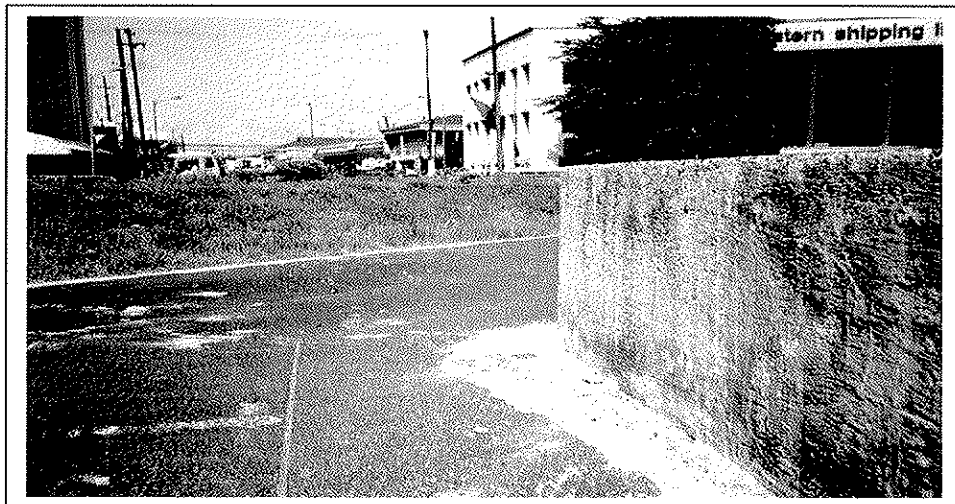
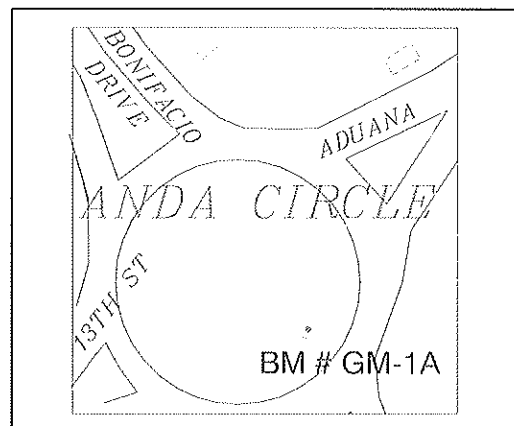
Location : Port area

Municipality : Manila

Description

BM GM-1A is in Port Area, Manila, at the concrete base of the Rotonda fountain at the intersection of Bonifacio drive Mark is located at 0.14 m SE of the S corner of the octagonal parapet of the fountain. It is a 5/8-in diameter brass rod

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-7H

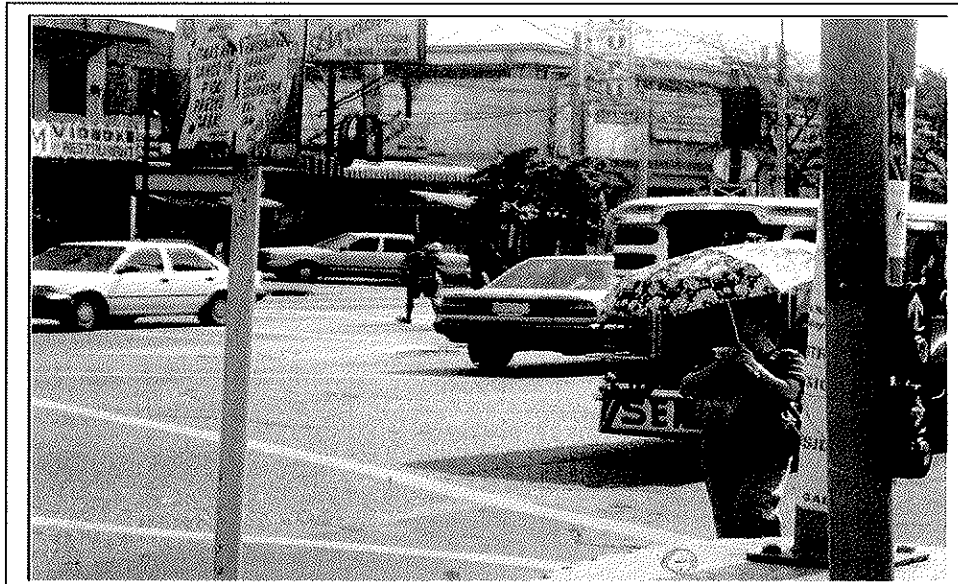
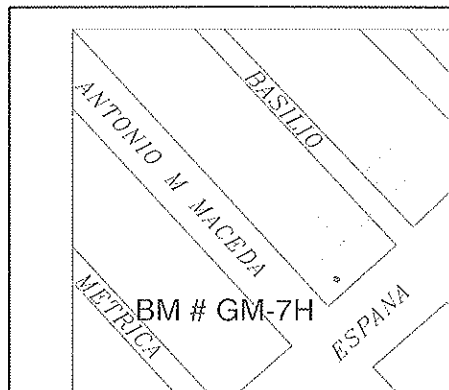
Location : Tondo

Municipality : Manila

Description

BM GM-7H is in Sampaloc, Metro Manila, at the N intersection of España and Antonio Maceda streets, on top of the oval shaped concrete foundation of the Meralco electric light post, 0.78 m. above the ground. Mark is a 5/8-inch diameter brass rod set in the foundation protruding about 2 mm from its surface.

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-9Ab

Location : Port area

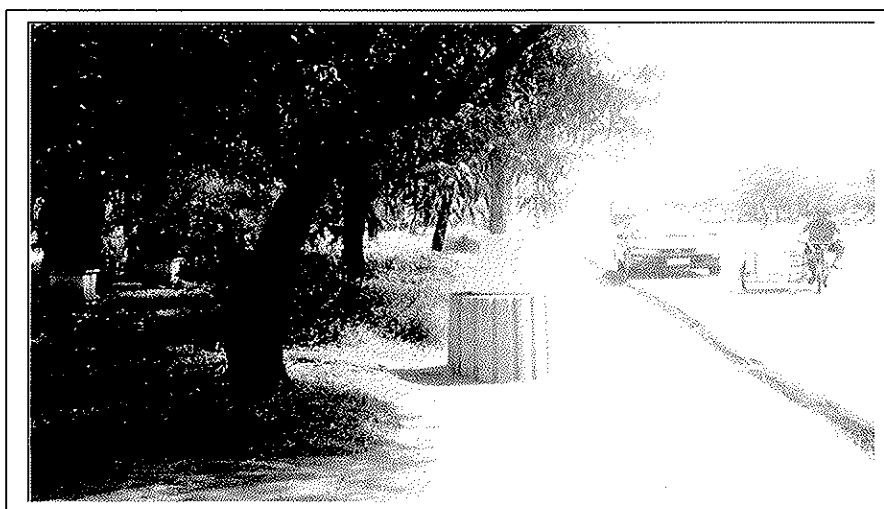
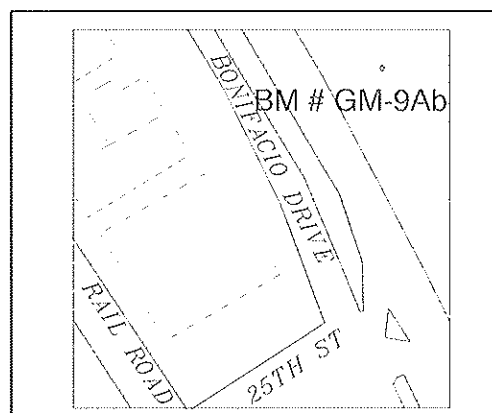
Municipality : Manila

Description

BM GM-9Ab is in South Port District, Manila about 75 m. E from the National Power Corporation Bldg. 61.9 m. N from the intersection of 25th St. and Bonifacio Ave. and 16.6 m. NE from the center of the island on the middle of the avenue. It is set on top of 0.70 m. NW from the south edge of the oval shaped electric light post foundation located in front of Citadel Building and 0.75 m. above the sidewalk surface.

Mark is the head of a 4-inch copper nail embedded in a drilled hole and protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "GM-9Ab, BCGS, 1987".

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-P2a

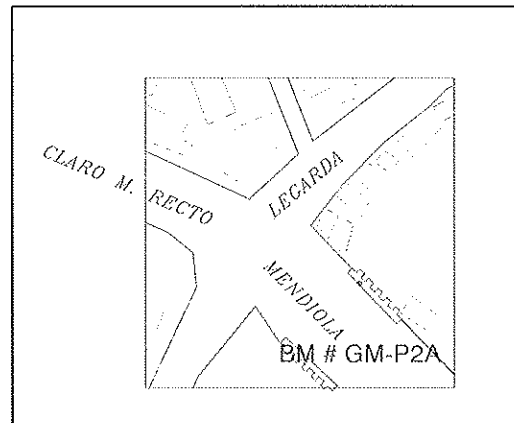
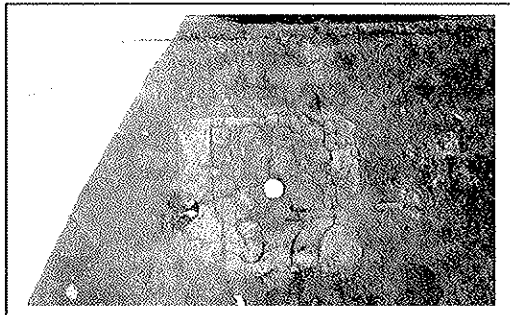
Location : Sampaloc

Municipality : Manila

Description

BM GM-P2a is in Metro Manila, district of Sampaloc, along Mendiola street about 15.0 m. east of Legarda street. Mark is a 1/2-inch diameter brass rod cemented in a drilled hole located at the N sidewalk of Mendiola street and about 3.0 m. from the E end of Mendiola Bridge, with inscription on the cement putty around the mark: "BCGS P2a 1977".

