



*Final Operations Report
on the*

SANTOS LTD

CAMERONS 2000 SEISMIC SURVEY

for

**SCHLUMBERGER RESERVOIR
EVALUATION SEISMIC**

April 2000

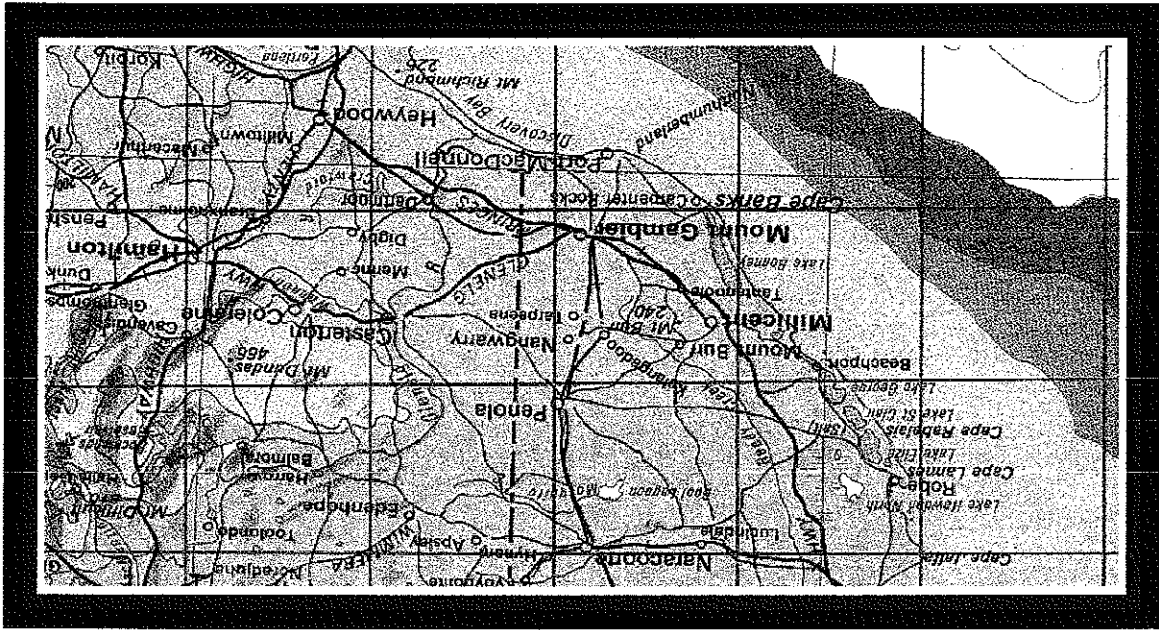


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INTRODUCTION

The following report covers the **Cameron's 2000 2D Seismic Survey** operations, performed by **Dynamic Satellite Surveys Pty Ltd (DSS)** whilst contracted to **Schlumberger Reservoir Evaluation Seismic for Santos Ltd**.

The survey consisted of 70.52 kilometres of seismic lines on the PEP 119 prospect situated approximately ten (10) kilometres west of Casterton, Victoria.

The survey commenced on March 14th and was completed on April 2nd. There were eight (8) seismic lines with the station interval set at 20 m. These lines are listed below:

Line From To Distance

OCM00-01	200	550	7.000
OCM00-02	200	675	9.500
OCM00-03	200	700	10.000
OCM00-04	200	675	9.500
OCM00-05	200	625	8.500
OCM00-06	200	676	9.520
OCM00-07	200	650	9.000
OCM00-08	200	575	7.500

Total Distance = 70.520 Kilometres

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INSTRUMENTATION AND PERSONNEL

2.1 Personnel

DSS personnel involved in the survey were:

Senior Surveyors:

- Lynne Baker Bachelor of Geomatic Engineering - UNSW
- Denis Williams Bachelor of Applied Science (Surveying) QUT
- Bachelor of Information Technology (QUT)

Field Chainperson

- Rob Heyer DSS Operations Manager

2.2 Equipment

Equipment provided by DSS and used on this project:

Quantity	Description	
1	Toyota Landcruiser Trayback - Hired	Vehicles
2	NovAtel 2151R/RT20 c/w VHF telemetry	GPS receivers
1	Acer 486 Portable PC	Computers
2	GRID 386 Field PC	

	Description	Quantity
Software	Waypoint GPS post-processing	1
	DSS MIB for Windows QC	1
Printer	Lexmark 1000 ColorJet	1
Survey Instruments	Suunto Clinometer	1
	Suunto Compass	2
Miscellaneous	Sundry office and support equipment	
	Field and Office Consumables	

2.3 Logistics

Personnel and equipment logistics were supported by the DSS Yeppoon office.

The survey vehicle was hired from Adelaide and the crew mobilised to Casterton on March 13th after picking up relevant equipment and supplies.

Survey operations and messing were based from the Albion Hotel in Casterton.



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SURVEY REFERENCE SYSTEMS

3.1 Survey Datum

3.1.1 Geodetic Datum

Raw GPS data is acquired on the WGS 84 datum, described by the following parameters:

Datum:	WGS 84 (World Geodetic System 1984)
Spheroid:	WGS 84
Semi-Major Axis Length:	6 378 137.0
Inverse Flattening:	298.257223563
The Unit of Measure:	International Metre

Coordinate sets are transformed directly to the Australian Map Grid (AMG) based on the Australian Geodetic Datum 1966 (AGD 66):

Datum:	AGD 66 (Australian Geodetic Datum 1966)
Spheroid:	ANS (Australian National Spheroid)
Semi-Major Axis Length:	6 378 160.0
Inverse Flattening:	298.25
The Unit of Measure:	International Metre

Coordinate conversions from WGS 84 to AGD 66 are performed using the following seven transformation parameters:

Translations:		ΔX :	116.00 m	ΔY :	50.47 m	ΔZ :	-141.69 m
Rotations:		R1:	0.230"	R2:	0.390"	R3:	0.344"
Scale:		bs :	-0.0983 ppm				

3.1.2 Map Projection

Rectangular coordinates provided were based on the Australian Map Grid (AMG).

Parameters for this projection are:

Projection:		AMG Zone 54
Latitude of Origin:		0°
Central Meridian (CM):		141° E
Scale Factor at CM:		0.9996
False Easting:		500 000
False Northing:		10 000 000
The Unit of Measure:		International Metre

Final data was presented as AMG66 and AHD coordinates as requested by the client.

3.1.3 Height Datum

Observations were made on the WGS84 datum. The height associated with this datum is an ellipsoidal height (h). The Australian Height Datum (AHD) uses a height datum associated with the Australian Map Grid (AMG), as an orthometric height, which is measured as the height above mean sea level or the geoid (H).

The function that defines the relationship between the ellipsoid and orthometric heights is:

$$H = h - N$$

Or

$$AHD = WGS84 - \text{Geoid-Ellipsoid Separation}$$

A digital model (AUSGEOID98) was used for automatic determination of N at each point, so that orthometric heights within the survey area could be readily derived. For all lines, one model was calculated and the models' residuals indicated a good fit, reflecting the gradual change in geoid slope within the extents of the models.

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SURVEY CONTROL

4.1 Survey Datum

The datum for the survey was based upon a local government survey mark (PM125). This mark is located directly underneath the Corndale fire tower ten kilometres west of Casterton. The listed coordinates for this mark are:

<u>Station Name</u>	<u>Easting</u>	<u>Northing</u>	<u>Elevation</u>	<u>Order</u>
PM125	525117.005	5840147.709	127.500	hor 3rd, v 5th

The GPS base station used for the survey was BASETOW which is located between the fire tower and the Casterton - Penola road. The computed coordinates for this base are:

<u>Station</u>	<u>Easting</u>	<u>Northing</u>	<u>AHD</u>
BASETOW	525106.54	5840124.28	127.55

A location diagram for BASETOW and the control network diagram can be found in Appendix B - Control Network and Base Station Diagrams.

Ties were made another survey mark as well as numerous old permanent markers. These ties can be found in Appendix A - Control Survey, Miscloses and Ties. The results are included in the digital data supplied to the client in the file named TIES.CRD.



MONUMENTATION

White wooden pegs were placed at all stations with the pegs at even stations numbered on both sides. The line name was written on at least every 25th peg and on any pegs placed near a track or road.

White paper plates marked with the line name were also placed on major tracks and roads.

New permanent markers were placed at all new line intersections and the ends of lines where appropriate. The markers consist of a steel star picket with an aluminium tag attached. These attached tags were stamped with relevant information such as line name and station number. A total of 30 new permanent markers were installed and surveyed.

A coordinate listing of the new permanent markers placed is contained in **Appendix C - Permanent Markers Listing**. This list of permanent markers was included in the digital data supplied to the client.

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METHOD OF SURVEY

The survey work was completed in two stages; line pointing and RT20 survey-chaining.

6.1 Line Pointing

The first stage of the survey operations was line pointing. This was carried out by both DSS and Schlumberger personnel.

The pre-designed line coordinates were loaded into the GPS unit as waypoints. The GPS unit, in RT20 mode (described in the following section - 6.2 RT20 survey-chaining), was carried along the line on a backpack or vehicle and was used to guide the surveyors along the line. Generally, due to the heavily wooded nature of the area, a compass was used for flagging the line and the line was checked with the GPS approximately every 400 metres. This sped up the operation considerably.

The lines were flagged using fluorescent pink flagging tape and white paper plates marking each line were placed on major tracks and roads.

Line pointing through the blue gum and thick pine plantations was slow due to the lack of intervisibility and intermittent GPS signal.

DSS completed 24.25 kms of the line pointing.

6.2 RT20 Survey-chaining

Chaining and surveying were carried out in a single pass operation using DSS' RT20 Real-Time Kinematic survey-chaining technique. RT20 enables both position and elevation coordinates to be acquired in real time and on the appropriate datum.

The survey method utilised phase data received from US Navy NAVSTAR Satellites to provide three dimensional positioning. One receiver was set up as a base station at a known location while another receiver was used as a remote rover. The base station was set up to transmit "corrections" via VHF telemetry to the roving GPS unit in order to eliminate any errors present in the GPS positional data.

The pre-designed line coordinates were used as waypoints and DSS in house software was used to guide the surveyor to each station along the line. In the heavily wooded areas of the prospect a 60 m survey chain was dragged behind the vehicle meaning that the vehicle could stop at every third station. The chain was marked at 20 m intervals so that pegs could be placed at the intermediate stations. This sped up the operation in such areas.

NovAtel Real-Time Kinematic can achieve accuracies of better than ± 0.3 m in position and elevation depending on base line length. The expected precision for locating pegged positions is better than 0.3 metres in both elevation and height relative to the base station used and is generally better than 0.2 metres.

Initialisation of the RT20 rover GPS usually takes as little as 2-3 minutes, although this is greatly dependant on satellite geometry, availability, and baseline length.

Checks and ties were examined in both real time operation and at the post-processing stage to assess coordinate integrity.

The field data was edited into line files and examined for quality control.

Line trace diagrams (mud maps) were drawn as the line was pegged and were later finalised in the office. These maps aid the main crew in line navigation and were provided to David Branton on a regular basis.

6.3 GPS Processing and Quality Control

When using RT20, all data is recorded internally in GRID palmtop data loggers and then downloaded to the office computer each evening. Quality of the satellite data was monitored by careful examination of the various on-screen quality control statistics produced by DSS's software. These checks on data integrity are in the form of standard deviation (or sigma) values for latitude, longitude, and height and are generally better than 0.3 metres.

The coordinates were then checked using a chaining check routine developed by DSS that calculates line bearing and compares calculated peg distance with actual peg distance. Points outside specified distance and azimuth tolerances are flagged for further investigation and rechainned if necessary. The chaining checks for each line were provided to the client in digital format (.CHK). In some places the hydro-axed line was deviated to avoid the clearing of trees and this shows up in the chaining checks.

Profile plots were examined to identify any height anomalies.

Coordinates were then finalised by interpolating intermediate stations using software developed by DSS.

Surveyed elevations at all new line intersections were checked and the results are listed in **Appendix D - New Line Intersections Listing**. The list was also included in the digital data supplied to Schlumberger as **INTERSEC.CRD**.

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DATA PRESENTATION

On completion of the survey two full sets of digital data were presented to Schlumberger. Files supplied were:

File	Description
OCM00-??,UKA	Coordinates and elevations of all stations in UKOOA format.
OCM00-??,CHK	A chaining check file for each surveyed station.
OCM00-??,PMS	Coordinates and elevations of all permanent markers on the line.
OCM00-??,AMG	Coordinates and elevations of all surveyed stations.
UPHOLES.CRD	A listing of all upholes.
INTERSEC.CRD	A listing of all new line intersections.
TIES.CRD	A listing of all ties to old permanent markers and survey marks.

These files are all backed up on digital disks in the Yeppoon office for future reference. No hard copy data was given to the client as it was not required.

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SAFETY

DSS personnel are aware of safety conditions governing mining and exploration leases. DSS safety guidelines were followed at all times.

The DSS vehicle was fitted with a fire extinguisher, shovel, first-aid kit, UHF radio and weekly vehicle maintenance check lists. A digital mobile phone was also carried by the DSS personnel.

After arriving at the job, DSS personnel were advised that long sleeved shirts, long pants and safety jackets were part of Santos and Schlumberger's personal protective equipment (PPE). This policy was adhered to by DSS.

No field work was carried out on the prospect during the two total fire ban days.

No LTIs (Lost Time Injuries), no near misses and no accidents were reported for the survey.





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CHRONOLOGICAL SUMMARY OF SURVEY

DATE **SURVEY OPERATIONS**

Mar 12 Denis and Lynne mobilise from Sydney to Adelaide.

Mar 13 Pick up vehicle and mobilise from Adelaide to Casterton. Arrive 18:30 and met with Ben Zillman.

Mar 14 Meeting and gear setup. Control ties. Line pointing: OCM00-07 7.6 km. Went to Mt Gambier to buy a fire extinguisher and PPE clothing.

Mar 15 Line pointing: OCM00-08 7.5 km. Control ties, new base, BASETOW, established at the fire tower. Set up survey chain. Processing.

Mar 16 Line pointing: OCM00-04 4.0 km, OCM00-03 1.5km, OCM00-06 1.5 km. Total = 7.0 km. Lots of blue gumsl

Mar 17 Static control tie. Total fire ban = standby 8 hours. Went to Mt Gambier to pick up pegs and gear.

Mar 18 Line pointing: OCM00-06 0.75 km, OCM00-07 1.5km. Total = 2.25 km. Lots of pine trees. Line pointing complete. Control tie and processing.

Mar 19 **Chaining:** OCM00-01 (200 - 550). **Surveying:** OCM00-01 218 - 550 (6.64 kms). Three PMS placed.

DATE	SURVEY OPERATIONS	
Mar 20	Chain and Survey: OCM00-07 200 - 388 (3.76 kms).	
	OCM00-02 345 - 560 (4.30 kms).	
	Total = 8.06 kms.	
Mar 21	Chain and Survey: OCM00-02 249 - 345 (1.92 kms).	
	OCM00-02 597 - 695 (1.56 kms).	
	OCM00-01 200 - 218 (0.36 kms).	
	Total = 3.84 kms.	
	Line pointing access to southern end of OCM00-03. Upholes #1 and #6 placed.	
	Caught up with hydro-axe: 2 hours standby.	
Mar 22	Total fire ban - standby = 10 hours.	
Mar 23	Chain and Survey: OCM00-02 200 - 249 (0.98 kms).	
	OCM00-03 200 - 376 (3.52 kms).	
	Total = 4.50 kms.	
	Caught up with hydro-axe: 3.5 hours standby.	
Mar 24	Chain and Survey: OCM00-03 376 - 632 (5.12 kms).	
	OCM00-04 536 - 606 (1.40 kms).	
	Total = 6.52 kms.	
	Upholes #3, #8, #9, #10, #13, #14 and #16 flagged as requested by the client.	
Mar 25	Chain and Survey: OCM00-04 430 - 536 (2.12 kms).	
	OCM00-07 388 - 499 (2.22 kms).	
	Total = 4.34 kms.	
	Caught up with hydro-axe: 3.5 hours standby. Upholes #11, #15 flagged.	

DATE	SURVEY OPERATIONS
Mar 26	<p>Chain and Survey: OCM00-04 200 - 430 (4.60 kms)</p> <p>OCM00-08 395 - 462 (1.34 kms).</p> <p>Total = 5.94 kms.</p> <p>Control tie to PM 32, McEachern #1 not found.</p> <p>Upholes #12, #14 flagged.</p>
Mar 27	<p>Chain and Survey: OCM00-07 499 - 582 (1.66 kms).</p> <p>OCM00-05 333 - 534 (4.02 kms).</p> <p>Total = 5.68 kms.</p> <p>Rob Heyer arrived 18:00.</p>
Mar 28	<p>Chain and Survey: OCM00-07 582 - 650 (1.36 kms).</p> <p>OCM00-02 560 - 597 (0.74 kms).</p> <p>Total = 2.10 kms.</p> <p>Caught up with hydro-axe: standby = 4.5 hours.</p> <p>Denis demobilised in morning.</p>
Mar 29	<p>Chain and Survey: OCM00-03 632 - 700 (1.36 kms).</p> <p>OCM00-06 392 - 498 (2.12 kms).</p> <p>Total = 3.48 kms.</p> <p>Processing, mudmaps during bad satellite period in middle of the day.</p> <p>Standby = 1 hour.</p>
Mar 30	<p>Chain and Survey: OCM00-04 606 - 675 (1.38 kms).</p> <p>OCM00-06 498 - 566 (1.36 kms).</p> <p>Total = 2.74 kms.</p> <p>Waiting for line to be cut in morning: Standby = 2.75 hours</p>

DATE	SURVEY OPERATIONS
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Mar 31	Chain and Survey: OCM00-05 200 - 333 (2.66 kms).
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534 - 625 (1.82 kms).

Total = 4.48 kms.

Met with Bruce Beer (1 hour) for revision of shooting order due to hydro-

axe down. Advised by Dave Branton (Geco) of line name change from

OS00B-?? to OCM-00-?? . All PM tags need to be changed.

Apr 1

Chain and Survey: OCM00-08 200 - 395 (3.90 kms).

462 - 575 (2.26 kms).

Total = 6.16 kms.

Slow and frustrating during bad satellite period 1100 - 1430!

Apr 2

Chain and Survey: OCM00-06 200 - 392 (3.84 kms).

566 - 676 (2.20 kms).

Total = 6.04 kms.

All chaining and surveying complete. 3 hours changing PM tags.

Apr 3

Processing final data. Equipment list and finals given to Dave Branton.

Line names changed again from OCM-00-?? to OCM00-??.

Demobilise to Port Fairy in afternoon.



OPERATIONAL ASPECTS

The line pointing was very efficient through the natural forest areas. It proved to be much slower through the blue gum and pine plantations due to the lack of intervisibility.

The chaining and surveying proceeded smoothly but was slowed down by numerous standby hours due to lack of cut line and a bad satellite period during the middle of the day.

The hydro-axe cleared 64 kms of line over a 17 day period (including 2 fire ban days) which gave an average of 3.8 kms per day or 4.3 kms per day not including fire ban days.

Chaining and survey averaged 5.4 kms per day (not including standby time) or 4.4 kms per day if you include standby time.

The method of combining RT20 survey - - chaining with a 60 m conventional chain was deemed to be the most efficient method through the heavily wooded areas. RT20 survey - - chaining worked well in the open areas and in the blue gum and pine plantations however these areas only accounted for approximately one quarter of the prospect.

Throughout the survey there was a bad satellite period lasting from 1 to 3 hours during the middle of the day. This slowed down production and made the survey work very frustrating. On April 1, one satellite was down which made survey through the middle of the day impossible. This time was used to do office work and draw mudmaps.

Upholes were marked by the survey crew as per the uphole program map. A full listing is contained in **Appendix F - Uphole Listing**.

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CONCLUSION AND RECOMMENDATIONS

There was little down time (2 hours) due to equipment problems but the poor satellite geometry and availability during the middle of the day slowed production.

The survey control network tied in reasonably well with the surrounding survey marks and all new points of survey met the required survey tolerances. 30 new permanent markers were placed throughout the prospect and one 1996 permanent marker was connected to and tagged on line OCM00-07 (triple intersection). These will provide survey control for future work in the area.

DSS recorded 18.25 hours of standby time due to no cleared line. The hydro-axe commenced only two days before survey therefore it never had enough lead. It is recommended that in future the hydro-axe be given as much lead time as possible.

Submitted by,
Lynne Baker

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APPENDICES



Control Survey, Miscloses and Ties

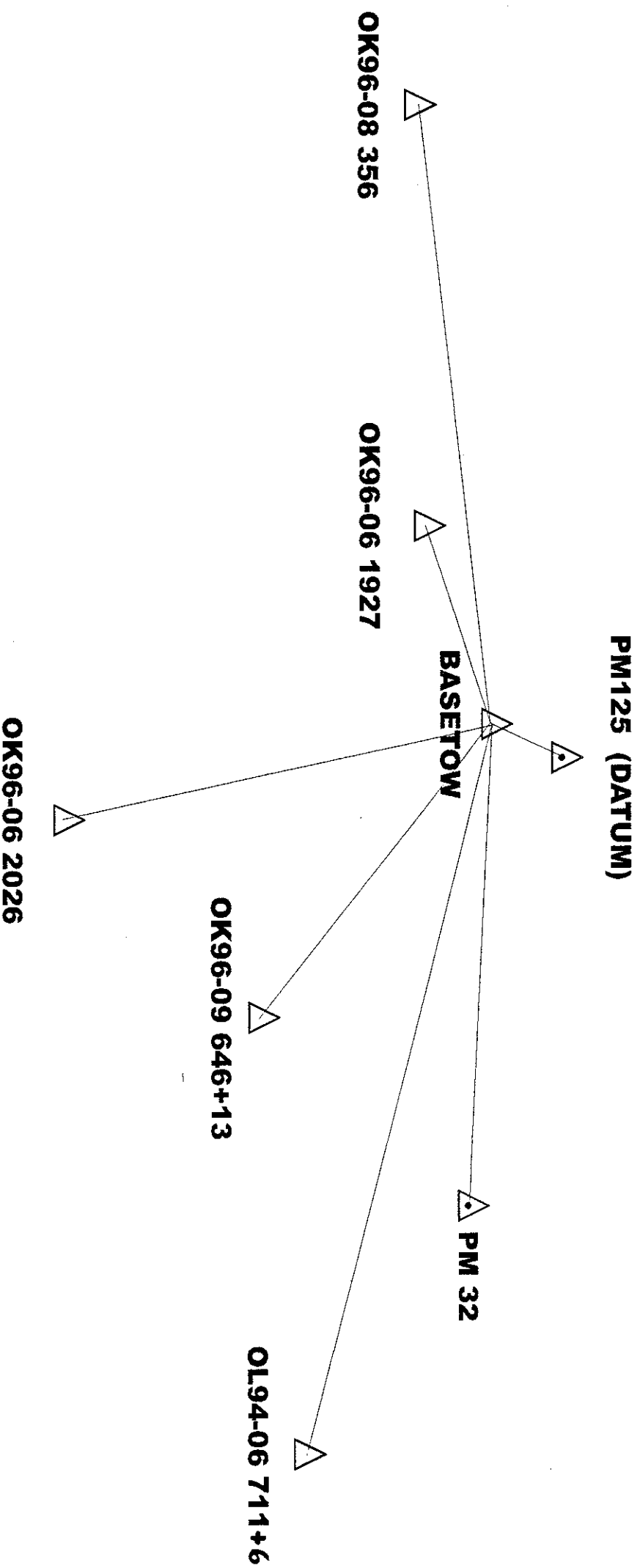
Control survey, Miscloses and Ties

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

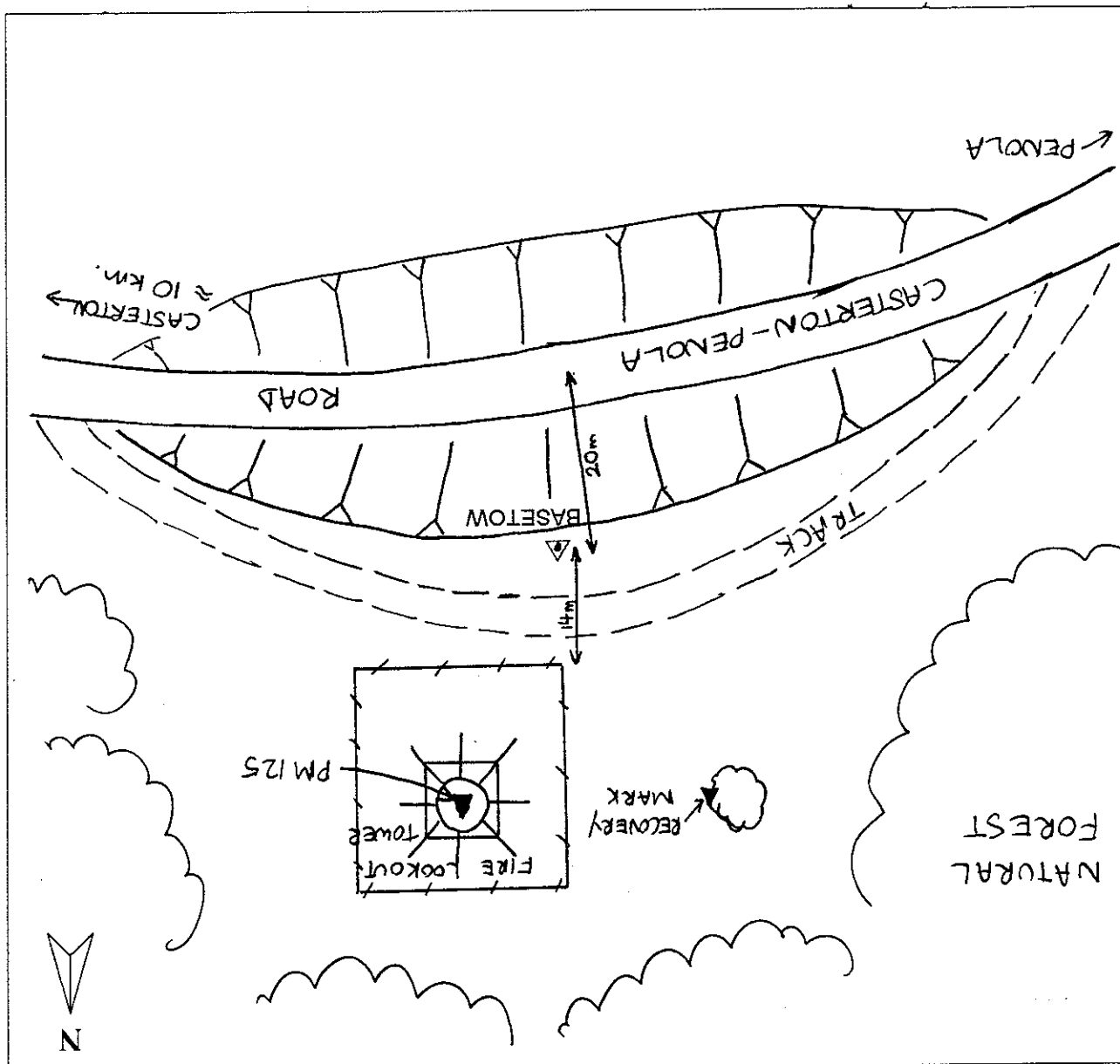
Station	Easting	Northing	AHD	Comments
PM 125	525117.005	5840147.709	127.5	DATUM
PM 32	527960.804	5839648.205	137.67	
	527960.33	5839647.77	137.77	RT20
	-0.47	-0.44	+0.10	
OK96-06 1927	524272.1	5839942.1	99.6	DSS Job #96-21
	524272.5	5839943.3	97.3	Float soln (trees)
	+0.4	+1.2	-2.3	
OK96-06 2026	525083.1	5838144.4	97.3	DSS Job #96-21
	525082.7	5838143.8	98.2	RT20
	-0.4	-0.6	+0.9	
OK96-08 356	520000.6	5839295.4	79.7	DSS Job #96-21
	520000.9	5839293.1	80.2	Static
	+0.3	-2.3	+0.5	
OK96-09 646+13	527635.5	5839959.2	136.2	DSS Job #96-21
	527636.2	5839958.9	136.0	Static
	+0.7	-0.3	-0.2	
OL94-06 711+6	529185.9	5839510.2	138.7	
	529186.2	5839509.9	138.1	RT20
	+0.3	-0.3	-0.6	

