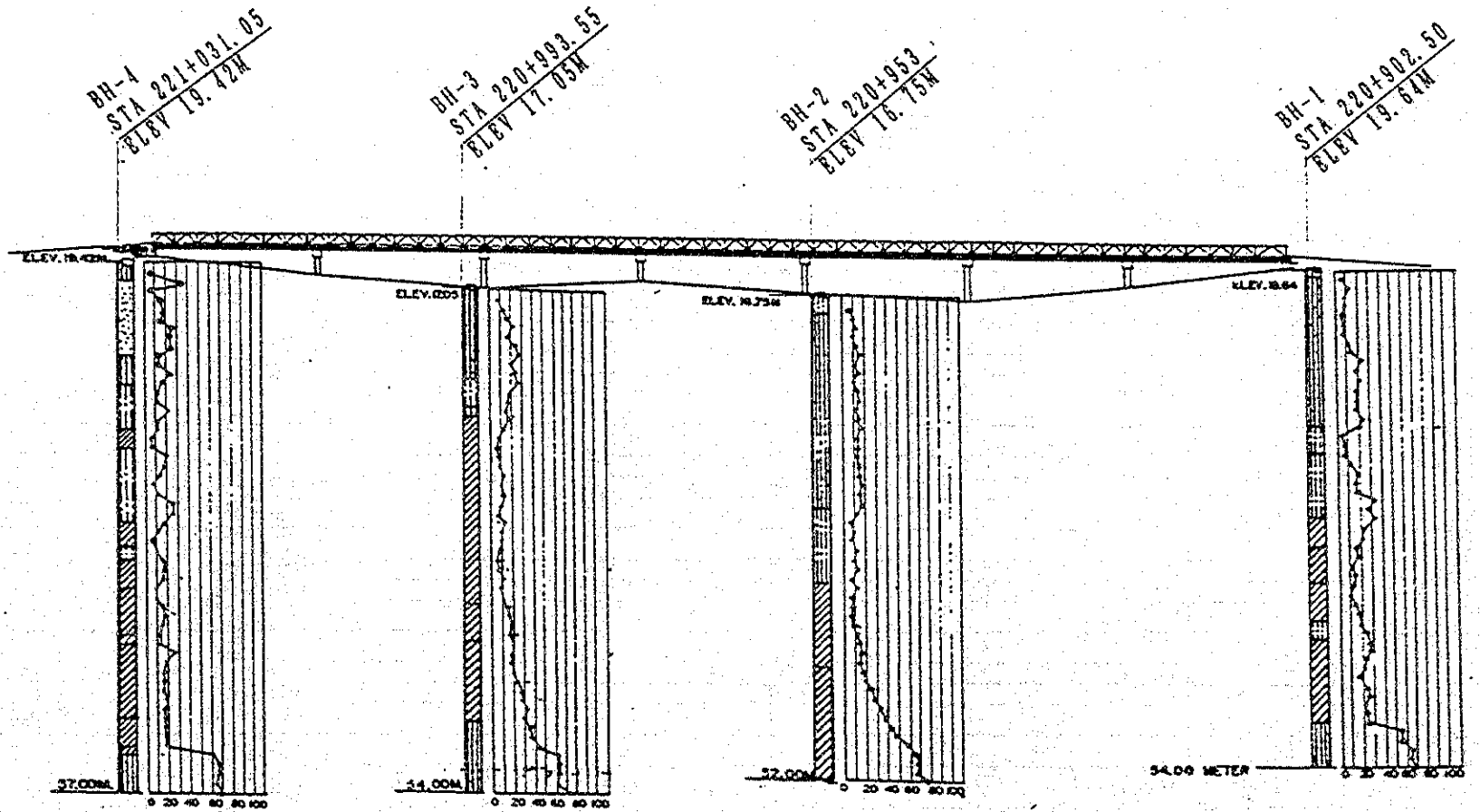
# APPENDIX 7

# DATA OF GEOTECHNICAL SURVEY

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01. 02 | MAPHILINDO Bridge | km 220+900 Biec-Lomboy Road, Binmaley, Pangasinan | 1 | 54. 0 | 49. 0 | 5. 0 | 54 | 2 | 2 | 54 | 0 | 0 | 0 | 2 | 0 |
| | | | 2 | 52. 0 | 47. 0 | 5. 0 | 52 | 2 | 0 | 52 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 54. 0 | 49. 0 | 5. 0 | 54 | 2 | 0 | 54 | 0 | 0 | 0 | 0 | 0 |
| | | | 4 | 57. 0 | 52. 0 | 5. 0 | 57 | 3 | 3 | 56 | 0 | 0 | 0 | 3 | 0 |
| 03. 03 | BACONG Bridge | km 105+360 Lucao-Bacong Road, Bacong Bataan | 1 | 25. 0 | 23. 0 | 2. 0 | 25 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 13. 0 | 10. 0 | 3. 0 | 13 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 28. 0 | 22. 0 | 6. 0 | 24 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 |
| 03. 07 | SAN ROQUE Bridge | km 57+284 San Roque Barangay Road, Hagonoy, Bulacan | 1 | 44. 0 | 38. 0 | 6. 0 | 44 | 3 | 2 | 41 | 0 | 0 | 0 | 3 | 0 |
| | | | 2 | 47. 0 | 40. 0 | 7. 0 | 47 | 2 | 0 | 39 | 0 | 0 | 0 | 2 | 0 |
| | | | 3 | 42. 0 | 37. 0 | 5. 0 | 42 | 2 | 0 | 39 | 0 | 0 | 0 | 2 | 0 |
| | | | 4 | 45. 0 | 40. 0 | 5. 0 | 45 | 3 | 3 | 42 | 0 | 0 | 0 | 3 | 1 |
| 03. 10 | DOLORES Bridge | km 76+870 Dolores-Del Rosario Road, Dolores, Bacolor Pampanga | 1 | 20. 0 | 13. 0 | 7. 0 | 18 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 20. 0 | 14. 0 | 6. 0 | 20 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 19. 0 | 15. 0 | 4. 0 | 19 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 |
| 03. 13 | MANGKUYOG Bridge | km 169+000 Camachile-Bantug Road, Nueva Ecija | 1 | 12. 0 | 5. 0 | 7. 0 | 11 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 11. 0 | 7. 0 | 4. 0 | 10 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 12. 0 | 8. 0 | 4. 0 | 11 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| | | | 4 | 10. 0 | 7. 0 | 3. 0 | 9 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| 03. 17 | SULA Bridge | km 150+000 Tarlac-Sula Road, Sula, Tarlac, Tralac | 1 | 10. 0 | 2. 0 | 8. 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 10. 0 | 1. 0 | 9. 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 10. 0 | 1. 0 | 9. 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | | | 4 | 10. 0 | 1. 0 | 9. 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| 03. 19a | LAOAG Bridge | km 177+722 Maloma-Laoag Road, San Felipe, Zambales | 1 | 10. 0 | 2. 5 | 7. 5 | 10 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 10. 0 | 3. 0 | 7. 0 | 10 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 10. 0 | 3. 0 | 7. 0 | 10 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| | | | 4 | 10. 0 | 3. 0 | 7. 0 | 10 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| 04. 07a | CAMAGONG Bridge | km 23+700 Quezon-Alabat Perez Road, Alabat, Quezon | 1 | 13. 0 | 8. 0 | 5. 0 | 12 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 12. 0 | 6. 0 | 6. 0 | 12 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 |
| 04. 20a | PARAGUSAN Bridge | km 91+84 San Pablo-San Isidro Road San Pablo City Laguna | 1 | 10. 0 | 3. 0 | 7. 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 11. 0 | 1. 0 | 10. 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 13. 0 | 7. 0 | 6. 0 | 11 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 |
| 04. 07b | TAN-AGAN Bridge | km 11+100 Odiongan-San Andres Road, Tan-Agan San Andres, Romblon | 1 | 15. 0 | 9. 0 | 6. 0 | 15 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 17. 0 | 12. 0 | 5. 0 | 17 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 14. 0 | 9. 0 | 5. 0 | 14 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 |
| 04. 10b-2 | IHATUB Bridge | km 116+832. 85 Boac-Gasan Road Ihatub, Boac, Marinduque | 1 | 10. 0 | 1. 0 | 9. 0 | 10 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 |
| | | | 2 | 10. 0 | 4. 0 | 6. 0 | 10 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| | | | 3 | 10. 0 | 4. 0 | 6. 0 | 10 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| | TOTAL | | 37 | 730. 0 | 556. 5 | 223. 5 | 735 | 15 | 15 | 682 | 0 | 0 | 0 | 15 | 1 |

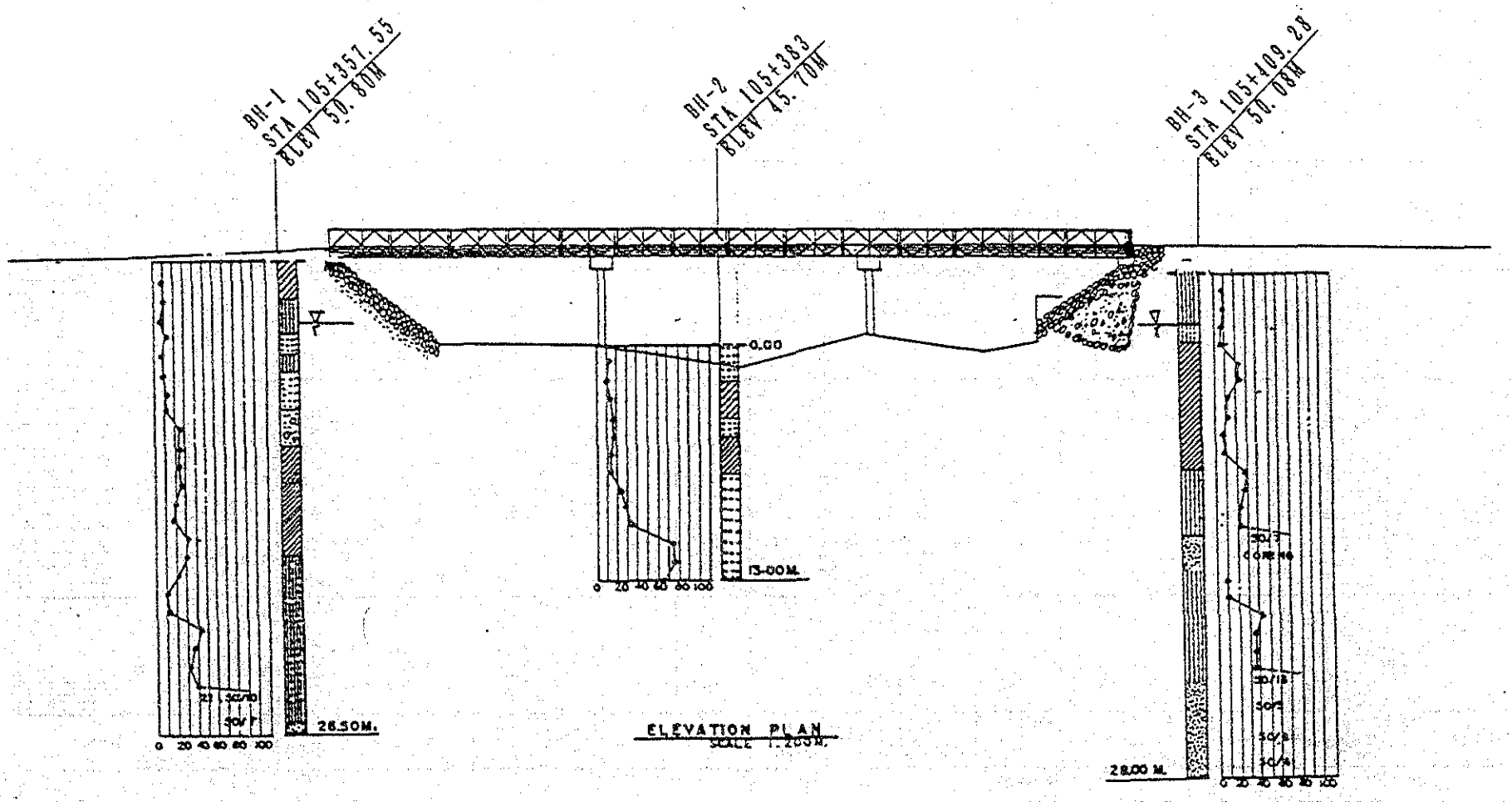
Bridge No. 01.02 Name of Bridge MAPHILINDO BRIDGE



Bridge No. 01, 02 Bridge Name : Maphilindo

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | | Boring No. 2 | | | | Boring No. 3 | | | | Boring No. 4 | | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test | |
| | | | | | | | | | Wn (%) | qu (kg/cd) | | | Wn (%) | qu (kg/cd) | | | Wn (%) | qu (kg/cd) | | | kg/cm² |
| US (AS-1) | Alluvial delta deposite | • most upper layer sandy clay<br>• Fine sand or silty sand | 1～2<br>13 ≀ 17 | 2<br>13 ≀ 17 | 10～20<br>17 | | 17 | 15 | 20～40 | - | 23 | 17 | 20～50 | — | 14 | 17 | 20～40 | - | 13 | 17 | 20～30 | - |
| M ≀ clay c-1 | Alluvial delta deposite | • sandy silt and<br>• sandy clay alternalior | 23<br>≀<br>40 | 10<br>≀<br>17 | 5～25 | | 21 | 7～25 | 30～45 | 8m 0.645 kg/cd 19m 0.277 kg/cd | 17 | 8～18 | 30～57 | — | 17 | 7～9 | 30～40 | - | 14 | 11～27 | 30～40 | 19m qu= 0.328 kg/cd 24m qu= 0.150 kg/cd 36m 0.429 kg/cd |
| D I L | Oilurial deposito | • sandy silt<br>• sandy clay | 23<br>≀<br>47 | 10<br>≀<br>15 | 20～30 | | 11 | 18～24 | 50～65 | - | 7 | 20～47 | 50～60 | — | 6 | 20～30 | 30～50 | - | 27 | 10～18 | 35～85 | - |
| WR | weathered Rock. -soft Rock. (Pliocen ～ Pleistocene) | • Fine sand stne | 52<br>≀<br>57 | | 50＜N | | 5 | 50＜H | 50～65 | - | 5 | 50＜H | 50～60 | — | 5 | 50＜N | 30～60 | - | 5 | 50＜H | 35～85 | - |
| | | | | | | | 54 | | | | 52 | | | | 54 | | | | 57 | | | |