PHOTOGRAPHS AND SKETCH



Station Name: BM QU-2

Location : Sampaloc

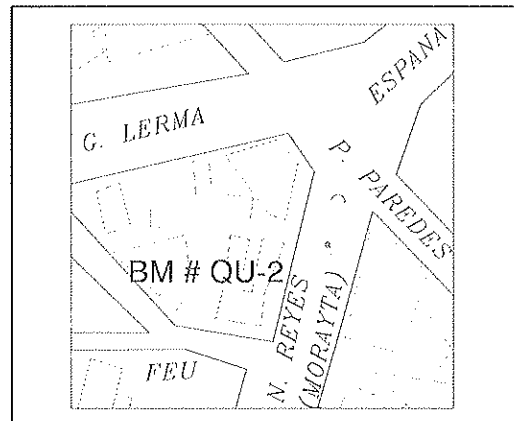
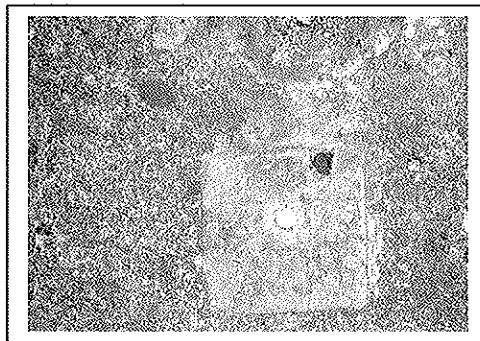
Municipality : Manila

Description

BM QU-2 is in Manila, district of Sampaloc, along Nicanor Reyes street and near its intersection with P. Paredes street. Bench mark is at the end 10.0 m. from the central island, about 40 m. W of Professional Regulation Commission, and 60 m. S of overpass.

Mark is a 1/2-inch diameter brass rod with inscription on the cement putty around the mark thus: "BCGS QU-2 1977".

PHOTOGRAPHS AND SKETCH



Station Name: BM SC-2

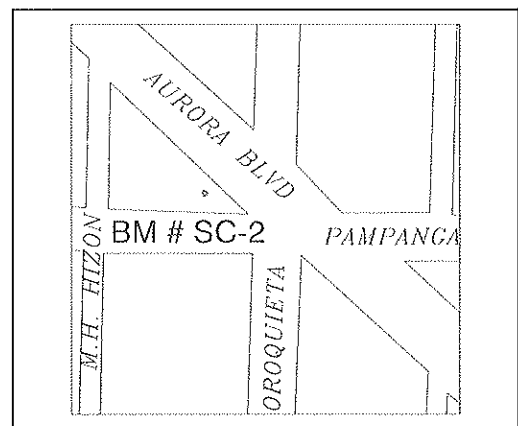
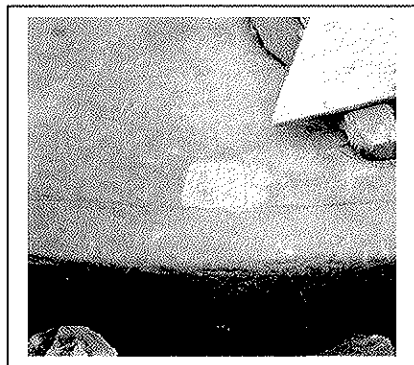
Location : Sta. Cruz

Municipality : Manila

Description

BM SC-2 is in Manila, district of Sta. Cruz along Aurora Blvd and W of its intersection with Oroquieta street. Mark is a 1/2-inch diameter brass rod cemented in a drilled hole at the concrete curb located at W edge of Oroquieta and near the intersection of northern and southern edges of Pampanga and Aurora Blvd. respectively, beside the wooden electric post and near the opening of gutter and with inscription on the cement putty around the mark thus: "BCGS SC-2 1977".

PHOTOGRAPHS AND SKETCH



Station Name: BM ST-3

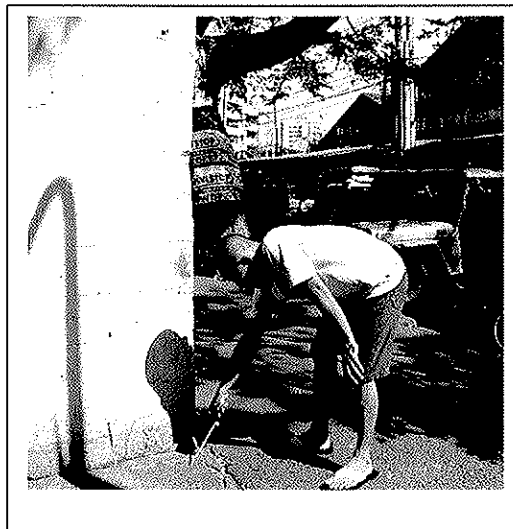
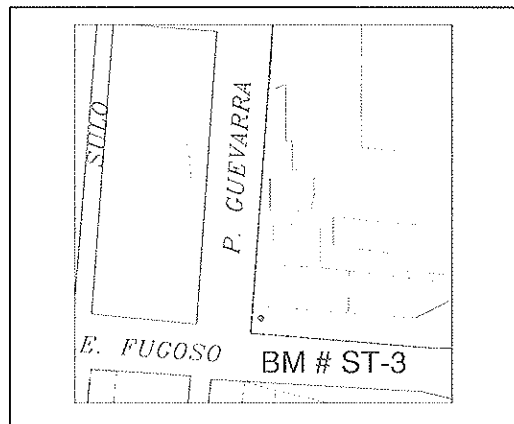
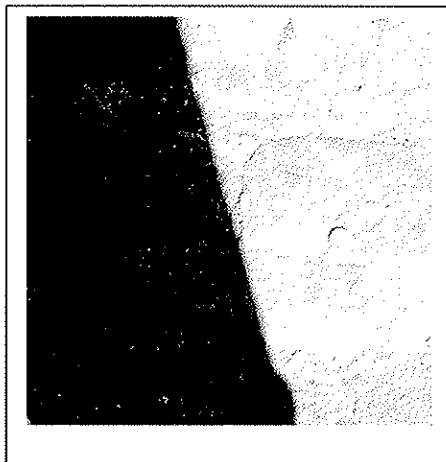
Location : Sta. Cruz

Municipality : Manila

Description

BM ST-3 is in Metro Manila, district of Sta. Cruz along the NE corner of P. Guevarra and Zurbarran street and about 20.0 meter N of Central Market. Mark is a 1/2-inch diameter brass rod cemented in a drilled hole at the concrete sidewalk near the SW corner of a hollow block wall of Gomez Elementary School and with inscription on the cement putty around the mark thus: "BCGS ST-3 1977".

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-9M

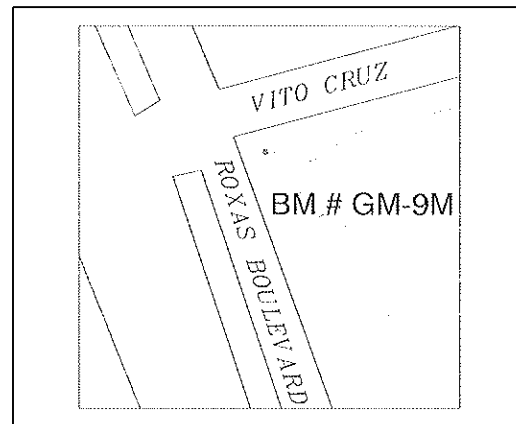
Location : Malate

Municipality : Manila

Description

BM GM-9M is in Malate, Manila along the eastern road side of Roxas Blvd. on the concrete base of the lamp post found at the junction of Roxas Blvd and Vito Cruz street. Mark is 5/8-inch diameter brass rod embedded on the concrete base of the lamp post 0.22 m. from the edge of the southern side of the square metal base of the post and surrounded by a cement putty with inscription "GM-9M".

