DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
SOILS GEOLOGY SECTION

Report on

SOILS GEOLOGY RELATING TO EARTHWORKS

TORRENS GORGE ROAD DEVIATION

by

J. B. Firman
Acting Senior Geologist

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29th June, 1962.

D.M. 1575/61

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TORRENS GORGE ROAD DEVIATION

INTRODUCTION:

The construction of a reservoir in the Torrens Gorge has made necessary a four mile road deviation along the northern side of the gorge at a higher level than the present road.

This report deals with various geological features that will influence earthworks along the route of the proposed road. Although much of the report deals with sediments, soils and weathered rocks, that is with surficial or soils geology, some comment on hard rocks has been included for the sake of completeness.

The 19 base plans and long sections for the series of geological plans, G2-G20, were supplied at 40 ft. = 1 inch scale by the Highways and Local Government Department. Geology was added and the plans were then reduced to 80 ft. = 1 inch.

GENERAL GEOLOGY:

Indurated Rocks: Lithology, Stratigraphy and Structure

The hard rocks cropping out on the route of the road deviation are gneiss and schist of Archaean age, and a phyllite, sandstone and dolomite sequence of Proterozoic age.

The gneiss and schist occur between chainage 1278 feet and 21,650 feet. The phyllite, sandstone and dolomite sequence occurs between chainage 100 feet and 1278 feet.

Other information on the lithology and stratigraphy of this area is given in Webb, B.P. (1956) and Hiern, M.N. (1961) and in reports by other authors listed in the bibliography.

In the older gneiss and schist, earlier folds have been obscured by metamorphism. Foliation and jointing are now the dominant structures. Rocks of the younger sedimentary sequence generally trend 200-220 degrees magnetic and dip at 25-45 degrees south-east (Hiern, 1961).

The contact between the older gneiss and schist and the dolomite of the younger sequence is a steeply dipping normal fault, west block down, trending approximately north-south near chainage 1278 ft.

Landform

Within recent geological time, the indurated basement rocks have been uplifted and eroded. Evidence of at least two cycles of erosion is found in the upper gently undulating land surface about 1200 feet above sea-level, and in the steep valley walls that mark a period of rapid incision through the older land surface by the Torrens River.

Structural control of landform is present where the slope of valley walls is fitted to the steep dip of joints or foliation. Lithological control is most in evidence in the gorge section proper where downcutting through more resistant rocks has produced steep valley walls.

Recent Sediments, Soils and Weathered Rock

The Torrens valley is a simple youthful valley from which most weathered material has been transported. The sediments within the valley at the present are, therefore, thin and not particularly stable.

Recent sediments are alluvial silt and sand with irregular lenses of gravel along the course of the Torrens River, and valley wall deposits including rock-slide, rock-stream, talus and slump earth flow deposits. The talus deposits near the present road below chainage 9,500 and the alluvial deposits of a cut-off meander below chainage 14,000 were laid down at an earlier, and higher, stage of river development.

Soils along the deviation route are thin, poorly differentiated colluvial soils that are stony in many places. Variation in lithology is reflected in changes in soil colour and the size and composition of mineral particles. All the soils along the route are unstable and are subject to down-hill creep, particularly when wet. The yellow-brown and red-brown mottled or red-brown clay

soils are subject to seasonal shrink and swell.

The depth and intensity of weathering varies considerably along the route. It depends on the kind of rock exposed, the amount of foliation and jointing, and the rate of erosion at the particular locality. On gentler slopes, where erosion is slower than weathering, the rock may be weathered down to 8 feet below ground surface.

Schist tends to weather to the greatest depth, gneiss is generally more resistant and tends to form more prominent outcrops.

Veins of pegmatite and quartz occur as hard layers in the weathered rock.

Phyllite is generally highly weathered down to 3 feet or more below the surface and may be weathered down to 12 feet or more in the river bed. Dolomite appears to weather to soil rapidly so that a transitional zone of weathered rock is not present.

Boundaries between soil, weathered rock, and fresh rock are sharp in most places.

ENGINEERING GEOLOGY

Most of the comment in this part of the report refers to problems in cut and fill areas as revealed during geological mapping of the route.

In areas of abundant rock outcrop where extensive cutting is required, the natural slope of the valley wall adjusts by rock-fall toward the attitude of joints or foliation that nearly parallels the trend of the valley wall. In a similar way the angles of a batter slope will be affected by joints or foliation. The attitudes of joint and foliation planes are shown on the accompanying plans (G2 to G20). Additional information on these attitudes is given in Hiern, M.N. (1961).

A batter slope that is steeper than a joint or foliation plane trending in the same direction, will be unstable and heavy rock-fall can be expected.

Steep batter slopes can be achieved in hard rock where cuts trend across foliation or joint planes. The faces of these batter slopes will be blocky and irregular and should be checked for loose blocks.

Most of the thin soils are clay soils which will shrink and swell. In many places the clay when wet will provide an unstable layer below fill and should be removed. If removal of soil is not practicable, then the slope of the fill-soil interface could be reduced.

Because most of the valley wall sediments and soils are slowly moving downhill, the removal of small amounts of debris from the road below batter slopes will be a continuing problem.

Problems Along the Route

Notes on problems are set out in the following section against chainage and with reference to the map number. For convenience, the information has been organised according to the following natural sections along the route:

	Sections			
Section 1	0	-	1253	G2 and 3
Section 2	1253	-	6600	G3, 4, 5, 6, 7
Section 3	6600	-	9600	G8, 9
Section 4	9600	-	11200	G9, 10, 11
Section 5	11200	-	13640	G11, 12, 13
Section 6	13640	-	17290	G14, 15, 16
Section 7	17290	-	18720	G16, 17
Section 8	18720	-	20400	G18, 19
Section 9	20400	-	216500	G19, 20

These notes are intended to be read in conjunction with the maps. The positions of pits dug to reveal soil profiles are shown on the plans and the profiles are recorded in Appendix 1. Other soil profiles have been recorded from benches. These profiles are given with map co-ordinates in Appendix 2. The estimated minimum depth of rippable material - soil and weathered rocks - is shown on the long section.

SECTION 1: CHAINAGE 00-1253 (G2-G3)

G2: 00-420 — Lower Bridge Site:

Red clay from 00 to 100 is subject to shrink and swell. River bed material permeable and subject to compaction. Dolomite on valley wall unweathered and likely to have fairly high strength.

G2: 420-520 — Fill over dolomite:

The dolomite will provide a sound base for fill.

G2 and G3: 520-1288 — Fill over red-brown soil and dolomite:

The soil is subject to seasonal shrink and swell and to down-slope creep and could be removed.

Below the red-brown clay the dolomite is generally hard and not rippable, but thin patches of softer weathered dolomite may occur.

SECTION 2: CHAINAGE 1253-6600 (G3-G7)

G3-G4 and G5: 1288-4190 — Cut in solid outcrop:

Little or no rippable material is present. Jointing and foliation will tend to control batter slopes where dip on planar structures is in the same direction as the batter slope. Foliation and jointing produce natural blocks up to 6 feet in length. Sheet jointing near 2000 will influence blasting.

G3: near 1500 — Batter slope construction:

A batter slope steeper than 35 degrees may require rock bolts or other stabilizing methods.

G4: 2100-2450 — Batter slope construction:

The foliation is sub-parallel to the batter slope. Unstable blocks may occur which will require rock bolting or some other stabilizing method.

G4: 2600-3100 — Batter slope construction:

Proposed batter slope may not be achieved because on the joints dipping 45 degrees south.

G6: 4800-4950 — Hill-side fill:
Fill could be bedded on solid rock.

G6: vicinity 5400 — Crib retaining wall:
This structure could be seated below soil and floaters on solid rock. Trend of foliation is about at right angles to road direction. Moderately steep batter slopes can be constructed.

G6: 5515-5570 — Crib retaining wall:
This structure should be seated on solid rock. Large blocks up to 6 feet in length in this rock-stream may not be stable when subjected to severe vibration.

G7: 660-1015 (Lower Road) — Fill and crib retaining wall (vicinity 900):
The fill and the retaining wall on the down slope side of the road should be bedded on solid rock.

SECTION 3: CHAINAGE 6600-9600 (G8-G9)

G8: 7300-7700 — Fill:
The fill will butt against solid rock down-slope. Soil cover could be removed.

G8: 7300-7400 — Loose blocks:
The hill slope should be checked for large loose blocks of talus which may move down-slope on to the road or parking area.

G8: 8000-8400 — Valley side fill:
Soil cover and some of the more highly weathered schists should be removed so as to provide a suitable surface on which to base the fill. The soil below fill will be sandy clay to 4 feet, over weathered schist from 4 feet to 6 feet and be rippable throughout, but hard rock occurs within 3 feet of the surface in some places.

G9: 8750-9000 Fill:

Soil and talus should be removed by excavating to solid rock down-slope from the road, so that the fill may butt into solid rock.

G9: 8700-8800 Movement of talus and soil:

Talus and soil will be unstable when saturated and subjected to severe vibration.

Earth flow will butt the talus and soil against the fill near chainage 8750.

Deviation of run-off and soakage water from the talus would make it more stable. The talus and soil should be removed from below the road and fill area.

G9: 9200-9400 Fill:

Thin clayey soil should be removed below base of fill.

SECTION 4: CHAINAGE 9600-11200 (G9-G11)

G9 and G10: 9500-9800 Cut:

Soil profile in pit 3 suggests that the depth of strong weathering is not great and only a few feet of surface material is likely to be rippable.

G10: 9800-10180 Fill:

Deep pockets of clay may occur in the area to be filled. A good part of the fill area should be cleared down to rock.

G10: 10080-10120 Slump:

A zone of unstable slump and earth flow upslope from the road is shown on Plan G10. The lower end of this zone could be cleared out so that any slumping will butt against solid rock at about the 1000 contour.

If drains could be constructed to draw run-off and soakage waters from the zone at higher

G10: 10080-10120 (contd.) elevation, this would decrease the tendency for further slumping.

G10: 10200-10500 Cut:
The bulk of the excavation will be through solid rock not rippable to any appreciable depth.

G10 and G11: 10470-11200 Fill:
The rock outcrop between chainage 10470 and 10650, and from about 10800 to 10930 should provide a good surface upon which to seat fill. Where soil cover is shown on plan G10 to occur in the fill area down-slope from the road, some removal of soil material is suggested. The periphery of the fill should butt against solid outcrop. Culvert No. 23 should not discharge onto unprotected fill.

SECTION 5: CHAINAGE 11200-13640 (G11-G13)

G11 and G12: 11300-11670 Valley side fill:
Soil and boulders should be removed from the fill area so that the fill can be seated on solid rock.

G12-G13: 11670-12400 Shallow Cut:
The bulk of the material is expected to be solid rock and not rippable deeper than a few feet from the surface.

G12-G13: 12400-12800 Fill:
The gully bottom of the fill should be seated on solid rock. On the hill slopes where the depth to bedrock is unknown, excavation could be carried out so that the fill may be seated on solid rock or on a reduced slope.

G13: 12800-13360 Fill:

The depth of soil cover is very variable and some deeply weathered zones occur as shown on Plan G13 near chainage 13050. The soil-bed rock interface is highly irregular near 13250. Fill could be seated on solid rock or a benched surface.

G13: 13360-13640 Cut:

The cut will be through rock with a thin sandy soil cover. The rock is not expected to be rippable below about four feet.

SECTION 6: CHAINAGE 13640-17290 (G14-G16)

G14: 13980-14340 Cut:

The cut will be through rock with a thin soil cover. The rock is not expected to be rippable below about 5 feet.

G14: 14340-14670 Fill:

The depth of soil and weathered rock is unknown but soil accumulation or highly weathered rock may extend down to 20 feet in places. The gully soil may be unstable when saturated and excavation of the fill area to bedrock or to form benches is suggested.

G14: 14670-14940 Cut:

The rock should be rippable to about 5 feet.

G14-15: 14940-15730 Fill:

The fill area has a shallow soil over weathered bedrock which is rippable to perhaps 5 feet. The fill should be seated on solid rock where possible, particularly in gully bottoms. On hill slopes the excavation should be taken down to solid rock or to benches with a reduced slope. Benches excavated in the gully down slope from about 15540 show about 2 feet of

G14-15: 14940-15730 (contd.) soil over weathered rock, which is rippable to 4 feet or more below the surface. (Profiles are given in appendix 2 with reference to plan G 15 and co-ordinates).

G15: 15730-16012 Cut:

The cut will be through partly weathered rock with a thin soil cover. Material may be rippable down to about 5-10 feet below ground surface.

G15: 16012-16300 Fill:

Variable thickness of soil extends down to 4 feet in places and overlies weathered rippable gneiss. A good part of the soil should be removed and the fill seated on solid rock.

G15: 16300-16457 Cut:

The cut will be through solid rock with thin soil cover in places.

G15-16: 16457-16700 Fill:

The down-slope fill area has at least 2-3 feet of soil over weathered rippable rock extending down at least 8 feet below the surface in places.

G16: 16950-17290 Fill:

The fill area contains some rock outcrop, but there is generally a thin soil cover. The weathered rock below the soil cover may be rippable in part down to about 4 feet.

SECTION 7: CHAINAGE 17290-18720 (G16 and G17)

G16: 17290-17650 Cut:

The cut is expected to be mostly through solid rock with only thin soil and very little rippable material.

G16, 17: 17650-18400 Cut:
After cutting through rock with thin soil and some talus, the road sub-surface should be checked for unstable soil and talus.

G17: 18400-18720 Cut:
The cut is expected to be through solid rock with some thin soil cover and little rippable material.

SECTION 8: CHAINAGE 18720-20400 (G18-G19)

G17, 18: 18720-19230 Fill:
Thin soil cover should be removed and the fill seated on solid bedrock.

G18: 19230-19500 Cut:
It may be possible to remove material by ripping down to about 5 feet.

G18: 19500-19900 Shallow cut and fill:
Shallow cuttings may be too hard for ripping.

G18, 19: 19900-20400 Cut:
The cut is expected to be mainly through solid rock with thin soil cover. In general it is probably not rippable below about 5 feet.

SECTION 9: CHAINAGE 20400-21650 (G19, 20)

G19: 20400-20470 Cut and fill near abutment:
The cutting will be through solid rock with little soil cover. The western abutment will be partly in rock outcrop and partly in thin soil with a gravelly base over solid rock.

20470-20710 Bridge and eastern abutment
The structure will be on alluvial beds which include fine sands with boulders, over bed-rock. The thickness of the alluvial material may exceed 20 feet in places.

G19: 20710-20800 (contd.) Fill:
The fill will be over fine sandy clay with some pebbles and boulders.

20800-21200 Cut:
The cut will be mostly through solid rock with thin soil cover. The rock is expected to be rippable to only a few feet in places.

G19-G20: 21200-21400 Cut:
The cut will be through solid rock with very little soil or rippable material.

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APPENDIX I

SOIL PROFILES IN TEST PITS

Pit 1: Chainage 700

0'0"	- 1'2"	Brownish-grey loam with abundant small roots and a few scattered angular pebbles.
1'2"	- 4'4" / 4'10"	Reddish brown sandy clay with numerous small roots and a few scattered angular quartz pebbles. Granular structure and an irregular coarse polyhedral structure. Dull to moderate sheen on unit faces. Light irregular cracking, the vertical component being preferred. Crumbly toward the top. Stiff toward the bottom.
4'4"	- 4'10"	Reddish and greyish brown sandy clay with angular quartz pebbles. Fine polyhedral to coarse nutty structure. Stiff. Irregular light cracking. This horizon is not continuous.
4'10+"	- 5'5"	Red-brown very sandy clay. Irregular vague polyhedral structure. Moderate sheen on unit faces. Light irregular cracking. Very compact. This horizon is not continuous.
5'5"	- 5'11"	Yellowish and reddish brown slightly clayey sand to sandstone. Cemented in part but generally friable. This horizon is not continuous.
5'11"		Near white sandy hard crystalline dolomite showing cross bedding on weathered surface. The surface of the dolomite varies from four feet to six feet from the surface.

Pit 2: Chainage 25 ft. East from 1253

0'0"	- 0'6"	Grey-brown loam with scattered angular pebbles and boulders of dolomite, sandstone and quartzite. Friable. Damp.
0'6"	- 2'4"	Brown silty sandy clay with scattered angular pebbles and boulders. Friable in part but becoming reddish brown and more clayey with depth.
2'4"	- 3'10"	Brownish-grey loam with scattered angular pebbles and boulders. Very compact but friable with difficulty.
3'10"	- 6'1"	Brown and slightly reddish-brown sandy clay with numerous to abundant angular pebbles and boulders of schist, quartzite etc.
6'1"	- 8'2"	Weathered bedrock. Vari-coloured, decomposed chlorite mica and quartz schist. Generally clayey with some grey clay pockets. Pocket Penetrometer tests suggest compressive strength of about $2\frac{1}{2}$ tons per square foot but values as low as $1\frac{1}{2}$ tons per square foot were obtained in the clay pockets.

Schist and gneiss with quartz filled fractures occurs on the eastern side of the trench at both the up-slope and down-slope ends.

Weathered schist bedrock occurs at variable depths 4'0" to 6'1" below the soil surface. The dip of foliation varies from 55° to 80° to the west with a strike of N10°E magnetic. Drag folding exposed in the trench suggests a near vertical fault zone, the west block down.

Pit 3: Chainage 9650

0'0"	- 0'8"	Light brownish grey silty loam. Friable.
0'8"	- 1'6"	Light brown silt with numerous angular fragments of schist. Friable.
1'6"	- 6' +	Yellowish and greenish grey-brown schist. Weathered but not highly decomposed. Foliation near vertical. The upper surface is not well defined and small pockets of clayey silt extend down into the schist.

Pit 4: Chainage 10700

0'0"	- 0'6"	Greyish brown silty loam with numerous angular pebbles, cobbles and boulders. Numerous small roots.
0'6"	- 1'4"	Light brown sandy, clayey silt with very abundant angular rock fragments. The silt is friable.
1'4"	- 7' +	Chlorite schist. Well jointed with interstitial sandy clayey silt becoming less abundant with depth. The rock can be easily broken with a light hammer.

Pit 5: Chainage 11600

0'0"	- 0'8"	Brown sandy and silty loam with scattered angular pebbles of sandstone quartz, etc. Friable.
0'8"	- 2'2" / 3'0"	Light brown, very stoney, sandy clayey silt. Very abundant angular pebbles, cobbles and boulders of sandstone, gneiss etc. Friable.
2'2" / 3'0"	- 5'3"	Chloritic schist and quartz-felspar-gneiss. Pockets of vari-coloured, stiff clays occur as decomposition products of the bedrock and extend irregularly to a maximum depth of 4'2". Rippable to bottom except for hard bands.

Pit 6: Chainage 12964

0'0" - 1'0"	Brownish grey loam with numerous angular pebbles and cobbles of sandstone, quartzite etc. becoming abundant at the base. Friable in part.
2'9" - 8'6" +	Vari-coloured (predominantly grey) stiff clay and very micaceous clay with some sand and grit occurring as decomposition products of in situ schistose bedrock. Foliation dips 45° in the direction 80° west. The rock is less decomposed near the base at about 7'6" but is still easily broken with a light hammer. The clay is stiff and damp. It has an irregular polyhedral structure developed in part with a moderate sheen on the unit faces. Light irregular cracking.