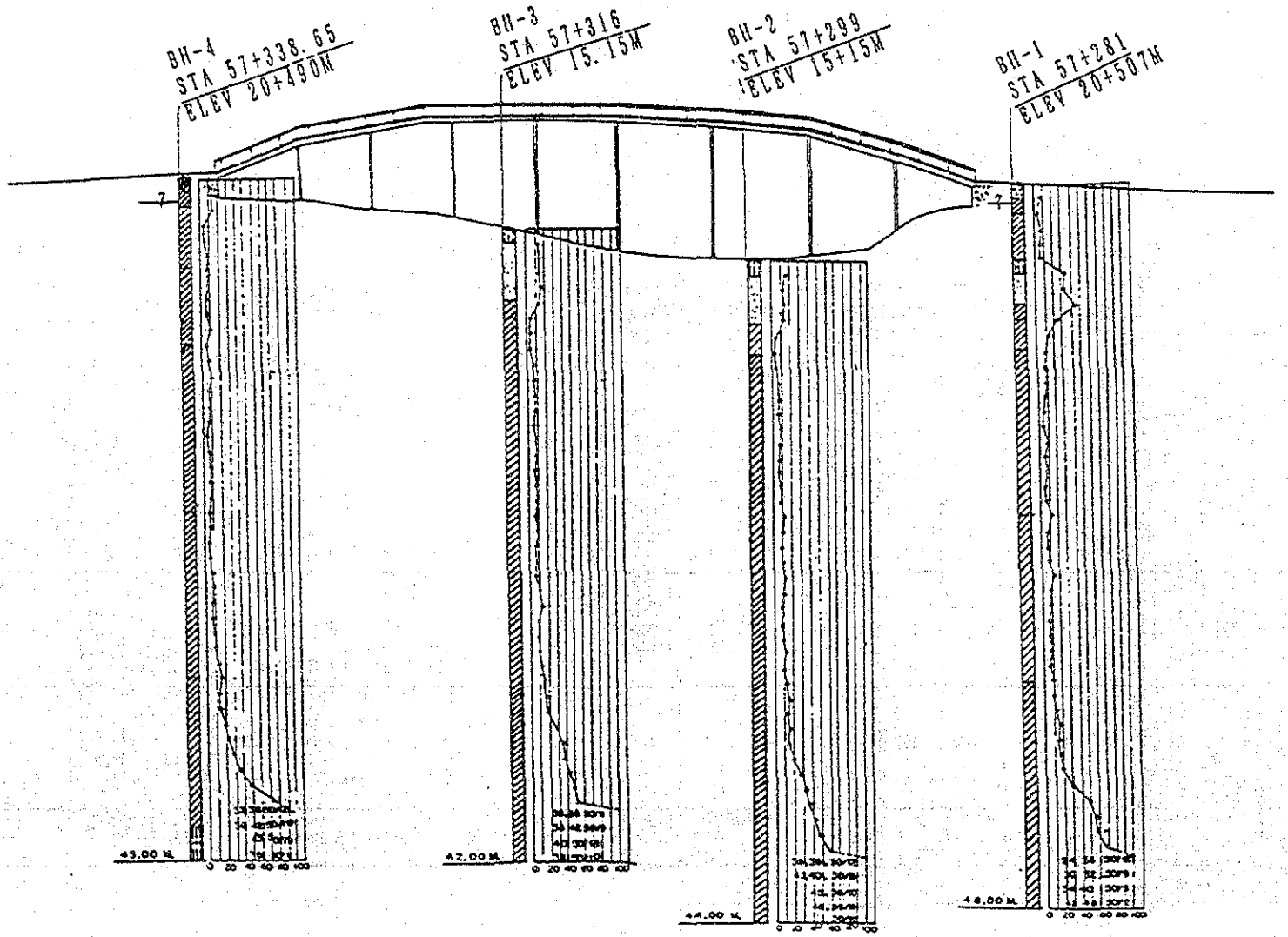
Bridge No. 03.03 Name of Bridge BACONG BRIDGE



Bridge No. 03. 03 Bridge Name : Bacong Bridge

| General View | | | | | | Result of Boring | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test |
| | | | | | | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | kg/cm² |
| Fd | Flood deposit | • sand and gravel (with clay or silt layer) | 10<br>?<br>23 | 10<br>?<br>23 | N<30 | 23 | 10~30 | 10~40 - | 10 | 10~33 | 13~29 - | 23 | 30 | 17~48 - | | | |
| Ss | Sand stone (PLIOCENE ~PLEISTOCEN) | • Fine sand with silt (clay) | 23<br>? | 1 | 50<N | 5 | 50<N | 20~30 - | 3 | 50<N | 20~30 - | 5 | 50<N | 34 - | | | |
| | | | | | | 25.5 | | | 13.0 | | | 28.0 | | | | | |

Bridge No. 03.07 Name of Bridge SAN ROQUE BRIDGE

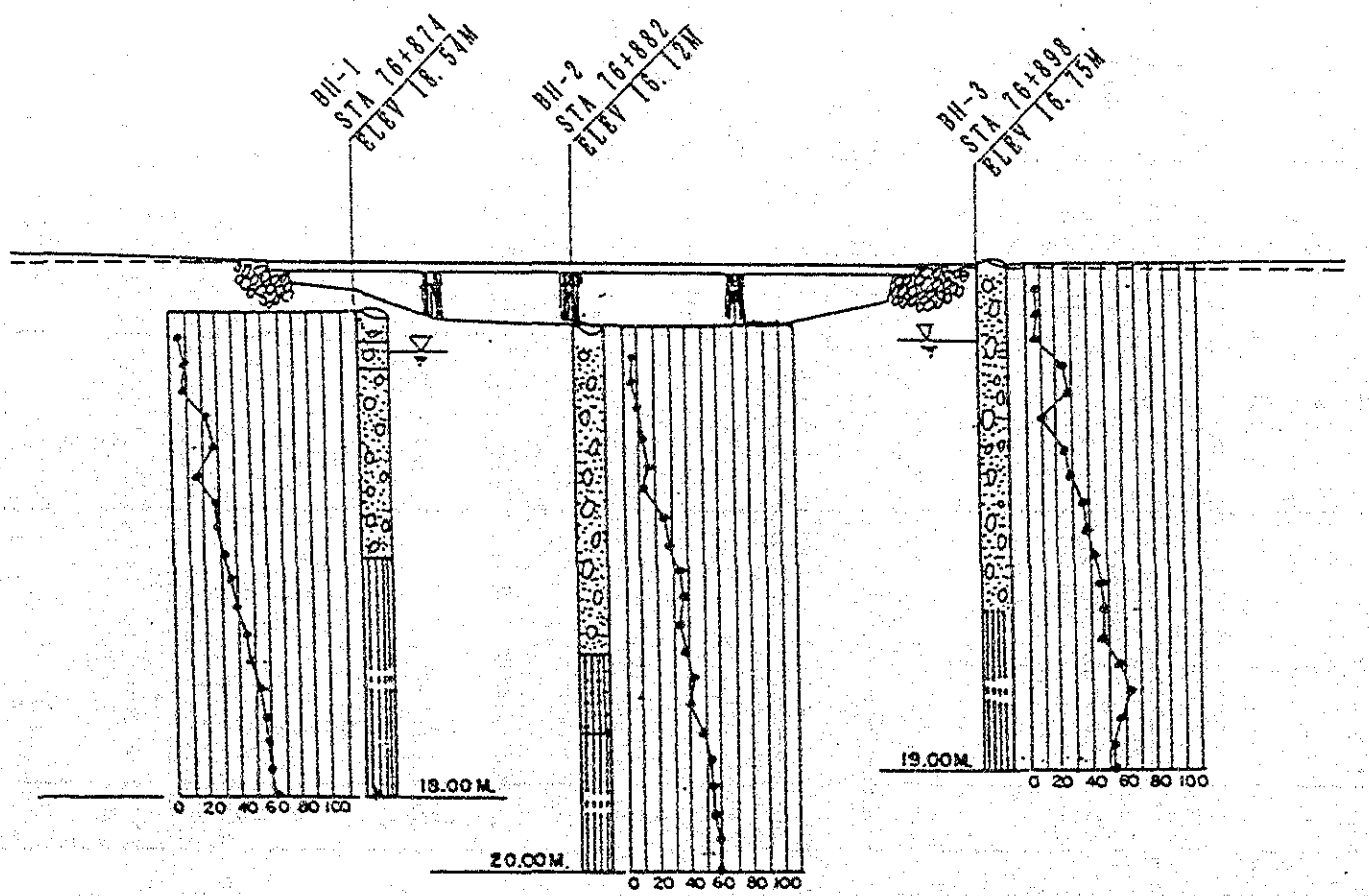


Bridge No. 03. 07 Bridge Name : San Roque Bridge

| General View | | | | | | Result of Boring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test |
| | | | | | | | | Wn. (%) qu (kg/cm²) | | | Wn. (%) qu (kg/cm²) | | | Wn. (%) qu (kg/cm²) | | | kg/cm² |
| As | alluvial delta deposite | ・sand (UPPER 2~5m) | 2~5 | 2~5 | sand 5~15 | 9 | 3~42 | 20~60 | 4 | 12~25 | 10~20 | 5 | 12~15 | 40 | 2 | 12~13 | 45 |
| Ac 1 1 | | ・clay ・silt lie thin sand | ? 32 | 30 | clay 3~18 | 23 | 4~11 | 60~80 4m 0.139 12m 0.117 23m 0.124 | 22 | 3~11 | 40~80 6m 0.112 | 25 | 3~15 (7) | 50~80 6m 0.129 | 29 | 3~10 (7) | 50~80 4m 0.229 9m 0.209 14m 0.104 |
| Ac 1 2 | alluvial deposite | ・sandy clay or silt | 30 ? 40 | 10 | 15~36 | 8 | 10~30 (20) | 40~60 | 12 | 10~47 (20) | 40~60 24m 0.074 | 7 | 11~47 (20) | 40~60 26m 0.120 | 9 | 11~35 (20) | 40~60 - |
| SR | SOLIDFY Mud stone | ・Mud stone (PLISTOCENE) | 40 ? | - | 50<N | 9 | 50<N | 20~40 - | 6 | 50<N | 20~40 - | 5 | 5<N | 20~40 | 5 | 50<N | 20~40 - |
| | | | | | | 49m | | | 44 | | | 42 | | | 45 | | |

7-7

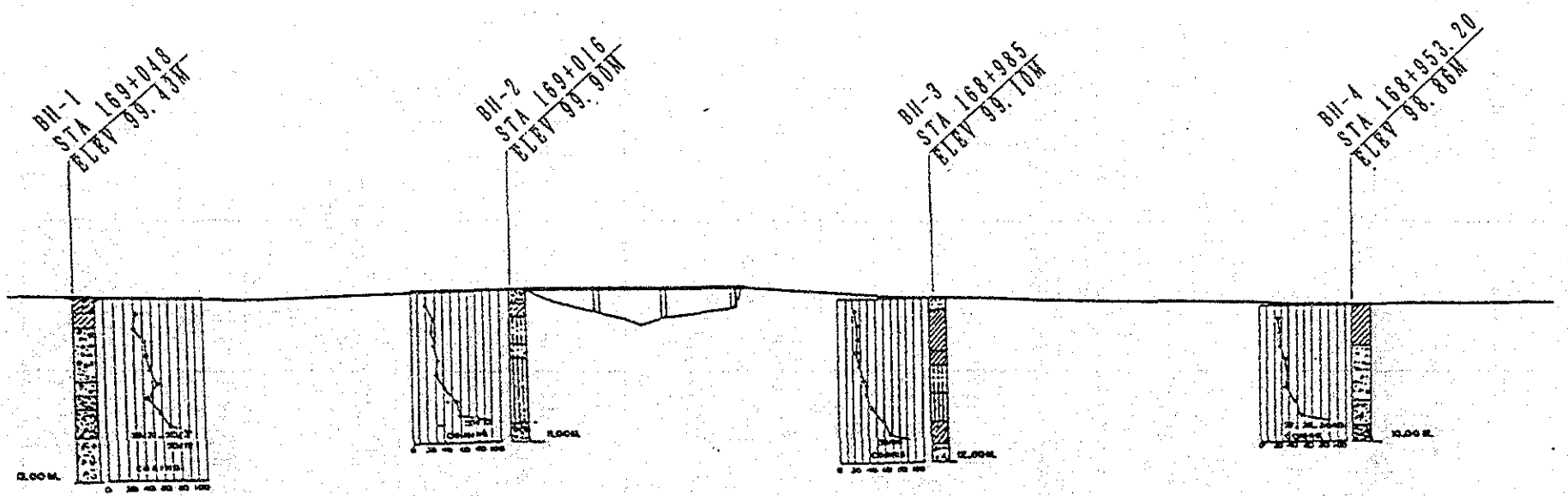
Bridge No. 03.10 Name of Bridge DIORES BRIDGE



Bridge No. 03, 10 Bridge Name : Dolores Bridge

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test |
| | | | | | | | | | Wn (%) qa (kg/cm²) | | | Wn (%) qa (kg/cm²) | | | Wn (%) qa (kg/cm²) | | | kg/cm² |
| AS | Flood deposite | ・Fine sand and gravel | 13 | 13 | 10 | Ag | 9 | 5～38 | 5～25 | | | | As | 13 | | | | |
| | | (lie sandy silt) | 〃 | 〃 | 〃 | | | | | 15 | 6～48 | 7～19 - | | | 6～47 | 7～11 | | |
| AC | | | 15 | 15 | 30 | Ac | 6 | 39～50 | 20～40 | | | | | | | | | |
| SR | Solidify sand (silt) | ・Mud stone (Pleistocene) | 15 | 2 | - | | | | | | | | | | | | | |
| | | | 〃 | 〃 | 50＜N | | 3 | 50＜N | 30～40 - | 5 | 50＜N | 24～29 - | 6 | 50＜N | 24～27 | | | |
| | | | 20 | 5 | | | | | | | | | | | | | | |
| | | | | | | | 18 | | | 20 | | | 19 | | | | | |

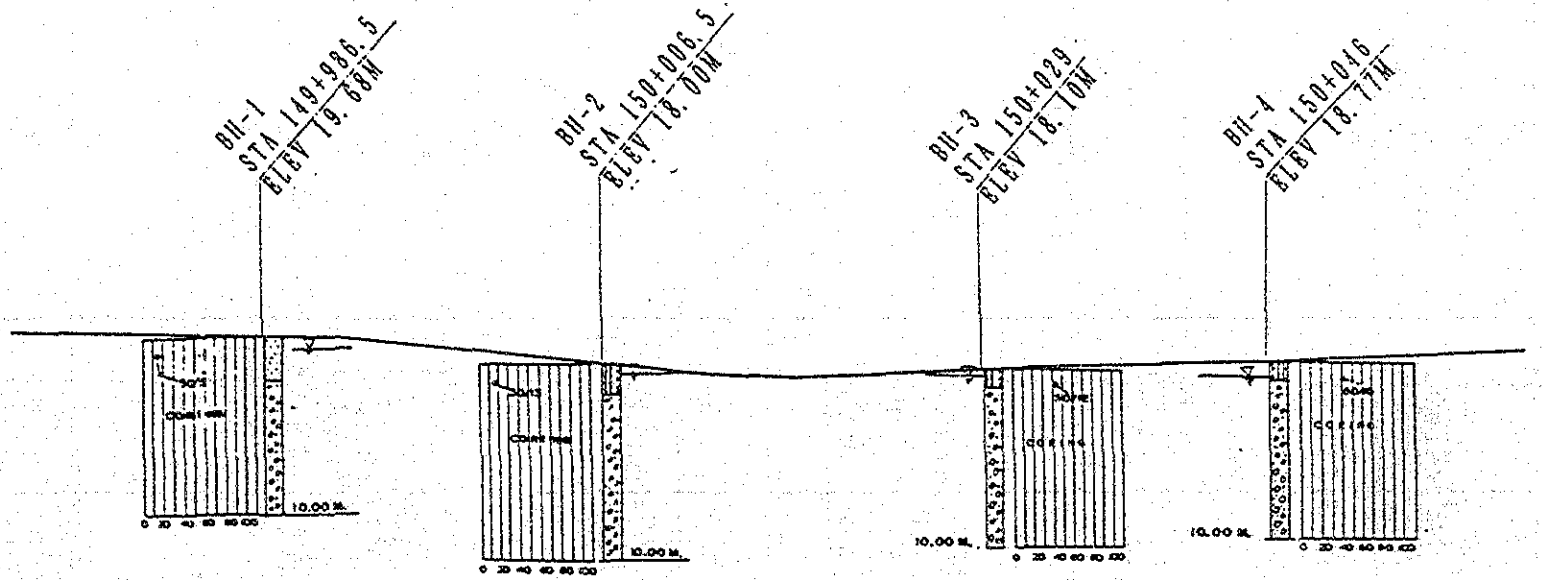
Bridge No. 03.13 Name of Bridge MANGKUYOG BRIDGE