PHOTOGRAPHS AND SKETCH



Station Name: BM GM-6E

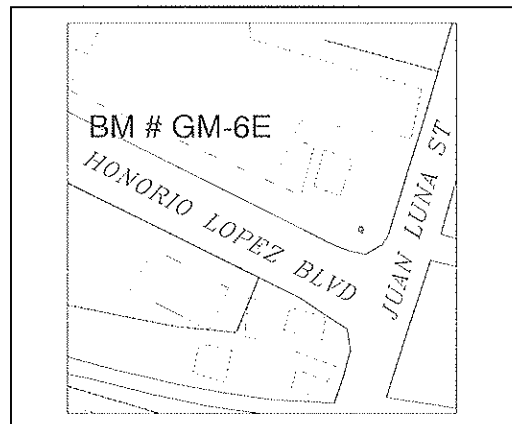
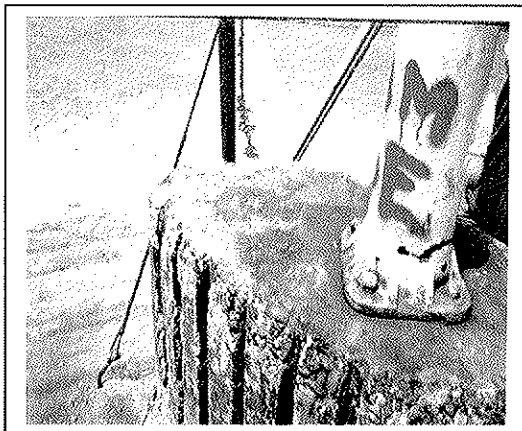
Location : Tondo

Municipality : Manila

Description

BM GM-6E is in Tondo, Metro Manila at the junction of Juan Luna street and Honorio Lopez Boulevard, on top of the oval shaped concrete foundation of the Meralco electric post, 0.90 m above the ground. Mark is a 5/8-inch diameter brass rod set in the foundation protruding about 3.0 mm from its surface.

PHOTOGRAPHS AND SKETCH



Station Name: BM 53a

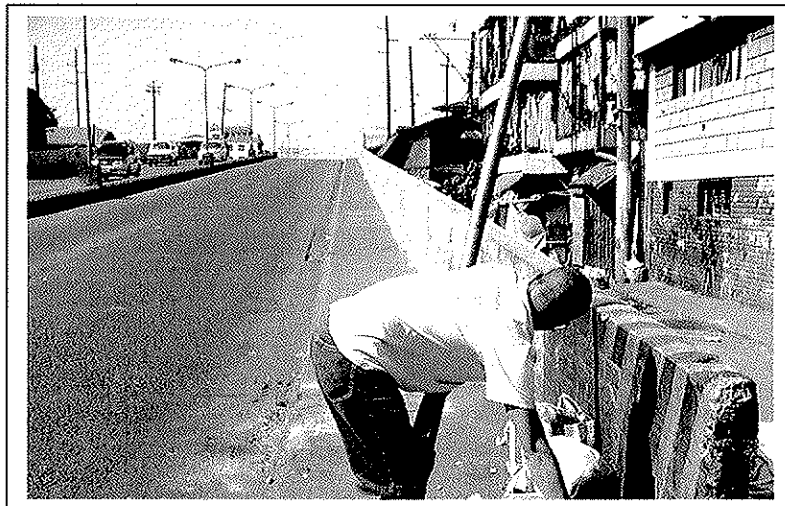
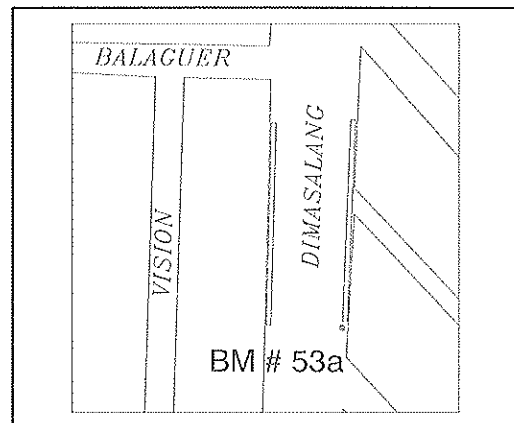
Location : Sampaloc

Municipality : Manila

Description

BM 53a is in Dimasalang Bridge in Sampaloc, Manila located at the NE junction of Constancia street. Mark is cemented in a drilled hole at concrete sidewalk at SE of the bridge. It is a 1/2-inch diameter brass rod with inscription. Mark is cemented in a drilled hole at concrete sidewalk at SE of the bridge. It is a 1/2-inch diameter brass rod with inscription.

PHOTOGRAPHS AND SKETCH



Station Name: DLM-1

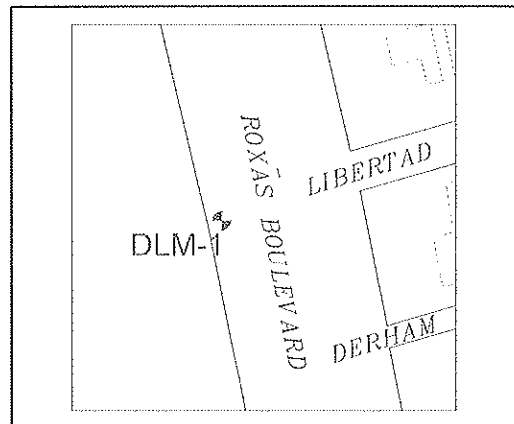
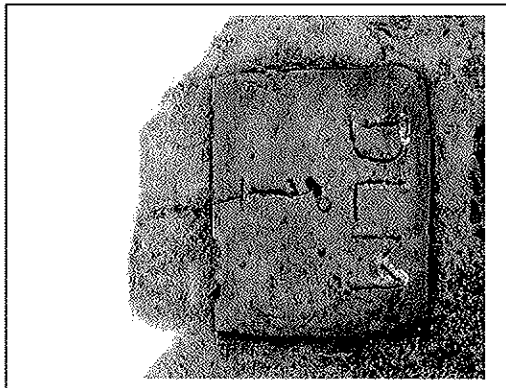
Location : Roxas Blvd.

Municipality : Pasay

Description

DLM-1 is in Roxas Blvd., Pasay City. It is located at intersection of Arnaiz (Libertad) Avenue The mark is the head of the concrete nail embedded on the concrete seawall near the Libertad Pumping station. It is located about 100 m. NW of Cuneta Astrodome and 5 m. from edge of asphalt road. The mark is surrounded by a cement putty with inscription "DLM 1".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-2a

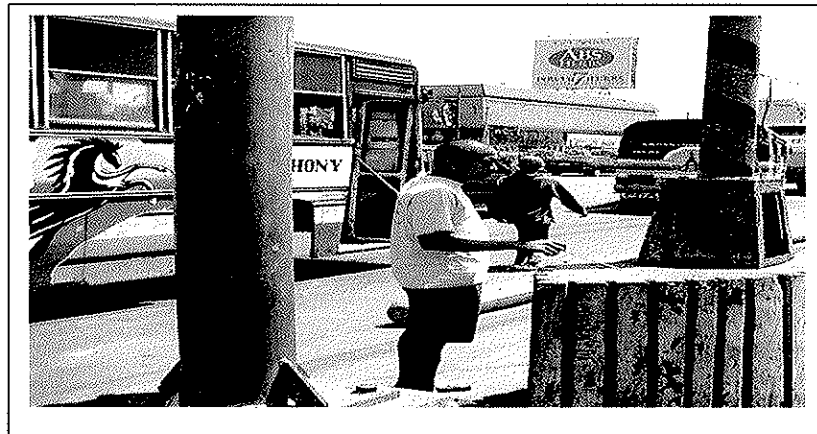
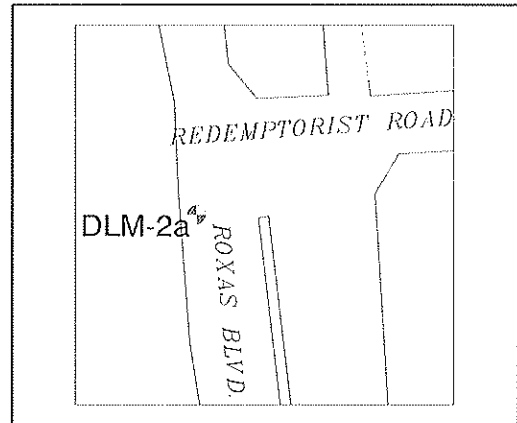
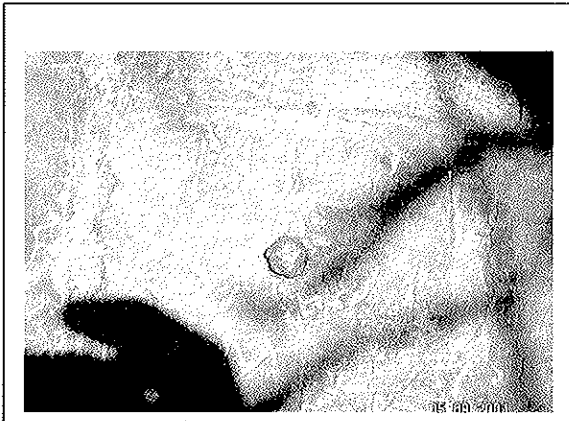
Location : Baclaran

Municipality : Paranaque

Description

DLM-2 is in Baclaran, Paranaque City located along Roxas Boulevard intersection of Redemptorist Road, in front of Baclaran Catholic Church. Mark is the head of concrete nail embedded on the top of concrete foundation of Meralco lamp post. It is 4.0 m from concrete seawall and 1.5 m from traffic sign post. The mark is on old NAMRIA benchmark.