Control Network and Base Station Diagrams

**00-19 - 2000 CAMERONS SEISMIC SURVEY
CONTROL NETWORK DIAGRAM**



NOT TO SCALE



Horizontal Control Data		Vertical Control Data	
Eastings	525106.543	RL	127.553
Northings	5840124.276	Datum	AHD
Datum	AMG Zone 54 AGD 66	Origin	PM125
Origin	PM125		
Mark Type	Star Picket		

AREA: CAMERONS PEP119
 STATION NAME: BASETOW
 MAP REFERENCE:

Dynamic
 Satellite
 Surveys
 PROJECT / JOB # 00-19 CLIENT SANTOS
 DATE 03/00
 NOV 1995
 REV 4.0
 DSS-FR-15
 STATION LOCATION DIAGRAM

New Permanent Markers Listing

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°
 Heights are AHD, using AUSGEOID98 N value model

Line name	Stn	Easting	Northing	Elev.	Comments
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OCM00-01	200	518559.1	5840160.9	75.7	EOL
OCM00-01	366+13	521058.6	5842375.1	86.1	OCM00-07 273+11
OCM00-01	456+6	522398.6	5843565.7	100.3	OCM00-06 320+9
OCM00-01	547+10	523759.6	5844779.5	122.1	EOL 50m NE

OCM00-02	200	517651.6	5838110.1	72.1	EOL
OCM00-02	288+18	519061.4	5839193.2	77.5	OCM00-08 283+12
OCM00-02	467+3	521906.4	5841343.2	85.4	OCM00-07 340+5
OCM00-02	557+17	523352.5	5842437.8	106.2	OCM00-06 394+6
OCM00-02	674+11	525214.2	5843847.1	129.7	EOL 9M NE

OCM00-03	200	517894.5	5837138.4	71.4	EOL
OCM00-03	334+13	520092.0	5838695.2	79.9	OCM00-08 340+16
OCM00-03	488+5	522603.2	5840465.2	86.3	OCM00-07 396+7
OCM00-03	580+19	524113.1	5841540.4	103.8	OCM00-06 453+3
OCM00-03	697+17	526022.5	5842890.6	131.3	EOL 43M NE

OCM00-04	200	518661.3	5836491.9	71.7	EOL
OCM00-04	348+14	521068.6	5838239.2	75.9	OCM00-08 394+13
OCM00-04	479+3	523189.9	5839758.2	86.8	OCM00-07 442+5
OCM00-04	571+15	524682.9	5840854.2	116.7	OCM00-06 497+15
OCM00-04	667	526227.7	5841968.3	132.8	EOL 160M NE

OCM00-05	200	520143.2	5836024.8	74.1	EOL
OCM00-05	334+12	522285.8	5837654.2	76.7	OCM00-08 462+4
OCM00-05	434+17	523884.1	5838863.8	89.9	OCM00-07 498+17
OCM00-05	529+17	525396.7	5840013.3	126.6	OCM00-06 552+17
OCM00-05	625	526907.6	5841169.7	135.7	EOL

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°

Heights are AHD, using AUSGEOID98 N value model cont.

Line name	Stn	Easting	Northing	Elev.	Comments
OCM00-06	200	520837.3	5845400.8	98.2	EOL
OCM00-06	676	526983.2	5838129.1	128.0	EOL

Permanent Markers

Coordinates are AMG66 Zone 54 Central Meridian 141°

Heights are AHD, using AUSGEOID98 N value model

Line name	Stn	Easting	Northing	Elev.	Comments
OCM00-07	200	520178.1	5843553.3	86.0	EOL
OCM00-07	569+7	525082.7	5838143.8	98.2	X OK96-06&09
OCM00-07	627+4	526098.2	5837589.5	105.8	EOL 456M SE
OCM00-08	200	517545.8	5839897.9	74.7	EOL
OCM00-08	575	524320.4	5836678.7	80.9	EOL

New Line Intersections Listing

New Line Intersections

Coordinates are AMG66 Zone 54 Central Meridian 141°
Heights are AHD, using AUSGEOID98 N value model

Line 1 and VP	Line 2 and VP	Easting	Northing	Elev.
OCM00-01/456+04	OCM00-06/320+09	522396.85	5843564.41	100.36
OCM00-02/557+15	OCM00-06/394+09	523352.01	5842434.93	105.83
OCM00-03/580+16	OCM00-06/543+04	524111.96	5841538.14	103.69
OCM00-04/571+15	OCM00-06/497+17	524683.40	5840851.76	116.50
OCM00-05/529+15	OCM00-06/552+14	525393.43	5840015.32	126.73
OCM00-01/366+15	OCM00-07/273+08	521057.42	5842377.08	86.39
OCM00-02/467+04	OCM00-07/340+08	521908.29	5841341.55	84.97
OCM00-03/488+09	OCM00-07/396+01	522602.97	5840472.53	86.31
OCM00-04/479+05	OCM00-07/442+07	523192.03	5839758.26	86.68
OCM00-05/435+00	OCM00-07/498+17	523886.16	5838866.11	89.50
OCM00-02/288+17	OCM00-08/283+15	519063.84	5839189.92	77.19
OCM00-03/334+10	OCM00-08/340+13	520089.01	5838695.24	79.68
OCM00-04/348+14	OCM00-08/394+16	521069.53	5838236.64	75.82
OCM00-05/334+08	OCM00-08/462+01	522281.62	5837653.18	76.51

Line Intersection Diagrams

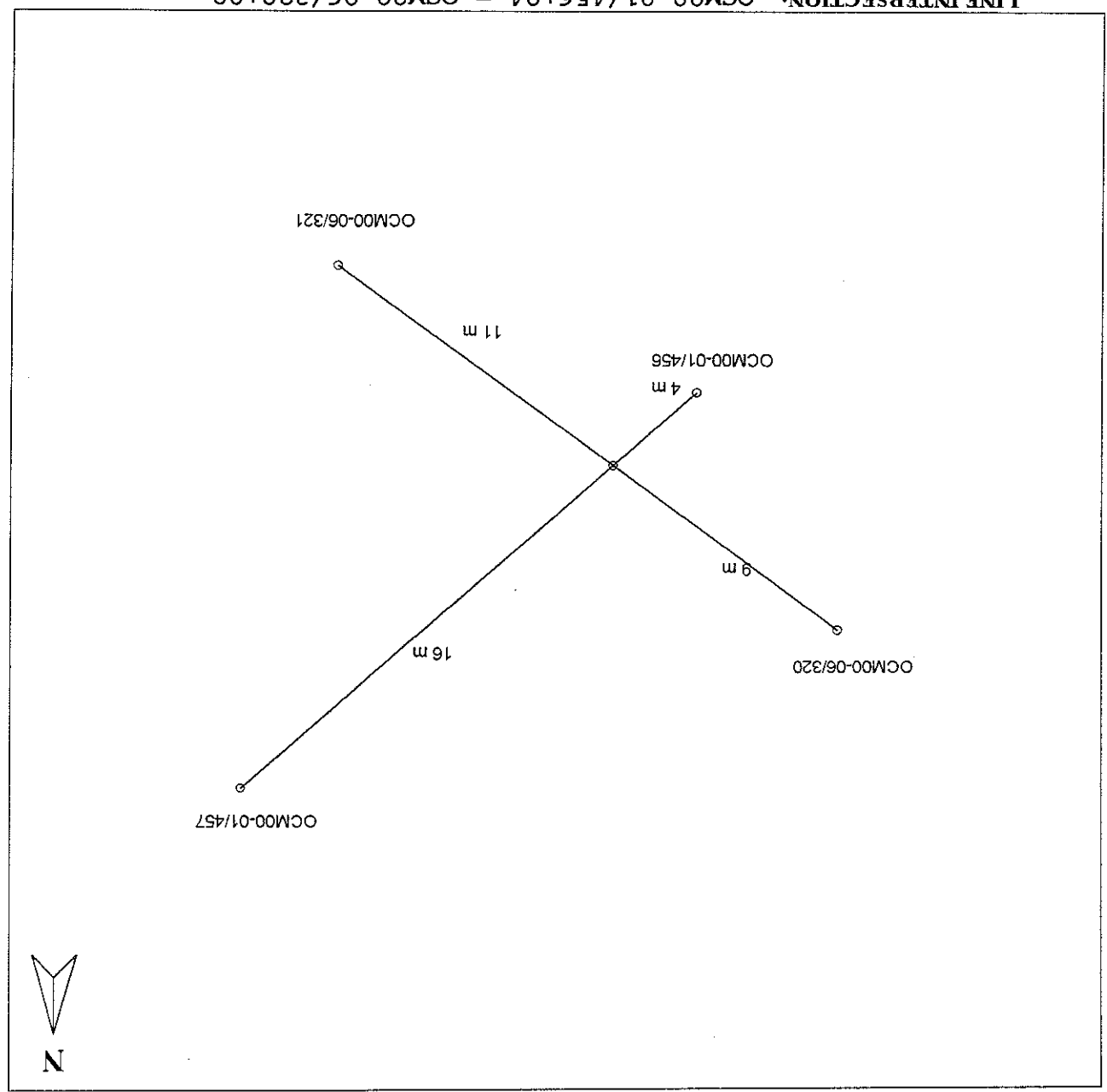
INTERSECTION LINES: OCM00-01 / OCM00-06

AREA: CAMERONS PEP119

STATION INTERVAL: 20

PROJECTION: AMG Zone 54 CM: 141

DATUM: AGD 66 AHD



LINE INTERSECTION: OCM00-01/456+04 = OCM00-06/320+09	
Easting	522396.85
Northing	5843564.41
RL	100.36
RL1 =	100.57
RL2 =	100.16
MEAN:	100.36



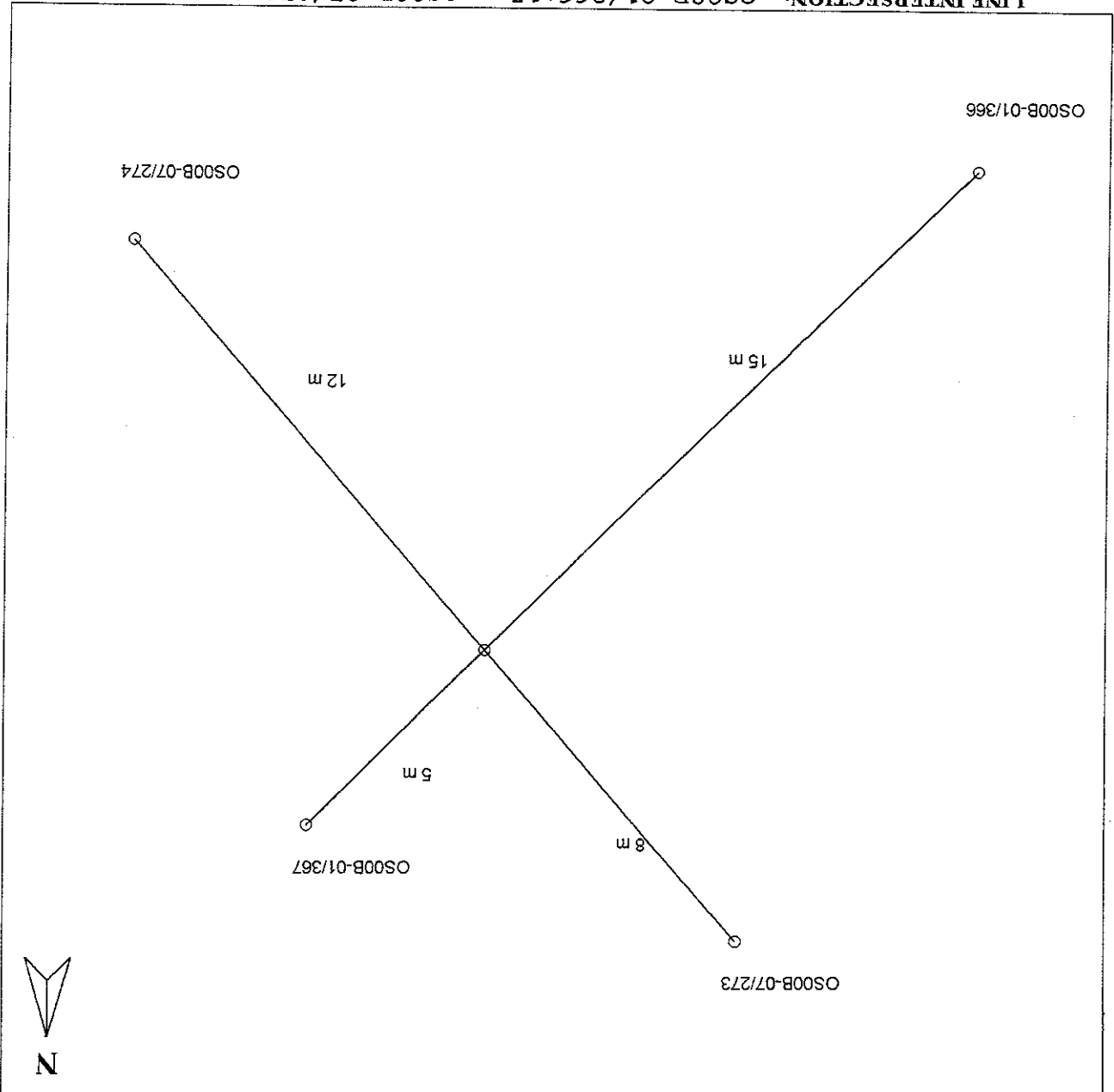
INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19
CLIENT SANTOS

INTERSECTION LINES: OS00B-01 / OS00B-07

AREA: CAMERONS PEP119
PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-01/366+15 = OS00B-07/273+08

Easting 521057.42
Northing 5842377.08
RL 86.39
MEAN: 86.39
RL1 = 86.54
RL2 = 86.23

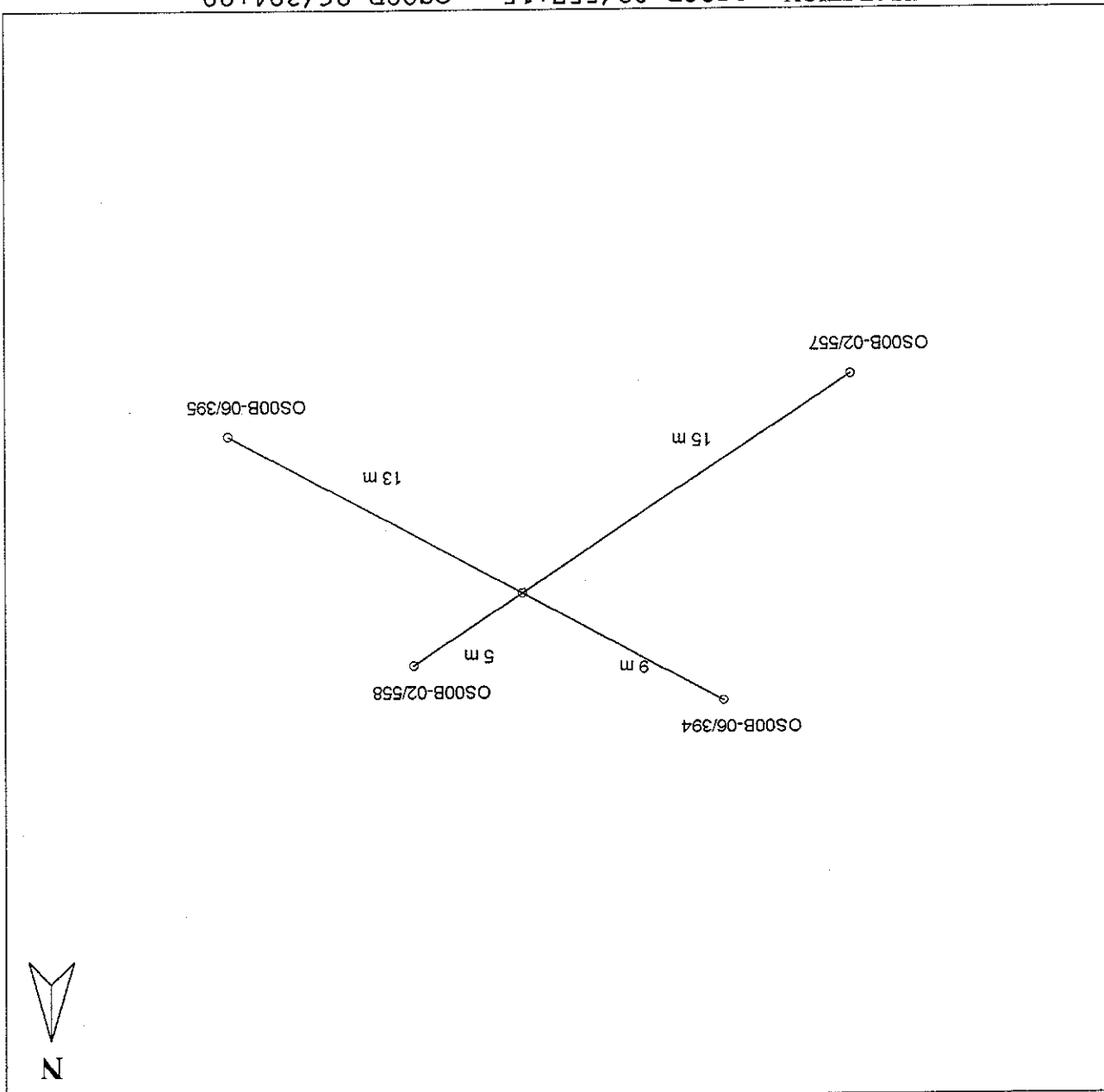


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FF-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-02 / OS00B-06

AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-02/557+15 = OS00B-06/394+09

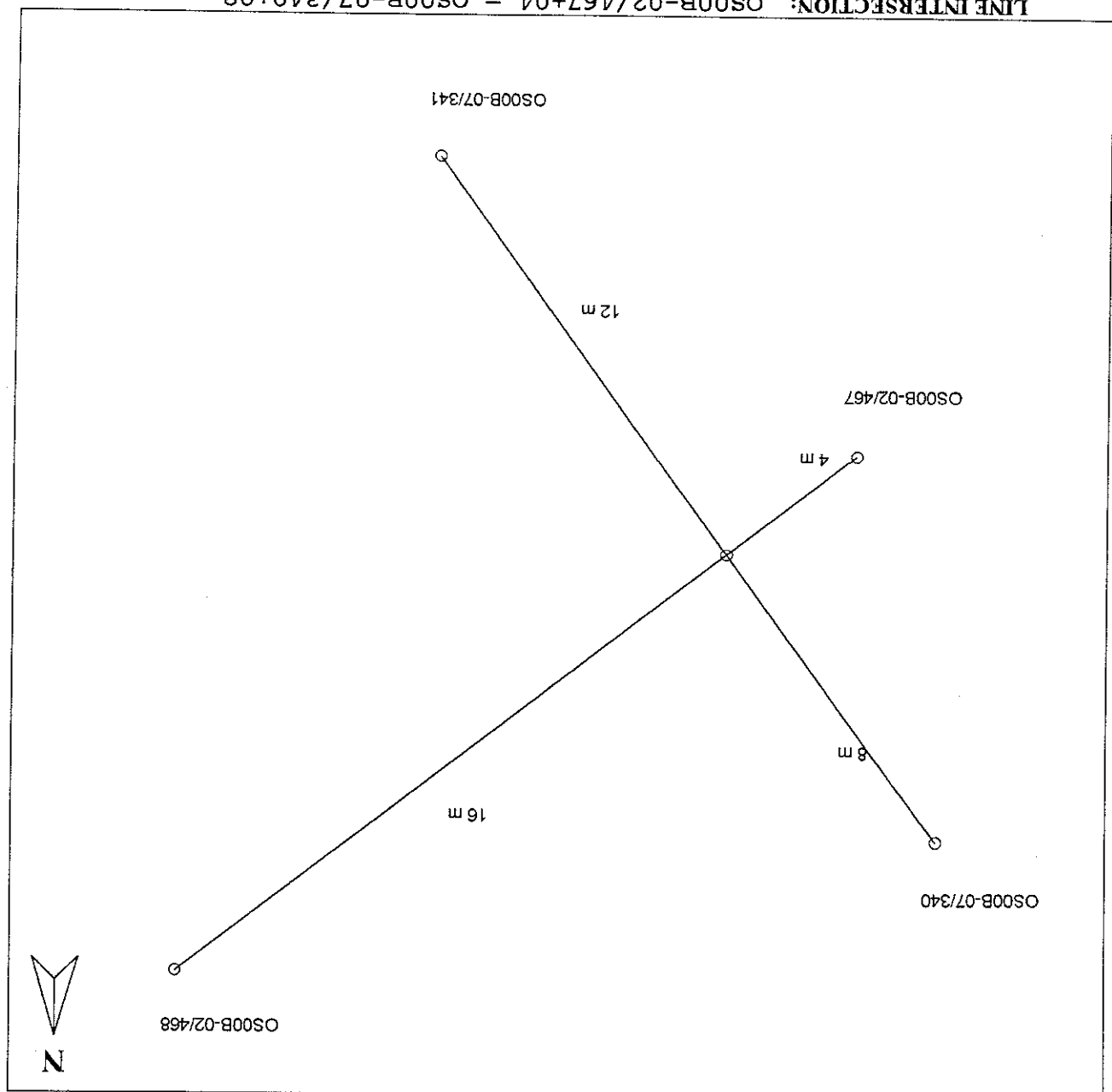
Easting 523352.01
Northing 5842434.93
RL 105.83
RL1 = 106.01
RL2 = 105.65
MEAN: 105.83



INTERSECTION DIAGRAM

DSS-FF-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19
CLIENT SANTOS

INTERSECTION LINES: OS00B-02 / OS00B-07
AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66
AHD

