

## 5 混合土による分散性低減効果検証試験

### 5.1 試験条件

これまでに示した現状土の試験結果を参考に、分散性と判定された試料の内、比較的分散性が高いと考えられる試料に対し、非分散性と判定された試料を添加した混合土による試験を実施した。

実施した混合土の試験ケースは表 5-1 に示す通りである。

なお、試験ケースは次のように設定した。

- ・ 分散性土に非分散性土を添加するケース (表 5-1 の上 4 段)
- ・ 混合する土の性質が混合土の性質に影響する可能性が考えられるため、残存する試料が多い試料No.2-8 を対象に、4 種の非分散性土を添加するケース (表 5-1 の下 4 段)
- ・ なお、試料No.2-6 は共通の添加土として採用し、添加する土による影響も確認する
- ・ 本調査では、試みとして混合比を試料の重量比で 対象試料 : 添加試料 = 2:1 とした

表 5-1 混合土の試験ケース一覧

| ケース名     | 試料No. | 添加試料 | 混合比                |
|----------|-------|------|--------------------|
| Mix1-4   | 1-4   | 2-6  | 対象試料 : 添加試料<br>2:1 |
| Mix1-5   | 1-5   | 2-7  |                    |
| Mix4-1   | 4-1   | 3-6  |                    |
| Mix4-2   | 4-2   | 3-7  |                    |
| Mix2-8-1 | 2-8   | 1-2  |                    |
| Mix2-8-2 |       | 2-4  |                    |
| Mix2-8-3 |       | 2-6  |                    |
| Mix2-8-4 |       | 3-3  |                    |

## 5.2 試験結果

### 5.2.1 一般土質試験結果

混合土の一般土質試験結果は表 5-2、表 5-3 に示す通りである。

現状土 (未混合土) の試験結果(表 4-1、表 4-2)と比較すると、試料のばらつきの影響もあり、混合した 2 試料の中間的な数値になっていないケースも認められるが、締固め試験結果については、全てのケースで混合した 2 試料の中間的な最大乾燥密度を示した。

なお、次節に示す分散性判定のための試験には粒度試験に使用したものと同一の試料は用いず、分散性判定のための試験に用いる 2mm 以下の試料のみを 2:1 の混合比で混ぜたものを使用することで、砂礫を含む試料全体での混合に比較してばらつきを少なく抑えることができるものと考えられる。

表 5-2 混合土の物理・透水試験結果

| 試料No.                      | Mix1-4 | Mix1-5  | Mix4-1 | Mix4-2  | Mix2-8-1 | Mix2-8-2 | Mix2-8-3 | Mix2-8-4 |
|----------------------------|--------|---------|--------|---------|----------|----------|----------|----------|
| 初期含水比 (%)                  | 3.00   | 2.05    | 3.08   | 3.98    | 4.13     | 3.87     | 3.57     | 4.97     |
| 土粒子密度 (g/cm <sup>3</sup> ) | 2.689  | 2.696   | 2.628  | 2.665   | 2.675    | 2.631    | 2.651    | 2.698    |
| 通過質量百分率 (%)                | 礫分     | 23.5    | 40.0   | 36.7    | 19.8     | 4.5      | 3.2      | 17.6     |
|                            | 砂分     | 27.5    | 31.2   | 20.7    | 29.4     | 38.4     | 36.3     | 34.7     |
|                            | シルト分   | 32.3    | 20.3   | 25.1    | 31.6     | 29.7     | 34.0     | 21.8     |
|                            | 粘土分    | 16.7    | 8.5    | 17.5    | 19.2     | 27.4     | 26.5     | 25.9     |
| 液性限界 (%)                   | 27.60  | 21.10   | 27.40  | 29.20   | 36.80    | 32.80    | 24.90    | 39.70    |
| 塑性限界 (%)                   | 13.45  | 12.15   | 13.45  | 18.17   | 12.36    | 9.57     | 11.22    | 12.15    |
| 塑性指数                       | 14.15  | 8.95    | 13.95  | 11.03   | 24.44    | 23.23    | 13.68    | 27.55    |
| 透水係数 (cm/s)                | -      | 9.6E-05 | -      | 7.6E-05 | -        | -        | 1.0E-06  | 1.1E-05  |

表 5-3 混合土の締固め試験結果

| 試料 No.                      | Mix1-4 | Mix1-5 | Mix4-1 | Mix4-2 | Mix2-8-1 | Mix2-8-2 | Mix2-8-3 | Mix2-8-4 |
|-----------------------------|--------|--------|--------|--------|----------|----------|----------|----------|
| 最大乾燥密度 (g/cm <sup>3</sup> ) | 1.910  | 1.952  | 1.821  | 1.773  | 1.808    | 1.868    | 1.870    | 1.798    |
| 最適含水比 (%)                   | 12.4   | 11.2   | 14.5   | 14.5   | 12.9     | 12.8     | 13.0     | 14.1     |

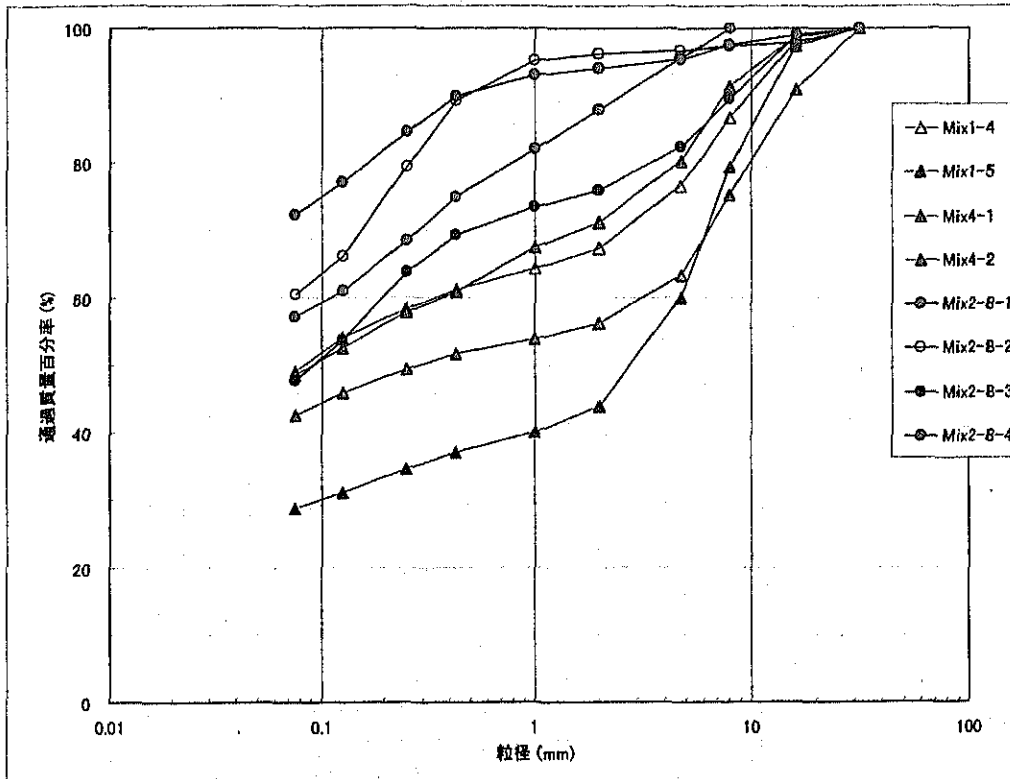


図 5-1 混合土の粒径加積曲線

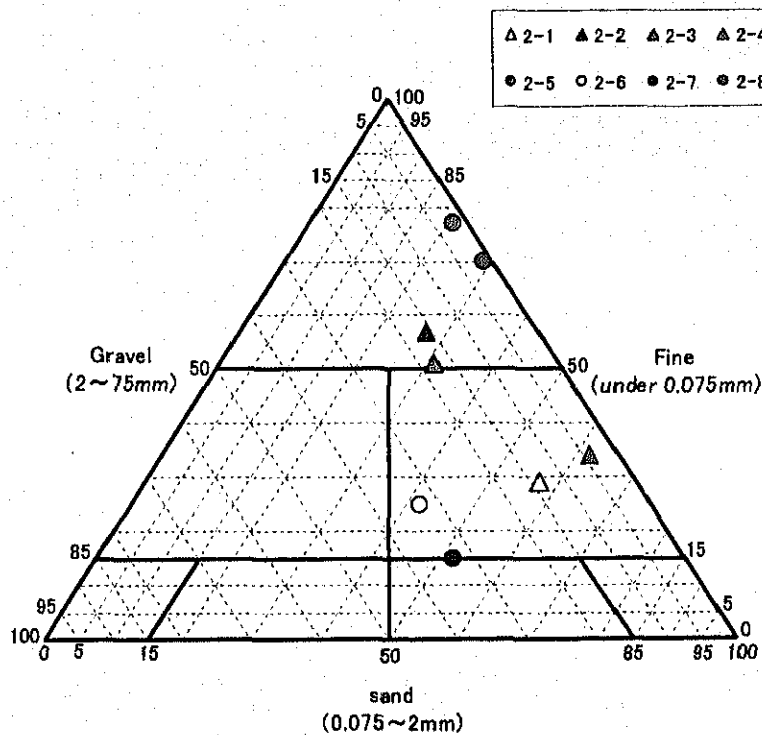


図 5-2 三角座標表記による粒度分布

### 5.2.2 分散性判定試験結果

混合土の分散性判定試験結果を表 5-4～表 5-7、図 5-3 に、4 種の分散判定試験結果を基にした総合判定結果を表 5-8 に示す。

なお、各試験結果の表の右端には、現状土（未混合土）における分散性判定結果を記した。試験結果より、次のことが言える。

- ・ 分散性土に非分散性土を添加しても、分散性土が混在している限りは分散性が残っているため、分散性土と判定される
- ・ 8 試験を行った内の 2 試験でピンホール試験結果が改善された(分散性が低減した)が、ダブルハイドロメータ試験、クラム試験では現状土と変わらず分散性と判定されたため、混合土による効果があるとは明言できない

以上の結果から、分散性土に非分散性土を添加するだけでは土の分散性が残っているため、ドラゴンホールやガリー侵食に対する有効な対策とはなり得ないことが分かった。

したがって、現地発生材に限らず外部からの搬入土を混入することも、同様に有効な対策とはならないものと判断する。

表 5-4 混合土のクラム試験結果

| 試料No.    | 高分散性    | 分散性     | 中性      | 非分散性    | 未改良時の判定 |
|----------|---------|---------|---------|---------|---------|
|          | Grade 4 | Grade 3 | Grade 2 | Grade 1 |         |
| Mix1-4   | ○       |         |         |         | Grade 4 |
| Mix1-5   | ○       |         |         |         | Grade 4 |
| Mix4-1   | ○       |         |         |         | Grade 4 |
| Mix4-2   | ○       |         |         |         | Grade 3 |
| Mix2-8-1 | ○       |         |         |         | Grade 4 |
| Mix2-8-2 | ○       |         |         |         | Grade 4 |
| Mix2-8-3 | ○       |         |         |         | Grade 4 |
| Mix2-8-4 | ○       |         |         |         | Grade 4 |

表 5-5 混合土のダブルハイドロメータ試験結果

| 試料No.    | A値   | B値   | 分散率<br>D <sub>p</sub> (%) | 分散性<br>[D <sub>p</sub> ≥ 50%] | 中性<br>[50% > D <sub>p</sub> > 30%] | 非分散性<br>[D <sub>p</sub> ≤ 30%] | 未改良時の判定 |
|----------|------|------|---------------------------|-------------------------------|------------------------------------|--------------------------------|---------|
| Mix1-4   | 19.0 | 16.7 | 113.8                     | ○                             |                                    |                                | 分散性     |
| Mix1-5   | 9.0  | 8.5  | 105.9                     | ○                             |                                    |                                | 分散性     |
| Mix4-1   | 15.0 | 17.5 | 85.7                      | ○                             |                                    |                                | 分散性     |
| Mix4-2   | 13.5 | 19.2 | 70.3                      | ○                             |                                    |                                | 分散性     |
| Mix2-8-1 | 27.8 | 27.4 | 101.5                     | ○                             |                                    |                                | 分散性     |
| Mix2-8-2 | 32.6 | 26.5 | 123.0                     | ○                             |                                    |                                | 分散性     |
| Mix2-8-3 | 24.0 | 25.5 | 94.1                      | ○                             |                                    |                                | 分散性     |
| Mix2-8-4 | 42.5 | 45.0 | 94.4                      | ○                             |                                    |                                | 分散性     |

表 5-6 混合土のピンホール試験結果

| 試料No.    | 分散性 |    | 中性  |     | 非分散性 |     | 未改良時の判定 |
|----------|-----|----|-----|-----|------|-----|---------|
|          | D1  | D2 | ND4 | ND3 | ND2  | ND1 |         |
| Mix1-4   |     | ○  |     |     |      |     | D2      |
| Mix1-5   |     | ○  |     |     |      |     | D2      |
| Mix4-1   |     |    |     |     |      | ○   | D2      |
| Mix4-2   |     |    |     |     |      | ○   | D2      |
| Mix2-8-1 |     | ○  |     |     |      |     | D2      |
| Mix2-8-2 |     | ○  |     |     |      |     | D2      |
| Mix2-8-3 |     | ○  |     |     |      |     | D2      |
| Mix2-8-4 |     | ○  |     |     |      |     | D2      |

表 5-7 混合土の化学分析試験結果

| 試料No.    | 陽イオン量 (me/L)    |                |                  |                  | TDS (me/L) | PS (%) | 分散性<br>Zone A | 中性<br>Zone B | 非分散性<br>Zone C | 未改良時の判定 |
|----------|-----------------|----------------|------------------|------------------|------------|--------|---------------|--------------|----------------|---------|
|          | Na <sup>+</sup> | K <sup>+</sup> | Ca <sup>2+</sup> | Mg <sup>2+</sup> |            |        |               |              |                |         |
| Mix1-4   | 0.099           | 0.068          | 0.014            | 0.020            | 0.201      | 49.2   |               |              | ○              | 非分散性    |
| Mix1-5   | 0.091           | 0.062          | 0.024            | 0.020            | 0.197      | 46.1   |               |              | ○              | 非分散性    |
| Mix4-1   | 0.095           | 0.109          | 0.019            | 0.026            | 0.249      | 38.1   |               |              | ○              | 非分散性    |
| Mix4-2   | 0.072           | 0.121          | 0.011            | 0.024            | 0.229      | 31.5   |               |              | ○              | 非分散性    |
| Mix2-8-1 | 0.124           | 0.068          | 0.019            | 0.025            | 0.236      | 52.8   |               |              | ○              | 非分散性    |
| Mix2-8-2 | 0.125           | 0.071          | 0.016            | 0.022            | 0.235      | 53.4   |               |              | ○              | 非分散性    |
| Mix2-8-3 | 0.127           | 0.051          | 0.016            | 0.018            | 0.213      | 59.5   |               |              | ○              | 非分散性    |
| Mix2-8-4 | 0.124           | 0.041          | 0.014            | 0.022            | 0.201      | 61.7   |               |              | ○              | 非分散性    |

