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VALIDATION OF THE AMC-71 MOBILITY MODEL

APPENDIX A: VEHICLE DATA. APPENDIX B: LOCATION AND DESCRIPTION OF TEST SITES. APPENDIX C: DEFINITIONS OF TERRAIN TERMS AND PROCEDURES USED TO COLLECT TERRAIN DATA FOR VALIDATION TESTS. APPENDIX D: BASIC TERRAIN DATA

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by

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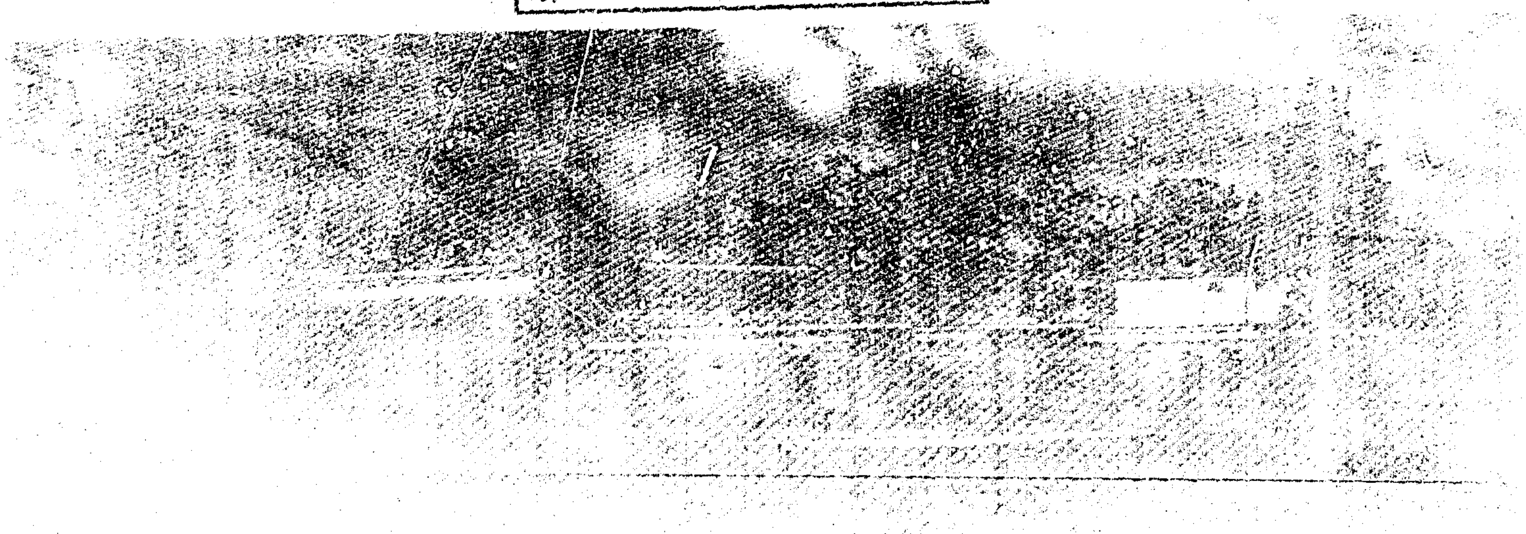

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APPENDIX A: VEHICLE DATA

1. Data required for each vehicle as input to the AMC-71 Mobility Model are contained in Table A1. Photos of the vehicles are shown in Figure 3 in the main text.

Table A1

Vehicle Characteristics

No.	Vehicle Characteristics Identification	Dimensions	Test Vehicles M151	M35A2	M113A1	M48	M60
1	Vehicle type (0 for tracked and 1 for wheeled)	-	1	1	0	0	0
2	Gross vehicle weight (cross country)	lb	3180	18,225	23,410	104,000	93,620
3	Weight on powered axles	lb	3180	18,225	NA*	NA	NA
4	Track type (0 for flexible and 1 for girderized)	-	NA	NA	0	0	0
5	Grouser height for tracks; number of tires for wheels (duals as two)	in.	4	6	1.0	1.5	1.5
6	Tire ply rating	-	6	12	NA	NA	NA
7	Gross rated horsepower	bhp	71	140	215	750	750
8	No. of tracks or tires (duals as two)	-	4	6	2	2	2
9	No. of tracks or tires (duals as one)	-	4	6	2	2	2
10	No. of axles	-	2	3	NA	NA	NA
11	Vehicle width	in.	62.25	96	105	143	143
12	Vehicle length	in.	132	280.6	192	270.5	273
13	Track width or nominal tire width	in.	7	11	15	28	28
14	Wheel rim diameter	in.	16	20	NA	NA	NA
15	Recommended tire pressure (highway)	psi	20 ft** 25 rr**	70	NA	NA	NA

(Continued)

* Not applicable.
** ft = front tire pressure; rr = rear tire pressure.

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Table A1 (Continued)

Vehicle Characteristics			Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
16	Recommended tire pressure (cross-country)	psi	18 ft 22 rr	35	NA	NA	NA
17	Recommended tire pressure (sand)	psi	12 ft 18 rr	15	NA	NA	NA
18	Area of one track shoe (tracked) or No. of wheels (wheeled)	$in.^2$	4	6	90	194	194
19	No. of bogies in contact with ground (tracked) or chain indicator (wheeled)--0 for no chains and 1 for chains	-	0	0	10	12	12
20	Vehicle ground clearance at center of greatest wheel span	in.	13.2	21.5	16	16	18
21	Minimum vehicle ground clearance	in.	8.8	12.5	16	16	18
22	Rear-end clearance (vertical clearance of vehicle's trailing edge)	in.	18	32	23	41	40
23	Vehicle departure angle	deg	37	40	40	40	42.5
24	Vertical clearance of vehicle's leading edge	in.	19	39	30	45	45
25	Vehicle approach angle	deg	66	42	70	90	90
26	Length of track on ground or wheel diameter	in.	30	42	105	161.5	171
27	Height of vehicle pushbar	in.	19	39	30	45	45

(Continued)

Table A1 (Continued)

Vehicle Characteristics			Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
28	Distance between first and last wheel center lines (or bogies)	in.	85	178	105	157.5	167
29	Horizontal distance from center of gravity to the front-wheel vertical center lines	in.	45	101.4	52	77.5	77.2
30	Vertical distance from center of gravity to the road-wheel horizontal center line	in.	10	23	24	26.3	36
31	Maximum span between adjacent wheel center lines	in.	85	130	NA	NA	NA
32	Angle between a line parallel to the ground surface and the line connecting the center of gravity and the center of the rear road wheel or idler (the wheel used to determine departure angle)	deg	NA	NA	18.4	5.5	25.9
33	Direct distance from the center of gravity to the center of the rear idler or rear sprocket	in.	NA	NA	91.0	120	120.7
34	Vertical distance from the ground to the center of the rear sprocket or rear idler	in.	NA	NA	15	41	43
35	Track thickness plus the radius of the rear sprocket or rear idler	in.	NA	NA	11	15.25	15.25
36	Track thickness plus the road wheel radius	in.	NA	NA	14.5	17.0	17.0

(Continued)

(Sheet 3 of 7)

Table A1 (Continued)

Vehicle Characteristics			Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
37	Rolling radius of tire or sprocket pitch radius	in.	14.2	20.1	9.8	12.25	12.25
38	Height of rigid point used to determine approach angle	in.	19	39	23	45	45
39	Maximum braking force vehicle can develop divided by vehicle weight	-	0.8	0.8	0.8	0.8	0.8
40	Loaded wheel radius	in.	14.2	20.1	NA	NA	NA
41	Distance vehicle spans before significant motion begins	in.	15	21	49.7	70	67
42	Maximum force pushbar can withstand	lb	3180	18,225	55,000	208,000	185,000
43	Maximum axle load/gross vehicle weight (0.5 is maximum)	-	0.5	0.33	NA	NA	NA
44	Vehicle rated horsepower per ton	hp/ton	44.7	15.4	18.4	14.4	16.0
45	Transmission type (0 for automatic and 1 for manual)	-	1	1	0	0	0
46	Final drive-gear ratio	-	4.86	6.27	3.93	5.08	5.08
47	Final drive-gear efficiency	-	0.9	0.9	0.95	0.98	0.9
48	Number of gears in transmission	-	4	10	3	2	2

(Continued)

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Table A1 (Continued)

	Vehicle Characteristics		Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
49	Gear ratios for transmission	-	5.712,3.179, 1.674,1.00	9.94,5.5, 5.02,3.21, 2.78,1.98, 1.62,1.56, 1.00,0.79	3.79,1.931, 1.00	3.497,1.256	3.497,1.256
50	Transmission efficiency	-	0.9	0.9	0.95	0.98	0.9
51	Number of point pairs in net engine torque versus engine speed curve	-	10	9	12	15	15
52	Array containing net engine torque versus engine speed curve	-	800,115, 1200,115, 1600,115, 2000,115, 2400,112, 2800,108, 3200,103, 3600,96, 4000,88, 4400,80	1000,325, 1200,325, 1400,325, 1600,324, 1800,320, 2000,310, 2200,300, 2400,285, 2600,270	600,158.9, 800,309.4, 1000,379.4, 1200,410.3, 1400,419.9, 1600,417, 1800,406.7, 2000,391.7, 2200,374.[illegible], 2400,355.1, 2600,335.6, 2800,316.1	1000,1500, 1100,1560, 1200,1610, 1300,1640, 1400,1670, 1500,1680, 1600,1680, 1700,1670, 1800,1650, 1900,1630, 2000,1600, 2100,1560, 2200,1515, 2300,1470, 2400,1420	1000,1500, 1100,1560, 1200,1610, 1300,1640, 1400,1670, 1500,1680, 1600,1680, 1700,1670, 1800,1650, 1900,1630, 2000,1600, 2100,1560, 2200,1515, 2300,1470, 2400,1420
53	Gear ratio from engine to torque converter	-	NA	NA	1	0.862	0.862
54	Denotes presence of a torque converter lockup (No = 0; Yes = 1)	-	NA	NA	1	0	0
55	Input torque at which the torque converter curves were measured	ft-lb	NA	275	900	900	900

(Continued)

(Sheet 5 of 7)

Table A1 (Continued)

Vehicle Characteristics			Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
56	Number of point pairs in array containing torque converter input speed versus converter torque ratio curve	-	NA	NA	24	12	12
57	Array containing torque converter input speed versus converter torque ratio curve	-	NA	NA	0,2340,0.05,2320, 0.1,2300,0.15,2280, 0.2,2260,0.25,2250, 0.3,2240,0.35,2230, 0.4,2230,0.45,2240, 0.5,2250,0.55,2270, 0.6,2300,0.65,2340, 0.7,2400,0.75,2490, 0.8,2620,0.85,2840, 0.9,3160,0.91,3280, 0.92,3400,0.93,3600, 0.94,4000,1,5000	0,1875,0.1,1850, 0.2,1825,0.3,1815, 0.4,1830,0.5,1895, 0.6,1970,0.7,2030, 0.8,2130,0.85,2210, 0.9,2500,1.0,50000	0,1875,0.1,1850, 0.2,1825,0.3,1815, 0.4,1830,0.5,1895, 0.6,1970,0.7,2030, 0.8,2130,0.85,2210, 0.9,2500,1.0,50000
58	Number of point pairs in array containing torque converter torque multiplying coefficient versus converter speed ratio curve	-	NA	NA	21	21	21
59	Array containing torque converter torque multiplying coefficient versus converter speed ratio curve	-	NA	NA	0,3.31,0.05,3.16, 0.1,2.99,0.15,2.8, 0.2,2.58,0.25,2.38, 0.3,2.19,0.35,2.02, 0.4,1.87,0.45,1.73, 0.5,1.6,0.55,1.49, 0.6,1.38,0.65,1.28, 0.7,1.18,0.75,1.07, 0.8,0.98,0.85,0.98, 0.9,0.98,0.95,0.97, 1,0.97	0,3.65,0.05,3.55, 0.1,3.25,0.15,2.87, 0.2,2.66,0.25,2.46, 0.3,2.28,0.35,2.12, 0.4,1.96,0.45,1.82, 0.5,1.67,0.55,1.54, 0.6,1.42,0.65,1.32, 0.7,1.22,0.75,1.14, 0.8,1.05,0.85,0.98, 0.9,0.97,0.95,0.95, 1,0.93	0,3.65,0.05,3.55, 0.1,3.25,0.15,2.87, 0.2,2.66,0.25,2.46, 0.3,2.28,0.35,2.12, 0.4,1.96,0.45,1.82, 0.5,1.67,0.55,1.54, 0.6,1.42,0.65,1.32, 0.7,1.22,0.75,1.14, 0.8,1.05,0.85,0.98, 0.9,0.97,0.95,0.95, 1,0.93

(Continued)

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Table A1 (Concluded)

Vehicle Characteristics			Test Vehicles				
No.	Identification	Dimensions	M151	M35A2	M113A1	M48	M60
60	Number of point pairs in vehicle velocity versus obstacle height at 2.5-g vertical acceleration curve	-	26	17	19	30	24
61	Array containing vehicle speed versus obstacle height 2.5-g vertical acceleration curve	-	1,50,2,16.667, 3,10,4,7.143, 5,5.556,6,4.545, 7,3.846,8,3.333, 9,2.941,10,2.632, 11,2.381 12,2.174, 13,2,14,1.852, 15,1.724,16,1.613, 17,1.515,18,1.429, 19,1.351,20,1.282, 21,1.22,22,1.163, 23,1.111,24,1.064, 25,1.02,100,1	0,50,5,30, 7,35,8 26.8, 9,21.2,10,16.7, 11,15.8,12,10.5, 13,7.8,14,5,6.5, 15,5,16,3.7, 17,2.8,18,2.1, 19,1.5,20,1.2, 100,1	0.1,50,8,50, 9,31.3,10,18, 11,12.3,12,9.1, 13,7.1,14,5.7, 15,4.7,16,3.9, 17,3.3,18,2.8, 19,2.3,20,2, 21,1.7,22,1.4, 23,1.3,24,1, 100,1	0,60,9,60, 10,12.2,11,6.9, 12,6,13,5.6, 14,5.4,15,5.3, 16,5.2,17,5.2, 18,5.1,19,5.1, 20,5.0,21,5, 22,5,23,5, 24,5,25,4.9, 26,4.9,27,4.9, 28,4.9,29,4.9, 30,4.9,31,4.9, 32,4.9,34,4.9, 36,4.9,37,4.9, 38,4.9,100,4.8	0,60,9,60, 10,12.2,11,6.9, 12,6,13,5.6, 14,5.4,15,5.3, 16,5.2,17,5.2, 18,5.1,19,5.1, 20,5.21,5, 22,5,23,5, 24,5,25,4.9, 26,4.9,27,4.9, 28,4.9,29,4.9, 38,4.9,100,4 9
62	Number of point pairs in ride dynamics versus speed curve	-	10	10	10	10	10
63	Array containing ride dynamics speed curve	-	0,66,0.2,30, 1,39,2,20, 3,13.5,4,10, 5,7.5,6,6.3, 7,5.5,8,5	0,58,0.2,40, 1,25,2,19, 3,4.4,4,11.3, 5,9,6,7.5, 7,6.3,8,5.2	0,40,0.2,40, 1,32,2,15.5, 3,7,4,4.9, 5,3.7,6,3.1, 7,3,8,3	0.30,0.2,30, 3,30,3.4,26, 4,22.4.6,19, 5.8,5,7,12, 8.10 10,7	0,30,0.2,30, 1,30,2,30, 3,30,4,24.5, 5,20,6,16.8, 7,14.2,8,12

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APPENDIX B: LOCATION AND DESCRIPTION OF TEST SITES

1. To verify the performance predictions from AMC-71 Ground Mobility Model satisfactorily, a variety of sites in which to conduct tests to meet the requirements of the validation program were required. Test sites were selected from the results of reconnaissance of several military reservations and other sites with a variety of terrain conditions, accessibility, and proximity to maintenance areas. Sites selected were at Fort Sill, Oklahoma; Yuma Proving Ground, Arizona; Eglin AFB, Florida; Houghton, Michigan; and Fort Knox, Kentucky. Locations of the traverses and single terrain units tested are shown in Figures 4-9 in the main text. A general description of each of the test sites is given in the following paragraphs, and a profile with photos of each of the test traverses is shown in Plates B1-B17. The terrain units described are those that were outside the traverses. All soil types described in the following paragraphs are in terms of the Unified Soil Classification System (USCS).

Fort Sill Traverses and Terrain Units

Traverses

2. All four traverses at Fort Sill were within the Fort Sill Military Reservation, near Lawton in south-central Oklahoma. Three of the traverses were composed of characteristic prairieland terrains; the other course was composed primarily of large stands of relatively dense hardwood trees. The soil type in the area was mainly lean clay (CL).

3. Traverse 1. This traverse, the longest at Fort Sill, was 11,350 ft long. Most of the terrain comprising the traverse was rolling grassland. However, along the drainageways the vegetation density and size increased, with some trees included. The soil was lean clay with some rocks and boulders.

4. Traverse 2. This traverse was 8150 ft long and composed of rolling grassland. Along the drainageways vegetation density and size

increased, with some trees. The soil was lean clay with some rocks and boulders.

5. Traverse 3. This traverse was 6750 ft long. The first 2401 ft was a relatively dense stand of oaks and other hardwoods. The remainder was rolling grassland with some areas of rugged terrain near rock outcroppings. The soil was lean clay with some rocks and boulders, especially near outcroppings.

6. Traverse 4. This traverse, near the end of Traverse 1, was 5300 ft long. The entire traverse was rolling grassland with no trees. The soil was lean clay with scattered rocks.

Terrain units

7. Terrain units 0-1 and 0-2. These terrain units had a soil classification of lean clay with a 100 percent cover of grass 6 in. high at the time of testing. Terrain unit 0-1 had a surface slope of 3.3 percent and terrain unit 0-2, a slope of 7.4 percent.

8. Terrain unit 0-3. This unit had a 100 percent cover of 6-in.-high grass and a soil type of lean clay with a few small rocks. It had a 13.7 percent slope.

9. Terrain units 0-4 and 0-5. These terrain units had a 70 percent cover of 48-in.-high grass and a soil type of lean clay with numerous small rocks. Terrain unit 0-4 had a 27.2 percent slope, and terrain unit 0-5 had a 31.5 percent slope.

10. Terrain unit 0-6. This unit had a 95 percent cover of 6-in.-high grass with a soil type of lean clay with a few scattered small rocks. The slope was 17.8 percent.

11. Terrain unit 0-7. This nearly level terrain unit, near the end of Traverse 2, was 100 percent covered with grass and was of relatively firm lean clay. Grass heights varied up to 36 in.

12. Terrain unit 0-8. This terrain unit, near the main base, was a very firm area of moved Bermuda grass with terrain slope of 0.47 percent.

13. Terrain unit 0-9. This unit was relatively firm and open with uniformly spaced scrub oaks. Ground cover was 60 percent grass up

to 12 in. high on a soil classified as silty clay. The slope was 0.4 percent.

Yuma Traverses and Terrain Units

Traverses

14. Five of the six traverses at Yuma were within the boundaries of Yuma Proving Ground, 24 miles northeast of Yuma in southwestern Arizona. One traverse was in the dune area of the Sand Hills in southeastern California, 20 miles west of Yuma.

15. Traverse 1. This traverse, 19,877 ft long, was the longest of six traverses. It was purposely chosen for testing because it encompassed the entire range of materials found at the Yuma sites; namely, dunes, undulating hills, smooth and rough washes, desert pavement, and some of the denser desert vegetation. The soils were mixtures of alluvial sand, gravel, and sandy silt. Desert pavement areas at the ends of this traverse consisted of pebbles on undisturbed apron surfaces overlying silt and sand mixtures. These apron surfaces were drained by many branching and braided ephemeral washes. Bouldery and gravelly materials mixed with sands and silts were in the washes. Along the washes were the denser areas of vegetation in the traverse, with clusters of trees up to 30 ft tall scattered throughout the wash areas. The central portion of traverse was an area of undulating silty and hills bordered by microdunes with a sparse growth of desert vegetation.

16. Traverse 2. This traverse was in a hilly area near Traverse 1 and was 2902 ft long. It was basically a gently sloping area of sand, silt, and gravel with an occasional clump of vegetation or a small wash. No desert pavement areas were included in the traverse.

17. Traverse 3. Located southeast of Traverses 1 and 2, Traverse 3 was on a broad alluvial apron in the Castly Dome Plain. The entire 8971-ft course was relatively flat, though numerous washes crossed it. Desert pavement areas comprised the bulk of the traverse, scattered between the wash areas or clumps of vegetation. Soils were

mostly silty sand with large quantities of bouldery and gravelly materials.

18. Traverse 4. This traverse, some 6 miles to the east of Traverse 3, generally followed a broad smooth wash for 6000 ft. The initial 1600 ft and final 1700 ft of the traverse were broad, flat wash areas of sandy, gravelly silt with some large boulders and dead vegetation. The remainder of the traverse followed a relatively smooth wash. The wash bottom was composed of fine, smooth pebbles mixed with sandy silt and a few boulders. Trees up to 30 ft tall, mixed with scrub desert vegetation, grew along the wash bottom.

19. Traverse 5. This traverse was some 40 miles to the west of the above traverses in the Sand Hills area of southeastern California. Most of the 6966-ft traverse was in an area of wind-blown dunes up to 20 ft high with sparse desert vegetation. The soil was primarily clean sand, though in some areas of exposed desert floor the soil was a mixture of sand and silt.

Terrain units

20. Terrain units 0-1 through 0-13. These terrain units were relatively firm areas of bouldery gravel, near Pole Line Road east of Traverse 4. Surface slopes ranged from 24.9 to 61.6 percent with little or no vegetation.

21. Terrain units 0-14 through 0-36. These terrain units were areas of coarse sand near Traverse 1. Slopes ranged from 10.0 to 49.7 percent with little or no vegetation.

22. Terrain units 0-37 through 0-46. This group of terrain units was in the sand dune area of the Sand Hills in California. They were composed of fine, clean sand slopes ranging from 8.5 to 43.0 percent with no vegetation.

23. Terrain unit 0-47. This unit was 800 ft long, at the end of Traverse 4. The soil was a mixture of gravel, sand, and silt. The surface slope was 0.9 percent with some scrub vegetation.

24. Terrain unit 0-48. This unit was 646 ft long, south of Pole Line Road between Traverses 3 and 4. The soil was a silty sand; the

scattered clumps of desert vegetation ranged from small shrubs tc large cacti. Terrain surface slope was 0.6 percent.

25. Terrain unit 0-49. This unit of desert pavement was near the beginning of Traverse 1 in an area nearly void of vegetation. This terrain was covered with a sandy silt overlain with 1- to 2-in.-diam washed brownish-black rocks.

26. Terrain unit 0-50. This terrain unit was near Traverse 2. It was level and composed of silty, gravelly sand with little or no vegetation.

27. Terrain unit 0-51. In a clean dune area, this terrain unit was a clean sand with sparse scrub vegetation.

28. Terrain unit 0-52. This level sand flat was located 1/4 mile east of the dunes. The desert floor material was a mixture of sand and silt with sparse vegetation.

29. Terrain unit 0-53. In a clean dune area at the end of Traverse 5, this terrain unit was a clean, windward, sandy slope of 12.1 percent with no vegetation.

30. Terrain units 0-54 through 0-64. These units were along a gravelly wash parallel to the slope test area (0-1 to 0-13), near Pole Line Road east of Traverse 4. The units contained obstacles of various geometric shapes and sizes mainly of sandy silt with some sparse desert vegetation.

Eglin AFB Traverses and Terrain Units

Traverses

31. All three traverses at Eglin AFB were in the northwest corner of the base, east of Pensacola in the western panhandle of Florida. The traverses were in an area known as Airfield 6, used as a training area by the U. S. Army Ranger Training School at Eglin. The traverses were composed of various combinations of pines and scrub oaks, with mixed shrubs, in poorly graded sands with some fines which were classified as SP according to the USCS.

32. Traverse 1. This traverse, adjacent to one of the runways of Airfield 6, was 3857 ft long. The first 700 ft of the course was composed of small scrub oak trees; the remainder consisted of large stands of pine trees with some scrub oak and palmetto mixed with small underbrush.

33. Traverse 2. East of Airfield 6 and parallel to the main runway of the airfield, this traverse was 5668 ft long, the longest of the three traverses at Eglin. The traverse encompassed a large variety of terrain conditions, including tall, thick stands of pine, thick scrub oak areas, and areas containing tree-length logs of varying diameters. In most areas, especially near pine stands, the ground surface was completely covered with thick pine straw, which allowed little or no vegetation growth at ground level.

34. Traverse 3. Directly south of Traverse 1, this traverse was 3588 ft long. The vegetation was generally the same as that of the other traverses, with generally more open areas underneath large pine stands.

Terrain units

35. Terrain units 0-1 and 0-4. These two terrain units were relatively bare, with little or no slope. Soil in terrain unit 0-4 was firm sand and in terrain unit 0-1, near a trail, was somewhat disturbed loose sand.

36. Terrain units 0-2 and 0-5. Small shrubs and several trees were cut from an area adjacent to Traverse 3 to provide a suitable area for terrain units 0-2 and 0-5. These two terrains were adjacent to each other in relatively soft sand with a 2- to 3-in.-thick layer of ground litter composed of pine straw and oak leaves.

37. Terrain units 0-3 and 0-6. These two terrain units were in an area of very large pines with little or no underbrush. Ground cover was nearly 100 percent pine straw. The soil of terrain unit 0-6, which was near a small drainageway, was less firm than that of terrain unit 0-3.

38. Terrain unit 0-7. This terrain unit, in the same terrain as unit 0-1 of Traverse 1, was modified from the existing terrain by removing all scrub oaks in an area large enough for vehicle testing. After removal of the trees, the only vegetation remaining was short grass with some ground litter.

39. Terrain unit 0-8. In a thickly vegetated area near the Yellow River, this 354-ft-long terrain unit was composed of nearly all vegetation types common to the overall test area, including pines, oaks, palmetto, and various low shrubs, with thick grass and pine straw on the ground. The area contained some surface roughness.

40. Terrain unit 0-9. This short terrain unit was near the Yellow River in an area of extremely thick vegetation. The thick titi trees with numerous branches and exposed roots, intermingled with tall pines and stumps, created an area nearly impossible to penetrate. The soft ground surface was composed of decayed vegetation and mosses atop the sandy soil.

41. Terrain unit 0-10. Adjacent to Traverse 2, this terrain unit, 210 ft long, had tall pines, scattered oaks, and little or no ground vegetation. The soft sandy soil was nearly 100 percent littered with pine straw and decayed leaves.

42. Terrain unit 0-11. This terrain unit was 1000 ft long and was adjacent to the end of the longest of the runways at Airfield 6. The area had been cleared of trees to increase visibility around the airstrip and at test time contained only surface grasses with scrub oak saplings less than 1 ft high.

43. Terrain units 0-12, 0-14, and 0-16. These units were all originally the same 450-ft terrain unit. Terrain unit 0-12 had a minimum tree spacing of 13.7 ft, but this spacing was increased to 15.2 ft in units 0-14 and 0-16 by removal of some of the smaller trees. The vegetation was composed of large pines and some scrub oaks with a few low shrubs and nearly 100 percent pine straw ground litter.

44. Terrain unit 0-13. This terrain unit was 388 ft long and in an area of nearly 100 percent scrub oak trees with a minimum spacing of 5.3 ft. The trees were so thick that the visibility in the test lane

was only 34 ft. Little or no ground surface vegetation was present on the sandy soil. The test course had a slight upslope of 2.2 percent in the direction of vehicle travel.

45. Terrain unit 0-15. This 365-ft-long terrain unit was in an area east of Airfield 6, which had been logged recently and at test time was overgrown with small oaks. The area was relatively flat with some surface grasses growing with the oaks in the sandy soil (SP). Visibility in the terrain unit was cut to 34 ft by thick saplings.

46. Terrain unit 0-17. This terrain unit, at the western edge of Airfield 6, had been logged just before test time. Only large scrub oaks and unmarketable pines remained in the sandy soil (SP), which was otherwise devoid of vegetation.

Houghton Traverses and Terrain Units

Traverses

47. All three traverses were in the Keweenaw Peninsula of the Upper Peninsula of Michigan, northeast of Houghton-Hancock. Most terrain units of all three traverses were forested areas with characteristic vegetation of the area, including maples, poplars, and pines with scattered low shrubs and blueberry patches growing in loamy sand (SP-SM) with some organic matter in the low areas. The area in general was harshly glaciated with random-rounded and traverse ridges, with abrupt irregular ditches, which, in combination, produced rather high values of surface roughness in most terrain units. (Tests were conducted with some vehicles in the spring and some in the fall of the year. Therefore, descriptions given below relate to both seasonal conditions unless stated otherwise.)

48. Traverse 1. This 4550-ft-long traverse, near the village of Ahmeek, was the most open and level traverse of the three. The initial 2346 ft was relatively bare with mostly lichens, grasses, and blueberry bushes along with scattered currant bushes as vegetable cover. Also, of the remaining 2204 ft, 568 ft was open with only grasses as surface

vegetation. The last 717 ft of the traverse was composed of dense pine and poplar growths, which hindered visibility. The entire profile was relatively irregular with numerous surface irregularities and rocks. Recognition distances were generally about the same in the pine areas in both the spring and fall tests.

49. Traverse 2. West of Traverse 1, this 4050-ft-long traverse was composed of 100 percent heavy vegetation with much deadfall and numerous stumps. The major feature in the surface profile was a deep, scoured area about one third of the way down in the traverse with sloping tree-covered sides of greater than 16 percent slope. The vegetation all along the traverse was closely spaced, with the minimum tree spacing in all units less than 10 ft. Visibility in some of the units was cut to less than 25 ft by the dense vegetation. In the fall, the visibility was much better as a result of leaf loss caused by a seasonal change.

50. Traverse 3. Near the Houghton County Airport, this 3025-ft-long traverse was very rough, with heavy stands of maple trees and numerous large boulders. Only one 500-ft area was open but was covered with surface grasses and scattered currant bushes. The soil was relatively firm in most areas, although the surface was soft and wet in the drainage areas. Minimum tree spacings were, in general, about 10 ft, which created visibility problems by reducing recognition distances to less than 25 ft in most units. This visibility problem was nonexistent during the fall.

Terrain units

51. Terrain unit 0-1. This terrain unit was modified from existing terrain to create a terrain unit with a minimum tree spacing of about 8 ft. The vegetation in the entire 330-ft unit was composed of maple trees of various diameters over rocky, sand soil with some surface roughness. The surface was essentially bare except for lichens and mosses; visibility was not impaired by the vegetation.

52. Terrain unit 0-2. This short 100ft wooded terrain unit was adjacent to terrain unit 0-5 of Traverse 2. The 23.9 percent sloping terrain was heavily wooded with a relatively rough sandy surface. The

dense growths of small sugar maples and ferns and other surface vegetation reduced visibility in the unit to 52 ft.

53. Terrain unit 0-3. Adjacent to terrain unit 0-6 of Traverse 2, this heavily wooded 300-ft unit was so dense that vehicle passage was difficult. The ground surface was rough with scattered small obstacles, and the dense clumps of sugar maples reduced visibility to only 30 ft.

Fort Knox Traverses and Terrain Units

Traverses

54. Both traverses at Fort Knox were within the boundaries of the Fort Knox Military Reservation, south of Louisville, Kentucky. Each traverse was composed of alternately occurring woods and open areas. Soil types in the area traverse 1 were MH (silt with high plasticity) and CL, and in the terrain units of Traverse 2 were ML (silt with slight plasticity) and CL.

55. Traverse 1. This 14,222-ft traverse was in the northwestern part of Fort Knox in an area known as the Salt River floodplain. The entire traverse was relatively flat, though in some areas of low elevation the water table was at or above the ground surface. Consequently, the soil strength in some of the terrain units was relatively low. Terrain conditions prevented traverse layout in one continuous relatively straight-line segment. Accordingly, this traverse started at a fire lane on the eastern edge of the reservation and completed a somewhat rectangular loop clockwise through the terrain, back onto the fire lane, and then down the fire lane to the starting point.

56. Traverse 2. In the south-central portion of the reservation, this 11,750-ft traverse was rather rough and undulating. Numerous drainageways crossed the traverse in the wooded areas, creating problems for some of the vehicles. The open areas, which were heavily trafficked by armored tracked vehicles during training exercises, presented surface roughness problems in some terrains, especially those near the start of

the traverse, which originated in one of the main training areas of the southern part of the reservation.

Terrain units

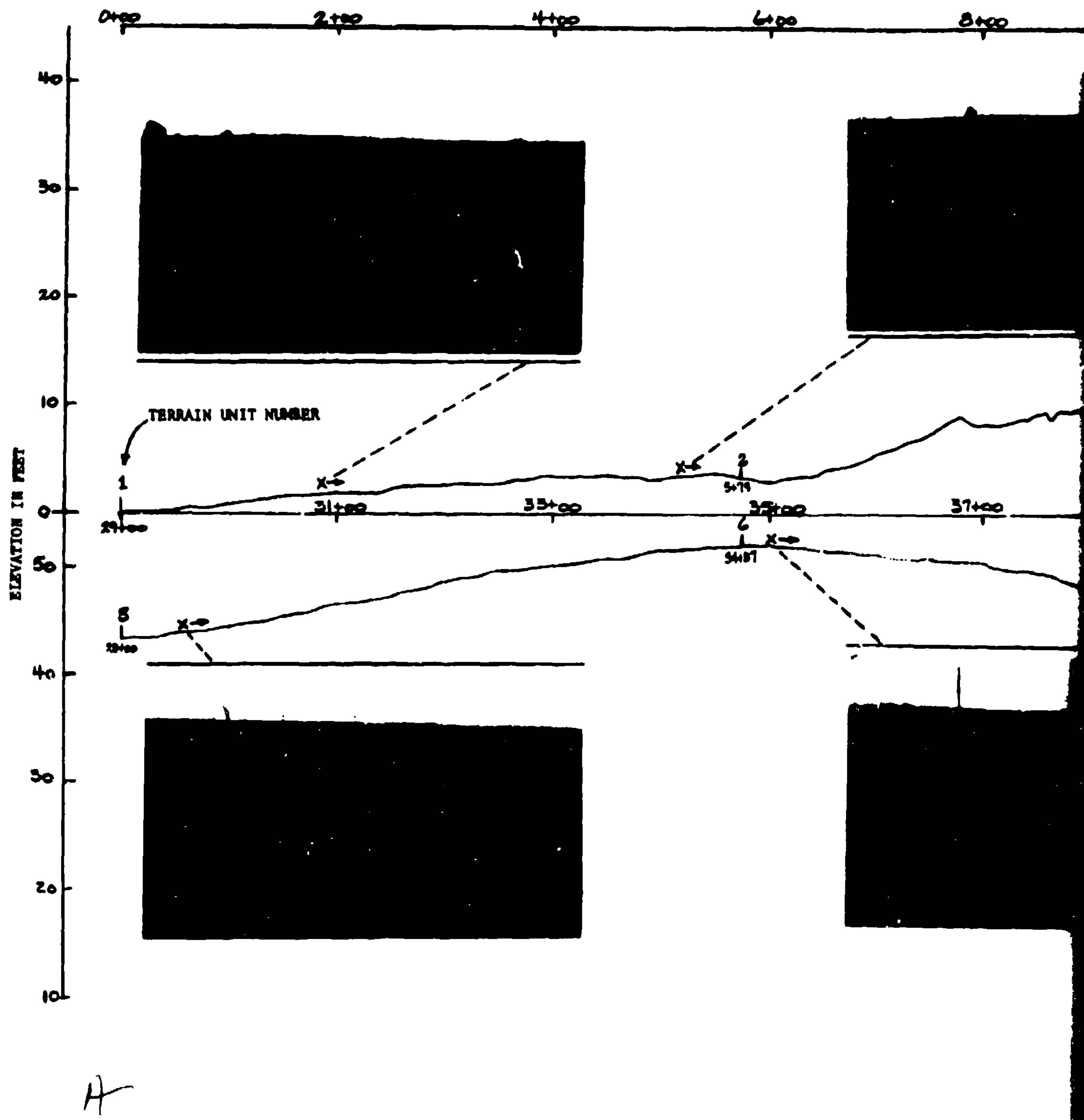
57. Terrain unit 0-1. This 750-ft terrain unit was essentially bare with some small obstacles and some surface roughness. The relatively firm surface was 2.2 percent downslope toward the west.

58. Terrain unit 0-2. This 550-ft unit was nearly 100 percent covered with broom sedge and grasses of various heights, though not tall enough to hinder visibility. The relatively firm surface was downslope 2.1 percent in the same direction as terrain unit 0-1, with only minimal surface roughness and no obstacles.

59. Terrain unit 0-3. This 260-ft unit was modified from existing terrain, by removing some trees, into a uniformly spaced vegetation unit to obtain information on manueverability of the vehicles. The remaining trees were spaced 20-22 ft apart in an area of thick broom sedge. Visibility was reduced to 55 ft by the grasses. The flat surface was relatively smooth with no obstacles.

60. Terrain unit 0-4. This 400-ft, 7.3 percent grass-covered slope was used to study the effects of slope on vehicle speed. The surface was relatively rough but firm. Surface grasses reduced visibility to 45 ft in the terrain unit.

61. Terrain units 0-5 through 0-10. Near terrain unit 0-3, these six terrain units were actually short linear feature crossings. The units were essentially bare and steep-sided with deformable banks.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8+00
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30
20
10
0
50
40
30
20
10
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2
5
6
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29+00
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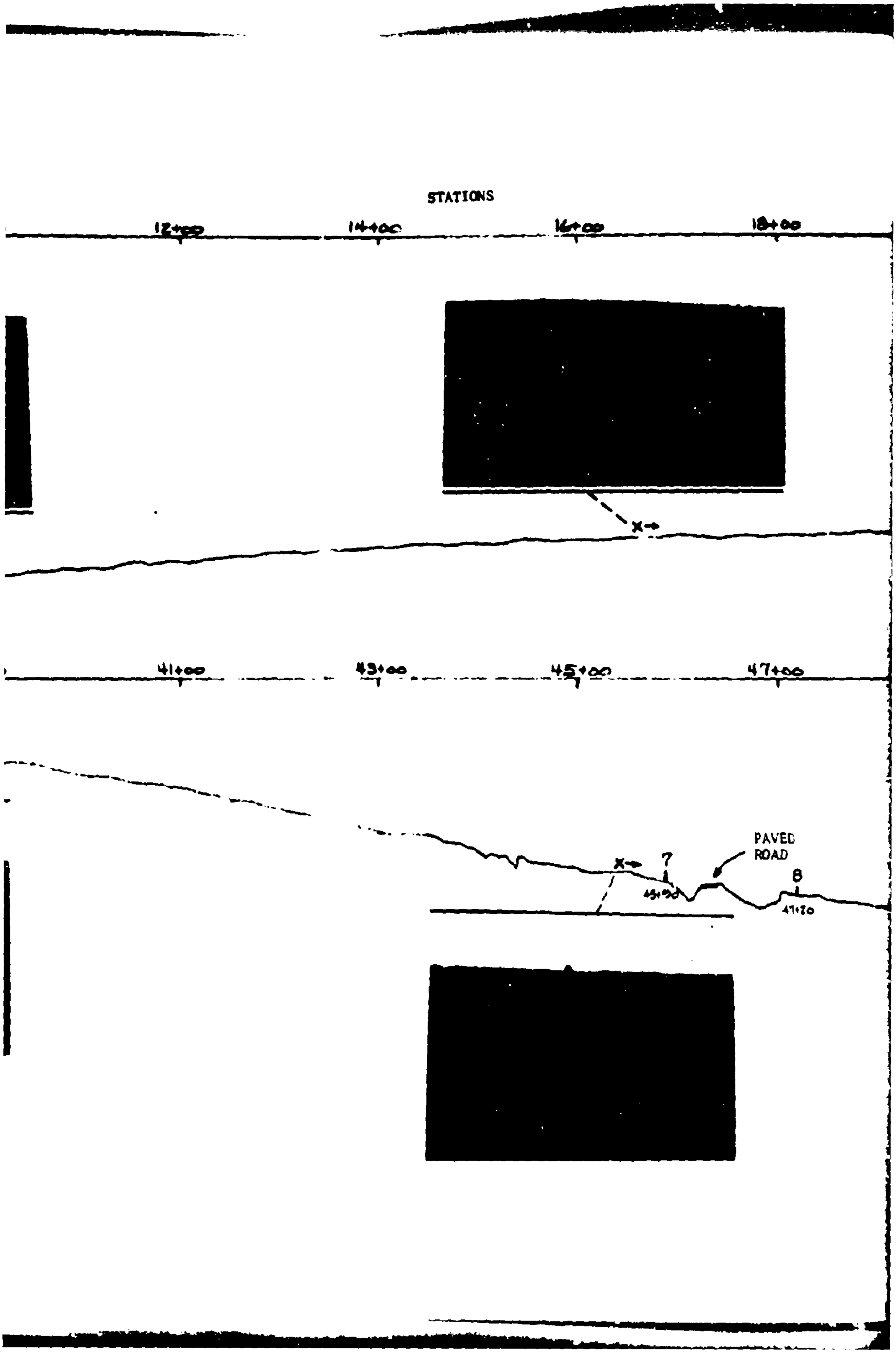
33+00
35+00
37+00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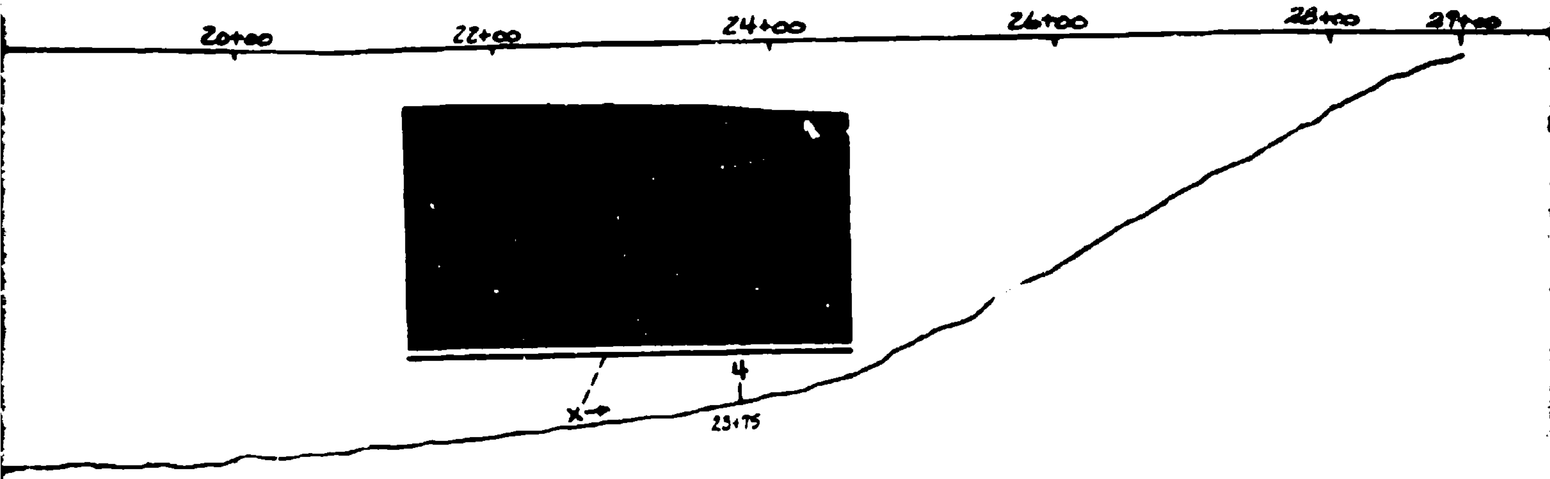
PAVED ROAD
7
8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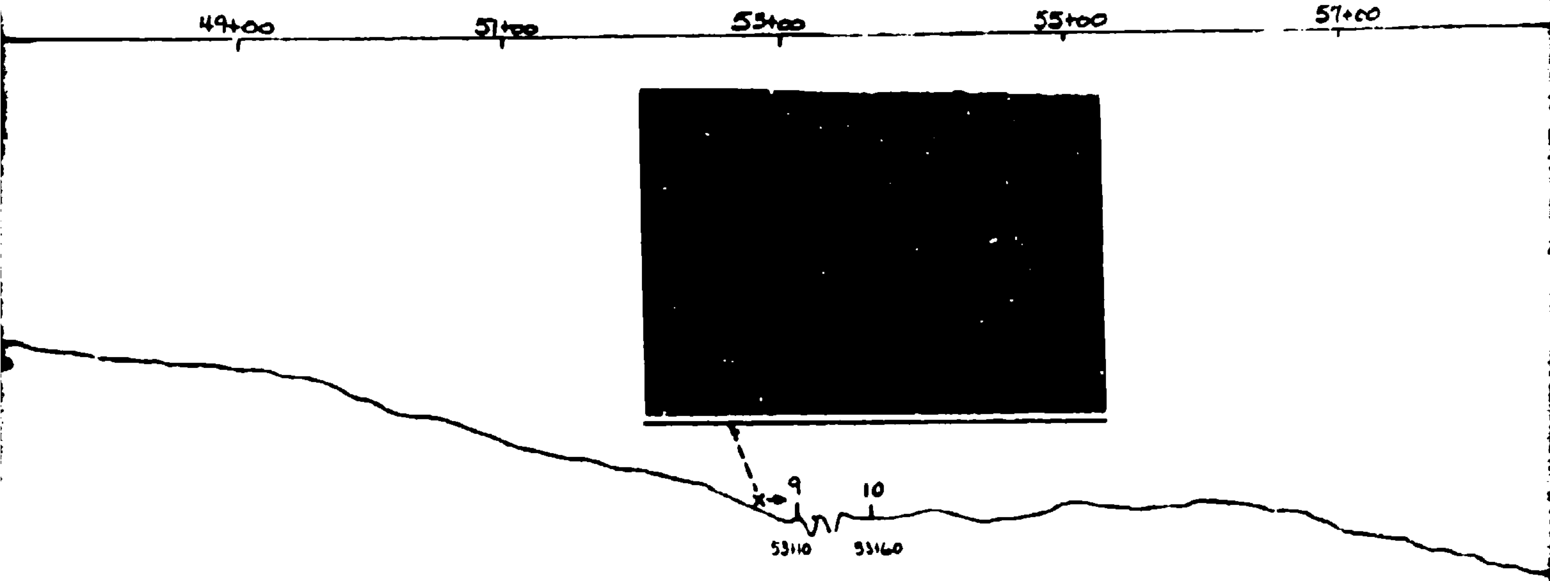
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57+00
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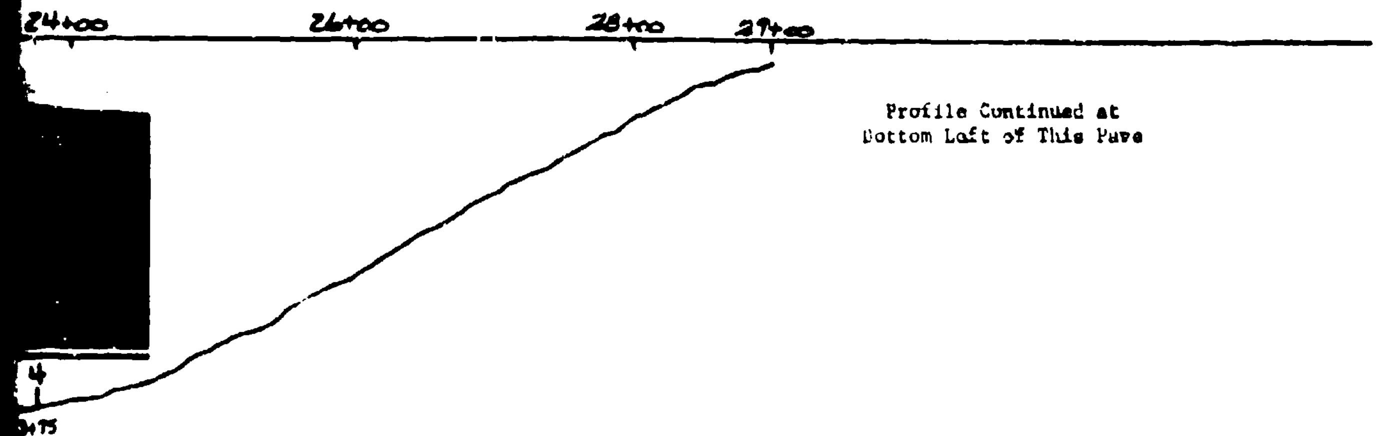
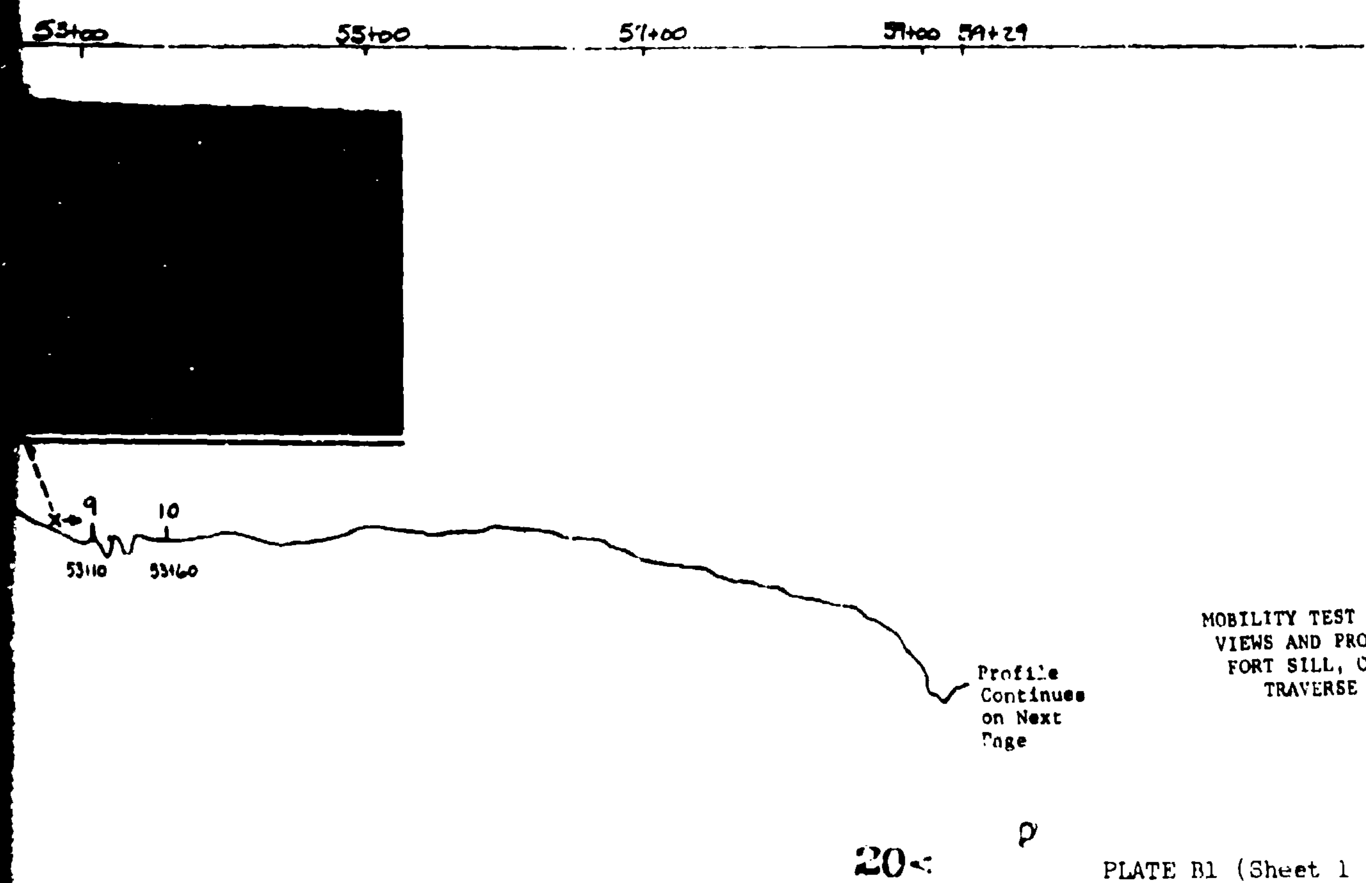
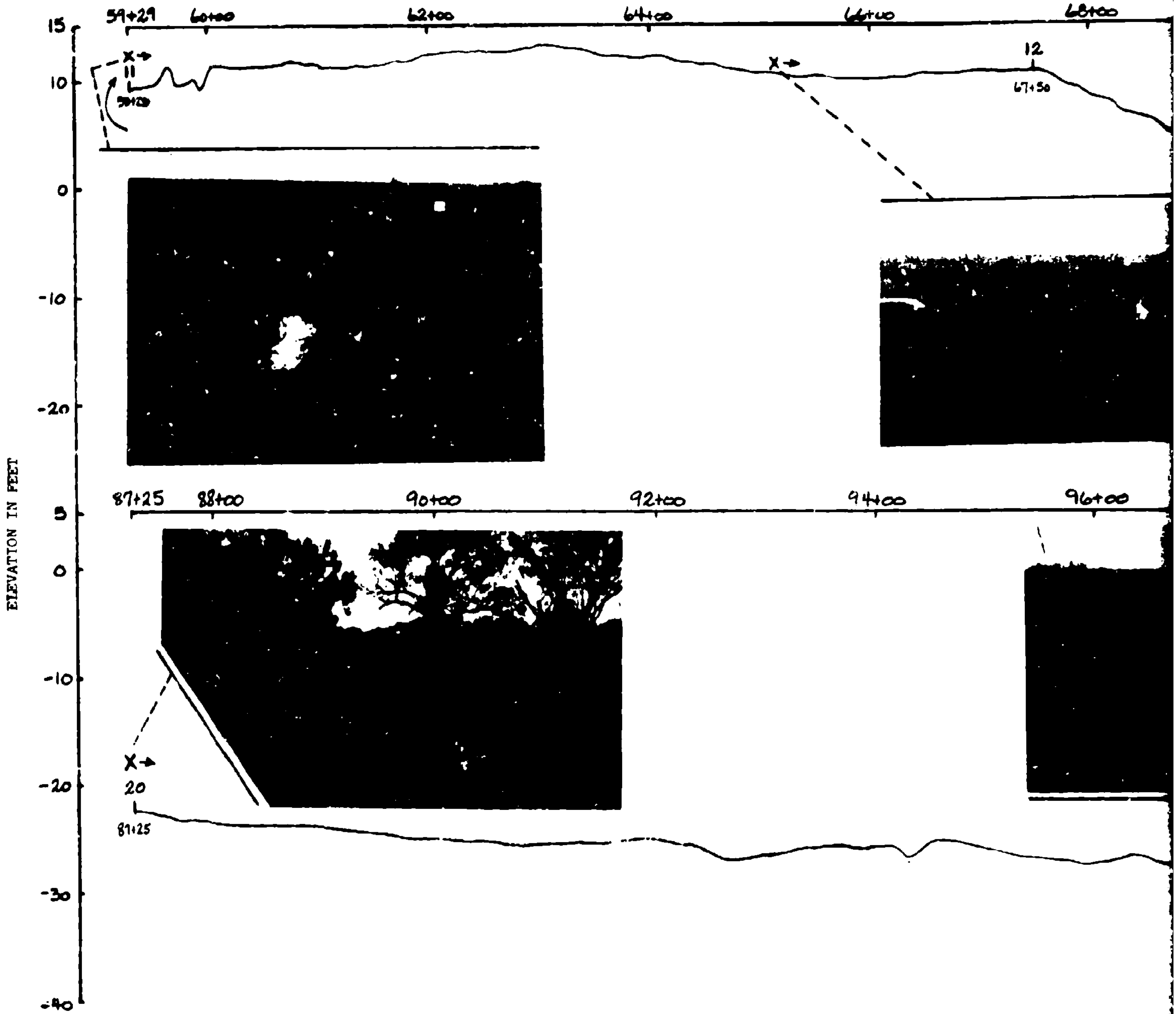
10
53+10
53+60





MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 1

PLATE B1 (Sheet 1 of 2)



