

**U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY**

Descriptions and Elevations for First Order, Class II
Leveling Bench Marks in the vicinity of Medicine Lake, California

by

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Note added in proof:

Jack W. Kleinman died in a kayaking accident on the White Salmon River on February 12, 1994. He served as a crew chief for the Medicine Lake leveling surveys and played a key role in establishing the network. Jack thrived on challenges. For those who knew him, Jack's death poses the challenge to live by the principles he cherished: integrity, hard work, and an intense appreciation for nature's wonders. Thus will his spirit live on in the hearts of those he touched.

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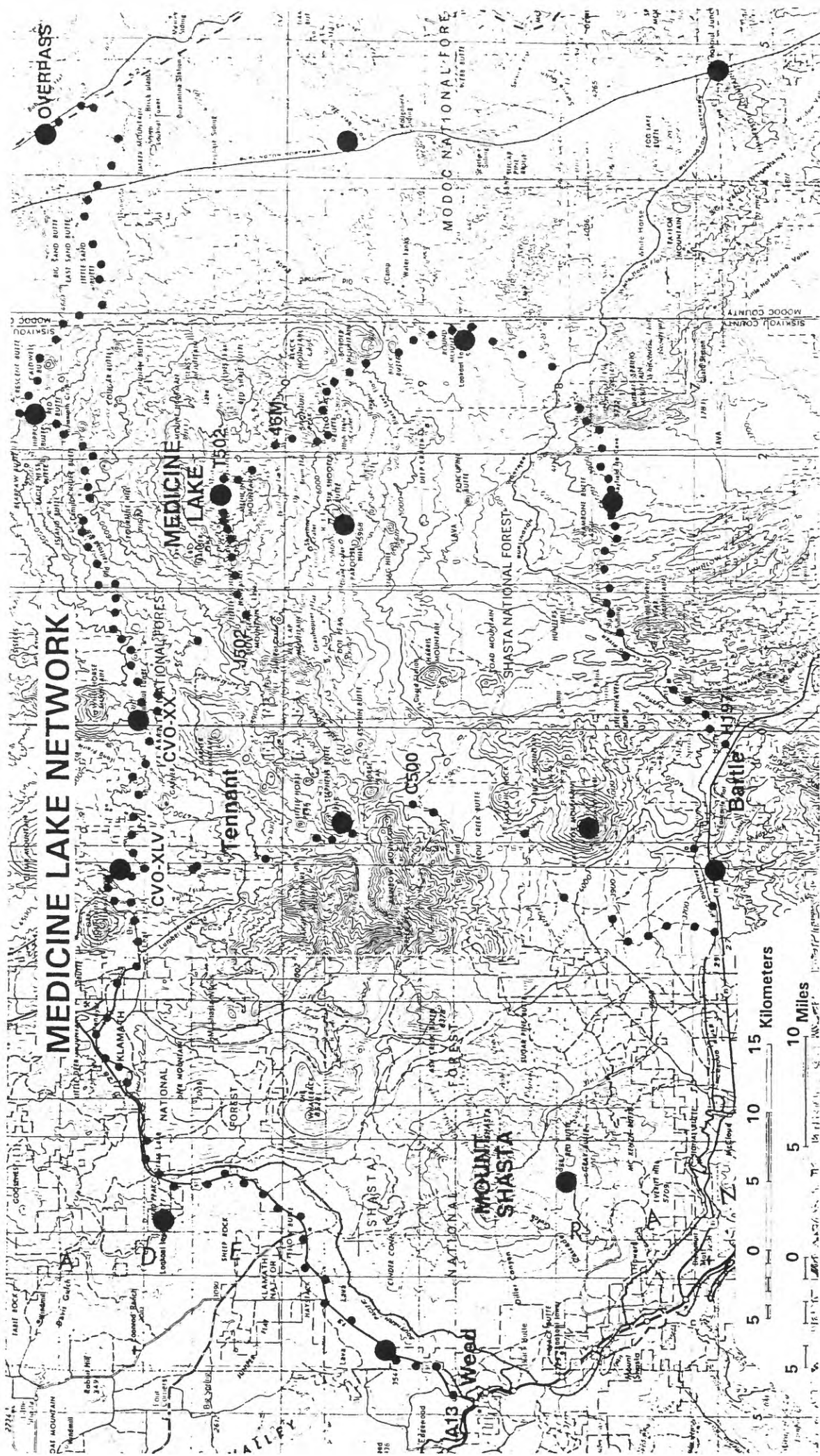


Figure 1 - Map of network area. The small black dots refer to bench marks which were recovered from the 1954 C&GS survey. New marks set by Cascades Volcano Observatory (CVO) crews to replace marks missing or destroyed since 1954 are not shown. The larger black dots refer to marks used for a regional Global Positioning System survey, and are not pertinent to this report. The west-to-east line from Weed to OVERPASS was surveyed by CVO crews in 1990. The loop in the center of the map including Tenent, Bartle, and Medicine Lake was surveyed in 1989. The approximate locations of bench marks CVO-XLV and CVO-XX, two marks common to both surveys, are shown.

INTRODUCTION

In 1989 and 1990, the Cascades Volcano Observatory (CVO) ran leveling campaigns in the Medicine Lake area of northern California. Elevation differences between bench marks were compared to a 1954 leveling survey conducted by the Coast and Geodetic Survey (C&GS). The CVO crew used existing bench marks wherever possible, and installed new bench marks to replace any marks found to be missing or destroyed since the 1954 survey. The goal was to study vertical ground displacements which might have occurred during the intervening time period owing to the proximity of Medicine Lake volcano (see Dzurisin and others, 1991).

The survey was run in two main campaigns. In 1989, a loop of nearly 200 kilometers (and containing the portion along the shore of Medicine Lake itself) was surveyed. In 1990, a west-to-east line including a portion of the northern part of the previous year's loop was run. The descriptions and elevations in this report are also organized in this way. Listed first is the west-east line, from the town of Weed to bench mark **OVERPASS**, south of the town of Tule Lake along Highway 139. The large loop is divided into two sections, both beginning at bench marks located on the Weed-Overpass line, then going south to the town of Bartle. The western of the two half-loops begins at bench mark **CVO-XLV**, north of the town of Tennant, then runs south and east over Stevens Pass to bench mark **H 197** just northeast of Bartle. The eastern of the two half-loops begins at bench mark **CVO-XX** and runs southeast past Medicine Lake itself, then to the south and west also ending at **H 197** to the northeast of Bartle. See Figure 1.

SURVEY PROCEDURE

Surveys by the Cascades Volcano Observatory (CVO) are conducted following the guidelines established by the Federal Geodetic Control Committee (FGCC, 1984) for first-order, class-II level surveys (FGCC, 1980; Schomaker and Berry, 1981). Reading sequence was as follows: backsight low scale, backsight stadia, foresight low scale, foresight stadia, foresight high scale, and backsight high scale. Maximum allowable height differences between low scale and high scale readings was 0.030 cm. Stadia imbalance for each setup between backsight rod and foresight rod was kept within five meters; stadia imbalance between bench marks was also kept within five meters, although a maximum imbalance of 10 meters is allowed (FGCC, 1980). All raw survey data as well as the required internal data checking were recorded and calculated using a Hewlett-Packard 71B hand-held computer (Yamashita, 1989). Temperature readings were taken at 0.5 m and 1.0 m above ground at each set-up to use for temperature corrections.

All 1989 and 1990 surveys were run using a magnetically shielded Wild NA2 self-leveling pendulum level gun with a micrometer plate, and two Wild 3-m precise invar rods supported with stays. A collimation test was performed on the level instrument before the beginning of each surveying day, and adjacent sections were run in opposing directions to minimize the effects of pin settling. The level rods are calibrated annually or bi-annually by the National Bureau of Standards (NBS) in Gaithersburg, MD. For more information on the procedures used in this type of survey, see Yamashita and Kaiser, 1992.

DATA

Corrections for the index of refraction of the light path, changes in length of the invar strip due to temperature differences, and a rod scale error (rod correction) as determined by NBS for the paired rods used have been applied. Data used from the 1954 C&GS survey were obtained from the National Geodetic Survey and it is assumed that all corrections were applied to the published data.

In tabulating the data for both the 1989 and 1990 CVO surveys, we have arbitrarily held fixed the 1954 CG&S elevation of bench mark **H 197**, at the southeast part of the loop near Bartle, California. All listed elevations and elevation differences are internally consistent relative to this mark. Except where noted within the following benchmark descriptions, the benchmark titles used in this report are as stamped on the bench marks themselves.

REFERENCES

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ACKNOWLEDGMENTS

The authors would like to thank Dan Dzurisin, the project leader, for his support during the survey and all the participants of the 1989 and the 1990 surveys.

Appendix 1 - BENCHMARK DESCRIPTIONS

Part 1: Weed, California to south of Tule Lake, California

From the town of Weed north along Highway 97, then east along railroad tracks to just west of the town of Bray.

A 13 1913

This mark is located in the town of Weed, 0.2 km (0.1 mi) southeast along Alma Street from its intersection with Highway 97, 22.9 m (75 ft) east of a 2.4 x 13.7 m (8 x 45 ft) propane gas tank, and set in the top of 0.6 x 0.6 m (2 x 2 ft) square concrete footing.

CVO 9009

1.7 km (1.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, on the northeast end of a deep road cut, 11 m (35 ft) north of the centerline of the highway, about 1 m (3 ft) above the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

V 494

3.7 km (2.3 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, approximately 6 m (20 ft) north of the entrance to a gravel area on the east side of the highway, (there is an electrical sub-station on the west side of the highway), approximately 15.2 m (50 ft) east of the centerline of the highway, about 1.2 m (4 ft) above the road, and set in the top of an embedded boulder.

W 494

5.1 km (3.15 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, on the east slope of a hill and road cut, 3.7 m (12 ft) west of a fence line, 19 m (62 ft) northwest of the centerline of the road, about 4.6 m (15 ft) above the road level and 1.2 m (4 ft) above the ground level, and set in the top of a 1 x 1 m (3 x 3 ft) embedded boulder.

CVO 9006

6.6 km (4.1 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, at a steep drop-off on the north side of the road, approximately 23 m (75 ft) north of the centerline of the road, about 6.1 m (20 ft) below the road and 1 m (3 ft) above the ground level, and set in the top of an embedded boulder.

CVO 9080

8.1 km (5.0 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, at the north end of a long downgrade and a "KEEP RIGHT EXCEPT TO PASS" sign on the west side of the highway, 13.7 m (45 ft) east of the centerline of the road,

5.5 m (18 ft) south of a 1.2 x 1.5 m (4 x 5 ft) exposed boulder, about 1.1 m (3.5 ft) above the road, and set in the top of a 1.5 x 1.8 m (5 x 6 ft) embedded boulder partially covered by manzanita bushes. (*Bench mark CVO 9080 is about 15.2 m (50 ft) south of bench mark Y 494.*)

Y 494

8.1 km (5.0 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, at the north end of a long downgrade and a "KEEP RIGHT EXCEPT TO PASS" sign on the west side of the highway, 10.7 m (35 ft) east of the centerline of the road, 1.4 m (4.5 ft) southeast of a 0.8 m (2.5 ft) diameter pine tree, about 0.3 m (1 ft) lower than the road, and set in the top of an outcrop. (*Bench mark Y 494 is about 15.2 m (50 ft) north of bench mark CVO 9080.*)

ALTON AZI

9.7 km (6.1 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, at a side road with a heavy metal gate on the northwest side of the highway, approximately 38 m (125 ft) northeast of the metal gate, approximately 30.5 m (100 ft) northwest of the centerline of Highway 97, 10.7 m (35 ft) northwest of the fence line, about 2.1 m (7 ft) above the road, and set in the top of an embedded boulder.

A 495 RESET

11.3 km (7.0 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, approximately 107 m (350 ft) north of a short 3 m (10 ft) high road cut, approximately 18.3 m (60 ft) east of the centerline of the road, about the same level as the road, and set in the top of a small piece of exposed rock.

CVO 9008

12.6 km (7.8 mi) northeast along Highway 97 from its intersection with Alma Street in Weed, at the intersection of a paved road leading northwest, approximately 14 m (45 ft) northwest of the centerline of Highway 97, 9 m (30 ft) west of the center of the side road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO 9007

Approximately 30.4 m (100 ft) southwest along Highway 97 from the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), approximately 15.2 m (50 ft) southeast of the centerline of the road, at the east end of a large gravel turnout, 2.1 m (7 ft) west of the north gate support of a metal gate, enclosed in a 15 cm (6 in) diameter (PVC) pipe, and attached to a rod driven to refusal.

CVO 9005

1.3 km (0.8 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from

its intersection with Alma Street in Weed), at a large gravel turnout on the northwest side of the highway, approximately 23 m (75 ft) west of the centerline of the highway, 2.1 m (7 ft) east of a fence line, about 1.5 m (5 ft) above the road, and attached to a rod driven to refusal.

D 495 RESET

3.5 km (2.2 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at a sign on the north side of the highway marked "WEED 10 REDDING 82 SACRAMENTO 235", approximately 91.4 m (300 ft) west of a 6.1 m (20 ft) high lava knoll, approximately 46 m (150 ft) northeast of the above referenced sign, 32.4 m (106 ft) north of the centerline of the road, about 0.6 m (2 ft) above the road, and set in the top of a concrete post.

E 495 RESET

5.2 km (3.2 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at the south end of a long, 6 m (20 ft) deep road cut, approximately 46 m (150 ft) east of the centerline of the road, about 4.6 m (15 ft) above the road, and set in the top of a boulder. There is a California Division of Highways bench mark about 23 m (75 ft) west of this mark.

F 495

7.1 km (4.4 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), approximately 122 m (400 ft) northwest of Highway 97, 16.5 m (54 ft) southeast of the remains of an old roadbed, about 4.6 m (15 ft) lower than Highway 97, about 0.8 m (2.5 ft) lower than the old roadbed, and set in the top of a rock ledge.

G 495

9.0 km (5.6 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at a rock quarry on the northwest side of the highway and a "Klamath National Forest" sign on the southeast side of the road, approximately 54 m (175 ft) northwest of the centerline of the road, at the southeast end of the rock quarry, about 6.1 m (20 ft) lower than road, and cemented into an embedded boulder.

H 495

10.2 km (6.35 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), then 0.3 km (0.2 mi) north along an old paved road from a locked wire gate, at a sand pit, 17.7 m (58 ft) east of the center of

the old road, about 2.5 m (8 ft) above the road, about 0.2 m (0.5 ft) above the ground level on the north side, about 1.2 m (4 ft) above the ground level on the south side, and set in the top of a rock outcrop.

J 495

11.5 km (8.1 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at the north side of the Deer Mtn. Lodge and a track road leading to the east, 12 m (40 ft) east of a "LANE ENDS MERGE LEFT" sign, 1.5 m (5 ft) west of the corner post of a fence line, 3.7 m (12 ft) north of the center of the dirt road, and set in the top of a concrete post.

K 495

13.0 km (7.15 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), to a point just before the highway starts uphill, approximately 30.5 m (100 ft) west of the centerline of the road, at a fence line, 2.1 m (6.7 ft) north of the northernmost of three split rail fence posts that form the north side of a wire fence/gate and set in the top of a concrete post.

HERD AZI

14.0 km (8.7 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), to the north end of a long and deep road cut, 21 m (70 ft) west of the centerline of the road, 12 m (40 ft) east of a fence line, about 2 m (7 ft) above the road, and set in the top of a small rock outcrop.

M 495

16.2 km (10.05 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at a "REST AREA 2 MILES" sign, 0.6 km (0.35 mi) south of the ranger station at Grass Lake, 17 m (55 ft) east of the centerline of the road, 0.7 m (2 ft) west of a fence line, about 0.15 m (6 in) below the ground level, and cemented into a lobe of exposed rock.