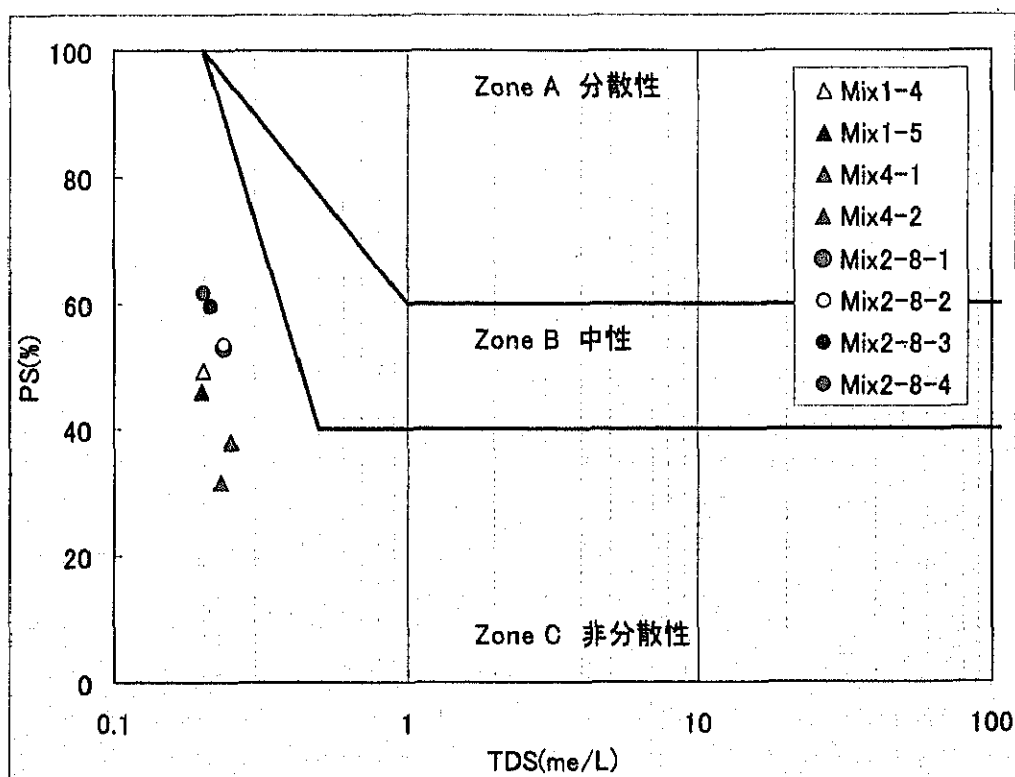


図 5-3 混合土の化学分析試験結果

表 5-8 混合土の分散性の総合判定

| 試料No.    | クラム試験   |         |         |         | ダブルハイドロメータ試験      |                     |                   | ピンホール試験 |    |      |     | 化学分析 |      |        | 判定     |        |   |
|----------|---------|---------|---------|---------|-------------------|---------------------|-------------------|---------|----|------|-----|------|------|--------|--------|--------|---|
|          | 高分散性    | 分散性     | 中性      | 非分散性    | 分散性               | 中性                  | 非分散性              | 分散性     | 中性 | 非分散性 | 分散性 | 中性   | 非分散性 | 分散性    | 中性     | 非分散性   |   |
|          | Grade 4 | Grade 3 | Grade 2 | Grade 1 | $[D_p \geq 50\%]$ | $[50 > D_p > 30\%]$ | $[D_p \leq 30\%]$ | D1      | D2 | ND4  | ND3 | ND2  | ND1  | Zone A | Zone B | Zone C |   |
| Mix1-4   | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |
| Mix1-5   | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |
| Mix4-1   | ○       |         |         |         | ○                 |                     |                   |         |    |      |     | ○    |      |        |        | ○      | ● |
| Mix4-2   | ○       |         |         |         | ○                 |                     |                   |         |    |      |     | ○    |      |        |        | ○      | ● |
| Mix2-8-1 | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |
| Mix2-8-2 | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |
| Mix2-8-3 | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |
| Mix2-8-4 | ○       |         |         |         | ○                 |                     |                   | ○       |    |      |     |      |      |        |        | ○      | ● |

## 6 まとめ

### 6.1 総括

これまで示した室内土質試験結果から以下のことがいえる。

- ・ プノンペン周辺には分散性土が広い範囲で分布している
- ・ 分散性土の分布状況と侵食被害の発生状況に明確な相関性は認められず、分散性土の存在だけが盛土被害発生の原因ではない
- ・ 被害のあるなしにかかわらず、分散性土が分布していることから、現在被害の確認されていない地区においても、雨季の洪水などにより今後被害が発生する可能性は高い
- ・ 近隣地区でも材料のバラツキが大きく、盛土品質の確保が難しい可能性がある
- ・ 非分散性土を添加することによる分散性低減は、十分な対策工にはなり得ない

また、締固め度が高くなれば水に対する抵抗性が向上することも考えられるため、ピンホール試験でも分散性と判定された試料No.1-1、1-4、1-5の3試料を用いて、締固め度100%条件でピンホール試験およびクラム試験を実施した。

これら3試料は、締固め度90%条件では全て分散性土と判定される「D2」であったが、締固め度100%条件では、試料No.1-4では同じく分散性と判定される「D2」、試料No.1-1、1-5は非分散性と判定される「ND1」という結果となった。ただし、密度は異なるものの同じ試料であるため、クラム試験での判定は密度条件(締固め度)が変わっても同じであった。

このことから、ピンホール試験結果が示すように、締固め度を向上させることで水に対する抵抗性が向上する可能性は確認できたものの、クラム試験結果が示すように、分散性土であれば締固め度(密度)によらず水に溶け出し易い性質は普遍であるため、施工密度を向上させるだけでは十分な対策にはならないことが確認できた。

更に、非分散性と判定されたにもかかわらず現地で変状が確認された試料No.1-2、3-3を用いて、締固め度85%条件でピンホール試験を実施した。

これら2試料は、締固め度90%条件では双方非分散性土と判定される「ND1」であったが、締固め度85%の緩い供試体においても同じく非分散性と判定される「ND1」という結果であった。

このことから、非分散性土であれば、施工上発生する可能性のある材料のばらつきによる締固め不足による分散性に対する著しい影響は小さいものと考えられる。ただし、締固め不足による強度不足は当然発生するため、材料に応じた施工品質管理は厳密にする必要がある。



## 6.2 対策手法の検討および今後の課題

現地で確認した状況および状況から考えられることを以下に記す。

- 盛土下部にドラゴンホールや濁水の滲み出した形跡が認められたことから、旧盛土や自然堤防等の旧地形と新設盛土との境界部が水道となり、ドラゴンホール形成の一要因となっている可能性がある。また、法面内で盛土の上から下への連続した流線が形成され、土が流されている状況もうかがえる。

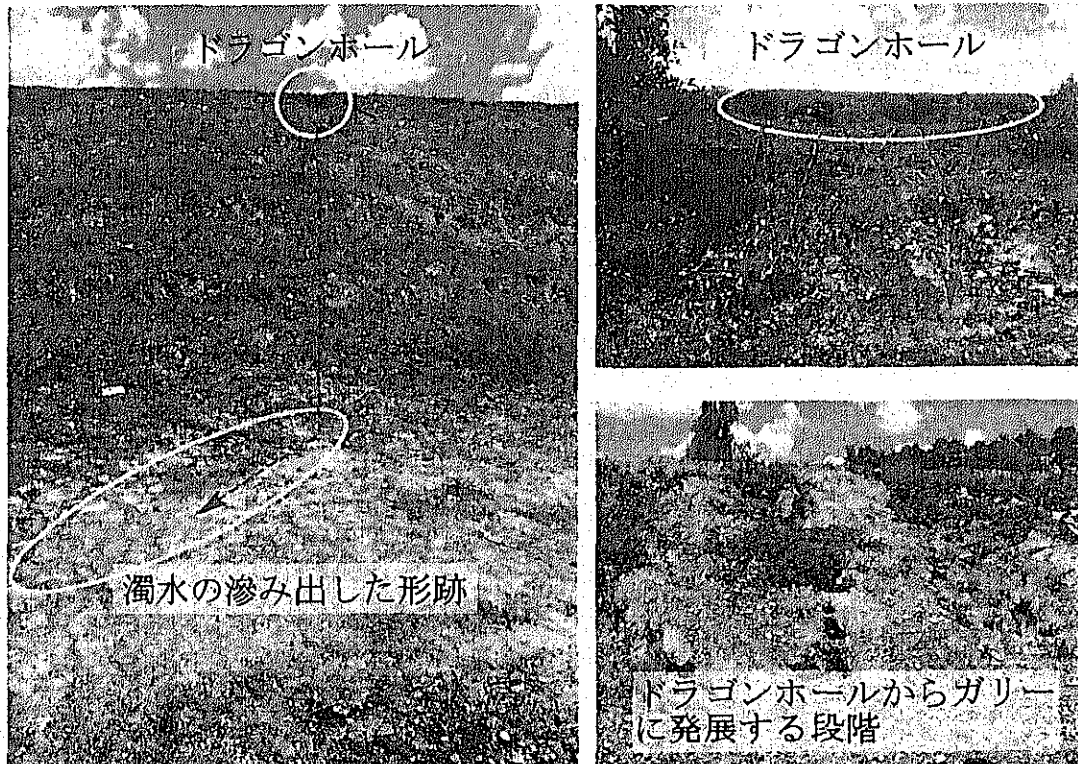


図 6-1 ドラゴンホールの状況

- 樹木の根元周辺にドラゴンホールが形成されていることが多いため、樹木の根に沿った水の流れによりドラゴンホール形成され易いと考えられる。これも、上記と同じく異物との境界が要因となったケースであると考えられる。
- 樹木に関しては、地元住民が勝手に盛土上に苗木を植えている箇所もあり、それらの樹木が成長するとドラゴンホールを誘発させる要因となるため、盛土管理上規制すべき事項であると考ええる。
- 雑草の類についても、植生の有無によらず被害が認められることから、植生による法面保護も恒久対策にはならないと考えられる。ただし、表面の保護という観点からは、樹木に比較して根が細く密に生える芝などの植生工は裸地状の盛土よりは有利ではないかと考える。

試験結果から分かったことおよび上記のような状況を踏まえて、分散性土が原因と考えられる盛土侵食被害対策としては、以下のような対策が考えられる。

- ① 盛土表面を完全に遮水し、分散性土を水分から隔離する
  - ② 排水性を向上させ、分散性土を長時間水浸させない
  - ③ セメント添加等により盛土本体を強化する
  - ④ 分散性土を高い確率で含む現地発生土ではなく、購入材で盛土を造成する
- 上記の各対策について以下に長所・短所等を記す。

表 6-1 対策工の特徴

| 対策 | 長所                                      | 短所                                    | 総合判定 |
|----|---|---------------------------------------|------|
| ①  | 現地発生材を有効に使える                            | 目地などからの浸水を完全に防ぐことはかなり困難である            | △    |
| ②  | 現地発生材を有効に使える<br>フィルターや水抜き程度の敷設であれば施工は簡単 | 異物との境界を水が流れる可能性が高く、長期的には不安定化を招く可能性がある | ×    |
| ③  | 現地発生土を有効に使える                            | 施工に手間がかかる<br>添加量によっては、材料費がかかる可能性がある   | ○    |
| ④  | 分散性土による被害の心配がない                         | 材料費、輸送費共に膨大な費用がかかる                    | △    |

いずれの方法にしても、洪水時に冠水するという道路盛土としては異常な状況下に置かれているため、施工後の維持管理は重要な事項であり、定期的なパトロールの実施を行い、被害の出始めの小さい変状の内に補修作業を行うことが重要であると考えられる。そのような維持管理ができれば、既存の道路盛土で今後発生する侵食被害も最小限に抑えることが可能であると考えられる。

また、新設盛土を造成する際にも、重要構造物（橋梁、カルバート等）周辺や重要区間は改良土とし、その他の区間では現地発生土（分散性土も含んでいる）を用いて従来通りに施工するにすれば、施工費の膨大な増加を抑えることが可能であると考えられる。ただし、その場合、定期的なパトロールを含んだ維持管理は必須条件となる。

以下に、施工時、施工後における留意点、および定期的なパトロールや小変状の補修等について考えられる事項を記す。

- ・ 品質確認試験による材料特性の把握、施工品質の確認により、可能な限り施工むらを少なくし、施工管理基準以上の品質を確保する施工
- ・ 材料のばらつきが大きいと、材料品質の確認試験は現行の管理基準以上に頻繁に行うことが望ましい
- ・ 施工後の継続的なパトロールを含むモニタリングの実施
- ・ セメント等による改良材を用いた施工区間においても、重要区間であるため、通常施工区間と同様のパトロール、モニタリングを実施する必要がある
- ・ 雨季のように頻繁に雨や洪水にさらされる時期には少なくとも週1回のパトロール実施
- ・ 少雨期には、定期パトロールとして月1回のパトロール実施を基本とし、一時的な豪雨後には臨時パトロールを実施
- ・ 降雨後に路肩付近、路側に発生した水溜りはドラゴンホールの原因になる可能性が考えられるため、排水および土・砂を撒くなどの窪地を排除する対応を行う
- ・ 初期の小さなドラゴンホールであれば、土砂で穴を埋める程度の簡易な対策でも穴の急速な拡大を防げるのではないかと考える

なお、今後道路盛土を造成する際などに材料となる土の分散性を判定する必要がある場合、本調査の試験結果を踏まえて、材料特性の把握を目的とした一般土質試験および分散性判定のための試験として、以下の試験を行うことを提案する。

- ・ 一般土質試験：土粒子の密度試験、粒度試験、締固め試験
- ・ 分散性判定試験：クラム試験、ダブルハイドロメータ試験、ピンホール試験

ただし、ピンホール試験は高い分散性を有している土に対しての分散性判定に優れていると考えられるため、第一段階としてはクラム試験とダブルハイドロメータ試験で分散性を確認し、重要構造物周辺等詳細な検討が必要な場合にはピンホール試験も併せて実施するなどの対応も考えられる。

また、現状では最適と思われる改良土による対策を考えた場合、今後は以下のような事項が必要であると考ええる。

- ・ セメント配合試験 : 最適添加量の選定
- ・ 試験施工とモニタリング : 対策工の効果判定、改良層の厚さの検討など
- ・ 対策工の提案 : 実用化に向けての具体化

最後に、本調査ではプノンペン周辺の主要国道沿線から採取した試料による調査しか実施していないため、今後発展するカンボジア全土に広がる道路網を考えると、より広範囲での調査を行い、分散性粘土が全土に分布するものなのか、もしくは限られた地域にしか分布しないものなのか等の更なる調査を行うことが望ましいものと考ええる。

もしくは、道路の設計、施工時には必ず分散性土の判定試験を行い、当該地区の土質特性を十分に把握した設計、施工、および施工後における維持管理を行うことが重要であると考ええる。

最終的には、それらの結果を反映した設計・施工仕様書さらには維持管理マニュアルの構築が望まれる。



# 現状土の試験結果



## <分散性判定試験結果>





# ＜実験用水の品質証明書＞





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ក្រសួងឧស្សាហកម្ម រ៉ែ និង ថាមពល  
Ministry of Industry, Mines and Energy  
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មជ្ឈមណ្ឌលស្រាវជ្រាវនិងសាកល្បងកម្ពុជា( ម.ប.ឧ.ក)  
Industrial Laboratory Center of Cambodia (ILCC)  
លេខ (N°) : ០២០៤/០៦

ត្រីប័ត្រវិភាគគុណភាព  
Bulletin of Analysis  
\*\*\*\*\*

ឈ្មោះផលិតផល (Designation of Product) : ទឹកបរិសុទ្ធ  
ពាណិជ្ជសញ្ញា (Trade Mark) : (EUROTECH)  
ឈ្មោះម្ចាស់ ក្រុមហ៊ុន- សិប្បកម្ម (Name of entrepreneur of Company / Handicraft) : លោក-លោកស្រី  
អាសយដ្ឋាន ក្រុមហ៊ុន- សិប្បកម្ម (Address of Company / Handicraft) :  
ថ្ងៃទទួលបានវិភាគ (Received Date) : ០៩ មិថុនា ០៦ ថ្ងៃចេញលទ្ធផល (Issued Date) : ០៩ មិថុនា ០៦

| លក្ខណៈគីមី<br>Chemical Characteristics | ស្តង់ដារ- ទឹកផឹក<br>Standard- drinking water | លទ្ធផលវិភាគ<br>Results |
|--|--|------------------------|
| ១-pH                                   | 6.5 - 8.5                                    | 6.10                   |
| ២- សារធាតុរ៉ែអាលុយមីញ៉ូម<br>(T.D.S)    | < 800 ppm                                    | 0.00 ppm               |
| ៣- ភាពចំលងចរន្តអគ្គិសនី<br>(Cond.)     | < 1600 $\mu$ s / cm                          | 0.00 $\mu$ s / cm      |

បានឃើញ Approved

ក្នុងពេល ថ្ងៃទី ខែ ឆ្នាំ ២០០៦  
P.Penh..... ០៩... ០៦..... 2006

អនុប្រធាននាយកដ្ឋានជំនួយការអគ្គនាយក ឧសក.  
Assistance of GDI  
Deputy Director

In. Samdy  
អ៊ុន សំបូរ

បានពិនិត្យត្រឹមត្រូវ Verified

ក្នុងពេល ថ្ងៃទី ខែ ឆ្នាំ ២០០៦  
P.Penh ... ០៩... ០៦..... 2006

ប្រធានមន្ទីរពិសោធន៍មីក្រូជីវសាស្ត្រ ចំណីអាហារ និងគីមីសាស្ត្រ  
Chief of Food Microbiology and Chemicals Laboratory

តេឡ ប៉ាន់ដាវិទ្យា

ក្នុងពេល ថ្ងៃទី ខែ ឆ្នាំ ២០០៦

P.Penh... ០៩... ០៦..... 2006

អ្នកវិភាគ

Analyst

យស ធីត្យុដីតា

សំគាល់: លទ្ធផលនៃការវិភាគនេះ មិនអាចប្រើប្រាស់សំរាប់ការផ្សព្វផ្សាយបានទេ ដល់មានតែលេខចំពោះវត្ថុដែលបានបញ្ជូនមកប៉ុណ្ណោះ ។  
Note : The result of analysis is not to be used for advertising purposes and valid for the submitted sample only.