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64+00
66+00
68+00
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10
0
-10
-20
X→
11
59+29
X→
12
67+50
ELEVATION IN FEET
87+25
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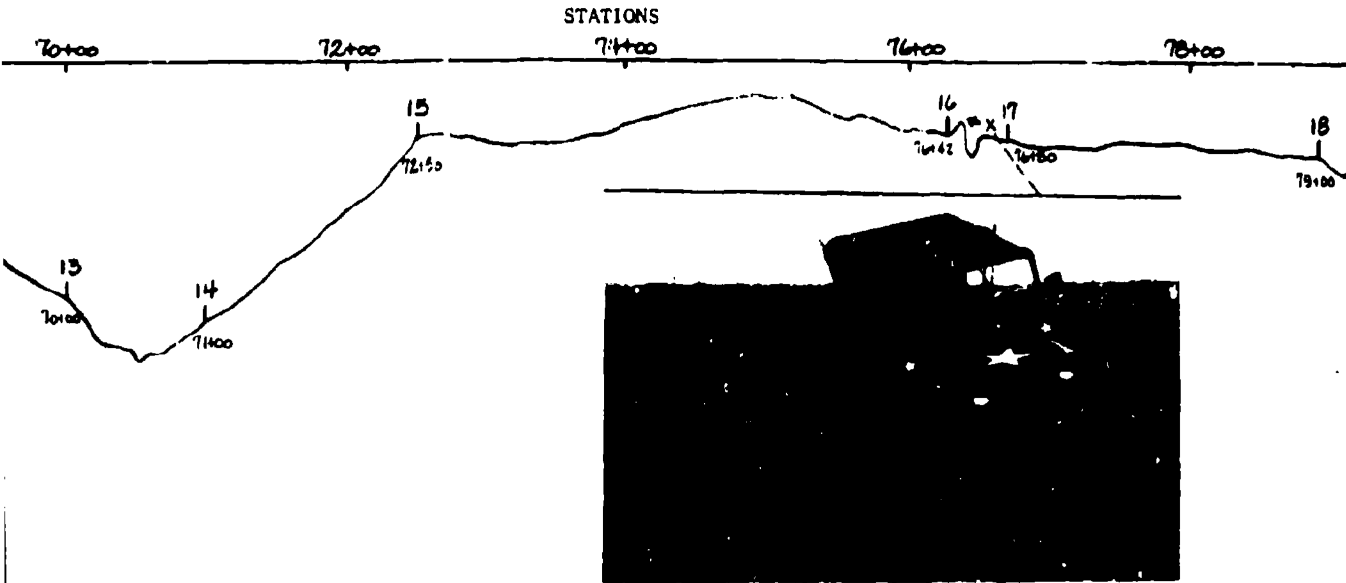
X→
20
87+25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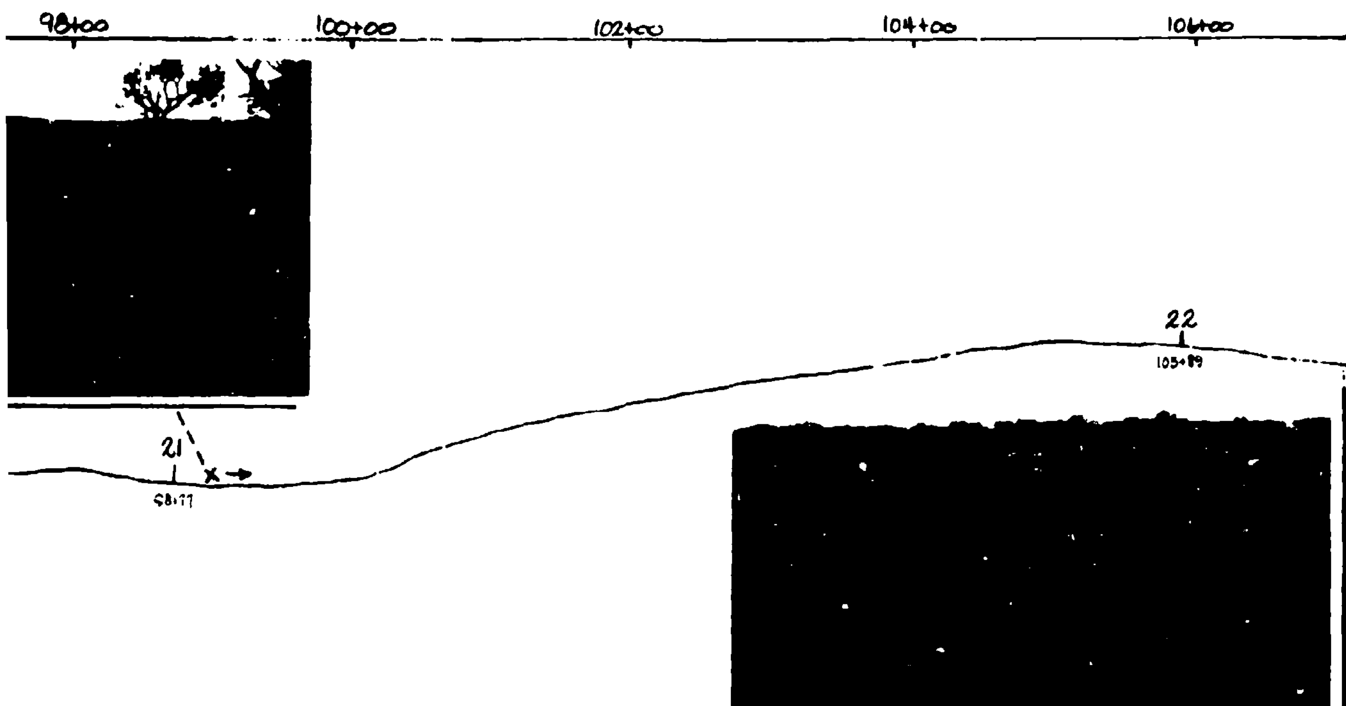
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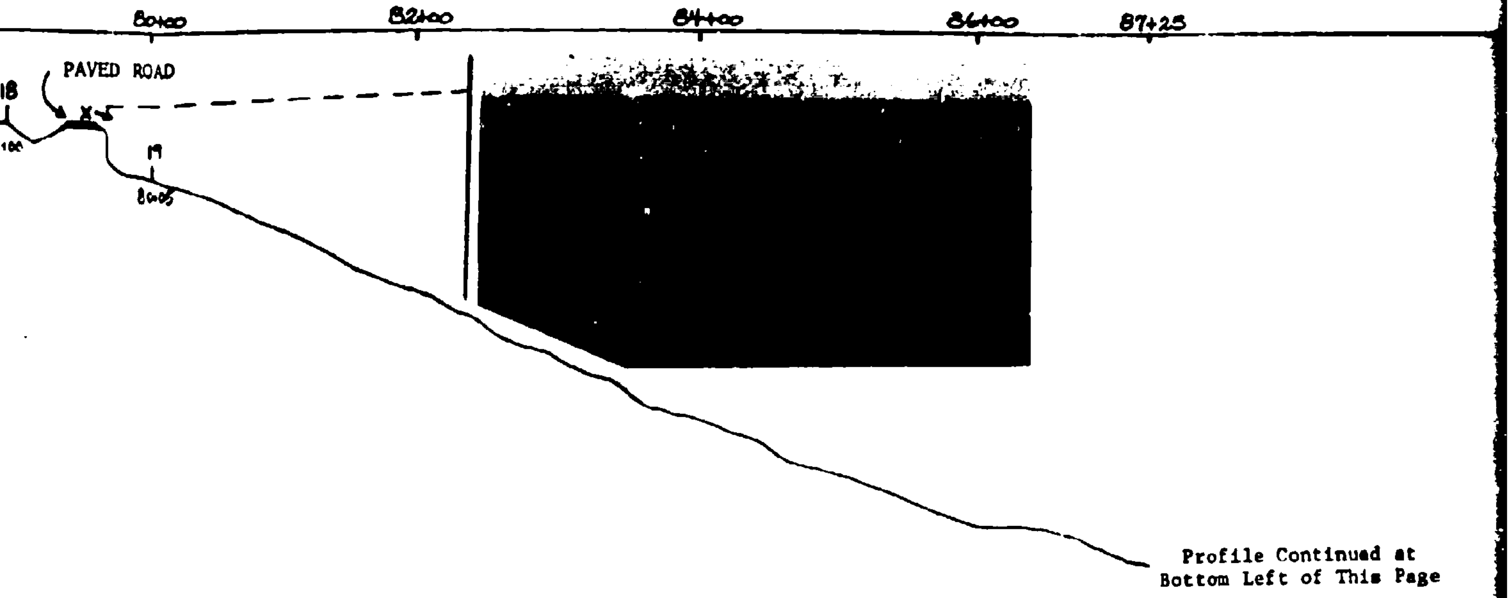
104+00
106+00
21
22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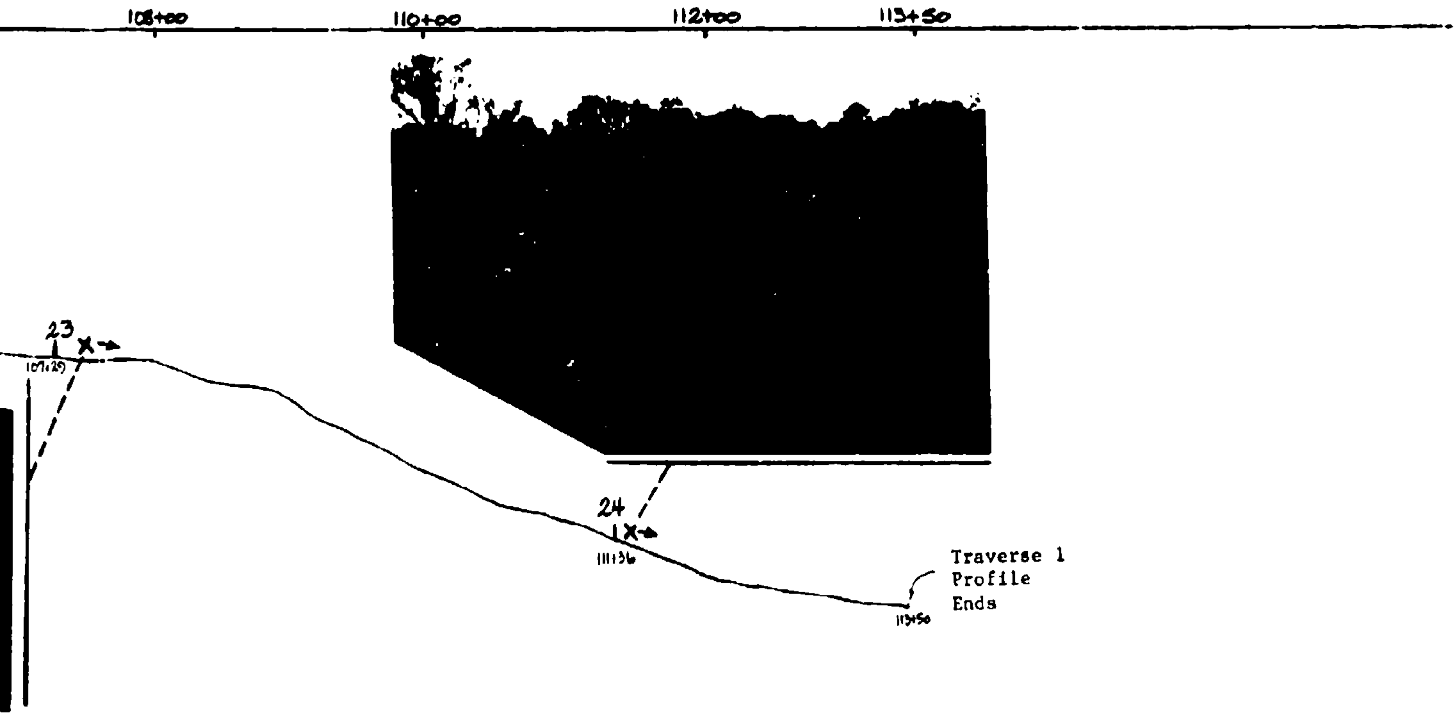
82+00
84+00
86+00
87+25
18
PAVED ROAD
19
Profile Continued at
Bottom Left of This Page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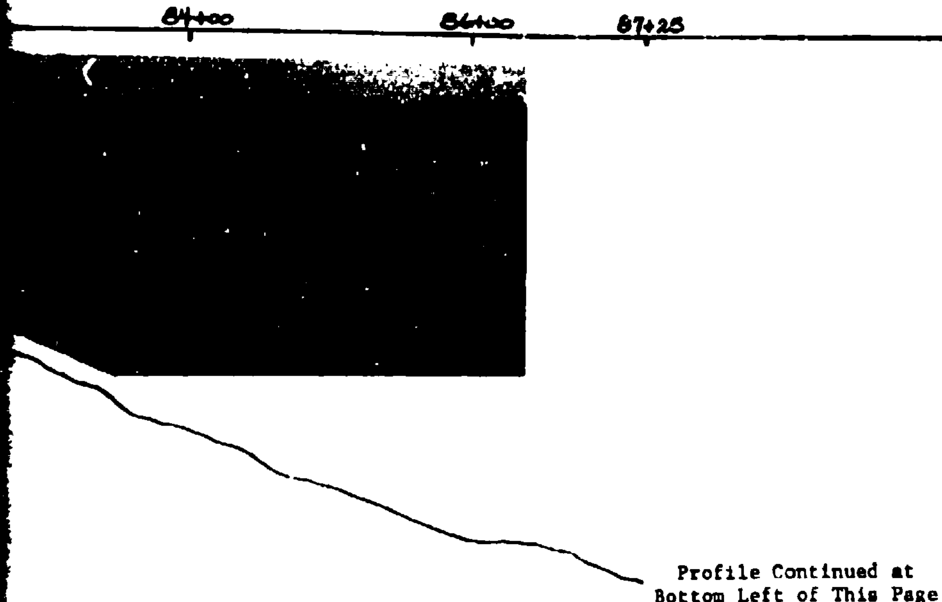
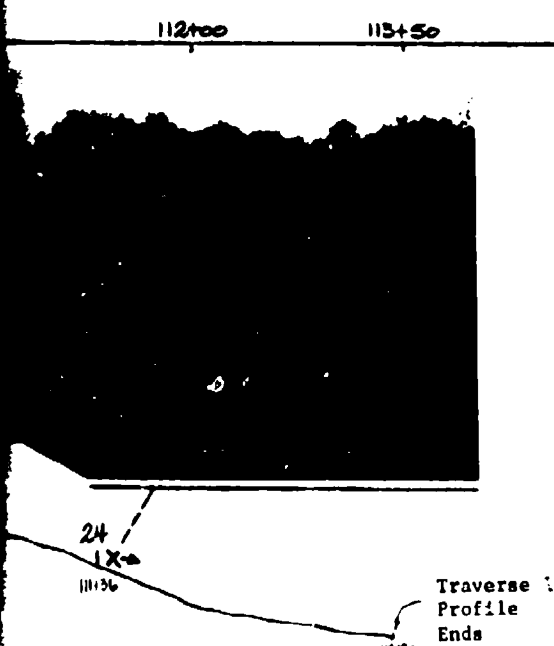
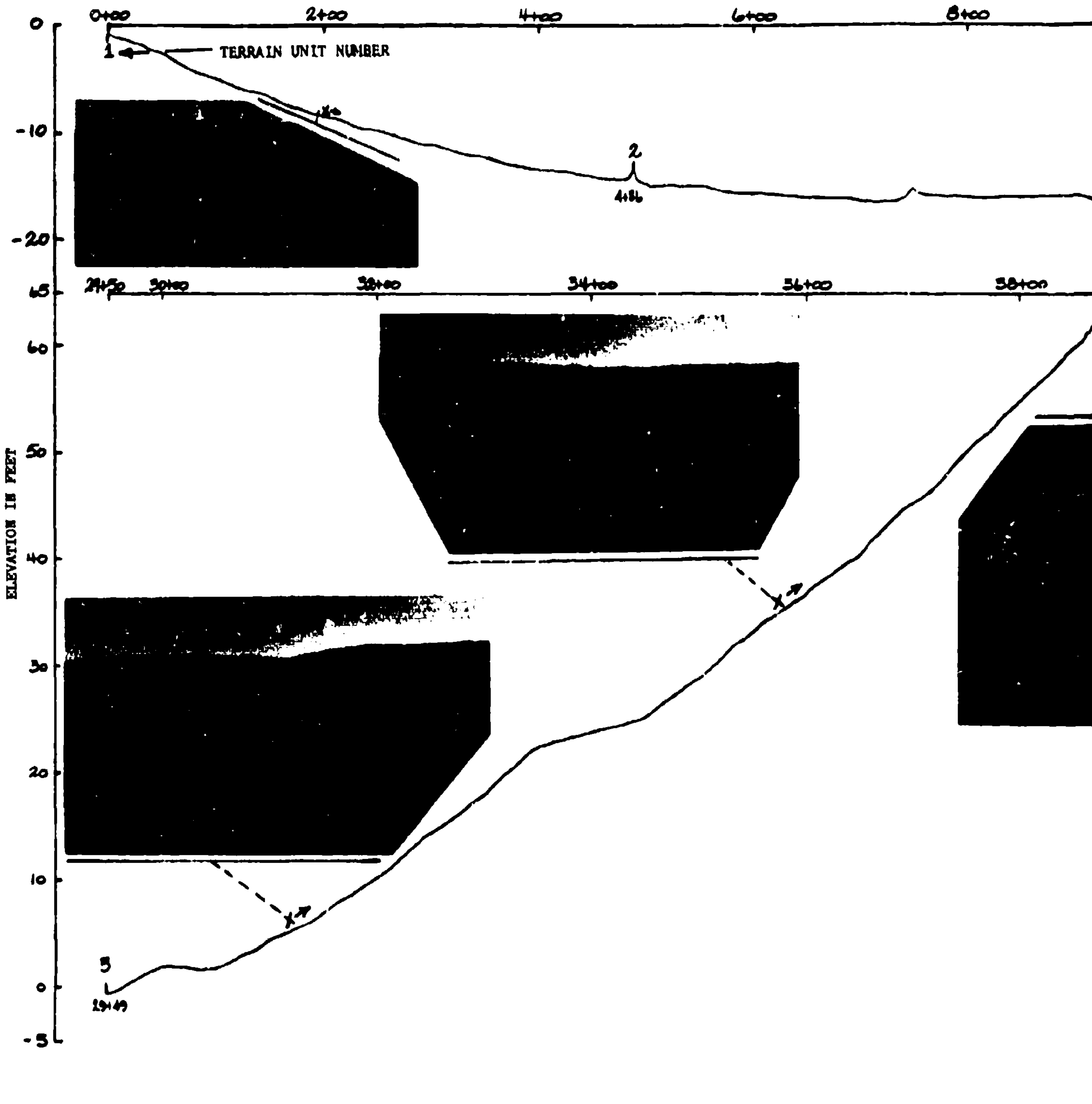
112+00
113+50
23
24
Traverse 1
Profile
Ends





MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 1

PLATE B1 (Sheet 2 of 2)



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34+00
36+00
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-20
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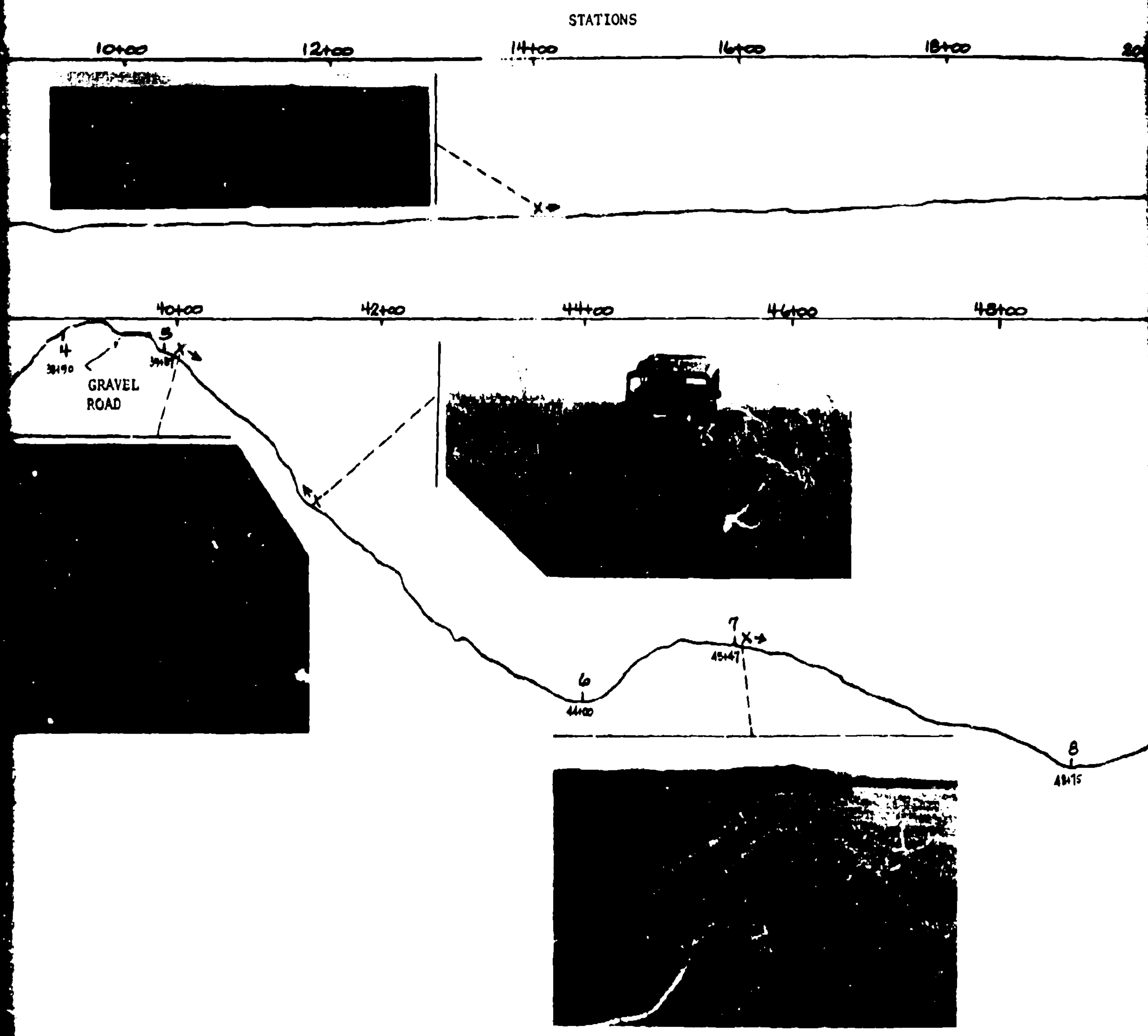
50
40
30
20
10
0
-5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14+00
16+00
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46+00
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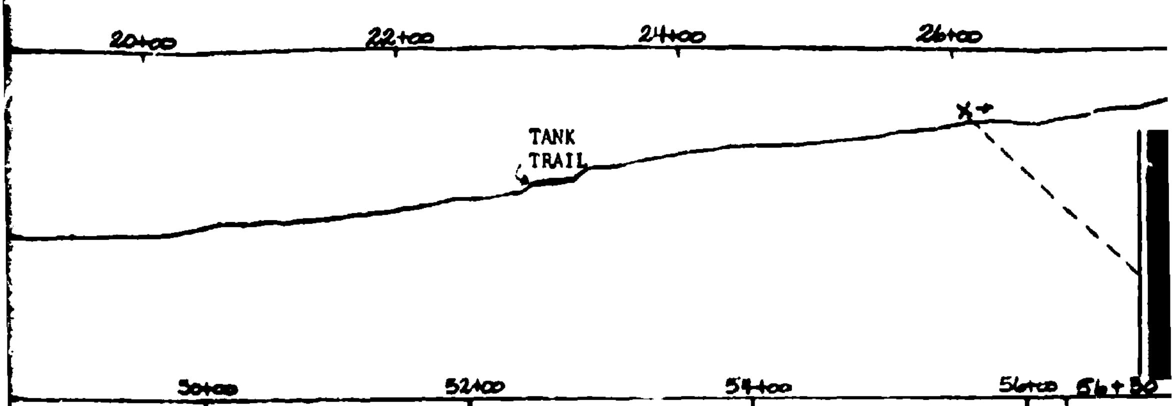
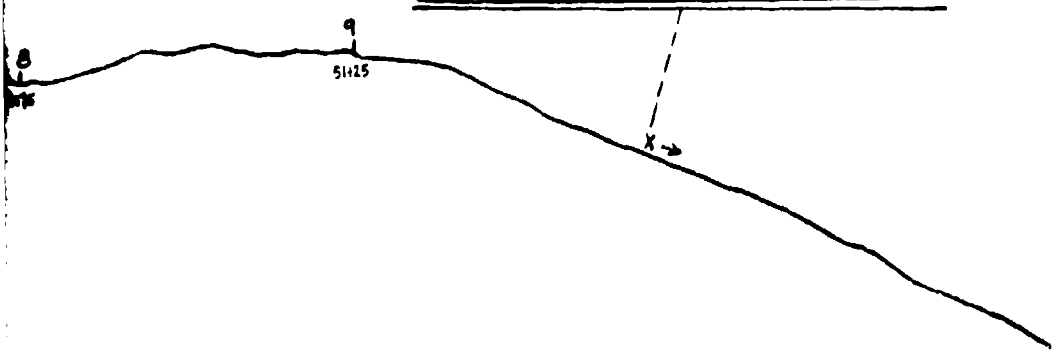
4
5
GRAVEL ROAD
6
44+00
7
45+47
8





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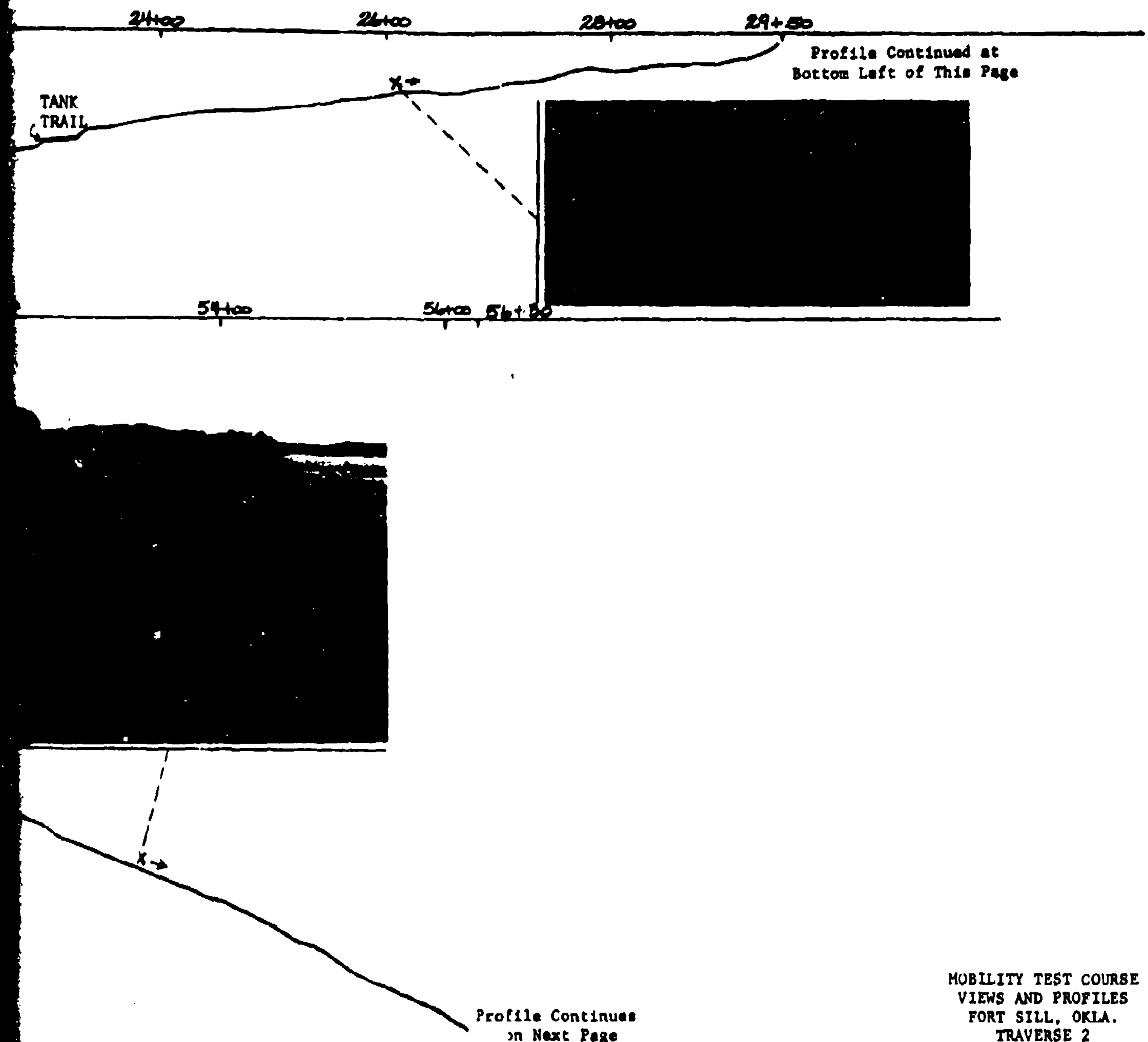
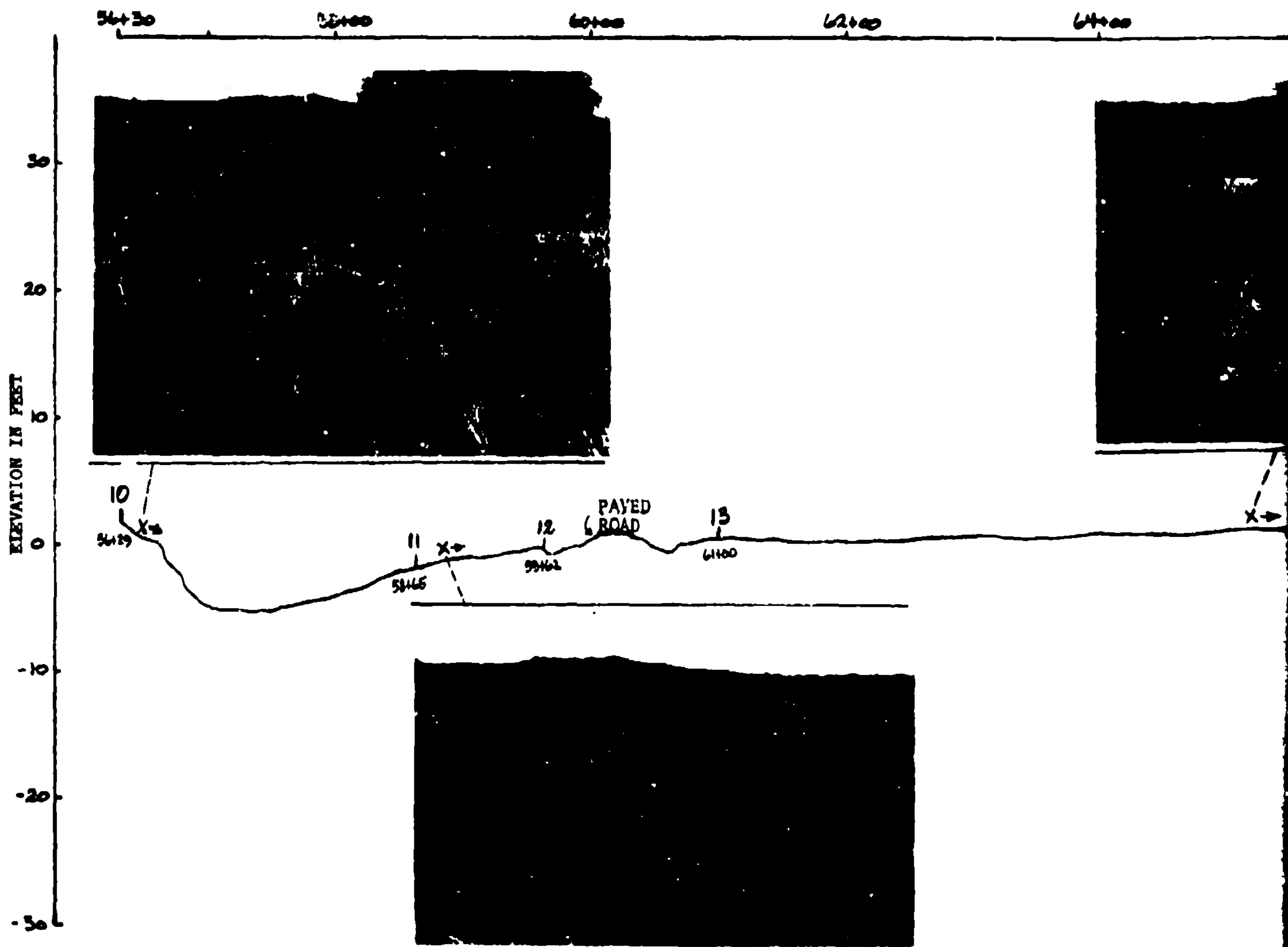


MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 2

PLATE B2 (Sheet 1 of 2)



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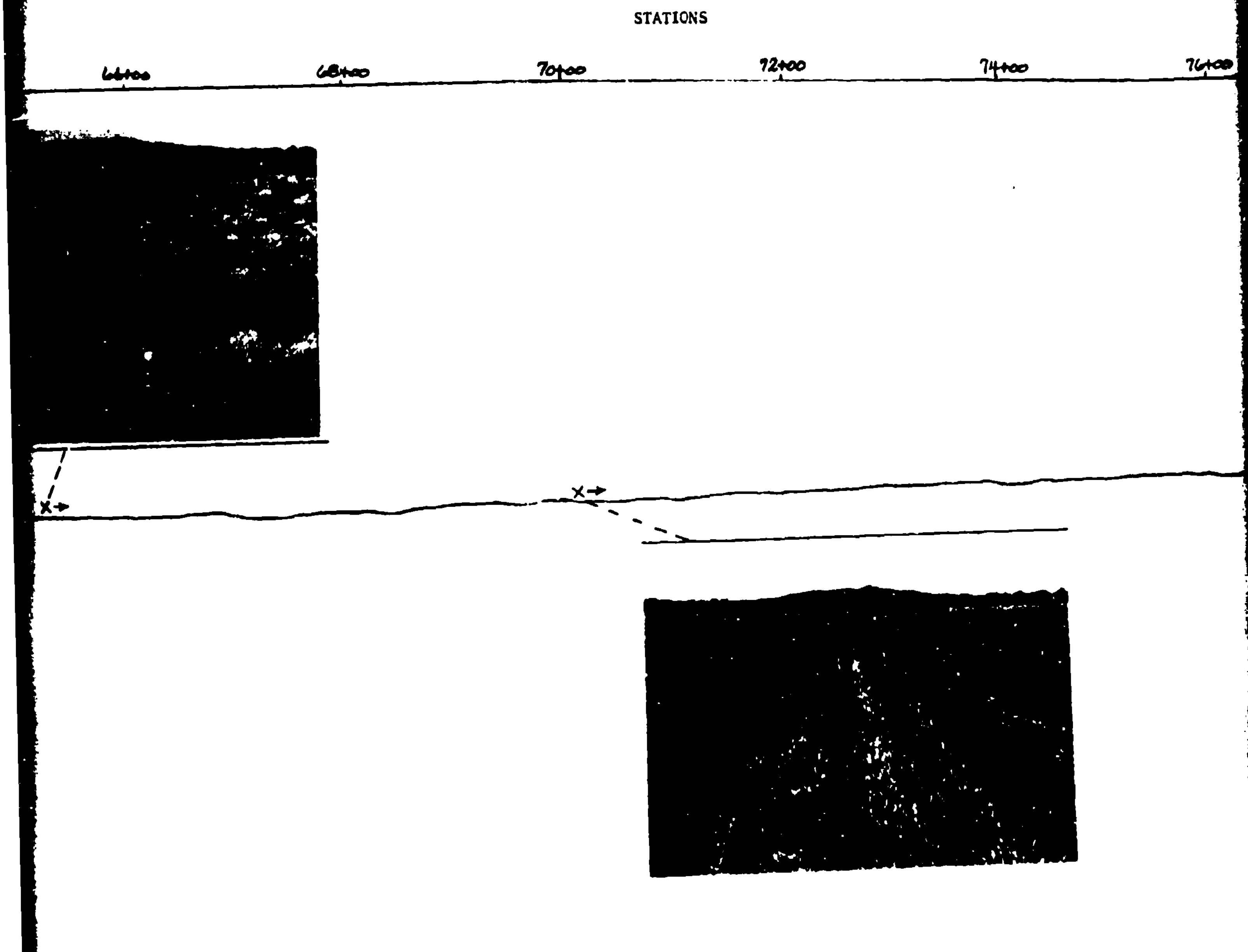
64+00
30
20
10
0
-10
-20
-30
ELEVATION IN FEET
10
11
12
PAVED ROAD
13
61+00

H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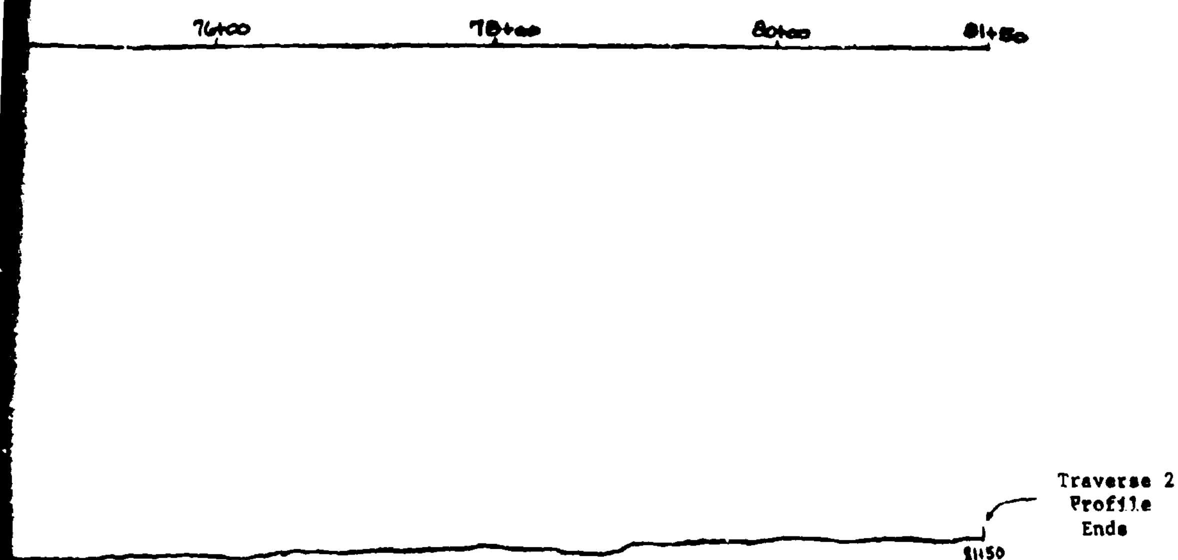
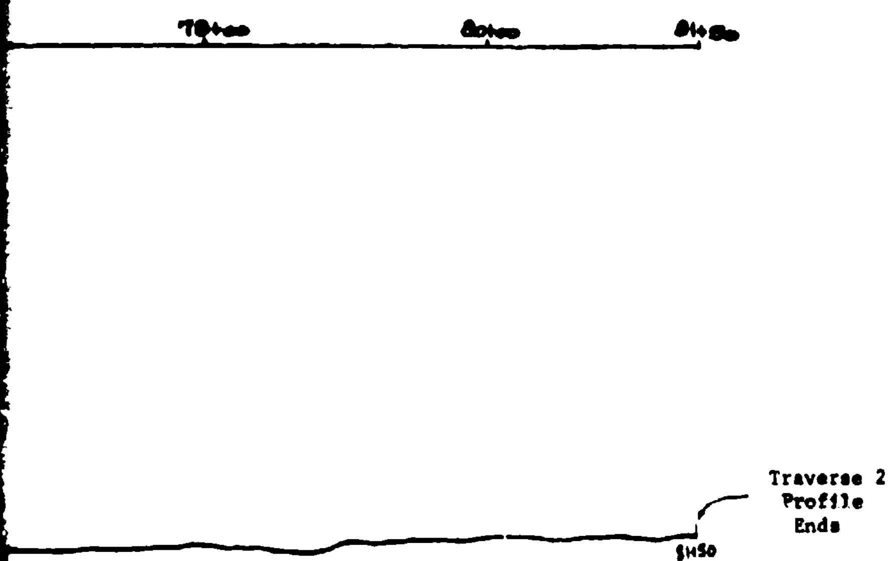
70+00
72+00
74+00
76+00



MOBILITY
VIEWS A
FORT
TRA

PLATE B2 (S

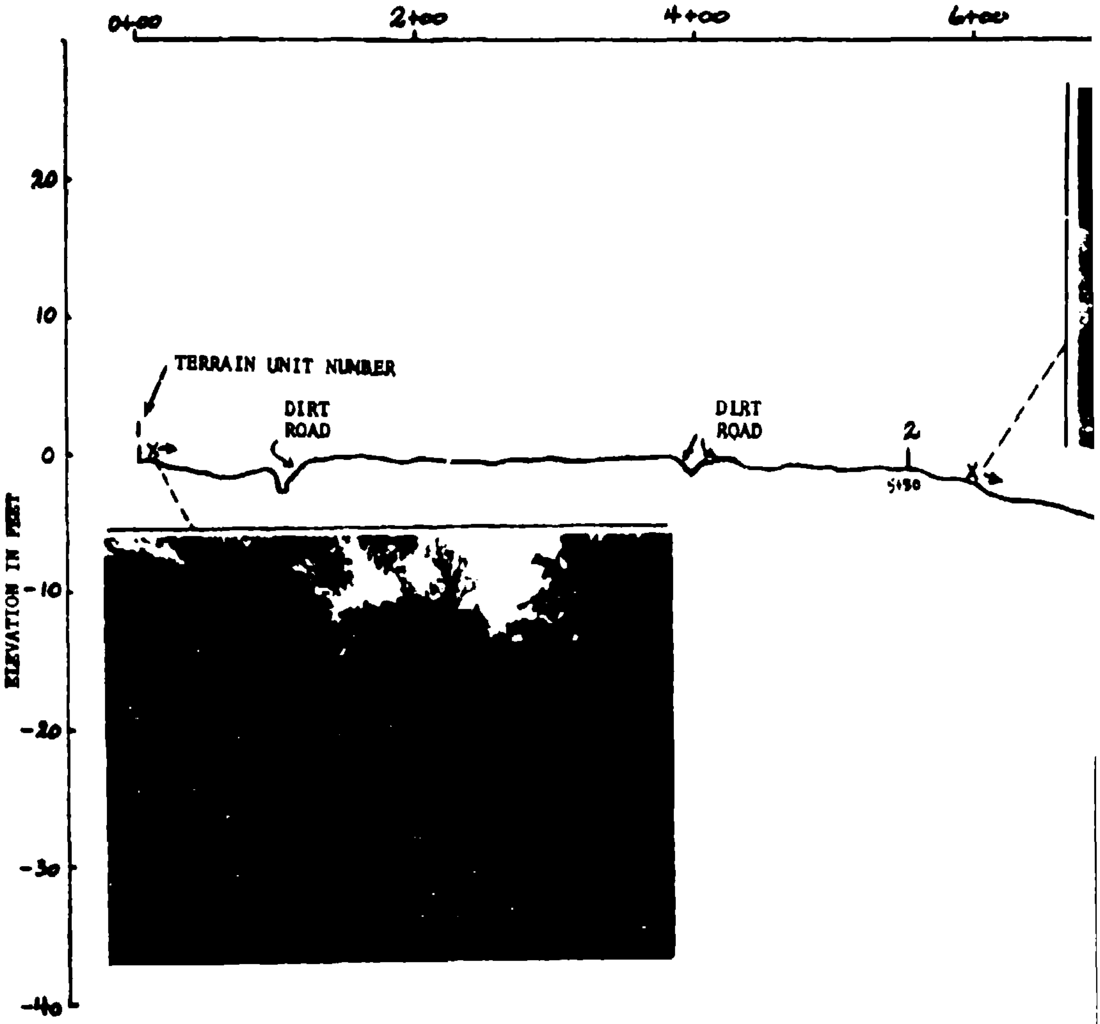


MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 2

D

23<

PLATE B2 (Sheet 2 of 2)



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DIRT ROAD
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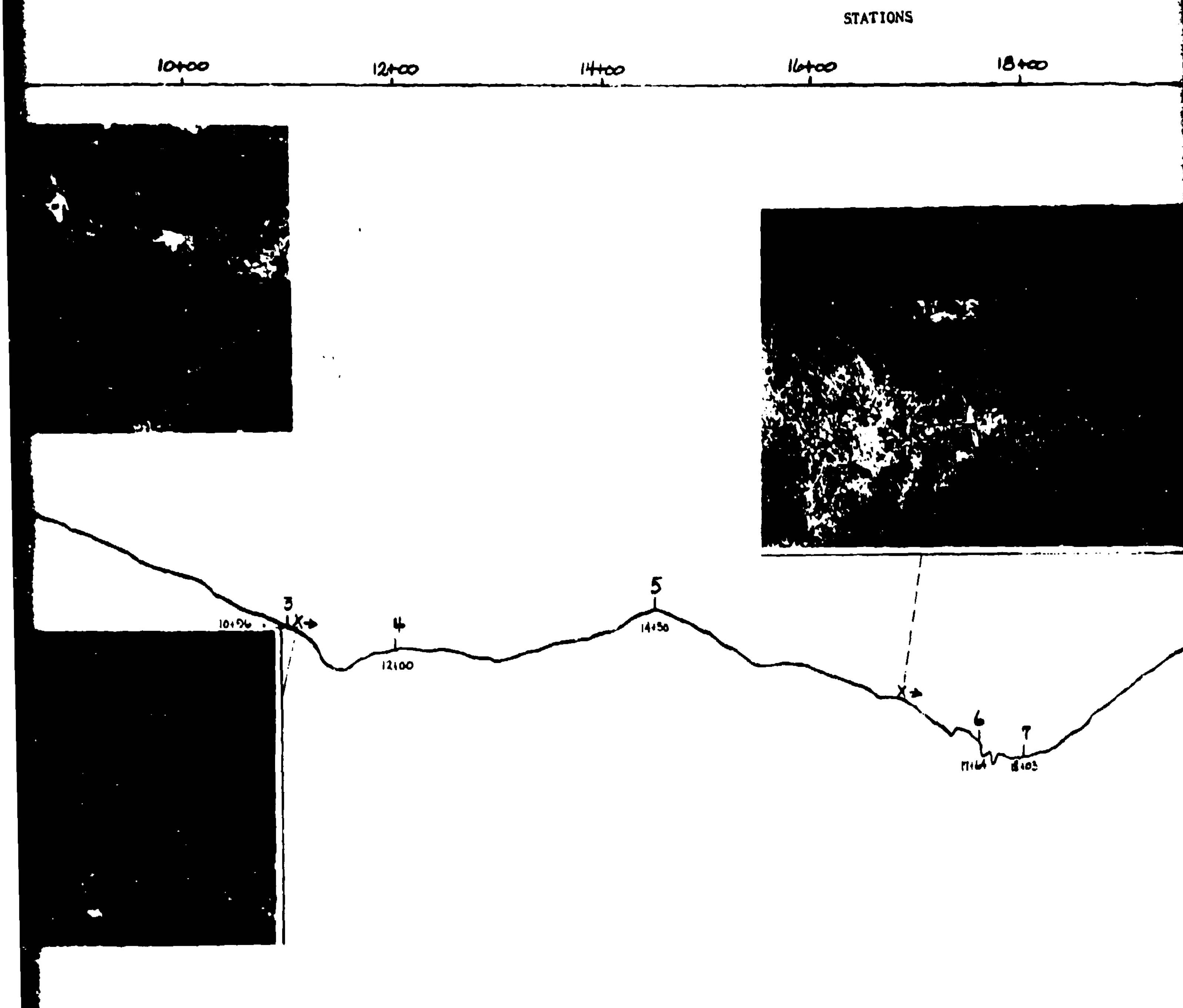
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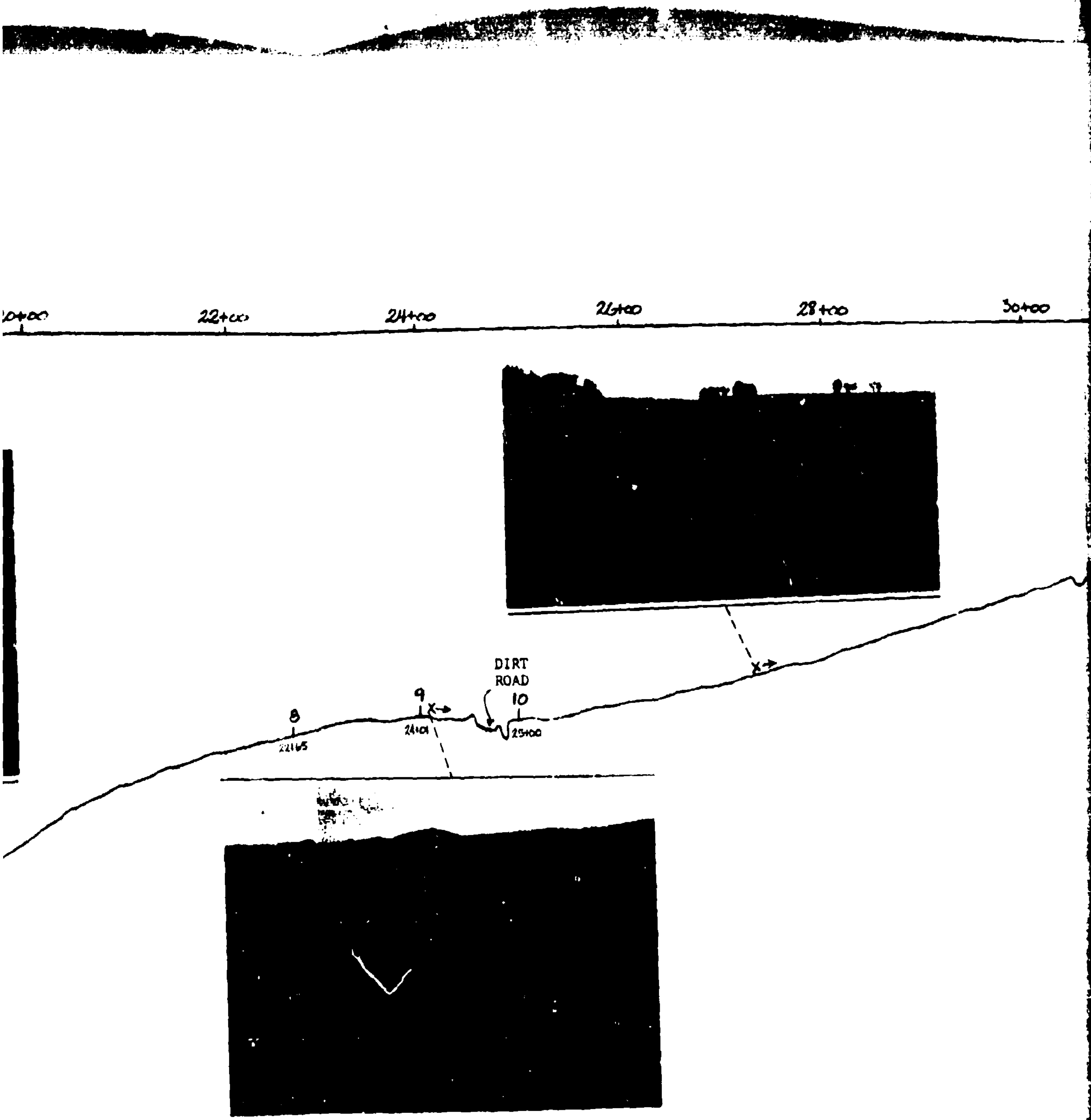

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ROAD
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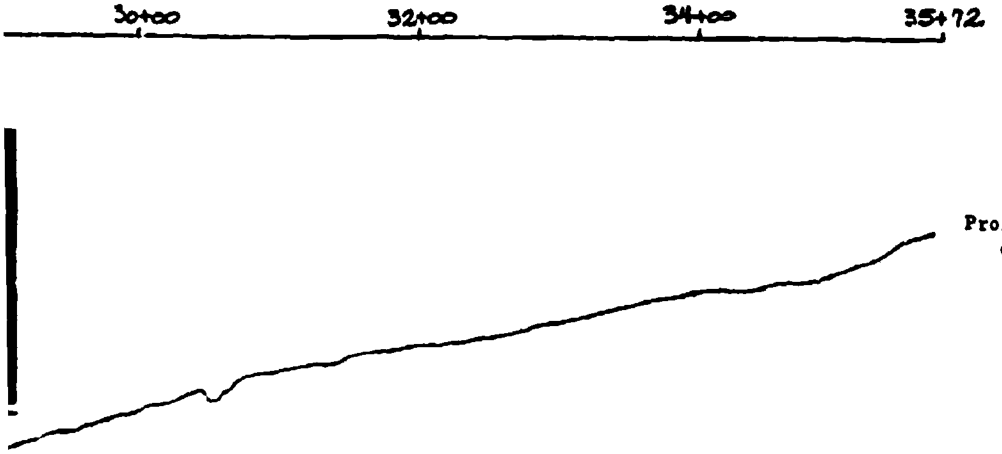

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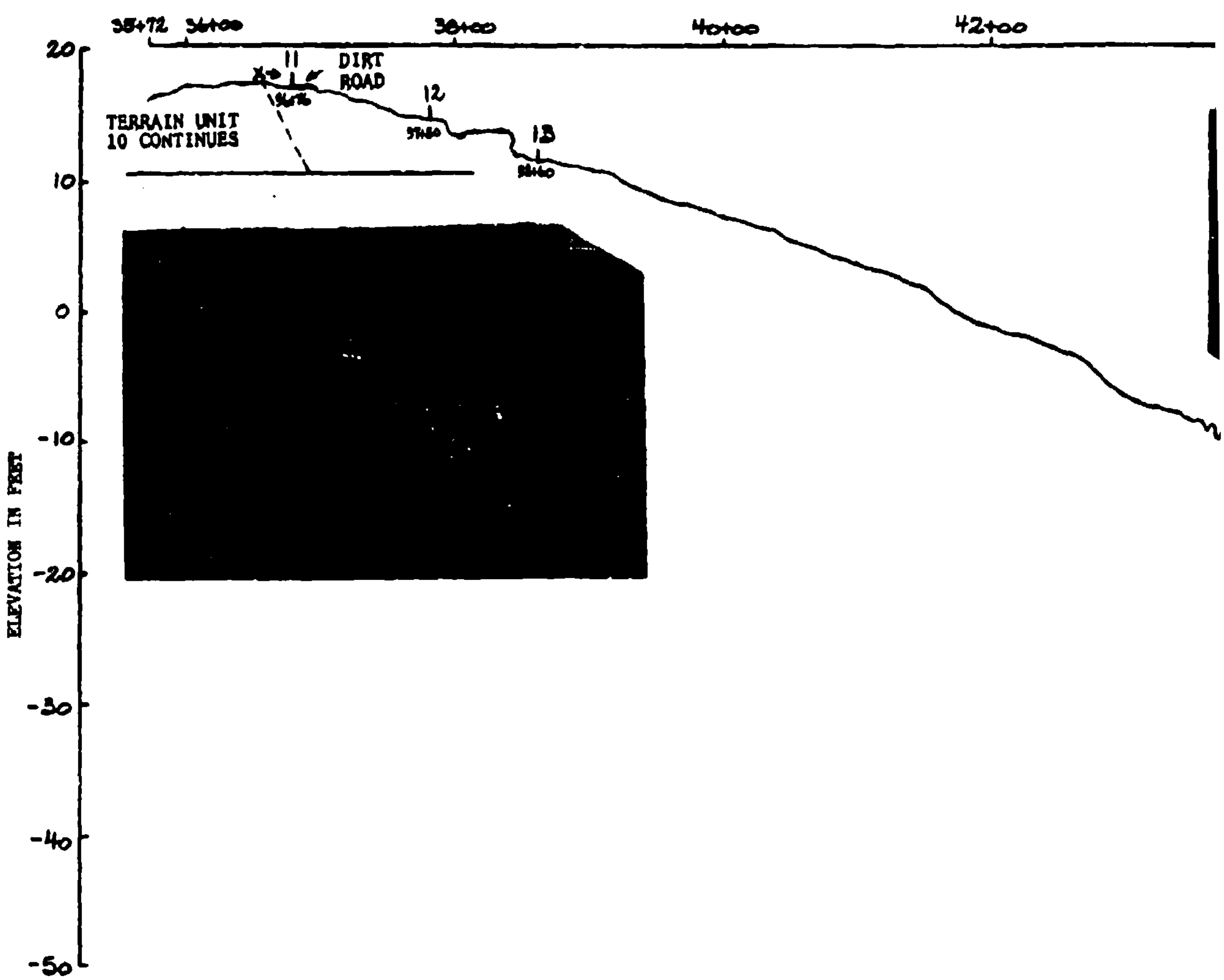
MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 3

PLATE B3 (Sheet 1 of 2)



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ELEVATION IN FEET
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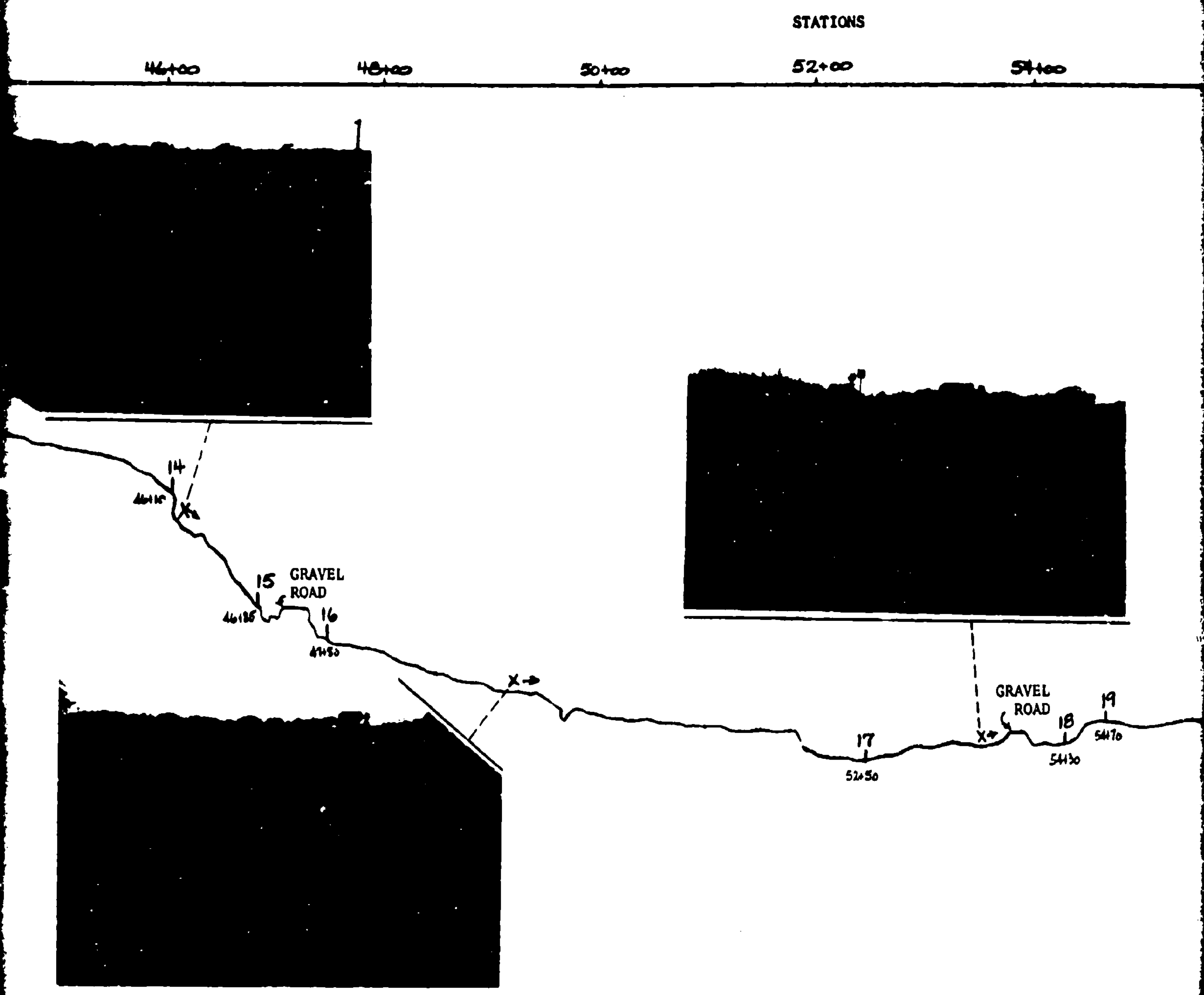
DIRT ROAD
12
13
TERRAIN UNIT 10 CONTINUES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GRAVEL
ROAD
16
17
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GRAVEL
ROAD
18
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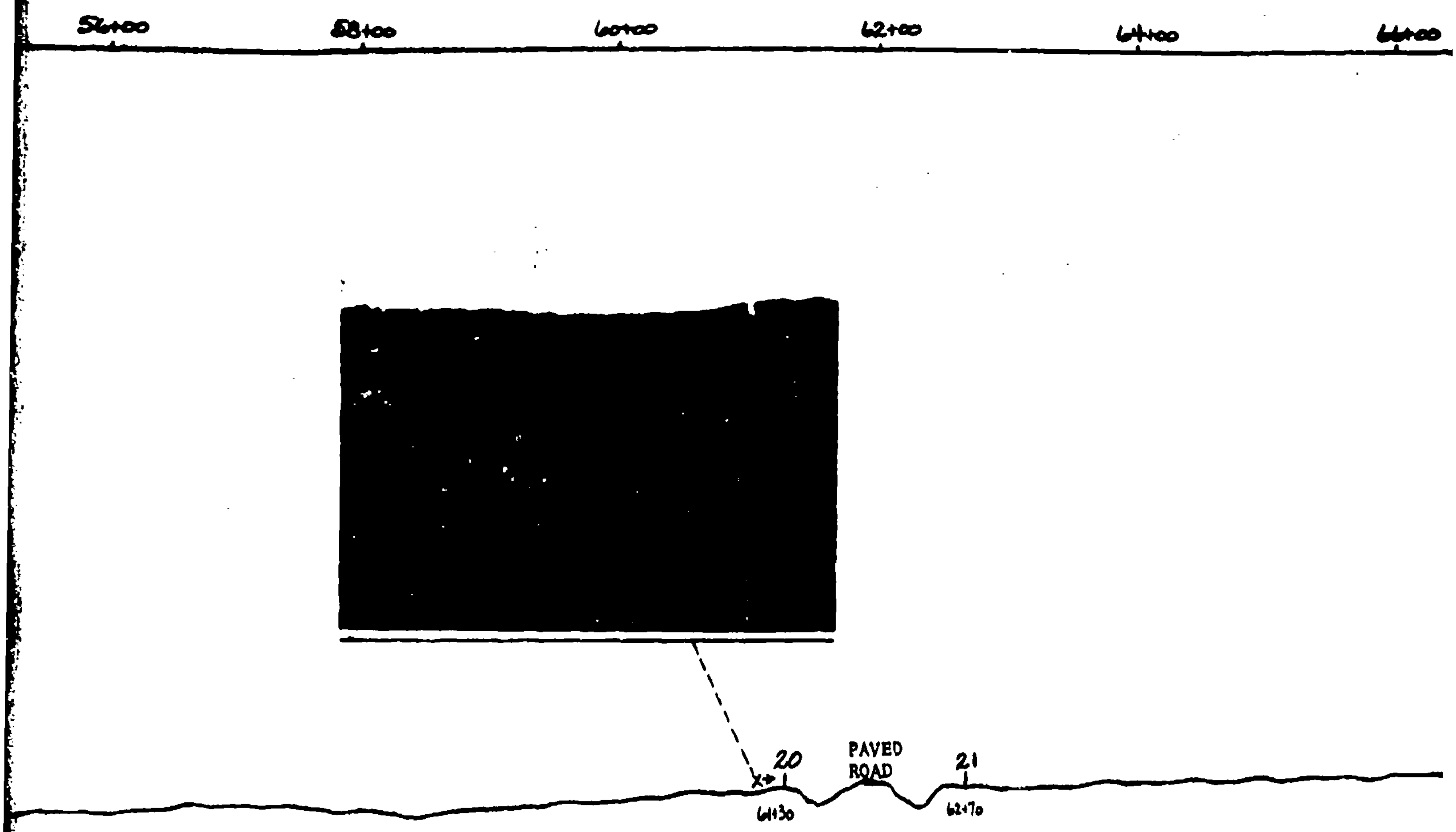
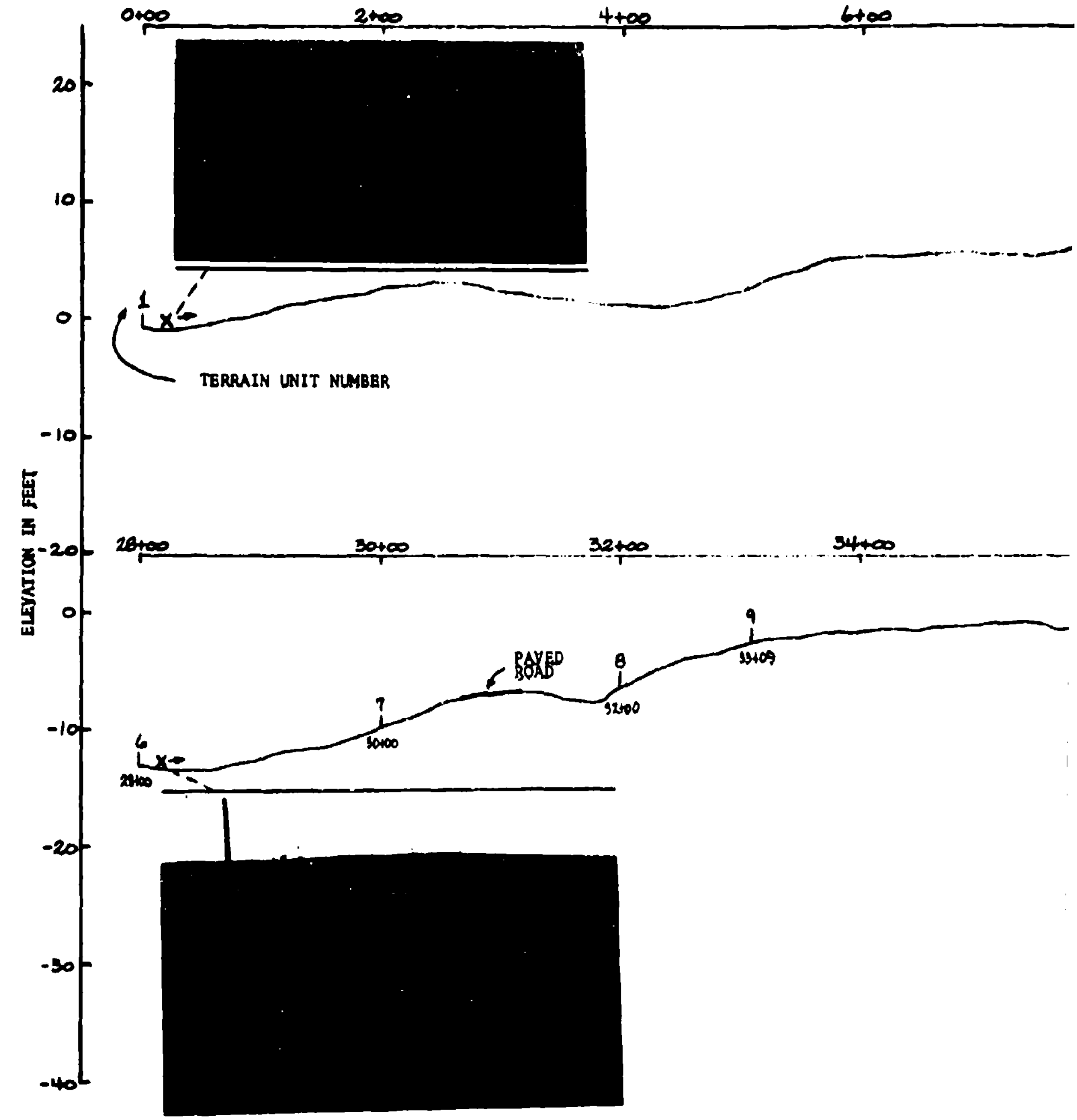
19
54+70


56+00
58+00
60+00
62+00
64+00
66+00
X→
20
PAVED
ROAD
21
61+30
62+70

MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 3

PLATE B3 (Sheet 2 of 2)



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ELEVATION IN FEET
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7
30+00
PAVED ROAD
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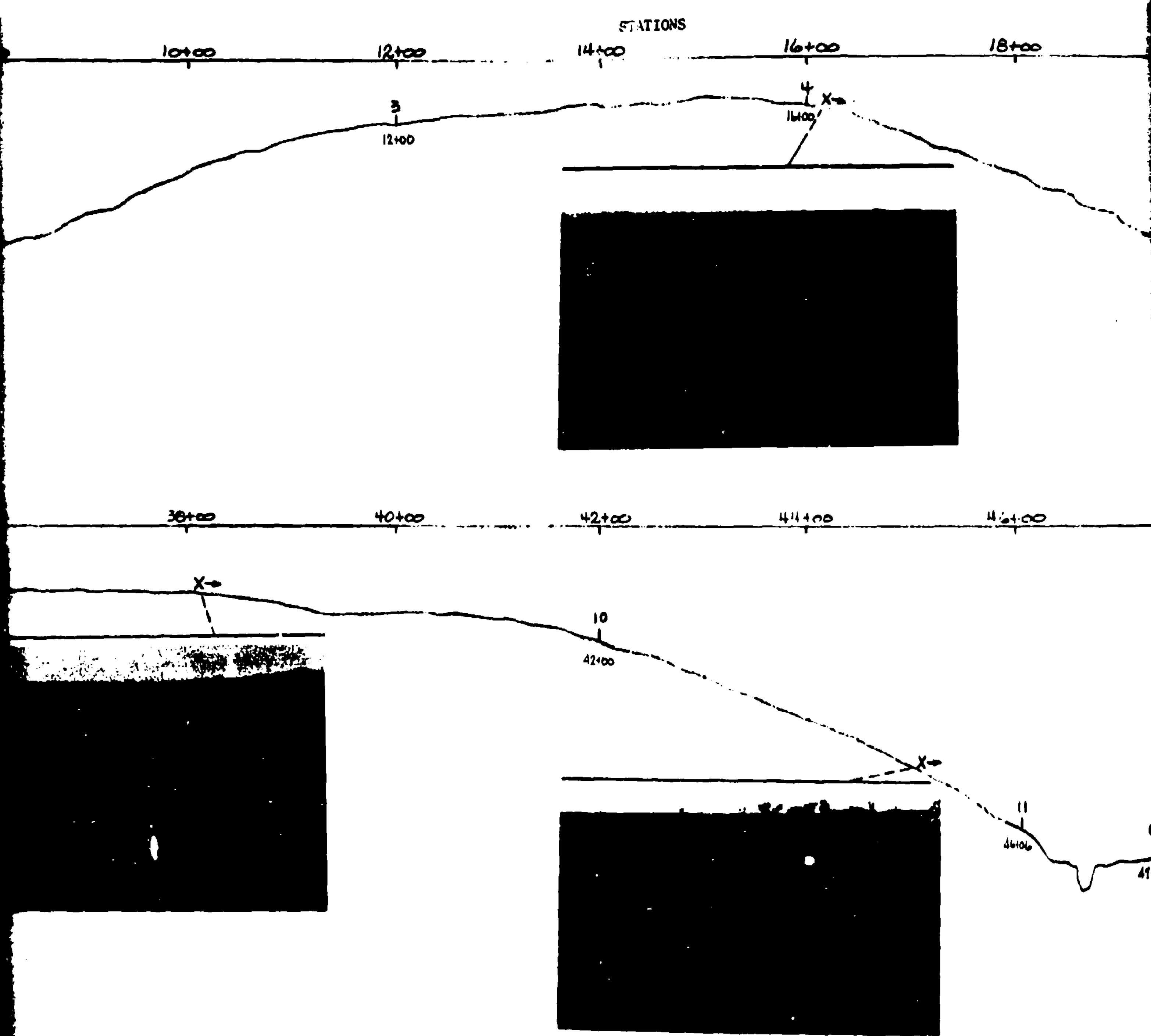
32+00
9
33+09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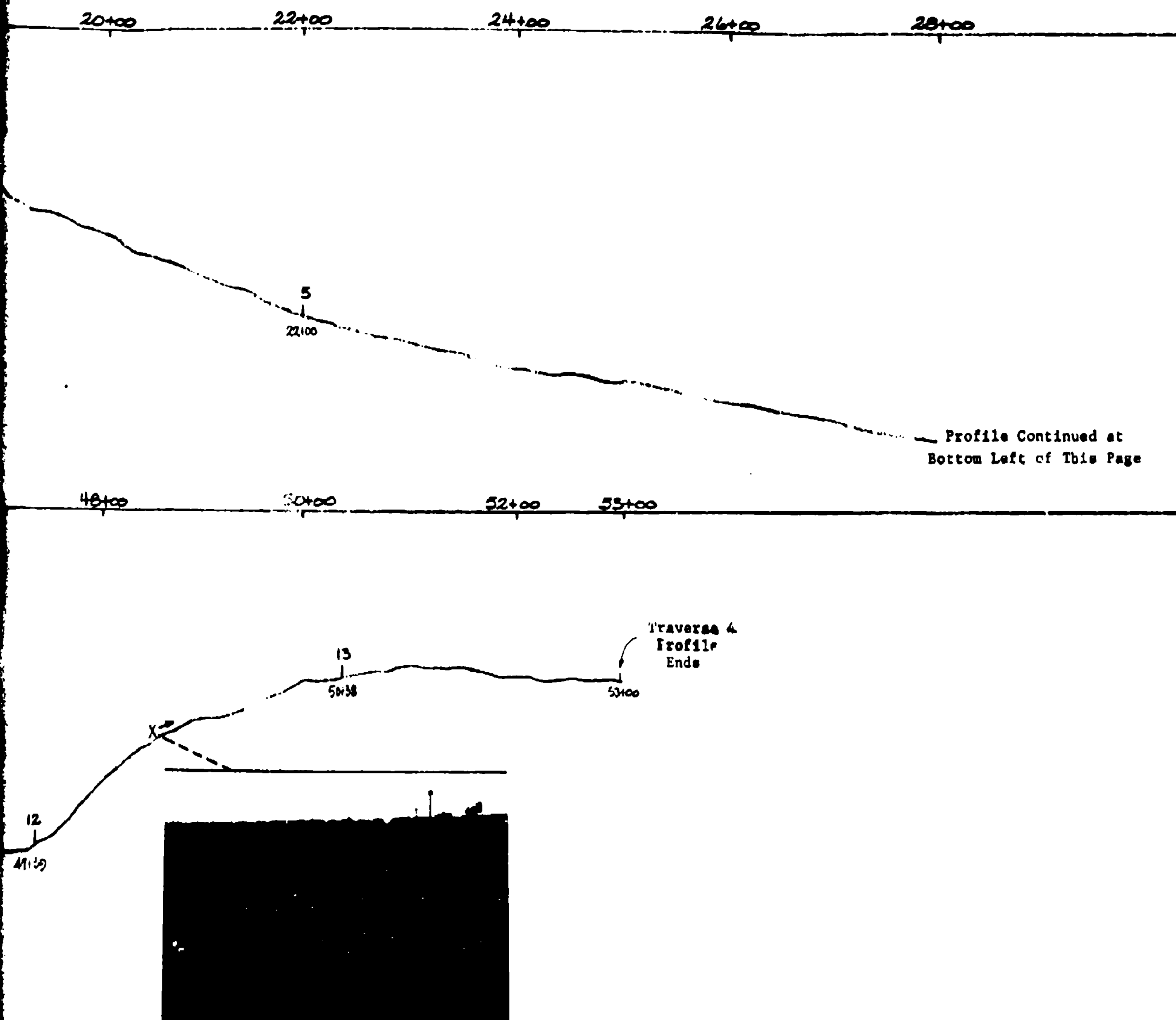
42+00
11
46+06