Pit 7: Chainage 13600

0'0" - 1'0"	Brown loam with numerous scattered angular pebbles and cobbles. Friable.
1'0" - 2'5"	Red-brown clay with numerous angular pebbles and cobbles near the top and fragments of in situ bedrock near the base. Patches of more resistant bedrock occur within 2 ft. from the surface.
2'5" - 7'6"	Bedrock comprising fine to medium grained equi-granular felspar, mica (chlorite), quartz metasediments, gneissic in part. Some thin quartz veining occurs. Some red brown clay extends down along joints as far as 4 feet from the surface in places. The rock is generally weathered but is tough and not brittle. It becomes harder below about 4'6"

Pit 8: Chainage 14778

0'0" - 1'4" / 1'10"	Brownish grey loam with numerous scattered angular pebble to cobble sized bedrock fragments. Friable.
1'4" / 1'10" - 4'0"	Light brown, fine to medium grained quartz-felspar gneiss. Blocky. Weathered and easily broken with light hammer.

Pit 9: Chainage 15200

0'0" - 2'0"	Brownish grey silty loam with scattered angular pebble sized stone fragments. Friable.
2'0" - 3'3" approx.	Light brown slightly clayey, sandy silt with scattered angular pebble and cobble sized bedrock fragments. Friable to compact.
3'3" - 11'6"	Brown and greenish brown decomposed mica schist. Generally friable but with abundant hard, less weathered fragments. Layers of hard quartz-felspar gneiss are present. Becomes generally hard and less weathered below about 5 ft.

Pit 10: Chainage 15826

0'0" - 1'4"	Brownish grey very stoney loam. Very abundant angular pebbles, cobbles and boulders of schist, gneiss, etc. Friable.
1'4" - 1'6"	Light brown weathered quartz - mica schist and gneiss. Highly cleaved. Interstitial red-brown clay occurs in some joints. The weathered rock is friable in part down to 9'6".

A portion of the pit contains a large pocket of vari-coloured clay (red-brown, yellow-brown etc.) extending from 1'10" to 6'0". It is moist and soft in part. Pocket Penetrometer tests show values ranging from $1\frac{1}{2}$ to 3 tons per square foot. The clay has an irregular polyhedral structure with a granular sub-structure. Moderate sheen on unit faces. There is irregular surface cracking.

APPENDIX 2

SOIL PROFILES IN BENCHES

Plan G8: Coords. 178022 YE, 692495 YN:

0'0"	-	0'10"	Light brown sandy clay-loam.
0'10"	-	1'10"	Light yellow-brown sandy clay.
1'10"	-	4'4"	Light brown sandy clay with dark yellow mottles.
4'4"	-	6'3"	Weathered schist. Rippable throughout within a distance of 20 feet from this coordinate.

Plan G9: Coords. 178270 YE, 692505 YN:

0'0"	-	1'6"	Brown or yellow-brown sandy and gravelly clay loam.
1'6"	-	3'9"	Yellow-brown gravelly and sandy clay (weathered gneiss more or less in situ). Soft.
3'9"	-	6'5"	Weathered gneiss. Firmer. Still rippable but with difficulty.

Plan G11: Coords. 178580YE, 692910 YN:

0'0"	-	1'6"	Dark brown sandy clay loam.
1'6"	-	4'0"	Light brown sandy clay with scattered pebbles and boulders of gneiss. Plastic
4'0"	-	8'0"	Weathered gneiss with red-brown clay in joints. Pockets of red-brown clay extend down to 8 feet in places.

Weathered gneiss boulders (more or less in situ) extend in places to within 1 ft. 6 ins. of the surface. The weathered gneiss is rippable down to 6ft. 6 ins. and deeper where clay pockets occur.

Plan G11: Coords. 178612 YE, 692908 YN:

0'0"	-	1'0"	Brown loam with numerous angular pebbles and scattered boulders. Friable.
1'0"	-	2'0") 3'0")	Angular pebble to boulder sized fragments of gneiss in a light brown gritty clay matrix.
2'0") 3'0")	-	3'6"	The above merges down into weathered gneiss which is rippable in part.

Plan G15: Coords. 179234 YE, 693857 YN:

0'0"	-	0'6"	Grey-brown sandy clay loam.
0'6"	-	1'5"	Fine angular gravel with clay matrix.
1'5"	-	4'7"	Weathered gneiss. All rippable.

The weathered gneiss occurs below 6 ins. in some places (other horizons being absent.)

Plan G 15: Coords 179233 YE, 693872 YN:

0'0"	-	0'6"	Light grey sandy clay loam.
0'6"	-	2'0"	Light yellow sandy clay.
2'0"	-	4'0"	Coarse grained weathered gneiss. Rippable with difficulty.

Plan G 15: Coords 179207 YE, 694077 YN:

0'0"	-	1'1"	Light brown sandy clay loam.
1'1"	-	2'10"	Light yellow-brown sandy clay, stoney in part. Granular structure.
2'10"	-	4'4"	Light red-brown sandy clay.
4'4"	-	5'4"	Yellow and olive clayey sand (weathered gneiss).

All of the material in the pit is rippable, but an unweathered bar of gneiss (not rippable) occurs nearby.

Plan G16: Coords 179230 YE, 694105 YN:

0'0"	-	1'3"	Light brown sandy clay loam with abundant gravel.
1'3"	-	2'0"	Light red-brown sandy clay with abundant angular gravel.
2'0"	-	4'10"	Weathered gneiss. Rippable throughout.

Plan G 16: Coords 179240 YE, 694163 YN:

0'0"	-	1'6"	Dark greyish brown sandy clay loam with scattered pebbles and angular gravel.
1'6"	-	3'3"	Brown and yellow-brown sandy clay with scattered pebbles and boulders of gneiss.
3'3"	-	8'4"	Weathered bedrock. Soft and rippable to at least 8 ft. 4 ins.

Plan G16: Coords 179355 YE, 694260 YN:

The soil profile in the excavated area is variable but is represented by the following:

0'0"	-	0'9"	Grey-brown fine sandy clay.
0'9"	-	1'3"	As above with angular gneiss gravel.
1'3"	-	1'10"	Brown to red-brown fine sandy clay with scattered angular pebbles.
1'10"	-	4'0"	Weathered gneiss with harder veins of quartz and zones of mineralization.
4'0" plus			Harder than above.

Plan G 18: Coords 180045 YE, 694430 YN: (Chainage 19,300)

0'0"	- 1'5"	Brown clayey loam with numerous angular pebbles of pegmatite becoming abundant toward the base.
1'5"	- 3'3"	Red-brown sandy clay with abundant pebble and boulder sized fragments of gneiss and pegmatite merging downward into in situ weathered gneiss.
3'3"	- 6'0"	Weathered gneiss with pegmatitic veins. Rippable except for hard bands.

SOILS GEOLOGY RELATING TO EARTHWORKS

REFERENCE

GEOLOGICAL BOUNDARY

OUTCROP

SOIL

TALUS OR FLOATERS IN SOIL COVERED AREA

JOINTS WITH SYMBOL SHOWING TREND AND DIRECTION OF DIP

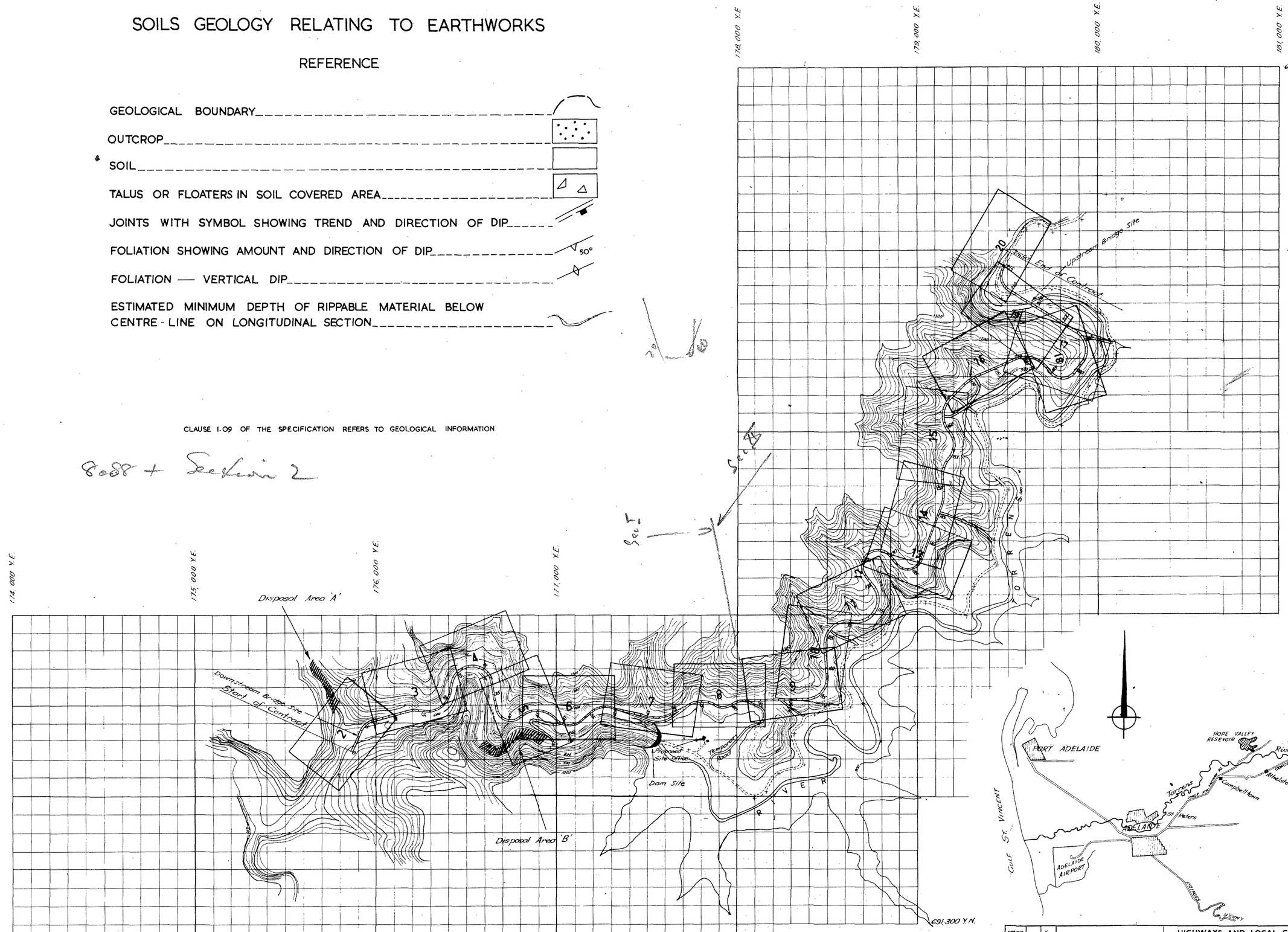
FOLIATION SHOWING AMOUNT AND DIRECTION OF DIP 50°

FOLIATION — VERTICAL DIP

ESTIMATED MINIMUM DEPTH OF RIPPABLE MATERIAL BELOW CENTRE-LINE ON LONGITUDINAL SECTION

CLAUSE 1.09 OF THE SPECIFICATION REFERS TO GEOLOGICAL INFORMATION

8088 + Section 2



HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing.

LOCALITY PLAN

Scale: 2 miles to 1 inch

GEOLOGY BY J.B.FIRMAN AND R.I.CHUGG - S.A. DEPARTMENT OF MINES.

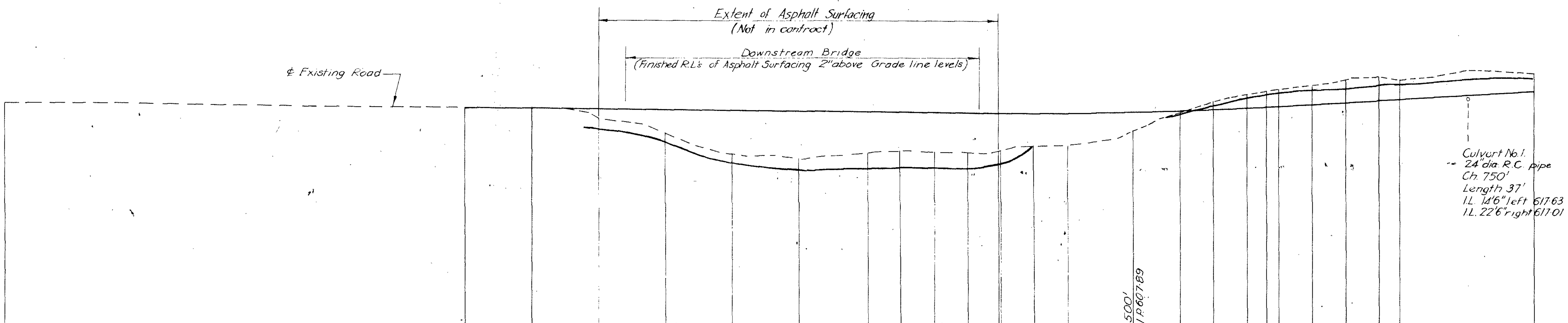
DESIGN		Approved:	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.
DRAWN & TRACED	B.P.	Commissioner of Highways	TORRENS GORGE M.R. Nº 272 DEVIATION AT KANGAROO CREEK DAM INDEX PLAN
EXAM'D	I.F.	Date 29/5/62	
PASSED		Chief Engineer	Consulting Engineers: Len T. Fraser & Associates, 3 Wellington Street, Kew. E.4. Victoria
ENGIN'G POL DESIGN EXAMINED		Date 29/5/62	Job No. 254 1:5:62
DISTRICT ENGINEERS			
SCALE	10 Chs to 1 in		

H.L.G. DRGS. 271/60

R.A.C. SHS. ADELAIDE 1M 758923 795948

G1

FILE No. 2940

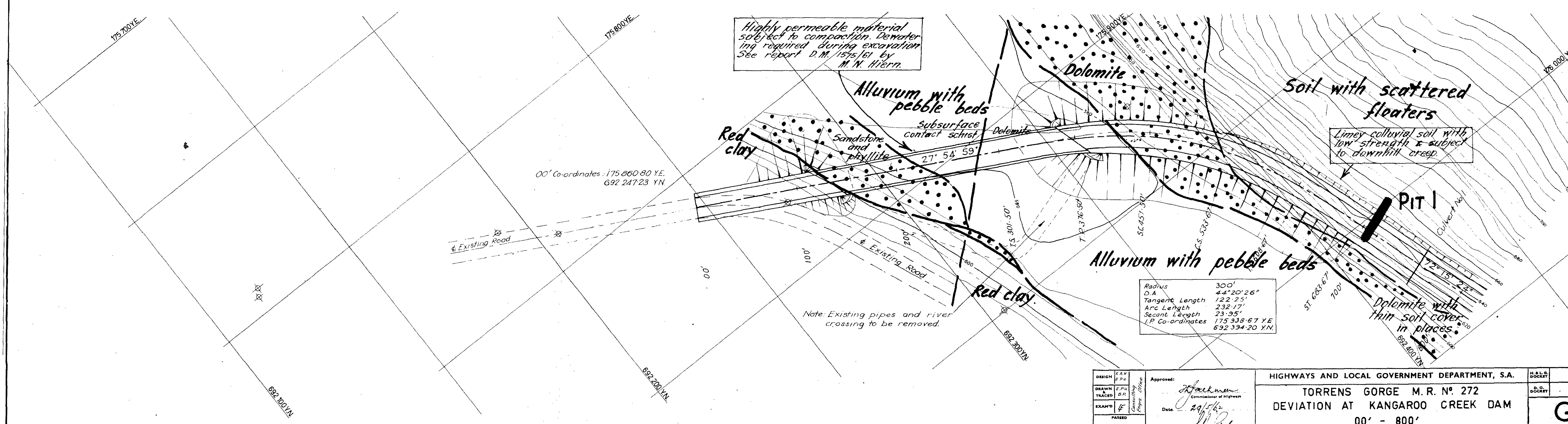


Datum R.L. 450.00

	00'	50'	100'	150'	200'	250'	301.50'	326.50'	351.50'	376.50'	400'	401.50'	426.50'	451.50'	500'	533.67'	558.67'	583.67'	600'	608.67'	633.67'	658.67'	683.67'	700'	800'
EXISTING R.L. AT CENTRELINE	614.60		606		579		580							586		609	617	622		627	628		635		638
GRADIENT OF CENTRELINE	◐ Grade −1.34 %										◐ 200' V.C. Sag								◐ Grade +5.51 %						
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	−3¼"	−3¼"	−3¼"							+5¼"		+10¾"	+1'1⅞"	+1'3"	+1'3"	+1'3"	+1'1⅞"	+10¾"		+5¼"	−⅛"	−3⅜"	−3¼"	−3¼"	−3¼"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE	−3¼"	−3¼"	−3¼"							−9¾"		−1'0¾"	−1'2⅜"	−1'3"	−1'3"	−1'3"	−1'2⅜"	−1'0¾"		−9¾"	−6⅞"	−5"	−3¼"	−3¼"	−3¼"
RELATION OF CENTRELINE TO PEG	+4"																			−9'7"				−16'2¾"	
R.L. OF CENTRELINE	614.60	613.93	613.26 / 613.26 (Asph.)	612.59 / 612.76 (Asph.)	611.92 / 612.09 (Asph.)	611.25 / 611.42 (Asph.)	610.55 / 610.72 (Asph.)		609.88 / 610.06 (Asph.)		(Asph.) 609.24 / 609.23	609.22	609.01	609.00	609.60	610.50	611.41	612.55	613.40	613.88	615.26	616.63	618.01	618.91	624.42
R.L. OF REFERENCE PEG	614.27																			623.46				635.13	
CHAINAGE ON CENTRELINE	00'	50'	100'	150'	200'	250'	301.50'	326.50'	351.50'	376.50'	400'	401.50'	426.50'	451.50'	500'	533.67'	558.67'	583.67'	600'	608.67'	633.67'	658.67'	683.67'	700'	800'

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in. Vertical 40 ft. to 1 in.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing



Geology by S. A. Department of Mines.

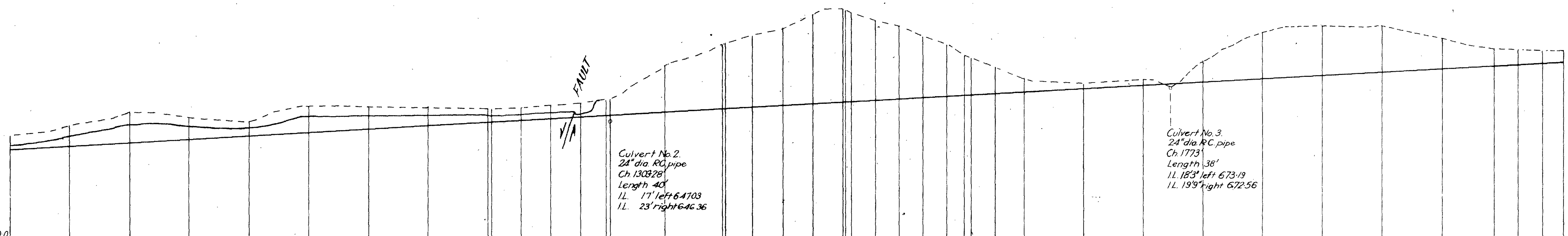
DESIGN		Approved:
DRAWN & TRACED		Commissioner of Highways, Date 29/5/62
EXAM'D		Chief Engineer, Date 29/5/62
PASSED ENGIN'R FOR DESIGN		
EXAMINED DISTRICT ENGINEER		
SCALE	40ft. to 1in.	