## ＜クラム試験結果＞



## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

curing time : 1 day

Sample No.1-1

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           |       |    |        |    |         |    |
| 2               | 2           |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.1-2

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           |       |    |        |    |         |    |
| 2               | 2           |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.1-3

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |      | 6 hours |      |
|-----------------|-------------|-------|------|--------|------|---------|------|
|                 |             | Grade | °C   | Grade  | °C   | Grade   | °C   |
| 1               | 1           | 1     | 30.5 | 2      | 29.5 | 3       | 28.5 |
| 2               | 2           | 1     | 30.5 | 2      | 29.5 | 3       | 28.5 |
|                 |             |       |      |        |      |         |      |
|                 |             |       |      |        |      |         |      |
| Judgement       |             |       |      |        |      | Grade 3 |      |

Sample No.1-4

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 30 | 4      | 29 | 4       | 29 |
| 2               | 2           | 1     | 30 | 4      | 29 | 4       | 29 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 4 |    |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

Sample No.1-5 Date 24/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |      |
|-----------------|-------------|-------|----|--------|----|---------|------|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C   |
| 1               | 1           | 2     | 29 | 4      | 29 | 4       | 29.5 |
| 2               | 2           | 2     | 29 | 4      | 29 | 4       | 29.5 |
|                 |             |       |    |        |    |         |      |
|                 |             |       |    |        |    |         |      |
| Judgement       |             |       |    |        |    | Grade 4 |      |

Sample No.1-6 Date 24/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|----|--------|------|---------|----|
|                 |             | Grade | °C | Grade  | °C   | Grade   | °C |
| 1               | 1           | 1     | 29 | 1      | 28.5 | 1       | 29 |
| 2               | 2           | 1     | 29 | 1      | 28.5 | 1       | 29 |
|                 |             |       |    |        |      |         |    |
|                 |             |       |    |        |      |         |    |
| Judgement       |             |       |    |        |      | Grade 1 |    |

Sample No.1-7 Date 24/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 29 | 2      | 29 | 3       | 29 |
| 2               | 2           | 1     | 29 | 2      | 29 | 3       | 29 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 3 |    |

Sample No.1-8 Date 24/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |      | 6 hours |      |
|-----------------|-------------|-------|----|--------|------|---------|------|
|                 |             | Grade | °C | Grade  | °C   | Grade   | °C   |
| 1               | 1           | 2     | 29 | 4      | 28.5 | 4       | 29.5 |
| 2               | 2           | 2     | 29 | 4      | 28.5 | 4       | 29.5 |
|                 |             |       |    |        |      |         |      |
|                 |             |       |    |        |      |         |      |
| Judgement       |             |       |    |        |      | Grade 4 |      |



## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

curing time : 1 day

Sample No.2-1

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 29 | 2      | 28 | 3       | 28 |
| 2               | 2           | 1     | 29 | 2      | 28 | 3       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 3 |    |

Sample No.2-2

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 29 | 1      | 28 | 1       | 28 |
| 2               | 2           | 1     | 29 | 1      | 28 | 1       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.2-3

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|----|--------|------|---------|----|
|                 |             | Grade | °C | Grade  | °C   | Grade   | °C |
| 1               | 1           | 2     | 29 | 3      | 28.5 | 4       | 28 |
| 2               | 2           | 2     | 29 | 3      | 28.5 | 4       | 28 |
|                 |             |       |    |        |      |         |    |
|                 |             |       |    |        |      |         |    |
| Judgement       |             |       |    |        |      | Grade 4 |    |

Sample No.2-4

Date 23/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|------|--------|----|---------|----|
|                 |             | Grade | °C   | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 28.5 | 1      | 28 | 2       | 28 |
| 2               | 2           | 1     | 28.5 | 1      | 28 | 2       | 28 |
|                 |             |       |      |        |    |         |    |
|                 |             |       |      |        |    |         |    |
| Judgement       |             |       |      |        |    | Grade 1 |    |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

Sample No.2-5

Date 27/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |      |
|-----------------|-------------|-------|----|--------|----|---------|------|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C   |
| 1               | 1           | 2     | 29 | 3      | 28 | 4       | 28.5 |
| 2               | 2           | 2     | 29 | 3      | 28 | 4       | 28.5 |
|                 |             |       |    |        |    |         |      |
|                 |             |       |    |        |    |         |      |
| Judgement       |             |       |    |        |    | Grade 4 |      |

Sample No.2-6

Date 27/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 2     | 29 | 2      | 28 | 2       | 28 |
| 2               | 2           | 2     | 29 | 2      | 28 | 2       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 2 |    |

Sample No.2-7

Date 27/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|------|--------|------|---------|----|
|                 |             | Grade | °C   | Grade  | °C   | Grade   | °C |
| 1               | 1           | 1     | 28.5 | 1      | 28.5 | 2       | 28 |
| 2               | 2           | 1     | 28.5 | 1      | 28.5 | 2       | 28 |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
| Judgement       |             |       |      |        |      | Grade 1 |    |

Sample No.2-8

Date 27/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |    | 6 hours |      |
|-----------------|-------------|-------|------|--------|----|---------|------|
|                 |             | Grade | °C   | Grade  | °C | Grade   | °C   |
| 1               | 1           | 2     | 28.5 | 4      | 28 | 4       | 28.5 |
| 2               | 2           | 2     | 28.5 | 4      | 28 | 4       | 28.5 |
|                 |             |       |      |        |    |         |      |
|                 |             |       |      |        |    |         |      |
| Judgement       |             |       |      |        |    | Grade 4 |      |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

curing time : 1 day

Sample No.3-1

Date 28/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 30 | 1      | 29 | 1       | 29 |
| 2               | 2           | 1     | 30 | 1      | 29 | 1       | 29 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.3-2

Date 28/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 30 | 1      | 29 | 1       | 28 |
| 2               | 2           | 1     | 30 | 1      | 29 | 1       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.3-3

Date 28/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 30 | 1      | 29 | 1       | 28 |
| 2               | 2           | 1     | 30 | 1      | 29 | 1       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.3-4

Date 28/06/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 30 | 2      | 29 | 2       | 28 |
| 2               | 2           | 1     | 30 | 2      | 29 | 2       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 2 |    |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

Sample No.3-5

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|------|--------|----|---------|----|
|                 |             | Grade | °C   | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 29.5 | 1      | 29 | 1       | 28 |
| 2               | 2           | 1     | 29.5 | 1      | 29 | 1       | 28 |
|                 |             |       |      |        |    |         |    |
|                 |             |       |      |        |    |         |    |
|                 |             |       |      |        |    |         |    |
| Judgement       |             |       |      |        |    | Grade 1 |    |

Sample No.3-6

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|------|--------|------|---------|----|
|                 |             | Grade | °C   | Grade  | °C   | Grade   | °C |
| 1               | 1           | 1     | 29.5 | 1      | 28.5 | 1       | 28 |
| 2               | 2           | 1     | 29.5 | 1      | 28.5 | 1       | 28 |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
| Judgement       |             |       |      |        |      | Grade 1 |    |

Sample No.3-7

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|------|--------|------|---------|----|
|                 |             | Grade | °C   | Grade  | °C   | Grade   | °C |
| 1               | 1           | 1     | 29.5 | 1      | 28.5 | 1       | 27 |
| 2               | 2           | 1     | 29.5 | 1      | 28.5 | 1       | 27 |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
| Judgement       |             |       |      |        |      | Grade 1 |    |

Sample No.3-8

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |      | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|------|--------|------|---------|----|
|                 |             | Grade | °C   | Grade  | °C   | Grade   | °C |
| 1               | 1           | 2     | 29.5 | 1      | 28.5 | 1       | 28 |
| 2               | 2           | 2     | 29.5 | 1      | 28.5 | 1       | 28 |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
|                 |             |       |      |        |      |         |    |
| Judgement       |             |       |      |        |      | Grade 1 |    |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

curing time : 1 day

Sample No.4-1

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 2     | 29             | 3      | 28.5           | 4       | 28             |
| 2               | 2           | 2     | 29             | 3      | 28.5           | 4       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 4 |                |

Sample No.4-2

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 2     | 29.5           | 3      | 29             | 3       | 28             |
| 2               | 2           | 2     | 29.5           | 3      | 29             | 3       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 3 |                |

Sample No.4-3

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 29.5           | 1      | 29             | 1       | 28             |
| 2               | 2           | 1     | 29.5           | 1      | 29             | 1       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 1 |                |

Sample No.4-4

Date 29/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 30             | 2      | 29             | 2       | 28             |
| 2               | 2           | 1     | 30             | 2      | 29             | 2       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 2 |                |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 90%, water content : plastic limit

Sample No.4-5

Date 30/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 28.5           | 1      | 28             | 1       | 28.5           |
| 2               | 2           | 1     | 28.5           | 1      | 28             | 1       | 28.5           |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 1 |                |

Sample No.4-6

Date 30/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 28.5           | 1      | 28             | 1       | 28             |
| 2               | 2           | 1     | 28.5           | 1      | 28             | 1       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 1 |                |

Sample No.4-7

Date 30/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 28.5           | 1      | 28             | 2       | 28             |
| 2               | 2           | 1     | 28.5           | 2      | 28             | 2       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 2 |                |

Sample No.4-8

Date 30/06/2006

| Specimen Number | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|-----------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                 |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
| 1               | 1           | 1     | 28.5           | 1      | 28             | 1       | 28             |
| 2               | 2           | 1     | 28.5           | 1      | 28             | 1       | 28             |
|                 |             |       |                |        |                |         |                |
|                 |             |       |                |        |                |         |                |
| Judgement       |             |       |                |        |                | Grade 1 |                |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 100%, water content : plastic limit

curing time : 1 day

Sample No.1-1

Date 03/07/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
| 1               | 1           | 1     | 28 | 1      | 28 | 1       | 28 |
| 2               | 2           | 1     | 28 | 1      | 28 | 1       | 28 |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    | Grade 1 |    |

Sample No.1-4

Date 03/07/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |      | 6 hours |    |
|-----------------|-------------|-------|----|--------|------|---------|----|
|                 |             | Grade | °C | Grade  | °C   | Grade   | °C |
| 1               | 1           | 1     | 28 | 4      | 28.5 | 4       | 28 |
| 2               | 2           | 1     | 28 | 4      | 28.5 | 4       | 28 |
|                 |             |       |    |        |      |         |    |
|                 |             |       |    |        |      |         |    |
| Judgement       |             |       |    |        |      | Grade 4 |    |

Sample No.1-5

Date 03/07/2006

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |      |
|-----------------|-------------|-------|----|--------|----|---------|------|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C   |
| 1               | 1           | 1     | 28 | 3      | 28 | 4       | 28.5 |
| 2               | 2           | 1     | 28 | 3      | 28 | 4       | 28.5 |
|                 |             |       |    |        |    |         |      |
|                 |             |       |    |        |    |         |      |
| Judgement       |             |       |    |        |    | Grade 4 |      |

Sample No.

Date

| Specimen Number | Dish Number | 2 min |    | 1 hour |    | 6 hours |    |
|-----------------|-------------|-------|----|--------|----|---------|----|
|                 |             | Grade | °C | Grade  | °C | Grade   | °C |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
|                 |             |       |    |        |    |         |    |
| Judgement       |             |       |    |        |    |         |    |

## CRUMB TEST FOR DISPERSIBILITY OF CLAYEY SOILS

condition of sample : disturbed soil

condition of specimen : 1.7cm cubic, degree of compaction 85%, water content : plastic limit

Sample No.1-2

Date 11/07/2006

| Specimen Number  | Dish Number | 2 min |                | 1 hour |                | 6 hours        |                |
|------------------|-------------|-------|----------------|--------|----------------|----------------|----------------|
|                  |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade          | <sup>o</sup> C |
| 1                | 1           | 1     | 30             | 1      | 29.5           | 1              | 29             |
| 2                | 2           | 1     | 30             | 1      | 29.5           | 1              | 29             |
|                  |             |       |                |        |                |                |                |
|                  |             |       |                |        |                |                |                |
| <b>Judgement</b> |             |       |                |        |                | <b>Grade 1</b> |                |

Sample No.3-3

Date 11/07/2006

| Specimen Number  | Dish Number | 2 min |                | 1 hour |                | 6 hours        |                |
|------------------|-------------|-------|----------------|--------|----------------|----------------|----------------|
|                  |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade          | <sup>o</sup> C |
| 1                | 1           | 1     | 30             | 1      | 29.5           | 1              | 29.5           |
| 2                | 2           | 1     | 30             | 1      | 29.5           | 1              | 29.5           |
|                  |             |       |                |        |                |                |                |
|                  |             |       |                |        |                |                |                |
| <b>Judgement</b> |             |       |                |        |                | <b>Grade 1</b> |                |

Date

| Specimen Number  | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|------------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                  |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
| <b>Judgement</b> |             |       |                |        |                |         |                |

Sample No.

Date

| Specimen Number  | Dish Number | 2 min |                | 1 hour |                | 6 hours |                |
|------------------|-------------|-------|----------------|--------|----------------|---------|----------------|
|                  |             | Grade | <sup>o</sup> C | Grade  | <sup>o</sup> C | Grade   | <sup>o</sup> C |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
|                  |             |       |                |        |                |         |                |
| <b>Judgement</b> |             |       |                |        |                |         |                |



## <ダブルハイドロメータ試験結果>



PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |                                 |            |        |        |                 |  |            |  |  |
|--|---------------------------------|------------|--------|--------|-----------------|--|------------|--|--|
| Sample No.: <b>11</b>  | Testing Date : <b>16-Jun-06</b> |            |        |        |                 |  |            |  |  |
| Depth : _____  | Checked by Ket Chansavuth       |            |        |        |                 |  |            |  |  |
|  | Tested by : Chou Sarem          |            |        |        |                 |  |            |  |  |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p> <p>Legend:<br/>             ● dw<br/>             ▲ da<br/>             — Poly. (dw)<br/>             - - - Poly. (da)</p>  |                                 |            |        |        |                 |  |            |  |  |
| Comments<br>A= 20 %<br>B= 34 %<br>% Dispersion = <b>58.82</b>  |                                 |            |        |        |                 |  |            |  |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |                                 |            |        |        |                 |  |            |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td style="text-align: center;">SIEVE TEST</td> <td></td> </tr> </table> | CLAY                            | SILT       | SAND   | COBBLE | HYDROMETER TEST |  | SIEVE TEST |  |  |
| CLAY   | SILT                            | SAND       | COBBLE |        |                 |  |            |  |  |
| HYDROMETER TEST  |                                 | SIEVE TEST |        |        |                 |  |            |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