B


20+00
22+00
24+00
26+00
28+00
5
22+00
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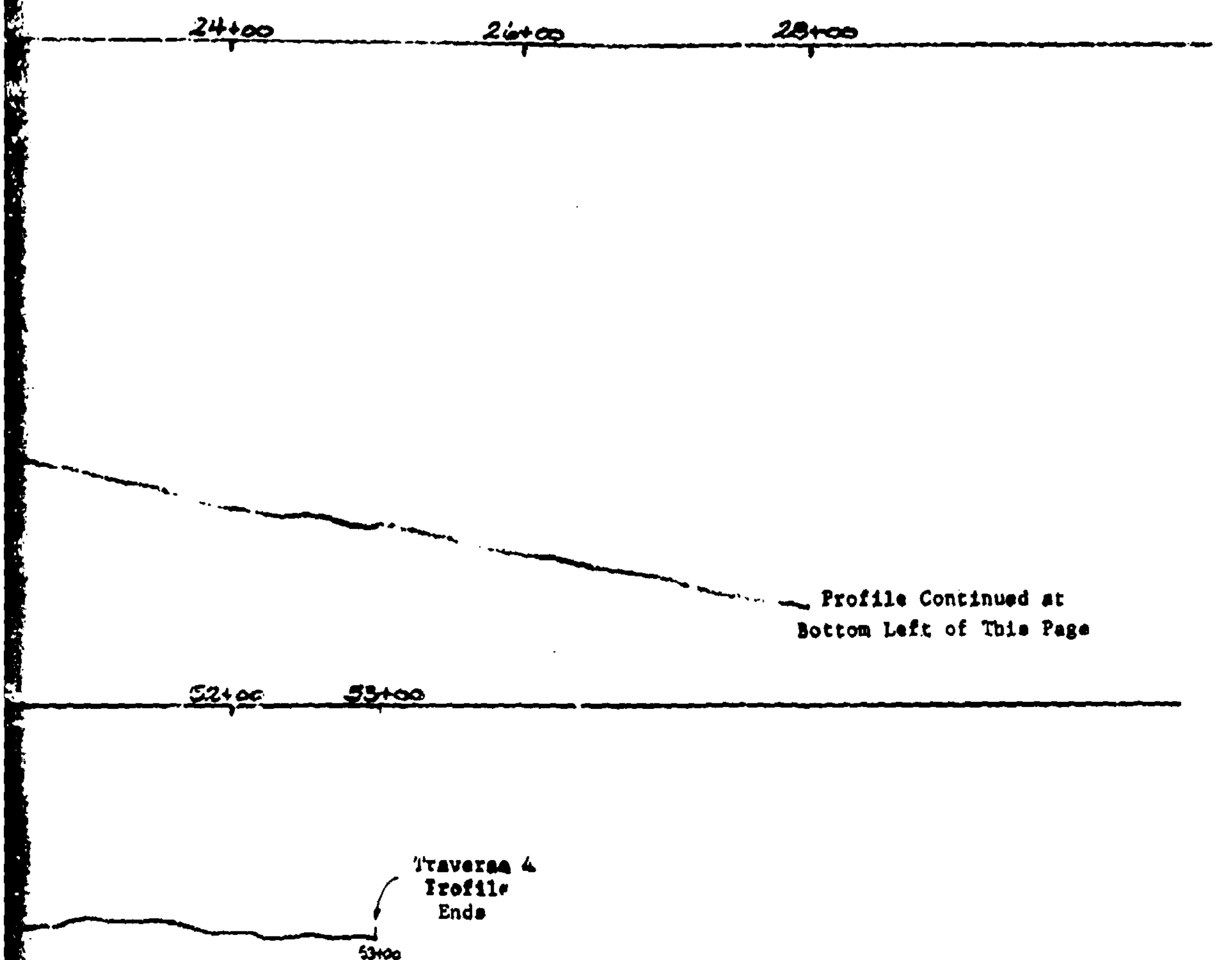
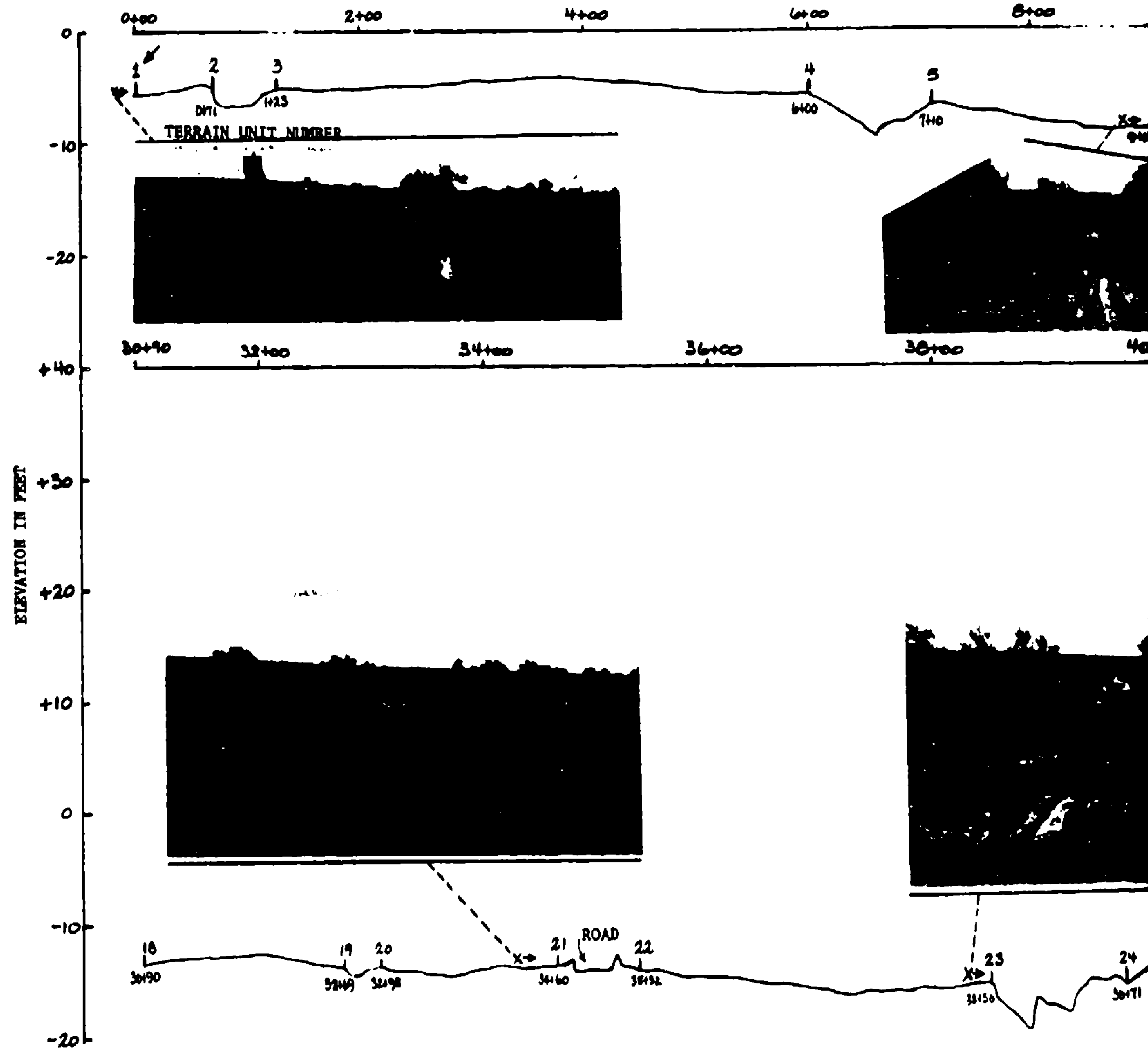
50+00
52+00
53+00
Traverse 4 Profile Ends
13
50+38
53+00
X
12
49+39

C



MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT SILL, OKLA.
TRAVERSE 4

PLATE B4



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4+00
6+00
8+00
1
2
3
4
5
TERRAIN UNIT NUMBER
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32+00
34+00
36+00
38+00
ELEVATION IN FEET
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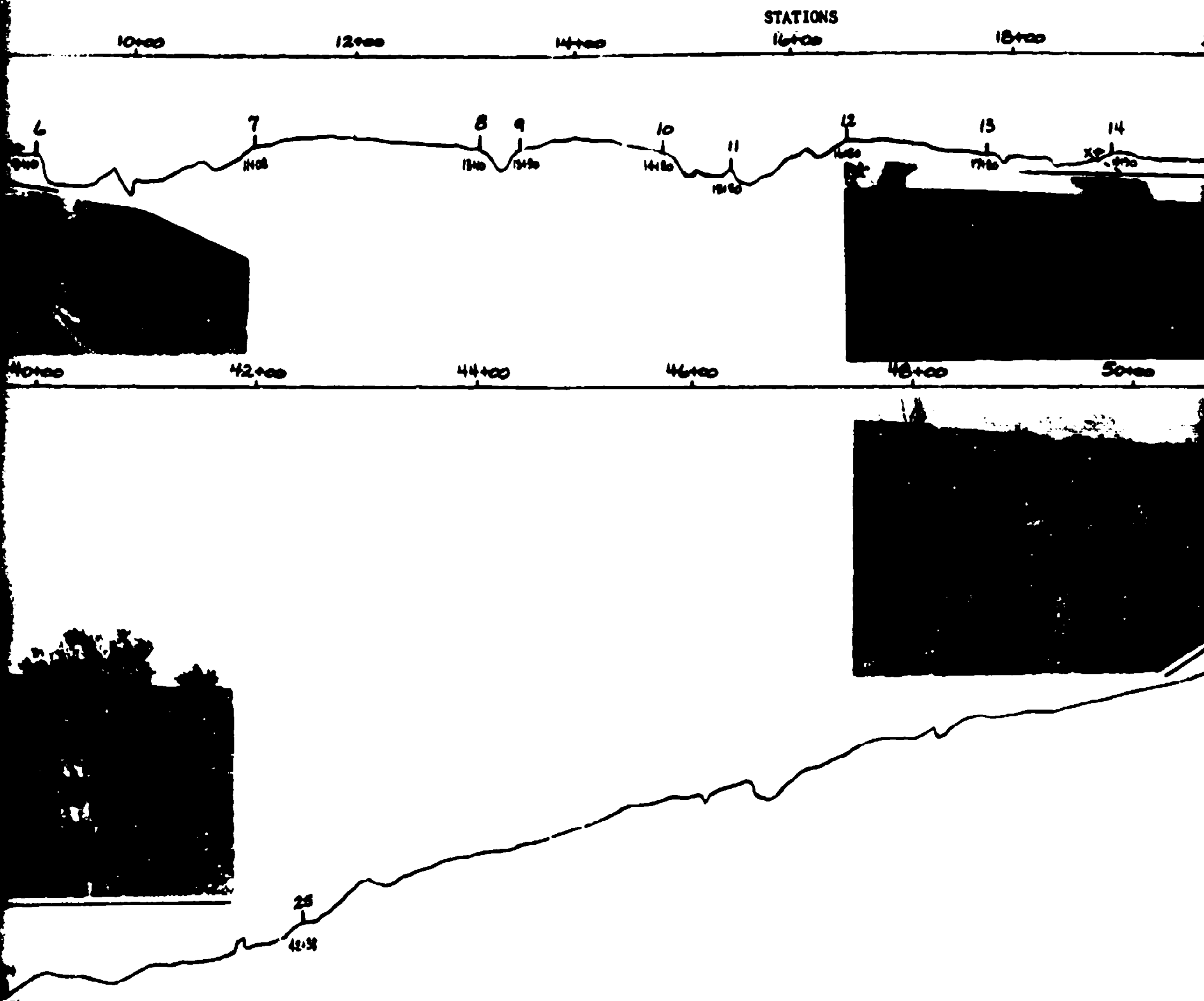
-10
-20
+40
+30
+20
+10
18
19
20
21
ROAD
22
23
24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16+00
18+00
6
7
8
9
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12
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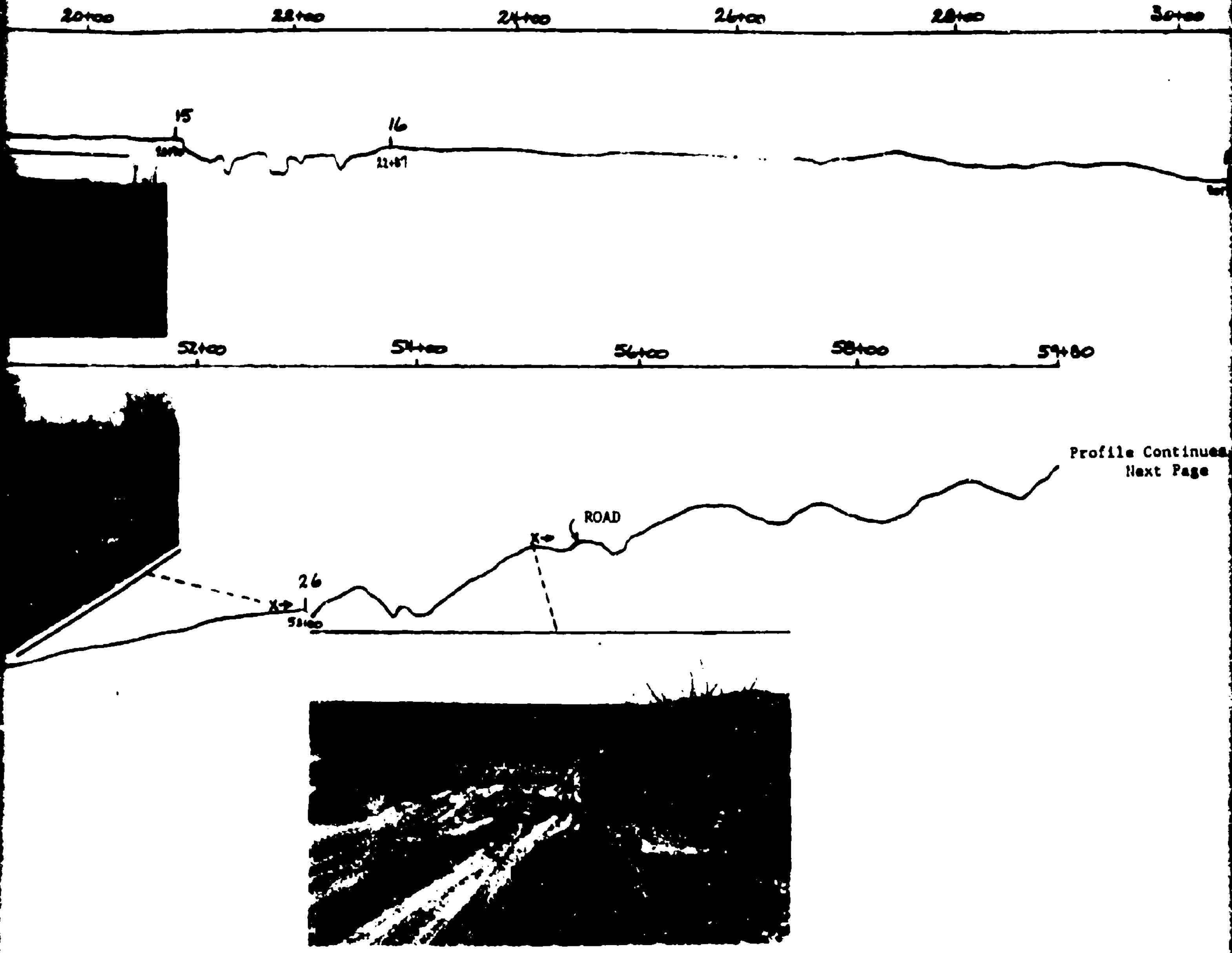
42+00
44+00
46+00
48+00
50+00
25

B

1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24+00
26+00
28+00
30+00
15
16
21+87
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54+00
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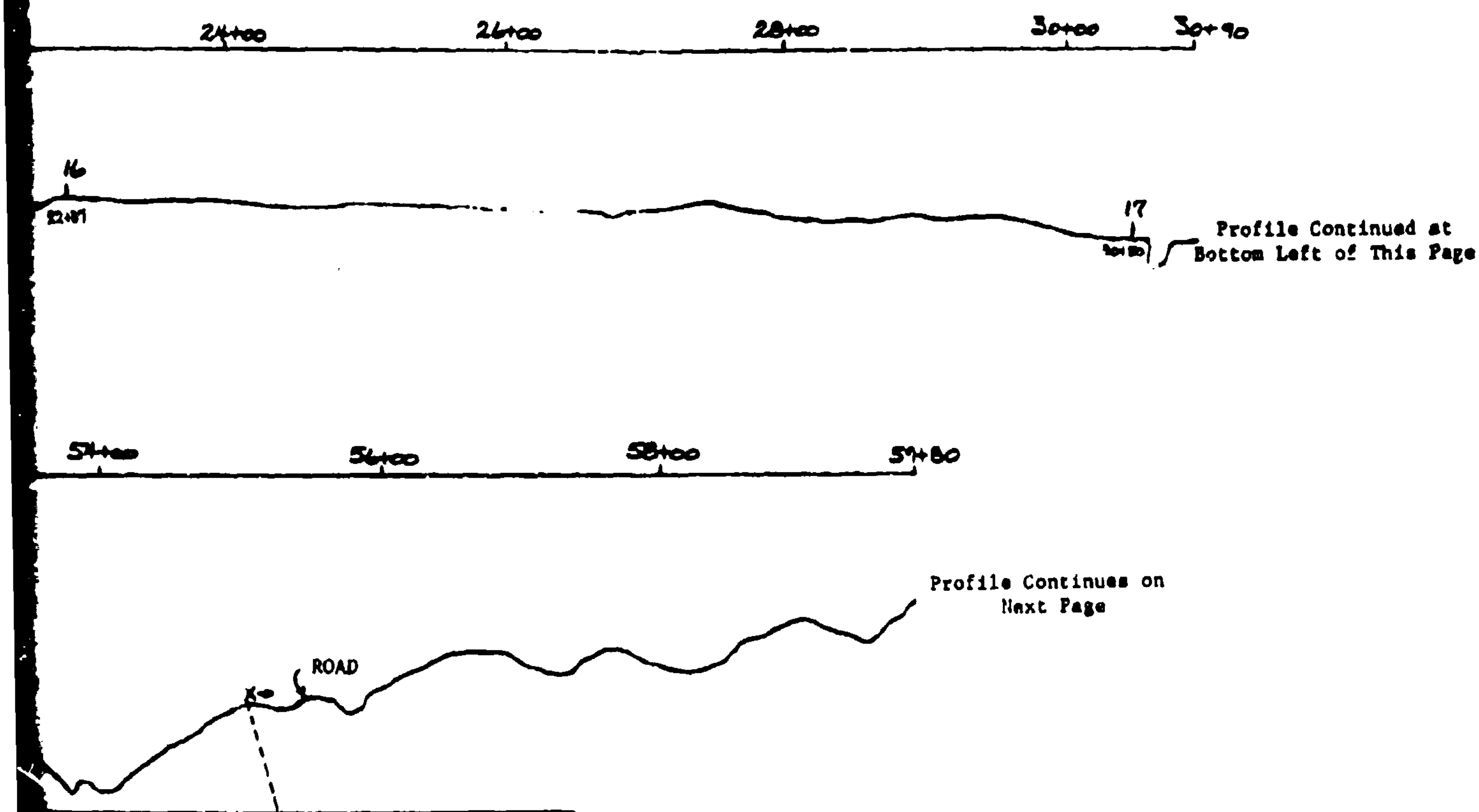
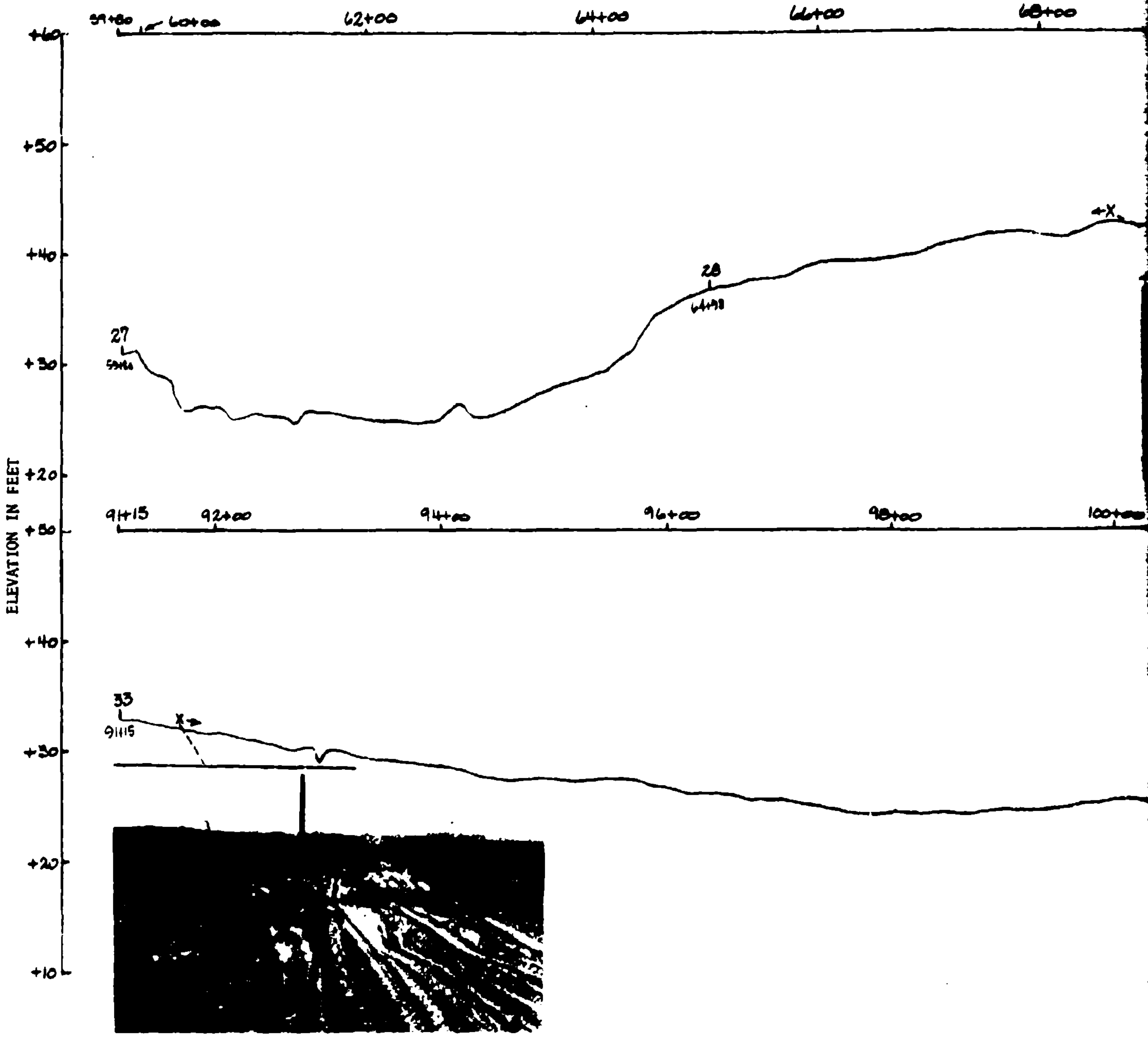
59+80
Profile Continues
Next Page
ROAD
26



MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 1

PLATE B5 (Sheet 1 of 4)


ELEVATION IN FEET
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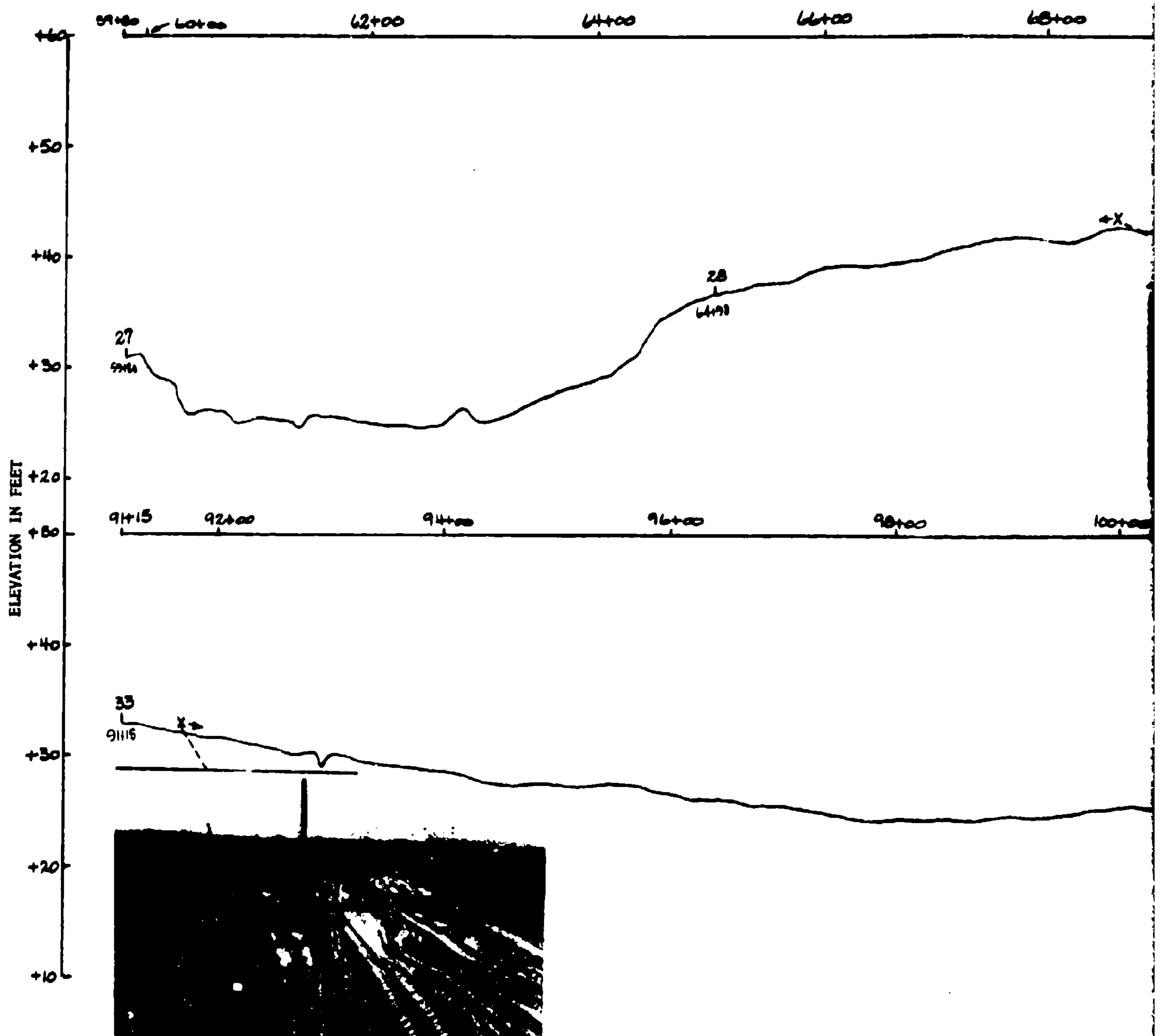
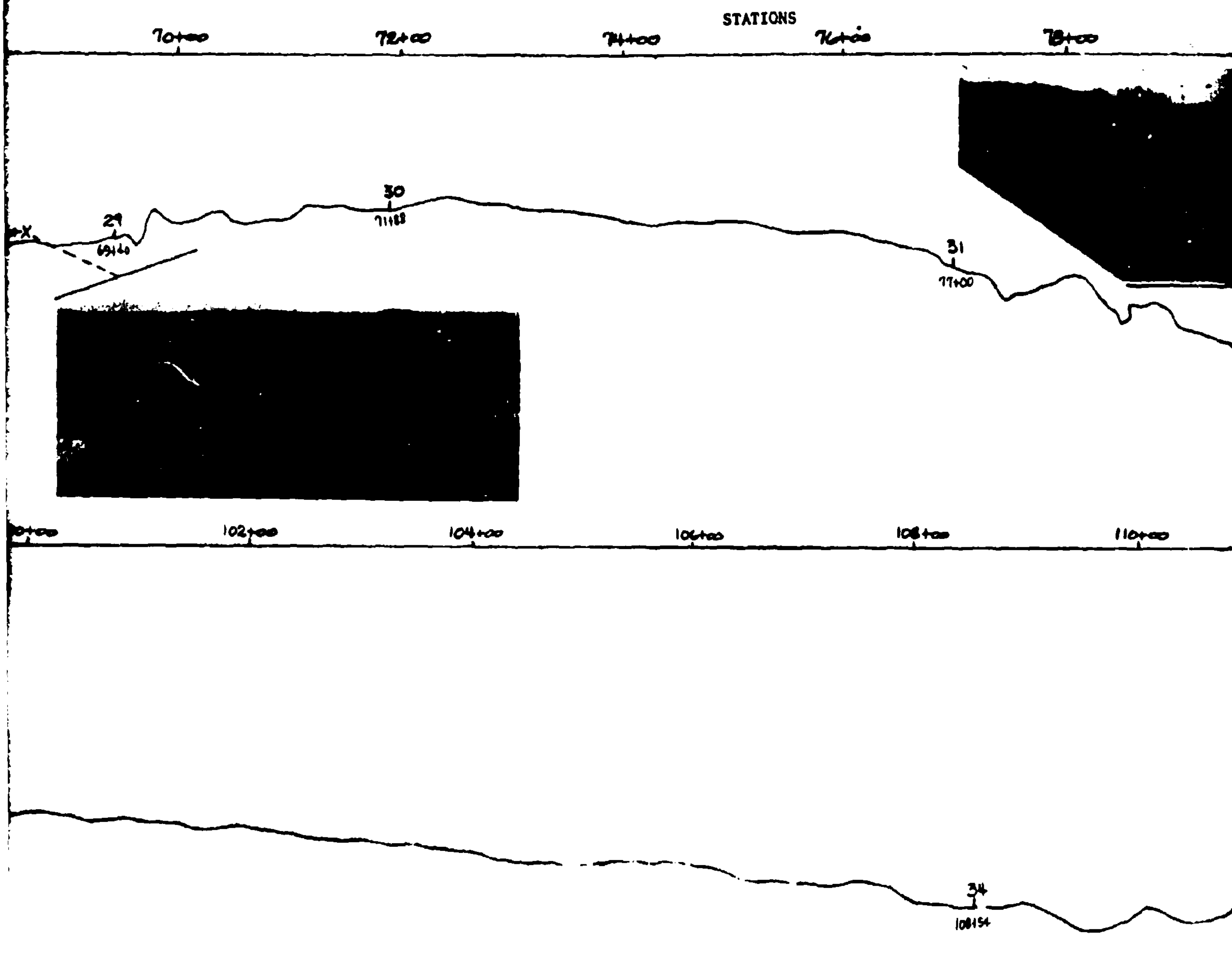
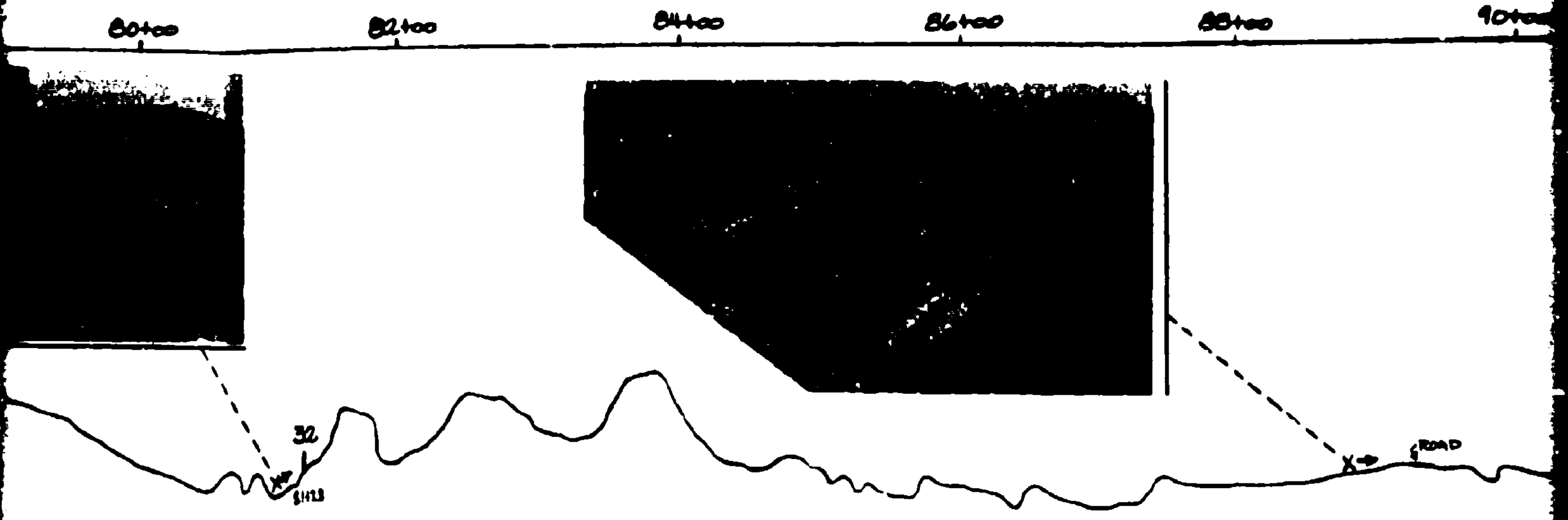
64+00
66+00
68+00
+60
+50
+40
+30
+20
27
28
91+15
92+00
94+00
96+00
98+00
100+00
+50
+40
+30
+20
+10
33
91+15

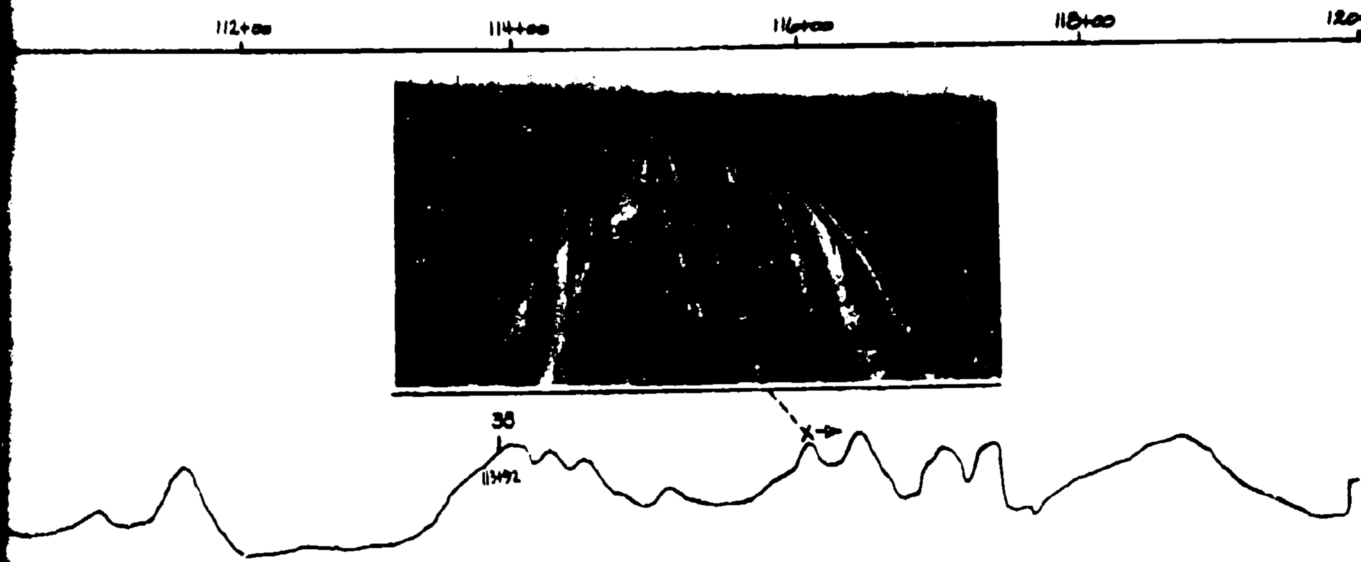


ELEVATION IN FEET
+60
+50
+40
+30
+20
+40
+30
+20
+10
62+00
64+00
66+00
68+00
27
28
91+15
92+00
94+00
96+00
98+00
33


STATIONS
70+00
72+00
74+00
76+00
78+00
29
69+40
30
71+83
31
102+00
104+00
106+00
108+00
110+00
34
108+54

B





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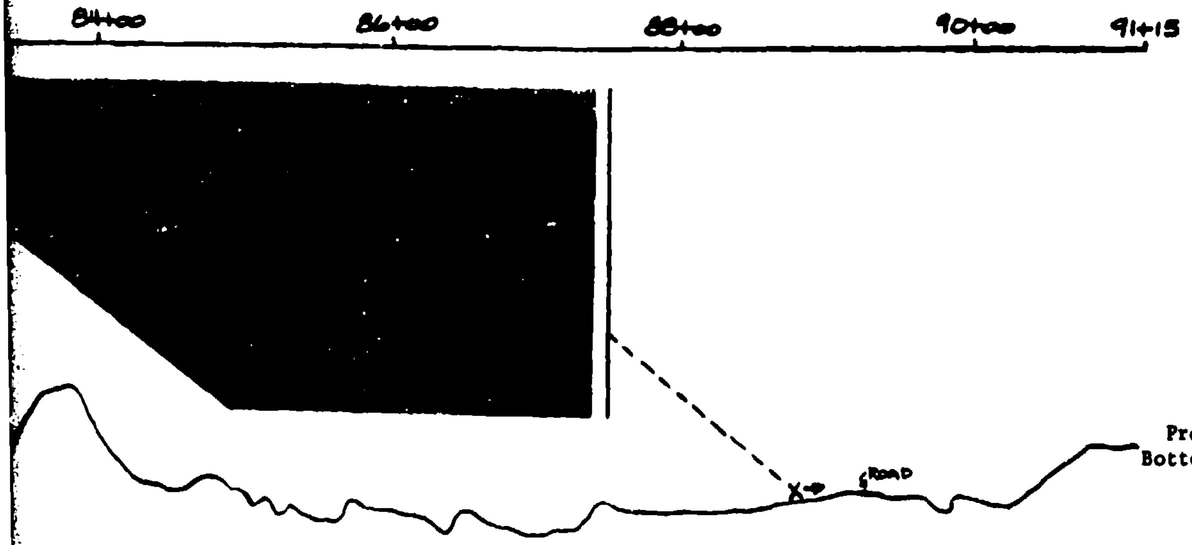

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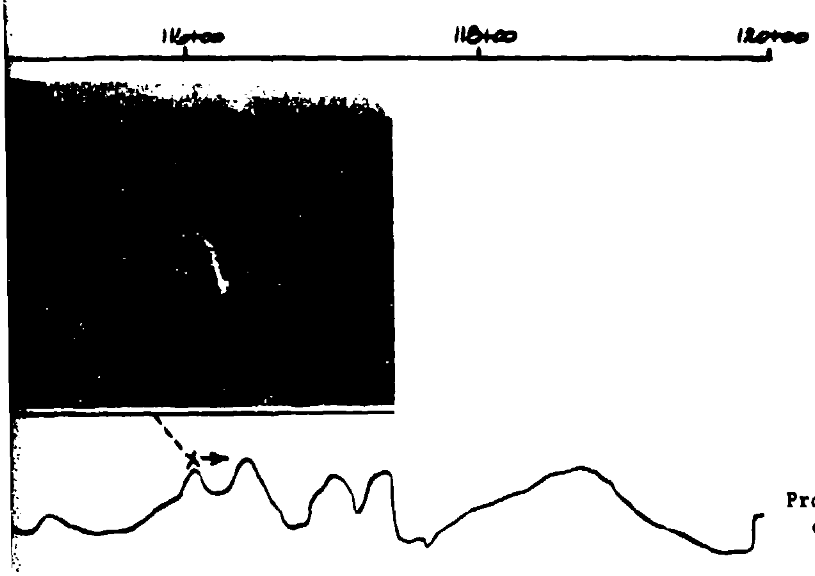
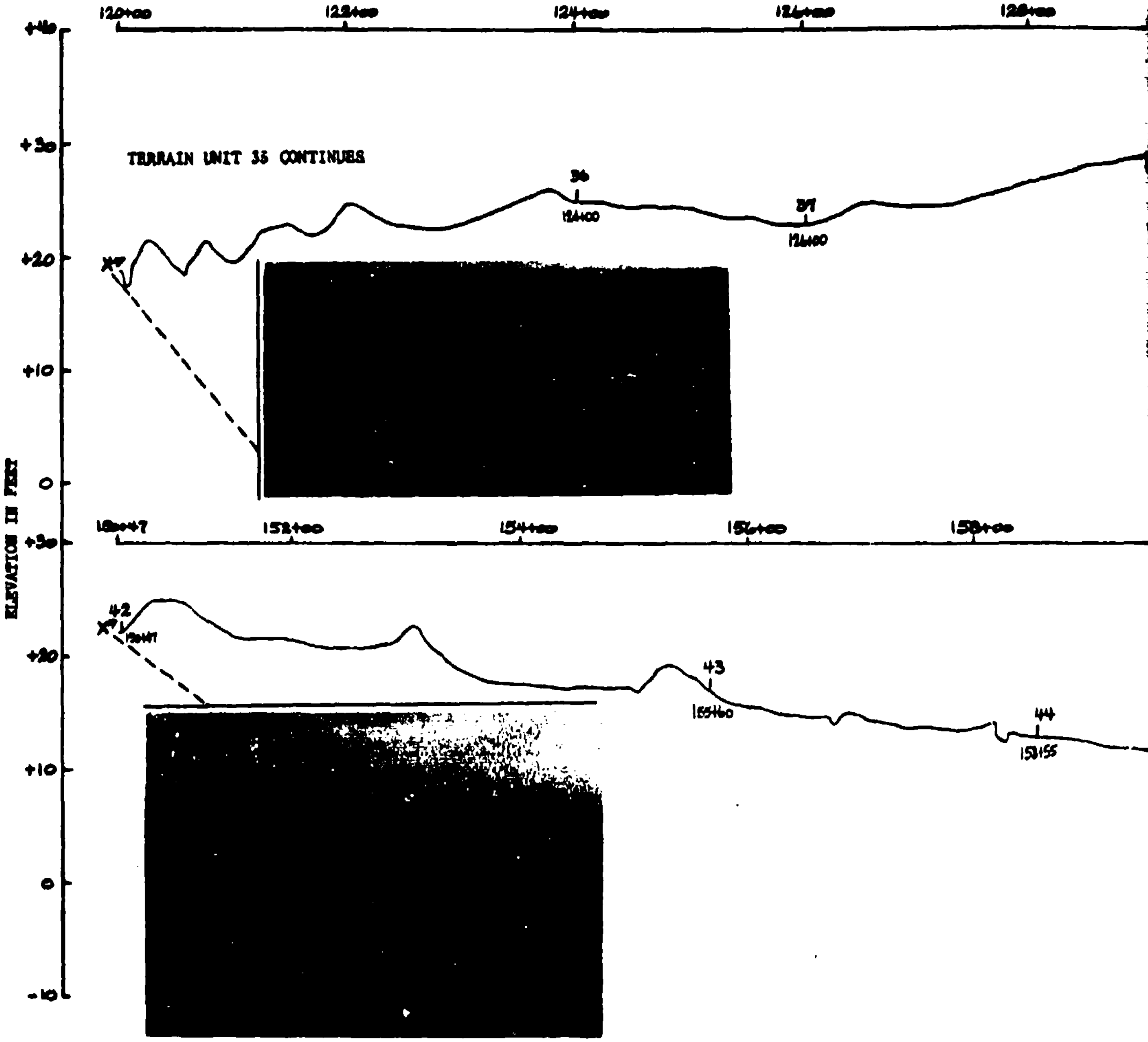


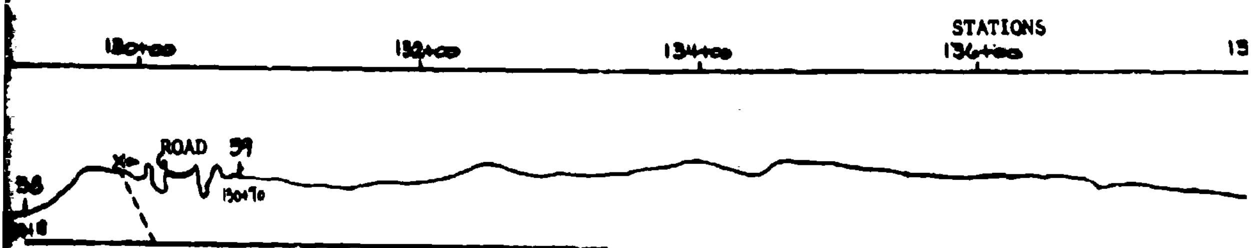
Profile Continues
on Next Page

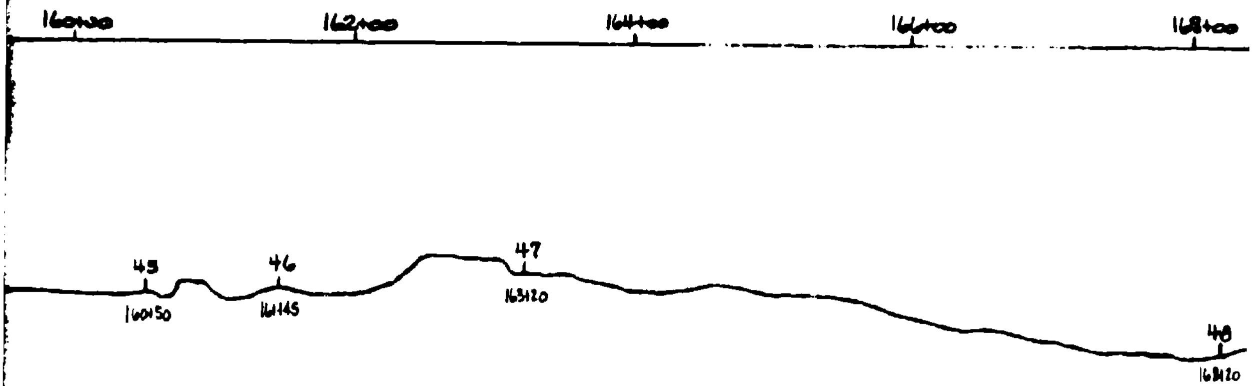
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 1

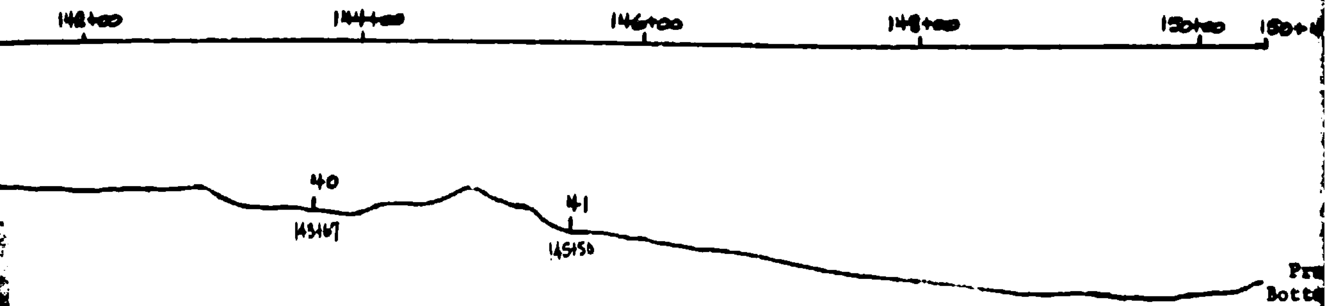
PLATE B5 (Sheet 2 of 4)

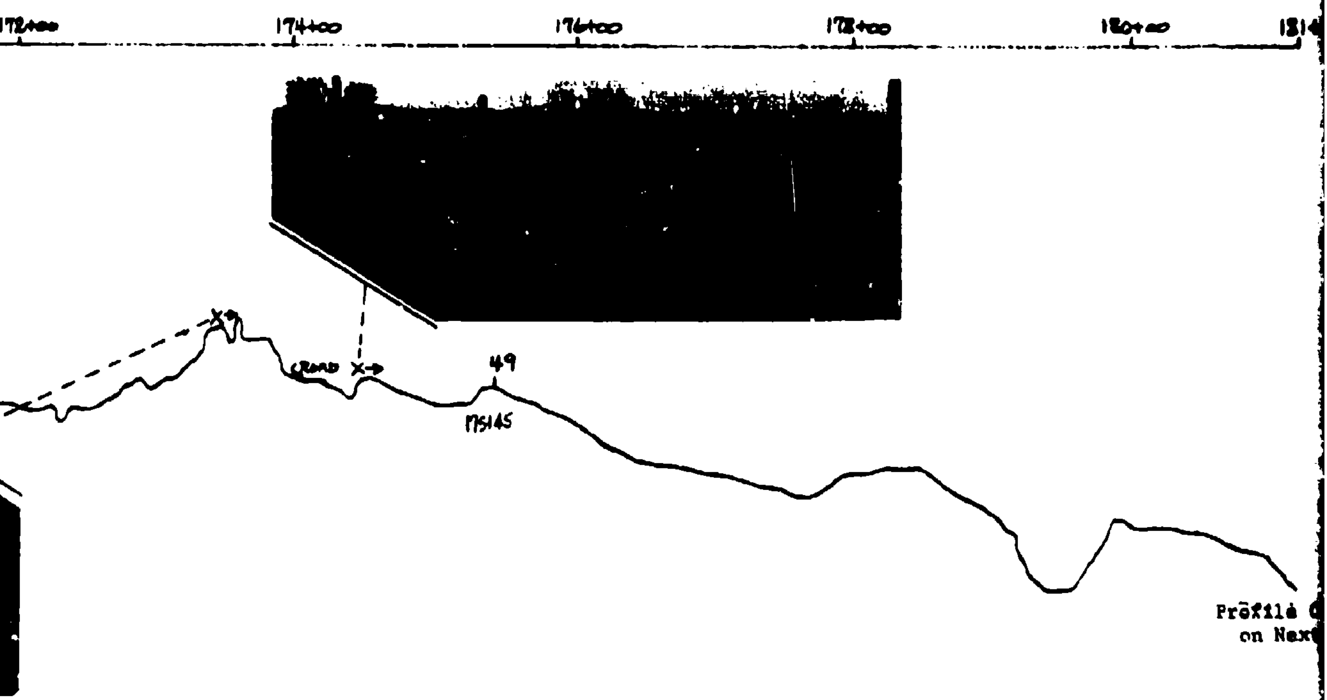


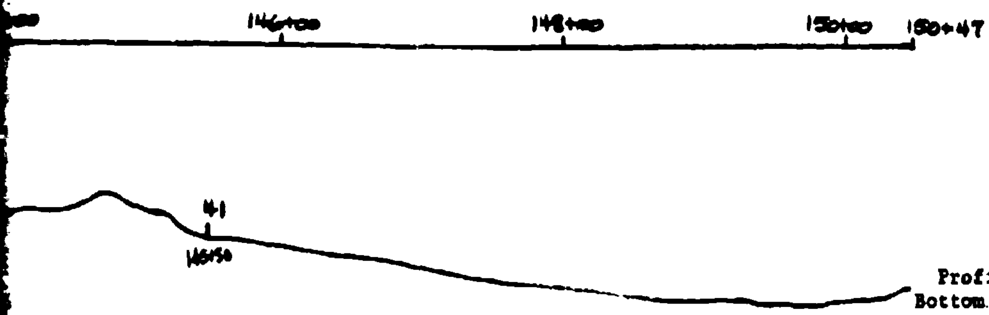
120+00
122+00
124+00
126+00
128+00
+40
+30
TERRAIN UNIT 35 CONTINUES
+20
+10
0
ELEVATION IN FEET
150+47
152+00
154+00
156+00
158+00
+30
+20
+10
0
-10
42
43
44

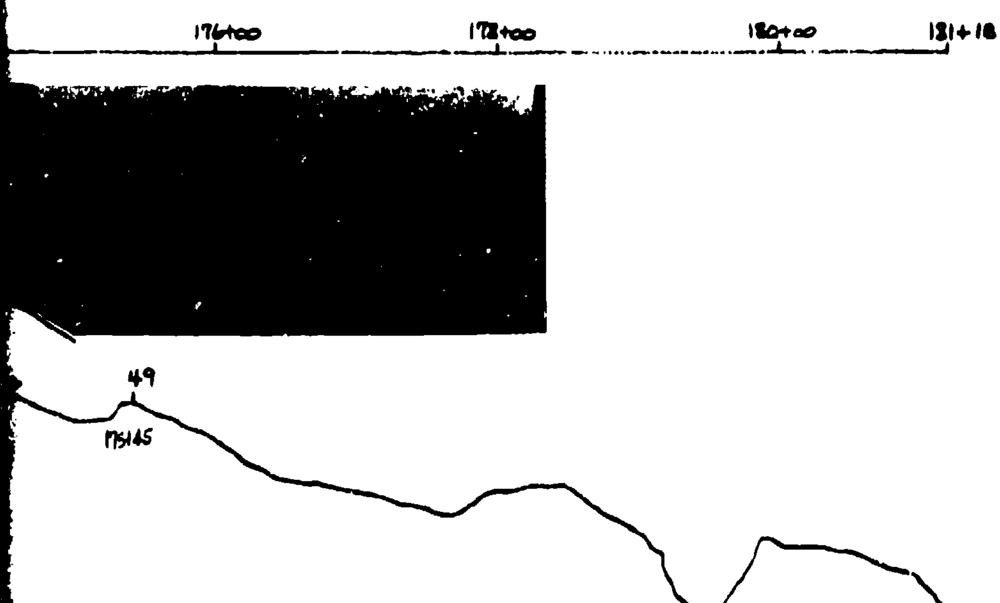

STATIONS
130+00
132+00
134+00
136+00
13
58
ROAD
59
130+70


160+00
162+00
164+00
166+00
168+00
45
160+50
46
161+45
47
163+20
48
168+20


142+00
144+00
146+00
148+00
150+00
40
41
145+50

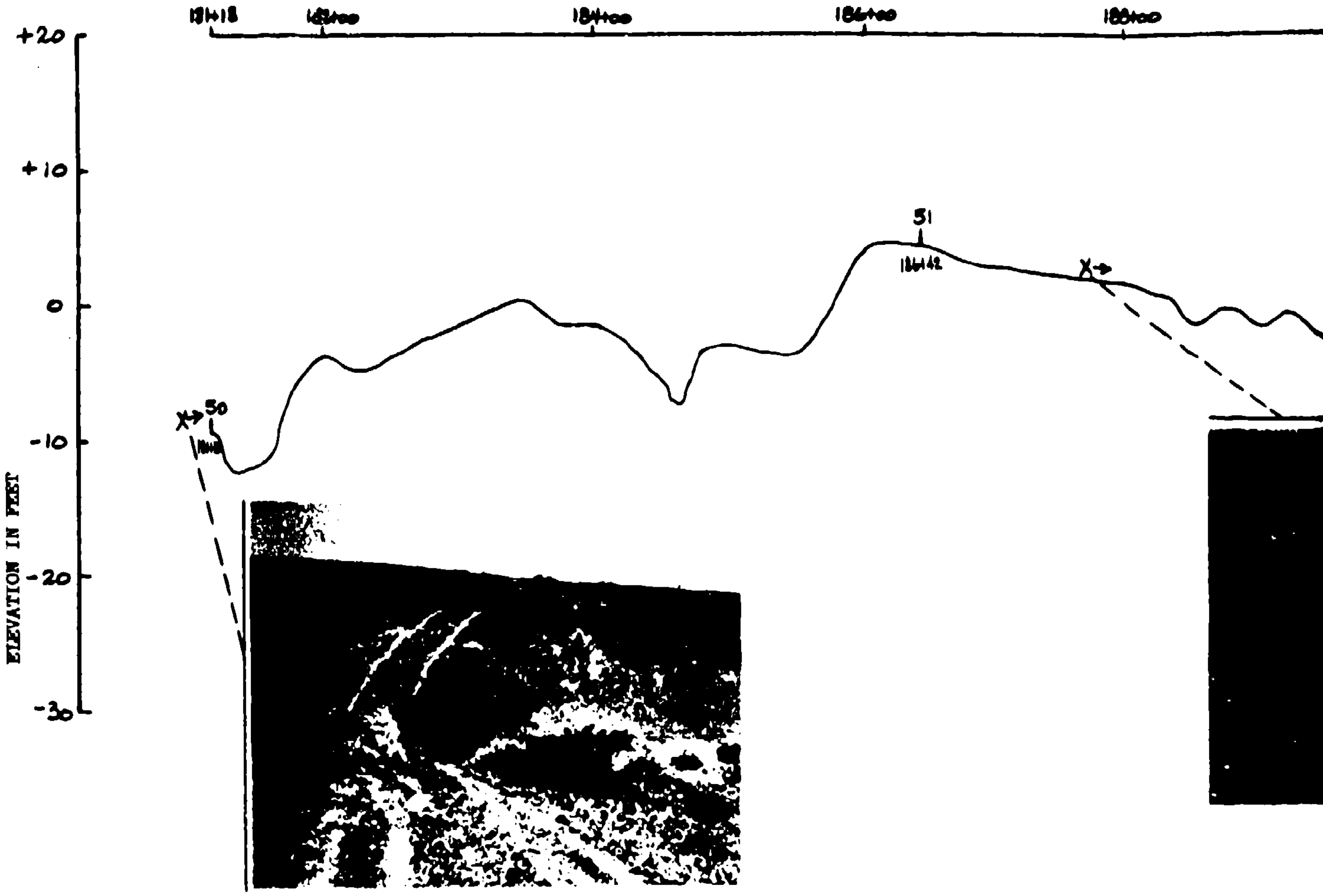

172+00
174+00
176+00
178+00
180+00
ROAD X→
49
175+45
Profile
on Next



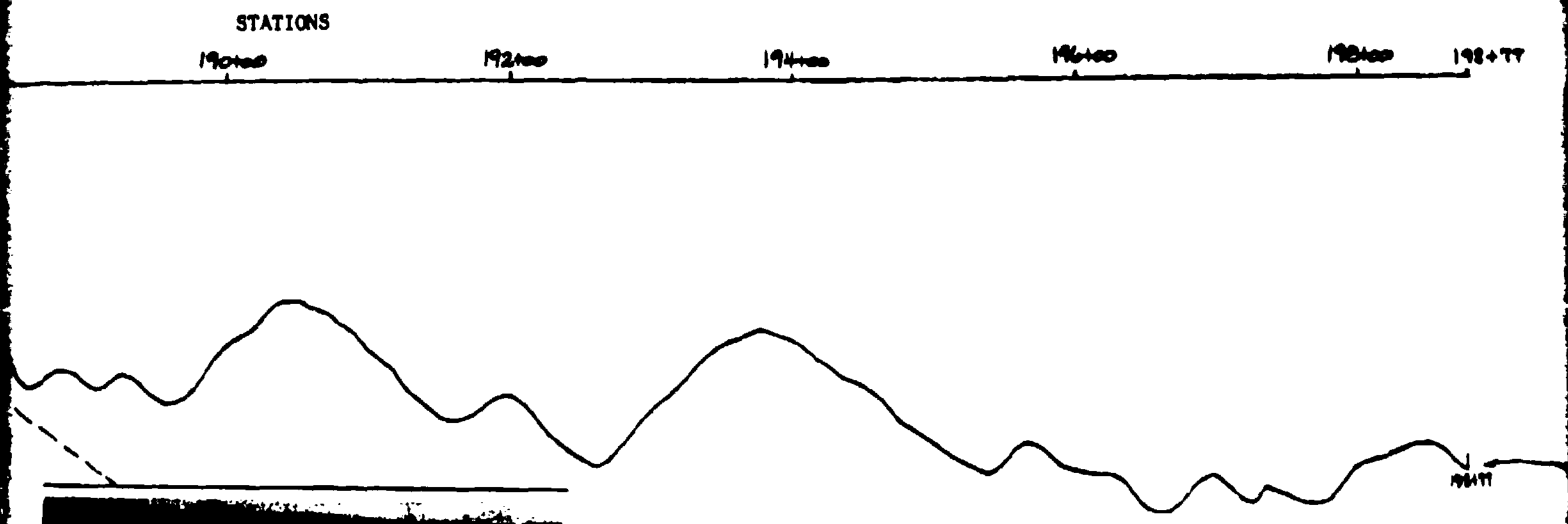


MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 1

PLATE B5 (Sheet 3 of 4)

