A DETAILED GRAVITY STUDY OF THE CHARLESTON, SOUTH CAROLINA, EPICENTRAL ZONE

A THESIS

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A DETAILED GRAVITY STUDY OF THE CHARLESTON,

SOUTH CAROLINA, EPICENTRAL ZONE

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SUMMARY

Approximately 2000 new gravity measurements were made near Charleston, South Carolina, in the suspected epicentral zone of the 1886 earthquake. These data were used to construct a simple Bouguer gravity map. The data were contoured at 1 milligal intervals. The contours delineate several major features. In the central western quadrangle, a large positive anomaly exhibits a steep gravity gradient of 2 to 3 milligals per kilometer on both its northern and southern sides. This positive anomaly is interpreted to result from a large basic plug which extends upward to within 1 kilometer of the surface. To the east of this anomaly the gradient becomes less steep and the contours begin to spread, forming a nose-like, low-magnitude, positive anomaly. This anomaly is considered to result from basic flows intermixed with coastal plain sediments. Surrounding the nose-like anomaly there are large negative anomalies which are interpreted to be representative of deep sedimentary basins. The northern quadrangles contain several low-magnitude positive and negative anomalies which are interpreted to represent, respectively, small basic plugs and shallow basins. The map also suggests the presence of a linear anomaly which trends approximately N 45° E and passes 6 kilometers to the southeast of Summerville, South Carolina. This linear anomaly is observed in a residual Bouguer gravity anomaly map as well as in a two-dimensional spectral analysis of the residual gravity.

Three-dimensional modeling of the simple Bouguer gravity data

shows that the linear alignment of anomalies can be interpreted to result from basic flows which are down-faulted to the southeast. The throw on the interpreted fault would be on the order of 1.5 kilometers. The magnitude of this throw agrees with that determined by two-dimensional modeling of a pair of detailed gravity profiles which traverse this lineation.

Cross correlation coefficients between gravity and topography were computed for each of eleven detailed gravity profiles and their residuals. Four of the five traverses crossing the linear anomaly show close correspondence between gravity and topography. This may indicate that structural features in the basement rocks are paralleled by the surface topography. Similarly, close correspondence between two residual gravity profiles and topography may indicate that these basement structures locally extend into the sedimentary beds above the basement, which in turn, may be indicative of recent vertical movement.

Based on five detailed gravity profiles, the northeastern termination of this linear anomaly, which is interpreted as a fault, is just north of the northeastern sedimentary basin observed on the simple Bouguer gravity map. The southwestern extent of this feature is uncertain, but it is not considered to terminate within the area of investigation.

In general, it is not unreasonable to expect that such a fault exists under the Atlantic Coastal Plain because many such buried grabens have been found. However, it is suggested that well loggings should be concentrated within this area to determine the validity of this interpretation. If a graben is present, isostatic readjustments within such a down-faulted block may explain the earthquake activity in this area.

CHAPTER I

INTRODUCTION

Within recorded history, several damaging earthquakes have occurred in the area of Charleston, South Carolina. The most disastrous of these was the August 31, 1886, earthquake which resulted in the loss of several lives and considerable damage to various structures in the city of Charleston and the surrounding area.

Although many events have been felt in the region since 1886, no fault to which the activity can be definitely attributed has been located, nor has any other satisfactory cause for the seismicity been determined. The probable reason that no tectonic cause has yet been agreed upon is that the structure responsible is not only apparently quite complex, but also is hidden by approximately 2500 feet of Post Paleozoic sediments and basalts. The surface of these sediments shows no evidence of displacements related to the earthquakes. Woollard, et al., (1957) were among the first to approach the problem of the structure of the Coastal Plain basement rocks through geophysical methods. They obtained regional gravity data at an average station spacing of 5 kilometers and ran seismic refraction profiles in most of the eastern states adjoining the Atlantic Ocean. However, they obtained very little data in the Charleston-Summerville area. The lack of detailed regional data prevented detailed structural analysis of the crystalline basement in this area.

Cooke (1936) after logging a deep well near Summerville, South

Carolina, reported that the well bottomed in basalts after passing through an 800-foot layer of Triassic sediments. This report led many to believe that there might be a relationship between the Florence Triassic basin and the Charleston area.

Mansfield (1936) also studied these well cuttings. He reported that the cuttings contained no Triassic sediments and dated the material which Cooke had called Triassic as Cretaceous. Woollard, et al., (1957), assuming that Mansfield was correct, suggested that the epicentral area near Charleston, South Carolina, might be related to some structure other than the Florence basin, and suggested the Yamacraw Ridge and the associated basement valley to the north of it.

Pooley (1960) studied the Yamacraw uplift in detail (Figure 1). He concluded that his seismic information did not preclude the possibility that the earthquakes to the north of this ridge resulted from faulting and folding due to this uplift.

Sheridan (1974) suggested that extensive block faulting has controlled the shape and location of major marginal basins. Wrench fault motion within these basins may have produced tensional faults along hingements. Sheridan also suggested that this faulting would be compatible with the rifting of the North American and Afro-European plates during the Jurassic. Associated with such tensional faulting of the continental margins, lithospheric density changes may have caused drastic subsidence.

Long (1975) has suggested that the earthquake activity in the South Carolina Coastal Plain may result from crustal flexing in response to isostatic readjustments of neighboring crustal rock having different

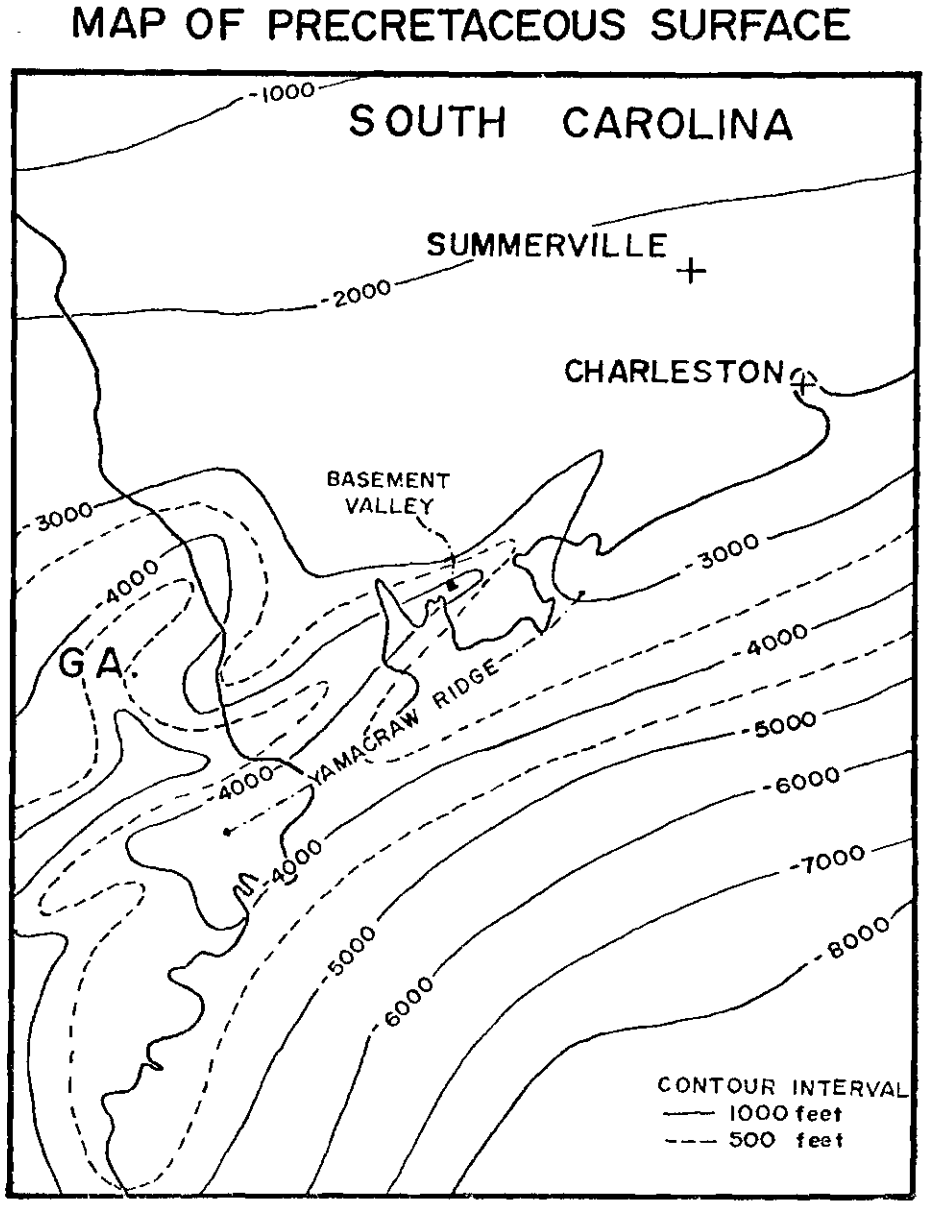

Figure 1. Map of Precretaceous Surface (after Pooley, 1960).

elastic characteristics. Under this assumption, earthquakes should be associated with more rigid rock such as basalts and diabases. Such rocks have been identified in the Charleston-Summerville area.

The purpose of this study was to obtain detailed gravity data in the Charleston epicentral region to be used to construct a structural model of this region which might aid in the search for a geologic cause of the region's tectonic activity.

CHAPTER II

GEOLOGIC SETTING

The stratigraphy determined for the Charleston-Summerville, South Carolina, region is based primarily on two well logs. A deep well near Summerville (Figure 2) passed through 2500 feet of Post Paleozoic sediments before reaching basalts at the bottom of the well. Cooke (1936) interpreted this well log. He identified the top 40 feet of sediments as Duplin Marl, which is a white sandy marl, and possibly the Hawthorn Formation, which consists of a gray clay, medium to fine grained sand, and a hard "shell rock". The Duplin Marl and the Hawthorn Formation are Miocene sediments. The Eocene beds, Cooper Marl, and Santee Limestone, lie below the Miocene beds and extend to a depth of approximately 300 feet. The Cooper Marl is a granular marl containing Foraminifera fossils. Santee Limestone is a soft cream-colored limestone. The Peedee Formation and possibly the Black Creek, or Tuscaloosa Formation, were logged between the depths of 300 feet and 1500 feet. This Upper Cretaceous material consists of dark gray, gritty clay and marl containing Inoceramus and Beleminitella fossils. Positive identification of the Tuscaloosa Formation was not possible, but was considered to comprise the region between 700 feet and 1580 feet. The material between 700 feet and 1500 feet contains a coarse quartz sand and a gray, rusty sand. Any fossil fragments found in the well cuttings from this depth were considered to be derived from fossiliferous beds above the 700 foot depth. At depths below 1580 feet, Cooke (1936) found material

consisting of a reddish sandstone and shale, intermixed with diabase which he interpreted to be Triassic. These Triassic sediments were thought to be of the Newark group. Crystalline basement, consisting of basalt, was encountered at 2550 feet, the bottom of the well. If Cooke's interpretation is correct, the region around Summerville, South Carolina, may have been a hill during the Triassic upon which no Tuscaloosa sediments were deposited.

Mansfield (1936) reinterpreted the well log near Summerville. Using paleontological data, he reported the region below 1600 feet to contain the Upper Cretaceous Tuscaloosa Formation. This region contained reddish sandy clay with inclusions of coarse quartz grains which, according to Stephenson (1926), suggests a delta or terrestrial deposit rather than a Triassic or deep water sedimentation. Mansfield states that the basement basalt is of an undetermined age.

Woollard, et al., (1957) gives a brief account of a 2000-foot well at Charleston, South Carolina, which was initially logged by Stephenson (1926). The strata encountered between the depths of 450 and 750 feet yielded no discernible fossils, but the area was thought to be Upper Cretaceous or Eocene. Foraminifera fossils which are considered characteristic of Cretaceous rock were found at 750 feet. Neither crystalline basement rock nor the Tuscaloosa Formation were reached.

Woollard, et al., (1957) used the formation from these two wells and his seismic refraction data to extrapolate a crystalline basement slope between Summerville and Charleston, South Carolina, of approximately 1°. However, Woollard's data were too general to be used to

determine detailed structural trends in the Charleston-Summerville area.

DEEP WELL NEAR SUMMERVILLE, S.C.
LOGGED BY COOKE

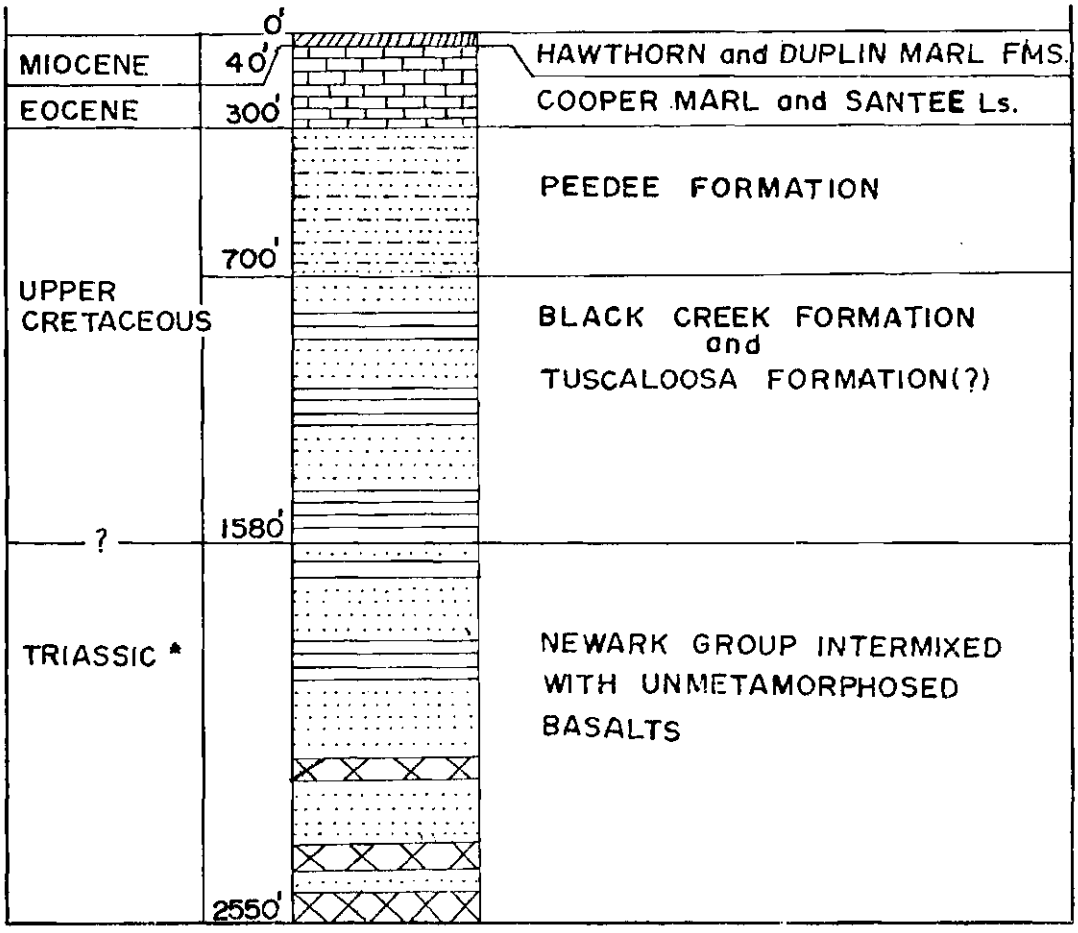

Figure 2. Deep Well Near Summerville, South Carolina (after Cooke, 1936). (*Mansfield (1936) disputed Cooke's interpretation of the material between the depths of 1580' and 2550'. He dated this rock as Cretaceous.)

CHAPTER III

REGIONAL GRAVITY

Based on gravity measurements made at approximately 2000 locations in the Charleston-Summerville, South Carolina, region (Figure 3) a simple Bouguer gravity map was constructed (Figure 4). The borders of the area investigated are defined by the corner locations N 32° 37.5', W 80° 00'; and N 33° 7.5', W 80° 22.5'. The area includes a major portion of the suspected epicentral zone of the 1886 earthquake as well as the epicenters of more recent seismic events such as the November 22, 1974, earthquake. The maximum estimated error in the gravity data is 0.20 milligal (Appendix I). The data were contoured at 1 milligal intervals.

There are several major features delineated by the isogals. In the central western quadrangles, a positive anomaly having a peak value of 15 milligals exhibits a steep gravity gradient of 2 to 3 milligals per kilometer on both its northern and southern sides. To the east of this feature, the gravity gradient becomes less steep, and the isogals spread to form a nose-like feature. To the south and to the northeast, negative anomalies appear to form an arc about the nose-like feature. The northwestern quadrangles are characterized by a reasonably constant negative gravity anomaly field of approximately -3 milligals. Dispersed throughout this region, small zones of slightly more positive and negative anomalies are observed.

Three prominent zones of alignment of contour lines and anomalies can be observed. The trend of the strongest alignment of gravity

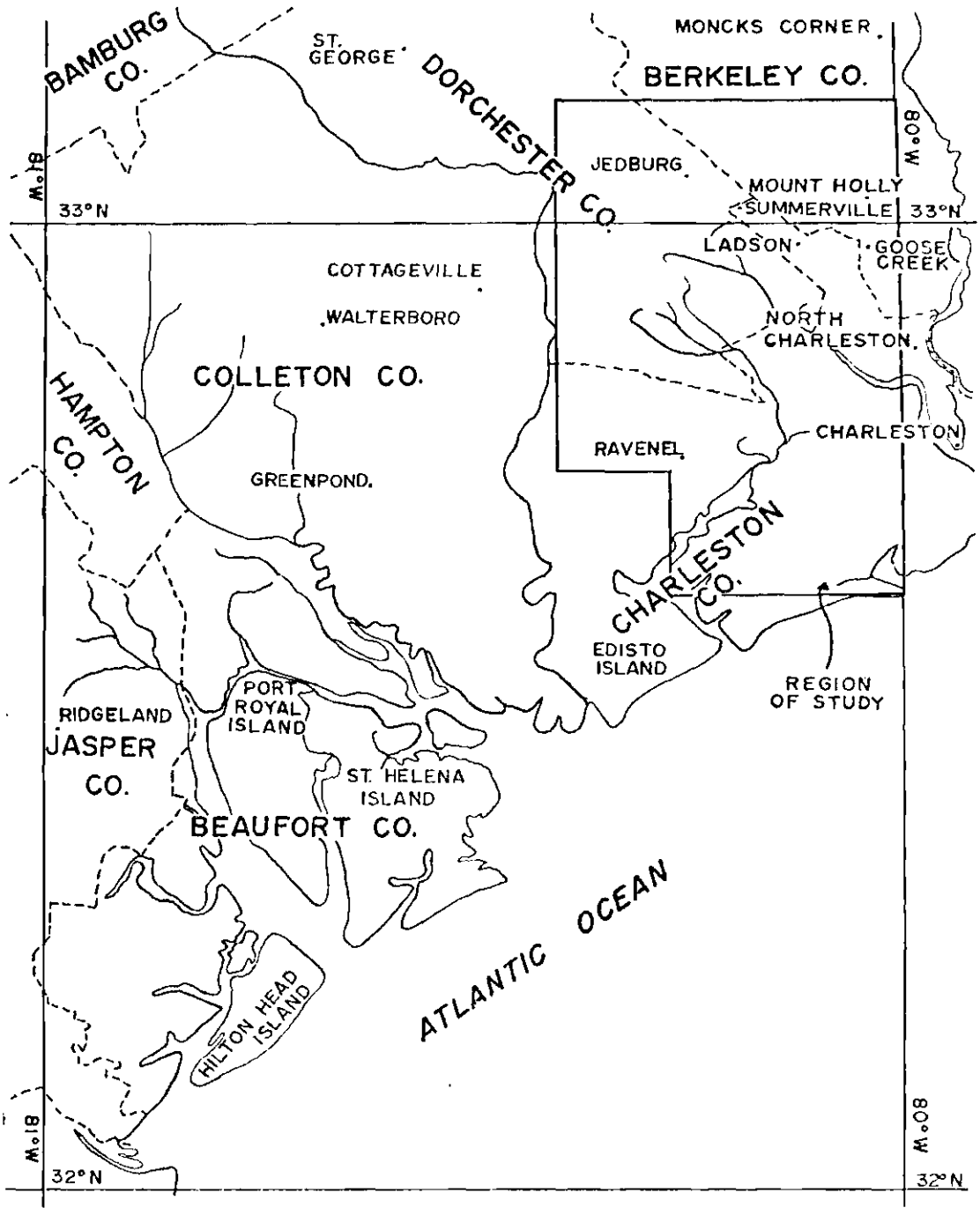

Figure 3. Index Map Showing the Location of the Region of Study (portion of State of South Carolina Map published by U.S.G.S., 1970).

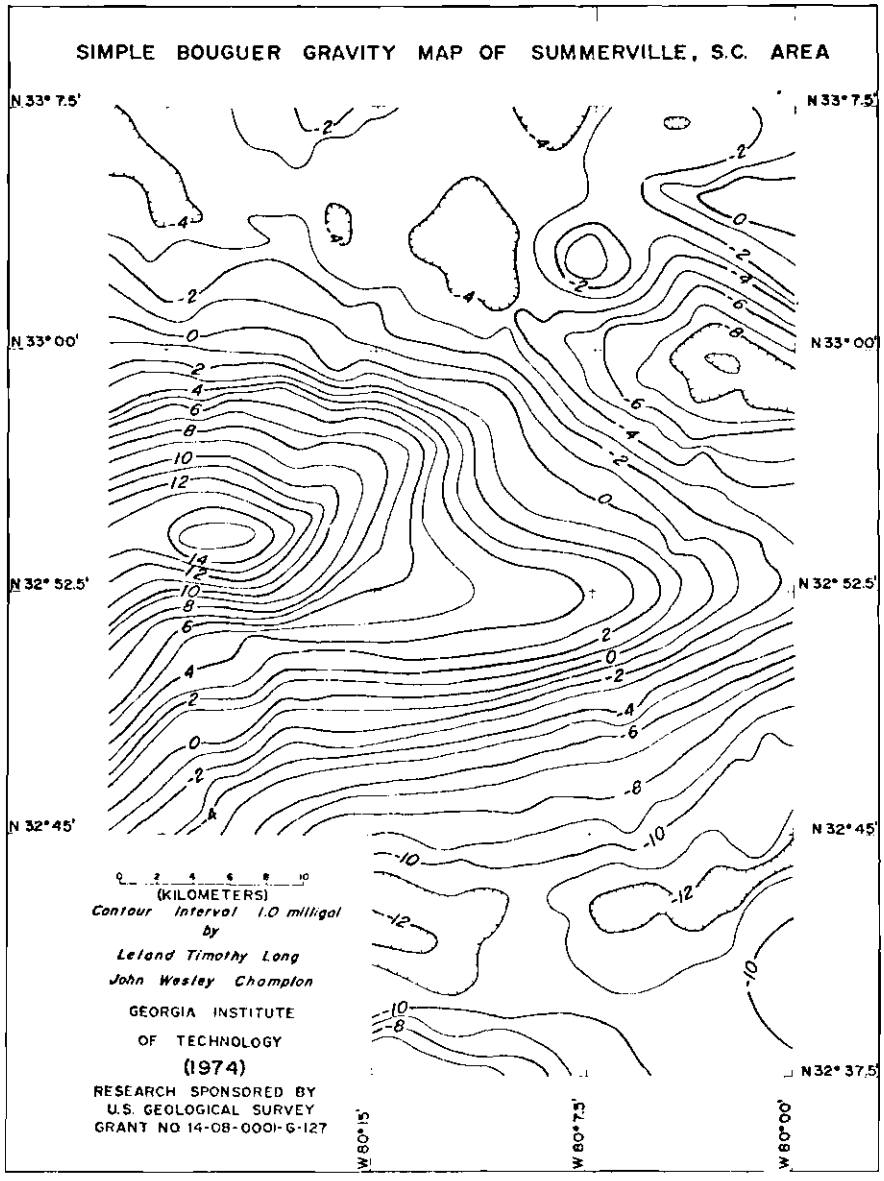

Figure 4. Simple Bouguer Gravity Map of Summerville, South Carolina, Area. (It is contoured at 1 milligal intervals.)

contours is approximately east-west and is formed by isogals south of the central positives. Another alignment of contours is defined by the trend of the isogals north of the central positives and bears approximately N 50° W. These two contour alignments appear to be a consequence of the shape of the central positive anomalies. A third alignment is defined by the western termination of the northeastern and southern negative anomalies. The northwestern edges of these negative regions defines an alignment of anomalies trending N 40° to 50° E which intersects the central positive anomalies in the region where the isogals begin to spread to form the nose-like positive anomaly.

CHAPTER IV

ANALYSIS OF GRIDDED GRAVITY DATA

Residual Gravity Anomalies

The gravity data were gridded at 1 kilometer intervals encompassing the area defined by the simple Bouguer gravity map. A regional gravity grid was determined from the gridded gravity data by a two-dimensional smoothing operator devised by Shapiro (1970). It consists of the application of a one-dimensional smoothing operator to the entire data set, first in one direction and then in the other direction. The one-dimensional operator in the ith direction has the form:

$$Z^{i}_{ij} = Z_{ij} + S/2(Z_{i-1,j} + Z_{i+1,j} - 2Z_{ij})$$

Z^{i}_{ij} = Smoothed value of the i,j grid point in the ith direction

Z_{ij} = Unsmoothed i,j grid point

S = Damping constant (usually 0.5 or -0.5)

Z(x,y) is considered to be composed of the sum of two-dimensional Fourier components of the form:

$$Z_{ij} = C + A \cos k(x_i - \phi)\cos(h(y_i - \theta))$$

k = wave number in x direction

h = wave number in y direction

ϕ = phase displacement in x direction

θ = phase displacement in y direction

A = spectral amplitude

The ratio of the smoothed to unsmoothed spectral amplitudes, R(k,h), is defined as the two-dimensional response function of the smoothing operator.

$$R(k,h) = [1 - S(1 - \cos k\Delta x)][1 - S(1 - \cos(h\Delta y))]$$

$\Delta x \rightarrow$ grid interval in x direction

$\Delta y \rightarrow$ grid interval in y direction

When S is +0.5 the smoothing operator has the property of damping short wavelengths (high frequencies) in a function. If the operator is applied "n" times, each operation decreases the prominence of the short wavelengths in proportion to the nth power of the response function.

Regional anomalies are determined by using the smoothing operator six times in succession on the two-dimensional gridded gravity data. The regional field is then subtracted from the original gravity grid and the difference is defined to be the residual anomalies. The residual anomalies are the short wavelength anomalies which are removed by the smoothing operator from the original gravity field. Since the width of the smoothing operator is 5.0 kilometers, they are considered to be representative of crustal features having depths less than 2.5 kilometers. Figure 5 is the residual gravity map which is contoured at a 0.5 milligal interval. Positive anomalies appear in the central quadrangles as observed in the original data set. This implies that a portion of the source of these anomalies is less than 2.5 kilometers

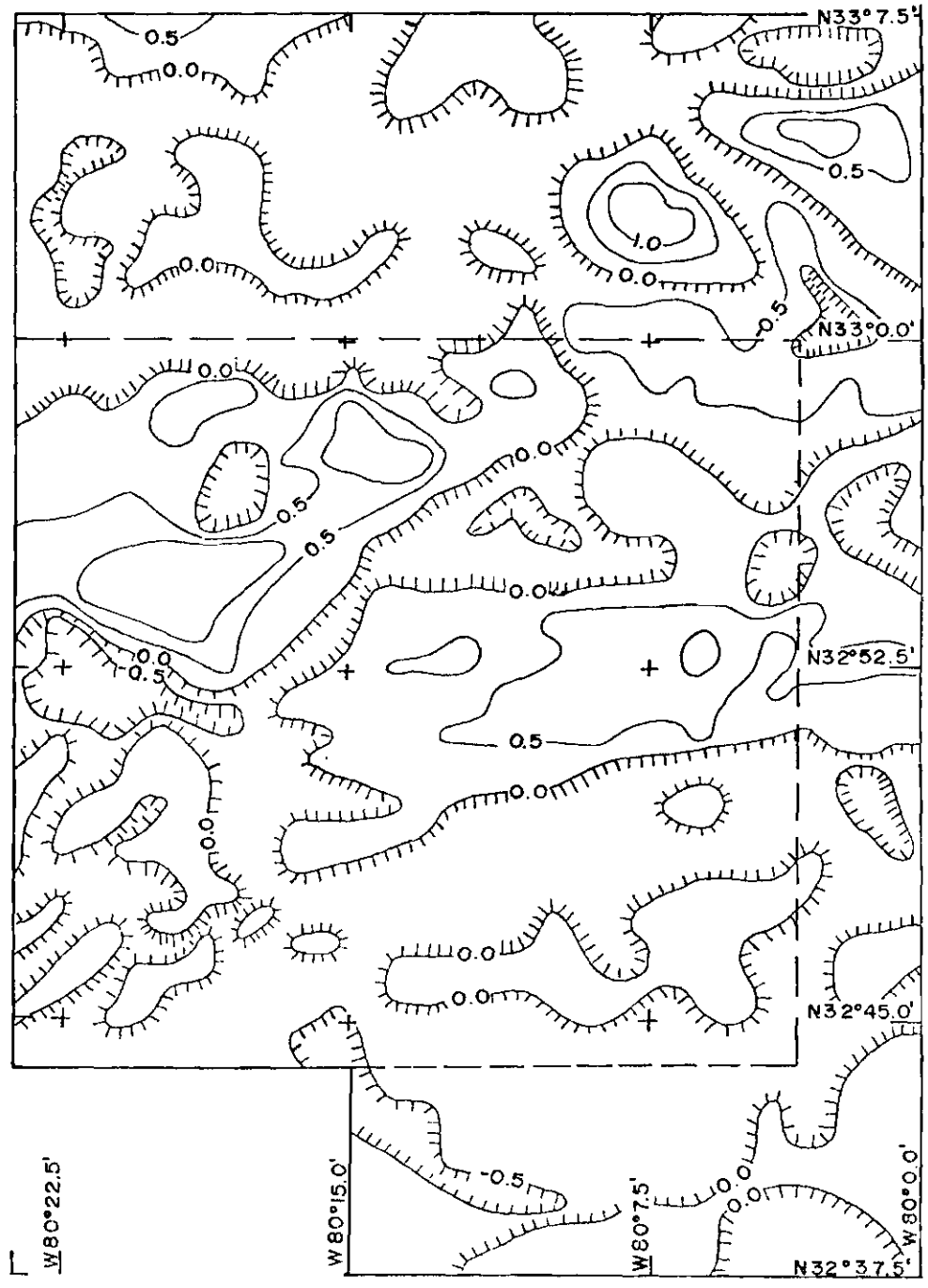

Figure 5. Residual Gravity Map of the Summerville, South Carolina, Area. (The map shows the N.E. trending, low-magnitude, negative anomaly separating the two peaks of the central western positive anomaly from the broad eastern central positive anomaly.) (The area outlined by the dashed line is the 32 kilometer square region which is spectral analyzed for lineations.)

deep. The westernmost positive exhibits two peaks, and the eastern nose-like anomaly exhibits only one small peak surrounded by a large low-magnitude positive region. A negative zone trending N 45° E separates the two peaks of the westernmost positive from the nose-like positive. The negative zone corresponds in location and trend with the western terminations of the northeastern and southern Bouguer negative anomalies. Another trend is delineated by the north and south edges of the centrally located positive anomalies. This alignment of isogals trends east-west. Another trend is evident in the northeastern quadrangle. It is defined by a low magnitude negative anomaly zone which separates two large positive residual gravity anomalies. The trend of this lineation is approximately N 35° W.

Spectral Analysis of Lineations

In order to determine the limits of resolution where lineations observed in the residual gravity grid are concerned, a 32 kilometer square area (Figure 6) was spectrally analyzed using a two-dimensional Fast Fourier Transformation. Such an analysis allows one to find those wave numbers which are common throughout the function, since these form zones of high magnitude in the transformed domain. Lineations observed in gravity contours are represented in the wave number domain as wave numbers oriented perpendicular to the orientation of the isogals. Therefore, the spectrum must be rotated 90° to coincide with the lineations of the real domain (Figure 7). The area of interest is defined by a shell which has an inner radius of $(4\ km)^{-1}$. The $(4\ km)^{-1}$ radius circle contains the wave numbers of gravity wavelengths greater than 4 kilometers which are not removed in computing the residual. Low

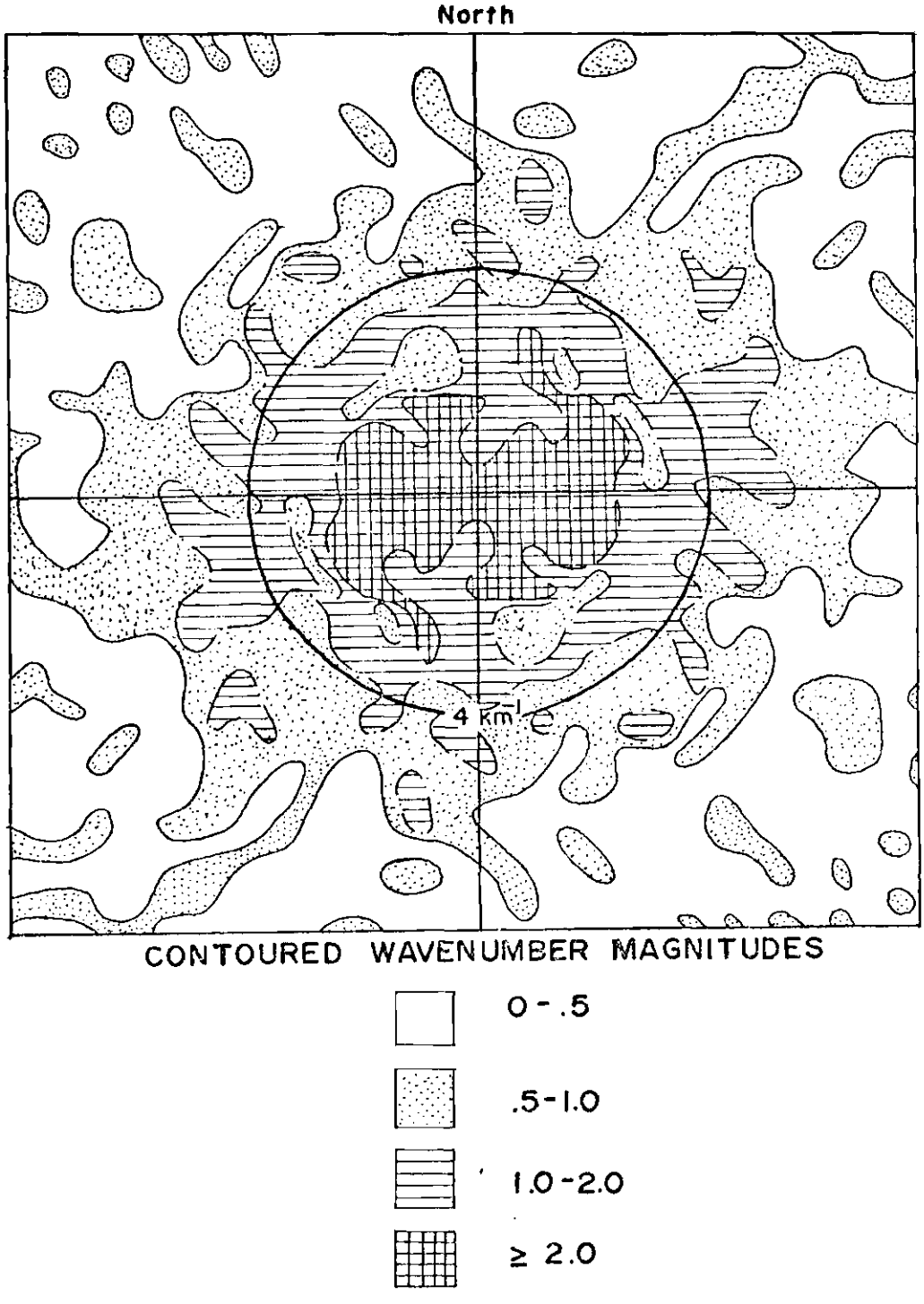

Figure 6. Complex Modulas of the Fourier Spectrum of the 32 Kilometer Square Region Outlined in the Residual Gravity Map.