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. Nº 272
DEVIATION AT KANGAROO CREEK DAM
00' - 800'

Consulting Engineers: Len T. Fraser & Associates, 3 Wellington Street, Kew E4, Victoria.
Job No 254. 1-5-'62

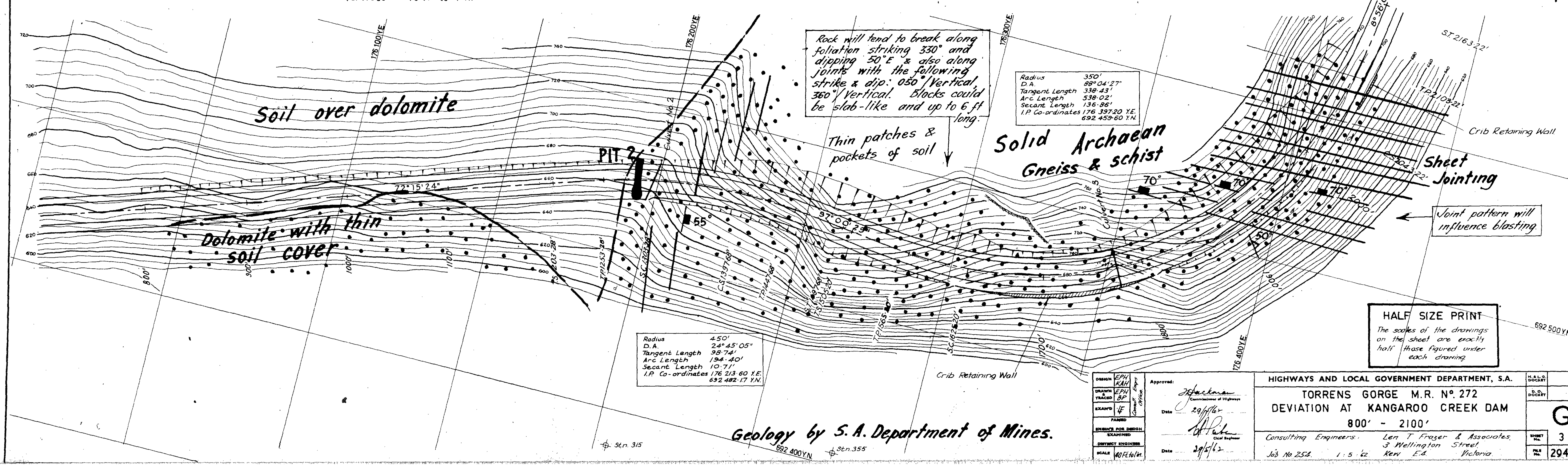
Sheet No. G 2 — File No. 2940



Gradient of centreline: 5.51%

Chainage on centreline	Existing R.L. at centreline	Relation of edges to centreline – Left edge	Relation of edges to centreline – Right edge	Relation of centreline to peg	R.L. of centreline	R.L. of reference peg
800'	639		-3¾		624.42	
850'	645	-3¾			627.18	
900'	655		-3¾		629.93	
850'	652	-3¾			632.69	
1000'	647		-3¾	-24'1½"	635.44	660.39
1050'	660	-3¾			638.20	
1100'	659		-3¾"		640.95	
1150'	658	-3¾			643.70	
1200'	657	-3¾	-3¾		646.46	
1203.28'	657	-3¾"	-3¾"		646.64	
1228.28'		-3¼"	-4¼"		648.02	
1253.28'	660	+3¼"	-5¼"	-11'7¾"	649.40	661.04
1278.28'		+4¾"	-5¾"		650.78	
1300'	665				651.97	
1303.28'	666	+6"	-6"		652.15	
1350'	693	+6"	-6"		654.72	
1397.68'	710	+6"	-6"		657.35	
1400'					657.48	
1422.68'		+4¾"	-5¾"		658.73	
1447.68'	723	+3¼"	-5¼"	-80'5¾"	660.10	740.57
1472.68'		-3¼"	-4¼"		661.48	
1497.68'	740	-3¾"	-3¾"		662.86	
1500					662.99	
1505.20'		-3¾"	-3¾"		663.28	
1525.20'		-4⅞"	-3⅝"		664.38	
1545.20'	725	-6⅛"	-⅞"		665.48	
1565.20'		-8¼"	+3¾"	-51'2½"	666.58	717.79
1585.20'	709	-10⅜"	+8¼"		667.68	
1600'					668.50	
1605.20'		-11⅝"	+11"		668.78	
1625.20'	692	-12"	+12"		669.88	
1650'	682		+12"		671.26	
1700'	678	-12"		-6'-1¾"	674.01	680.16
1750'	681		+12"		676.77	
1800'	697	-12"			679.52	
1850'	720		+12"		682.27	
1900'	726	-12"		-39'9½"	685.03	724.82
1950'	725		+12"		687.78	
2000'	715	-12"			690.54	
2043.22'	707	-12"	+12"		692.92	
2063.22'		-11⅝"	+11"		694.02	
2083.22'	706	-10⅜"	+8¼"		695.12	
2100'					696.05	

LONGITUDINAL SECTION Scales Horizontal 40 ft to 1 in
Vertical 40 ft to 1 in



HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing.

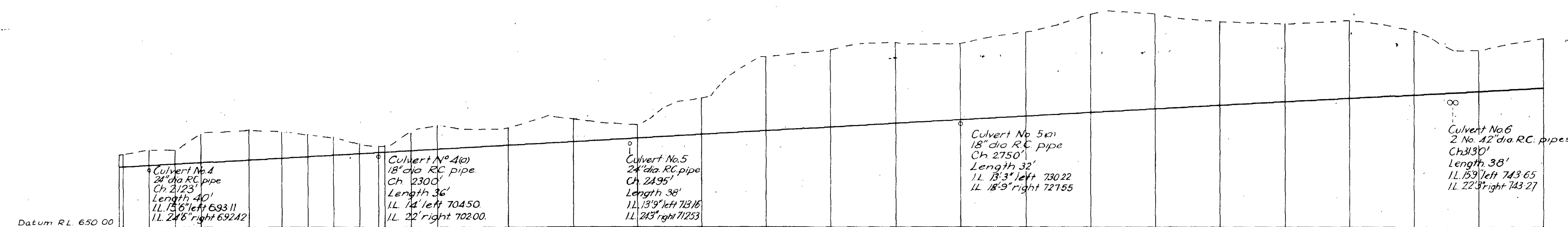
Design	EPH KAH	Consult. Engrs Office	Approved: [signature] Commissioner of Highways Date 29/5/62
Drawn & Traced	EPH BP		
Exam'd	LF		
Passed Engin'r for Design Examined District Engineer			[signature] Chief Engineer Date 29/5/62
Scale	40 Ft. to 1 in.		

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
800' - 2100'

Consulting Engineers: Len T Frazer & Associates, 3 Wellington Street, Kew E.4. Victoria
Job No 254. 1 : 5 : 62

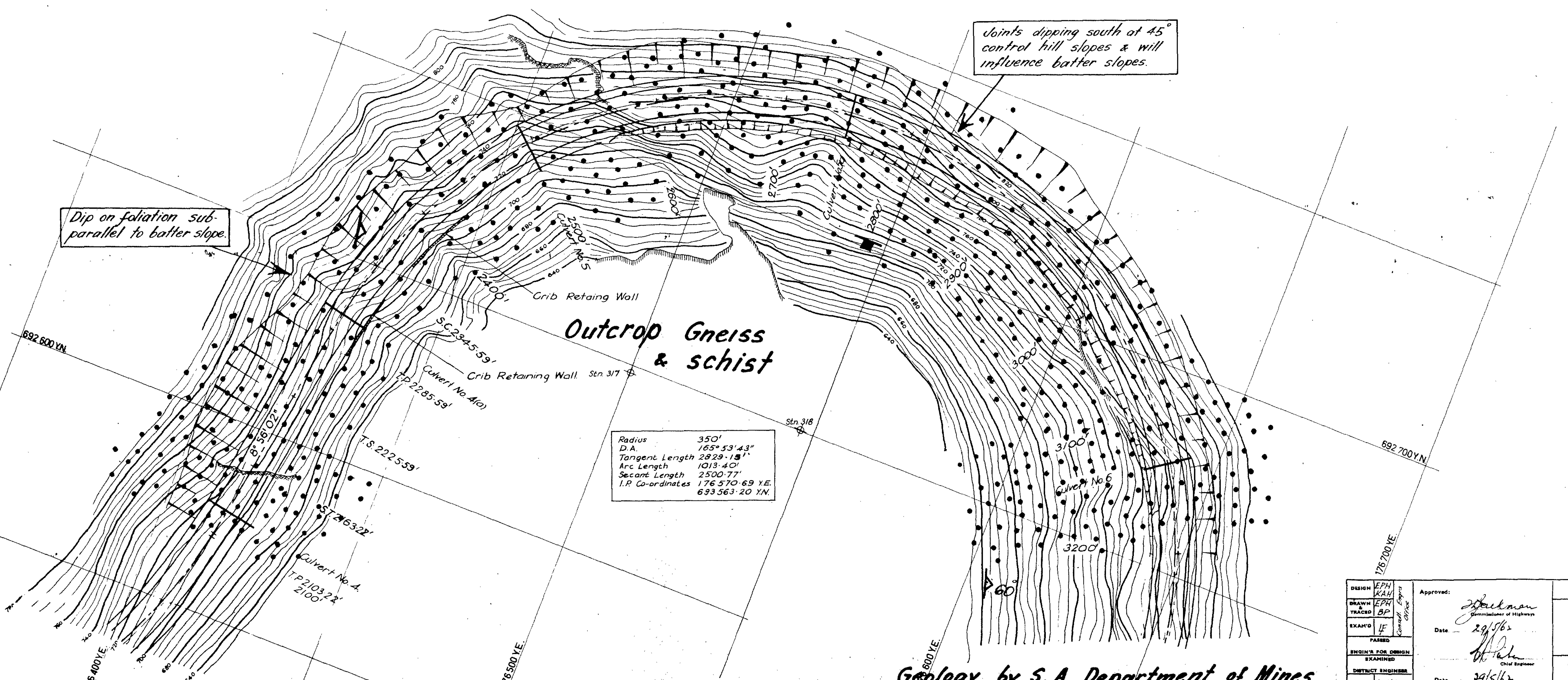
H.&L.G. Docket
D.O. Docket
G
Sheet No. 3
File No. 2940



CHAINAGE ON CENTRELINE	2100'	2103·22'	2123·22'	2143·22'	2163·22'	2200'	2225·59'	2245·59'	2265·59'	2285·59'	2300'	2305·59'	2325·59'	2345·59'
EXISTING R.L. AT CENTRELINE			709		722	724	723			714				728
GRADIENT OF CENTRELINE								5·51 %						
RELATION OF EDGES TO CENTRELINE — LEFT EDGE		-8¼"	-6⅛"	-4⅞"	3¼"	-3¼"	-3¾"	-3⅝"	-7/8"	+3¾"		+8¼"	+11"	-12"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE		+3¼"	-7/8"	-3⅝"	-3¼"	-3¼"	-3¾"	-4⅞"	-6⅛"	-8½"		-10⅜"	-11⅝"	-12"
RELATION OF CENTRELINE TO PEG.		-8'4"								-8'2¾"				
R.L. OF CENTRELINE	696·05	696·22	697·32	698·42	699·53	701·56	702·96	704·06	705·17	706·27	707·07	707·37	708·47	709·57
R.L. OF RERERENCE PEG		704·54								714·50				

CHAINAGE ON CENTRELINE	2400'	2450'	2500'	2550'	2600'	2650'	2700'	2750'	2800'	2850'	2900'	2950'	3000'	3050'	3100'	3150'	3200'
EXISTING R.L. AT CENTRELINE	726	733	728	748	782	785	791	790	800	812	812	807	806	807	798	786	794
GRADIENT OF CENTRELINE																	
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	+12"		+12"		+12"		+12"		+12"		+12"		+12"		+12"		+12"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE		-12"		-12"		-12"		-12"		-12"		-12"		-12"		-12"	
RELATION OF CENTRELINE TO PEG.	-5'4"				-44'9½"		-52'9¼"		-64'6¾"		-60'5½"		-61'7¼"		-38'4"		-36'6¼"
R.L. OF CENTRELINE	712·58	715·34	718·08	720·85	723·60	726·36	729·11	731·87	734·62	737·38	740·13	742·89	745·64	748·40	751·15	753·91	756·66
R.L. OF RERERENCE PEG	719·90				768·38		781·98		799·18		800·59		807·24		789·48		793·[illegible]

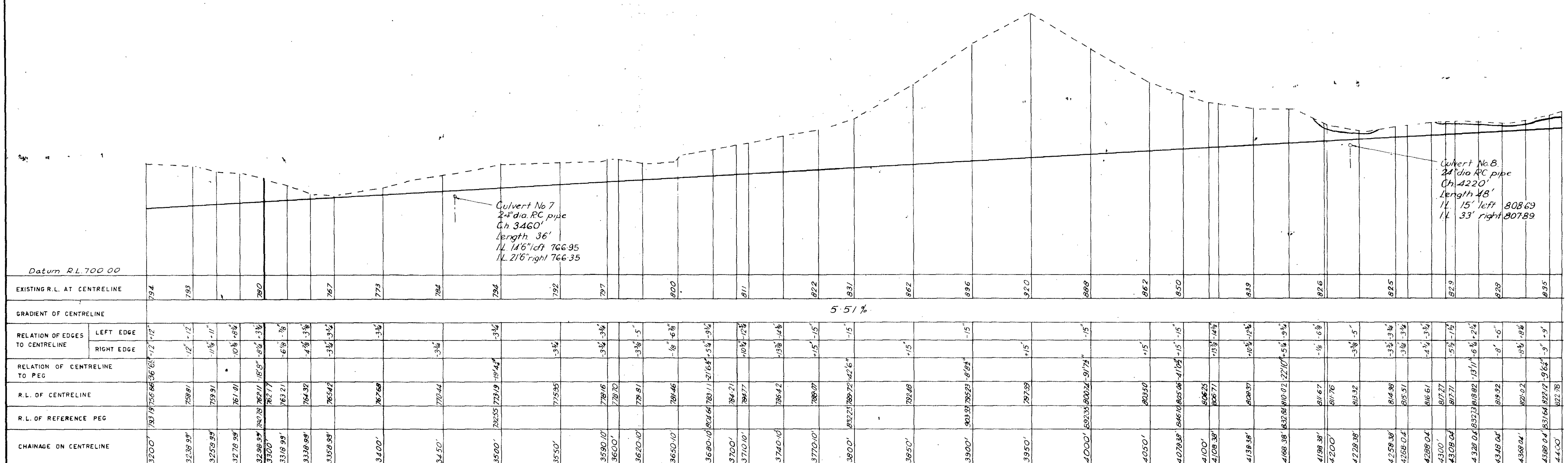
LONGITUDINAL SECTION   Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



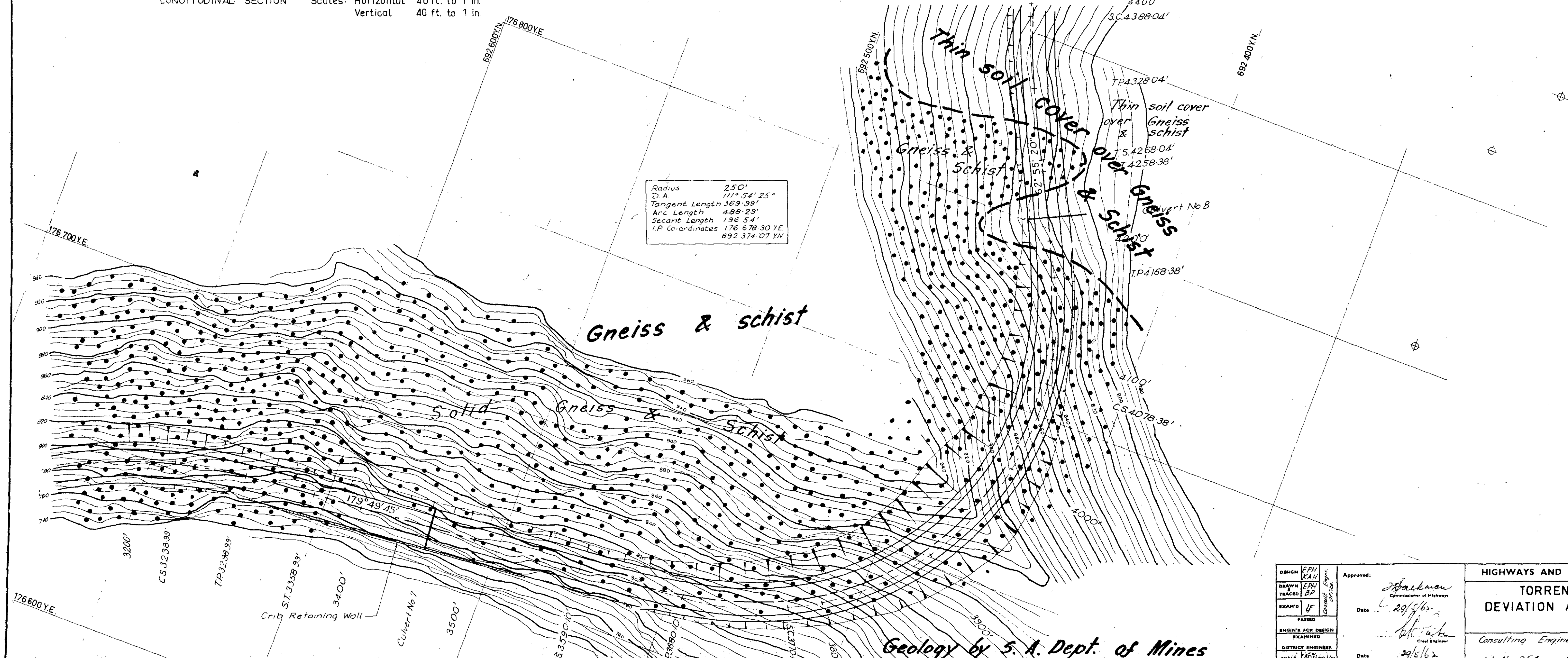
Geology by S. A. Department of Mines.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN: EPH, KAH	Approved: (signature) Commissioner of Highways	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.	H.& L.G. DOCKET
DRAWN & TRACED: EPH, BP (Consult. Engrs Office)	Date 29/5/62	TORRENS GORGE M.R. N°. 272	P.O. DOCKET
EXAM'D: LF	(signature) Chief Engineer	DEVIATION AT KANGAROO CREEK DAM	G
PASSED / ENGIN'R FOR DESIGN / EXAMINED / DISTRICT ENGINEER	Date 29/5/62	2100' - 3200'	SHEET No. 4
SCALE: 40Ft. to 1in.		Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E4. Victoria. Job No 254. 1 5 62	FILE No. 2940



LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in. Vertical 40 ft. to 1 in.



HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN	EPH KAH	
DRAWN & TRACED	EPH BP	
EXAM'D	LF	
PASSED ENGIN'R FOR DESIGN		
EXAMINED DISTRICT ENGINEER		
SCALE	40ft to 1in	

Approved: Commissioner of Highways Date 29/5/62

Chief Engineer Date 29/5/62

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. Nº 272
DEVIATION AT KANGAROO CREEK DAM
3200' - 4400'

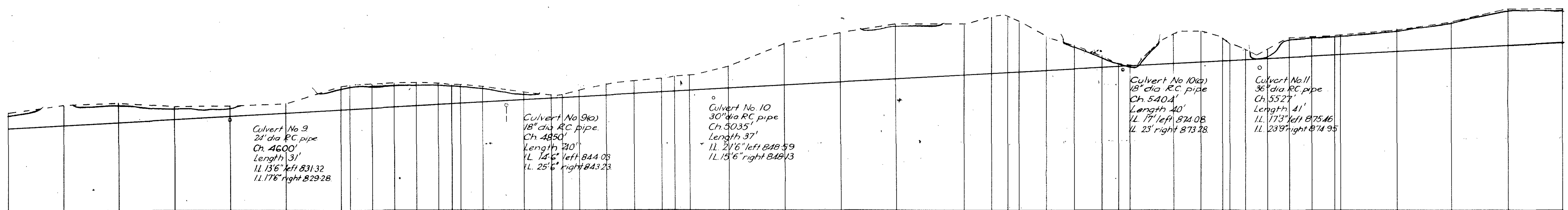
Consulting Engineers: Len T Frazer & Associates, 3 Wellington Street, Kew E4 Victoria

Job No 254 1.5.62

G

SHEET No. 5

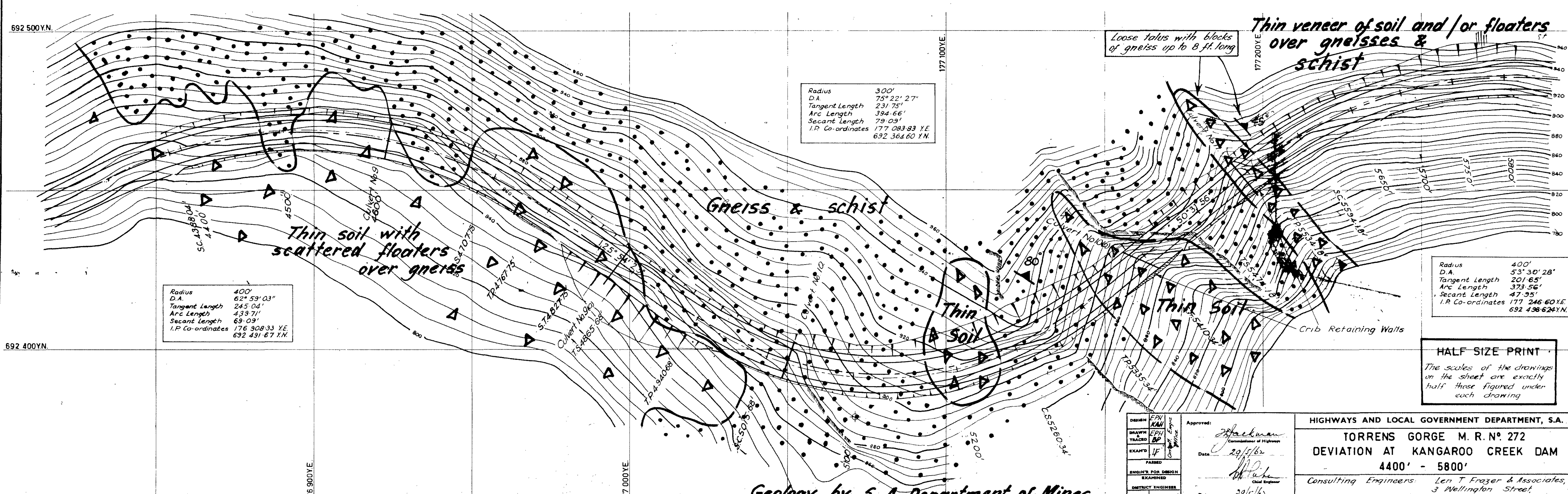
FILE No. 2940



GRADIENT OF CENTRELINE: 5·51 %

CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	RELATION OF EDGES TO CENTRELINE – LEFT EDGE	RELATION OF EDGES TO CENTRELINE – RIGHT EDGE	RELATION OF CENTRELINE TO PEG.	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
4400'	837	+9"	-9"		822.78	
4450'	845	+9"			825.54	
4500'	845		-9"	-11'7¼"	828.29	839.89
4550'	843	+9"			831.05	
4600'	843		-9"	-5'10"	833.80	839.63
4650'	845	+9"			836.56	
4700'	860		-9"		839.31	
4707.75'	862	+9"	-9"	-23'2¾"	839.74	862.96
4727.75'		+8¼"	-8¾"		840.84	
4747.75'	864	+6"	-8"		841.94	
4767.75'		+2¼"	-6¾"	-16'5"	843.05	859.18
4787.75'	863	-1½"	-5½"		844.15	
4800'					844.82	
4807.75'		-3¾"	-4¼"		845.25	
4827.75'	860	-3¾"	-3¾"		846.35	
4865.68'	855	-3⅞"	-3¾"		848.44	
4890.68'		-5"	-3⅜"		849.82	
4900'				-5'9¼"	850.33	856.10
4915.68'	858	-6⅞"	-⅛"		851.20	
4940.68'		-9¼"	+5¼"	-6'2"	852.58	858.75
4965.68'	865	-12¾"	+10¾"		853.35	
4990.68'		-14⅞"	+13⅞"		855.33	
5000'					855.84	
5015.68'	871	-15"	+15"		856.71	
5050'	880		+15"		858.59	
5100'	900	-15"		-36'1⅛"	861.35	897.46
5150'	909		+15"		864.10	
5200'	916	-15"		-45'6½"	866.06	912.56
5260.34'	916	-15"	+15"		870.18	
5285.34'		-14⅞"	+13⅞"		871.56	
5300'					872.37	
5310.34'	917	-12¾"	+10¾"		872.94	
5335.34'		-9¼"	+5¼"	25'10"	874.32	900.16
5360.34'	896	-6⅞"	-⅛"		875.69	
5385.34'		-5"	-3⅜"		877.07	
5400'					877.88	
5410.34'	879	-3¾"	-3¾"		878.45	
5450'					880.64	
5474.18'	910	-3¾"	-3¾"		881.97	
5494.18'		-3¾"	-4¼"		883.07	
5500'					883.39	
5514.18'	893	-1½"	-5½"		884.17	
5534.18'		+2¼"	-6¾"	-1'4¼"	885.27	886.62
5554.18'	904	+6"	-8"		886.38	
5574.18'		+8½"	-8¾"		887.48	
5594.18'	906	+9"	-9"		888.58	
5600'			-9"		888.80	
5650'	911	+9"		-17'7"	891.65	909.23
5700'	918		-9"		894.41	
5750'	930	+9"			897.17	
5800'	930	+9"	-9"	-36'11"	899.92	936.84

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



Geology by S. A. Department of Mines.

HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN	EPH KAH
DRAWN & TRACED	EPH BP
EXAM'D	IF
PASSED ENGIN'R FOR DESIGN	
EXAMINED DISTRICT ENGINEER	
SCALE	1" = 40'

Consult. Engrs. Office.

Approved: [signature] Commissioner of Highways Date 29/5/62

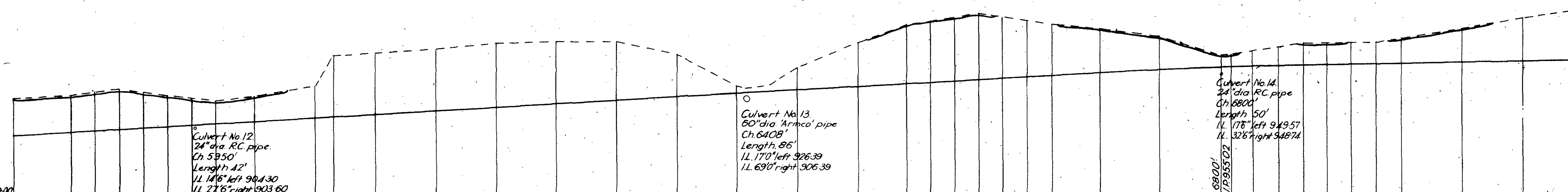
[signature] Chief Engineer Date 29/5/62

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M. R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
4400' - 5800'

Consulting Engineers: Len T Frazer & Associates, 3 Wellington Street, Kew E.4. Victoria.
Job No. 254 1.5.62.

H. & L.G. DOCKET
D.O. DOCKET
G
SHEET No. 6
FILE No. 2940

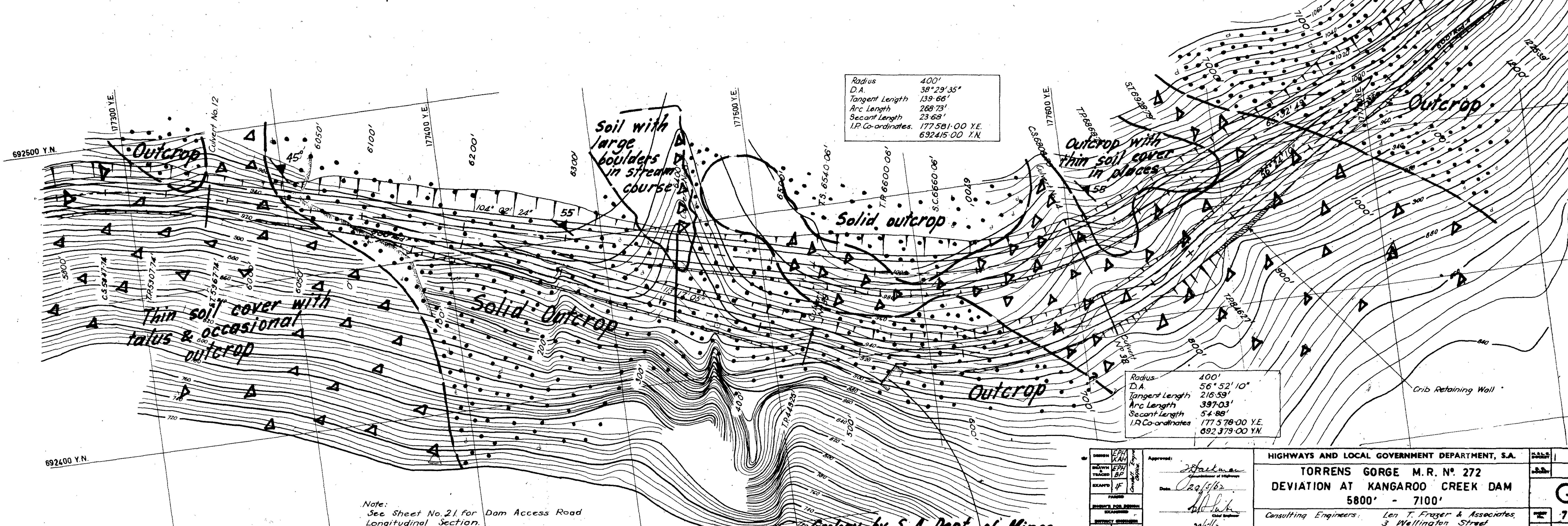


Gradient of centreline: Grade +5·51 % ◑ 200' V.C. Summit ◐ Grade +1·80 %

Chainage on centreline	Existing R.L. at centreline	Relation of edges to centreline: Left edge	Relation of edges to centreline: Right edge	Relation of centreline to peg	R.L. of centreline	R.L. of reference peg
5800'	930	+9"	-9"	-36'11"	899·92	936·84
5847·74'	933	+9"	-9"		902·55	
5867·74'		+8¼"	-8¼"		903·65	
5887·74'	938	+6"	-8"		904·76	
5907·74'		+2¼"	-6¼"	-29'9"	905·86	935·61
5927·74'	933	-1½"	-5¼"		906·96	
5947·74'		-3¼"	-4¼"		908·06	
5967·74'	928	-3¼"	-3¼"		909·16	
6000'	932		-3¼"	-22'2¼"	910·94	933·17
6050'	940	-3¼"			913·70	
6065'	965				914·53	
6100'	967		-3¼"	-47'2¼"	916·45	963·64
6150'	970	-3¼"			919·21	
6200'	975		-3¼"		921·96	
6250'	976	-3¼"			924·72	
6300'	976		-3¼"	-48'9"	927·47	976·21
6350'	965	-3¼"			930·23	
6400'	939		-3¼"		932·98	
6450'	954	-3¼"			935·74	
6500'	975		-3¼"	-42'6¼"	938·49	981·07
6540·06'	989	-3¼"	-3¼"		940·70	
6560·06'		-4¼"	-3¼"		941·80	
6580·06'		-5¼"	-1½"		942·90	
6600·06'	999	-6¼"	+2¼"	-50'2"	944·00	994·17
6620·06'		-8"	+6"		945·11	
6640·06'		-8¼"	+8¼"		946·21	
6660·06'	990	-9"	+9"		947·31	
6700'	986		+9"	-47'6¼"	949·51	992·20
6750'	980	-9"			952·03	
6800'	965				954·09	964·68
6808·79'		-9"	+9"		954·41	
6828·79'		-8¼"	+8¼"		955·07	
6848·79'		-8"	+6"		955·66	
6868·79'	974	-6¼"	+2¼"	-15'1¼"	956·17	971·30
6888·79'		-5¼"	-1½"		956·61	
6908·79'		-4¼"	-3¼"		[illegible]	
6928·79'	975	-3¼"	-3¼"		[illegible]	
6950'	987	-3¼"			957·72	
7000'	986		-3¼"	-26'7"	[illegible]	985·20
7050'	995	-3¼"			[illegible]	
7100'	1002		-3¼"		[illegible]	

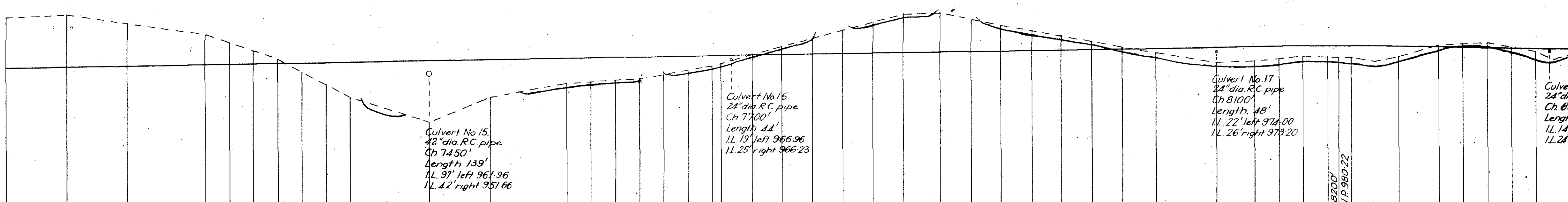
LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing



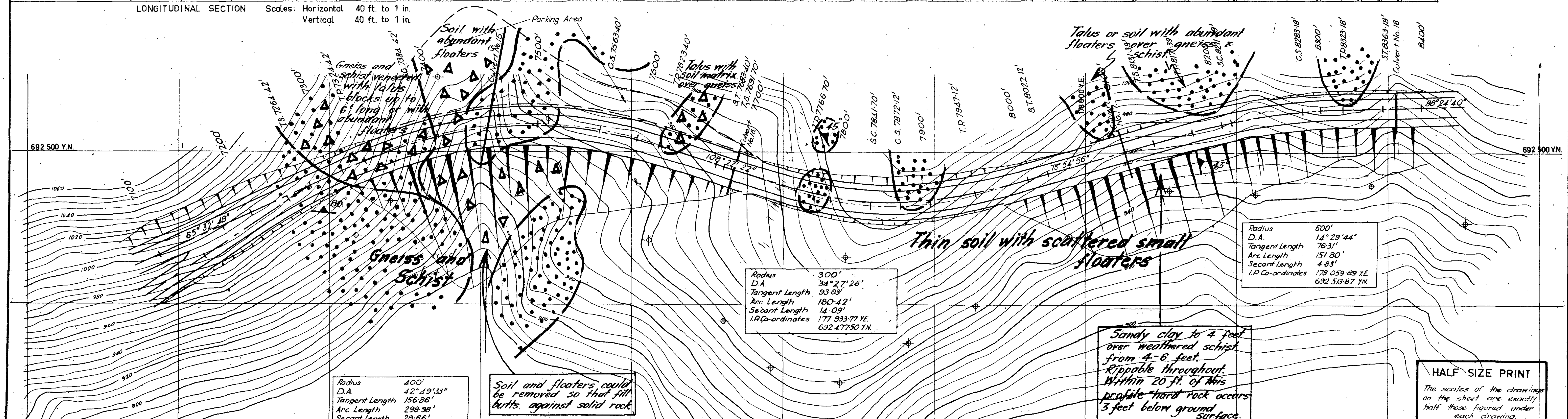
Note:
See Sheet No. 21 for Dam Access Road Longitudinal Section.

Design: EPH KAH	Approved: [signature] Commissioner of Highways	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.	H.&L.G. Docket: 1
Drawn & Traced: EPH BP	Date 29/5/62	TORRENS GORGE M.R. Nº. 272	S.D. Docket:
Exam'd: IF	[signature] Chief Engineer	DEVIATION AT KANGAROO CREEK DAM 5800' - 7100'	G
Passed		Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4. Victoria.	Sheet No. 7
Scale: 40ft to 1in.	Date 29/5/62	Job No. 254. 1 : 5 : 62.	File No. 2940



CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	GRADIENT OF CENTRELINE	RELATION OF EDGES TO CENTRELINE: LEFT EDGE	RELATION OF EDGES TO CENTRELINE: RIGHT EDGE	RELATION OF CENTRELINE TO PEG	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
7100'	1002			-3¾"		960·42	
7150'	1004		-3¾"			961·32	
7200'	997			-3¾"	-38'9"	962·22	1000·36
7264·42'	988		-3¾" -3¾"	-3¾" -3¾"		963·38	
7284·42'			-3¾" -3¾"	-4¾" -4¾"		963·74	
7304·42'			-1½" -1½"	-5½" -5½"		964·10	
7324·42'	968		+2¼" +2¼"	-6¾" -6¾"	-10"	964·46	965·28
7344·42'			+6" +6"	-8" -8"		964·82	
7364·42'			+8¼" +8¼"	-8¾" -8¾"		965·18	
7384·42'	937		+9" +9"	-9" -9"		965·54	
7450'	916			-9"		966·72	
7500'	937		+9"		+29'3¼"	967·62	938·31
7563·40'	948	Grade +1·80 %	+9" +9"	-9" -9"		968·76	
7583·40'			+8¼" +8¼"	-8¾" -8¾"		969·12	
7603·40'			+6" +6"	-8" -8"		969·48	
7623·40'	952		+2¼" +2¼"	-6¾" -6¾"	+17'1½"	969·84	952·73
7643·40'			-1½" -1½"	-5½" -5½"		970·20	
7663·40'			-3¾" -3¾"	-4¾" -4¾"		970·56	
7683·40'	963		-3¾" -3¾"	-3¾" -3¾"		970·92	
7691·70'			-3¾" -3¾"	-3¾" -3¾"		971·07	
7716·70'			-5" -5"	-3⅜" -3⅜"		971·52	
7741·70'	978		-6⅞" -6⅞"	-⅛" -⅛"		971·97	
7766·70'			-9¾" -9¾"	+5¼" +5¼"	-13'3¼"	972·42	985·69
7791·70'	992		-12¾" -12¾"	+10¾" +10¾"		972·87	
7816·70'			-14⅜" -14⅜"	+13⅞" +13⅞"		973·32	
7841·70'	1005		-15" -15"	+15" +15"		973·77	
7872·12'	1006		-15" -15"	+15" +15"		974·32	
7897·12'			-14⅜" -14⅜"	+13⅞" +13⅞"		974·77	
7922·12'	996		-12¾" -12¾"	+10¾" +10¾"		975·22	
7947·12'			-9¾" -9¾"	+5¼" +5¼"	-18'0¼"	975·67	993·69
7972·12'	987		-6⅞" -6⅞"	-⅛" -⅛"		976·12	
7997·12'			-5" -5"	-3⅜" -3⅜"		976·57	
8022·12'	978		-3¾" -3¾"	-3¾" -3¾"		977·02	
8050'	974			-3¾"		977·52	
8100'	966	◑	-3¾"			978·42	
8131·39'	967		-3¾" -3¾"	-3¾" -3¾"		978·93	
8151·39'			-3⅜" -3⅜"	-4½" -4½"		979·18	
8171·39'	971		0" 0"	-4½" -4½"	+7'3½"	979·38	972·09
8191·39'		200' V.C. Summit	+3⅜" +3⅜"	-4½" -4½"		979·53	
8200'						979·57	
8211·39'	970		+4½" +4½"	-4½" -4½"		979·62	
8250'	971		+4½" +4½"	-4½" -4½"		979·66	
8283·18'	980		+4½" +4½"	-4½" -4½"		979·53	
8303·18'		◐	+3⅜" +3⅜"	-4½" -4½"		979·39	
8323·18'	982		0" 0"	-4½" -4½"	-4'0¼"	979·23	983·26
8343·18'		Grade -0·80%	-3⅜" -3⅜"	-4½" -4½"		979·07	
8363·18'	975		-3¾" -3¾"	-3¾" -3¾"		978·91	
8400'	974		-3¾" -3¾"	-3¾" -3¾"		978·62	

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



Geology by S.A. Dept. of Mines.

HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing.

DESIGN	E.P.H. K.A.H.	
DRAWN & TRACED	E.P.H. B.P.	
EXAM'D	L.F.	
PASSED		
ENGR'S FOR DESIGN		
EXAMINED		
DISTRICT ENGINEER		
SCALE	40ft to 1in.	

Approved: [signature] Commissioner of Highways
Date 29/5/62
[signature] Chief Engineer
Date 29/5/62

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A

TORRENS GORGE M.R. Nº. 272

DEVIATION AT KANGAROO CREEK DAM

7100' - 8400'

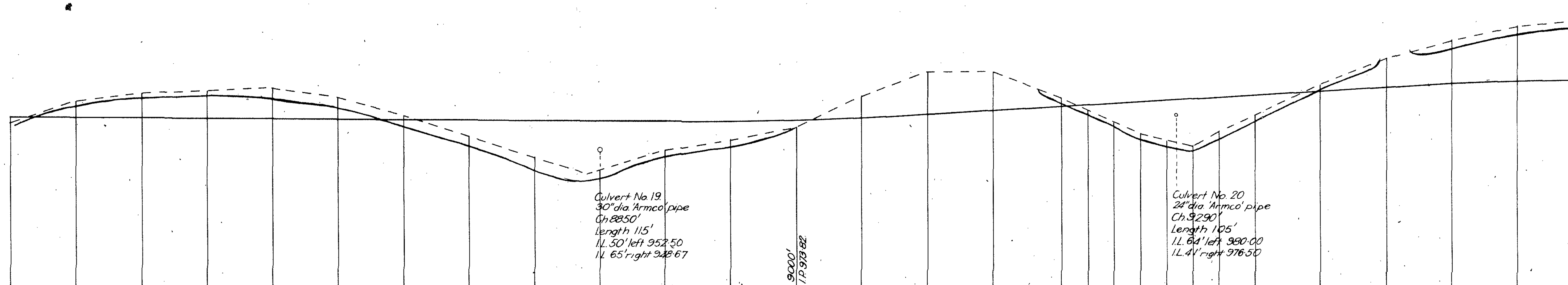
Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4 Victoria.

Job. No. 254. 1 : 5 : 62.

H.&L.G. DOCKET
D.O. DOCKET

G

SHEET No. 8



Datum R.L. 850·00

EXISTING R.L. AT CENTRELINE	974	990	996	998	1000	993	979	963	947	938	952	960	970	993
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	-3¾"		-3¾"		-3¾'		-3¾"		-3¾"		-3¾"		-3¾"	
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE	-3¾"	-3¾"		-3¾"		-3¾"		-3¾"		-3¾"		-3¾"		-3¾"
RELATION OF CENTRELINE TO PEG			-17'4"		-24'3½"		-6'5"				+20'8¼"			
R.L. OF CENTRELINE	978.62	978.22	977.82	977.42	977.02	976.62	976.22					974.62	975.42	977.02
R.L. OF REFERENCE PEG			995.16		1001.31		982.64							
CHAINAGE ON CENTRELINE	8400'	8450'	8500'	8550'	8600'	8650'	8700'					8950'	9000'	9050'

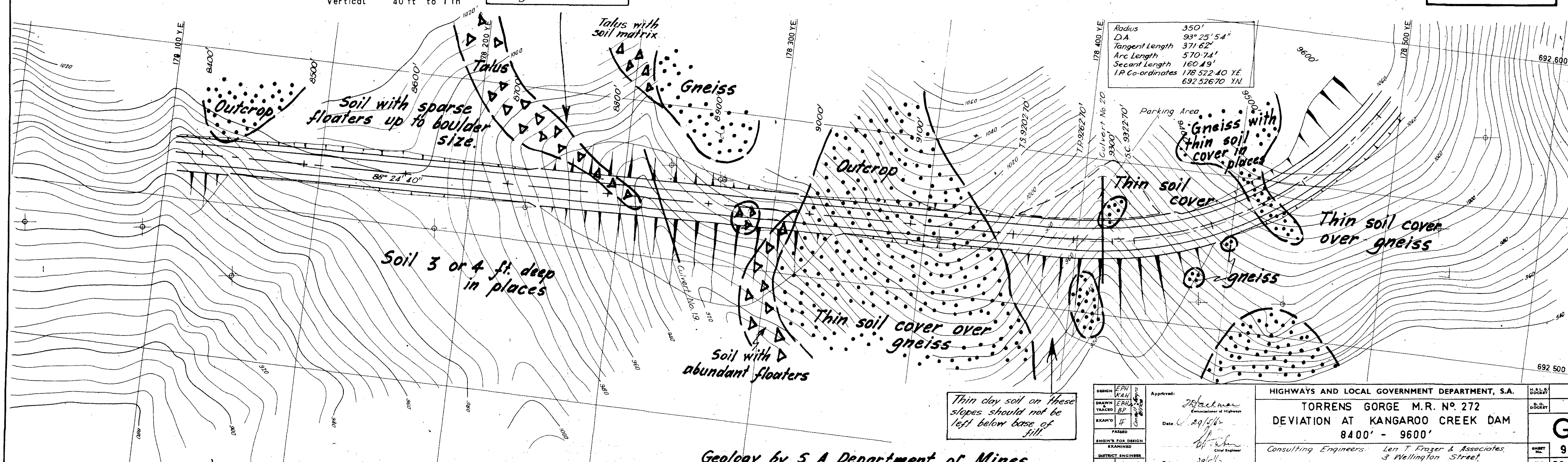
EXISTING R.L. AT CENTRELINE	1012	1012	992			965		956	967	979	1003	1023	1036	1047	1052
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	-3¾"		-3¾" -3¾"	-4⅞"	-6⅛"	-8¼"	-10⅜"	-11⅝"	-12" -12"		-12"		-12"		-12"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE		-3¾"	-3¾"	-3⅝"	-⅞"	+3¾"	+8¼"	+11"	+12"	+12"		+12"		+12"	
RELATION OF CENTRELINE TO PEG	-30'5¼"					-22'8"					-7'4¼"		-37'8¾"		-47'5¼"
R.L. OF CENTRELINE	979.42	982.22	985.17	986.29	987.41	988.53	989.65	990.77	991.89	993.42	996.22	999.02	1001.82	1004.14	1006.49
R.L. OF REFERENCE PEG	1009.86					965.86					1003.57		1039.52		1052.94
CHAINAGE ON CENTRELINE	9100'	9150'	9202.70'	9222.70'	9242.70'	9262.70'	9282.70'	9302.70'	9322.70'	9350'	9400'	9450'	9500'	9550'	9600'

GRADIENT OF CENTRELINE: Grade −0·80% ◐ 200' V.C. Sag ◑ Grade +5·60% ◐ 300' V.C. Summit

LONGITUDINAL SECTION Scales Horizontal 40 ft to 1 in
Vertical 40 ft to 1 in

Blocks of talus about 2 ft. long in soil matrix. Gneiss below at about 2 or 3 feet. Unstable & subject to movement during severe vibration.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

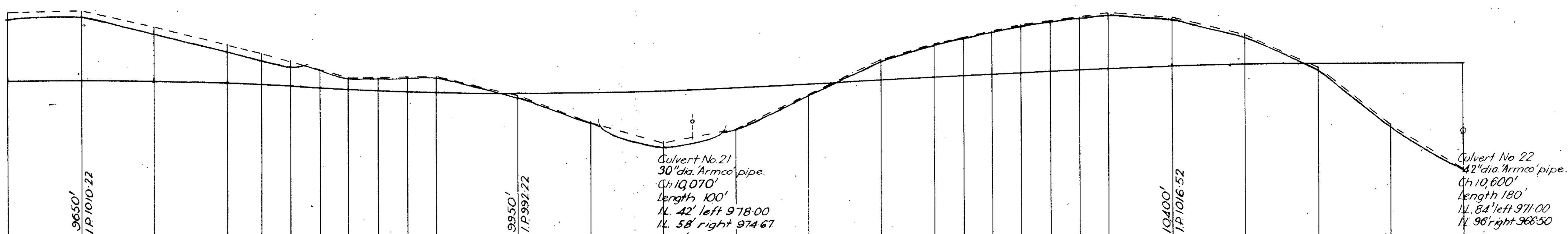


Thin clay soil on these slopes should not be left below base of fill.

Geology by S. A. Department of Mines.

DESIGN	EPH KAH	Approved:	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.
DRAWN & TRACED	EPH BP	Commissioner of Highways	TORRENS GORGE M.R. Nº. 272
EXAM'D	IF	Date 29/5/62	DEVIATION AT KANGAROO CREEK DAM 8400' - 9600'
PASSED ENGIN'R FOR DESIGN		Chief Engineer	Consulting Engineers. Len T. Frazer & Associates. 3 Wellington Street Kew E.4. Victoria.
EXAMINED DISTRICT ENGINEER			Job 254. 1 : 5 : 62.
SCALE	40 ft. to 1 in.	Date 29/5/62	

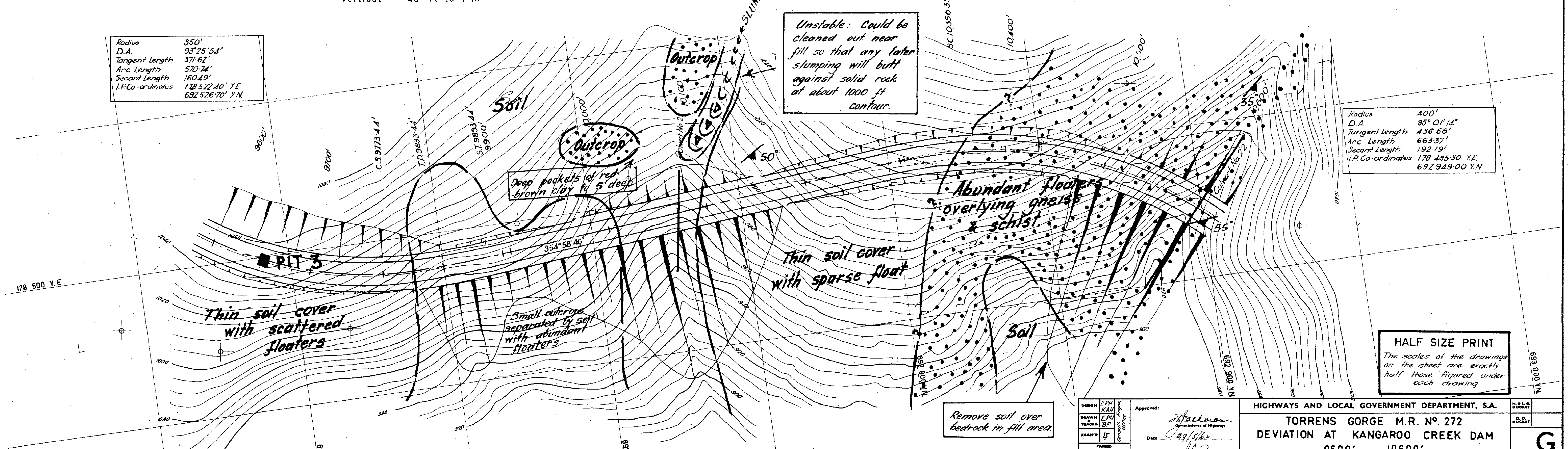
H.&L.G. DOCKET
D.O. DOCKET
G
SHEET No. 9
FILE No. 2940



GRADIENT OF CENTRELINE: 300' V.C. Summit ◐ 300' V.C. Sag ◑ Grade +5·40% ◐ 200' V.C. Summit ◑ Grade +0·50%

CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	RELATION OF EDGES TO CENTRELINE – LEFT EDGE	RELATION OF EDGES TO CENTRELINE – RIGHT EDGE	RELATION OF CENTRELINE TO PEG	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
9600'	1052	-12"		-47'5¾"	1005·48	1052·94
9650'	1053		+12"		1005·67	
9700'	1042	-12"		-39'0¼"	1005·29	1044·31
9750'	1029		+12"		1003·74	
9773·44'	1023	-12"	+12"		1002·67	
9793·44'		-11⅝"	+11"		1001·60	
9800'					1001·22	
9813·44'		-10⅜"	+8¼"		1000·44	
9833·44'	1007	-8¼"	+3¾"	-8'9¼"	999·41	1007·18
9853·44'		-6⅝"	-⅞"		998·55	
9873·44'		-4⅞"	-3⅝"		997·84	
9893·44'	1008	-3¾"	-3¾"		997·27	
9950'	995	-3¾"			996·50	
10,000'	976		-3¾"		996·82	
10,050'	963	-3¾"			998·10	
10,100'	972		-3¾"	+23'11"	1000·32	976·40
10150'	996	-3¾"			1003·02	
10,200'	1019		-3¾"		1005·72	
10236·35'	1030	-3¾"	-3¾"		1007·68	
10256·35'		-3¾"	-4¾"		1008·76	
10276·35'		-1½"	-5½"		1009·84	
10296·35'	1043	+2¼"	-6¼"	-33'4¾"	1010·92	1044·31
10300' / 10316·35'		+6"	-8"		1011·12 / 1011·97	
10336·35'		+8¼"	-8¼"		1012·92	
10356·35'	1051	+9"	-9"		1013·77	
10400'	1048		-9"		1015·29	
10450'	1036	+9"			1016·46	
10500'	1014		-9"		1017·02	
10550'	975	+9"			1017·27	
10600'	945		-9"	+72'4½"	1017·52	945·18 (on rock)

LONGITUDINAL SECTION Scales Horizontal 40 ft to 1 in
Vertical 40 ft to 1 in

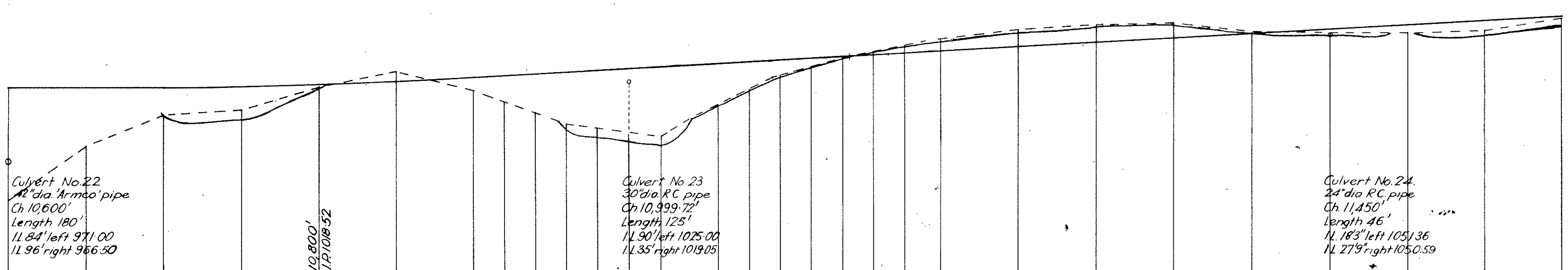


Geology by S.A. Dept. of Mines.

HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN: EPH KAH / DRAWN & TRACED: EPH BP / EXAM'D: LF (Consult. Engrs. Office) / PASSED / ENGIN'R FOR DESIGN / EXAMINED / DISTRICT ENGINEER / SCALE: 40Ft. to 1in.	Approved: [signature] Commissioner of Highways, Date 29/5/62; [signature] Chief Engineer, Date 29/5/62	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A. — TORRENS GORGE M.R. Nº. 272 — DEVIATION AT KANGAROO CREEK DAM — 9600' - 10600' — Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4 Victoria — Job No 254 1·5·62	H.&L.G. DOCKET / D.O. DOCKET / G / SHEET No. 10 / FILE No. 2940

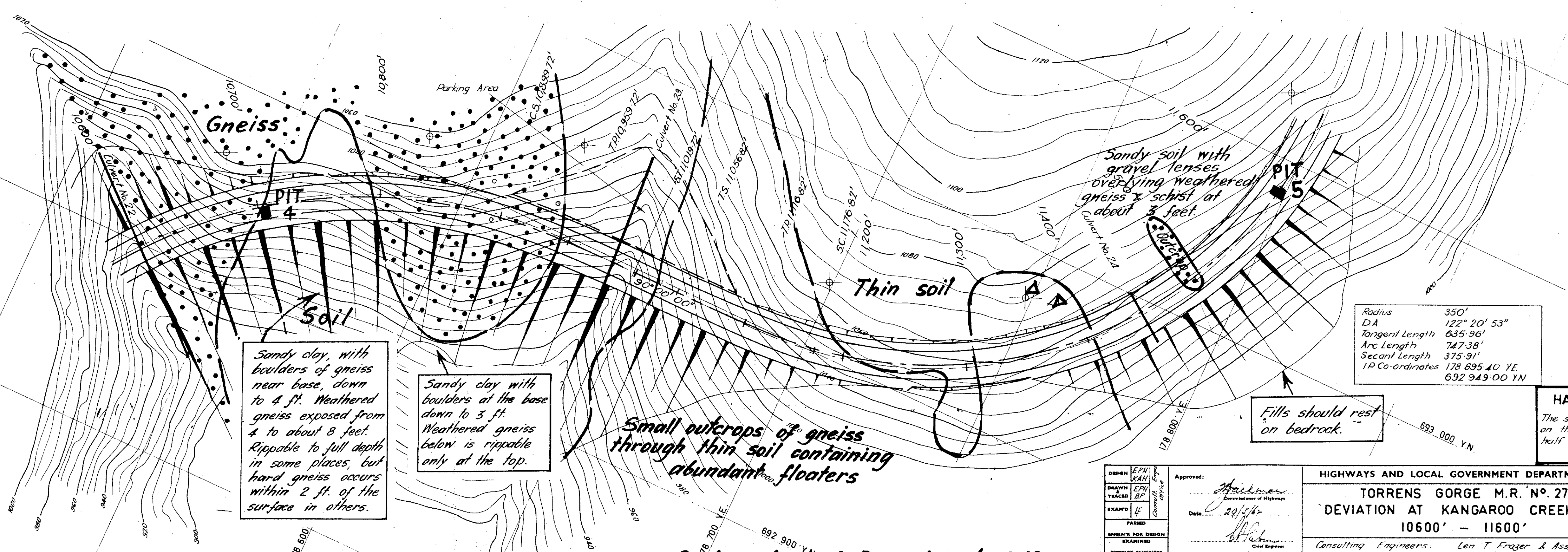


	10600'	10650'	10700'	10750'	10800'	10850'	10899·72'
EXISTING R.L. AT CENTRELINE	945	980	1000	1003	1018	1028	1016
GRADIENT OF CENTRELINE	Grade +0·50% ◑			200' V.C. Sag			◐
RELATION OF EDGES TO CENTRELINE — LEFT EDGE		+9"		+9"		+9"	+9"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE	-9"		-9"		-9"		-9"
RELATION OF CENTRELINE TO PEG	+72'4¾"		+20'2"		+2'5"		
R.L. OF CENTRELINE	1017·52	1017·77	1018·02	1018·40	1019·85	1021·76	1024·31
R.L. OF REFERENCE PEG	945·18 (on rock)		997·85		1017·44		
CHAINAGE ON CENTRELINE	10600'	10650'	10700'	10750'	10800'	10850'	10899·72'