PHOTOGRAPHS AND SKETCH



Station Name: DLM-3a

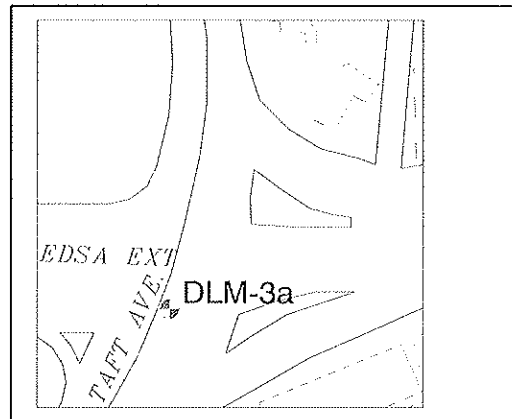
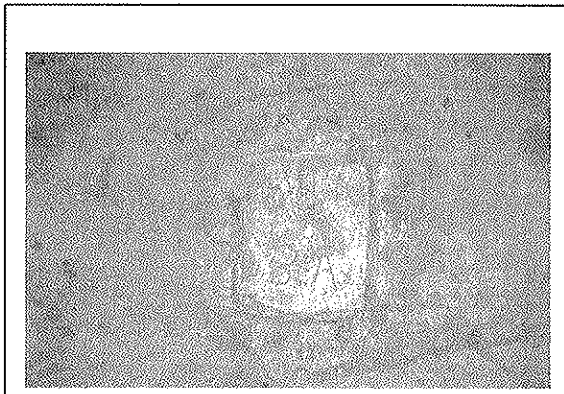
Location : EDSA

Municipality : Pasay

Description

DLM-3a is located along Efipanio Delos Santos Avenue (EDSA) intersection of Taft Avenue in Pasay City. Mark is the head of concrete nail embedded on the concrete center island of LRT beside column the post and about 0.40 m from the edge of concrete curb. It is protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 3a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-4a

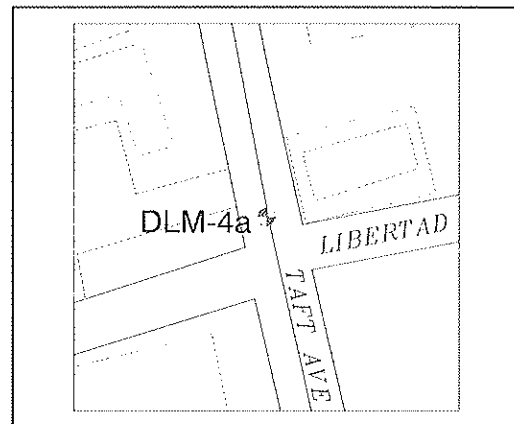
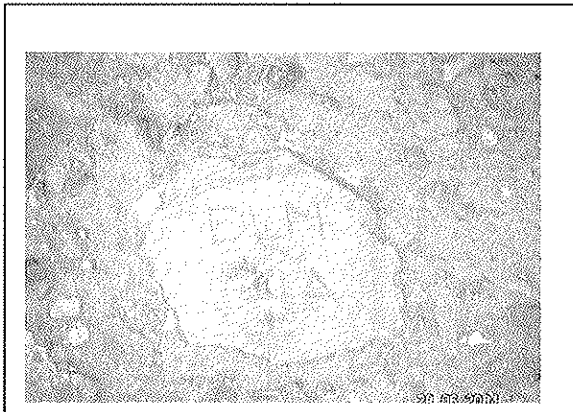
Location : San Roque

Municipality : Pasay

Description

DLM-4a is located along Taft Avenue in San Roque, Pasay City. It is about 10.0 meters N from the intersection road of Libertad Mark is the head of concrete nail embedded and protruding about 3.0mm above the surface of the surrounding cement putty. It is located under the LRT on center island and about 20.0cm from steel railing. The inscription is "DLM-4a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-5a

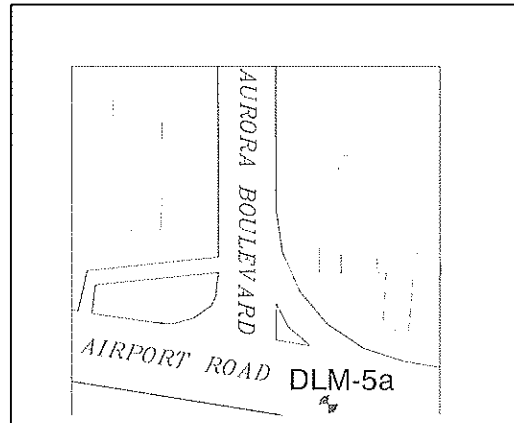
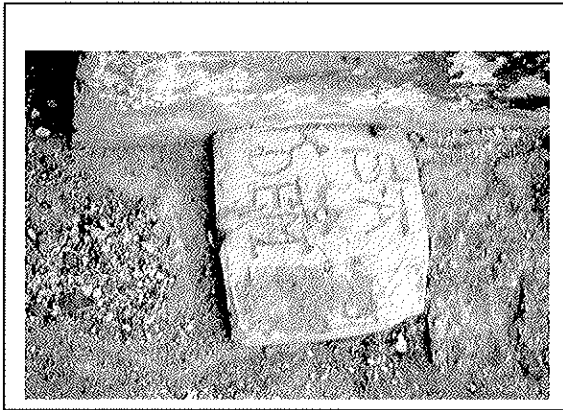
Location : Airport Road

Municipality : Pasay

Description

DLM-5a is located along Airport Road. Intersection of Aurora Boulevard in Pasay City. Mark is the head of concrete nail embedded on the oncrete slab beside the traffic light post across Shell Gasoline Station 0.20m from traffic light post and 15 cm from plant box. The mark is protruding about 2.0 mm above the surface of the surr ounding cement putty with inscription "DLM 5a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-6a

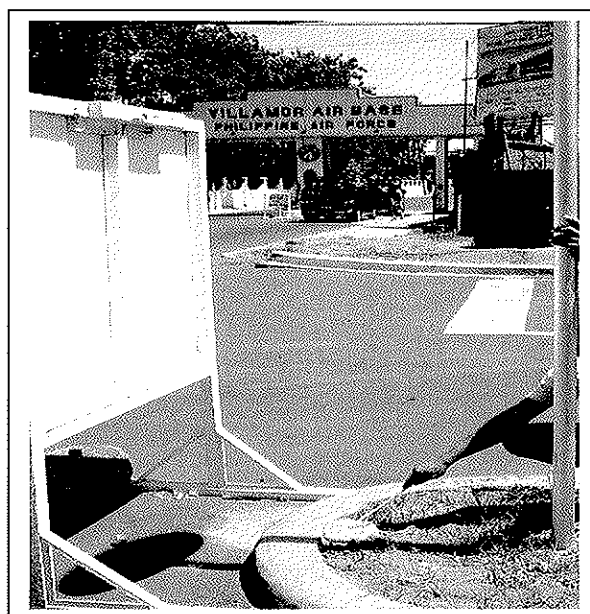
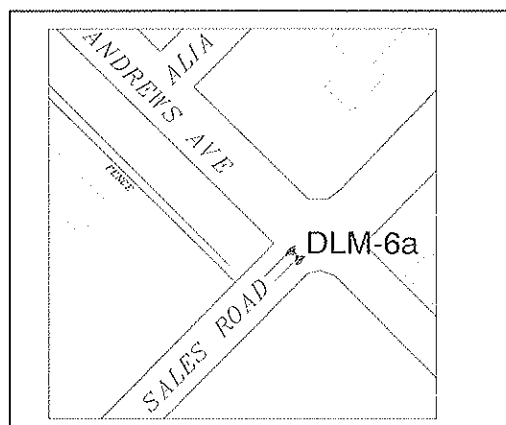
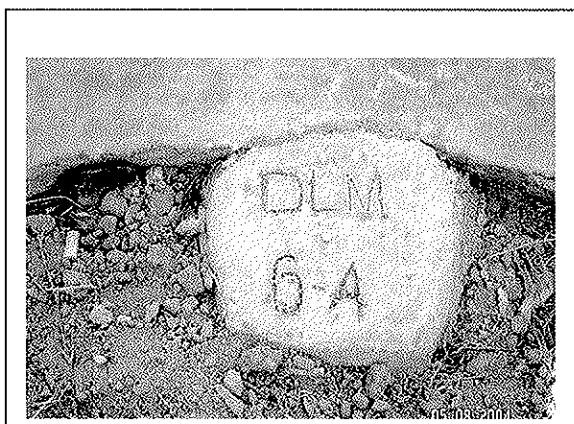
Location : Villamor Air Base

Municipality : Pasay

Description

DLM-6a is located at intersection of Andrew Avenue and Sales Road inside the Villamor Air Base compound in Pasay City. Mark is the head of the nail embedded on the edge of concrete sidewalk and about 1.0 m from lamp post and 0.20 m from edge of concrete curb. The mark is protruding about 3.0 mm above the surface of the surrounding cement putty with inscription "DLM 6a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-7