Bridge No. 03. 13 Bridge Name : Mang. uyog Bridge

| General View | | | | | | Result of Boring | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test |
| | | | | | | | | Wn (%) qu (kg/cd) | | | Wn (%) qu (kg/cd) | | | Wn (%) qu (kg/cd) | | | kg/cm² |
| Fd | Flood deposite | ・clay<br>sand<br>gravel | 5<br>〃<br>7 | 5<br>〃<br>7 | 22<br>〃<br>48 | 7 | 33～48 | 8～17 | 7 | 20～40 | 15～18 | 8 | 22～45 | 11～13 | 7 | 24～48 | 8～4 |
| Fd | Flood deposite | ・sand<br>gravel<br>with boluder | 5<br>〃<br>13 | 2<br>〃<br>7 | 50<N | 6 | 50<N | 7～11 | 4 | 50<N | 9～18 | 4 | 50<N | 8～12 | 3 | 50<N | 9～12 |
| | | | | | | 13 | | | 11 | | | 12 | | | 10 | | |

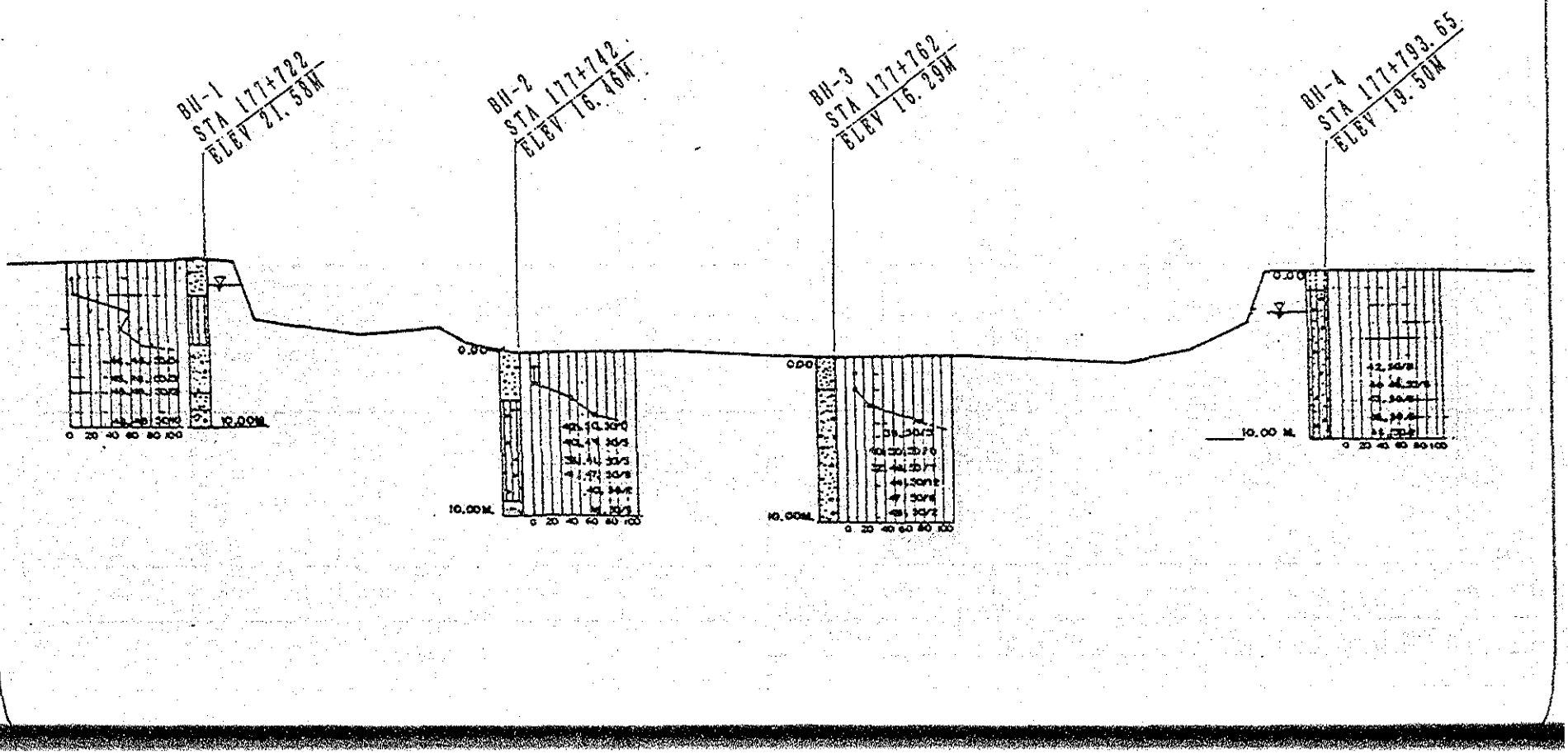
Bridge No. 03.17 Name of Bridge SULA BRIDGE



Bridge No. 03. 17 Bridge Name : Sula Bridge

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | | | |
| Symbol | | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | | |
| | | | | | | | | | Wn. (%) qu (kg/cm²) | | | Wn. (%) qu (kg/cm²) | | | Wn. (%) qu (kg/cm²) | | | | kg/cm² |
| | Fd | Flood deposite (As) | · sand<br>· gravel<br>· cobble | 2 | 2 | 14~50 | 2 | 14~18 | 14~16 | 2 | 28~30 | 9~13 | 2 | 42~50 | 8~12 | 2 | 40~50 | 6~8 | | |
| | Fd | Flood deposite (As) | · sand<br>· gravel<br>(cobble ) | 2<br>?<br>10 | 8 | 50<N | 8 | 50<N | - | 8 | 50<N | - | 8 | 50<N | - | 8 | 10 | | | |
| | | | | | | | 10 | | | 10 | | | 10 | | | 10 | | | | |

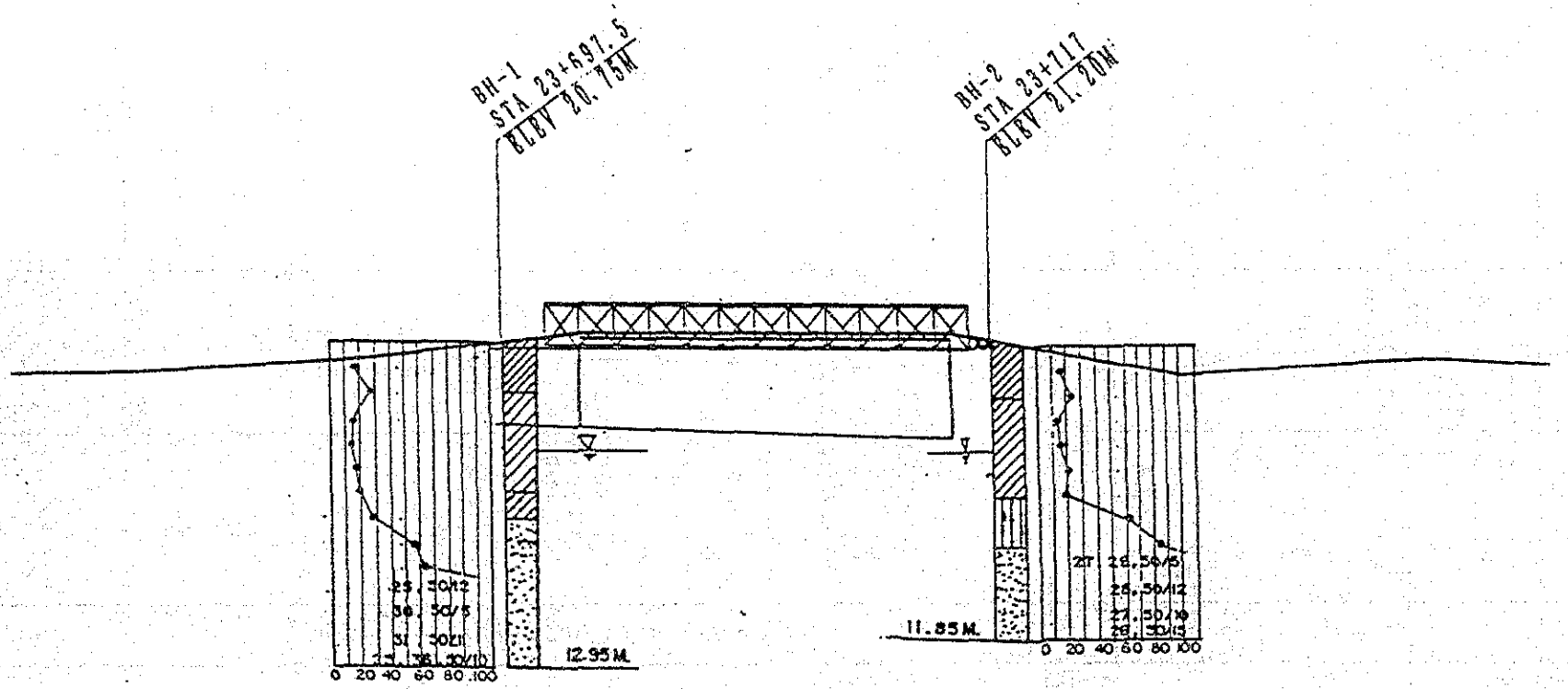
Bridge No. 03.19 Name of Bridge, LAOAG BRIDGE



Bridge No. 03. 19 Bridge Name : Laoag Bridge

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | | Boring No. 2 | | | | Boring No. 3 | | | | Boring No. 4 | | | |
| Symbol | | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test | |
| | | | | | | | | | Wn (%) | qu (kg/cm²) | | | Wn (%) | qu (kg/cm²) | | | Wn (%) | qu (kg/cm²) | | | kg/cm² |
| | Sd | Flood deposite | • sand<br>• gravel | 2<br>?<br>6 | 2<br>?<br>4 | 2～3<br>40～50 | 2<br>4 | 2～3<br>40～50 | 5～9<br>9 | | 2<br>2 | 3<br>41 | 9～13<br>8～10 | | 3<br>2 | 10～26<br>50 | 9～12<br>8～ | | 3<br>3 | 2～11<br>50 | 15～18<br>15～21 | |
| | SR | soft Rock | fine sand stone with gravel | 6<br>?<br>10 | 4 | 50<N | 4 | 50<N | 12～14 | | 6 | 50<N | 9～12 | | 5 | 50<N | 11～15 | | 4 | 50<N | 19～23 | |

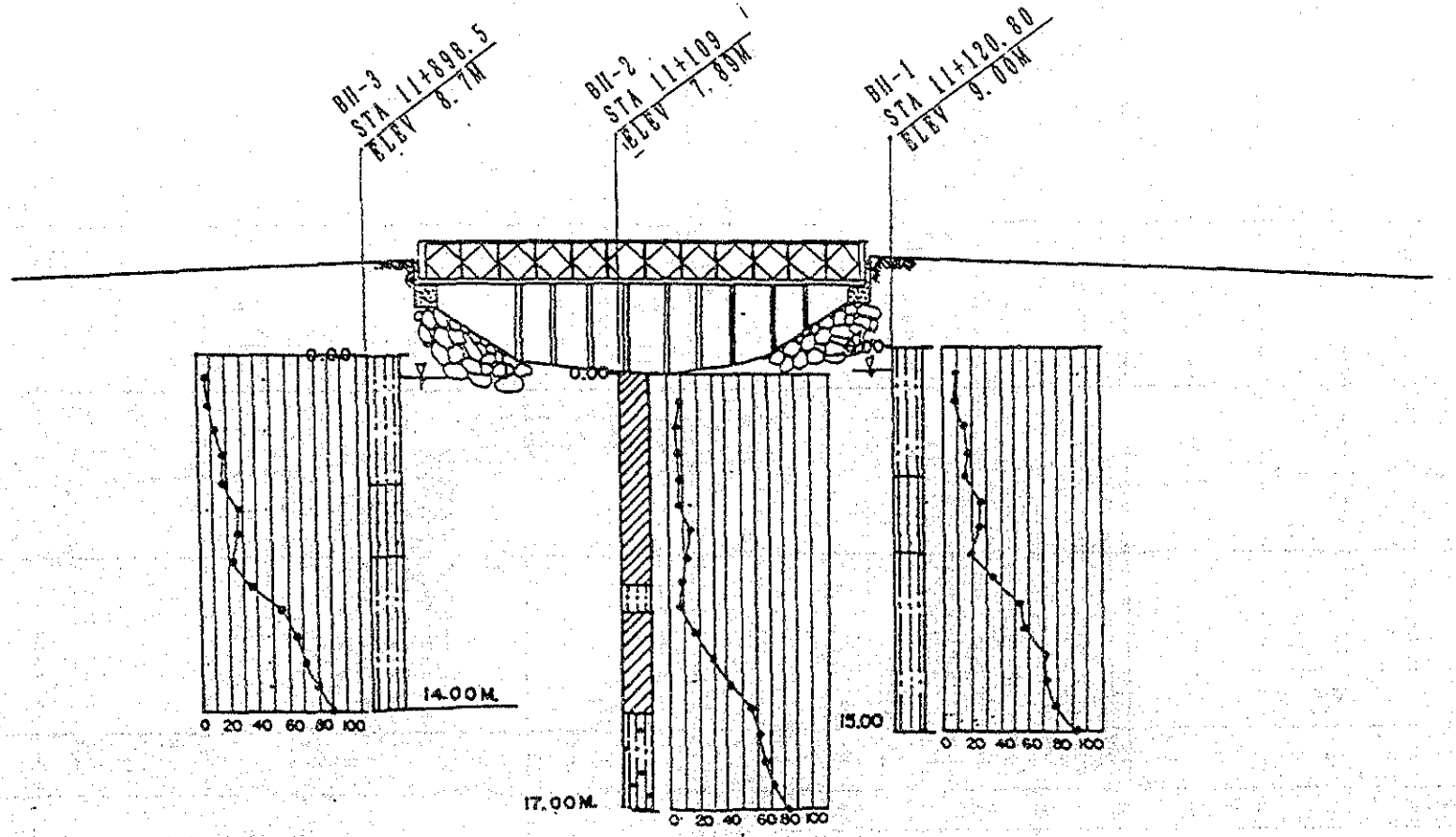
Bridge No. 04.07A Name of Bridge CAMAGONG BRIDGE



Bridge No. 04. 07a Bridge Name : Camagong Bridge

| General View | | | | | | Result of Boring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Boring No. 1 | | | | Boring No. 2 | | | | Boring No. 3 | | | | Boring No. 4 | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test | | Thick-ness (m) | N-Value | Soil Test |
| | | | | | | | | Wn. (%) | qa (kg/cd) | | | Wn. (%) | qa (kg/cd) | | | Wn. (%) | qa (kg/cd) | | | kg/cm² |
| Ac | alluvial upper clay | ・clay with sand | 6 | 6 | 13～32 | 6 | 13～27 | 21～32 | | 6 | 13～24 | 21～27 | | | | | | | | |
| Ac | alluvial sand | ・sand (in sand with clay) | 7 | 1 | 26～85 | 1 | 26 | 30 | | 2 | 61～85 | 21～26 | | | | | | | | |
| Ds | Diluvial sand | ・fine sand solidfy | 7 | 6 | 50＜N | 6 | 50＜N | 16～29 | - | 4 | 50＜N | 17～24 | | | | | | | | |
| | | | | | | 13 | | | | 12 | | | | | | | | | | |