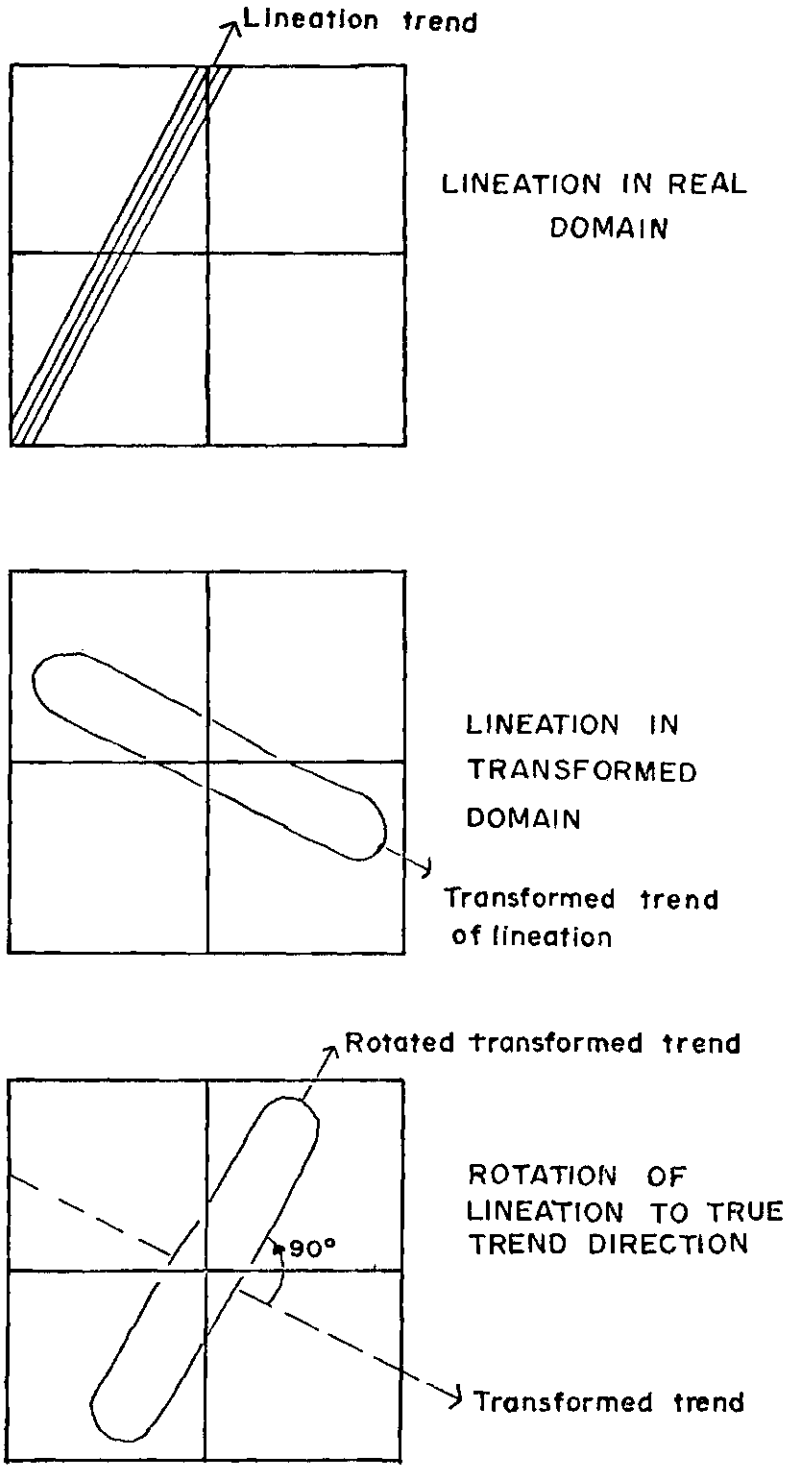

Figure 7. Diagrams Showing the Rotation of Real Lineations in the Fourier Spectrum Domain.

frequency components of gravity anomalies which are truncated at the borders of the 32 kilometer square area are also observed within the circle.

Within the shell several weak lineations are apparent. The strongest of these trends is directed almost east-west. The orientation of this trend is parallel to the direction of the apparent alignment of the central positive residual anomalies. A second trend is directed approximately N 45° E. This trend parallels the northeastern alignment of negative anomalies observed in the residual gravity. This lineation is also observed in the simple Bouguer gravity map to be the trend defined by the western termination of the northeastern and southern negative anomalies. Another lineation bears approximately north-south and is the result of the truncation of positive anomalies on the eastern and western borders of the area. Lastly, a high frequency trend bearing northwest is not easily recognized in the residual gravity map. The trend may be the result of an alignment of low amplitude short wavelength anomalies in that direction.

Three-Dimensional Theoretical Gravity Modeling

Grant, et al., (1965) have suggested that two-dimensional gravity modeling has many drawbacks such as the inherent inability to handle the effects of regional trends or the effects of truncation of two-dimensional structures. Three-dimensional modeling, on the other hand, has the ability to reproduce regional gravity fields as well as to determine nonunique three-dimensional structural solutions. For this reason, three-dimensional modeling was chosen as the indirect method to be used to determine a geologically acceptable crustal structure for the

Summerville-Charleston, South Carolina, area.

Talwani, et al., (1960) showed that gravity anomalies produced by three-dimensional bodies of arbitrary shape could be calculated by approximating the irregularly shaped bodies by several stacked horizontal polygons of constant thickness. The thickness of each polygon is controlled by the effective density contrast. Each polygon's thickness is kept small with respect to its depth. The method of Talwani, et al. was used to construct the following crustal models for the Summerville-Charleston, South Carolina, area.

The region modeled was chosen to be larger than the area defined by the Summerville simple Bouguer gravity map, to allow for accurate modeling of anomalies that terminate at the western edge of the map. The region selected for modeling has its origin at the upper northeastern corner of the Summerville map and extends 75 kilometers west of this point and 55 kilometers to the south. The data used for preliminary modeling were selected from Woollard's regional gravity data and were gridded at 5 kilometer intervals. The 1 kilometer gridded data in the Summerville area were used to improve the details of the preliminary model. Models No. 1 and No. 2 included the entire area modeled, but only the region encompassed by the Summerville map was revised by the utilization of data from the kilometer grid. The densities used for the anomalous masses were chosen to agree with the density contrasts used in modeling, with 2.67gm/cm^3 used as the reference density (Figures 8 and 9).

Model No. 1

Under the assumption that the gravity anomalies in the

Summerville area are produced by shallow crustal bodies, a three-dimensional model was constructed. This model consists of three horizontal, 2 kilometer thick layers which lie between the depths of 2.5 and 8.5 kilometers. The Coastal Plain sediments occupying the upper 2.5 kilometers of the crust are not considered to contribute to the observed gravity anomalies. The top layer, which lies between the depths of 2.5 to 4.5 kilometers, consists of two central western 2.9 gm/cm^3 bodies intruding a less dense 2.8 gm/cm^3 irregularly shaped material. This 2.89 gm/cm^3 material is surrounded on all sides by 2.67 gm/cm^3 country rock. The eastern termination of this material lies along a lineation which trends N 30° E. This lineation corresponds generally in direction and location to the northeastern linear anomaly observed in the simple Bouguer gravity map and the residual gravity map.

The second layer, (4.5 to 6.5 kilometers), consists of two regions having densities of 2.8 gm/cm^3 and three lower density 2.4 gm/cm^3 regions. The 2.8 gm/cm^3 region of the first layer is continuous in this layer with a similar "nose-like" feature extending to the east. The nose-like anomalous body is partially surrounded by low density 2.4 gm/cm^3 features to the northeast and southeast. The western edge of this feature coincides with the previously discussed northeastern lineation. The westernmost extent of the northeastern and southern low density zones also coincides with this lineation.

The third layer, (4.5 to 6.5 kilometers), contains only a 2.8 gm/cm^3 "nose-like" feature. The western termination of this feature strikes approximately N 50° E. Again, this correlates with the

northeastern lineation observed in the other analyses.

Model No. 2

Under the assumption that the large positive gravity anomaly observed in the western central quadrant of the Summerville map originates at a crustal depth of 16.5 kilometers and extends upward to within 2.5 kilometers of the surface, a second three-dimensional, four layer model was constructed. The top layer, which lies between the depths of 2.5 and 3.5 kilometers, consists of two centrally located 3.0 gm/cm^3 bodies intruding a lower density, 2.4 gm/cm^3, region. No feature in this layer corresponds to the 2.8 gm/cm^3 structure found in the first layer of Model No. 1. The second layer, (3.5 to 4.5 kilometers), contains three 3.0 gm/cm^3 bodies. The westernmost centrally located body corresponds to the westernmost 3.0 gm/cm^3 feature of the first layer. To the east of this feature, another 3.0 gm/cm^3 body lies beneath the easternmost centrally located high density body of the first layer . A third 3.0 gm/cm^3 nose-like feature extends to the east of this body. To the northeast and south of the nose-like feature lie lower density 2.4 gm/cm^3 regions. The western edge of the nose-like feature forms a lineation which includes the westernmost extent of the northeastern and southern low density zones. The trend of this lineation is N 45° E. The third layer, (4.5 to 7.5 kilometers), contains the two centrally located 3.0 gm/cm^3 bodies which continue downward to a depth of 7.5 kilometers. The low density zones of the second layer and the nose-like 3.0 gm/cm^3 feature continue to this depth, also. However, the northeastern section of the easternmost centrally located 3.0 gm/cm^3 body terminates at a depth of 6.5 kilometers. The western edge

of the nose-like appendage forms a lineation which trends N 45° E. The fourth layer shows the downward continuation of both centrally located positives to a depth of 16.5 kilometers.

Both models suggest the presence of a vertical offset of the nose-like appendage with respect to the eastern central high density bodies. In both models, the offset appears to be associated with the northeast lineation. In the first model, the nose-like appendage of 2.8 gm/cm^3 density is observed only in the second and third layers, and thus appears to be unconformably offset 2 kilometers downward from the first layer. The second model shows the nose-like feature to be present in the 3.5 to 4.5 kilometer layer. This feature extends downward to a depth of 7.5 kilometers, while the northeastern edge of the eastern central positive extends to a depth of only 6.0 kilometers. This observation, as well as the fact that the nose-like feature is not modeled in the top layer, may indicate an uncomformable offset in the model of 1 to 1.5 kilometers.

The two preceding three-dimensional models produced gravity anomalies which agreed to within 10% with the gridded Summerville gravity data. Other models, which did not contain a vertical offset were constructed, but the effective density contrasts required for these models were not realistic.

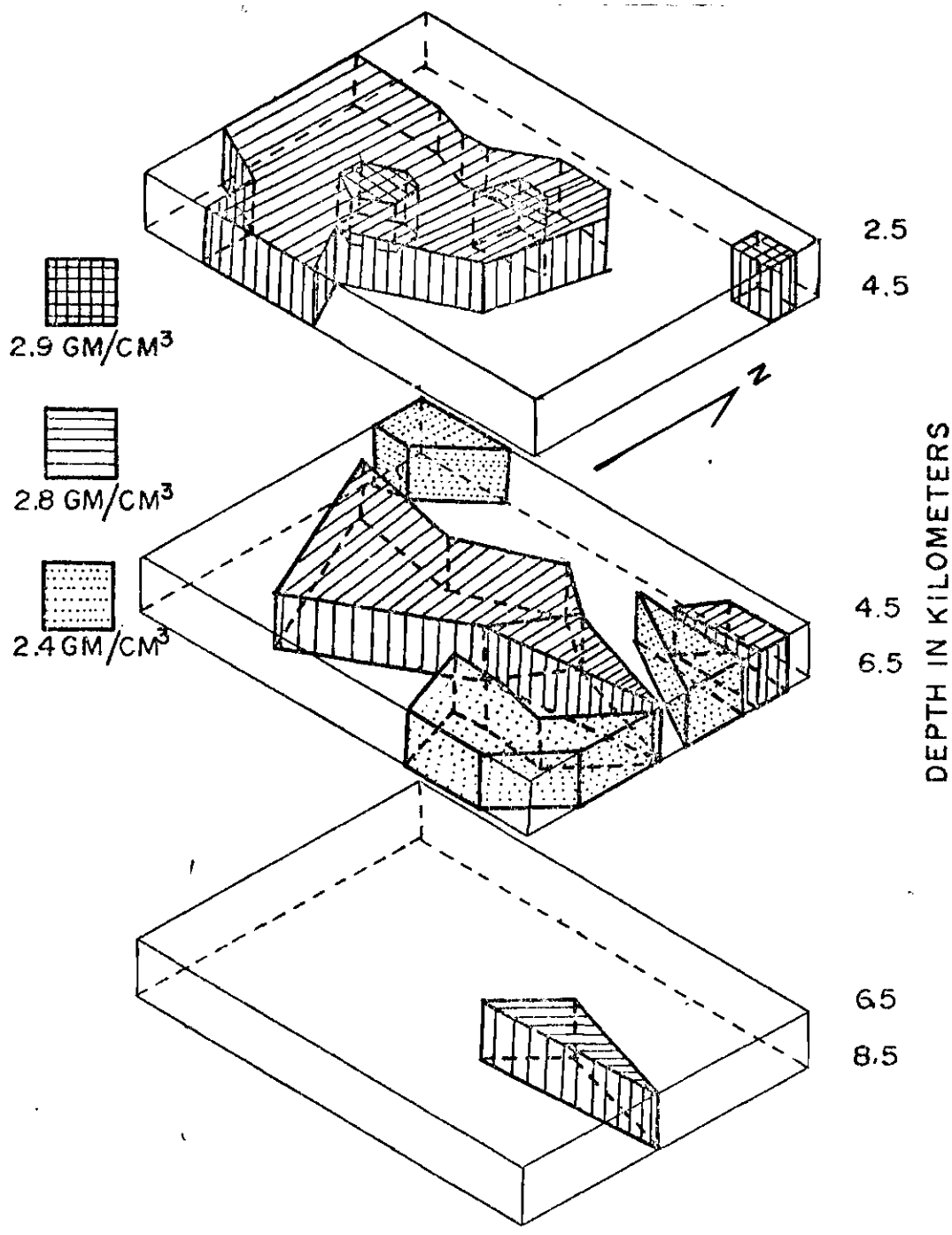

Figure 8. Three-Dimensional Model No. 1. (The model consists of three, 2 kilometer thick layers which give evidence for vertical offset of the nose-like feature along a N.E. lineation.)

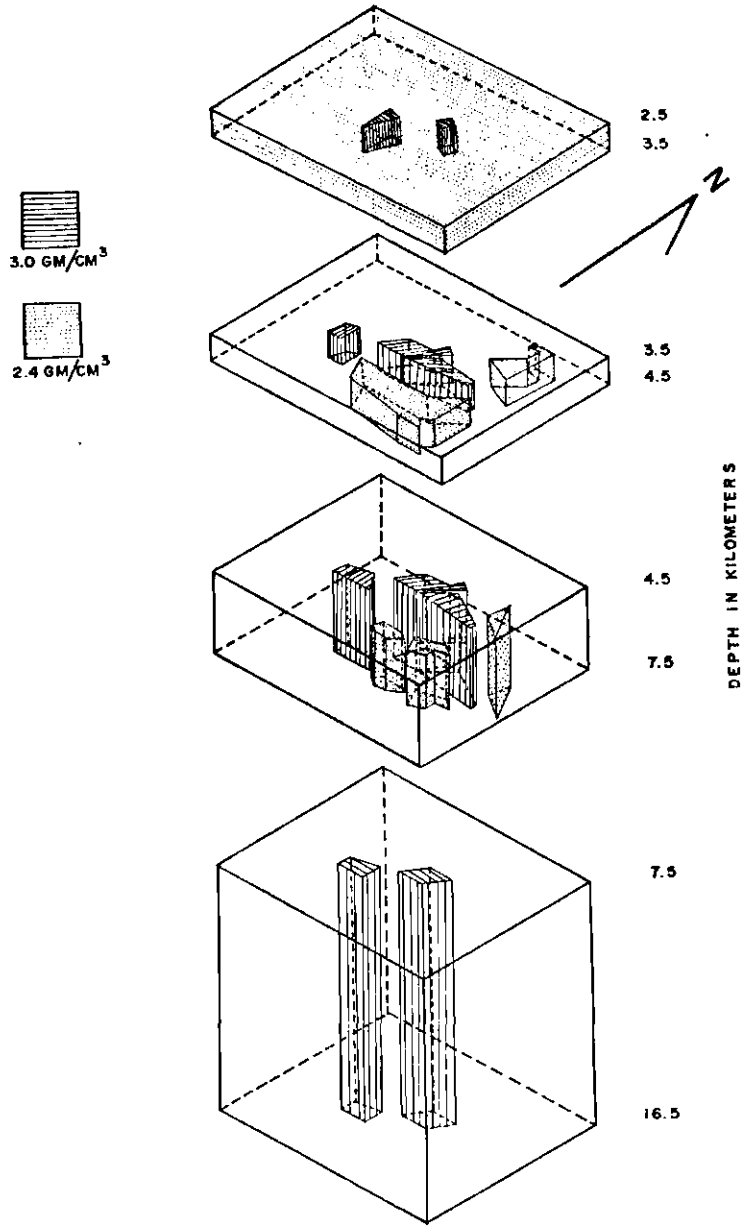

Figure 9. Three-Dimensional Model No. 2. (This model also suggests a vertical offset of the nose-like feature along a N.E. lineation.)

CHAPTER V

DETAILED GRAVITY PROFILES AND TWO-DIMENSIONAL GRAVITY ANALYSIS

Two-Dimensional Theoretical Models

Theoretical anomalies are calculated for "step model" faults for comparison with observed anomalies. The method of Talwani, et al., (1959) is used to compute the anomalies resulting from faults at depths of 0.5, 1.0, and 2.0 kilometers which vary in throw from 1, 2, or 3 kilometers. These depths are based on estimates by Cooke (1936) and Mansfield (1936) for the depth to the crystalline basement. As would be expected, the anomalies resulting from the fault models are asymmetric about the edge of the fault. As depth to fault increases, the sigmoidal anomaly becomes extended, producing lower gradients. Increasing the throw on the fault has a similar effect, but it primarily determines the radii of curvature in the profile on either side of the fault location. In general, the wavelength of the anomaly increases with both depth to the fault and throw of the fault. Since the shapes of the anomalies are determined by structural shape and not density, the theoretical curves were normalized and compared to normalized observed profiles (Figures 10, 11, and 12). However, once the depths are determined, the density can be computed.

Cross Correlation Coefficients

In order to determine and quantify any relationship between

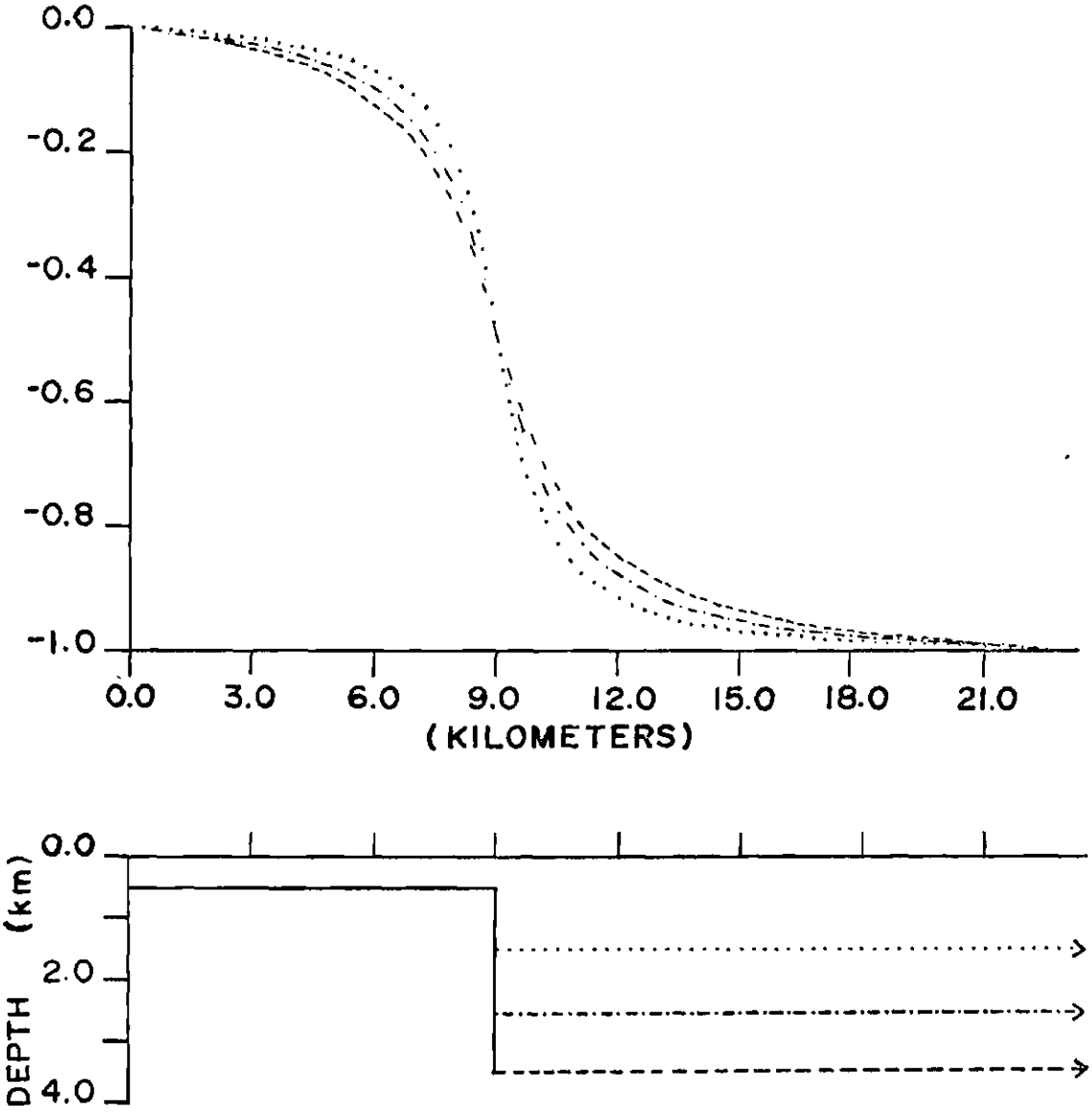

Figure 10. Normalized Curves for a "Step" Fault at 0.5 Kilometers Showing the Effects of Fault Offsets of 1.0, 2.0, and 3.0 Kilometer on the Shape of the Vertical Gravity Anomaly.

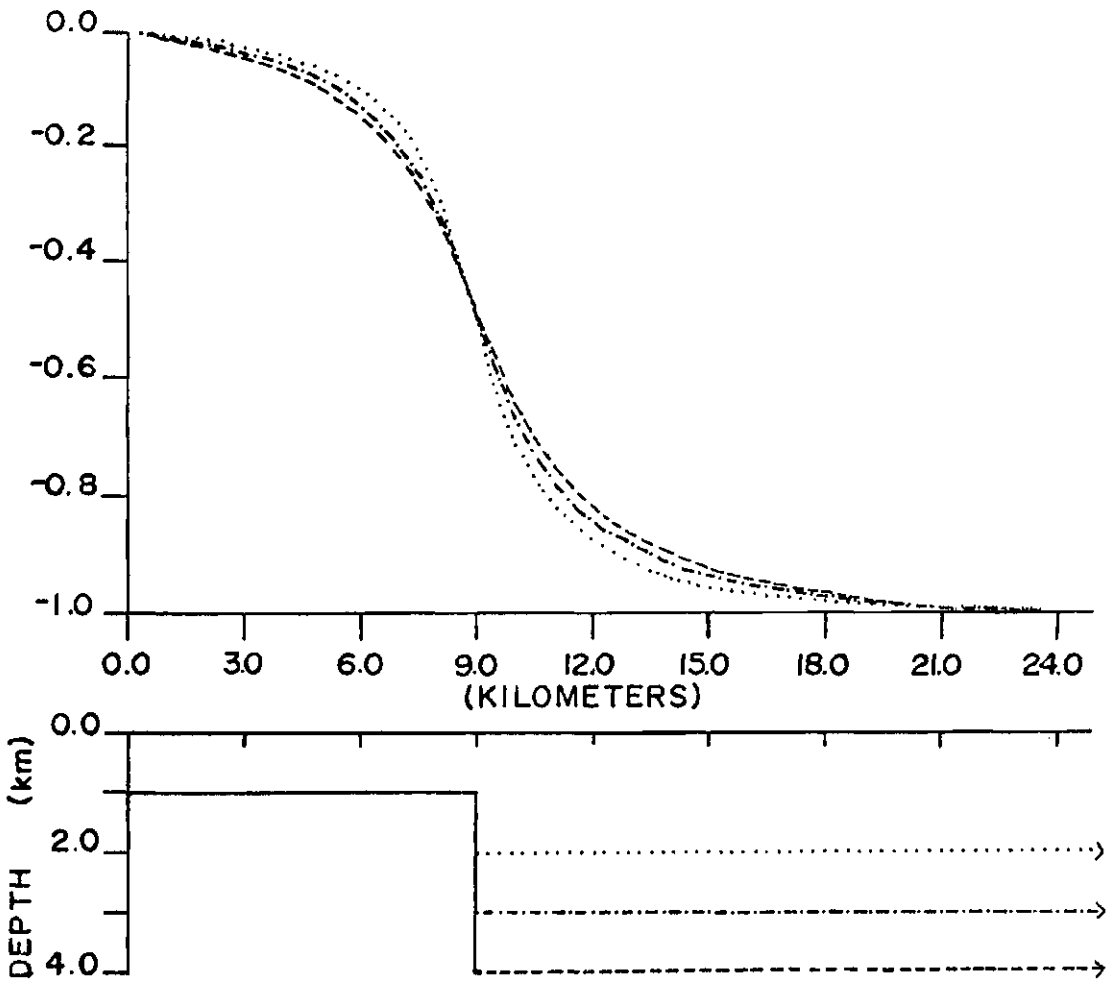

Figure 11. Normalized Curves for a "Step" Fault at 1.0 Kilometer Showing the Effects of Fault Offsets of 1.0, 2.0, and 3.0 Kilometers on the Shape of the Vertical Gravity Anomaly.

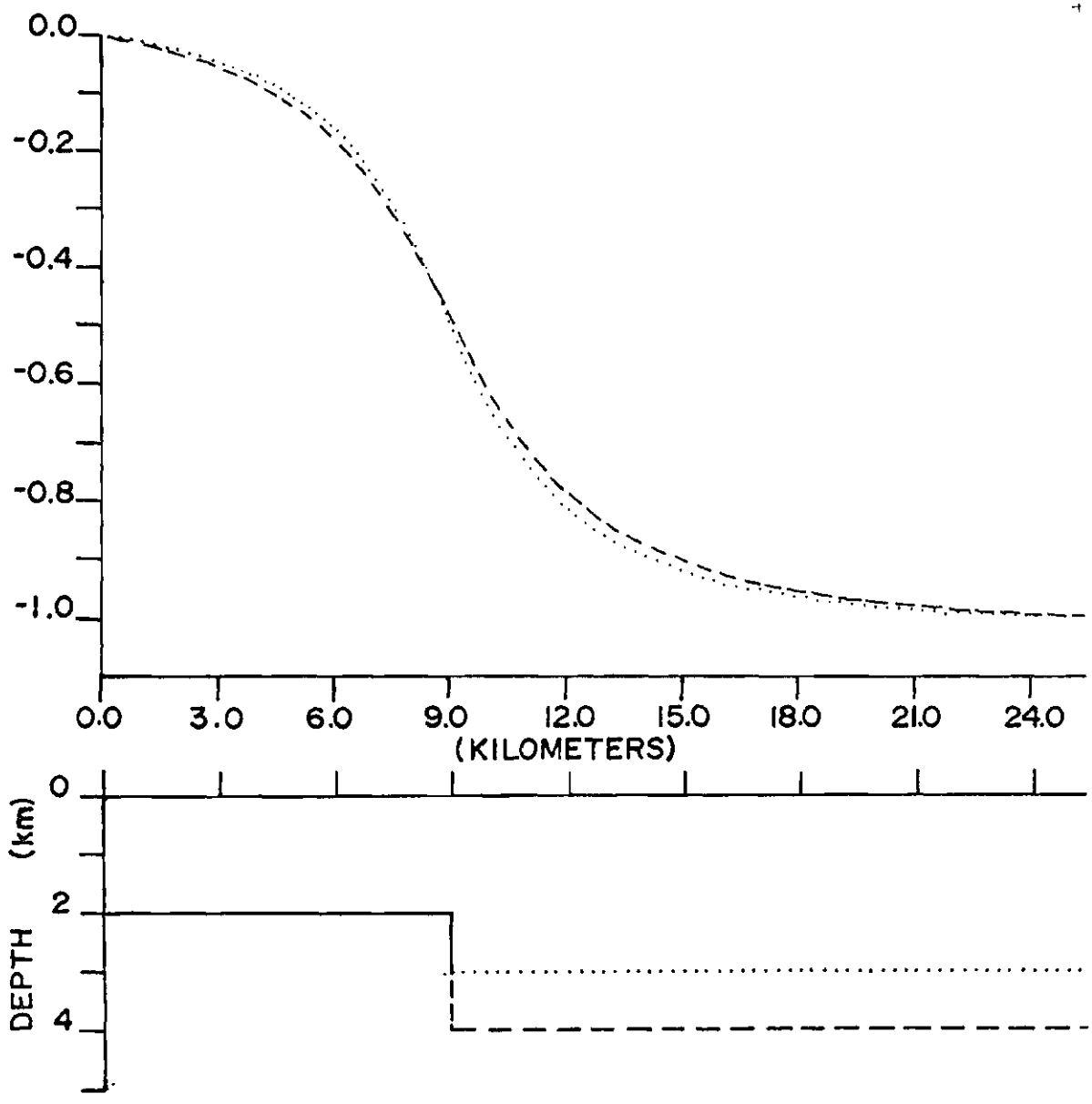

Figure 12. Normalized Curves for a "Step" Fault at 2.0 Kilometers Showing the Effects of Fault Offsets of 1.0 and 2.0 Kilometers on the Shape of the Vertical Gravity Anomaly.

observed gravity and topography along detailed profiles, cross correlation coefficients between elevation and gravity are computed for each profile. The coefficients are calculated using the method described by Pick, et al., (1973). One usually attempts to pick a reduction density which removes all the topographic masses. However, in the Summerville area, the necessary reduction densities to remove correlation between the topography and gravity are unrealistic.

There are advantages, however, to having a correlation between elevation and gravity. This relationship can add information concerning the control of surface topography by basement structure. For example, a strong positive correlation in a region where faulting is suspected may show the response of the surface to faulting. On the other hand, a negative correlation may result from inaccurate determination of station elevation in an area, or the structural control of a river which channels a region showing a large positive gravity gradient.

In general, correlation coefficients in the following detailed gravity profiles are used to see if topographic features might indicate the presence of faulting along the northeast lineation. Both residual profiles and observed gravity are compared with elevation (Table 1).

Detailed Gravity Profiles

Eleven detailed gravity profiles have been established utilizing most of the major highways in the area of investigation (Figure 13). Along each profile, the average station spacing is 0.3 kilometers. Five of the profiles traverse the northeast-trending linear anomaly. Residual profiles were obtained by subtracting the regional profile from the observed gravity profile. In this instance, the regional

Table 1. Cross Correlation Coefficients Between Gravity and Elevation for Each Profile

Designation	Correlation Coefficient	
	Bouguer + Elevation	Residual + Elevation
AA'	.70	.78
BB'	.86	-.02
CC'	.56	-.20
DD'	-.05	-.14
EE'	.48	.25
FF'	-.24	-.28
GG'	-.89	-.30
HH'	-.49	.07
II'	-.60	-.22
JJ'	-.26	-.22
KK'	.29	.12

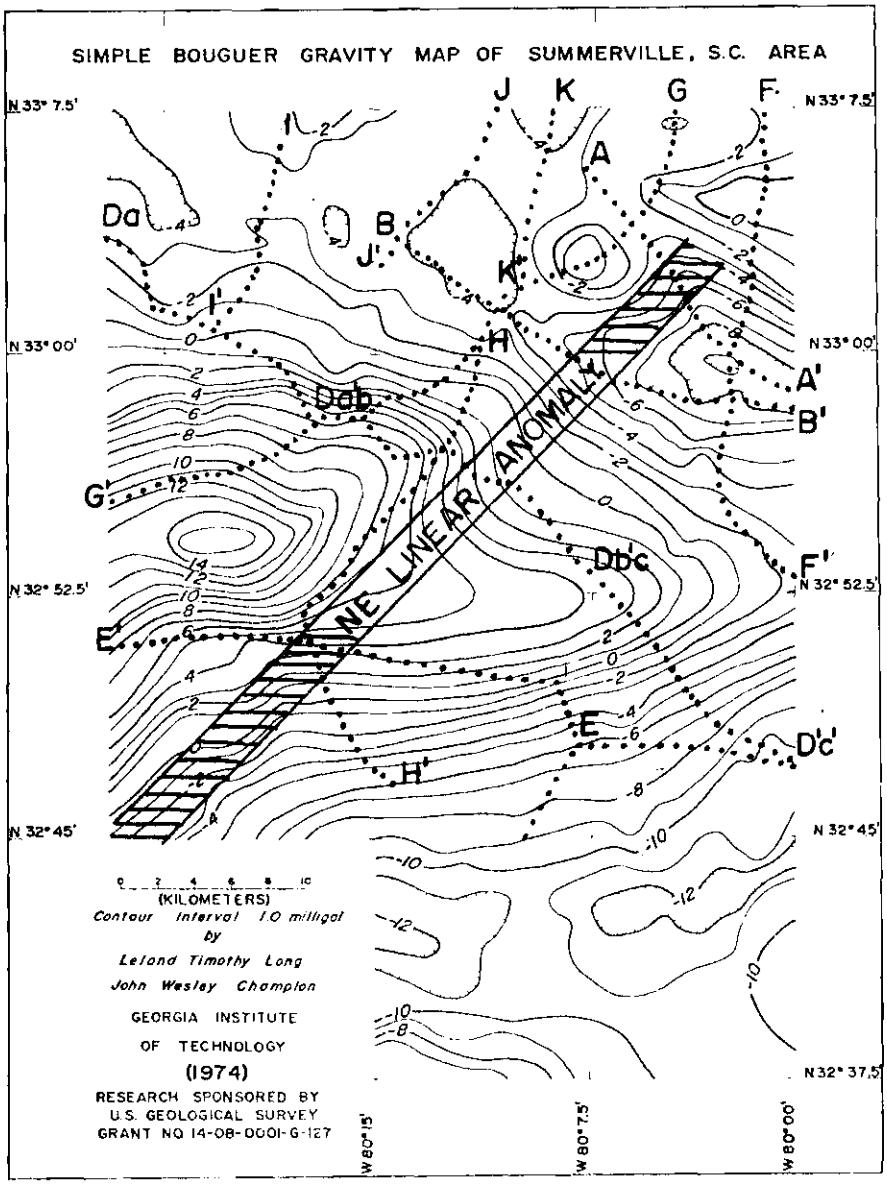

Figure 13. Index Map Showing the Locations of Each of the Detailed Gravity Profiles with Respect to the N.E. Linear Anomaly.

profile was determined from a four-times smoothed, 1 kilometer interval grid. Each regional line point was calculated by determining a curved surface which best fit the nine nearest regional grid points. The contribution of each grid point was determined with respect to distance from the line point and the effects of all nine points were totaled to give the regional point value. The residual profiles are considered to result from the effects of bodies lying at depths no greater than 1 kilometer. Descriptions of the locations for the eleven profiles are given in Appendix I (Table 2).