N 495

18.4 km (11.4 mi) northeast along Highway 97 from the south end of the bridge over Whitney Creek (Whitney Creek is 14.6 km (9.05 mi) northeast along Highway 97 from its intersection with Alma Street in Weed), at a 6 m (20 ft) high hill on the south side of the highway in Grass Lake, along the railroad tracks, in the top of the northwest end of the southwest abutment of Bridge 369.01, 6.1 m (20 ft) northwest of the southeast rail and about 0.15 m (6 in) below the tracks.

The distance between bench marks M 495 and N 495 is nearly the same along Highway 97 as it is when following the railroad tracks. The next five bench marks to the east, however, follow the railroad tracks, hence stadia distances will be along the railroad and not the highway. Permission to work along the railroad can be obtained from Southern Pacific Railroad in Klamath Falls, Oregon, through Mr. Flowers at (503) 220-4610.

P 495

(Note that this mark is 1.6 km (1.0 mi) northeast along the railroad tracks from bench mark N 495 described above.) 12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service (FS) Maintenance station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 11.6 km (7.2 mi) west along the railroad tracks, at milepost 370, 32 m (105 ft) southeast of the mile post marker, 8.1 m (26.5 ft) east of the east rail, 4.6 m (15 ft) northeast of a fenceline, about 0.8 m (2.5 ft) above the railbed, and set in the top of an embedded boulder.

CVO 9004

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 10.0 km (6.2 mi) west along the railroad tracks, at milepost 371, north of the rail, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO 9003

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 8.3 km (5.15 mi) west along the railroad tracks, approximately 30.5 m (100 ft) west of the west rail, in line with milepost 372, about 1 m (3 ft) above the railbed, about 1 m (3 ft) above the ground level, and cemented on the east side of a 1.2 x 2.1 m (4 x 7 ft) lava knoll.

S 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 6.6 km (4.1 mi) west along the railroad tracks, at an area of large boulders on the north side of the tracks, 14.2 m (46.5 ft) north of the north rail, 1 m (4 ft) south of a fence line, across the tracks from milepost 373, about 0.8 m (2.5 ft) below the railbed, and set in the top of a small outcrop.

T 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 5.0 km (3.1 mi) west

along the railroad tracks, at a 6.1 m (20 ft) high hill on the west side of the tracks, 12 m (40 ft) north of the north end of the hill, 13.1 m (43 ft) west of the west rail, 1.2 m (4 ft) east of the fenceline, and set in the top of an embedded boulder.

U 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 3.2 km (2.0 mi) west along the railroad tracks, at a 1.2 m (4 ft) deep rocky road cut on the south side of the tracks, 7.5 m (24.5 ft) southeast of the southeast rail, 7 m (23 ft) west of a fenceline, about 1.2 m (4 ft) above the railbed, and set in the top of the rock outcrop.

V 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 1.9 km (1.2 mi) west along the railroad tracks, at a large fallen tree trunk near the rails and another on the north side of a fence line, 22 m (72 ft) north of the north rail, 0.7 m (2 ft) north of the fenceline, and set in the top of a concrete post.

W 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, approximately 61 m (200 ft) west of the road center, 44 m (140 ft) northeast of the north rail of the railroad tracks, and set in the top of a concrete post among mature pine trees.

CVO 9002

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 1.6 km (1.0 mi) east along the railroad tracks, at a 1.8 m (6 ft) deep road cut on the north side of the tracks, 38 m (125 ft) west of milepost 378, 3.4 m (11 ft) north of the north rail, about 0.3 m (1 ft) below the railbed, and cemented into a rock shelf at the east end of the road cut.

X 495

12.3 km (7.6 mi) northeast along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 3.3 km (2.05 mi) east along the railroad tracks to a 0.6 x 1.2 x 1.8 m (2 x 4 x 6 ft) aluminum box on the south side of the tracks, 30.5 m (100 ft) east of the aluminum box, 7.6 m (25 ft) north of the northern most rail, and cemented into bedrock.

Y 495

12.3 km (7.6 mi) northwest along Highway 97 from the Forest Service Maintenance Station at Grass Lake, then 2.1 km (1.3 mi) southeast along a paved side road to a railroad crossing and a large gravel turnout on the west side, then 4.8 km (3.0 mi) east along the railroad tracks, at a bridge over Butte Creek, 30.5 m (100 ft) northwest of milepost 380, 2.1 m (7 ft) south of the southern most rail, about 0.3 m (1 ft) below the rail, and set in the top of the southeast abutment of the bridge.

A 496 RESET

(Note that this bench mark is 1.7 km (1.05 mi) northeast along the railroad tracks from Y 495 described above.) 1.9 km (1.15 mi) west along a gravel road from its intersection with Shasta Lane in the town of Bray, at a small railroad bridge on the north side of the road, set in the top of the east abutment of the bridge on the south side of the tracks, and about 0.3 m (1 ft) below the rail.

B 496

0.2 km (0.15 mi) west along a gravel road from its intersection with Shasta Lane in the town of Bray, then north along a dirt road across the railroad tracks, then make an immediate left and follow the lower of two roads for approximately 122 m (400 ft) to a wire gate at a utility pole, 6.1 m (20 ft) north of the utility pole at the anchor of the utility pole guy wire, and set in the top of a concrete post.

From just east of the town of Bray to 8 km (5 mi) north of the town of Tennant.

CVO 505

1.5 km (0.95 mi) east along a gravel road from its intersection with Shasta Lane in the town of Bray, at a faint track road to the north, approximately 61 m (200 ft) south of a "25 MPH" and curved-arrow sign, 38 m (125 ft) west of the road center, about 0.8 m (2.5 ft) above the road, and cemented into a lava outcrop.

CVO 510

3.0 km (1.85 mi) east along a gravel road from its intersection with Shasta Lane in the town of Bray, 8.5 m (28 ft) west of the road center, about 0.3 m (1 ft) below the road, and cemented in bedrock.

R 501

3.8 km (2.35 mi) east along a gravel road from its intersection with Shasta Lane in the town of Bray, then 0.3 km (0.2 mi) west along the Tennant Road, to a small rise on the right side of the road, 18.3 m (60 ft) south of the road center, about 1 m (3 ft) above the road, and cemented into the northwest end of a lava outcrop.

ORR AZI

3.8 km (2.35 mi) east along a gravel road from its intersection with Shasta Lane in the town of Bray, then 1.2 km (0.75 mi) west and south along the Tennant Road, 8.8 m (29 ft) north of the road center, 2.5 m (8 ft) west of a 0.5 m (1.5 ft) diameter pine tree, about 0.3 m (1 ft) above the road, and set in the top of an embedded boulder. The bench mark is brass tablet stamped "ORR MTN AZI".

P 501

3.8 km (2.35 mi) east along a gravel road from its intersection with Shasta Lane in the town of Bray, then 2.4 km (1.5 mi) west and south along the Tennant Road, to a small hill on the left, 17 m (55 ft) east of the road center, about 3.7 m (12 ft) above the road, about 2.4 m (8 ft) lower than the top of the hill, and set in a rock shelf on the west side of the hill. *0.8 km (0.5 mi) south of bench mark P 501 is a cattleguard and bench mark CVO XLV.*

From 8 km (5 mi) north of the town of Tennant to Lava Beds National Monument Headquarters.

The following five benchmark descriptions refer to a track road to the east of the Tennant Road 8.08 km (5.05 mi) north of the town of Tennant, California. This intersection, at which there is a cattleguard, can also be found as follows: 4.0 km (2.45 mi) north of Shasta Lane in the town of Bray to an intersection on the right, then 3.2 km (2.0 mi) east and south along the Tennant Road.

CVO-XLV

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, to a cattleguard and the intersection of a track road to the east, 23 m (75 ft) southwest of the cattleguard, 15 m (50 ft) west of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

T 501

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 1.5 km (0.95 mi) east along a track road, 12 m (40 ft) south of the center of the road, 3 m (10 ft) northeast of a 0.6 m (2 ft) diameter pine tree, and cemented into a 25 cm (10 in) diameter concrete post.

U 501

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 2.9 km (1.8 mi) east along a track road, to a bend in a dry stream bed on the left, 9 m (30 ft) north of the center of the road, 0.4 m (1.5 ft) south of the fence line, and cemented into a 25 cm (10 in) diameter concrete post.

V 501

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 4.5 km (2.8 mi) east along a track road to a slight grade, approximately 22.9 m (75 ft) south of the center of the road, about 0.6 m (2 ft) above the road, and set in bedrock.

W 501

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 6.0 km (3.7 mi) east along a track road, to a wide area in the road, 15 m (50 ft) north of the center of the road, and set in bedrock at road level.

0.4 km (0.25 mi) east of this bench mark is an intersection with a major graded road. 1.0 km (0.6 mi) northeast of this junction is bench mark CVO-XL.

The following ten bench mark descriptions refer to the intersection of Forest Service (FS) Road 15 and FS Road 44 N 06. This intersection is located as follows: 5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 34.3 km (21.3 mi) northeast along FS Road 13 to a "Y" intersection, then 1.8 km (1.1 mi) north (the left fork) along FS Road 42 N 17 Y, then 19.8 km (12.2 mi) north along FS Road 15 (also labeled FS Road 77 later) to the intersection with a pumice road on the right leading to Medicine Lake, then another 8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) to the major intersection (with restrooms and paved parking) with paved FS Road 77 heading west and FS 44 N 01 heading east to Lava Beds National Monument, then continue 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS Road 44 N 06 to the west (left) and FS Road 44 N 05 to the east (right).

CVO-XL

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), then 0.3 km (0.2 mi) northwest along that side road to a "Y" intersection, then take the left fork 2.1 km (1.3 mi) to another "Y" intersection, then take the right fork 0.2 km (0.1 mi) to another "Y" intersection, then take the left fork followed by another immediate left at the "Tennant 9" sign and continue 0.2 km (0.1 mi) to a "Y" intersection and cattleguard, then take the right fork and continue 3.8 km (2.4 mi) to an intersection with a graded road, then turn left and continue 0.9 km (0.55 mi) northwest along the graded road, to an area with exposed rocks on the left, 14 m (45 ft) southwest of the center of the road, about 1 m (3 ft) above the road, and cemented into bedrock.

To get from CVO-XL to W 501 (the next bench mark west along the line), the level line leaves the well graded road 0.8 km (0.5 mi) west of this intersection and continues along the track road to the north (right). W 501 is 0.4 km (0.25 mi) north of the intersection along the track road.

98 GWM

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), then 0.3 km (0.2 mi) northwest along that side road to a "Y" intersection, then take the left fork 2.1 km (1.3 mi) to another "Y" intersection, then take the right fork 0.2 km (0.1 mi) to another "Y" intersection, then take the left fork followed by another immediate left at the "Tennant 9" sign and continue 0.2 km (0.1 mi) to a "Y" intersection and cattleguard, then take the right fork and continue 3.0 km (1.85 mi), 7.6 m (25 ft) south of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

CVO-XXXV

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), then 0.3 km (0.2 mi) northwest along that side road to a "Y" intersection, then take the left fork 2.1 km (1.3 mi) to another "Y" intersection, then take the right fork 0.2 km (0.1 mi) to another "Y" intersection, then take the left fork followed by another immediate left at the "Tennant 9" sign and continue 0.2 km (0.1 mi) to a "Y" intersection and cattleguard, then take the right fork and continue 1.4 km (0.85 mi) to a small open area on the north (right) side of the road, across the road from the open area, among trees, 12 m (40 ft) south of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

97 GWM

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), then 0.3 km (0.2 mi) northwest along that side road to a "Y" intersection, then take the left fork 2.1 km (1.3 mi) to another "Y" intersection, then take the right fork 0.2 km (0.1 mi) to another "Y" intersection, in the east end of a small island created by the intersection of two roads, 1 m (3 ft) northwest of a 1.8 m (6 ft) high, 10 x 10 cm (4 x 4 in) wooden post, and cemented into a 20 x 20 cm (8 x 8 in) diameter concrete post.

CVO-XXX

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), then 0.3 km (0.2 mi) northwest along that side road to a "Y" intersection, then take the left fork 0.65 km (0.4 mi) to an open area with exposed bedrock, approximately 18 m (60 ft) north-northwest of the center of the road, and cemented into bedrock.

CVO-XXV

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 1.2 km (0.75 mi) south along FS Road 44 N 04 to a "Y" intersection, then take the right fork and continue 0.55 km (0.35 mi) northwest along FS Road 44 N 04 to a side road on the right (north), in the northeast corner of the triangle formed by the two roads, 10.6 m (35 ft) northeast of the center of the main road, 12 m (40 ft) east of the center of the side road, about 10 cm (4 in) above the ground, and set in the top of an embedded boulder.

A 502

4.7 km (2.9 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, then 0.1 km (0.05 mi) south along FS Road 44 N 04 to a small hill and sloping road cut on the left, 3.7 m (12 ft) south of the center of the road, about 1.2 m (4 ft) above the road, and set in the north end of a 3.3 m (10 ft) high rock outcropping.

95 GWM

3.3 km (2.05 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, at a 1.8 m (6 ft) deep road cut, 3 m (10 ft) south of the center of the road, about 1 m (3 ft) lower than the top of the road cut, about 1 m (3 ft) above the road, and set in a boulder.

B 502

1.7 km (1.05 mi) west along FS Road 44 N 06 from its intersection with FS Road 15, 7 m (23 ft) south of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

CVO-XX

In the northwest triangle formed by FS Road 15 and FS Road 44 N 06, approximately 12 m (40 ft) west of the centerline of FS Road 15, approximately 12 m (40 ft) north of the center of FS Road 44 N 06, enclosed in 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

Note: the level line splits off to the right on FS road 44 N 05 and to the left on FS road 44 N 06.

The following five benchmark descriptions refer to the intersection of Forest Service (FS) Road 15 and the pumice road leading to Medicine Lake. This intersection is located as follows: 5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 34.3 km (21.3 mi) northeast along FS Road 13 to a "Y" intersection, then 1.8 km (1.1 mi) north (the left fork) along FS Road 42 N 17 Y, then 19.8 km (12.25 mi) north along FS Road 15 (also labeled FS Road 77 later) to the intersection with a pumice road on the right (labeled FS 43 N 48 later).

S 503

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake to an intersection with FS 44 N 01 to Lava Beds National Monument on the east side and a paved road (FS Road 77) on the west side and with restrooms and paved parking, then 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS 44 N 06 on the left (west) and FS 44 N 05 on the right (east), then 1.5 km (0.95 mi) east along FS 44 N 05 (staying on what appears to be the main road), 6.7 m (22 ft) northwest of the center of the road, and set in the top of a concrete post.

T 503

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake to an intersection with FS 44 N 01 to Lava Beds National Monument on the east side and a paved road (FS Road 77) on the west side and with restrooms and paved parking, then 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS 44 N 06 on the left (west) and FS 44 N 05 on the right (east), then a total of 3.0 km (1.9 mi) east along FS 44 N 05 (staying on what appears to be the main road: 1.9 km (1.2 mi) to a "Y" intersection, then 0.7 km (0.45 mi) along the right fork to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork), to a large outcrop on the north side of the road, 11 m (36 ft) northeast of the center of the road, 1.2 m (4 ft) northeast of the southwest edge of the outcrop, about 3.4 m (11 ft) above the road, and set in bedrock.

U 503

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from the intersection with the pumice road leading to Medicine Lake to an intersection with FS 44 N 01 to Lava Beds National Monument on the east side and a paved road (FS Road 77) on the west side and with restrooms and paved parking, then 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS 44 N 06 on the left (west) and FS 44 N 05 on the right (east), then a total of 4.6 km (2.9 mi) east along FS 44 N 05 (staying on what appears to be the main road: 1.9 km (1.2 mi) to a "Y" intersection, then 0.7 km (0.45 mi) along the right fork to another "Y" intersection, then 2.0 km (1.25 mi) north along the left fork), to a sharp curve and a wide area on the right, 28 m (92 ft) south of the center of the road, about 2.4 m (8 ft) above the road, about 1.2 m (4 ft) above the ground, and set in a rock outcrop.