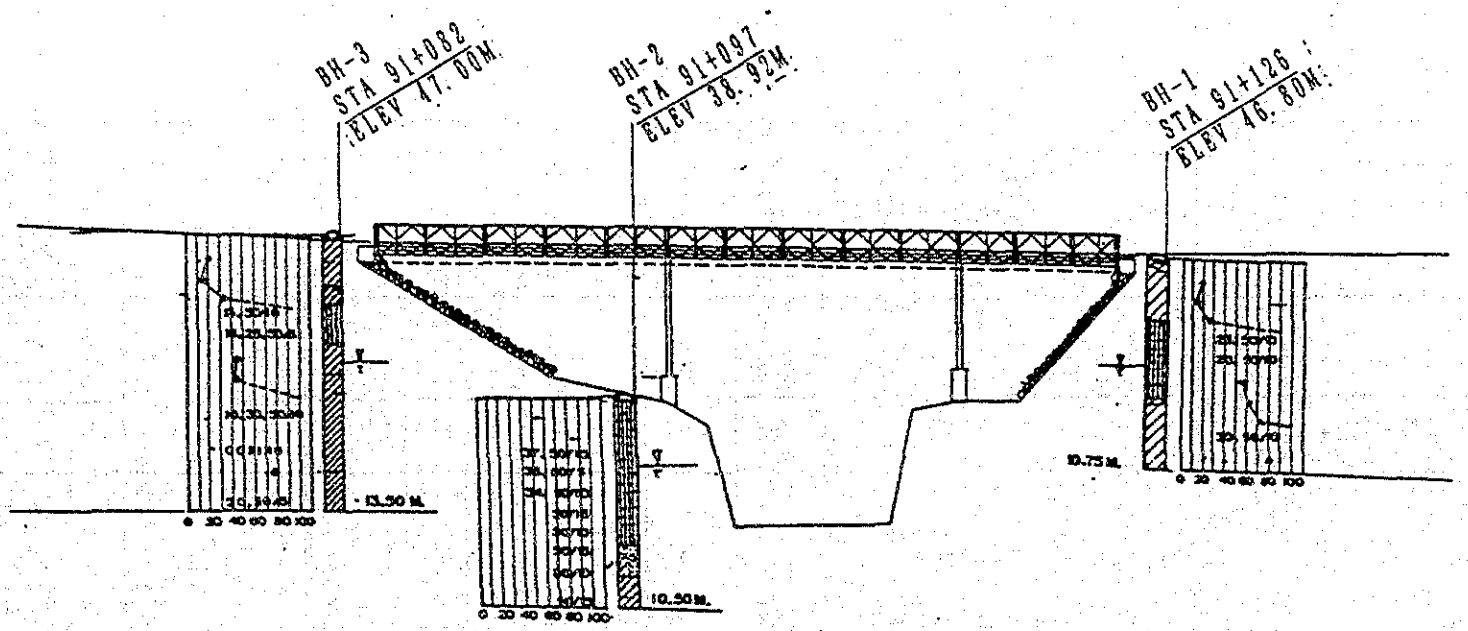
Bridge No. 04.07B Name of Bridge TAN AGAN BRIDGE



Bridge No. 04. 07b Bridge Name : Tan-Agan Bridge

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | Thick-ness (m) | N-Value | Soil Test | | |
| | | | | | | | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | | |
| Ac 1 1 | Alluvial clay | • fine sandy silt | 5 ~ 8 | 5 ~ 8 | 5 ~ 18 | | 5 | 9~18 | 10~29 - | 8 | 5~15 | 29~73 (45) - | 5 | 7~15 | 10~18 - | | | | | |
| As | terrace deposite | • silty sand | 8 | 1~3 | 19~39 | | 3 | 19~26 | 21~23 - | 1 | 8 | 39 - | 3 | 22~35 | 24~28 - | | | | | |
| Ac 1 2 | | • sandy silt | 10 ~ 12 | 2 ~ 4 | 34~50 | | 2 | 34 | 25 - | 4 | 17~41 | 43~46 - | 4 | 35~30 | 31 - | | | | | |
| SR | soft rock | • Mud stone | | 2 ~ 5 | 50<N | | 5 | 50<N | 23~43 - | 4 | 50<N | 48~58 - | 2 | 50<N | 32~40 - | | | | | |
| | | | | | | | 15 | | | 17 | | | 14 | | | | | | | |

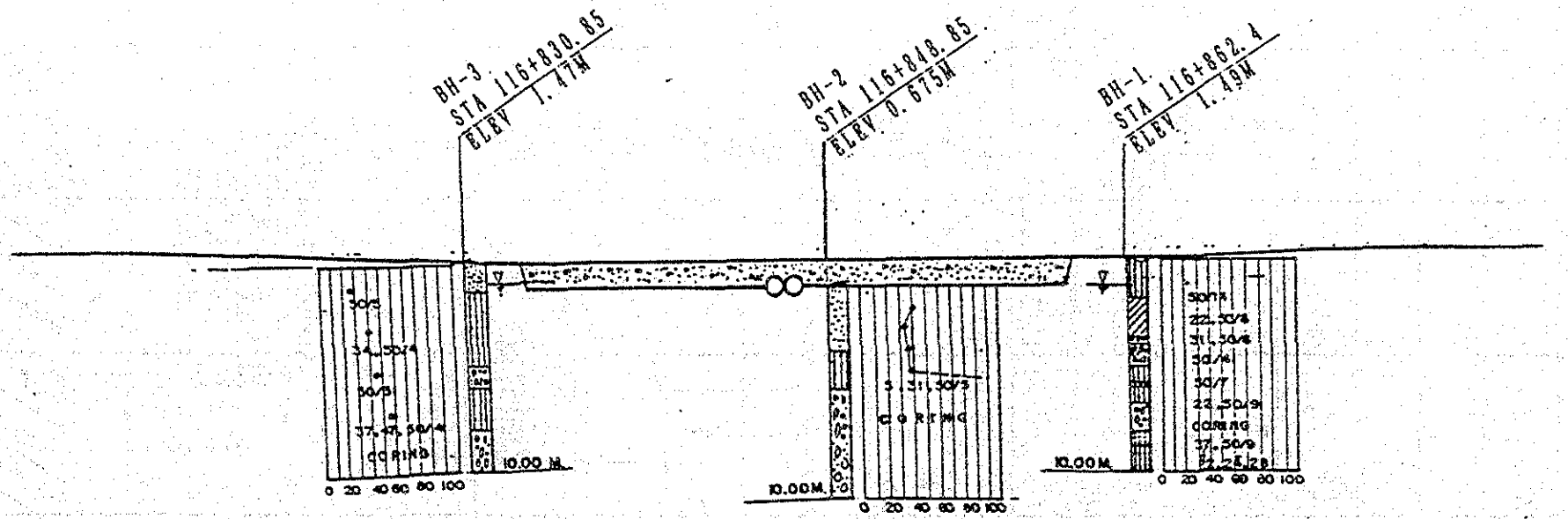
Bridge No. 04.20A Name of Bridge PARAGUSAN BRIDGE



Bridge No. 04. 20a Bridge Name : Paragusan Bridge

| General View | | | | | | | Result of Boring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Boring No. 1 | | | | Boring No. 2 | | | | Boring No. 3 | | | | Boring No. 4 | | | |
| Symbol | | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test | | Thickness (m) | N-Value | Soil Test |
| | | | | | | | | | Wn (%) | qu (kg/cm²) | | | Wn (%) | qu (kg/cm²) | | | Wn (%) | qu (kg/cm²) | | | kg/cm² |
| | La | clay (doam) with sand | clay (doam) with sand | 3 | 3 | 13~42 | 3 | 13~25 | 40~42 | | — | — | - | - | 3 | 13~32 | 30~40 | | | | |
| | Te | Terrace deposite | gravel sand with clay | 7 | 4 | 50<N | 4 | 50<N | 24~42 | | — | — | - | - | 4 | 50<N | 25~40 | | | | |
| | BR | Base rock | Tuff<br>Tuff brecia<br>Tuffaceous sand stone | | 4 | 50<N | 4 | 50<N | 44 | | 10 | 50<N | 32~45 | | 6.5 | 50<N | 33~42 | | | | |
| | | | | | | | 11 | | | | 10 | | | | | 13.5 | | | | | |

Bridge No. 04.10B Name of Bridge IHATUB BRIDGE



Bridge No. 04. 10b-2 Bridge Name : Thetub Bridge

| General View | | | | | | Result of Boring | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Boring No. 1 | | | Boring No. 2 | | | Boring No. 3 | | | Boring No. 4 | | |
| Symbol | Name of Soil (Rock) Layer | Constituted Materials (Layer) | Layer Depth (m) | Thickness (m) | N-Value | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test | Thickness (m) | N-Value | Soil Test |
| | | | | | | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | Wn (%) qu (kg/cm²) | | | kg/cm² |
| TE | Terrace deposite | • Course sand with gravel clay | 4～5 | 1～4 | 22～47 | 1 | 22 | 9 | 4 | 33～40 | 6～9 | 5 | 29～49 | 7～18 | | | |
| | | • Boulder gravel • thin silty sand | 10 | 6～9 | 50＜N | 9 | 50＜N | 5～7 | 6 | 50＜N | 9～10 | 5 | 50＜N | 21～25 | | | |

# APPENDIX 8

## ANALYSIS ON SOFT GROUND AND INVESTIGATION OF LIQUEFACATION

It is necessary to analyze soft ground at Bridge No.03.07 and to investigate liquefaction at Bridge No.01.02.

So they will be investigate the following.

1. Analysis on Soft Ground at Bridge No.03.07

1.1 Geology Condition

Results of boring survey, geology condition of BH-2 is almost simillar to one of BH-3 except BH-1.
So we recognize BH4-4 as the typical data and we'll recognize soft ground.

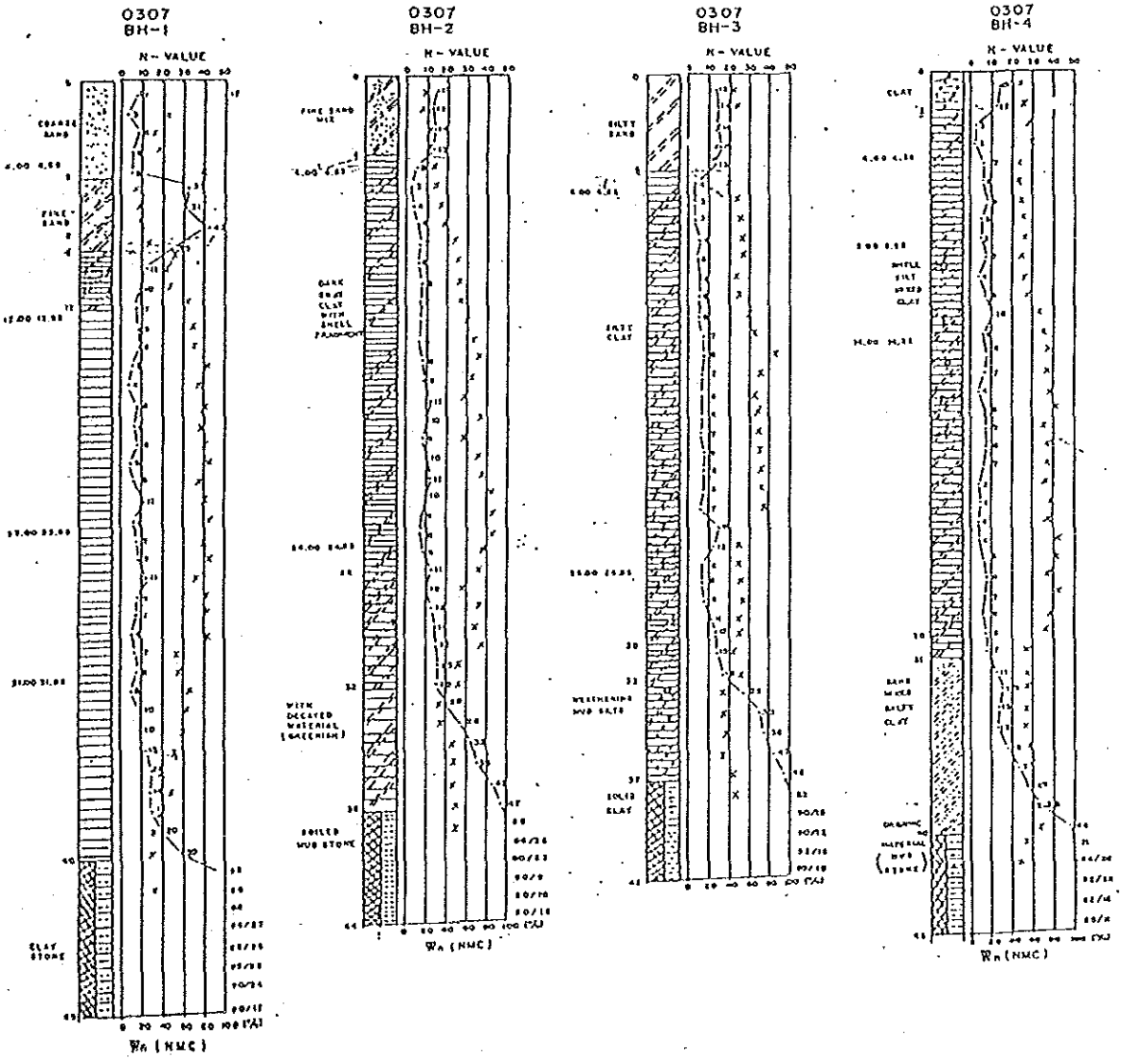



FIGURE-1 BORING DATA

1.2 Gross-Sectional Veiw of Investigation

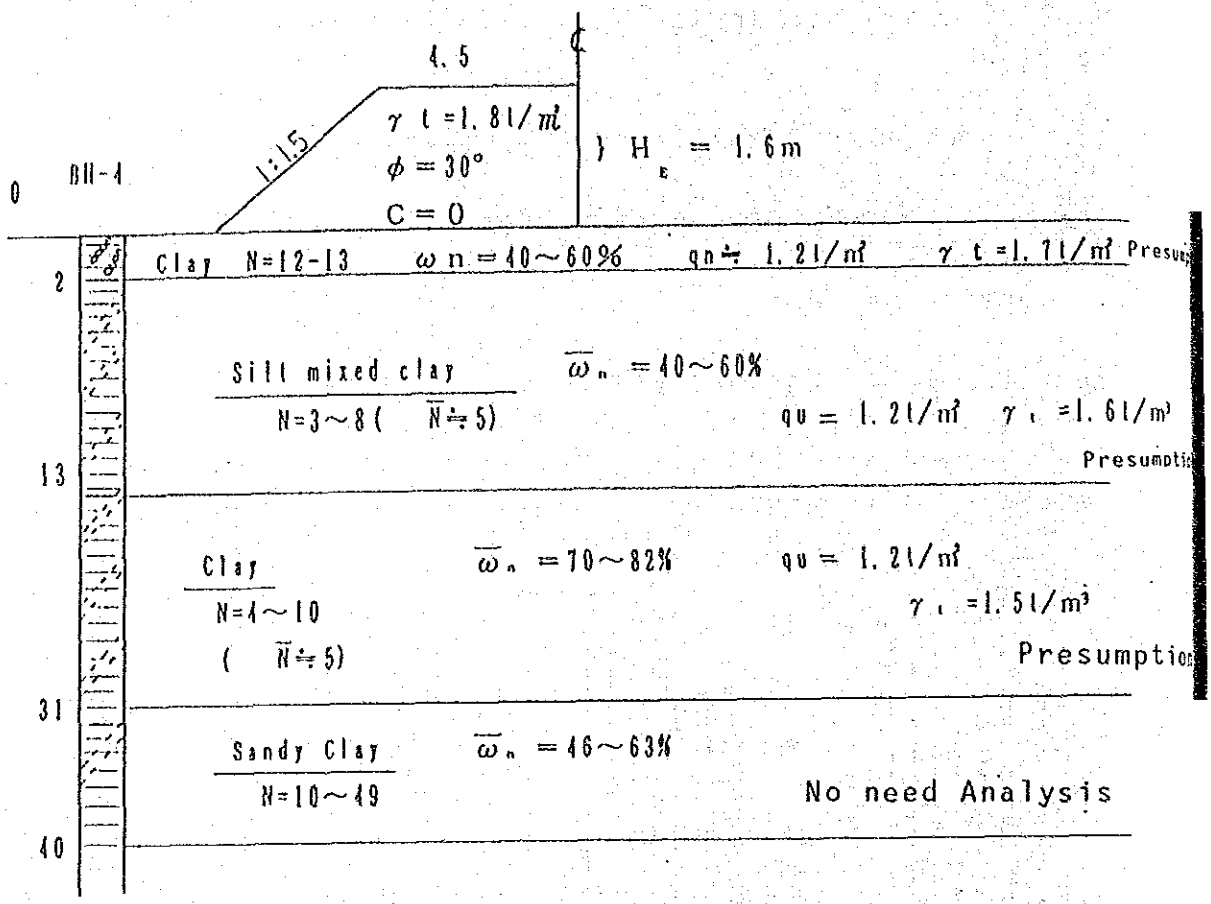



FIGURE-2 CROSS-SECTIONAL VIEW OF INVESTIGATION

1.3 Caluculation of Stability

Limit Embankment Height ($H_{EC}$)

$$\bar{Cu} = \frac{qu}{2} = 0.12 kg/cm^2 \quad \text{(average data by 31m depth)}$$

$$qd = 3.6 \times 0.12 = 0.432 \ kg/cm^2 = 4.32 t/m^2$$

$$H_{EC} = qd / \gamma tE = 4.32/1.8 = 2.4 \ m$$

($\gamma tE$: average unit weight of embankment material)

$$Fs = H_{EC} / H_E = 1.5$$

As in case of embankment height $H_E$ = 1.6 m Fs is 1.5, it is no problem about stability of embankment.