Profile AA'

Profile AA' exhibits negative anomalies which indicate the existence of low density material in this region. At approximately 5.5 kilometers from the eastern end of the profile, a steep negative gravity gradient of -0.8 milligal per kilometer is observed. The location of this gradient is coincident with the northeastern lineation seen in the two-dimensional residual data set (Figure 14).

Examination of the theoretical anomaly curves for idealized faults suggests that the anomaly is produced by a fault having its up side at a depth of 1 kilometer, and its down side 1 kilometer deeper. There is a discrepancy consisting of a positive bump at the onset of the negative slope which is considered to be due to the additive effects of two regional positives, one to the north, and the other to the southeast of the line. The two positive anomalies are expected to counteract the more gradual slope which would be expected for a fault at this depth, producing a positive discrepancy.

Essentially all the information of short wavelength nature is

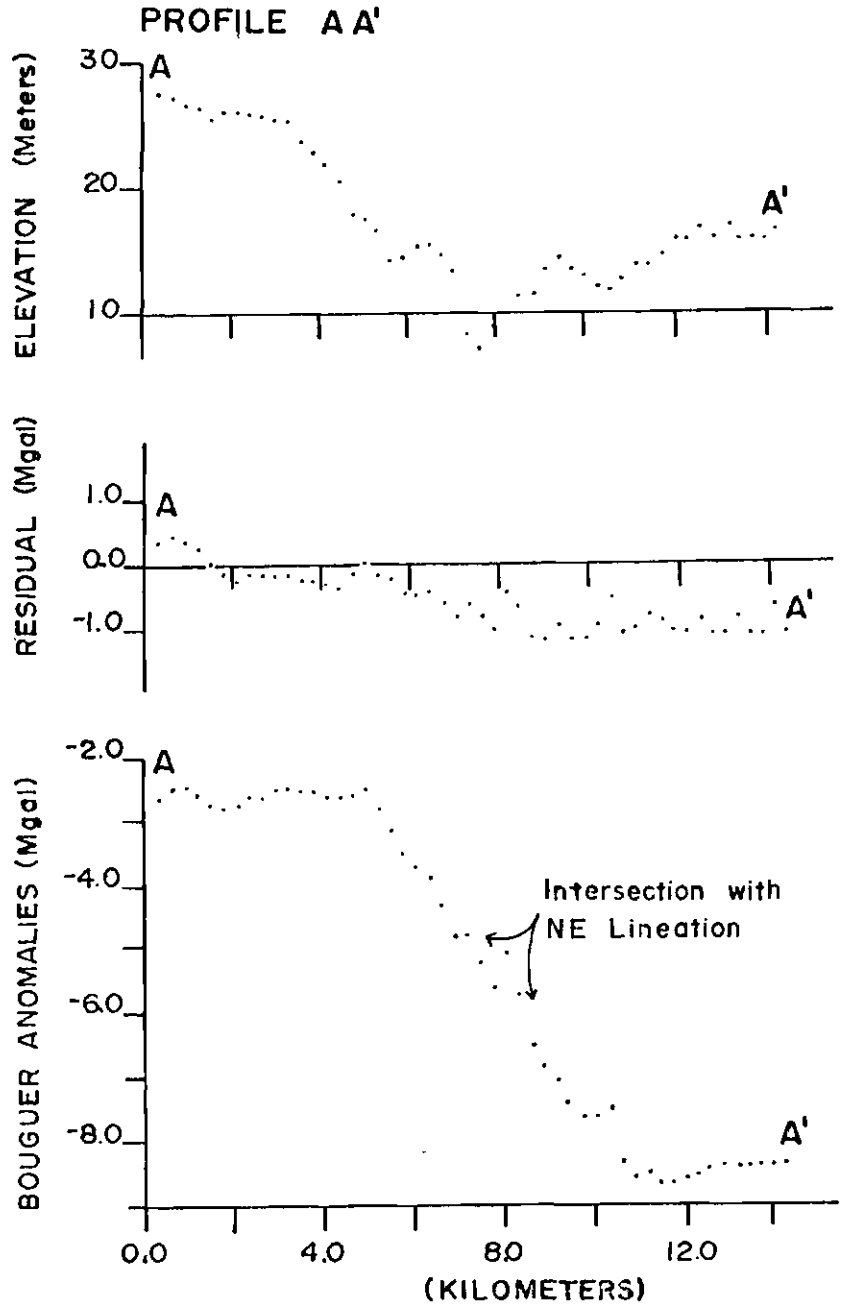

Figure 14. Composite Profile AA'. (The negative gradient is coincident with N.E. linear anomaly and both the residual gravity and Bouguer gravity are paralleled to some extent by the topography.)

contained in the residual profile. The slight negative trend to the east may be indicative of a thickening of the low density zone. The more positive portions of the residual may indicate the biasing effects of the two regional positives.

The cross correlation coefficients determined for this profile show strong positive relationships between elevation and both gravity and residual gravity profiles. Comparison of the elevation profiles with the gravity profiles shows the elevation to have a more gradual negative slope to the southeast than that of the gravity. This gradual slope in the elevation may show the type of response which would be expected at the surface of a blanket of unconsolidated sediments if basement faulting took place. The strong correlation between the residual profile and elevation possibly shows the extension of the faulting into consolidated beds above the basement which could be evidence for recent faulting along the northeast lineation. A similar effect would be expected for differential compaction.

Profile BB'

Detailed gravity profile BB' is similar in shape to profile AA'. The steep negative gradient of profile BB' is -0.7 milligal per kilometer and is coincident with the residual northeast lineation (Figure 15). Comparison of this profile with the theoretical "simple fault" model curves shows that the best fit to the observed profile is a fault with its upthrown side 1 kilometer deep and its downthrown side 2 kilometers deeper. While the "noisy" nature of this profile makes accurate throw determination difficult, the curvature of the profile is still best fit by a 1.5 kilometer throw which is interpolated from

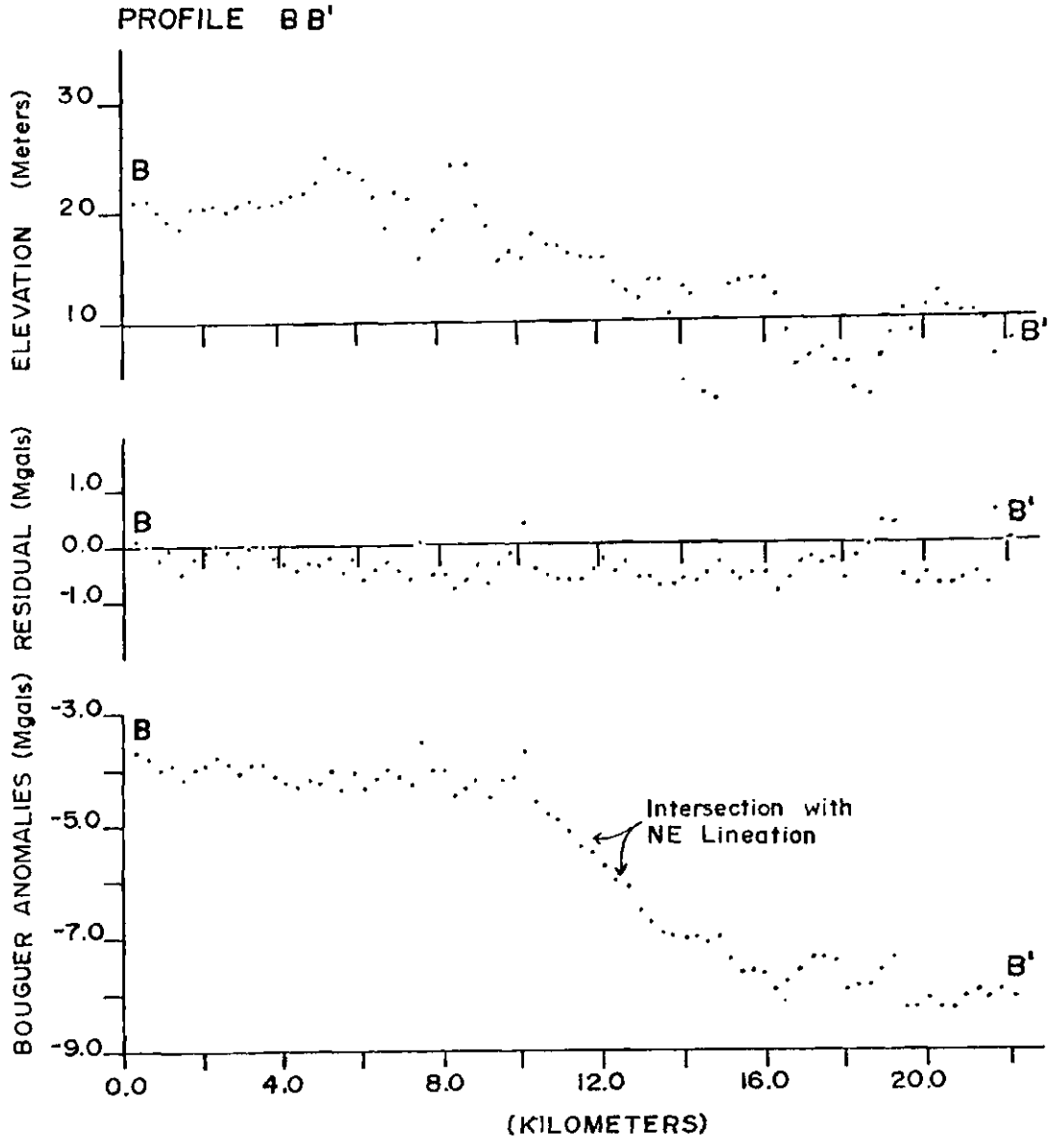

Figure 15. Composite Profile BB'. (The negative Bouguer gradient is coincident with N.E. linear anomaly and the Bouguer gravity is paralleled to some extent to the topography.)

the curves for faults having 1 and 2 kilometer throws at a depth of 1 kilometer (Figure 16).

The residual profile shows the noisy character of the actual profile. There is a slight negative gradient indicative of thickening sediments to the southeast, but the noise in the residual makes interpretation of structure difficult.

Cross correlation coefficients determined for this profile show a strong positive correlation between the gravity and the topography. Examination of the elevation change with respect to the gravity shows the elevation to begin to drop prior to the corresponding decrease in the gravity profile. This may show surface response to previous faulting. No such correlation is seen between the residual profiles and topography. Lack of such correlation may indicate that there is no fault extension into the consolidated beds above the basement. It should be noted that the resolution depth for the residual profiles is strongly related to the nature of the surrounding regional field. For example, if the regional field is constant, then undulations upon that field are essentially nondistorted in the residual. However, if the regional gravity field changes rapidly, the shape of the short wavelength anomalies produced by near surface structures are distorted in the residual. This may be the case along this profile. However, it suffices to say that the residual gives no evidence for fault extension into the sedimentary layers above the basement, but that this lack of evidence is not conclusive.

Profile CC'

Detailed gravity profile CC' shows the effect of three regional

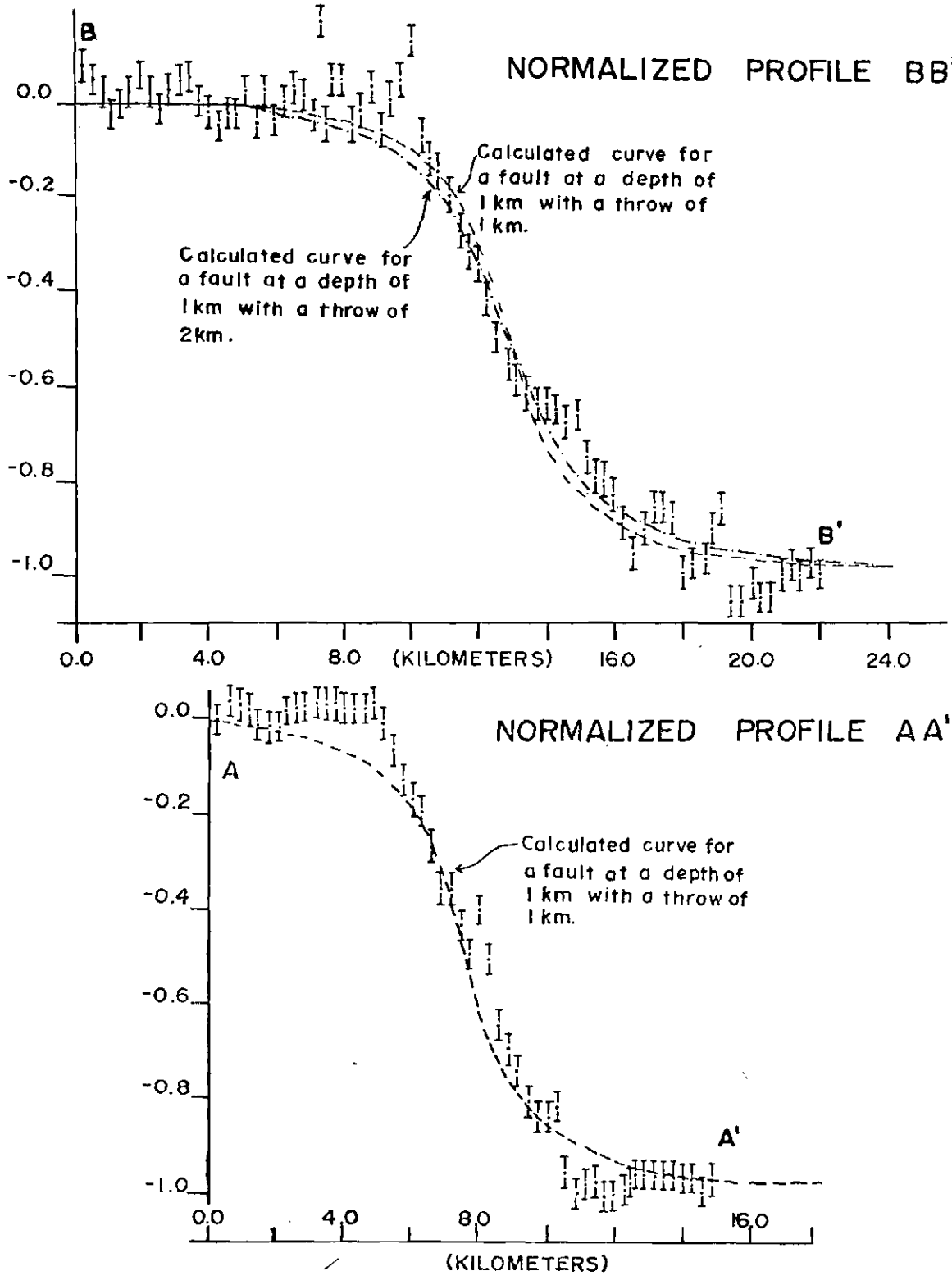

Figure 16. Comparison of the Shape of the Normalized Bouguer Gravity Profiles AA' and BB' with Shape of the Normalized Anomalies Calculated from "Step" Fault Models.

features. The southeastern end of the profile shows the cumulative effects of the southern negative anomalous zone and the central positive anomalous nose-like feature. The anomalies observed across the "nose" have a flat character. As the profile crosses the northeast lineation, a slight dip is observed prior to the increase in the gravity field due to the edge of the west central positive (Figure 17).

Since the profile is not perpendicular to the isogals throughout its traverse, no attempt was made to obtain depth information. However, it is interesting that the northeast lineation intersects this profile coincident with the slight dip. Qualitatively, such a dip in the profile would be expected if the two features producing the positive anomalies were at different depths. The magnitude and width of the regional nose-like positive anomaly may indicate that it is deeper in the crust than the western central positive. Therefore, the dip may indeed represent an offset in the basement whose strike is northeast.

The residual profile is reasonably flat. There are short wavelength anomalies of low amplitude which oscillate about the 0.0 milligal line. Little structural information is contained in this profile.

The correlation coefficients for profile CC' show a positive relationship between actual gravity and topography. Observation of the elevation profile shows the elevation to drop off just prior to the slight dip in the gravity profile. Profile CC', as did AA' and BB', may imply that the basement structure is paralleled by the topography. The coefficient computed for the residual profile and elevation is weakly positive.

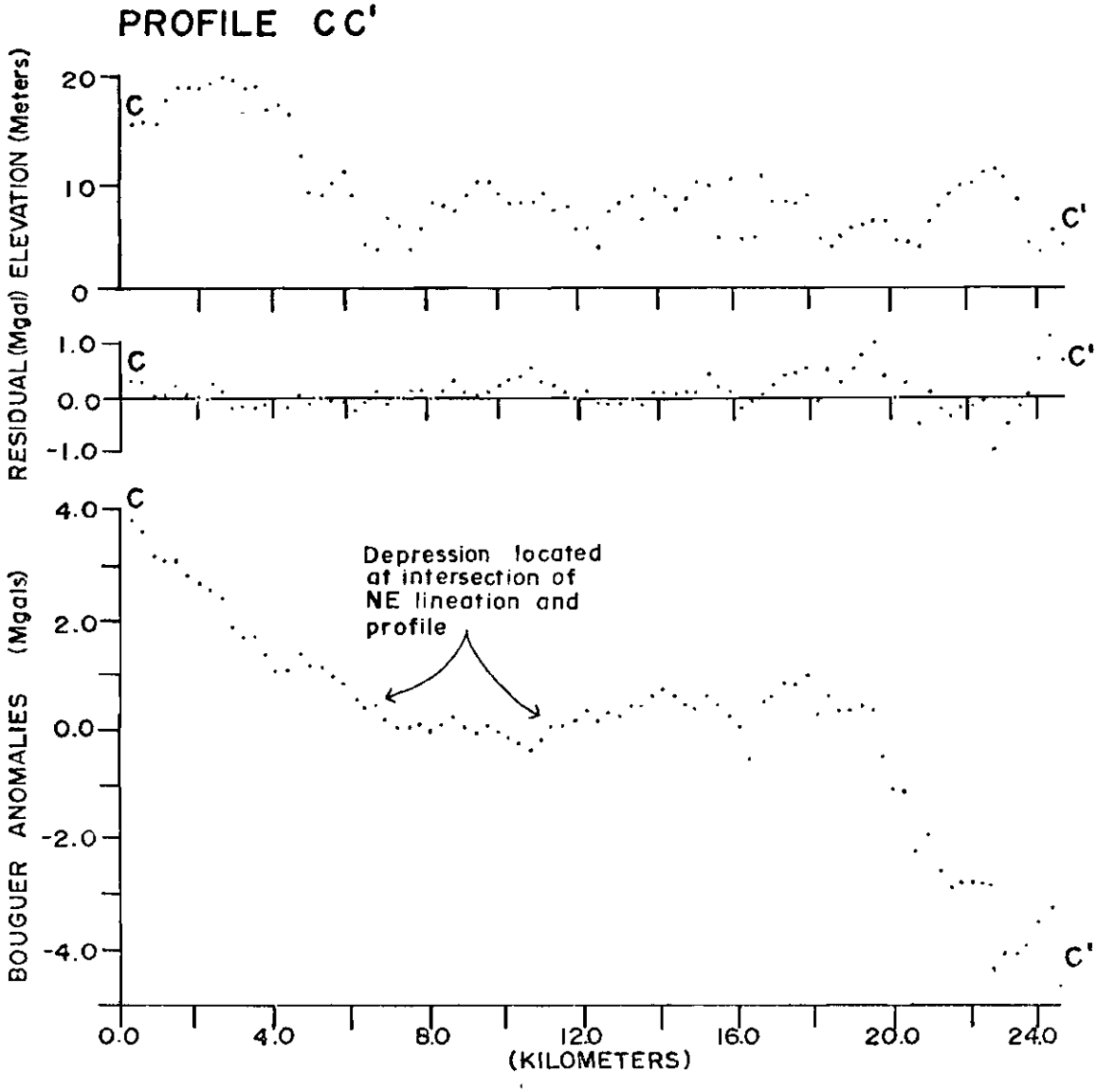

Figure 17. Composite Profile CC'. (This detailed gravity profile shows a slight depression in the gravity anomalies located at the intersection of the profile and the N.E. linear anomaly.)

Profile DD'

Detailed gravity profile DD' is 44 kilometers in length. The length of this traverse, as well as the widely varying regional field along the profile, makes discussion of this profile more informative if done in three sections. The sections are marked on the profile and are referred to as the northwest, central, and the southeastern sections (Figure 18).

The northwestern section of this profile, aa', traverses the northwestern edge of the west central positive. The section does not cross the peak of the regional positive anomaly, nor is the traverse normal to the isogals. This results in distortion of the apparent anomaly with respect to its width and magnitude. Therefore, reasonable depth determinations are not easily obtained. Examination of the relationship between gravity and topography along this profile showed a strongly negative correlation. This negative correlation is also shared to some extent by the residual gravity profile.

The central section of profile DD', bb', shows a similar dip to that observed in profile CC'. This dip again corresponds to the northeastern lineation observed in the two-dimensional residual. The residual profile for this section also exhibits this slight dip. The elevation profile shows a gentle negative slope to the southeast which, to some extent, is paralleled by the gravity. This correlation is not nearly as positive as observed in the previously discussed profiles. The residual profile also parallels this decrease in gravity and elevation. Apparently, the correlation between gravity and elevation weakly suggests the presence of basement offset as well as the extension

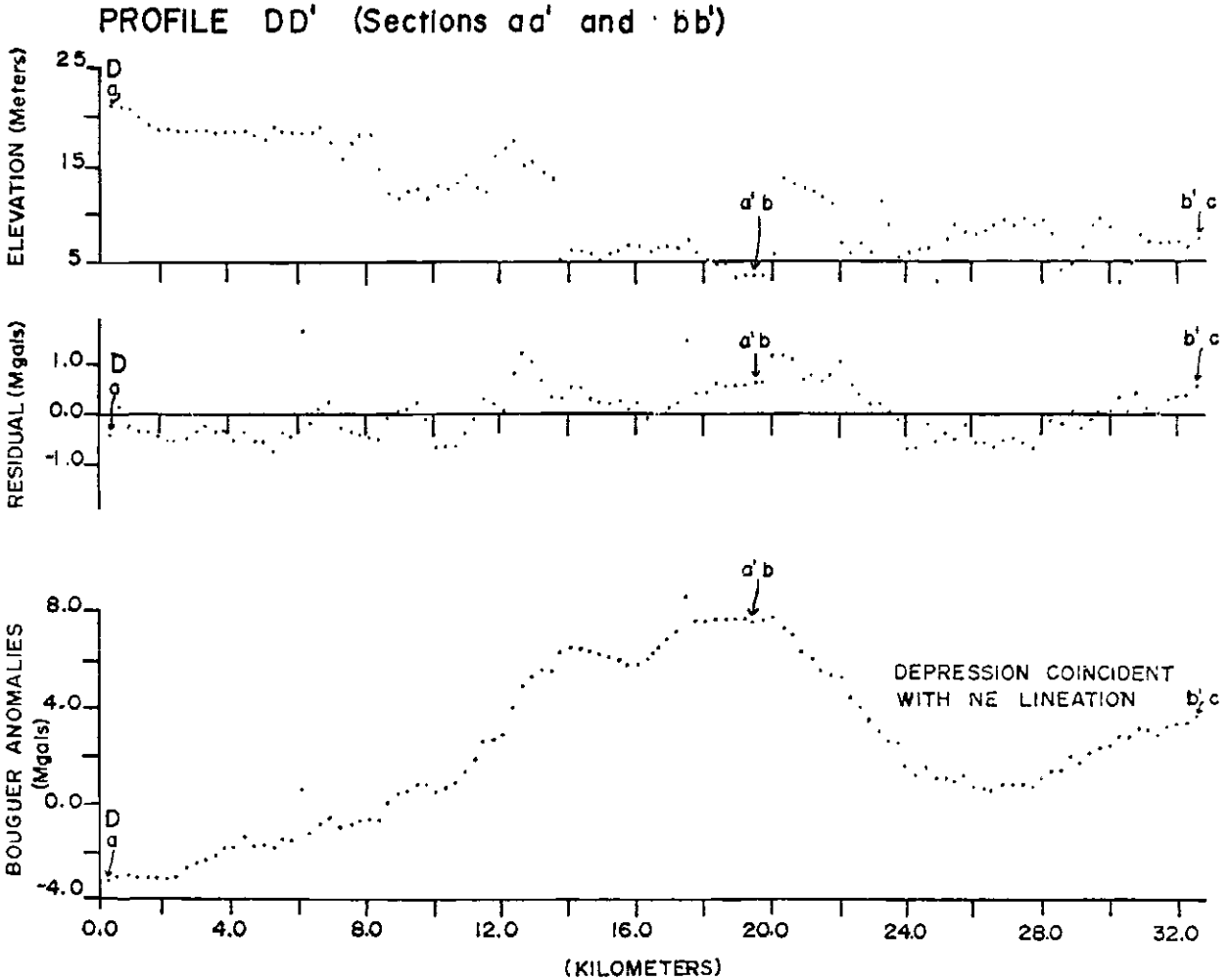

Figure 18. Composite Profile DD'--Sections aa' and bb'. (Section bb' of the gravity profile shows a slight depression in the Bouguer anomalies associated with the N.E. linear anomaly.)

of this offset into the lower density region above the basement.

The southeastern section of profile DD', cc', shows both the residual gravity and the observed gravity to decrease in response to the southern basin. The traverse of this section is essentially perpendicular to the regional isogals and is used to obtain a depth to the nose-like positive feature (Figure 19). The effects of the gravity field of the surrounding high and low density regions may distort the gravity anomaly in such a manner as to bias the minimum depth upward. Using the empirical formula for depth to a buried horizontal cylinder, the minimum depth to the center of the body is determined to be 4.2 kilometers. The effective radius of the cylinder is found to be 2.1 kilometers for a density contrast of 0.3 gm/cm^3. The estimated depth to the top of the nose-like positive is therefore approximately 2.0 kilometers.

Profile EE'

Detailed gravity profile EE' traverses the regional isogals considerably off normal. The profile crosses the northeast lineation, but does not show the pronounced depression or "simple fault" anomaly observed in the other profiles. This is not thought to indicate that the suspected offset truncates north of this profile, but that it is the result of the location and direction of the traverse (Figure 20).

Study of the profile with respect to the northeast lineation shows a slight change in positive gradient near the intersection. The residual profile shows a sharp change from positive to negative anomalies at this location. This may indicate that the area south of the western central positive is of lower density. The profile traverses the edge of the nose-like appendage, producing the positive

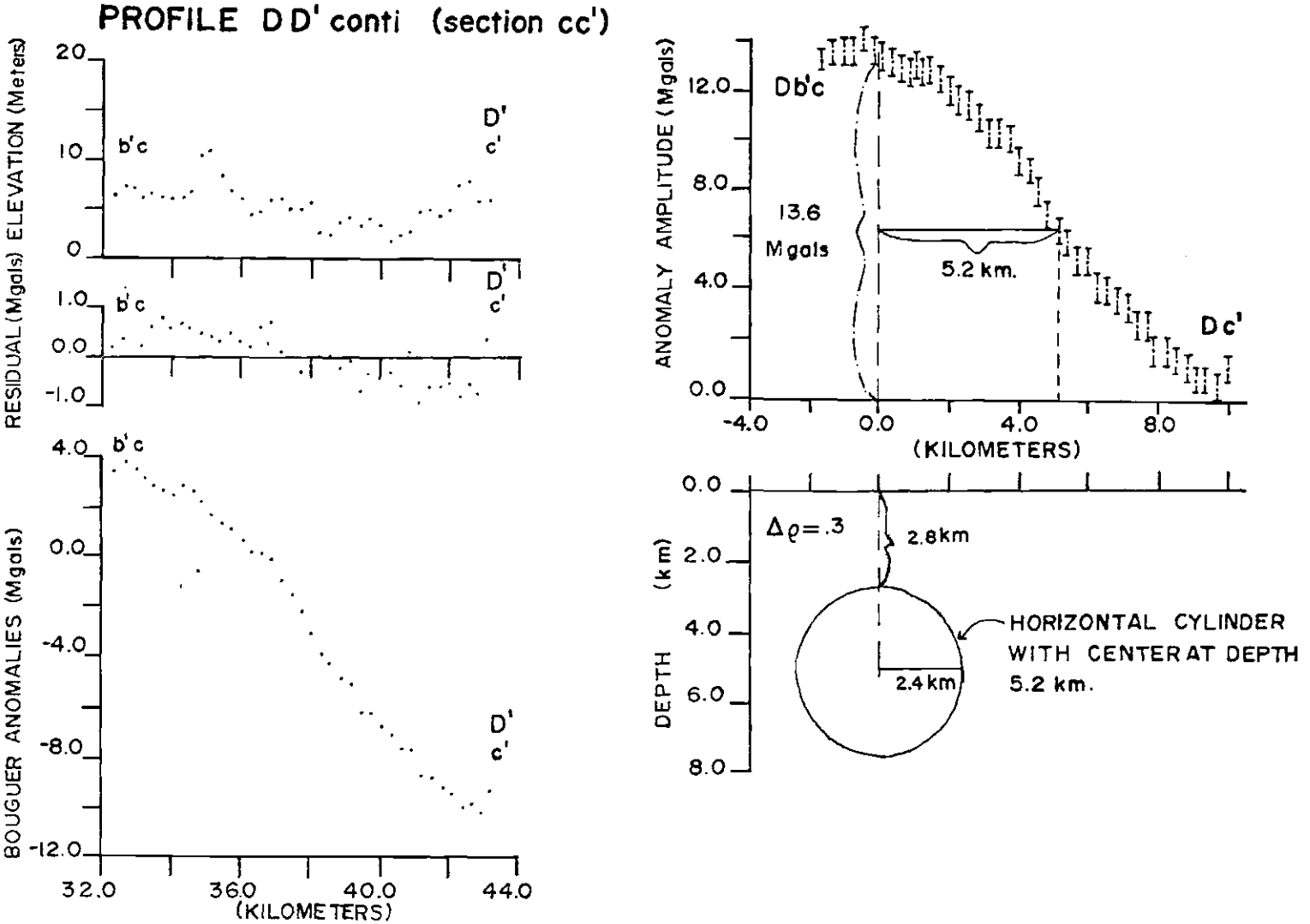

Figure 19. Composite Profile DD'--Section cc'. (Section cc' traverses the nose-like positive anomaly. Using the empirical formula for depth to a buried horizontal cylinder, a depth of 2.8 kilometers is computed for the coastal feature which produces the observed gravity anomaly.

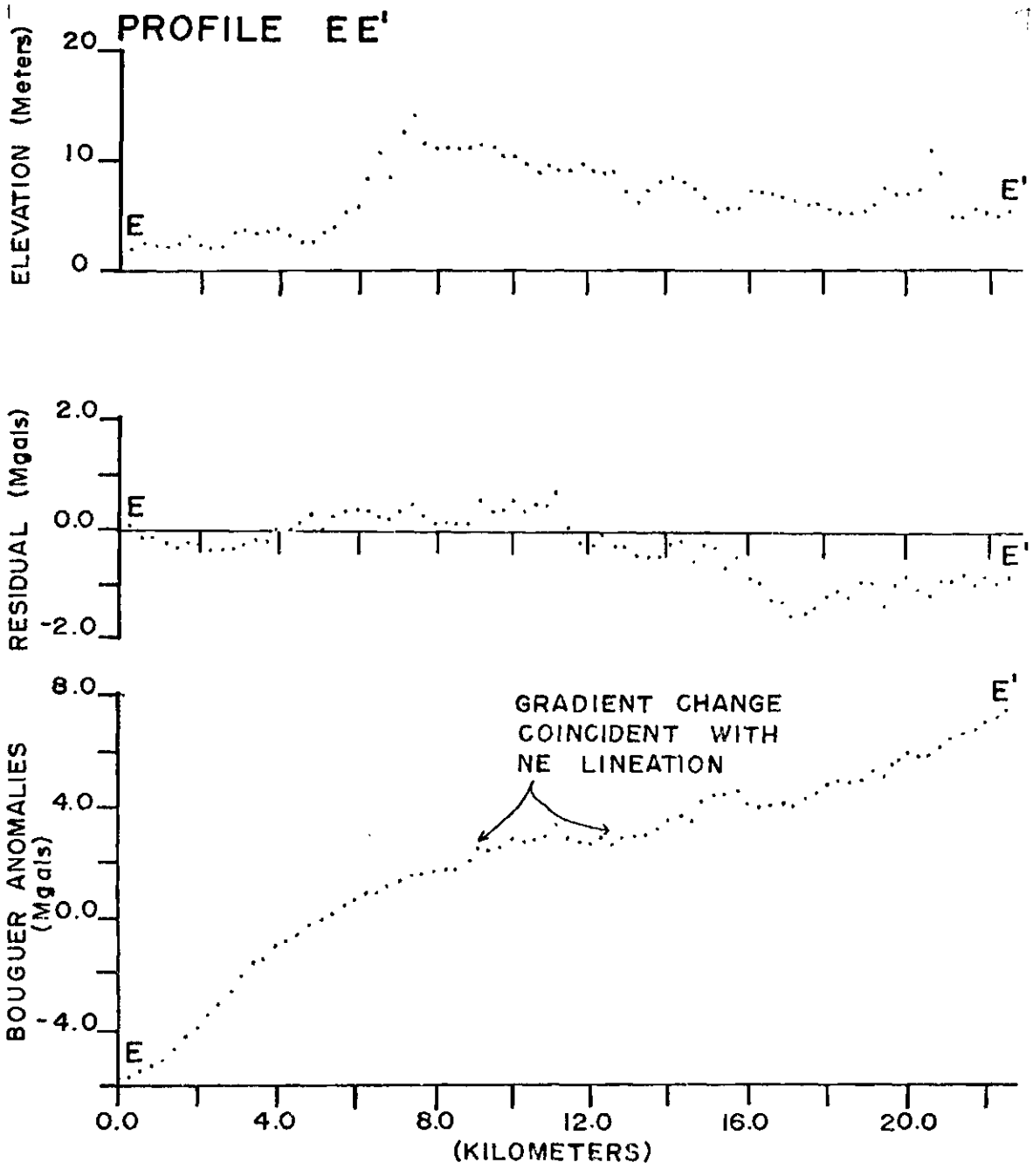

Figure 20. Composite Profile EE'. (The profile shows change in gravity gradient associated with N.E. linear anomaly.)

residual anomaly, and then enters the lower density region. If this sudden change in density contrast is caused by faulting, the direction of fault motion is difficult to determine unless offset of the higher density rock about the lineation is established.

Cross correlation coefficients obtained for this traverse indicate a strong positive relationship between gravity and topography. The relationship between the residual gravity and topography is weakly positive. The elevation profile shows that the elevation rises suddenly in the southeast and decreases gradually to the northwest. The sudden elevation change does not appear to be related to the northeast lineation. As the profile progresses out of the southeastern flood plain of the Edisto River, the topography rises. The decrease in elevation to the northwest is also thought to be related to the Stono River valley. Therefore, this profile is considered to give little evidence for basement control of surface topography, but may instead indicate a poor choice of reduction density.