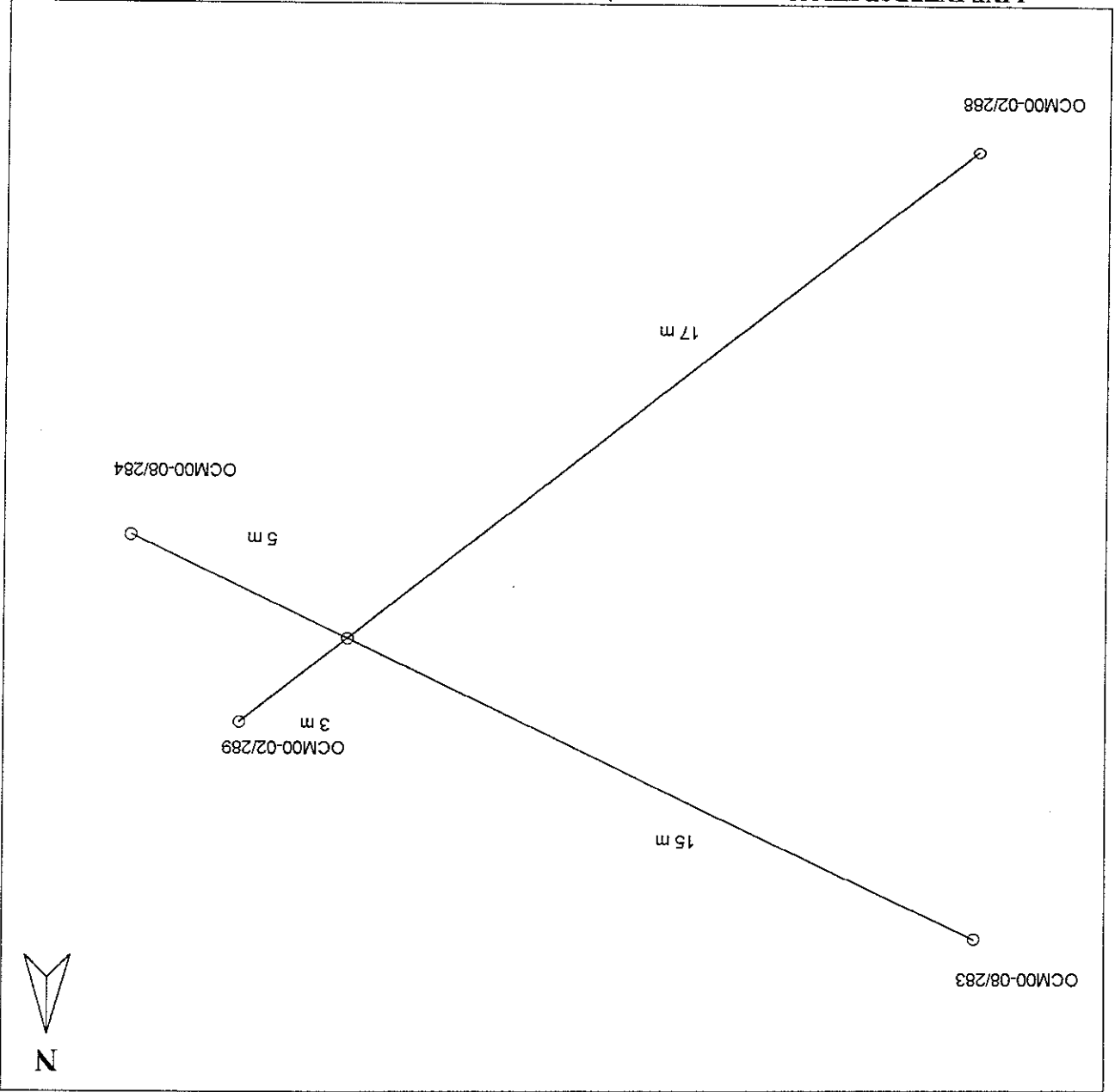


LINE INTERSECTION: OS00B-02/467+04 = OS00B-07/340+08

Eastng	521908.29	RL1 =	85.02
Northng	5841341.55	RL2 =	84.92
RL	84.97	MEAN:	84.97

INTERSECTION LINES: OCM00-02 / OCM00-08

AREA: CAMERONS PEP119
PROJECTION: AMG Zone 54 CM: 141
STATION INTERVAL: 20
DATUM: AGD 66 AHD



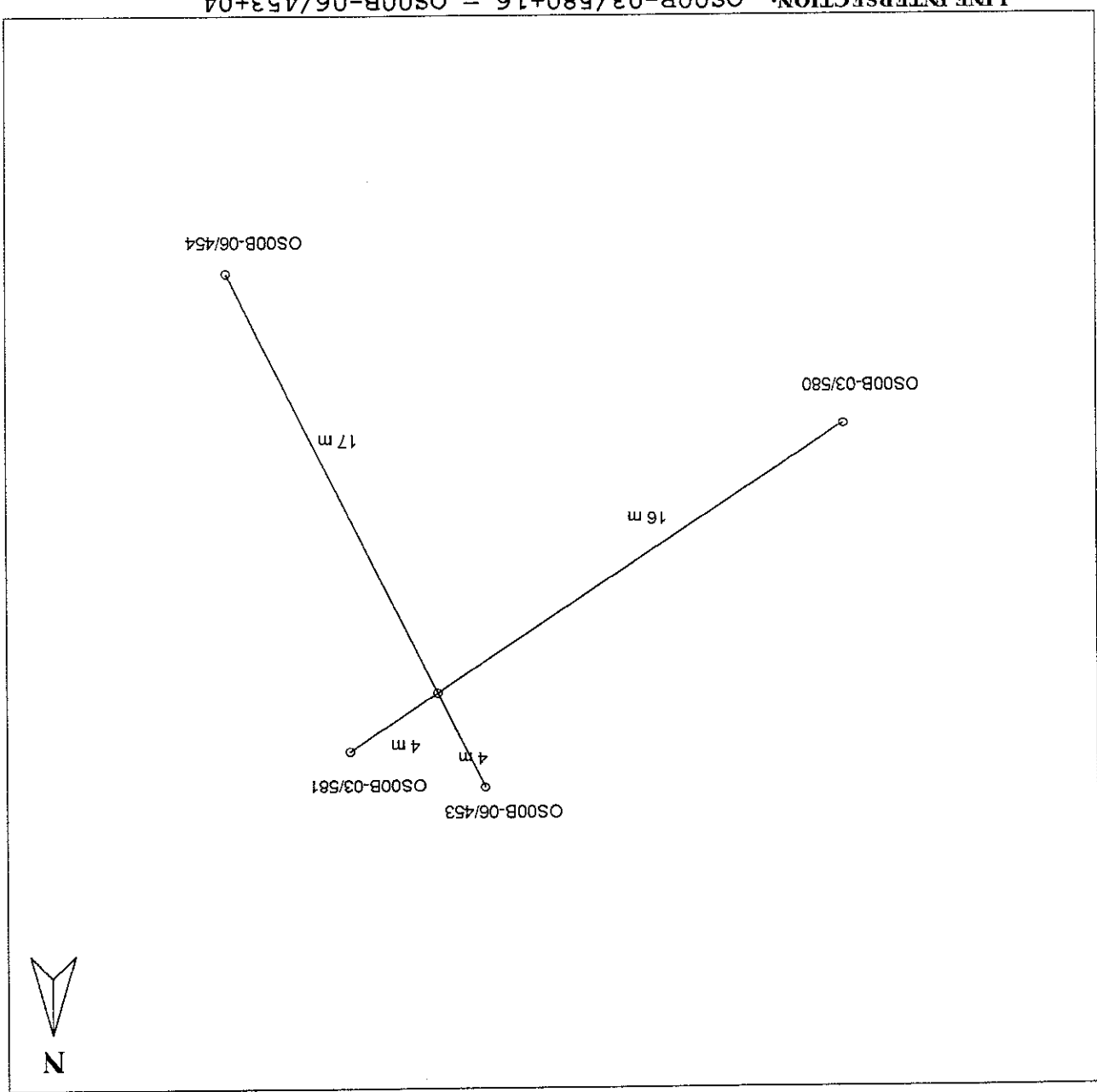
LINE INTERSECTION: OCM00-02/288+17 = OCM00-08/283+15			
Easting	519063.84	RL1 =	77.22
Northing	5839189.92	RL2 =	77.16
RL	77.19	MEAN:	77.19



INTERSECTION DIAGRAM

DSS-FF-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS

INTERSECTION LINES: OS00B-03 / OS00B-06
AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-03/580+16 = OS00B-06/453+04

Eastings	524111.96	RL1 =	103.62
Northings	5841538.14	RL2 =	103.77
RL	103.69	MEAN:	103.69

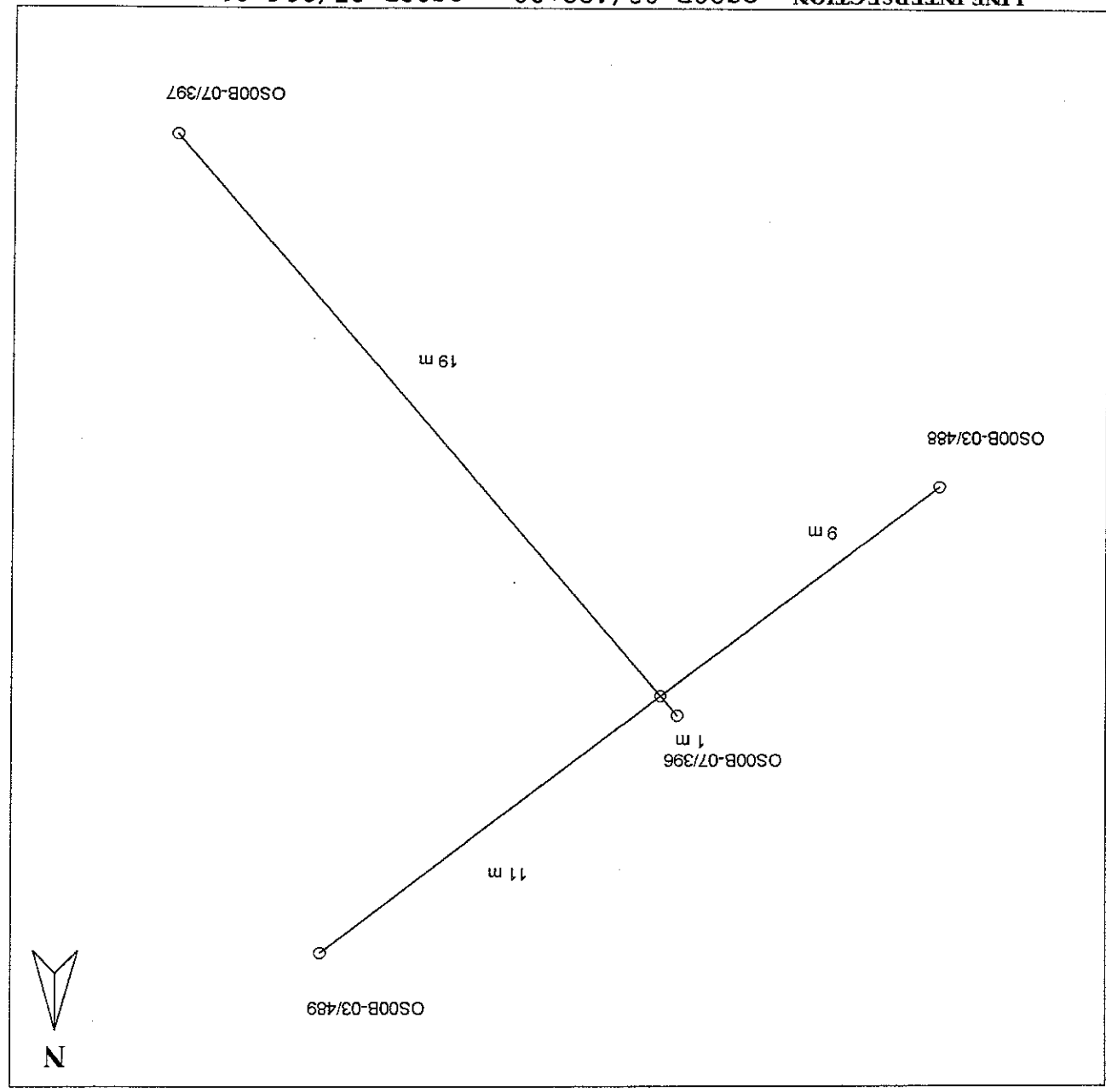
INTERSECTION LINES: OS00B-03 / OS00B-07

AREA: CAMERONS PEP119

STATION INTERVAL: 20

PROJECTION: AMG Zone 54 CM: 141

DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-03/488+09 = OS00B-07/396+01

Eastng	522602.97	RLI =	86.21
Northng	5840472.53	RL2 =	86.40
RL	86.31	MEAN:	86.31

INTERSECTION DIAGRAM

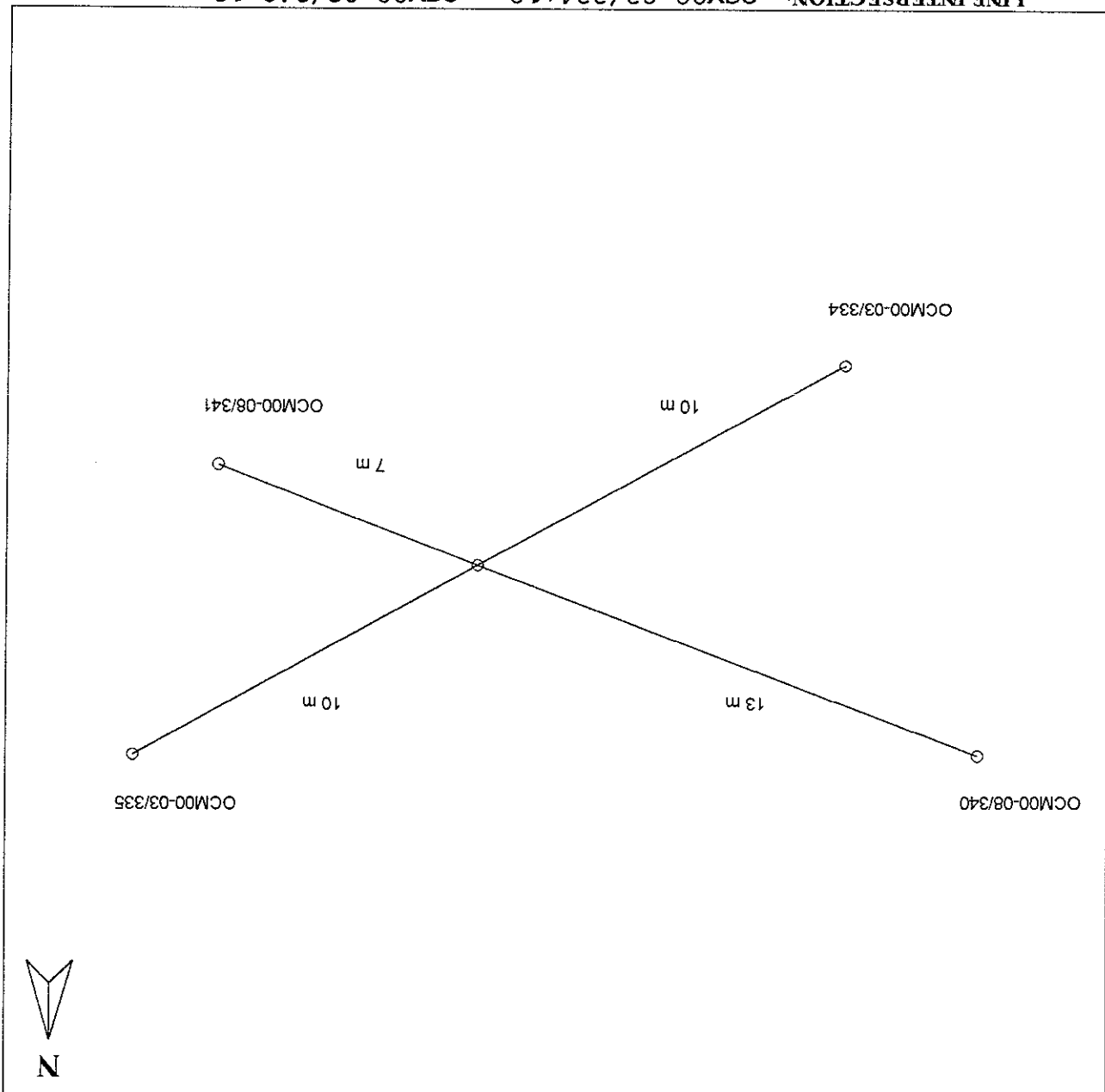
INTERSECTION LINES: OCM00-03 / OCM00-08

AREA: CAMERONS PEP19

PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20

DATUM: AGD 66 AHD



LINE INTERSECTION: OCM00-03/334+10 = OCM00-08/340+13

Eastng	520089.01	RL1 =	79.54
Northng	5838695.24	RL2 =	79.82
RL	79.68	MEAN:	79.68

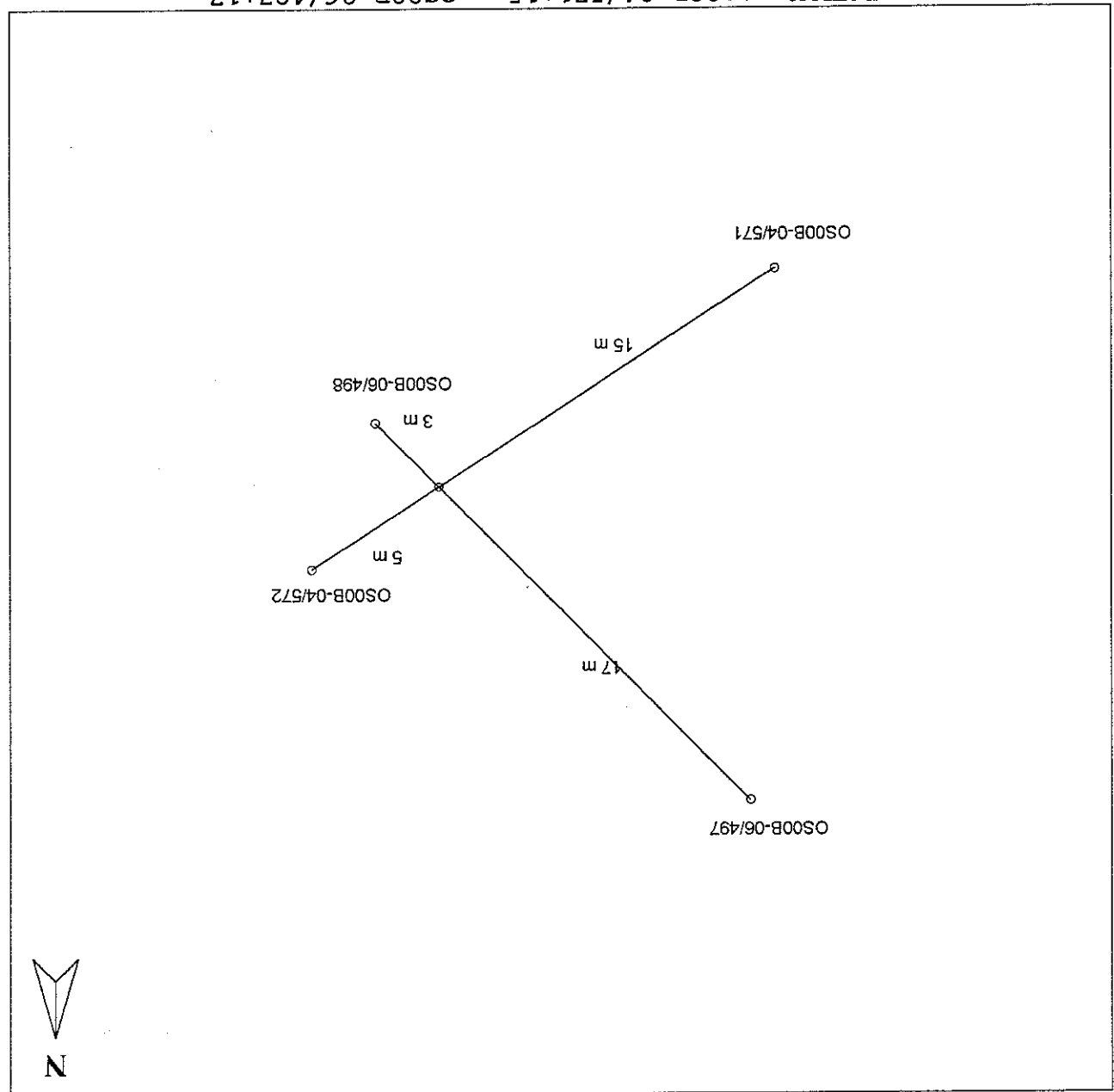


Dynamic
Satellite
Surveys

INTERSECTION DIAGRAM

DSS-FF-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS

INTERSECTION LINES: OS00B-04 / OS00B-06
AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-04/571+15 = OS00B-06/497+17

Eastings	524683.40	RL1 =	116.75
Northings	5840851.76	RL2 =	116.26
RL	116.50	MEAN:	116.50

INTERSECTION DIAGRAM

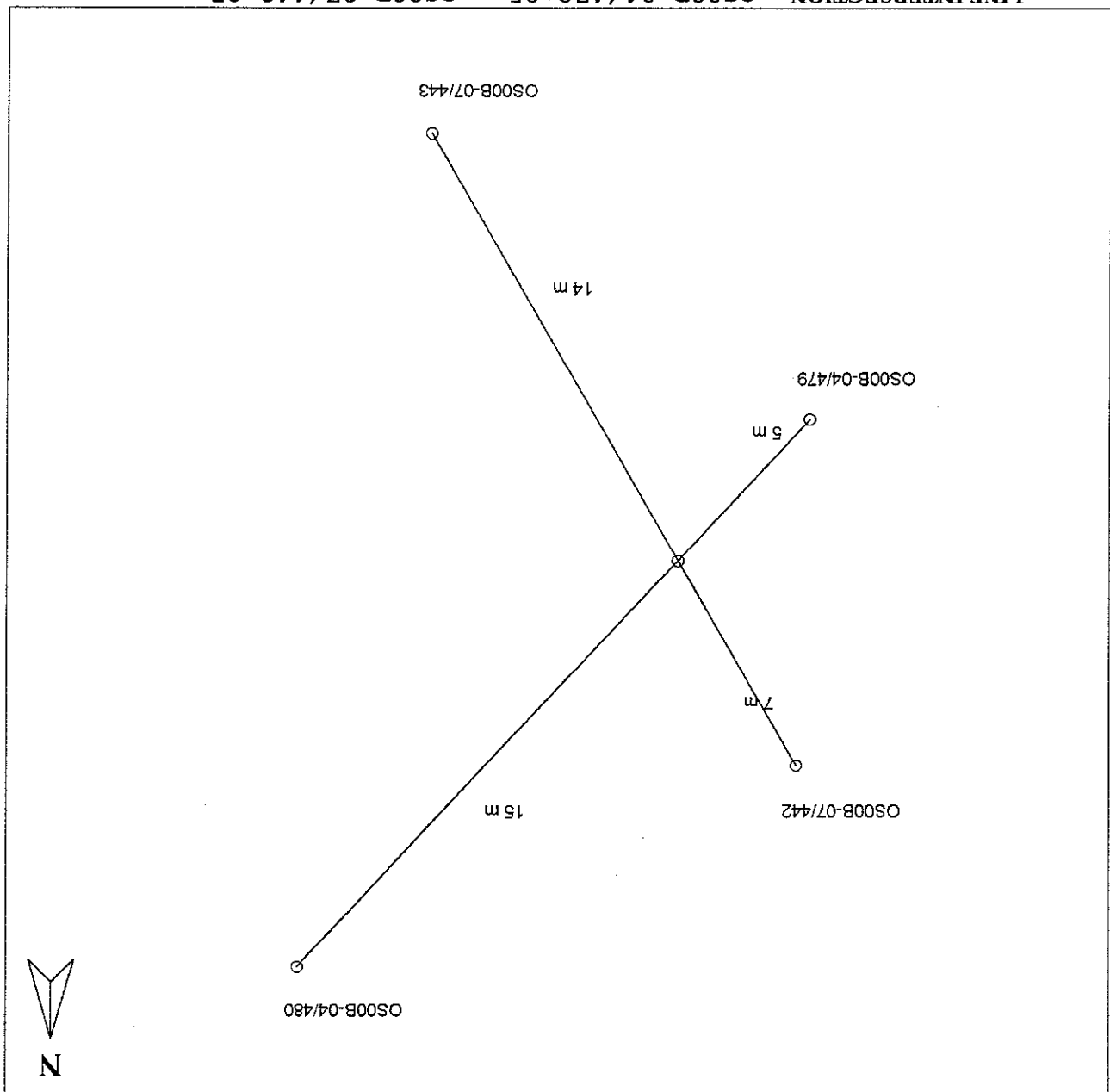
INTERSECTION LINES: OS00B-04 / OS00B-07

AREA: CAMERONS PEP19

STATION INTERVAL: 20

DATUM: AGD 66

PROJECTION: AMG Zone 54 CM: 141



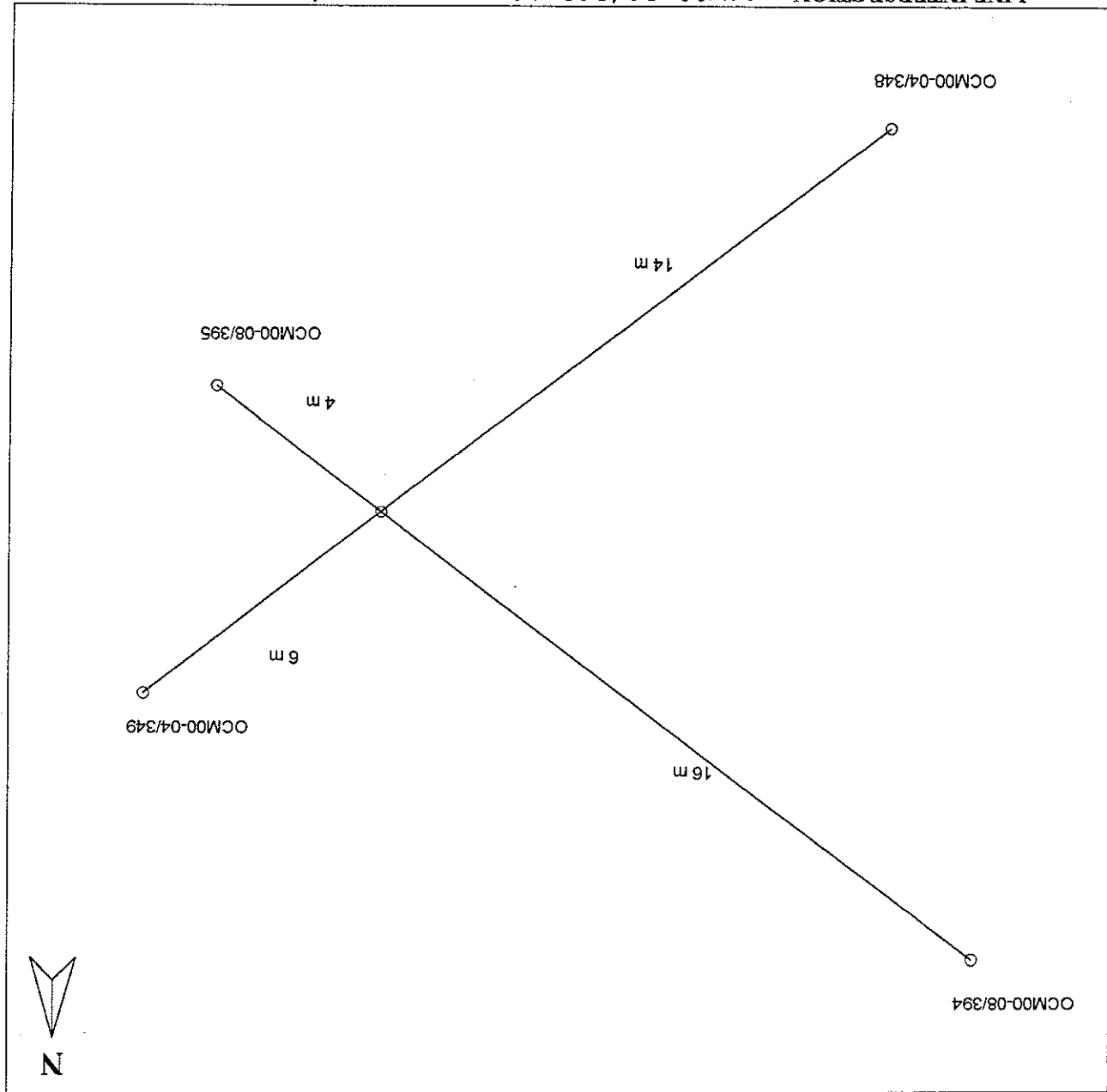
LINE INTERSECTION: OS00B-04/479+05 = OS00B-07/442+07