## 1.4 Caluculation of Settlement

The caluculated results of consolidation settlement is TABLE-1.

### 1.4.1 Consolidation Settlement

TABLE-1 Caluculated Results of Consolidation Settlement

$\Delta p = I_z \times q_z = 1.6 \times 1.8 = 2.88$ t

| No. | Depth (m) | layer (m) | $\gamma_t$ (t/m³) | Iz a/z | Iz b/z | Iz l'z | Σ Iz (Iz) | Pxlz (l'z) | $P_o$ | $P_o + \Delta p$ | $e_o$ | $e_1$ | S cm | e-log P CURVE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ① | 1.0 | 2.0 (2.0) | 1.7 | 6.0 | 4.5 | 0.5 | 1.0 | 2.88 | 0.7 | 3.58 | 1.33 | 1.28 | 5 | $\omega_n$ = 50 Ⓐ |
| ② | 7.5 | 11.0 (13.0) | 1.6 | 0.8 | 0.6 | 0.4 | 0.8 | 2.3 | 2.3 | 1.0 | 1.71 | 1.67 | 16.2 | $\omega_n$ = 60~80 Ⓑ |
| ③ | 22 | 18.0 (31.0) | 1.5 | 0.273 | 0.205 | 0.21 | 0.42 | 1.2 | 1.2 | 13.7 | 1.60 | 1.59 | 6.9 | $\omega_n$ = 60~80 Ⓑ |

Total 28.1m

$$Sc = \sum \frac{e_0 - e_1}{1 + e_0} \cdot H$$

where : Sc = consolidation settlement (cm)
$e_0$ = initial void ratio
$e_1$ = consolidated void ratio
H = depth of each soft layer (cm)

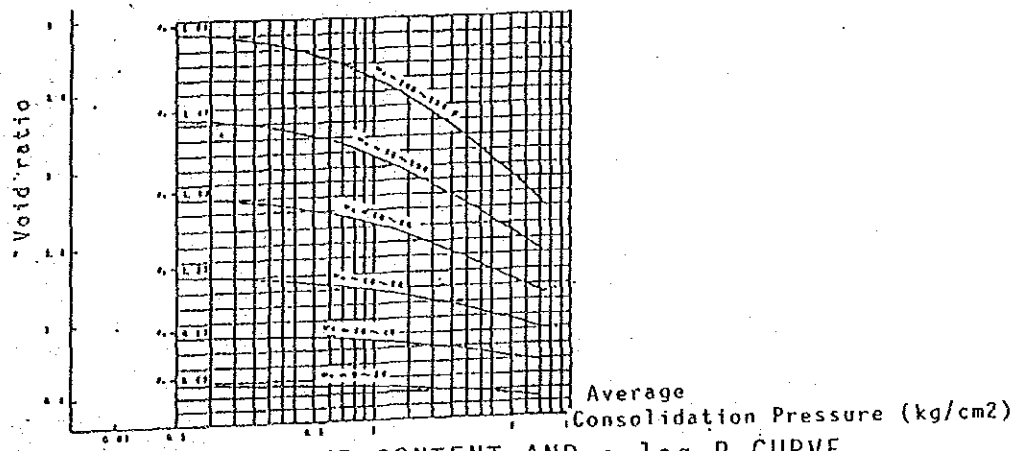



FIGURE-3 RERATION NATURAL WATER CONTENT AND e-log P CURVE

From the calculated results, incase of embankment height H =1.6 m consolidation settlement is 28.1 cm.

1.4.2 Time of consolidation Settlement

Caluculated results of time of consolidation is TABLE-1.

$$t = \frac{Tv\ (H/2)^2}{CV}$$

where : H = drain distance
Tv = coefficient of time
t = settlement time
$C_V$ = coefficient of consolidation

TABLE-2 CALUCULATED RESULTS OF TIME OF CONSOLIDATION

| u (%) | T v | C v ① $3.7\times10^{-3}$ ㎡/nce (days) | C v ② $4.0\times10^{-3}$ (days) | C v ③ $3.3\times10^{-3}$ (days) |
|---|---|---|---|---|
| 10 | 0.008 | 0.3 | 7.6 | 22 |
| 20 | 0.031 | 1.0 | 29.7 | 88 |
| 30 | 0.070 | 2.2 | 68.0 | 201.7 |
| 40 | 0.126 | 3.9 | 120.7 | 357.9 |
| 50 | 0.287 | 8.9 | 275.0 | 815.4 |
| 60 | 0.403 | 12.6 | 386.2 | 1144.9 |
| 70 | 0.567 | 17.7 | 534.4 | 1610.9 |
| 80 | 0.808 | 26.5 | 812.7 | 2409.0 |
| 95 | 1.13 | 35.7 | 1082.0 | 3210.6 |
| 100 | — | | | |

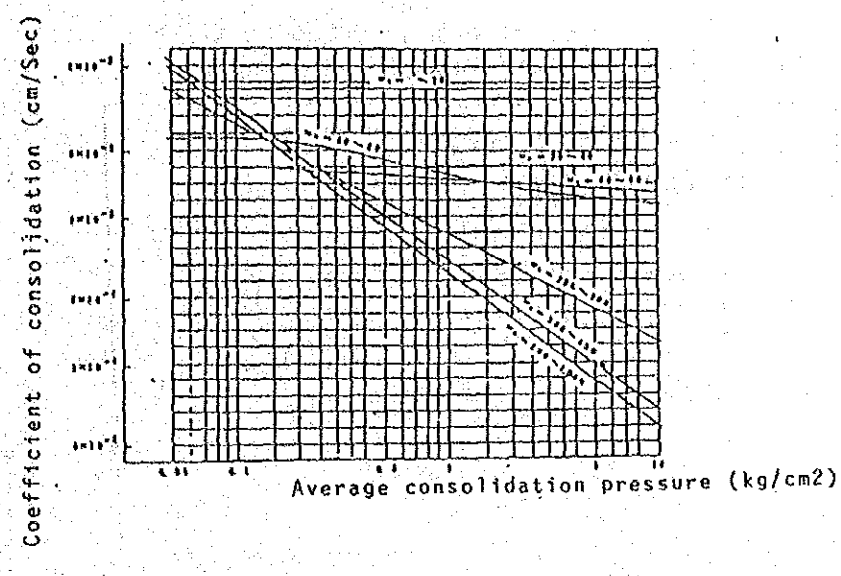



FIGURE-4 RERATION OF NATURAL WATER CONTENT AND e-log P CURVE

(Wn = 0 - 80 %, 200 - 400 %, 700 - 1000 %)

From the caluculated results, 80 % of complete settlement at second layer, 2.00 m - 13.00 m depth, will be completed in two years from starting of embankment, and the third layer will be completed in 6 years and 6 month.

1.4.3 Lateral Flow of Abutment

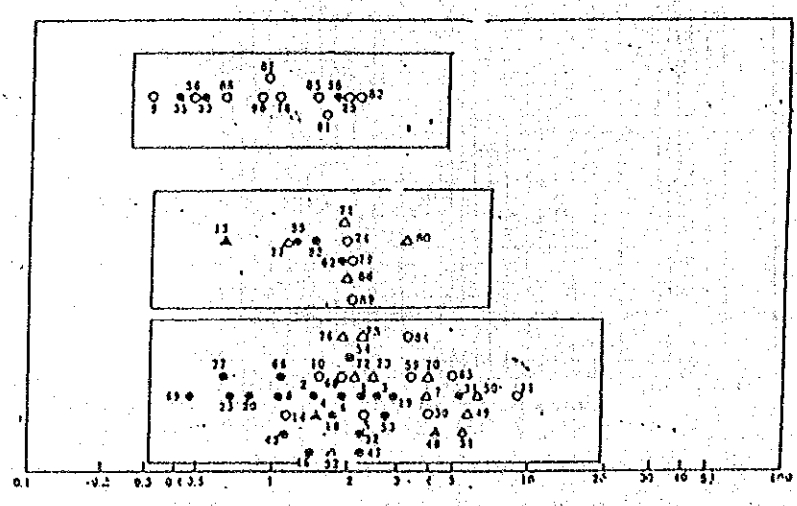


FIGURE-5 CORRELATION OF LATERAL FLOW AND EXISTING GRAUND

Caluculation of F value

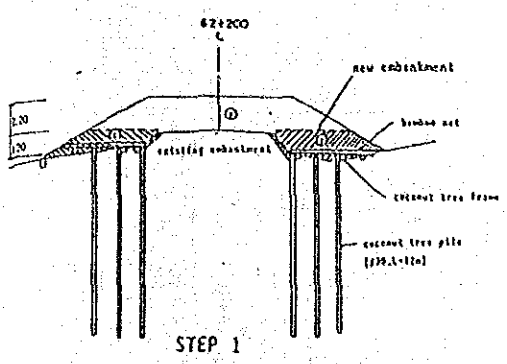
$$F = \frac{C}{r.\,h} \times \frac{1}{D} = \frac{0.6}{1.8 \times 1.6} \times \frac{1}{31.0} = 6.72 \times 10^{-3}$$

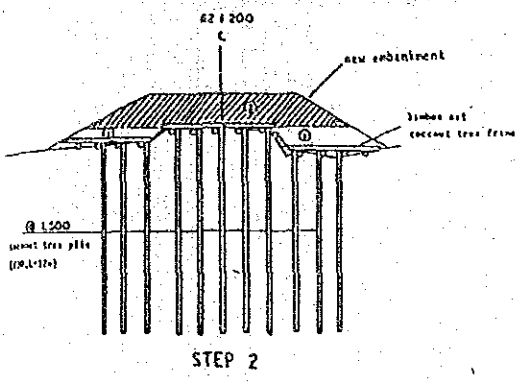
where : c = cohesion of ground

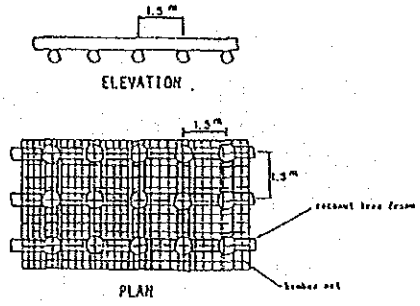
r = unit weight of embankment ($t/m^3$)
h = embankment height
D = depth of soft layer

From the caluculated results, it is supposed to have problems at the abutment as embankment height is low, F value is small.

So, it will be the best method of construction that they drive piles at backfill to the bridge abutment showing FIGURE-6 and reduce lateral flow length and settlement volume.




PILE - NET

Procedure of Execution

I) Drive coconut tree piles and stall wooden frames and bamboo nets on both side of existing embankment.. Execute Embankment on the bamboo nets up to existing embankment. (Riprap should be removed prior to embankment is executed where riprap is existing.)

II) Drive coconut tree piles and stall wooden frames and bamboo nets on top of existing embankment. Execute embankment up to proposed grade.