	10919·72'	10939·72'	10959·72'	10979·72'	10999·72'	11019·72'	11056·82'	11076·82'	11096·82'	11116·82'
EXISTING R.L. AT CENTRELINE			995			987	1006			1033
GRADIENT OF CENTRELINE										
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	+3¼"	+6"	+2¼"	-1½"	-3¾"	-3¾"	-3¾"	-4⅞"	-6⅛"	-8¼"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE	-3¼"	-8"	-6¼"	-5¼"	-4¼"	-3¾"	-3¾"	-3⅝"	-⅞"	+¾"
RELATION OF CENTRELINE TO PEG			+33'1¼"							+12"
R.L. OF CENTRELINE	1025·47	1026·63	1027·79	1028·95	1030·11	1031·27	1033·42	1034·58	1035·74	1036·90
R.L. OF REFERENCE PEG			993·85							1035·91 (on rock)
CHAINAGE ON CENTRELINE	10919·72'	10939·72'	10959·72'	10979·72'	10999·72'	11019·72'	11056·82'	11076·82'	11096·82'	11116·82'

	11136·82'	11156·82'	11176·82'	11200'	11250'	11300'	11350'	11400'	11450'	11500'	11550'	11600'
EXISTING R.L. AT CENTRELINE			1045	1048	1055	1058	1059	1054	1053	1053	1055	1063
GRADIENT OF CENTRELINE					Grade +5·80%							
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	-10⅜"	-11⅝"	-12"	-12"		-12"		-12"		-12"		-12"
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE	+8¼"	+11"	+12"		+12"		+12"		+12"		+12"	
RELATION OF CENTRELINE TO PEG				-7'5"		-10'10¾"		-5'8½"		+4'4½"		-10¾"
R.L. OF CENTRELINE	1038·06	1039·22	1040·38	1041·72	1044·62	1047·52	1050·42	1053·32	1056·22	1059·12	1062·02	1064·92
R.L. OF REFERENCE PEG				1049·15		1058·40		1059·04		1054·75		1065·81
CHAINAGE ON CENTRELINE	11136·82'	11156·82'	11176·82'	11200'	11250'	11300'	11350'	11400'	11450'	11500'	11550'	11600'

LONGITUDINAL SECTION Scales Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



Geology by S. A. Department of Mines.

HALF· SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing

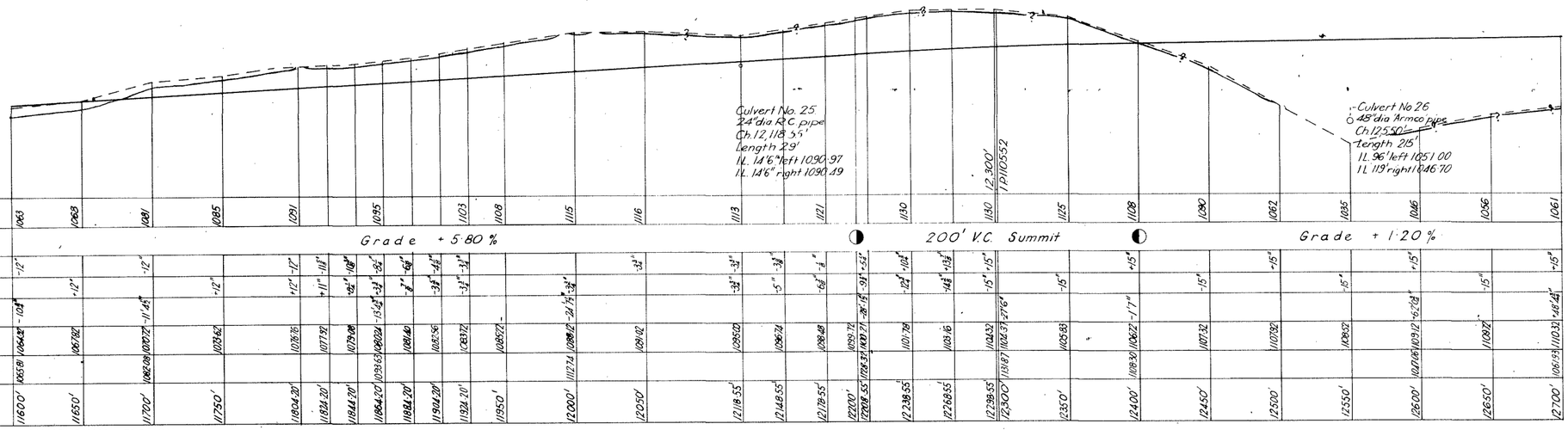
DESIGN	EPH KAH	Consult. Engrs. Office	Approved: [signature] Commissioner of Highways Date 29/5/62
DRAWN & TRACED	EPH BP		
EXAM'D	LF		
PASSED ENGIN'R FOR DESIGN			[signature] Chief Engineer
EXAMINED DISTRICT ENGINEER			Date 29/5/62
SCALE	40ft to 1in.		

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

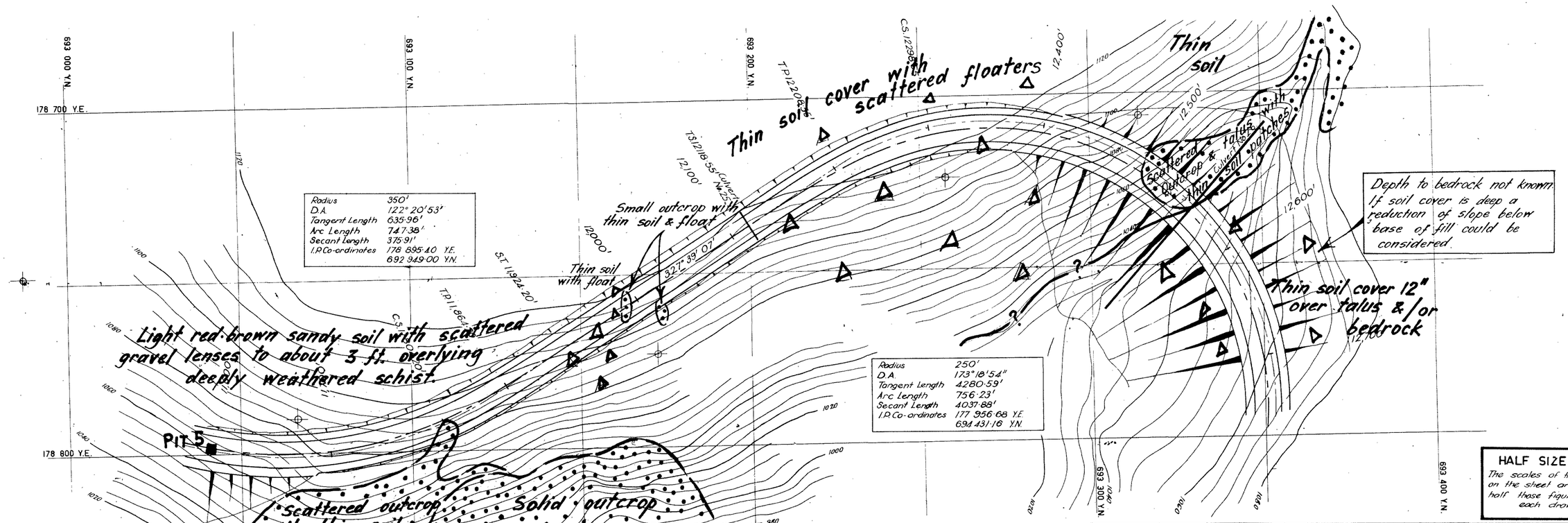
TORRENS GORGE M.R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
10600' – 11600'

Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4. Victoria.
Job No 254. 1·5·62.

H.&L.G. DOCKET
D.O. DOCKET
G
SHEET No. 11
FILE No. 2940



LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



Geology by S.A. Department of Mines.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN	EPH KAH	Approved:
DRAWN TRACED	EPH BP	Commissioner of Highways
EXAM'D	JF	Date 29/5/62
PASSED		Chief Engineer
ENGR'S FOR DESIGN EXAMINED		Date 29/5/62
DISTRICT ENGINEER		
SCALE	40ft. to 1in.	

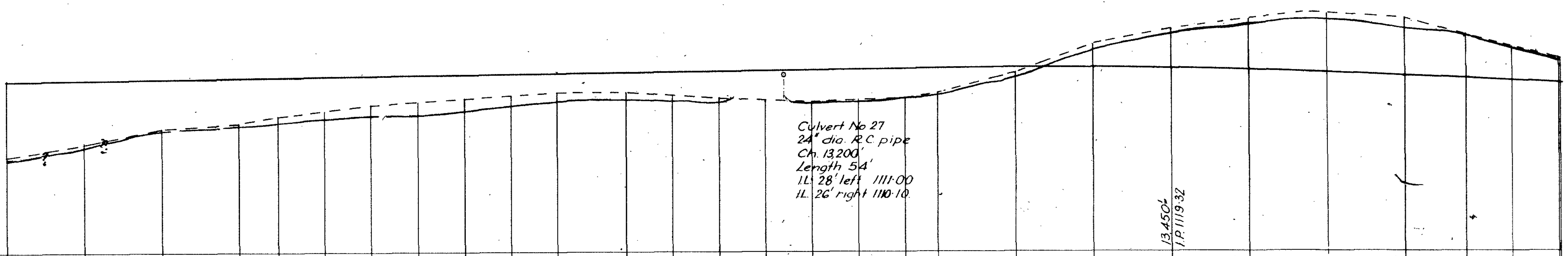
HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. No. 272
DEVIATION AT KANGAROO CREEK DAM
11600' – 12700'

Consulting Engineers Len T. Frazer & Associates, 3 Wellington Street, Kew E.4 Victoria

Job No. 254. 1 5 62

H.L.&L.G. DOCUMENT	
D.C.D. DOCUMENT	
	G
SHEET No.	12
FILE No.	2940

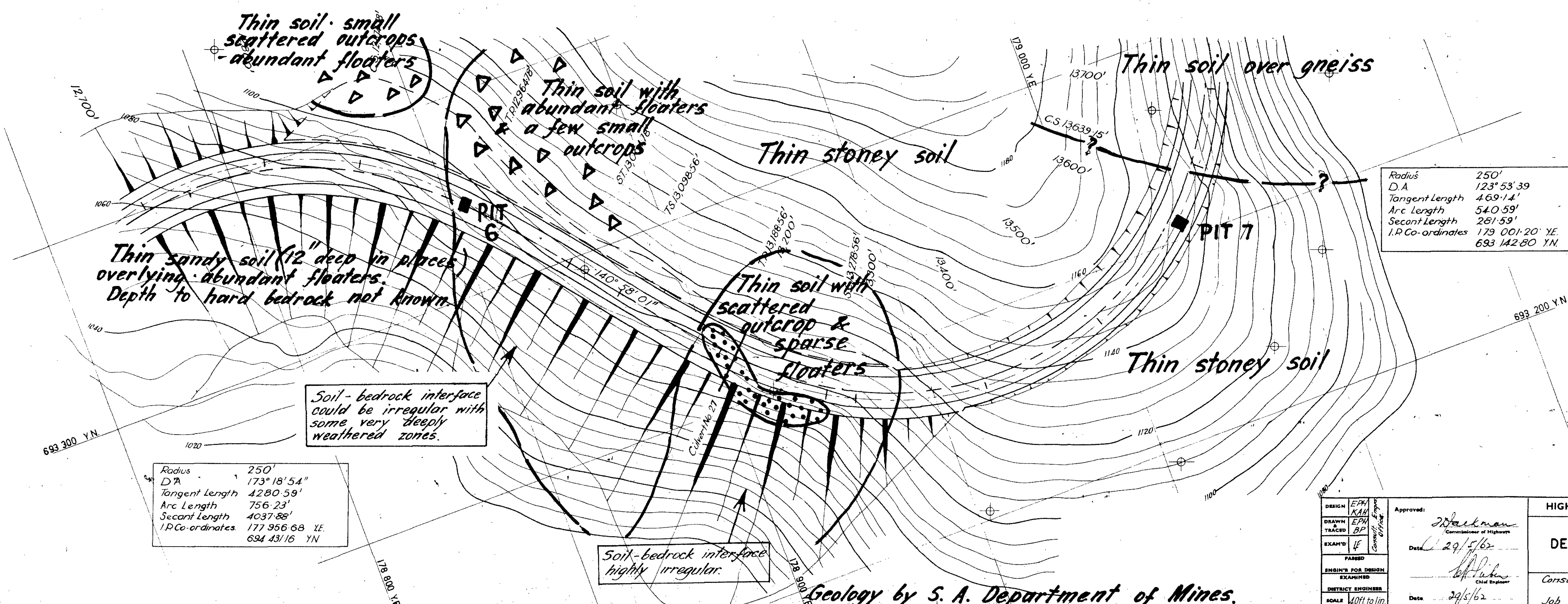


Datum R.L. 1000·00

		12700'	12750'	12800'	12850'	12874·78	12904·78'	12934·78'	12964·78'	12994·78'	13024·78'	13054·78
EXISTING R.L. AT CENTRELINE		1061	1069	1079	1082	1087		1094		1098		1102
GRADIENT OF CENTRELINE		Grade +1·20%										
RELATION OF EDGES TO CENTRELINE	LEFT EDGE	+15"		+15"		+15"	+1 3/8"	+10 3/4"	+5 1/4"	-1/8"	-3 3/8"	-3 3/4"
	RIGHT EDGE		-15"		-15"	-15"	-14 3/8"	-12 1/4"	-9 3/4"	-6 7/8"	-5"	-3 3/4"
RELATION OF CENTRELINE TO PEG		+48'4 3/4"		+30'7"					+16'1 1/4"			
R.L. OF CENTRELINE		1110·32	1110·92	1111·52	1112·12	1112·42	1112·78	1113·14	1113·50	1113·86	1114·22	1114·58
R.L. OF REFERENCE PEG		1061·93		1080·95					1097·39			
CHAINAGE ON CENTRELINE		12700'	12750'	12800'	12850'	12874·78	12904·78'	12934·78'	12964·78'	12994·78'	13024·78'	13054·78

		13098·56'	13128·56'	13158·56'	13188·56'	13218·56'	13248·56'	13278·56'	13300'	13350'	13400'	13450'	13500'	13550'	13600'	13639·15'	13669·15'	13699·15'	13700'
EXISTING R.L. AT CENTRELINE		1102		1098		1036		1098	1101	1114	1132	1142	1148	1152	1148	1138		1123	1123
GRADIENT OF CENTRELINE											300' V.C. Summit					Grade -4·86%			
RELATION OF EDGES TO CENTRELINE	LEFT EDGE	-3 3/4"	-5"	-6 7/8"	-9 3/4"	-12 1/4"	-14 3/8"	-15"	-15"		-15"		-15"		-15"	-15"	-14 3/8"	-12 1/4"	
	RIGHT EDGE	-3 3/4"	-3 3/8"	-1/8"	+5 1/4"	+10 3/4"	+13 3/8"	+15"		+15"		+15"		+15"		+15"	+13 3/8"	+10 3/4"	
RELATION OF CENTRELINE TO PEG					+15'6"				+14'1 1/2"		-17'10"		-34'1 1/4"		-36'10 3/4"				
R.L. OF CENTRELINE		1115·11	1115·47	1115·83	1116·19	1116·55	1116·91	1117·27	1117·52	1117·87	1117·71	1117·06	1115·87	1114·20	1112·02	1110·12	1108·67	1107·22	1107·16
R.L. OF REFERENCE PEG					1100·69 (on rock)				1103·38		1133·54		1149·97		1148·90				
CHAINAGE ON CENTRELINE		13098·56'	13128·56'	13158·56'	13188·56'	13218·56'	13248·56'	13278·56'	13300'	13350'	13400'	13450'	13500'	13550'	13600'	13639·15'	13669·15'	13699·15'	13700'

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



Geology by S. A. Department of Mines.

HALF SIZE PRINT

The scales of the drawings on the sheet are exactly half those figured under each drawing.

DESIGN	EPH KAH	Consult. Engrs Office	
DRAWN & TRACED	EPH BP		
EXAM'D	LF		
PASSED ENGIN'R FOR DESIGN			
EXAMINED DISTRICT ENGINEER			
SCALE	40ft to 1in.		

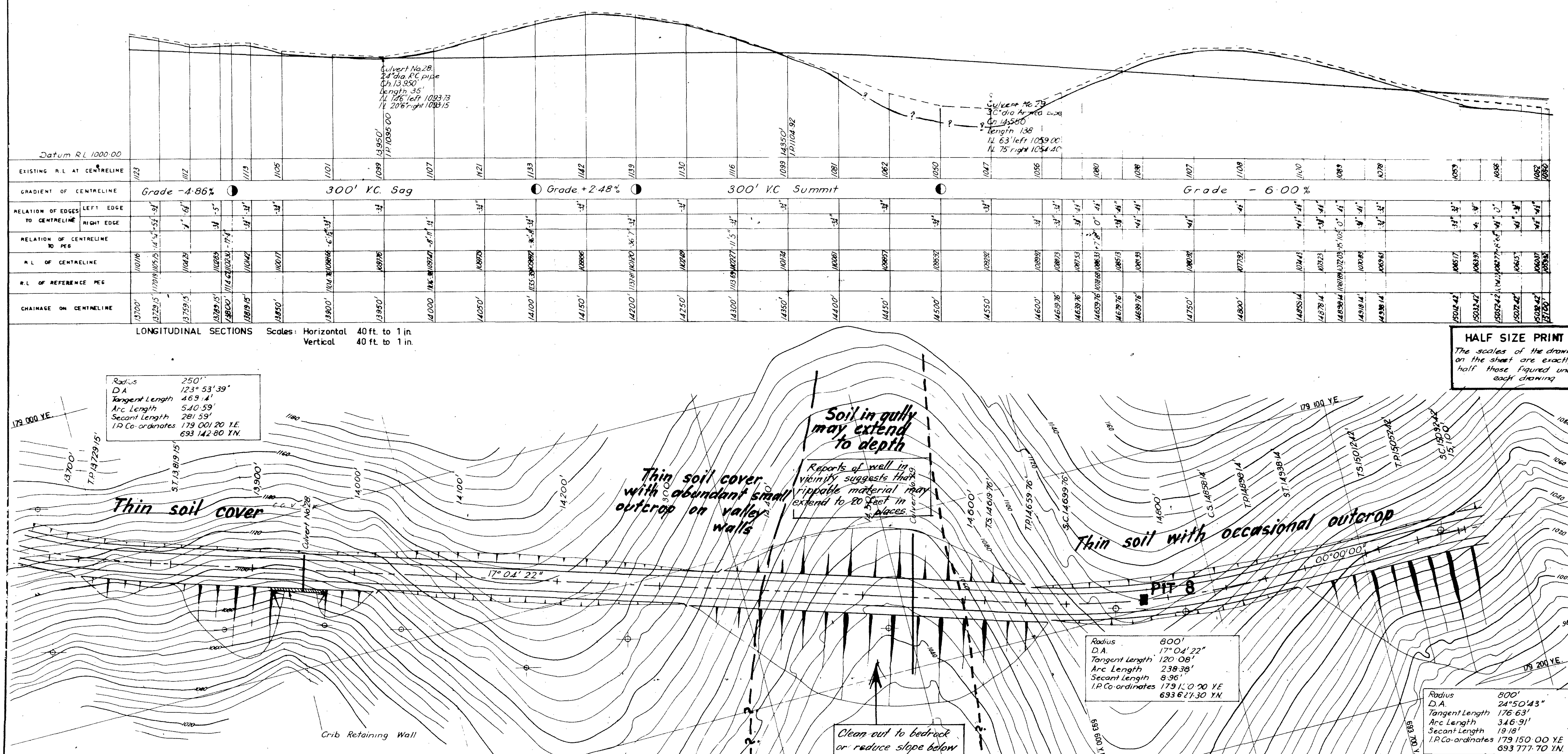
Approved: [signature] Commissioner of Highways
Date 29/5/62
[signature] Chief Engineer
Date 29/5/62

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. No. 272
DEVIATION AT KANGAROO CREEK DAM
12700' - 13700'

Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew. E4. Victoria
Job No. 254. 1:5:62.