Easting	523192.03	RL1 =	86.63
Northing	5839758.26	RL2 =	86.72
RL	86.68	MEAN:	86.68

INTERSECTION LINES: OCM00-04 / OCM00-08

AREA: CAMERONS PEP119
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD

STATION INTERVAL: 20



LINE INTERSECTION: OCM00-04/348+14 = OCM00-08/394+16			
Easting	521069.53	RL1 =	75.80
Northing	5838236.64	RL2 =	75.84
RL	75.82	MEAN:	75.82

DSS-FF-14
REV 4.0
May 1998

DATE 03/00

PROJECT / JOB # 00-19 CLIENT SANTOS

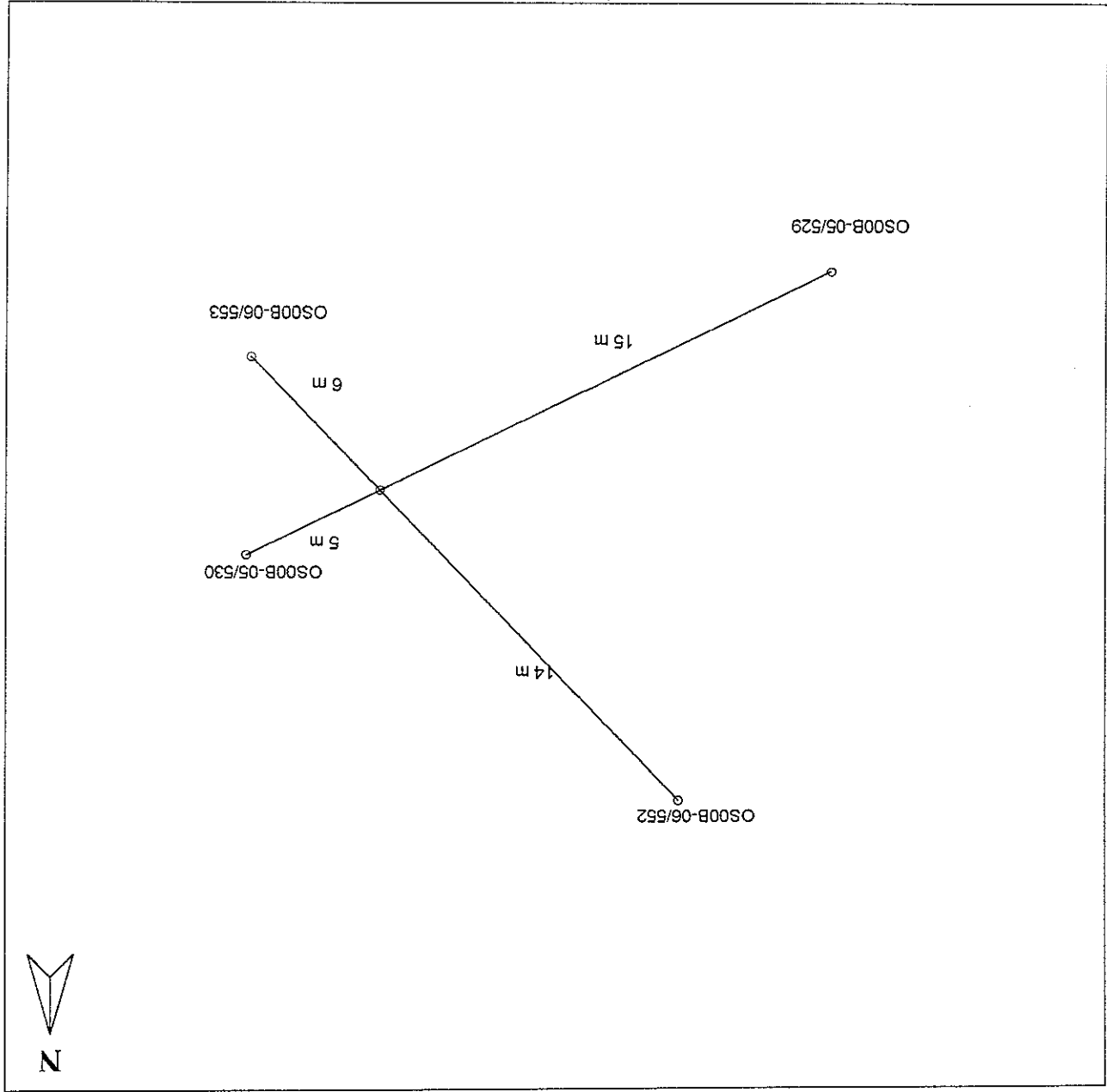


INTERSECTION DIAGRAM

INTERSECTION LINES: OS00B-05 / OS00B-06

AREA: CAMERONS PEP119 PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20 DATUM: AGD 66 AHD



LINE INTERSECTION: OS00B-05/529+15 = OS00B-06/552+14

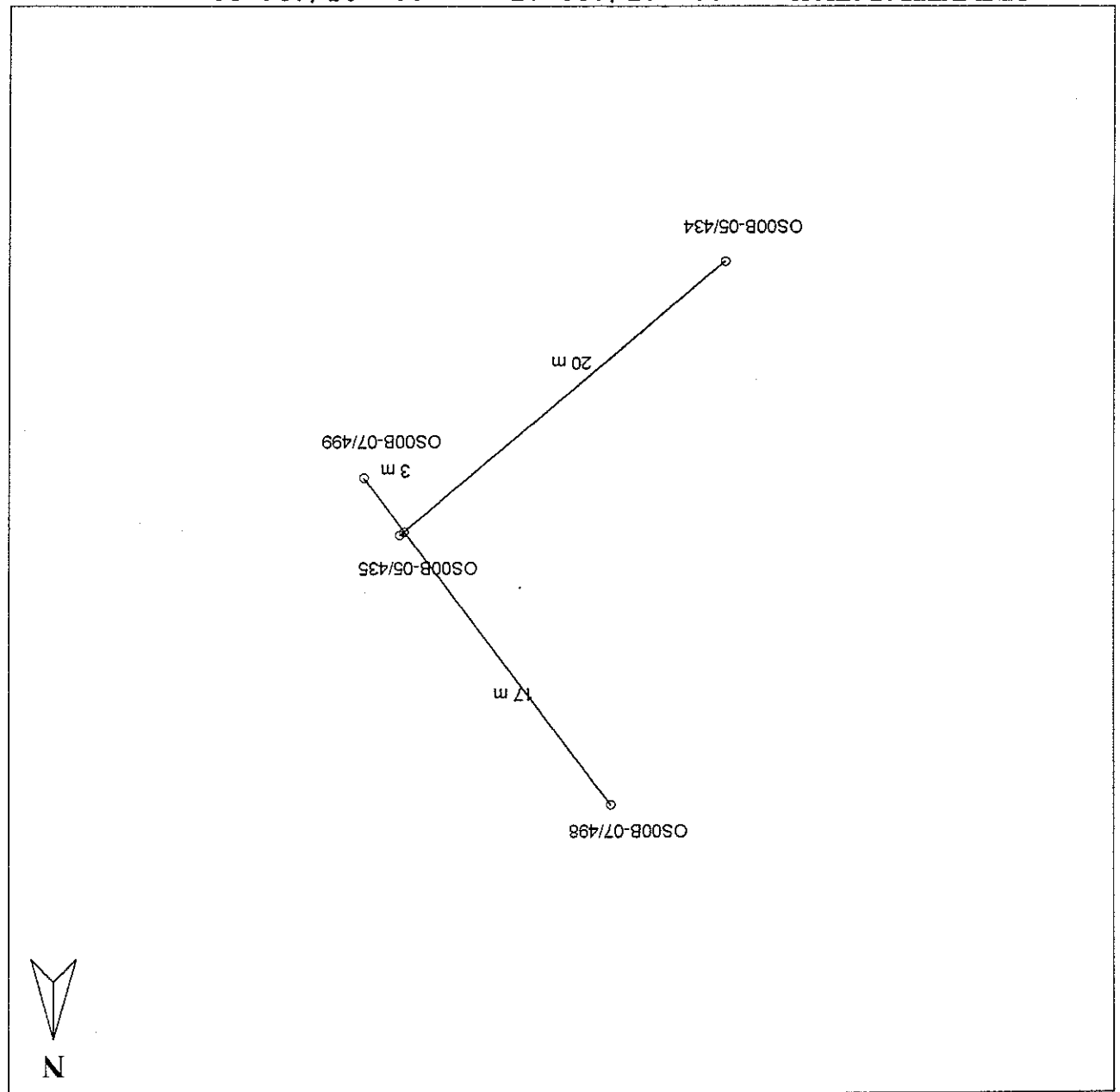
Eastng	525393.43	RL1 =	126.83
Northng	5840015.32	RL2 =	126.64
RL	126.73	MEAN:	126.73



INTERSECTION DIAGRAM

DSS-FI-14
REV 4.0
May 1998
DATE 03/00
PROJECT / JOB # 00-19 CLIENT SANTOS
INTERSECTION LINES: OS00B-07 / OS00B-05

AREA: CAMERONS PEP119
STATION INTERVAL: 20
PROJECTION: AMG Zone 54 CM: 141
DATUM: AGD 66 AHD



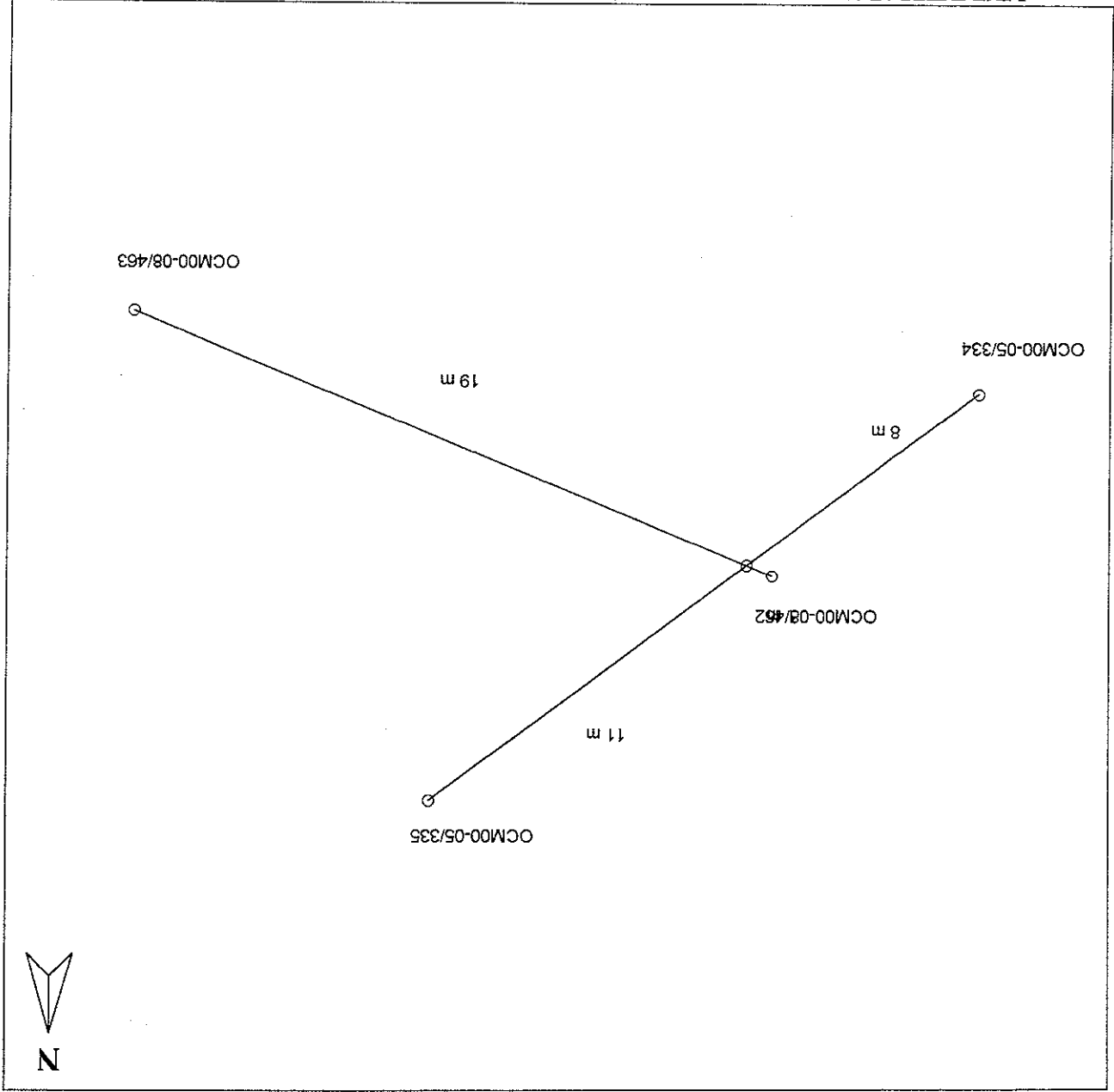
LINE INTERSECTION: OS00B-07/498+17 = OS00B-05/434+20

Eastings	523886.16	RL1 =	89.53
Northing	5838866.11	RL2 =	89.48
RL	89.50	MEAN:	89.50

INTERSECTION LINES: OCM00-05 / OCM00-08

AREA: CAMERONS PEP19
PROJECTION: AMG Zone 54 CM: 141

STATION INTERVAL: 20
DATUM: AGD 66
AHD



LINE INTERSECTION: OCM00-05/334+08 = OCM00-08/462+01

Eastng	522281.62	RL1 =	76.46
Northng	5837653.18	RL2 =	76.56
RL	76.51	MEAN:	76.51

Upholes Listing

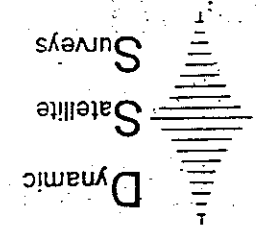
UPHOLES

Coordinates are AMG66 Zone 54 Central Meridian 141°
Heights are AHD, using AUSGEOID98 N value model

Uphole No.	Line	VP	Eastings	Northings	Elev.	Comments
UH#1	OCM00-01	221	518871	5840445	78.6	
UH#2	OCM00-07	273+11	521059	5842375	86.4	X OCM00-01
UH#3	OCM00-06	320+9	522399	5843566	100.3	X OCM00-01
UH#4	OCM00-02	557+17	523353	5842438	106.0	X OCM00-06
UH#5	OCM00-07	340+5	521906	5841343	85.2	X OCM00-02
UH#6	OCM00-02	288+16	519061	5839193	77.0	X OCM00-08
UH#7	OCM00-03	334+13	520092	5838695	80.0	X OCM00-08
UH#8	OCM00-03	488+5	522604	5840465	86.5	X OCM00-07
UH#9	OCM00-03	580+19	524113	5841541	103.9	X OCM00-06
UH#10	OCM00-04	571+15	524683	5840854	116.6	X OCM00-06
UH#11	OCM00-04	479+3	523190	5839758	86.9	X OCM00-07
UH#12	OCM00-04	348+14	521069	5838239	75.9	X OCM00-08
UH#13	OCM00-04	233+4	519202	5836879	73.2	X HF88-03
UH#14	OCM00-08	462+4	522286	5837654	76.7	X OCM00-05
UH#15	OCM00-07	498+17	523884	5838864	89.9	X OCM00-05
UH#16	OCM00-05	529+17	525397	5840013	126.5	X OCM00-06

Chaining Maps

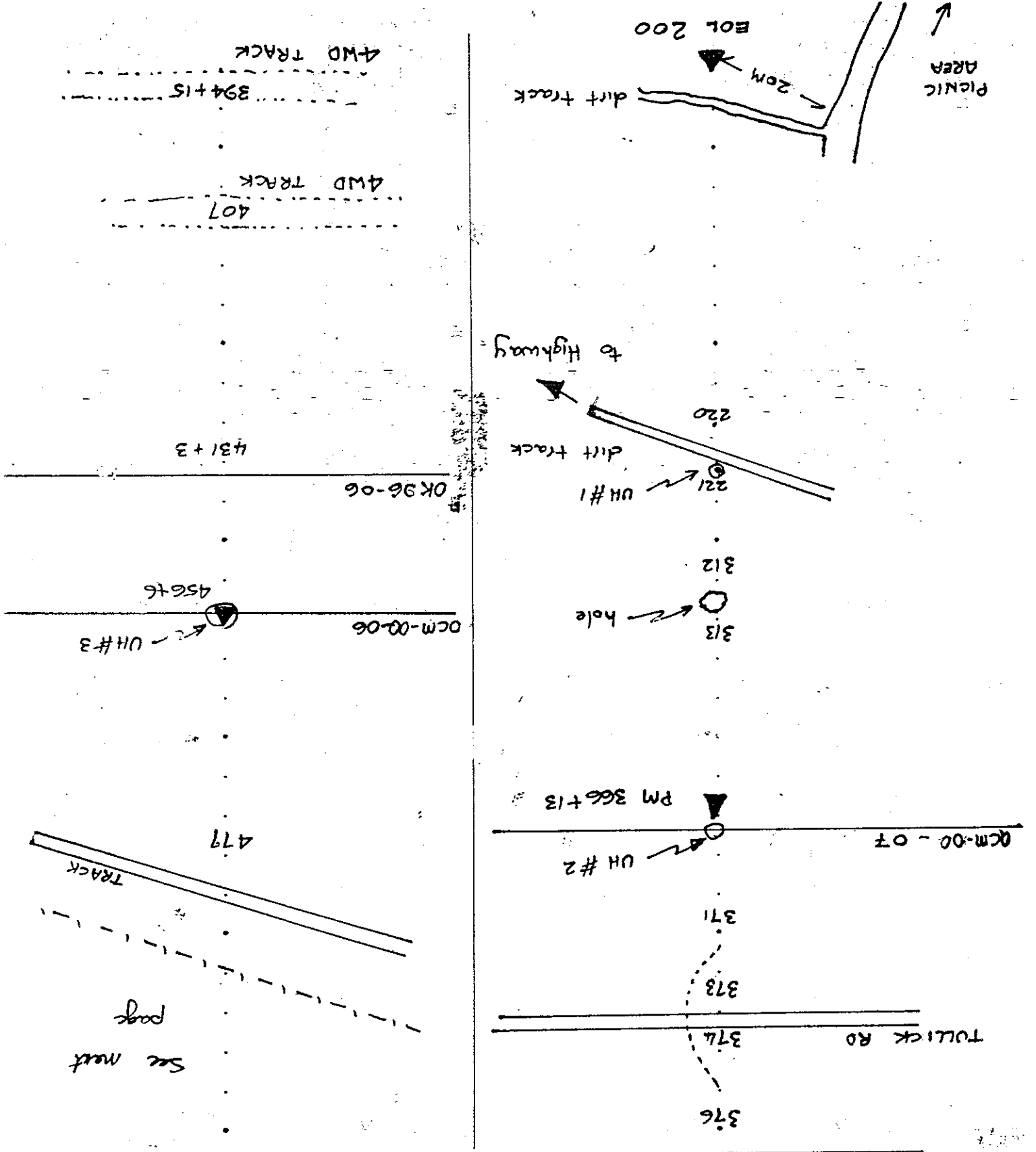
TRACE DIAGRAM



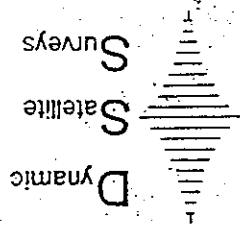
PROJECT/JOB # 00-19 CLIENT GEO / SANTOS

PAGE 1 OF 2 LINE 00M-00-01 AREA CAMERONS STN INTERVAL 20 m

FROM STN 200 TO STN 477 SHOOTING DIRECTION: S → N BEARING: °



See next page



TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

CLIENT GECO / SANTOS

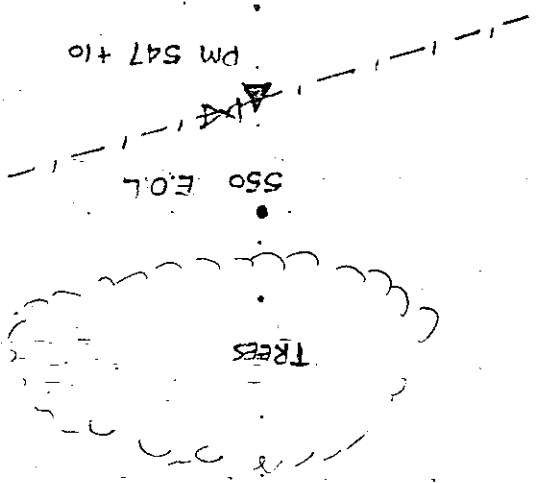
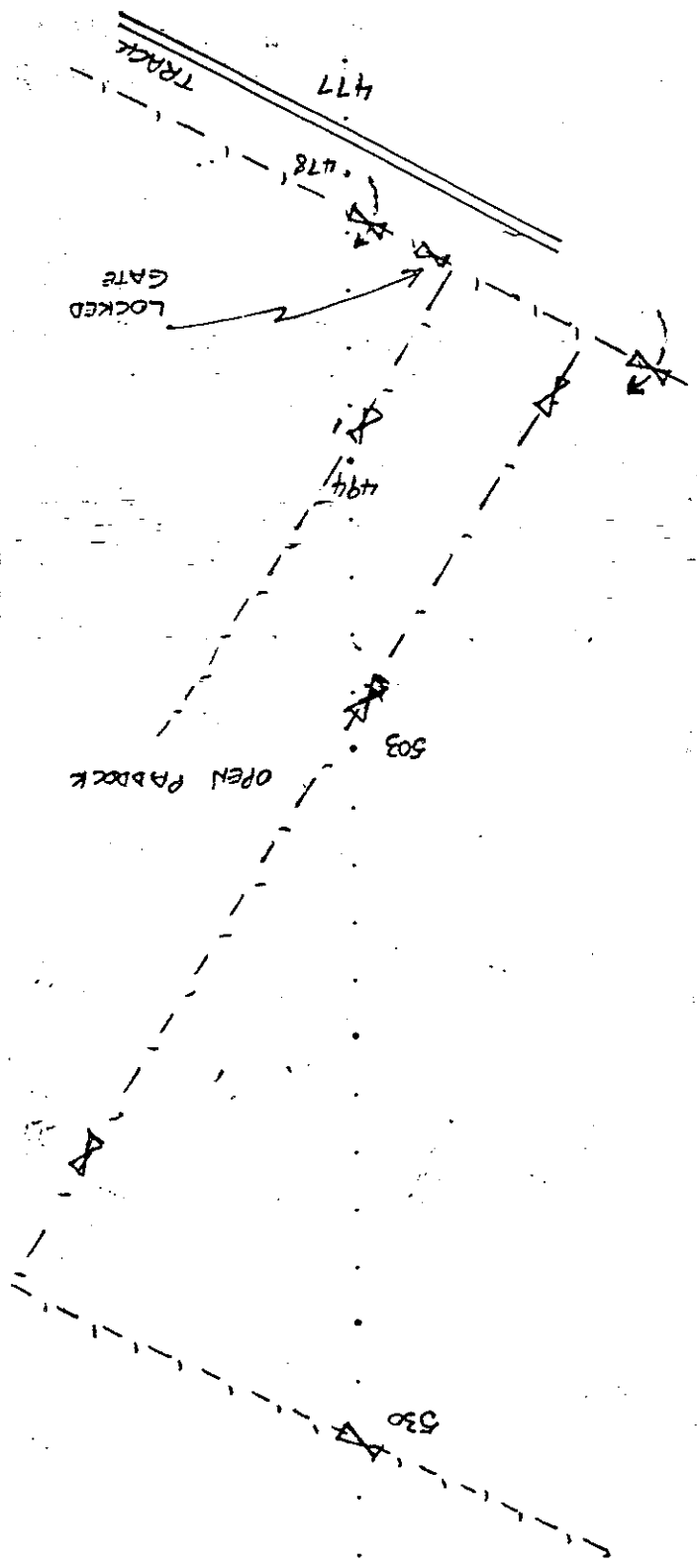
PROJECT/JOB # 00-19