FIGURE-6 BEARING UNITS BACKFILL TO THE BRIDGE ABUTMNET

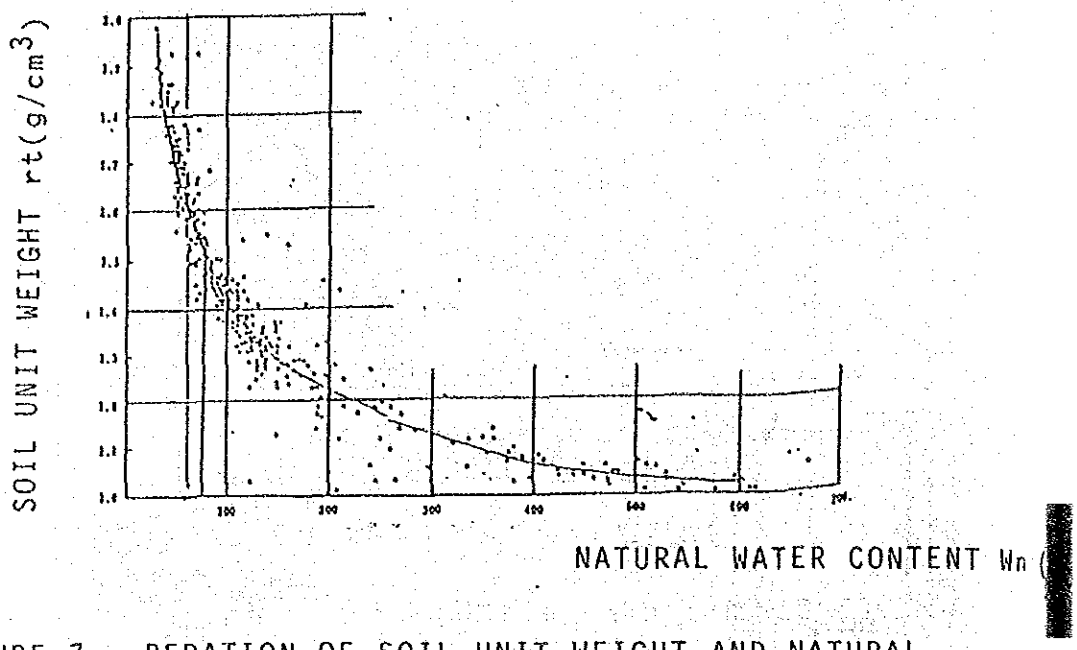



FIGURE-7 RERATION OF SOIL UNIT WEIGHT AND NATURAL WATER OCNTENT

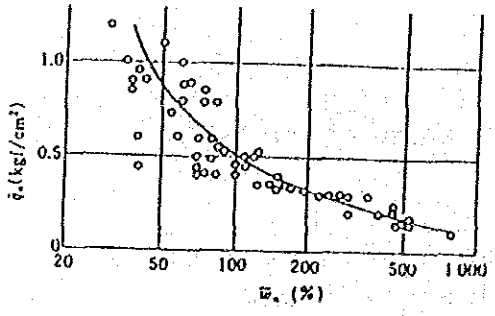



FIGURE-8 RERATION Wn AND qu

## 2. Investigation of Liquefaction at Bridge No.01.02

### 2.1 Geology condition

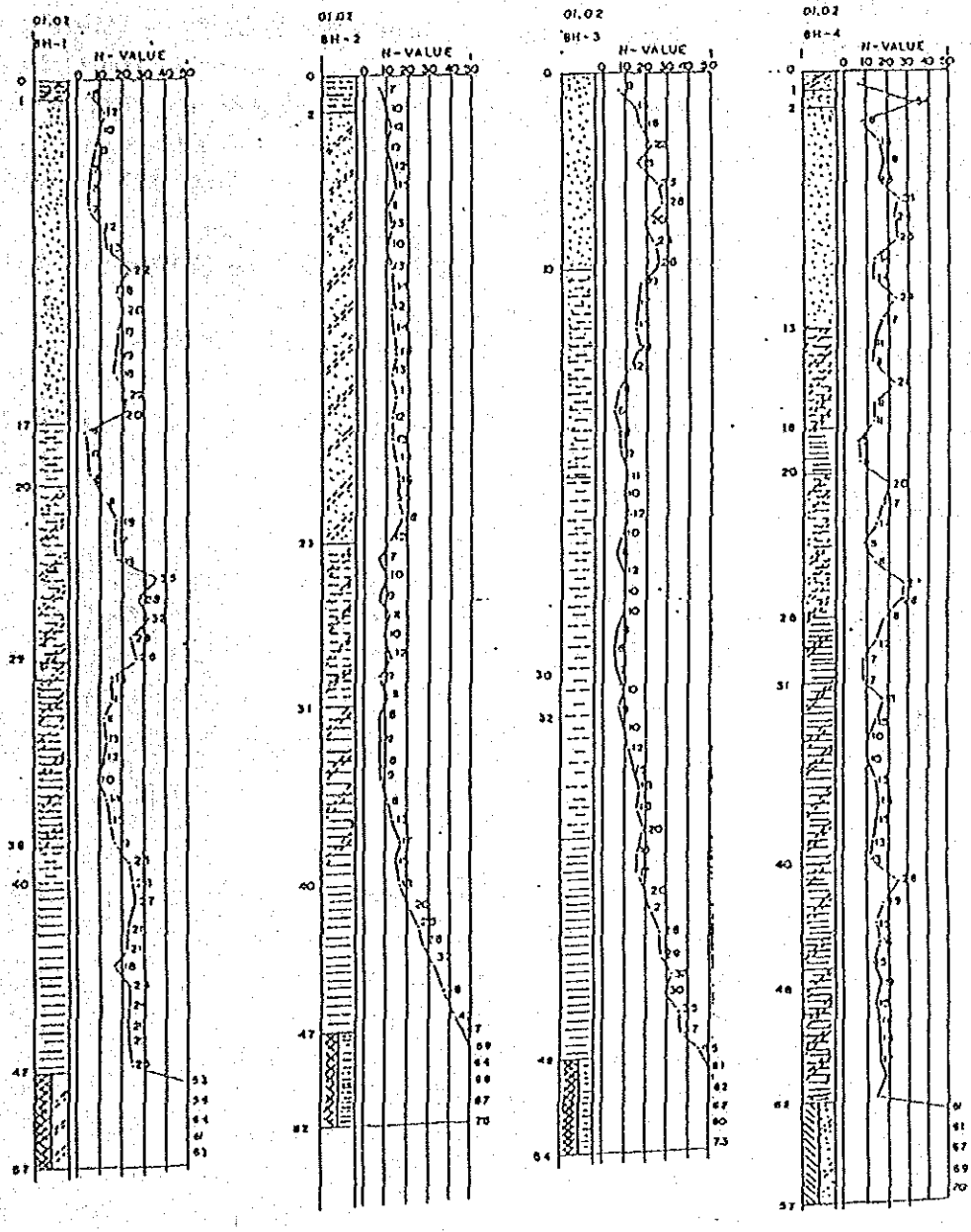



FIGURE-9 BORING DATA

From figure-9 boring data there is fine sand layer, N value = 7 - 23, from 10 m depth to 23 m depth. As this layer is homogeneous fine sand, there is in danger of liquefaction in case of earthguake. There is in little danger of liquefaction, as according to the boring results average N value is less than 15 at Boring No.3 and No.4.
Howerever, there is in danger of liquefaction, as average N value is more than 15 at Boring No.1 and No.2.
Then it will be analyzed at the abutment of Boring No.1.

## 2.2 Judgement Method of Liquefaction

Liquefaction can be judged using the following method. (by Specifications for Highway Bridges; Japan Road Asssociation)

### 2.2.1 Layer to Plan a Judgement of Liquefaction

- Alluvium which there is water level within 10 m from existin ground
- Average grain size D10 within extent from existing ground to 20 m depth is more than 0.2 mm and less than 2.0 mm.

### 2.2.2 Judgement of Lequefaction

Resistnace Ratio FL can be computed using the formular 1.
If this FL is less than 1.0, the layer is in danger of liquefaction.

$$F_L = R/L \quad \cdots\cdots 1$$

$$R = R_1 + R_2 \quad \cdots\cdots 2$$

$$L = r_d \cdot k_s \cdot \frac{\sigma_v}{\sigma'_v} \quad \cdots\cdots 3$$

$$r_d = 1.0 - 0.015x \quad \cdots\cdots 4$$

$$k_s = \nu_1 \cdot \nu_2 \cdot \nu_3 \cdot k_{s0} \quad \cdots\cdots 5$$

$$\sigma_v = (\gamma_{t1} h_w + \gamma_{t2}(x - h_w))/10 \quad \cdots\cdots 6$$

$$\sigma'_v = (\gamma_{t1} h_w + \gamma'_{t2}(x - h_w))/10 \quad \cdots\cdots 7$$

where : FL = resistance ratio against liquefaction
R = dynamic ratio of shear resistance
L = shear stress ratio during earthquakes
$\gamma d$ = reduction factor of depth direction of shear stress ratio during earthquakes
ks = forizontal seismic intensity at land surface for the judgement of liquefaction
$\sigma v$ = all surcharge ($kg/cm^2$)
$\sigma' v$ = effective surcharge ($kg/cm^2$)
R1 = by FIGURE-2
R2 = BY FIGURE-3

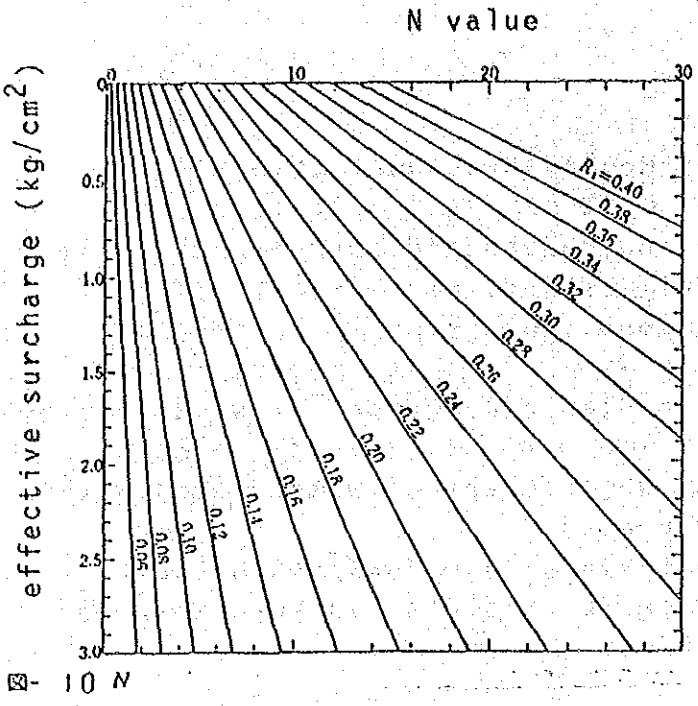
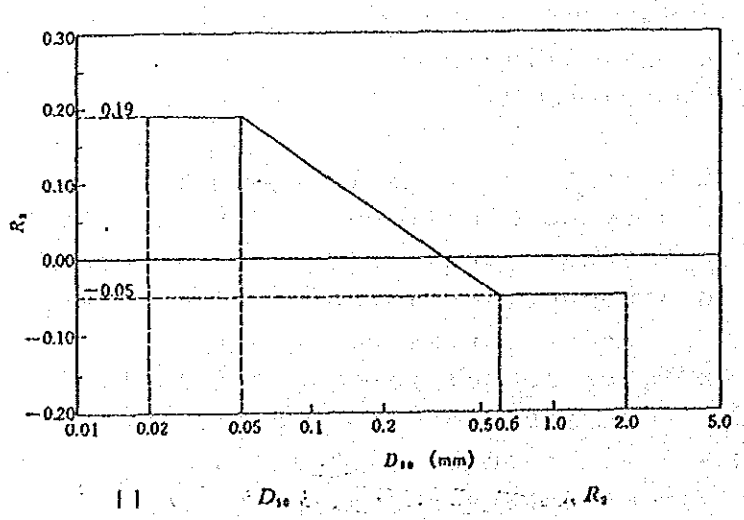



図- 10 N

FIGURE-10 RERATION EFFECTIVE SURCHARGE AND Ri

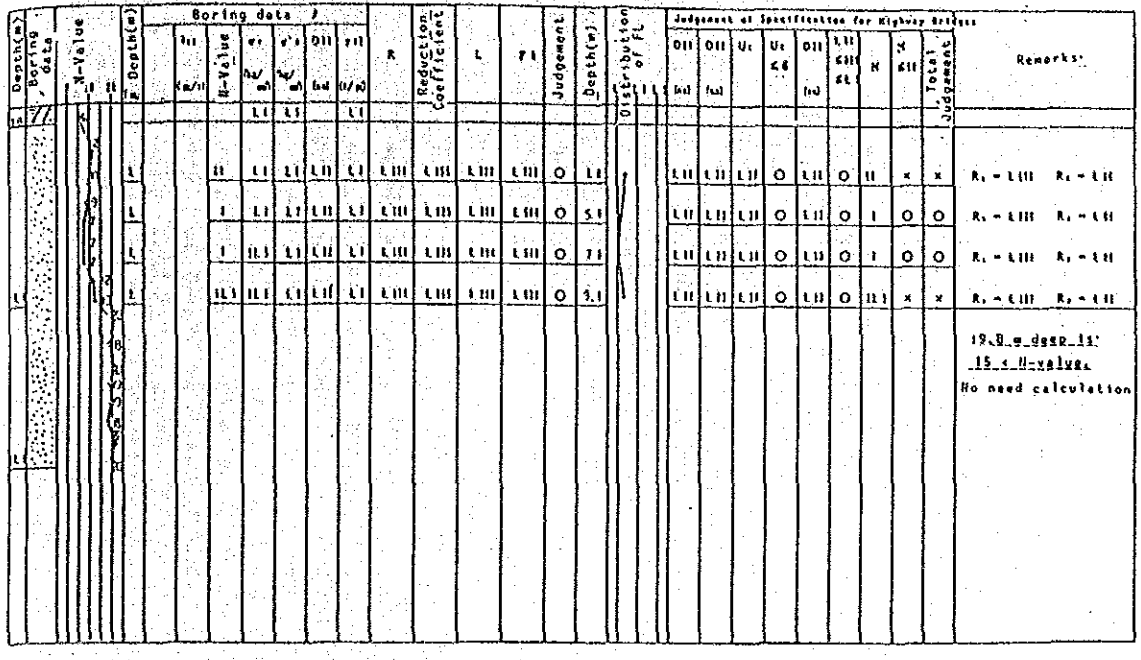



11 $D_{10}$ $R_2$

FIGURE-11 AVERAGE GARAIN SIZE $D_{10}$(mm)

## 2.3 Caluculated Results and Judgement

TABLE-3 CALUCULATED RESULTS




From TABLE-3, there is FC from 0.54 to 0.73, it is in danger of liquefaction.
And reduction of K value by liquefaction is based on following Specifications for Highway Bridges. So reduction of K value is 1/3.

TABLE-4 FACTOR MULTIPLIED SOIL CONSTANT

| Extent of FL | Depth from existing earth ground x (m) | Factor Multiplied Soil Constant DE |
|---|---|---|
| $F_L \leqq 0.6$ | $0 \leqq x \leqq 10$<br>$10 < x \leqq 20$ | 0<br>1/3 |
| $0.6 < F_L \leqq 0.8$ | $0 \leqq x \leqq 10$<br>$10 < x \leqq 20$ | 1/3<br>2/3 |
| $0.8 < F_L \leqq 1.0$ | $0 \leqq X \leqq 10$<br>$10 < X \leqq 20$ | 2/3<br>1 |

# APPENDIX 9

## COUNTRY DATA

## Land and Population

### (1) Land

The Philippines consists of 7,100 islands that were formed by repeated orogenic movements and volcanic activities. The islands are divided into the three (3) main groups of Luzon, Visayas and Mindanao. Luzon is the largest island and is located furthest north. Visayas, composed of Samar, Leyte and other islands, is situated between the other two, and Midanao, the second largest island, is located furthest south.

The area of the major islands is as follows:

| Island | Area ($km^2$) |
|---|---|
| Luzon | 104,687 |
| Mindanao | 94,630 |
| Samar | 13,079 |
| Negros | 12,704 |
| Palawan | 11,784 |
| Others | 43,541 |
| Total | 280,415 |

### (2) Climate

The Philippines is located in the tropics. The climate in the Philippines is due to its geographical location and the different winds system that prevails over the locality. The condition of the climate has been described in term of the characteristics of the distribution of rainfall received in a locality during the different month of the year. There are four climate types in the Philippines.

Over 50% of the rainfall is associated with tropical cyclones. The frequency of tropical cyclones in the Philippine Area of Responsibility (PAR) has an average of 20 times a year, while the frequency crossing in the Philippines has an average of 8.8 times a year.

The average annual rainfall in the Philippines is 2416.3 mm. The largest average annual rainfall are 4316 mm and 4360 mm at Borongan in Samar and Hinatuan in Surigao del Sur, respectively, both of which face the Pacific Ocean and belong to the 2nd type of climate. The highest daily rainfall was 979.4 mm recorded in Baguio City on October 17, 1967. In Samar and Leyte islands, the highest daily rainfall in 387.9 mm was recorded in Catbalogan City, whereas in Mindanao Island, 564.7 mm in Surigao City. Figure 1 shows type of Climate and Distribution of Rainfall.

(3) Population

The National Capital Region, an integrated community composed of 4 cities and 13 municipalities, holds a population density of 11,536 persons per each square kilometer, as compared to 191 for the whole country. Its population has being growing at a much higher rate.

Table 1 shows comparative figures of the population, and density of each region.

II. Economy

(1) National Economy

The decade of the 1970's witnessed substantial growth in the Philippines economy. Real Gross National product (GNP) increased at an average yearly rate of 6.2 percent from 1972 to 1980. However, the early 1980's was a period of relatively slower growth in the Philippine economy as an effect of the worldwide economic recession precipitated by the oil crisis.

This moreover, continued to pose difficulties for the Philippine economy until the early part of 1983. As a result of this tight financial situation, the maturities of Philippine borrowings became shorter while interest rates became higher. The declining pace of the economy continued until it reached the lowest fall in GNP in 1984 which gave a negative growth of 5.3%. The negative growth of 2.5% in 1985 showed a gradual recovery of the economy, which was actually the start of the Philippine economic recovery, from a negative growth to a positive growth of 1.2% in 1986 to a

rapid growth until the early part of 1987 which was estimated at 5.4%.

The relatively higher growth the country is currently experiencing is expected to continue as the necessary structural reforms within the economy are currently being instituted under the new leadership.