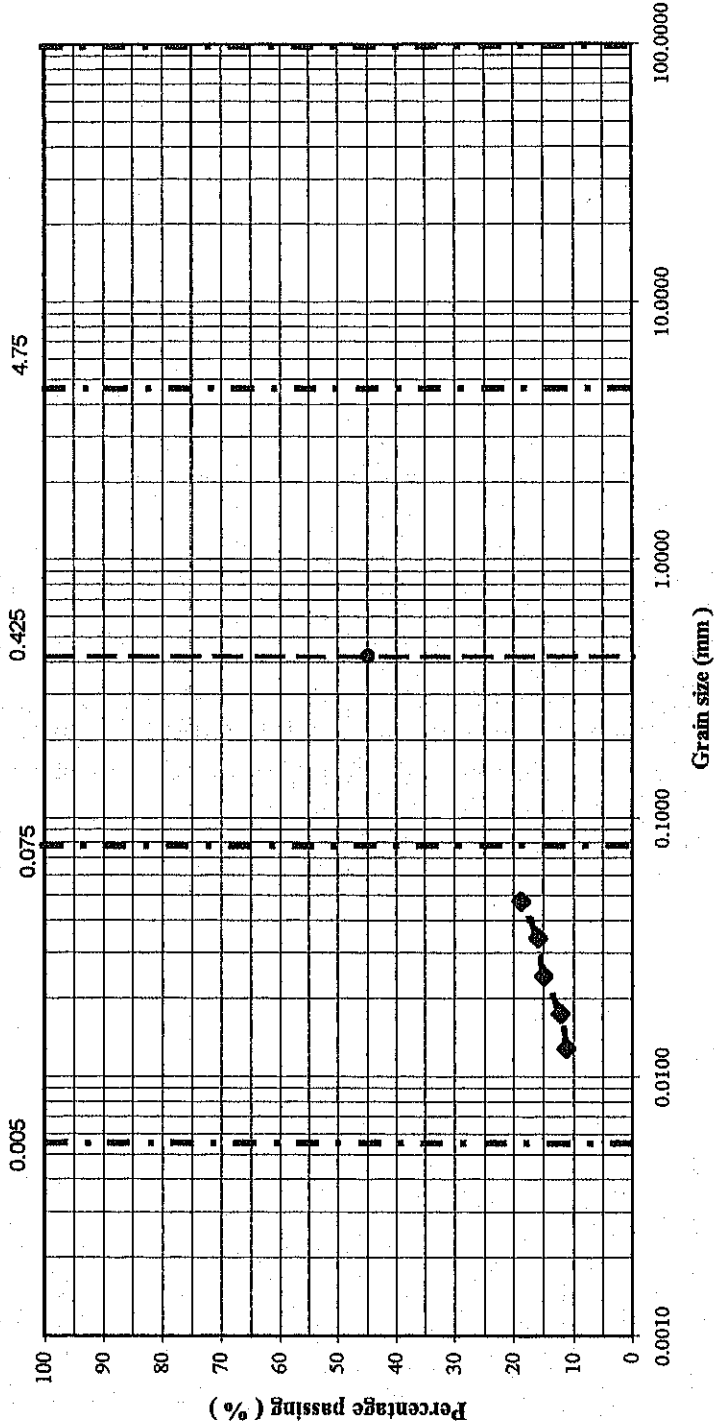
GRAIN-SIZE ANALYSIS

Sample No.: 1\_2 Testing Date : 11-Jun-06  
 Depth : \_\_\_\_\_

Checked by : Kei Chansavuth

Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



| Grain size (mm) | %passing | TEST TYPE       |
|-----------------|----------|-----------------|
| #DIV/0!         | 7.57     | HYDROMETER TEST |
| #DIV/0!         | 7.57     |                 |
| #DIV/0!         | 7.57     |                 |
| #DIV/0!         | 7.57     |                 |
| #DIV/0!         | 7.57     | SIEVE TEST      |
| 0.01285         | 11.16    |                 |
| 0.01754         | 12.11    |                 |
| 0.02441         | 14.95    |                 |
| 0.03430         | 15.89    |                 |
| 0.04770         | 18.73    |                 |
| 0.075           |          |                 |
| 0.125           |          |                 |
| 0.250           |          |                 |
| 0.425           | 44.90    |                 |
| 1               |          |                 |
| 2               |          |                 |
| 4.75            |          |                 |
| 8               |          |                 |
| 16              |          |                 |
| 31.5            |          |                 |

|                |   |
|----------------|---|
| Silt : _____   | % |
| Clay : _____   | % |
| Sand : _____   | % |
| Gravel : _____ | % |

Sample Description :

| CLAY | SAND |        |        | GRAVEL | Cobb |
|------|------|--------|--------|--------|------|
|      | Fine | Medium | Coarse |        |      |
|      |      |        |        |        |      |

HYDROMETER TEST SIEVE TEST

Remark :

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |  |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
|--|--|---|--------|--------|--------|------|---|------|--------|--------|------|--|--|--|---|-----------------|------------|
| Sample No.: <u>1 3</u><br>Depth : _____  | Testing Date : <u>20-Jun-06</u><br>_____ |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p> <p>Legend:<br/>                     ● dw<br/>                     ▲ da<br/>                     — Poly. (dw)<br/>                     - - Poly. (da)</p>  |  |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| Comments<br>A= 18 %<br>B= 30 %<br>% Dispersion = 60.00   |  |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |  |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Fine</td> <td style="width: 25%;">Medium</td> <td style="width: 25%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> </td> <td></td> </tr> </table> | CLAY                                     | SILT  | SAND   | COBBLE |        |      | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Fine</td> <td style="width: 25%;">Medium</td> <td style="width: 25%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine | Medium | Coars. | SAND |  |  |  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">HYDROMETER TEST</td> <td style="width: 50%; text-align: center;">SIEVE TEST</td> </tr> </table> | HYDROMETER TEST | SIEVE TEST |
| CLAY   | SILT                                     | SAND  | COBBLE |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
|  |  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Fine</td> <td style="width: 25%;">Medium</td> <td style="width: 25%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine   | Medium | Coars. | SAND |   |      |        |        |      |  |  |  |   |                 |            |
| Fine   | Medium                                   | Coars.  |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| SAND   |  |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |
| HYDROMETER TEST  | SIEVE TEST                               |   |        |        |        |      |   |      |        |        |      |  |  |  |   |                 |            |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |                                   |            |        |        |                 |  |            |  |  |
|--|-----------------------------------|------------|--------|--------|-----------------|--|------------|--|--|
| Sample No.: <u>14</u>  | Testing Date : <u>16-Jun-06</u>   |            |        |        |                 |  |            |  |  |
| Depth : _____  | Checked by: <u>Ket Chansavuth</u> |            |        |        |                 |  |            |  |  |
|  |                                   |            |        |        |                 |  |            |  |  |
| Comments<br>A = 38 %<br>B = 42 %<br>% Dispersion = <b>90.48</b>  |                                   |            |        |        |                 |  |            |  |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |                                   |            |        |        |                 |  |            |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td style="text-align: center;">SIEVE TEST</td> <td></td> </tr> </table> | CLAY                              | SILT       | SAND   | COBBLE | HYDROMETER TEST |  | SIEVE TEST |  |  |
| CLAY   | SILT                              | SAND       | COBBLE |        |                 |  |            |  |  |
| HYDROMETER TEST  |                                   | SIEVE TEST |        |        |                 |  |            |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 15

Testing Date : 16-Jun-06

Depth : \_\_\_\_\_

Checked by Ket Chansavuth

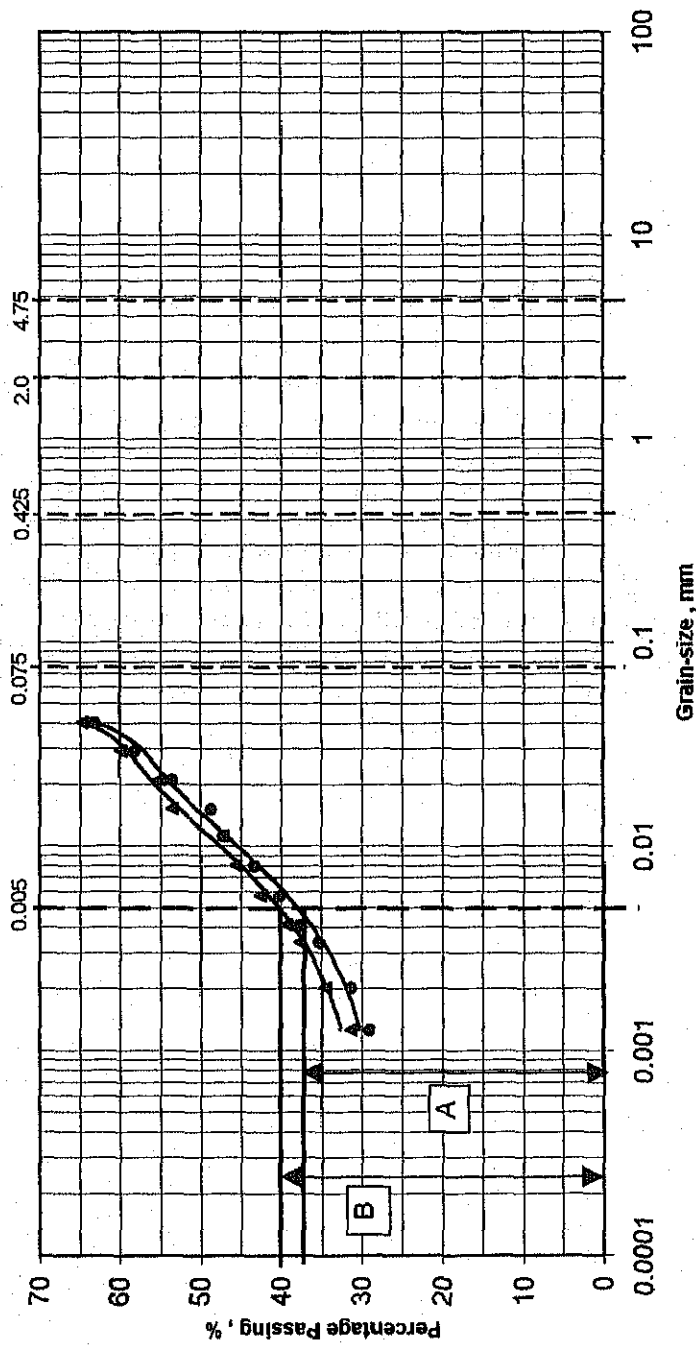
Tested by : Chou Sarem

Comments  
 A= 37.5 %  
 B= 40 %  
 % Dispersion = 93.75

Remark :  
 dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |  |            |        |        |                 |  |            |  |
|--|--|------------|--------|--------|-----------------|--|------------|--|
| Sample No.: <u>1_6</u><br>Depth: _____   | Testing Date : <u>16-Jun-06</u><br>_____ |            |        |        |                 |  |            |  |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p>   |  |            |        |        |                 |  |            |  |
| Comments<br>A= 34 %<br>B= 45 %<br>% Dispersion = 75.56   |  |            |        |        |                 |  |            |  |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem  |  |            |        |        |                 |  |            |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |  |            |        |        |                 |  |            |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td colspan="2" style="text-align: center;">SIEVE TEST</td> </tr> </table> | CLAY                                     | SILT       | SAND   | COBBLE | HYDROMETER TEST |  | SIEVE TEST |  |
| CLAY   | SILT                                     | SAND       | COBBLE |        |                 |  |            |  |
| HYDROMETER TEST  |  | SIEVE TEST |        |        |                 |  |            |  |

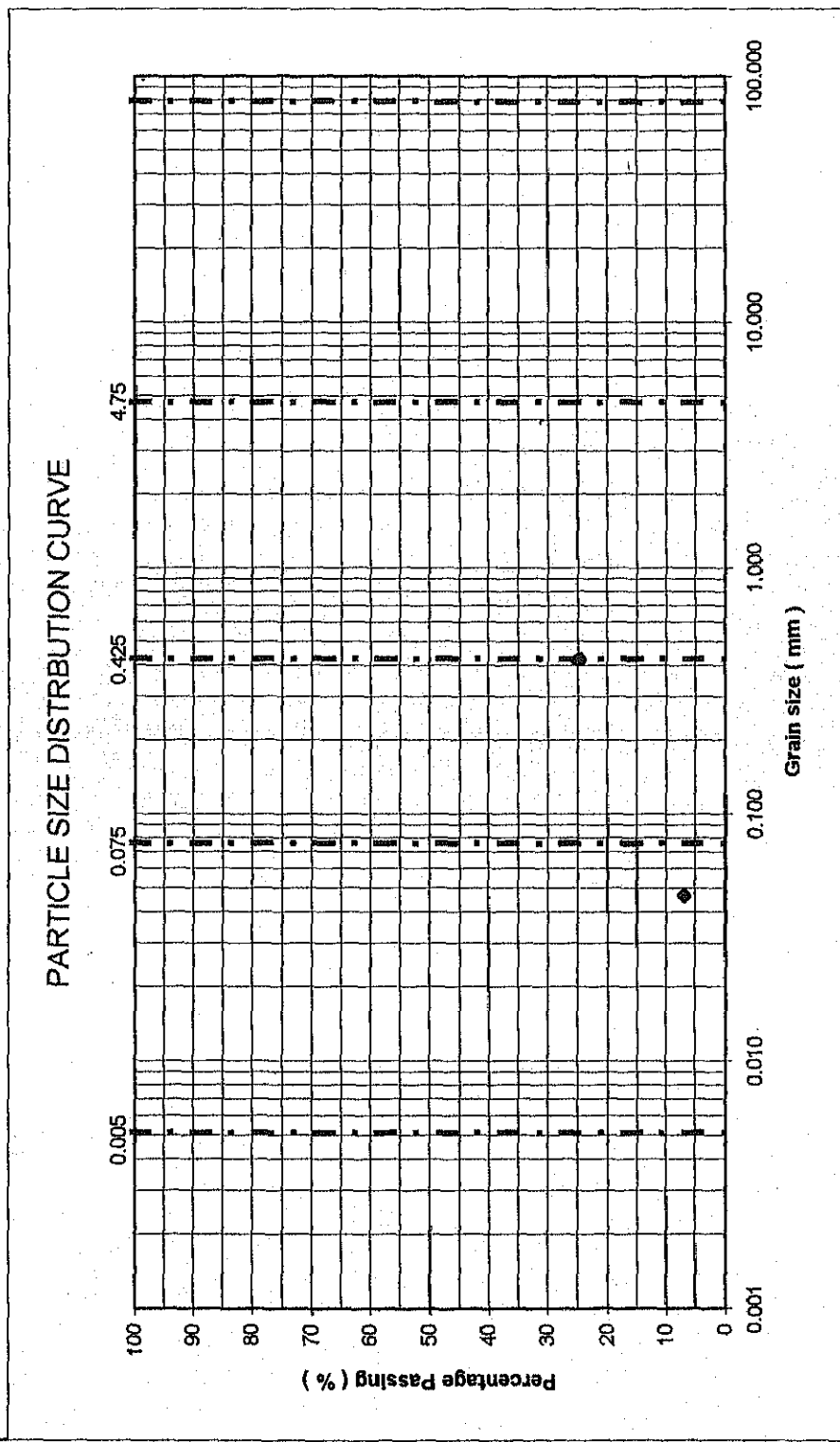


PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 1\_7 Testing Date : 11-Jun-06  
 Depth : \_\_\_\_\_

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem



| HYDROMETER TEST |          |
|-----------------|----------|
| Grain size(mm)  | %passing |
| 0.0000          | 13.48    |
| 0.0000          | 14.48    |
| 0.0000          | 15.49    |
| 0.0000          | 17.00    |
| 0.0000          | 18.00    |
| 0.0000          | 18.50    |
| 0.0000          | 20.52    |
| 0.0000          | 21.02    |
| 0.0000          | 22.53    |
| 0.04690         | 6.94     |

| SIEVE TEST     |          |
|----------------|----------|
| Grain size(mm) | %passing |
| 0.075          | 24.66    |
| 0.125          |          |
| 0.250          |          |
| 0.425          |          |
| 1              |          |
| 2              |          |
| 4.75           |          |
| 8              |          |
| 16             |          |
| 31.5           |          |

|          |   |
|----------|---|
| Silt :   | % |
| Clay :   | % |
| Sand :   | % |
| Gravel : | % |

Sample Description :

|                 |      |      |        |        |        |            |
|-----------------|------|------|--------|--------|--------|------------|
| CLAY            | SILT | Fine | Medium | Coarse | GRAVEL | Cobble     |
| HYDROMETER TEST |      |      | SAND   |        |        | SIEVE TEST |

Remark :

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST  |   |
|---|---|
| Sample No.: <u>18</u><br>Depth: _____   | Testing Date: <u>16-Jun-06</u><br>_____ |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p>  |   |
| Comments<br>A= 43 %<br>B= 42 %<br>% Dispersion = 102.38   |   |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem   |   |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent |   |