V 503

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from the intersection with the pumice road leading to Medicine Lake to an intersection with FS 44 N 01 to Lava Beds National Monument on the east side and a paved road (FS Road 77) on the west side with restrooms and paved parking, then 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS 44 N 06 on the left (west) and FS 44 N 05 on the right (east), then a total of 6.0 km (3.75 mi) east along FS 44 N 05 (staying on what appears to be the main road: 1.9 km (1.2 mi) to a "Y" intersection, then 0.7 km (0.45 mi) along the

right fork to another "Y" intersection, then 3.4 km (2.1 mi) north along the left fork), to a 1.2 m (4 ft) deep road cut with a 1.5 m (5 ft) rock outcrop on the north side, 4.9 m (16 ft) south of the center of the road, about 2.1 m (7 ft) above the road, about 0.6 m (1.5 ft) lower than the highest part of the rock outcrop, and set in an outcrop.

W 503

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from the intersection with the pumice road leading to Medicine Lake to an intersection with FS 44 N 01 to Lava Beds National Monument on the east side and a paved road (FS Road 77) on the west side and restrooms and paved parking, then 1.8 km (1.1 mi) north along FS Road 15 to the intersection with FS 44 N 06 on the left (west) and FS 44 N 05 on the right (east), then a total of 6.8 km (4.25 mi) east along FS 44 N 05 (staying on what appears to be the main road: 1.9 km (1.2 mi) to a "Y" intersection, then 0.7 km (0.45 mi) along the right fork to another "Y" intersection, then 4.2 km (2.6 mi) north along the left fork) to an intersection with a major gravel road, then 0.5 km (0.3 mi) northeast along FS 44 N 01 to two intersections 100 m (330 ft) apart both leading to the east, in a rock outcrop between the two intersections, 14 m (47 ft) southeast of the center of the road, about 6.1 m (20 ft) northwest of and 1.2 m (4 ft) lower than the highest part of the rock outcrop, and set in the outcrop.

CVO 605

The authors regret the absence of a full description of CVO 605. The mark can nevertheless likely be found from the following notes which give its location relative to the surrounding marks: 1.4 km (0.9 mi) north of bench mark W 503 is a dirt road leading to the left (west); 0.2 km (0.1 mi) west of this intersection is bench mark CVO 605. 1.5 km (0.95 mi) west of bench mark Y 503 (the next bench mark along the line to the east) is a locked gate and bench mark CVO 605. CVO 605 is enclosed in a 15 cm (6 in) diameter PVC pipe on the west side of the road, and attached to a rod driven to refusal.

The descriptions for the next thirteen bench marks begin from the intersection of FS Road 49 and the paved road to Lava Beds National Monument Headquarters. This intersection is found as follows: 3.9 km (2.4 mi) southeast along Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then south (at a railroad crossing) approximately 9.2 km (5.7 mi) along Co. Road 111 to a "T" intersection and a "LAVA BEDS NATIONAL MONUMENT" sign on the right, then approximately 27.3 km (16.9 mi) west along Co. Road 120 past Schonchin Butte and into the Monument, then 1.8 km (1.1 mi) northwest of the Monument Headquarters to the intersection with Forest Service Road 49, at a "MEDICINE LAKE" and "MAMMOTH CRATER" sign.

Y 503

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.6 km (1.6 mi) along the right fork to another "Y" intersection with a major gravel road (FS Road 44 N 01), then 5.0 km

(3.1 mi) west along FS Road 44 N 01 to a "Y" intersection with an old logging road closed by an earth berm on the right (which is approximately 61 m (200 ft) past a reverse "Y" from the right), then 2.2 km (1.35 mi) west along the abandoned (and closed) road, to a 2.4 x 3.7 m (8 x 12 ft) lava outcrop, 7 m (23 ft) north of the center of the road, about 0.7 m (2.5 ft) above the road, on the north end of the outcrop, and set in the center of a 1 x 1.6 m (3 x 5 ft) outcrop.

1.5 km (0.95 mi) west of bench mark Y 503 is a locked gate and bench mark CVO 605.

Z 503

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.6 km (1.6 mi) along the right fork to another "Y" intersection with a major gravel road (FS Road 44 N 01), then 5.0 km (3.1 mi) west along FS Road 44 N 01 to a "Y" intersection with an old logging road closed by an earth berm on the right (which is approximately 61 m (200 ft) past a reverse "Y" from the right), then 1.0 km (0.6 mi) west along the abandoned (and closed) road, on the east slope of a slight ridge, 21 m (70 ft) north of the center of the road, 18.9 m (62 ft) north of the west end of a road fill, about 0.6 m (2 ft) below the road, and set in the top of a rock shelf.

A 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.6 km (1.6 mi) along the right fork to another "Y" intersection with a major gravel road (FS Road 44 N 01), then 4.4 km (2.75 mi) west along FS Road 44 N 01, to a clear cut area and a hill on the south side of the road, 23 m (75 ft) south of the center of the road, about 1.2 m (4 ft) above the road, about 1 m (3 ft) below the top of the hill, and set in bedrock on the north slope of the hill.

B 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.6 km (1.6 mi) along the right fork to another "Y" intersection with a major gravel road (FS Road 44 N 01), then 3.0 km (1.85 mi) west along FS Road 44 N 01, to a faint track road on the left, 8 m (26 ft) southeast of the center of the road, 3 m (11 ft) east of the track road, and set in the top of a concrete post.

C 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.6 km (1.6 mi) along the right fork

to another "Y" intersection with a major gravel road (FS Road 44 N 01), then 1.8 km (1.1 mi) west along FS Road 44 N 01, to a lone 0.5 m (1.5 ft) diameter pine tree on the south side of the road, 4 m (13 ft) south of the center of the road, 1.2 m (4 ft) south of the pine tree, about 1.2 m (4 ft) above the road, and set in an embedded boulder.

D 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 2.5 km (1.55 mi) along the right fork, at an intersection on the left (south) side, at a badly abused "TENNANT, MEDICINE LAKE" sign, 29 m (95 ft) northwest of the center of the road, about 0.5 m (1.5 ft) above the ground, and set in the southeast edge of a lava flow.

E 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 1.0 km (0.65 mi) along the right fork, to the top of a low ridge and a curve in the road, 5.5 m (18 ft) southwest of the center of the road, and set in a concrete post.

F 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 1.7 km (1.05 mi) west along a track road to a "Y" intersection, then 55 m (175 ft) along the right fork, at a large outcrop on the right side of the road, 33 m (108 ft) northwest of the center of the road, 5 m (16 ft) south of the north end of the outcrop, about 1.2 m (4 ft) above the road, about 0.6 m (2 ft) above the ground, and set in bedrock.

G 504

7.5 km (4.65 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, then 0.2 km (0.05 mi) west along a track road to a rock outcropping on the right, 12 m (40 ft) northwest of the center of the road, about 1.2 m (4 ft) above the road, and set in the top of a 1.2 x 3 m (4 x 10 ft) outcropping.

H 504

6.0 km (3.7 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, to a logged area and a hill on the left (south), on the north slope of a cinder hill, 22 m (72 ft) south of the center of the road, about 0.5 m (1.5 ft) above the road, and set on an embedded boulder.

J 504

4.5 km (2.8 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, about 110 m (300 ft) east of and across a dirt road, on the west slope of a hill, 23 m (75 ft) northeast of a 2 m (7 ft) deep road cut, 11 m (36 ft) east of the center of the road, about 1.2 m (4 ft) above the road, and set in bedrock.

K 504

3.1 km (1.9 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, to a short but steep downgrade, on the east edge of a rock shelf, 24.4 m (80 ft) northwest of the center of the road, 1 m (3 ft) lower than the top of the rock shelf and 1 m (3 ft) above the road, and set in bedrock.

L 504

1.3 km (0.8 mi) south along FS Road 49 (which goes towards Medicine Lake) from its intersection with the paved road to the Monument Headquarters, to an outcrop on the east side of the road, 8.5 m (28 ft) east of the center of the road, about 1 m (3 ft) above the road, and set in bedrock.

M 504

1.8 km (1.1 mi) northwest of the Lava Beds National Monument Headquarters (or 3.9 km (2.4 mi) southeast along Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then south (at a railroad crossing) approximately 9.2 km (5.7 mi) along Co. Road 111 to a "T" intersection and a "LAVA BEDS NATIONAL MONUMENT" sign on the right, then approximately 27.3 km (16.9 mi) west along Co. Road 120 past Schonchin Butte and into the Monument), to the intersection with Forest Service Road 49, at a "MEDICINE LAKE" and "MAMMOTH CRATER" sign, in the "V" created by the paved road leading to the Monument Headquarters and the dirt road leading to Medicine Lake, approximately 30 m (100 ft) south-southeast of the apex of the triangle formed by the two roads, approximately 15 m (50 ft) south of the centerline of the paved road and approximately 15 m (50 ft) southwest of the center of the dirt road, about 2.4 m (8 ft) above the paved road level and about 1.8 m (6 ft) above the dirt road, about 0.5 m (1.5 ft) above the ground, and set in a small outcropping of rock.

4770 USFS

In the circular driveway at Lava Beds National Monument Headquarters, 20 m (66 ft) southwest of the flag pole, 4.9 m (16 ft) north of the north edge of Mush Pot cave, and set in bedrock. The bench mark is a brass tablet stamped "INDIAN WELLS RS 4770 1933".

From Lava Beds National Monument Headquarters to approximately 37 km (23 mi) south of the town of Tule Lake.

N 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 21.5 km (13.3 mi) northwest along the road to Lava Beds (FS Road 10), (or 1.3 km (0.8 mi) southeast along FS Road 10 from the Lava Beds National Monument Headquarters), to a small ridge of rocks on the east side of the road, 23 m (75 ft) southwest of the centerline of the road, about 0.6 m (2 ft) above ground, and set in bedrock.

111 GWM

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 19.5 km (12.1 mi) northwest along the road to Lava Beds (FS Road 10), to a curve in the road, 27.4 m (90 ft) north of the centerline of the road, 10 m (32 ft) south of a lone juniper tree, about 0.6 m (2 ft) above the ground, about 0.3 m (1 ft) below the road, and set on the east side of a 1.2 x 1.2 m (4 x 4 ft) boulder.

P 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 17.1 km (10.6 mi) northwest along the road to Lava Beds (FS Road 10), at a small knoll on the west side of the road, 18.3 m (60 ft) southwest of the centerline of the road, 2 m (6 ft) south of a juniper tree, about 1.2 m (4 ft) above the road, and set in bedrock.

Q 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 16.0 km (9.9 mi) northwest along the road to Lava Beds (FS Road 10), at a large turnout on the west side of the road and a large juniper tree, approximately 23 m (75 ft) southeast of a "LAVA BEDS NATIONAL MONUMENT" sign, 14.3 m (47 ft) southwest of the centerline of the road, at the north end of the turnout, under the branches on the east side of the tree, and set in the top of a concrete post.

R 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 14.4 km (8.9 mi) northwest along the road to Lava Beds (FS Road 10), at the northeast corner of a dirt cross road intersection, 13.7 m (45 ft) east of the centerline of

the paved road, 12.2 m (40 ft) northwest of the center of the dirt road, 4.6 m (15 ft) east of a FS Road "10" sign, and set in the top of a concrete post.

113 GWM

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 12.6 km (7.8 mi) northwest along the road to Lava Beds (FS Road 10), at a dirt road on the west side of the road, 10.2 m (33 ft) northeast of the centerline of the road, and set in the top of a concrete post.

S 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 11.0 km (6.8 mi) northwest along the road to Lava Beds (FS Road 10), to the summit of a slight rise just before a downgrade, 6.9 m (22.5 ft) northwest of the centerline of the road, about 0.6 m (2 ft) above the road, and set in bedrock.

T 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 10.0 km (6.2 mi) northwest along the road to Lava Beds (FS Road 10), to a slight rise, 23.8 m (78 ft) north of the centerline of the road, about 1.2 m (4 ft) above the ground, and set in a 1 x 1.2 m (3 x 4 ft) boulder.

BM 500

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 9.0 km (5.6 mi) northwest along the road to Lava Beds (FS Road 10), to a scattering of boulders on the right, 20.7 m (68 ft) north of the centerline of the road, about 0.3 m (1 ft) above the ground, and set in a small outcrop of rock. The bench mark is a brass tablet stamped "500".

U 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 7.6 km (4.7 mi) northwest along the road to Lava Beds (FS Road 10), to a large boulder on the southeast side of the road, 10 m (33 ft) southeast of the centerline of the road, 4.3 m (14 ft) northeast of a 0.8 m (30 in) diameter lone pine tree, and set in the south end of the 1.8 x 3.7 m (6 x 12 ft) boulder.

115 GWM

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 6.0 km (3.7 mi) northwest along the road to Lava Beds (FS Road 10), 12 m (40 ft) south of the centerline of the road, about 15 cm (6 in) above the ground, and set in the top of a concrete post.

V 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 4.5 km (2.8 mi) northwest along the road to Lava Beds (FS Road 10), to a slight rise in the road and a large earth crack, 38 m (125 ft) south of the centerline of the road, 0.5 m (1.5 ft) west of the east edge of the large earth crack, and set in bedrock.

116 GWM

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 2.7 km (1.7 mi) northwest along the road to Lava Beds (FS Road 10), to a bend in the road and a small rise on the right, 11 m (36 ft) south of the centerline of the road, about 1 m (3 ft) above the road, and set in the top of the bedrock rise.

Z 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 4.2 km (2.6 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), then 1.1 km (0.65 mi) northwest along the road to Lava Beds (FS Road 10), 19 m (62 ft) northeast of the centerline of the road, about 1.2 m (4 ft) above the road, and set in the top of a small bedrock knoll.

Y 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 3.2 km (2.0 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument), to a slight rise and a large juniper tree on the southeast side of the road, 40.5 m (133 ft) southeast of the road center, 4.5 m (15 ft) east of the juniper tree, about 0.3 m (1 ft) above the road, and set in bedrock.

BM 501

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake, then 1.8 km (1.1 mi) southwest along FS Road 97 (the road which goes to Medicine Lake and Lava Beds National Monument),

to a low rock-covered rise, 10.5 m (34 ft) northwest of the road center, about 0.3 m (1 ft) above the road, and set in bedrock. The bench mark is a brass tablet stamped "501".

W 504

36.7 km (22.8 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake (which is 4.4 km (2.7 mi) south of an overpass over the railroad tracks), then approximately 122 m (400 ft) west along FS Road 97 (which goes to Medicine Lake and Lava Beds National Monument) to a cattleguard, approximately 30.5 m (100 ft) southwest of the cattleguard, 23 m (76 ft) southeast of the road center, about 1 m (3 ft) above the road, and set in bedrock.

M 602

32.4 km (20.1 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake to an overpass over the railroad tracks, then 3.8 km (2.4 mi) further south along Highway 139 from the apex of the overpass (or 0.6 km (0.4 mi) north along Highway 139 from its intersection with FS Road 97 which goes to Medicine Lake and Lava Beds National Monument), 63 m (206 ft) east of the centerline of the highway, 5 m (16 ft) southwest of a faint track road, set in the top of a concrete post, 0.3 m (1 ft) above the ground.

L 602

32.4 km (20.1 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake to an overpass over the railroad tracks, then 1.8 km (1.1 mi) further south along Highway 139 from the apex of the overpass (or 2.6 km (1.6 mi) north along Highway 139 from its intersection with FS Road 97 which goes to Medicine Lake and Lava Beds National Monument), approximately 23 m (75 ft) east of the centerline of the road, about 0.3 m (1 ft) above the ground, and set in a concrete post.