Profile FF'

Detailed gravity profile FF' crosses the most northeastern positive as well as the northeastern lower density region modeled as part of the vertically down-faulted region in profile AA' (Figure 21).

The empirical formula for depth to a buried horizontal cylinder was applied to the northeastern positive. The depth to the top of the body, based on a 0.3 gm/cm^3 density contrast, was determined to be 1.2 kilometers. The effects of the positive anomalies on either side of the basin made depth determinations difficult, and the basin depth calculated using a cylinder density of -0.2 gm/cm^3 does not agree with

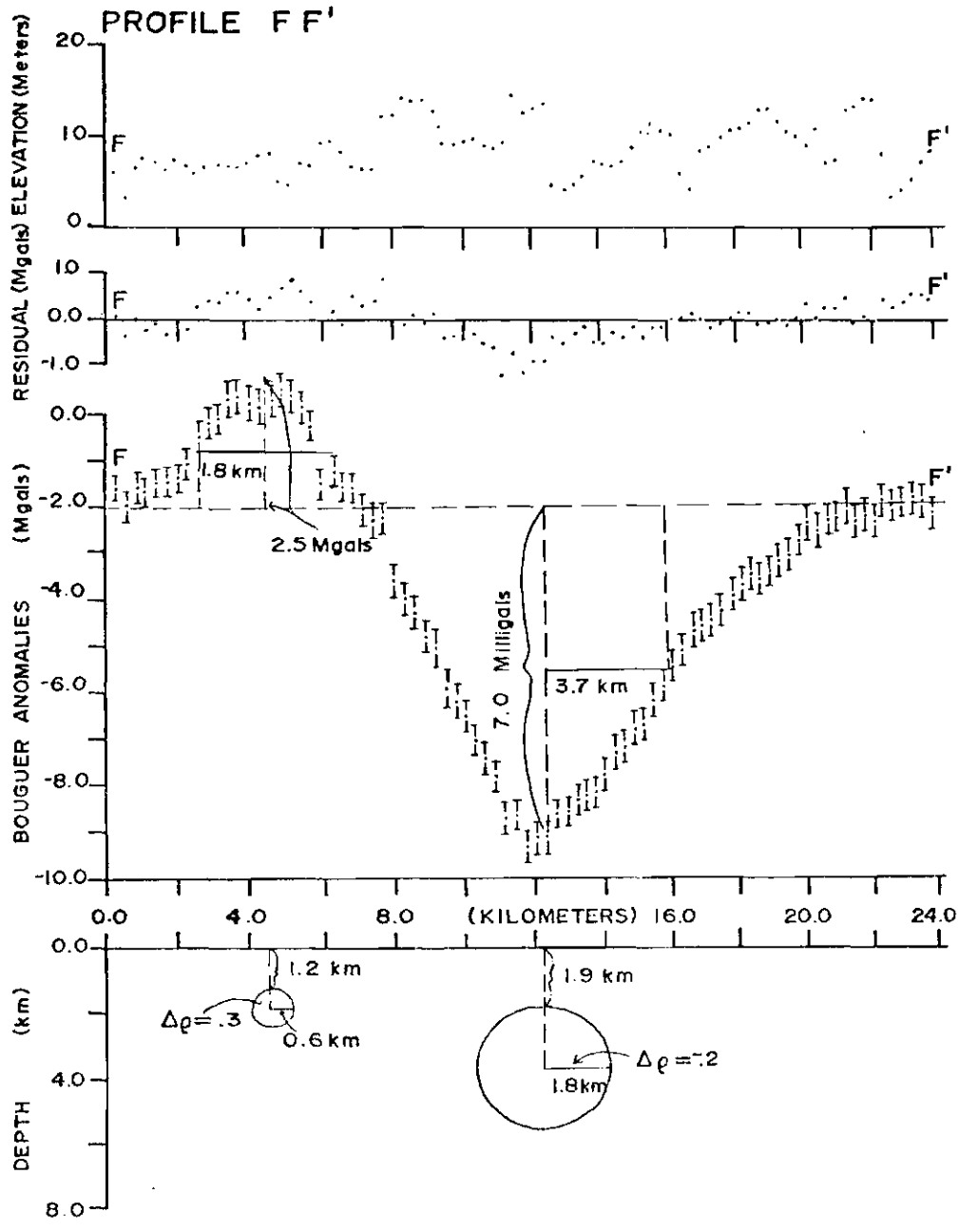

Figure 21. Composite Profile FF'. (The profile is modeled by two cylinders to obtain depth estimates for the crustal features which produce the observed gravity anomalies.)

the depths of 2 to 3 kilometers estimated by profiles AA' and BB'.

The correlation coefficients between elevation and gravity computed for this profile were weakly negative. Examination of the elevation with respect to residual and actual gravity shows that the elevation rises from north to south. There was a sudden increase in elevation near the beginning of the gravity low. This slight negative correlation may indicate that terrain corrections are necessary for sections of this profile. The variations in the elevation could produce terrain effects on the order of 0.25 milligal.

Profile GG'

Detailed gravity profile GG' is 38 kilometers long and traverses somewhat parallel to the northeastern linear anomaly (Figure 22). In the northeastern quadrant of the Summerville gravity map, the profile traverses a small feature which was observed as a small positive anomaly in the low density sedimentary region. The residual profile shows this peak more clearly than the observed gravity profile. The empirical formula for depth to a buried horizontal cylinder was used to approximate the anomaly. The center of the body was computed to be 1.6 kilometers beneath the surface. A density contrast of 0.3 gm/cm^3 was used to determine the effectiveness radius of 0.5 kilometers. The top of the feature was determined to be approximately 1.0 kilometers beneath the surface. The continuation of the profile to the southwest distorts the western central anomaly because the profile crosses the anomaly at a 45° angle with respect to normal.

The correlation coefficients between elevation and gravity for this profile are strongly negative. The surface feature thought to have

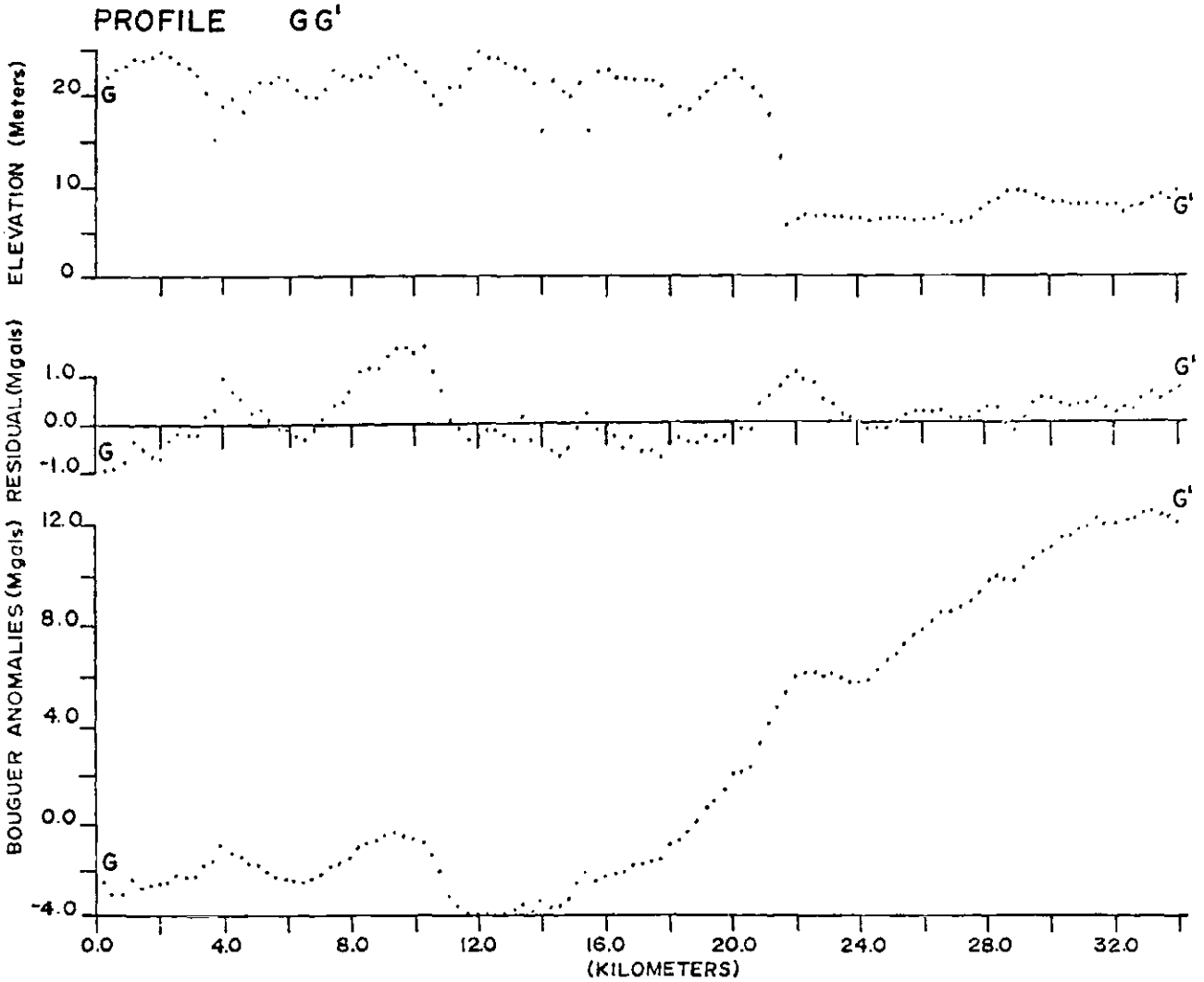

Figure 22. Composite Profile GG'. (This detailed gravity profile parallels to some extent the N.E. linear anomaly.)

produced this effect is the Edisto River channel, which crosses the western central gravity positive. There could be a structural reason for this. Differential weathering on the Pre-Cretaceous surface of the unstable high density material which is now at a depth of 2500 feet may be related to the entrenchment of the river. However, this hypothesis is not well supported by the data.

Profile HH'

Detailed gravity profile HH' shows one broad peak resulting from the orientation of the traverse with respect to the isogals. This distortion curtails the information which can be obtained concerning depth and shape. The southern end of this profile traverses the northeastern lineation. At this location there is very little evidence observed for the continuation of this trend southward. Traverse HH' crosses the northeastern trend near the intersection of the intersection of the northeastern lineation and profile EE'. Profile EE' did not strongly suggest the presence of faulting either. This may indicate that the hypothesized fault trace terminates, or changes direction, north of these profiles. The direction change is considered to be the more likely because the southern low density zone appears similar to the northeastern basin (Figure 23).

The coefficients computed between the elevation and gravity for profile HH' are negative. As seen in profile GG', the positive gravity anomaly was in a region of lower elevation.

Profiles II', JJ', and KK'

Detailed gravity profiles II', JJ', and KK' are not considered to give valuable structural information and will not be described.

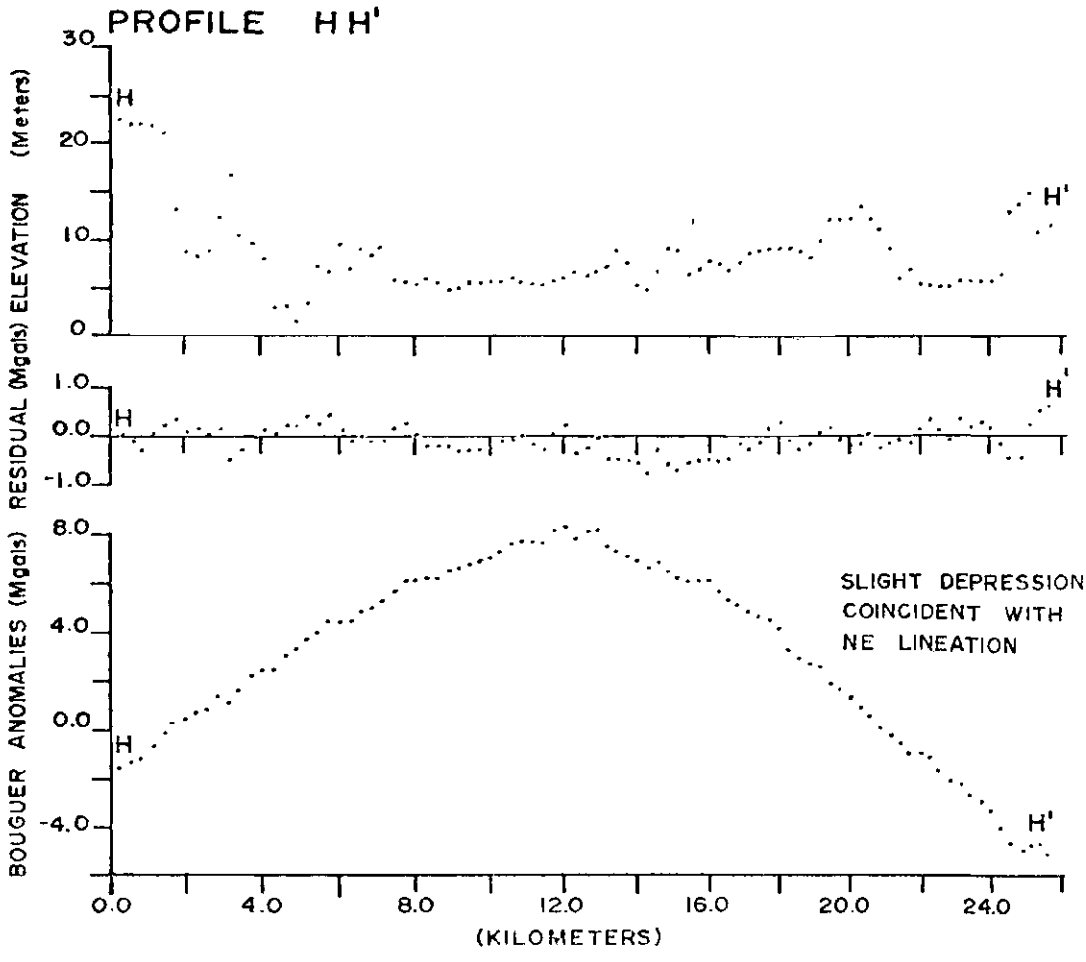

Figure 23. Composite Profile HH'. (The topographic profile suggests that areas of lowest elevation are associated with positive gravity anomalies.)

However, the locations and plots of the observed gravity along the profiles are given for completeness of text (Figures 24 and 25).

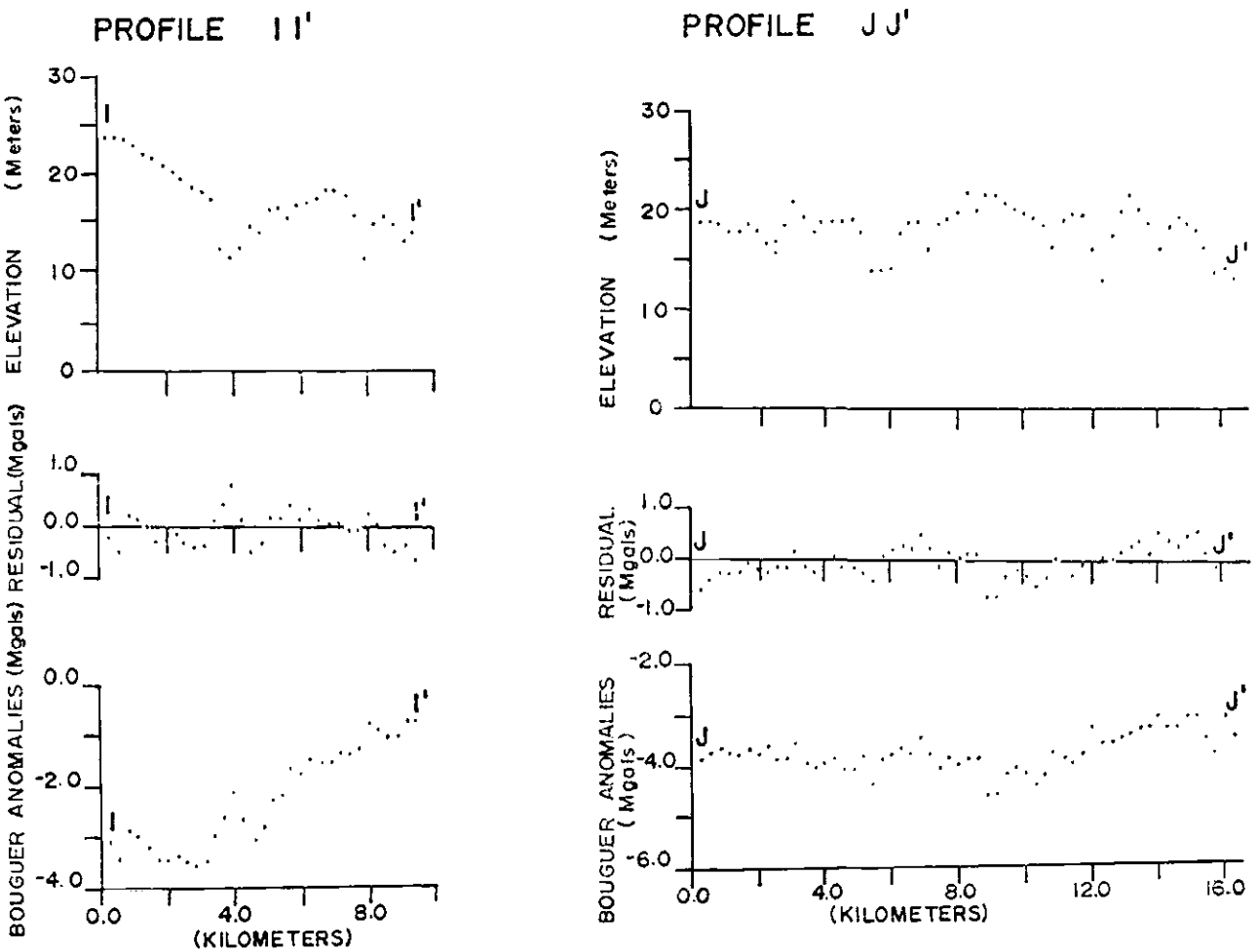

Figure 24. Composite Profiles II' and JJ'.

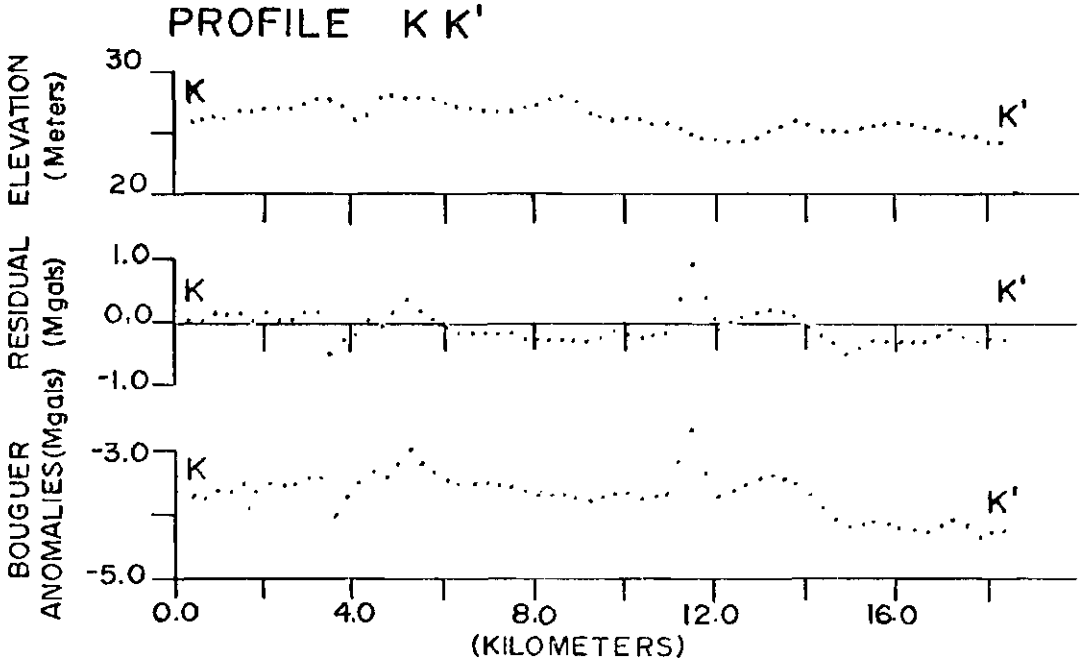

Figure 25. Composite Profile KK'.

CHAPTER VI

DISCUSSION AND CONCLUSIONS

Examination of the Charleston-Summerville, South Carolina, epicentral zone by detailed analysis of gravity reveals probable existence of a linear alignment of gravity anomalies oriented N 40° E. This lineation is observed in the simple Bouguer gravity map as a feature defined by the western termination of the northeastern and southern negative gravity anomalies, which imply low density crustal rocks. The lineation intersects the positive gravity anomalies in a region where the isogals spread to form a nose-like positive anomaly protruding to the east. This northeastern alignment of anomalies is observed as a linear zone of negative anomalies in the two-dimensional residual gravity map and as a strong trend in the two-dimensional spectral analysis of the residual gravity map.

Three-dimensional modeling of this linear feature in the Summerville area supports the interpretation of this feature as a vertical fault having an offset of 1 to 2 kilometers. The central high density regions in the first gravity model are interpreted to be basic plugs of density 2.9 gm/cm^3. The surrounding 2.8 gm/cm^3 material is considered to be basic flows. These flows appear to have been down-faulted to the east about the northeast lineation. Thus, the nose-like appendage modeled at a depth of 4.5 kilometers, having a thickness of 4 kilometers, is interpreted to have once been at a depth of 2.5 kilometers. The low density zones to the northeast and southeast are considered to

be sedimentary basins containing beds of average density 2.4 gm/cm^3. These low density zones appear to be associated with this northeastern lineation. Assuming this lineation is representative of a fault, the down-faulted flows, as well as the sedimentary basins, may be elements of a graben. The second three-dimensional model also supports this vertical offset.

The three-dimensional models do not extend upward to the depth of known crystalline basic basement rock. However, both theoretical models indicate faulting along the northeast lineation. Distortions in the depth and shape of structural bodies are difficult to avoid in gravity models. Differences in depth of two bodies of similar densities are more reliable. Peter Popanoe of the United States Geological Survey (personal communication) found the density of the basaltic basement rock to be 2.72 gm/cm^3 at a depth of 2800 feet. This density is nearly the same as the Bouguer reduction density, and would not produce a Bouguer anomaly. The depth at which both these models predict dense basalts may be more reasonable.

On the basis of two-dimensional theoretical curves for a simple fault, two detailed gravity profiles (AA' and BB') which cross this lineation, show a fault which has a depth of 1 kilometer and a throw of 1 to 2 kilometers to best fit the observed profiles. This throw is supported by the determination of the depth to the top of the nose-like positive in profile DD'.

Four of the five gravity profiles which traverse the suspected fault suggest a strong direct relationship between the gravity and topography. Examination of the elevation profiles suggest that basement

faulting may control the surface topography. In general, this relationship only appears to be true if the density contrast of basement rock remains similar in sign throughout the traverse. In profiles which cross both low density and high density rock, the correlation functions show an inverse relationship between gravity and topography. Again, this may suggest basement control of topography. Positive gravity anomalies are generally found in regions of low elevations. This may indicate that the differential weathering of unstable basic basement rock was more rapid than the surrounding sedimentary sequences, producing small basement valleys which contribute to the channeling of the rivers from the Cretaceous to the present.

The residual gravity map, as well as the gravity profiles, suggests that the northeast lineation truncates near the northern edge of the northeastern basin. The southwestern extent of this suspected fault is not as obvious. It is possible that this fault is related to the southern basin and therefore extends out of the area of investigation. It is also possible that the northeastern and southern basins are the same basins (S.C. Gravity Map, in preparation).

It is not unreasonable to expect to find such a graben fault in the Coastal Plain basement. Sheridan (1974) predicted such major grabens might result from Protoatlantic continental rifting. Mayhew (1974) suggested that volcanics were common in the rift zones and were concentrated in the outer part or the outer shelf, adjacent to the locus of continental breaching. The amplitude of the throw on such a fault is also reasonable and is comparable to that of the Deep River Basin in North Carolina (Reinemund 1955). Such a down-faulted block also has

tectonic implications. Isostatic readjustment of such a block could reactivate old faults or create new ones within the graben. The November 22, 1974, event was located near this northeast lineation within the proposed graben (Tarr, personal communication). The depth of the event was calculated to be approximately 10 kilometers, which is near the base of the down-faulted basic material in the graben observed in three-dimensional Model No. 1.

Gravity analysis does not, of course, yield unique solutions. Justification of the presence of faults such as that postulated here, would require additional geophysical study. Seismic reflection studies, as well as more detailed well loggings, are the logical tools for the determination of the validity of such an offset in the basement surface. It is hoped that these methods will be applied and that the cause of the earthquake activity in the Charleston area will soon be determined.

APPENDIX I

GRAVITY DATA AND DATA REDUCTION

Gravity measurements were obtained and reduced by standard techniques. The data consists of approximately 2000 measurements, 1000 of which are observations along 11 detailed gravity profiles. The location of these profiles are described in Table 2. The remaining 1000 measurements are regional data having an average station spacing of 1 kilometer.

Thr gravimeters used in this study were both of Lacosta-Romberg design. The meters were loaned to this project by Peter Popenoe of the United States Geological Survey and Dr. Al Erickson of the University of Georgia. Both meters, when read by a single operator, have a reading precision of $\pm$0.02 milligal. Instrumental drift over an eight-hour period is typically 0.15 milligal, but may be as high as 0.4 milligal for the same period. Both meters have internal temperature controls and are maintained at a constant temperature of 49°C to eliminate mechanical drift due to temperature change. The uncertainties in drift and reading precision combine to give a total measurement precision of $\pm$0.15 milligal.

Five new gravity base stations were established from the state base of Branchville, South Carolina. These base stations were established at either benchmarks or controlled intersections and were used to correct for drift during surveys. Information concerning the location and value of these bases is given in Table 3.

Observed survey drifts are listed in Table 4.

The effect of latitude on gravity measurements was compensated for by using the international gravity formula of 1931 (Dobrin, 1960, p. 187). Drift corrections for each of the surveys were made by assuming linear drift between base station readings after removal of tidal effects. The data were reduced using the standard Bouguer reduction density of 2.67 gm/cm^3.

The data, in standard Department of Defense computer and format, are listed in Table 5 (Figure 26).

Eight 7.5 minute topography maps and two 15' topographic sheets were used for location control and some elevation control. The 7.5 minute United States Geological Survey maps were Summerville (1971), Mt. Holly (1971), Stallsville (1971), Ladson (1971), Johns Island (1971), Ravenel (1971), Legerville (1971), and Wadmalaw (1971). The two 15' quadrangles were Cottageville (1943) and Ridgeville (1943). Elevations of regional stations' locations were determined by interpolation between topographic controus and are estimated to be $\pm$3 feet on the 7.5 minute sheets and $\pm$5 feet on the 15' quadrangles. It is important to note that in some areas, the topography has been altered since the 15' quadrangles were published. Due to rapidly varying barometric conditions in the coastal regions, the barometric altimeter proved less than satisfactory. Profile measurements in most instances were obtained by recording elevation differences obtained by level sighting. The accuracy of these elevations is estimated to be $\pm$1 foot. The estimated uncertainty in the regional gravity due to elevation is $\pm$0.15 milligal, but may be as high at $\pm$0.3 milligal. The uncertainty of profile measurements due to elevation is estimated to be $\pm$0.05 milligal. The total maximum

uncertainty of the regional data obtained by combining the measurement precision and the uncertainty due to elevation control is estimated to be $\pm$0.20 milligal. The maximum estimated uncertainty of the profile data is $\pm$0.15 milligal.

Table 2. Description of Profile Location

Profile Designation	Profile Location
AA'	The profile is established along U.S. Highway 176. It begins at the intersection of U.S. Highway 176 and Berkeley County Road 276, and ends at the intersection of U.S. Highway 176 and Berkeley County Road 45.
BB'	The profile is established along U.S. Highway 78 and Berkeley County Road 29. It begins on U.S. Highway 78 at Jedburg, South Carolina, and continues along U.S. Highway which changes to Berkeley County Road 29. The profile ends at the intersection of Berkeley County Roads 29 and 136.
CC'	The profile is established along South Carolina Highway 642. It begins at the intersection of South Carolina Highway 642 and U.S. Highway 12A, and ends at the intersection of South Carolina Highway 642 and South Carolina Highway 62 just outside Charleston, South Carolina.
DD'	The profile is established along Colleton County Road 30 and South Carolina Highway 61. It begins at the intersection of Colleton County Road 30 and Colleton County Road 19 and continues along County Road 30 to the intersection with South Carolina Highway 61. The profile ends along South Carolina Highway 61 approximately 1.5 km southeast of its intersection with South Carolina Highway 7.
EE'	The profile is established along the Old Dorchester-Charleston County Line Road. It begins at the intersection of County Line Road and U.S. Highway 17, and ends at the intersection of County Line Road and South Carolina Highway 38.
FF'	The profile is established along old U.S. Highway 52. It begins at the intersection of U.S. Highway 52 and Berkeley Road 50, and ends at the intersection of U.S. Highway 52 and the Charleston Municipal Airport Road.
GG'	The profile is established along U.S. Highway 17-A beginning at the intersection of Berkeley Road 50 and U.S. Highway 17-A, and ends at the U.S. 17-A Edisto River bridge.

Table 2. Continued

Profile Designation	Profile Location
HH'	The profile is established along South Carolina Highway 165. It begins at the intersection of South Carolina Highway 165 and U.S. Highway 17-A, and ends at the intersection of South Carolina Highway 165 and U.S. Highway 17.
II'	The profile is established along South Carolina Highway 27. It begins along Highway 27 at Ridgeville, South Carolina, and ends at the intersection of South Carolina Highway 27 and South Carolina Highway 61.
JJ'	The profile is established along Dorchester County Road 58. It begins at the intersection of County Road 58 and Dorchester County Road 22, and ends along Berkley County Road 22, a continuation of Dorchester County Road 58, 2.4 km north of New Hope Church.
KK'	The profile is established along Berkeley County Road 275. It begins at the intersection of County Road 275 and U.S. 17-A, and ends at the intersection of County Road 275 and U.S. Highway 176.

Table 3. Base Stations Used and Established

Name of Station	Description of Station	Location		Elevation (Feet)	Value (Total)
		Long.	Lat.		
Branchville, S. C.	Established by AMS-(1929) at Railroad station at BM "M25 1934 126.630"	80° 49.0' W	33° 150' N	126.601	979590.786
*Lotts Corner S.C. Base	Controlled intersection--Summerville Quad	80° 14.96 W	33° 3.25 N	62.	979574.383
*17-A Base	Established at BM on U.S. 17-A in yard of Mrs. Williams, Mt. Holly Quad	80° 7.17' W	33° 2.60 N	81.	979576.627
*642 Base	Established at BM on S.C. 642, 28 mile S.E. of intersection of S.C. 642 & 165. BM is on telephone pole. Stallsville Quad	80° 11.82' W	32° 57.97' N	48.	979574.077
*Ashley Phosphate Base	Established at controlled intersection in Ashley Heights .26 N.E. of railroad crossing in front of a Quick Shoppe on Ashley Phosphate Rd.	80° 3.06' W	32° 55.9' N	29.	979567.485
*U.S. 61 Base	Established at controlled intersection on U.S. 61, .2 mile S.E. of railroad crossing at Springfield Estates. The base is in front of a Quick Shoppe	80° 3.20' W	32° 50.37' N	16.	979560.659

*Base stations which were established in this study.

Table 4. Survey Drift

Georgia Tech Survey Number	Station Numbers	Drift (Mgals/hr)	Time Between Base Stations
115	1-48	.05	6.7 hours
116	1-15	.001	3.9
116	15-34	.06	3.0
117	1-25	.01	3.3
117	25-50	.02	2.9
118	1-15	.05	3.0
118	15-46	.004	4.0
119	1-48	-.02	6.4
120	1-28	.01	5.4
121	1-16	.03	1.8
122	1-18	.03	4.0
122	18-46	.02	3.3
123	1-48	.02	5.4
123	48-68	.02	1.7
124	1-27	.07	2.5
124	22-55	.01	3.3
125	1-30	.003	4.5
126	1-26	.06	2.9
126	26-73	.005	4.6
127	1-16	.07	1.1
127	16-35	.004	2.5
128	1-61	-.005	5.0
129	1-40	.03	6.4
130	1-43	.02	5.1
130	43-62	.01	2.7
131	1-49	.01	4.4
131	49.83	.03	3.0
132	1-55	.04	4.8
132	55-100	.05	3.7
133	1-48	.04	5.6
134	1-43	-.03	6.2
135	1-36	.005	7.6
136	1-30	.001	7.0
137	1-42	.000	10.4
138	1-33	.002	10.0
139	1-24	.030	7.0
140	1-44	.004	8.9
141	1-17	-.10	5.0
142	1-11	.03	4.1
142	11-27	.06	3.1
143	1-31	.005	5.9
143	31-52	.01	5.6
144	1-47	.009	11.1
145	1-19	.01	7.2
153	1-25	.004	9.5

Table 4. Continued

Georgia. Tech Survey Number	Station Numbers	Drift (Mgals/hr)	Time Between Base Stations
154	1-40	.01	10.1
155	1-22	.01	7.3
155	22-38	.09	1.5
156	1-27	.009	3.8
157	1-8	-.02	1.4
157	8-31	.004	6.9
158	1-51	.003	8.8
159	1-35	.01	5.0

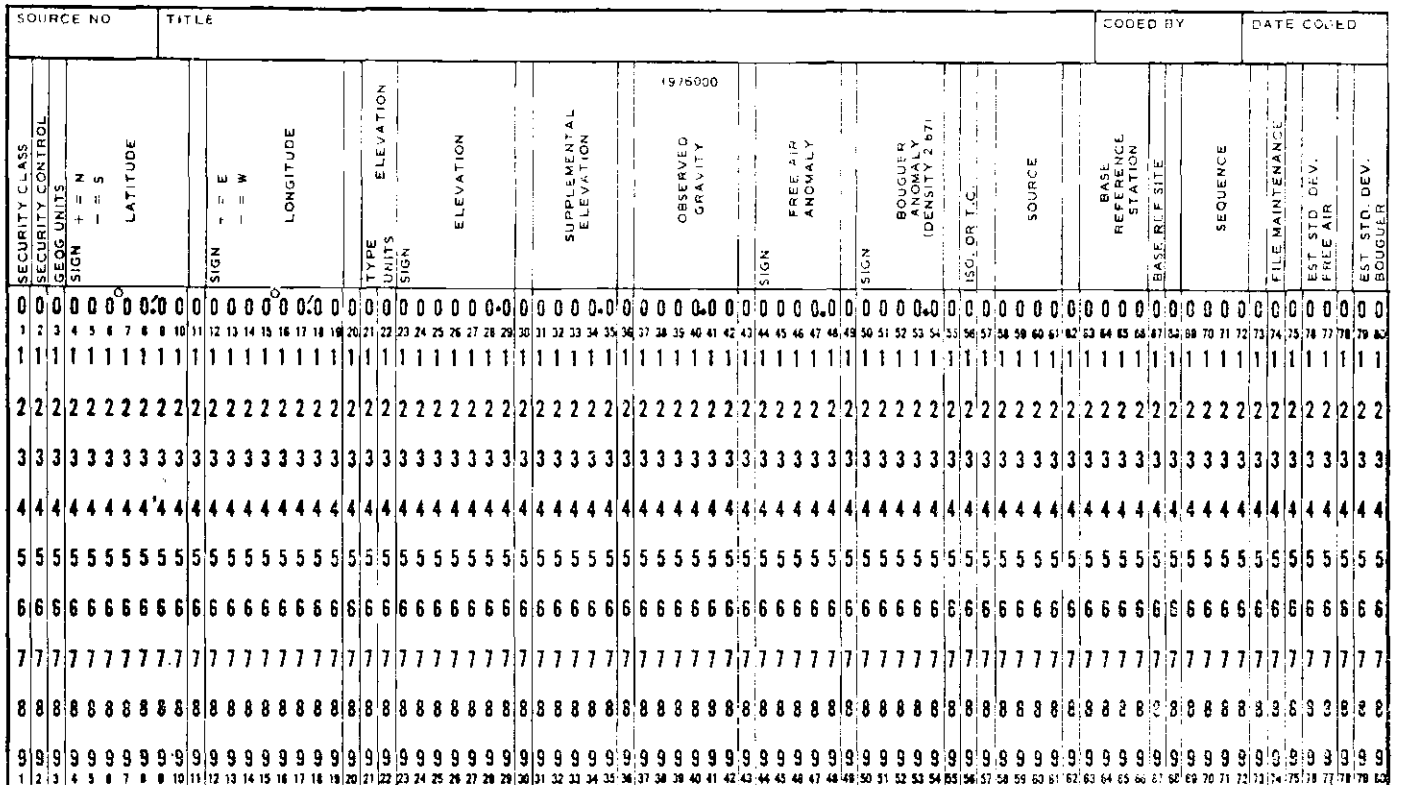

Figure 26. Standard Department of Defense Gravity Coding Form.