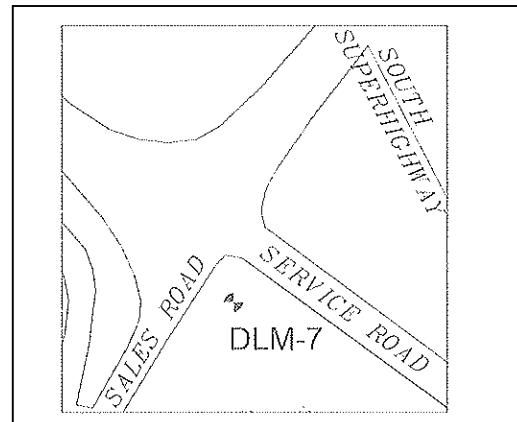
Location : Sales Road

Municipality : Pasay

Description

DLM-7 is located at the intersection of Sales Road and West Sevice Road along South Super Highway of Villamor Interchange. Mark is the head of concrete nail embedded on top of concrete lamp post foundation about 15.0 m SW of center line of service road. The mark is protruding 2.0 mm above the surface of the surrounding cement putty with inscription "DLM -7".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-8

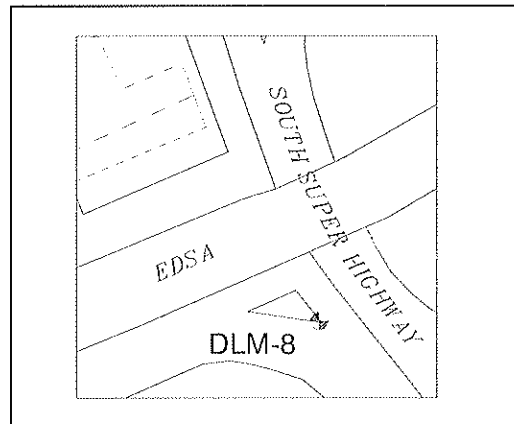
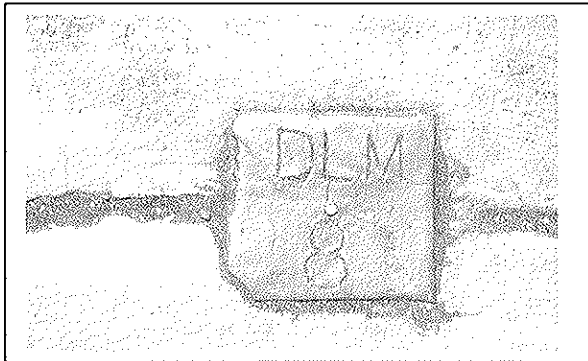
Location : Bangkal

Municipality : Makati

Description

DLM-8 is in Barangay Bangkal, Makati City located along Epifanio Delos Santos (EDSA). Mark is the head of concrete nail embedded on the edge of curb of triangular island located under the Pasay interchange. The mark is protruding about 3.0 mm above the surface of the surrounding cement putty with inscription "DLM 8".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-9a

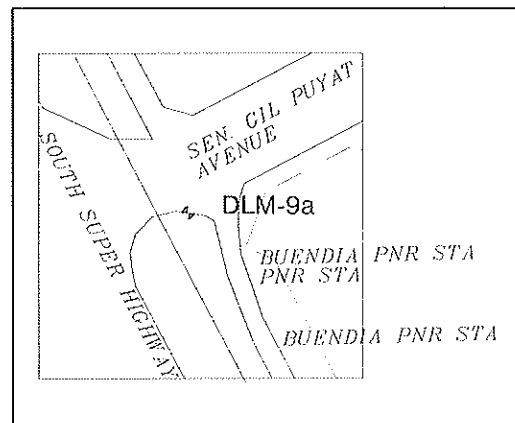
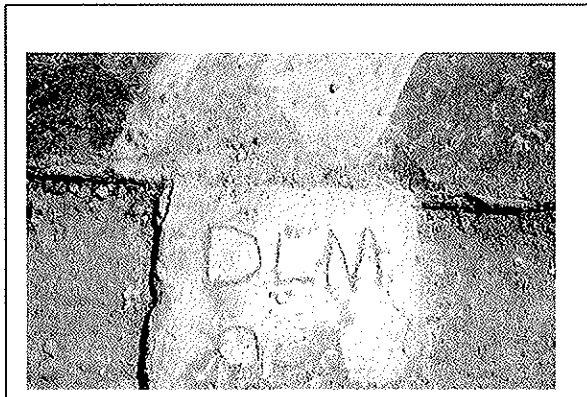
Location : South Expressway

Municipality : Makati

Description

DLM-9a is in Makati City, Metro Manila located along South Luzon Expressway (North Bound) near the intersection of Sen. Gil Puyat Ave. Mark is the head of concrete nail embedded on the triangular island and protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 9".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-10

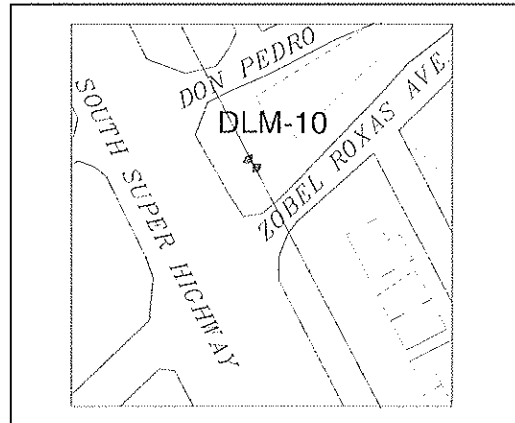
Location : South Super Highway

Municipality : Makati

Description

DLM-10 is in Makati City, Metro Manila located along South Luzon Expressway (North bound side) between the intersecting roads of Don Pedro and Roxas-Zobel Ave. It is set on top of concrete plant box 0.50 m high from the surface of sidewalk. Mark is the head of concrete nail embedded and protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 10".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-11

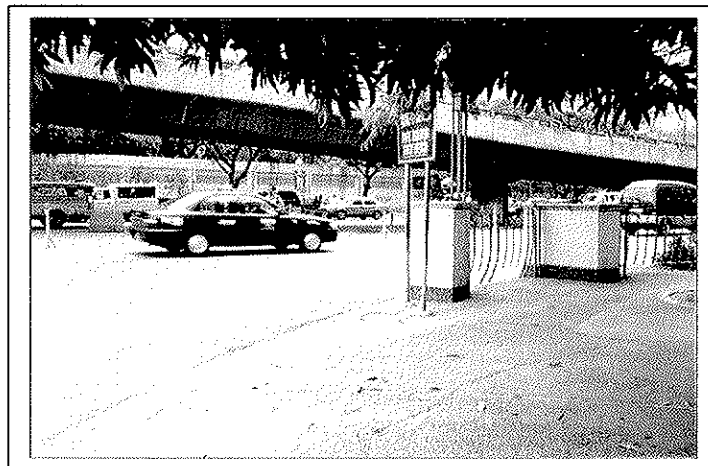
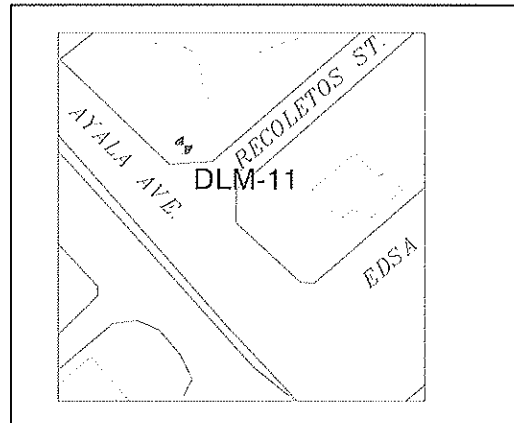
Location : Ayala Ave.

Municipality : Makati

Description

DLM-11 is in Makati City, Metro Manila located along Ayala Avenue at the intersection of Recoletos street, 1.0 m from concrete curb stone. Mark is the head of concrete nail embedded on sidewalk near the traffic sign board and protruding about 2.0 mm above the surface of the surrounding cement putty with inscription " DLM 11".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-12a

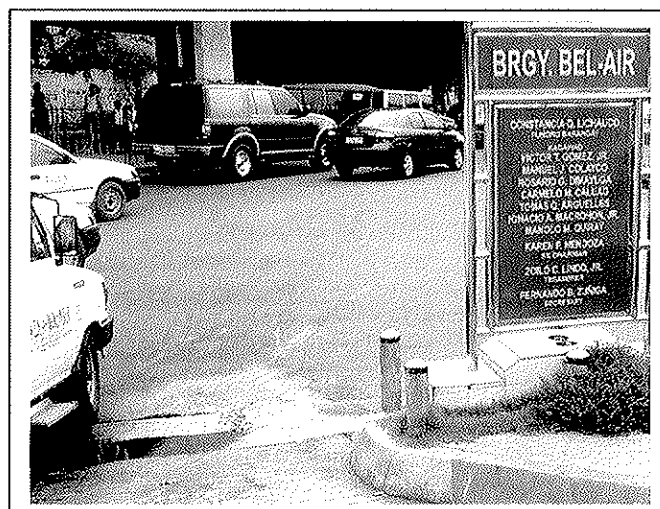
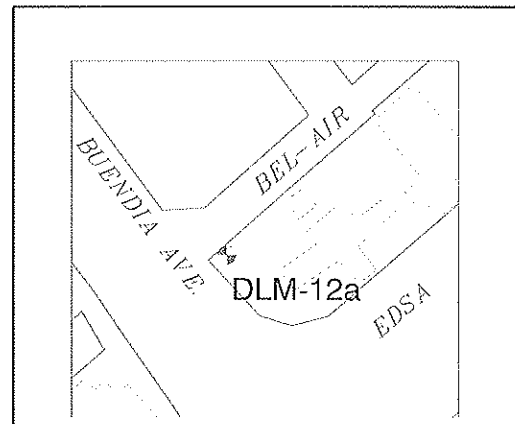
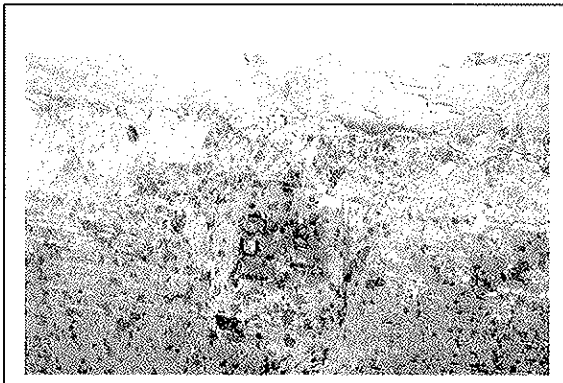
Location : Buendia