H.&L.G. DOCKET
B.O. DOCKET
G
SHEET No. 13
FILE No. 2940



Design	EPH KAH
Drawn & Traced	EPH BP
Exam'd	LF
Scale	40ft. to 1in.

Consult. Engrs. Office

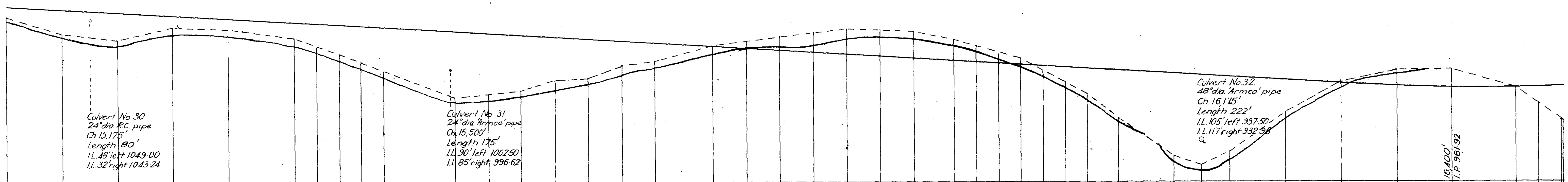
Approved: [signature] Commissioner of Highways
Date 29/5/62
[signature] Chief Engineer
Date 29/5/62

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
13700' – 15100'

Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew. E.4. Victoria.
Job No 254. 1:5:62.

G
Sheet No. 14
File No. 2940

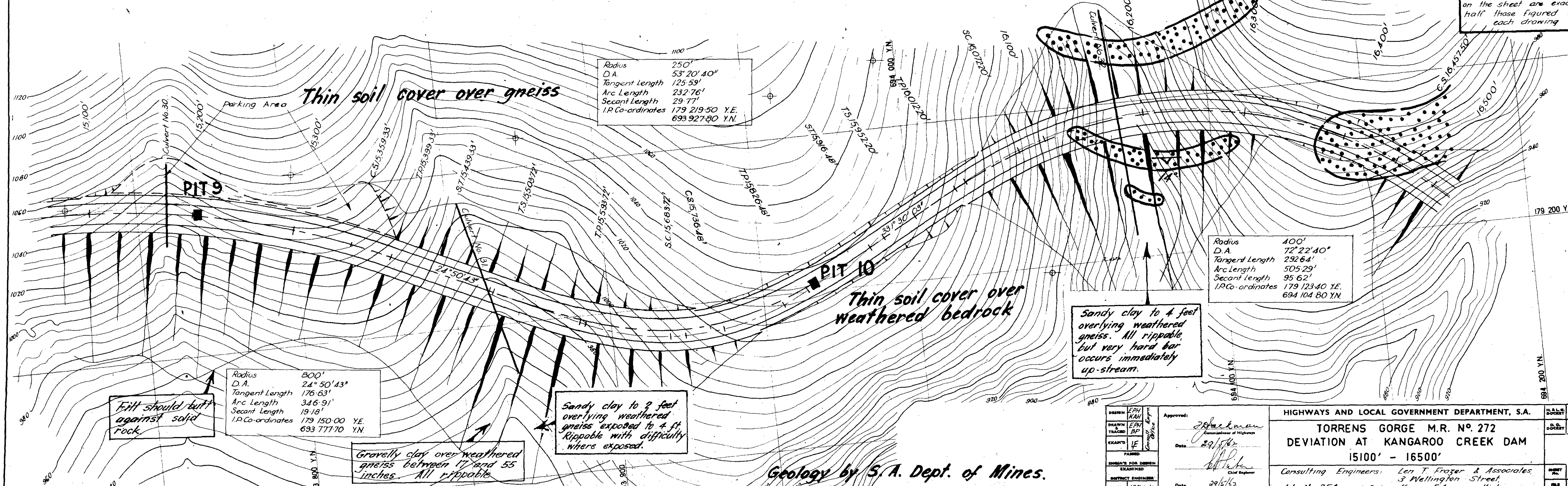


Datum R.L. 900·00

CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	GRADIENT OF CENTRELINE	RELATION OF EDGES TO CENTRELINE: LEFT EDGE	RELATION OF EDGES TO CENTRELINE: RIGHT EDGE	RELATION OF CENTRELINE TO PEG	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
15100'	1050			-4½"		1059·92	
15150'	1035		+4½"			1056·92	
15200'	1029			-4½"	+26'10½"	1053·92	1027·05
15250'	1040		+4½"			1050·92	
15300'	1038			-4½"	+10'9½"	1047·92	1037·12
15359·33'	1030		+4½"	-4½"		1044·36	
15379·33'			+3⅜"	-4½"		1043·16	
15399·33'	1016		0"	-4½"	+27'6½"	1041·96	1014·44
15419·33'			-3⅜"	-4½"		1040·76	
15439·33'	1000		-3¾"	-3¾"		1039·56	
15503·72'	976		-3¾"	-3¾"		1035·70	
15533·72'			-5"	-3⅜"		1033·90	
15563·72'	982		-6⅜"	-⅛"		1032·10	
15593·72'			-9¼"	+5¼"	+46'7½"	1030·30	983·67
15623·72'	993		-12¾"	+10¾"		1028·50	
15653·72'			-14⅜"	+13⅜"		1026·70	
15683·72'	1008	Grade -6·00%	-15"	+15"		1024·90	
15736·48'	1022		-15"	+15"		1021·73	
15766·48'			-14⅜"	+13⅜"		1019·93	
15796·48'	1029		-12¾"	+10¾"		1018·13	
15826·48'			-9¼"	+5¼"	-16'8"	1016·33	1032·99
15856·48'	1036		-6⅜"	-⅛"		1014·53	
15886·48'			-5"	-3⅜"		1012·73	
15916·48'	1034		-3¾"	-3¾"		1010·93	
15952·20'	1027		-3¾"	-3¾"		1008·79	
15972·20'			-3¼"	-4¼"		1007·59	
15992·20'			-1¼"	-5¼"		1006·39	
16012·20'	1010		+2¼"	-6¾"	-4'2¼"	1005·19	1009·10
16032·20'			+6"	-8"		1003·99	
16052·20'			+8¼"	-8¼"		1002·79	
16072·20'	978		+9"	-9"		1001·59	
16100'	957			-9"		999·92	
16150'	923		+9"			996·92	
16175'	915			-9"		995·42	
16200'	927		+9"			993·92	
16250'	962			-9"		990·92	
16300'	988	200' V.C. Sag	+9"		-3'3"	987·92	991·17
16350'	999			-9"		984·52	
16400'	1000		+9"		-15'1½"	984·32	1000·28
16457·50'	984		+9"	-9"		984·12	
16477·50'			+8¼"	-8¼"		984·83	
16497·50'			+6"	-8"		985·43	
16500'	955					985·52	

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing



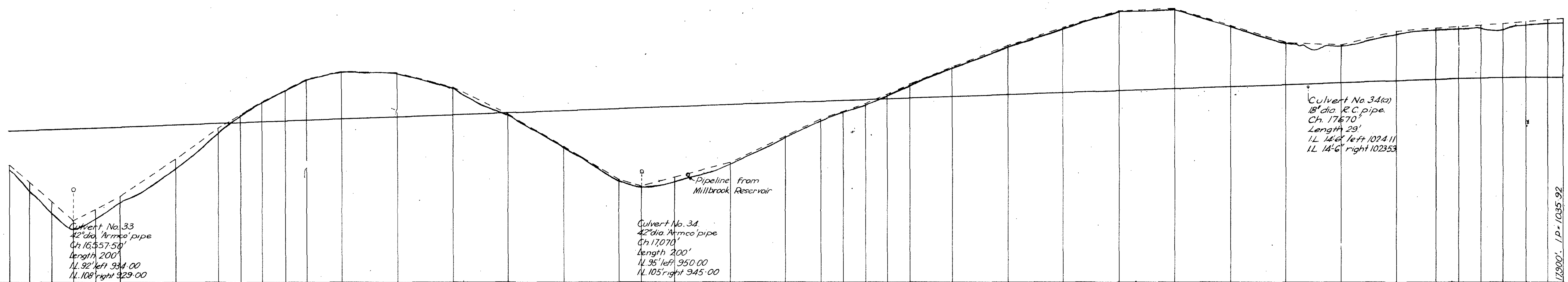
DESIGN	EPH KAH	Consult. Engrs. Office	Approved: [signature] Commissioner of Highways Date 29/5/62
DRAWN & TRACED	EPH BP		
EXAM'D	LF		
PASSED ENGIN'R FOR DESIGN / EXAMINED DISTRICT ENGINEER			[signature] Chief Engineer Date 29/5/62
SCALE	40ft. to 1 in.		

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. No. 272
DEVIATION AT KANGAROO CREEK DAM
15100' – 16500'

Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4. Victoria
Job No. 254. 1:5:62

H.&L.G. DOCKET
D.O. DOCKET
G
SHEET No. 15
FILE No. 2940

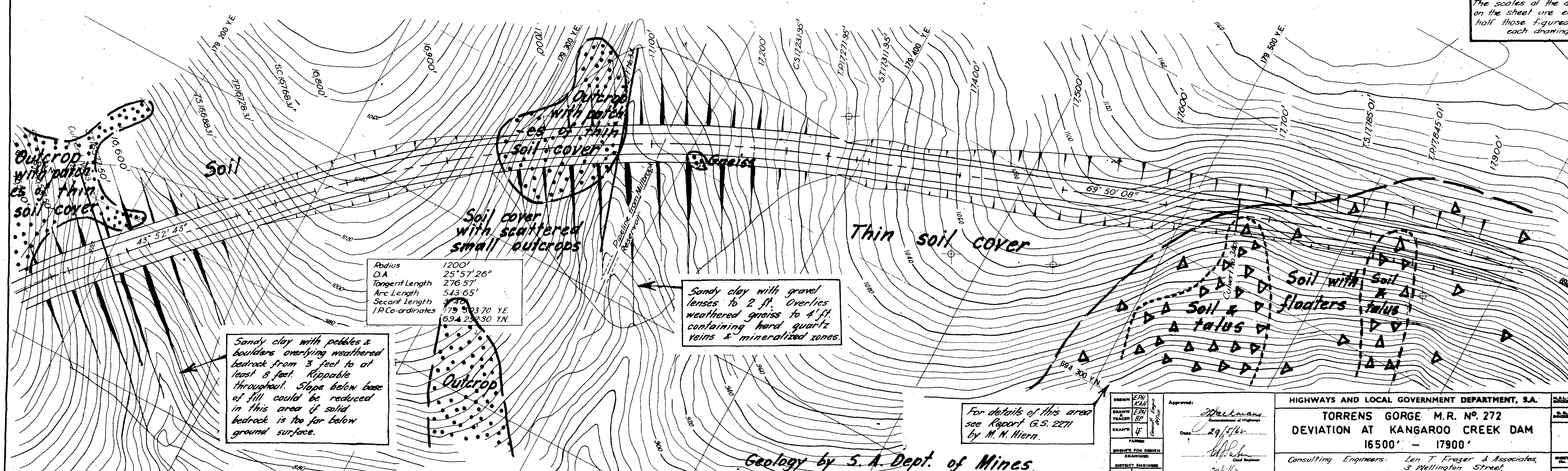


Gradient of centreline: Grade + 3·60 % — 200' V.C. Summit

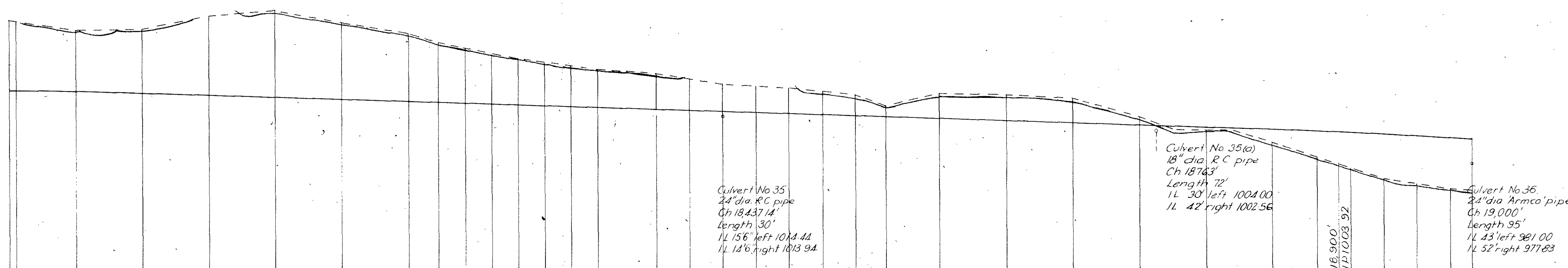
Chainage on centreline	Existing R.L. at centreline	Relation of edges to centreline: Left edge	Relation of edges to centreline: Right edge	Relation of centreline to peg	R.L. of centreline	R.L. of reference peg
16500'	955				985·52	
16517·50'		+2¼"	-6¼"	+50'11"	986·15	935·24
16537·50'		-1½"	-5¾"		986·87	
16557·50'	905	-3¾"	-4½"		987·59	
16577·50'	915	-3¾"	-3¾"		988·31	
16600'	927		-3¾"	+59'6"	989·12	929·63
16650'	960	-3¾"			990·92	
16688·31'	988	-3¾"	-3¾"		992·30	
16708·31'		-3⅜"	-4½"		993·02	
16728·31'	1012	0"	-4½"	-18'2"	993·74	1011·91
16748·31'		+3⅜"	-4½"		994·46	
16768·31'	1032	+4½"	-4½"		995·18	
16800'	1039		-4½"		996·32	
16850'	1038	+4½"			998·12	
16900'	1025		-4½"	-27'10¼"	999·92	1026·95
16950'	1001	+4½"			1001·72	
17000'	972		-4½"		1003·52	
17050'	942	+4½"			1005·32	
17070'	936		-4½"		1006·04	
17100'	944	+4½"		+62'1"	1007·12	945·05
17150'	957		-4½"		1008·92	
17200'	980	+4½"			1010·72	
17231·95'	996	+4½"	-4½"		1011·87	
17251·95'		+3⅜"	-4½"		1012·59	
17271·95'	1010	0"	-4½"	+2'10½"	1013·31	1010·44
17291·95'		-3⅜"	-4½"		1014·03	
17311·95'	1027	-3¾"	-3¾"		1014·75	
17350'	1043		-3¾"		1016·12	
17400'	1062	-3¾"		-44'1¼"	1017·92	1062·02
17450'	1078		-3¾"		1019·72	
17500'	1093	-3¾"		-70'1"	1021·52	1081·59
17550'	1095		-3¾"		1023·32	
17600'	1080	-3¾"			1025·12	
17650'	1065		-3¾"		1026·92	
17700'	1063	-3¾"		-33'4¼"	1028·72	1062·09
17750'	1075		-3¾"		1030·52	
17785·01'	1078	-3¾"	-3¾"		1031·78	
17800'					1032·32	
17805·01'		-3¾"	-4¼"		1032·50	
17825·01'	1082	-1½"	-5½"		1033·11	
17845·01'		+2¼"	-6¼"	-50'0¼"	1033·60	1083·62
17865·01'		+6"	-8"		1033·94	
17885·01'		+8¼"	-8¼"		1034·15	
17900'	1087				1034·22	

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing



Design: EPH KAH	Approved: [signature] Commissioner of Highways	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.	H.& L.G. Docket
Drawn & Traced: EPH BP	Date 29/5/62	TORRENS GORGE M.R. Nº. 272 DEVIATION AT KANGAROO CREEK DAM 16500' – 17900'	S.D. Docket
Exam'd: LF (Consult. Engrs. Office)	[signature] Chief Engineer		G
Passed		Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew. E.4. Victoria	Sheet No. 16
Engineer for Design Examined	Date 29/5/62	Job No. 254 1 : 5 : 62.	File No. 2940
District Engineer			
Scale 40ft. to 1in.			