OVERPASS

32.4 km (20.1 mi) south along U.S. Highway 139 from the Forest Service Ranger Station just south of the town of Tule Lake (or 4.4 km (2.75 mi) north along Highway 139 from its intersection with Forest Service (FS) Road 97 which goes to Medicine Lake and Lava Beds National Monument) to an overpass over the railroad tracks, then 0.2 km (0.1 mi) farther south along Highway 139 from the apex of the overpass to a track road on the west side of the highway, then 0.2 km (0.1 mi) north on a faint track road that parallels both the main road and a fence line, 18 m (59 ft) west of the centerline of the highway, 2.3 m (8 ft) west of the fence line, and set in bedrock at the south end of the overpass.

Part 2: Near Tennant to Bartle, California

From approximately 8 km (5 mi) north of the town of Tennant to the vicinity of Stevens Pass.

CVO-XLV

8.08 km (5.05 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, (or 4.0 km (2.45 mi) north of Shasta Lane in the town of Bray to an intersection on the right, then 3.2 km (2.0 mi) east and south along the Tennant Road), to a cattleguard and the intersection of a track road to the east, 23 m (75 ft) southwest of the cattleguard, 15 m (50 ft) west of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

N 501

7.12 km (4.45 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 7.5 m (25 ft) northeast of the center of the road, about 3.4 m (11 ft) northeast of a witness post, about 1 m (3 ft) above the road, and set in a the approximate center of a 1 x 1 m (3 x 3 ft) lava boulder nearly flush with the ground.

M 501

5.68 km (3.55 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 0.48 km (0.3 mi) north of a cattleguard, 8.5 m (28 ft) west of the center of the road, 0.6 m (1.9 ft) east of a witness post, about level with the road, and set in a concrete post projecting 0.2 m (0.6 ft) above the ground.

CVO-L

4.32 km (2.7 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, just south of a slight curve in the road to the east, 12 m (40 ft) east of the center of the road, 2.4 m (8 ft) east of and 1 m (3.3 ft) above the a witness post, about 3 m (10 ft) above the road, and set on an embedded boulder nearly flush with the ground.

TENNANT AZ

2.96 km (1.85 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 26 m (86 ft) northeast of the center of the road, about 4.5 m (15 ft) above the road, near the summit of a lava knoll, about 0.6 m (2 ft) lower than the summit on the south slope, and set in the top of a bedrock outcrop.

K 501

2.56 km (1.6 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, on a low lava knoll, about 91 m (100 yards) northwest of and across the road from a large lava knoll, 30 m (97 ft) south of the center of the "Y" junction of a track road leading east, 15 m (49 ft) southwest of the center of the road, about 1.2 m (4 ft) above the road, and set in the top of a 1 x 1.2 m (3 x 4 ft) lava boulder projecting 5 cm (0.2 ft) above the ground.

TENNANT

2.48 km (1.55 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, about 30 m (100 ft) northeast of the center of the road, about 6 m (20 ft) above the road, and set in the top of a bedrock outcrop projecting 5 cm (0.2 ft) above the ground.

TENNANT RM 1

2.48 km (1.55 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 26 m (85 ft) northeast of the center of the road, 5.5 m (17.9 ft) south of the station **TENNANT**, about 6 m (20 ft) above the road, and set in the top of a bedrock outcrop projecting 0.3 m (1 ft) above the ground.

TENNANT RM 2

2.48 km (1.55 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 26 m (86 ft) northeast of the center of the road, 5.2 m (17.2 ft) northwest of the station **TENNANT**, about 6 m (20 ft) above the road, and set in the top of a bedrock outcrop flush with the surrounding area.

CVO 89-109

1.04 km (0.65 mi) north along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 15 m (49 ft) north of the center of the Tennant road, 1.1 m (3.6 ft) north of a witness post, about the same height as the road, enclosed in a 15 cm (6 in) diameter PVC pipe projecting 5 cm (0.2 ft) above the ground, and attached to a rod driven to refusal.

CVO 89-110

0.56 km (0.35 mi) south along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, 19.5 m (64 ft) northeast of the center of the Tennant Road, 6.0 m (20 ft) north of the center of a tract road leading east, 21.4 m (70 ft) north of the "Pipe" sign, 21.0 m (69 ft) north of the water valve, 0.5 m (1.6 ft) north of a stump of a cut-down telephone pole, about the same height as the road, enclosed in a 15 cm (6 in) diameter PVC pipe projecting 5 cm (0.2 ft) above the ground, and attached to a rod driven to refusal.

CVO-LXV

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 69 m (225 ft) southeast along the Stevens Pass Road, on the inside of a southward curve in the Stevens Pass Road, 15 m (48 ft) west of the center of the road, 1.2 m (4 ft) north of a witness post, about 2 m (7 ft) above the road, set in a 1.0 x 1.2 m (3 x 4 ft) boulder projecting 24 cm (0.8 ft) above the ground, and approximately 0.3 m (1 ft) south of the north edge of the boulder.

0.4 km (0.25 mi) south of the junction with FS Road 77 along the Stevens Pass road, a track road joins from the southwest. Stay on the main road going north-south.

F 501

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 1.52 km (0.95 mi) south along the Stevens Pass Road, 22 m (72 ft) southwest of the summit of a slight grade, 7.5 m (24.5 ft) west of the center of the road, 0.5 m (1.5 ft) northeast of a witness post, about 0.3 m (1 ft) above the road, and set in a concrete post projecting 0.2 m (0.7 ft) above the ground.

2.80 km (1.75 mi) south of the junction with the FS Road 77 along the Stevens Pass road, a tract road joins from the southwest. Stay on the main road going northwest-southeast.

CVO 89-111

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 2.96 km (1.85 mi) south along the Stevens Pass Road, 29 m (96 ft) northeast of the center of the Stevens Pass Road, 1.9 m (6.2 ft) northeast of a witness post, to the west of and below a large lava knoll, 7.1 m (23 ft) northwest of a vertical 1.8 m (6 ft) high face of the knoll, about 1 m (3.3 ft) above the road, and set in a bedrock outcrop projecting 5 cm (0.2 ft) above ground.

4.24 km (2.65 mi) south of the junction with FS Road 77 along the Stevens Pass road, a tract road joins from the east. Stay on the main road going north-south.

CVO 89-112

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 4.40 km (2.75 mi) south along the Stevens Pass Road, 10 m (32 ft) east of the center of the road, 12 m (39 ft) south of a tract road leading east, 0.5 m (1.6 ft) east of a witness post, about the same height as the road, enclosed in a 15 cm (6 in) diameter PVC pipe projecting 3 cm (0.1 ft) above ground, and attached to a rod driven to refusal.

4.96 km (3.1 mi) south of the junction with the FS Road 77 along the Stevens Pass road, a track road joins from the west. Stay on the main road going north-south.

C 501

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 6.08 km (3.8 mi) south along the Stevens Pass Road, on the outside of a curve, 6 m (20 ft) east of the center of the road, 0.6 m (1.9 ft) west of a witness post, about 0.3 m (1 ft) above the road, and set in a concrete post projecting 0.1 m (0.3 ft) above ground.

47 C

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 7.52 km (4.7 mi) south along the Stevens Pass Road, 0.88 km (0.55 mi) northwest of the "Y" junction of a track road leading south, 15 m (49 ft) west of the center of the road, on the northeast side of a rocky knoll, 0.8 m (2.8 ft) southwest of the northeast point of the knoll, about 2.7 m (9 ft) above the road, and set in the approximate center of a 0.9 x 1.5 m (3 x 5 ft) basalt rock outcrop.

B 501

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 8.8 km (5.5 mi) south along the Stevens Pass Road, 1.12 km (0.7 mi) northwest of the "Y" junction of a road leading south to Antelope, 0.4 km (0.25 mi) southwest of a cattleguard, 13 m (42.5 ft) northeast of the center of the road, about 0.6 m (2 ft) above the road, and set in the approximate center of a 1 x 1 m (3 x 3 ft) basalt boulder projecting 0.3 m (1 ft) above ground.

From the vicinity of Stevens Pass to approximately 20 km (12.5 mi) northeast of the town of McCloud.

9.68 to 9.84 km (6.05 to 6.15 mi) south of the junction with FS Road 77 along the Stevens Pass Road is a large "Y" with a road leading west. Stay on the main road going northwest-southeast.

10 km (6.25 mi) south of the junction with FS Road 77 along the Stevens Pass Road, a track road joins from the north. Stay on the main road going northwest-southeast.

10.4 km (6.5 mi) south of the junction with FS Road 77 along the Stevens Pass Road, the FS Road 42 N 10 Y crosses the Stevens Pass Road. Stay on the main road going northwest-southeast.

CVO-LXX

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 10.48 km (6.55 mi) south along the Stevens Pass Road, 11 m (36 ft) northeast of the center of the Stevens Pass Road, 19 m (62 ft) southeast from the center of the FS Road 42 N 10 Y which crosses the Stevens Pass Road, 0.9 m (3 ft) northeast of a witness post, about 0.9 m (3 ft) above the road, and set in a 1.2 x 1.2 m (4 x 4 ft) boulder projecting 0.1 m (0.4 ft) above ground.

10.72 km (6.7 mi) south of the junction with FS Road 77 along the Stevens Pass Road, the road to Harris Spring and Lost Spring joins from the east. If going north to south, go southeast on the FS Road 43 N 44 towards Trout Creek.

CVO-LXXV

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 11.76 km (7.3 mi) south along the Stevens Pass Road, on the inside of a curve in the road to the east, 3 m (10 ft) east of the center of the road, 0.5 m (1.5 ft) west of a witness post, about 1 m (3 ft) above the road, and set in a boulder projecting 0.3 m (1 ft) above ground.

11.84 km (7.4 mi) south of the junction with FS Road 77 along the Stevens Pass Road, a tract road joins from the west. Continue straight.

CVO-LXXVII

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 13.04 km (8.1 mi) south along the Stevens Pass Road, 7 m (22 ft) west of the center of the road, 2.4 m (8 ft) south of the north edge of a large 1.5-m (5-ft) high boulder (in which disturbed mark **V 499 1954** has been set), 0.5 m (1.5 ft) west of a witness post, about 0.3 m (1 ft) above the road, and set in a 1.5 x 1.5 m (5 x 5 ft) boulder projecting 0.15 m (0.5 ft) above ground.

CVO-LXXX

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 14.16 km (8.8 mi) south along the Stevens Pass Road, 59 m (195 ft) north of the junction with a dirt road heading east, 6 m (21 ft) east of the center of the Stevens Pass Road, 0.9 m (3 ft) east of a witness post, about 1.5 m (5 ft) above the road, and set in the center of a 1.2 x 1.5 m (4 x 5 ft) boulder projecting 0.5 m (1.5 ft) above ground.

14.24 km (8.9 mi) south of the junction with FS Road 77 along the Stevens Pass road, a track road joins from the southeast. Continue straight.

C 500

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 15.68 km (9.8 mi) south along the Stevens Pass Road, 0.4 km (0.25 mi) north of the "Y" junction of a dirt road leading northeast to Medicine Lake, 8 m (26 ft) northwest of the center of the road, 0.3 m (1.0 ft) southeast of a witness post, about 0.3 m (1 ft) above the road, and set in a concrete post projecting 0.1 m (0.4 ft) above ground.

16.24 km (10.1 mi) south of the junction with FS Road 77 along the Stevens Pass Road, FS Road 42 N 82 road joins from the northeast. Continue straight.

16.4 km (10.2 mi) south of the junction with FS Road 77 along the Stevens Pass Road, a track road joins from the northwest. Continue straight.

17.04 km (10.6 mi) south of the junction with FS Road 77 along the Stevens Pass Road, a track road joins from the northwest. Continue straight.

45 C

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 17.44 km (10.9 mi) south along the Stevens Pass Road, 0.8 km (0.5 mi) north of the T junction of a track road leading northwest to Rainbow Mountain, 14 m (45 ft) northwest of the center of the road, 0.9 m (3 ft) west of a witness post, about 1.2 m (4 ft) above the road, 0.3 m (1 ft) west of the east end of the boulder, with a fallen tree lying across the boulder, and set in a 1.2 x 1.8 m (4 x 6 ft) basalt boulder nearly flush with the ground.

17.44 km (10.9 mi) south of the junction with FS Road 77 along the Stevens Pass road, a track road joins from the northwest. Continue straight.

17.84 km (11.1 mi) south of the junction with FS Road 77 along the Stevens Pass Road, arrive at the junction of the Stevens Pass Road, a road leading southeast to McCloud, and the FS Road 43 N 44 Road leading south to Trout Creek. Take the road leading southeast towards McCloud to continue to Bartle.

The next two bench marks make a spur to the south, reached by continuing south at this road junction towards Trout Creek.

0.24 km (0.15 mi) south of the junction of the Stevens Pass Road and the FS Road 43 N 44 Road (and about 0.16 km (0.1 mi) north of Trout Creek), cross a cattleguard.

0.32 km (0.2 mi) south of the junction of the Stevens Pass Road and FS Road 43 N 44 Road (and about 0.08 km (0.05 mi) north of Trout Creek), arrive at a 4-way junction. If working north to south, make a hard left turn to the east and go through a green gate.

B 500

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 17.84 km (11.1 mi) south along the Stevens Pass Road, then 0.32 km (0.2 mi) south along FS Road 43 N 44, then pass through a green gate north of Trout Creek and continue 0.8 km (0.5 mi) southeast along a track road, 9 m (29 ft) northwest of the center of the road, at the southwest end of a short lava knoll, about 1.5 m (5 ft) above the road, 0.3 m (1.1 ft) northeast of the southwest edge of the outcrop, and set in a 0.6 x 0.9 m (2 x 3 ft) lava outcrop projecting 0.6 m (2 ft) above ground.

A 500

1.76 km (1.1 mi) southwest along the Tennant Road from the center of the bridge over Antelope Creek on the north side of the town of Tennant, then 0.16 km (0.1 mi) southeast along FS Road 77, then 17.84 km (11.1 mi) south along the Stevens Pass Road, then 0.32 km (0.2 mi) south along the FS Road 43 N 44, then pass through a green gate north of Trout Creek, then 2.4 km (1.5 mi) southeast along a track road, 0.4 km (0.25 mi) north of a point where Trout Creek crosses the road, 7 m (22.5 ft) west of the center of the road, 0.7 m (2.2 ft) east of a witness post, about 0.3 m (1 ft) above the road, and set in a concrete post projecting 0.1 m (0.3 ft) above ground.

Bench mark CVO89-216 is the next bench mark along the line from 45 C.

CVO89-216

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 28.6 km (17.7 mi) northeast along FS Road 13, to the intersection with FS Road 42 N 09 (the road to Stevens Pass), 42.7 m (139 ft) north-northwest of the center of FS Road 13, 13 m (42 ft) west-southwest of the center of FS Road 42 N 09, about 4 m (13 ft) above the road, and set in a bedrock outcrop.

To reach bench mark 45 C, turn left onto FS road 42 N 09 and continue westerly along FS road 42 N 09 for 1.3 km (0.8 mi) to the intersection with FS road 43 N 44. Leave FS road 42 N 09 and turn right on FS road 43 N 44 and continue northerly for 0.3 km (0.2 mi) along FS road 43 N 44. Follow description for bench mark 45 C.

CVO89-217

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 27.2 km (16.8 mi) northeast along FS Road 13, at the intersection with FS Road 42 N 13 H, 67 m (220 ft) southwest of the center of FS Road 42 N 13 H, 46.3 m (152 ft) northwest of the center of FS Road 13, about 2 m (6.5 ft) above the ground, and set in a 4.8 x 6.5 m (15 x 20 ft) rounded bedrock knoll.

CVO89-218

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 25.3 km (15.6 mi) northeast along FS Road 13, 30 m (97 ft) southwest of the centerline of FS Road 13, approximately 3 m (9.7 ft) east of a 0.46 m (1.5 ft) diameter tree stump with a distinctive bend in its trunk, about 1 m (3 ft) above the ground, and set in a bedrock ledge that parallels the road and drops 20 cm (0.6 ft) beginning about 2 m (6.5 ft) southwest of the mark.