Municipality : Makati

Description

DLM-12a is in Makati City, Metro Manila located along Buendia Avenue inside the gasoline station along Epifanio Delos Santos Avenue (EDSA). Mark is the head of concrete nail embedded and protruding about 2.0 mm above the surface of the surrounding cement putty on top of concrete curb of triangular island. The inscription is "DLM 12a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-13

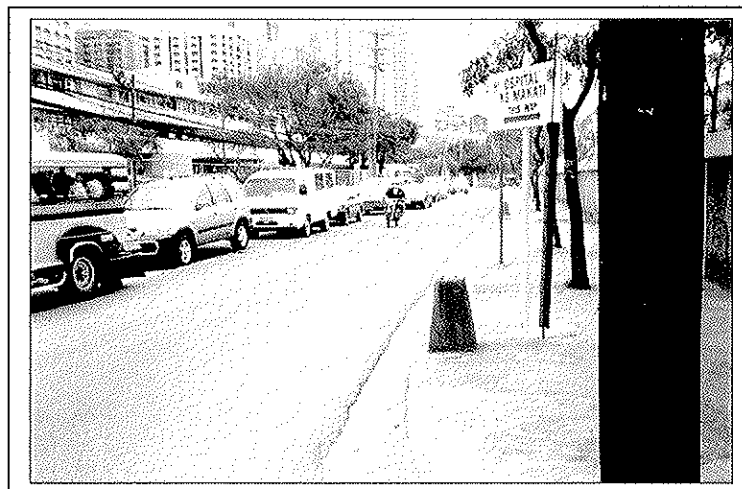
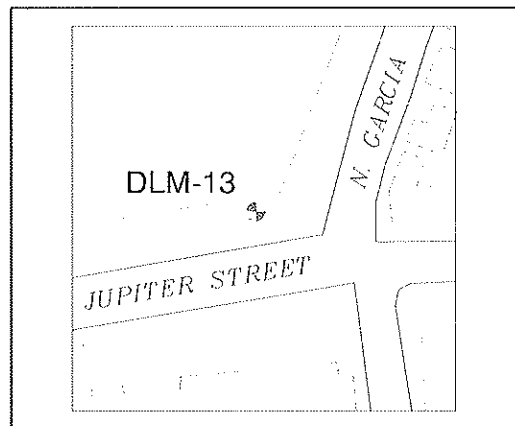
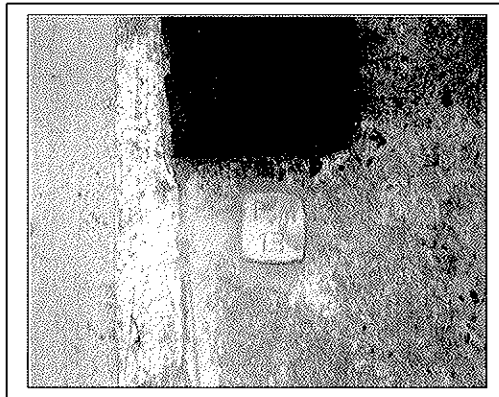
Location : N. Garcia

Municipality : Makati

Description

DLM-13 is in Makati City, Metro Manila located along Jupiter street near intersection of Nicanor Garcia street. Mark is the head of concrete nail embedded on sidewalk, it is 1.0 m from the concrete curb and near the sign board "Hospital ng Maynila". The nail is protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 13".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-14

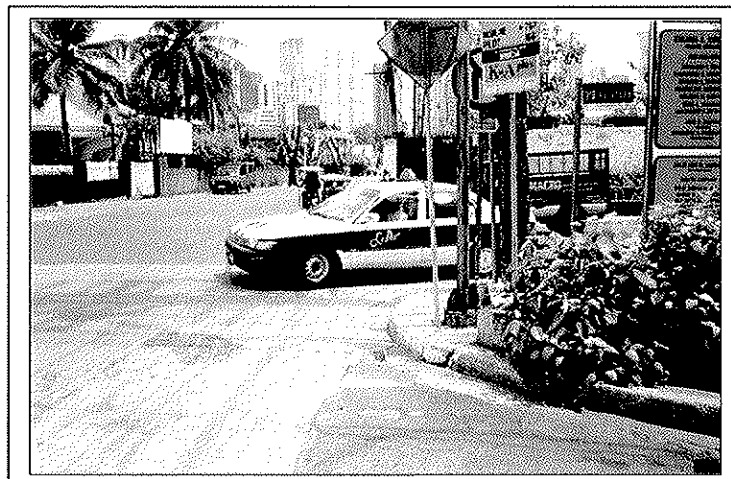
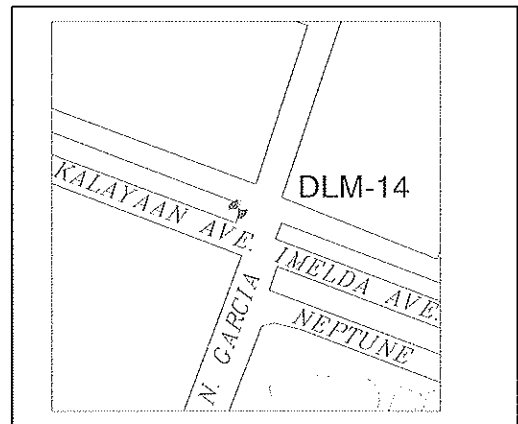
Location : Kalayaan Ave.

Municipality : Makati

Description

DLM-14 is in Makati City, Metro Manila located along Kalayaan Avenue and Nicanor Garcia street intersection. Mark is the head of concrete nail embedded on the concrete center island. Mark is protruding about 2.0 mm above the surface of the surrounding cement putty and about 0.50 m from wooden electric post with inscription "DLM 14".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-15

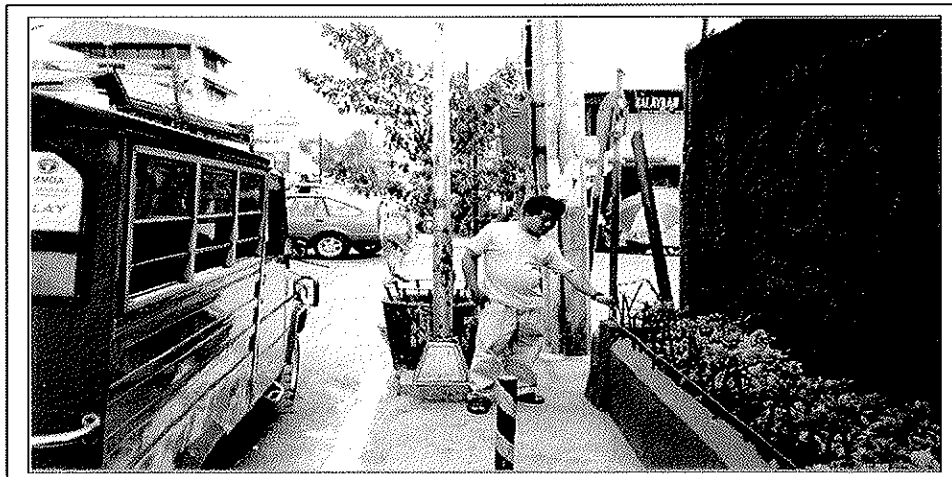
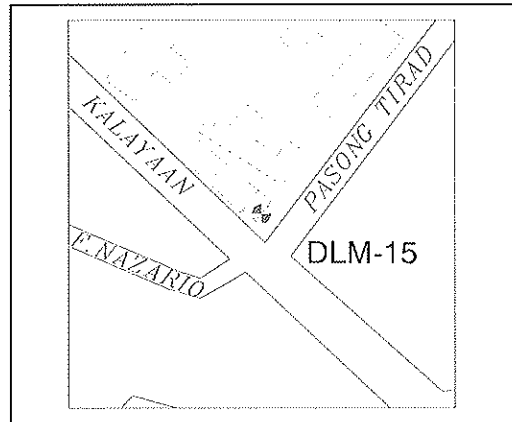
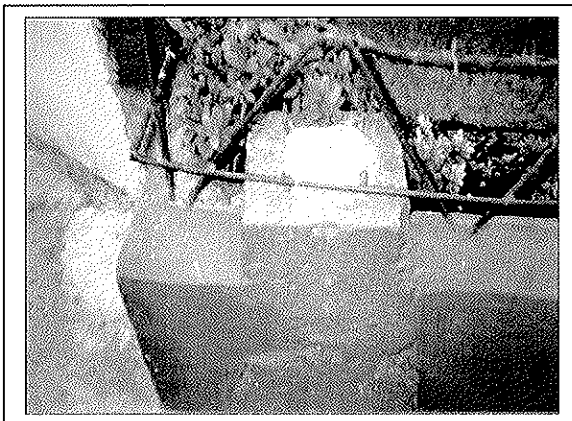
Location : Tejeron