Table 5. Gravity Data

33 253 - 801492 1	189	3574806-	171-	381	GT15	GA	1	2	6
33 260 - 801486 1	189	3574808-	159-	376	GT15	GA	1	3	6
33 268 - 801481 1	186	3574834-	157-	364	GT15	GA	1	4	6
33 275 - 801476 1	177	3575048-	174-	371	GT15	GA	1	5	6
33 282 - 801471 1	177	3575063-	179-	376	GT15	GA	1	6	6
33 289 - 801466 1	186	3575108-	158-	366	GT15	GA	1	7	6
33 296 - 801459 1	177	3575335-	173-	371	GT15	GA	1	8	6
33 303 - 801454 1	165	3575753-	179-	362	GT15	GA	1	9	6
33 311 - 801449 1	152	3575812-	211-	381	GT15	GA	1	10	6
33 320 - 801442 1	183	3575823-	178-	382	GT15	GA	1	11	6
33 325 - 801436 1	207	3575838-	123-	354	GT15	GA	1	12	6
33 334 - 801429 1	192	3575966-	177-	391	GT15	GA	1	13	6
33 342 - 801417 1	177	3575968-	203-	400	GT15	GA	1	14	6
33 350 - 801405 1	186	3575984-	186-	394	GT15	GA	1	15	6
33 357 - 801394 1	189	3575760-	174-	385	GT15	GA	1	16	6
33 366 - 801383 1	189	3575754-	189-	400	GT15	GA	1	17	6
33 372 - 801375 1	189	3576842-	189-	401	GT15	GA	1	18	6
33 378 - 801363 1	177	3576394-	181-	379	GT15	GA	1	19	6
33 387 - 801353 1	167	3576847-	285-	438	GT15	GA	1	20	6
33 395 - 801345 1	137	3577294-	236-	389	GT15	GA	1	21	6
33 403 - 801343 1	137	3577528-	223-	376	GT15	GA	1	22	6
33 412 - 801339 1	171	3577784-	177-	367	GT15	GA	1	23	6
33 419 - 801331 1	186	3576778-	170-	378	GT15	GA	1	24	6
33 427 - 801325 1	180	3577247-	145-	347	GT15	GA	1	25	6
33 437 - 801314 1	158	3577632-	194-	371	GT15	GA	1	26	6
33 447 - 801306 1	183	3576915-	204-	408	GT15	GA	1	27	6
33 455 - 801298 1	189	3577131-	175-	389	GT15	GA	1	28	6
33 464 - 801282 1	204	3576817-	171-	393	GT15	GA	1	29	6
33 471 - 801273 1	213	3576905-	144-	382	GT15	GA	1	30	6
33 479 - 801262 1	198	3577259-	165-	386	GT15	GA	1	31	6
33 487 - 801251 1	210	3576451-	221-	455	GT15	GA	1	32	6
33 495 - 801238 1	210	3576559-	221-	456	GT15	GA	1	33	6
33 504 - 801225 1	204	3577240-	184-	412	GT15	GA	1	34	6
33 515 - 801215 1	195	3577589-	185-	404	GT15	GA	1	35	6
33 523 - 801203 1	192	3577709-	201-	415	GT15	GA	1	36	6
33 534 - 801197 1	189	3577740-	222-	433	GT15	GA	1	37	6
33 545 - 801189 1	186	3578102-	214-	418	GT15	GA	1	38	6
33 554 - 801184 1	152	3579164-	201-	370	GT15	GA	1	39	6
33 562 - 801181 1	183	3578725-	181-	385	GT15	GA	1	40	6
33 573 - 801175 1	192	3578842-	176-	390	GT15	GA	1	41	6
33 581 - 801169 1	189	3579058-	165-	375	GT15	GA	1	42	6
33 593 - 801161 1	152	3580309-	159-	329	GT15	GA	1	43	6
33 605 - 801153 1	122	3580359-	217-	353	GT15	GA	1	44	6
33 616 - 801145 1	168	3580024-	172-	359	GT15	GA	1	45	6
33 626 - 801137 1	192	3579862-	127-	341	GT15	GA	1	46	6
33 637 - 801131 1	210	3579758-	95-	330	GT15	GA	1	47	6
33 647 - 801125 1	195	3580251-	107-	329	GT16	GA	1	2	6
33 653 - 801126 1	180	3580654-	121-	322	GT16	GA	1	3	6
33 660 - 801113 1	152	3581437-	139-	309	GT16	GA	1	4	6
33 669 - 801106 1	177	3580497-	124-	321	GT16	GA	1	5	6
33 675 - 801100 1	189	3580753-	114-	325	GT16	GA	1	6	6
33 680 - 801093 1	183	3581127-	103-	307	GT16	GA	1	7	6
33 696 - 801088 1	174	3581519-	114-	308	GT16	GA	1	8	6
33 705 - 801083 1	158	3581351-	170-	347	GT16	GA	1	9	6
33 713 - 801075 1	131	3581938-	227-	373	GT16	GA	1	10	6
33 722 - 801071 1	137	3582613-	153-	306	GT16	GA	1	11	6
33 733 - 801060 1	125	3582625-	205-	344	GT16	GA	1	12	6
33 196 - 80 981 1	256	3572391-	37-	373	GT16	GA	1	16	6
33 206 - 80 979 1	256	3572524-	86-	372	GT16	GA	1	17	6
33 214 - 80 977 1	259	3572629-	77-	366	GT16	GA	1	18	6
33 224 - 80 975 1	259	3572820-	72-	361	GT16	GA	1	19	6
33 232 - 80 972 1	262	3572909-	65-	357	GT16	GA	1	20	6
33 242 - 80 971 1	262	3572964-	73-	365	GT16	GA	1	21	6
33 253 - 80 969 1	265	3573122-	59-	354	GT16	GA	1	22	6

Table 5. Continued

33	208	-	80	968	1	205	3573233-	61-	357	GT16	GA	1	23	6
33	208	-	80	970	1	205	3573374-	58-	354	GT16	GA	1	24	6
33	278	-	80	975	1	268	3573473-	56-	349	GT16	GA	1	25	6
33	285	-	80	975	1	271	3573514-	45-	343	GT16	GA	1	26	6
33	294	-	80	972	1	271	3573633-	103-	405	GT16	GA	1	27	6
33	305	-	80	958	1	205	3573672-	79-	375	GT16	GA	1	28	6
33	313	-	80	954	1	256	3574121-	74-	355	GT16	GA	1	29	6
33	320	-	80	952	1	268	3574231-	57-	337	GT16	GA	1	30	6
33	334	-	80	952	1	271	3574295-	58-	341	GT16	GA	1	31	6
33	337	-	80	949	1	274	3574421-	29-	326	GT16	GA	1	32	6
33	346	-	80	946	1	271	3574801-	4-	316	GT16	GA	1	33	6
33	373	-	80	935	1	271	3574960-	29-	332	GT17	GA	1	2	6
33	386	-	80	934	1	269	3575034-	54-	356	GT17	GA	1	3	6
33	404	-	80	926	1	262	3575265-	65-	358	GT17	GA	1	4	6
33	421	-	80	922	1	264	3575394-	70-	368	GT17	GA	1	5	6
33	437	-	80	920	1	269	3575470-	71-	374	GT17	GA	1	6	6
33	446	-	80	915	1	274	3575582-	64-	370	GT17	GA	1	7	6
33	467	-	80	912	1	259	3575703-	97-	386	GT17	GA	1	8	6
33	474	-	80	908	1	256	3576170-	98-	375	GT17	GA	1	9	6
33	505	-	80	904	1	256	3576441-	98-	384	GT17	GA	1	10	6
33	517	-	80	900	1	256	3576859-	99-	374	GT17	GA	1	11	6
33	535	-	80	898	1	244	3578219-	6-	278	GT17	GA	1	12	6
33	552	-	80	891	1	238	3577515-	119-	384	GT17	GA	1	13	6
33	554	-	80	887	1	238	3577861-	104-	369	GT17	GA	1	14	6
33	559	-	80	883	1	244	3578149-	93-	355	GT17	GA	1	15	6
33	563	-	80	879	1	256	3578167-	84-	363	GT17	GA	1	16	6
33	574	-	80	875	1	244	3578096-	134-	409	GT17	GA	1	17	6
33	587	-	80	873	1	244	3578015-	157-	439	GT17	GA	1	18	6
33	596	-	80	868	1	247	3578184-	153-	426	GT17	GA	1	19	6
33	606	-	80	868	1	256	3578331-	156-	435	GT17	GA	1	20	6
33	615	-	80	865	1	247	3578575-	165-	441	GT17	GA	1	21	6
33	721	-	80	859	1	241	3579137-	152-	421	GT17	GA	1	22	6
33	715	-	80	856	1	238	3579062-	188-	453	GT17	GA	1	23	6
33	734	-	80	852	1	232	3579947-	185-	443	GT17	GA	1	24	6
33	754	-	801431		1	210	3575111-	144-	379	GT17	GA	1	26	6
33	823	-	801424		1	210	3574331-	149-	384	GT17	GA	1	27	6
33	822	-	801417		1	201	3574909-	176-	401	GT17	GA	1	28	6
33	814	-	801399		1	195	3574935-	180-	398	GT17	GA	1	29	6
33	802	-	801382		1	186	3574766-	220-	424	GT17	GA	1	30	6
33	293	-	801369		1	204	3574462-	172-	400	GT17	GA	1	31	6
33	284	-	801347		1	204	3574417-	164-	392	GT17	GA	1	32	6
33	274	-	801329		1	207	3574313-	151-	382	GT17	GA	1	33	6
33	264	-	801312		1	204	3574131-	168-	396	GT17	GA	1	34	6
33	255	-	801294		1	207	3573729-	184-	419	GT17	GA	1	35	6
33	246	-	801277		1	210	3573712-	164-	398	GT17	GA	1	36	6
33	237	-	801262		1	207	3573674-	164-	398	GT17	GA	1	37	6
33	229	-	801244		1	207	3573353-	184-	419	GT17	GA	1	38	6
33	218	-	801227		1	210	3573087-	188-	426	GT17	GA	1	39	6
33	209	-	801211		1	210	3572754-	190-	431	GT17	GA	1	40	6
33	202	-	801196		1	219	3572615-	178-	422	GT17	GA	1	41	6
33	195	-	801178		1	229	3572359-	169-	424	GT17	GA	1	42	6
33	181	-	801162		1	250	3571932-	130-	409	GT17	GA	1	43	6
33	172	-	801144		1	241	3571754-	164-	432	GT17	GA	1	44	6
33	163	-	801127		1	238	3571993-	137-	402	GT17	GA	1	45	6
33	151	-	801110		1	232	3571633-	175-	434	GT17	GA	1	46	6
33	138	-	801086		1	213	3571358-	180-	418	GT17	GA	1	47	6
33	131	-	801071		1	183	3572007-	201-	405	GT17	GA	1	48	6
33	127	-	801061		1	219	3571739-	178-	414	GT17	GA	1	49	6
33	115	-	801042		1	213	3571534-	192-	430	GT18	GA	1	2	6
33	97	-	801030		1	192	3573205-	188-	358	GT18	GA	1	3	6
33	87	-	801013		1	180	3572820-	209-	409	GT18	GA	1	4	6
33	76	-	80	988	1	195	3571537-	189-	408	GT18	GA	1	5	6
33	73	-	80	965	1	244	3570244-	169-	441	GT18	GA	1	6	6
33	64	-	80	947	1	244	3570175-	184-	436	GT18	GA	1	7	6

Table 5. Continued

33	54	-	80	927	1	207	3570927-	198-	413	GT18	GA	1	8	6
33	42	-	80	908	1	189	3570764-	244-	455	GT18	GA	1	9	6
33	33	-	80	892	1	165	3571650-	247-	421	GT18	GA	1	10	6
33	25	-	80	874	1	165	3571556-	234-	416	GT18	GA	1	11	6
33	14	-	80	856	1	158	3571748-	201-	376	GT18	GA	1	12	6
33	4	-	80	838	1	186	3570373-	259-	469	GT18	GA	1	13	6
33	264	-	80	736	1	238	3576736	198-	67	GT18	GA	1	16	6
33	268	-	80	696	1	229	3576842	150-	99	GT18	GA	1	17	6
33	273	-	80	676	1	213	3576936	136-	102	GT18	GA	1	18	6
33	279	-	80	652	1	219	3576728	121-	124	GT18	GA	1	19	6
33	287	-	80	638	1	213	3576473	66-	176	GT18	GA	1	20	6
33	300	-	80	626	1	219	3576350	54-	190	GT18	GA	1	21	6
33	315	-	80	615	1	223	3576339	42-	206	GT18	GA	1	22	6
33	330	-	80	603	1	213	3576418	1-	237	GT18	GA	1	23	6
33	343	-	80	591	1	195	3576776-	37-	255	GT18	GA	1	24	6
33	358	-	80	579	1	198	3576760-	50-	271	GT18	GA	1	25	6
33	373	-	80	562	1	204	3577011-	35-	263	GT18	GA	1	26	6
33	394	-	80	548	1	213	3577072-	21-	259	GT18	GA	1	27	6
33	410	-	80	537	1	219	3577199-	12-	257	GT18	GA	1	28	6
33	424	-	80	520	1	216	3577733	13-	228	GT18	GA	1	29	6
33	440	-	80	518	1	216	3578249	43-	199	GT18	GA	1	30	6
33	457	-	80	512	1	201	3578786	25-	199	GT18	GA	1	31	6
33	473	-	80	506	1	177	3579796	29-	169	GT18	GA	1	32	6
33	484	-	80	502	1	192	3579881	71-	143	GT18	GA	1	33	6
33	501	-	80	497	1	183	3580584	90-	114	GT18	GA	1	34	6
33	517	-	80	491	1	146	3580881-	16-	180	GT18	GA	1	35	6
33	534	-	80	485	1	198	3579925	25-	196	GT18	GA	1	36	6
33	553	-	80	479	1	219	3579418	6-	245	GT18	GA	1	37	6
33	567	-	80	472	1	226	3579553	7-	245	GT18	GA	1	38	6
33	585	-	80	466	1	232	3579686	14-	244	GT18	GA	1	39	6
33	625	-	80	451	1	230	3579650-	6-	271	GT18	GA	1	40	6
33	647	-	80	445	1	241	3579776-	14-	282	GT18	GA	1	41	6
33	659	-	80	440	1	238	3579971-	20-	288	GT18	GA	1	42	6
33	675	-	80	434	1	235	3580151-	34-	235	GT18	GA	1	43	6
33	690	-	80	428	1	235	3579512-	3-	264	GT18	GA	1	44	6
33	632	-	80	427	1	229	3580240-	66-	321	GT19	GA	1	2	6
33	709	-	80	422	1	225	3580358-	77-	325	GT19	GA	1	3	6
33	727	-	80	416	1	216	3581415-	35-	277	GT19	GA	1	4	6
33	740	-	80	412	1	241	3582110	93-	176	GT19	GA	1	5	6
33	743	-	80	115	1	104	3584479-	49-	164	GT19	GA	1	6	6
33	727	-	80	115	1	113	3584726-	24-	156	GT19	GA	1	7	6
33	709	-	80	115	1	61	3585537-	98-	166	GT19	GA	1	8	6
33	691	-	80	114	1	56	3585287-	172-	266	GT19	GA	1	9	6
33	673	-	80	113	1	67	3584758-	86-	163	GT19	GA	1	10	6
33	655	-	80	113	1	73	3584228-	97-	179	GT19	GA	1	11	6
33	631	-	80	112	1	70	3584151-	81-	159	GT19	GA	1	12	6
33	619	-	80	112	1	64	3584087-	96-	161	GT19	GA	1	13	6
33	602	-	80	110	1	73	3583866-	60-	142	GT19	GA	1	14	6
33	585	-	80	106	1	67	3584026-	40-	119	GT19	GA	1	15	6
33	567	-	80	101	1	61	3584433	12-	56	GT19	GA	1	16	6
33	550	-	80	96	1	64	3584540	50-	21	GT19	GA	1	17	6
33	533	-	80	93	1	67	3584293	58-	16	GT19	GA	1	18	6
33	515	-	80	88	1	67	3584523	106	31	GT19	GA	1	19	6
33	494	-	80	84	1	67	3584352	118	43	GT19	GA	1	20	6
33	476	-	80	94	1	70	3583876	102	23	GT19	GA	1	21	6
33	463	-	80	104	1	76	3583445	98	13	GT19	GA	1	22	6
33	448	-	80	116	1	82	3583371	130	38	GT19	GA	1	23	6
33	431	-	80	128	1	49	3583945	108	53	GT19	GA	1	24	6
33	416	-	80	139	1	46	3583692	93	42	GT19	GA	1	25	6
33	401	-	80	150	1	76	3582758	96	17	GT19	GA	1	26	6
33	387	-	80	162	1	67	3582066	36-	39	GT19	GA	1	27	6
33	358	-	80	191	1	91	3580318-	54-	156	GT19	GA	1	28	6
33	345	-	80	204	1	91	3580056-	32-	134	GT19	GA	1	29	6
33	342	-	80	208	1	82	3579909-	71-	162	GT19	GA	1	30	6

Table 5. Continued

33	311	- 80	204	1	67	3579736-	92-	167	GT19	GA	1	31	6
33	293	- 80	201	1	61	3579147-	145-	213	GT19	GA	1	32	6
33	276	- 80	197	1	61	3578583-	198-	236	GT19	GA	1	33	6
33	257	- 80	201	1	122	3577336-	96-	225	GT19	GA	1	34	6
33	239	- 80	202	1	122	3575728-	225-	261	GT19	GA	1	35	6
33	221	- 80	204	1	140	3574609-	248-	404	GT19	GA	1	36	6
33	203	- 80	206	1	137	3574150-	286-	439	GT19	GA	1	37	6
33	186	- 80	208	1	137	3573599-	328-	481	GT19	GA	1	38	6
33	169	- 80	210	1	125	3573139-	373-	513	GT19	GA	1	39	6
33	151	- 80	212	1	91	3572787-	402-	594	GT19	GA	1	40	6
33	133	- 80	214	1	91	3572246-	522-	624	GT19	GA	1	41	6
33	116	- 80	216	1	91	3571672-	556-	658	GT19	GA	1	42	6
33	98	- 80	219	1	94	3570916-	597-	703	GT19	GA	1	43	6
33	81	- 80	221	1	88	3570419-	643-	741	GT19	GA	1	44	6
33	68	- 80	222	1	85	3569902-	686-	781	GT19	GA	1	45	6
33	48	- 80	225	1	91	3568572-	773-	875	GT19	GA	1	46	6
33	22	- 80	228	1	143	3567337-	781-	866	GT19	GA	1	47	6
33	25	- 80	261	1	143	3567044-	712-	879	GT20	GA	1	2	6
33	39	- 80	268	1	140	3567687-	693-	855	GT20	GA	1	3	6
33	59	- 80	279	1	140	3568005-	694-	850	GT20	GA	1	4	6
33	75	- 80	288	1	123	3568672-	687-	830	GT20	GA	1	5	6
33	98	- 80	299	1	119	3569317-	641-	754	GT20	GA	1	6	6
33	106	- 80	304	1	122	3569916-	624-	760	GT20	GA	1	7	6
33	122	- 80	318	1	131	3570905-	619-	765	GT20	GA	1	8	6
33	136	- 80	327	1	137	3571658-	594-	747	GT20	GA	1	9	6
33	145	- 80	336	1	140	3572360-	538-	701	GT20	GA	1	10	6
33	160	- 80	346	1	137	3571234-	530-	683	GT20	GA	1	11	6
33	184	- 80	355	1	116	3572106-	525-	654	GT20	GA	1	12	6
33	200	- 80	365	1	116	3573164-	447-	576	GT20	GA	1	13	6
33	221	- 80	378	1	134	3573759-	380-	509	GT20	GA	1	14	6
33	223	- 80	395	1	91	3574035-	466-	568	GT20	GA	1	15	6
33	232	- 80	405	1	70	3575001-	442-	520	GT20	GA	1	16	6
33	245	- 80	427	1	85	3575240-	392-	487	GT20	GA	1	17	6
33	252	- 80	443	1	134	3574420-	336-	486	GT20	GA	1	18	6
33	262	- 80	457	1	149	3574782-	267-	433	GT20	GA	1	19	6
33	276	- 80	471	1	152	3575306-	224-	394	GT20	GA	1	20	6
33	288	- 80	484	1	152	3575715-	200-	370	GT20	GA	1	21	6
33	302	- 80	498	1	143	3576240-	195-	354	GT20	GA	1	22	6
33	316	- 80	513	1	140	3576895-	158-	314	GT20	GA	1	23	6
33	329	- 80	525	1	165	3576913-	98-	282	GT20	GA	1	24	6
33	344	- 80	535	1	174	3577205-	62-	255	GT20	GA	1	25	6
33	360	- 80	546	1	177	3577254-	69-	266	GT20	GA	1	26	6
33	380	- 80	562	1	204	3577048-	33-	261	GT20	GA	1	27	6
33	396	- 80	575	1	219	3576943-	18-	263	GT21	GA	1	2	6
33	411	- 80	596	1	229	3577041	0-	256	GT21	GA	1	3	6
33	424	- 80	599	1	236	3577091	15-	251	GT21	GA	1	4	6
33	447	- 80	617	1	253	3577107	32-	251	GT21	GA	1	5	6
33	459	- 80	626	1	253	3577207	25-	257	GT21	GA	1	6	6
33	473	- 80	639	1	256	3577285	23-	262	GT21	GA	1	7	6
33	487	- 80	656	1	259	3577353	26-	269	GT21	GA	1	8	6
33	502	- 80	662	1	259	3577363	0-	289	GT21	GA	1	9	6
33	516	- 80	674	1	259	3577616	7-	282	GT21	GA	1	10	6
33	531	- 80	687	1	256	3577818-	3-	269	GT21	GA	1	11	6
33	545	- 80	698	1	262	3578108	25-	267	GT21	GA	1	12	6
33	561	- 80	710	1	265	3578454	42-	253	GT21	GA	1	13	6
33	575	- 80	722	1	268	3578544	47-	252	GT21	GA	1	14	6
33	591	- 80	736	1	271	3578533	33-	270	GT21	GA	1	15	6
325797		- 801182		1	146	3574077	292	124	GT22	GA	1	2	6
325810		- 801492		1	143	3578203	677	517	GT22	GA	1	4	6
325840		- 801471		1	149	3577074	542	375	GT22	GA	1	5	6
325842		- 801451		1	152	3576874	528	358	GT22	GA	1	6	6
325840		- 801431		1	146	3576510	476	313	GT22	GA	1	7	6
325838		- 801409		1	174	3575841	496	303	GT22	GA	1	8	6
325837		- 801388		1	183	3575640	506	302	GT22	GA	1	9	6

Table 5. Continued

325836	-	801367	1	186	3575289	486	278	GT22	GA	1	10	6
325834	-	801346	1	186	3575140	473	266	GT22	GA	1	11	6
325829	-	801326	1	189	3574951	468	257	GT22	GA	1	12	6
325827	-	801306	1	195	3574557	449	251	GT22	GA	1	13	6
325825	-	801285	1	189	3574164	394	183	GT22	GA	1	14	6
325822	-	801265	1	193	3574065	369	169	GT22	GA	1	15	6
325817	-	801245	1	186	3573957	374	167	GT22	GA	1	16	6
325816	-	801208	1	162	3574132	318	138	GT22	GA	1	17	6
325786	-	801164	1	165	3573432	293	109	GT22	GA	1	19	6
325786	-	801145	1	165	3573556	291	107	GT22	GA	1	20	6
325775	-	801129	1	119	3574385	268	155	GT22	GA	1	21	6
325763	-	801113	1	88	3574655	217	119	GT22	GA	1	22	6
325753	-	801097	1	85	3574529	213	118	GT22	GA	1	23	6
325738	-	801081	1	94	3573933	198	93	GT22	GA	1	24	6
325723	-	801065	1	107	3573436	200	81	GT22	GA	1	25	6
325718	-	801049	1	82	3573948	149	56	GT22	GA	1	26	6
325714	-	801030	1	37	3574301	89	46	GT22	GA	1	27	6
325714	-	801009	1	34	3574356	85	48	GT22	GA	1	28	6
325714	-	80 988	1	64	3573400	90	18	GT22	GA	1	29	6
325709	-	80 968	1	58	3573275	59-	5	GT22	GA	1	30	6
325693	-	80 953	1	54	3573692	41	3	GT22	GA	1	31	6
325690	-	80 946	1	52	3573183	57	0	GT22	GA	1	32	6
325674	-	80 932	1	79	3572267	72-	16	GT22	GA	1	33	6
325665	-	80 918	1	78	3572264	82-	3	GT22	GA	1	34	6
325646	-	80 905	1	70	3572474	100	22	GT22	GA	1	35	6
325635	-	80 890	1	85	3571673	88-	7	GT22	GA	1	36	6
325622	-	80 874	1	98	3571256	89-	1	GT22	GA	1	37	6
325615	-	80 856	1	94	3571282	104	0	GT22	GA	1	38	6
325602	-	80 841	1	88	3571443	117	18	GT22	GA	1	39	6
325592	-	80 825	1	76	3571625	111	26	GT22	GA	1	40	6
325583	-	80 808	1	75	3571557	121	36	GT22	GA	1	41	6
325571	-	80 791	1	76	3571560	133	48	GT22	GA	1	42	6
325563	-	80 777	1	65	3571067	123	28	GT22	GA	1	43	6
325541	-	80 756	1	70	3570937	82	4	GT22	GA	1	44	6
325813	-	801231	1	174	3574092	356	162	GT22	GA	1	45	6
325796	-	801500	1	46	3581178	805	761	GT23	GA	1	2	6
325696	-	801487	1	46	3581144	808	763	GT23	GA	1	3	6
325689	-	801465	1	43	3581095	803	759	GT23	GA	1	4	6
325685	-	801449	1	46	3580912	799	755	GT23	GA	1	5	6
325686	-	801428	1	61	3580717	844	776	GT23	GA	1	6	6
325684	-	801407	1	137	3578947	900	747	GT23	GA	1	7	6
325691	-	801385	1	151	3578637	846	706	GT23	GA	1	8	6
325692	-	801364	1	128	3578061	777	635	GT23	GA	1	9	6
325693	-	801343	1	125	3577851	750	610	GT23	GA	1	10	6
325693	-	801317	1	119	3577551	701	566	GT23	GA	1	11	6
325693	-	801300	1	113	3577448	668	542	GT23	GA	1	12	6
325696	-	801278	1	75	3578148	611	530	GT23	GA	1	13	6
325695	-	801256	1	64	3577461	514	443	GT23	GA	1	14	6
325687	-	801236	1	73	3576709	486	404	GT23	GA	1	15	6
325677	-	801208	1	61	3576299	415	347	GT23	GA	1	16	6
325674	-	801184	1	116	3574716	430	301	GT23	GA	1	17	6
325667	-	801171	1	91	3574696	362	260	GT23	GA	1	18	6
325658	-	801152	1	61	3574881	299	231	GT23	GA	1	19	6
325648	-	801132	1	61	3573960	221	153	GT23	GA	1	20	6
325641	-	801115	1	70	3573528	215	137	GT23	GA	1	21	6
325636	-	801092	1	70	3573597	237	159	GT23	GA	1	22	6
325518	-	801082	1	37	3573530	144	103	GT23	GA	1	23	6
325605	-	801058	1	79	3572656	206	117	GT23	GA	1	24	6
325603	-	801066	1	94	3572241	214	109	GT23	GA	1	25	6
325591	-	801052	1	88	3572378	225	127	GT23	GA	1	26	6
325580	-	801036	1	82	3571852	167	79	GT23	GA	1	27	6
325568	-	801022	1	88	3571421	161	63	GT23	GA	1	28	6
325556	-	801004	1	91	3571104	155	53	GT23	GA	1	29	6
325543	-	80 987	1	98	3570927	178	76	GT23	GA	1	30	6

Table 5. Continued

325528 - 80 971 1	94	3570334	176	71	GT23 GA 1	31	6
325517 - 80 958 1	98	3570673	184	70	GT23 GA 1	32	6
325504 - 80 944 1	94	3570428	168	63	GT23 GA 1	33	6
325491 - 80 932 1	98	3570585	211	102	GT23 GA 1	34	6
325479 - 80 918 1	82	3571018	224	132	GT23 GA 1	35	6
325464 - 80 904 1	46	3571654	195	144	GT23 GA 1	36	6
325448 - 80 893 1	52	3571615	252	194	GT23 GA 1	37	6
325432 - 80 886 1	70	3571054	254	178	GT23 GA 1	38	6
325418 - 80 870 1	91	3570684	302	200	GT23 GA 1	39	6
325405 - 80 856 1	98	3570721	343	234	GT23 GA 1	40	6
325396 - 80 845 1	91	3570856	350	240	GT23 GA 1	41	6
325385 - 80 829 1	34	3572257	326	209	GT23 GA 1	42	6
325372 - 80 812 1	104	3570547	389	274	GT23 GA 1	43	6
325364 - 80 797 1	131	3570341	464	318	GT23 GA 1	44	6
325349 - 80 783 1	128	3570049	446	306	GT23 GA 1	45	6
325342 - 80 768 1	125	3569809	422	283	GT23 GA 1	46	6
325338 - 80 754 1	125	3570048	452	312	GT23 GA 1	47	6
325308 - 801126 1	223	3571996	84-	164	GT23 GA 1	49	6
325954 - 801137 1	213	3572087	103-	142	GT23 GA 1	50	6
325936 - 801147 1	219	3571960	112-	133	GT23 GA 1	51	6
325922 - 801156 1	219	3572369	179-	70	GT23 GA 1	52	6
325905 - 801166 1	207	3572842	208-	23	GT23 GA 1	53	6
325892 - 801173 1	128	3574058	163	20	GT23 GA 1	54	6
325874 - 801182 1	85	3575443	134	39	GT23 GA 1	55	6
325858 - 801190 1	82	3575524	155	63	GT23 GA 1	56	6
325842 - 801196 1	85	3575458	178	83	GT23 GA 1	57	6
325824 - 801137 1	122	3574966	268	132	GT23 GA 1	58	6
325812 - 801206 1	105	3575708	290	157	GT23 GA 1	59	6
325797 - 801217 1	101	3575252	268	156	GT23 GA 1	60	6
325781 - 801214 1	94	3575739	320	214	GT23 GA 1	61	6
325766 - 801209 1	79	3576142	334	245	GT23 GA 1	62	6
325748 - 801211 1	30	3576936	287	253	GT23 GA 1	63	6
325727 - 801214 1	36	3577178	348	308	GT23 GA 1	64	6
325709 - 801218 1	15	3577495	349	332	GT23 GA 1	65	6
325697 - 801224 1	37	3577335	416	375	GT23 GA 1	66	6
325683 - 801242 1	78	3576736	470	397	GT23 GA 1	67	6
325668 - 801251 1	64	3577050	512	440	GT24 GA 1	2	6
325653 - 801261 1	94	3576232	544	459	GT24 GA 1	3	6
325636 - 801272 1	97	3576670	524	449	GT24 GA 1	4	6
325625 - 801288 1	86	3576452	586	488	GT24 GA 1	5	6
325614 - 801303 1	82	3576499	587	495	GT24 GA 1	6	6
325610 - 801319 1	91	3576546	626	524	GT24 GA 1	7	6
325594 - 801337 1	58	3577486	638	573	GT24 GA 1	8	6
325578 - 801350 1	55	3577600	662	601	GT24 GA 1	9	6
325566 - 801362 1	52	3577542	663	605	GT24 GA 1	10	6
325553 - 801376 1	58	3577302	676	611	GT24 GA 1	11	6
325537 - 801388 1	55	3577248	683	624	GT24 GA 1	12	6
325526 - 801405 1	49	3577557	710	656	GT24 GA 1	13	6
325513 - 801419 1	49	3577558	720	665	GT24 GA 1	14	6
325503 - 801433 1	55	3577331	738	677	GT24 GA 1	15	6
325487 - 801450 1	55	3577329	759	698	GT24 GA 1	16	6
325482 - 801459 1	55	3577362	770	708	GT24 GA 1	17	6
325469 - 801475 1	55	3577509	802	741	GT24 GA 1	18	6
325457 - 801492 1	58	3577523	829	765	GT24 GA 1	19	6
325895 - 80 737 1	107	3569146-	460-	579	GT24 GA 1	23	6
325900 - 80 716 1	91	3569906-	437-	539	GT24 GA 1	24	6
325903 - 80 698 1	131	3568960-	413-	559	GT24 GA 1	25	6
325907 - 80 678 1	140	3568511-	435-	591	GT24 GA 1	26	6
325913 - 80 660 1	137	3568492-	454-	607	GT24 GA 1	27	6
325917 - 80 639 1	131	3568555-	472-	618	GT24 GA 1	28	6
325921 - 80 621 1	122	3568474-	514-	650	GT24 GA 1	29	6
325925 - 80 599 1	140	3567897-	521-	677	GT24 GA 1	30	6
325923 - 80 581 1	137	3567711-	546-	699	GT24 GA 1	31	6
325914 - 80 565 1	107	3568135-	585-	704	GT24 GA 1	32	6