AREA: CARERONS

PAGE 2 OF 2 LINE: OCM-00-01

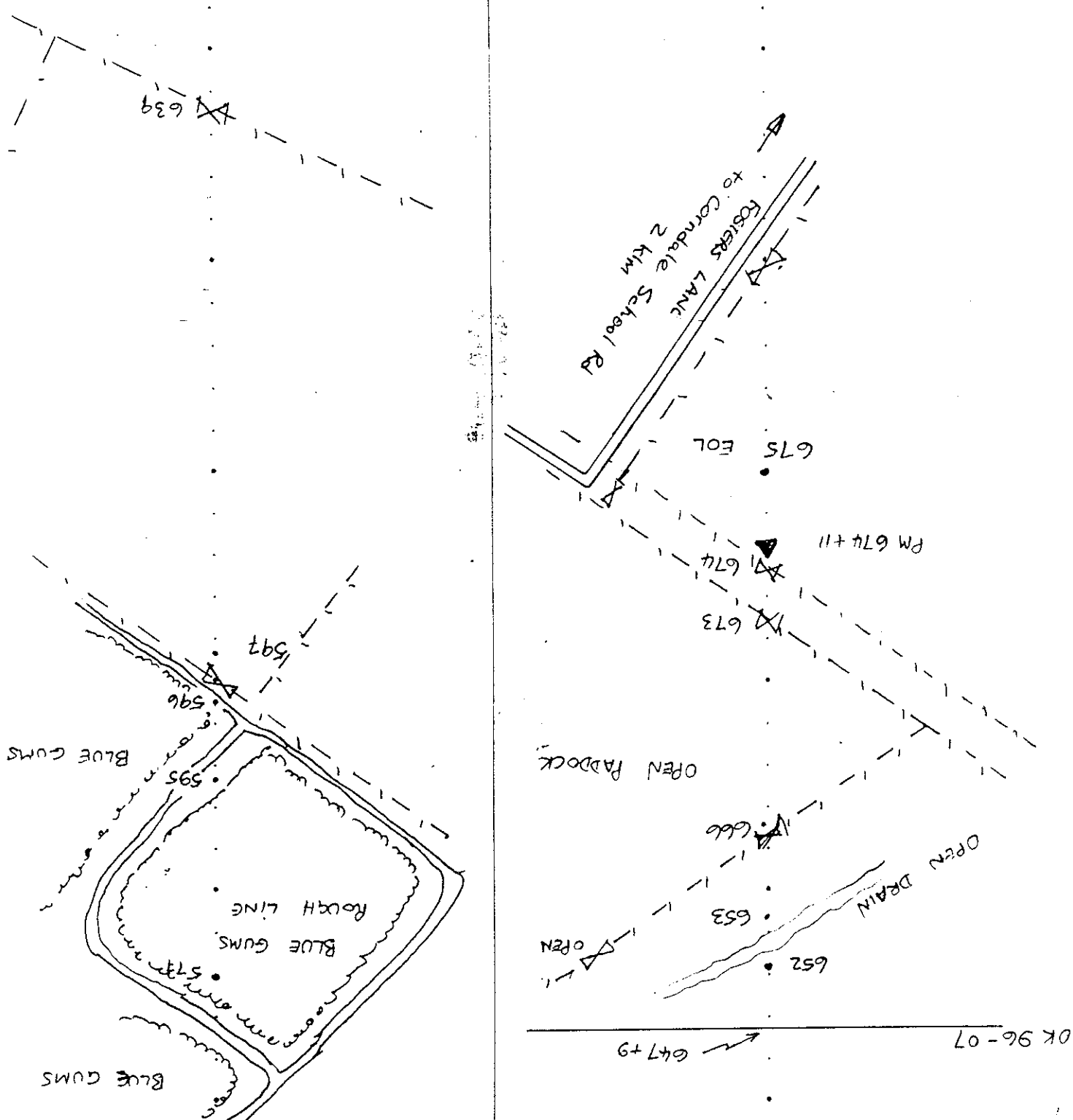
FROM STN 477 TO STN 550 SHOOTING DIRECTION: S → N BEARING: _____

STN INTERVAL: 20 m



PROJECT/JOB # 00-19 CLIENT Geeco / SANTOS

FROM STN 675 TO STN 577 SHOOTING DIRECTION: N → S BEARING: _____



CLIENT GECO / SANTOS

PROJECT/JOB # 00-19

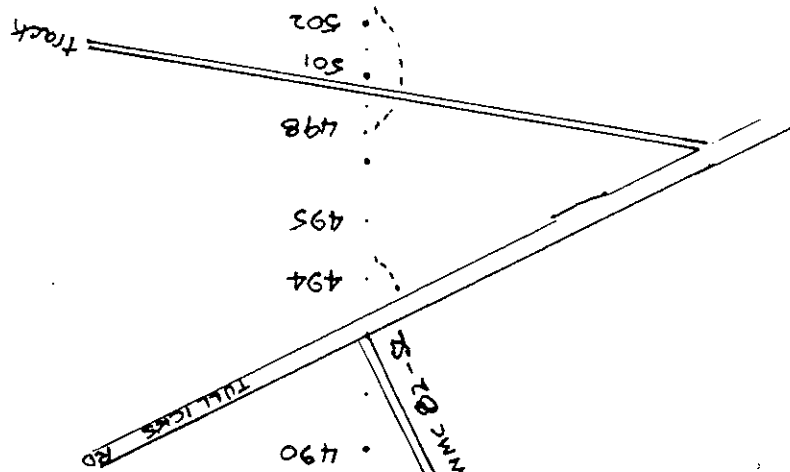
Dynamic
Satellite
Surveys



PAGE 2 OF 3 LINE: OCM-00-02 AREA: CAMERONS STN INTERVAL: 20 m

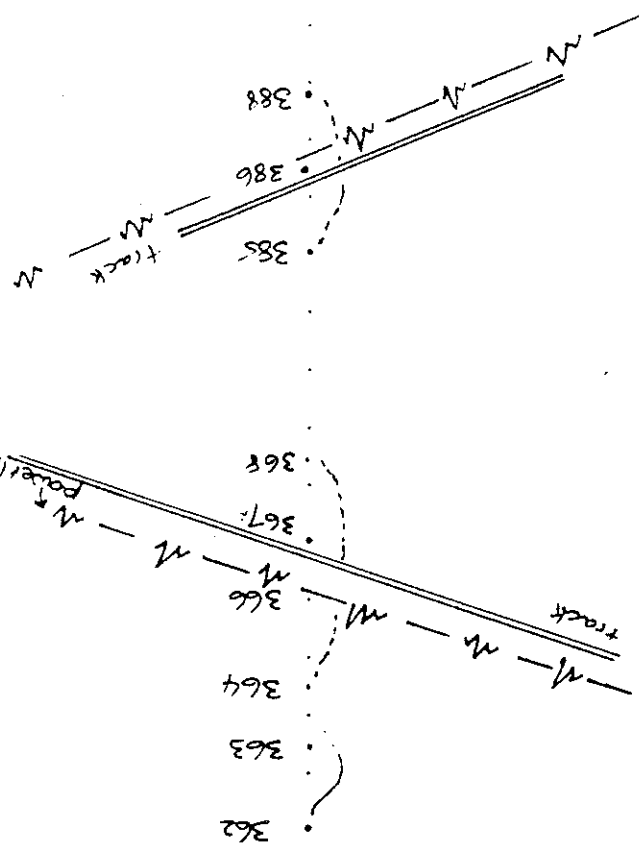
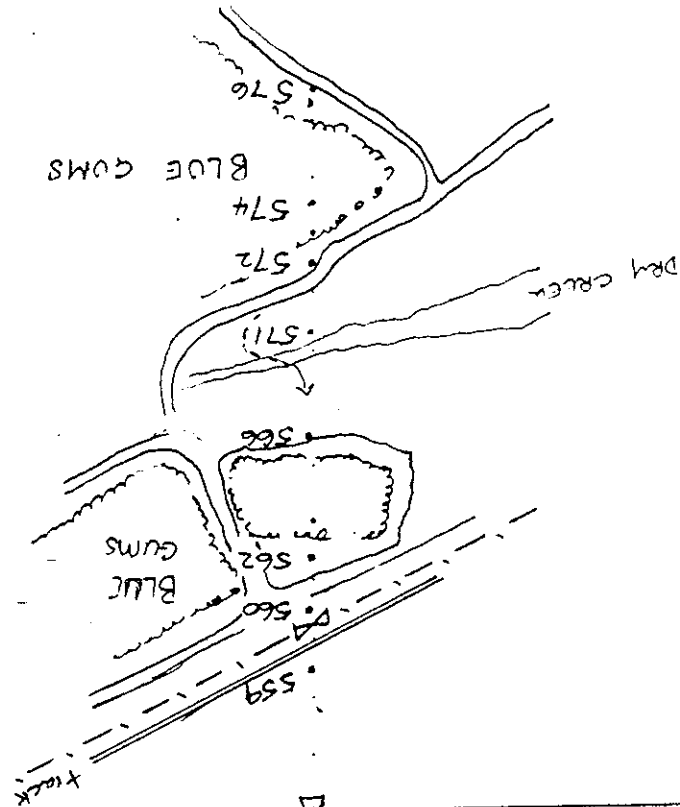
FROM STN 576 TO STN 362 SHOOTING DIRECTION: N 9 S BEARING: 0

TRACE DIAGRAM



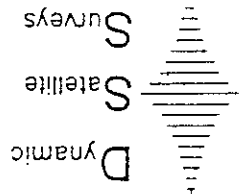
OK 96-06 541+2

OCM-00-06 PM 557+17



OCM-00-07 PM 467+3

TRACE DIAGRAM



PROJECT/JOB #

00-19

CLIENT

GECO / SANTOS

PAGE 3 OF 3

LINE: DCM-00-02

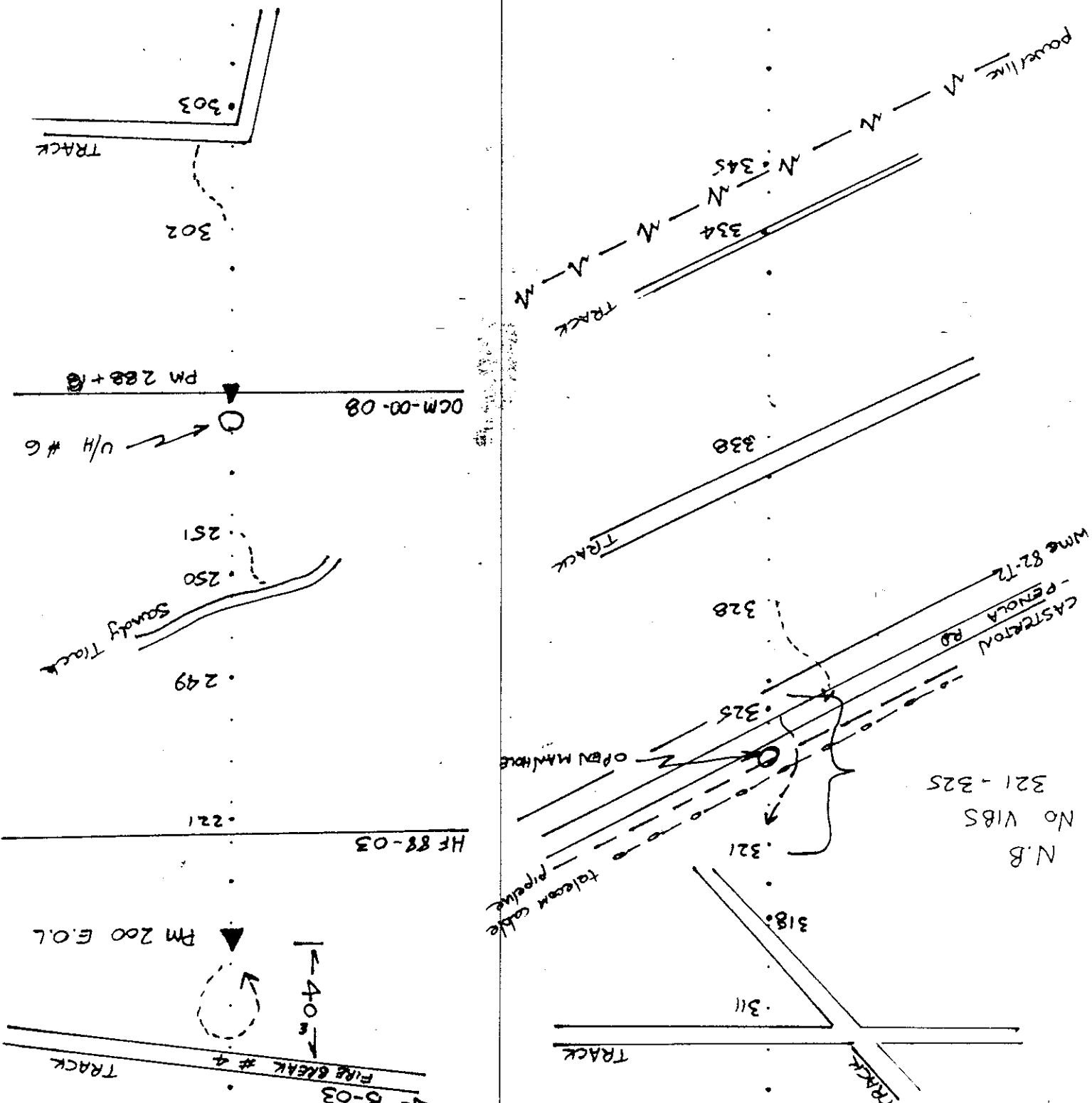
AREA: CAMERONS

STN INTERVAL: 20 m

FROM STN 362 TO STN 200 EOL

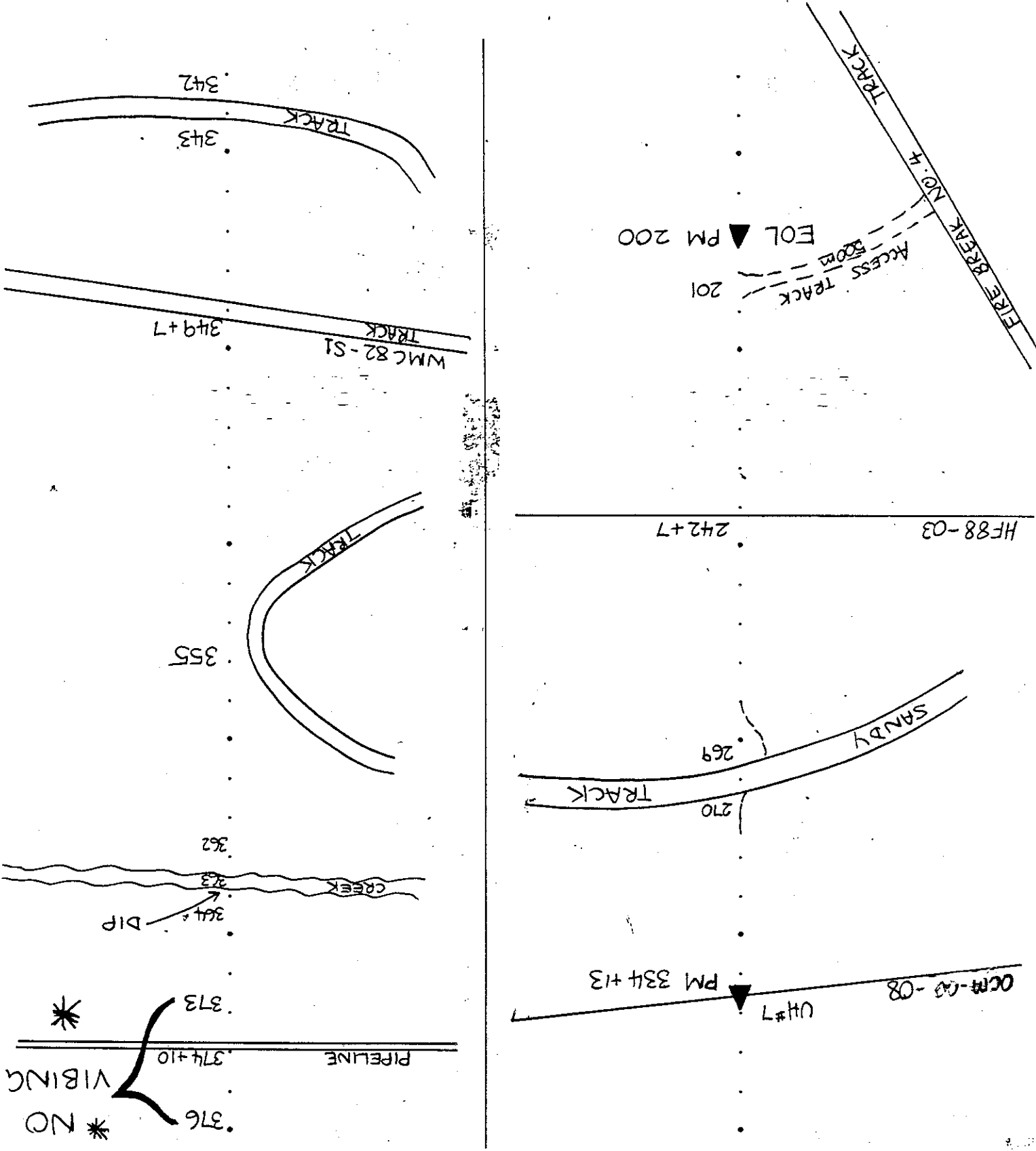
SHOOTING DIRECTION: N → S

BEARING: °



N.B.
No VIBS
321 - 325

TRACE DIAGRAM



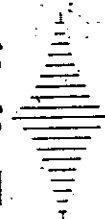
TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

CLIENT GECO / SANTOS

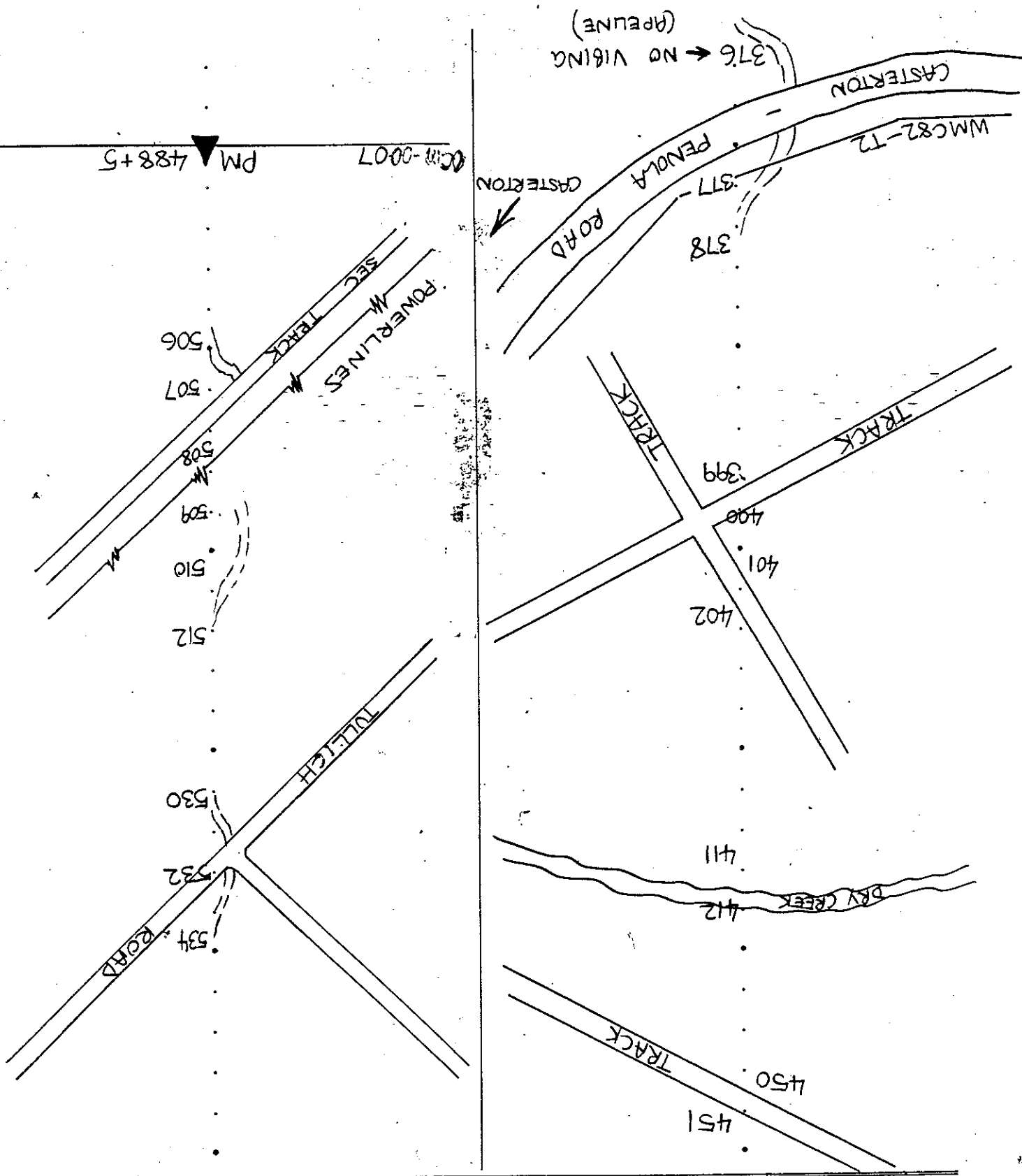
PROJECT/JOB # 00-19

Dynamic
Satellite
Surveys



PAGE 2 OF 4 LINE: 0CM-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 376 TO STN 534 SHOOTING DIRECTION: S-N BEARING: °



Dynamic
Satellite
Surveys



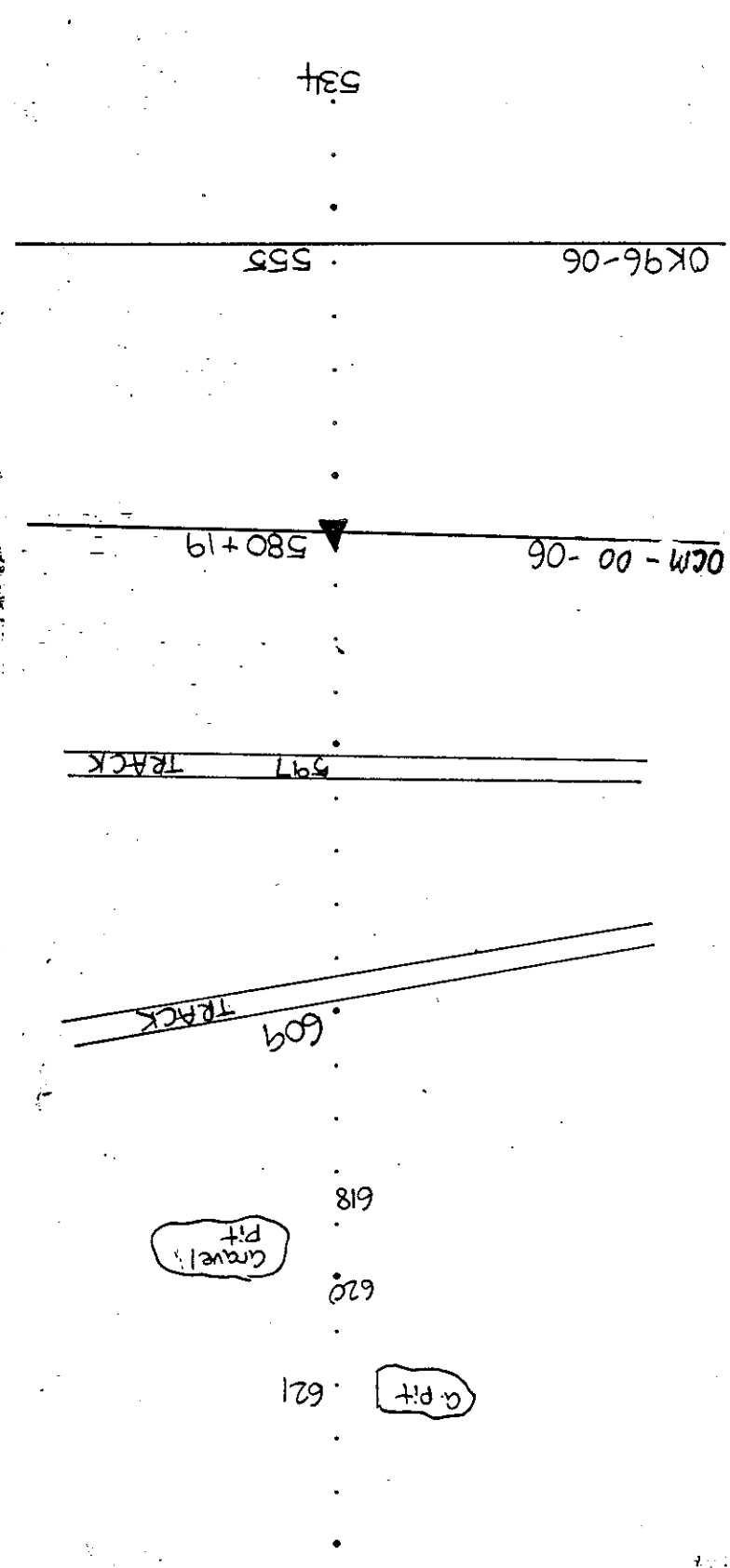
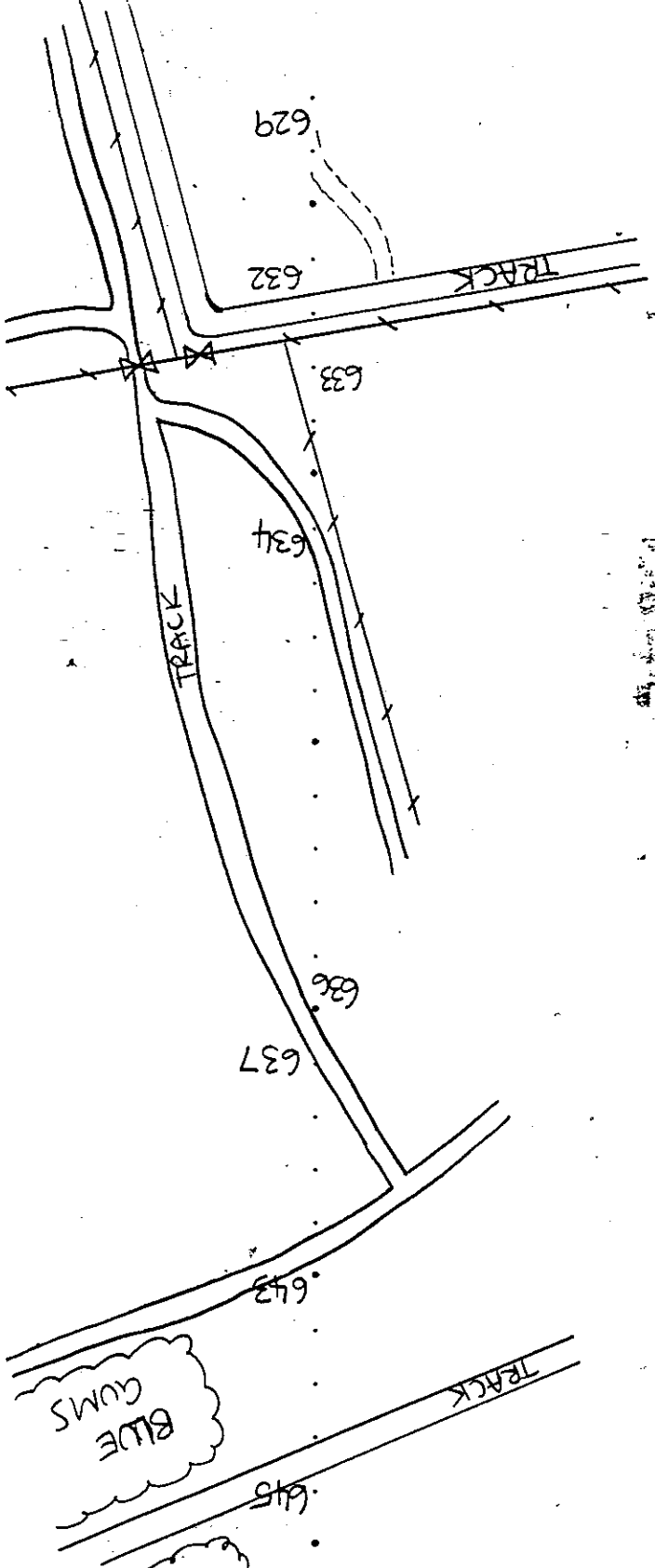
TRACE DIAGRAM