Municipality : Makati

Description

DLM-15 is in Tejeron, Metro Manila along Pasong Tirad corner Kalayaan. Mark is the head of concrete nail embedded on top of concrete foundation and end of flower fence line. Mark is protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 15".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-16

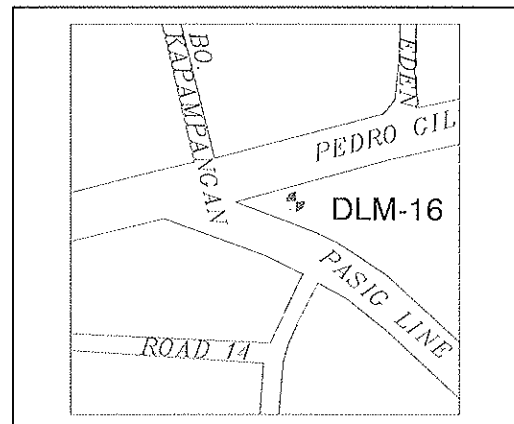
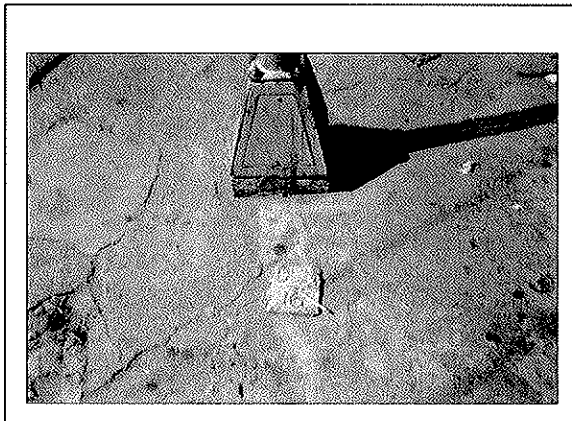
Location : Pedro Gil

Municipality : Manila

Description

DLM-16 is in Manila City, Metro Manila located along Pedro Gil corner Pasig Line. Mark is the head of concrete nail embedded on concrete sidewalk between the two light poles (about 40 cm from left side light pole) in front of Mother Mary's Grotto. The mark is protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 16".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-17

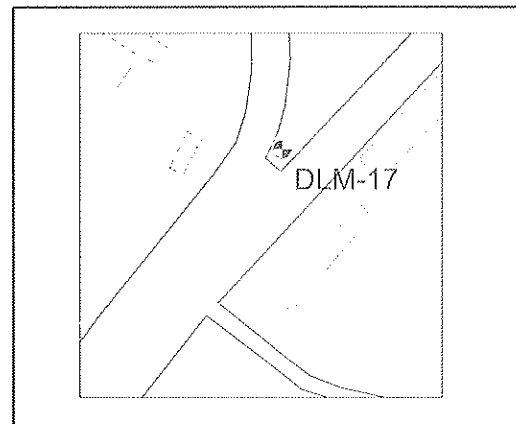
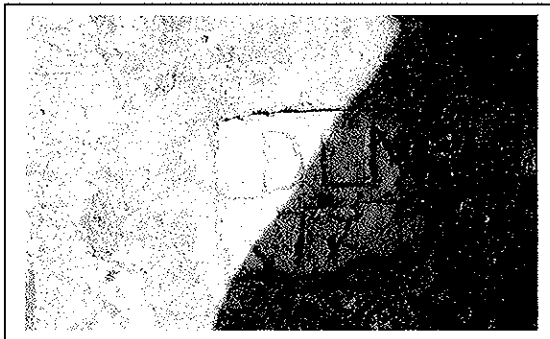
Location : A. Mabini

Municipality : Caloocan

Description

DLM-17 is located along Pres. Quirirno Avenue, near the bridge approach of father Jacinto Zamora bridge. The mark is the head of concrete nail embedded on the corner of concrete island near the huge electric post. The mark is protruding about 2mm above the surface of the surrounding cement putty with inscription "DLM-17".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-18

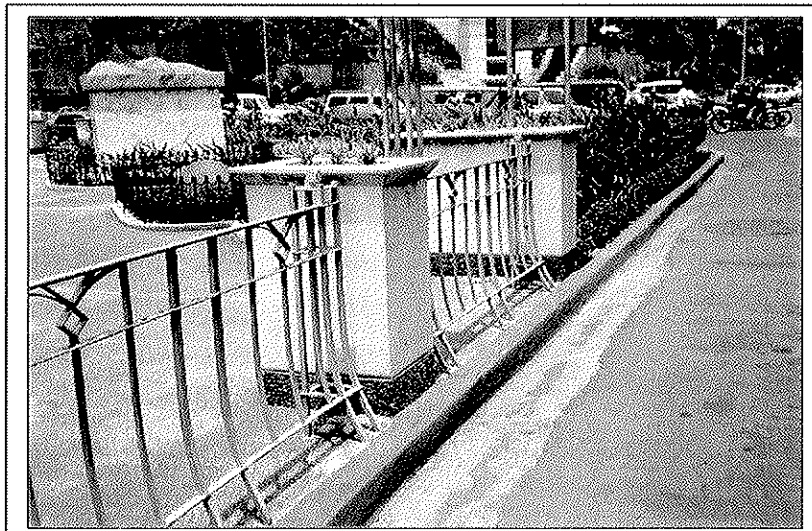
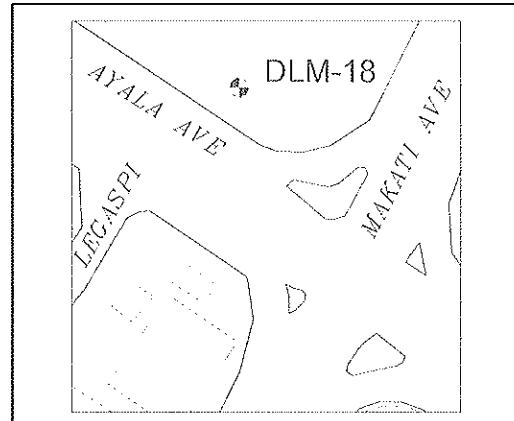
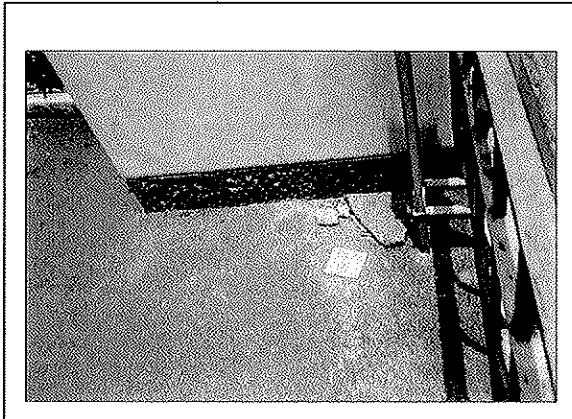
Location : Ayala Ave.

Municipality : Makati

Description

DLM-18 is in Makati City, Metro Manila located along Ayala Avenue corner Makati Avenue. Mark is the head of the concrete nail embedded and protruding about 2.0 mm above the surface of the surrounding cement putty. It is located on the concrete sidewalk about 30 cm from the edge of concrete curb near the Gabriela Silang monument and the traffic signboard. The inscription is "DLM 18".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-19

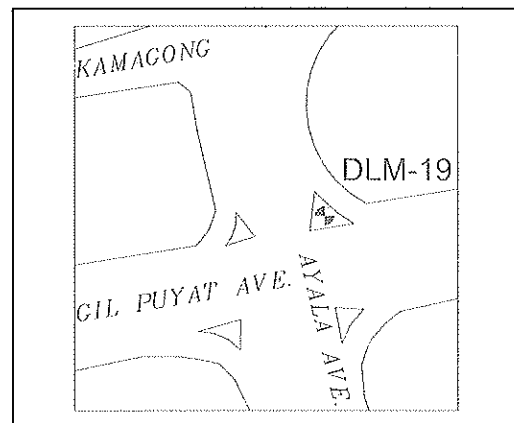
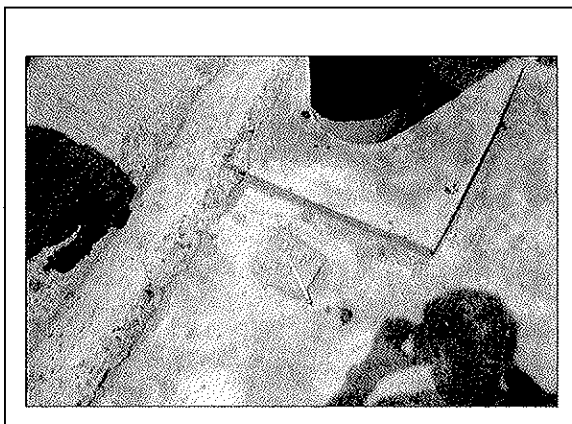
Location : Gil Puyat