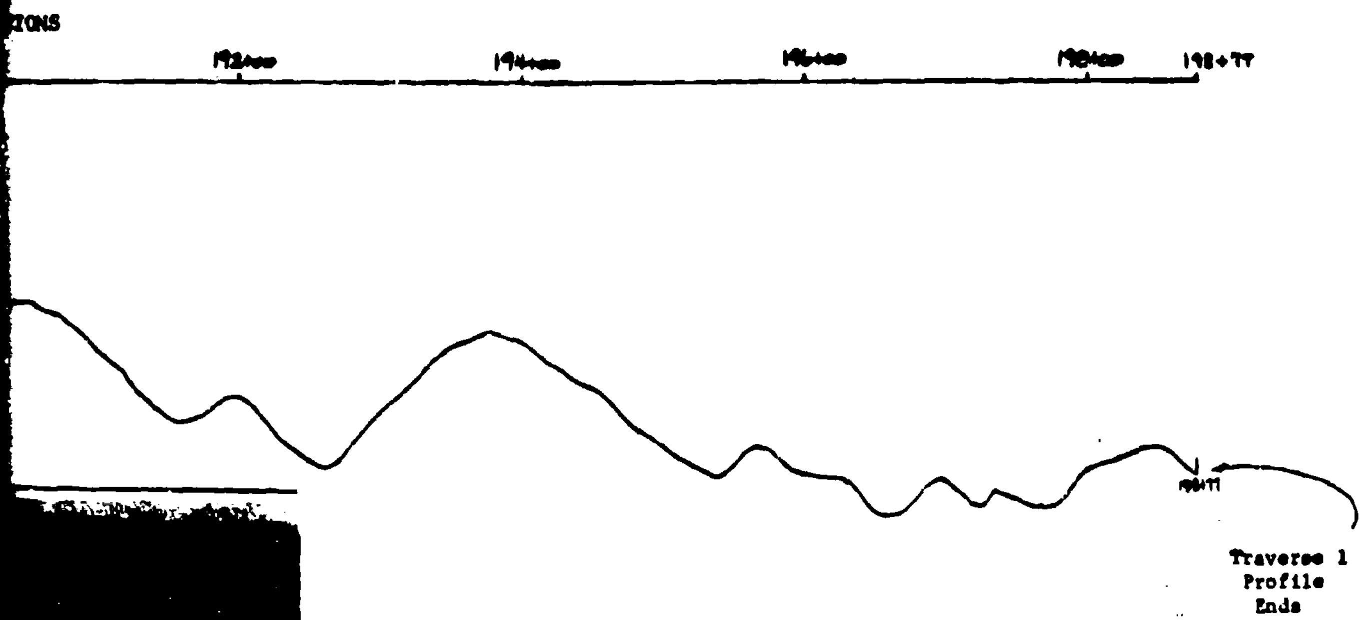

181+18
182+00
184+00
186+00
188+00
+20
+10
0
-10
-20
-30
ELEVATION IN FEET
X→ 50
51
186+42
X→

17



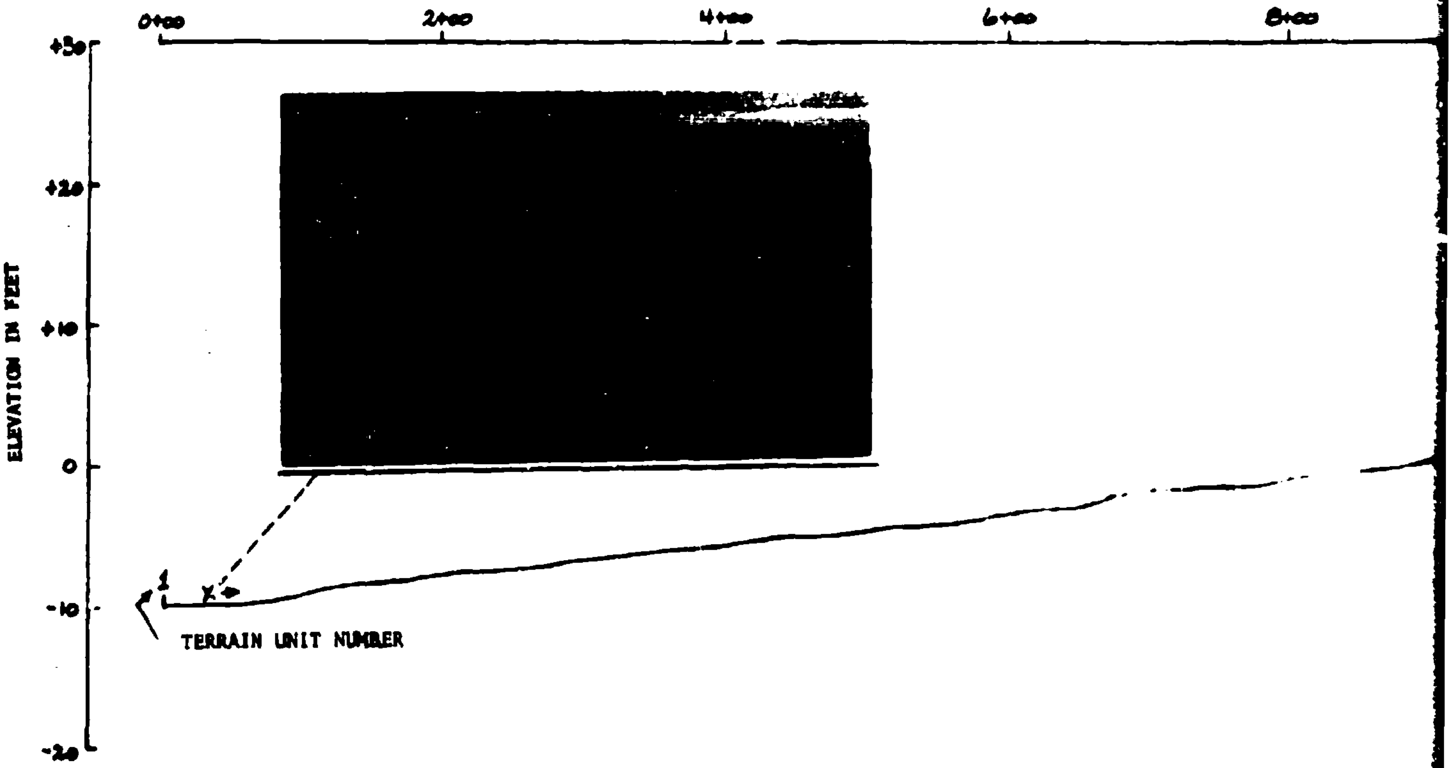
Trav
Prof
End

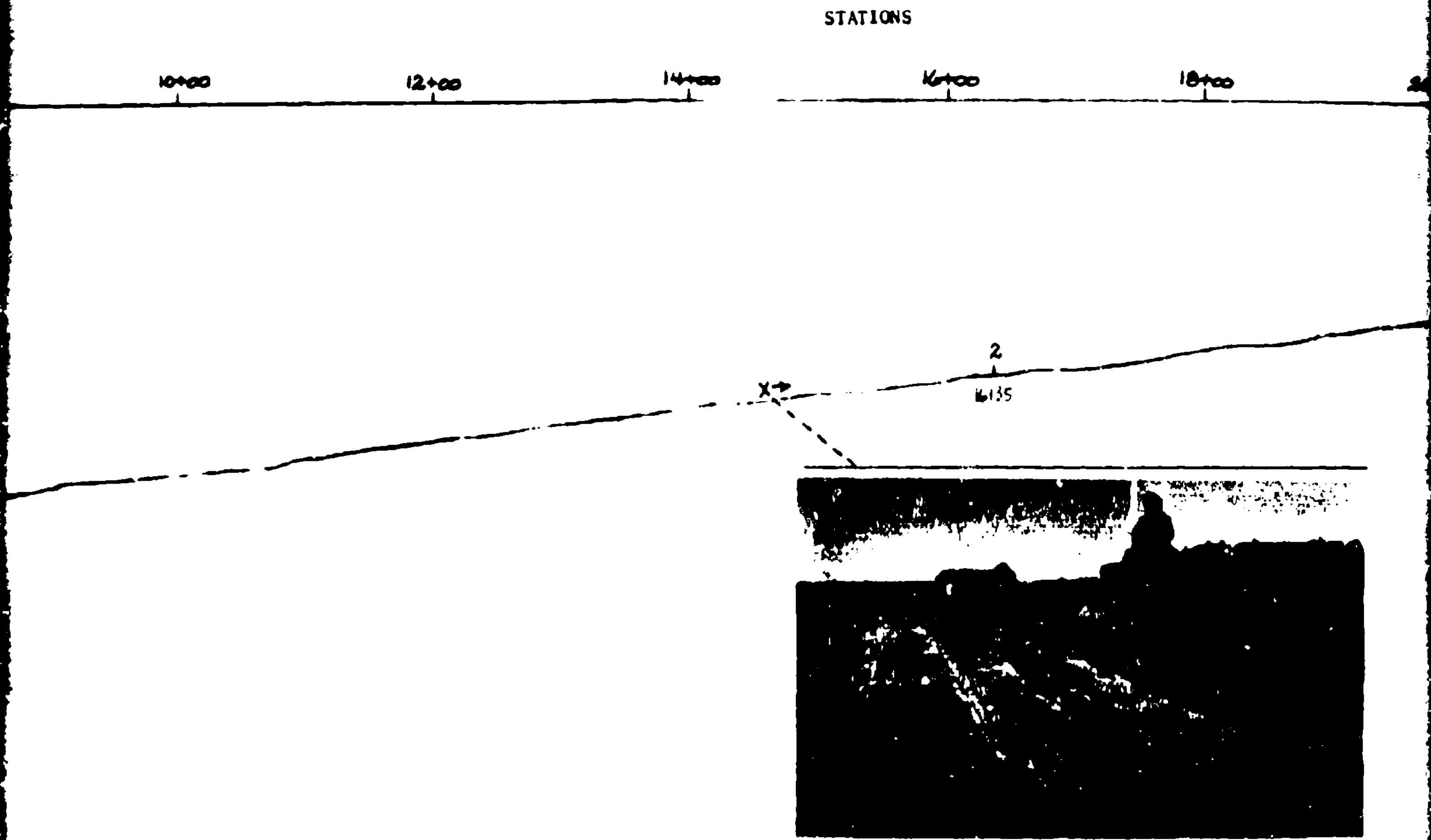
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 1

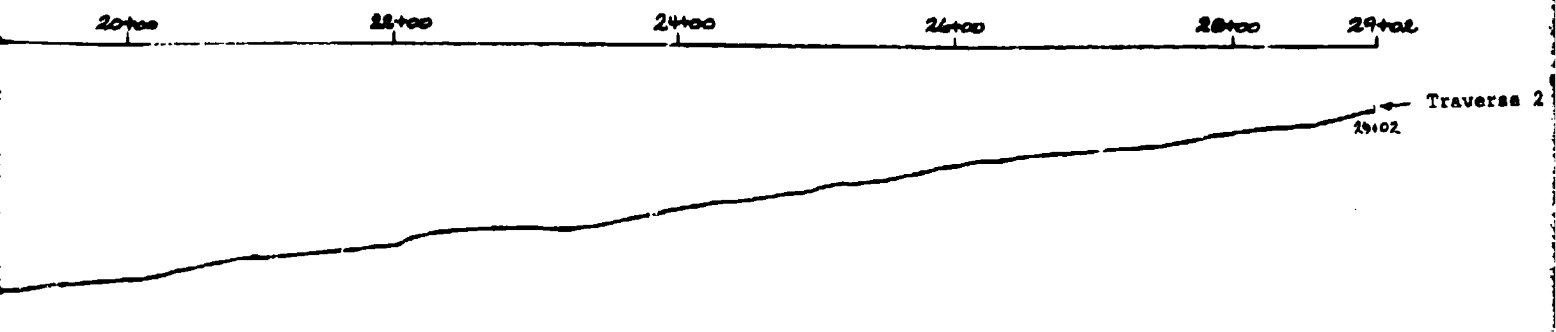


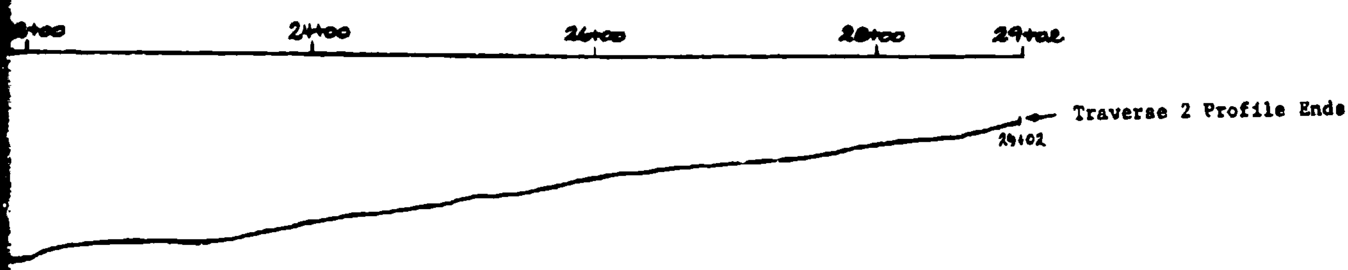
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 1

PLATE B5 (Sheet 4 of 4)


0+00
2+00
4+00
6+00
8+00
+30
+20
+10
0
-10
-20
ELEVATION IN FEET
1
TERRAIN UNIT NUMBER

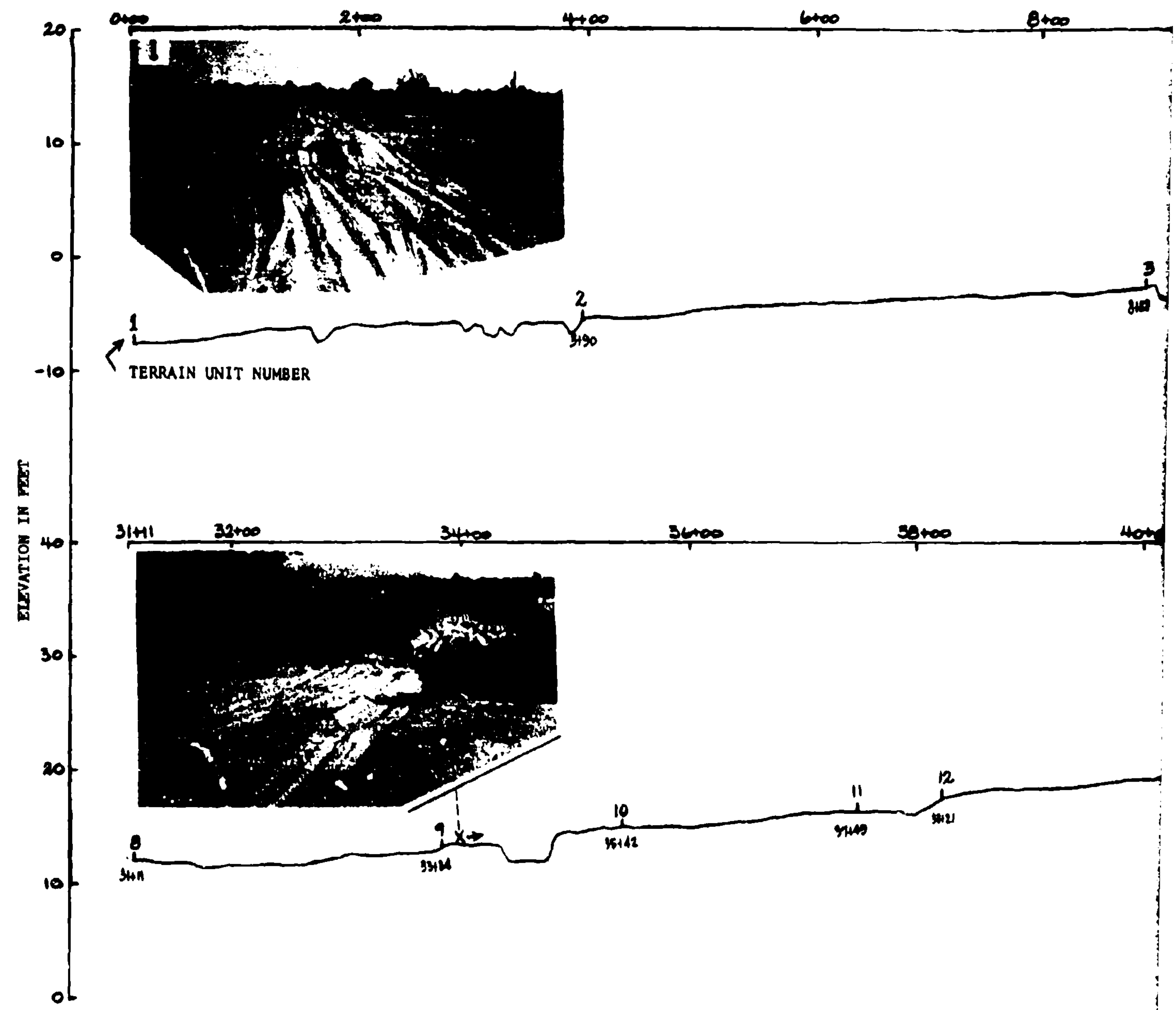

STATIONS
10+00
12+00
14+00
16+00
18+00
2
X


20+00
22+00
24+00
26+00
28+00
29+02
Traverse 2
29+02

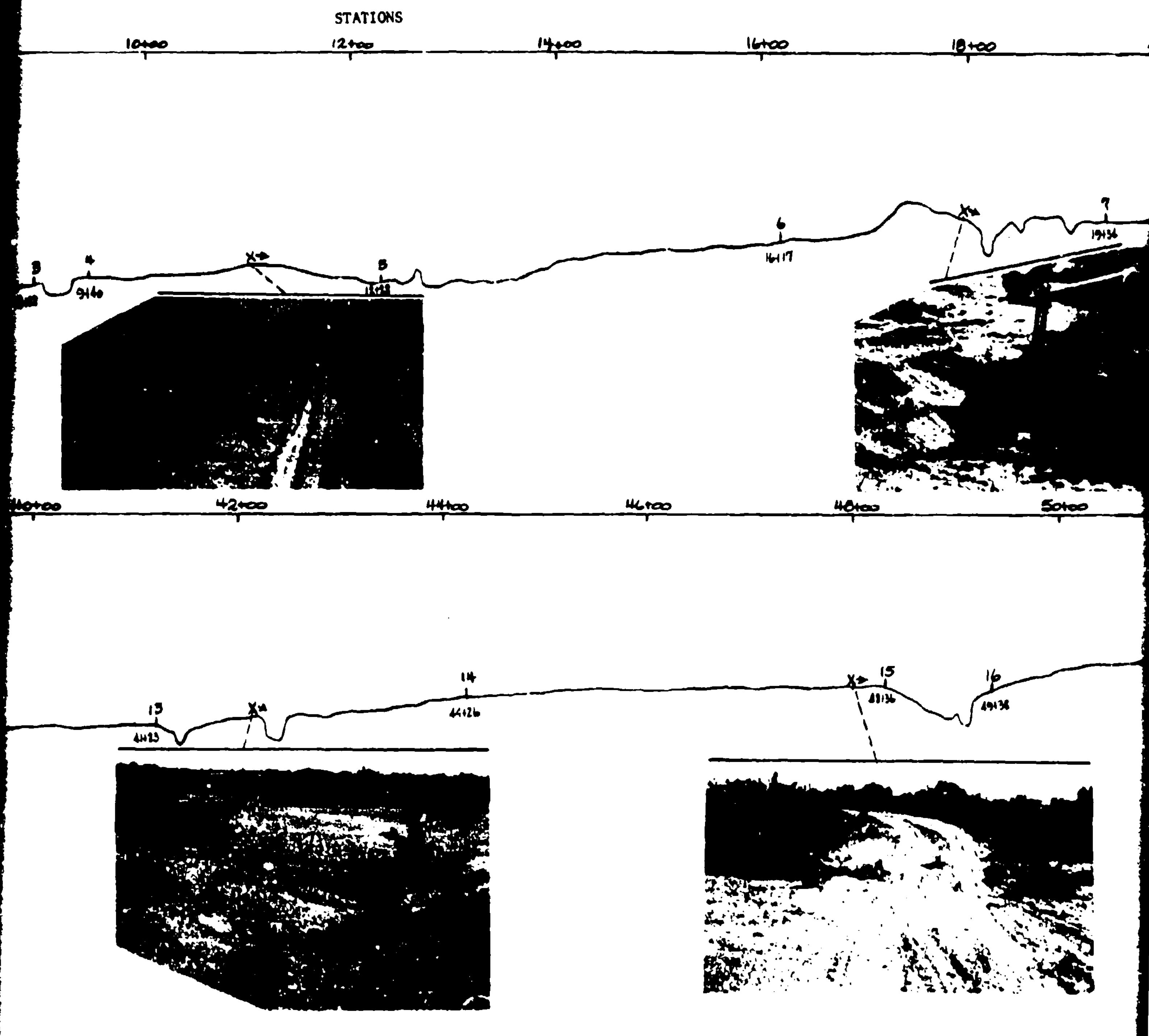


MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 2

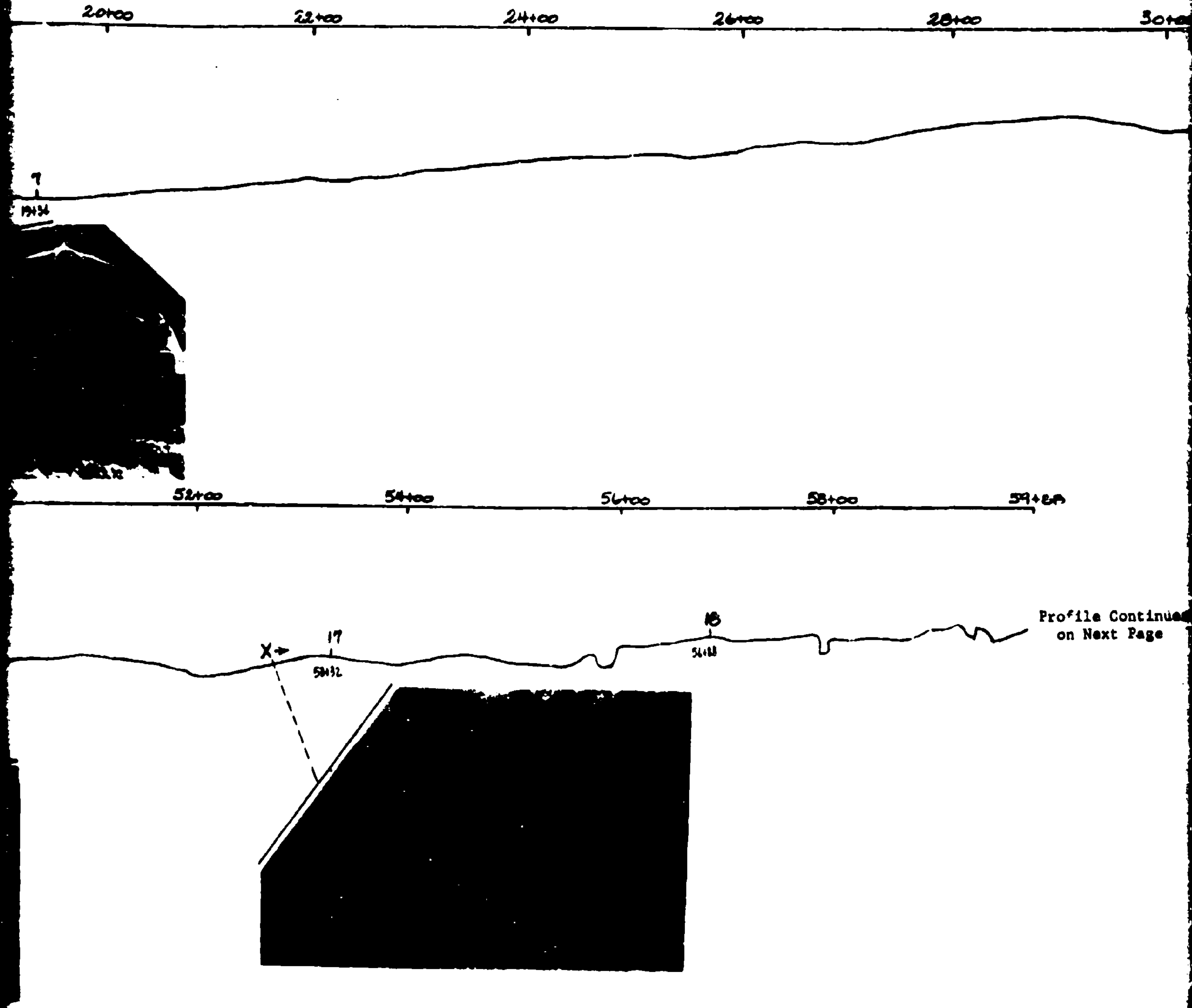
PLATE B6

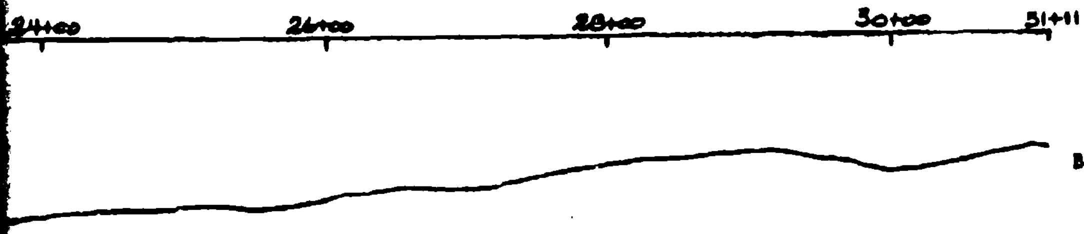


20
10
0
-10
ELEVATION IN FEET
40
30
20
10
0
0+00
2+00
4+00
6+00
8+00
TERRAIN UNIT NUMBER
31+11
32+00
34+00
36+00
38+00


STATIONS
10+00
12+00
14+00
16+00
18+00
3
4
5
6
16+17
7
19+36
40+00
42+00
44+00
46+00
48+00
50+00
13
14
44+26
15
16

1 B


20+00
22+00
24+00
26+00
28+00
7
52+00
54+00
56+00
58+00
X
17
18
Profile Continued
on Next Page



Profile Continued at
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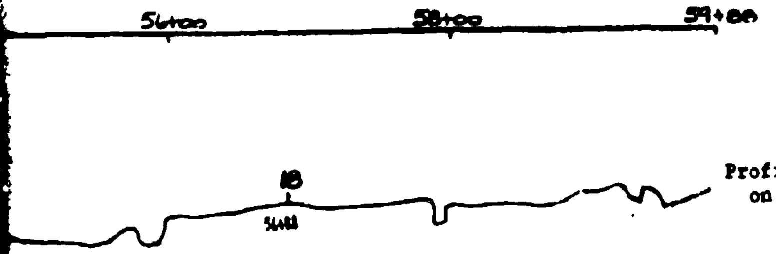
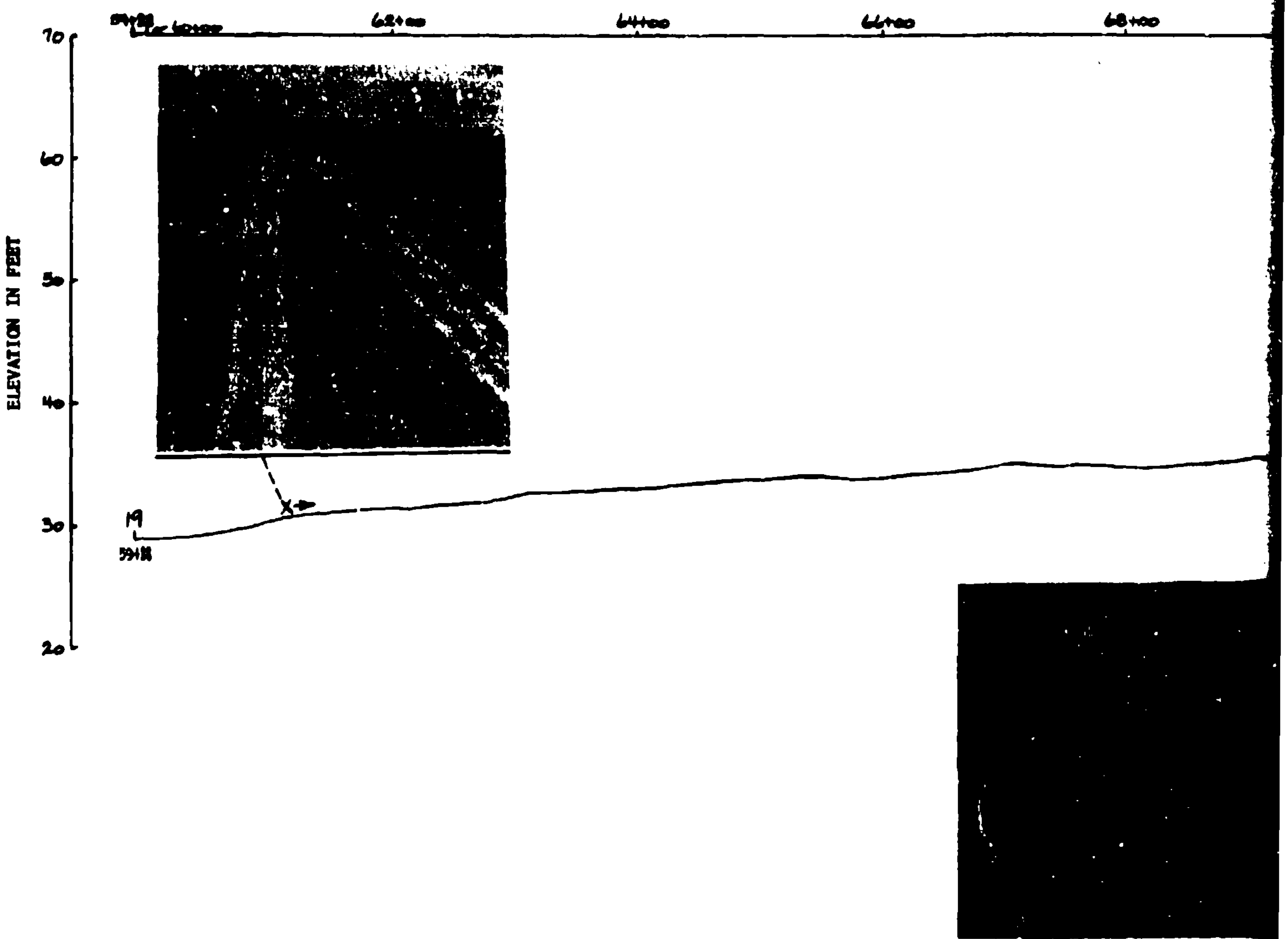


Profile Continues
on Next Page

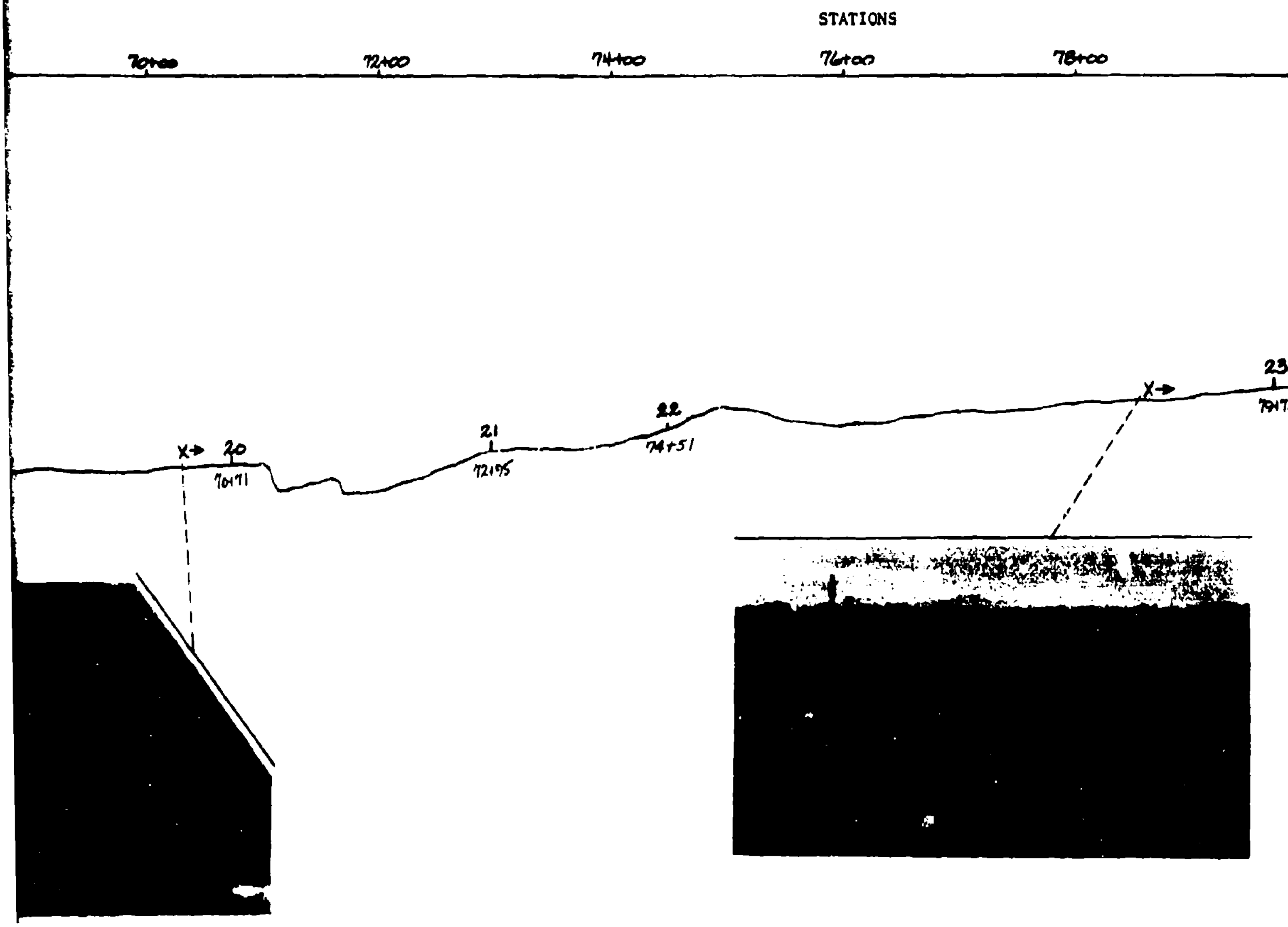
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 3

D

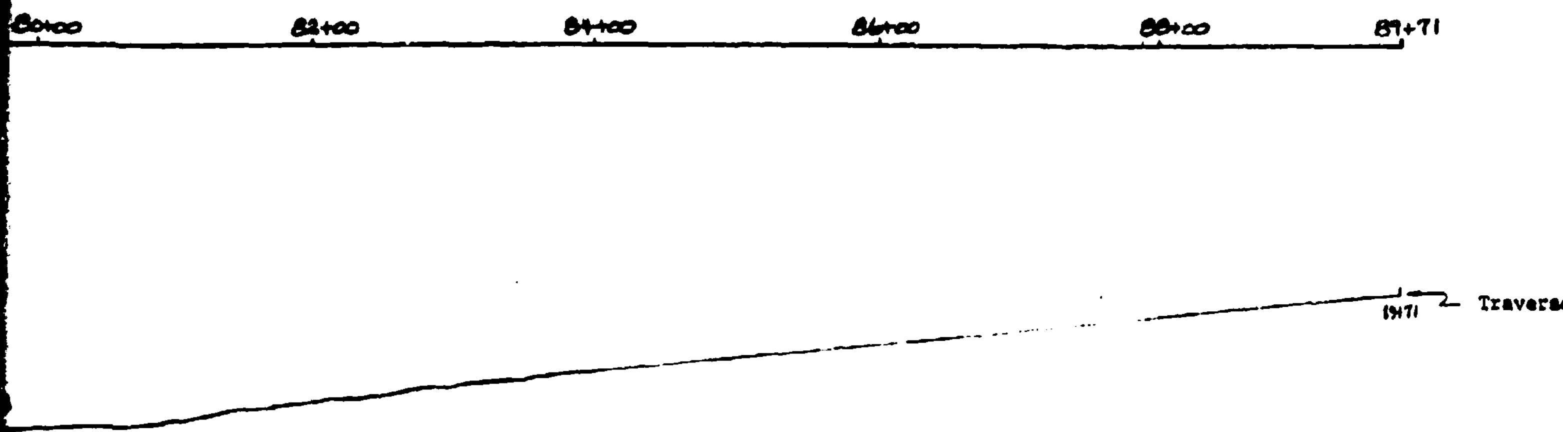
PLATE B7 (Sheet 1 of 2)



62+00
64+00
66+00
68+00
ELEVATION IN FEET
70
60
50
40
30
20
19



B



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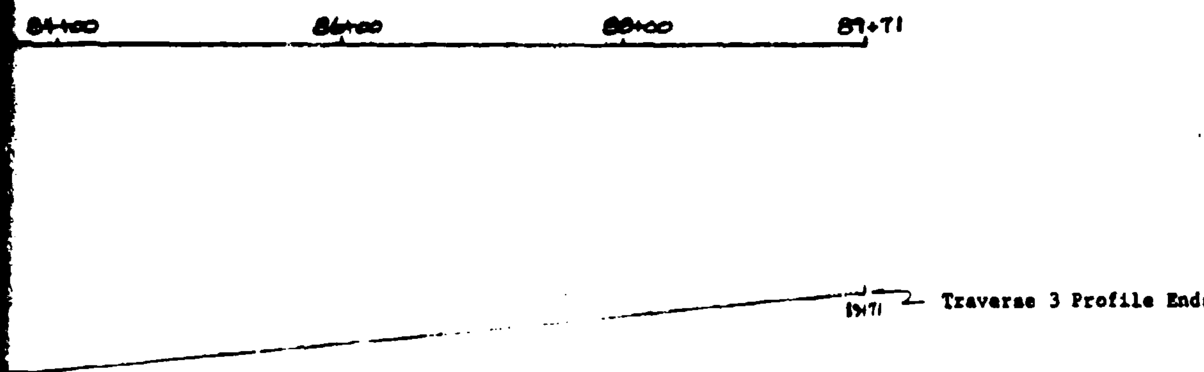
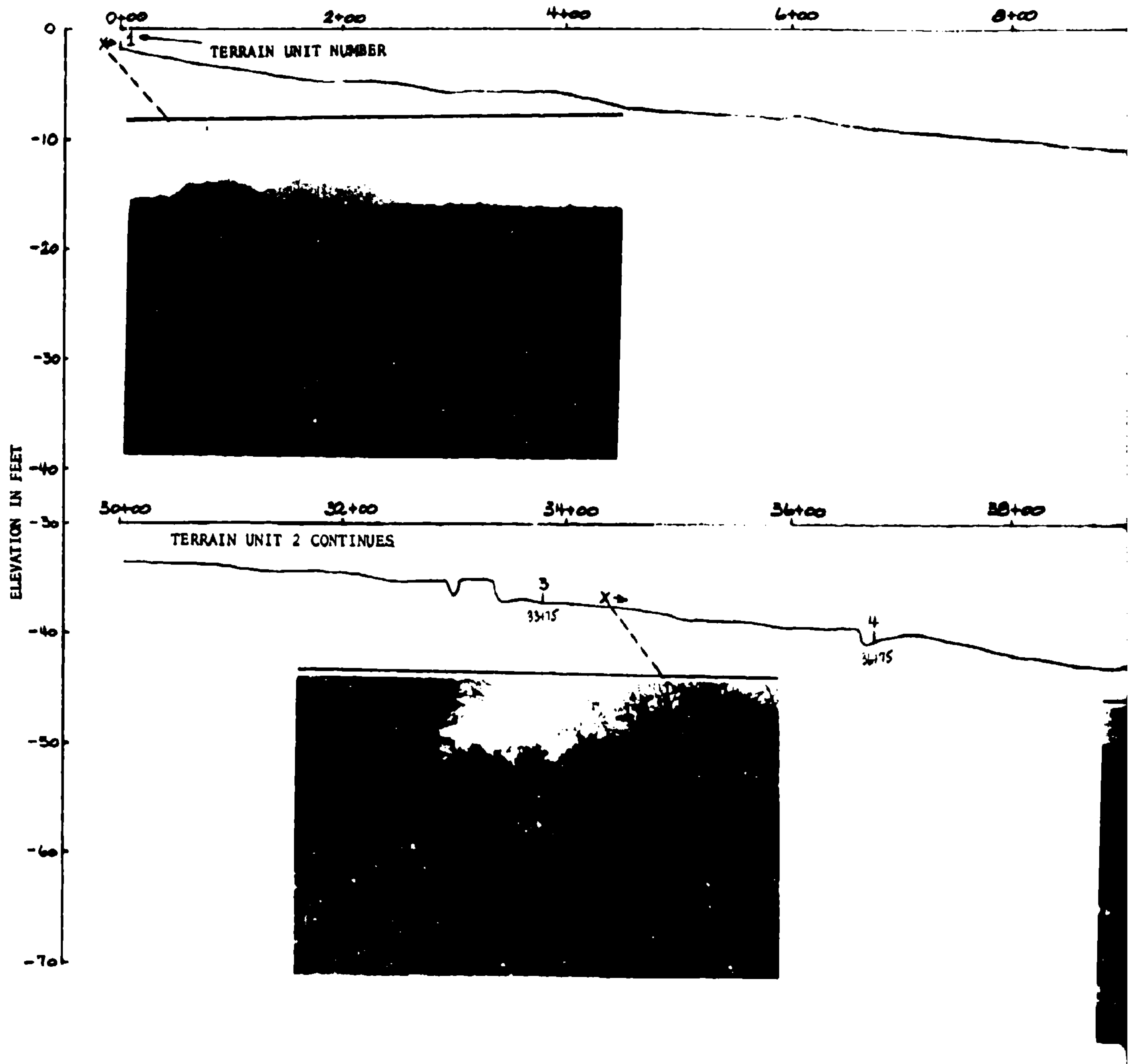
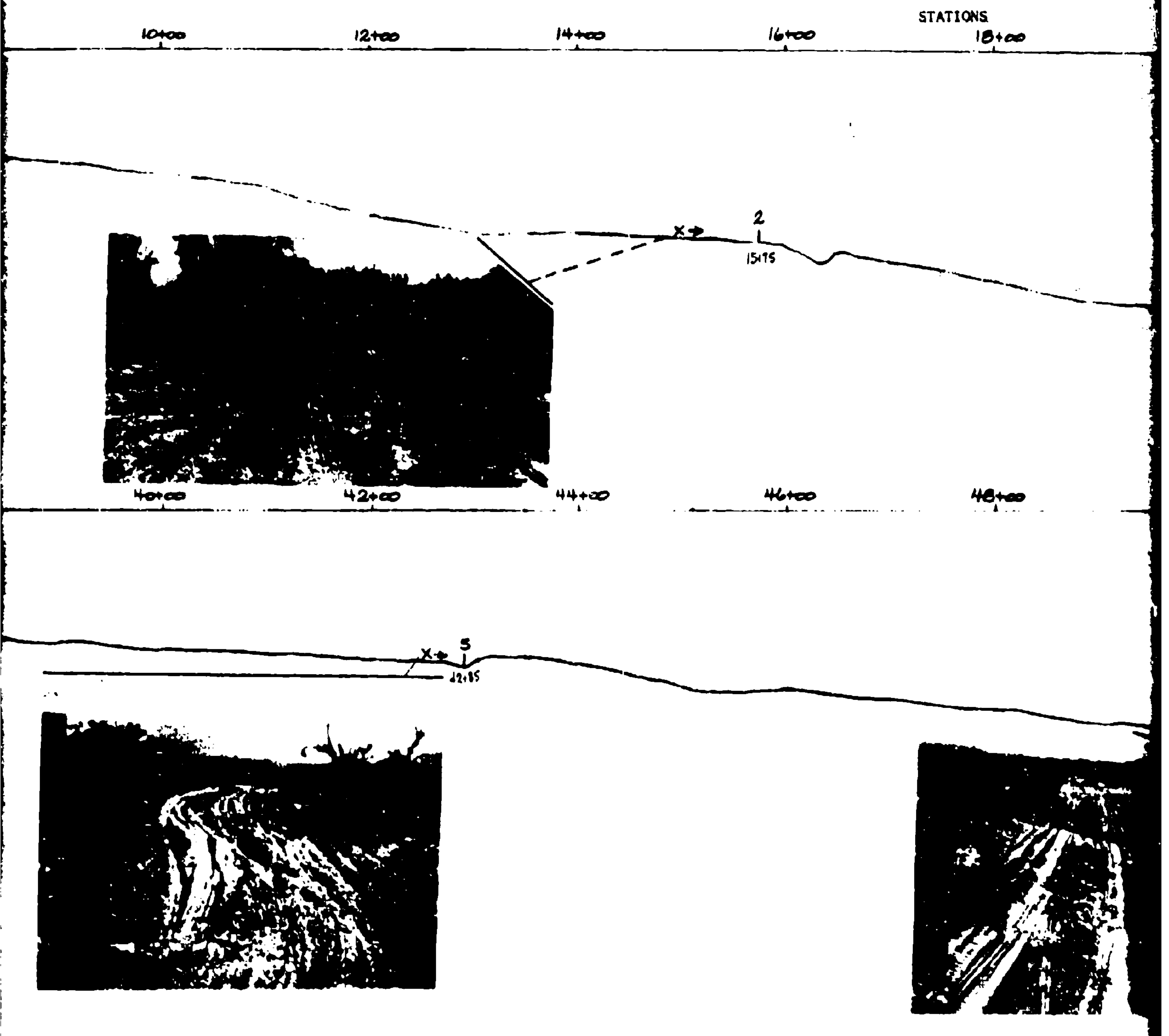


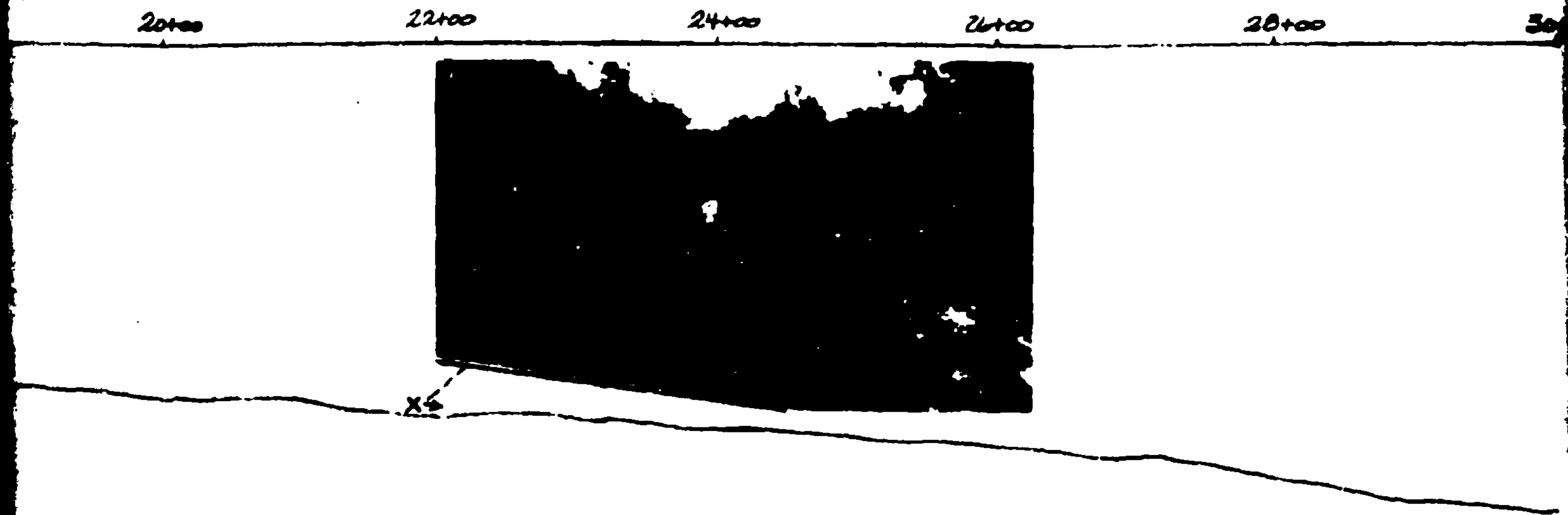
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 3

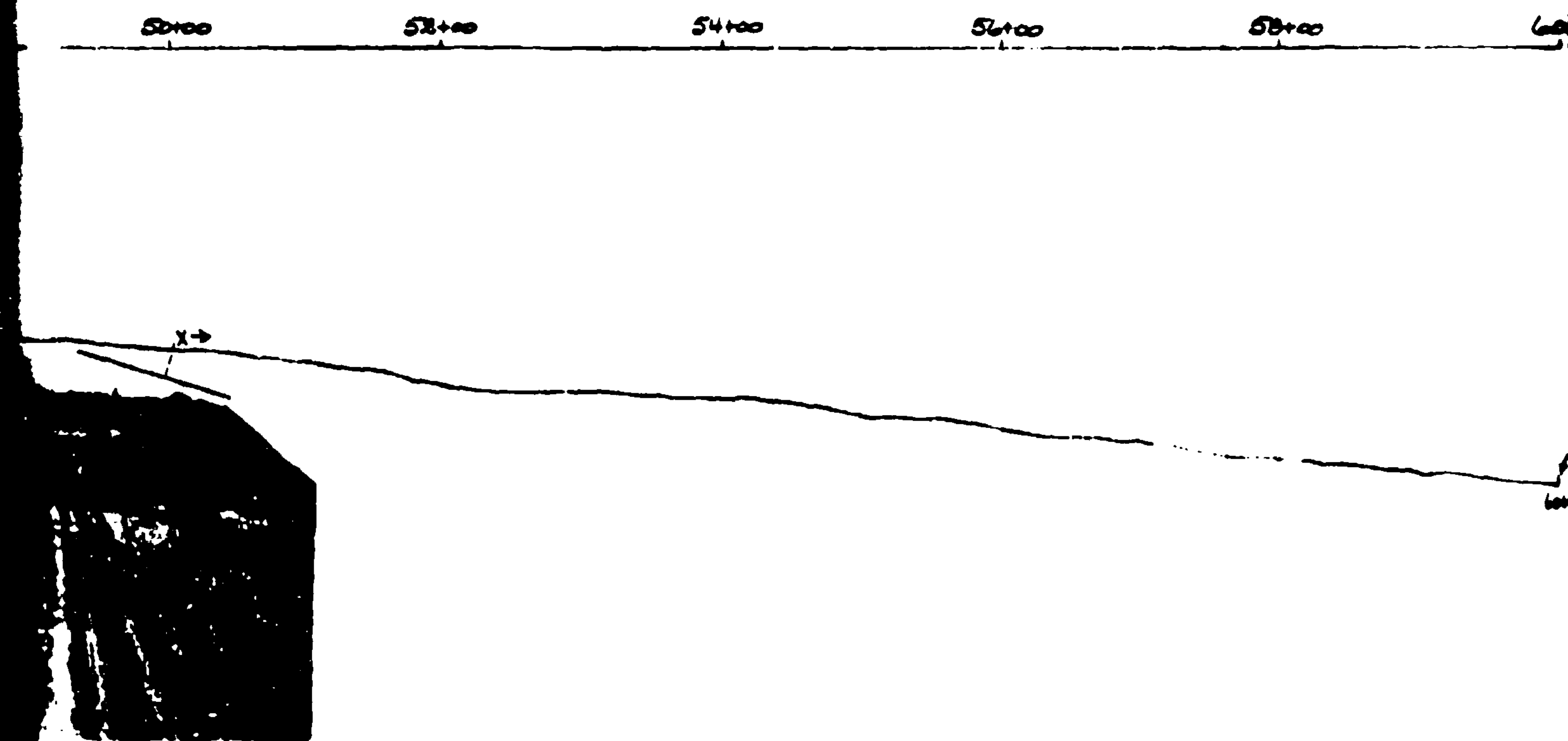
PLATE B7 (Sheet 2 of 2)

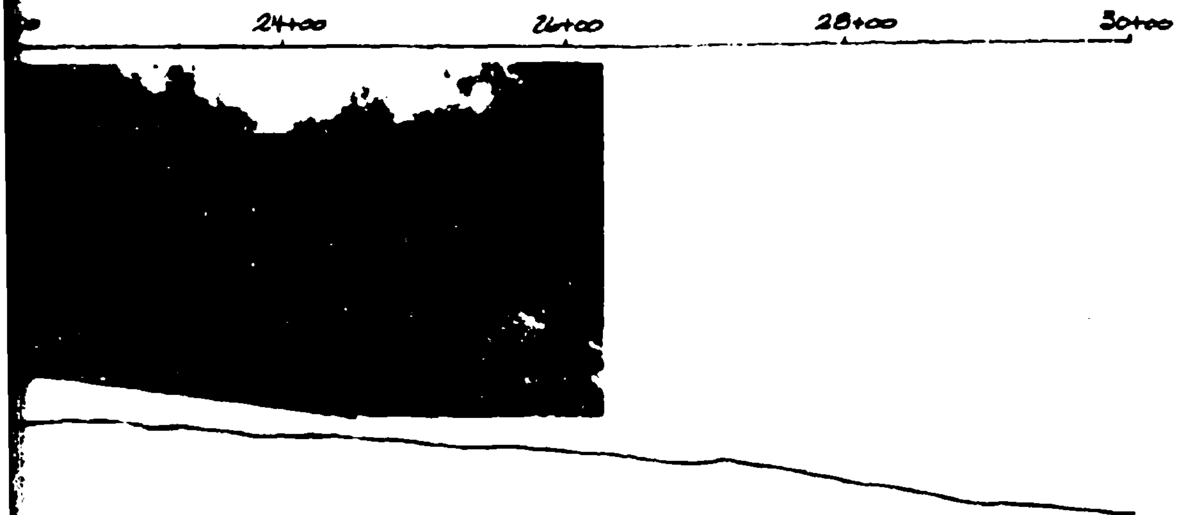

0+00
2+00
4+00
6+00
8+00
1
TERRAIN UNIT NUMBER
0
-10
-20
-30
-40
ELEVATION IN FEET
30+00
32+00
34+00
36+00
38+00
-30
TERRAIN UNIT 2 CONTINUES
3
33+75
4
36+75
-40
-50
-60
-70


STATIONS
10+00
12+00
14+00
16+00
18+00
X→
2
15+75
40+00
42+00
44+00
46+00
48+00
X→
5
42+85

B


20+00
22+00
24+00
26+00
28+00
X


50+00
52+00
54+00
56+00
58+00
X



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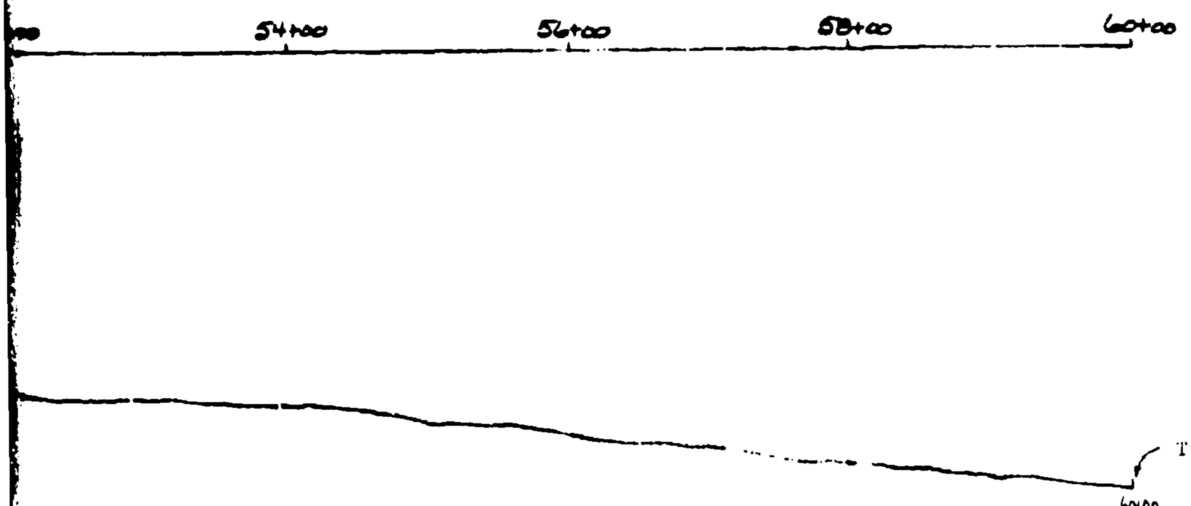
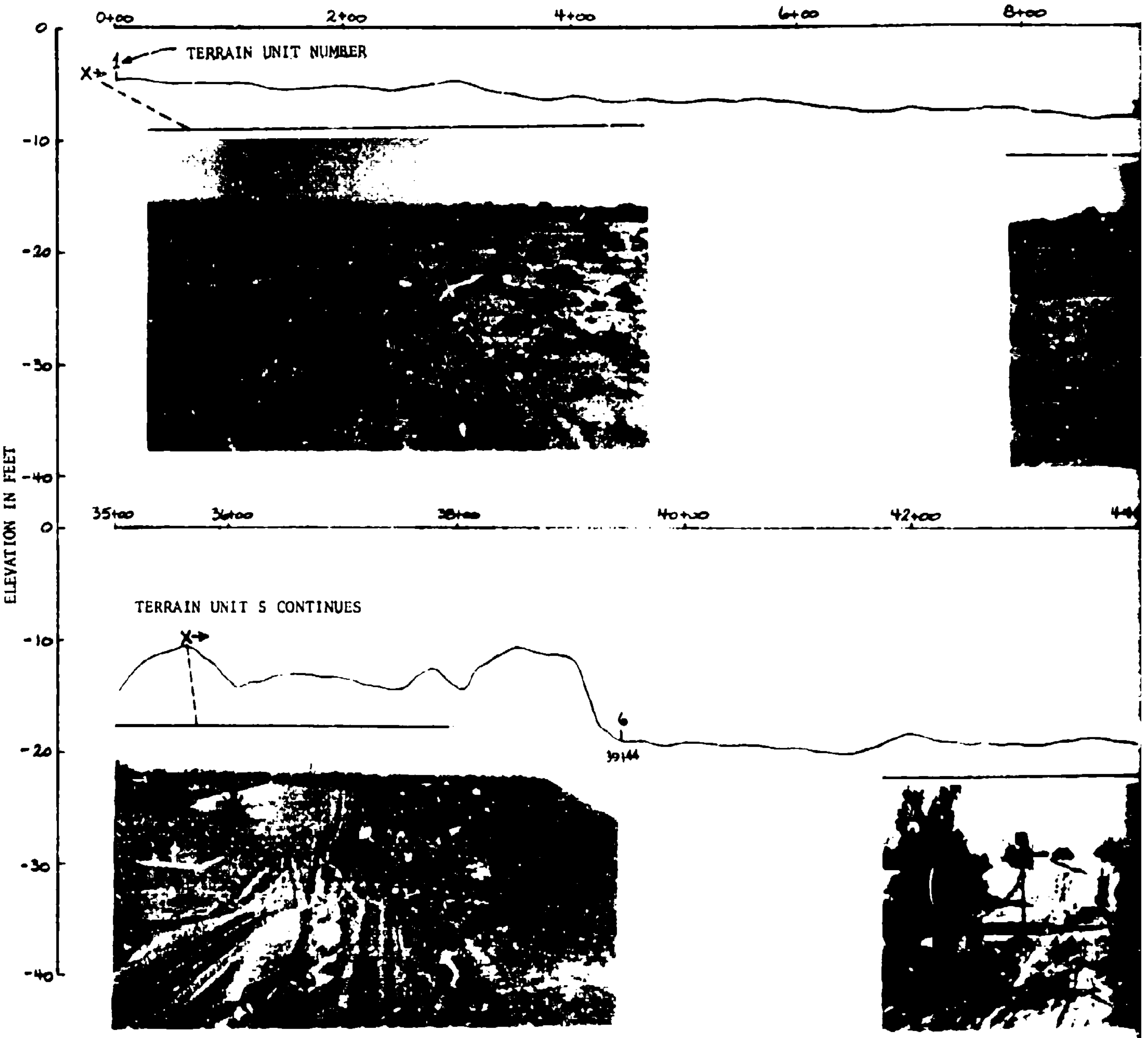
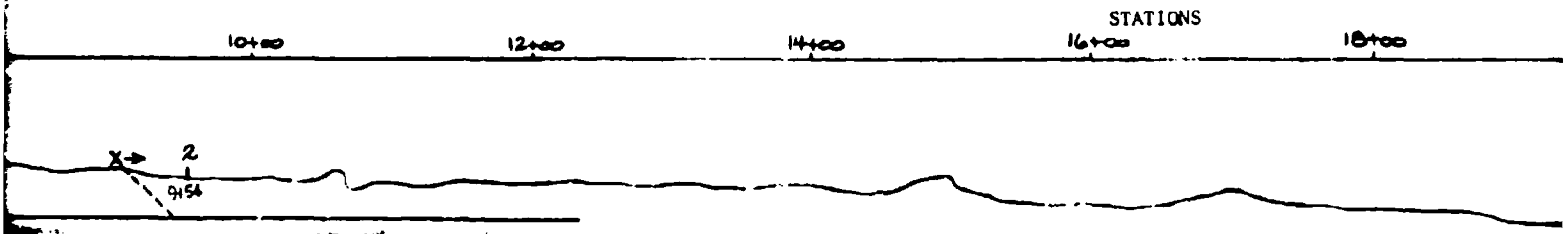
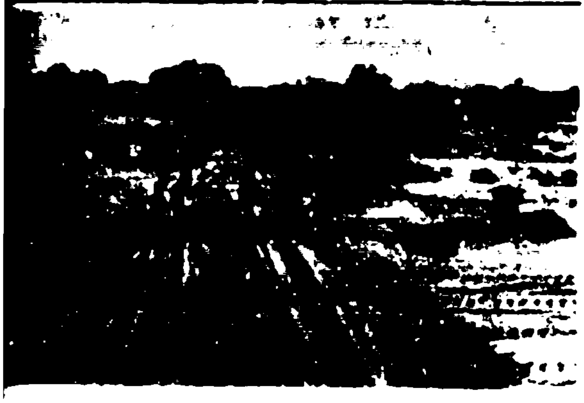


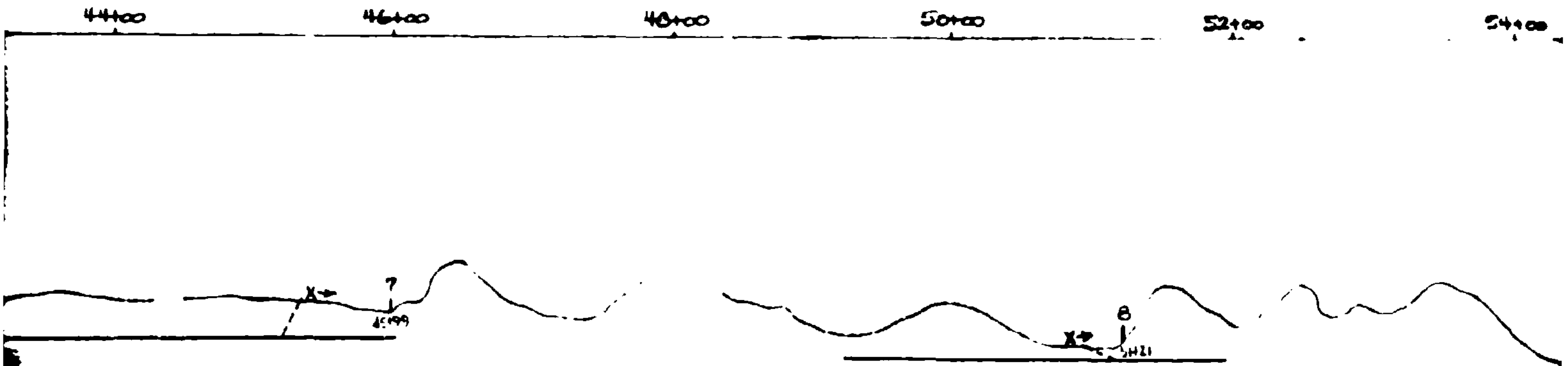
MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 4