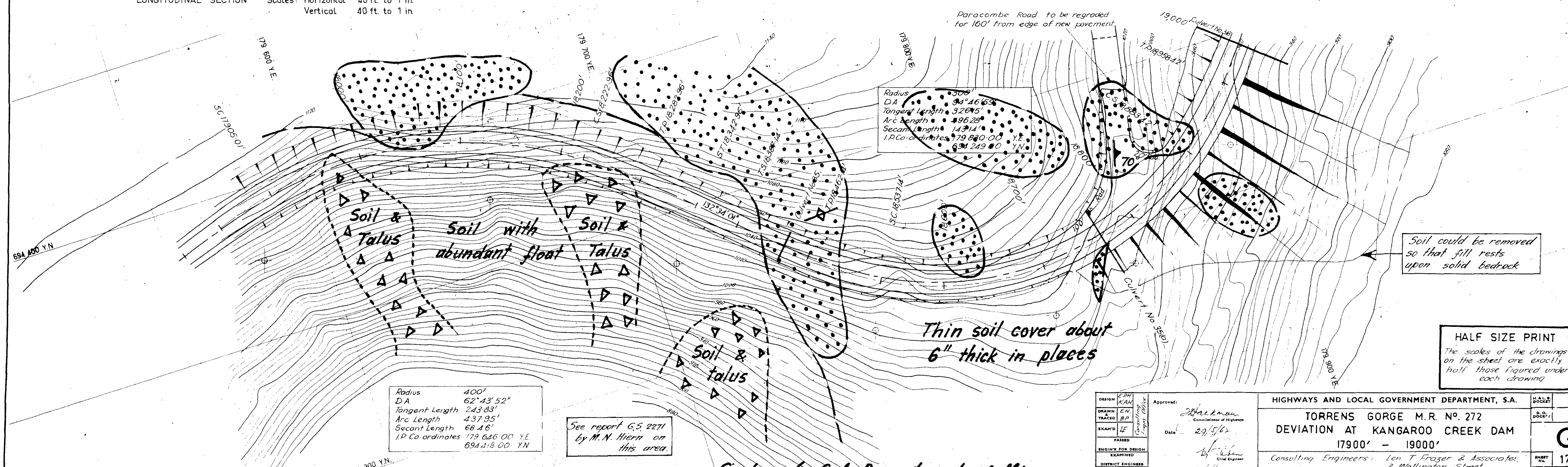


Datum R.L. 900.00

GRADIENT OF CENTRELINE: 200' V.C. Summit — Grade -3·20 % — 200' V.C. Summit

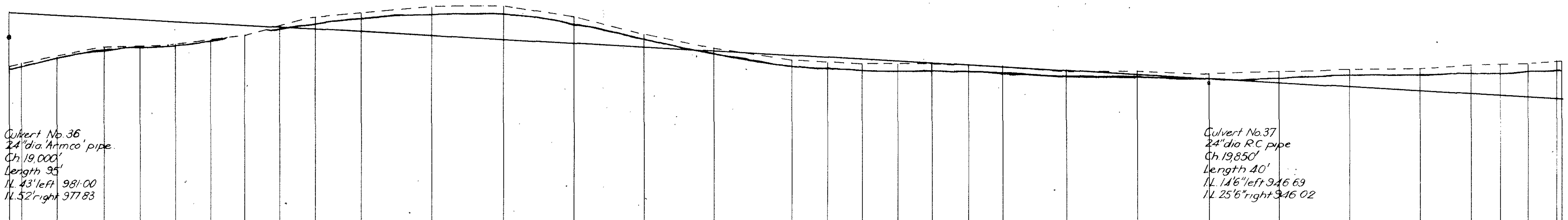
CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	RELATION OF EDGES TO CENTRELINE: LEFT EDGE	RELATION OF EDGES TO CENTRELINE: RIGHT EDGE	RELATION OF CENTRELINE TO PEG	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
17900'	1087				1034.22	
17905.01'	1086	+9"	-9"	-53'8¼"	1034.27	1087.93
17950'	1080		-9"		1033.89	
18000'	1080	+9"		-46'10"	1032.72	1019.56
18050'	1090		-9"		1031.12	
18100'	1094	+9"		-63'6¾"	1029.52	1093.06
18150'	1085		-9"		1027.92	
18200'	1077	+9"		-53'2"	1026.32	1079.48
18222.96'	1070	+9"	-9"		1025.58	
18242.96'		+8¾"	-8¾"		1024.94	
18262.96'		+6"	-8"		1024.30	
18282.96'	1058	+2¼"	-6¾"	-34'2"	1023.66	1051.87
18302.96'		-1½"	-5½"		1023.02	
18322.96'		-3¼"	-4¼"		1022.38	
18342.96'	1050	-3¼"	3¾"		1021.74	
18387.14'	1047	-3¾"	-3¾"	-24'11¾"	1020.33	1045.31
18412.14'		-5"	-3⅜"		1019.53	
18437.14'	1039	-6⅞"	-⅛"		1018.73	
18462.14'		-9¾"	-5¼"	-19'3¼"	1017.93	1037.21
18487.14'	1036	-12¾"	+10¾"		1017.13	
18512.14'		-14⅜"	+13⅜"		1016.33	
18537.14'	1031	-15"	+15"		1015.53	
18560'	1023		+15"		1014.80	
18600'	1032	-15"		-17'8¾"	1013.52	1031.27
18650'	1031		+15"		1011.92	
18700'	1029	-15"		-18'0"	1010.32	1028.31
18750'	1015		+15"		1008.72	
18800'	1005	-15"		+4'3½"	1007.12	1004.83
18850'	996		+15"		1005.37	
18883.42'	985	-15"	+15"	+17'4½"	1004.03	986.65
18900'					1003.37	
18908.42'		-14⅜"	+13⅜"		1002.95	
18933.42'	969	-12¼"	+10¾"		1001.78	
18958.42'		-9¾"	+5¼"	+35'7½"	1000.55	964.92
18983.42'	961	-6⅞"	-⅛"		999.23	
19000'	960				998.32	

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

DESIGN: E.P.H. K.A.H.	Approved: [signature] Commissioner of Highways, Date 29/5/62	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.	H.&L.G. DOCKET
DRAWN & TRACED: E.H. B.P. (Consulting Engrs Office)		TORRENS GORGE M.R. No. 272 DEVIATION AT KANGAROO CREEK DAM 17900' - 19000'	D.O. DOCKET / G
EXAM'D: L.F.			
PASSED ENGIN'R FOR DESIGN	[signature] Chief Engineer		
EXAMINED DISTRICT ENGINEER		Consulting Engineers: Len T Frazer & Associates 3 Wellington Street Kew E4 Victoria	SHEET No. 17
SCALE 40ft to 1in.	Date 29/5/62	Job No 254 1 : 5 62	FILE No. 2940



Datum RL 850·00

GRADIENT OF CENTRELINE: Grade −5·60%

CHAINAGE ON CENTRELINE	EXISTING R.L. AT CENTRELINE	RELATION OF EDGES TO CENTRELINE – LEFT EDGE	RELATION OF EDGES TO CENTRELINE – RIGHT EDGE	RELATION OF CENTRELINE TO PEG	R.L. OF CENTRELINE	R.L. OF REFERENCE PEG
19000'	960				998.32	
19008.42'		-5"	-3⅜"		997.85	
19033.42'	968	-3¾"	-3¾"	+29'5"	996.45	967.05
19067.22'	974	-3¾"	-3¾"		994.56	
19092.22'		-5"	-3⅜"		993.16	
19117.22'	975	-6⅞"	-⅛"		991.76	
19142.22'		-9¾"	+5¼"	+13'4"	990.36	977.04
19167.22'	982	-12¼"	+10¼"		988.96	
19192.22'		-14⅜"	+13⅞"		987.56	
19217.22'	994	-15"	+15"	-4'11¼"	986.16	991.12
19250'	997		+15"		984.32	
19300'	1002	-15"		-18'7¾"	981.52	1000.13
19350'	1002		+15"		978.72	
19400'	994	-15"		-18'8¾"	975.92	994.65
19450'	982		+15"		973.12	
19500'	972	-15"		-4¼"	970.32	970.67
19555.16'	964	-15"	+15"	+4'11"	967.23	962.31
19580.16'		-14⅜"	+13⅞"		965.83	
19605.16'	961	-12¼"	+10¼"		964.43	
19630.16'		-9¾"	+5¼"		963.03	
19655.16'	961	-6⅞"	-⅛"		961.63	
19680.16'		-5"	-3⅜"		960.23	
19705.16'	959	-3¾"	-3¾"	+1'6½"	958.83	951.28
19750'	956		-3¾"		956.32	
19800'	956	-3¾"			953.52	
19850'	954		-3¾"		950.72	
19900'	956	-3¾"			947.92	
19950'	957		-3¾"		945.12	
20000'	958	-3¾"			942.32	
20036.55'	960	-3¾"	-3¾"		940.27	
20056.55'		-4½"	-3⅜"		939.15	
20076.55'	961	-4½"	0"		938.03	
20096.55'		-4½"	+3⅜"		936.91	
20100'	963				936.72	

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in. Vertical 40 ft. to 1 in.

HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

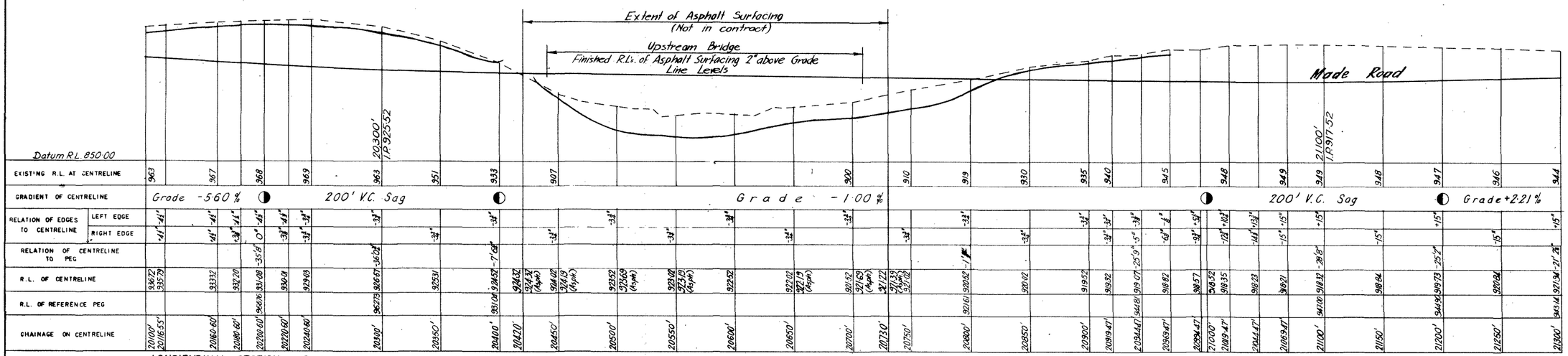
DESIGN	EPH KAH	Consulting Engrs Office	Approved:
DRAWN & TRACED	EPH BP		Commissioner of Highways Date 29/5/62
EXAM'D	LF		
PASSED ENGIN'R FOR DESIGN			Chief Engineer
EXAMINED DISTRICT ENGINEER			Date 29.5.62
SCALE	40ft to 1in.		

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

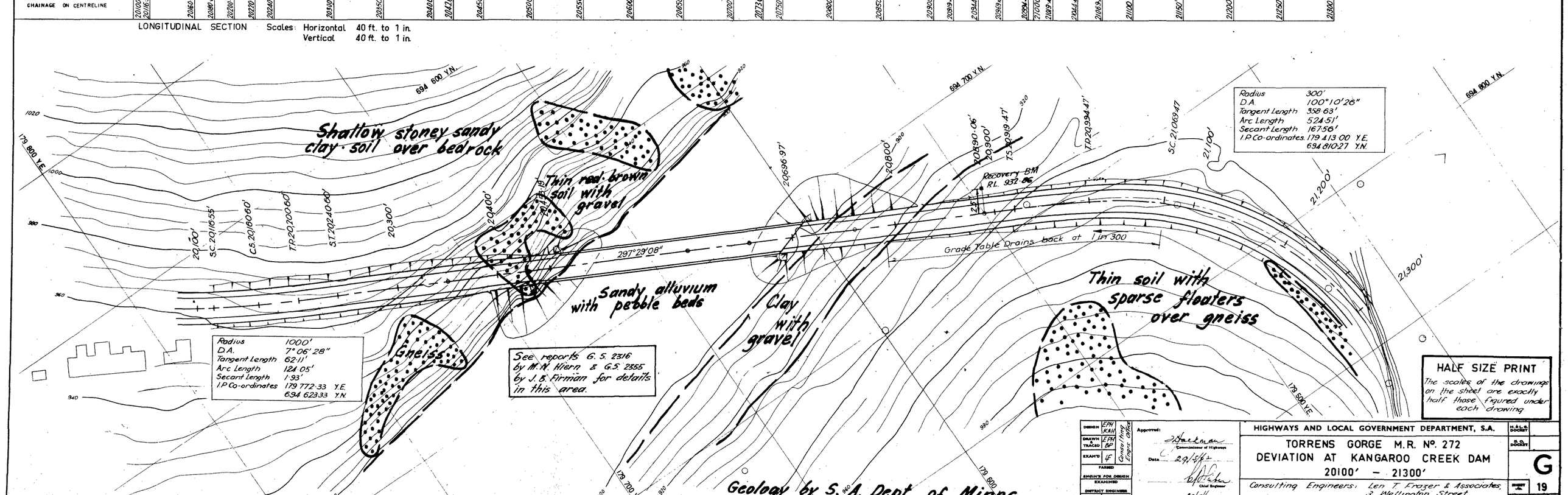
TORRENS GORGE M.R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
19000' — 20100'

Consulting Engineers: Len T Frazer & Associates, 3 Wellington Street, Kew E.4, Victoria.
Job No 254 1:5:62

H.&L.G. DOCKET
D.O. DOCKET
G
SHEET No. 18
FILE No. 2940



LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



HALF SIZE PRINT
The scales of the drawings on the sheet are exactly half those figured under each drawing

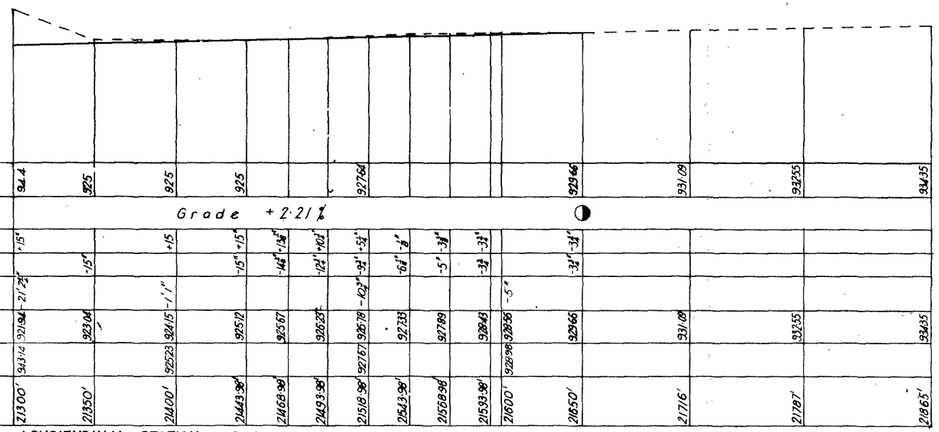
DESIGN	EPH KAH	Approved: H. Hackman, Commissioner of Highways. Date 29/5/62
DRAWN TRACED	EPH BP	
EXAM'D	JF	Consulting Engr. Office. Chief Engineer. Date 29/5/62
PASSED ENGR'G FOR DESIGN		
EXAMINED DISTRICT ENGINEER		
SCALE	40ft. to 1in.	

HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.

TORRENS GORGE M.R. Nº. 272
DEVIATION AT KANGAROO CREEK DAM
20100' – 21300'

Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew E.4 Victoria.
Job No 254 1:5:62.

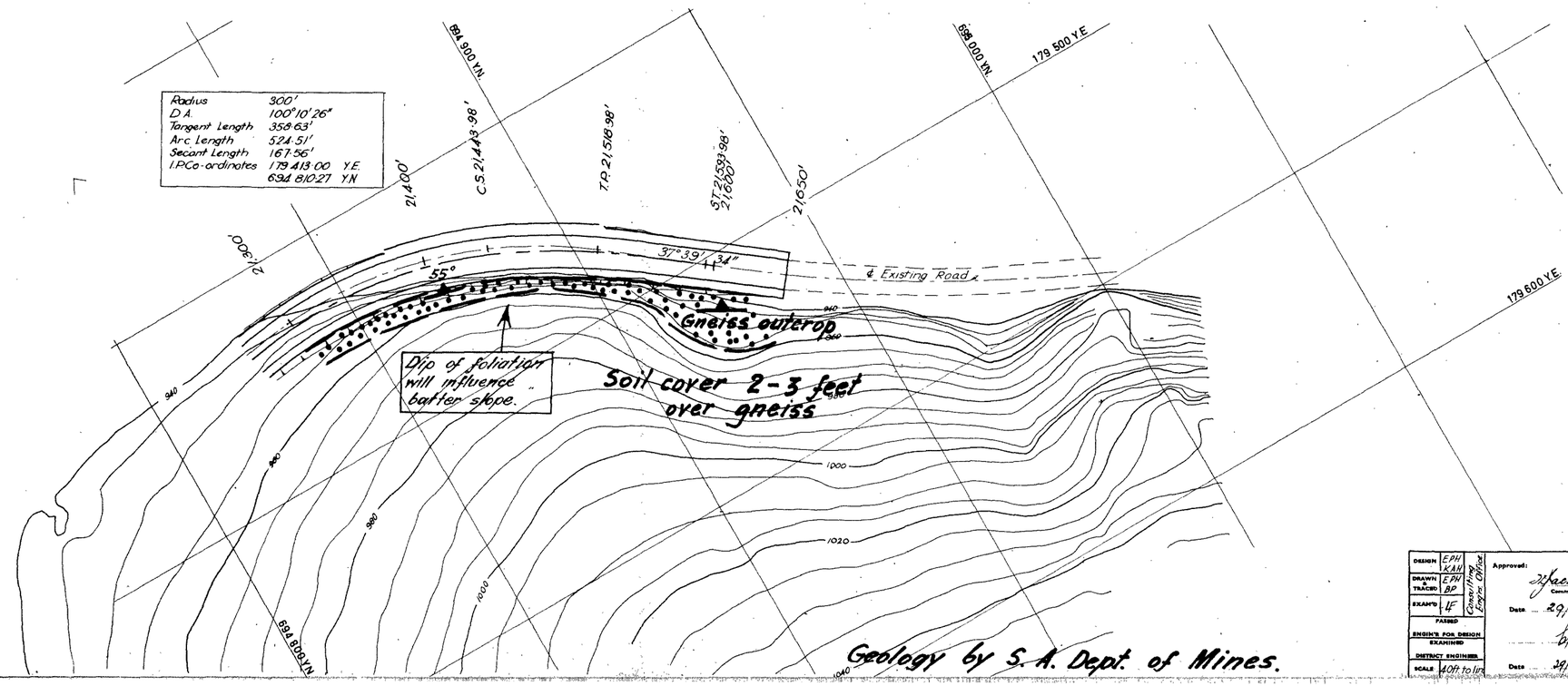
H.L.&L.G. DOCKET
S.O. DOCKET
G
SHEET No. 19
TOTAL SHEETS 2940



Datum R.L. 850·00

EXISTING R.L. AT CENTRELINE	924	925		925		925			927·66					929·46		931·09		932·55	934·35
GRADIENT OF CENTRELINE	Grade +2·21%																		
RELATION OF EDGES TO CENTRELINE — LEFT EDGE	+15'			+15'		+15'	+15'	-14'	-12'	+02'	-04'	-14'	-8'	-5'	-3'	-3'		-3'	
RELATION OF EDGES TO CENTRELINE — RIGHT EDGE		-15'				-15'	-14'	-18'	-24'	-32'	-42'	-54'	-16'	-8'	-5'	-3'	-3'	-3'	
RELATION OF CENTRELINE TO PEG	-21·72			-1·1												-5·5			
R.L. OF CENTRELINE	921·94	923·04		925·12		926·67			928·23		928·78	929·67	932·35	929·89	928·49	928·56	929·46	931·09	932·55	934·35
R.L. OF REFERENCE PEG	943·14			922·23								921·12				928·96			
CHAINAGE ON CENTRELINE	21300'	21350'		21400'		21443·98'	21468·98'		21493·98'		21518·98'	21543·98'		21568·98'	21593·98'	21600'	21650'	21716'	21787'	21865'

LONGITUDINAL SECTION Scales: Horizontal 40 ft. to 1 in.
Vertical 40 ft. to 1 in.



HALF SIZE PRINT
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DESIGN	EPH KAH	Approved: J. Jackman, Commissioner of Highways	HIGHWAYS AND LOCAL GOVERNMENT DEPARTMENT, S.A.
DRAWN & TRACED	EPH BP	Date 29/5/62	TORRENS GORGE M.R. No. 272
EXAM'D	IF		DEVIATION AT KANGAROO CREEK DAM
PASSED ENGIN'R FOR DESIGN			21300' — 21865'
EXAMINED DISTRICT ENGINEER		Date 29/5/62	Consulting Engineers: Len T. Frazer & Associates, 3 Wellington Street, Kew, E.4, Victoria
SCALE 40ft to 1in.			Job No. 254 1.5.62

H. & L. G. DOCKET —
S.D. DOCKET —
G
SHEET No. 20
FILE No. 2940