Municipality : Makati

Description

DLM-19 is in Makati City, Metro Manila located along Sen. Gil Puyat Avenue corner Ayala Avenue. Mark is the head of concrete nail embedded on the concrete triangular island and protruding about 2.0 mm above the surface of the surrounding cement putty with inscription "DLM 19".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-20a

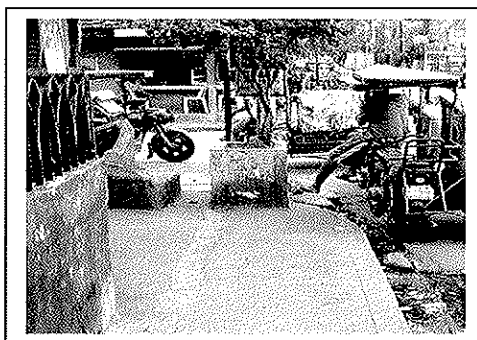
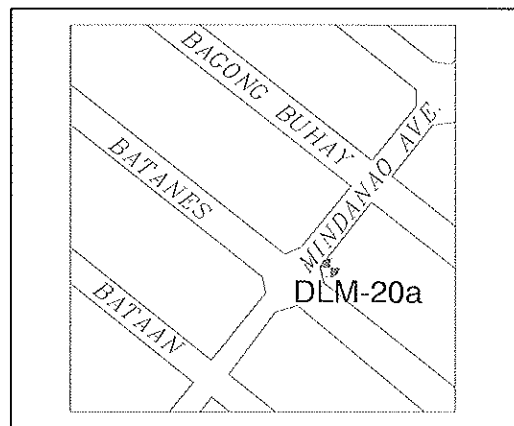
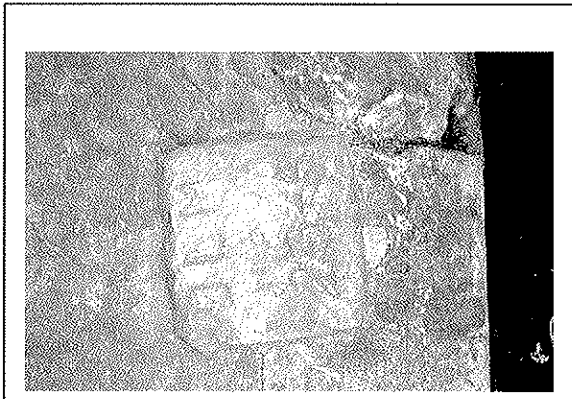
Location : Sampaloc

Municipality : Manila

Description

DLM-20a is in Sampaloc, Manila, located at the corner of Batanes Street and Mindanao Street. Mark is the head of concrete nail embedded and protruding about 3.0mm above the surface of the surrounding cement putty. It is located on the concrete foundation of concrete curb. The inscription is "DLM-20a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-21a

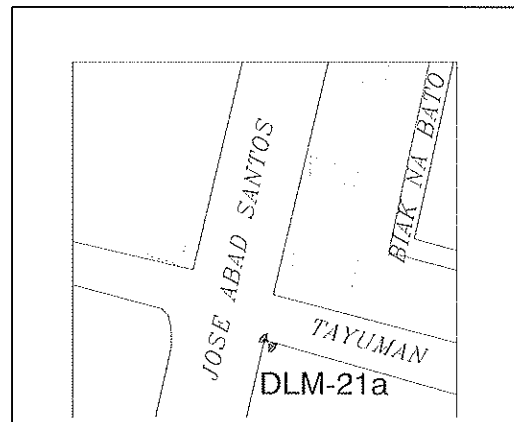
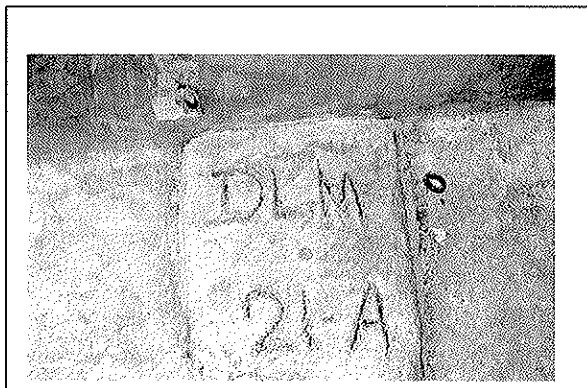
Location : Sampaloc

Municipality : Manila

Description

DLM-21a is located along Jose Abad Santos corner Tayuman Street in Manila. Mark is the head of concrete nail embedded and protruding about 3mm above surrounding cement putty on top, beside the foundation of the Meralco light post with inscription "DLM-21a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-22

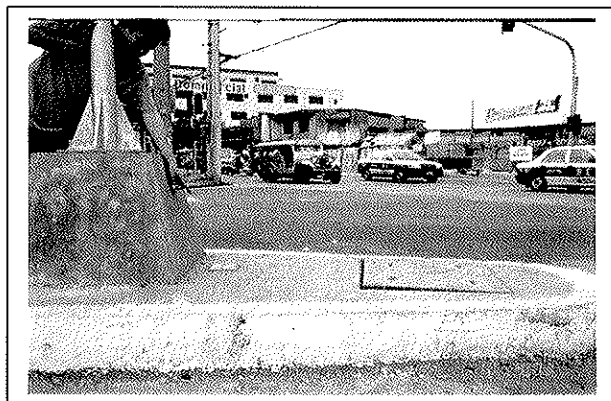
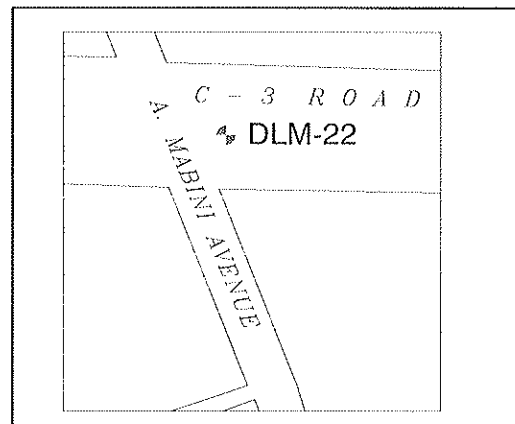
Location : A. Mabini

Municipality : Caloocan

Description

DLM-22 is located along C-3 Road at intersection of A. Mabini Avenue in Caloocan, City. The mark is the head of concrete nail embedded on the concrete center island, 25 cm from the edge of the curb with inscription "DLM-22"

PHOTOGRAPHS AND SKETCH



Station Name: DLM-23a

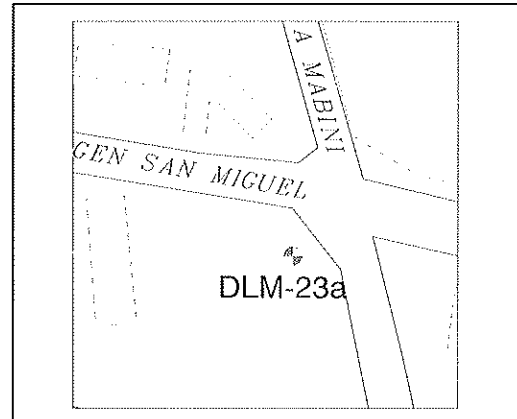
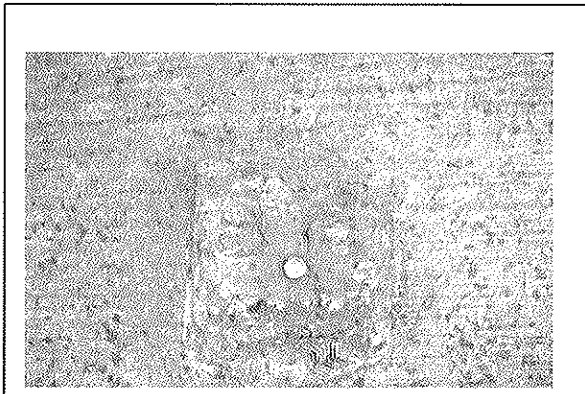
Location : Sampaloc

Municipality : Manila

Description

DLM-23a is located at the intersection road of A. Mabini and Samson Road in Sangandaan, Caloocan City. Mark is the head of concrete nail embedded on the concrete traingular island of the Police Traffic Outpost. The mark is protruding about 3.0mm above the surface of the surrounding cement putty with inscription "DLM-23a".

PHOTOGRAPHS AND SKETCH



Station Name: DLM-24

Location : Quirino Ave.

Municipality : Manila

Description

DLM-24 is located at the junction of Pres. Quirino Avenue and South Superhighway in Manila. The mark is the head of the concrete nail embedded on the triangular island 2.0 meters from foundation of traffic light post and 35.0 cm from the toe of plantbox. Mark is protruding about 2.0mm above the surface of the surrounding cement putty with inscription "DLM-24".

PHOTOGRAPHS AND SKETCH