DSS-FF-07
REV 6.0
March 1998

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

PAGE 3 OF 4 LINE: 00-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 534 TO STN 645 SHOOTING DIRECTION: S-N BEARING: °



TRACE DIAGRAM

Dynamic
Satellite
Surveys



CLIENT CECO / SANTOS

PROJECT/JOB # 00-19

PAGE 4 OF 4 LINE: OCM-00-03 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 645 TO STN 700 (EOL) SHOOTING DIRECTION: S-N BEARING: °

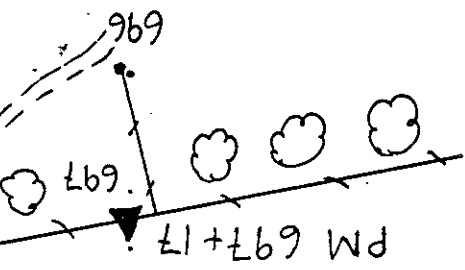
700 • EOL

698

PM 697+17

697

696



689

688

687

686

Access to
LINE #4
(Flagged in yellow)

ROUGH

LINE

BLUE GUMS

664

BLUE GUMS

664

LARGE
TREES

662

LARGE
TREES

659

655

BLUE GUMS

STUMP
651+15

ROUGH
LINE

647

646

645

TRACK

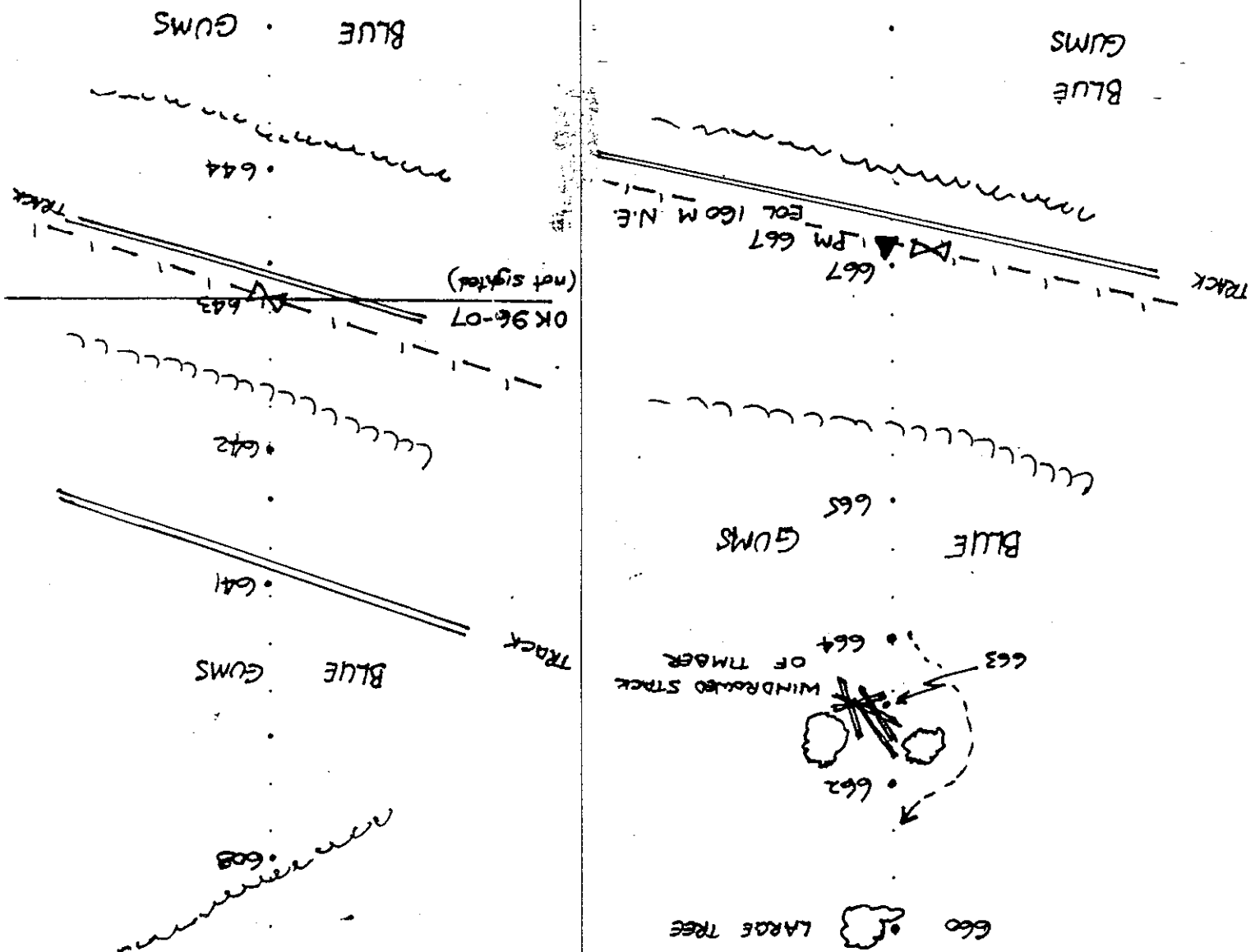
TRACE DIAGRAM

Dynamic
Satellite
Surveys

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

PAGE 1 OF 3 LINE: 0011-00-04 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 675 EOL TO STN 608 SHOOTING DIRECTION: N-5 BEARING: 0



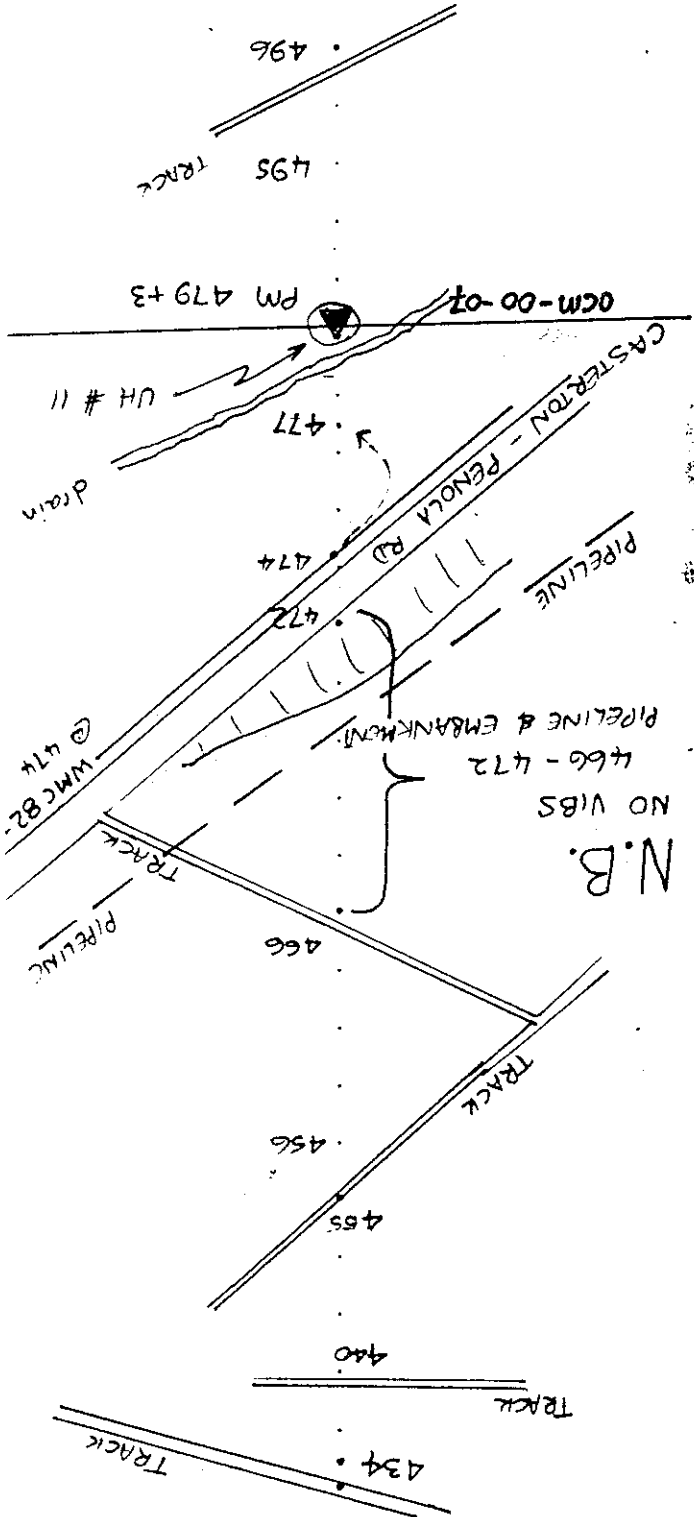
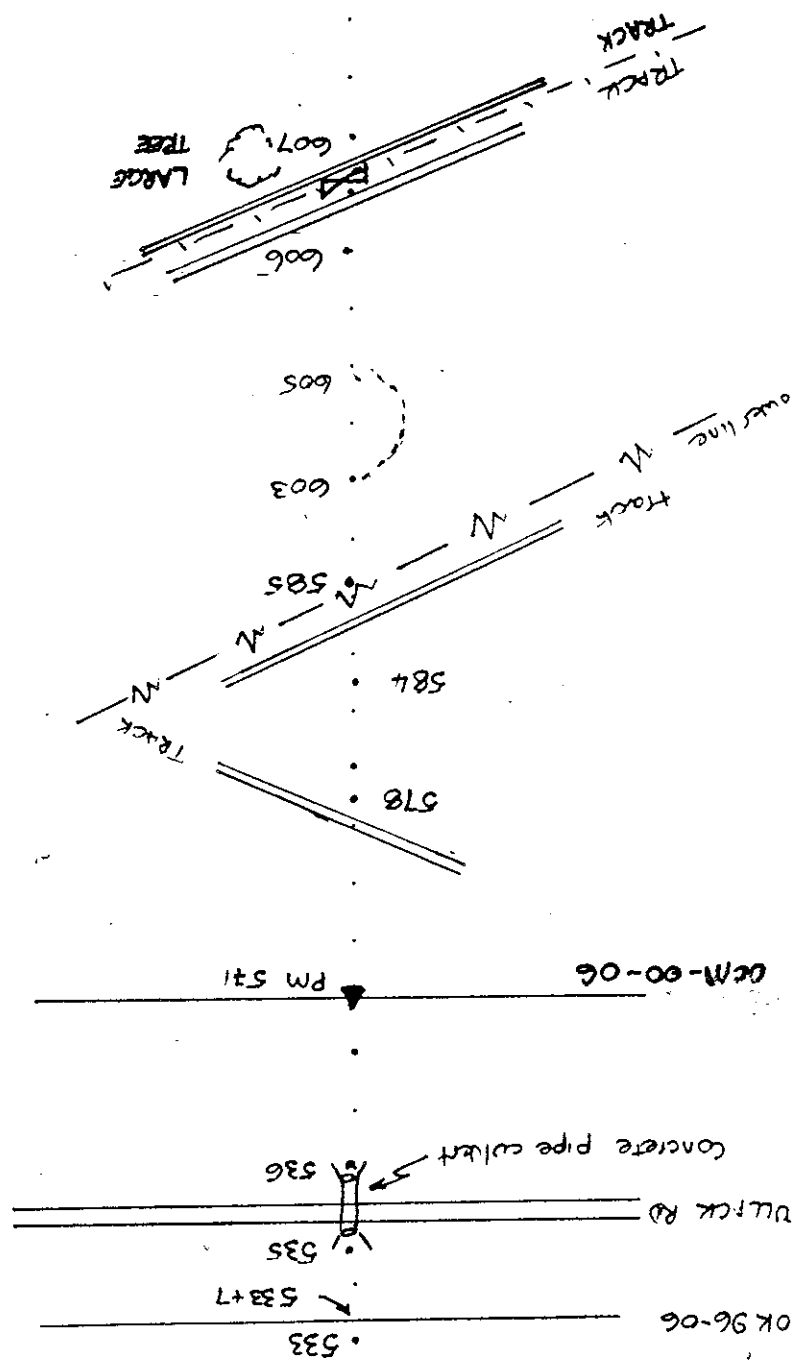
N.B. SMALL TURNAROUND
VIBS SHOULD INSPECT !! MAY REQUIRE
REVERSE IN FROM 668
675 EOL

PAGE 2 OF 3 LINE: 00M-00-04 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 607 TO STN 434 SHOOTING DIRECTION: N→S BEARING: _____°

TRACE DIAGRAM

Dynamic
Satellite
Surveys



CLIENT GECO / SANTOS

PROJECT/JOB # 00-19

Dynamic
Satellite
Surveys



TRACE DIAGRAM

PAGE 3 OF 3 LINE: OCM-00-04 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 434 TO STN 200 SHOOTING DIRECTION: N 95 BEARING: 0

FOR

Sandy Track
256
257

345

347

SOFT

348

391

390

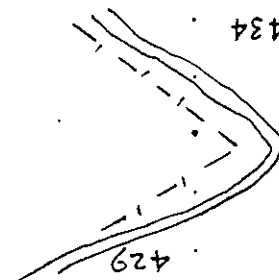
404

403

TRACK

429

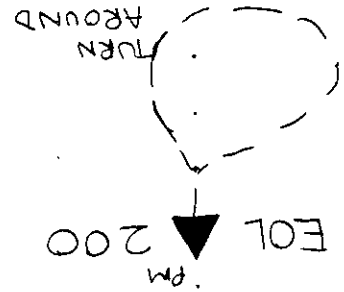
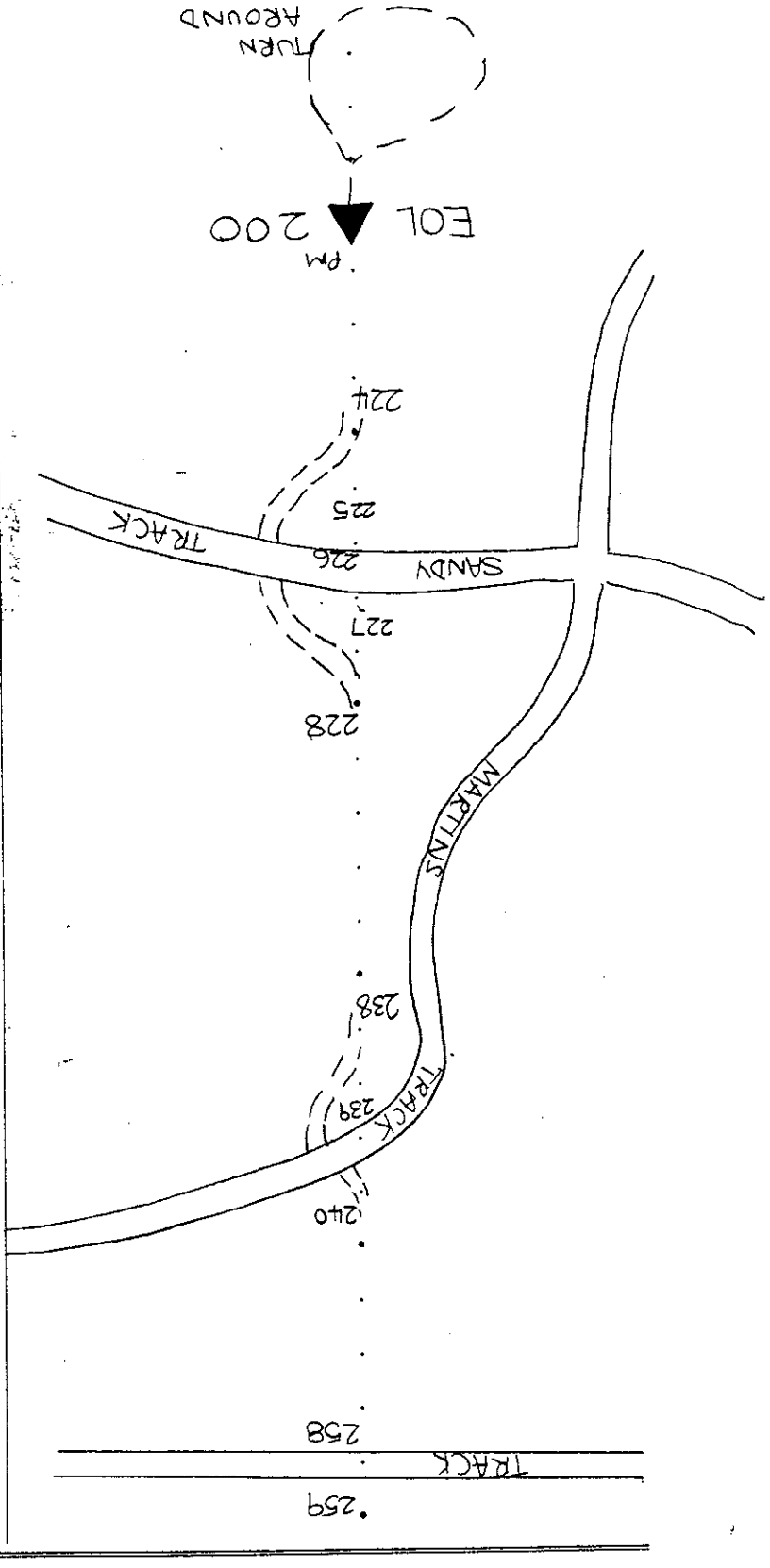
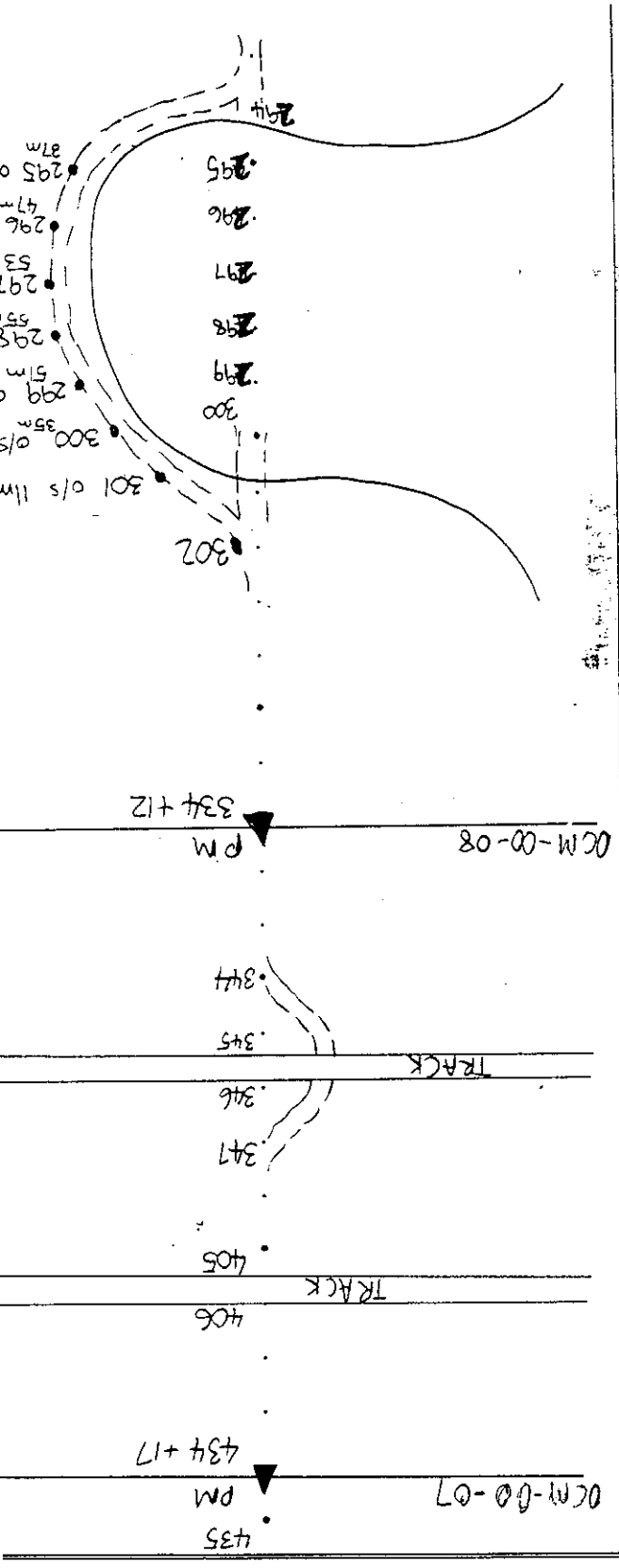
434



PM 200 EOL

HF 88-03
UH # 13
233 + 4

TRACE DIAGRAM



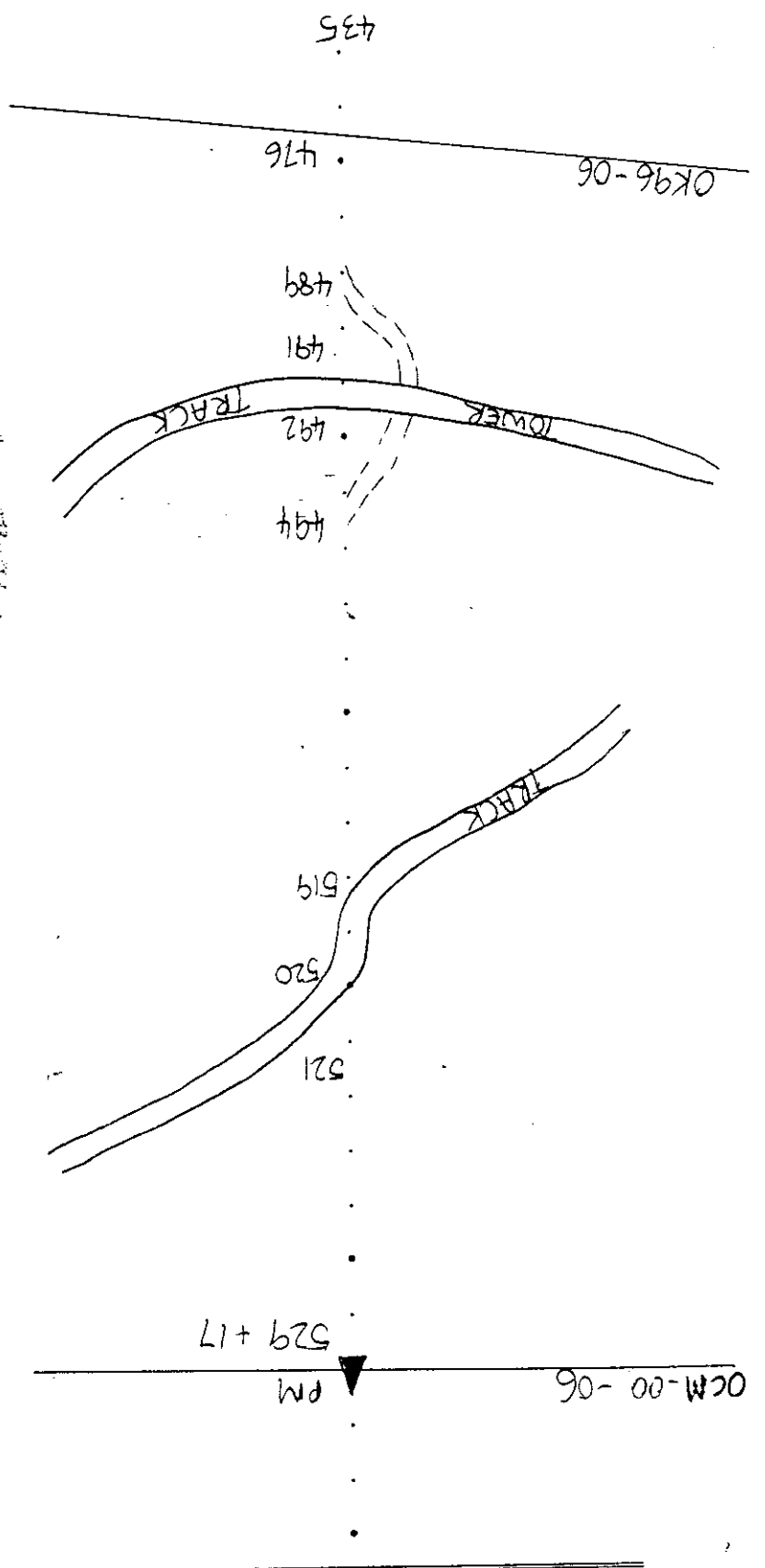
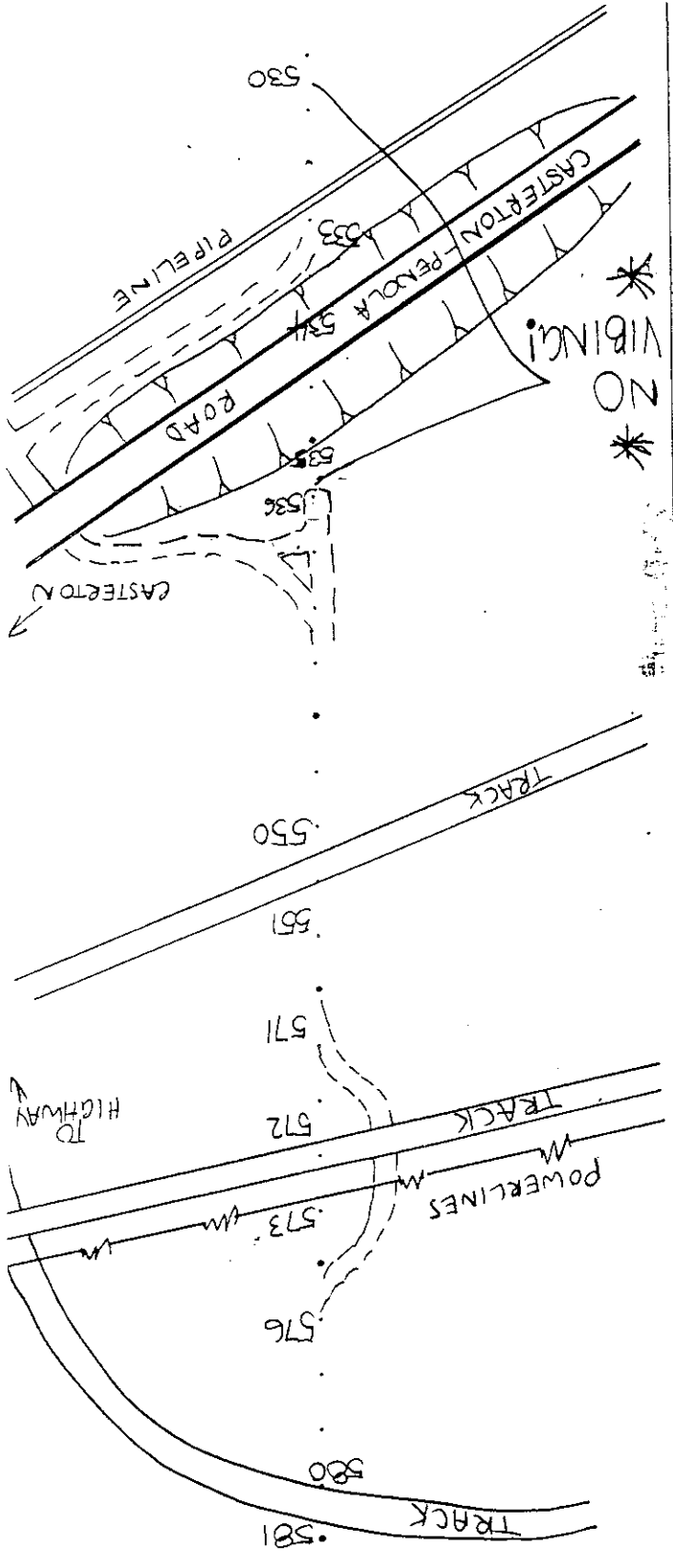
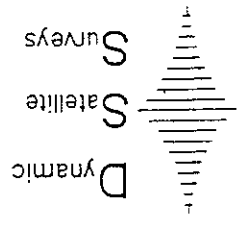
CLIENT CECO / SANTOS