Table 5. Continued

3259[illegible]3	-	80	548	1	131	3567489-	560-	706	GT24	GA	1	33	6
3253[illegible]9	-	80	532	1	125	3567414-	567-	75[illegible]	GT24	GA	1	34	6
3258[illegible]3	-	80	513	1	37	3568958-	677-	718	GT24	GA	1	35	6
3258[illegible]8	-	80	493	1	36	3569103-	674-	708	GT24	GA	1	36	6
3258[illegible]7	-	80	446	1	134	3566525-	597-	747	GT24	GA	1	37	6
3258[illegible]2	-	80	421	1	137	3566192-	614-	767	GT24	GA	1	38	6
3258[illegible]5	-	80	403	1	140	3566084-	606-	763	GT24	GA	1	39	6
3258[illegible]1	-	80	380	1	140	3565842-	621-	777	GT24	GA	1	40	6
3258[illegible]5	-	80	362	1	126	3565967-	661-	801	GT24	GA	1	41	6
3258[illegible]9	-	80	340	1	91	3566587-	684-	786	GT24	GA	1	42	6
3258[illegible]5	-	80	321	1	91	3567365-	695-	763	GT24	GA	1	43	6
3258[illegible]4	-	80	303	1	76	3567368-	664-	743	GT24	GA	1	44	6
3258[illegible]7	-	80	285	1	76	3567322-	658-	743	GT24	GA	1	45	6
3258[illegible]5	-	80	274	1	64	3567226-	686-	757	GT24	GA	1	46	6
3258[illegible]7	-	80	269	1	61	3566392-	735-	803	GT24	GA	1	47	6
3258[illegible]9	-	80	246	1	46	3567961-	743-	794	GT24	GA	1	48	6
3258[illegible]2	-	80	228	1	37	3567874-	757-	797	GT24	GA	1	49	6
3258[illegible]7	-	80	207	1	67	3567635-	693-	768	GT24	GA	1	50	6
3258[illegible]4	-	80	196	1	91	3567268-	638-	740	GT24	GA	1	51	6
3258[illegible]7	-	80	178	1	113	3565780-	710-	836	GT24	GA	1	52	6
3258[illegible]3	-	80	157	1	91	3566156-	729-	831	GT24	GA	1	53	6
3258[illegible]6	-	80	139	1	116	3565749-	689-	818	GT24	GA	1	54	6
3258[illegible]6	-	80	134	1	126	3565299-	696-	839	GT25	GA	1	2	6
3258[illegible]3	-	80	116	1	113	3565646-	704-	830	GT25	GA	1	3	6
3258[illegible]8	-	80	96	1	110	3565757-	696-	818	GT25	GA	1	4	6
3258[illegible]3	-	80	76	1	110	3565796-	685-	808	GT25	GA	1	5	6
3258[illegible]8	-	80	56	1	101	3565832-	703-	815	GT25	GA	1	6	6
3258[illegible]3	-	80	31	1	76	3566514-	722-	806	GT25	GA	1	7	6
3258[illegible]5	-	80	12	1	89	3565970-	722-	818	GT25	GA	1	8	6
3259[illegible]7	-	80	[illegible]36	1	126	3566152-	800-	939	GT25	GA	1	9	6
3259[illegible]9	-	80	236	1	128	3566102-	771-	914	GT25	GA	1	10	6
3259[illegible]4	-	80	245	1	131	3565793-	769-	915	GT25	GA	1	11	6
3259[illegible]3	-	80	292	1	46	3567721-	814-	865	GT25	GA	1	12	6
3258[illegible]7	-	80	256	1	40	3567656-	818-	862	GT25	GA	1	13	6
3258[illegible]1	-	80	262	1	43	3567599-	791-	839	GT25	GA	1	14	6
3258[illegible]4	-	80	266	1	55	3567435-	747-	806	GT25	GA	1	15	6
3258[illegible]5	-	80	271	1	70	3566736-	740-	813	GT25	GA	1	16	6
3258[illegible]3	-	80	278	1	67	3566982-	706-	781	GT25	GA	1	17	6
3258[illegible]3	-	80	273	1	64	3567116-	667-	738	GT25	GA	1	18	6
3257[illegible]1	-	80	268	1	67	3567024-	656-	725	GT25	GA	1	19	6
3257[illegible]3	-	80	266	1	85	3566787-	593-	688	GT25	GA	1	20	6
3257[illegible]9	-	80	262	1	101	3566443-	561-	673	GT25	GA	1	21	6
3257[illegible]8	-	80	259	1	110	3566436-	535-	628	GT25	GA	1	22	6
3257[illegible]1	-	80	256	1	101	3566723-	483-	592	GT25	GA	1	23	6
3257[illegible]7	-	80	254	1	98	3566948-	448-	557	GT25	GA	1	24	6
3256[illegible]1	-	80	248	1	59	3567846-	455-	516	GT25	GA	1	25	6
3256[illegible]4	-	80	247	1	48	3568295-	434-	478	GT25	GA	1	26	6
3256[illegible]7	-	80	246	1	82	3567327-	375-	467	GT25	GA	1	27	6
3256[illegible]8	-	80	243	1	85	3567088-	364-	459	GT25	GA	1	28	6
3255[illegible]9	-	80	242	1	94	3566930-	333-	438	GT25	GA	1	29	6
3256[illegible]3	-	80	234	1	104	3566948-	287-	403	GT26	GA	1	2	6
3255[illegible]7	-	80	224	1	104	3567013-	259-	374	GT26	GA	1	3	6
3255[illegible]8	-	80	209	1	110	3566848-	230-	353	GT26	GA	1	4	6
3255[illegible]1	-	80	202	1	125	3566179-	227-	366	GT26	GA	1	5	6
3255[illegible]2	-	80	192	1	125	3566175-	201-	341	GT26	GA	1	6	6
3255[illegible]8	-	80	183	1	113	3566434-	194-	326	GT26	GA	1	7	6
3255[illegible]5	-	80	173	1	101	3566588-	198-	310	GT26	GA	1	8	6
3254[illegible]4	-	80	164	1	98	3566616-	176-	285	GT26	GA	1	9	6
3254[illegible]2	-	80	154	1	88	3567009-	149-	247	GT26	GA	1	10	6
3254[illegible]5	-	80	146	1	104	3566282-	152-	208	GT26	GA	1	11	6
3254[illegible]8	-	80	137	1	67	3567077-	161-	236	GT26	GA	1	12	6
3254[illegible]6	-	80	128	1	67	3566941-	158-	233	GT26	GA	1	13	6
3254[illegible]2	-	80	118	1	122	3565964-	67-	203	GT26	GA	1	14	6
3253[illegible]2	-	80	109	1	128	3565150-	103-	245	GT26	GA	1	15	6

Table 5. Continued

325382	- 80	103	1	137	3564936-	82-	235	GT26	GA	1	16	6
325368	- 80	92	1	134	3564716-	94-	244	GT26	GA	1	17	6
325352	- 80	81	1	76	3566091-	114-	199	GT26	GA	1	18	6
325338	- 80	75	1	39	3566579-	177-	211	GT26	GA	1	19	6
325321	- 80	64	1	54	3566452-	157-	204	GT26	GA	1	20	6
325304	- 80	54	1	49	3566065-	138-	193	GT26	GA	1	21	6
325288	- 80	46	1	67	3565384-	125-	200	GT26	GA	1	22	6
325275	- 80	36	1	79	3564679-	140-	228	GT26	GA	1	23	6
325538	- 80	748	1	70	3570803	84	6	GT26	GA	1	27	6
325523	- 80	731	1	55	3571101	80	19	GT26	GA	1	28	6
325519	- 80	714	1	52	3571185	92	34	GT26	GA	1	29	6
325508	- 80	697	1	37	3571102	52	11	GT26	GA	1	30	6
325497	- 80	682	1	70	3570400	100	22	GT26	GA	1	31	6
325489	- 80	662	1	79	3570125	112	23	GT26	GA	1	32	6
325481	- 80	648	1	85	3570110	140	45	GT26	GA	1	33	6
325468	- 80	632	1	61	3570440	115	47	GT26	GA	1	34	6
325458	- 80	615	1	91	3569355	164	62	GT26	GA	1	35	6
325442	- 80	583	1	85	3569880	170	75	GT26	GA	1	36	6
325437	- 80	564	1	70	3570033	145	67	GT26	GA	1	37	6
325429	- 80	557	1	82	3569588	149	58	GT26	GA	1	38	6
325422	- 80	518	1	98	3569102	157	49	GT26	GA	1	39	6
325413	- 80	498	1	94	3569281	171	66	GT26	GA	1	40	6
325409	- 80	476	1	46	3568861	91	40	GT26	GA	1	41	6
325398	- 80	468	1	101	3568583	148	36	GT26	GA	1	42	6
325383	- 80	452	1	40	3569142	55	4	GT26	GA	1	43	6
325368	- 80	438	1	40	3568225-	16-	67	GT26	GA	1	44	6
325352	- 80	431	1	107	3567993	171	52	GT26	GA	1	45	6
325335	- 80	419	1	79	3568395	149	61	GT26	GA	1	46	6
325318	- 80	409	1	79	3568412	174	86	GT26	GA	1	47	6
325304	- 80	402	1	79	3568241	177	38	GT26	GA	1	48	6
325288	- 80	392	1	85	3567961	192	97	GT26	GA	1	49	6
325272	- 80	383	1	46	3567916	74	23	GT26	GA	1	50	6
325258	- 80	366	1	37	3568223	106	65	GT26	GA	1	51	6
325245	- 80	353	1	49	3567453	88	34	GT26	GA	1	52	6
325230	- 80	345	1	58	3567110	95	36	GT26	GA	1	53	6
325217	- 80	331	1	58	3567038	110	45	GT26	GA	1	54	6
325203	- 80	317	1	61	3566705	105	37	GT26	GA	1	55	6
325191	- 80	306	1	61	3565622	13-	55	GT26	GA	1	56	6
325180	- 80	300	1	40	3565260-	59-	110	GT26	GA	1	57	6
325169	- 80	288	1	43	3565042-	71-	119	GT26	GA	1	58	6
325156	- 80	277	1	37	3563928-	184-	225	GT26	GA	1	59	6
325144	- 80	263	1	61	3563565-	128-	196	GT26	GA	1	60	6
325133	- 80	246	1	79	3562336-	180-	268	GT26	GA	1	61	6
325130	- 80	226	1	88	3561899-	191-	290	GT26	GA	1	62	6
325137	- 80	203	1	94	3561910-	181-	286	GT26	GA	1	63	6
325145	- 80	185	1	94	3562072-	176-	281	GT26	GA	1	64	6
325141	- 80	166	1	107	3561619-	178-	297	GT26	GA	1	65	6
325127	- 80	137	1	107	3560825-	318-	437	GT26	GA	1	66	6
325125	- 80	117	1	104	3560244-	303-	418	GT26	GA	1	67	6
325123	- 80	97	1	82	3560656-	325-	416	GT26	GA	1	68	6
325123	- 80	75	1	43	3561584-	354-	402	GT26	GA	1	69	6
325122	- 80	54	1	37	3562147-	315-	356	GT26	GA	1	70	6
325121	- 80	37	1	52	3562076-	275-	332	GT26	GA	1	71	6
325120	- 80	7	1	40	3560840-	434-	478	GT26	GA	1	72	6
325227	- 80	546	1	58	3569440	336	271	GT27	GA	1	2	6
325215	- 80	531	1	67	3566693	306	231	GT27	GA	1	3	6
325202	- 80	515	1	104	3567539	321	206	GT27	GA	1	4	6
325187	- 80	500	1	107	3566749	272	153	GT27	GA	1	5	6
325177	- 80	488	1	82	3566774	213	121	GT27	GA	1	6	6
325166	- 80	472	1	67	3566712	175	100	GT27	GA	1	7	6
325153	- 80	458	1	58	3566225	116	51	GT27	GA	1	8	6
325140	- 80	444	1	43	3565869	51	3	GT27	GA	1	9	6
325127	- 80	429	1	49	3565398	41-	14	GT27	GA	1	10	6
325114	- 80	414	1	58	3564822	29-	36	GT27	GA	1	11	6

Table 5. Continued

325105	-	80	403	1	58	3563409-	60-	125	GT27	GA	1	12	6
325093	-	80	389	1	49	3563353-	117-	172	GT27	GA	1	13	6
325081	-	80	372	1	49	3562466-	190-	244	GT27	GA	1	14	6
325057	-	80	349	1	55	3561182-	266-	320	GT27	GA	1	15	6
325025	-	80	300	1	24	3560570-	378-	435	GT27	GA	1	17	6
325014	-	80	287	1	21	3560142-	413-	439	GT27	GA	1	18	6
325000	-	80	271	1	54	3559335-	469-	530	GT27	GA	1	19	6
324985	-	80	262	1	40	3558390-	494-	536	GT27	GA	1	20	6
324970	-	80	249	1	34	3557373-	594-	651	GT27	GA	1	21	6
324959	-	80	235	1	46	3556867-	590-	643	GT27	GA	1	22	6
324942	-	80	220	1	34	3556226-	657-	694	GT27	GA	1	23	6
324917	-	80	209	1	18	3555059-	700-	720	GT27	GA	1	24	6
324905	-	80	200	1	21	3554209-	750-	780	GT27	GA	1	25	6
324875	-	80	179	1	27	3554594-	758-	789	GT27	GA	1	26	6
324875	-	80	177	1	46	3553302-	834-	865	GT27	GA	1	27	6
324802	-	80	161	1	49	3552957-	845-	897	GT27	GA	1	28	6
324841	-	80	137	1	43	3552437-	883-	931	GT27	GA	1	29	6
324826	-	80	123	1	49	3551911-	899-	953	GT27	GA	1	30	6
324811	-	80	102	1	76	3550562-	926-	1011	GT27	GA	1	31	6
324805	-	80	87	1	79	3550416-	916-	1005	GT27	GA	1	32	6
324786	-	80	60	1	58	3550513-	967-	1032	GT27	GA	1	33	6
324780	-	80	37	1	58	3551522-	878-	944	GT27	GA	1	34	6
324917	-	801031		1	79	3547696-	802-	830	GT28	GA	1	2	6
324927	-	801022		1	82	3549139-	755-	847	GT28	GA	1	3	6
324945	-	801010		1	79	3548527-	754-	842	GT28	GA	1	4	6
324958	-	801000		1	76	3549351-	788-	816	GT28	GA	1	5	6
324968	-	80	987	1	58	3549729-	734-	798	GT28	GA	1	6	6
324986	-	80	976	1	21	3550770-	767-	791	GT28	GA	1	7	6
325002	-	80	964	1	43	3550884-	712-	759	GT28	GA	1	8	6
325016	-	80	950	1	61	3550435-	719-	787	GT28	GA	1	9	6
325032	-	80	940	1	79	3550356-	695-	781	GT28	GA	1	10	6
325047	-	80	933	1	88	3550538-	667-	765	GT28	GA	1	11	6
325058	-	80	923	1	91	3550761-	650-	752	GT28	GA	1	12	6
325073	-	80	912	1	64	3551766-	650-	726	GT28	GA	1	13	6
325088	-	80	901	1	64	3552172-	634-	708	GT28	GA	1	14	6
325104	-	80	890	1	55	3552817-	620-	681	GT28	GA	1	15	6
325119	-	80	879	1	46	3553609-	590-	641	GT28	GA	1	16	6
325136	-	80	870	1	30	3554384-	582-	616	GT28	GA	1	17	6
325150	-	80	855	1	15	3554883-	538-	619	GT28	GA	1	18	6
325151	-	80	837	1	16	3555037-	583-	603	GT28	GA	1	19	6
325165	-	80	826	1	18	3555357-	560-	587	GT28	GA	1	20	6
325180	-	80	802	1	18	3555387-	580-	600	GT28	GA	1	21	6
325196	-	80	788	1	18	3555762-	551-	571	GT28	GA	1	22	6
325186	-	80	776	1	18	3555949-	535-	555	GT28	GA	1	23	6
325202	-	80	757	1	18	3556089-	540-	560	GT28	GA	1	24	6
325211	-	80	741	1	21	3556323-	519-	543	GT28	GA	1	25	6
325215	-	80	724	1	18	3556531-	513-	534	GT28	GA	1	26	6
325217	-	80	703	1	18	3556280-	541-	562	GT28	GA	1	27	6
325216	-	80	686	1	21	3556191-	539-	563	GT28	GA	1	28	6
325214	-	80	664	1	21	3556217-	534-	556	GT28	GA	1	29	6
325211	-	80	643	1	15	3555944-	570-	593	GT28	GA	1	30	6
325206	-	80	620	1	18	3555918-	572-	593	GT28	GA	1	31	6
325198	-	80	577	1	30	3555120-	598-	627	GT28	GA	1	32	6
325194	-	80	556	1	21	3555110-	617-	641	GT28	GA	1	33	6
325189	-	80	536	1	21	3554334-	638-	662	GT28	GA	1	34	6
325183	-	80	515	1	21	3554412-	672-	696	GT28	GA	1	35	6
325177	-	80	496	1	27	3553996-	687-	717	GT28	GA	1	36	6
325175	-	80	475	1	30	3554011-	673-	707	GT28	GA	1	37	6
325173	-	80	451	1	27	3553777-	703-	734	GT28	GA	1	38	6
325173	-	80	436	1	27	3553443-	732-	763	GT28	GA	1	39	6
325169	-	80	415	1	21	3553361-	758-	782	GT28	GA	1	40	6
325167	-	80	394	1	21	3553309-	760-	784	GT28	GA	1	41	6
325165	-	80	372	1	24	3553065-	773-	800	GT28	GA	1	42	6
325162	-	80	350	1	27	3552883-	777-	808	GT28	GA	1	43	6

Table 5. Continued

3247[illegible]	-	80	331	1	30	3552[illegible]	806-	840	GT28	GA	1	44	[illegible]
324755	-	80	305	1	34	3551977-	840-	877	GT28	GA	1	45	[illegible]
324752	-	80	284	1	37	3551696-	856-	895	GT28	GA	1	46	[illegible]
3247[illegible]	-	80	262	1	37	3551[illegible]5-	886-	898	GT28	GA	1	47	[illegible]
324748	-	80	243	1	27	3551499-	897-	927	GT28	GA	1	48	[illegible]
324744	-	80	222	1	30	3551103-	921-	955	GT28	GA	1	49	[illegible]
324739	-	80	201	1	27	3550[illegible]-	944-	974	GT28	GA	1	50	[illegible]
324737	-	80	180	1	24	3550708-	973-	997	GT28	GA	1	51	[illegible]
324734	-	80	160	1	46	3550417-	948-	992	GT28	GA	1	52	[illegible]
324731	-	80	144	1	55	3549995-	930-	1001	GT28	GA	1	53	[illegible]
324727	-	80	127	1	49	3549407-	1011-	1060	GT28	GA	1	54	[illegible]
324724	-	80	105	1	43	3549365-	1011-	1066	GT28	GA	1	55	[illegible]
324722	-	80	84	1	49	3549303-	1015-	1069	GT28	GA	1	56	[illegible]
324718	-	80	62	1	52	3549283-	1002-	1060	GT28	GA	1	57	[illegible]
324715	-	80	45	1	46	3549158-	1029-	1080	GT28	GA	1	58	[illegible]
324711	-	80	25	1	46	3548932-	1041-	1092	GT28	GA	1	59	[illegible]
324707	-	80	2	1	43	3549159-	1030-	1077	GT28	GA	1	60	[illegible]
324752	-	80	846	1	18	3555048-	570-	596	GT29	GA	1	2	[illegible]
3247[illegible]	-	80	864	1	24	3555[illegible]-	547-	579	GT29	GA	1	3	[illegible]
324783	-	80	876	1	21	3555886-	525-	548	GT29	GA	1	4	[illegible]
324797	-	80	888	1	21	3556311-	501-	525	GT29	GA	1	5	[illegible]
324812	-	80	902	1	24	3556766-	467-	494	GT29	GA	1	6	[illegible]
3248[illegible]	-	80	913	1	30	3557322-	412-	446	GT29	GA	1	7	[illegible]
324854	-	80	927	1	21	3557983-	390-	414	GT29	GA	1	8	[illegible]
3248[illegible]	-	80	938	1	18	3558[illegible]-	359-	371	GT29	GA	1	9	[illegible]
3248[illegible]	-	80	943	1	18	3559[illegible]-	315-	335	GT29	GA	1	10	[illegible]
324889	-	80	948	1	34	3559752-	245-	263	GT29	GA	1	11	[illegible]
3248[illegible]	-	80	958	1	37	3560506-	195-	224	GT29	GA	1	12	[illegible]
3248[illegible]	-	80	976	1	34	3561062-	150-	188	GT29	GA	1	13	[illegible]
324916	-	80	996	1	37	3561292-	119-	160	GT29	GA	1	14	[illegible]
3249[illegible]	-	801017		1	37	3561[illegible]-	84-	125	GT29	GA	1	15	[illegible]
3249[illegible]	-	801037		1	34	3562013-	69-	108	GT29	GA	1	16	[illegible]
324932	-	801058		1	27	3562488-	44-	75	GT29	GA	1	17	[illegible]
324951	-	801078		1	27	3562[illegible]-	12-	42	GT29	GA	1	18	[illegible]
324941	-	801102		1	34	3563020	10-	27	GT29	GA	1	19	[illegible]
324941	-	801121		1	40	3563223	49	5	GT29	GA	1	20	[illegible]
324945	-	801142		1	55	3563268	95	34	GT29	GA	1	21	[illegible]
324949	-	801161		1	58	3563497	122	58	GT29	GA	1	22	[illegible]
324955	-	801183		1	85	3563[illegible]2	165	76	GT29	GA	1	23	[illegible]
324958	-	801202		1	107	3562827	193	74	GT29	GA	1	24	[illegible]
3249[illegible]	-	801221		1	85	3563555	194	96	GT29	GA	1	25	[illegible]
324967	-	801241		1	128	3563042	268	126	GT29	GA	1	26	[illegible]
324971	-	801258		1	143	3562945	300	141	GT29	GA	1	27	[illegible]
3249[illegible]	-	801277		1	116	3563[illegible]	275	148	GT29	GA	1	28	[illegible]
324982	-	801298		1	110	3563940	281	159	GT29	GA	1	29	[illegible]
3249[illegible]	-	801316		1	110	3564953	287	165	GT29	GA	1	30	[illegible]
3249[illegible]	-	801337		1	110	3564186	296	174	GT29	GA	1	31	[illegible]
324995	-	801358		1	110	3564449	314	192	GT29	GA	1	32	[illegible]
3250[illegible]	-	801381		1	113	3564967	367	242	GT29	GA	1	33	[illegible]
325004	-	801401		1	110	3565026	356	237	GT29	GA	1	34	[illegible]
3250[illegible]	-	801419		1	104	3565[illegible]	362	246	GT29	GA	1	35	[illegible]
325014	-	801438		1	104	3565642	389	273	GT29	GA	1	36	[illegible]
325018	-	801457		1	98	3565[illegible]	376	263	GT29	GA	1	37	[illegible]
325020	-	801476		1	91	3566015	380	278	GT29	GA	1	38	[illegible]
325025	-	801492		1	98	3566338	345	286	GT29	GA	1	39	[illegible]
325032	-	801508		1	94	3566692	441	336	GT30	GA	1	2	[illegible]
325038	-	801531		1	94	3566155	379	274	GT30	GA	1	3	[illegible]
325042	-	801552		1	98	3566077	375	266	GT30	GA	1	4	[illegible]
325045	-	801578		1	94	3566139	368	260	GT30	GA	1	5	[illegible]
325048	-	801600		1	91	3566442	385	280	GT30	GA	1	6	[illegible]
325052	-	801621		1	91	3566437	379	277	GT30	GA	1	7	[illegible]
325056	-	801639		1	76	3566896	374	287	GT30	GA	1	8	[illegible]
3250[illegible]	-	801658		1	67	3567106	358	283	GT30	GA	1	9	[illegible]
3250[illegible]	-	801678		1	76	3567117	381	296	GT30	GA	1	10	[illegible]

Table 5. Continued

325071 - 801696 1	82	3567217	405	311	GT30 GA 1	11	6
325075 - 801711 1	88	3567473	442	343	GT30 GA 1	12	6
325082 - 801728 1	82	3568716	467	376	GT30 GA 1	13	6
325092 - 801748 1	76	3568147	448	365	GT30 GA 1	14	6
325098 - 801768 1	70	3568367	492	414	GT30 GA 1	15	6
325104 - 801788 1	55	3568448	496	435	GT30 GA 1	16	6
325112 - 801807 1	58	3569436	498	434	GT30 GA 1	17	6
325112 - 801850 1	58	3569072	517	452	GT30 GA 1	18	6
325109 - 801847 1	70	3568356	490	411	GT30 GA 1	19	6
325104 - 801871 1	73	3568652	473	391	GT30 GA 1	20	6
325099 - 801895 1	70	3568844	476	397	GT30 GA 1	21	6
325110 - 801914 1	67	3568940	474	400	GT30 GA 1	22	6
325114 - 801936 1	64	3569036	469	398	GT30 GA 1	23	6
325118 - 801957 1	61	3569444	495	427	GT30 GA 1	24	6
325120 - 801978 1	61	3569076	516	448	GT30 GA 1	25	6
325121 - 801992 1	58	3570022	559	475	GT30 GA 1	26	6
325121 - 802016 1	52	3570145	542	461	GT30 GA 1	27	6
325121 - 802037 1	55	3570194	547	466	GT30 GA 1	28	6
325124 - 802056 1	58	3570467	580	515	GT30 GA 1	29	6
325123 - 802071 1	61	3570563	590	522	GT30 GA 1	30	6
325130 - 802094 1	79	3570652	596	508	GT30 GA 1	31	6
325133 - 802116 1	73	3570716	639	557	GT30 GA 1	32	6
325136 - 802131 1	73	3571056	669	588	GT30 GA 1	33	6
325136 - 802150 1	76	3570839	657	572	GT30 GA 1	34	6
325138 - 802176 1	116	3573116	704	575	GT30 GA 1	35	6
325139 - 802198 1	91	3570946	716	616	GT30 GA 1	36	6
325140 - 802220 1	55	3571694	691	636	GT30 GA 1	37	6
325141 - 802238 1	52	3572213	712	654	GT30 GA 1	38	6
325143 - 802259 1	58	3572216	729	604	GT30 GA 1	39	6
325143 - 802278 1	55	3572530	751	690	GT30 GA 1	40	6
325146 - 802300 1	52	3572899	774	716	GT30 GA 1	41	6
325148 - 802319 1	58	3573111	811	747	GT30 GA 1	42	6
325702 - 801567 1	52	3581029	824	767	GT30 GA 1	44	6
325703 - 801523 1	52	3581056	823	762	GT30 GA 1	45	6
325712 - 801546 1	55	3580389	817	756	GT30 GA 1	46	6
325718 - 801568 1	61	3580963	825	757	GT30 GA 1	47	6
325719 - 801585 1	76	3581756	949	864	GT30 GA 1	48	6
325730 - 801601 1	67	3580619	793	716	GT30 GA 1	49	6
325741 - 801618 1	67	3580392	755	680	GT30 GA 1	50	6
325753 - 801631 1	67	3580253	725	656	GT30 GA 1	51	6
325769 - 801642 1	64	3580114	680	608	GT30 GA 1	52	6
325739 - 801661 1	70	3580040	664	585	GT30 GA 1	53	6
325769 - 801681 1	70	3580039	664	585	GT30 GA 1	54	6
325787 - 801703 1	64	3580329	677	605	GT30 GA 1	55	6
325785 - 801712 1	61	3580417	679	611	GT30 GA 1	56	6
325787 - 801742 1	58	3580650	690	625	GT30 GA 1	57	6
325790 - 801760 1	61	3580758	706	638	GT30 GA 1	58	6
325798 - 801782 1	64	3580923	721	649	GT30 GA 1	59	6
325802 - 801806 1	64	3580947	718	646	GT30 GA 1	60	6
325806 - 801831 1	58	3580958	695	630	GT30 GA 1	61	6
325839 - 801846 1	137	3579053	703	550	GT31 GA 1	2	6
325853 - 801848 1	146	3579083	715	552	GT31 GA 1	3	6
325869 - 801848 1	155	3578944	708	554	GT31 GA 1	4	6
325890 - 801846 1	149	3578970	663	496	GT31 GA 1	5	6
325907 - 801839 1	177	3577751	602	465	GT31 GA 1	6	6
325923 - 801840 1	168	3576991	476	289	GT31 GA 1	7	6
325939 - 801848 1	158	3577134	445	268	GT31 GA 1	8	6
325952 - 801856 1	122	3577936	389	253	GT31 GA 1	9	6
325966 - 801871 1	134	3577217	336	187	GT31 GA 1	10	6
325974 - 801884 1	140	3576660	288	132	GT31 GA 1	11	6
325986 - 801902 1	131	3576547	232	86	GT31 GA 1	12	6
325996 - 801916 1	128	3576547	209	66	GT31 GA 1	13	6
33 8 - 801932 1	128	3576533	191	48	GT31 GA 1	14	6
33 19 - 801950 1	119	3577238	218	86	GT31 GA 1	15	6

Table 5. Continued

33	51	- 801962	1	125	3577307	220	68	GT31	GA	1	16	6
33	45	- 801977	1	122	3577261	194	58	GT31	GA	1	17	6
33	52	- 801992	1	116	3577273	157	33	GT31	GA	1	18	6
33	62	- 802010	1	122	3576922	137	1	GT31	GA	1	19	6
33	72	- 802031	1	140	3575785	85-	78	GT31	GA	1	20	6
33	83	- 802048	1	180	3575278	123-	78	GT31	GA	1	21	6
33	91	- 802062	1	186	3575279	112-	89	GT31	GA	1	22	6
33	100	- 802079	1	171	3575533	97-	94	GT31	GA	1	23	6
33	110	- 802105	1	159	3575350	66-	104	GT31	GA	1	24	6
33	122	- 802111	1	171	3576041	117-	76	GT31	GA	1	25	6
33	132	- 802129	1	186	3575695	116-	91	GT31	GA	1	26	6
33	138	- 802151	1	183	3575371	66-	138	GT31	GA	1	27	6
33	137	- 802171	1	185	3577269	257	56	GT31	GA	1	28	6
33	133	- 802192	1	183	3575025	31-	173	GT31	GA	1	29	6
33	130	- 802217	1	183	3575095	38-	166	GT31	GA	1	30	6
33	139	- 802235	1	180	3574821	6-	206	GT31	GA	1	31	6
33	139	- 802256	1	174	3575101	9-	184	GT31	GA	1	32	6
33	140	- 802275	1	177	3575068	14-	183	GT31	GA	1	33	6
33	145	- 802306	1	183	3575196	39-	169	GT31	GA	1	34	6
33	165	- 802326	1	183	3575147	9-	195	GT31	GA	1	35	6
33	171	- 802346	1	183	3575269	16-	194	GT31	GA	1	36	6
33	191	- 802362	1	185	3575275-	16-	220	GT31	GA	1	37	6
33	213	- 802385	1	183	3575431-	39-	245	GT31	GA	1	38	6
33	222	- 802411	1	183	3575379-	48-	254	GT31	GA	1	39	6
33	246	- 802421	1	185	3575466-	76-	274	GT31	GA	1	40	6
33	278	- 802445	1	183	3575468-	115-	319	GT31	GA	1	41	6
33	289	- 802462	1	183	3575596-	119-	323	GT31	GA	1	42	6
33	291	- 802525	1	183	3575704-	111-	315	GT31	GA	1	43	6
33	303	- 802537	1	189	3575705-	104-	315	GT31	GA	1	44	6
33	311	- 802555	1	195	3575709-	100-	318	GT31	GA	1	45	6
33	319	- 802570	1	201	3575837-	78-	306	GT31	GA	1	46	6
33	331	- 802582	1	204	3575906-	80-	308	GT31	GA	1	47	6
33	342	- 802595	1	204	3575694-	120-	348	GT31	GA	1	48	6
33	333	- 801605	1	238	3573863-	47-	312	GT31	GA	1	50	6
33	582	- 801878	1	235	3578248-	96-	358	GT31	GA	1	51	6
33	566	- 801890	1	235	3578057-	33-	295	GT31	GA	1	52	6
33	555	- 801890	1	229	3578496-	53-	308	GT31	GA	1	53	6
33	539	- 801887	1	219	3578330-	76-	321	GT31	GA	1	54	6
33	519	- 801882	1	213	3577836-	117-	359	GT31	GA	1	55	6
33	502	- 801880	1	207	3577711-	125-	346	GT31	GA	1	56	6
33	484	- 801874	1	201	3577548-	125-	349	GT31	GA	1	57	6
33	466	- 801870	1	195	3577471-	137-	354	GT31	GA	1	58	6
33	449	- 801872	1	186	3577345-	154-	362	GT31	GA	1	59	6
33	430	- 801879	1	180	3577318-	150-	350	GT31	GA	1	60	6
33	412	- 801885	1	174	3577537-	112-	398	GT31	GA	1	61	6
33	394	- 801889	1	122	3578812-	130-	266	GT31	GA	1	62	6
33	376	- 801895	1	113	3579267-	88-	213	GT31	GA	1	63	6
33	359	- 801898	1	122	3578278-	135-	271	GT31	GA	1	64	6
33	340	- 801895	1	146	3577133-	148-	311	GT31	GA	1	65	6
33	321	- 801893	1	140	3577157-	138-	295	GT31	GA	1	66	6
33	303	- 801890	1	162	3577083-	55-	235	GT31	GA	1	67	6
33	288	- 801892	1	162	3576987-	44-	224	GT31	GA	1	68	6
33	267	- 801895	1	152	3577331-	9-	179	GT31	GA	1	69	6
33	248	- 801900	1	165	3576747-	4-	187	GT31	GA	1	70	6
33	234	- 801902	1	168	3576872	37-	150	GT31	GA	1	71	6
33	221	- 801910	1	171	3576472	24-	166	GT31	GA	1	72	6
33	205	- 801925	1	180	3576093	37-	164	GT31	GA	1	73	6
33	192	- 801943	1	180	3576081	53-	147	GT31	GA	1	74	6
33	180	- 801957	1	174	3576055	49-	145	GT31	GA	1	75	6
33	169	- 801971	1	155	3576363	38-	135	GT31	GA	1	76	6
33	155	- 801982	1	119	3577405	49-	84	GT31	GA	1	77	6
33	141	- 801995	1	146	3576542	66-	97	GT31	GA	1	78	6
33	129	- 802008	1	152	3576059	51-	119	GT31	GA	1	79	6
33	115	- 802020	1	146	3575986	46-	117	GT31	GA	1	80	6