W 499

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 23.4 km (14.5 mi) northeast along FS Road 13, at an intersection with a dirt road on the right (northeast), approximately 7.6 m (25 ft) northeast of the center of FS Road 13, 7.3 m (24 ft) northwest of the dirt road, and set in a 25 cm (10 in) diameter concrete post.

CVO89-206

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 21.1 km (13.1 mi) northeast along FS Road 13, to the intersection of FS Road 41 N 05, at a "Black Fox L.O." sign, 33 m (108 ft) southwest of the center of FS Road 13, 22 m (72 ft) northwest of the center of FS Road 41 N 05, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 1.5 m (5 ft) to refusal.

CVO89-207

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley road in McCloud, then 29.5 km (12.1 mi) northeast along FS Road 13, to the intersection of FS Road 41 N 06 (Edison Creek Road), 23 m (75 ft) east of the center of FS Road 41 N 06, 23 m (75 ft) south of the center of FS Road 13, in heavy manzanita bush; enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 2.1 m (7.0 ft) to refusal.

CVO89-208

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 17.6 km (10.9 mi) northeast along FS Road 13, to the 4-way intersection of FS Road 42 N 13 C and 41 N 44 Y, 22.5 m (74 ft) northwest of the centerline of FS Road 13, 19 m (62 ft) northeast of the centerline of FS Road 41 N 44 Y, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 2.1 m (7.0 ft) to refusal.

CVO89-209

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 15.9 km (9.85 mi) northeast along FS Road 13, 40.3 m (132 ft) southwest of the intersection of FS Road 41 N 52, to an outcrop on the east side of the road, 30 m (98 ft) southeast of the centerline of FS Road 13, 3 m (10 ft) from the west end of the rock outcrop, about 1.5 m (5 ft) above the road, and set in the northwest dipping portion of a 10 x 15 m (33 x 50 ft) rock outcrop.

K 499

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 15.2 km (9.45 mi) northeast along FS Road 13, then 0.7 km (0.45 mi) southeast along FS Road 41 N 06 Y, then 0.3 km (0.2 mi) northeast into a clear-cut area along a faint road (nearly obliterated by logging activity), 5.9 m (19.5 ft) east of the center of the road, 6.4 m (21 ft) west of a witness post, about 0.3 m (1 ft) above the road, and set in a 25 cm (10 in) diameter concrete post.

CVO89-210

5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 15.2 km (9.45 mi) northeast along FS Road 13, then 2.7 km (1.7 mi) southeast along FS Road 41 N 06 Y, to an intersection with FS Road 40 N 12, at a clear-cut area, 33.5 m (110 ft) southeast of the center of the intersection, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 4.6 m (15 ft) to refusal.

1.1 km (0.7 mi) west along FS Road 40 N 12 from the intersection with FS Road 41 N 06 Y (the intersection near bench mark CVO89-210) is the turn off to bench mark H 499, and approximately 2.9 km (1.8 mi) west of that is the intersection with FS Road 13.

From approximately 20 km (12.5 mi) northeast of the town of McCloud to just northwest of the town of Bartle.

H 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 7.5 km (4.65 mi) north along FS Road 40 N 16 to a "Y" intersection, then 0.7 km (0.45 mi) north along FS Road 40 N 93 to a "Y" intersection, then 0.2 km (0.15 mi) along the right fork to another "Y" intersection, then 1.1 km (0.7 mi) along the left fork (FS Road 43 N 19, also Bear Wallow Rd.) (straight through a 4-way intersection at the 0.2 km (0.15 mi) point) to a 3-way intersection, then straight through that intersection along a road nearly closed by trees growing along the side for 0.5 km (0.3 mi), 10.3 m (34 ft) south of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

1.1 km (0.7 mi) northeast of bench mark H 499 is the intersection with a red cinder road, FS Road 40 N 12. Approximately 2.9 km (1.8 mi) west of this intersection (along FS Road 40 N 12) is the intersection with a paved road, FS Road 13 (Pilgrim Creek Road); approximately 1.1 km (0.7 mi) east of this intersection (along FS Road 40 N 12) is bench mark CVO89-210).

G 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 7.5 km (4.65 mi) north along FS Road 40 N 16 to a "Y" intersection, then 0.1 km (0.05 mi) north along FS Road 40 N 93, to a reverse "Y" intersection to the left, 6.1 m (20 ft) northeast of the middle of the intersection, about 0.6 m (2 ft) above the road, and set in a 25 cm (10 in) diameter concrete post.

F 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 6.2 km (3.85 mi) north along FS Road 40 N 16, to the intersection with FS Road 40 N 78 to the west, approximately 9 m (30 ft) southwest of the center of FS Road 40 N 16, 7.6 m (25 ft) southeast of the center of FS Road 40 N 78, and set in a 25 cm (10 in) diameter concrete post.

E 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 4.7 km (2.90 mi) north along FS Road 40 N 16, 7.6 m (25 ft) east of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

CVO89-211

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 3.5 km (2.15 mi) north along FS Road 40 N 16, at the intersection of FS Road 40 N 55 to the west, 70 m (230 ft) north of a cattle guard, 32 m (105 ft) south of the center of FS Road 40 N 72 Y, 18 m (59 ft) east of the center of FS Road 40 N 16, about 1.8 m (6 ft) above the road, and set in a lava tumulus.

1.2 km (0.75 mi) north of FS road 40 N 55 is the intersection with FS road 40 N 54.

C 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley road in McCloud), then 1.8 km (1.1 mi) north along FS Road 40 N 16, at the intersection of FS Road 40 N 71 Y to the west, 22 m (75 ft) north of the center of FS Road 40 N 71 Y, approximately 7.3 m (24 ft) west of the center of FS Road 40 N 16, and set in a 25 cm (10 in) diameter concrete post.

B 499

16.6 km (10.3 mi) west along Highway 89 from the lodge and gas station in Bartle (also 12.8 km (7.9 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 0.3 km (0.2 mi) north along FS Road 40 N 16, to a railroad crossing, approximately 17 m (54 ft) east of the center of the road, approximately 6 m (20 ft) north of the north rail of the railroad tracks, and set in a 25 cm (10 in) diameter concrete post.

Approximately 61 m (200 ft) north of the railroad crossing is FS Road 40 N 14 to the east.

C 197

12.7 km (7.85 mi) west along Highway 89 from the lodge and gas station in Bartle (also 16.7 km (10.35 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud) to the "Cattle Campground" intersection on the south side of Highway 89 then 0.6 km (0.35 mi) north along an unmarked FS road to a railroad track (near bench mark D 197), then 40 m (130 ft) northwest to the intersection with FS Road 40 N 16, then 1.9 km (1.15 mi) west along FS Road 40 N 16, approximately 46 m (150 ft) south of the center of the road, approximately 10 m (33 ft) north of the railroad tracks, and set in a 25 cm (10 in) diameter concrete post.

A 499

12.7 km (7.85 mi) west along Highway 89 from the lodge and gas station in Bartle (also 16.7 km (10.35 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud) to the "Cattle Campground" intersection on the south side of Highway 89, then 0.6 km (0.35 mi) north along an unmarked FS road to a railroad track (near bench mark D 197), then 40 m (130 ft) northwest to the intersection with FS Road 40 N 16, then 1.6 km (1.0 mi) west along FS Road 40 N 16, to a triad of 1 m (3 ft) diameter trees on the south side of the road, approximately 20 m (67 ft) north of the railroad tracks, approximately 7.6 m (25 ft) south of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

D 197

8.15 km (5.05 mi) west along Highway 89 from the lodge and gas station in Bartle, (also 18.0 km (11.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 1.0 km (0.6 mi) north along FS Road 40 N 06 (Edison Creek Road), then (at an intersection with a set of railroad tracks) 1.6 km (1.0 mi) west along FS Road 40 N 16, then left (south) 0.1 (0.05 mi) at a "Y" intersection, to a railroad crossing, approximately 14 m (45 ft) west of the dirt road, approximately 7.6 m (25 ft) north of the north rail of the railroad tracks, and set in a 25 cm (10 in) diameter concrete post.

0.5 km (0.35 mi) south of bench mark D197 is the intersection with Highway 89 at the Cattle Campground exit.

CVO89-219

8.15 km (5.05 mi) west along Highway 89 from the lodge and gas station in Bartle (also 18.0 km (11.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 1.3 km (0.8 mi) north along FS Road 40 N 06 (Edison Creek Road), at a 3 m (10 ft) deep road cut and clear-cut on the west, 8 m (26 ft) west of the center of the road, about 4 m (13 ft) above the road, and set in a large boulder.

CVO89-220

8.15 km (5.05 mi) west along Highway 89 from the lodge and gas station in Bartle (also 18.0 km (11.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud), then 1.5 km (0.9 mi) north along FS Road 41 N 06 (Edison Creek Road), then 1.2 km (0.75 mi) west along FS Road 40 N 14 *[at the 0.8 km (0.5 mi) point, take the right fork of the "Y" intersection to stay on FS 40 N 14]*, approximately 12 m (40 ft) south of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

1.1 km east of CVO89-220 is a "Y" intersection with FS road 40 N 14 F. 0.4 km (0.25 mi) east of this intersection is CVO89-221.

CVO89-221

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.75 km (0.5 mi) north along a dirt road (about 0.1 km (0.05 mi) past a railroad crossing), then 1.0 km (0.6 mi) west along a dirt road that parallels the railroad tracks, then 4.0 km (2.5 mi) south (from the "T" intersection) along FS Road 40 N 14 F, at a group of large outcropping boulders, approximately 21 m (75 ft) north of the center of the road, about 4.5 m (15 ft) above the road, about 0.5 m (1.5 ft) above the ground, and set in a large 1 x 2 m (3 x 6 ft) embedded boulder.

0.4 km (0.25 mi) west along FS Road 40 N 14 F from CVO89-221 is a reverse "Y" intersection with FS Road 40 N 14 from the right (north). 1.1 km (0.7 mi) west of CVO89-221, along FS Road 40 N 14, is CVO89-220.

CVO89-222

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.75 km (0.5 mi) north along a dirt road (about 0.1 km (0.05 mi) past a railroad crossing), then 1.0 km (0.6 mi) west along a dirt road that parallels the railroad tracks, then 2.4 km (1.5 mi) south (from the "T" intersection) along FS Road 40 N 14 F, at a major road intersection, in the southeast corner of the intersection, approximately 22.9 m (75 ft) north of the railroad track, approximately 12 m (40 ft) south of the center of FS Road 40 N 14 F, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO89-223

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.75 km (0.5 mi) north along a dirt road (about 0.1 km (0.05 mi) past a railroad crossing), then 1.0 km (0.6 mi) west along a dirt road that parallels the railroad tracks, then 0.73 km (0.45 mi) south (from the "T" intersection) along FS Road 40 N 14 F, to a blazed 0.6 m (24 in) pine tree on the south side of the road, 40 m (131 ft) north of the railroad crossing, 23 m (75 ft) north of the railroad tracks, 17 m (56 ft) south of the center of the road, 14 m (46 ft) north and 2 m (6.5 ft) east of a 0.70 m (2.3 ft) high junction box, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 7.6 m (25 ft) to refusal.

CVO89-224

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.75 km (0.5 mi) north along a dirt road (about 0.1 km (0.05 mi) past a railroad crossing), then 1.69 km (1.05 mi) west along a dirt road that parallels the railroad tracks, to a 0.70 m high junction box for buried telephone cable, 25.5 m (83.7 ft) northeast of the northern rail of the railroad tracks, 15.5 m (51 ft) northeast of the junction box, 13.5 m (44 ft) southwest of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 4.6 m (15 ft) to refusal.

CVO89-225

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.66 km (0.45 mi) north along a dirt road, to a railroad crossing, 18 m (59 ft) southwest of the south rail of the railroad tracks, 13 m (43 ft) southeast of the center of the dirt road, approximately 3 m (10 ft) northwest of a 0.6 m (24 in) pine tree, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 7.6 m (25 ft) to refusal.

E 500

0.65 km (0.45 mi) west along Highway 89 from the lodge and gas station in Bartle, then 0.66 km (0.45 mi) north along a dirt road, then 0.1 km (0.05 mi) east along the northern side of the railroad tracks, approximately 10.7 m (35 ft) north of the north rail of the railroad tracks, about 0.3 m (1 ft) above the railroad grade, and set in a 25 cm (10 in) diameter concrete post.

H 197

0.7 km (0.4 mi) east along Highway 89 from the town of Bartle, then 0.6 km (0.35 mi) north along FS Road 15, then approximately 0.1 km (0.05 mi) east along the south side of the railroad tracks, approximately 9.1 m (30 ft) south of the southernmost rail of the railroad tracks, and set in a concrete post.

Part 3: Northwest of Medicine Lake to Bartle.

From approximately 70 km (44 mi) northeast of the town of McCloud to the Ranger Station at Medicine Lake.

The following seventeen benchmark descriptions refer to the intersection of FS Road 15 and the pumice road leading to Medicine Lake (FS Road 43 N 48). This intersection can be reached as follows: 5.2 km (3.2 mi) east along Highway 89 from its intersection with Squaw Valley Road in McCloud, then 34.3 km (21.3 mi) northeast along FS Road 13 to a "Y" intersection, then 1.8 km (1.1 mi) north (left) along FS Road 42 N 17 Y, then 19.8 km (12.2 mi) north (left) along FS Road 15 (also labeled FS Road 77 later) to an intersection with a pumice road on the right which leads to Medicine Lake (FS Road 43 N 48).

CVO-XX

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake to a major intersection (with restrooms and paved parking) with FS Road 77 (a paved road) on the west (left) and FS Road 44 N 01 to Lava Beds National Monument on the east (right), then continue north along FS Road 15 for another 1.8 km (1.1 mi) to the intersection with FS Road 44 N 06 on the west (left) and FS Road 44 N 05 on the east (right), in the northwest triangle formed by FS Road 15 and FS Road 44 N 06, approximately 12 m (40 ft) west of the centerline of FS Road 15, approximately 12 m (40 ft) north of the center of FS Road 44 N 06, enclosed in 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO-XV

8.4 km (5.2 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake, at the major intersection (with restrooms and paved parking) with FS Road 77 (a paved road) on the west (left) and FS Road 44 N 01 to Lava Beds National Monument on the east (right), in the northwest corner of the triangle formed by FS Road 15 and FS Road 77, among the pine trees approximately 15 m (50 ft) northwest of the center of FS Road 15, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO-X

6.8 km (4.2 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake, to a long and steep downgrade, 7.6 m (25 ft) west of the centerline of the road, and set in the east base of a small rock outcrop that protrudes 1.8 m (6 ft) above the ground.

F 502

4.5 km (2.8 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake, to the remnants of an old track road from the east (left), approximately 12 m (40 ft) east of the centerline of the road, in the middle of the old track road bed, and set in a 25 cm (10 in) diameter concrete post.

CVO-V

3.0 km (1.9 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake, to a long straight section of road, approximately 12 m (40 ft) east of the centerline of the road, 0.3 m (1 ft) below the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO-I

1.5 km (0.9 mi) north along FS Road 15 (also numbered 77) from its intersection with the pumice road leading to Medicine Lake, at a track road on the left, approximately 12 m (40 ft) west of the center of the road, 2 m (7 ft) above the road, 1.2 m (4 ft) above the ground, among a number of boulders, and set in a large 1.8 x 3 m (6 x 10 ft) boulder. Road work may destroy this mark.

J 502

0.2 km (0.1 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, to the summit of a grade, 6.5 m (21 ft) northeast of the center of the road, 0.7 m (2.3 ft) south of a witness post, about 0.3 m (1 ft) above the road, about 0.2 m (6 in) above ground, and set in a concrete post.

K 502

1.7 km (1.05 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, 9.3 m (30.5 ft) southeast of the center of the road, 0.7 m (2.2 ft) west of a witness post, about 0.3 m (1 ft) above the road, about 0.1 m (4 in) above ground level, and set in a concrete post.