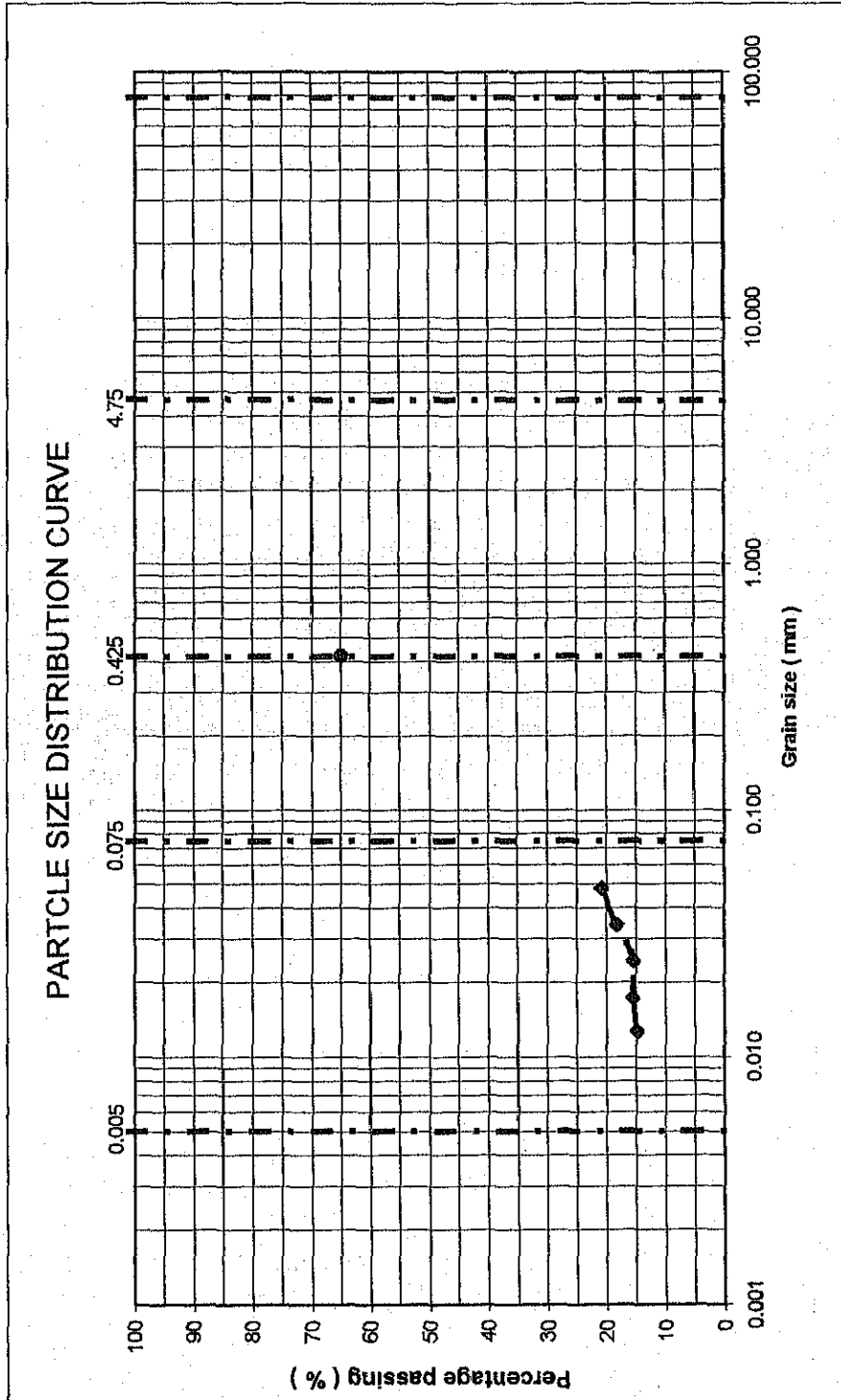
|                 |      |                                      |        |
|-----------------|------|--------------------------------------|--------|
| CLAY            | SILT | SAND                                 | COBBLE |
|                 |      | Fine      Medium      Coars.<br>SAND |        |
| HYDROMETER TEST |      | SIEVE TEST                           |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 2\_1      Testing Date : 11-Jun-06  
 Depth : \_\_\_\_\_

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem



| Grain size (mm) | %passing |
|-----------------|----------|
| #DIV/0!         | 15.53    |
| #DIV/0!         | 15.53    |
| #DIV/0!         | 15.53    |
| #DIV/0!         | 15.53    |
| #DIV/0!         | 15.53    |
| #DIV/0!         | 15.53    |
| 0.01268         | 14.87    |
| 0.01731         | 15.53    |
| 0.02448         | 15.53    |
| 0.03429         | 18.16    |
| 0.04803         | 20.80    |
| 0.075           |          |
| 0.125           |          |
| 0.250           |          |
| 0.425           | 64.86    |
| 1               |          |
| 2               |          |
| 4.75            |          |
| 8               |          |
| 16              |          |
| 31.5            |          |

Sieve Test  
 Silt : %  
 Clay : %  
 Sand : %  
 Gravel : %

Sample Description :

|                 |      |            |  |        |        |
|-----------------|------|------------|--|--------|--------|
| CLAY            | SILT | SAND       |  | GRAVEL | Cobble |
| HYDROMETER TEST |      | SIEVE TEST |  |        |        |

Remark :

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 2 2

Testing Date : 16-Jun-06

Depth :

Checked by Ket Chansavuth

Tested by : Chou Sarem

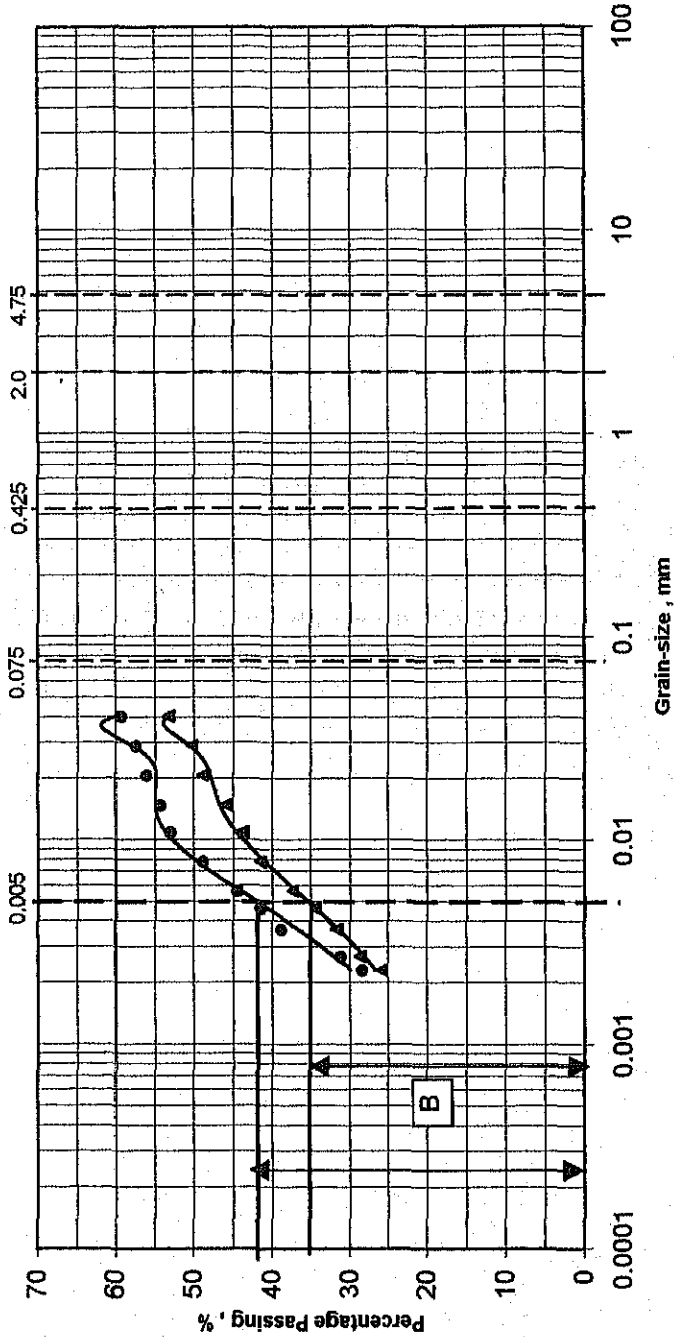
Comments  
 A= 42 %  
 B= 35 %

% Dispersion = 120.00

Remark :  
 dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



| HYDROMETER TEST |      | SAND |        |        | SIEVE TEST |        |
|-----------------|------|------|--------|--------|------------|--------|
| CLAY            | SILT | Fine | Medium | Coars. | GRAVEL     | COBBLE |
|                 |      | SAND |        |        |            |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 2\_3

Testing Date : 16-Jun-06

Depth :

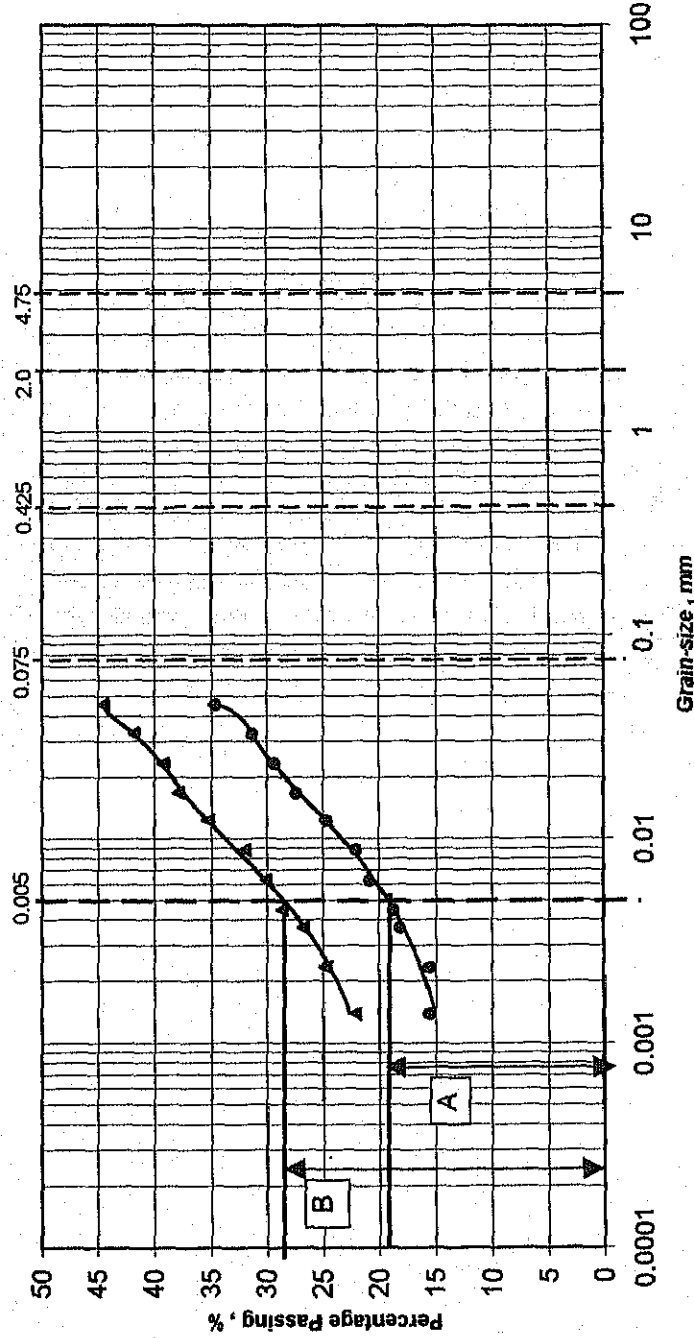
Checked by Ket Chansavuth

Tested by : Chou Sarem

Comments  
 A= 19 %  
 B= 28 %  
 % Dispersion = 67.86

Remark :  
 dw - Specimen soaked in Distilled Water  
 da - Specimen soaked in Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



| HYDROMETER TEST |      | SIEVE TEST |        |        |
|-----------------|------|------------|--------|--------|
| CLAY            | SILT | Fine       | Medium | Coars. |
|                 |      | SAND       |        |        |
|                 |      | GRAVEL     |        |        |
|                 |      | COBBLE     |        |        |

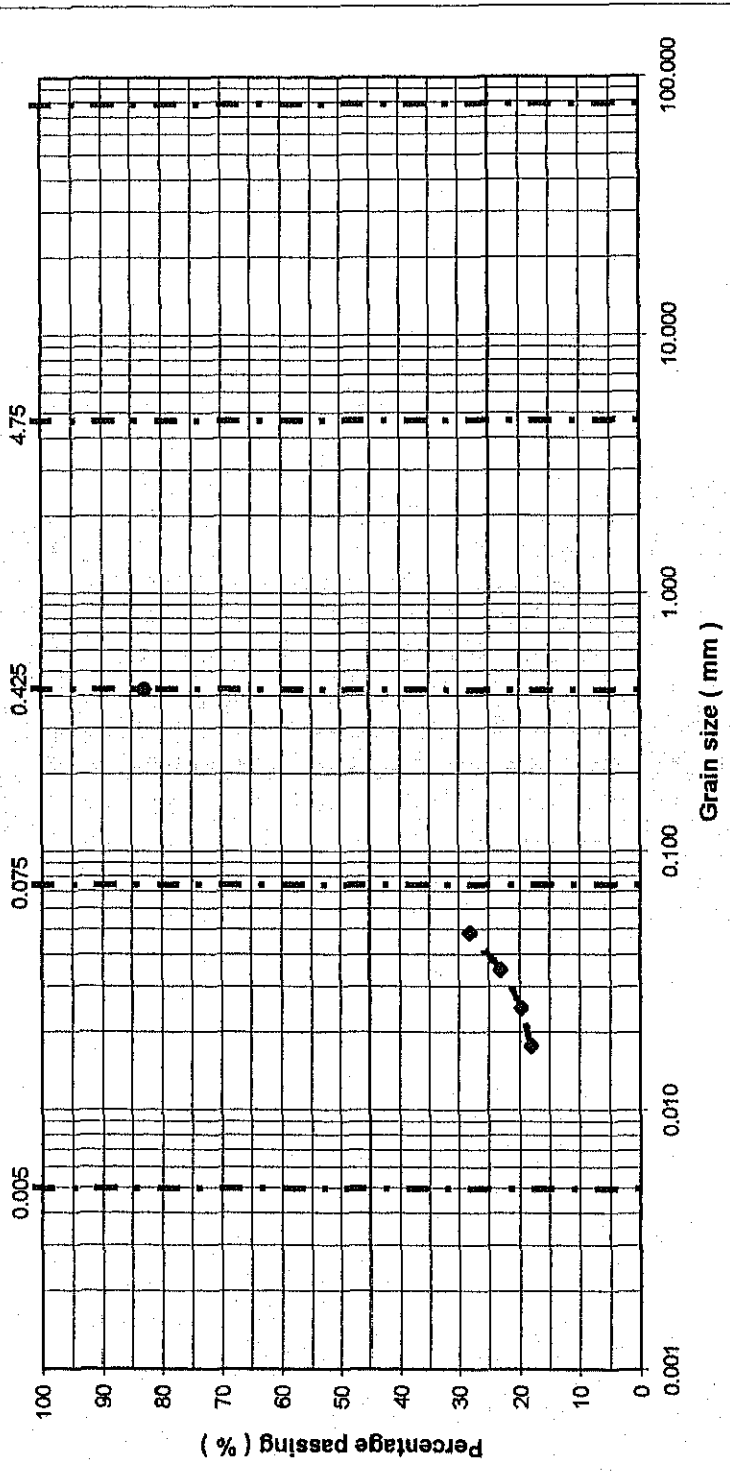
Ministry Of Water Resources and Meteorology  
 Engineering Department  
 Soil Quality Analysis Office

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 2 4      Testing Date : 11-Jun-06  
 Depth : \_\_\_\_\_

PARTICLE SIZE DISTRIBUTION CURVE



| Grain size(mm.) | %passing | TEST TYPE       |
|-----------------|----------|-----------------|
| #DIV/01         | 19.78    | HYDROMETER TEST |
| #DIV/01         | 19.78    |                 |
| #DIV/01         | 19.78    |                 |
| #DIV/01         | 19.78    |                 |
| #DIV/01         | 19.78    |                 |
| #DIV/01         | 19.78    | SIEVE TEST      |
| #DIV/01         | 19.78    |                 |
| 0.01770         | 18.11    |                 |
| 0.02488         | 19.78    |                 |
| 0.03485         | 23.14    |                 |
| 0.04850         | 28.17    |                 |
| 0.075           |          |                 |
| 0.125           |          |                 |
| 0.250           |          |                 |
| 0.425           | 82.62    |                 |
| 1               |          |                 |
| 2               |          |                 |
| 4.75            |          |                 |
| 8               |          |                 |
| 16              |          |                 |
| 31.5            |          |                 |
| Silt :          | %        |                 |
| Clay :          | %        |                 |
| Sand :          | %        |                 |
| Gravel :        | %        |                 |

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem

Sample Description :

|        |                 |            |
|--------|-----------------|------------|
| CLAY   | HYDROMETER TEST |            |
|        | SILT            |            |
| GRAVEL | Fine            | Coarse     |
|        | SAND            |            |
|        |                 | SIEVE TEST |
|        |                 | Cobble     |

Remark :