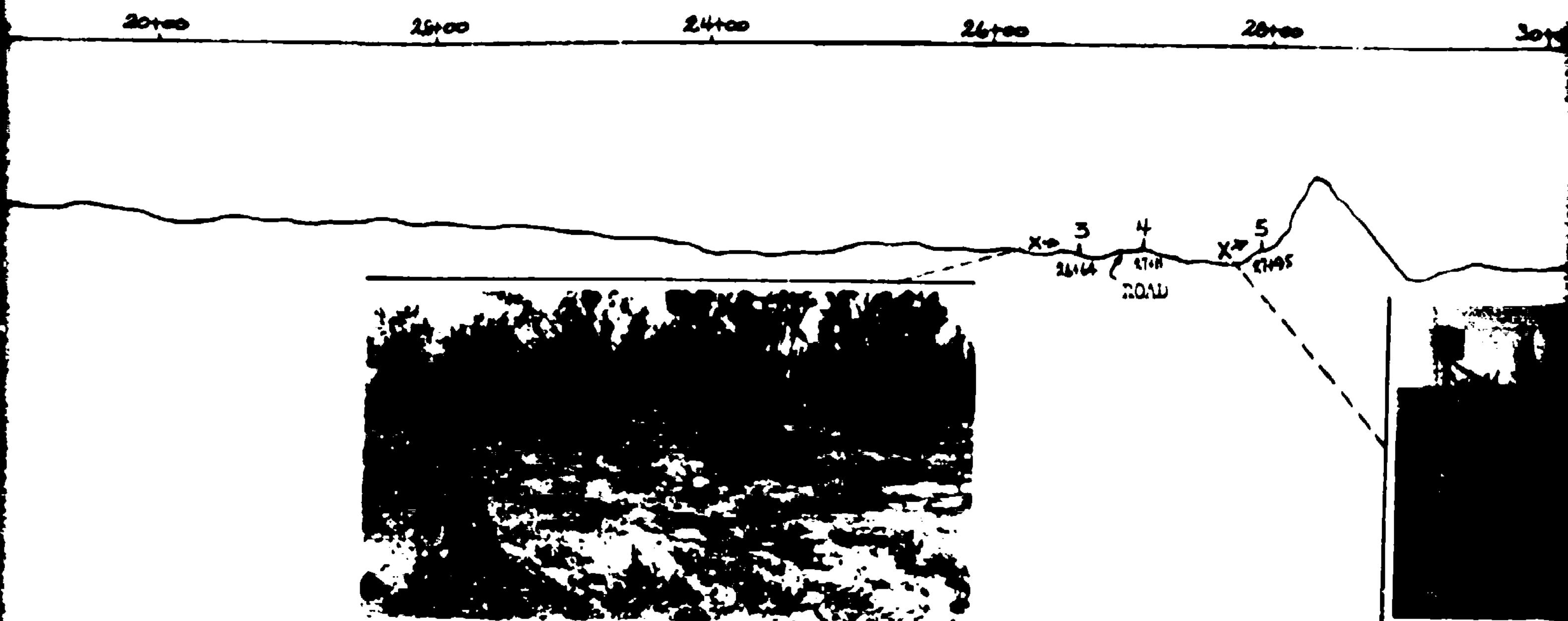


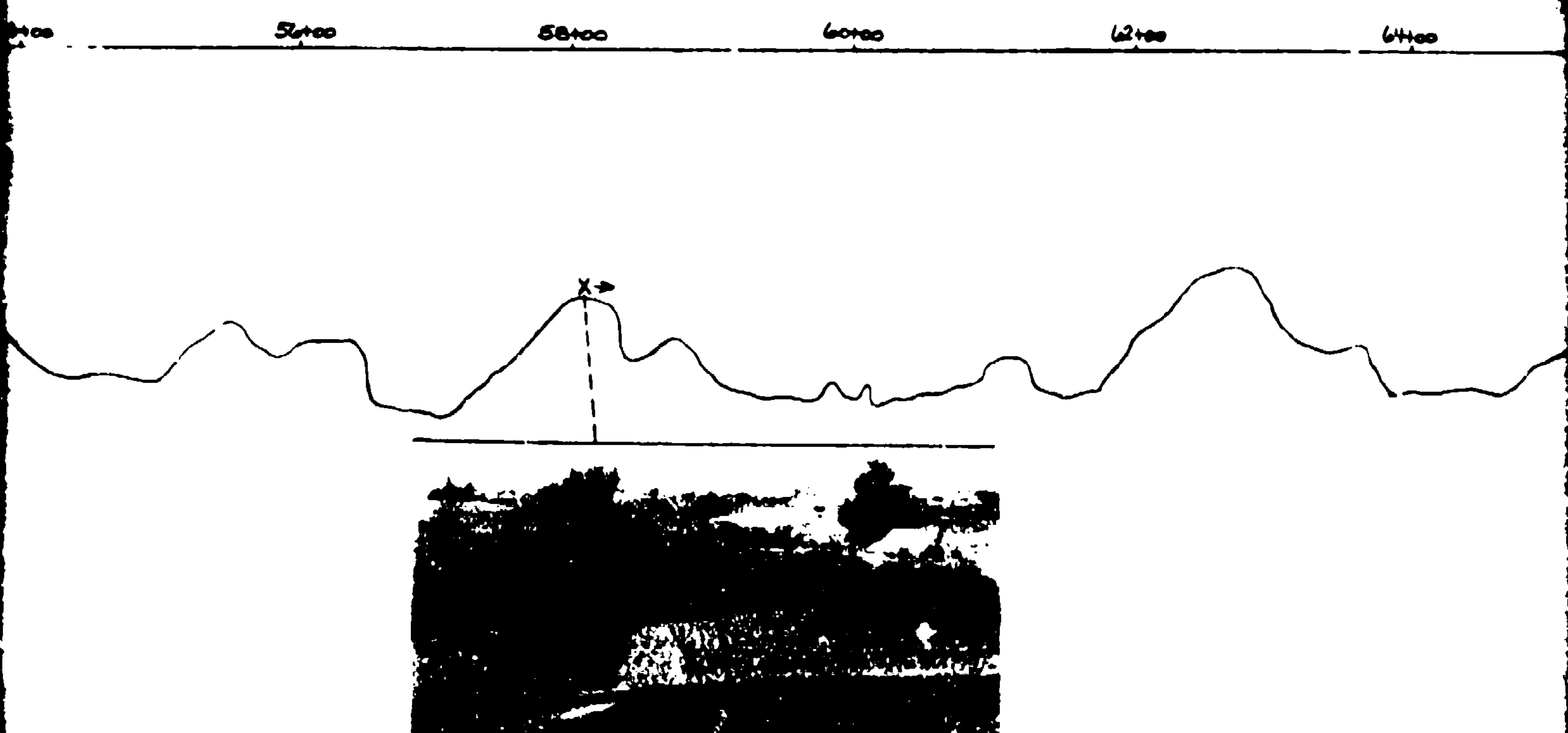
0+00
2+00
4+00
6+00
8+00
TERRAIN UNIT NUMBER
1
X
ELEVATION IN FEET
0
-10
-20
-30
-40
35+00
36+00
38+00
40+00
42+00
TERRAIN UNIT 5 CONTINUES
X
6
39+44

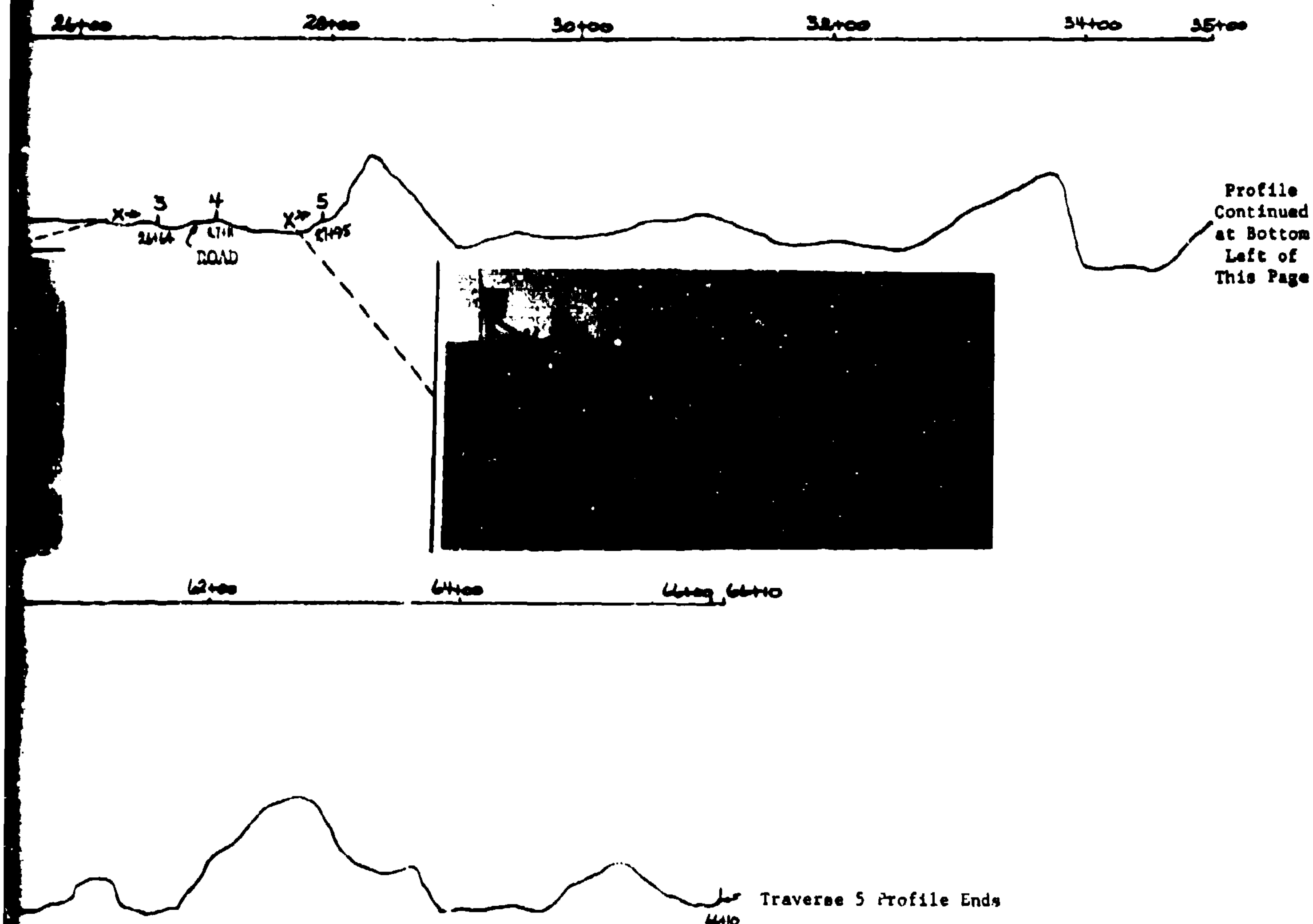

STATIONS
10+00
12+00
14+00
16+00
18+00
2



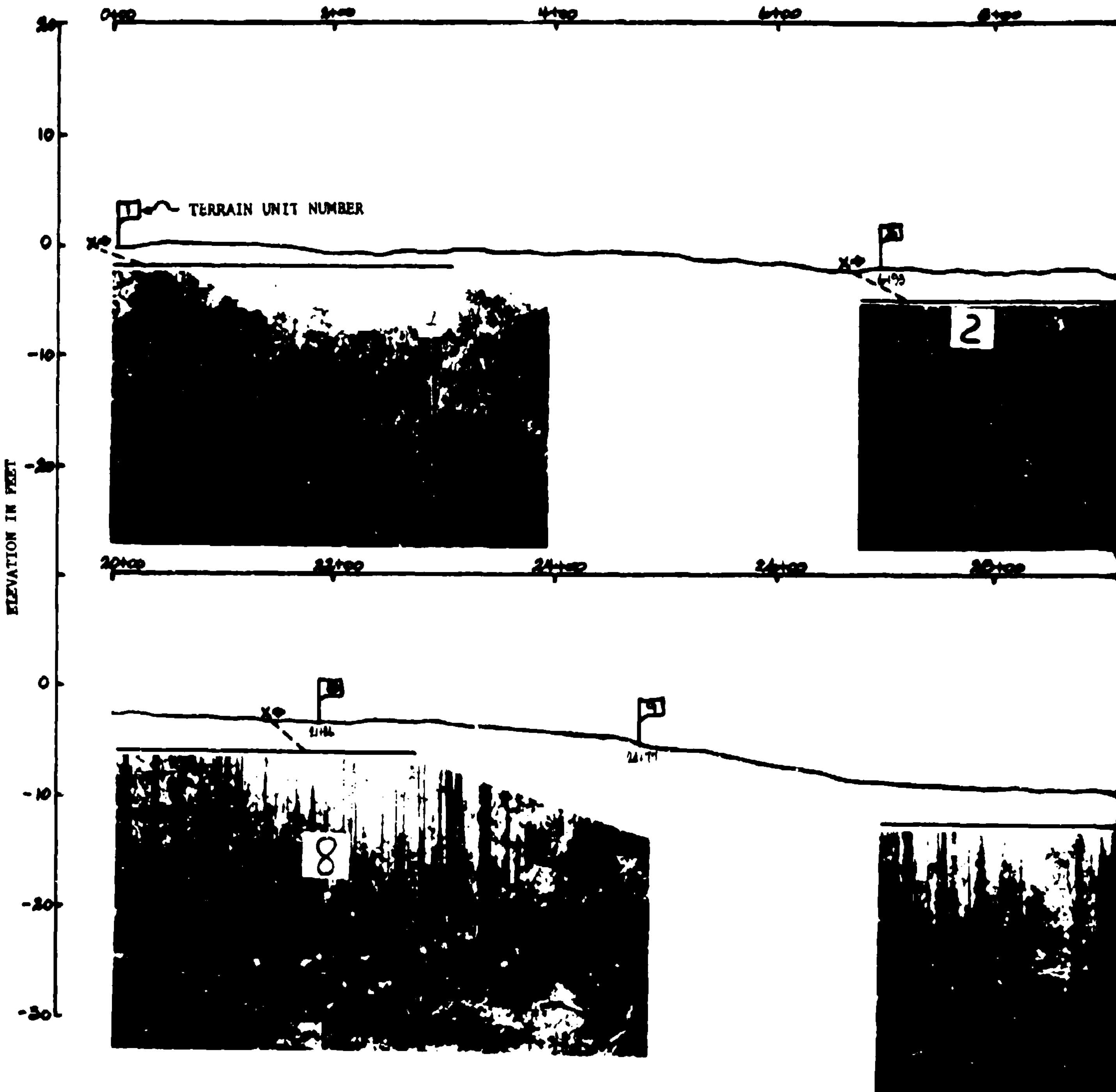

44+00
46+00
48+00
50+00
52+00
54+00
7
8

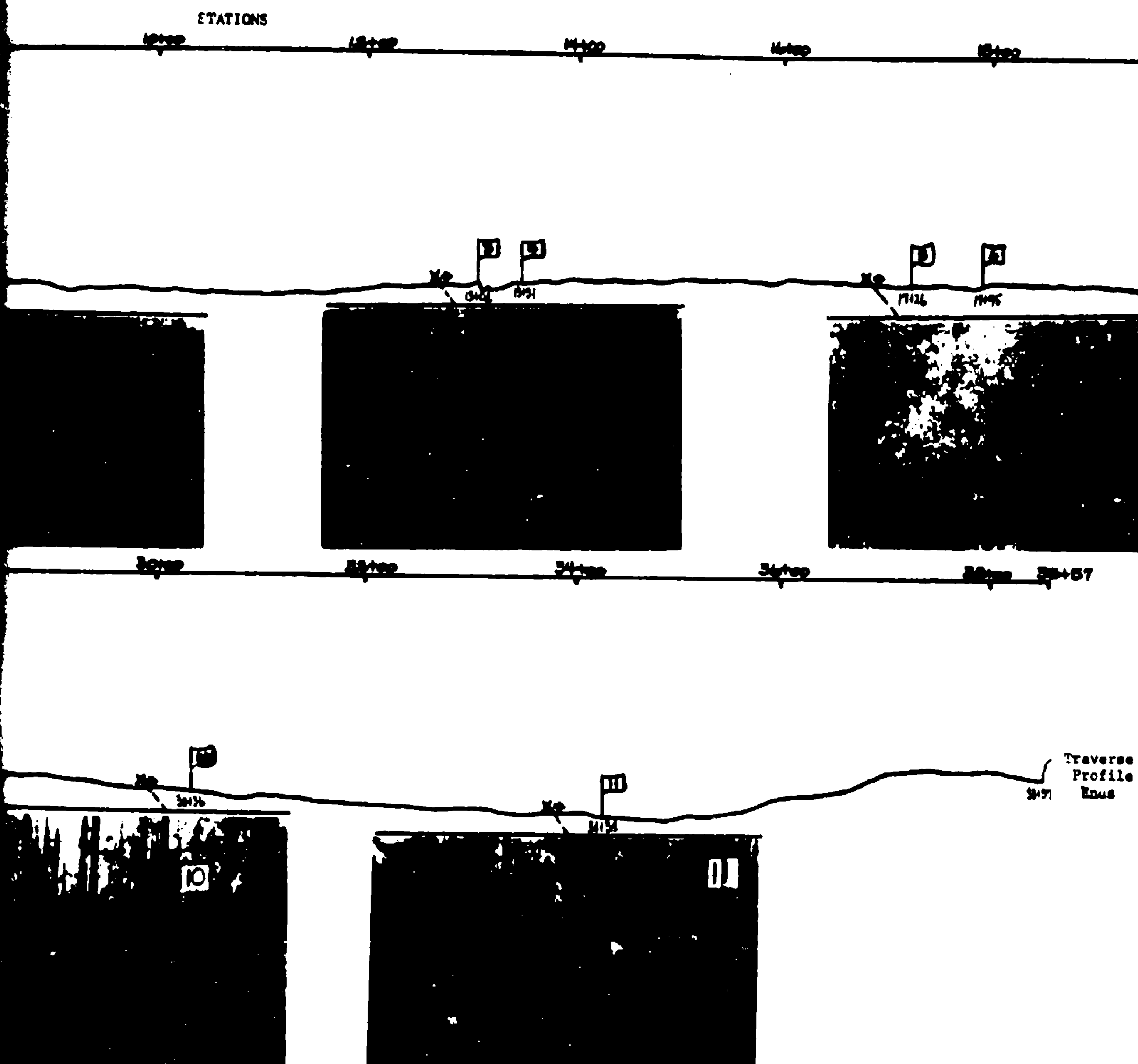

20+00
22+00
24+00
26+00
28+00
X→
3
4
ROAD
X→
5

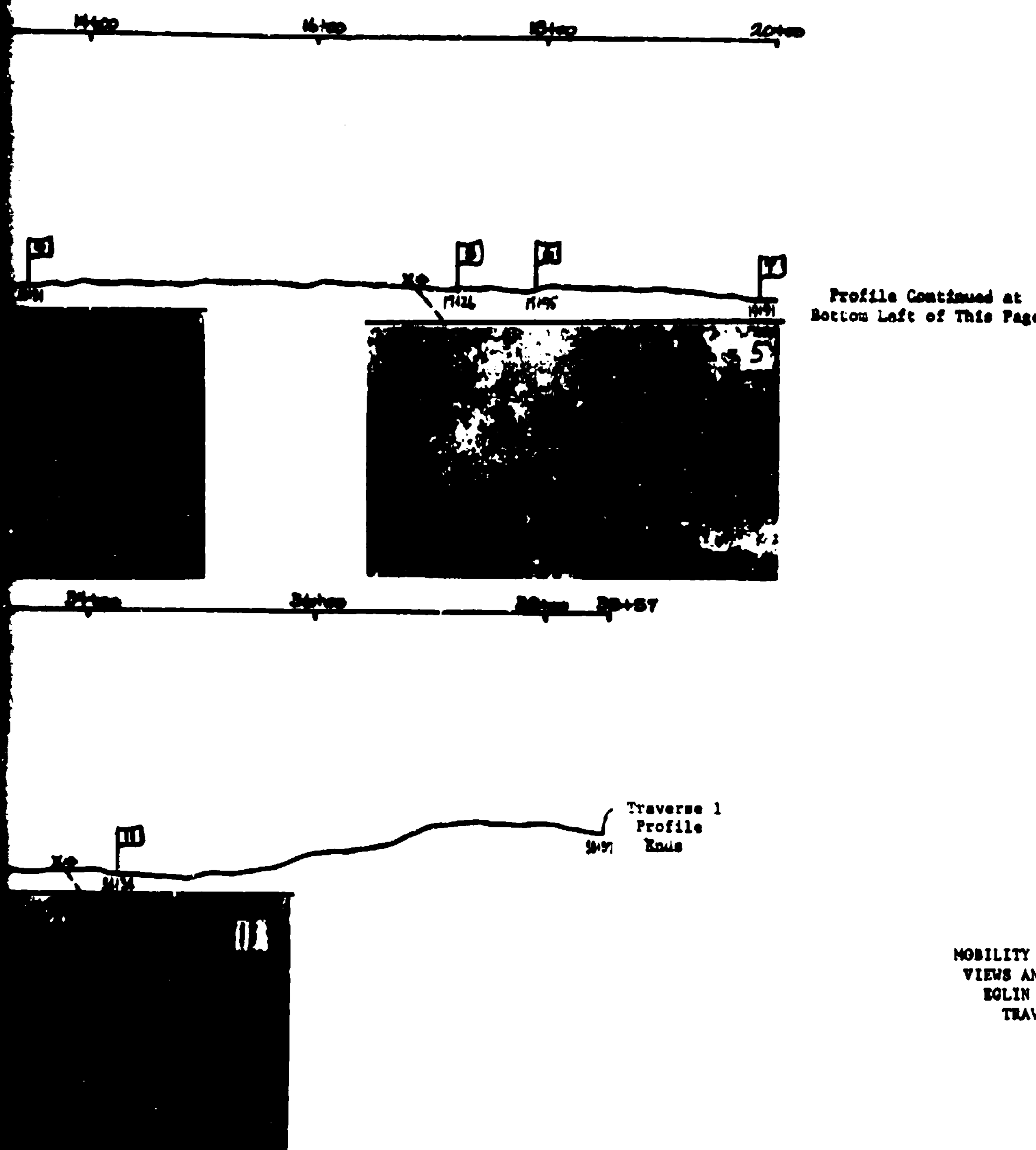

56+00
58+00
60+00
62+00
64+00
X→



MOBILITY TEST COURSE
VIEWS AND PROFILES
YUMA, ARIZ.
TRAVERSE 5

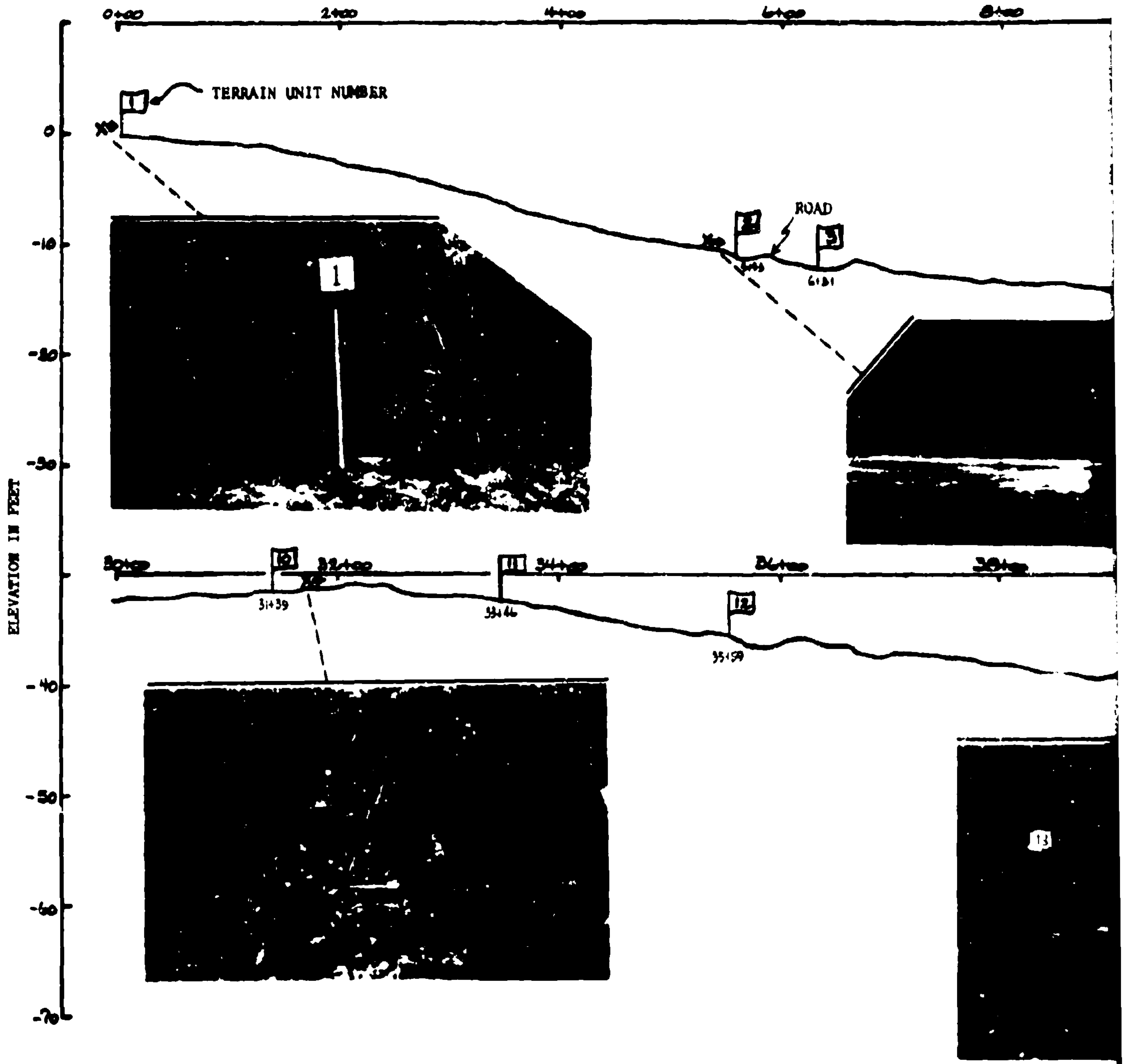

0+00
2+00
4+00
6+00
8+00
20
10
0
-10
-20
-30
TERRAIN UNIT NUMBER
ELEVATION IN FEET
2
20+00
22+00
24+00
26+00
28+00
8


STATIONS
Traverse
Profile

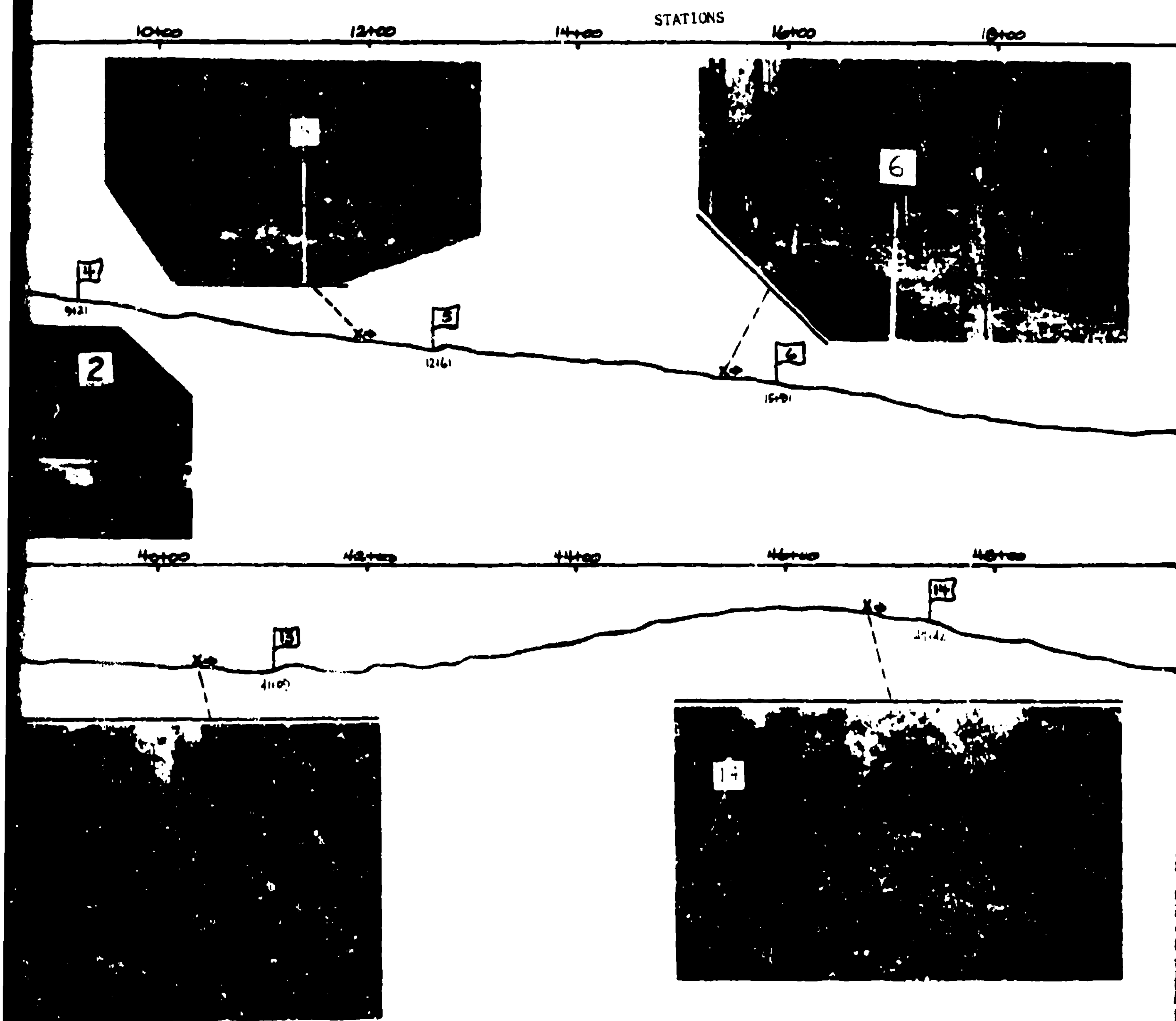


MOBILITY TEST COURSE
VIEWS AND PROFILES
EGLIN AFB, FLA.
TRAVERSE 1

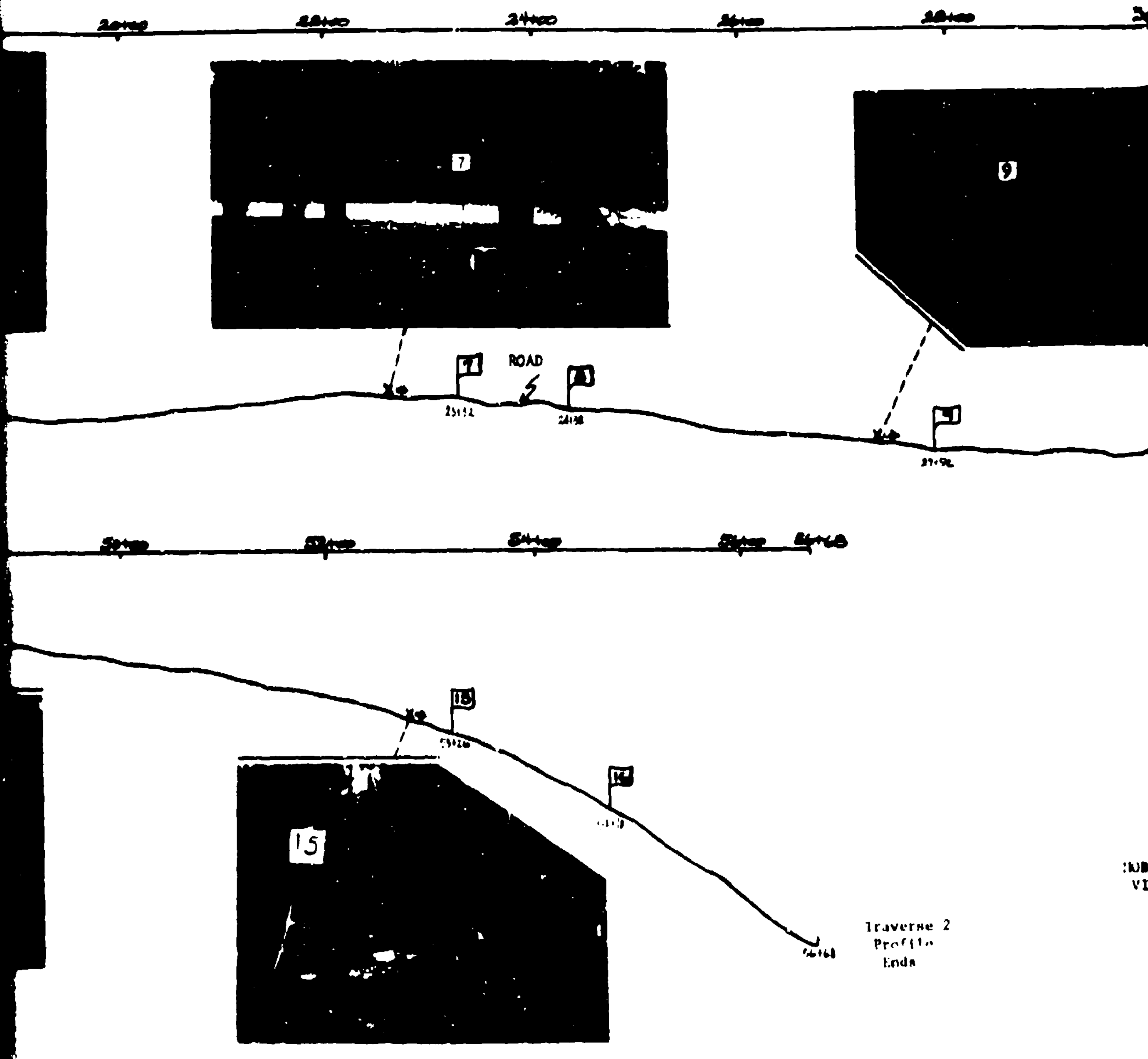
PLATE B10

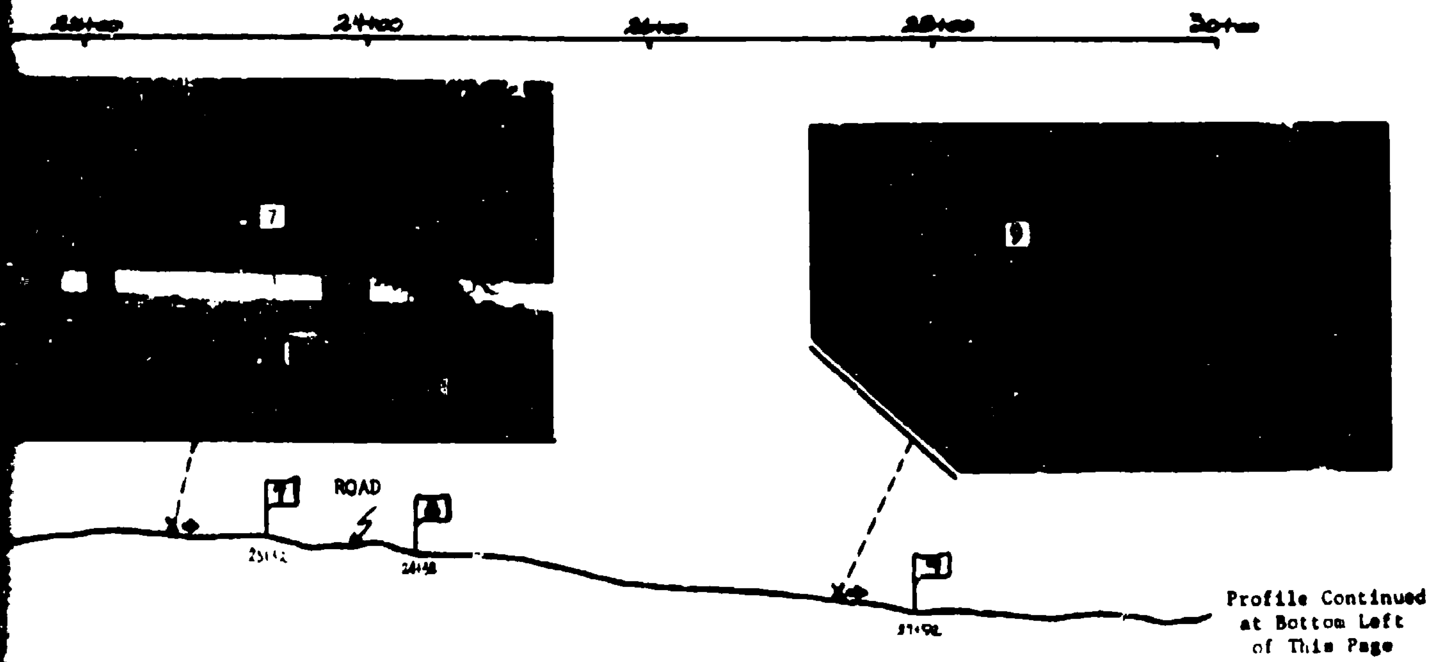


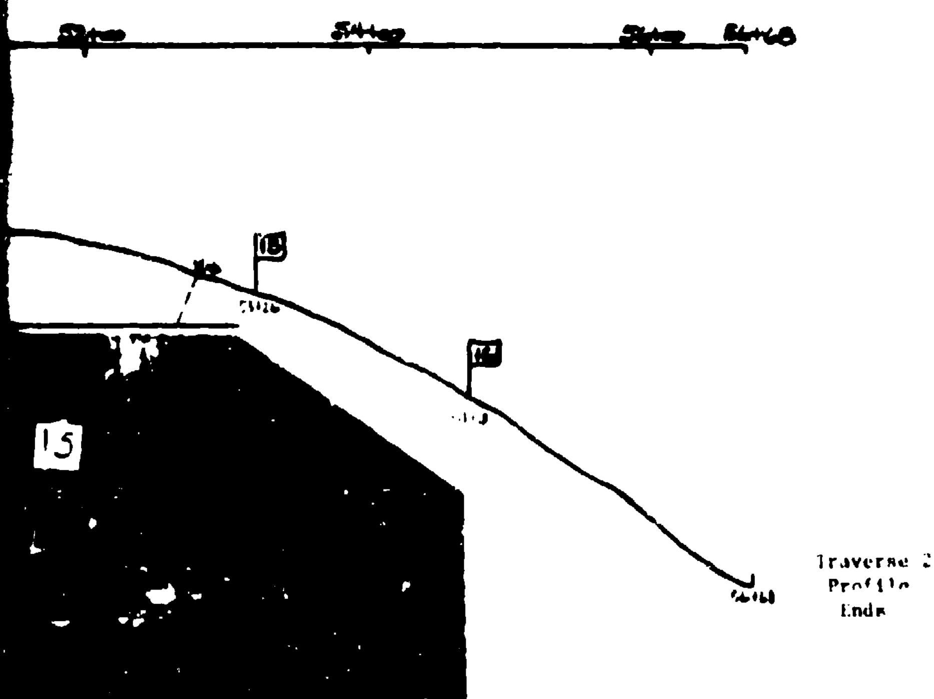
0+00
2+00
4+00
6+00
8+00
TERRAIN UNIT NUMBER
ROAD
ELEVATION IN FEET
0
-10
-20
-30
-40
-50
-60
-70
30+00
32+00
34+00
36+00
38+00
31+39



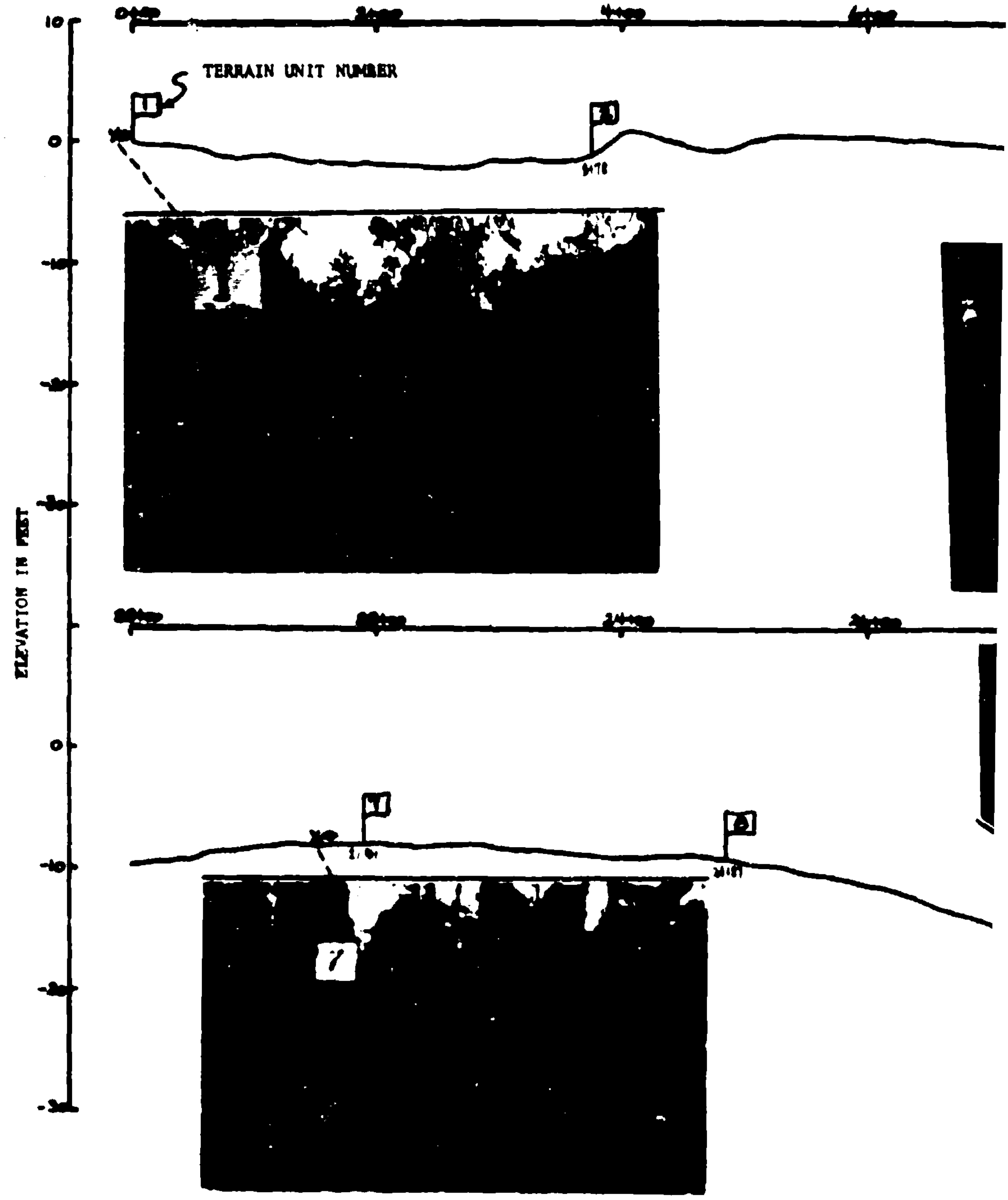
STATIONS
10+00
12+00
14+00
16+00
18+00
4
5
6
2
40+00
42+00
44+00
46+00
48+00
13
14


7
9
ROAD
15
Traverse 2
Profile
Ends

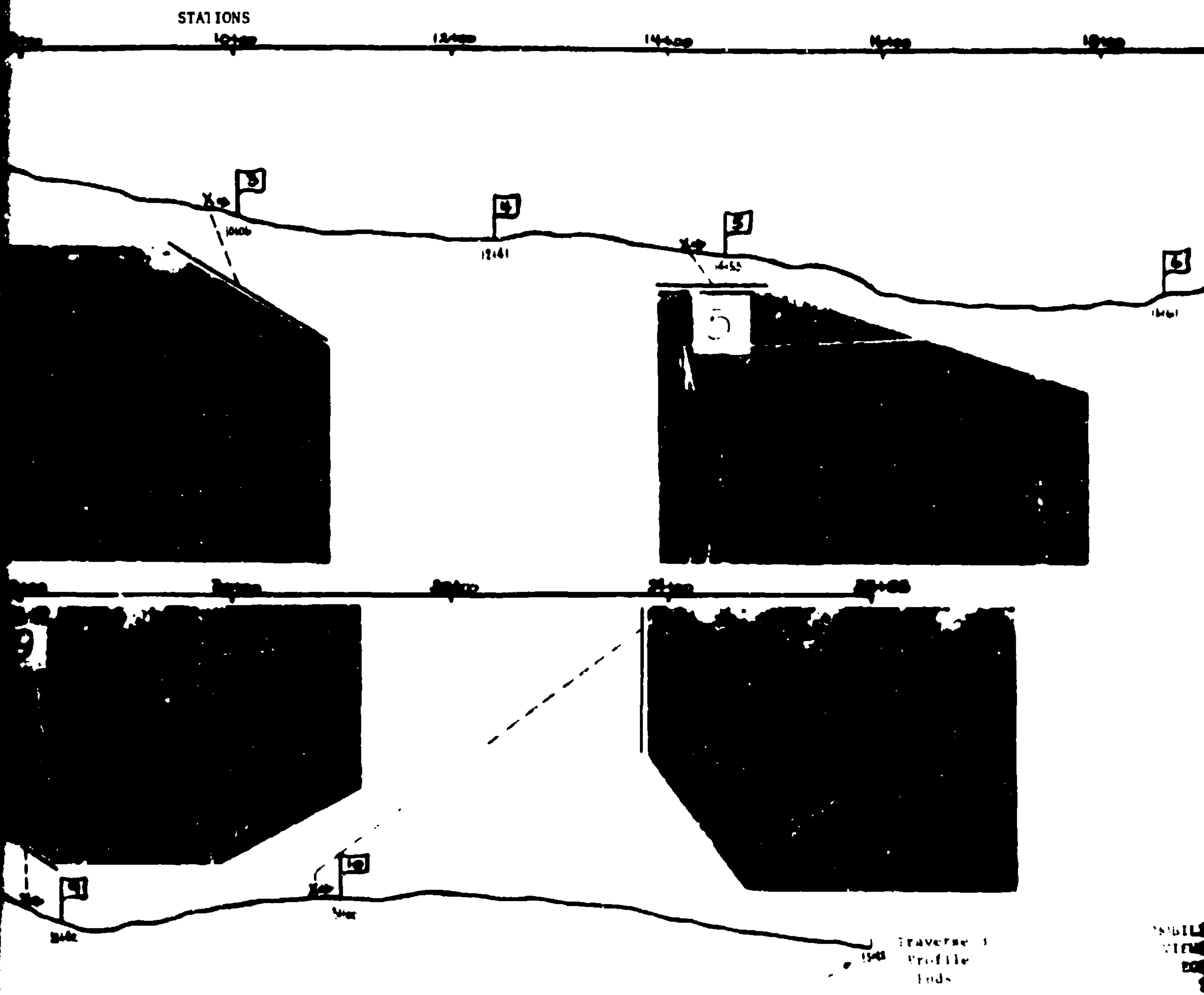


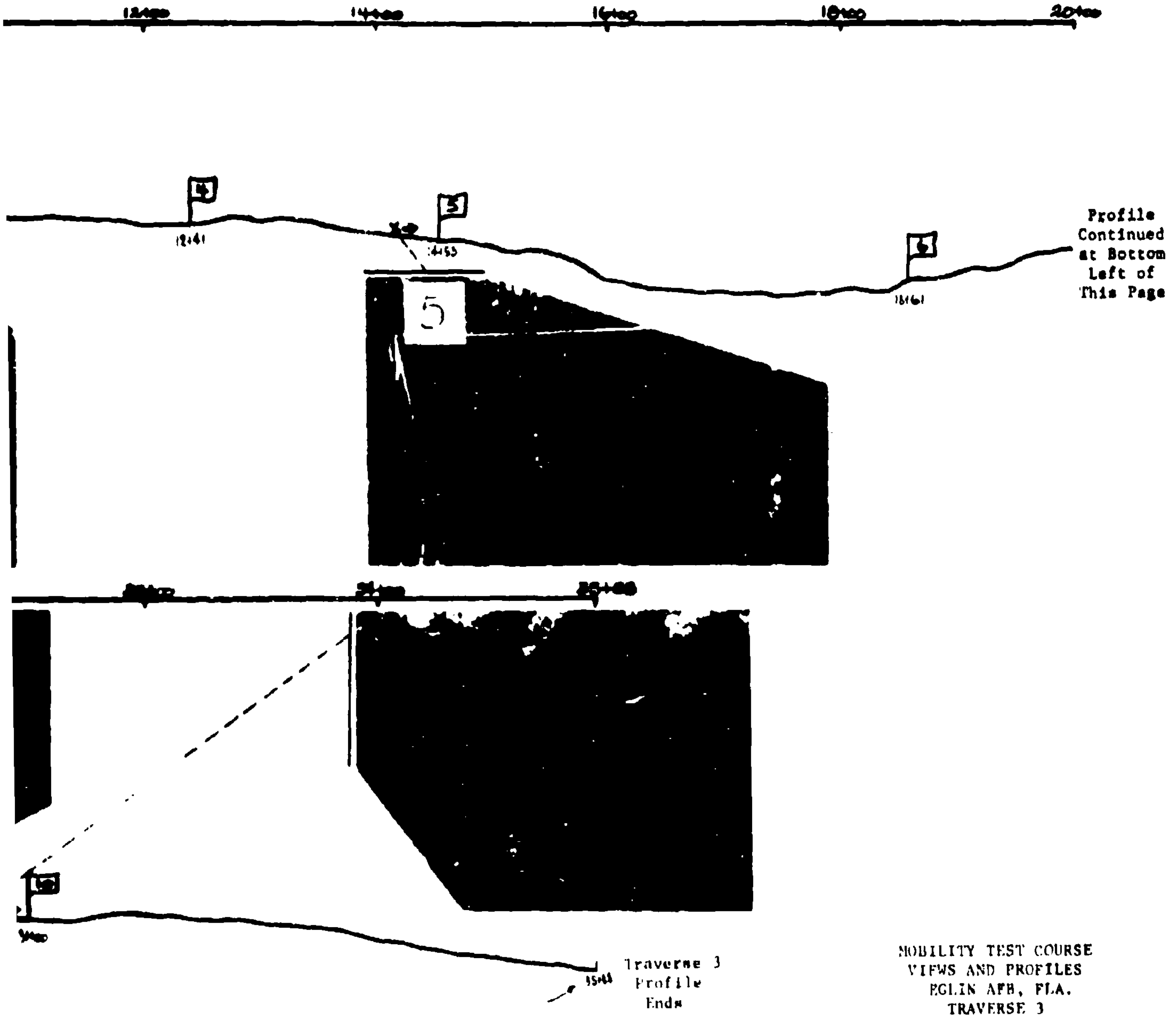


MOBILITY TEST COURSE
VIEWS AND PROFILES
EGLIN AFB, FLA.
TRAVERSE 2

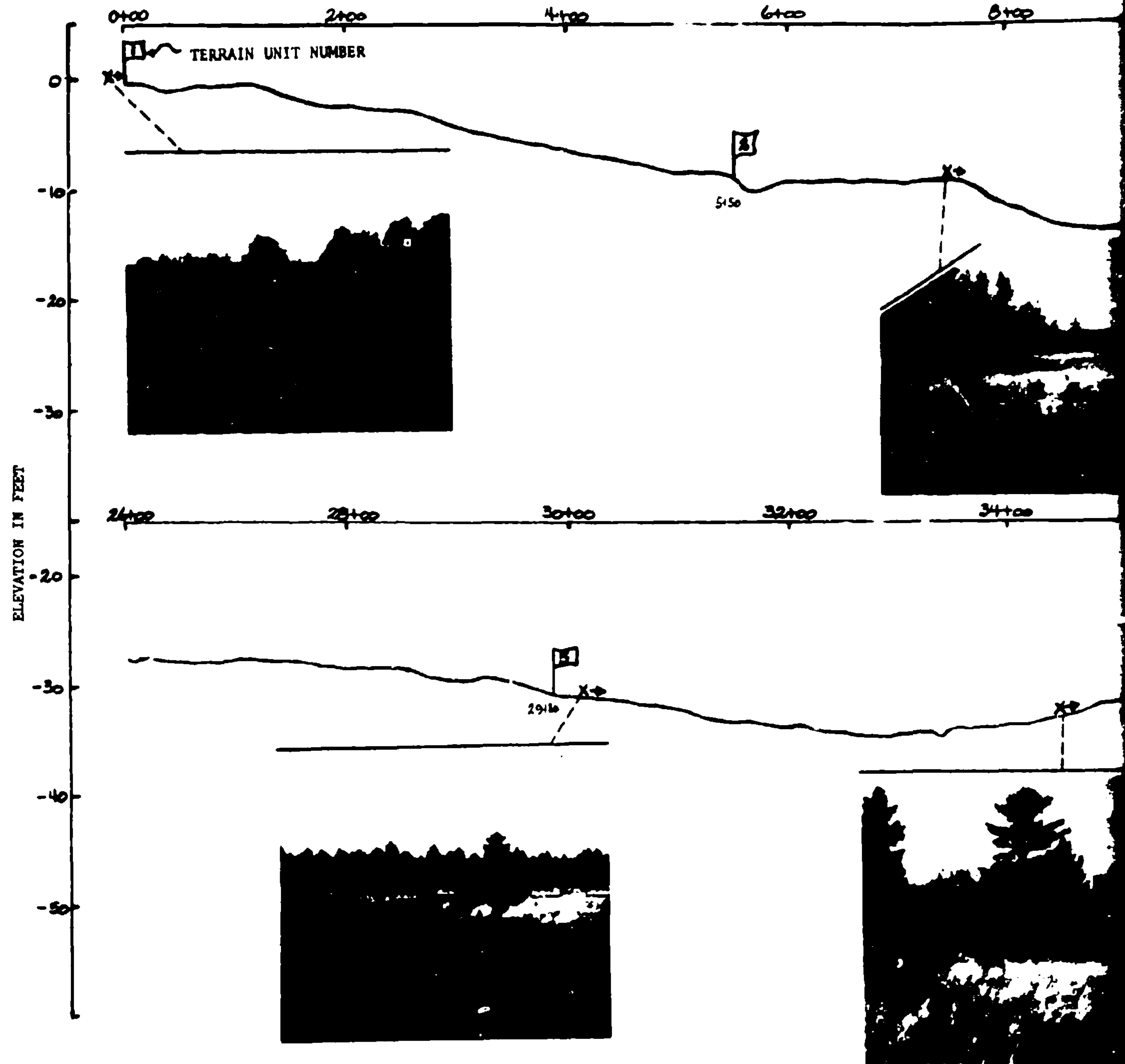


TERRAIN UNIT NUMBER
ELEVATION IN FEET
10
0
0
7

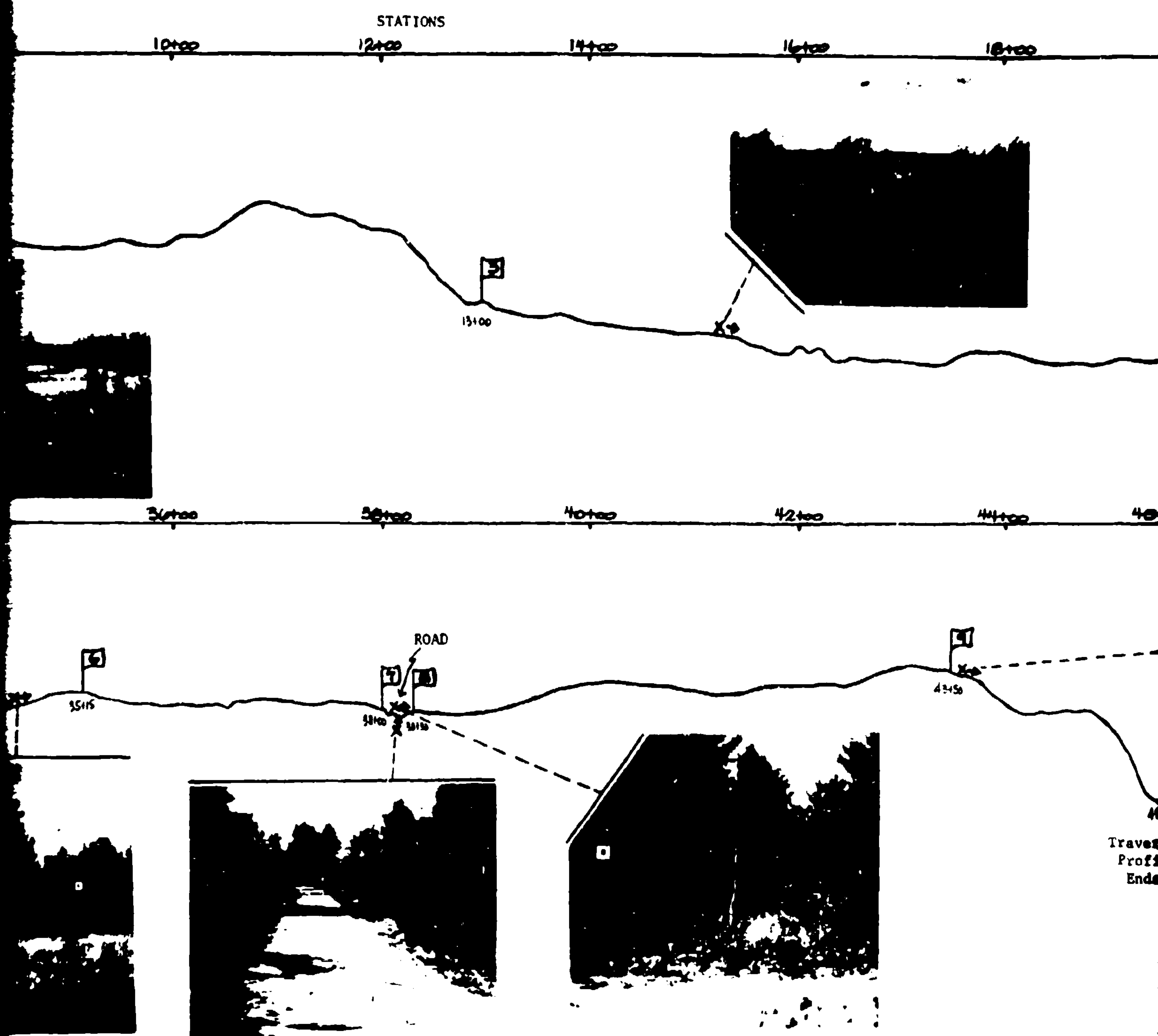

STATIONS



MOBILITY TEST COURSE
VIEWS AND PROFILES
EGLIN AFB, FLA.
TRAVERSE 3


0+00
2+00
4+00
6+00
8+00
TERRAIN UNIT NUMBER
0
-10
-20
-30
5150
ELEVATION IN FEET
28+00
30+00
32+00
34+00
-20
-30
-40
-50
29+10

A


STATIONS
10+00
12+00
14+00
16+00
18+00
13+00
36+00
38+00
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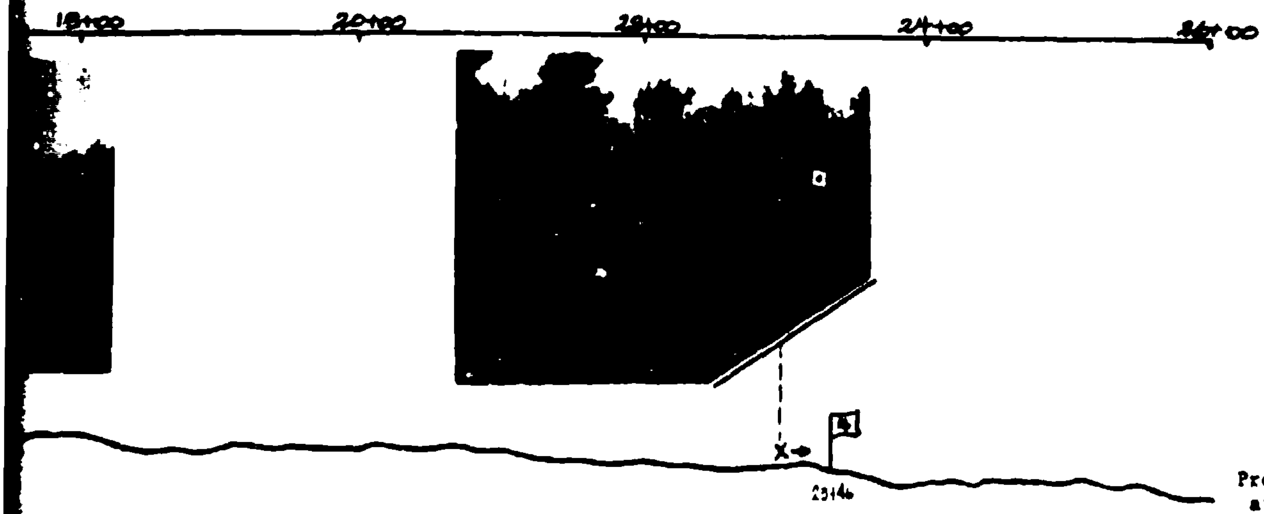
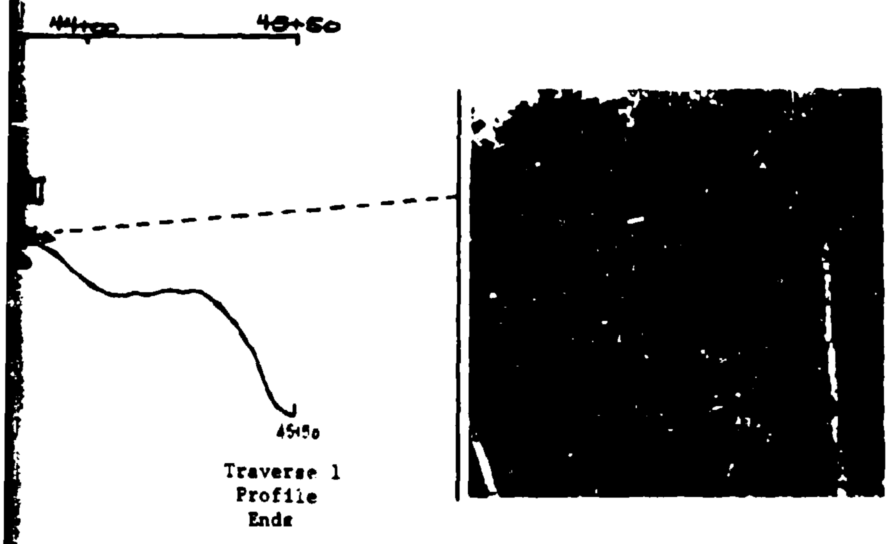
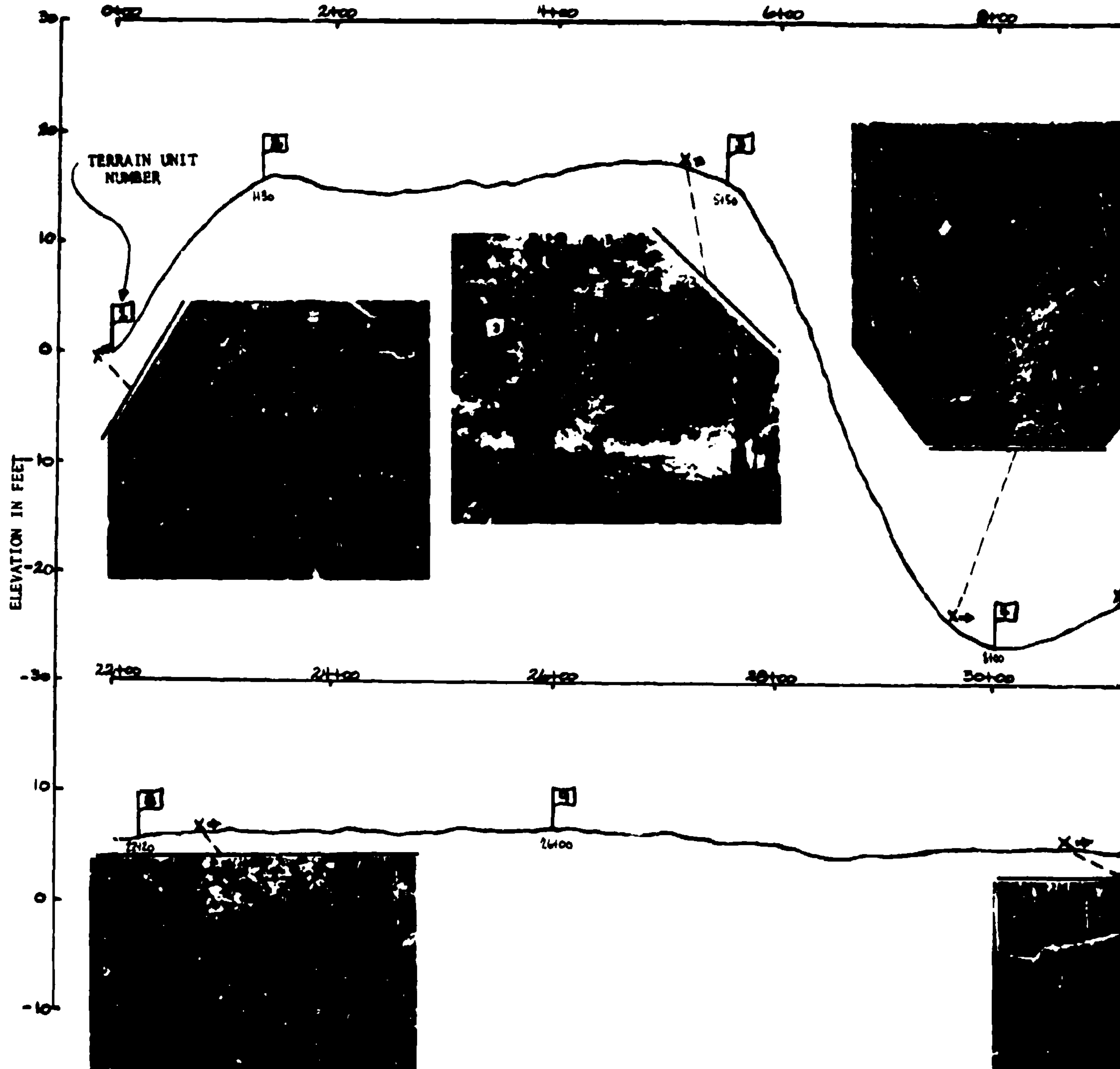
42+00
44+00
ROAD
35+15
38+00
38+50
43+50