Little Hoffman

3.1 km (1.9 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, to a slight grade, approximately 100 m (328 ft) west of FS Road N 43 N 32, approximately 23 m (75 ft) west of the summit of a grade, 4 m (13 ft) south of the center of the road, at the south edge of the road, 0.5 m (1.6 ft) west of a witness post, 0.3 m (1 ft) above the road, 0.2 m (8 in) above the ground, and welded to the top of a 4 cm (2 in) diameter iron pipe. The bench mark is a brass tablet stamped "Little Hoffman 1948".

CVO88-106

3.1 km (1.9 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, approximately 100 m (328 ft) west of FS Road N 43 N 32, 16.6 m (54.5 ft) southwest of the center of the road, 15.5 m southeast of bench mark Little Hoffman, 0.2 m (8 in) above the road, 0.1 m (4 in) above the ground, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 7.3 m (24 ft) to refusal. The bench mark is a 8 cm (3 in) red brass tablet with a 1.5 cm (0.75 in) nipple in the center.

CVO88-107

4.3 km (2.65 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, to a turnout on the south side of the road, 18.5 m (61 ft) southwest of the center of the road, 1 m (3 ft) southwest of a 2 m (6.5 ft) diameter boulder projecting 1 m (3 ft) above ground, 0.2 m (8 in) above the ground, 2 m (6.5 ft) below the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven 3.7 m (12 ft) to refusal. The bench mark is a 8 cm (3 in) red brass tablet with a 1.5 cm (0.75 in) nipple in the center.

L 502

4.6 km (2.85 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 5.02 km (3.1 mi) west along FS Road 43 N 48 from the ranger station at Medicine Lake)*, across from a turnout, 3.8 m (12.5 ft) southeast of the center of the road, 1 m (3 ft) above the road, and set in a 2.5 x 3 m (8 x 10 ft) boulder projecting 0.6 m (2 ft) above the ground.

R 502

5.6 km (3.5 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 4.0 km (2.5 mi) west along FS Road 43 N 48 from the ranger station at Medicine Lake)*, to the southeast corner of a triangle formed by FS Road 43 N 48 and the road to the summit of Little Mount Hoffman, 17 m (56 ft) east of the approximate center of the triangle formed by the road junctions, 13 m (43 ft) southeast of FS Road 43 N 48, 0.7 m (2.3 ft) west of a witness post, 0.3 m (1 ft) above the road, 0.2 m (8 in) above ground, and set in a concrete post.

M 502

6.3 km (3.9 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 3.3 km (2.1 mi) west along FS Road N 43 N 48 from the ranger station at Medicine Lake)*, on the outside of a curve, 5.8 m (19 ft) southeast of the center of the road, 0.7 m (2.3 ft) northeast of a witness post, 0.3 m (1 ft) above the road, 0.15 m (6 in) above ground, and set in a concrete post.

N 502

7.8 km (4.85 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 1.8 km (1.15 mi) west along FS Road N 43 N 48 from the ranger station at Medicine Lake)*, 17 m (56 ft) south of the center of the road, 5.5 m (18 ft) above the road, 1.2 m (4 ft) south of the north edge of a high rocky bluff, and set in the top of a large rock outcrop at the west end of the bluff.

CVO88-102

7.8 km (4.85 mi) east along FS road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 1.8 km (1.15 mi), west along FS Road N 43 N 48 from the ranger station at Medicine Lake)*, to the edge of a high rocky bluff, 6.5 m (21 ft) east of and 15 cm (6 in) lower than bench mark **N 502**, 15.4 m (50 ft) south of the

center of the road, 3 m (10 ft) above the road, and set in the top of a large rock outcrop at the west end of the bluff. Bench mark is a 8 cm (3 in) red brass tablet with a 1.5 cm (0.75 in) high nipple in the center.

P 502

9.1 km (5.65 mi) east along FS Road 43 N 48 (the pumice road to Medicine Lake) from its intersection with FS Road 15, *(or 0.53 km (0.3 mi) west along FS Road N 43 N 48 from the ranger station at Medicine Lake)*, 3 m (10 ft) south of the center of the road, 15 cm (6 in) above the ground, 0.6 m (2 ft) lower than the road, and set in a 0.75 x 1.2 m (2.5 x 4 ft) boulder.

S 502

9.6 km (6.0 mi) east along FS Road 43 N 48 from its intersection with FS Road 15, to the Ranger Station at Medicine Lake, to the northeast end of the ranger station at Medicine Lake, 3.5 m (11.5 ft) south of the old roadbed, 39 m (128 ft) south of the center of the main road, 29 m (95 ft) northwest of the center of the road to the campgrounds and the ranger station, 0.7 m (2.5 ft) north of a witness post, and set in a concrete post projecting 0.3 m (1 ft) above ground.

From the Ranger Station at Medicine Lake to approximately 11 km (6.8 mi) east of the ranger station at Medicine Lake (approximately 50 km (31 mi) northeast of the town of Bartle).

Q 502

1.55 km (1.0 mi) east along FS Road 43 N 48 from the ranger station at Medicine Lake, 8 m (26 ft) north of the center of the road, 0.5 m (1.5 ft) south of a witness post, 0.5 m (1.5 ft) above the road, 0.2 m (8 in) above the ground, and set in a 25 cm (10 in) diameter concrete post.

T 502

2.85 km (1.8 mi) east along FS Road 43 N 48 from the ranger station at Medicine Lake, 0.15 km (0.1 mi) south of the "T" junction of the road to FS Road 49 (44 N 75), along the road to the "Boat Ramps", to the east end of an outcrop, 8.5 m (28 ft) north of the center of the road, 2 m (6 ft) above the road, 0.7 m (2 ft) above ground, and set in a 1.2 x 3.7 m (4 x 12 ft) boulder.

X 502

4.00 km (2.5 mi) east along FS Road 43 N 48 from the ranger station at Medicine Lake, 1.3 km (0.8 mi) south of the "T" junction of the road to FS Road 49 (44 N 75), along the road to the "Boat Ramps", 0.57 km (0.35 mi) east of a closed off old roadbed, 23 m (75 ft) east of the center of the road, on a large rock outcrop, 3 m (10 ft) above the road, 0.6 m (2 ft) above the ground, and set in the southeast end of a 1.8 x 2.8 m (6 x 9 ft) boulder.

OR an alternate route:

2.7 km (1.7 mi) east along FS Road 43 N 48 from the ranger station at Medicine Lake, then 0.40 km (0.25 mi) east along the road to FS Road 49 (44 N 75), then 1.37 km (0.9 mi) south along FS Road 49, then 0.40 km (0.25 mi) east along dirt FS Road 44 N 30-F (private cabins) to a fork in the road, then north along the right fork for 0.1 km (0.05 mi), 23 m (75 ft) east of the center of the road, on a large rock outcrop, 3 m (10 ft) above the road, 0.6 m (2 ft) above the ground, and set in the southeast end of a 1.8 x 2.8 m (6 x 9 ft) boulder.

The following six (6) benchmark descriptions refer to the junction of FS Road 49 (also called 44 N 75) and the road to Medicine Lake. This intersection is reached as follows: 0.6 km (0.4 mi) east along Highway 89 from the gas station and lodge in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 39.0 km (24.15 mi) northeast along FS Road 49 to the intersection with the road to Medicine Lake (FS Road 43 N 48).

U 502

1.75 km (1.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road leading to Medicine Lake (*also 0.38 km (0.2 mi) south of the intersection with FS Road 44 N 30-F*) to the remnants of an old abandoned roadbed on the east (left) side, then 0.30 km (0.2 mi) east along the old roadbed, 7 m (23 ft) north of the center of the old roadbed, 1 m (3 ft) above the road, 0.8 m (2.5 ft) above the ground, and set in a 1.5 x 2 m (5 x 6 ft) boulder. U 502 is 1.18 km (0.7 mi) southeast of bench mark X 502 along an old abandoned roadbed.

SBM1

0.6 km (0.4 mi) east along Highway 89 from the gas station and lodge in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 35.6 km (22.05 mi) northeast along FS Road 49 (8.0 km (4.95 mi) past partially paved FS Road 56 on the right) (*Or 3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48)*) to an intersection on the east with a "Bullseye Lake" sign, then 0.8 km (0.5 mi) southeast (right) along a gravel road to the junction of a track road to Blanch Lake on the left (north), (*also 0.81 km (0.5 mi) south along this track road from its junction with FS Road 97 (44 N 17)*), 38 m (125 ft) north along the track road from its junction with the gravel road, and 9.5 m (31 ft) east of the center of the track road. The bench mark is a 6 x 6 cm (2 x 2 in) chiseled square centered on a 1 x 1.2 m (3 x 4 ft) embedded boulder projecting 0.1 m (4 in) above ground. SBM1 is 1.43 km (0.9 mi) southeast of bench mark U 502.

46 M

3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48), then 3.16 km (2.0 mi) east along the dirt road to Burnt Lava Flow (pass the junction to Bullseye Lake at the 2.36 km (1.5 mi) point and pass a dirt road to the south at the 2.76 km (1.75 mi) point), to the northeast end of a

sharp curve in the road, at the bottom of a steep grade, 14.6 m (48 ft) northeast of the center of the road, set in a large rock outcrop, 2 m (6.5 ft) south of the north end of the outcrop, 1.2 m (4 ft) east of the west edge of the outcrop, and 0.6 m (2 ft) above the road.

CVO88-112

3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48), then 4.44 km (2.8 mi) east along the dirt road to Burnt Lava Flow, approximately 40 m (131 ft) east of a track road leading north, 15 m (50 ft) south of the center of the road, 5.3 m (17 ft) southeast of a 0.6 m (2 ft) diameter blazed pine tree, 1.1 m (3.5 ft) above the road, 0.2 m (8 in) above the ground, and set in a 1 x 1.2 m (3 x 4 ft) embedded boulder. The bench mark is a 8 cm (3 in) red brass tablet with a 1.5 cm (0.75 in) nipple in the center.

CVO88-111

3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48), then 5.70 km (3.55 mi) east along the dirt road to Burnt Lava Flow, to the junction with FS Road 43 N 54, in the southeast corner of the triangle formed by FS Road 43 N 54 and the road to Burnt Lava Flow, 23.8 m (78 ft) south of the center of FS Road 43 N 54, 11 m (36 ft) east of the center of the road to Burnt Lava Flow, 0.3 m (1 ft) above the road, 0.2 m (8 in) above the ground, and set in a 0.6 x 1 m (2 x 3 ft) embedded boulder. Bench mark is a 8 cm (3 in) red brass tablet with a 1.5 cm (0.75 in) nipple in the center.

Y 502

3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48), then 6.4 km (4.0 mi) southeast along the dirt road to Burnt Lava Flow (right at the intersection at the 5.7 km (3.55 mi) point), to a bend in the road to the west, on the outside of a sharp curve, 7 m (23 ft) east of the center of the road, 0.6 m (2 ft) west of a witness post, 0.6 m (2 ft) above the road, 0.2 m (8 in) above the ground, and set in a concrete post.

Z 502

3.36 km (2.1 mi) south along FS Road 49 (44 N 75) from its intersection with the road to Medicine Lake (FS Road 43 N 48), then 8.0 km (5.0 mi) southeast along the dirt road to Burnt Lava Flow (right at the intersection at the 5.7 km (3.55 mi) point), in a small clearing 8 m (26 ft) northeast of the center of the road, 0.6 m (2.1 ft) southwest of a witness post, 0.3 m (1 ft) above the road, and set in a concrete post.

From approximately 11 km (6.8 mi) east of the ranger station at Medicine Lake (approximately 50 km (31 mi) northeast of the town of Bartle, CA) to approximately 4.8 km (3.0 mi) northwest of the Whitehorse Reservoir.

47 M

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56, at a slight downgrade, to an open area between the road and a lava flow, approximately 0.2 km (0.1 mi) west of an intersection, 12 m (40 ft) southeast of the center of the road, 12 m (40 ft) north of the edge of the lava flow, 1.8 m (6 ft) below the road, and set in a 1.8 x 1.8 m (6 x 6 ft) lava boulder.

CVO-LXXXV

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 1.4 km (0.85 mi) to a downgrade and a spatter rampart on the left (north), 6.4 m (21 ft) northwest of the center of the road, 1.8 m (8 ft) above the road, and set in the south edge of the spatter rampart.

B 503

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 2.8 km (1.75 mi), on the inside of a sharp curve to the left (northeast), 8.2 m (23 ft) northwest of the center of the road, 1.2 m (4 ft) above the road, and set in bedrock at the southeast base of a rocky hillside.

CVO89-100

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 8.1 km (5.05 mi), to a major intersection with a red cinder road, approximately 15.2 m (50 ft) east of the center of the intersection, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

D 503

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 8.1 km (5.05 mi), then 1.7 km (1.05 mi) southeast along a red cinder road, approximately 55 m (180 ft) southwest of the center of the road, 2.4 m (8 ft) below the top of a lava flow, 1.8 m (6 ft) above the ground, and set in a lava block.

E 503

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 8.1 km (5.05 mi), then 3.5 km (2.15 mi) southeast along a red cinder road, to a 0.9 m (3 ft) diameter pine tree with a 32 cm (1.5 in) diameter metal disc located 1.5 m (5 ft) above the ground, 12.2 m (40 ft) southwest of the center of the road, 1.5 m (5 ft) northeast of the, 1 m (3 ft) below the road, and set in a concrete post.

CVO89-101

0.6 km (0.4 mi) east along Highway 89 from the lodge and gas station in Bartle, then 7.3 km (4.55 mi) north along FS Road 15, then 27.6 km (17.1 mi) northeast along FS Road 49, then 6.7 km (4.1 mi) east along partially paved FS Road 56 to a reverse "Y" intersection from the left, then continue easterly along FS Road 56 for another 8.1 km (5.05 mi), then 4.9 km (3.0 mi) southeast along a red cinder road, to a reverse "Y" with a track road on the left (north), in the "V" formed by the two roads, approximately 6.1 m (20 ft) east of the main cinder road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

0.6 km (0.35 mi) southeast of bench mark CVO89-101 is an intersection with a secondary road to the south. 1.3 km (0.8 mi) southeast of this intersection along the secondary road is bench mark F 503.

The following sixteen (16) benchmark descriptions refer to the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats. This intersection is reached as follows: 0.7 km (0.40 mi) east along Highway 89 from the town of Bartle, then 7.2 km (4.45 mi) northeast along FS Road 15, then 5.3 km (3.3 mi) east along FS Road 49, then 17.6 km (10.9 mi) east along FS Road 3 to a "T" intersection with FS road 40 N 40 (not signed) leading south and FS road 3 leading north. (This "T" intersection is also 4.9 km (3.0 mi) east of FS Road 41 N 36.)

F 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to yet another "Y" intersection at an old "Round Mtn Road" sign, then 3.3 km (2.0 mi) northeast along the right fork (straight through a reverse "Y" intersection from the right (east) at the 1.2 km (0.7 mi) point) to another "Y" intersection, then 0.2 km (0.1 mi) northwest along the left fork to a 5-way intersection, then straight through for another 0.2 km (0.1 mi) to a reverse "Y" intersection from the left and a "Round Mtn L.O. 2; Whitehorse 11" sign, then stay on the main road for another 0.7 km (0.45 mi) to "high tension wire" crossing

the road, then stay on the main road for another 0.7 km (0.45 mi) to a reverse "Y" intersection from the right, staying on the main road for another 0.1 km (0.05 mi) to another "Y" intersection from the left and bench mark **164 GWM** on the right, then 0.3 km (0.2 mi) along the left fork to a major graded intersection, then through the intersection (jogging slightly to the west but still going north) for 2.1 km (1.30 mi), to a large boulder on the south side of the road, 12.8 m (42 ft) north of a 4.5 m (15 ft) high rock bluff, 4.9 m (16 ft) south of the center of the road, 1 m (3 ft) above the road, and set in a 1.5 x 1.5 m (5 x 5 ft) embedded boulder.