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

|  |                                 |            |        |        |                 |  |            |  |  |
|--|---------------------------------|------------|--------|--------|-----------------|--|------------|--|--|
| <b>HYDROMETER DISPERSIVITY TEST</b>  |                                 |            |        |        |                 |  |            |  |  |
| Sample No.: <u>2_5</u>   | Testing Date : <u>16-Jun-06</u> |            |        |        |                 |  |            |  |  |
| Depth : _____  | Checked by Ket Chansavuth       |            |        |        |                 |  |            |  |  |
|  | Tested by : Chou Sarem          |            |        |        |                 |  |            |  |  |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p>   |                                 |            |        |        |                 |  |            |  |  |
| <p>Comments<br/>                 A= 32 %<br/>                 B= 58 %<br/>                 % Dispersion = 55.17</p>  |                                 |            |        |        |                 |  |            |  |  |
| <p>Remark :<br/>                 dw - Specimen soaked in Distilled Water<br/>                 da - Specimen soaked in Dispersing Agent</p>   |                                 |            |        |        |                 |  |            |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td colspan="2" style="text-align: center;">SIEVE TEST</td> </tr> </table> | CLAY                            | SILT       | SAND   | COBBLE | HYDROMETER TEST |  | SIEVE TEST |  |  |
| CLAY   | SILT                            | SAND       | COBBLE |        |                 |  |            |  |  |
| HYDROMETER TEST  |                                 | SIEVE TEST |        |        |                 |  |            |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

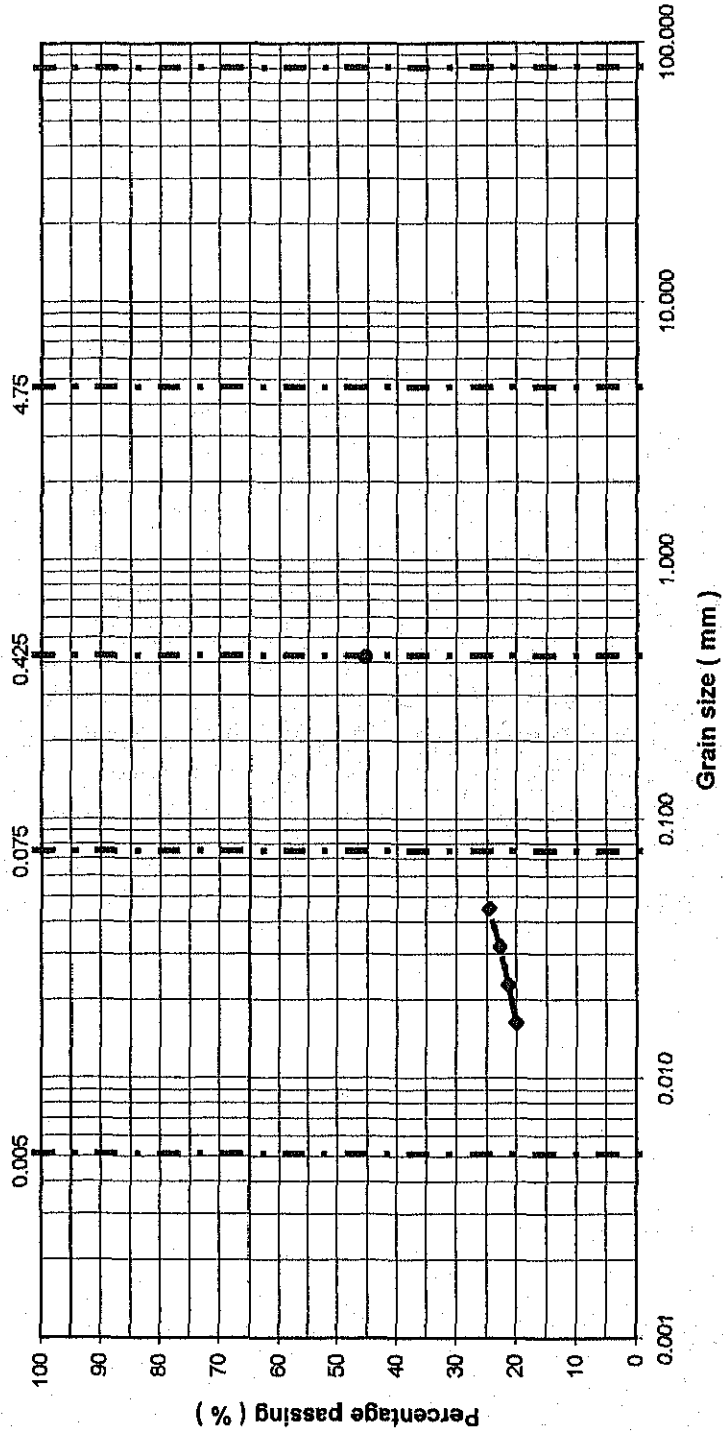
GRAIN-SIZE ANALYSIS

Sample No.: 2\_6  
 Depth: \_\_\_\_\_

Testing Date : 11-Jun-06

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



| Grain size(mm) | %passing |
|----------------|----------|
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| #DIV/0!        | 10.80    |
| 0.01642        | 19.95    |
| 0.02303        | 21.32    |
| 0.03228        | 22.70    |
| 0.04516        | 24.53    |
| 0.075          |          |
| 0.125          |          |
| 0.250          |          |
| 0.425          | 45.27    |
| 1              |          |
| 2              |          |
| 4.75           |          |
| 8              |          |
| 16             |          |
| 31.5           |          |

|          |   |
|----------|---|
| Silt :   | % |
| Clay :   | % |
| Sand :   | % |
| Gravel : | % |

Sample Description :

| CLAY | SILT | Fine SAND | Medium SAND | Coarse SAND | GRAVEL | Cobble |
|------|------|-----------|-------------|-------------|--------|--------|
|      |      |           |             |             |        |        |

HYDROMETER TEST

SIEVE TEST

Remark :



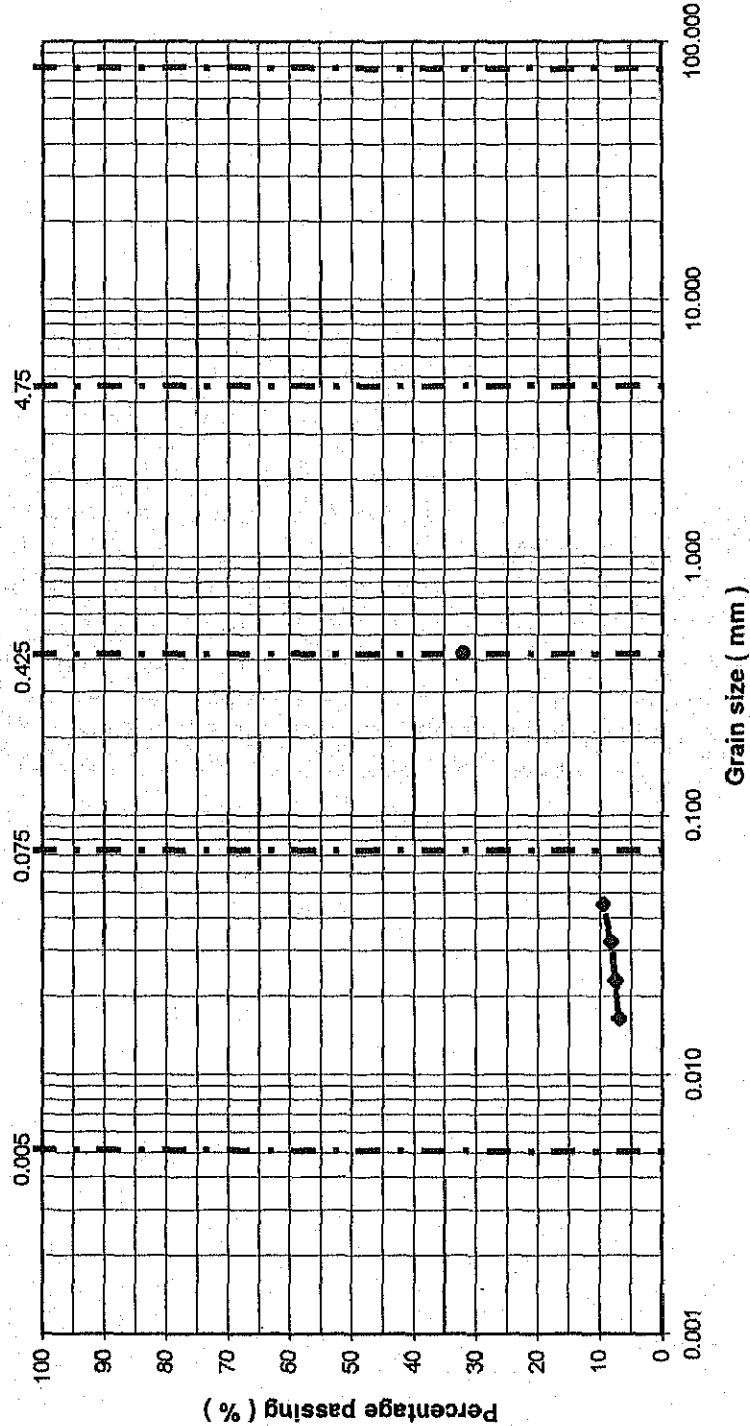
PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 27 Testing Date : 11-Jun-06  
 Depth

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



| Grain size (mm.) | %passing |
|------------------|----------|
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| #DIV/01          | 7.51     |
| 0.01642          | 6.87     |
| 0.02307          | 7.51     |
| 0.03253          | 8.14     |
| 0.04542          | 9.42     |
| 0.075            |          |
| 0.125            |          |
| 0.250            |          |
| 0.425            | 32.01    |
| 1                |          |
| 2                |          |
| 4.75             |          |
| 8                |          |
| 16               |          |
| 31.5             |          |

Sample Description :

|          |   |
|----------|---|
| Silt :   | % |
| Clay :   | % |
| Sand :   | % |
| Gravel : | % |

| CLAY | SILT |        |        | SAND |        |        | GRAVEL |
|------|------|--------|--------|------|--------|--------|--------|
|      | Fine | Medium | Coarse | Fine | Medium | Coarse |        |
|      |      |        |        |      |        |        |        |

Remark :

HYDROMETER TEST

SIEVE TEST

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

|   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
|---|----------------------------------|--------|--------|--------|-----------------|--|------|--------|--|--|--------|--|--|--|------|--|------------|--|--|--|--|
| <b>HYDROMETER DISPERSIVITY TEST</b>   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| Sample No.: <u>2_8</u>  | Testing Date : <u>16-Jun-06</u>  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| Depth : _____   | Checked by <u>Ket Chansavuth</u> |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| Tested by : <u>Chou Sarem</u>   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p> <p>Legend:<br/>         ● dw<br/>         ▲ da<br/>         — Poly. (dw)<br/>         - - Poly. (da)</p>   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| Comments<br>A= 43 %<br>B= 34 %<br>% Dispersion = 126.47   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent   |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">Coars.</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td style="text-align: center;">SAND</td> <td style="text-align: center;">GRAVEL</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">Medium</td> <td></td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">Fine</td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">SIEVE TEST</td> </tr> </table> | CLAY                             | SILT   | Coars. | COBBLE | HYDROMETER TEST |  | SAND | GRAVEL |  |  | Medium |  |  |  | Fine |  | SIEVE TEST |  |  |  |  |
| CLAY  | SILT                             | Coars. | COBBLE |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| HYDROMETER TEST   |                                  | SAND   | GRAVEL |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
|   |                                  | Medium |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
|   |                                  | Fine   |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |
| SIEVE TEST  |                                  |        |        |        |                 |  |      |        |  |  |        |  |  |  |      |  |            |  |  |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 3 1

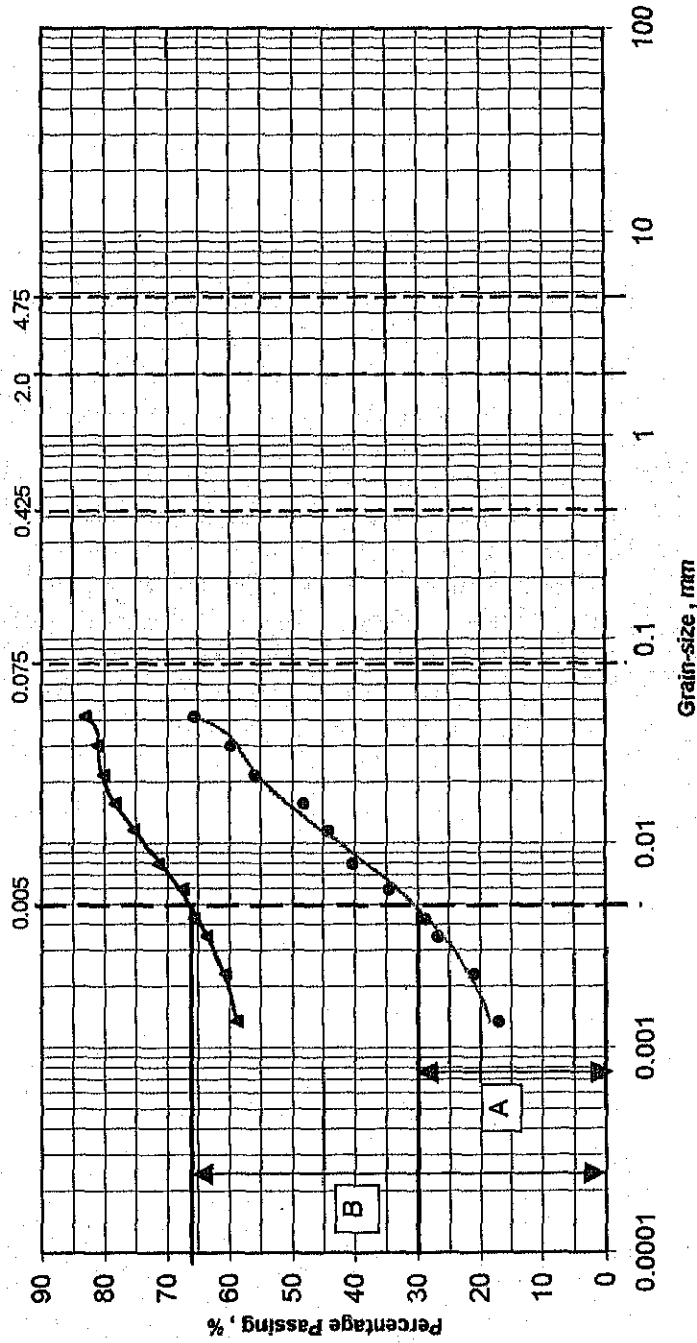
Testing Date : 20-Jun-06

Depth :

Checked by Ket Chansavuth

Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



Comments  
 A= 30 %  
 B= 66 %  
 % Dispersion = 45.45

Remark :

dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

| CLAY            | SILT | SAND       |        |        | GRAVEL | COBBLE |
|-----------------|------|------------|--------|--------|--------|--------|
|                 |      | Fine       | Medium | Coars. |        |        |
| HYDROMETER TEST |      | SIEVE TEST |        |        |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