B





MOBILITY TEST COURSE
VIEWS AND PROFILES
HOUGHTON, MICH.
TRAVERSE 1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ELEVATION IN FEET
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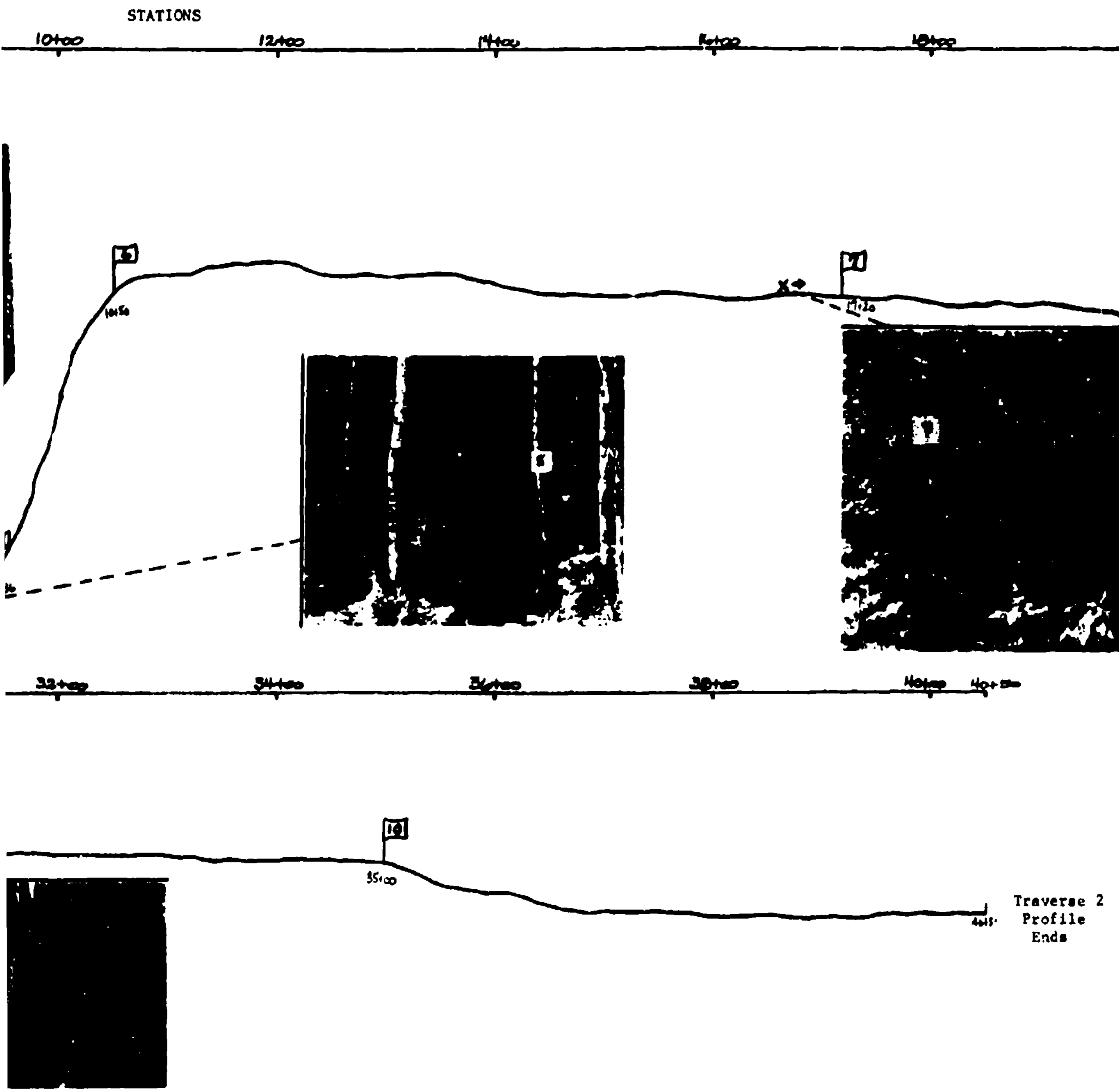
4+00
6+00
8+00
24+00
26+00
30+00
26+00

A


STATIONS
10+00
12+00
14+00
16+00
18+00
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34+00
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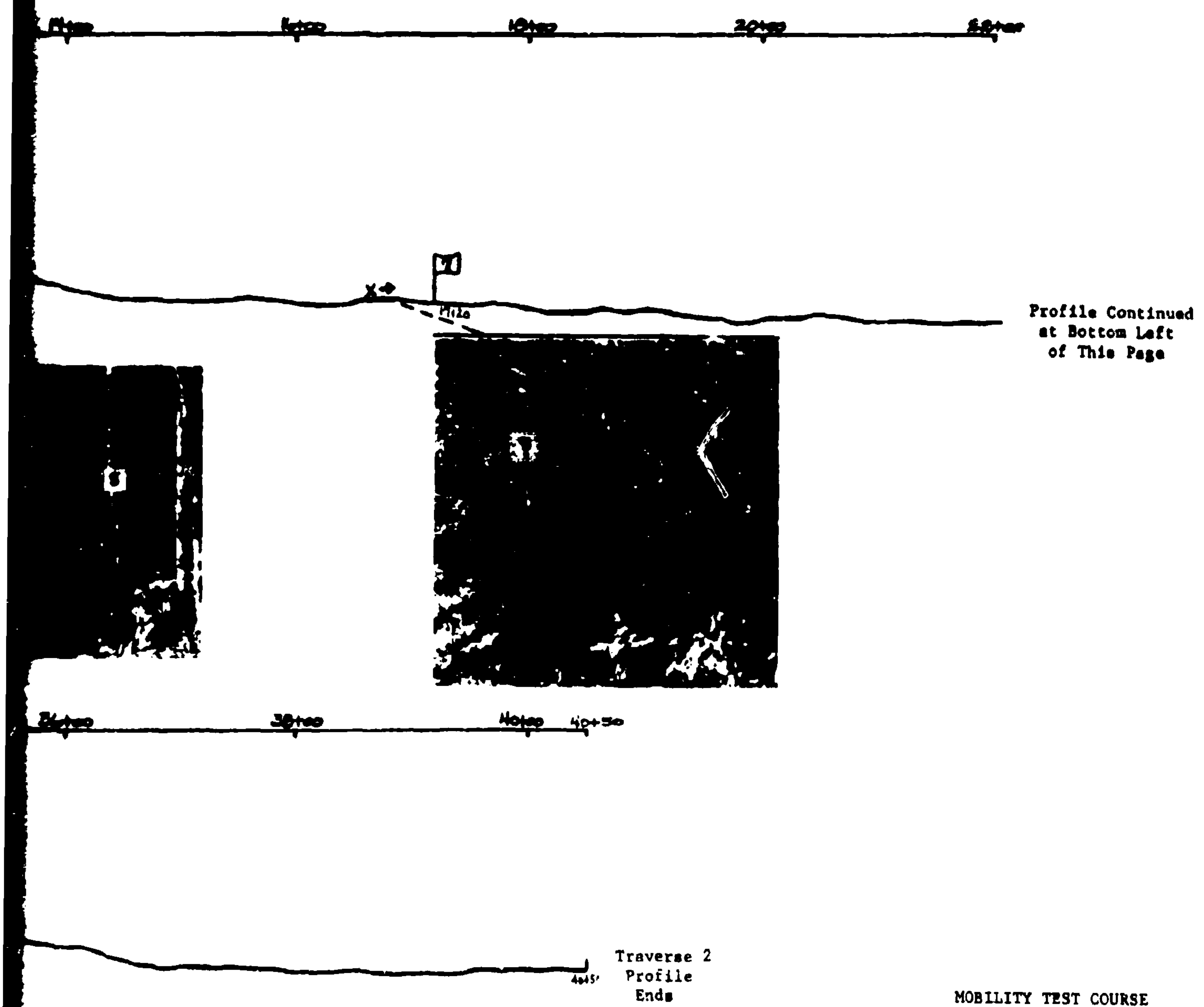
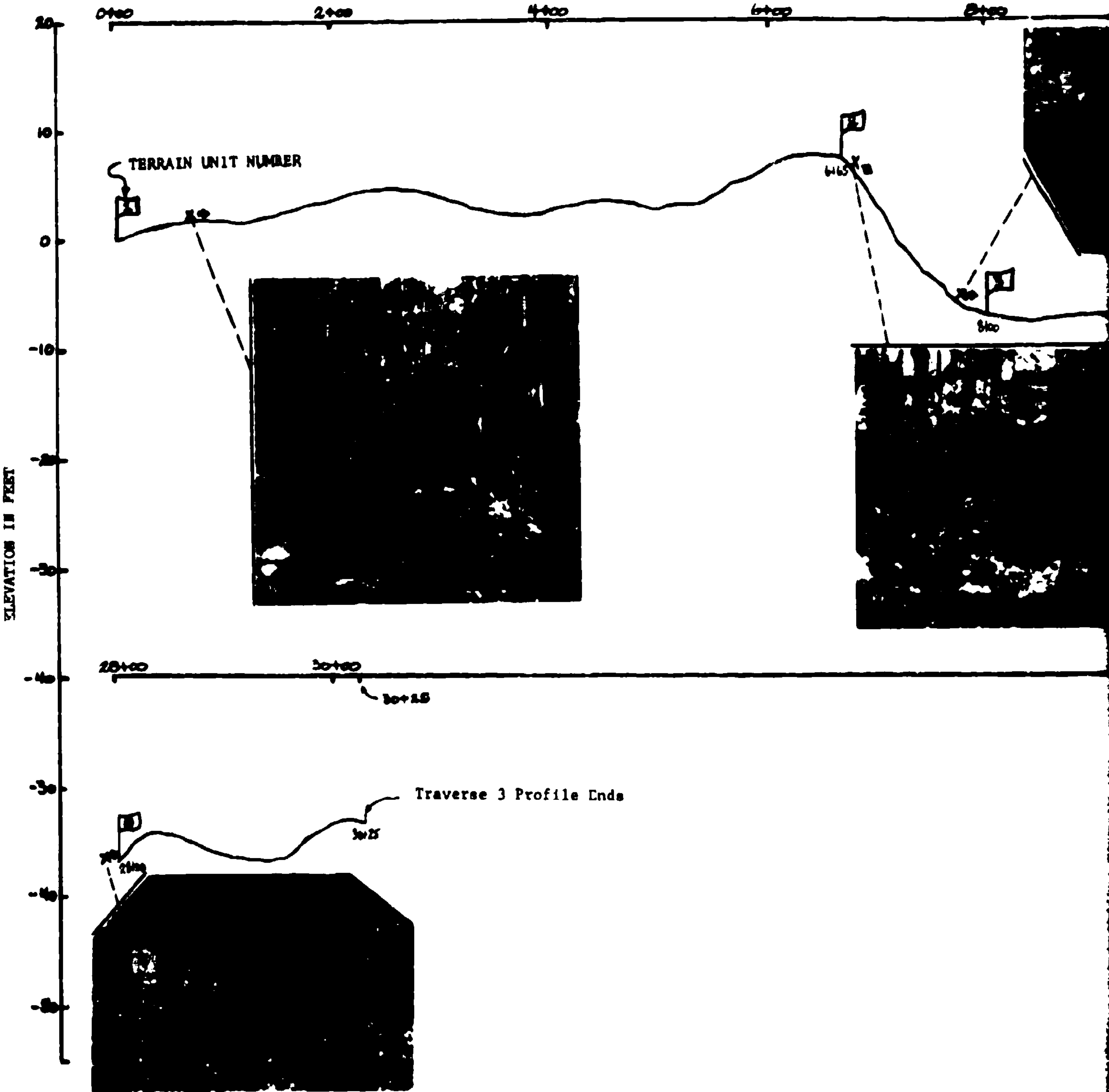
35+00
10
Traverse 2
Profile
Ends

B



MOBILITY TEST COURSE
VIEWS AND PROFILES
HOUGHTON, MICH.
TRAVERSE 2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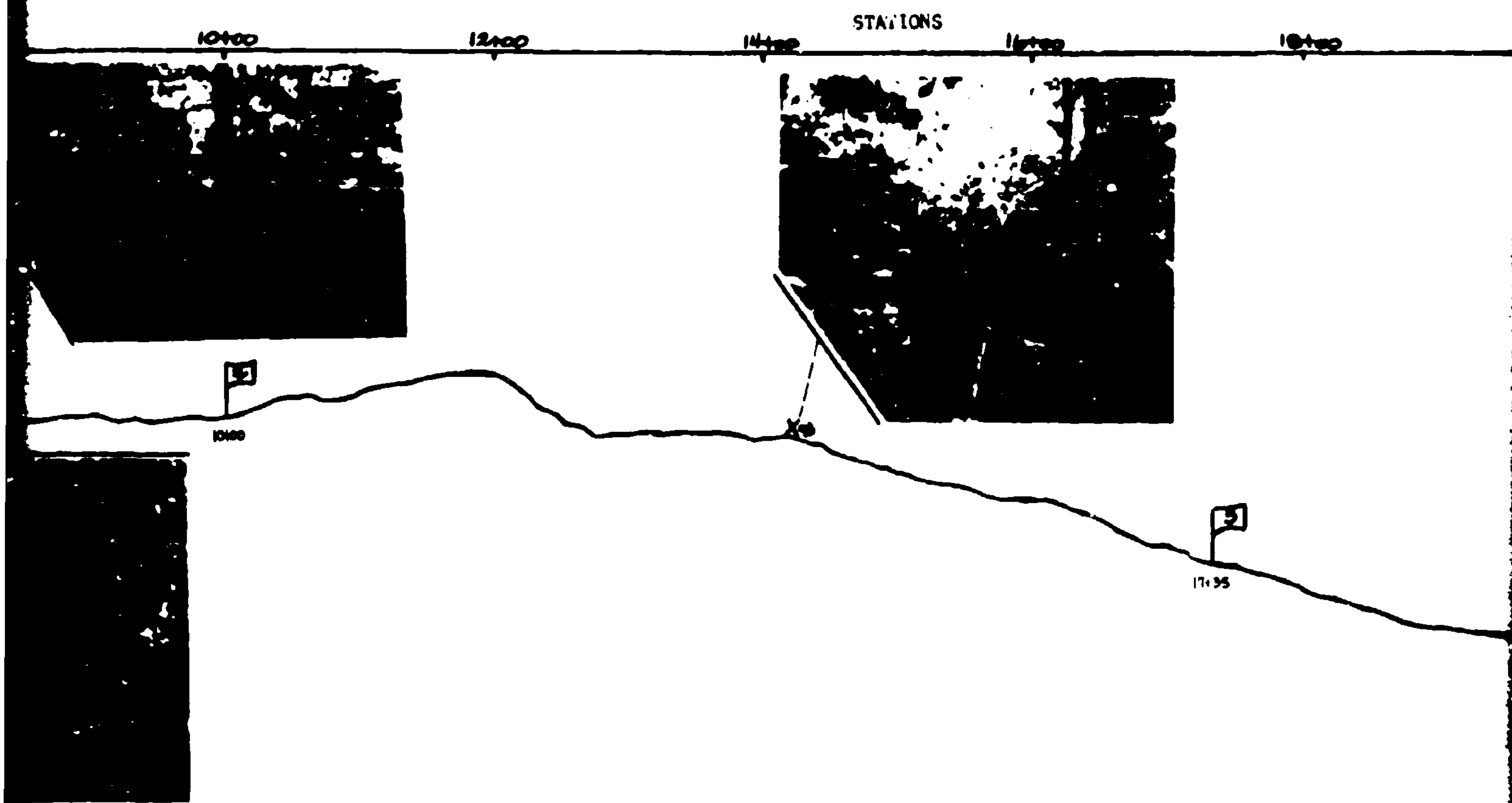
2+00
4+00
6+00
8+00
20
10
0
-10
-20
-30
-40
-50
ELEVATION IN FEET
TERRAIN UNIT NUMBER
28+00
30+00
30+25
Traverse 3 Profile Ends

A



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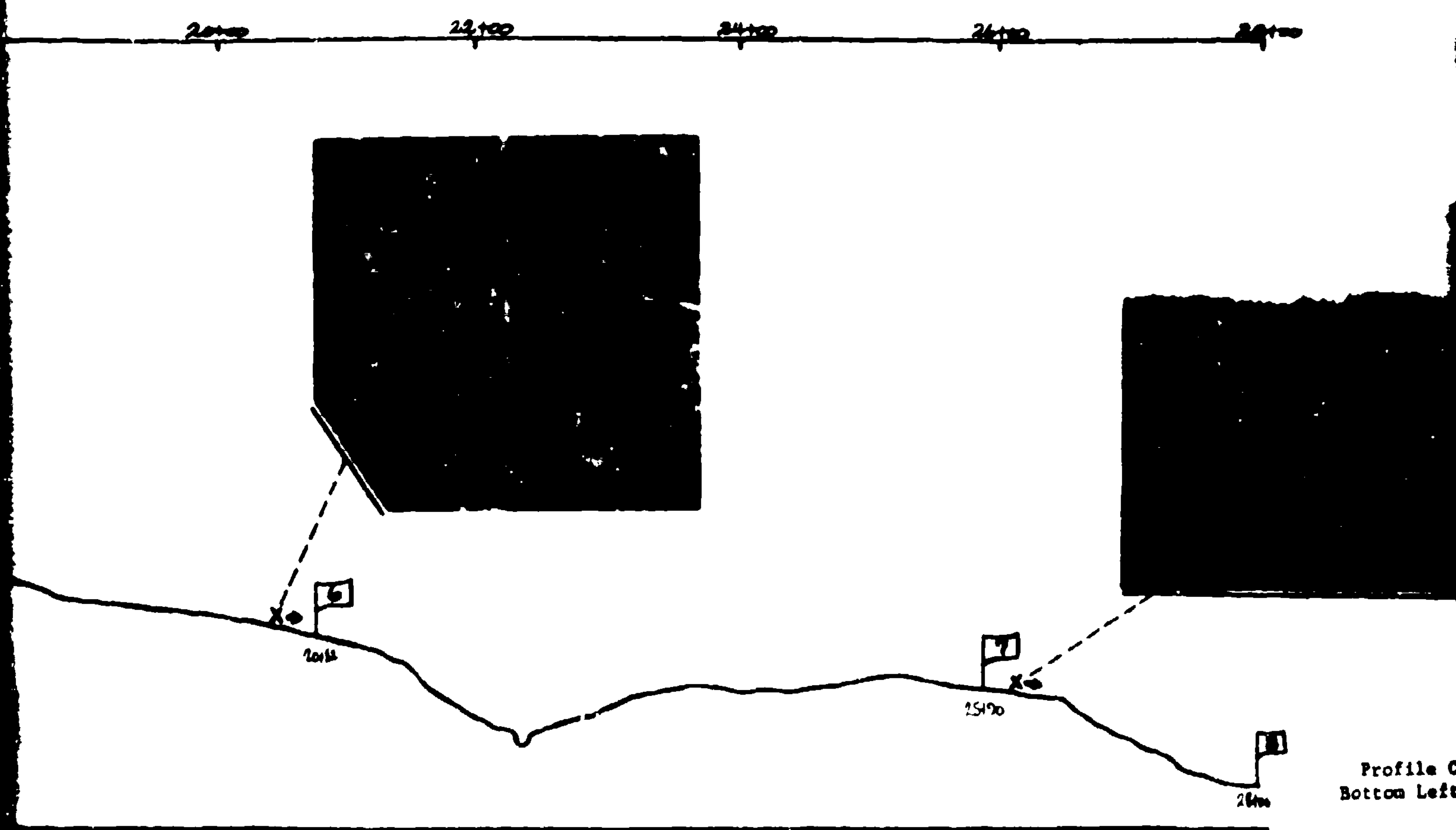

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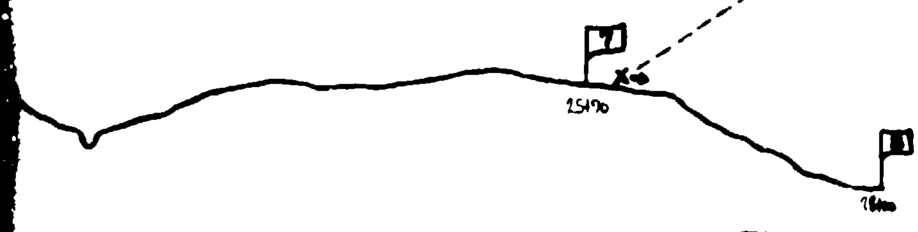
Bottom Left



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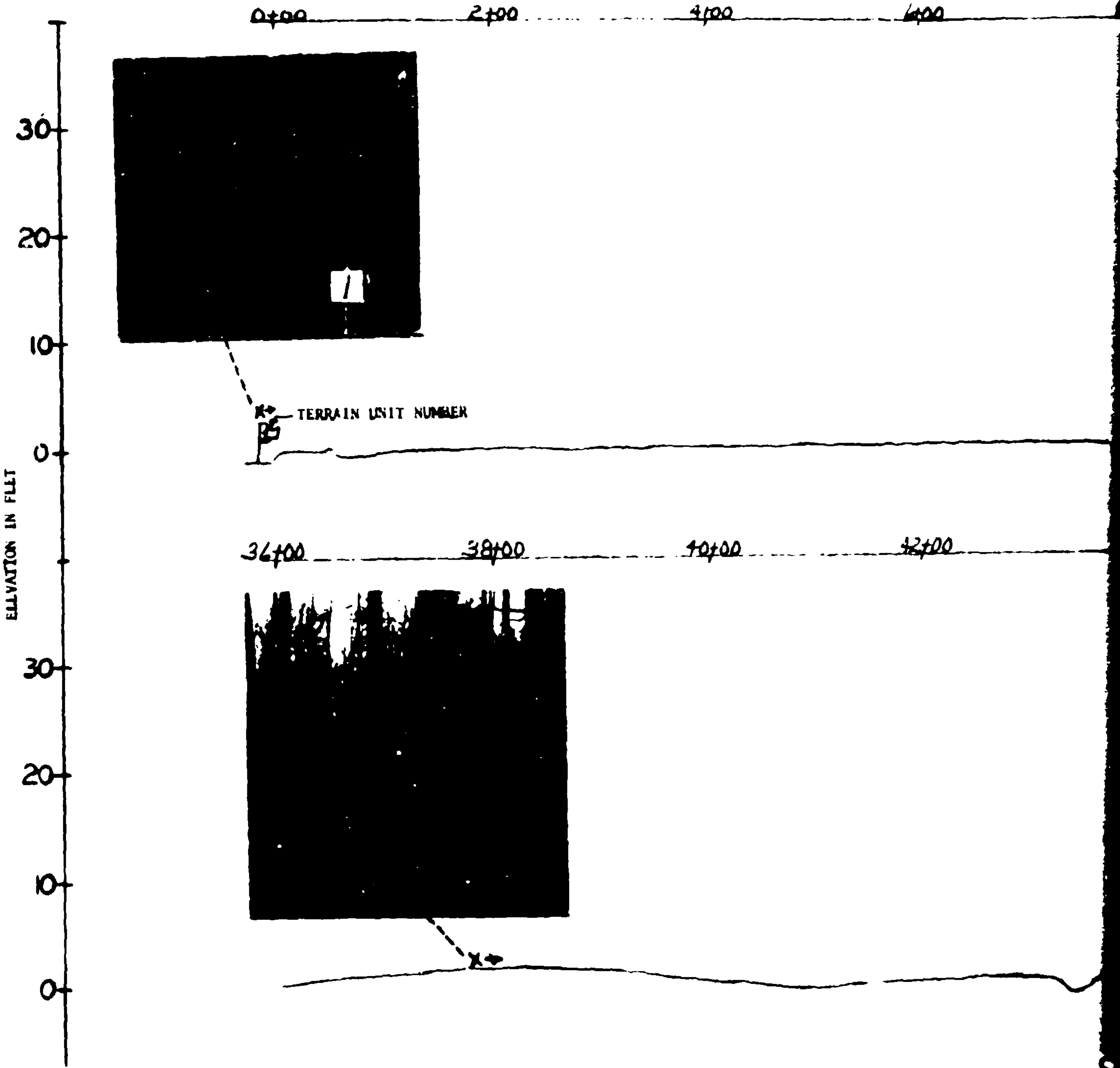
MOBILITY TEST COURSE
VIEWS AND PROFILES
HOUGHTON, MICH.
TRAVERSE 3

41<

PLATE B15


0+00
2+00
4+00
6+00
30
20
10
0
TERRAIN UNIT NUMBER
ELEVATION IN FEET
36+00
38+00
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42+00
30
20
10
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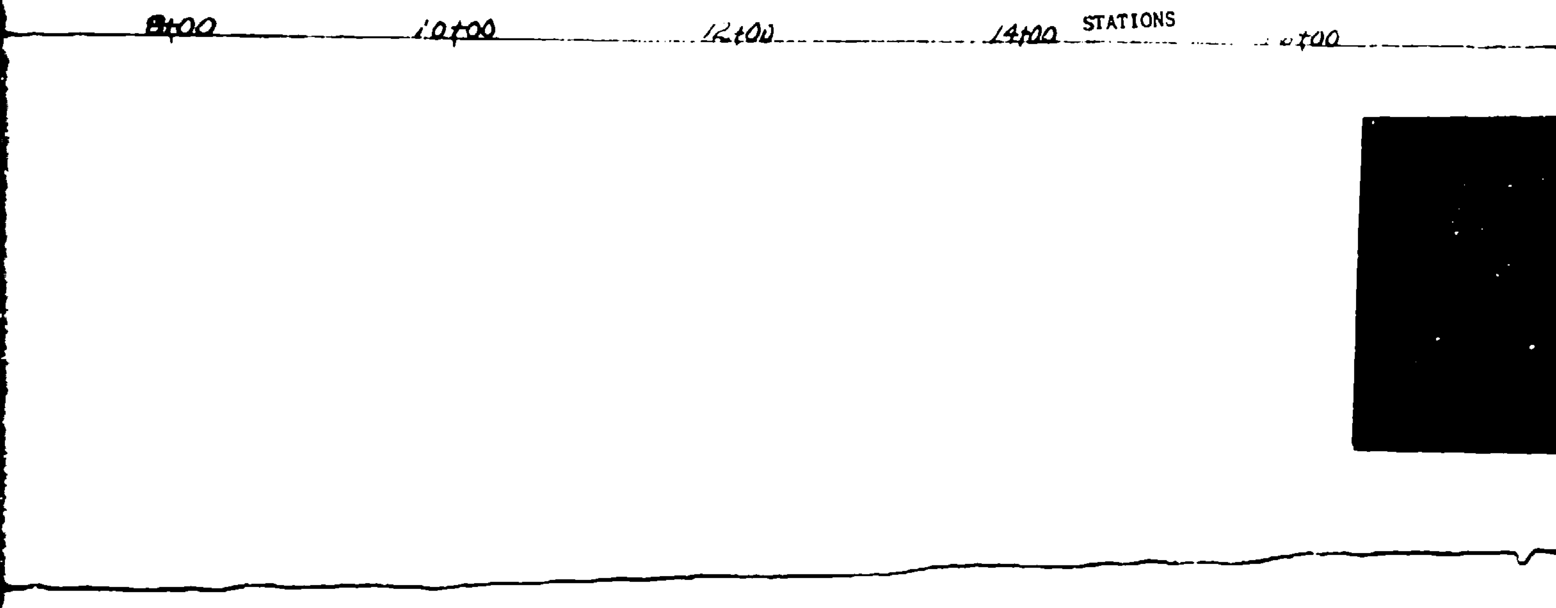
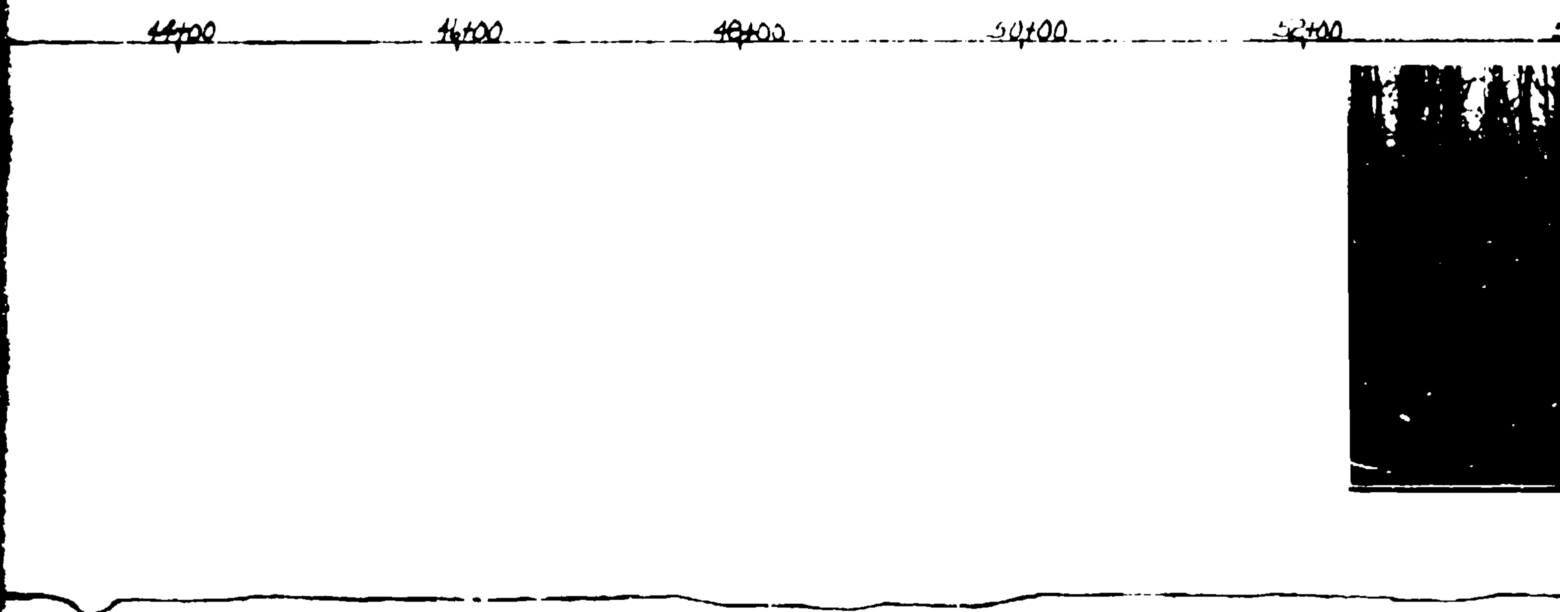

8+00
10+00
12+00
14+00
STATIONS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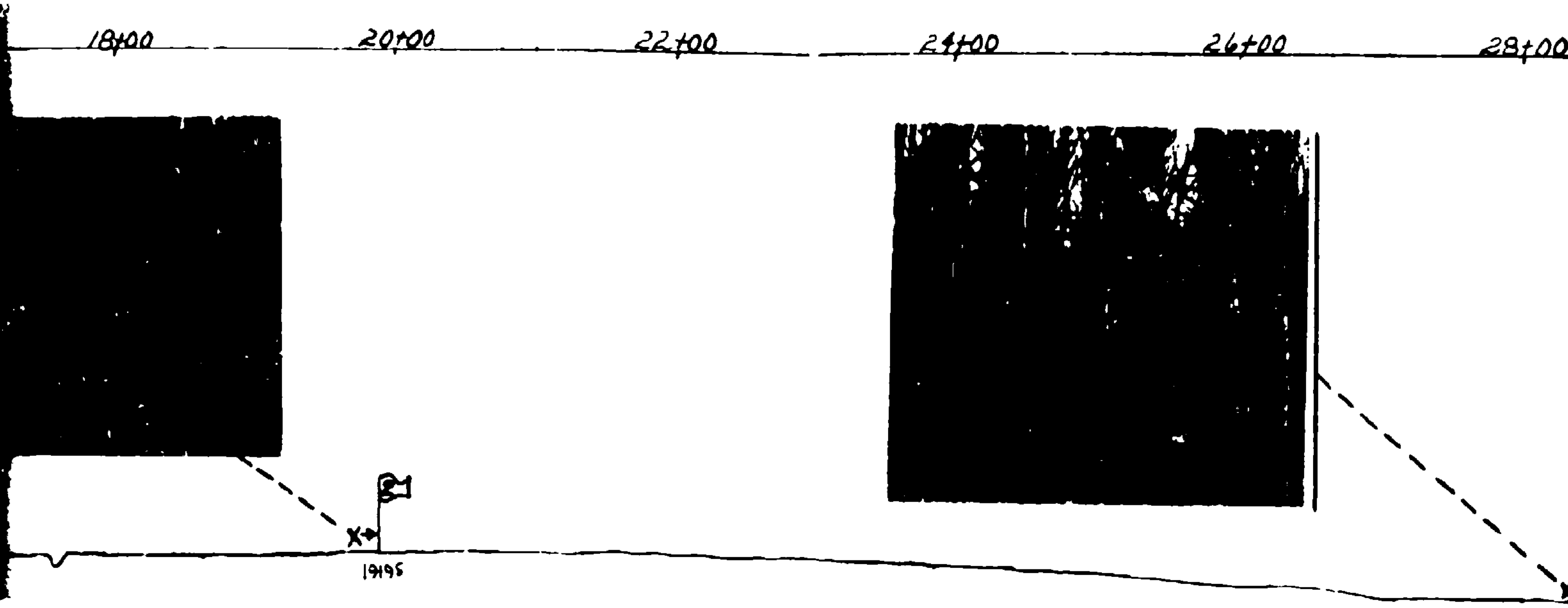
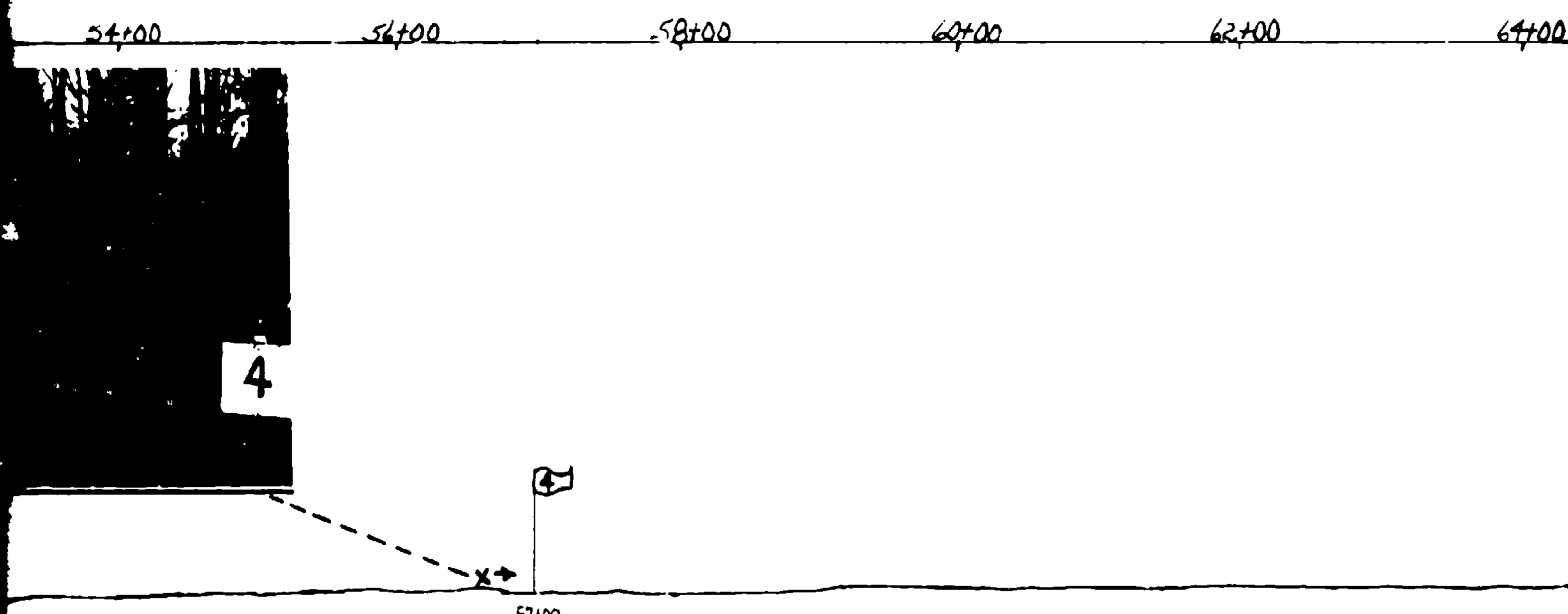
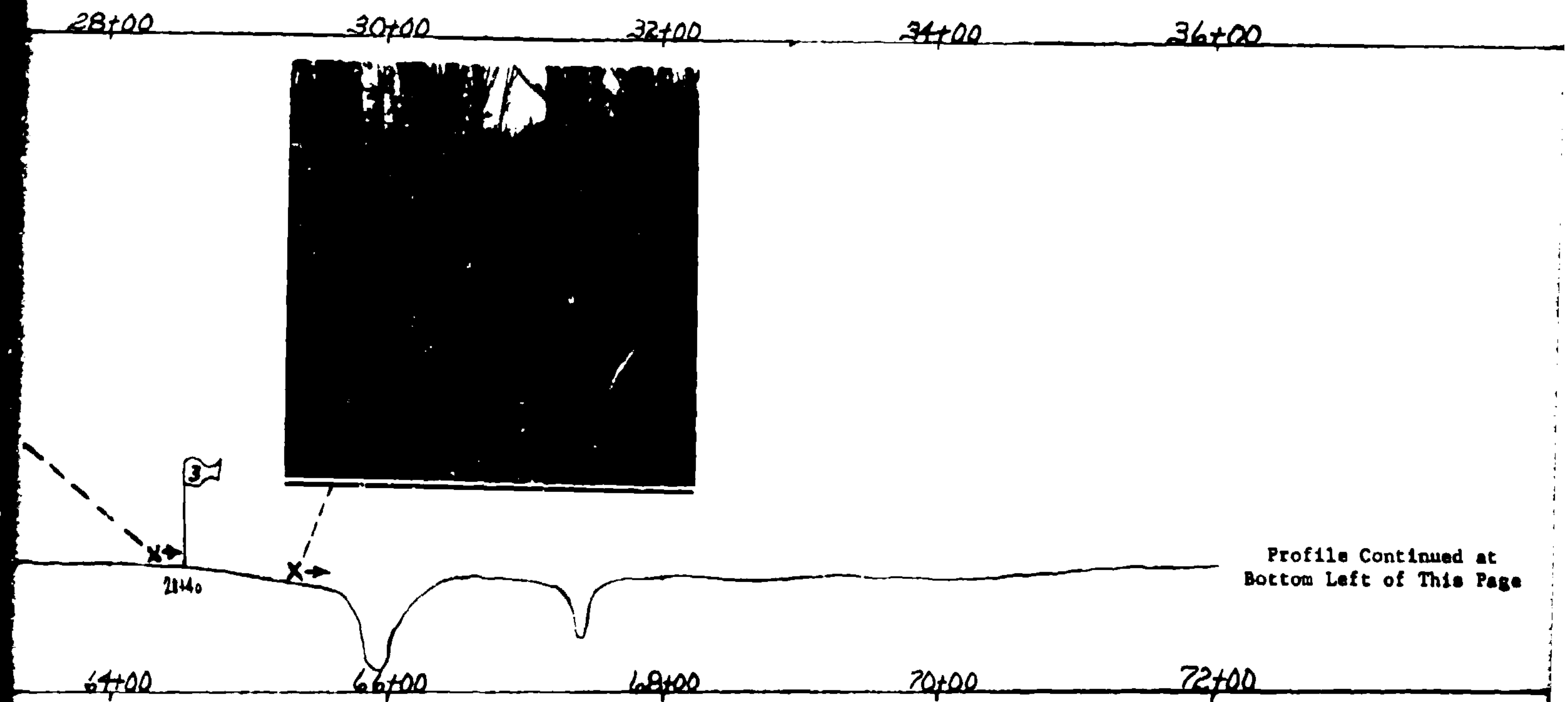
48+00
50+00
52+00



18+00
20+00
22+00
24+00
26+00
28+00
19+95



54+00
56+00
58+00
60+00
62+00
64+00
4
57+00



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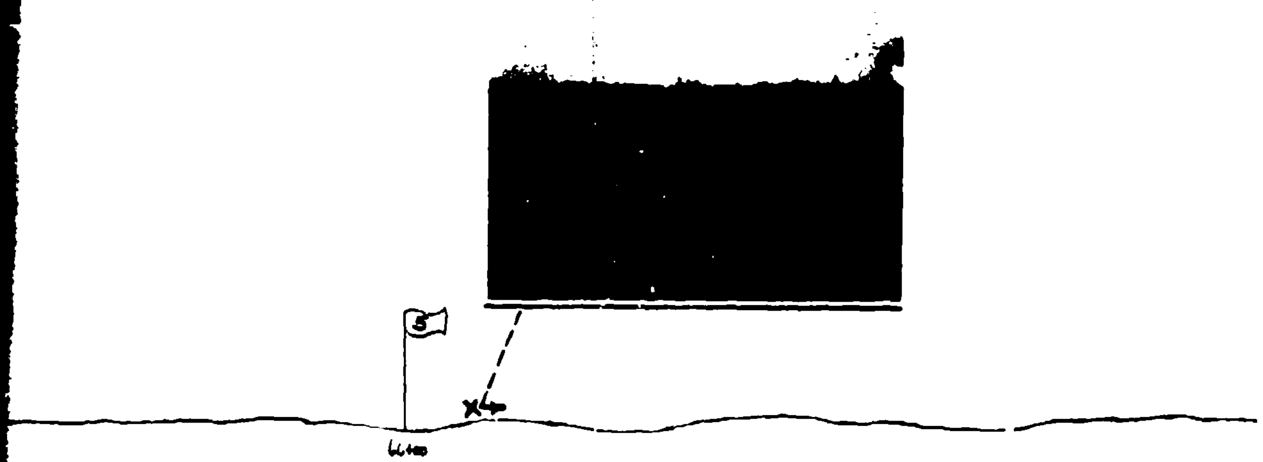

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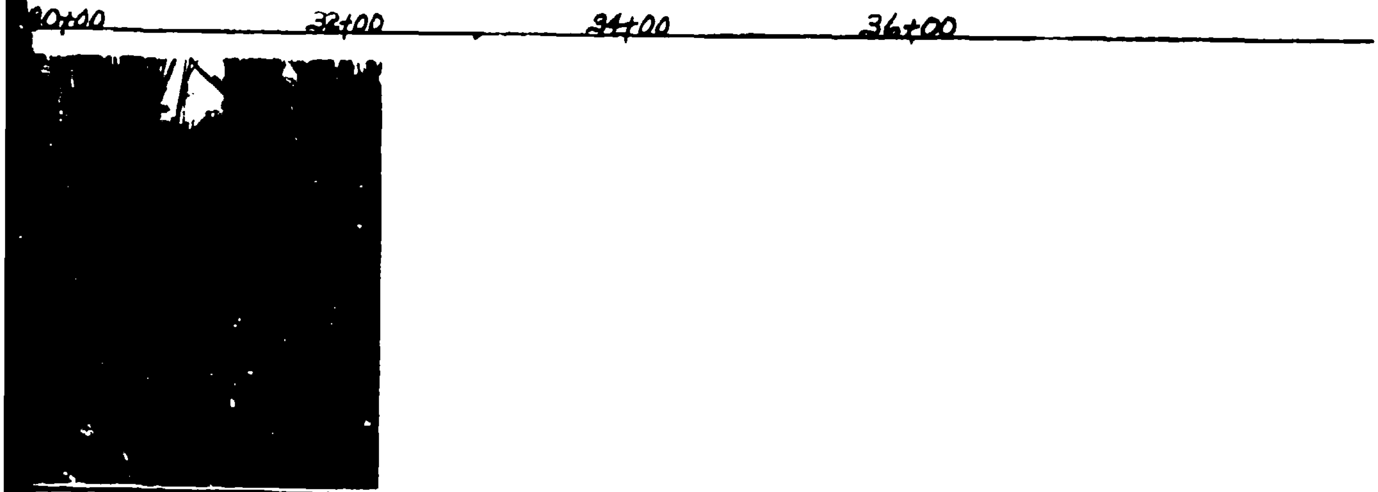
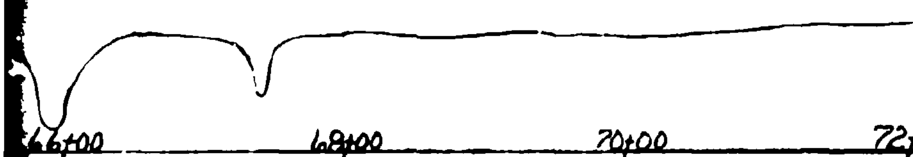
MOBILITY TEST CO
VIEWS AND PROF
FORT KNOX, K
TRAVERSE 1

PLATE B16 (Sheet

D





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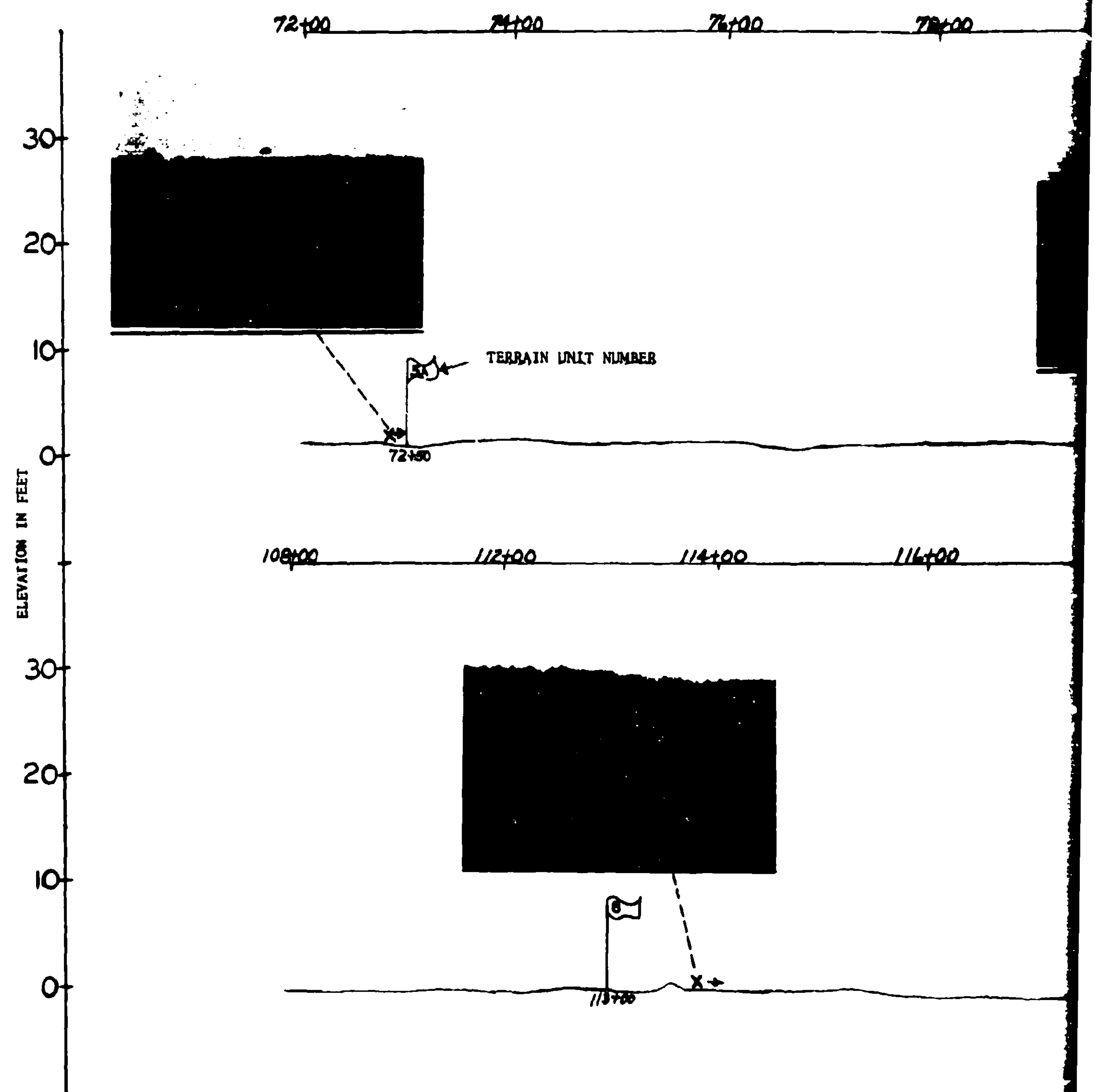
MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 1

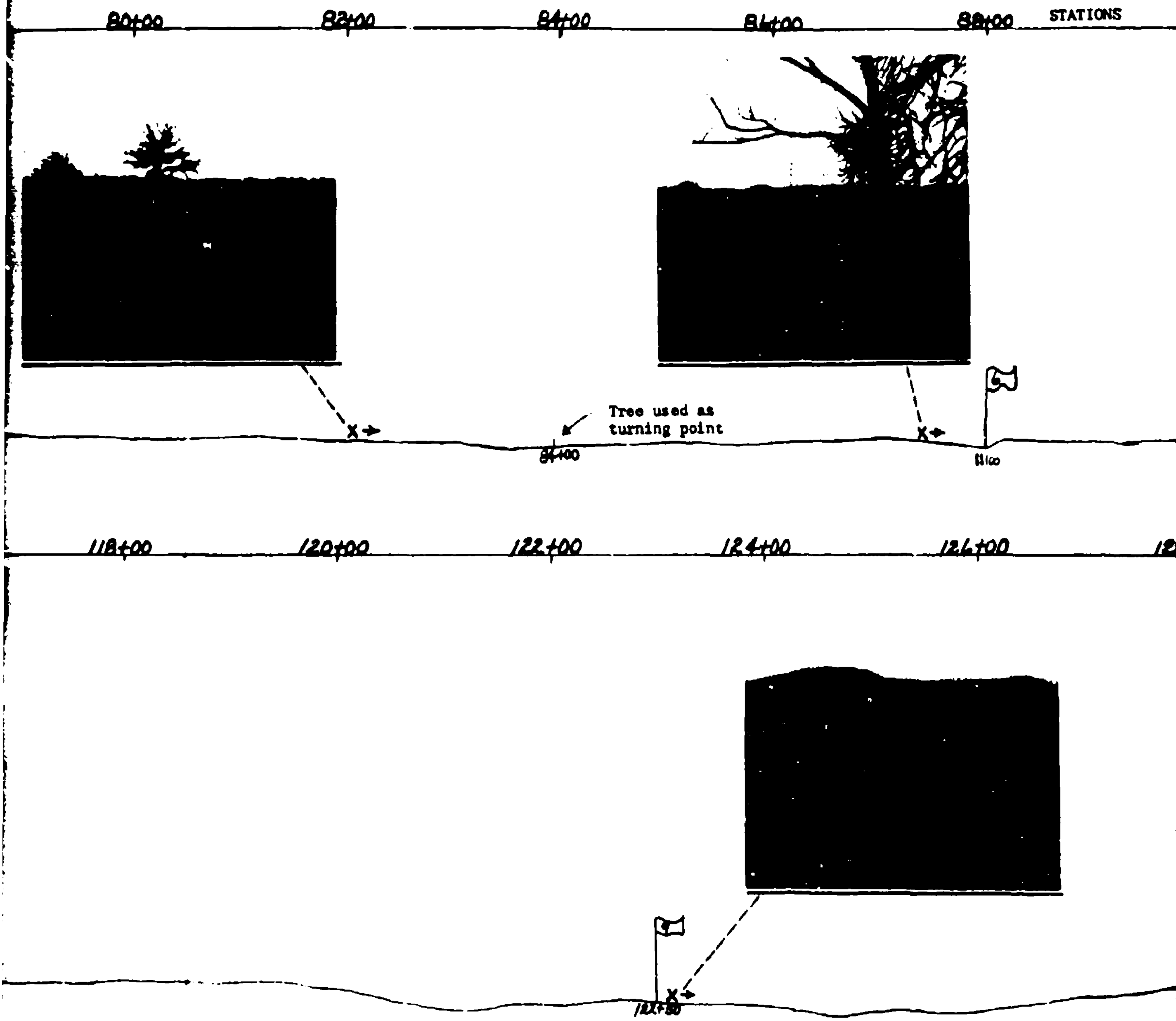
E

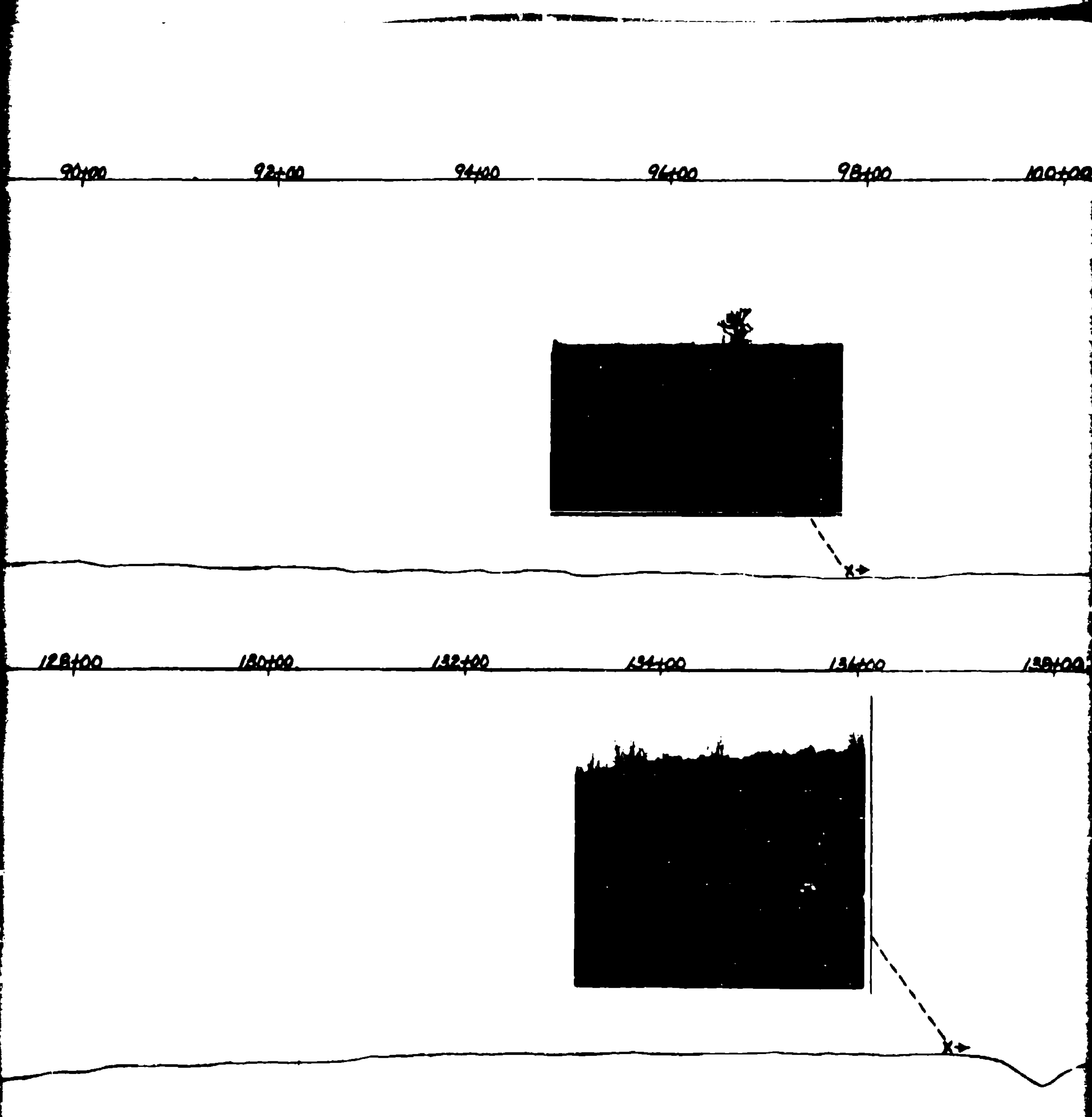
PLATE B16 (Sheet 1 of 2)



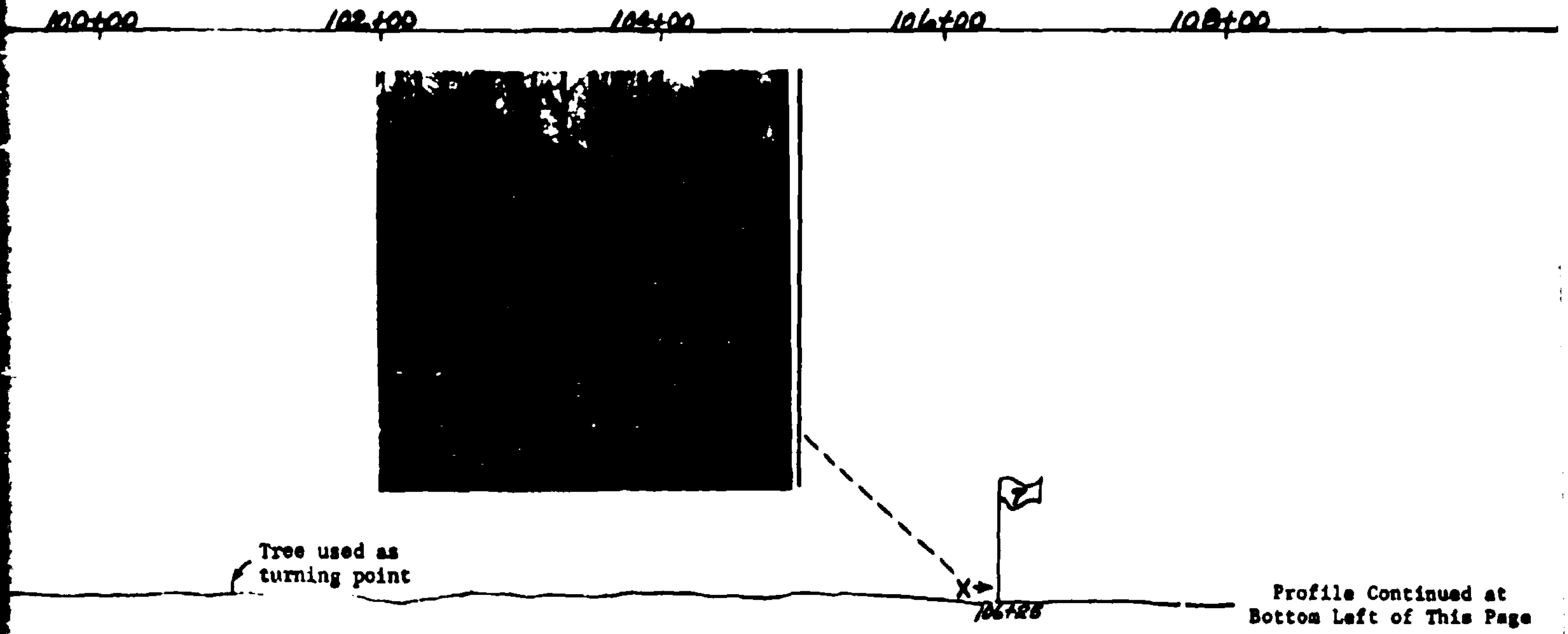
ELEVATION IN FEET
72+00
76+00
30
20
10
0
TERRAIN UNIT NUMBER
5A
72+50
112+00
114+00
116+00
6

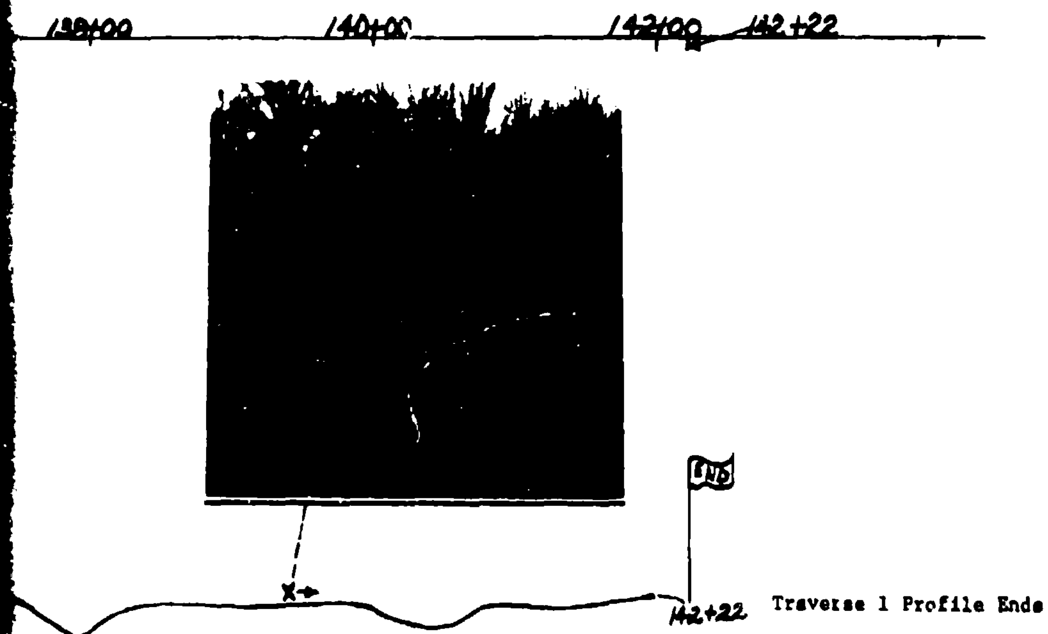
A


80+00
82+00
84+00
86+00
88+00
STATIONS
Tree used as turning point
84+00
118+00
120+00
122+00
124+00
126+00