Table 5. Continued

33 98	-	802030	1	128	3576412	56-	87	GT31 GA 1	81	6
33 75	-	802031	1	146	3575307	33-	80	GT31 GA 1	82	6
325441	-	801502	1	95	3577432	833	772	GT32 GA 1	2	6
325438	-	801516	1	52	3577597	852	774	GT32 GA 1	3	6
325424	-	801529	1	52	3577336	836	779	GT32 GA 1	4	6
325413	-	801542	1	95	3577461	874	813	GT32 GA 1	5	6
325402	-	801551	1	58	3577510	903	859	GT32 GA 1	6	6
325334	-	801563	1	64	3576698	852	781	GT32 GA 1	7	6
325378	-	801579	1	58	3576734	865	806	GT32 GA 1	8	6
325350	-	801583	1	64	3576420	884	813	GT32 GA 1	9	6
325338	-	801591	1	70	3575577	835	757	GT32 GA 1	10	6
325313	-	801598	1	85	3574796	830	736	GT32 GA 1	11	6
325303	-	801602	1	75	3574679	733	711	GT32 GA 1	12	6
325289	-	801609	1	52	3574574	756	698	GT32 GA 1	13	6
325274	-	801622	1	46	3574296	719	668	GT32 GA 1	14	6
325257	-	801631	1	64	3573932	763	692	GT32 GA 1	15	6
325241	-	801643	1	88	3572768	744	645	GT32 GA 1	16	6
325228	-	801653	1	85	3572421	717	622	GT32 GA 1	17	6
325212	-	801664	1	61	3572522	674	606	GT32 GA 1	18	6
325204	-	801681	1	67	3572225	678	603	GT32 GA 1	19	6
325193	-	801702	1	75	3571961	692	600	GT32 GA 1	20	6
325173	-	801712	1	70	3571942	650	571	GT32 GA 1	21	6
325154	-	801722	1	67	3570962	606	531	GT32 GA 1	22	6
325140	-	801730	1	73	3570543	605	523	GT32 GA 1	23	6
325134	-	801737	1	82	3569781	573	481	GT32 GA 1	24	6
325116	-	801749	1	85	3569222	548	453	GT32 GA 1	25	6
325097	-	801756	1	88	3568673	531	433	GT32 GA 1	26	6
325082	-	801774	1	58	3568146	439	401	GT32 GA 1	27	6
325067	-	801788	1	88	3567263	431	336	GT32 GA 1	28	6
325056	-	801794	1	85	3566829	394	298	GT32 GA 1	29	6
325042	-	801800	1	79	3566401	351	263	GT32 GA 1	30	6
325024	-	801891	1	98	3565839	356	247	GT32 GA 1	31	6
325005	-	801882	1	116	3564454	319	189	GT32 GA 1	32	6
324989	-	801876	1	119	3564041	302	169	GT32 GA 1	33	6
324981	-	801871	1	119	3563409	258	125	GT32 GA 1	34	6
324965	-	801867	1	131	3562928	229	83	GT32 GA 1	35	6
324948	-	801859	1	119	3562435	196	63	GT32 GA 1	36	6
324933	-	801851	1	107	3561766	122	3	GT32 GA 1	37	6
324918	-	801841	1	88	3561493	65-	33	GT32 GA 1	38	6
324893	-	801834	1	58	3561377-	13-	76	GT32 GA 1	39	6
324876	-	801828	1	67	3560564-	43-	118	GT32 GA 1	40	6
324862	-	801821	1	52	3560713-	56-	114	GT32 GA 1	41	6
324843	-	801821	1	52	3560197-	82-	139	GT32 GA 1	42	6
324826	-	801821	1	52	3559560-	125-	183	GT32 GA 1	43	6
324812	-	801820	1	49	3558904-	178-	232	GT32 GA 1	44	6
324795	-	801818	1	55	3558380-	185-	247	GT32 GA 1	45	6
324782	-	801804	1	55	3557890-	219-	281	GT32 GA 1	46	6
324769	-	801792	1	55	3557508-	240-	301	GT32 GA 1	47	6
324758	-	801778	1	55	3556940-	282-	343	GT32 GA 1	48	6
324744	-	801768	1	61	3555944-	343-	411	GT32 GA 1	49	6
324727	-	801760	1	125	3553728-	344-	483	GT32 GA 1	50	6
324712	-	801749	1	134	3553069-	361-	511	GT32 GA 1	51	6
324692	-	801731	1	146	3552741-	329-	492	GT32 GA 1	52	6
324683	-	801718	1	155	3552432-	319-	493	GT32 GA 1	53	6
324658	-	801718	1	162	3551541-	355-	536	GT32 GA 1	54	6
33 254	-	80 755	1	238	3576731	212-	53	GT32 GA 1	56	6
33 249	-	80 774	1	232	3576626	190-	69	GT32 GA 1	57	6
33 244	-	80 795	1	226	3576480	163-	89	GT32 GA 1	58	6
33 240	-	80 815	1	216	3576584	151-	91	GT32 GA 1	59	6
33 236	-	80 832	1	195	3576294	61-	156	GT32 GA 1	60	6
33 230	-	80 865	1	189	3575613-	17-	228	GT32 GA 1	61	6
33 221	-	80 906	1	219	3573940-	78-	323	GT32 GA 1	62	6
33 217	-	80 927	1	216	3573507-	129-	367	GT32 GA 1	63	6
33 212	-	80 944	1	223	3573050-	145-	394	GT32 GA 1	64	6

Table 5. Continued

33	203	- 80	962	1	247	3572696-	97-	373	GT32	GA	1	65	6
33	194	- 80	980	1	247	3572327-	118-	393	GT32	GA	1	66	6
33	183	- 80	998	1	244	3572014-	146-	415	GT32	GA	1	67	6
33	172	- 801011		1	238	3572066-	146-	408	GT32	GA	1	68	6
33	156	- 801019		1	238	3571825-	144-	409	GT32	GA	1	69	6
33	142	- 801033		1	232	3571699-	156-	415	GT32	GA	1	70	6
33	127	- 801043		1	229	3571521-	163-	418	GT32	GA	1	71	6
33	113	- 801053		1	226	3571934-	106-	357	GT32	GA	1	72	6
33	97	- 801063		1	210	3571654-	165-	399	GT32	GA	1	73	6
33	82	- 801077		1	158	3573334-	166-	343	GT32	GA	1	74	6
33	65	- 801092		1	213	3571912-	136-	374	GT32	GA	1	75	6
33	54	- 801107		1	201	3571649-	135-	366	GT32	GA	1	76	6
33	42	- 801122		1	198	3571795-	113-	334	GT32	GA	1	77	6
33	26	- 801132		1	213	3571961-	27-	265	GT32	GA	1	78	6
33	25	- 801142		1	158	3573288-	63-	259	GT32	GA	1	79	6
33	27	- 801164		1	226	3571889	2-	251	GT32	GA	1	80	6
33	19	- 801181		1	226	3571903	14-	267	GT32	GA	1	81	6
33	12	- 801209		1	219	3571959	11-	234	GT32	GA	1	82	6
33	4	- 801243		1	219	3571922	18-	227	GT32	GA	1	83	6
325937		- 801262		1	219	3572101	45-	199	GT32	GA	1	84	6
325908		- 801281		1	216	3572042	42-	193	GT32	GA	1	85	6
325883		- 801293		1	216	3572109	56-	185	GT32	GA	1	86	6
325875		- 801309		1	207	3572279	56-	176	GT32	GA	1	87	6
325903		- 801319		1	177	3573402	96-	107	GT32	GA	1	88	6
325940		- 801329		1	135	3573296	131-	77	GT32	GA	1	89	6
325932		- 801341		1	133	3573482	160-	44	GT32	GA	1	90	6
325918		- 801352		1	192	3573526	212-	3	GT32	GA	1	91	6
325904		- 801362		1	201	3573722	279	54	GT32	GA	1	92	6
325893		- 801372		1	213	3573621	327	69	GT32	GA	1	93	6
325882		- 801391		1	210	3573875	371	130	GT32	GA	1	94	6
325880		- 801411		1	226	3574185	433	181	GT32	GA	1	95	6
325879		- 801432		1	225	3574308	457	189	GT32	GA	1	96	6
325878		- 801451		1	216	3574608	456	208	GT32	GA	1	97	6
325876		- 801474		1	207	3574897	457	226	GT32	GA	1	98	6
325859		- 801483		1	198	3575842	543	322	GT32	GA	1	99	6
325841		- 801496		1	177	3576801	596	400	GT33	GA	1	2	6
325832		- 801509		1	125	3578303	606	461	GT33	GA	1	3	6
325818		- 801517		1	58	3580037	592	527	GT33	GA	1	4	6
325802		- 801531		1	61	3580349	648	586	GT33	GA	1	5	6
325733		- 801552		1	67	3580350	673	598	GT33	GA	1	6	6
325734		- 801571		1	67	3580320	675	601	GT33	GA	1	7	6
325791		- 801596		1	67	3580238	671	596	GT33	GA	1	8	6
325769		- 801620		1	67	3580151	665	590	GT33	GA	1	9	6
325787		- 801642		1	67	3580095	662	588	GT33	GA	1	10	6
325736		- 801662		1	64	3580076	646	575	GT33	GA	1	11	6
325738		- 801681		1	64	3580014	644	572	GT33	GA	1	12	6
325786		- 801702		1	61	3580069	642	574	GT33	GA	1	13	6
325774		- 801721		1	64	3580280	639	618	GT33	GA	1	14	6
325762		- 801738		1	64	3580469	725	653	GT33	GA	1	15	6
325756		- 801753		1	64	3580648	748	677	GT33	GA	1	16	6
325748		- 801778		1	64	3580690	786	715	GT33	GA	1	17	6
325737		- 801792		1	64	3581100	822	751	GT33	GA	1	18	6
325732		- 801809		1	64	3581301	849	778	GT33	GA	1	19	6
325719		- 801828		1	64	3581418	879	807	GT33	GA	1	20	6
325712		- 801847		1	67	3581546	910	836	GT33	GA	1	21	6
325704		- 801857		1	61	3581683	916	848	GT33	GA	1	22	6
325695		- 801878		1	61	3581727	933	865	GT33	GA	1	23	6
325688		- 801887		1	64	3581730	952	881	GT33	GA	1	24	6
325680		- 801904		1	73	3581837	1002	921	GT33	GA	1	25	6
325672		- 801927		1	85	3581944	1061	966	GT33	GA	1	26	6
325658		- 801949		1	88	3582026	1084	985	GT33	GA	1	27	6
325663		- 801962		1	94	3581720	1080	974	GT33	GA	1	28	6
325661		- 801985		1	94	3581639	1074	969	GT33	GA	1	29	6
325656		- 801997		1	94	3582008	1118	1013	GT33	GA	1	30	6

Table 5. Continued

325651	-	802013	1	91	3582437	1158	1056	GT33	GA	1	31	6
325649	-	802032	1	88	3582758	1138	1089	GT33	GA	1	32	6
325641	-	802051	1	89	3582681	1190	1102	GT33	GA	1	33	6
325624	-	802071	1	89	3583019	1235	1146	GT33	GA	1	34	6
325621	-	802090	1	82	3583345	1237	1145	GT33	GA	1	35	6
325612	-	802111	1	82	3583236	1263	1171	GT33	GA	1	36	6
325614	-	802132	1	82	3583288	1274	1182	GT33	GA	1	37	6
325602	-	802152	1	82	3583416	1295	1203	GT33	GA	1	38	6
325598	-	802170	1	82	3583284	1287	1196	GT33	GA	1	39	6
325591	-	802182	1	82	3583138	1282	1192	GT33	GA	1	40	6
325584	-	802208	1	76	3583304	1298	1205	GT33	GA	1	41	6
325578	-	802228	1	73	3583281	1305	1217	GT33	GA	1	42	6
325570	-	802251	1	82	3583250	1322	1231	GT33	GA	1	43	6
325567	-	802272	1	88	3583211	1341	1248	GT33	GA	1	44	6
325564	-	802291	1	91	3583017	1336	1234	GT33	GA	1	45	6
325565	-	802317	1	88	3582957	1319	1220	GT33	GA	1	46	6
325562	-	802351	1	94	3582783	1324	1219	GT33	GA	1	47	6
33	590	- 80	736	1	271	3578553	30-	266	GT34	GA	1	13	5
33	577	- 80	562	1	264	3577041-	29-	257	GT34	GA	1	14	6
33	268	- 80	717	1	247	3576576	216-	59	GT34	GA	1	15	6
33	724	- 801472	1	241	3580682-	29-	296	GT34	GA	1	2	6
33	741	- 801392	1	213	3581340-	101-	339	GT34	GA	1	3	6
33	746	- 801350	1	223	3581168-	68-	316	GT34	GA	1	4	6
33	678	- 801297	1	189	3580758-	115-	328	GT34	GA	1	5	6
33	634	- 801136	1	210	3579655-	134-	359	GT34	GA	1	6	6
33	601	- 801012	1	264	3573780-	146-	373	GT34	GA	1	7	6
33	577	- 80	948	1	210	3579478-	179-	414	GT34	GA	1	8	6
33	559	- 80	908	1	256	3578344-	151-	430	GT34	GA	1	9	6
33	727	- 80	912	1	216	3579718-	131-	433	GT34	GA	1	10	6
33	719	- 80	836	1	247	3579091-	158-	434	GT34	GA	1	11	6
33	633	- 80	771	1	268	3578551-	33-	332	GT34	GA	1	12	6
33	197	- 80	980	1	155	3572437-	393-	566	GT34	GA	1	16	6
33	318	- 80	953	1	268	3574204-	34-	334	GT34	GA	1	17	6
33	457	- 80	920	1	274	3575445-	82-	388	GT34	GA	1	18	6
33	540	- 80	897	1	256	3577155-	109-	388	GT34	GA	1	19	6
33	624	- 80	966	1	213	3579121-	132-	370	GT34	GA	1	20	6
33	627	- 801046	1	195	3579399-	105-	323	GT34	GA	1	21	6
33	546	- 801082	1	210	3578409-	106-	340	GT34	GA	1	22	6
33	439	- 801085	1	223	3577196-	125-	373	GT34	GA	1	23	6
33	485	- 801119	1	229	3575868-	220-	475	GT34	GA	1	24	6
33	442	- 801155	1	207	3576038-	209-	441	GT34	GA	1	25	6
33	390	- 801045	1	213	3575228-	200-	458	GT34	GA	1	26	6
33	337	- 801004	1	262	3573763-	124-	416	GT34	GA	1	27	6
33	543	- 80	967	1	252	3577753-	102-	360	GT34	GA	1	28	6
33	557	- 801182	1	171	3578760-	208-	399	GT34	GA	1	29	6
33	532	- 801322	1	189	3578287-	165-	375	GT34	GA	1	30	6
33	425	- 801224	1	180	3577744-	109-	361	GT34	GA	1	31	6
33	336	- 801159	1	229	3574238-	179-	434	GT34	GA	1	32	6
33	287	- 801107	1	223	3573646-	189-	437	GT34	GA	1	33	6
33	204	- 801132	1	232	3572015-	210-	468	GT34	GA	1	34	6
33	271	- 801179	1	219	3573700-	171-	416	GT34	GA	1	35	6
33	332	- 801267	1	210	3575138-	139-	374	GT34	GA	1	36	6
33	425	- 801394	1	174	3577165-	177-	371	GT34	GA	1	37	6
33	472	- 801396	1	183	3577438-	186-	390	GT34	GA	1	38	6
33	439	- 801487	1	162	3577541-	196-	376	GT34	GA	1	39	6
33	384	- 801474	1	171	3576444-	202-	393	GT34	GA	1	40	6
33	214	- 801424	1	186	3573886-	177-	385	GT34	GA	1	41	6
33	71	- 801428	1	198	3573306-	2-	223	GT35	GA	1	2	6
33	112	- 801327	1	219	3572471-	75-	320	GT35	GA	1	3	6
33	92	- 801232	1	229	3571933-	74-	329	GT35	GA	1	4	6
33	112	- 801136	1	238	3571461-	120-	385	GT35	GA	1	5	6
33	178	- 801244	1	213	3574798	48-	190	GT35	GA	1	6	6
33	18	- 801035	1	250	3573877	288	9	GT35	GA	1	7	6
33	111	- 80	916	1	250	3571800-	47-	326	GT35	GA	1	8	6

Table 5. Continued

33	32	-	80	794	1	174	3570980-	297-	491	GT36	GA	1	9	6
33	648	-	80	653	1	271	3579535	54-	248	GT36	GA	1	10	6
33	986	-	80	604	1	256	3579092	39-	243	GT36	GA	1	11	6
33	526	-	80	543	1	223	3579201	39-	210	GT36	GA	1	12	6
33	599	-	80	537	1	259	3578548	45-	251	GT36	GA	1	13	6
33	371	-	80	376	1	137	3581371-	78-	283	GT36	GA	1	14	6
33	516	-	80	348	1	131	3581724	26-	126	GT36	GA	1	15	6
33	477	-	80	250	1	94	3583671	213	107	GT36	GA	1	16	6
33	415	-	80	205	1	101	3582035	184-	8	GT36	GA	1	17	6
33	552	-	80	137	1	104	3583783	94-	22	GT36	GA	1	18	6
33	633	-	80	177	1	76	3583615-	137-	216	GT36	GA	1	19	6
33	721	-	80	172	1	76	3584621-	158-	256	GT36	GA	1	20	6
33	717	-	80	25	1	54	3585927-	135-	172	GT36	GA	1	21	6
33	491	-	80	3	1	36	3584893	63	29	GT36	GA	1	22	6
33	245	-	80	65	1	76	3578840-	65-	148	GT36	GA	1	23	6
33	133	-	80	291	1	194	3573818-	409-	525	GT36	GA	1	24	6
33	357	-	80	438	1	143	3577448-	149-	309	GT36	GA	1	25	6
33	411	-	80	385	1	140	3579480-	30-	186	GT36	GA	1	26	6
33	265	-	80	537	1	116	3576929-	161-	289	GT36	GA	1	27	6
33	372	-	80	648	1	229	3576215-	30-	235	GT36	GA	1	28	6
33	341	-	80	737	1	247	3577426	190-	85	GT36	GA	1	29	6
33	177	-	80	677	1	174	3575387-	16-	216	GT36	GA	1	30	6
33	106	-	80	737	1	156	3572502-	252-	429	GT36	GA	1	31	6
33	69	-	80	658	1	116	3570929-	485-	614	GT36	GA	1	32	6
33	29	-	80	527	1	91	3570430-	561-	663	GT36	GA	1	33	6
33	120	-	80	532	1	146	3571959	626	462	GT36	GA	1	34	6
33	203	-	80	546	1	131	3574642-	243-	389	GT36	GA	1	35	6
325033		-	80	401	1	38	3567752-	295-	393	GT36	GA	1	2	6
325023		-	80	496	1	40	3569608-	246-	290	GT36	GA	1	3	6
325574		-	80	437	1	98	3568074-	154-	262	GT36	GA	1	4	6
325469		-	80	408	1	91	3567962-	67-	169	GT36	GA	1	5	6
325445		-	80	431	1	116	3567487	21-	108	GT36	GA	1	6	6
325357		-	80	395	1	110	3567763	150	20	GT36	GA	1	7	6
325382		-	80	338	1	113	3567141	63-	63	GT36	GA	1	8	6
325451		-	80	328	1	134	3566612-	18-	168	GT36	GA	1	9	6
325513		-	80	346	1	131	3566673-	115-	261	GT36	GA	1	10	6
325535		-	80	311	1	116	3566942-	154-	283	GT36	GA	1	11	6
325401		-	80	257	1	110	3566638-	103-	228	GT36	GA	1	12	6
325402		-	80	186	1	131	3565956-	29-	172	GT36	GA	1	13	6
325405		-	80	11	1	140	3564499-	148-	304	GT36	GA	1	14	6
325459		-	80	1	1	55	3567095-	248-	313	GT36	GA	1	15	6
325534		-	80	95	1	104	3566477-	240-	355	GT36	GA	1	16	6
325762		-	80	199	1	30	3568016-	624-	658	GT36	GA	1	17	6
325566		-	80	156	1	110	3566280-	284-	407	GT36	GA	1	18	6
325798		-	80	151	1	94	3565975-	680-	785	GT36	GA	1	19	6
325730		-	80	99	1	94	3566595-	525-	630	GT36	GA	1	20	6
325603		-	80	67	1	94	3566832-	416-	521	GT36	GA	1	21	6
325002		-	80	31	1	64	3567174-	306-	457	GT36	GA	1	22	6
325559		-	80	12	1	34	3568174-	321-	358	GT36	GA	1	23	6
325832		-	80	76	1	98	3566284-	759-	864	GT36	GA	1	24	6
325921		-	80	63	1	101	3566836-	744-	857	GT36	GA	1	25	6
325356		-	80	85	1	98	3567382-	747-	855	GT36	GA	1	26	6
325935		-	80	170	1	98	3566818-	774-	883	GT36	GA	1	27	6
325378		-	80	321	1	55	3568054-	841-	902	GT36	GA	1	28	6
325992		-	80	688	1	140	3569680-	434-	591	GT36	GA	1	29	6
325531		-	80	576	1	88	3569585	28-	76	GT37	GA	1	2	6
325192		-	80	84	1	82	3563290-	156-	248	GT37	GA	1	3	6
325072		-	80	196	1	24	3561263-	373-	400	GT37	GA	1	4	6
325006		-	80	94	1	34	3560193-	443-	486	GT37	GA	1	5	6
325215		-	80	226	1	37	3565803-	77-	118	GT37	GA	1	6	6
324870		-	80	11	1	67	3552297-	861-	936	GT37	GA	1	7	6
324904		-	80	70	1	18	3554332-	855-	875	GT37	GA	1	8	6
324825		-	80	230	1	61	3552532-	795-	863	GT37	GA	1	9	6
324935		-	80	126	1	43	3555114-	744-	791	GT37	GA	1	10	6

Table 5. Continued

324377	-	80	295	1	30	3555363-	677-	711	GT37	GA	1	11	6
324994	-	80	206	1	30	3558350-	544-	578	GT37	GA	1	12	6
324970	-	80	331	1	30	3558633-	477-	511	GT37	GA	1	13	6
325071	-	80	280	1	24	3562924-	295-	323	GT37	GA	1	14	6
325035	-	80	323	1	49	3560643-	309-	363	GT37	GA	1	15	1
324996	-	80	428	1	40	3561443-	334-	378	GT37	GA	1	16	6
324964	-	80	509	1	43	3559057-	362-	414	GT37	GA	1	17	6
324884	-	80	454	1	37	3556752-	531-	572	GT37	GA	1	18	6
324387	-	80	604	1	40	3558835-	311-	355	GT37	GA	1	19	6
324746	-	80	53	1	43	3550036-	993-	1041	GT37	GA	1	20	6
324742	-	80	106	1	46	3560554-	927-	978	GT37	GA	1	21	6
324676	-	80	120	1	27	3549036-	1044-	1079	GT37	GA	1	22	6
324610	-	80	12	1	30	3547819-	1068-	1102	GT37	GA	1	23	6
324716	-	80	211	1	46	3549545-	992-	1043	GT37	GA	1	24	6
324677	-	80	271	1	30	3549911-	940-	983	GT37	GA	1	25	6
324807	-	80	335	1	21	3554136-	732-	756	GT37	GA	1	26	6
324851	-	80	517	1	21	3556326-	574-	597	GT37	GA	1	27	6
324753	-	80	651	1	15	3554297-	661-	678	GT37	GA	1	28	6
324668	-	80	638	1	27	3552068-	730-	761	GT37	GA	1	29	6
324561	-	80	640	1	37	3549146-	848-	889	GT37	GA	1	30	6
324512	-	80	596	1	82	3547794-	772-	864	GT37	GA	1	31	6
324565	-	80	712	1	52	3547479-	891-	945	GT37	GA	1	32	6
324516	-	80	709	1	40	3550433-	771-	816	GT37	GA	1	33	6
324651	-	80	536	1	34	3551267-	768-	806	GT37	GA	1	34	6
324603	-	80	439	1	30	3549724-	875-	909	GT37	GA	1	35	6
324564	-	80	347	1	18	3548209-	1006-	1023	GT37	GA	1	36	6
324615	-	80	274	1	24	3546580-	1079-	1107	GT37	GA	1	37	6
324514	-	80	173	1	15	3547131-	1046-	1062	GT37	GA	1	38	6
324516	-	80	84	1	30	3547147-	1005-	1039	GT37	GA	1	39	6
324526	-	80	430	1	24	3548209-	965-	992	GT37	GA	1	40	6
324598	-	80	557	1	34	3549919-	832-	865	GT37	GA	1	41	6
325054	-	80	453	1	49	3562656-	134-	188	GT38	GA	1	2	6
324973	-	80	736	1	34	3558282-	379-	410	GT38	GA	1	3	6
324846	-	80	790	1	27	3557067-	474-	504	GT38	GA	1	4	6
324942	-	80	891	1	34	3560869-	206-	244	GT38	GA	1	5	6
324882	-	801019		1	34	3559978-	210-	251	GT38	GA	1	6	6
324867	-	801157		1	34	3559309-	200-	237	GT38	GA	1	7	6
325023	-	801230		1	82	3565312	338	246	GT38	GA	1	8	6
325104	-	801240		1	30	3560449	421	387	GT38	GA	1	9	6
325100	-	801215		1	24	3571057	486	459	GT38	GA	1	10	6
325058	-	801147		1	55	3567623	376	315	GT38	GA	1	11	6
325021	-	801071		1	30	3566391	228	194	GT38	GA	1	12	6
325041	-	801217		1	34	3567537	325	286	GT38	GA	1	13	6
324613	-	80	877	1	85	3549735-	710-	805	GT38	GA	1	14	6
324562	-	80	846	1	34	3549421-	831-	869	GT38	GA	1	15	6
324653	-	80	811	1	46	3551687-	692-	743	GT38	GA	1	16	6
324698	-	80	851	1	52	3552500-	652-	710	GT38	GA	1	17	6
324680	-	801000		1	18	3553313-	650-	671	GT38	GA	1	18	6
324681	-	801108		1	37	3553365-	590-	631	GT38	GA	1	19	6
324695	-	801213		1	46	3553772-	542-	593	GT38	GA	1	20	6
324687	-	801317		1	116	3552542-	436-	565	GT38	GA	1	21	6
324668	-	801470		1	119	3551781-	477-	610	GT38	GA	1	22	6
324655	-	801487		1	125	3551385-	480-	619	GT38	GA	1	23	6
324518	-	801442		1	88	3547497-	794-	893	GT38	GA	1	24	6
324583	-	801440		1	116	3549295-	619-	748	GT38	GA	1	25	6
324515	-	801300		1	79	3548076-	761-	849	GT38	GA	1	26	6
324632	-	801235		1	76	3551312-	606-	691	GT38	GA	1	27	6
324599	-	801338		1	104	3549978-	610-	725	GT38	GA	1	28	6
324720	-	801493		1	125	3553430-	359-	499	GT38	GA	1	29	6
324710	-	801390		1	110	3553600-	389-	511	GT38	GA	1	30	6
325075	-	801306		1	37	3568780	412	371	GT38	GA	1	31	6
325066	-	801486		1	122	3566851	495	359	GT38	GA	1	32	6
325082	-	801417		1	116	3567575	527	398	GT39	GA	1	2	6
324908	-	801500		1	128	3561178	163	20	GT39	GA	1	3	6

Table 5. Continued

324942	-	801416	1	131	3561818	200	53	GT33	GA	1	4	6
324927	-	801306	1	128	3561214	140-	2	GT39	GA	1	5	6
325707	-	801256	1	119	3576211	461	329	GT39	GA	1	6	6
325643	-	801024	1	67	3573253	121	46	GT39	GA	1	7	6
325811	-	801014	1	82	3574452	112	21	GT39	GA	1	8	6
325815	-	801057	1	146	3573573	107-	56	GT39	GA	1	9	6
325632	-	801113	1	101	3575243	156	38	GT39	GA	1	10	6
325971	-	801022	1	210	3571343-	22-	257	GT39	GA	1	11	6
325929	-	80 945	1	67	3573439-	185-	266	GT39	GA	1	12	6
325893	-	80 855	1	192	3569497-	165-	379	GT39	GA	1	13	6
325870	-	80 872	1	116	3571687-	142-	271	GT39	GA	1	14	6
325836	-	80 846	1	85	3571689-	191-	286	GT39	GA	1	15	6
325875	-	80 781	1	155	3569295-	265-	439	GT39	GA	1	16	6
325795	-	80 898	1	61	3572717-	105-	173	GT39	GA	1	17	6
325751	-	80 861	1	49	3572769-	77-	132	GT39	GA	1	18	6
325774	-	80 818	1	88	3570911-	172-	271	GT39	GA	1	19	6
325730	-	80 768	1	85	3571466-	25-	120	GT39	GA	1	20	6
325735	-	801128	1	24	3576215	214	187	GT39	GA	1	21	6
325874	-	801397	1	131	3573916	117-	29	GT39	GA	1	23	6
324476	-	80 639	1	73	3546014-	928-	1010	GT40	GA	1	2	6
324395	-	80 634	1	73	3543710-	1049-	1131	GT40	GA	1	3	6
324355	-	80 592	1	70	3542750-	1107-	1185	GT40	GA	1	4	6
324318	-	80 686	1	58	3542221-	1143-	1207	GT40	GA	1	5	6
324294	-	80 740	1	67	3541888-	1115-	1190	GT40	GA	1	6	6
324324	-	80 492	1	70	3541805-	1149-	1227	GT40	GA	1	7	6
324271	-	80 574	1	43	3541706-	1177-	1225	GT40	GA	1	8	6
324211	-	80 652	1	70	3540007-	1162-	1247	GT40	GA	1	9	6
324263	-	80 744	1	76	3540784-	1073-	1158	GT40	GA	1	10	6
324253	-	80 415	1	21	3541867-	1202-	1226	GT40	GA	1	11	6
324156	-	80 431	1	76	3540131-	1093-	1171	GT40	GA	1	12	6
324115	-	80 492	1	55	3540259-	1072-	1134	GT40	GA	1	13	6
324076	-	80 568	1	49	3539708-	1093-	1147	GT40	GA	1	14	6
324026	-	80 674	1	52	3539414-	1043-	1101	GT40	GA	1	15	6
323991	-	80 749	1	52	3539620-	975-	1033	GT40	GA	1	16	6
324032	-	80 373	1	55	3540214-	1044-	1105	GT40	GA	1	17	6
324043	-	80 300	1	46	3540060-	1029-	1081	GT40	GA	1	18	6
323989	-	80 368	1	21	3539709-	1052-	1078	GT40	GA	1	19	6
323924	-	80 379	1	43	3538485-	1025-	1073	GT40	GA	1	20	6
323936	-	80 246	1	40	3538539-	1046-	1090	GT40	GA	1	21	6
323955	-	80 473	1	27	3539052-	1055-	1086	GT40	GA	1	22	6
323945	-	80 549	1	40	3538931-	1019-	1063	GT40	GA	1	23	6
323935	-	80 573	1	37	3537997-	972-	1012	GT40	GA	1	24	6
323902	-	80 502	1	37	3538705-	986-	1027	GT40	GA	1	25	6
323911	-	80 653	1	37	3539105-	965-	1005	GT40	GA	1	26	6
323878	-	80 735	1	37	3539287-	901-	942	GT40	GA	1	27	6
323828	-	80 735	1	40	3538925-	870-	914	GT40	GA	1	28	6
324069	-	80 208	1	46	3540766-	986-	1037	GT40	GA	1	29	6
324124	-	80 119	1	46	3542038-	934-	985	GT40	GA	1	30	6
324207	-	80 90	1	67	3542480-	937-	1012	GT40	GA	1	31	6
324323	-	80 56	1	18	3544814-	1013-	1033	GT40	GA	1	32	6
324289	-	80 117	1	21	3544042-	1034-	1058	GT40	GA	1	33	6
324279	-	80 208	1	34	3542755-	1111-	1149	GT40	GA	1	34	6
324258	-	80 265	1	40	3541690-	1170-	1215	GT40	GA	1	35	6
324245	-	80 336	1	30	3541476-	1202-	1236	GT40	GA	1	36	6
324359	-	80 148	1	49	3541951-	1254-	1308	GT40	GA	1	37	6
324406	-	80 190	1	49	3544523-	1061-	1115	GT40	GA	1	38	6
324489	-	80 201	1	49	3546209-	1006-	1060	GT40	GA	1	39	6
324460	-	80 231	1	70	3544798-	1041-	1120	GT40	GA	1	40	6
324426	-	80 294	1	64	3543380-	1106-	1177	GT40	GA	1	41	6
324386	-	80 372	1	85	3543045-	1059-	1104	GT40	GA	1	42	6
324349	-	80 447	1	79	3542434-	1038-	1186	GT40	GA	1	43	6
325132	-	80 118	1	107	3560469-	291-	400	GT42	GA	1	3	6
325123	-	80 68	1	34	3562196-	321-	359	GT42	GA	1	4	6
33 17	-	801033	1	250	3573837	286	7	GT42	GA	1	5	6

Table 5. Continued

33 177	- 801244	1	213	3572632-	167-	405	GT42	GA	1	6	6
33 423	- 801225	1	183	3576613-	211-	411	GT42	GA	1	7	6
325977	- 801369	1	223	3572354	107-	141	GT42	GA	1	8	6
325339	- 801424	1	168	3574355	190	3	GT42	GA	1	9	6
325975	- 801485	1	216	3573360	192-	49	GT42	GA	1	10	6
324453	- 80 804	1	55	3546617-	911-	972	GT42	GA	1	12	6
324470	- 80 754	1	34	3547220-	926-	963	GT42	GA	1	13	6
324429	- 80 834	1	46	3546216-	932-	983	GT42	GA	1	14	6
324402	- 80 957	1	52	3545447-	954-	1012	GT42	GA	1	15	6
324334	- 80 925	1	49	3544033-	1012-	1066	GT42	GA	1	16	6
324348	- 80 815	1	64	3543504-	1029-	1100	GT42	GA	1	17	6
324311	- 80 752	1	45	3542487-	1144-	1195	GT42	GA	1	18	6
324166	- 80 810	1	24	3541550-	1096-	1123	GT42	GA	1	19	6
324120	- 80 905	1	70	3540834-	955-	1041	GT42	GA	1	20	6
32411o	- 801002	1	55	3541155-	983-	1044	GT42	GA	1	21	6
324062	- 80 979	1	79	3540210-	955-	1044	GT42	GA	1	22	6
323989	- 80 922	1	34	3539584-	1032-	1070	GT42	GA	1	23	6
323959	- 80 874	1	34	3539294-	1021-	1058	GT42	GA	1	24	6
324011	- 801118	1	82	3538736-	991-	1085	GT42	GA	1	25	6
323995	- 801022	1	52	3539270-	1017-	1079	GT42	GA	1	26	6
324473	- 801431	1	116	3546095-	807-	936	GT43	GA	1	2	6
324406	- 801449	1	94	3544187-	953-	1055	GT43	GA	1	3	6
324333	- 801479	1	49	3542899-	1124-	1178	GT43	GA	1	4	6
324303	- 801427	1	27	3542386-	1156-	1180	GT43	GA	1	5	6
3242o2	- 801444	1	18	3542316-	1179-	1199	GT43	GA	1	6	6
324216	- 801493	1	34	3541247-	1179-	1216	GT43	GA	1	7	6
324138	- 801466	1	27	3541085-	1188-	1210	GT43	GA	1	8	6
324145	- 801547	1	37	3540269-	1161-	1201	GT43	GA	1	9	6
324335	- 801506	1	40	3543911-	1053-	1090	GT43	GA	1	10	6
324287	- 801294	1	30	3542451-	1135-	1169	GT43	GA	1	11	6
324343	- 801206	1	37	3544474-	1024-	1065	GT43	GA	1	12	6
324314	- 801107	1	34	3543353-	1099-	1136	GT43	GA	1	13	6
324354	- 801114	1	55	3544180-	1009-	1067	GT43	GA	1	14	6
324422	- 801196	1	67	3545535-	925-	1000	GT43	GA	1	15	6
324455	- 801260	1	101	3546362-	784-	896	GT43	GA	1	16	6
324426	- 801357	1	101	3545199-	861-	975	GT43	GA	1	17	6
324483	- 801162	1	85	3547145-	791-	806	GT43	GA	1	18	6
324479	- 801060	1	37	3547364-	854-	895	GT43	GA	1	19	6
324453	- 801164	1	82	3545974-	849-	941	GT43	GA	1	20	6
324267	- 80 787	1	52	3541767-	1055-	1113	GT43	GA	1	21	6
324216	- 80 870	1	40	3542319-	1003-	1047	GT43	GA	1	22	6
324135	- 80 956	1	52	3541728-	1029-	1087	GT43	GA	1	23	6
3241o3	- 801016	1	82	3541143-	964-	1055	GT43	GA	1	24	6
324128	- 801075	1	73	3540615-	997-	1078	GT43	GA	1	25	6
324185	- 801108	1	49	3541551-	1058-	1112	GT43	GA	1	26	6
324153	- 801196	1	27	3540805-	1161-	1191	GT43	GA	1	27	6
324086	- 801154	1	61	3539555-	1083-	1151	GT43	GA	1	28	6
324064	- 801255	1	30	3539902-	1112-	1146	GT43	GA	1	29	6
324026	- 801223	1	70	3538643-	1064-	1142	GT43	GA	1	30	6
323945	- 801258	1	43	3539697-	933-	980	GT43	GA	1	32	6
323964	- 801328	1	67	3539226-	931-	1006	GT43	GA	1	33	6
324030	- 801334	1	37	3539738-	1064-	1104	GT43	GA	1	34	6
324017	- 801407	1	21	3540285-	1038-	1062	GT43	GA	1	35	6
323921	- 801396	1	67	3539976-	797-	872	GT43	GA	1	36	6
323977	- 801464	1	49	3541264-	665-	719	GT43	GA	1	37	6
323872	- 801335	1	46	3540578-	736-	787	GT43	GA	1	38	6
323821	- 801406	1	64	3540677-	600-	671	GT43	GA	1	39	6
323780	- 801362	1	21	3541401-	603-	627	GT43	GA	1	40	6
323821	- 801287	1	30	3540900-	674-	708	GT43	GA	1	41	6
323889	- 801259	1	30	3539849-	879-	913	GT43	GA	1	42	6
323944	- 801028	1	43	3538810-	1020-	1068	GT43	GA	1	43	6
323939	- 801104	1	49	3539293-	810-	864	GT43	GA	1	44	6
323827	- 801194	1	37	3539837-	777-	818	GT43	GA	1	45	6
323753	- 801142	1	24	3540880-	609-	636	GT43	GA	1	46	6