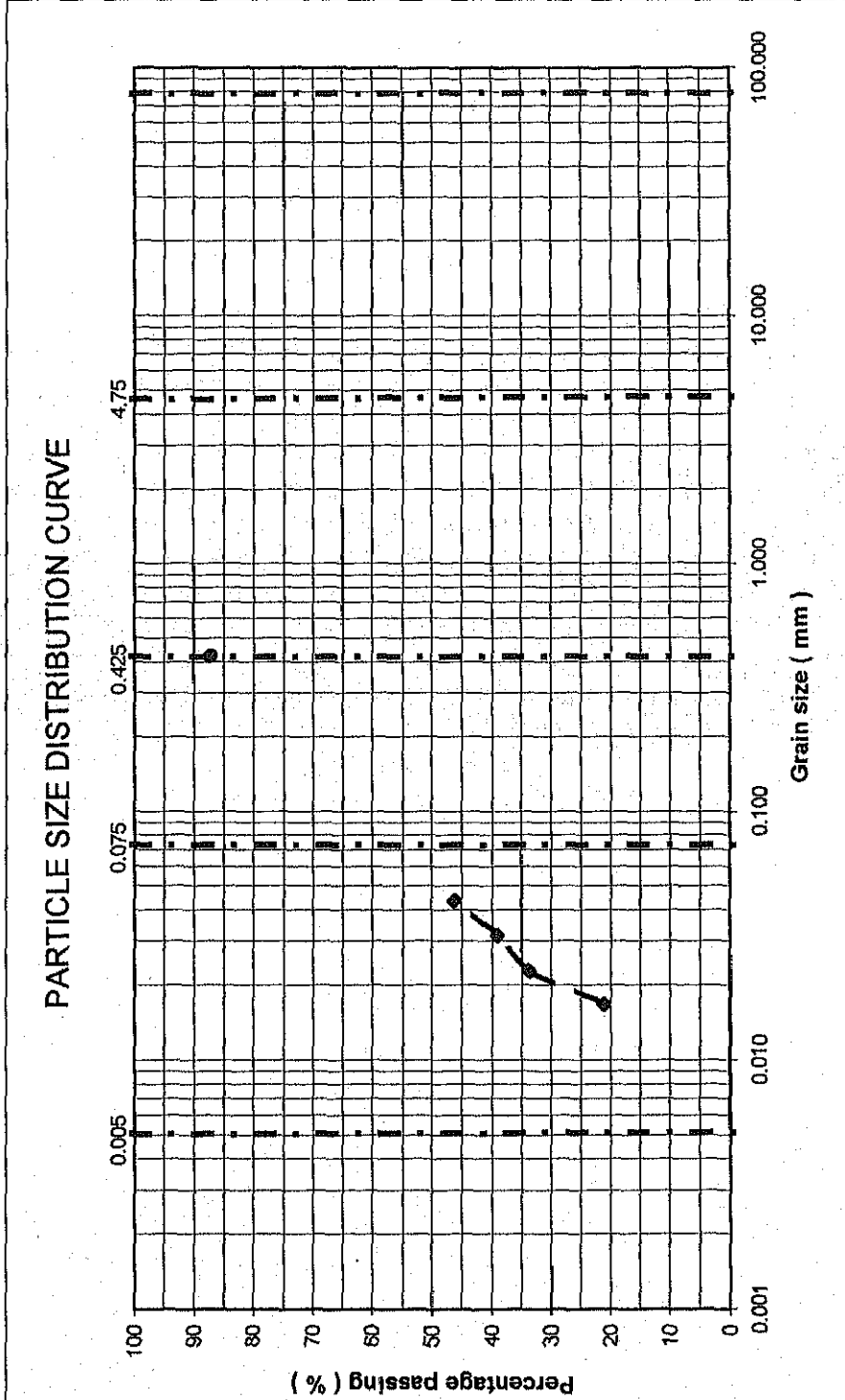
| HYDROMETER DISPERSIVITY TEST   |  |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
|--|--|---|--------|--------|--------|------|---|--------|--------|--------|--------|---|---|---------|-----------------|---|------------|---|---|-------|---|---|-------|---|---|------|---|---|------|---|---|------|---|---|-------|---|---|------|---|---|-----|---|---|-----|---|---|------|---|---|-----|---|---|------|---|---|-----|---|---|----|---|---|----|---|---|----|---|---|-----|---|---|
| Sample No.: <u>3 2</u><br>Depth: _____   | Testing Date : <u>20-Jun-06</u><br>_____ |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p> <p>Legend:<br/>                     ● dw<br/>                     ▲ da<br/>                     — Poly. (dw)<br/>                     — Poly. (da)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Grain-size, mm</th> <th>dw (%)</th> <th>da (%)</th> </tr> </thead> <tbody> <tr><td>0.0001</td><td>0</td><td>0</td></tr> <tr><td>0.0002</td><td>0</td><td>0</td></tr> <tr><td>0.0004</td><td>0</td><td>0</td></tr> <tr><td>0.00075</td><td>0</td><td>0</td></tr> <tr><td>0.0015</td><td>0</td><td>0</td></tr> <tr><td>0.003</td><td>0</td><td>0</td></tr> <tr><td>0.006</td><td>0</td><td>0</td></tr> <tr><td>0.01</td><td>0</td><td>0</td></tr> <tr><td>0.02</td><td>0</td><td>0</td></tr> <tr><td>0.04</td><td>0</td><td>0</td></tr> <tr><td>0.075</td><td>0</td><td>0</td></tr> <tr><td>0.15</td><td>0</td><td>0</td></tr> <tr><td>0.3</td><td>0</td><td>0</td></tr> <tr><td>0.6</td><td>0</td><td>0</td></tr> <tr><td>1.18</td><td>0</td><td>0</td></tr> <tr><td>2.0</td><td>0</td><td>0</td></tr> <tr><td>4.75</td><td>0</td><td>0</td></tr> <tr><td>7.5</td><td>0</td><td>0</td></tr> <tr><td>15</td><td>0</td><td>0</td></tr> <tr><td>30</td><td>0</td><td>0</td></tr> <tr><td>60</td><td>0</td><td>0</td></tr> <tr><td>100</td><td>0</td><td>0</td></tr> </tbody> </table> |  | Grain-size, mm  | dw (%) | da (%) | 0.0001 | 0    | 0   | 0.0002 | 0      | 0      | 0.0004 | 0 | 0 | 0.00075 | 0               | 0 | 0.0015     | 0 | 0 | 0.003 | 0 | 0 | 0.006 | 0 | 0 | 0.01 | 0 | 0 | 0.02 | 0 | 0 | 0.04 | 0 | 0 | 0.075 | 0 | 0 | 0.15 | 0 | 0 | 0.3 | 0 | 0 | 0.6 | 0 | 0 | 1.18 | 0 | 0 | 2.0 | 0 | 0 | 4.75 | 0 | 0 | 7.5 | 0 | 0 | 15 | 0 | 0 | 30 | 0 | 0 | 60 | 0 | 0 | 100 | 0 | 0 |
| Grain-size, mm   | dw (%)                                   | da (%)  |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.0001   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.0002   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.0004   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.00075  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.0015   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.003  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.006  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.01   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.02   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.04   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.075  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.15   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.3  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 0.6  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 1.18   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 2.0  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 4.75   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 7.5  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 15   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 30   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 60   | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| 100  | 0  | 0   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem  |  |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| Comments<br>A= 36 %<br>B= 69 %<br>% Dispersion = 52.17   |  |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |  |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Fine</td> <td style="width: 33%;">Medium</td> <td style="width: 33%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> </td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td colspan="2" style="text-align: center;">SIEVE TEST</td> </tr> </table>   | CLAY                                     | SILT  | SAND   | COBBLE |        |      | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Fine</td> <td style="width: 33%;">Medium</td> <td style="width: 33%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine   | Medium | Coars. | SAND   |   |   |         | HYDROMETER TEST |   | SIEVE TEST |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| CLAY   | SILT                                     | SAND  | COBBLE |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
|  |  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Fine</td> <td style="width: 33%;">Medium</td> <td style="width: 33%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine   | Medium | Coars. | SAND |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| Fine   | Medium                                   | Coars.  |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| SAND   |  |   |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |
| HYDROMETER TEST  |  | SIEVE TEST  |        |        |        |      |   |        |        |        |        |   |   |         |                 |   |            |   |   |       |   |   |       |   |   |      |   |   |      |   |   |      |   |   |       |   |   |      |   |   |     |   |   |     |   |   |      |   |   |     |   |   |      |   |   |     |   |   |    |   |   |    |   |   |    |   |   |     |   |   |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 3 3      Testing Date : 14-Jun-06  
 Depth : \_\_\_\_\_

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem



| HYDROMETER TEST |          |
|-----------------|----------|
| Grain size(mm)  | %passing |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| #DIV/0!         | 17.60    |
| 0.01672         | 21.19    |
| 0.02281         | 33.76    |
| 0.03171         | 39.14    |
| 0.04372         | 46.33    |
| 0.075           |          |
| 0.125           |          |
| 0.250           |          |
| 0.425           | 87.19    |
| 1               |          |
| 2               |          |
| 4.75            |          |
| 8               |          |
| 16              |          |
| 31.5            |          |

| SIEVE TEST     |   |
|----------------|---|
| Grain size(mm) | % |
| Silt :         | % |
| Clay :         | % |
| Sand :         | % |
| Gravel :       | % |

Sample Description :

|      |                 |        |        |      |            |        |        |
|------|-----------------|--------|--------|------|------------|--------|--------|
| CLAY | HYDROMETER TEST |        |        | SILT | SIEVE TEST |        |        |
|      | Fine            | Medium | Coarse |      | SAND       | GRAVEL | Cobble |

Remark :

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |                                  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
|--|----------------------------------|---|--------|--------|--------|------|---|-------|------------|--------|------|--|--|--|-----------------|--|------------|--|--|
| Sample No.: <u>3_4</u>   | Testing Date : <u>20-Jun-06</u>  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| Depth : _____  | Checked by <u>Ket Chansavuth</u> |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| Tested by : <u>Chou Sarem</u>  |                                  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| <p>Comments</p> <p>A= 36 %</p> <p>B= 60 %</p> <p>% Dispersion = 60.00</p>  |                                  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| <p>Remark :</p> <p>dw - Specimen soaked in Distilled Water</p> <p>da - Specimen soaked in Dispersing Agent</p>   |                                  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p> <table border="1" style="margin: 10px auto;"> <caption>Legend</caption> <tr> <td>●</td> <td>dw</td> </tr> <tr> <td>▲</td> <td>da</td> </tr> <tr> <td>—</td> <td>Poly. (dw)</td> </tr> <tr> <td>- - -</td> <td>Poly. (da)</td> </tr> </table>  |                                  | ●   | dw     | ▲      | da     | —    | Poly. (dw)  | - - - | Poly. (da) |        |      |  |  |  |                 |  |            |  |  |
| ●  | dw                               |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| ▲  | da                               |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| —  | Poly. (dw)                       |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| - - -  | Poly. (da)                       |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
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| CLAY   | SILT                             | SAND  | COBBLE |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
|  |                                  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Fine</td> <td style="width: 33%;">Medium</td> <td style="width: 33%;">Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine   | Medium | Coars. | SAND |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| Fine   | Medium                           | Coars.  |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| SAND   |                                  |   |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |
| HYDROMETER TEST  |                                  | SIEVE TEST  |        |        |        |      |   |       |            |        |      |  |  |  |                 |  |            |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST   |  |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
|--|--|------------|--------|--------|--------|--------|-----------------|------|------|--------|--------|-----------------|--|------------|--|--|
| Sample No.: <u>3_5</u><br>Depth: _____   | Testing Date : <u>20-Jun-06</u><br>_____ |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
| <h3 style="margin: 0;">PARTICLE SIZE DISTRIBUTION CURVE</h3>   |  |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
| Comments<br>A= 12 %<br>B= 16 %<br>% Dispersion = <b>75.00</b>  |  |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem  |  |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |  |            |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">CLAY</th> <th style="width: 25%;">SILT</th> <th style="width: 25%;">SAND</th> <th style="width: 25%;">GRAVEL</th> <th style="width: 25%;">COBBLE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">HYDROMETER TEST</td> <td style="text-align: center;">SILT</td> <td style="text-align: center;">SAND</td> <td style="text-align: center;">GRAVEL</td> <td style="text-align: center;">COBBLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td colspan="3" style="text-align: center;">SIEVE TEST</td> </tr> </tbody> </table> |  | CLAY       | SILT   | SAND   | GRAVEL | COBBLE | HYDROMETER TEST | SILT | SAND | GRAVEL | COBBLE | HYDROMETER TEST |  | SIEVE TEST |  |  |
| CLAY   | SILT                                     | SAND       | GRAVEL | COBBLE |        |        |                 |      |      |        |        |                 |  |            |  |  |
| HYDROMETER TEST  | SILT                                     | SAND       | GRAVEL | COBBLE |        |        |                 |      |      |        |        |                 |  |            |  |  |
| HYDROMETER TEST  |  | SIEVE TEST |        |        |        |        |                 |      |      |        |        |                 |  |            |  |  |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

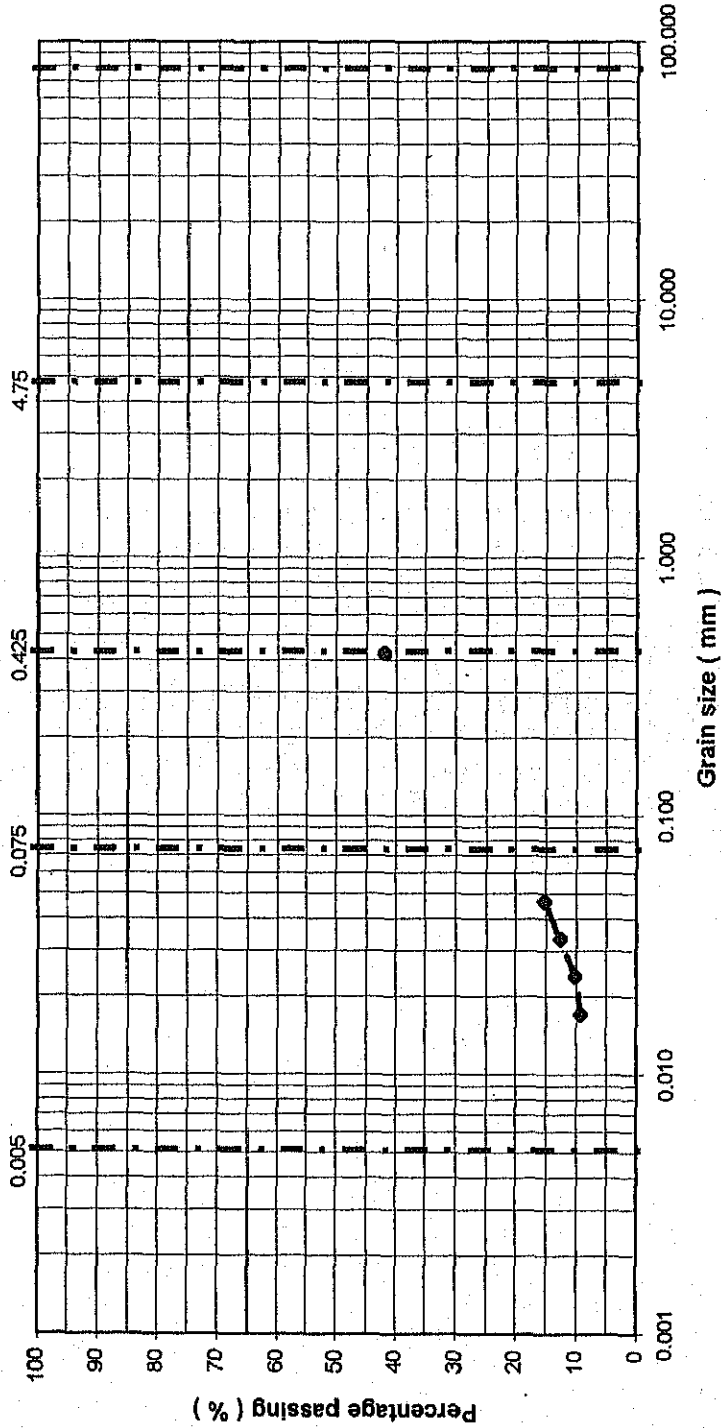
GRAIN-SIZE ANALYSIS

Sample No.: 3 6  
 Depth: \_\_\_\_\_

Testing Date : 13-Jun-06

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



| Grain size(mm) | %passing |
|----------------|----------|
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| #DIV/0!        | 10.13    |
| 0.01713        | 9.27     |
| 0.02407        | 10.13    |
| 0.03351        | 12.71    |
| 0.04678        | 15.28    |
| 0.075          |          |
| 0.125          |          |
| 0.250          |          |
| 0.425          | 41.95    |
| 1              |          |
| 2              |          |
| 4.75           |          |
| 8              |          |
| 16             |          |
| 31.5           |          |

| HYDROMETER TEST |   |
|-----------------|---|
| Silt:           | % |
| Clay:           | % |
| Sand:           | % |
| Gravel:         | % |

Sample Description :

Remark :

| CLAY            | SILT | Fine | Medium | Coarse     | GRAVEL | Cobble |
|-----------------|------|------|--------|------------|--------|--------|
|                 |      | SAND |        |            |        |        |
| HYDROMETER TEST |      |      |        | SIEVE TEST |        |        |