(2) Regional Economy

A review of past regional economic performance reveals that different regions of the country showed wide variations in growth and development as exhibited in Table 2. Overall, more than half of the country's domestic output was contributed by only 3 regions: Metro Manila (NCR), Southern Tagalog (R-III) and Western Visayas (R-VI). The depressed regions are Regions II, VIII, IX and XII.

Poverty has been identified as a critical problem in all of the country's regions. Despite various government assistance and programs directed toward low-income groups, the situation has worsened in recent years.

Larger number of poor families and higher poverty incidences have been observed in both developed and poorer regions, pointing to the uneven distribution of incomes within the regions.

As shown in Table 3 regional poverty incidence in 1985 ranged from 44.1 percent in the National Capital Region to a high 73.2 percent in Region V. Nine of the country's thirteen regions had poverty incidences higher than the national average. The Visayas area, covering three regions, had a generally higher proportion of poor families in the Philippines. Poverty in the rural sector is more severe than in the urban areas. Rural poverty incidence were highest of Regions V, VI, VII and VIII, with more than 70 percent of families falling below the poverty line.

In urban areas, the proportion of poor families was highest in Eastern (R-VIII) and Western (R-VII) Visayas and Northern Midanao (R-IX).

(3) Industrial Structure

By industrial sector, the service sector consistently dominated the country's economy throughout the years from 1970 to 1985, contributing 38% to 42% to the national economy. Industry was next with contributions from 30% to 37%. Agriculture had the least contribution, ranging from 25% to 29% during the same period.

The economy of the country is basically agricultural and its total land area is predominantly rural. The total arable land of the Philippines is 1,333,258 hectares. In 1986, total agricultural crop production of the country reached to 28.5 million metric tons planted to 12.2 million hectors and valued at 77.9 million. Of total production about 80% was contributed by food crops made up of palay, corn and fruits, and only 20% by commercial crops with coconuts and sugarcane as the leading commercial crops.

The largest crop producing region of the country is Region XI (Southern Midanao) contributing about 18 percent of the country's total crop production. The next largest crop producing region are Central Mindanao (R-XII) and Western Visayas (R-VI) contributing 12 percent, respectively.

These different regions of the country consists of different soil types suitable to different types of crops, thus different regions each advantages to different types of crops. The major producers of palay are Regions X, XI and XII, all in Mindanao while the major producers of coconuts are Southern Tagalog (R-IV) and Southern Mindanao (R-XI). Sugarcane is predominantly grown in Western Visayas (R-VI) while abaca is the major crop of Bicol Region (R-V).

Table 4 shows crop production and the value of production by region. Characteristic of the Philippines Economy, Functional Classification of National Government Expenditure (1987-1992) and Existing Road Length are shown in the Table 5, 6 and 7.

## II. National Development Plan

The Medium-Term Philippine Development Plan from 1987 to 1992 was formulated to guide development efforts in both the public and private sector as follows:

The plan address the fundamental problems of the people persistence of poverty and income inequality, high unemployment and underemployement, and urban/rural and regional disparities. These have been brought about by continued structural inefficiencies in the economy. Moreover, the external debt crisis experienced in 1983 has set back whatever gains had been attained in the past.

The Philippines experienced the worst economic and financial crisis in its postwar history starting in late 1983. The roots of these problems can be traced to structural weaknesses in the foundation of the economy, errors in economic management, and abuse of power by the previous regime.

Philippines development efforts in 1987-92 shall be principally directed towards the following goals: (a) alleviation of poverty, (b) generation of more productive employment, (c) promotion of equity and social justice, and (d) the attainment of sustainable economic growth.

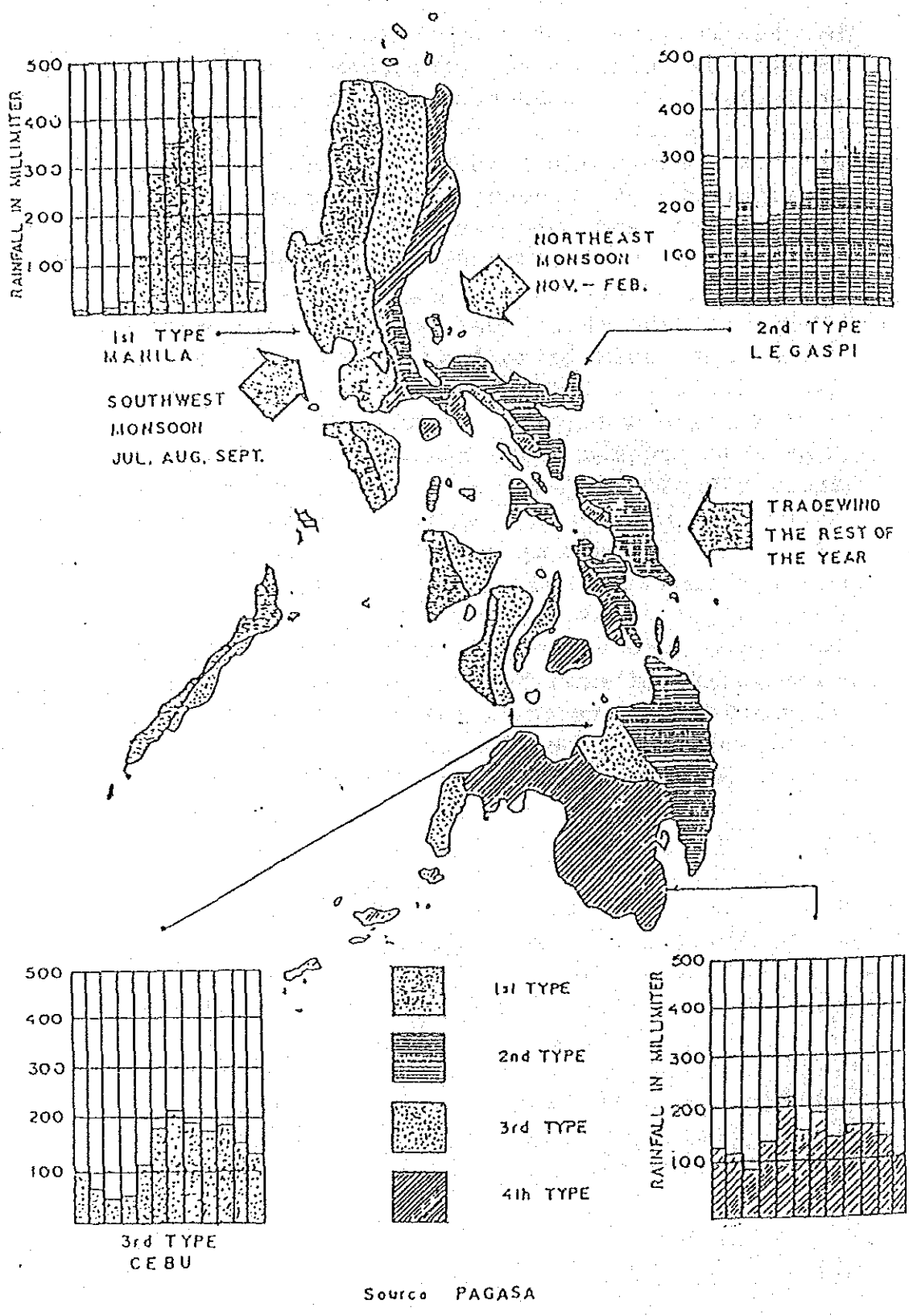



FIGURE 1 TYPE OF CLIMATE AND DISTRIBUTION OF RAINFALL

TABLE 1 POPULATION DENSITY BY REGION AND RANK (1987, 1980, 1975)

| | Land Area (Sq. Km.) | 1987 | | | 1980 | | | 1975 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Population (In Thousand) | Density | Rank | Population (In Thousand) | Density | Rank | Population (In Thousand) | Density | Rank |
| Philippines | 300,000 | 57,294 | 191.0 | | 48,099 | 160.3 | | 42,071 | 191.0 | |
| National Capital Region | 636 | 7,337 | 11,536.2 | 1 | 5,926 | 9,317.4 | 1 | 4,971 | 7,814.5 | 1 |
| Region I—Ilocos | 21,568.4 | 4,053 | 187.9 | 6 | 3,541 | 164.2 | 6 | 3,269 | 151.6 | 6 |
| Region II—Cagayan Valley | 36,403.0 | 2,645 | 72.7 | 13 | 2,216 | 60.9 | 13 | 1,933 | 53.1 | 13 |
| Region III—Central Luzon | 18,230.8 | 5,720 | 313.8 | 2 | 4,803 | 263.4 | 2 | 4,210 | 230.9 | 2 |
| Region IV—Southern Tagalog | 46,924.2 | 7,478 | 159.4 | 8 | 6,119 | 130.4 | 9 | 5,214 | 111.1 | 8 |
| Region V—Bicol | 17,632.5 | 4,101 | 232.6 | 5 | 3,477 | 197.2 | 5 | 3,194 | 181.1 | 5 |
| Region VI—Western Visayas | 20,223.1 | 5,316 | 262.9 | 4 | 4,526 | 223.8 | 4 | 4,146 | 205.0 | 4 |
| Region VII—Central Visayas | 14,951.4 | 4,368 | 292.1 | 3 | 3,787 | 253.3 | 3 | 3,387 | 226.6 | 3 |
| Region VIII—Eastern Visayas | 21,431.7 | 3,184 | 148.6 | 9 | 2,800 | 130.6 | 8 | 2,600 | 121.3 | 7 |
| Region IX—Western Mindanao | 18,685.1 | 2,991 | 160.1 | 7 | 2,529 | 135.3 | 7 | 2,048 | 109.6 | 9 |
| Region X—Northern Mindanao | 28,327.7 | 3,346 | 118.1 | 11 | 2,759 | 97.4 | 12 | 2,314 | 81.7 | 12 |
| Region XI—Southern Mindanao | 31,692.8 | 4,028 | 127.1 | 10 | 3,347 | 105.6 | 10 | 2,715 | 85.6 | 11 |
| Region XII—Central Mindanao | 23,293.2 | 2,730 | 117.2 | 12 | 2,271 | 97.5 | 11 | 2,070 | 88.9 | 10 |

TABLE 2 GROSS DOMESTIC PRODUCT AND GROWTH RATE BY REGION

| | Region/Year | GRDP in Million Pesos | | | | Growth Rate | | |
|---|---|---|---|---|---|---|---|---|
| | | 1971 | 1975 | 1980 | 1985 | 1971-1975 | 1975-1980 | 1980-1985 |
| | Philippines | 53528 | 67455 | 92706 | 90469 | 6.0 | 6.6 | 9.5 |
| | N C R | 16182 | 20976 | 29959 | 27026 | 6.7 | 7.4 | 8.0 |
| I. | Ilocos Region | 2691 | 3144 | 3315 | 3859 | 4.0 | 1.1 | 3.1 |
| II. | Cagayan Valley | 1421 | 1809 | 2437 | 2472 | 6.2 | 6.1 | 0.3 |
| III. | Central Luzon | 4664 | 5556 | 7500 | 7996 | 4.5 | 6.2 | 1.3 |
| IV. | Southern Tagalog | 6434 | 9617 | 12935 | 12905 | 0.6 | 6.1 | -0.05 |
| V. | Bicol Region | 2032 | 2554 | 3277 | 3069 | 5.9 | 5.1 | 0.7 |
| VI. | Western Visayas | 5988 | 5837 | 7331 | 7241 | 9.4 | 4.7 | 9.8 |
| VII. | Central Visayas | 3137 | 4754 | 6794 | 6332 | 1.0 | 7.4 | 8.6 |
| VIII. | Eastern Visayas | 1766 | 2094 | 2272 | 2205 | 4.4 | 1.6 | 9.4 |
| IX. | Western Mindanao | 1589 | 1834 | 3240 | 3235 | 3.6 | 2.1 | 9.9 |
| X. | Northern Mindanao | 2304 | 2731 | 4267 | 4349 | 4.3 | 9.3 | 0.4 |
| XI. | Southern Mindanao | 3552 | 4587 | 6292 | 6157 | 6.6 | 6.5 | 9.6 |
| XII. | Central Mindanao | 1768 | 1962 | 3079 | 3623 | 2.6 | 9.4 | 3.3 |

TABLE 3 REGIONAL POVERTY INDICATORS:1985

| Region | Total | | | Urban | | | Rural | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total Poverty Threshold (In ₱) | Magnitude of Poverty (000 Families)** | Incidence of Poverty (In %) *** | Total Poverty Threshold (In ₱)* | Magnitude of Poverty (000 Families)** | Incidence of Poverty (In %)*** | Total Poverty Threshold (In ₱)* | Magnitude of Poverty (000 Families)** | Incidence of Poverty (In %) *** |
| Philippines | 2,382 | 5,676.6 | 59.3 | 3,021 | 1,875.9 | 52.1 | 2,066 | 3,800.7 | 63.7 |
| N C R | 3,282 | 550.5 | 44.1 | 3,282 | 550.5 | 44.1 | | | |
| Outs. NCR | 2,285 | 5,126.1 | 61.6 | 2,912 | 1,325.4 | 56.3 | 2,066 | 3,800.7 | 63.7 |
| I | 2,374 | 364.9 | 52.3 | 3,093 | 89.7 | 56.2 | 2,139 | 275.2 | 51.1 |
| II | 2,194 | 246.3 | 54.6 | 2,897 | 31.3 | 48.6 | 2,092 | 215.0 | 55.6 |
| III | 2,550 | 420.0 | 44.4 | 3,153 | 178.5 | 45.2 | 2,104 | 241.5 | 43.8 |
| IV | 2,471 | 712.2 | 55.9 | 3,048 | 241.7 | 50.6 | 2,174 | 470.5 | 59.1 |
| V | 2,148 | 464.0 | 73.2 | 2,625 | 81.2 | 62.3 | 2,047 | 382.7 | 76.0 |
| VI | 2,449 | 632.4 | 73.1 | 3,069 | 154.1 | 65.0 | 2,249 | 478.3 | 76.2 |
| VII | 1,982 | 530.6 | 68.8 | 2,426 | 142.7 | 58.9 | 1,819 | 387.9 | 73.4 |
| VIII | 2,016 | 385.4 | 70.4 | 2,733 | 81.9 | 70.1 | 1,822 | 303.5 | 70.5 |
| IX | 2,118 | 316.5 | 65.3 | 2,650 | 47.2 | 61.6 | 2,025 | 269.3 | 66.0 |
| X | 2,262 | 355.4 | 66.2 | 2,952 | 91.7 | 65.7 | 2,022 | 263.7 | 66.3 |
| XI | 2,388 | 426.0 | 61.7 | 2,998 | 143.1 | 59.6 | 2,079 | 282.9 | 62.8 |
| XII | 2,233 | 272.4 | 65.2 | 2,624 | 42.2 | 56.8 | 2,161 | 230.2 | 67.0 |

* The monthly income required to satisfy 100 percent of nutritional requirements and other needs of a family of 6.
** The total number of families below the poverty line or threshold in 1985.
*** Out of the total number of families, the proportion of families that fall below the povertyline in 1985.

SOURCE: Inter-agency Working Group on Poverty Determination - NEDA, FNRI, NCSO.