G 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to another "Y" intersection at an "Old Round Mtn Road" sign, then 3.3 km (2.0 mi) northeast along the right fork (straight through a reverse "Y" intersection from the right (east) at the 1.2 km (0.7 mi) point) to another "Y" intersection, then 0.2 km (0.1 mi) northwest along the left fork to a 5-way intersection, then straight through for another 0.2 km (0.1 mi) to a reverse "Y" intersection from the left and a "Round Mtn L.O. 2; Whitehorse 11" sign, then stay on the main road for another 0.7 km (0.45 mi) to "high tension wire" crossing the road, then stay on the main road for another 0.7 km (0.45 mi) to a reverse "Y" intersection from the right, then stay on the main road for another 0.1 km (0.05 mi) to another "Y" intersection from the left and bench mark **164 GWM** on the right, then 0.3 km (0.2 mi) along the left fork to a major graded intersection, then through the intersection (jogging slightly to the west but still going north) for 1.0 km (0.60 mi) to a lava blister on the west side of the road, 13 m (43 ft) west of the center of the road, 0.6 m lower than the highest point of the lava blister, about 1.2 m (4 ft) above the road, and set in the west side of the lava blister.

164 GWM

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then north (left) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to yet another "Y" intersection at an "Old Round Mtn Road" sign, then 3.3 km (2.0 mi) northeast along the right fork (straight through a reverse "Y" intersection from the right (east) at the 1.2 km (0.7 mi) point) to another "Y" intersection, then 0.2 km (0.1 mi) northwest along the left fork to a 5-way intersection, then straight through for another 0.2 km (0.1 mi) to a reverse "Y" intersection from the left and a "Round Mtn L.O. 2; Whitehorse 11" sign (and bench mark H503 on the left), then stay on the main road for another 0.7 km (0.45 mi) to "high tension wire" crossing the road, then stay on the main road for another 0.7

km (0.45 mi) to a reverse "Y" intersection from the right, then stay on the main road for another 0.1 km (0.05 mi) to another "Y" intersection from the left, 14 m (46 ft) northeast of the intersection, about 0.6 m (2 ft) above the road, and set in a 25 cm (10 in) diameter concrete post.

H 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to another "Y" intersection at an "Old Round Mtn Road" sign, then 3.3 km (2.0 mi) northeast along the right fork (straight through a reverse "Y" intersection from the right (east) at the 1.2 km (0.7 mi) point) to another "Y" intersection, then 0.2 km (0.1 mi) northwest along the left fork (through a 5-way intersection at the 0.2 km (0.1 mi) point), at a reverse "Y" intersection from the left and a "Round Mtn L.O. 2; Whitehorse 11" sign, in the "V" created by the two roads, 4.9 m (16 ft) southeast of the center of the main road, 4.6 m (15 ft) southwest of the center of the spur road, and set in a 25 cm (10 in) diameter concrete post.

J 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to another "Y" intersection at an "Old Round Mtn Road" sign, then 2.3 km (1.4 mi) northeast along the right fork (straight through a reverse "Y" intersection from the right (east) to the 1.2 km (0.7 mi) point), at the edge of a lava flow (hidden in trees), 13.8 m (45 ft) west of the center of the road, 1 m (3 ft) above the road, 0.46 m (1.5 ft) lower than the top of the lava flow, at the east edge of a lava finger, and set in a 1 x 1.2 m (3 x 4 ft) lava boulder.

K 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork to another "Y" intersection at an "Old Round Mtn Road" sign, then 0.5 km (0.3 mi) northeast along the right fork, at a 1 m (3 ft) deep road cut, 3.7 m (12 ft) north of the center of the road,

0.7 m (2.5 ft) lower than the top of the road cut, 0.46 m (1.5 ft) above the road, and set in a 0.6 x 1 m (2 x 3 ft) rock shelf of the road cut.

L 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 0.4 km (0.25 mi) north along the left fork to another "Y" intersection, then 1.0 km (0.6 mi) northwest along the left fork, to a small clearing, 84 m (270 ft) south of the east end of a lava knoll, 12 m (40 ft) east of the center of the road, and set in a concrete post.

M 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks) to another "Y" intersection, then 1.6 km (1.0 mi) north along the left fork, 5 m (17 ft) southeast of the center of the road, and set in a concrete post.

CVO89-102

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 2.9 km (1.8 mi) northwest along the left fork (2.2 km (1.35 mi) past the railroad tracks), at a "Y" intersection, at an elongated depression to the east, approximately 21.6 m (70.9 ft) northeast of the center of the "Y" created by the two roads, and set in a rock outcrop at the north end of the depression.

CVO89-103

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 1.6 km (1.0 mi) northwest along the left fork (0.9 km (0.55 mi) past the railroad tracks), to the edge of a lava flow, 16 m (50 ft) west of the center of the road, about 1 m (3 ft) above the road, and set in the east edge of a lava flow.

P 503

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 1.5 km (0.95 mi) northwest along the left fork (0.8 km (0.5 mi) past the railroad tracks), 4.9 m (16 ft) west of the center of the road, about 1 m (3 ft) above the road, and set in a 1.2 x 1.2 m (4 x 4 ft) lava boulder.

CVO89-104

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash and continue northwest for 1.7 km (1.05 mi) to a "Y" intersection, then 0.8 km (0.5 mi) northwest along the left fork (0.1 km (0.05 mi) past the railroad tracks), to the top of a rise, at a dim trail on the left (west), approximately 31 m (102 ft) west of the center of the road, and set in bedrock in the middle of the trail.

CVO89-105

4.9 km (3.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, then left (north) onto a small side road and dry wash at an offset "T" intersection, approximately 30 m (100 ft) northeast of the center of the road, approximately 15.4 m (50 ft) north of the center of the wash, approximately 3 m (10 ft) southwest of a 1 m (3 ft) diameter boulder, and set in an embedded boulder.

CVO89-106

5.0 km (3.1 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, to a lone 6 m (20 ft) tall 0.3 m (1 ft) diameter pine tree on the east side of the road, 6.8 m (22 ft) south of the center of the road, 2.5 m (8 ft) east of the pine tree, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

CVO89-107

3.2 km (2.0 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, to a relatively flat area, at "Shasta National Forest" and "FS 3" signs, approximately 122 m (400 ft) northeast of the "Shasta National Forest" sign, 7.4 m (24 ft) southeast of the center of the road, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

Y 500

3.1 km (1.9 mi) north along FS Road 3 from the "T" intersection of FS Road 40 N 40 and FS Road 3 just east of Julia Grover Flats, to a relatively flat area, at "Shasta National Forest" and "FS 3" signs, 12.3 m (40 ft) southeast of the center of the road, about 0.3 m (1 ft) above the road, nearly across the road from the "Shasta National Forest" sign, and set in a 25 cm (10 in) diameter concrete post.

The following benchmark descriptions refer to the intersection of FS Road 15 and Highway 89. This intersection is 0.7 km (0.4 mi) east along Highway 89 from the town of Bartle, CA.

X 500

7.2 km (4.45 mi) northeast along FS Road 15 from its intersection with Highway 89, then 5.3 km (3.3 mi) east along FS Road 49, then 17.6 km (10.9 mi) east along FS Road 3 to a point just east of Julia Grover Flats and the "T" intersection of FS Road 40 N 40 (not signed) leading south and FS Road 3 leading north (4.9 km (3.0 mi) east of FS Road

41 N 36), then 1.3 km (0.85 mi) north along FS Road 3, at the summit of a steep grade and a sharp curve to the right (east), on the inside of the curve, 7 m (23 ft) east of the center of the road, about 1.5 m (5 ft) above the road, about 1 m (3 ft) above the ground, and set in a large outcrop.

From approximately 4.8 km (3.0 mi) northwest of Whitehorse reservoir to approximately 0.7 km (0.4 mi) northeast of the town of Bartle.

W 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 17.5 km (10.85 mi) east along FS Road 3, then north along a track road for approximately 45.7 m (150 ft), to the west end of a small clearing, west of the "V" created by the two roads, approximately 12.2 m (40 ft) southwest of the center of the track road, about 15 cm (6 in) above the ground, and set in a 25 cm (10 in) diameter concrete post.

17.4 km (10.80 mi) east along FS Road 3 from its junction with FS Road 49, bear left (north) at the "Y" intersection.

16.9 km (10.50 mi) east along FS Road 3 from its junction with FS Road 49 (also 4.2 km (2.60 mi) east of the FS Road 41 N 36 junction) is a set of high-tension wires.

V 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 15.9 km (9.85 mi) east along FS Road 3 (3.2 km (1.95 mi) east of the FS Road 41 N 36 junction), approximately 18.3 m (60 ft) south of the center of the road, about 2.4 m (8 ft) above the road, about 1.2 m (4 ft) below the highest point of a small lava tumulus, and set in the northwest end of the lava tumulus.

U 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 14.2 km (8.80 mi) east along FS Road 3 (1.5 km (0.90 mi) east of the FS Road 41 N 36 junction), approximately 8.2 m (27 ft) southeast of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

T 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 13.2 km (8.15 mi) east along FS Road 3 (0.40 km (0.25 mi) east of the junction of FS Road 3 and FS Road 41 N 36), approximately 10.4 m (34 ft) southeast of the center of the road, at the top of a large fallen tree, and set in a lava flow.

12.75 km (7.9 mi) east along FS Road 3 from its junction with FS Road 49 is the junction of FS Road 41 N 36.

S 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 12.2 km (7.55 mi) east along FS Road 3, approximately 18.2 m (60 ft) north of the center of the road, and set in a lava flow.

R 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 11.4 km (7.05 mi) east along FS Road 3, approximately 7.6 m (25 ft) north of the center of the road, and set in a small lava outcrop.

Q 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 10.4 km (6.45 mi) east along FS Road 3, approximately 5.5 m (18 ft) south of the center of the road, and set in a lava flow.

P 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 9.52 (5.90 mi) east along FS Road 3, approximately 12.3 m (40 ft) north of the center of the road, about 0.3 m (1 ft) below the road, and set in a 25 cm (10 in) diameter concrete post.

M 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 8.8 km (5.45 mi) east along FS Road 3 (1.2 km (0.75 mi) east of the junction of FS Road 3 and FS Road 41 N 02), across the road from a 30 m (100 ft) wide by 0.4 km (0.25 mi) long clear-cut area on the southwest side of the road, approximately 12 m (40 ft) northwest of the center of the road, about 1 m (3 ft) above the road, and set in a 25 cm (10 in) diameter concrete post.

7.6 km (4.7 mi) east along FS Road 3 from its junction with FS Road 49 is the junction of FS Road 41 N 02.

L 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 6.9 km (4.3 mi) east along FS Road 3, to the west edge of a clear-cut area and at a Forest Service Road 3 sign, 0.1 km (0.05 mi) east of FS Road 40 N 03, approximately 13.7 m (45 ft) north of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

M 57 RESET

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 5.3 km (3.3 mi) east along FS Road 3, within the "Y" formed by the intersection of FS Road 3 and FS Road 40 N 12 X, approximately 24.4 m (80 ft) north of the intersection of the two roads, approximately 7.6 m (25 ft) east of the center of FS Road 40 N 12 X, about 1.2 m (4 ft) lower than FS Road 3 road, and set in a 25 cm (10 in) diameter concrete post.

CVO89-229

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 4.0 km (2.45 mi) east along FS Road 3, 1.2 km (0.75 mi) west of the road leading south to Pondosa, approximately 86 m (280 ft) south of a track road leading north, approximately 45 m (150 ft) south of sharp bend in the road, approximately 14 m (46 ft) southeast of the center of the road, about 4 m (13 ft) above the road, about 1 m (3 ft) below the top of a bedrock ledge, and set in that ledge.

K 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 3.15 km (1.95 mi) east along FS Road 3, approximately 8 m (25 ft) north of the center of the road, and set in a 25 cm (10 in) diameter concrete post.

J 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.4 km (2.75 mi) east along FS Road 49, then 1.4 km (0.9 mi) east along FS Road 3 (towards Hambone), at a railroad crossing, approximately 23 m (75 ft) southeast of the center of the road, approximately 15.4 m (50 ft) north of the railroad tracks, and set in a 25 cm (10 in) diameter concrete post.

H 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 4.3 km (2.65 mi) east along FS Road 49, at the base of a slight rise, approximately 13 m (44 ft) west of where the paved road intersects a dim track road, 8 m (26 ft) west of the center line of FS Road 49, nearly flush with ground, and set in a 25 cm (10 in) diameter concrete post.

CVO89-228

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 2.9 km (1.8 mi) east along FS Road 49 (1.1 km (0.7 mi) northeast of where FS Road 40 N 04 crosses FS Road 49), at the north end of a small road cut which has exposed rounded boulders particularly on the east side of the road, 26 m (85 ft) southeast of the center of FS Road 49, slightly below road, and set in the top of an embedded boulder projecting 20 cm (8 in) above ground.

CVO89-227

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 2.3 km (1.4 mi) east along FS Road 49 to a clear-cut area, then 0.2 km (0.1 mi) east along FS Road 42 N 04 to a "Y" intersection, then 30 m (97 ft) along the left fork of this "Y" intersection, in a clump of trees between FS Roads 42 N 04 and 42 N 08, 35 m (115 ft) north of the northern rail of a set of railroad tracks, 23 m (85 ft) east of the center of FS Road 42 N 08, 10 m (33 ft) south of FS Road 42 N 04, enclosed in a 15 cm (6 in) PVC pipe, and attached to a rod driven 9.9 m (32 ft) to refusal.

G 500

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 2.3 km (1.4 mi) east along FS Road 49 to a clear-cut area, then 0.2 km (0.1 mi) east along FS Road 42 N 04 to a "Y" intersection, then (take the right fork) 1.5 km (0.9 mi) east along FS Road 42 N 08, approximately 6 m (20 ft) east of the center of the road, about 10 cm (4 in) above the ground, and set in a 25 cm (10 in) diameter concrete post.

Q 499

7.2 km (4.45 mi) northeast along FS Road 15 from its junction with Highway 89, then 2.3 km (1.4 mi) east along FS Road 49 to a clear-cut area, then 0.2 km (0.1 mi) east along FS Road 42 N 04 to a "Y" intersection, then (take the right fork) 1.8 km (1.1 mi) east along FS Road 42 N 08 to another "Y" intersection, then (again take the right fork) 1.45 km (0.85 mi) south along a secondary road (40 N 07 Y ?) to a reverse "Y", in the "V" formed by the two roads, and set in a 25 cm (10 in) diameter concrete post.

Bench mark Q 499 is approximately 152 m (500 ft) northeast of a set of railroad tracks and the end of a road. 1.3 km (0.8 mi) southwest along this road is bench mark M 499.

M 499

2.5 km (1.55 mi) northeast along FS Road 15 from its junction with Highway 89, then (at the four-way intersection) right (east-northeast) onto FS Road 39 N 54, then an immediate left (northeast) onto FS Road 40 N 07 Y for 1.2 km (0.75 mi), approximately 9 m (30 ft) east of the center of the road, about 0.76 m (2.5 ft) above the road, and set in a concrete post.

CVO89-226

2.4 km (1.50 mi) northeast along FS Road 15 from its junction with Highway 89, at the remnants of an old roadbed on the right, 90 m (295 ft) south of the intersection of FS Road 39 N 54, 23 m (75 ft) southeast of the centerline of FS Road 15, about 0.6 m (2 ft) lower than the new roadbed (FS Road 15), about level with the old roadbed, enclosed in a 15 cm (6 in) diameter PVC pipe, and attached to a rod driven to refusal.

H 197

0.7 km (0.4 mi) east along Highway 89 from the town of Bartle, then 0.6 km (0.35 mi) north along FS Road 15, then approximately 0.1 km (0.05 mi) east along the south side

of the railroad tracks, approximately 9.1 m (30 ft) south of the southern most rail of the railroad tracks, and set in a concrete post.