90+00
92+00
94+00
96+00
98+00
100+00
128+00
130+00
132+00
134+00
136+00
138+00

C

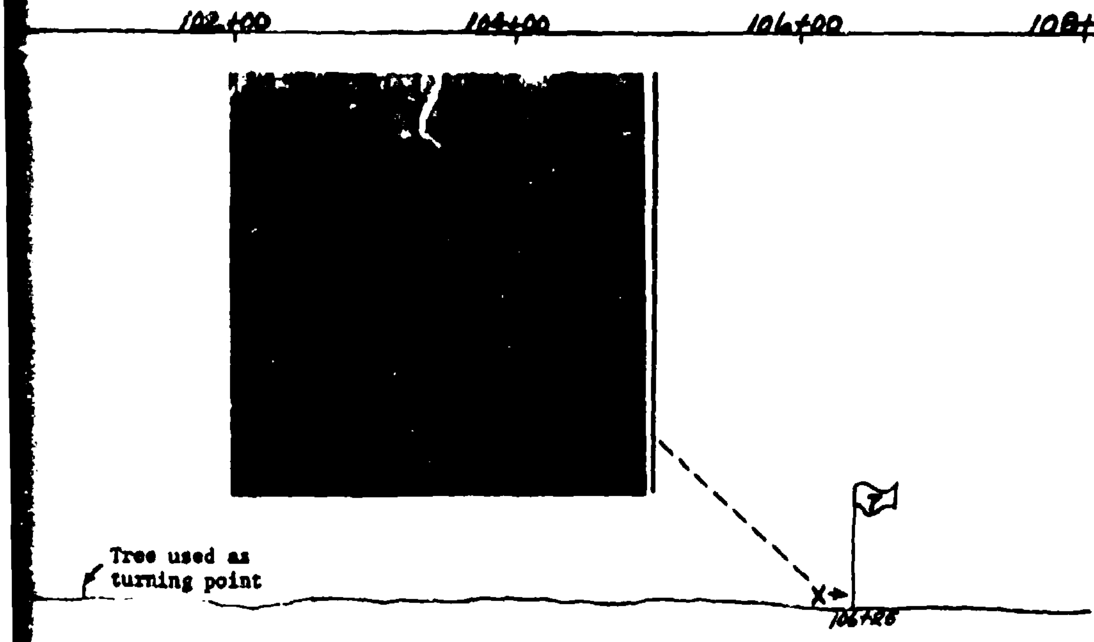


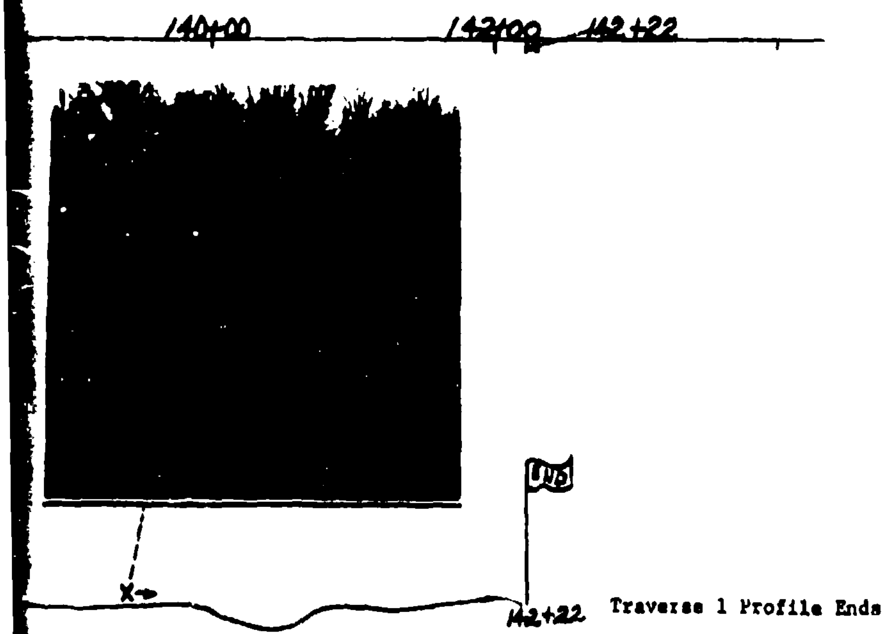


MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 1

43<

PLATE B16 (Sheet 2 of

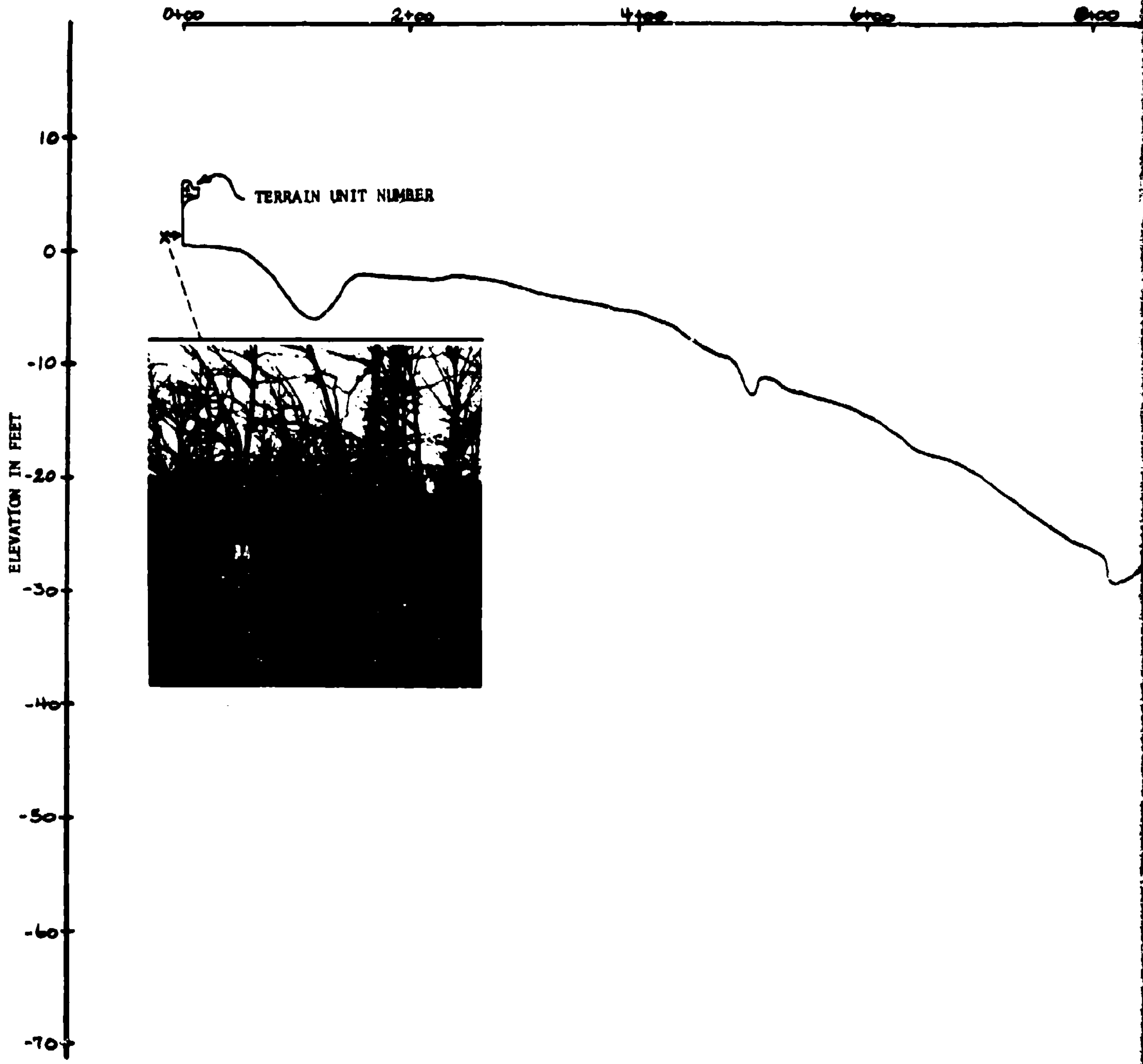




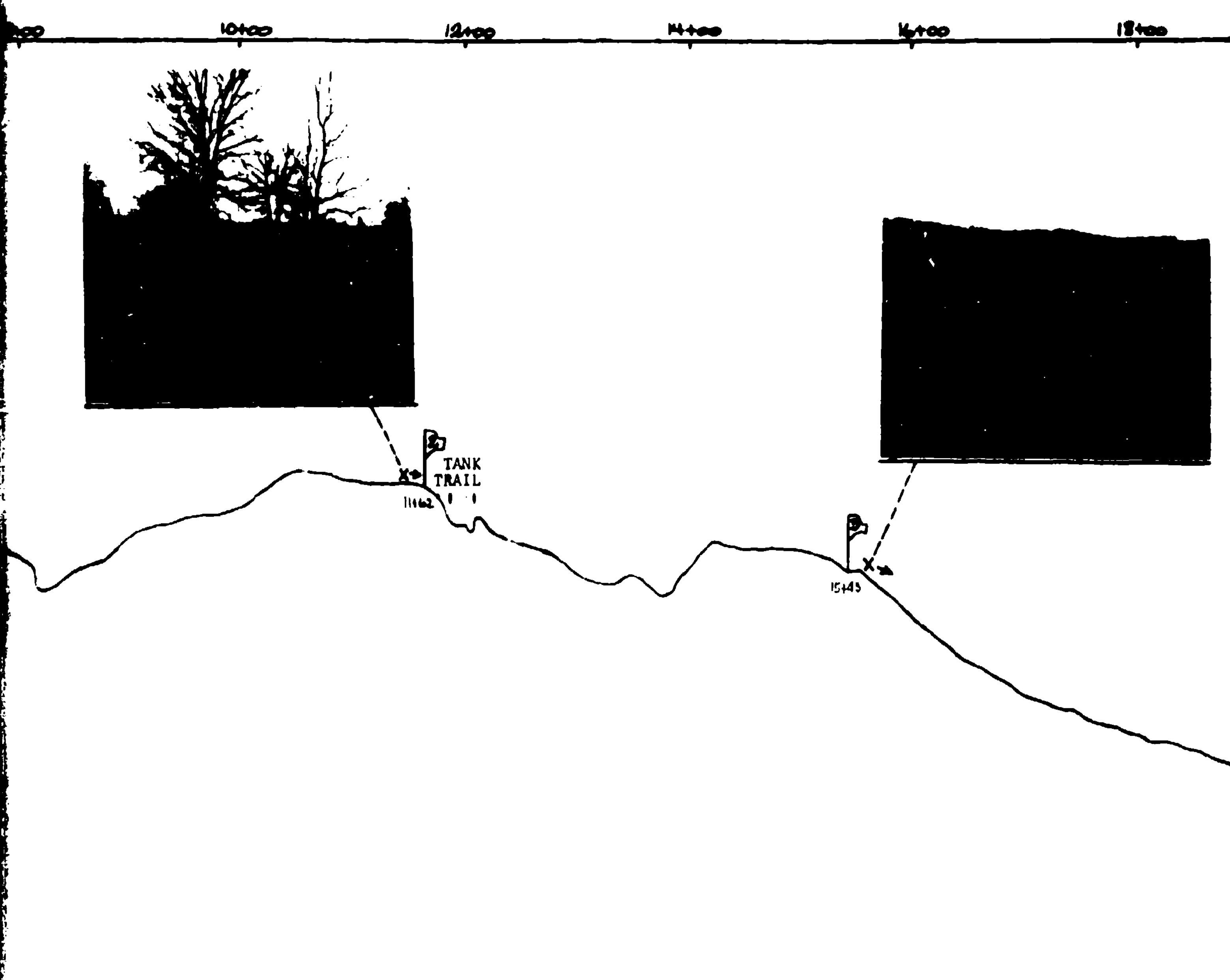
MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 1

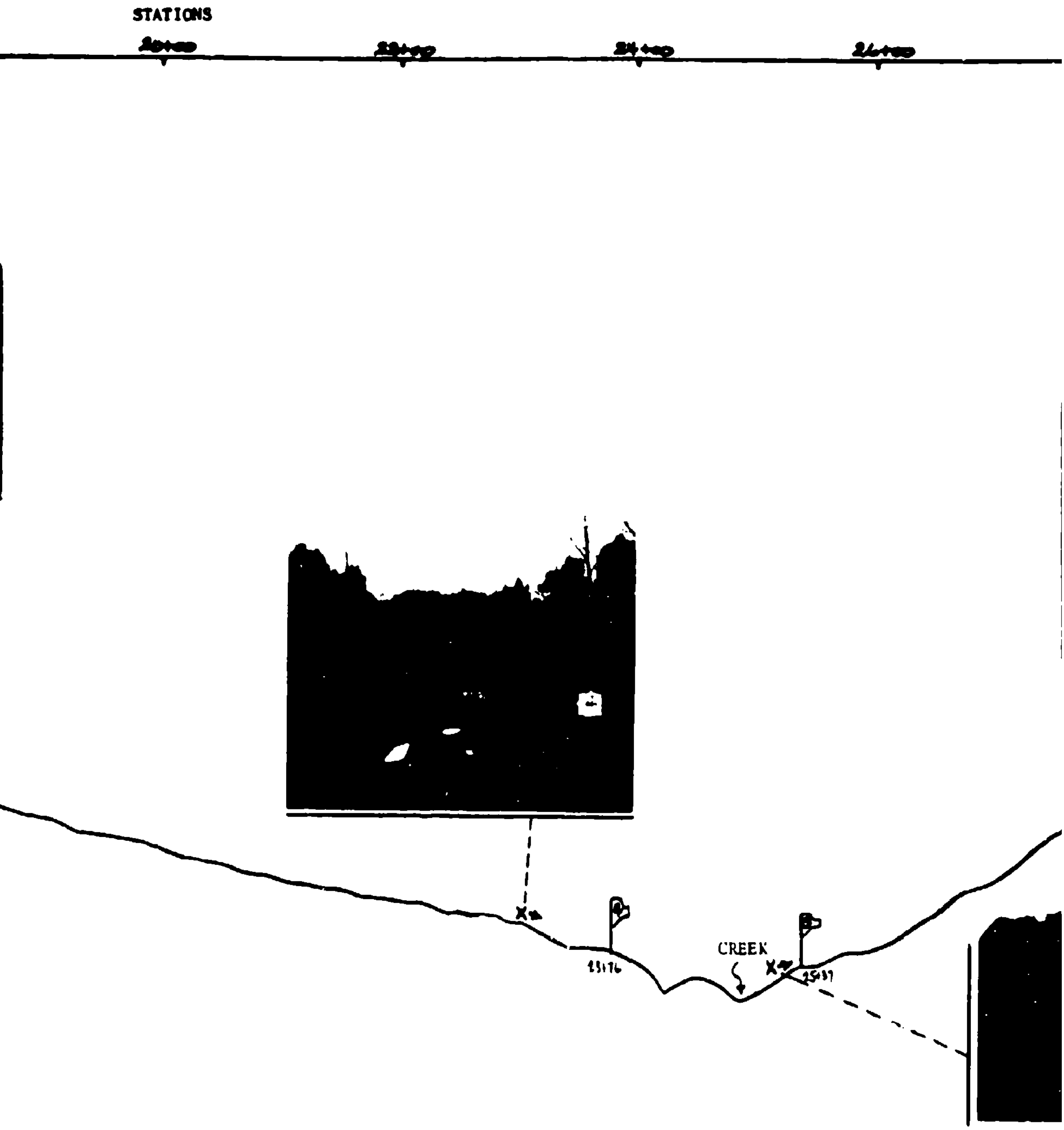
E

PLATE B16 (Sheet 2 of 2)


0+00
2+00
4+00
6+00
8+00
10
0
-10
-20
-30
-40
-50
-60
-70
ELEVATION IN FEET
TERRAIN UNIT NUMBER
14

17


10+00
12+00
14+00
16+00
18+00
TANK
TRAIL
11+62
15+43


STATIONS
CREEK

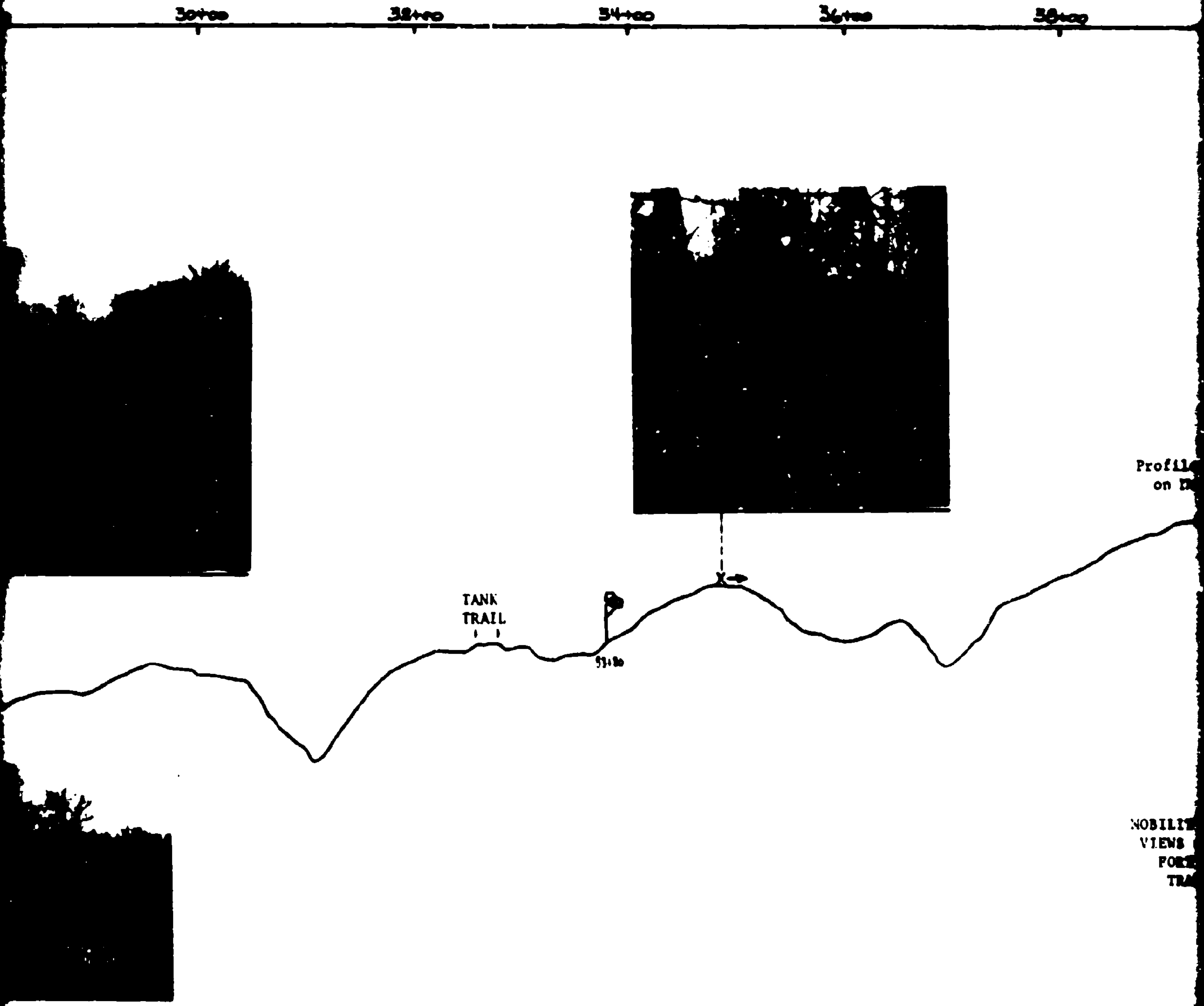


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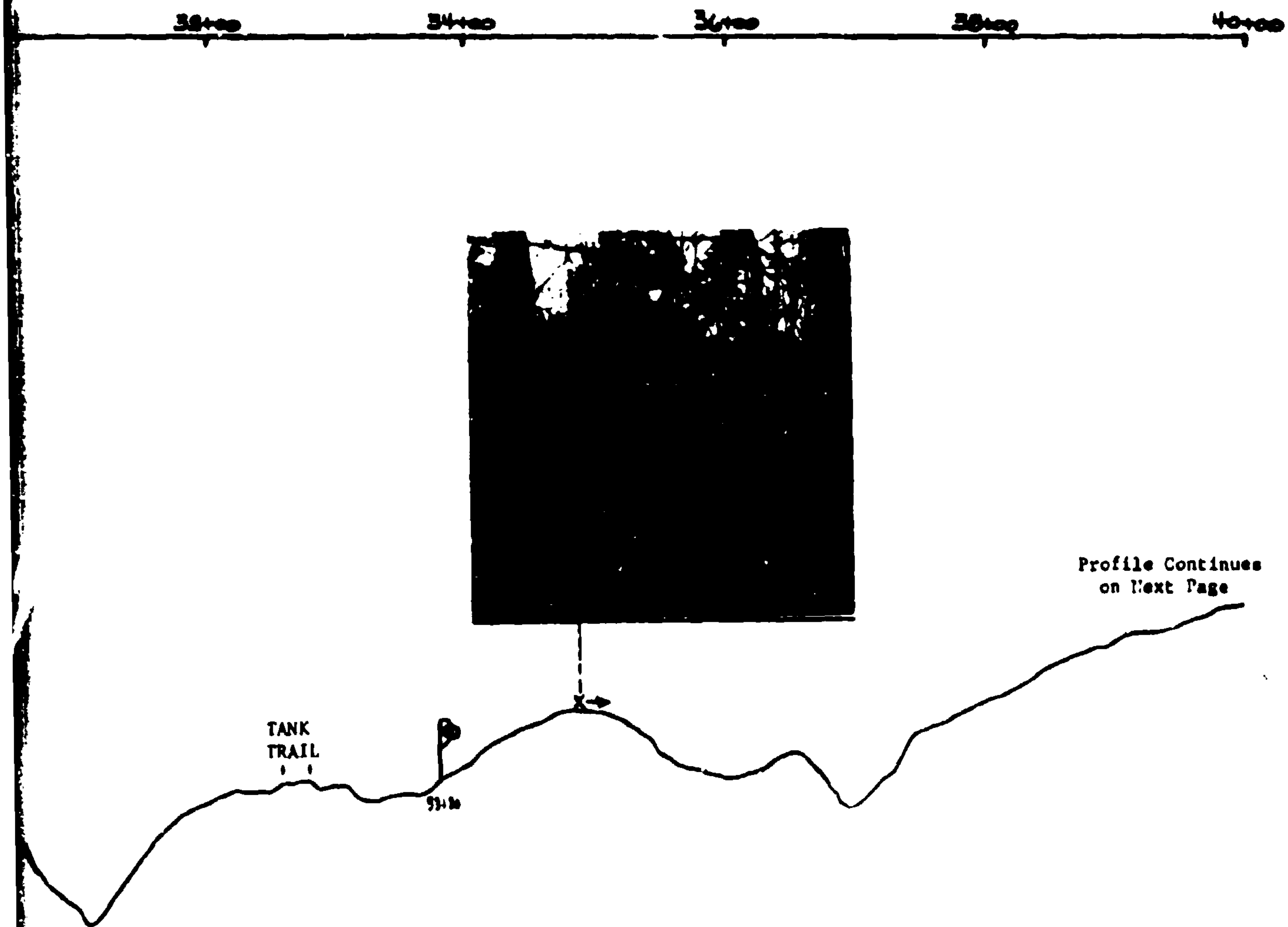
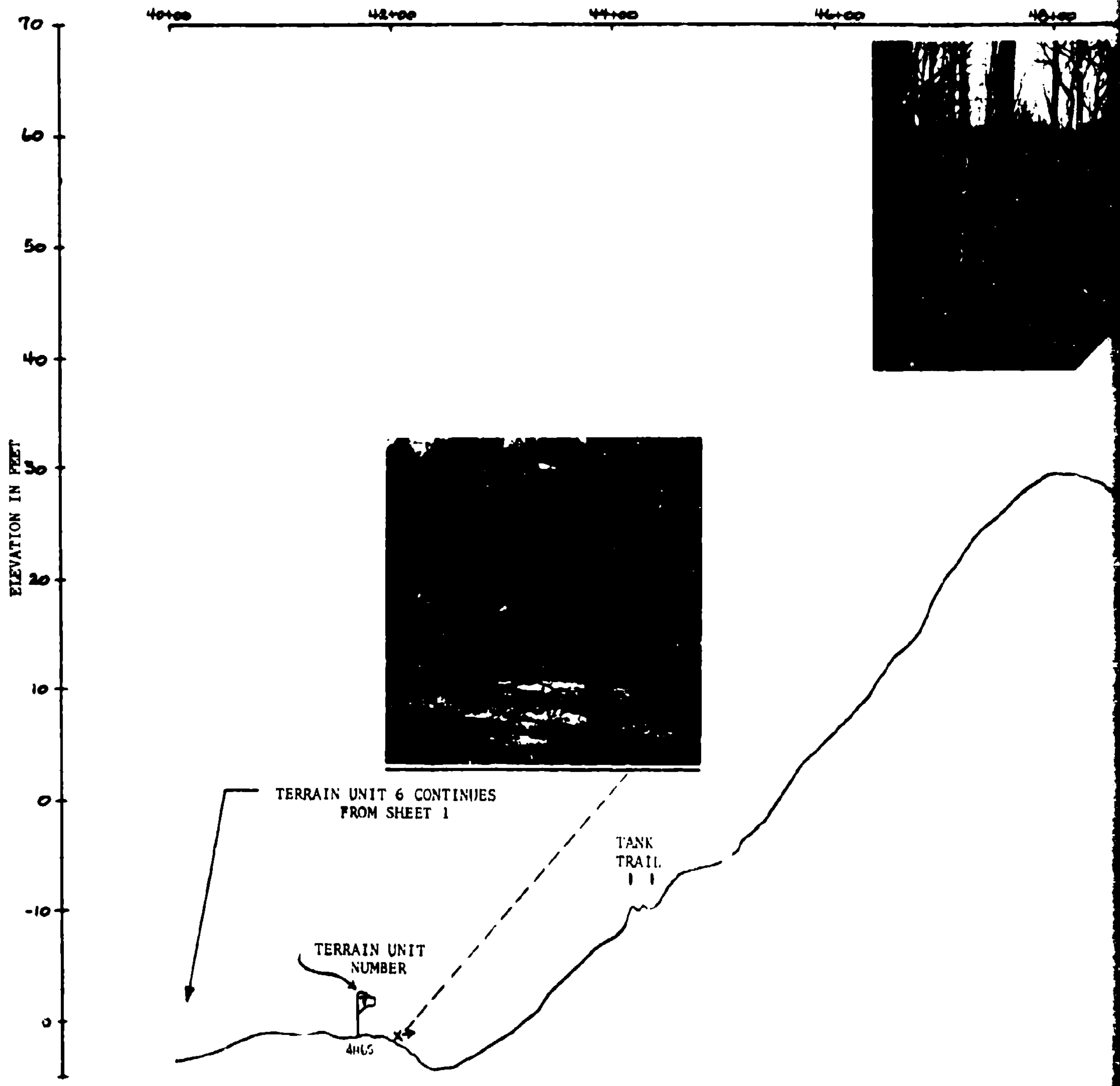
PLATE B17 (Sh



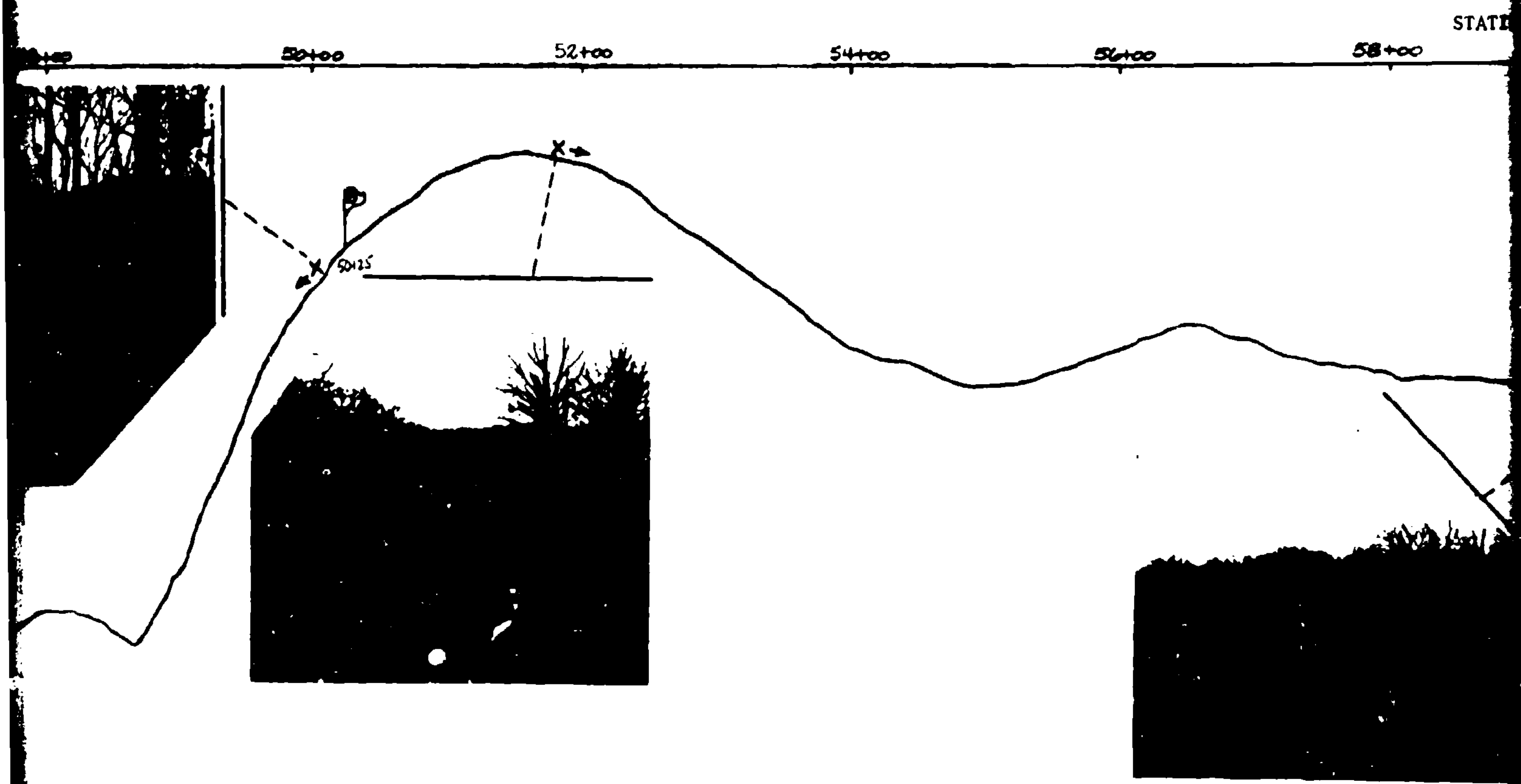
MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 2

E

PLATE B17 (Sheet 1 of 3)



40+00
42+00
44+00
46+00
48+00
70
60
50
40
30
20
10
0
-10
0
ELEVATION IN FEET
TERRAIN UNIT 6 CONTINUES FROM SHEET 1
TANK TRAIL
TERRAIN UNIT NUMBER



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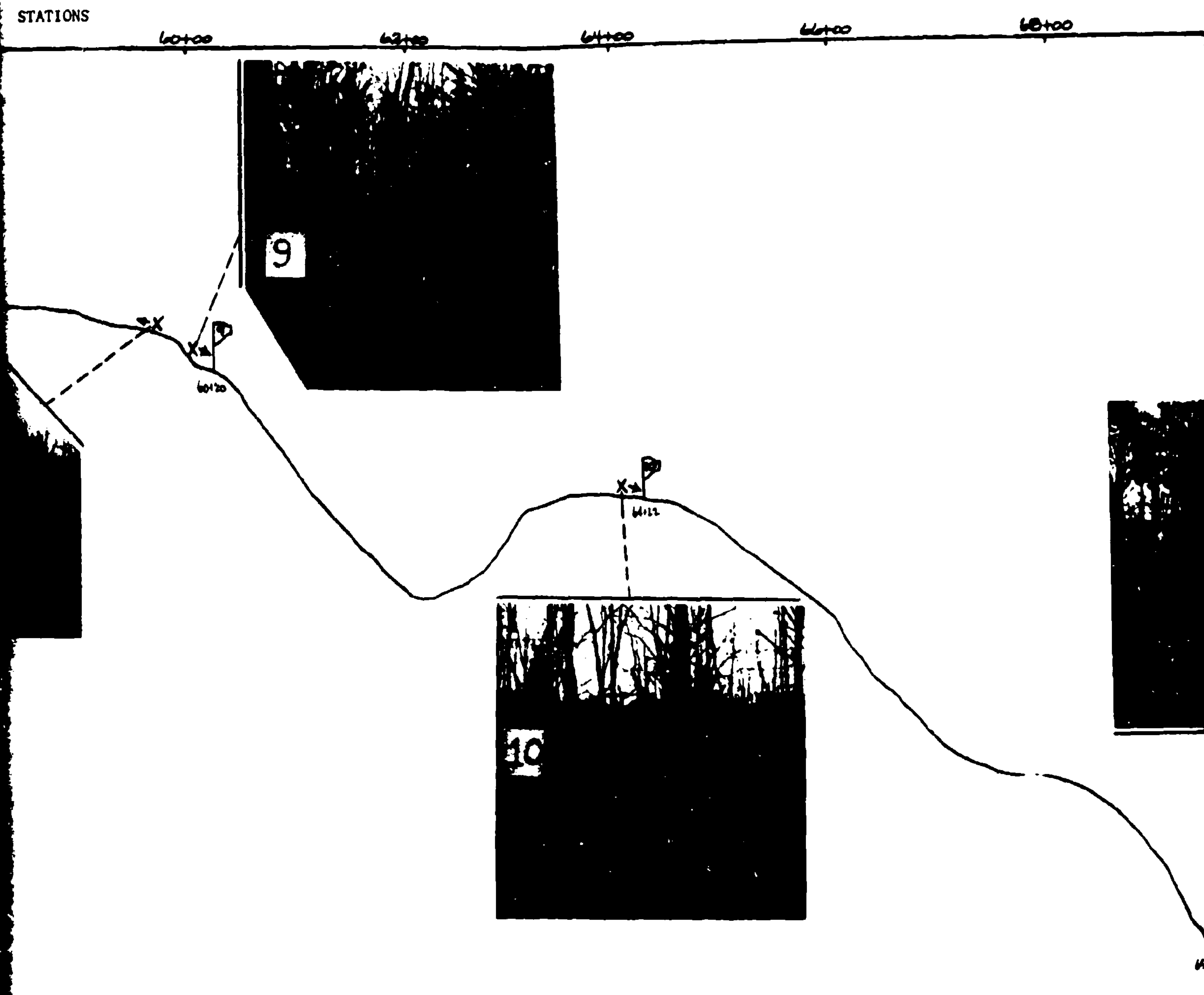
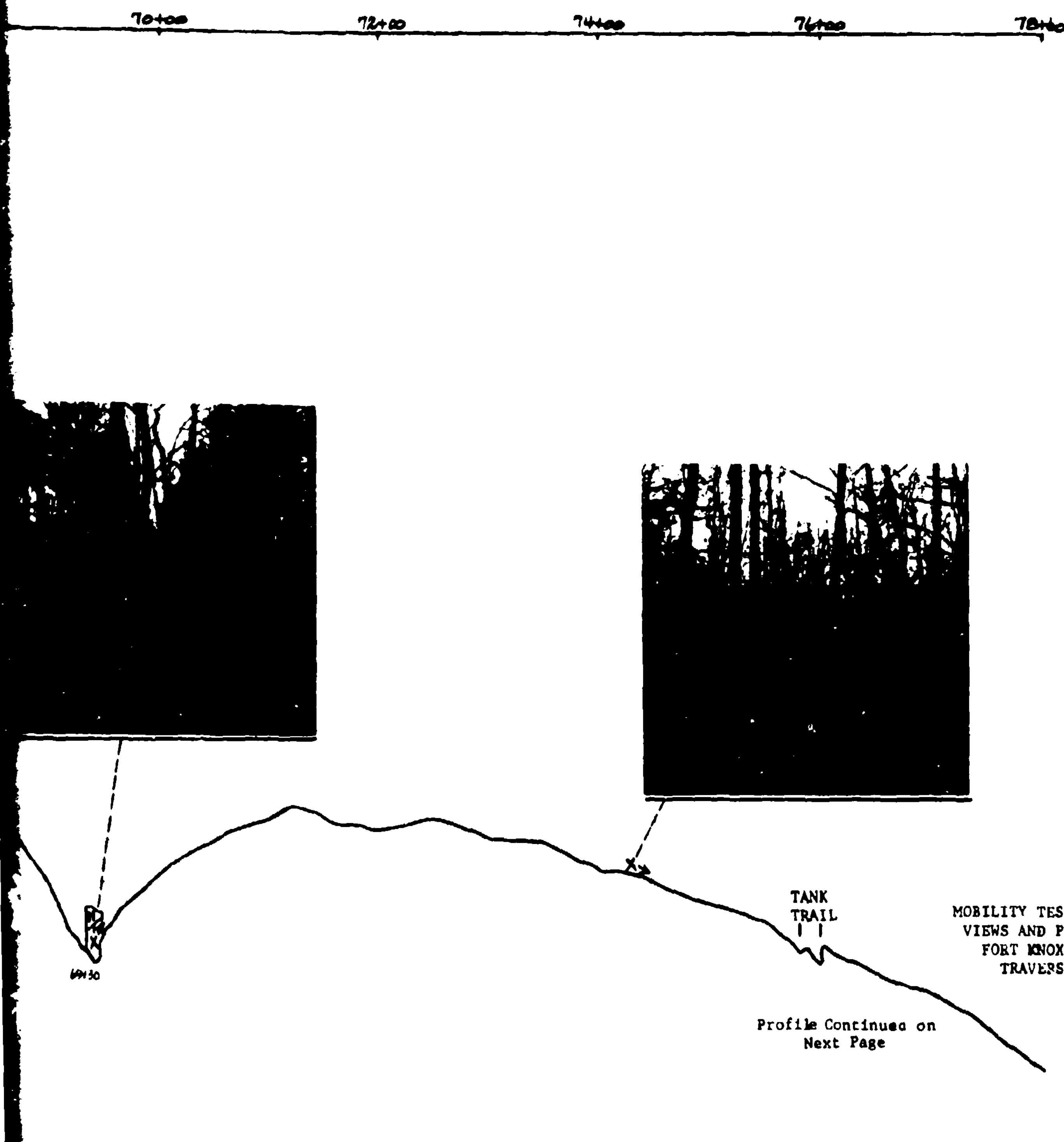


STATIONS
60+00
62+00
64+00
66+00
68+00
9
60+20
64+12
10



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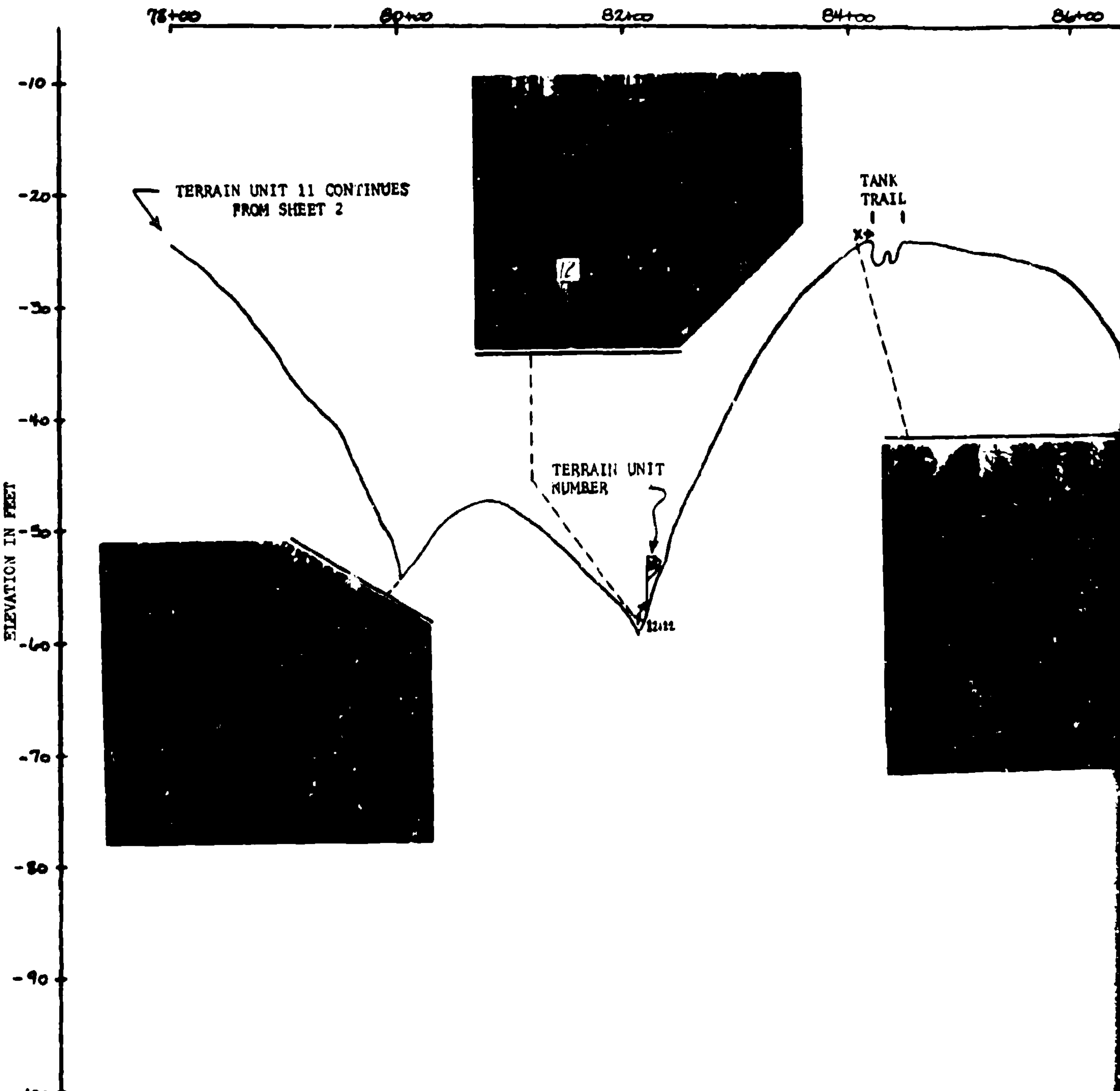
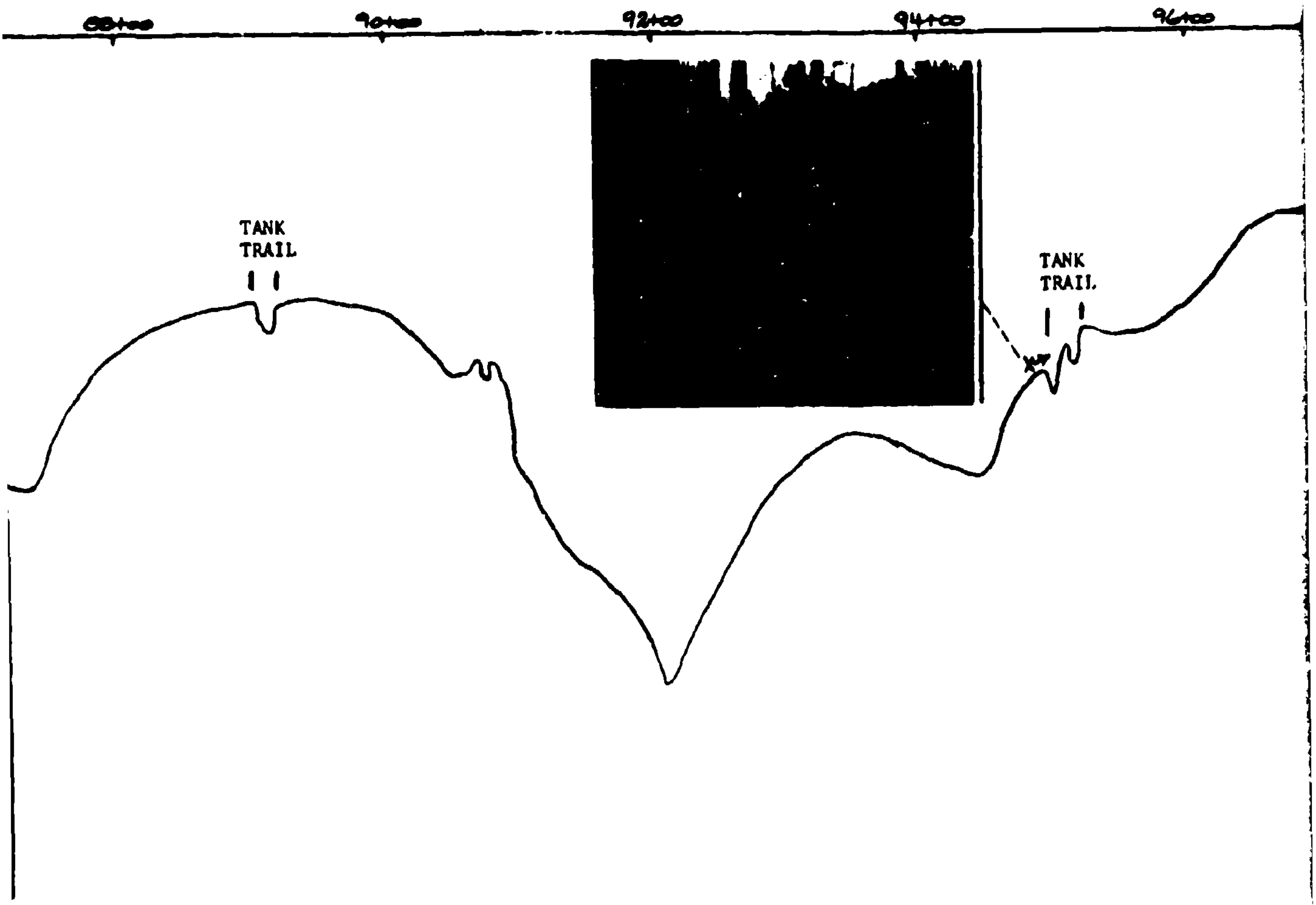
MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 2

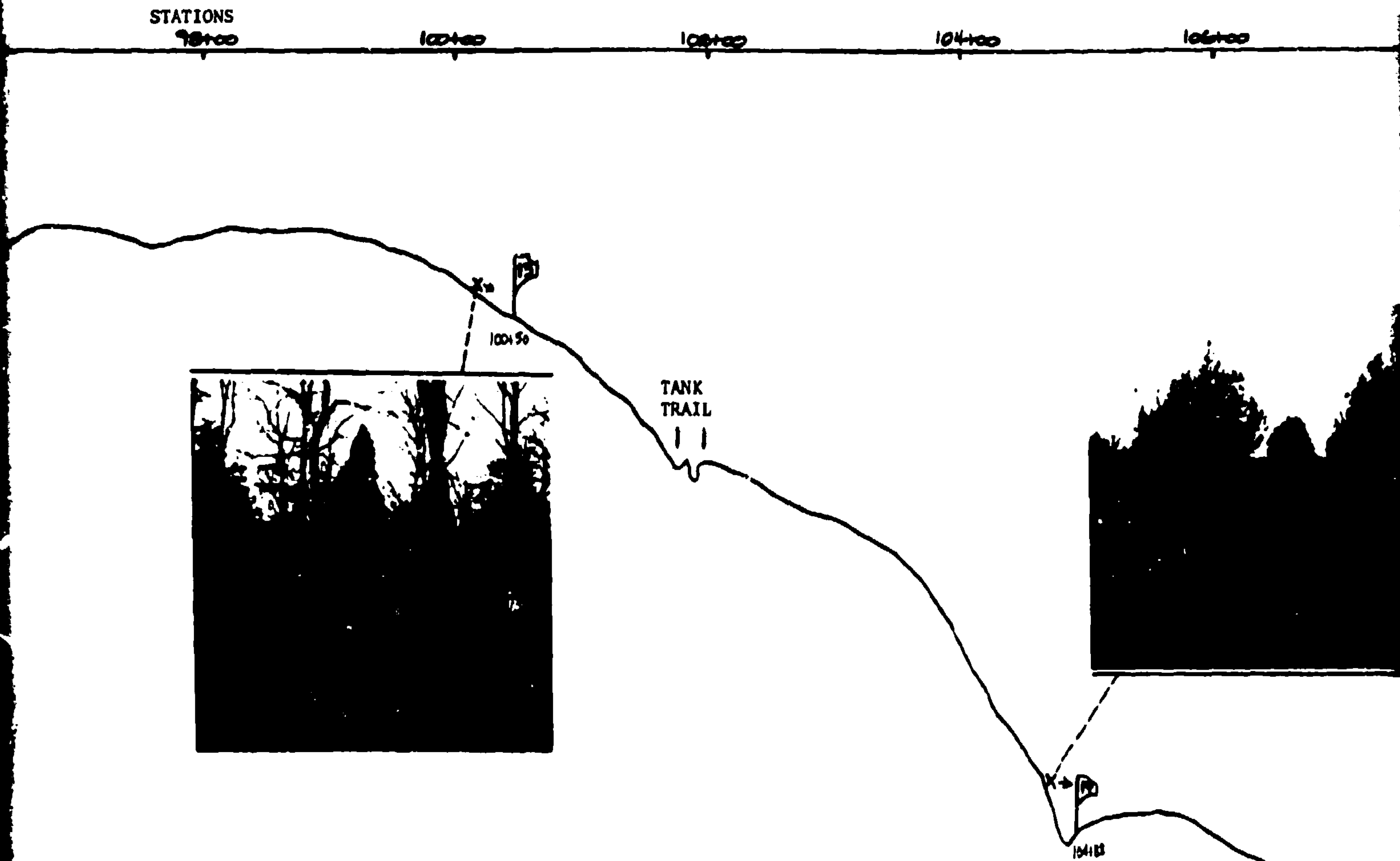
PLATE D17 (Sheet 2 of 3)

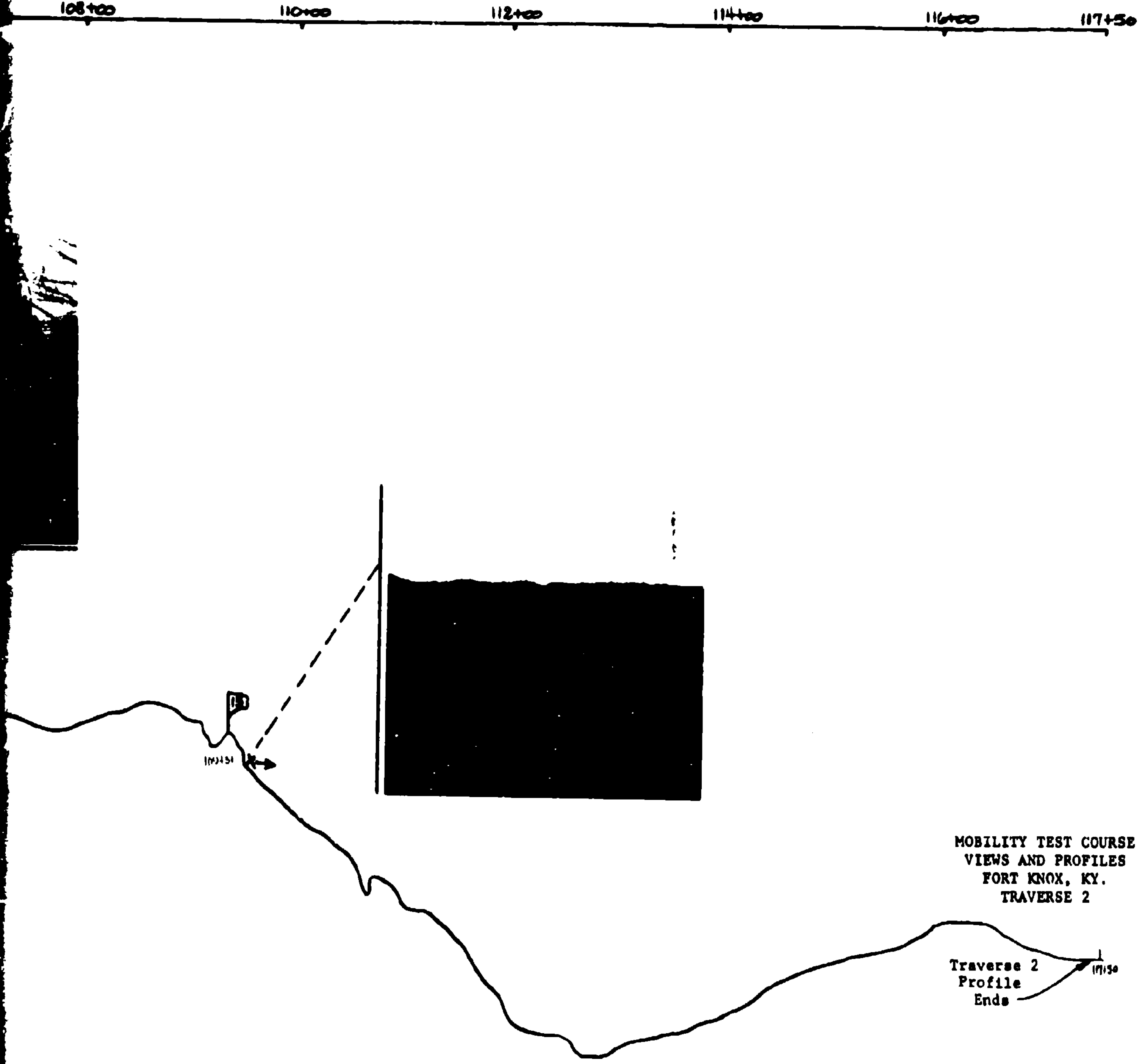


78+00
80+00
82+00
84+00
86+00
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
ELEVATION IN FEET
TERRAIN UNIT 11 CONTINUES FROM SHEET 2
TANK TRAIL
TERRAIN UNIT NUMBER
12



90+00
92+00
94+00
96+00
TANK TRAIL
TANK TRAIL


STATIONS
98+00
100+00
102+00
104+00
106+00
100+50
TANK
TRAIL



MOBILITY TEST COURSE
VIEWS AND PROFILES
FORT KNOX, KY.
TRAVERSE 2

PLATE B17 (Sheet 3 of 3)

APPENDIX C: DEFINITIONS OF TERRAIN TERMS AND PROCEDURES USED TO COLLECT TERRAIN DATA FOR VALIDATION TESTS

1. This appendix defines terrain terms applicable to mobility and presents procedures for terrain data collection for validation testing.

Definitions

2. General terrain terms are defined as follows:

   a. Terrain factor. Any attribute of the terrain that can adequately be described at any point (or instant of time) by a single measurable value, for example, slope or obstacle height.

   b. Terrain factor value. A specific occurrence of a terrain factor. For example, 2 percent is a factor value of the terrain factor slope.

   c. Terrain factor class (class range). A specified range of factor values established for a specific purpose, for example, a range of slope from 0 to 2 percent.

   d. Terrain factor class number (Figure C1). A number assigned to a terrain factor class range. For mobility purposes, terrain factor class numbers are assigned in order of increasing severity of effect on vehicle performance.

   e. Terrain factor complex number. A combination of two or more terrain factor class numbers chosen for a specific purpose.

   f. Terrain unit. A patch (areal) or length (linear) of homogeneous terrain as defined by a specific array of terrain factors.

   g. Terrain factor map. A map showing the terrain factor class number associated with specific map coordinates.

   h. Terrain factor group map. A map showing a series of terrain factor class numbers associated with specific map

Terrain Factors	Class Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Surface Type	Fine-Grained Soil	Coarse-Grained Soil	Muskeg											
Surface Strength (CI or RCI)	>280	221-280	161-220	101-160	61-100	41-60	33-40	26-32	17-25	11-16	0-10	13-25	7-12	0-6
Slope (%)	0-2	2.1-5	5.1-10	10.1-20	20.1-40	40.1-60	60.1-70	>70						
Obstacle Approach Angle (deg)	178.6-180	180-181.5	175.6-178.5	181.5-184.5	170.1-175.5	184.5-190	158.1-170	190.1-202	149.1-158	202.1-211	135.1-149	211.1-225	90.0-135	226-270
Obstacle Vertical Magnitude (in.)	0-6	6.1-10	10.1-14	14.1-18.0	18.1-23.6	23.7-33.5	>33.5							
Obstacle Base Width (in.)	>47	36.1-47	24.1-36	12.1-24	0-12									
Obstacle Length (ft)	0-1	1.1-3.3	3.4-6.6	6.7-10.0	10.1-19.9	20.0-492	>492							
Obstacle Spacing (ft)	>197.0	65.7-197.0	36.4-65.6	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Obstacle Spacing Type	Random	Linear												
Surface Roughness	0-0.4	0.5-1.5	1.6-2.5	2.6-3.5	3.6-4.5	4.6-5.5	5.6-6.5	6.6-7.5	>7.6					
Stem Diameter (in.)	>0.1	>1.0	>2.4	>3.9	>5.5	> 7.0	>8.7	>9.8						
Stem Spacing (ft)	>328	65.6-328	36.4-65.5	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Visibility (ft)	>164	79.0-164	39.6-78.9	29.8-39.5	20.0-29.7	15.1-19.9	10.1-15.0	5.1-10.0	0-5.0					

Figure C1. Areal terrain factor class numbers coordinates.

i. Terrain factor complex map. A map showing all pertinent terrain factor class numbers associated with all areal terrain or all linear terrain shown on the map.

3. Surface geometry terms used are:

a. Linear obstacle spacing (LST). Distance between obstacles that cross the entire terrain unit and have a somewhat regular pattern, such as row crops or rice-field dikes.

b. Obstacle approach angles (A). The angles formed by the inclines at the base of a positive or top of a negative vertical obstacle that a vehicle must sense in surmounting the obstacle (Figure C2).

c. Obstacle base width (WB). The distance across the bottom of the obstacle (Figure C2).

d. Obstacle length (OBL). The length of the long axis of the obstacle.

e. Obstacle spacing (OBS). The horizontal distance between contact edges of vertical obstacles (Figure C2).

f. Obstacle spacing type (OBST). The pattern of obstacle location (linear (a) or random (h)).

g. Obstacle vertical magnitude (H). The vertical distance from the base of a vertical obstacle to the crest of the obstacle (Figure C2).

h. Random obstacle spacing (RST). Obstacles that do not cross the entire terrain unit and have a somewhat random location, such as stumps or logs.

i. Root mean square (rms) elevation. A measure of surface roughness expressed as the root mean square deviation of the terrain amplitudes of a microsurface profile from the mean. (Because peculiarities occur in natural terrain microprofiles, special data handling techniques are used in preprocessing the profile data.)

j. Slope. The angular deviation of a surface from the horizontal expressed as a percentage (Figure C2).

k. Surface roughness. Microvariations of the terrain surface that adversely affect vehicle ride dynamics.

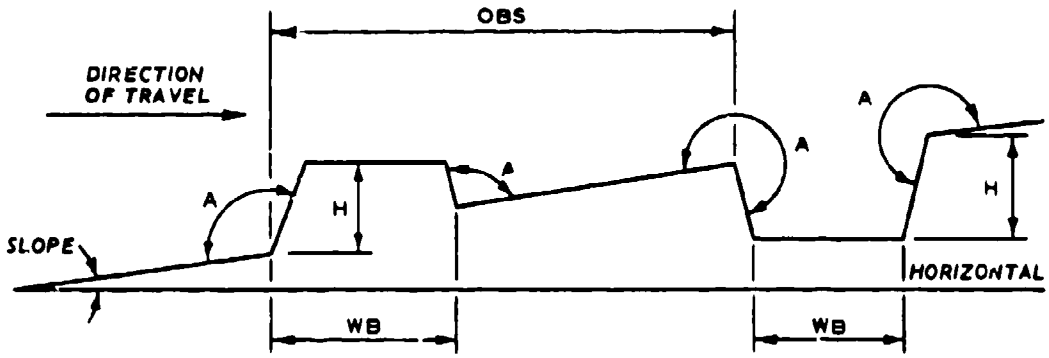


Figure C2. Illustration of obstacle terms

4. Vegetation terms used are:

a. Recognition distance or visibility. The distance at which a vehicle driver can see through vegetation and recognize objects that may be hazardous to his vehicle or to himself.

b. Stem diamerer. The diameter of the tree stems at breast height (4.5 ft) above ground.

c. Stem spacing. The average distance between tree stems. This value is computed from the number of stems per unit area.

Procedures Used to Collect Terrain Data for Validation Tests

5. Specific procedures are used to measure the terrain in terms of surface composition, surface geometry, and vegetation.

Surface composition

6. The data collected to characterize surface composition are described in the following paragraphs.

7. Type of surface material. The type of surface material in terms of fine-grained, coarse-grained, or organic soil is identified for the 0- to 6- and 6- to 12-in. layers.

8. Strength. Cone index is measured in undisturbed terrain at a minimum of 10 locations in each terrain unit. Measurements are made at the surface, at 1-in. vertical increments to a depth of 6 in., and then at 3-in. vertical increments to a depth of 18 in. In fine-grained soil, remolding indexes were determined for the 0- to 6- and 6- to 12-in. layers within each terrain unit at the weakest points in the unit as determined by the cone index data. The number and location of soil strength measurements ensured that the average strength of each terrain unit is characterized.

9. Atterberg limits and mechanical properties. Representative samples are taken from the 0- to 6- and 6- to 12-in. layers for laboratory determination of Atterberg limits and mechanical properties.

10. Moisture content and density. Moisture content and density samples are taken at the remolding index locations. Samples were taken from the 0- to 6- and 6- to 12-in. layers.

Surface geometry

11. Surface geometry data collected consists of macrogeometric and microgeometric measurements. The macrogeometric data are used to determine terrain unit slope, and the microgeometric data are used to characterize surface roughness and discrete obstacles in each terrain unit.

12. Slope. Sufficient vertical profile was measured with a rod, level, and tape along the center line of the traverse to determine average terrain unit slope. However, if the test director had reason to believe that one test course profile is not adequate to define the course for all vehicle test paths, additional profiles are measured as required.

13. Surface roughness. Detailed vertical profiles are measured of sufficient length along the vehicle path (100 ft desired) with a rod, level, and tape at locations representative of each terrain unit.

14. Discrete obstacles. Discrete obstacles within a terrain unit are defined in terms of type (linear or random), size, shape, and spacing. Linear obstacles are those over which a vehicle will have to pass, such as row crops or rice-field dikes, and the pitch motion will usually be excited in striking the obstacle at right angles. Random obstacles are considered to be those that a vehicle might be able to avoid, such as boulders or depressions that are randomly spaced in the terrain.

15. The factors that are measured to describe obstacles are approach angle, vertical magnitude (height), base width, length, and spacing. For linear obstacles, spacing is defined as the average center-to-center distance between obstacles; for random obstacles, mean spacings are computed from data obtained using the sample cell technique,* where cell diameter depends upon including 20 or more obstacles of the size designated as the determinant. In areas of widely spaced obstacles, the maximum sample cell diameter is limited to 250 ft. These data are used to compute average values for the terrain factors measured. One sample cell was taken in a terrain unit containing random obstacles, and sufficient spacings are measured in terrain units containing linear obstacles to establish a reliable average.

Vegetation

16. The data described in the following paragraphs were collected to characterize vegetation in each terrain unit in which vehicle tests were conducted.

17. Type. The type of vegetation was identified as nonwoody (grasses) or woody.

18. Stem size and spacing. Woody vegetation data were collected in at least one location in each terrain unit using the sample cell technique.* These data were used to compute stem size and spacing.

19. Visibility. By procedures derived from research at WES, visibility or recognition distance was measured in each vegetation

* U. S. Army Engineer Waterways Experiment Station, CE, "Environmental Data Collection Methods; Vegetation; Vegetation Structure," Instruction Report No. 10, Vol IV, Instruction Manual 1, May 1968, Vicksburg, Miss.

structural cell: Brown cards of various geometric shapes and with dimensions of approximately 1 ft on the sides were placed upright, with the center of the cards at 1 ft above the ground surface. The maximum distance at which an observer could correctly identify all the cards was recorded and considered the recognition distance.