TABLE 4 CROP PRODUCTION BY REGION, 1986

(UNIT:TON)

| | Ilocos | Cagayan Valley | Central Luzon | Southern Tagalog | Bicol | Western Visayas | Central Visayas | Eastern Visayas | Western Mindanao |
|---|---|---|---|---|---|---|---|---|---|
| All Crops | 1,713,726 | 1,760,242 | 2,001,026 | 2,753,156 | 1,741,385 | 3,038,775 | 1,157,011 | 1,594,719 | 1,511,664 |
| Food Crops | 1,582,284 | 1,710,079 | 1,789,876 | 1,824,165 | 1,485,439 | 1,769,198 | 815,986 | 1,266,609 | 1,122,542 |
| Palay (Rough Rice) | 871,740 | 1,172,110 | 1,525,355 | 985,765 | 683,090 | 1,121,920 | 148,180 | 469,440 | 353,370 |
| Corn (Shelled) | 64,530 | 374,835 | 8,370 | 242,305 | 133,975 | 43,740 | 243,645 | 273,020 | 216,700 |
| Fruit and nuts except Citrus | 265,868 | 73,754 | 101,881 | 330,135 | 118,420 | 430,622 | 137,106 | 254,842 | 191,755 |
| Others | 241,280 | 67,985 | 121,495 | 262,570 | 83,810 | 392,469 | 119,110 | 247,207 | 185,546 |
| Commercial Crops | 131,442 | 50,163 | 211,150 | 928,991 | 255,946 | 1,269,577 | 341,025 | 328,110 | 389,122 |
| Coconut (Products) | 84,961 | 23,393 | 10,913 | 624,397 | 212,533 | 116,617 | 133,123 | 245,035 | 295,673 |
| Sugarcane | 7,576 | 16,615 | 197,127 | 303,218 | 13,536 | 1,149,153 | 205,072 | 61,519 | 8 |
| Abaca | - | - | - | 594 | 29,860 | 1,185 | 930 | 21,462 | 9,098 |
| Tobacco | 35,855 | 10,122 | 3,105 | 695 | 13 | 412 | 583 | 39 | 65 |
| Coffee | 1,846 | 4,969 | 230 | 32,971 | 1,215 | 4,793 | 1,445 | 390 | 17,261 |
| Cacao | 114 | 60 | 11 | 133 | 113 | 186 | 2,174 | 99 | 306 |
| Peanut | 11,117 | 17,394 | 1,954 | 3,051 | 1,118 | 979 | 19,119 | 844 | 1,661 |
| Rootcrops | 85,378 | 22,590 | 38,364 | 95,247 | 466,930 | 82,291 | 242,079 | 285,208 | 301,211 |
| Vegetables | 147,067 | 9,433 | 35,130 | 54,954 | 17,484 | 25,658 | 10,482 | 5,184 | 3,074 |
| Others | 102,446 | 100,790 | 79,251 | 310,751 | 50,347 | 57,425 | 23,089 | 10,702 | 142,968 |

TABLE 5 CHARACTARISTIC OF THE PHILIPPINES ECONOMY

| | 1970 | 1975 | 1980 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|
| Population (thousands) | 36,850 | 42,070 | 48,320 | 50,740 | 51,960 | 53,170 | 54,380 |
| GNP (billion pesos) | 42 | 114 | 265 | 335 | 379 | 539 | 607 |
| GDP (billion pesos) | 143 | 195 | 265 | 279 | 282 | 268 | 257 |
| GNP Growth rate (%) | | | | | 1.1 | -6.8 | -3.8 |
| GNP Per Capital (Pesos) | | 375 | | 769 | 635 | 660 | |
| Consumer Price Increase Rate (%) | | - | | 10.2 | 10.0 | 50.4 | 23.1 |
| Exchange Rate on US$ (Pesos) | 59,044 | 72,479 | 75,114 | 85,400 | 111,127 | 166,987 | 186,073 |
| External Accounts (US$ mil.) | | | | | | | |
| Current Account | -48 | -923 | -1,917 | -3,212 | -2,751 | -1,268 | 8 |
| Trade Account | -26 | -1,196 | -1,939 | -2,646 | -2,485 | -679 | -482 |
| Exports | 1,064 | 2,263 | 5,788 | 5,021 | 5,005 | 5,391 | 4,629 |
| Imports | 1,090 | 3,459 | 7,727 | 7,667 | 7,490 | 6,070 | -5,111 |
| Invisible trade Account | -141 | -46 | -412 | -1,040 | -738 | -975 | 111 |
| Capital Account | 271 | 1,094 | 2,684 | 2,846 | -394 | 750 | 301 |
| Total External Account | 75 | -11 | 891 | -730 | -3,501 | -403 | 952 |
| Gold, Foreign Currency Reserves | 251 | 1,359 | 3,140 | 1,711 | 864 | 890 | 1,116 |
| Commercial Banking (mil.Ruplah) | | | | | | | |
| Total Asset | 12 | 47 | 123 | 164 | 201 | 224 | 206 |
| Deposit liabilities | 7 | 15 | 45 | 66 | 76 | 88 | 100 |
| Public Finance (mil.Pesos) | | | | | | | |
| Revenues | 4,849 | 16,838 | 34,373 | 37,993 | 45,606 | 56,851 | 68,961 |
| Expenditures | 4,790 | 18,198 | 37,758 | 52,407 | 53,074 | 66,689 | 80,102 |
| Accounts | 59 | -1,360 | -3,385 | -14,414 | -7,468 | -9,828 | -11,141 |
| External Debt(US$mil.) | 1,562 | 2,043 | 17,390 | 24,166 | 23,871 | 24,381 | 26,700 |
| External Debt/GNP(%) | 22.1 | 12.9 | 49.4 | 61.5 | 69.9 | 75.8 | 83.7 |
| Debt Service (US$mil.) | 258 | 404 | 1,576 | 2,930 | 2,659 | 2,802 | 2,774 |
| Debt Service/Exports(%) | | 12.7 | 19.7 | 36.6 | 32.7 | 35.0 | 35.0 |

Source: IMF, International Monetary Statistics yearbook, 1986
Philippines Central Bank Data

TABLE 6 FUNCTIONAL CLASSIFICATION OF NATIONAL GOVERNMENT EXPENDITURES, 1987-1992

(Percentage Distribution)

(UNIT: %)

| | Actual Annual average 1976-85 | Estimate 1986 | Projections 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | Annual Average 1987-92 |
|---|---|---|---|---|---|---|---|---|---|
| *Economic Services* | 33.9 | 17.3 | 19.0 | 21.6 | 23.9 | 26.3 | 28.4 | 30.3 | 25.1 |
| Agriculture | 7.3 | 3.2 | 3.0 | 5.7 | 6.5 | 7.4 | 8.2 | 9.1 | 6.8 |
| Industry, trade and tourism | 3.1 | 0.7 | 1.4 | 1.9 | 2.4 | 2.8 | 3.0 | 3.3 | 2.5 |
| Utilities and Infrastructure | 23.6 | 13.4 | 14.6 | 14.0 | 15.0 | 16.1 | 17.2 | 17.9 | 15.8 |
| *Social Services* | 20.2 | 18.3 | 21.5 | 24.5 | 28.4 | 31.4 | 35.7 | 39.2 | 30.1 |
| Education | 12.3 | 10.2 | 11.6 | 13.2 | 14.1 | 14.9 | 17.1 | 18.7 | 15.0 |
| Health | 3.9 | 3.0 | 3.4 | 4.2 | 5.0 | 6.6 | 8.2 | 9.6 | 6.3 |
| Social security and welfare | 2.1 | 4.7 | 6.2 | 6.2 | 6.2 | 6.3 | 6.4 | 6.4 | 6.2 |
| Housing and community development | 1.9 | 0.4 | 0.4 | 0.0 | 2.2 | 3.6 | 4.0 | 4.5 | 2.7 |
| *Defense* | 14.0 | 8.9 | 7.3 | 7.4 | 8.0 | 8.4 | 8.5 | 8.9 | 8.1 |
| *General Public Services* | 20.0 | 10.0 | 11.3 | 15.7 | 14.7 | 13.7 | 12.3 | 9.6 | 12.9 |
| *Debt Service Fund and Net Lending*[a] | 11.9 | 47.5 | 40.0 | 30.8 | 26.0 | 20.2 | 15.1 | 12.0 | 23.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

a. For 1987 onwards, this item includes a portion of the external liabilities of government financial institutions to be assumed by the national government. Excludes debt service on liabilities of the Philippine Nuclear Power Plant.

Sources of Basic Data: MBM and NEDA.

TABLE 7 (1) EXISTING ROAD LENGTH, 1988

(km)

| | National | | | | | City | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Concrete | Asphalt | Gravel | Earth | Total | Concrete | Asphalt | Gravel | Earth | Total |
| Philippines | 6,179.7 | 5,829.3 | 13,400.3 | 743.4 | 26,143.7 | 649.4 | 2,006.0 | 1,164.5 | 164.7 | 3,984.6 |
| NCR | 446.8 | 421.3 | 14.0 | 0.0 | 882.1 | 281.9 | 832.8 | 159.1 | 0.0 | 1,273.8 |
| I | 449.3 | 919.7 | 952.9 | 93.2 | 2,415.1 | 8.3 | 183.4 | 118.1 | 0.0 | 309.8 |
| II | 599.1 | 108.8 | 1,532.0 | 61.9 | 2,301.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| III | 796.5 | 504.0 | 391.8 | 0.0 | 1,692.3 | 56.5 | 115.9 | 41.0 | 45.2 | 258.6 |
| IV | 556.9 | 1,191.7 | 2,180.6 | 89.3 | 4,028.5 | 37.9 | 127.7 | 102.1 | 25.0 | 292.7 |
| V | 648.0 | 337.2 | 909.4 | 47.0 | 1,941.6 | 20.3 | 81.1 | 125.8 | 18.1 | 245.3 |
| VI | 307.0 | 789.2 | 1,533.7 | 0.0 | 2,629.9 | 91.7 | 152.4 | 48.8 | 4.6 | 297.5 |
| VII | 164.6 | 676.5 | 821.2 | 4.4 | 1,666.7 | 32.4 | 236.7 | 24.1 | 22.0 | 315.2 |
| VIII | 662.0 | 57.1 | 1,152.4 | 92.1 | 1,963.6 | 39.1 | 2.8 | 20.0 | 8.7 | 70.6 |
| IX | 52.6 | 312.6 | 653.9 | 0.0 | 1,019.1 | 8.2 | 76.9 | 36.3 | 0.1 | 121.5 |
| X | 634.6 | 352.8 | 1,200.0 | 0.0 | 2,187.4 | 36.2 | 71.2 | 99.0 | 11.0 | 217.4 |
| XI | 455.2 | 129.9 | 1,224.4 | 144.7 | 1,954.2 | 15.2 | 92.5 | 319.1 | 26.9 | 453.7 |
| XII | 397.1 | 28.5 | 834.0 | 201.8 | 1,461.4 | 21.7 | 32.6 | 71.1 | 3.1 | 128.5 |

TABLE 7(2) EXISTING ROAD LENGTH, 1988

(km)

| | Municipal | | | | | Provincial | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Concrete | Asphalt | Gravel | Earth | Total | Concrete | Asphalt | Gravel | Earth | Total |
| Philippines | 1,712.4 | 1,574.5 | 6,383.0 | 3,224.8 | 12,858.7 | 714.1 | 2,584.4 | 20,477.9 | 5,215.0 | 28,991.4 |
| NCR | 351.2 | 162.0 | 29.4 | 11.8 | 518.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| I | 40.4 | 286.5 | 667.4 | 409.6 | 1,403.9 | 49.0 | 470.4 | 1,677.9 | 659.8 | 2,857.1 |
| II | 21.0 | 56.4 | 827.9 | 236.3 | 1,141.6 | 8.5 | 159.0 | 1,416.8 | 338.2 | 1,972.5 |
| III | 202.1 | 213.6 | 465.9 | 155.2 | 1,036.8 | 302.0 | 332.4 | 1,543.9 | 185.7 | 2,364.0 |
| IV | 330.1 | 239.3 | 594.1 | 217.3 | 1,380.8 | 151.6 | 488.8 | 2,824.5 | 401.7 | 3,866.6 |
| V | 107.1 | 192.3 | 361.0 | 121.2 | 781.6 | 35.1 | 318.2 | 1,082.3 | 361.0 | 1,796.6 |
| VI | 204.3 | 75.8 | 359.3 | 57.1 | 696.5 | 62.0 | 94.2 | 2,190.7 | 106.2 | 2,453.1 |
| VII | 97.6 | 144.6 | 457.6 | 229.4 | 929.2 | 13.7 | 170.0 | 1,918.6 | 261.5 | 2,363.8 |
| VIII | 246.9 | 18.2 | 310.8 | 138.0 | 713.9 | 60.6 | 327.4 | 830.6 | 185.2 | 1,403.8 |
| IX | 3.3 | 25.5 | 547.7 | 260.1 | 836.6 | 1.7 | 130.7 | 1,730.7 | 231.9 | 2,095.0 |
| X | 38.4 | 91.9 | 556.4 | 523.9 | 1,210.6 | 14.1 | 88.1 | 2,022.1 | 663.3 | 2,787.6 |
| XI | 39.5 | 33.5 | 758.7 | 429.5 | 1,261.2 | 10.7 | 4.5 | 2,210.5 | 783.7 | 3,009.4 |
| XII | 30.5 | 34.9 | 446.8 | 435.4 | 947.6 | 5.1 | 0.7 | 1,029.3 | 986.8 | 2,021.9 |

TABLE 7(3) EXISTING ROAD LENGTH, 1988

(km)

| | Barangay | | | | | Total | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Concrete | Asphalt | Gravel | Earth | Total | Concrete | Asphalt | Gravel | Earth | Total |
| Philippines | 299.1 | 557.7 | 84,826.6 | 0.0 | 85,685.7 | 9,554.7 | 12,551.9 | 126,254.3 | 9,338.9 | 157,664.1 |
| NCR | 0.0 | 0.0 | 234.7 | 0.0 | 234.7 | 1,079.9 | 1,416.1 | 437.2 | 11.8 | 2,909.0 |
| I | 18.5 | 72.4 | 9,898.6 | 0.0 | 9,989.8 | 565.5 | 1,932.4 | 13,314.9 | 1,162.6 | 16,975.7 |
| II | 1.2 | 0.0 | 7,453.1 | 0.0 | 7,454.3 | 629.8 | 324.2 | 11,229.8 | 686.4 | 12,870.2 |
| III | 83.9 | 19.1 | 7,619.9 | 0.0 | 7,722.9 | 1,441.0 | 1,185.0 | 10,062.5 | 386.1 | 13,074.6 |
| IV | 122.8 | 204.5 | 8,460.1 | 0.0 | 8,787.4 | 1,209.3 | 2,252.0 | 14,161.4 | 733.3 | 18,356.0 |
| V | 12.3 | 70.8 | 3,768.2 | 0.0 | 3,851.3 | 822.8 | 999.6 | 6,246.7 | 547.3 | 8,616.4 |
| VI | 49.3 | 99.8 | 7,753.0 | 0.0 | 7,902.1 | 714.3 | 1,211.4 | 11,885.5 | 167.9 | 13,979.1 |
| VII | 5.3 | 68.9 | 5,411.3 | 0.0 | 5,485.5 | 313.6 | 1,296.7 | 8,632.8 | 517.3 | 10,760.4 |
| VIII | 0.0 | 0.0 | 4,284.4 | 0.0 | 4,284.4 | 1,008.6 | 405.5 | 6,598.2 | 424.0 | 8,436.3 |
| IX | 0.0 | 6.1 | 5,432.0 | 0.0 | 5,438.1 | 65.8 | 551.8 | 8,400.6 | 492.1 | 9,510.3 |
| X | 4.5 | 13.4 | 8,379.5 | 0.0 | 8,397.4 | 727.8 | 617.4 | 12,257.0 | 1,198.2 | 14,800.4 |
| XI | 0.0 | 0.0 | 8,769.4 | 0.0 | 8,769.4 | 520.6 | 260.4 | 13,282.1 | 1,384.8 | 15,447.9 |
| XII | 1.3 | 2.7 | 7,364.4 | 0.0 | 7,368.4 | 455.7 | 99.4 | 9,745.6 | 1,627.1 | 11,927.8 |