Appendix 2: BENCHMARK ELEVATIONS

Table 1: A 13 to OVERPASS

BENCH MARK	STADIA DISTANCE (mi) (km)		ELEVATION DIFFERENCE (m)	ELEVATION 1989, 1990 (m)	PAGE NUMBER
A 13	0.0	0.0	-	1056.3784	5
CVO 9009	3.8	2.4	-14.4469	1070.8253	5
V 494	5.8	3.6	-7.2613	1063.5640	5
W 494	7.2	4.5	-2.4638	1061.1002	5
CVO 9006	8.7	5.4	-9.9651	1051.1351	5
CVO 9080	10.2	6.3	39.0448	1090.1799	5
Y 494	10.2	6.3	-3.0368	1087.1431	6
ALTON AZI	11.8	7.3	-3.9413	1083.2018	6
A 495 RESET	13.4	8.3	1.5435	1084.7453	6
CVO 9008	14.7	9.1	-22.7040	1062.0413	6
CVO 9007	16.7	10.4	76.7346	1138.7759	6
CVO 9005	18.0	11.2	38.0560	1176.8319	6
D 495 RESET	20.2	12.5	35.5629	1212.3948	7
E 495 RESET	21.9	13.6	56.1215	1268.5163	7
F 495	23.8	14.8	19.8855	1288.4018	7
G 495	25.7	16.0	45.4753	1333.8771	7
H 495	27.2	16.9	83.5381	1417.4152	7
J 495	28.8	17.9	49.7564	1467.1716	8
K 495	30.3	18.8	-1.6484	1465.5232	8
HERD AZI	31.3	19.4	14.0823	1479.6055	8
M 495	33.5	20.8	70.6483	1550.2538	8
N 495	35.8	22.2	-8.6858	1541.5680	8
P 495	37.4	23.2	1.5875	1543.1555	9
CVO 9004	39.0	24.2	7.8181	1550.9736	9

BENCH MARK	STADIA DISTANCE (mi) (km)		ELEVATION DIFFERENCE (m)	ELEVATION 1989, 1990 (m)	PAGE NUMBER
CVO 9003	40.7	25.3	-4.2754	1546.6982	9
S 495	42.4	26.3	-17.7647	1528.9335	9
T 495	44.0	27.3	-13.0324	1515.9011	9
U 495	45.8	28.4	-15.4454	1500.4557	10
V 495	47.1	29.2	-14.3067	1486.1490	10
W 495	49.0	30.4	-17.2096	1468.9394	10
CVO 9002	50.6	31.4	-12.0616	1456.8778	10
X 495	52.3	32.5	-15.9430	1440.9348	10
Y 495	53.8	33.4	-14.3000	1426.6348	11
A 495 RESET	55.5	34.5	-8.4675	1418.1673	11
B 496	57.1	35.5	-4.1838	1413.9835	11
CVO 505	58.9	36.6	-15.8700	1398.1135	11
CVO 510	60.4	37.5	-5.9339	1392.1796	11
R 501	61.6	38.3	2.0804	1394.2600	11
ORR AZI	62.5	38.8	6.4349	1400.6949	12
P 501	63.7	39.6	-15.0909	1385.6040	12
CVO-XLV	64.5	40.1	0.6839	1386.2879	12
T 501	66.0	41.0	15.9364	1402.2243	12
U 501	67.4	41.9	-5.9728	1396.2515	12
V 501	69.0	42.8	2.0700	1398.3215	13
W 501	70.5	43.8	1.2836	1399.6051	13
CVO-XL	72.1	44.8	2.0970	1401.7021	13
98 GWM	73.7	45.8	1.3390	1403.0411	14
CVO-XXXV	75.3	46.8	43.3896	1446.4307	14
97 GWM	76.9	47.8	55.7297	1502.1604	14
CVO-XXX	78.5	48.7	40.8932	1543.0536	14

BENCH MARK	STADIA DISTANCE		ELEVATION DIFFERENCE (m)	ELEVATION 1989, 1990 (m)	PAGE NUMBER
	(mi)	(km)			
CVO-XXV	79.5	49.4	31.4001	1574.4537	15
A 502	81.3	50.5	-4.4070	1570.0467	15
95 GWM	82.9	51.5	-9.2930	1560.7537	15
B 502	84.5	52.5	-6.3236	1554.4301	15
CVO-XX	86.2	53.5	-16.2478	1538.1823	15
S 503	87.7	54.5	-24.1757	1514.0066	16
T 503	89.2	55.4	20.6503	1534.6569	16
U 503	90.8	56.4	39.7754	1574.4323	16
V 503	92.2	57.3	47.9308	1622.3631	16
W 503	93.9	58.3	36.6239	1658.9870	17
CVO 605	95.3	59.2	21.3812	1680.3682	17
Y 503	96.8	60.1	-1.2754	1679.0928	17
Z 503	98.0	60.9	11.6169	1690.7097	18
A 504	99.6	61.9	43.2227	1733.9324	18
B 504	101.0	62.7	24.5908	1758.5232	18
C 504	102.2	63.5	36.1214	1794.6446	18
D 504	104.1	64.6	6.2103	1800.8549	19
E 504	105.6	65.6	-25.2653	1775.5896	19
F 504	106.6	66.2	-29.6454	1745.9442	19
G 504	108.4	67.3	-14.8815	1731.0627	19
H 504	109.9	68.2	-78.2621	1652.8006	19
J 504	111.4	69.2	-37.0787	1615.7219	20
K 504	112.8	70.0	-26.7914	1588.9305	20
L 504	114.6	71.2	-62.5751	1526.3554	20
M 504	115.9	72.0	-52.7168	1473.6386	20
4770 USFS	117.7	73.1	-21.0609	1452.5777	20

BENCH MARK	STADIA DISTANCE		ELEVATION DIFFERENCE (m)	ELEVATION 1989, 1990 (m)	PAGE NUMBER
	(mi)	(km)			
N 504	119.0	73.9	-28.8566	1423.7211	21
111 GWM	121.0	75.1	-49.2290	1374.4921	21
P 504	122.8	76.3	-45.3454	1329.1467	21
Q 504	123.9	76.9	-21.7546	1307.3921	21
R 504	125.5	77.9	9.7896	1317.1817	21
113 GWM	127.3	79.1	11.3378	1328.5195	22
S 504	128.9	80.0	-10.9304	1317.5891	22
T 504	129.9	80.7	-18.0006	1299.5885	22
BM 500	130.9	81.3	-3.0763	1296.5122	22
U 504	132.3	82.2	-5.7024	1290.8098	22
115 GWM	133.9	83.2	-3.0630	1287.7468	23
V 504	135.4	84.1	-4.2351	1283.5117	23
116 GWM	137.2	85.2	-0.6111	1282.9006	23
Z 504	138.8	86.2	11.6684	1294.5690	23
Y 504	140.9	87.5	-14.7315	1279.8375	23
BM 501	142.3	88.4	-10.4866	1269.3509	23
W 504	144.0	89.4	-1.5960	1267.7549	24
M 602	144.7	89.9	-0.1460	1267.6089	24
L 602	146.7	91.1	2.1121	1269.7210	24
OVERPASS	148.5	92.2	4.7877	1274.5087	24

Table 2: CVO-XLV to H 197

BENCH MARK	STADIA DISTANCE (mi) (km)		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
CVO-XLV	0.0	0.0	-	1386.2879	25
N 501	1.0	0.6	13.1283	1399.4162	25
M 501	2.4	1.5	7.0778	1406.4940	25
CVO-L	3.7	2.3	15.5176	1422.0116	25
TENNANT AZ	5.0	3.1	14.6162	1436.6278	25
K 501	5.3	3.3	0.9753	1437.6031	26
TENNANT	5.4	3.4	6.6305	1444.2336	26
CVO89-109	6.9	4.3	9.0991	1453.3327	26
CVO89-110	8.5	5.3	11.9509	1465.2836	26
CVO-LXV	9.7	6.0	14.8683	1480.1519	27
F 501	11.1	6.9	27.8280	1507.9799	27
CVO89-111	12.6	7.8	43.5550	1551.5349	27
CVO89-112	14.1	8.8	50.6420	1602.1769	27
C 501	15.7	9.7	25.5677	1627.7446	28
47 C	17.1	10.6	64.4416	1692.1862	28
B 501	18.3	11.4	28.9350	1721.1212	28
CVO-LXX	20.0	12.4	-47.0180	1674.1032	29
CVO-LXXV	21.4	13.3	-65.7243	1608.3789	29
CVO-LXXVII	22.7	14.1	-52.8649	1555.5140	29
CVO-LXXX	23.8	14.8	-50.6402	1504.8738	29
C 500	25.5	15.8	-11.1956	1493.6782	30
45 C	27.0	16.8	1.9914	1495.6696	30
B 500*	28.5	17.7	-10.11090	1485.5587	31
A 500*	30.1	18.8	-17.43920	1468.1195	31

* These two marks make a spur from 45 C.

BENCH MARK	STADIA DISTANCE		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
	(mi)	(km)			
CVO89-216	28.6	17.8	9.8615	1505.5311	31
CVO89-217	30.2	18.8	-25.7058	1479.8253	32
CVO89-218	32.0	19.9	-39.3273	1440.4980	32
W 499	33.8	21.0	-22.3908	1418.1072	32
CVO89-206	35.7	22.2	-61.3834	1356.7238	32
CVO89-207	37.8	23.5	-82.0918	1274.6320	32
CVO89-208	39.9	24.8	-46.6179	1228.0141	32
CVO89-209	41.7	25.9	-1.0023	1227.0118	33
K 499	42.5	26.4	-14.8670	1212.1448	33
CVO89-210	45.0	27.9	-19.9027	1192.2421	33
H 499	47.2	29.3	8.3469	1200.5890	33
G 499	49.5	30.7	-15.7338	1184.8552	34
F 499	51.0	31.7	-21.0101	1163.8451	34
E 499	52.5	32.6	-17.4603	1146.3848	34
CVO89-211	53.6	33.3	-10.0899	1136.2949	34
C 499	55.3	34.3	-22.0626	1114.2323	34
B 499	56.8	35.3	-13.0753	1101.1570	35
C 197	57.2	35.5	1.0337	1102.1907	35
A 499	59.0	36.6	15.6153	1117.8060	35
D 197	60.6	37.6	9.0525	1126.8585	35
CVO89-219	62.5	38.8	17.5172	1144.3757	36
CVO89-220	63.7	39.6	8.4421	1152.8178	36
CVO89-221	65.3	40.6	6.3629	1159.1807	36
CVO89-222	66.9	41.5	34.4348	1193.6155	36
CVO89-223	68.6	42.6	14.3180	1207.9335	37
CVO89-224	70.2	43.6	-7.4846	1200.4489	37
CVO89-225	71.8	44.6	17.1883	1217.6372	37

BENCH MARK	STADIA DISTANCE		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
	(mi)	(km)			
E 500	71.9	44.6	-2.3471	1215.2901	37
H 197	73.3	45.5	-4.0501	1211.2400	37

Table 3: CVO-XX to H 197

BENCH MARK	STADIA		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
	(km)	(mi)			
CVO-XX	0.0	0.0	-	1538.1823	38
CVO-XV	1.8	1.1	78.5757	1616.7580	38
CVO-X	3.4	2.1	54.3034	1671.0614	38
F 502	5.7	3.5	52.3721	1723.4335	38
CVO-V	7.2	4.5	70.8154	1794.2489	39
CVO-I	8.7	5.4	101.6302	1895.8791	39
J 502	10.3	6.4	51.9080	1947.7871	39
K 502	11.8	7.3	18.0975	1965.8846	39
Little Hoffman	13.2	8.2	11.0919	1976.9765	39
CVO88-106	13.2	8.2	0.2965	1977.2730	39
CVO88-107	14.4	8.9	-	-	40
L 502	14.7	9.1	98.4158	2075.6888	40
R 502	15.7	9.7	50.4984	2126.1872	40
M 502	16.3	10.1	3.3016	2129.4888	40
N 502	17.8	11.0	-8.2322	2121.2566	40
CV088-102	17.8	11.0	-0.1583	2121.0983	40
P 502	19.1	11.8	-61.3868	2059.7115	41
S 502	19.6	12.2	-14.1117	2045.5998	41
Q 502	21.2	13.1	-8.2516	2037.3482	41
T 502	22.5	14.0	12.3996	2049.7478	41
X 502	23.6	14.6	-1.0909	2048.6569	41
U 502	24.7	15.3	-0.6716	2047.9853	42
SBM1	26.2	16.2	32.3012	2080.2865	42
46 M	27.7	17.2	-106.7698	1973.5167	42
CVO88-112	28.9	17.9	-16.8592	1956.6575	43

BENCH MARK	STADIA		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
	(km)	(mi)			
CVO88-111	30.0	18.6	-35.2061	1921.4514	43
Y 502	30.7	19.0	-16.3184	1905.1330	43
Z 502	32.3	20.0	-116.5416	1788.5914	43
47 M	33.1	20.5	-37.5764	1751.0150	44
CVO-LXXXV	34.5	21.4	4.9976	1756.0126	44
B 503	36.0	22.3	-38.0817	1717.9309	44
CVO89-100	37.5	23.3	-39.6487	1678.2822	44
D 503	39.3	24.4	-89.1442	1589.1380	44
E 503	41.1	25.5	-72.0702	1517.0678	45
CVO89-101	42.4	26.3	-38.3575	1478.7103	45
F 503	44.3	27.5	-41.1485	1437.5618	45
G 503	45.8	28.4	-10.6611	1426.9007	46
164 GWM	47.1	29.2	-20.0639	1406.8368	46
H 503	48.6	30.1	-18.0630	1388.7738	47
J 503	50.0	31.0	-7.3019	1381.4719	47
K 503	51.8	32.1	-25.8822	1355.5897	47
L 503	53.4	33.1	-18.9496	1336.6401	48
M 503	54.8	34.0	-6.8297	1329.8104	48
CVO89-102	56.4	35.0	-9.8443	1319.9661	48
CVO89-103	57.8	35.8	5.0850	1325.0511	48
P 503	57.9	35.9	-1.0998	1323.9513	48
CVO89-104	58.6	36.3	0.1325	1324.0838	49
CVO89-105	61.0	37.8	6.2359	1330.3197	49
CVO89-106	62.9	39.0	-11.8038	1318.5159	49
CVO89-107	64.7	40.1	-53.1531	1265.3628	49
Y 500	64.8	40.2	-0.7227	1264.6401	49

BENCH MARK	STADIA		ELEVATION DIFFERENCE (m)	ELEVATION 1989 (m)	PAGE NUMBER
	(km)	(mi)			
X 500	66.6	41.3	-43.7937	1220.8464	49
W 500	68.0	42.2	-47.3701	1173.4763	50
V 500	69.7	43.2	0.3593	1173.8356	50
U 500	71.4	44.3	-1.0339	1172.8017	50
T 500	72.5	45.0	10.2241	1183.0258	50
S 500	73.5	45.6	1.6952	1184.7210	51
R 500	74.3	46.1	8.2788	1192.9998	51
Q 500	75.2	46.6	13.2152	1206.2150	51
P 500	76.1	47.2	31.9035	1238.1185	51
M 500	78.5	48.7	48.9618	1287.0803	51
L 500	80.4	49.8	1.9950	1289.0753	51
57 M RESET	82.1	50.9	29.9943	1319.0696	52
CVO89-229	83.5	51.8	24.5106	1343.5802	52
K 500	84.3	52.3	3.3177	1346.8979	52
J 500	86.0	53.3	43.9249	1390.8228	52
H 500	87.7	54.4	7.5936	1398.4164	52
CVO89-228	89.2	55.3	-3.7958	1394.6206	52
CVO89-227	90.9	56.4	29.2685	1423.8891	53
G 500	92.4	57.3	-22.4457	1401.4434	53
Q 499	93.9	58.2	-44.2668	1357.1766	53
M 499	95.5	59.2	-66.9444	1290.2322	53
CVO89-226	96.7	60.0	-52.5455	1237.6867	53
H 197	98.5	61.1	-26.4467	1211.2400	53