Other information

20. Still and motion pictures were made as aids in describing the terrain and pertinent terrain-vehicle interactions.

APPENDIX D: BASIC TERRAIN DATA

1. Table D1 shows the specific values of the terrain data collected at each test site for the validation program.

2. Table D2 shows the classed terrain data for each traverse of the validation program.

Table D1

Specific Terrain Data

Terrain Unit No.	Terrain Unit Distance ft*	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type**	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
											Ft. Sill, Okla., Traverse 1									
1	375	1	320	0.9	--	--	--	--	--	--	2.16	--	--	--	--	--	--	--	--	90
2	353	1	262	2.5	--	--	--	--	--	--	1.06	--	--	--	--	--	--	--	--	90
3	1361	1	363	0.6	--	--	--	--	--	--	0.40	--	--	--	--	--	--	--	--	43
4	325	1	372	4.7	--	--	--	--	--	--	0.40	--	--	--	--	--	--	--	--	30
5	357	1	463	1.7	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	30
6	1133	1	272	1.6	--	--	--	--	--	--	0.74	--	--	--	--	--	--	--	-	50
7	130	1	750	1.6	185	22	90	--	65	2	3.35	--	--	--	--	--	--	--	--	29
8	500	1	391	2.1	--	--	--	--	--	--	0.93	--	--	--	--	--	--	--	--	29
9		1	218	0.1	191	12	54	--	50	2	3.38	--	--	--	--	--	--	--	--	29
10	569	1	390	1.6	--	--	--	--	--	--	2.68	--	--	--	--	--	--	--	--	29
11	821	1	331	0.1	--	--	--	--	--	--	2.84	--	--	--	--	--	--	--	--	30
12	250	1	435	3.0	--	--	--	--	--	--	2.84	--	--	--	--	--	--	--	--	32
13	100	1	225	9.0	192	7	24	--	100	2	3.21	--	--	--	--	--	--	--	--	38
14	150	1	439	9.0	--	--	--	--	--	--	2.10	--	--	--	--	--	--	--	--	38
15	392	1	417	1.1	--	--	--	--	--	--	0.98	--	--	--	--	--	--	--	--	39
16	38	1	394	1.1	200	20	36	--	38	2	1.40	--	--	--	--	--	--	--	--	40
17	220	1	334	0.3	--	--	--	-	--	--	1.17	--	--	--	--	--	--	--	--	40
18	105	1	750	4.3	182	24	876	--	105	2	3.47	--	--	--	--	--	--	--	--	40
19	725	1	879	4.3	--	--	--	--	--	--	1.04	--	--	--	--	--	--	--	--	43
20	1152	1	268	0.4	--	--	--	--	--	--	1.22	--	--	--	--	--	--	--	--	19
21	712	1	405	1.5	--	--	--	--	--	--	1.15	--	--	--	--	--	--	--	--	60
22	140	1	690	7.1	--	--	--	--	--	--	1.15	--	--	--	--	--	--	--	--	50
23	407	1	435	3.7	--	--	--	--	--	--	1.15	--	--	--	--	--	--	--	--	42
24	214	1	333	2.6	-	-	--	--	--	--	1.36	--	--	--	--	--	--	--	--	77
											Ft. Sill, Okla., Traverse 2									
1	186	1	254	2.8	--	--	--	--	--	--	1.50	--	--	--	--	--	--	--	--	50
2	2463	1	328	0.5	188	9	96	--	1232	2	1.22	--	--	--	--	--	--	--	--	50
3	941	1	220	7.4	--	--	--	--	--	--	1.62	--	--	--	--	--	--	--	--	76
4	97	1	165	5.[illegible]	--	--	--	--	--	--	2.94	--	--	--	--	--	--	--	--	53
5	113	1	167	9.0	--	--	--	--	--	--	3.06	--	--	--	--	--	--	--	--	72
6	147	1	156	4.4	195	11	132	--	117	2	1.52	--	--	--	--	--	--	--	--	>164
7	328	1	150	5.8	--	--	--	--	--	--	1.11	--	--	--	--	--	--	--	--	>164
8	250	1	120	1.4	--	--	--	--	--	--	1.52	--	--	--	--	--	--	--	--	>164
9	504	1	214	4.6	--	--	--	--	--	--	0.68	--	--	--	--	--	--	--	--	161
10	256	[illegible]	151	[illegible]	--	--	--	--	--	--	1.95	--	--	--	--	--	--	--	--	50
11	97	1	236	1.5	--	--	--	--	--	--	0.79	--	--	--	--	--	--	--	--	40
12	138	1	750	5.0		--	--	--	--	--	1.62	--	--	--	--	--	--	--	--	40
13	2050	1	220	0.2	--		--	--	--	--	0.66	--	--	--	--	--	--	--	--	50
											Ft. Sill, Okla., Traverse 3									
1	550	1	566	0.1	187	6	36	--	275	2	1.03	4	4	4	75	75	75	--	--	93
2	546	1	549	3.7	--	--	--	--	--	--	0.92	4	4	4	75	75	75	--	--	98
3	104	1	260	3.7	--	--	--	--	--	--	2.97	4	4	4	75	75	75	--	--	50
4	250	1	327	2.1	--	--	--	--	--		0.18	4	4	4	75	75	75	75	75	113
5	314	1	178	4.1	197	8	24	--	314		2.17	4	4	4	75	75	75	75	75	94
6	33	1	127	0.5	213	11	24	--	33	[illegible]	3.32	75	75	75	75	75	75	75	75	75
7	362	1	115	5.2	185	11	54	--	50	[illegible]	1.22	75	75	75	75	75	75	75	75	68
8	136	1	556	1.8	--	--	--	--	--	--	0.70	75	75	75	75	75	75	75	75	46
9		1	350	3.7	--	--	--	--	--	--	2.48	--	--	--	--	--	--	--	--	16
10	1176	1	340	2.2	189	8	60	--	1176	2	0.47	--	--	--	--	--	--	--	--	21
11	104	1	485	2.9	--	--	--	--	--	-	1.02	--	--	--	--	--	--	--	--	37
12	80	1	750	5.0	191	33	144	--	80	2	2.60	--	--	--	--	--	--	--	--	37
13	750	1	347	4.0	133	6	24	--	750	2	1.40	--	--	--	--	--	--	--	--	34
14	75	1	540	12.0	190	29	60	--	75	2	3.11	--	--	--	--	--	--	--	--	34

(Continued)

* [illegible]-grained soils = 1; coarse-grained soils = 2.

** [illegible] = 1; linear = 2.

Table D1 (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Terrain Factor Values																		
		Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
											Ft. Sill, Okla., Traverse 3 (Continued)									
15	65	1	750	10.3	198	11	0	--	65	2	5.76	--	--	--	--	--	--	--	--	34
16	500	1	132	2.5	186	12	66	--	250	2	1.52	--	--	--	--	--	--	--	--	164
17	180	1	750	1.1	180	13	456	--	180	2	1.33	--	--	--	--	--	--	--	--	39
18	40	1	57	4.7	--	--	--	--	--	--	3.02	--	--	--	--	--	--	--	--	30
19	660	1	133	0.3	--	--	--	--	--	--	0.22	--	--	--	--	--	--	--	--	30
20	140	1	750	5.9	--	--	--	--	--	--	2.34	--	--	--	--	--	--	--	--	30
21	480	1	259	0.2	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	30
											Ft. Sill, Okla., Traverse 4									
1	800	1	90	1.0	--	--	--	--	--	--	0.67	--	--	--	--	--	--	--	--	39
2	400	1	100	4.2	--	--	--	--	--	--	0.83	--	--	--	--	--	--	--	--	75
3	400	1	94	1.0	--	--	--	--	--	--	0.83	--	--	--	--	--	--	--	--	>164
4	600	1	126	4.0	--	--	--	--	--	--	0.52	--	--	--	--	--	--	--	--	110
5	600	1	270	1.8	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	>164
6	200	1	203	2.5	--	--	--	--	--	--	0.31	--	--	--	--	--	--	--	--	>164
7	200	1	750	2.5	--	--	--	--	--	--	0.42	--	--	--	--	--	--	--	--	>164
8	109	1	203	3.7	--	--	--	--	--	--	0.37	--	--	--	--	--	--	--	--	>164
9	801	1	151	0.8	--	--	--	--	--	--	0.64	--	--	--	--	--	--	--	--	>164
10	406	1	119	4.7	--	--	--	--	--	--	2.62	--	--	--	--	--	--	--	--	>164
11	133	1	91	7.0	194	24	96	--	133	2	4.43	--	--	--	--	--	--	--	--	10
12	299	1	122	5.4	--	--	--	--	--	--	1.20	--	--	--	--	--	--	--	--	>164
13	262	1	95	0.3	--	--	--	--	--	--	0.55	--	--	--	--	--	--	--	--	>164
											Ft. Sill, Okla., Traverse 9									
1A	2500	1	134	3.3	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
2A	250	1	159	7.4	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
3A	200	1	235	13.7	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
4A	125	1	198	27.2	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
5A	125	1	175	31.5	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	>164
6A	100	1	195	17.8	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
1B	2500	1	131	3.3	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
2B	250	1	149	7.4	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
3B	200	1	205	13.7	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
4B	125	1	242	27.2	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
5B	125	1	207	31.5	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	>164
6B	100	1	257	17.8	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
1C	2500	1	257	3.3	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
2C	250	1	628	7.4	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
3C	200	1	351	13.7	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
4C	125	1	610	27.2	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
5C	125	1	349	31.5	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	>164
6C	100	1	514	17.8	--	--	--	--	--	--	0.5	--	--	--	--	--	--	--	--	>164
7	800	1	182	0.0	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--	>164
8A	2000	1	214	0.47	--	--	--	--	--	--	0.13	--	--	--	--	--	--	--	--	>164
8B	2000	1	704	0.47	--	--	--	--	--	--	0.13	--	--	--	--	--	--	--	--	>164
9	800	1	415	0.4	--	--	--	--	--	--	1.71	24	24	24	24	24	24	24	24	120
											Yuma, Ariz., Traverse 1									
1	71	2	567	0.4	--	--	--	--	--	--	0.90	--	--	--	--	--	--	--	--	>164
2	52	2	537	0.0	185	23	288	--	52	2	3.15	40	40	--	--	--	--	--	--	>164
3	477	2	508	0.6	--	--	--	--	--	--	0.55	--	--	--	--	--	--	--	--	>164
4	110	2	492	5.4	183	36	84	--	110	2	2.63	--	--	--	--	--	--	--	--	135
5	200	2	578	1.1	--	--	--	--	--	--	0.94	--	--	--	--	--	--	--	--	>164
6	198	2	451	2.7	191	24	132	--	66	2	0.44	15	15	53	53	53	53	--	--	50
7	202	2	486	0.9	--	--	--	--	--	--	0.52	--	--	--	--	--	--	--	--	>164
8	40	2	591	2.0	183	17	84	--	40	2	4.05	--	--	--	--	--	--	--	--	129
9	130	2	459	1.9	--	--	--	--	--	--	0.65	--	--	--	--	--	--	--	--	>164
10	70	2	539	2.0	176	5	132	--	70	2	3.40	110	110	110	110	110	--	--	--	>154
11	100	2	539	3.0	184	8	96	--	50	2	1.97	--	--	--	--	--	--	--	--	>164

(Continued)

(Sheet ? of 8)

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Table 61 (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
											Yuma, Ariz., Traverse 1 (Continued)									
12	130	2	455	1.0	--	--	--	--	--	--	0.79	--	--	--	--	--	--	--	--	>164
13	110	2	582	1.6	180	7	24	--	55	2	1.72	--	--	--	--	--	--	--	--	>164
14	200	2	563	0.4	--	--	--	--	--	--	6.32	--	--	--	--	--	--	--	--	>164
15	197	2	544	2.0	192	11	87	--	49	2	3.45	6	6	80	80	--	--	--	--	87
16	763	2	577	1.0	182	5	36	--	254	2	0.91	--	--	--	--	--	--	--	--	>164
17	40	2	441	0.0	198	19	72	--	40	2	4.01	40	40	80	80	--	--	--	--	100
18	179	2	461	0.3	--	--	--	--	--	--	0.49	--	--	--	--	--	--	--	--	>164
19	29	2	461	0.7	191	6	60	--	29	2	2.40	12	12	--	--	--	--	--	--	>164
20	162	2	461	0.5	--	--	--	--	--	--	0.81	--	--	--	--	--	--	--	--	>164
21	72	2	659	0.4	152	11	78	--	36	2	2.04	--	--	--	--	--	--	--	--	>164
22	318	2	476	0.7	--	--	--	--	--	--	0.92	15	15	--	--	--	--	--	--	>164
23	121	2	300	0.9	198	26	96	--	60	2	5.16	8	8	50	50	50	--	--	--	20
24	267	2	350	2.8	162	12	132	--	267	2	0.87	75	75	--	--	--	--	--	--	>164
25	1062	2	323	2.7	162	6	36	3	10	1	1.66	75	75	--	--	--	--	--	--	21
26	680	2	474	4.0	186	8	64	--	827	2	2.08	40	40	--	--	--	--	--	--	50
27	518	2	473	6.2	176	16	492	--	518	2	2.80	--	--	--	--	--	--	--	--	>164
28	442	2	360	1.6	162	6	36	3	10	1	1.47	75	75	--	--	--	--	--	--	21
29	248	2	378	1.3	172	20	600	--	124	2	2.35	--	--	--	--	--	--	--	--	120
30		2	274	1.4	162	6	36	3	10	1	1.66	75	75	--	--	--	--	--	--	>164
31	428	2	330	3.9	180	20	64	--	140	2	3.55	--	--	--	--	--	--	--	--	70
32	987	2	330	3.6	190	13	94	--	329	2	2.27	--	--	--	--	--	--	--	--	70
33	1738	2	394	0.9	--	--	--	--	--	--	1.82	45	45	--	--	--	--	--	--	>164
34	538	2	421	4.6	--	--	--	--	--	--	2.17	--	--	--	--	--	--	--	--	75
35	1008	2	421	2.2	195	25	65	--	144	2	4.98	--	--	--	--	--	--	--	--	75
36	200	2	[illegible]	1.1	--	--	--	--	--	--	2.33	--	--	--	--	--	--	--	--	>164
37	318	2	271	2.0	--	--	--	--	--	--	1.10	--	--	--	--	--	--	--	--	>164
38	152	2	491	[illegible]	200	17	0	--	76	2	4.14	--	--	--	--	--	--	--	--	>164
39	1297	2	382	0.5	--	--	--	--	--	--	1.94	150	150	--	--	--	--	--	--	>164
40	183	2	337	2.5	--	--	--	--	--	--	1.88	--	--	--	--	--	--	--	--	>164
41	497	2	284	0.9	--	--	--	--	--	--	1.81	--	--	--	--	--	--	--	--	>164
42	513	2	389	3.1	--	--	--	--	--	--	2.64	150	150	--	--	--	--	--	--	>164
43	295	2	382	1.4	191	10	78	--	115	2	1.90	--	--	--	--	--	--	--	--	>164
44	195	2	359	0.7	--	--	--	--	--	--	1.52	150	150	--	--	--	--	--	--	>164
45	95	2	386	0.3	--	--	--	--	--	--	2.43	150	150	--	--	--	--	--	--	>164
46	175	2	356	2.8	--	--	--	--	--	--	1.92	150	150	--	--	--	--	--	--	>164
47	500	2	356	1.2	--	--	--	--	--	--	1.87	150	150	--	--	--	--	--	--	>164
48	725	2	488	4.0	194	10	60	--	167	2	3.39	--	--	--	--	--	--	--	--	100
49	573	2	567	5.4	--	--	--	--	--	--	3.44	--	--	--	--	--	--	--	--	75
50	224	2	577	6.8	--	--	--	--	--	--	4.79	--	--	--	--	--	--	--	--	75
51	1235	2	577	4.2	185	26	106	--	309	2	2.51	--	--	--	--	--	--	--	--	>164
											Yuma, Ariz., Traverse 2									
1	1636	2	320	1.1	--	--	--	--	--	--	0.86	--	--	--	--	--	--	--	--	>164
2	1267	2	320	1.1	--	--	--	--	--	--	1.18	--	--	--	--	--	--	--	--	>164
											Yuma, Ariz., Traverse 3									
1	390	2	538	1.2	192	9.6	108	--	78	2	2.50	--	--	--	--	--	--	--	--	>164
2	498	2	516	1.2	--	--	--	--	--	--	0.84	---	--	--	--	--	--	--	--	>164
3	52	2	452	17.5	191	13.2	252	--	62		4.45	--	--	--	--	--	--	--	--	>164
4	288	2	518	1.2	--	--	--	--	--	--	0.53	--	--	--	--	--	--	--	--	>164
5	389	2	518	1.8	187	13.2	264	--	130	2	3.50	41	41	41	41	41	41	--	--	>164
6	317	2	532	4.7	195	16.8	84	--	106	2	3.14	--	--	--	--	--	--	--	--	>164
7	1177	2	607	1.0	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	>164
8	273	2	442	1.0	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	>164
9	158	2	442	4.5	196	21.6	420	--	158	2	5.70	--	--	--	--	--	--	--	--	42
10	207	2	606	1.0	--	--	--	--	--	--	1.72	--	--	--	--	--	--	--	--	>164
11	72	2	536	2.8	191	20.4	34	--	72	2	3.48	--	--	--	--	--	--	--	--	>164
12	302	2	606	0.6	--	--	--	--	--	--	0.39	--	--	--	--	--	--	--	--	24
13	203	2	606	3.0	195	19.8	108	--	151	2	5.15	--	--	--	--	--	--	--	--	>164
14	310	2	511	0.4	--	--	--	--	--	--	0.31	--	--	--	--	--	--	--	--	>164
15	102	2	525	6.7	194	33.5	156	--	102		3.81	--	--	--	--	--	--	--	--	>164

(Continued)

(Sheet 3 of 8)

Table D1 (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.[illegible] in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
											Terrain Factor Value									
											Yuma, Ariz., Traverse 3 (Continued)									
16	[illegible]	2	518	1.6	--	--	--	--	--	--	0.73	--	--	--	--	--	--	--	--	>164
17	356	2	535	0.6	194	15.6	144	--	176	2	3.52	43	43	43	43	43	43	43	43	>164
18	300	2	586	0.6	196	10.8	108	--	100	2	2.82	70	70	70	70	70	70	70	70	>164
19	1083	2	556	[illegible]	--	--	--	--	--	--	0.58	--	--	--	--	--	--	--	--	>164
20	224	2	540	2.9	190	31.2	1068	--	176	2	3.35	28	28	28	28	28	28	28	28	44
21	156	2	581	1.43	--	--	--	--	--	--	0.32	--	--	--	--	--	--	--	--	>164
22	320	2	550	1.2	--	--	--	--	--	--	0.15	--	--	--	--	--	--	--	--	>154
23	1000	2	550	1.0	--	--	--	--	--	--	0.15	--	--	--	--	--	--	--	--	>164
											Yuma, Ariz., Traverse 4									
1	1575	2	514	1.0	--	--	--	--	--	--	1.37	--	--	--	--	--	--	--	--	>164
2	1800	2	611	0.7	190	15.0	24	--	900	2	2.05	--	--	--	--	--	--	--	--	80
3	300	2	579	1.0	192	16.0	90	--	300	2	2.28	75	75	--	75	75	75	--	--	>164
4	610	2	533	0.6	187	10.0	156	--	305	2	1.39	80	80	80	80	80	80	--	--	>164
5	1715	2	558	0.9	--	--	--	--	--	--	1.14	--	--	--	--	--	--	--	--	>164
											Yuma, Ariz., Traverse 5									
1	954	2	229	0.4	--	--	--	--	--	--	1.85	40	40	--	--	--	--	--	--	>140
2	1710	2	187	0.4	206	18.0	1200	--	1710	2	2.57	40	40	--	--	--	--	--	--	>140
3	47	2	205	0.4	--	--	--	--	--	--	4.99	--	--	--	--	--	--	--	--	>164
4	84	2	161	0.6	--	--	--	--	--	--	2.96	50	50	--	--	--	--	--	--	75
5	1149	2	70	5.0	--	--	--	--	--	--	2.44	100	100	--	--	--	--	--	--	120
6	655	2	192	0.7	--	--	--	--	--	--	2.24	--	--	--	--	--	--	--	--	>164
7	522	2	104	3.7	--	--	--	--	--	--	2.62	--	--	--	--	--	--	--	--	70
8	1489	2	79	5.6	168	18.0	228	--	744	2	2.62	--	--	--	--	--	--	--	--	50
											Yuma, Ariz., Traverse 6									
1	55	2	376	40.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
2	43	2	321	46.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
3	49	2	402	43.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
4	50	2	406	41.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
5	44	2	379	33.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
6	45	2	417	52.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
7	40	2	532	49.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
8	30	2	379	40.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
9	35	2	461	29.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
10	72	2	527	24.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
11	50	2	308	52.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
12	38	2	278	61.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
13	45	2	361	53.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
14	25	2	74	46.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
15	25	2	82	49.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
16	36	2	112	14.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
17	28	2	160	10.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
18	28	2	124	12.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
19	25	2	106	23.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
20	30	2	123	18.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
21	25	2	112	22.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
22	42	2	98	33.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
23	25	2	85	32.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
24	25	2	31	43.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
25	25	2	26	19.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
26	31	2	36	11.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
27	25	2	32	39.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
28	25	2	39	25.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
29	25	2	22	32.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
30	25	2	30	17.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
31	25	2	23	37.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
32	25	2	12	49.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164

(Continued)

(Sheet 4 of 5)

Table D1 (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
Yuma, Ariz., Traverse 0 (Continued)																				
33	25	2	44	40.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
34	25	2	22	32.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
35	25	2	36	39.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
36	25	2	15	36.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
37	25	2	17	31.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
38	25	2	36	20.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
39	25	2	42	26.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
40	25	2	56	23.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
41	30	2	68	8.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
42	30	2	66	14.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
43	30	2	55	12.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
44	30	2	38	9.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
45	50	2	32	40.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
46	50	2	20	43.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
47	800	2	558	0.9	--	--	--	--	--	--	1.29	--	--	--	--	--	--	--	--	>164
48	646	2	274	0.5	164	9.0	62	3	14	1	1.6	14	14	75	75	75	75	75	75	> 27
49	562	2	562	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
50	489	2	489	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
51	110	2	110	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
52	543	2	543	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
53	30	2	30	12.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>164
54	--	2	118	0.0	270	17.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
55	--	2	349	0.0	270	31.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
56	--	2	203	0.0	28	20.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
57	--	2	472	0.0	80	17.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
58	--	2	449	0.0	210	21.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
59	--	2	284	0.0	50	11.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
60	--	2	284	0.0	50	14.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
61	--	2	284	0.0	90	25.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
62	--	2	300	0.0	270	21.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
63	--	2	300	0.0	90	15.5	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
64	--	2	300	0.0	90	14.0	>48	--	>197	2	--	--	--	--	--	--	--	--	--	>164
Eglin AFB, Fla., Traverse 1																				
1	693	2	92	0.27	--	--	--	--	--	--	0.83	6.8	[illegible]	8.6	27.6	--	--	--	--	75
2	611	2	67	0.37	--	--	--	--	--	--	0.94	5.7	5.7	8.6	13.5	26.6	78.0	--	--	58
3	47	2	271	0.0	194	12	336	--	47	2	2.41	--	--	--	--	--	--	--	--	164
4	375	2	59	0.13	--	--	--	--	--	--	1.36	11.9	11.9	12.7	15.2	18.6	20.9	23.2	24.6	106
5	69	2	55	0.13	--	--	--	--	--	--	0.67	8.8	8.8	9.5	10.5	13.1	14.4	16.3	27.0	70
6	196	2	57	0.31	--	--	--	--	--	--	1.72	11.0	11.0	12.1	15.5	18.5	20.3	24.2	24.2	80
7	195	2	61	0.46	--	--	--	--	--	--	1.25	11.7	11.7	12.5	13.3	14.3	18.5	20.3	21.8	104
8	291	2	62	0.69	--	--	--	--	--	--	1.44	8.8	8.8	10.4	13.8	16.8	21.0	36.4	44.7	89
9	559	2	92	0.98	--	--	--	--	--	--	1.36	9.5	9.5	10.6	12.9	15.1	19.9	24.9	26.9	151
10	398	2	70	0.56	--	--	--	--	--	--	0.59	11.1	11.1	11.8	15.5	20.1	25.6	36.2	51.4	86
11	423	2	68	1.25	--	--	--	--	--	--	0.68	7.7	7.7	8.8	14.7	19.4	28.0	28.0	32.2	>164
Eglin AFB, Fla., Traverse 2																				
1	553	2	55	2.07	--	--	--	--	--	--	0.48	5.9	5.9	9.7	23.1	50.0	50.0	50.0	50.0	64
2	78	2	464	1.07	184	4.0	360	--	75	2	2.49	--	--	--	--	--	--	--	--	>164
3	290	2	58	0.79	--	--	--	--	--	--	1.63	12.1	12.1	18.4	24.1	24.1	28.5	31.8	36.7	131
4	340	2	59	1.38	--	--	--	--	--	--	0.58	8.6	8.6	10.2	13.5	15.7	22.2	35.0	49.6	150
5	330	2	56	0.92	--	--	--	--	--	--	0.63	8.5	8.5	10.1	14.2	16.6	20.0	34.7	40.0	124
6	741	2	60	0.95	--	--	--	--	--	--	0.42	9.4	9.4	10.0	11.7	15.3	18.1	23.3	31.2	150
7	106	2	391	1.14	184	12	1020	--	106	2	2.20	--	--	--	--	--	--	--	--	>164
8	324	2	58	1.13	--	--	--	--	--	--	0.87	8.8	8.8	10.2	13.5	16.5	20.2	26.4	31.2	145
9	347	2	51	0.57	--	--	--	--	--	--	0.59	6.6	6.6	8.2	12.8	16.0	20.0	24.5	30.0	102
10	207	2	55	0.92	--	--	--	--	--	--	0.88	7.1	7.1	10.1	16.4	27.0	32.2	35.5	36.8	85
11	213	2	57	1.55	--	--	--	--	--	--	0.52	6.2	6.2	10.4	28.9	35.5	35.5	35.5	35.5	38
12	550	2	67	0.78	--	--	--	--	--	--	1.05	7.4	7.4	10.7	18.7	28.6	35.0	35.0	40.5	140
13	633	2	59	1.09	--	--	--	--	--	--	0.48	8.4	8.4	12.1	20.7	25.3	35.7	46.2	56.7	105
14	584	2	73	2.06	--	--	--	--	--	--	0.49	7.4	7.4	10.1	26.8	42.6	50.3	50.3	50.3	66
15	152	2	51	4.95	90.0	6.2	5.2	27.0	18.7	1	0.48	9.4	9.4	10.2	15.5	20.0	20.0	30.0	42.0	133
16	190	2	61	6.84	--	--	--	--	--	--	0.55	8.5	8.5	11.5	21.2	26.8	30.0	34.7	35.0	158

(Continued)

Table II (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
											Eglin AFB, Fla., Traverse 3									
1	378	2	144	0.80	--	--	--	--	--	--	1.27	10.0	10.0	49.6	--	--	--	--	--	60
2	628	2	69	1.17	--	--	--	--	--	--	0.44	3.7	8.7	10.9	16.0	20.0	30.0	30.0	34.7	112
3	235	2	63	0.85	--	--	--	--	--	--	0.69	6.5	8.5	10.5	15.0	21.2	26.8	34.7	42.6	112
4	212	2	58	1.00	--	--	--	--	--	--	0.87	10.0	10.0	14.6	18.1	21.2	26.8	--	--	126
5	408	2	63	1.54	--	--	--	--	--	--	0.44	7.8	7.8	9.3	14.5	25.0	33.0	33.0	33.0	74
6	330	2	71	1.45	--	--	--	--	--	--	0.52	7.2	7.2	11.2	18.9	25.0	28.9	35.5	35.5	90
7	296	2	69	0.51	--	--	--	--	--	--	0.75	7.5	7.5	11.8	17.7	25.0	35.5	35.5	75.0	102
8	355	2	66	3.01	--	--	--	--	--	--	2.00	7.9	7.9	8.7	12.1	20.4	35.5	35.5	35.5	113
9	258	2	59	1.33	--	--	--	--	--	--	0.92	10.2	10.2	11.2	13.9	19.3	21.7	29.4	41.6	140
10	488	2	65	1.10	--	--	--	--	--	--	1.75	7.7	7.7	10.9	22.6	30.0	30.0	30.0	30.0	96
											Eglin AFB, Fla., Traverse 0									
1	--	2	70	0.0	--	--	--	--	--	--	0.87	--	--	--	--	--	--	--	--	>164
2	--	2	56	0.0	--	--	--	--	--	--	0.92	--	--	--	--	--	--	--	--	>164
3	--	2	96	0.27	--	--	--	--	--	--	0.83	--	--	--	--	--	--	--	--	>164
4	--	2	291	1.40	--	--	--	--	--	--	0.20	--	--	--	--	--	--	--	--	>164
5	--	2	54	0.0	--	--	--	--	--	--	0.87	--	--	--	--	--	--	--	--	>164
6	--	2	49	0.0	--	--	--	--	--	--	0.92	--	--	--	--	--	--	--	--	>164
7	--	2	82	0.27	--	--	--	--	--	--	0.83	--	--	--	--	--	--	--	--	>164
8A	354	2	130	0.46	--	--	--	--	--	--	1.48	9.3	9.3	12.7	15.1	16.9	19.1	21.1	21.9	12
9B	200	2	24	0.58	--	--	--	--	--	--	1.93	4.0	4.0	5.2	6.7	14.3	20.2	20.2	20.2	75
10C	210	2	60	0.45	--	--	--	--	--	--	0.61	7.3	7.3	8.8	11.5	13.5	20.7	30.8	37.8	112
11D	1000	2	259	1.60	--	--	--	--	--	--	0.82	--	--	--	--	--	--	--	--	160
12E	450	2	61	1.30	--	--	--	--	--	--	0.60	13.7	13.7	13.7	18.2	20.4	24.1	29.7	37.1	>164
13F	388	2	76	2.24	--	--	--	--	--	--	0.61	5.3	5.3	9.0	24.3	--	--	--	--	34
14G	450	2	55	1.30	--	--	--	--	--	--	0.60	15.2	15.2	15.2	18.7	20.7	24.1	29.7	37.1	>164
15H	365	2	105	0.26	--	--	--	--	--	--	0.54	5.5	5.5	29.4	--	--	--	--	--	34
16G	450	2	53	1.30	--	--	--	--	--	--	0.60	15.2	15.2	15.2	19.7	20.7	24.1	29.7	37.1	>164
17	--	2	67	0.0	--	--	--	--	--	--	0.20	--	--	--	--	--	--	--	--	>164
											Houghton, Mich., Traverse 1									
1	550.0	2	255	1.70	--	--	--	--	--	--	1.87	--	--	--	--	--	--	--	--	58
2	750.0	2	288	2.60	--	--	--	--	--	--	1.72	11.2	14.4	28.3	46.2	--	--	--	--	38
3	1046.0	2	231	0.60	--	--	--	--	--	--	2.14	--	--	--	--	--	--	--	--	40
4	634.0	2	136	0.60	90	3.5	3.5	11	50.0	1	1.75	6.6	7.8	10.8	19.7	40.4	60.0	60.0	60.0	11
5	535.0	2	161	1.37	193	2.05	60.0	--	76.4	2	1.04	--	--	--	--	--	--	--	--	164
6	2.85	2	162	9.50	90	3.5	35.0	11	55.0	1	1.82	6.6	7.2	9.6	15.5	34.6	--	--	--	16
7	33.0	2	750	0.10	200	6.3	24.0	--	33.0	2	1.44	--	--	--	--	--	--	--	--	164
8	517.0	2	135	1.37	90	4.2	4.2	12	45.0	1	1.44	6.7	8.3	9.7	13.8	22.7	30.0	34.6	42.4	22
9	200.0	2	148	6.67	90	2.5	2.5	10	50.0	1	2.10	5.7	6.2	7.3	11.5	28.9	35.0	35.0	35.0	14
											Houghton, Mich., Traverse 1 (MWB)									
1	550.0	2	255	1.70	--	--	--	--	--	--	1.87	--	--	--	--	--	--	--	--	60
2	750.0	2	288	2.60	--	--	--	--	--	--	1.72	11.2	14.4	28.3	46.2	--	--	--	--	40
3	1046.0	2	231	0.60	--	--	--	--	--	--	2.14	--	--	--	--	--	--	--	--	60
4	634.0	2	136	0.80	90	3.5	3.5	11	50.0	1	1.75	6.6	7.8	10.0	19.7	40.4	60.0	50.0	60.0	53
5	535.0	2	161	1.37	193	2.05	60.0	--	76.4	2	1.04	--	--	--	--	--	--	--	--	>164
6	2.85	2	162	0.50	90	3.5	35.0	11	55.0	1	1.62	6.6	7.2	9.6	15.5	34.6	--	--	--	80
7	33.0	2	750	0.10	200	6.3	24.0	--	33.0	2	1.44	--	--	--	--	--	--	--	--	>164
8	517.0	2	135	1.37	90	4.2	4.2	12	45.0	1	1.44	6.7	8.3	9.7	13.0	22.7	30.0	34.6	42.4	50
9	200.0	2	148	6.67	90	2.5	2.5	10	50.0	1	2.10	5.7	6.2	7.3	11.5	28.9	35.0	35.0	35.0	20
											Houghton, Mich., Traverse 2									
1	130.0	2	146	12.31	--	--	--	--	--	--	2.75	9.1	12.8	14.9	16.3	22.2	28.3	32.7	46.2	75
2	420.0	2	152	1.68	90	3.7	3.7	13.5	25.0	1	1.43	6.9	8.1	9.0	11.5	14.6	17.5	22.1	24.7	45
3	250.0	2	101	16.80	90	5.2	5.2	16.5	20.0	1	2.81	7.6	8.6	10.1	13.8	22.7	26.8	42.0	42.4	80
4	136.0	2	118	5.15	90	6.5	6.5	23.0	14.0	1	2.25	9.8	9.9	11.8	16.0	30.0	38.0	--	--	12
5	114.0	2	119	23.91	--	--	--	--	--	--	2.68	4.5	9.9	28.8	14.6	27.3	26.0	24.6	24.6	52
6	670.0	2	134	0.81	90	6.5	6.5	20.0	20.0	1	1.72	7.9	10.8	11.2	13.2	17.4	26.4	36.2	38.7	30
7	500.0	2	111	0.34	90	5.0	5.0	15.0	35.0	1	1.82	6.9	7.0	8.0	9.1	12.2	16.6	30.0	30.0	18
8	380.0	2	115	0.26	90	5.0	5.0	18.0	50.0	1	2.83	8.8	10.0	11.5	13.4	17.3	22.7	34.6	42.4	22
9	900.0	2	102	0.26	90	4.0	4	18.0	45.0	1	2.90	7.7	9.2	10.4	12.5	13.8	21.8	25.8	31.6	40
10	550.0	2	121	0.91	90	4.5	4	7.5	60.0	1	2.18	8.0	9.6	11.3	16.6	21.2	30.0	30.0	30.6	8

(Continued)

(Sheet 6 of 8)

Table 10 (Continued)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft
										Houghton, Mich., Traverse 2 (M&B)										
1	130.0	2	146	12.31	--	--	--	--	--	--	2.75	9.4	12.8	14.9	16.3	22.2	28.3	32.7	36.2	100
2	420.0	2	152	1.68	90	3.7	3.7	13.5	25.0	1	1.43	6.9	8.1	9.0	11.5	16.6	17.5	22.1	24.7	90
3	250.0	2	101	16.00	90	5.2	5.2	16.5	20.0	1	2.81	7.6	8.6	10.1	13.8	22.7	26.0	42.4	42.4	80
4	136.0	2	118	5.15	90	6.5	6.5	23.0	74.0	1	2.25	9.0	9.9	11.8	16.0	30.0	35.0	--	--	60
5	114.0	2	119	23.91	--	--	--	--	--	--	2.60	6.3	7.7	9.5	10.4	14.1	19.0	30.0	50.0	100
6	670.0	2	134	0.81	90	6.5	6.5	20.0	20.1	1	1.72	7.9	10.0	11.2	13.2	17.4	26.4	36.2	38.7	75
7	500.0	2	111	0.34	90	5.0	5.0	15.0	35.0	1	1.82	6.9	7.0	8.0	9.1	12.2	16.6	30.0	30.0	66
8	380.0	2	115	0.26	90	5.0	5.0	18.0	50.0	1	2.83	8.8	10.0	11.5	12.4	17.3	22.7	34.6	42.4	66
9	900.0	2	102	0.26	90	4.0	4.0	18.0	45.0	1	2.90	7.7	9.2	10.4	12.5	13.8	21.0	25.8	31.6	75
10	550.0	2	121	0.91	90	4.5	4.5	13.5	60.0	1	2.18	8.0	9.6	11.3	16.6	21.2	30.0	30.0	30.0	50
										Houghton, Mich., Traverse 3										
1	565.0	2	147	1.13	90	3.0	3.0	7.0	40.0	1	3.46	11.4	11.4	13.0	14.8	17.4	18.8	23.6	27.2	44
2	135.0	2	170	11.11	--	--	--	--	--	--	3.96	10.2	10.2	11.2	11.7	13.7	15.7	18.7	22.1	24
3	200.0	2	112	0.0	90	4.0	4.0	15.0	30.0	1	1.92	10.6	10.6	14.1	15.5	16.0	18.1	18.1	20.0	19
4	735.0	2	148	1.16	90	4.0	4.0	15.0	45.0	1	4.58	7.1	7.1	10.5	13.0	19.1	22.0	27.2	36.2	64
5	347.0	2	133	1.07	90	4.5	4.5	15.0	30.0	1	4.16	11.2	11.2	11.2	12.0	13.5	15.7	18.1	23.3	100
6	508.0	2	160	2.35	--	--	--	--	--	--	3.05	--	--	--	--	--	--	--	--	15
7	210.0	2	126	3.33	90	3.5	3.5	12.0	27.5	1	2.99	6.5	6.5	10.2	15.1	35.4	50.0	50.0	50.0	40
8	225.0	2	148	3.08	90	3.0	3.0	15.0	35.0	1	3.08	5.7	5.7	10.4	17.7	28.9	35.4	35.4	40.0	23
										Houghton, Mich., Traverse 3 (M&B)										
1	200.0	2	147	1.13	90	3.0	3.0	7.0	40.0	1	3.48	11.4	11.4	13.0	14.8	17.4	18.8	23.6	27.2	150
2	155.0	2	170	11.11	--	--	--	--	--	--	3.96	10.2	10.2	11.2	11.7	13.7	15.7	18.7	22.1	150
3	200.0	2	112	0.0	90	4.0	4.0	15.0	30.0	1	1.92	10.6	10.6	14.1	15.5	16.0	[illegible]	[illegible]	20.0	75
4	735.0	2	148	1.16	90	4.0	4.0	15.0	30.0	1	4.58	7.1	7.1	10.5	13.0	19.1	[illegible]	27.2	36.2	75
5	347.0	2	133	1.07	90	4.5	4.5	15.0	30.0	1	4.16	11.2	11.2	11.2	12.0	13.5	15.7	[illegible]	23.3	100
6	508.0	2	160	2.35	--	--	--	--	--	--	3.05	--	--	--	--	--	--	--	--	15
7	210.0	2	126	3.33	90	3.5	3.5	12.0	27.5	1	2.99	6.5	6.5	10.2	15.1	35.4	50.0	50.0	50.0	100
8	225.0	2	148	3.08	90	3.0	3.0	15.0	35.0	1	3.08	5.7	5.7	10.4	17.7	28.9	35.4	35.4	40.0	80
										Houghton, Mich., Traverse 0										
1	330.0	2	139	1.5	90	2.5	2.5	12.0	20.0	1	1.72	8.0	8.0	9.1	10.5	14.1	23.7	[illegible]	41.8	115
2	100.0	2	110	25.9	--	--	--	--	--	--	2.68	6.3	7.7	9.5	10.4	14.1	19.0	50.0	[illegible]	52
3	300.0	2	134	0.81	90	6.5	6.5	20.0	20.0	1	1.72	2.6	2.6	2.9	3.9	6.2	26.4	36.2	53.7	30
										Ft. Knox, Ky., Traverse 1										
1	1995.0	1	59	0.0	90	7.0	7.0	25.0	40.0	1	0.57	7.8	9.6	15.0	17.4	20.0	20.0	20.0	21.4	85
2	845.0	1	58	0.0	90	5.0	5.0	20.0	45.0	1	0.64	6.0	7.2	11.3	12.0	14.6	16.6	20.0	24.5	85
3	2860.0	1	40	0.0	190	44.0	128.0	--	953.0	2	0.76	7.0	7.7	12.0	17.0	23.4	31.8	32.6	33.4	82
4	900.0	1	43	0.0	90	3.5	3.5	125.0	75.0	1	0.83	7.8	7.8	12.8	17.0	21.1	23.3	24.7	26.5	80
5	650.0	1	25	0.0	186	18.2	24.0	--	62.0	2	2.38	--	--	--	--	--	--	--	--	70
5A	1550.0	1	30	0.0	187	10.8	120.0	--	71.0	2	1.60	--	--	--	--	--	--	--	--	35
6	1825.0	1	28	0.0	--	--	--	--	--	--	0.99	--	--	--	--	--	--	--	--	45
7	675.0	1	30	0.0	90	8.0	8.0	25.0	32.5	1	1.26	6.7	6.7	8.5	10.2	12.9	14.4	18.0	28.9	85
8	950.0	1	31	0.0	--	--	--	--	--	--	1.26	--	--	--	--	--	--	--	--	65
9	1972.0	1	47	0.0	186.5	21.6	36.0	--	986.0	2	1.92	--	--	--	--	--	--	--	--	68
										Ft. Knox, Ky., Traverse 2										
1	1162	1	66	3.6	188.0	22.8	172	--	388.0	2	3.52	17.2	19.2	23.4	23.4	23.4	24.4	26.6	29.7	118
2	381	1	172	4.5	200.0	14.0	189	--	95.2	2	6.06	8.8	10.8	20.2	23.3	26.5	31.3	35.0	40.4	60
3	833	1	163	3.5	--	--	--	--	--	--	2.18	--	--	--	--	--	--	--	--	>164
4	161	1	293	0.9	183.0	4.0	120	--	80.0	2	4.10	--	--	--	--	--	--	--	--	>164
5	843	1	370	2.6	200.0	22.0	96	--	211.0	2	5.60	--	--	--	--	--	--	--	--	50
6	785	1	84	3.9	185.0	228.0	372	--	785.0	2	2.37	7.0	7.4	13.7	17.9	19.6	22.6	23.6	26.8	68
7	840	1	88	9.6	186.5	13.2	300	--	840.0	2	2.98	13.5	13.5	16.6	19.0	28.0	32.3	176.0	176.6	95
8	995	1	596	3.8	--	--	--	--	--	--	1.34	--	--	--	--	--	--	--	--	150
9	402	1	112	7.8	90.0	3.0	3.0	12	40.0	1	1.87	6.6	8.3	13.4	17.3	20.0	22.7	22.7	22.7	80

(Continued)

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Table B1 (Concluded)

Terrain Unit No.	Terrain Unit Distance ft	Surface Type	Surface Strength RCI	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.0 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems 5.5 in.	Obstacle Spacing ft of Stems 7.0 in.	Obstacle Spacing ft of Stems 8.7 in.	Obstacle Spacing ft of Stems 9.8 in.	Recognition Distance, ft
									Terrain Factor Value											
10	508	1	84	8.2	90.0	3.0	3.0	15	35.0	1	3.02	6.8	7.0	9.9	[illegible]	15.3	18.1	24.7	28.6	85
11	1292	1	85	6.5	194.0	17.6	63.0	--	323.0	1	2.59	7.3	8.4	12.7	15.7	20.4	24.7	28.7	29.6	92
12	1828	1	82	7.7	199.4	18.6	18.2	--	366.0	1	3.91	7.4	8.6	11.2	13.4	16.0	19.2	26.6	31.6	75
13	438	1	324	9.2	187.0	8.1	12.0	--	219.0	2	2.64	6.2	7.5	12.9	16.7	17.7	22.4	25.0	25.0	45
14	443	1	194	3.2	197.0	5.2	24.0	--	55.0	2	3.50	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	55
15	819	1	[illegible]	7.8	200.0	75.0	46.0	--	[illegible]	2	2.53	--	--	--	--	--	--	--	--	40
									[illegible] ars, Ky., Traverse 0											
1	750	1	348	2.17	194.0	11.0	60.0	--	250.0	2	2.12	--	--	--	--	--	--	--	--	164
2	550	1	366	2.07	--	--	--	--	--	--	0.86	--	--	--	--	--	--	--	--	100
3	260	1	398	0.0	--	--	--	--	--	--	1.06	28.7	--	--	--	--	--	--	--	55
4	400	1	303	7.3	--	--	--	--	--	--	2.54	--	--	--	--	--	--	--	--	45
5	--	1	341	0.0	205.0	18.0	12.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164
6	--	1	204	0.0	227.0	26	>48.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164
7	--	1	436	0.0	230.5	37.0	15.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164
8	--	1	332	0.0	234	40.0	24.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164
9	--	1	429	0.0	221.0	38.0	24.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164
10	--	1	407	0.0	236.0	38.0	>48.0	--	>197.0	2	--	--	--	--	--	--	--	--	--	164

(Sheet 8 of 8)

Table 92

Classed Terrain Data

Terrain Unit No.	Surface Type	Surface Strength* D	A	W	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition**
											Terrain Factor Complex No.											
											Ft. Sill, Okla., Traverse 1											
1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--
2	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
3	1	1	1	1	1	1	1	1	1	1	1	[illegible]	1	1	1	1	1	1	1	1	3	--
4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	--
5	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
6	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
7	1	1	1	1	1	6	5	1	7	3	2	4	1	1	1	1	1	1	1	1	4	--
8	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
9	1	3	3	3	1	8	3	1	7	3	2	4	1	1	1	1	1	1	1	1	4	--
10	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	4	--
11	1	1	1	1	1	1	1	1	1	1	1	4	[illegible]	1	1	1	1	1	1	1	4	--
12	1	1	1	1	2	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	4	--
13	1	2	2	2	3	8	2	4	7	2	2	4	1	1	1	1	1	1	1	1	4	--
14	1	1	1	1	3	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	4	--
15	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
16	1	1	1	1	1	8	5	3	7	3	2	5	1	1	1	1	1	1	1	1	3	--
17	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
18	1	1	1	1	2	4	6	1	7	2	2	4	1	1	1	1	1	1	1	1	3	--
19	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
20	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	6	--
21	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
22	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
23	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
24	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
											Ft. Sill, Okla., Traverse 2											
1	1	2	2	2	2	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	3	--
2	1	1	1	1	1	6	2	1	7	1	2	2	1	1	1	1	1	1	1	1	3	--
3	1	3	3	3	3	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	3	--
4	1	3	3	3	2	1	1	1	1	1	1	4	1	1	1	1	2	1	1	1	3	--
5	1	3	3	3	3	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	3	--
6	1	4	4	4	2	8	3	1	7	2	2	2	1	1	1	1	1	1	1	1	2	--
7	1	4	4	4	2	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	2	--
8	1	4	4	4	1	4	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
9	1	3	3	3	2	2	1	[illegible]	1	1	1	2	1	1	1	1	1	1	1	1	2	--
10	1	4	4	4	3	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	3	--
11	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
12	1	1	1	1	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	3	--
13	1	3	3	3	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	3	--
											Ft. Sill, Okla., Traverse 3											
1	1	1	1	1	1	6	1	3	7	1	2	2	6	8	8	2	2	2	1	1	2	--
2	1	1	1	1	2	1	1	1	1	1	1	2	8	8	8	2	2	2	1	1	2	--
3	1	2	2	2	3	1	1	1	1	1	1	4	8	8	8	2	2	2	1	1	3	
4	1	1	1	1	2	1	1	1	1	1	1	2	8	8	8	2	2	2	2	2	2	--
5	1	1	1	1	2	6	2	4	7	1	2	3	8	8	8	2	2	2	2	2	2	--
6	1	4	4	4	3	10	3	4	7	3	2	4	2	2	2	2	2	2	2	2	3	--
7	1	1	1	1	3	6	3	1	7	3	2	2	2	2	2	2	2	2	2	2	3	--
8	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	--
9	1	1	1	1	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	6	--
10	1	1	1	1	2	6	2	1	7	1	2	2	1	1	1	1	1	1	1	1	5	--
11	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
12	1	1	1	1	2	8	3	1	7	2	2	4	1	1	1	1	1	1	1	1	4	--
13	1	1	1	1	2	8	1	4	7	1	2	2	1	1	1	1	1	1	1	1	4	--
14	1	1	1	1	4	6	6	1	7	2	2	4	1	1	1	1	1	1	1	1	4	--
15	1	1	1	1	4	8	3	5	7	3	2	7	1	1	1	1	1	1	1	1	4	--
16	1	4	4	4	2	6	3	1	7	1	2	2	1	1	1	1	1	1	1	1	2	--

(Continued)

* Strength for Dry, Average, Wet (when no season desired, use same class for all seasons).
** Terrain factor used only for surface types 4 and 5 (snow).

(Sheet 1 of 6)

Table 82 (Continued)

Terrain Unit No.	Surface Type	Surface Strength B	Surface Strength A	Surface Strength M	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition
												Ft. Sill, Okla., Traverse 3 (Continued)										
17	1	1	1	1	1	6	3	1	7	2	2	2	1	1	1	1	1	1	1	1	4	--
18	1	6	6	6	2	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	4	--
19	1	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	--
20	1	1	1	1	3	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	4	--
21	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
												Ft. Sill, Okla., Traverse 4										
1	1	5	5	5	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	4	--
2	1	5	5	5	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
3	1	5	5	5	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
4	1	4	4	4	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
5	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
6	1	3	3	3	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
7	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
8	1	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
9	1	4	4	4	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
10	1	4	4	4	2	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	2	--
11	1	5	5	5	3	8	6	1	7	7	2	5	2	1	1	1	1	1	1	1	8	--
12	1	4	4	4	3	1	1	1	1	1	1	2	1	1	1	1	[illegible]	1	1	1	2	--
13	1	5	5	5	1	1	1	1	1	1	1	2	1	1	1	1	[illegible]	1	1	1	2	--
												Yuma, Ariz., Traverse 1										
1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
2	2	1	1	1	1	6	5	1	7	3	2	4	3	3	1	1	1	1	1	1	2	--
3	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
4	2	1	1	1	3	4	7	1	7	2	2	4	1	1	1	1	1	1	1	1	2	--
5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
6	2	1	1	1	2	8	6	1	7	2	2	5	6	6	3	3	3	3	1	1	3	--
7	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
8	2	1	1	1	1	4	4	1	7	3	2	5	1	1	1	1	1	1	1	1	2	--
9	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
10	2	1	1	1	1	3	1	1	7	2	2	4	2	2	2	2	2	1	1	1	2	--
11	2	1	1	1	2	4	2	1	7	3	2	3	1	1	1	1	1	1	1	1	2	--
12	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
13	2	1	1	1	1	6	2	3	7	3	2	3	1	1	1	1	1	1	1	1	2	--
14	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	-
15	2	1	1	1	1	8	3	1	7	3	2	4	8	8	2	2	1	1	1	1	2	--
16	2	1	1	1	1	4	1	2	7	1	2	2	1	1	1	1	1	1	1	1	2	--
17	2	1	1	1	1	8	5	1	7	3	2	5	3	3	2	2	1	1	1	1	2	--
18	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
19	2	1	1	1	1	8	2	1	7	4	2	3	7	7	1	1	1	1	1	1	2	--
20	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
21	2	1	1	1	1	9	3	1	7	4	2	3	1	1	1	1	1	1	1	1	2	--
22	2	1	1	1	1	1	1	1	1	1	1	2	6	6	1	1	1	1	1	1	2	--
23	2	1	1	1	1	8	6	1	7	3	2	6	8	8	3	3	3	1	1	1	5	--
24	2	1	1	1	2	7	3	1	7	1	2	2	2	2	1	1	1	1	1	1	2	--
25	2	1	1	1	2	7	1	2	2	7	1	3	2	2	1	1	1	1	1	1	2	--
26	2	1	1	1	2	8	2	1	7	1	2	3	3	3	1	1	1	1	1	1	3	--
27	2	1	1	1	3	3	4	1	7	1	2	4	1	1	1	1	1	1	1	1	2	--
28	2	1	1	1	1	7	1	2	2	7	1	2	2	2	1	1	1	1	1	1	5	--
29	2	1	1	1	1	4	5	1	7	2	2	3	[illegible]	1	1	1	1	1	1	1	2	--
30	2	2	2	2	1	7	1	2	2	7	1	3	2	2	1	1	1	1	1	1	2	--
31	2	1	1	1	2	6	5	1	7	2	2	4	1	1	1	1	1	1	1	1	3	--
32	2	1	1	1	2	6	3	1	7	1	2	3	1	1	1	1	1	1	1	1	3	--
33	2	1	1	1	1	1	1	1	1	1	1	3	3	3	1	1	1	1	1	1	2	--
34	2	1	1	1	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	3	--
35	2	1	1	1	2	8	6	1	7	2	2	6	1	1	1	1	1	1	1	1	3	--
36	2	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	-
37	2	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
38	2	1	1	1	2	8	4	5	7	2	2	5	1	[illegible]	1	1	1	1	1	1	2	--
39	2	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	2	--
40	2	1	1	1	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--

(Continued)

Table B2 (Continued)

Terrain Unit No.	Surface Type	Surface Strength D	Surface Strength A	Surface Strength B	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition
Yuma, Ariz., Traverse 1 (Continued)																						
41	2	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--
42	2	1	1	1	2	1	1	1	1	1	1	4	2	2	1	1	1	1	1	1	2	--
43	2	1	1	1	2	8	2	1	7	2	2	3	1	1	1	1	1	1	1	1	2	--
44	2	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	2	--
45	2	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	2	--
46	2	1	1	1	2	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	2	--
47	2	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	2	--
48	2	1	1	1	2	8	2	1	7	2	2	4	1	1	1	1	1	1	1	1	2	--
49	2	1	1	1	3	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	2	--
50	2	1	1	1	1	1	1	1	1	1	1	6	1	1	1	1	1	1	1	1	3	--
51	2	1	1	1	2	8	6	1	7	1	2	5	1	1	1	1	1	1	1	1	3	--
Yuma, Ariz., Traverse 2																						
1	2	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
Yuma, Ariz., Traverse 3																						
1	2	1	1	1	1	8	2	1	7	2	2	5	1	1	1	1	1	1	1	1	2	--
2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
3	2	1	1	1	4	8	3	1	7	3	2	5	1	2	1	1	1	1	1	1	2	--
4	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
5	2	1	1	1	1	8	3	1	7	2	2	4	3	3	1	1	3	3	1	2	2	--
6	2	1	1	1	2	8	4	1	7	2	2	4	1	1	1	1	1	1	1	1	2	--
7	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
8	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
9	2	1	1	1	2	8	5	1	7	2	2	[illegible]	1	1	1	1	1	1	1	1	3	--
10	2	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--
11	2	1	1	1	2	8	5	1	7	2	2	4	1	1	1	1	1	1	1	1	2	--
12	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	5	--
13	2	1	1	1	2	8	5	1	7	2	2	6	1	1	1	1	1	1	1	1	2	--
14	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
15	2	1	1	1	3	8	6	1	7	2	2	5	1	1	1	2	1	1	1	1	2	--
16	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
17	2	1	1	1	1	8	4	1	7	1	2	4	3	3	3	3	3	3	3	3	2	--
18	2	1	1	1	1	8	3	1	7	2	2	4	2	2	2	2	2	2	2	2	2	--
19	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
20	2	1	1	1	2	8	6	1	7	2	2	4	5	5	5	5	5	5	5	5	3	--
21	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
22	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
23	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	--
Yuma, Ariz., Traverse 4																						
1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
2	2	1	1	1	1	6	4	4	7	1	2	3	1	1	1	1	1	1	1	1	2	--
3	2	1	1	1	1	8	4	1	7	1	2	3	2	2	2	2	2	2	1	1	2	--
4	2	1	1	1	1	6	2	1	7	1	2	2	2	2	2	2	2	2	1	1	2	--
5	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
Yuma, Ariz., Traverse 5																						
1	2	2	2	2	1	1	1	1	1	1	1	3	3	3	1	1	1	1	1	1	2	--
2	2	3	3	3	1	10	4	1	[illegible]	1	2	5	3	3	1	1	1	1	1	1	2	--
3	2	3	3	3	1	1	1	1	1	1	1	6	1	1	1	1	1	1	1	1	2	--
4	2	3	3	3	1	1	1	1	1	1	1	4	3	3	1	1	1	1	1	1	3	--
5	2	5	5	5	2	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	2	--
6	2	3	3	3	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--
7	2	4	4	4	2	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	3	--
8	2	5	5	5	3	[illegible]	4	1	7	1	2	4	1	1	1	1	1	1	1	1	3	--

(Continued)

(Sheet 3 of 6)

Table 15 (Continued)

Terrain Bearing Complex No.

Terrain Unit No.	Surface Type	Surface Strength D	Surface Strength A	Surface Strength [illegible]	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition
Eglin AFB, Fla., Traverse 1																						
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Houghton, Mich., Traverse [illegible]																						
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(Continued)

Table D2 (Continued)

Terrain Unit No.	Surface Type	Surface Strength D	Surface Strength A	Surface Strength B	Slope %	Obstacle Angle deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.0 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems >9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition
											Houghton, Mich., Traverse 2											
1	2	4	4	4	4	1	1	1	1	1	1	4	-	-	8	6	5	4	4	3	3	2
2	2	4	4	4	1	13	1	5	2	2	1	2	8	8	7	-	8	+	5	5	3	2
3	2	4	4	4	4	13	1	5	5	5	1	4	8	-	7	6	5	4	3	3	2	-
4	2	4	4	4	1	13	1	2	6	6	1	3	-	-	-	6	4	4	1	1	7	3
5	2	4	4	4	5	1	1	2	1	1	1	4	-	-	-	6	4	4	4	4	3	2
6	2	4	4	4	1	13	2	5	6	5	1	3	8	-	7	-	6	5	4	3	4	3
7	2	4	4	4	1	15	1	5	5	4	1	3	8	8	8	-	-	6	4	8	6	3
8	2	4	4	4	1	13	1	3	5	1	1	4	+	-	7	6	6	5	4	3	5	3
9	2	4	4	4	1	15	1	5	5	3	1	4	8	-	7	-	6	5	5	8	3	3
10	2	4	4	4	1	15	1	5	5	3	1	3	8	-	-	6	5	4	4	4	8	2
											Houghton, Mich., Traverse 2 (MMD)											
1	2	4	4	4	4	1	2	2	2	1	1	8	-	-	6	6	.	4	4	5	2	--
2	2	4	4	4	1	13	1	1	5	5	2	2	6	8	-	-	6	6	5	5	2	--
3	2	4	4	4	4	13	2	5	5	5	1	8	8	-	-	6	5	4	3	5	2	--
4	2	4	4	4	5	13	2	5	6	6	2	3	-	-	-	6	4	4	1	1	3	--
5	2	4	4	4	5	1	1	2	2	2	1	8	8	8	-	-	8	5	3	3	2	--
6	2	4	4	4	2	13	-	5	6	5	2	2	8	-	-	7	6	5	4	5	3	--
7	2	4	4	4	1	15	1	5	5	3	1	8	-	-	7	6	+	6	4	4	3	--
8	2	4	4	4	1	15	1	5	5	3	2	8	-	-	-	6	6	5	4	3	3	--
9	2	4	4	4	2	13	1	5	5	3	1	4	8	-	.	-	6	5	5	4	3	--
10	2	4	4	4	1	13	1	7	5	3	1	5	6	-	-	8	5	4	4	4	2	--
											Houghton, Mich., Traverse 3											
1	2	4	8	4	1	13	2	5	4	5	1	4	-	-	-	6	6	5	5	4	3	--
2	2	3	3	3	8	2	1	2	1	1	.	5	-	.	-	-	8	6	5	5	5	--
3	2	4	4	4	1	13	.	5	5	4	2	3	-	-	6	6	8	6	6	5	6	--
4	2	4	4	4	1	13	2	5	3	5	1	6	4	4	7	-	5	5	4	4	5	--
5	2	4	4	4	1	13	.	5	5	4	1	5	-	-	-	-	6	6	6	5	2	--
6	2	4	4	4	2	2	1	1	1	1	2	4	1	1	1	.	1	1	1	1	-	--
7	2	4	4	4	2	13	1	5	5	4	1	4	8	8	-	6	4	3	3	3	3	--
8	2	4	4	4	2	13	1	5	5	4	1	4	8	8	-	6	4	8	4	3	5	--
											Houghton, Mich., Traverse 3 (MMD)											
1	2	4	4	4	1	13	2	5	4	3	2	4	-	-	-	6	6	5	5	4	2	--
2	2	3	3	3	4	1	1	1	1	1	1	5	-	-	-	-	6	6	5	5	2	--
3	2	4	4	4	1	13	1	5	5	4	2	3	-	-	6	6	8	6	6	5	3	--
4	2	4	4	4	1	13	1	5	5	5	1	6	8	8	-	-	5	5	4	4	3	--
5	2	4	4	4	1	13	1	5	5	4	2	5	-	-	-	-	6	6	6	5	2	--
6	2	4	4	4	2	1	1	1	1	1	1	4	1	1	1	1	2	1	1	1	-	--
7	2	4	4	4	2	15	1	5	5	4	.	4	8	8	-	6	4	3	3	3	2	--
8	2	4	4	4	2	13	2	5	5	4	1	4	8	8	-	6	4	4	4	3	2	--
											Ft. Amo Ga., Traverse 1											
1	1	6	6	6	1	15	2	5	6	5	1	2	8	-	6	6	5	5	5	5	2	..
2	1	6	6	6	1	13	1	5	6	3	1	2	8	6	-	-	6	6	5	5	2	..
3	1	7	7	7	1	6	-	1	-	1	2	2	6	8	-	6	5	4	4	4	2	..
4	1	6	6	6	1	13	1	5	5	2	1	2	8	8	-	6	5	5	5	4	2	--
5	1	8	8	8	2	6	5	3	7	3	2	3	1	1	1	1	1	1	1	1	3	..
5A	1	8	8	8	1	6	3	1	7	2	2	3	1	1	1	1	2	1	1	1	4	--
6	1	8	8	8	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	2	3	--
7	1	8	-	8	1	15	2	5	6	4	2	2	8	8	-	-	-	6	5	4	2	--
8	1	8	8	8	-	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	--
9	1	6	6	6	1	6	5	2	7	1	2	3	1	1	1	1	1	1	1	1	3	--

(Continued)

Table D2 (Concluded)

Terrain Unit No.	Surface Type	Surface Strength D	Surface Strength A	Surface Strength W	Slope %	Obstacle Angle Deg	Obstacle Vertical Magnitude in.	Obstacle Base Width in.	Obstacle Length ft	Obstacle Spacing ft	Obstacle Spacing Type	Surface Roughness	Obstacle Spacing ft of Stems >0 in.	Obstacle Spacing ft of Stems >1.9 in.	Obstacle Spacing ft of Stems >2.4 in.	Obstacle Spacing ft of Stems >3.9 in.	Obstacle Spacing ft of Stems >5.5 in.	Obstacle Spacing ft of Stems >7.0 in.	Obstacle Spacing ft of Stems >8.7 in.	Obstacle Spacing ft of Stems 9.8 in.	Recognition Distance, ft	Snow Depth or Snow Moisture Condition
												Ft. Knox Ky., Traverse 2										
1	1	5	5	5	2	6	2	1	7	1	2	4	6	5	5	5	5	5	4	4	2	--
2	1	3	3	3	[illegible]	8	3	1	7	[illegible]	2	7	7	7	5	5	4	4	4	3	3	--
3	1	3	3	3	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	--
4	1	1	1	1	1	4	1	1	7	2	2	5	1	1	1	1	1	1	1	1	2	--
5	1	1	1	1	2	4	5	1	7	1	2	7	1	1	1	1	1	1	1	1	3	--
6	1	5	5	5	2	6	5	1	7	1	2	3	8	8	6	6	5	5	5	4	3	--
7	1	5	5	5	3	6	3	1	[illegible]	1	2	4	6	6	6	5	4	4	2	2	2	--
8	1	1	1	1	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	--
9	1	4	4	4	3	13	1	5	5	1	1	3	8	7	6	6	5	5	5	5	2	--
10	1	5	5	5	3	13	1	5	5	4	1	4	8	8	7	7	6	6	5	4	2	--
11	[illegible]	5	5	5	3	8	4	1	7	1	2	4	8	7	7	6	5	5	4	4	2	--
12	1	5	5	5	3	8	5	4	7	1	2	5	8	7	7	6	6	5	4	4	3	--
13	1	1	1	1	3	6	2	4	7	1	2	4	8	9	7	6	6	[illegible]	5	5	3	--
14	1	3	3	3	2	8	1	3	7	2	2	4	3	3	3	3	[illegible]	3	3	3	3	--
15	1	5	5	5	2	8	2	2	7	2	2	3	1	1	1	1	1	1	1	1	3	--

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In accordance with ER 70-2-3, paragraph 6c(1)(b), dated 15 February 1973, a facsimile catalog card in Library of Congress format is reproduced below.