PROJECT/JOB # 00-19 AREA: CAMERONS LINE: 00-05 PAGE 2 OF 3

FROM STN 435 TO STN 581 SHOOTING DIRECTION: S-N BEARING: °

STN INTERVAL: 20 m

TRACE DIAGRAM



TRACE DIAGRAM

Dynamic
Satellite
Surveys



PROJECT/JOB # 00-19 CLIENT GECCO/SANTOS

PAGE 3 OF 3 LINE: OCM-00-05 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 581 TO STN 625 (EOL) SHOOTING DIRECTION: S-N BEARING: °

! PM 625 EOL

624

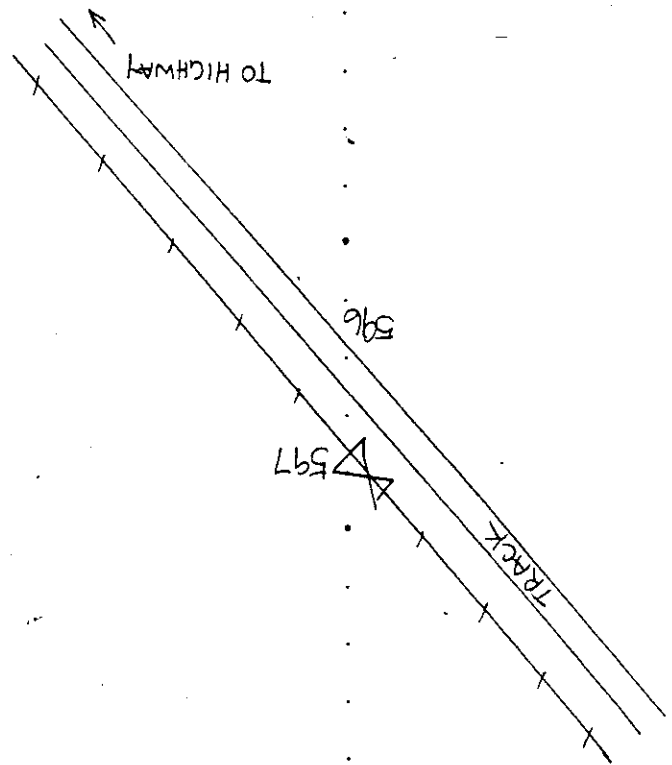
597

596

591+3

OK96-07

581



CLIENT GECO/SANTOS

PROJECT/JOB # 00-19

D
ynamic
S
atellite
S
urveys

AREA: CAMERONS

LINE: DCM-00-06

OF

4

STN INTERVAL: 20m

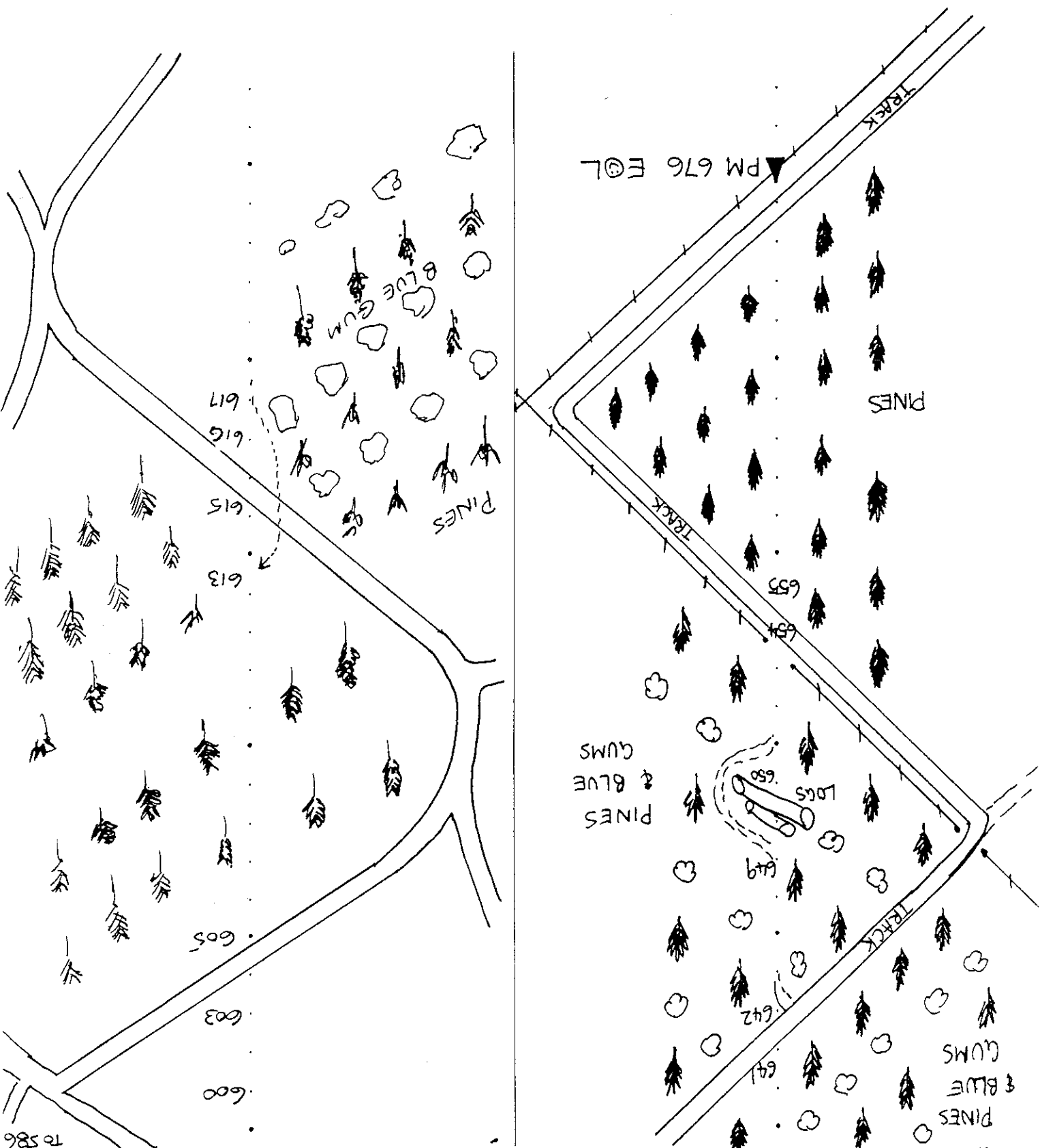
BEARING

S-N

SHOOTING DIRECTION:

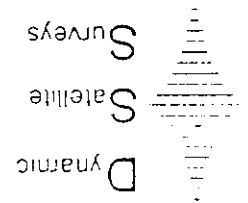
FROM STN 676 (EOL) TO STN 600

TRACE DIAGRAM

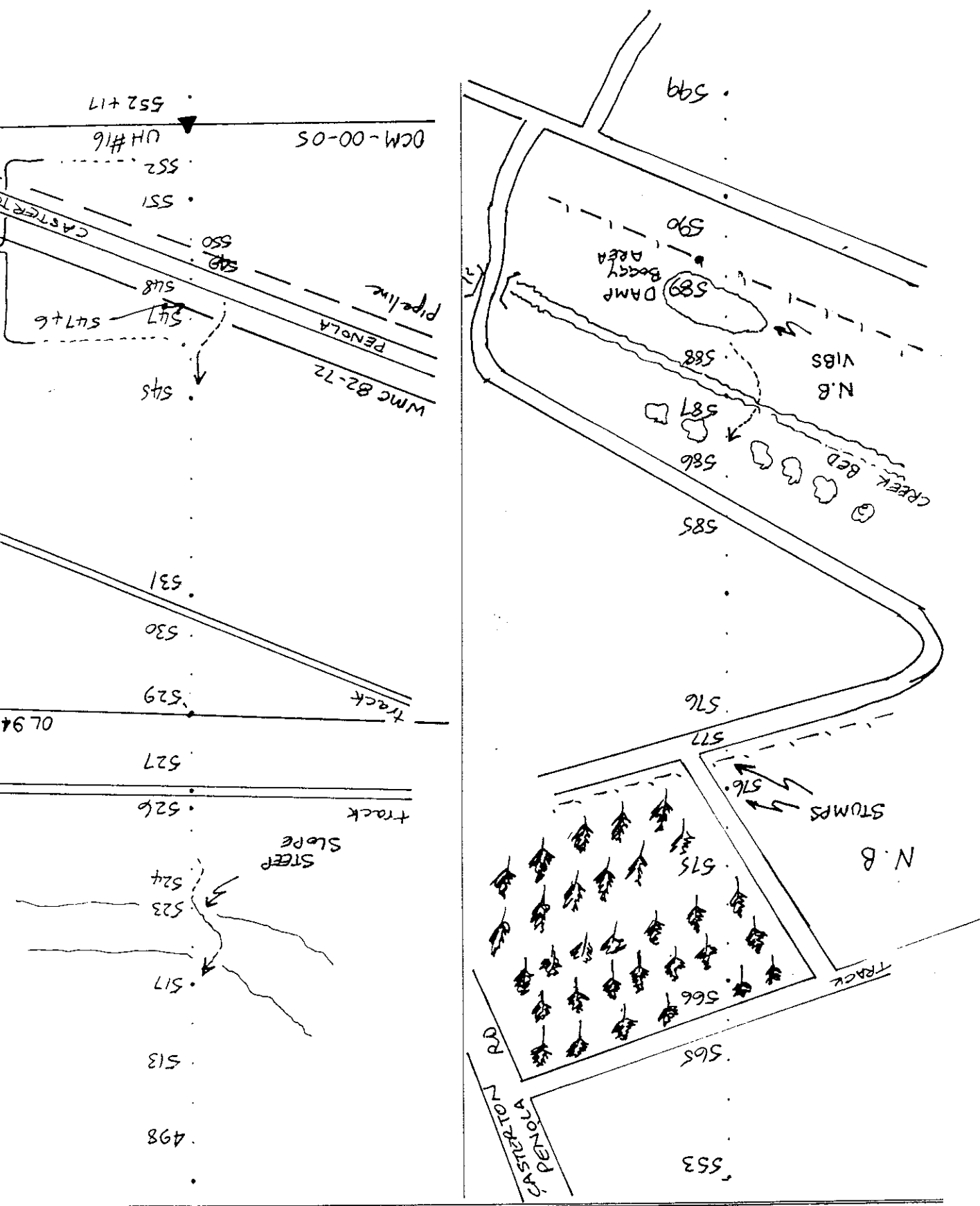


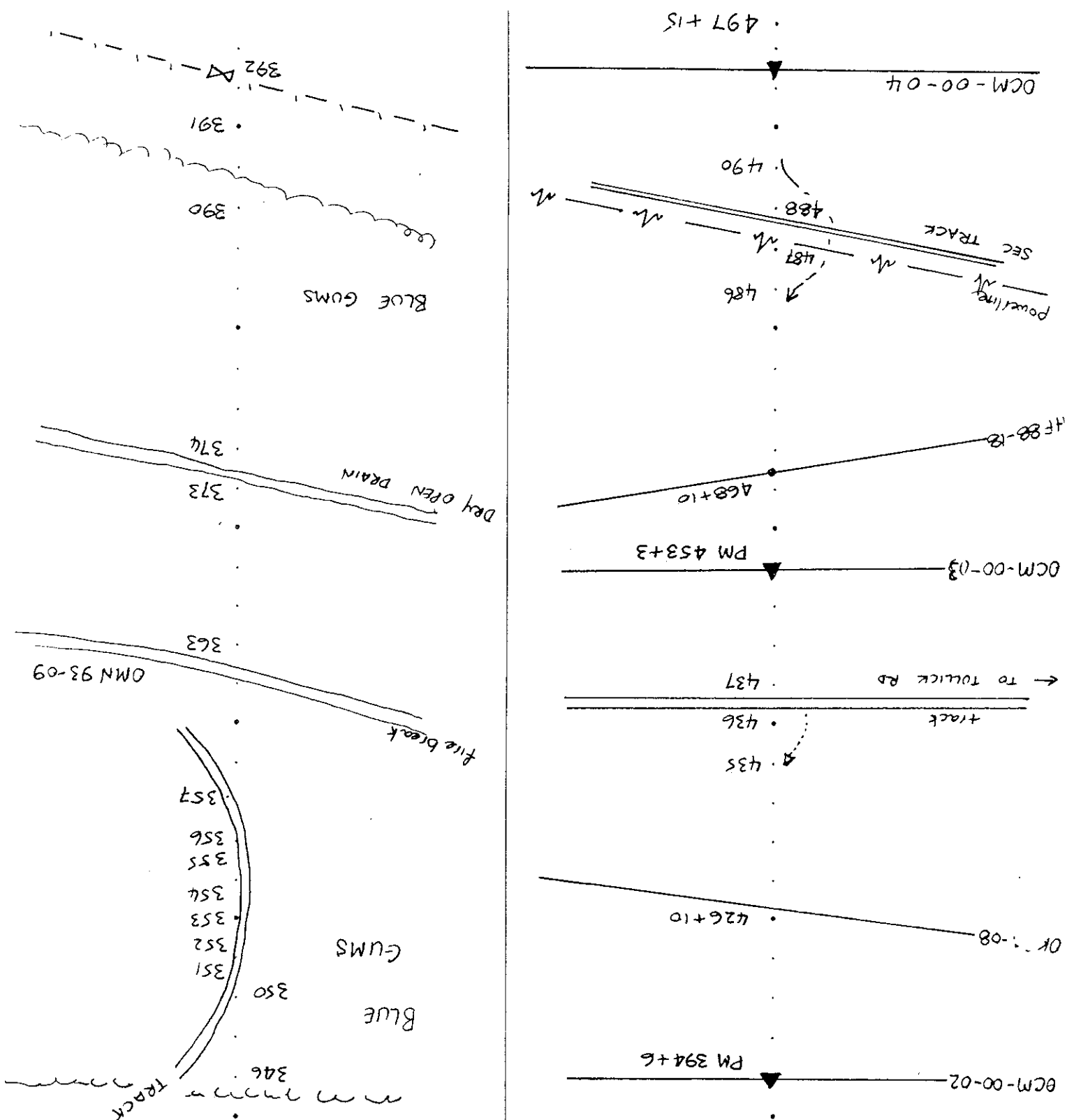
TRACE DIAGRAM

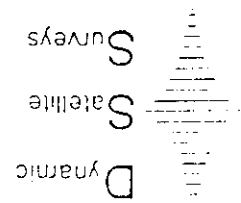
PROJECT/JOB # 00-19 CLIENT GECO / SANTOS



FROM STN 599 TO STN 498 SHOOTING DIRECTION: S-N BEARING:







PAGE 4 OF 4 LINE: 00-00-06 AREA: CAMERONS STN INTERVAL: 20 m

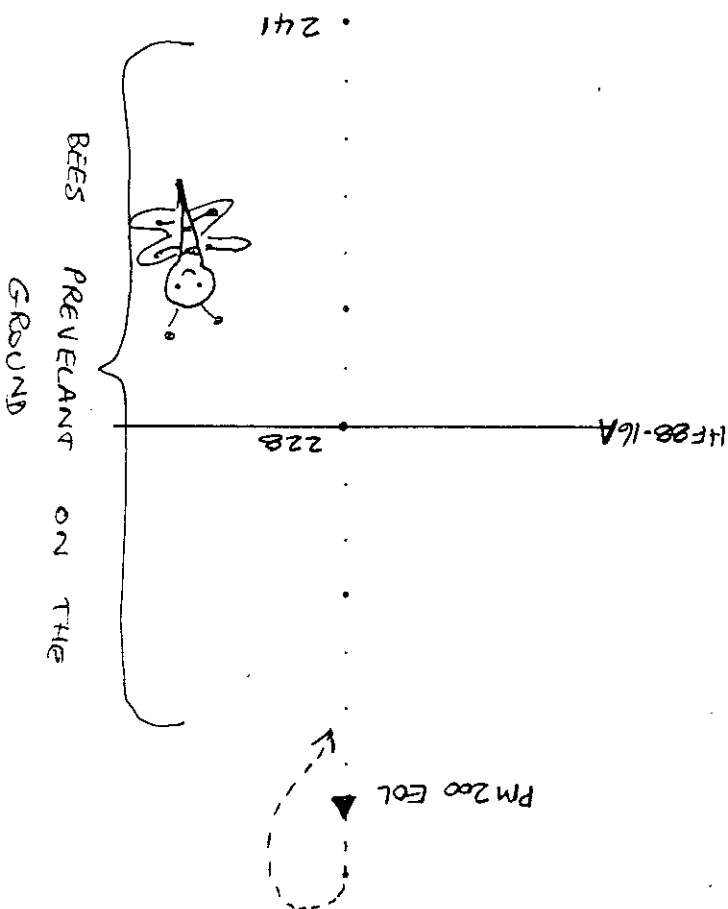
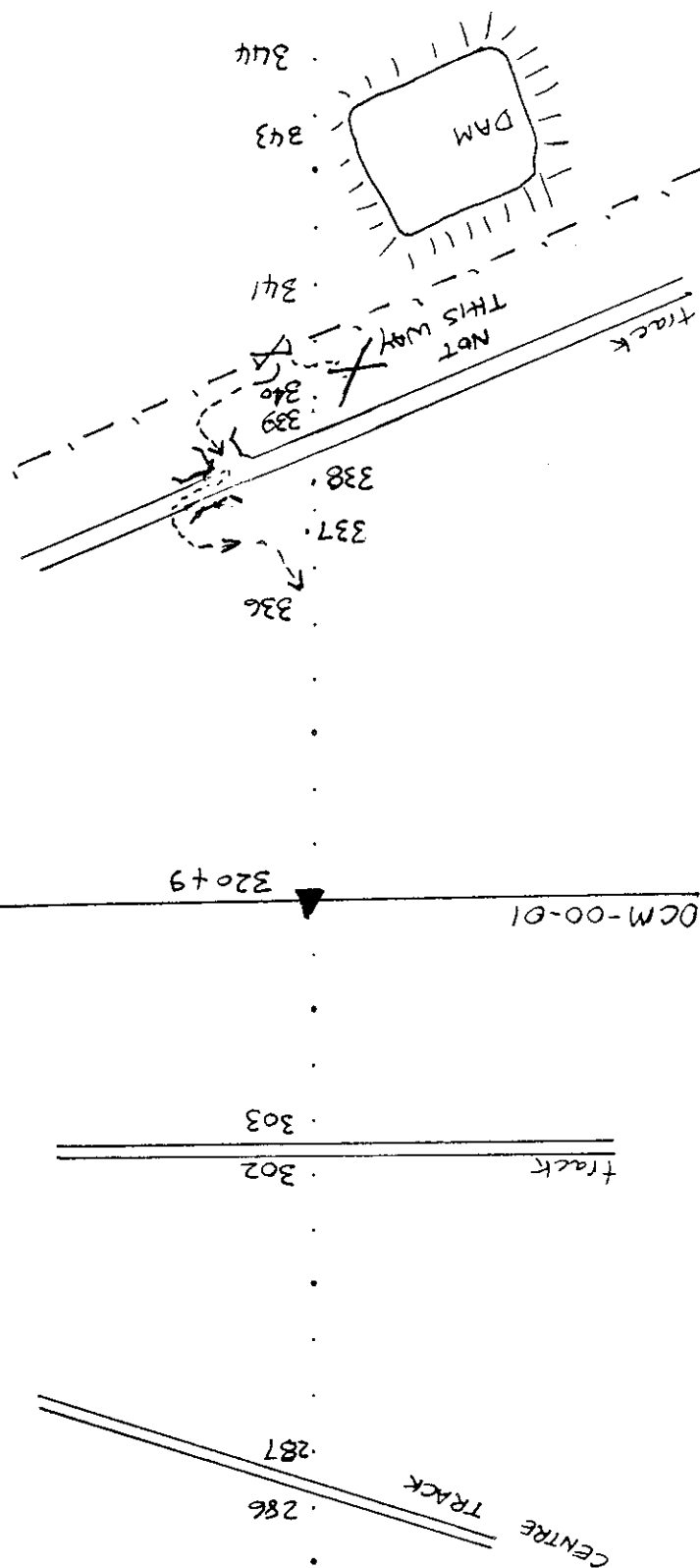
PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

March 1993

DSS-FE-07
REV 6.0

TRACE DIAGRAM

FROM STN 344 TO STN 200 SHOOTING DIRECTION: S - N BEARING:



BEES PREVALEANT ON THE
GROUND

D
ynamic
S
atellite
S
urveys



TRACE DIAGRAM

DSS-FF-07
REV 6.0

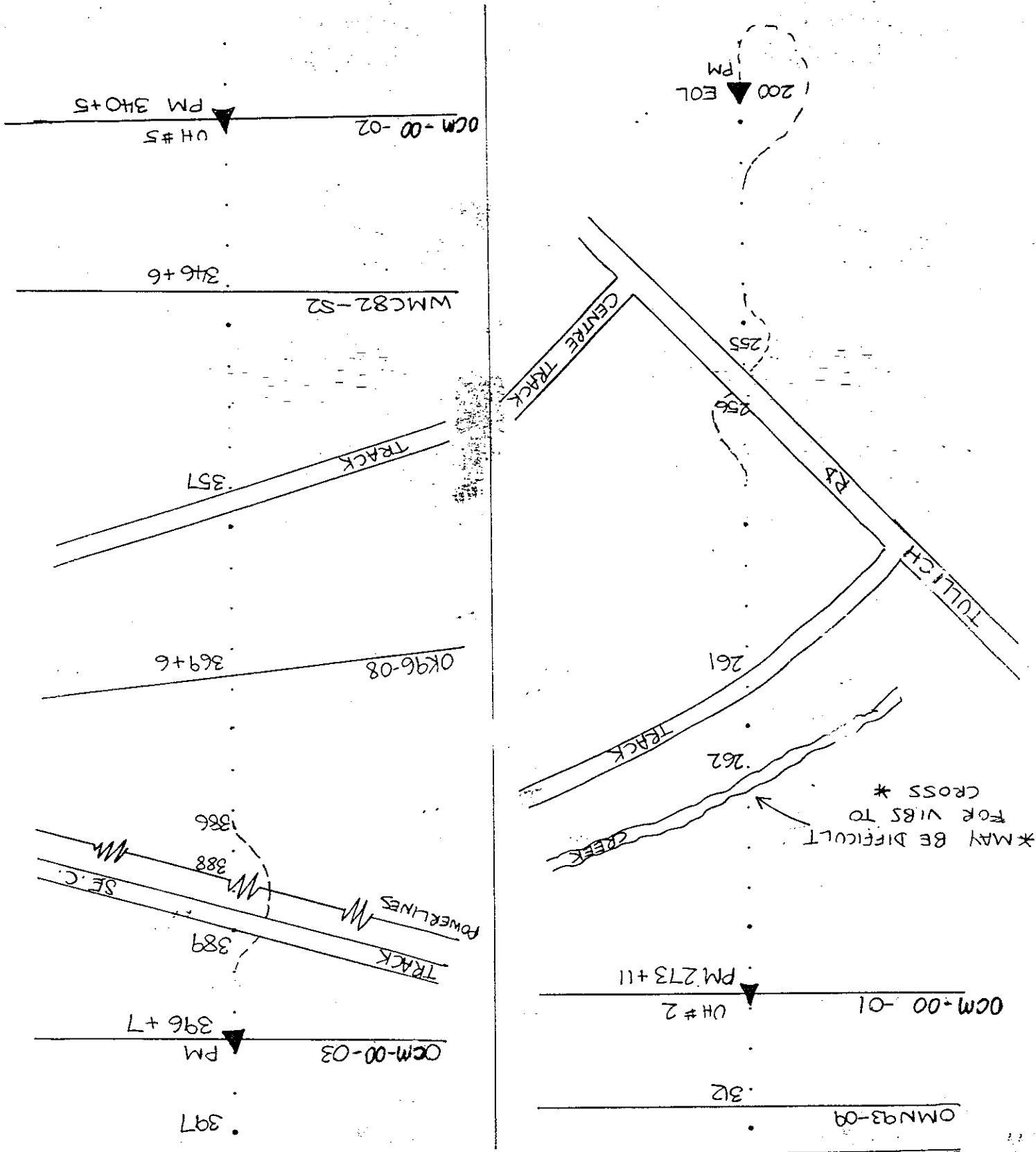
March 1998

CLIENT CECO/SANTOS

PROJECT/JOB # 00-19

PAGE 1 OF 3 LINE: OCM-00-07 AREA: CAMERONS STN INTERVAL: 20 m

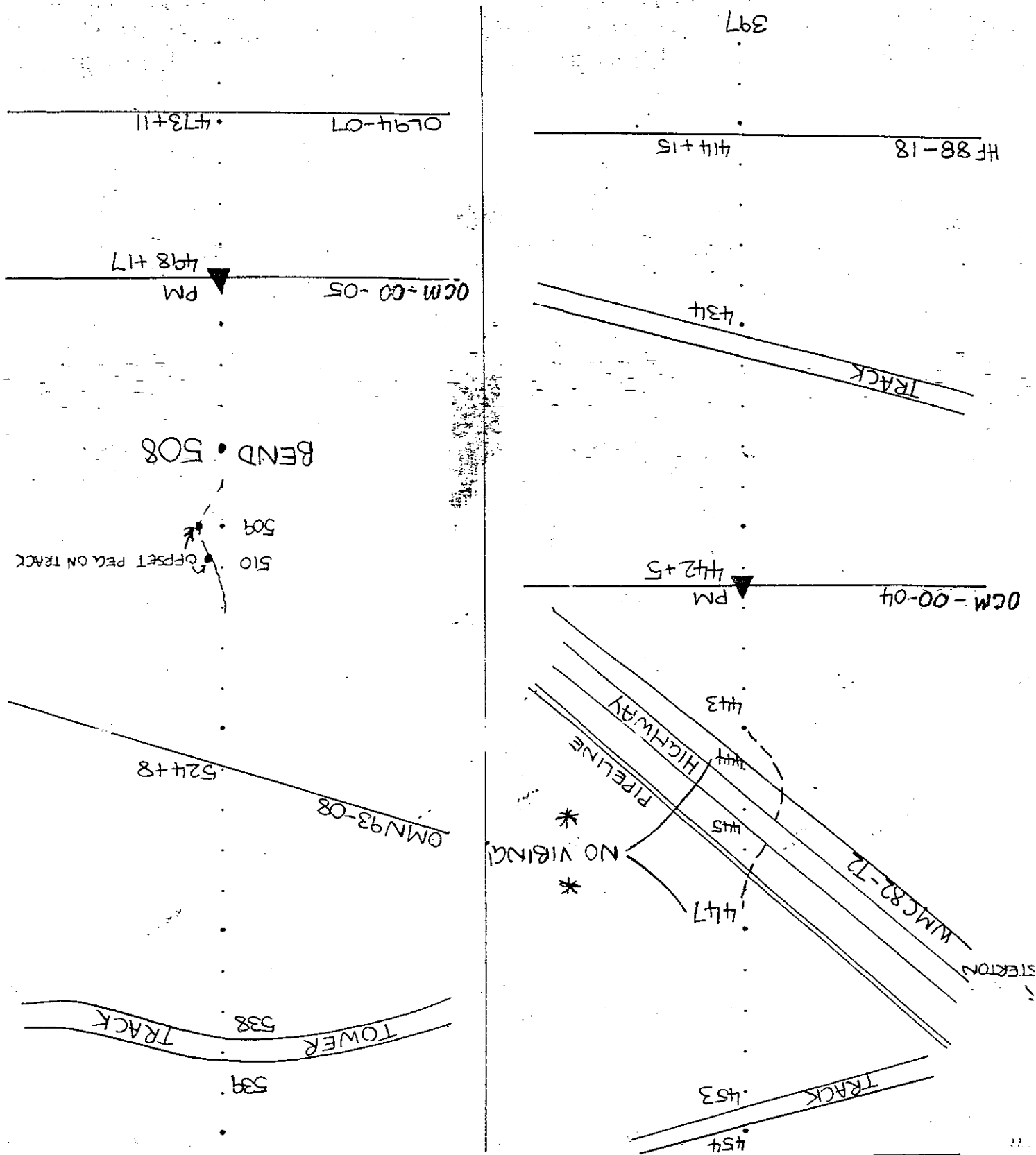
FROM STN 200 TO STN 397 SHOOTING DIRECTION: N-S BEARING: 0



DSS-FF-07
REV 6.0
March 1998

PAGE 2 OF 3 LINE: 00M-00-07 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 397 TO STN 539 SHOOTING DIRECTION: N-S BEARING: _____



TRACE DIAGRAM

PROJECT/JOB # 00-19

STN INTERVAL: 20 m

BEARING: _____

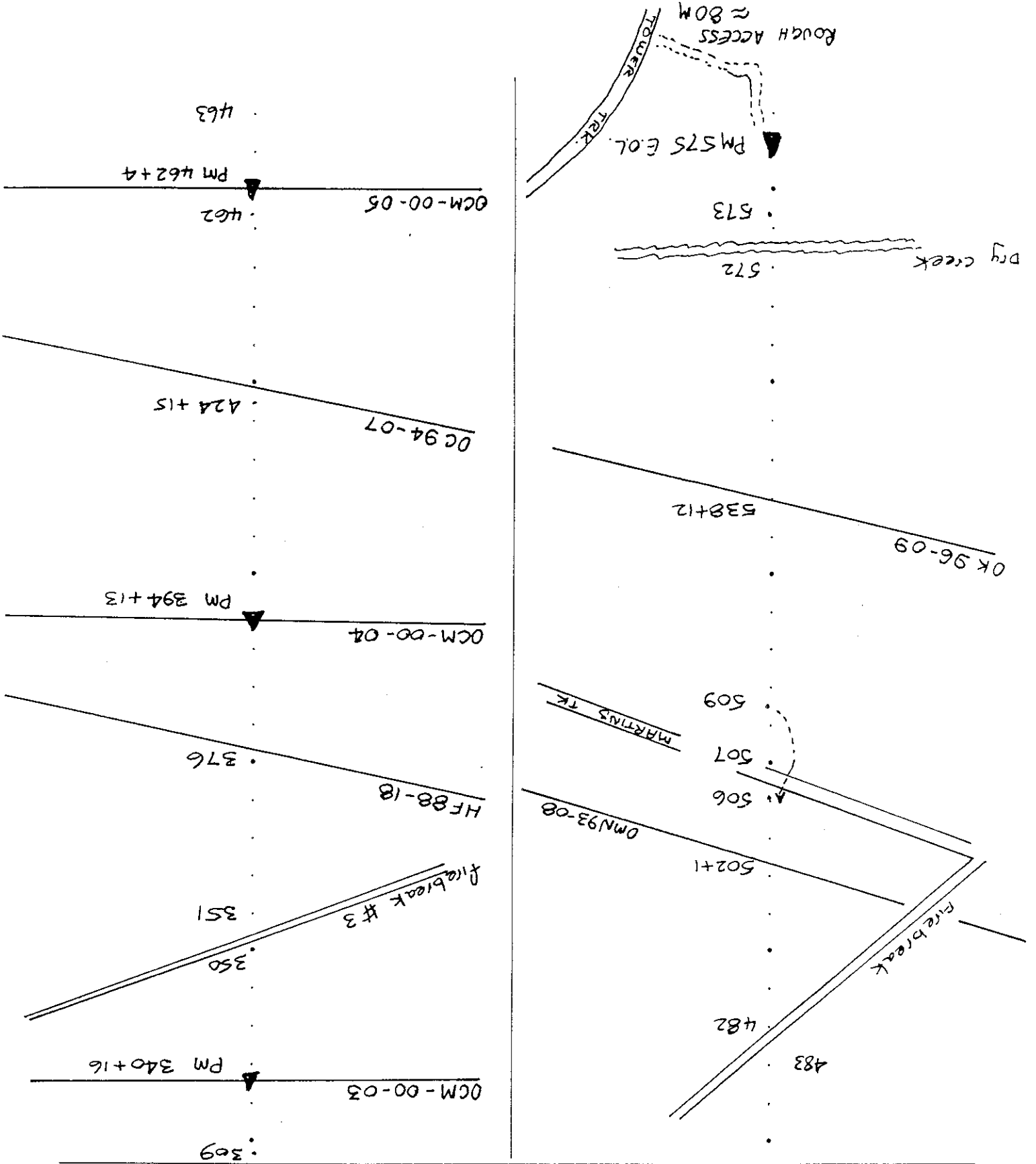


TRACE DIAGRAM

PROJECT/JOB # 00-19 CLIENT GECO / SANTOS

PAGE 1 OF 2 LINE: 00M-00-08 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 575 TO STN 309 SHOOTING DIRECTION: S → N BEARING: °



CLIENT GECCO / SANTOS

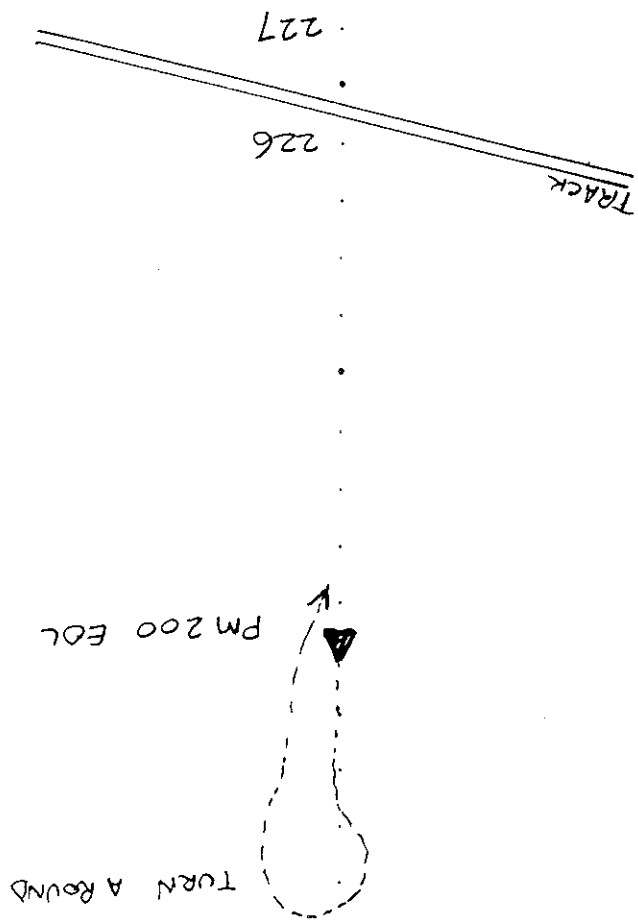
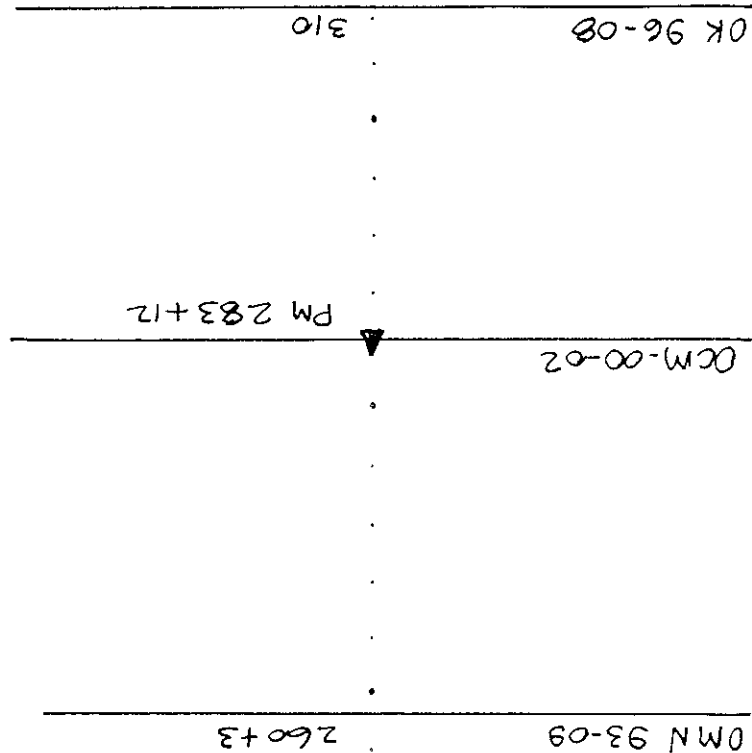
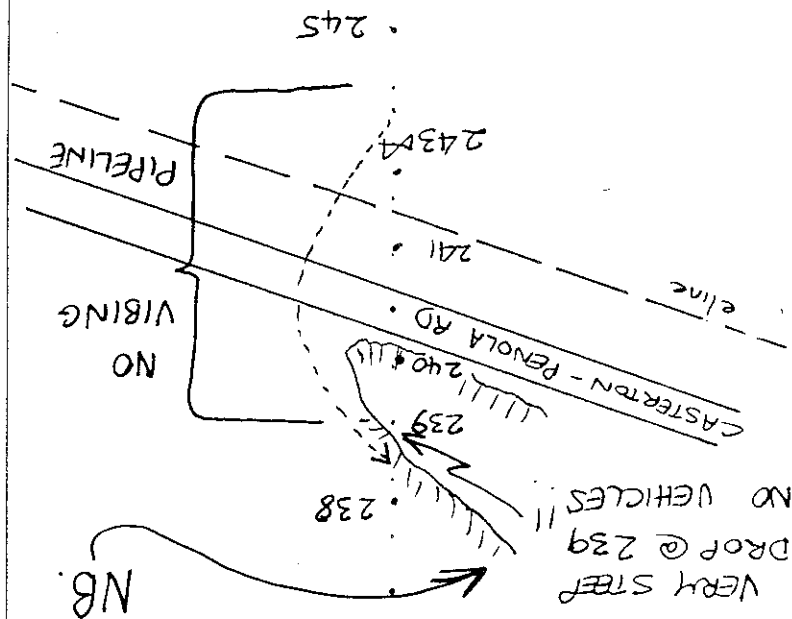
PROJECT/JOB # 00-19

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urveys

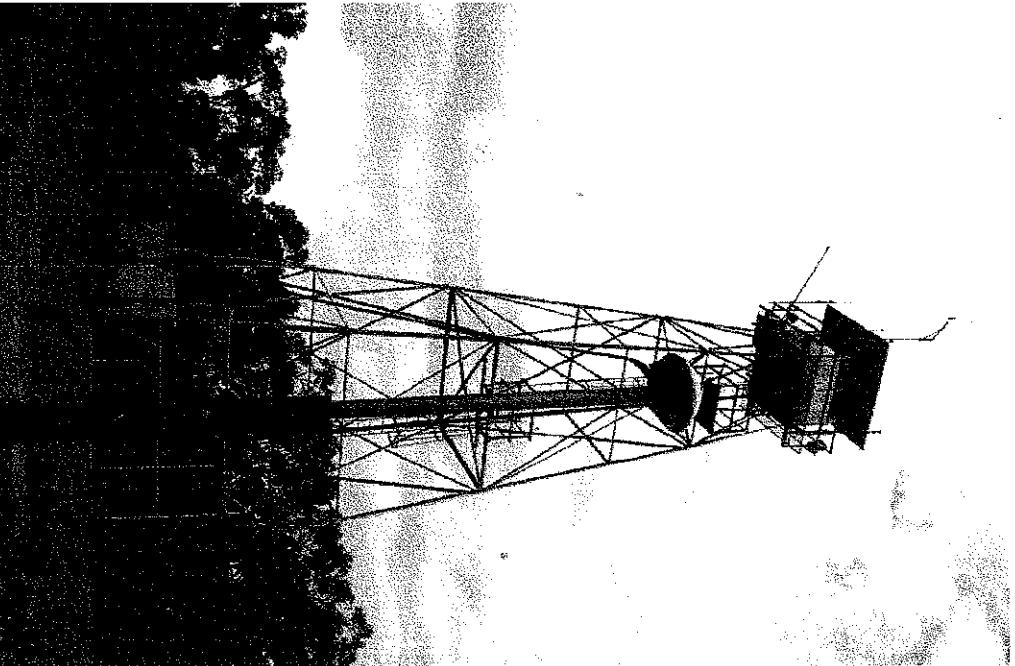
PAGE 2 OF 2 LINE: OCM-00-08 AREA: CAMERONS STN INTERVAL: 20 m

FROM STN 310 TO STN 200 EX SHOOTING DIRECTION: S → N BEARING

TRACE DIAGRAM



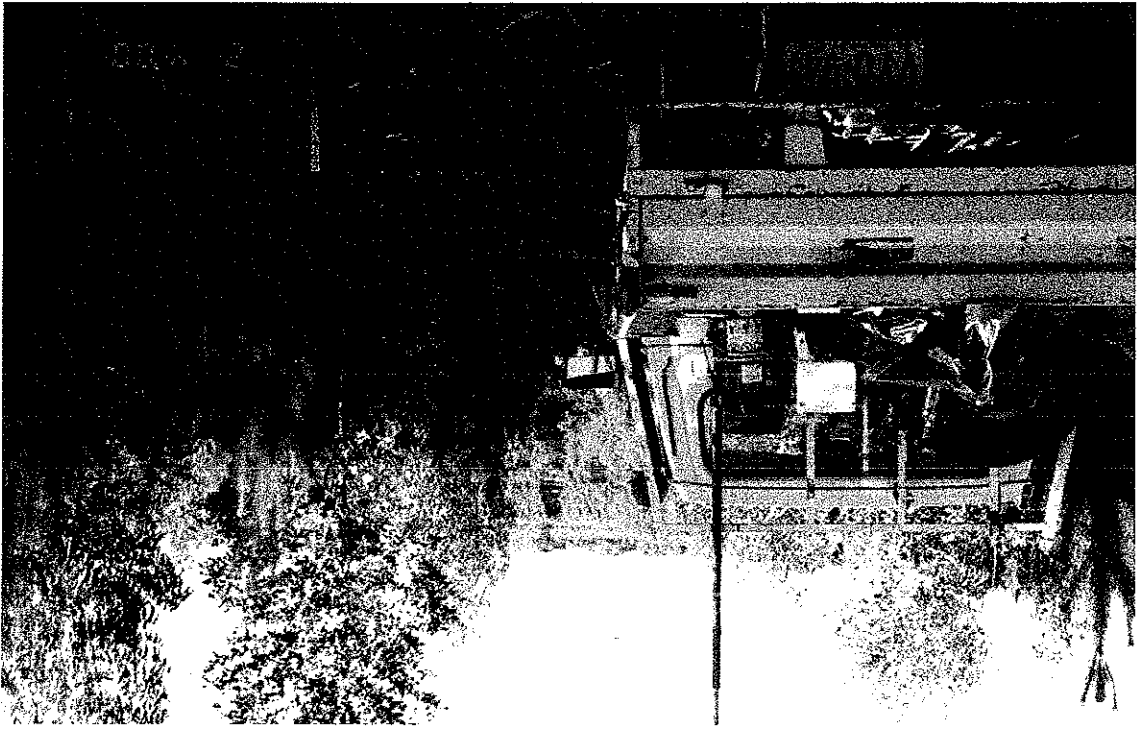
Photographs



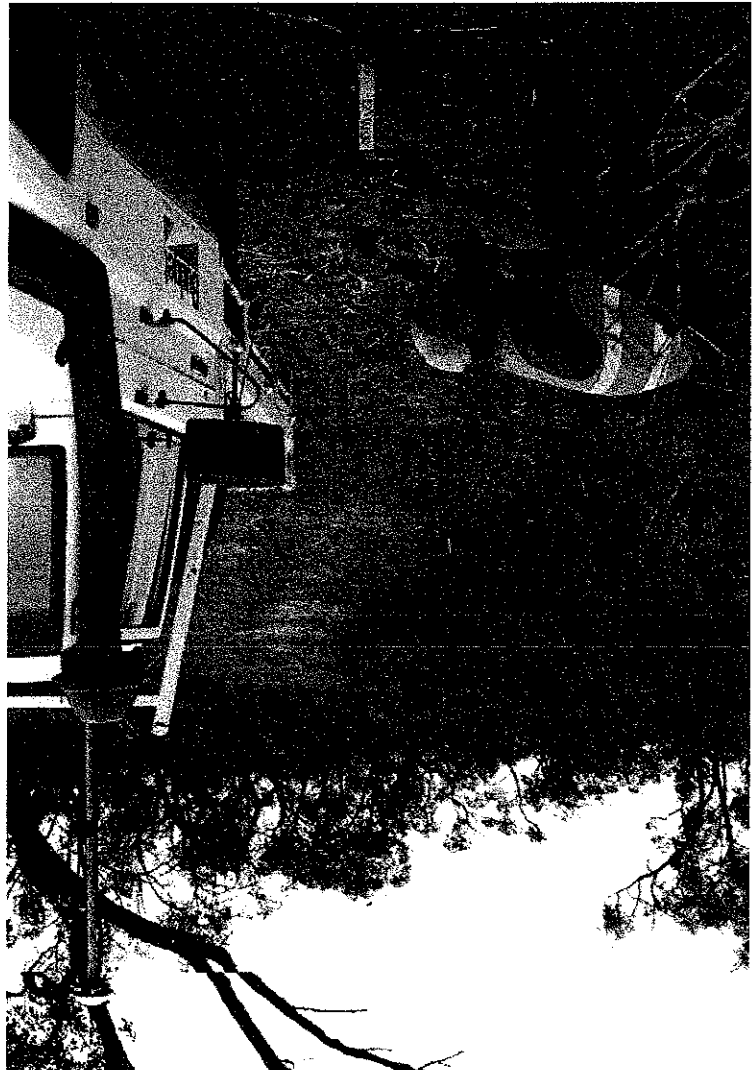
**GPS Base Station at "BASETOW"
next to Corndale Fire Tower.**



Line Pointing, GPS on backpack.

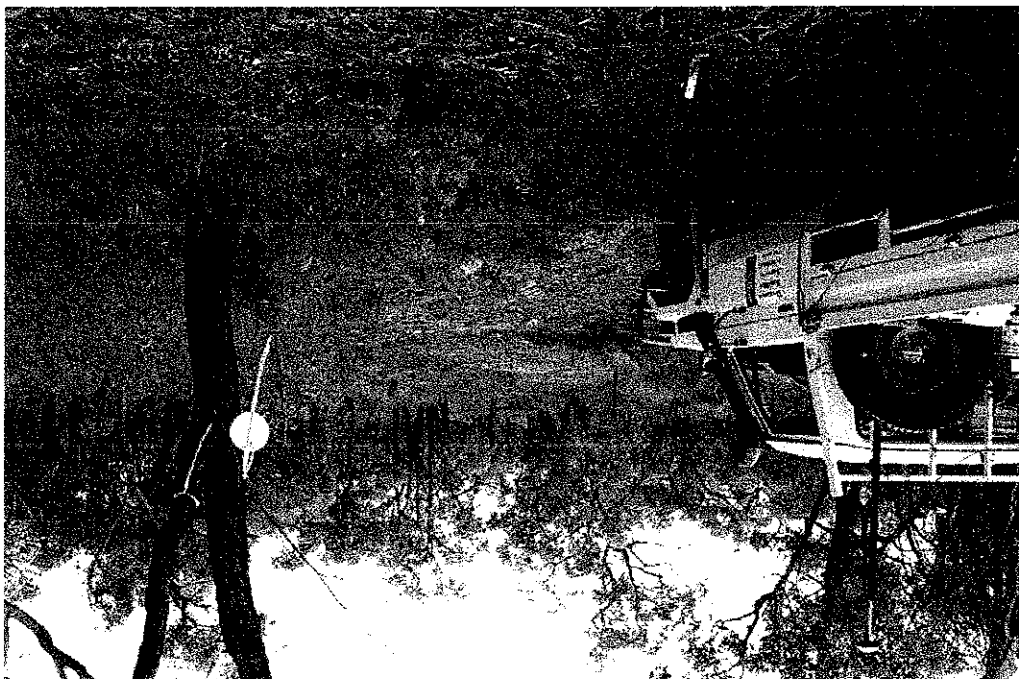


Chain and survey
through pines and
blue gums.
OCM00-06 596



Chain and Survey
through natural
forest area.

Intersection of OCM00-02 and OMC00-07 at uphole #5.



Tie to stn OL94-06 711+6.





00-19

GPS tie to OK96-09
646+13.



Chain and survey
through blue gum
plantation on line
OCM00-04.