Table 5. Continued

323886 - 801860 1	21	3540324-	850-	873	GT43 GA 1	47	5
323769 - 80 909 1	57	3539267-	755-	795	GT43 GA 1	48	6
323838 - 80 862 1	46	3538834-	863-	914	GT43 GA 1	49	6
323882 - 80 824 1	40	3538902-	927-	971	GT43 GA 1	50	6
323952 - 80 780 1	49	3539262-	967-	1022	GT43 GA 1	51	6
324514 - 801612 1	134	3550956-	466-	616	GT44 GA 1	2	6
324612 - 801712 1	128	3550817-	469-	611	GT44 GA 1	3	6
324532 - 801608 1	119	3550697-	482-	614	GT44 GA 1	4	6
324555 - 801805 1	119	3550434-	457-	589	GT44 GA 1	5	6
324531 - 801990 1	110	3550367-	489-	532	GT44 GA 1	6	6
324535 - 802083 1	98	3551383-	338-	447	GT44 GA 1	7	6
324533 - 802172 1	85	3553830-	198-	293	GT44 GA 1	8	6
324544 - 802272 1	67	3554217-	224-	298	GT44 GA 1	9	6
324556 - 802369 1	61	3556382-	42-	110	GT44 GA 1	10	6
324659 - 802492 1	55	3559854	145	84	GT44 GA 1	11	6
324742 - 802590 1	49	3562365	264	210	GT44 GA 1	12	6
324712 - 802271 1	58	3559702	73	8	GT44 GA 1	13	6
324654 - 802260 1	55	3558519	19-	43	GT44 GA 1	14	6
324673 - 802458 1	55	3567298	601	548	GT44 GA 1	15	6
324945 - 802372 1	55	3569332	702	641	GT44 GA 1	16	6
324942 - 802235 1	73	3566835	513	431	GT44 GA 1	17	6
324825 - 802227 1	91	3565526	461	359	GT44 GA 1	18	6
324827 - 802195 1	82	3561236	138	46	GT44 GA 1	19	6
324713 - 802131 1	85	3557683-	52-	147	GT44 GA 1	20	6
324835 - 802170 1	55	3556585-	150-	212	GT44 GA 1	21	6
324931 - 802150 1	55	3559310-	194-	255	GT44 GA 1	22	6
324743 - 802050 1	73	3560343	89	7	GT44 GA 1	23	6
324775 - 801962 1	61	3559475	6-	62	GT44 GA 1	24	6
324702 - 801926 1	55	3556908-	98-	151	GT44 GA 1	25	6
324736 - 801850 1	58	3557051-	209-	274	GT44 GA 1	26	6
324807 - 801822 1	55	3560174-	107-	168	GT44 GA 1	27	6
324814 - 801747 1	55	3563082	112	51	GT44 GA 1	28	6
324903 - 801626 1	50	3560594-	105-	171	GT44 GA 1	29	6
324975 - 801610 1	125	3551847-	461-	600	GT44 GA 1	30	6
324955 - 801647 1	94	3548688-	707-	812	GT44 GA 1	31	6
324866 - 802050 1	49	3554257-	361-	415	GT44 GA 1	32	6
324870 - 802078 1	67	3556135-	212-	287	GT44 GA 1	33	6
324894 - 801998 1	76	3556729-	149-	234	GT44 GA 1	34	6
324712 - 801925 1	46	3556783-	260-	311	GT44 GA 1	35	6
324865 - 801842 1	40	3554445-	451-	495	GT44 GA 1	36	6
324850 - 802074 1	79	3561925	166	78	GT44 GA 1	37	6
324815 - 802105 1	61	3563911	220	152	GT44 GA 1	38	6
325013 - 802142 1	58	3567807	466	401	GT44 GA 1	39	6
325034 - 802250 1	73	3569163	620	538	GT44 GA 1	40	6
325070 - 802071 1	61	3568656	482	414	GT44 GA 1	41	6
325041 - 802148 1	55	3568422	480	418	GT44 GA 1	42	6
325052 - 802310 1	67	3568067	528	453	GT44 GA 1	43	6
325026 - 802035 1	61	3567248	410	342	GT44 GA 1	44	6
324932 - 802014 1	55	3565292	316	254	GT44 GA 1	45	6
324956 - 801924 1	101	3564783	373	261	GT44 GA 1	46	6
325532 - 801108 1	55	3573137	279	217	GT45 GA 1	2	6
325483 - 801161 1	82	3572913	408	316	GT45 GA 1	3	6
325412 - 801233 1	76	3573867	563	485	GT45 GA 1	4	6
325382 - 801144 1	113	3572091	558	432	GT45 GA 1	5	6
325325 - 801092 1	98	3571959	576	467	GT45 GA 1	6	6
325427 - 801056 1	76	3571844	340	262	GT45 GA 1	7	6
325503 - 801040 1	91	3571542	265	163	GT45 GA 1	8	6
325615 - 801427 1	49	3579726	805	751	GT45 GA 1	9	6
325492 - 801300 1	107	3574062	586	467	GT45 GA 1	10	6
325505 - 801178 1	55	3574049	325	263	GT45 GA 1	11	6
325344 - 801310 1	24	3574705	599	572	GT45 GA 1	12	6
325318 - 801430 1	34	3574855	676	638	GT45 GA 1	13	6
325372 - 801488 1	34	3576225	741	703	GT45 GA 1	14	6
325267 - 801385 1	37	3573079	639	599	GT45 GA 1	15	6

Table 5. Continued

325216 - 801342 1	40	3572492	606	556	GT45 GA 1	16	6		
325229 - 801276 1	34	3572634	578	540	GT45 GA 1	17	6		
325231 - 801692 1	40	3574073	737	693	GT45 GA 1	18	6		
325346 - 80 925 1	101	3571103	471	359	GT53 GA 1	2	6		
325301 - 801634 1	107	3571449	591	472	GT53 GA 1	3	6		
325290 - 80 947 1	101	3570956	396	284	GT53 GA 1	4	6		
325227 - 801152 1	46	3572018	537	493	GT53 GA 1	5	6		
325264 - 801238 1	37	3572960	572	531	GT53 GA 1	6	6		
325227 - 80 995 1	79	3571289	587	498	GT53 GA 1	7	6		
325232 - 80 899 1	131	3569785	589	443	GT53 GA 1	8	6		
325165 - 80 864 1	94	3569463	536	431	GT53 GA 1	9	6		
325127 - 80 939 1	34	3569322	386	349	GT53 GA 1	10	6		
325131 - 801030 1	34	3569565	399	361	GT53 GA 1	11	6		
325107 - 80 824 1	56	3568173	374	309	GT53 GA 1	12	6		
325171 - 80 757 1	101	3568343	485	373	GT53 GA 1	13	6		
325241 - 80 787 1	116	3569977	549	420	GT53 GA 1	14	6		
325263 - 80 740 1	125	3569748	529	389	GT53 GA 1	15	6		
325323 - 80 698 1	125	3570078	475	336	GT53 GA 1	16	6		
325335 - 80 743 1	125	3570127	464	324	GT53 GA 1	17	6		
325363 - 80 653 1	52	3571605	430	372	GT53 GA 1	18	6		
325273 - 80 601 1	61	3570695	408	340	GT53 GA 1	19	6		
324993 - 80 556 1	43	3561371-	198-	245	GT53 GA 1	20	6		
325050 - 80 573 1	49	3564057	12-	43	GT53 GA 1	21	6		
325114 - 80 603 1	37	3567323	213	172	GT53 GA 1	22	6		
325127 - 80 690 1	43	3567085	270	223	GT53 GA 1	23	6		
325134 - 80 630 1	34	3570149	377	339	GT53 GA 1	24	6		
325022 - 801843 1	49	3566908	295	241	GT54 GA 1	2	6		
324949 - 801828 1	67	3563295	136	61	GT54 GA 1	3	6		
325007 - 801774 1	43	3566049	251	204	GT54 GA 1	4	6		
325102 - 801860 1	67	3573427	852	777	GT54 GA 1	5	6		
325221 - 801910 1	43	3570573	1011	963	GT54 GA 1	6	6		
325275 - 802010 1	55	3579343	1254	1193	GT54 GA 1	7	6		
325345 - 802007 1	55	3582797	1501	1446	GT54 GA 1	8	6		
325334 - 801940 1	70	3583152	1533	1452	GT54 GA 1	9	6		
325322 - 801871 1	67	3580035	1294	1219	GT54 GA 1	10	6		
325235 - 801778 1	64	3577033	1032	960	GT54 GA 1	11	6		
325237 - 801711 1	61	3575358	896	828	GT54 GA 1	12	6		
325185 - 801789 1	55	3573086	749	688	GT54 GA 1	13	6		
325255 - 801802 1	55	3576588	1013	952	GT54 GA 1	14	6		
325354 - 802105 1	67	3582559	1506	1432	GT54 GA 1	15	6		
325456 - 802184 1	122	3583292	1671	1535	GT54 GA 1	16	6		
325436 - 802307 1	79	3582506	1422	1353	GT54 GA 1	17	6		
325565 - 802340 1	98	3582539	1305	1196	GT54 GA 1	18	6		
325317 - 802300 1	55	3579904	1250	1189	GT54 GA 1	19	6		
325282 - 802187 1	55	3578589	1166	1105	GT54 GA 1	20	6		
325256 - 802191 1	64	3575695	969	898	GT54 GA 1	21	6		
325253 - 802082 1	61	3577484	1118	1050	GT54 GA 1	22	6		
325228 - 801985 1	64	3576196	1029	958	GT54 GA 1	23	6		
325190 - 802157 1	64	3573921	854	782	GT54 GA 1	24	6		
325436 - 801997 1	79	3584407	1614	1524	GT54 GA 1	25	6		
325431 - 802105 1	61	3584838	1537	1469	GT54 GA 1	26	6		
325561 - 802210 1	79	3583873	1429	1340	GT54 GA 1	27	6		
325501 - 801975 1	67	3583088	1244	1169	GT54 GA 1	28	6		
325506 - 802034 1	70	3584562	1512	1434	GT54 GA 1	29	6		
325541 - 801914 1	55	3583498	1302	1241	GT54 GA 1	30	6		
325646 - 801609 1	55	3581515	960	899	GT54 GA 1	31	6		
325634 - 801680 1	61	3581289	891	823	GT54 GA 1	32	6		
325615 - 801677 1	55	3581441	995	934	GT54 GA 1	33	6		
325655 - 801793 1	128	3580008	1023	880	GT54 GA 1	34	6		
325585 - 801657 1	55	3581992	1091	1030	GT54 GA 1	35	6		
325460 - 801852 1	64	3583102	1402	1331	GT54 GA 1	36	6		
325425 - 801757 1	61	3581359	1266	1198	GT54 GA 1	37	6		
325382 - 801673 1	64	3578385	1037	966	GT54 GA 1	38	6		
325540 - 801755 1	58	3581920	1155	1091	GT54 GA 1	39	6		

Table 5. Continued

325647	-	802365	1	91	3581710	1091	945	GT56	GA	1	2	6
325704	-	802375	1	82	3579942	726	634	GT55	GA	1	3	6
325802	-	802320	1	119	3578210	539	408	GT55	GA	1	4	6
325829	-	802215	1	146	3579415	781	618	GT55	GA	1	5	6
325747	-	802212	1	67	3581854	893	818	GT55	GA	1	6	6
325754	-	802113	1	76	3581375	857	772	GT56	GA	1	7	6
325758	-	802014	1	86	3581717	958	859	GT55	GA	1	8	6
325836	-	802044	1	110	3580750	799	676	GT56	GA	1	9	6
325846	-	802118	1	104	3573869	654	569	GT55	GA	1	10	6
325858	-	802190	1	158	3576960	408	281	GT55	GA	1	11	6
325938	-	802173	1	177	3576136	521	124	GT56	GA	1	12	6
33	5	- 802321	1	105	3575922	331	114	GT56	GA	1	13	6
325947	-	802342	1	168	3576933	437	250	GT56	GA	1	14	6
325865	-	802265	1	82	3582244	1092	1000	GT55	GA	1	15	6
325873	-	802228	1	140	3576074	316	147	GT55	GA	1	16	6
325811	-	802511	1	128	3577700	441	238	GT55	GA	1	17	6
325831	-	801934	1	183	3573696	829	616	GT56	GA	1	18	6
325706	-	801892	1	91	3580724	829	727	GT55	GA	1	19	6
325905	-	801581	1	135	3574398	203-	19	GT55	GA	1	20	6
325955	-	801624	1	128	3574597	70-	72	GT55	GA	1	21	6
33	435	- 801577	1	91	3579552-	275-	377	GT56	GA	1	24	6
33	565	- 801621	1	116	3580217-	243-	372	GT55	GA	1	25	6
33	662	- 801715	1	207	3579526-	139-	339	GT55	GA	1	26	6
33	712	- 801852	1	158	3582686-	52-	229	GT55	GA	1	27	6
33	913	- 801944	1	207	3581029-	54-	285	GT55	GA	1	28	6
33	957	- 801999	1	238	3577314-	118-	384	GT56	GA	1	29	6
33	566	- 802076	1	183	3573562-	139-	313	GT56	GA	1	30	6
33	556	- 802155	1	119	3579442-	263-	395	GT55	GA	1	31	6
33	516	- 802259	1	76	3579748-	345-	436	GT55	GA	1	32	6
33	913	- 802370	1	91	3579672-	297-	399	GT56	GA	1	33	6
33	463	- 802163	1	232	3576818-	113-	372	GT55	GA	1	34	6
33	916	- 802461	1	244	3576855-	117-	389	GT55	GA	1	35	6
33	704	- 802148	1	116	3577542-	285-	414	GT55	GA	1	36	6
33	340	- 802437	1	183	3576544-	102-	306	GT56	GA	1	37	6
33	623	- 801604	1	210	3579602-	92-	327	GT56	GA	1	2	6
33	621	- 801535	1	210	3579438-	106-	341	GT56	GA	1	3	6
33	677	- 801612	1	232	3580495-	11-	270	GT56	GA	1	4	6
33	705	- 801518	1	232	3580298-	70-	328	GT56	GA	1	5	6
33	913	- 801700	1	232	3580592	86-	172	GT56	GA	1	6	6
33	991	- 801711	1	122	3579935-	233-	369	GT56	GA	1	7	6
33	313	- 801779	1	171	3578797-	144-	334	GT56	GA	1	8	6
33	569	- 801795	1	207	3579255-	57-	206	GT56	GA	1	9	6
33	624	- 801920	1	198	3580848-	7-	228	GT56	GA	1	10	6
33	500	- 801944	1	183	3578373-	131-	335	GT56	GA	1	11	6
33	418	- 801970	1	189	3577421-	95-	306	GT56	GA	1	12	6
33	345	- 801976	1	137	3576868-	210-	363	GT56	GA	1	13	6
33	240	- 802046	1	192	3576018	19-	195	GT56	GA	1	14	6
33	321	- 802071	1	158	3576452-	152-	329	GT56	GA	1	15	6
33	337	- 802270	1	192	3575733-	225-	439	GT56	GA	1	16	6
33	222	- 802420	1	189	3576449	77-	133	GT56	GA	1	17	6
33	76	- 802321	1	201	3575361	207-	18	GT56	GA	1	18	6
33	89	- 802203	1	201	3574267	79-	145	GT56	GA	1	19	6
33	43	- 802111	1	168	3576034	220	33	GT56	GA	1	20	6
33	9	- 802030	1	152	3576311	245	73	GT56	GA	1	21	6
33	429	- 801509	1	213	3576850-	86-	324	GT56	GA	1	22	6
33	338	- 801539	1	131	3576644-	230-	376	GT56	GA	1	23	6
33	359	- 801639	1	128	3576623-	282-	424	GT56	GA	1	24	6
33	275	- 801505	1	180	3575390-	130-	330	GT56	GA	1	25	6
33	285	- 801603	1	157	3575806-	233-	386	GT56	GA	1	26	6
33	160	- 801590	1	195	3574246-	67-	284	GT57	GA	1	2	6
33	228	- 801648	1	177	3575103-	103-	306	GT57	GA	1	3	6
33	136	- 801502	1	183	3574865	18-	186	GT57	GA	1	4	6
33	50	- 801527	1	204	3573327	48-	180	GT57	GA	1	5	6
33	76	- 801625	1	183	3574737	84-	116	GT57	GA	1	6	6

Table 5. Continued

33 68 - 801718 1	119	3576835	116-	17	GT57 GA 1	7	5
33 500 - 801329 1	158	3580559-	125-	302	GT57 GA 1	9	5
33 536 - 801225 1	152	3580677-	191-	341	GT57 GA 1	10	6
33 706 - 801167 1	152	3582184-	134-	304	GT57 GA 1	11	6
33 424 - 80 857 1	259	3575893-	39-	326	GT57 GA 1	12	6
33 462 - 80 766 1	259	3576443-	37-	328	GT57 GA 1	13	6
33 490 - 80 716 1	253	3576714	57-	225	GT57 GA 1	14	5
33 487 - 80 834 1	259	3576432-	86-	379	GT57 GA 1	15	6
33 557 - 80 822 1	253	3577702-	60-	342	GT57 GA 1	16	5
33 725 - 80 716 1	262	3579974-	35-	328	GT57 GA 1	17	6
33 684 - 80 686 1	265	3579671	0-	296	GT57 GA 1	18	5
33 731 - 80 537 1	274	3580933	96-	216	GT57 GA 1	19	6
33 10 - 80 382 1	131	3567338-	726-	872	GT57 GA 1	20	5
325941 - 80 388 1	82	3568196-	746-	838	GT57 GA 1	21	5
33 667 - 80 523 1	283	3579664	79-	237	GT57 GA 1	22	5
325942 - 80 511 1	70	3580036-	628-	713	GT57 GA 1	23	5
325943 - 80 594 1	128	3567626-	470-	612	GT57 GA 1	24	6
325749 - 80 566 1	140	3568412-	291-	447	GT57 GA 1	25	6
325745 - 80 630 1	166	3568430-	139-	326	GT57 GA 1	26	6
325744 - 80 586 1	152	3567742-	251-	421	GT57 GA 1	27	6
325696 - 80 661 1	122	3569643-	34-	170	GT57 GA 1	28	6
325772 - 80 657 1	98	3570125	54-	55	GT57 GA 1	29	5
325773 - 80 384 1	122	3566490-	516-	652	GT57 GA 1	30	6
325722 - 80 279 1	116	3566553-	452-	562	GT58 GA 1	2	6
325750 - 80 297 1	98	3566637-	588-	697	GT58 GA 1	3	6
325783 - 80 329 1	98	3566601-	587-	696	GT58 GA 1	4	5
325771 - 80 336 1	116	3566572-	536-	659	GT58 GA 1	5	6
325756 - 80 373 1	116	3566469-	504-	633	GT58 GA 1	6	5
325727 - 80 371 1	92	3567076-	510-	602	GT58 GA 1	7	5
325704 - 80 340 1	101	3566855-	444-	557	GT58 GA 1	8	6
325743 - 80 395 1	76	3567491-	509-	594	GT58 GA 1	9	6
325758 - 80 409 1	73	3567559-	546-	627	GT58 GA 1	10	6
325785 - 80 418 1	101	3566759-	565-	677	GT58 GA 1	11	6
325812 - 80 433 1	122	3566615-	551-	647	GT58 GA 1	12	6
325826 - 80 444 1	125	3566736-	551-	691	GT58 GA 1	13	6
325826 - 81 397 1	137	3566127-	572-	725	GT58 GA 1	14	6
325807 - 80 389 1	128	3566229-	563-	706	GT58 GA 1	15	5
325834 - 80 380 1	146	3565817-	585-	748	GT58 GA 1	16	6
325824 - 80 325 1	61	3567488-	608-	736	GT58 GA 1	17	6
325947 - 80 274 1	34	3568753-	865-	902	GT58 GA 1	18	6
325973 - 80 286 1	116	3566835-	768-	897	GT58 GA 1	19	5
325975 - 80 257 1	131	3566508-	757-	903	GT58 GA 1	20	6
325987 - 80 239 1	128	3566800-	753-	896	GT58 GA 1	21	6
325983 - 80 274 1	125	3566849-	755-	894	GT58 GA 1	22	6
325968 - 80 296 1	107	3567052-	768-	887	GT58 GA 1	23	6
325993 - 80 328 1	79	3568316-	760-	849	GT58 GA 1	24	6
33 2 - 80 304 1	88	3567945-	782-	880	GT58 GA 1	25	6
33 12 - 80 277 1	134	3566956-	753-	903	GT58 GA 1	26	6
33 17 - 80 328 1	88	3568068-	790-	888	GT58 GA 1	27	6
33 13 - 80 299 1	128	3567345-	741-	884	GT58 GA 1	28	5
325894 - 80 405 1	85	3567650-	672-	768	GT58 GA 1	29	6
325894 - 80 442 1	76	3567937-	680-	771	GT58 GA 1	30	6
325920 - 81 421 1	30	3568556-	786-	820	GT58 GA 1	31	6
325891 - 80 457 1	88	3567809-	643-	742	GT58 GA 1	32	6
325942 - 80 552 1	128	3567395-	572-	715	GT58 GA 1	33	6
325963 - 80 588 1	131	3568733-	518-	664	GT58 GA 1	34	6
325972 - 80 542 1	61	3570019-	618-	686	GT58 GA 1	35	6
325934 - 80 630 1	140	3568974-	513-	670	GT58 GA 1	36	6
33 16 - 80 614 1	143	3569391-	487-	647	GT58 GA 1	37	5
325939 - 80 606 1	143	3568177-	503-	662	GT58 GA 1	38	6
325962 - 80 646 1	146	3568712-	471-	634	GT58 GA 1	39	6
325925 - 80 682 1	149	3568741-	408-	575	GT58 GA 1	40	6
325940 - 80 710 1	149	3569175-	385-	552	GT58 GA 1	41	6
325957 - 80 738 1	174	3569029-	348-	542	GT58 GA 1	42	6

Table 5. Continued

325934	-	80	815	1	99	3568458-	942-	849	GT58	GA	1	43	5
325840	-	80	642	1	146	3567982-	365-	542	GT58	GA	1	44	6
325874	-	80	657	1	101	3569181-	445-	597	GT58	GA	1	45	5
325736	-	80	629	1	155	3568122-	187-	360	GT58	GA	1	46	6
325728	-	80	727	1	162	3569179-	57-	237	GT58	GA	1	47	5
325766	-	80	685	1	46	3571070-	195-	246	GT58	GA	1	48	5
325651	-	80	708	1	94	3570169-	62-	167	GT58	GA	1	49	5
325625	-	80	662	1	58	3571112-	42-	107	GT58	GA	1	50	6
325862	-	80	524	1	104	3568252-	512-	627	GT59	GA	1	2	5
325837	-	80	521	1	54	3569254-	594-	631	GT59	GA	1	3	6
325817	-	80	520	1	52	3568942-	541-	599	GT59	GA	1	4	6
325792	-	80	532	1	61	3568936-	489-	557	GT59	GA	1	5	5
325765	-	80	517	1	46	3569523-	436-	481	GT59	GA	1	6	5
325733	-	80	485	1	58	3568804-	469-	533	GT59	GA	1	7	5
325701	-	80	465	1	70	3568393-	448-	527	GT59	GA	1	8	6
325729	-	80	455	1	43	3568749-	408-	516	GT59	GA	1	9	6
325712	-	80	439	1	73	3568248-	401-	482	GT59	GA	1	10	6
325702	-	80	417	1	98	3567548-	382-	496	GT59	GA	1	11	6
325704	-	80	385	1	91	3567296-	428-	536	GT59	GA	1	12	6
325678	-	80	389	1	79	3567698-	390-	479	GT59	GA	1	13	5
325576	-	80	337	1	110	3568132-	244-	366	GT59	GA	1	14	6
33	78	-	80	1067	1	128	3573166-	235-	377	GT59	GA	1	15	6
33	52	-	80	1039	1	201	3572972	1-	224	GT59	GA	1	16	6
33	33	-	80	993	1	250	3570210-	99-	378	GT59	GA	1	17	5
33	14	-	80	954	1	219	3570311-	157-	402	GT59	GA	1	18	5
33	03	-	80	879	1	207	3570756-	218-	445	GT59	GA	1	19	6
33	04	-	80	844	1	185	3570322-	289-	493	GT59	GA	1	20	6
33	27	-	80	817	1	162	3570408-	336-	516	GT59	GA	1	21	5
33	10	-	80	784	1	177	3569957-	319-	516	GT59	GA	1	22	5
33	36	-	80	757	1	177	3570282-	322-	519	GT59	GA	1	23	6
33	07	-	80	775	1	174	3571556-	274-	468	GT59	GA	1	24	6
33	153	-	80	781	1	201	3572586-	149-	374	GT59	GA	1	25	6
33	165	-	80	824	1	247	3572720-	39-	314	GT59	GA	1	26	5
33	192	-	80	853	1	216	3573784-	63-	305	GT59	GA	1	27	5
33	125	-	80	967	1	177	3572317-	190-	384	GT59	GA	1	28	6
33	104	-	80	860	1	229	3570833-	200-	455	GT59	GA	1	29	6
33	19	-	80	729	1	183	3569716-	336-	541	GT59	GA	1	30	6
33	32	-	80	695	1	158	3571628-	387-	484	GT59	GA	1	31	6
325992	-	80	815	1	183	3569911-	280-	484	GT59	GA	1	32	6
325973	-	80	788	1	177	3569745-	296-	493	GT59	GA	1	33	6
325965	-	80	762	1	177	3569423-	318-	515	GT59	GA	1	34	6

APPENDIX II

COMPUTER PROGRAMS FOR GRAVITY ANALYSIS AND MODELING

A computer program was developed for the calculation of the two-dimensional residual gravity data using a smoothing function defined by Shapiro (1970). A listing of the subroutines necessary for calculation of the regional gridded data, as well as line printer plotting of the data in grid form, is given in Table 6.

A computer program was developed for computation of the Fast Fourier transformation of the residual data to allow for lineation analysis. The necessary subroutines for the spectral calculations are given in Table 7.

A third computer program was developed for the calculation of vertical gravity anomalies of arbitrarily shaped three-dimensional structures using the procedure outlined by Talwani, et al., (1960). This program, including the subroutines necessary for line printer plotting, is given in Table 8.

A fourth computer program was developed by George H. Rothe, III (1973) for the computation of vertical gravity anomalies caused by two-dimensional structure. Rothe used the method of Talwani, et al., (1959) for this computation. A copy of this program, including the necessary subroutines for lone printer plotting, is given in his thesis.

Table 6. Smoothing Subroutine Used in the Calculation of the Regional Gravity Data

```
      SUBROUTINE RSM2D(U,M,N,II,JJ,S)
C*****U IS THE ARRAY TO BE SMOOTHED
C*****M,N ARE THE SIZE OF THE ARRAY TO BE SMOOTHED
C*****I,J ARE THE SIZE OF THE OUTPUT ARRAR AND MUST CORRESPOND TO
C*****CALLING PROGRAM
C*****S IS THE WEIGHTING FACTOR "FREQUENCY RESPONCE"
      DIMENSION U(II,JJ)
      DO 11 J=1,N
      U1=U(1,J)
      MM=M-1
      DO 11 I=2,MM
      U2=U(I,J)
      I1=I+1
      U(I,J)=U(I,J)+S*(U1+U(I1,J)-2*U2)/2.0
   11 U1=U2
      DO 21 I=1,M
      U1=U(I,1)
      NN=N-1
      DO21 J=2,NN
      U2=U(I,J)
      J1=J+1
      U(I,J)=U(I,J)+S*(U1+U(I,J1)-2*U2)/2.0
   21 U1=U2
      RETURN
      END
```

Table 7. Fast Fourier Transform Subroutine Used in Computing the Spectrum of the 32 Kilometer Square Area in the Residual Gravity Map

```
      SUBROUTINE FFT2D  (X,N,M,ISN)
      COMPLEX  X(N,M)
      DO 1  IM=1,M
    1 CALL FFT2(X,N,M,IM,ISN)
      DO 2  IN=1,N
    2 CALL FFT2T(X,N,M,IN,ISN)
      RETURN
      END
\FOR, IS FFT2
\COL 9
      SUBROUTINE FFT2(A,N,M,K,ISN)
      COMPLEX A(N,M),T1,T2,TEMP
      DOUBLE PRECISION PI2,SO,CO,SI,CI,SN,CS
      FN = N
      IGAM = LOG(FN)/LOG(2.) + 1.E-6
      PI2 = 6.28318530717958648D0
      NBIT=36-IGAM
      N1=N-2
      DO30  I=1,N1
      IFLIP=0
      DO 10  J=36,NBIT,-1
   10 IFLIP = 2*IFLIP + FLD(J,1,I)
      IF(I.LE.IFLIP)  GO TO 30
      T1 = I+1
      I2 = IFLIP + 1
      TEMP = A(I2,K)
      A(I2,K) = A(I1,K)
      A(I1,K) = TEMP
   30 CONTINUE
      DO 60  I=1,IGAM
      NEL = 2**I
      NEL2=NEL/2
      NSET=N/NEL
      SI=DSIN(PI2/NEL)
      CI = DCOS(PI2/NEL)
      DO 50 J=1,NSET
      INCR=(J-1)*NEL
      SO=0.D0
      CO=1.D0
      DO 40 II=1,NEL2
      J1=II + INCR
      J2 = J1 + NEL2
      T1 = A(J1,K)
      T2 = A(J2,K)*CMPLX(CO,ISN*SO)
      A(J1,K) = T1 + T2
      A(J2,K) = T1 - T2
      SN = SO*CI+CO*SI
      CS = CO*CI-SO*SI
      CO = CS
   40 SO = SN
      IF (ISN.GT.0) GO TO 120
      DO 110  I=1,N
  110 A(I,K) = A(I,K)/N
  120 CONTINUE
      RETURN
      END
\FOR, IS FFT2T
\COL 9
      SUBROUTINE FFT2T(A,N,M,K,ISN)
      COMPLEX A(N,M),T1,T2,TEMP
      DOUBLE PRECISION PI2,SO,CO,SI,CI,SN,CS
      FN=N
      IGAM=LOG(FN)/LOG(2.)  + 1.E-6
      PI2 = 6.28318530717958648D0
      NBIT=36-IGAM
      N1=N-2
      DO30  I=1,N1
      IFLIP=0
      DO 10  J=36,NBIT,-1
   10 IFLIP = 2*IFLIP + FLD(J,1,I)
      IF(I.LE.IFLIP)  GO TO 30
      T1 = I+1
      I2 = IFLIP + 1
      TEMP = A(K,I2)
      A(K,I2) = A(K,I1)
      A(K,I1) = TEMP
   30 CONTINUE
      DO 60  I=1,IGAM
      NEL = 2**I
      NEL2=NEL/2
      NSET=N/NEL
      SI=DSIN(PI2/NEL)
      CI = DCOS(PI2/NEL)
      DO 50 J=1,NSET
      INCR=(J-1)*NEL
      SO=0.D0
      CO=1.D0
      DO 40 II=1,NEL2
      J1=II + INCR
      J2 = J1 + NEL2
      T1 = A(K,J1)
      T2 = A(K,J2)*CMPLX(CO,ISN*SO)
      A(K,J1) = T1 + T2
      A(K,J2) = T1 - T2
      SN = SO*CI+CO*SI
      CS = CO*CI-SO*SI
      CO = CS
   40 SO = SN
      IF (ISN.GT.0) GO TO 120
      DO 110  I=1,N
  110 A(K,I) = A(K,I)/N
  120 CONTINUE
      RETURN
      END
```

Table 8. Three-Dimensional Gravity Modeling Program

```
      DIMENSION BO(38,55),X(100),Y(100),Q(100),T(100),RI(100),AA(100),
     1BB(100),RII(200),XY(100),YX(100),P(100),B(100),F(100),A(100),
     2S(100),W(100)
   10 READ(5,100,END=50)M,Z,D,R
  100 FORMAT(I10,F10.2,F10.2,F10.0)
      WRITE(6,201) M,Z,D,R
  201 FORMAT(I4,3F10.1)
      READ(5,101)(B(K),T(K),K=1,M)
  101 FORMAT(  )
      WRITE(6,200)(B(K),T(K),K=1,M)
  200 FORMAT(1X,(  ))
      DO 2 I=1,38
      DO 2 J=1,55
      DO 23 K=1,M
      IF(R.GT.0.) GO TO 11
      X(K)=(B(K)-7.4)*5.-I*1.
      GO TO 23
   11 X(K)=B(K)-I*1.
   23 Y(K)=(T(K)-J*1.)
      RI(K)=(X(K)*X(K)+Y(K)*Y(K))**.5
      IF(RI(K).GT.0.) GO TO 22
      RI(K)=.1
   22 CONTINUE
      AA(K)=X(K)/RI(K)
   23 BB(K)=Y(K)/RI(K)
      DO 21 K=1,M
      IF(K.EQ.M) Y(K+1)=Y(1)
      IF(K.EQ.M) AA(K+1)=AA(1)
      IF(K.EQ.M) BB(K+1)=BB(1)
      IF(K.EQ.M) X(K+1)=X(1)
      RII(K)= ((X(K)-X(K+1))*(X(K)-X(K+1))+(Y(K)-Y(K+1))*(Y(K)-Y(K+1)))
     1**.5
      XY(K)=(X(K)-X(K+1))/RII(K)
      YX(K)=(Y(K)-Y(K+1))/RII(K)
      P(K)=(X(K)*X(K)-XY(K)*Y(K)
      Q(K)=XY(K)*AA(K)+YX(K)*BB(K)
      F(K)=XY(K)*AA(K+1)+YX(K)*BB(K+1)
      A(K)=BB(K)*AA(K+1)-BB(K+1)*AA(K)
      S(K)=1.
      IF(P(K).LT.0.) S(K)=-1.
      W(K)=1.
      IF(A(K).LT.0.) W(K)=-1.
   21 BO(I,J)=BO(I,J)+6.67    *D*(W(K)*ACOS(AA(K)*AA(K+1)+BB(K)*BB(K+1))-
     1ASIN((Z*Q(K)*S(K))/((P(K)*P(K)+Z*Z)**.5))+ASIN((Z*F(K)*S(K))/
     2((P(K)*P(K)+Z*Z)**.5)))
    2 CONTINUE
      GO TO 10
   50 CONTINUE
      STOP
      END
$FOR,IS GRIDS
      SUBROUTINE GRIDS(BO)
      DIMENSION BO(38,55)
      WRITE(6,101)
  101 FORMAT(1H1)
      WRITE(6,102)((BO(I,J),I=1,15),J=11,1,-1)
  102 FORMAT(//,1X,15F5.1)
      RETURN
      END
```

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