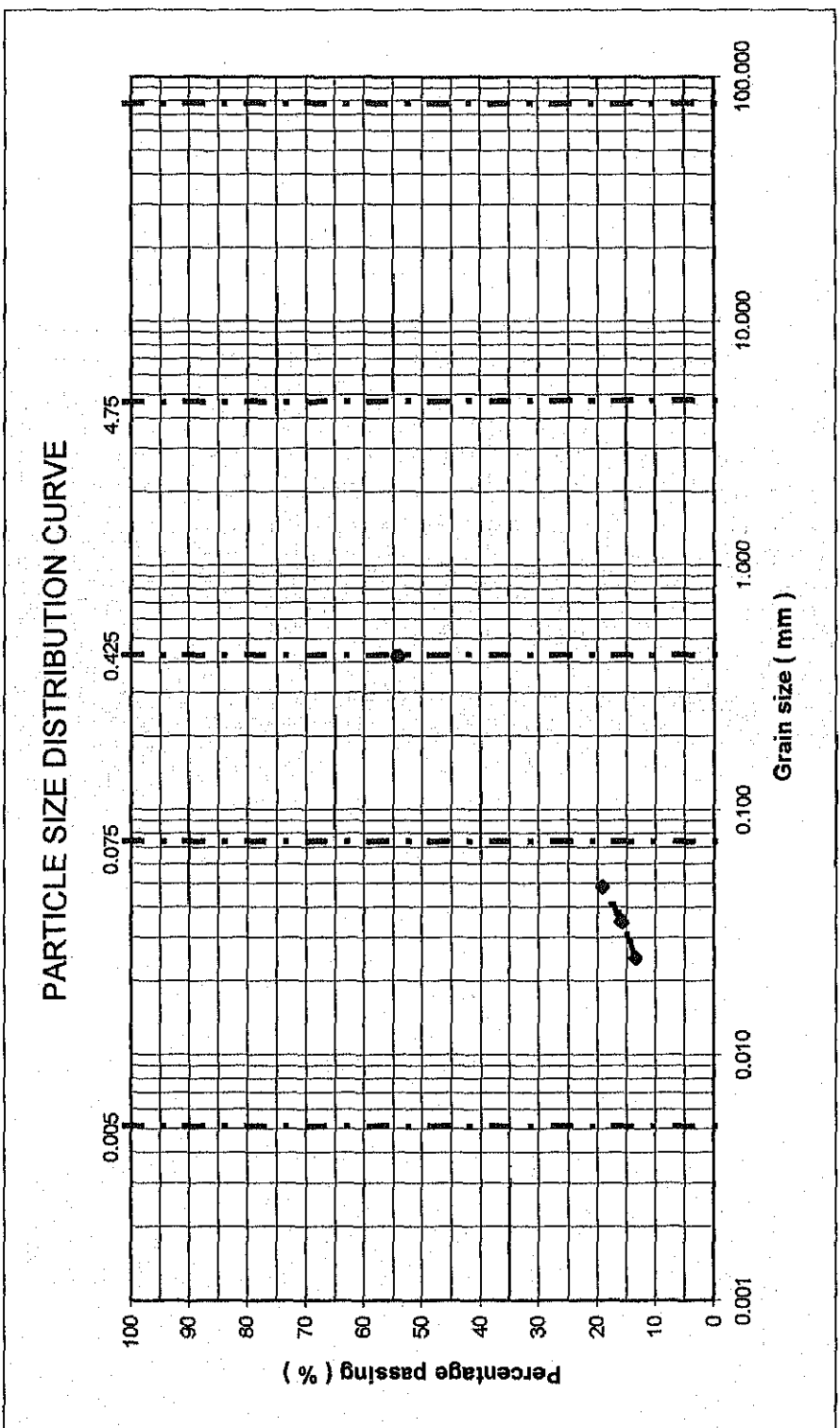


PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

Sample No.: 37      Testing Date : 13-Jun-06  
 Depth : \_\_\_\_\_

Checked by : Ket Chansavuth  
 Tested by : Chou Sarem



| Grain size(mm) | %passing |
|----------------|----------|
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| #DIV/0!        | 13.40    |
| 0.00000        | 13.40    |
| 0.02488        | 13.40    |
| 0.03485        | 15.67    |
| 0.04850        | 19.08    |

| Grain size(mm) | %passing |
|----------------|----------|
| 0.075          |          |
| 0.125          |          |
| 0.250          |          |
| 0.425          | 54.15    |
| 1              |          |
| 2              |          |
| 4.75           |          |
| 8              |          |
| 16             |          |
| 31.5           |          |

|          |   |
|----------|---|
| Silt :   | % |
| Clay :   | % |
| Sand :   | % |
| Gravel : | % |

Sample Description :

Remark :

| CLAY | SILT |        | SAND   |  | GRAVEL | Cobble |
|------|------|--------|--------|--|--------|--------|
|      | Fine | Medium | Coarse |  |        |        |
|      |      |        |        |  |        |        |

HYDROMETER TEST

SIEVE TEST

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 3 8

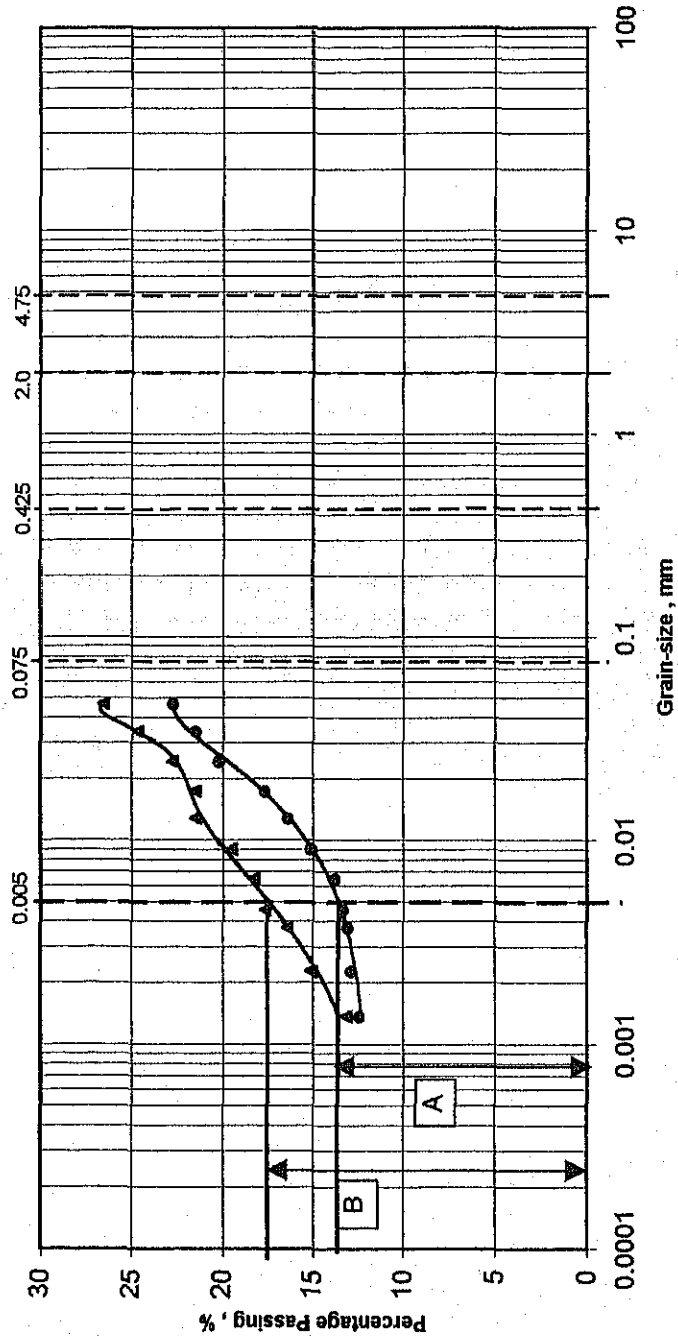
Testing Date : 20-Jun-06

Checked by Ket Chansavuth

Depth :

Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



Comments

A= 13.5 %

B= 17.5 %

% Dispersion = 77.14

Remark :

dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

| CLAY            | SILT | SAND       |        |        | GRAVEL | COBBLE |
|-----------------|------|------------|--------|--------|--------|--------|
|                 |      | Fine       | Medium | Coars. |        |        |
| HYDROMETER TEST |      | SIEVE TEST |        |        |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

| HYDROMETER DISPERSIVITY TEST  |  |            |        |  |  |      |      |      |        |                 |      |        |        |
|---|--|------------|--------|--|--|------|------|------|--------|-----------------|------|--------|--------|
| Sample No.: <u>4 1</u><br>Depth: _____  | Testing Date : <u>20-Jun-06</u><br>_____ |            |        |  |  |      |      |      |        |                 |      |        |        |
| <p><b>PARTICLE SIZE DISTRIBUTION CURVE</b></p>  |  |            |        |  |  |      |      |      |        |                 |      |        |        |
| Comments<br>A= 30 %<br>B= 27.5 %<br>% Dispersion = 109.09   |  |            |        |  |  |      |      |      |        |                 |      |        |        |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem   |  |            |        |  |  |      |      |      |        |                 |      |        |        |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent   |  |            |        |  |  |      |      |      |        |                 |      |        |        |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">SIEVE TEST</th> </tr> <tr> <th style="width: 25%;">CLAY</th> <th style="width: 25%;">SILT</th> <th style="width: 25%;">SAND</th> <th style="width: 25%;">COBBLE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">HYDROMETER TEST</td> <td style="text-align: center;">SAND</td> <td style="text-align: center;">GRAVEL</td> <td style="text-align: center;">COBBLE</td> </tr> </tbody> </table> |  | SIEVE TEST |        |  |  | CLAY | SILT | SAND | COBBLE | HYDROMETER TEST | SAND | GRAVEL | COBBLE |
| SIEVE TEST  |  |            |        |  |  |      |      |      |        |                 |      |        |        |
| CLAY  | SILT                                     | SAND       | COBBLE |  |  |      |      |      |        |                 |      |        |        |
| HYDROMETER TEST   | SAND                                     | GRAVEL     | COBBLE |  |  |      |      |      |        |                 |      |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 4 2

Testing Date : 20-Jun-06

Depth :

Checked by Ket Chansavuth

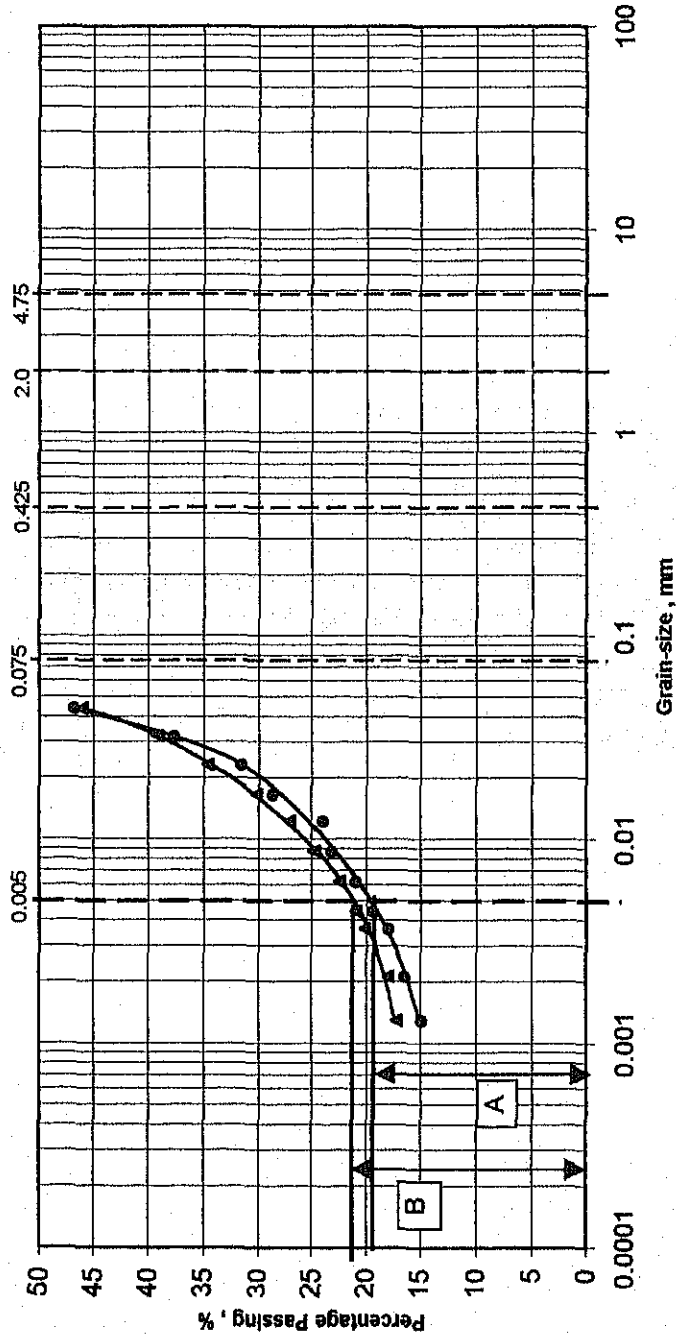
Tested by : Chou Sarem

Comments  
 A= 19.5 %  
 B= 22 %  
 % Dispersion = 88.64

Remark :  
 dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



| HYDROMETER TEST |      | SIEVE TEST |        |        |        |        |
|-----------------|------|------------|--------|--------|--------|--------|
| CLAY            | SILT | Fine       | Medium | Coars. | GRAVEL | COBBLE |
|                 |      | SAND       |        |        |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 4\_3

Testing Date : 20-Jun-06

Depth :

Checked by Ket Chansavuth

Tested by : Chou Sarem

Comments

A= 9.5 %

B= 24 %

% Dispersion = 39.58

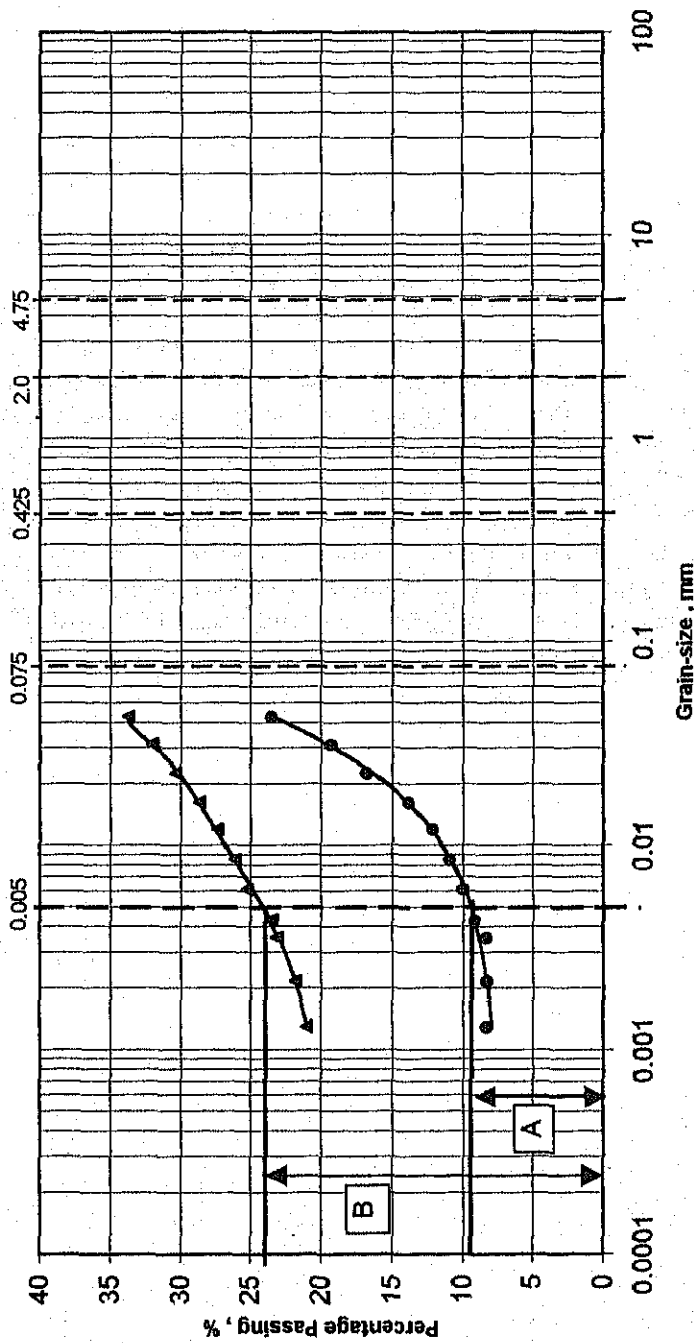
Remark :

dw - Specimen soaked in Distilled Water

da - Specimen soaked in

Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



| CLAY | SAND |        |        | GRAVEL | COBBLE |
|------|------|--------|--------|--------|--------|
|      | Fine | Medium | Coars. |        |        |
|      |      |        |        |        |        |

HYDROMETER TEST      SIEVE TEST

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 4 4 Testing Date : 20-Jun-06

Depth :

Checked by Ket Chansavuth

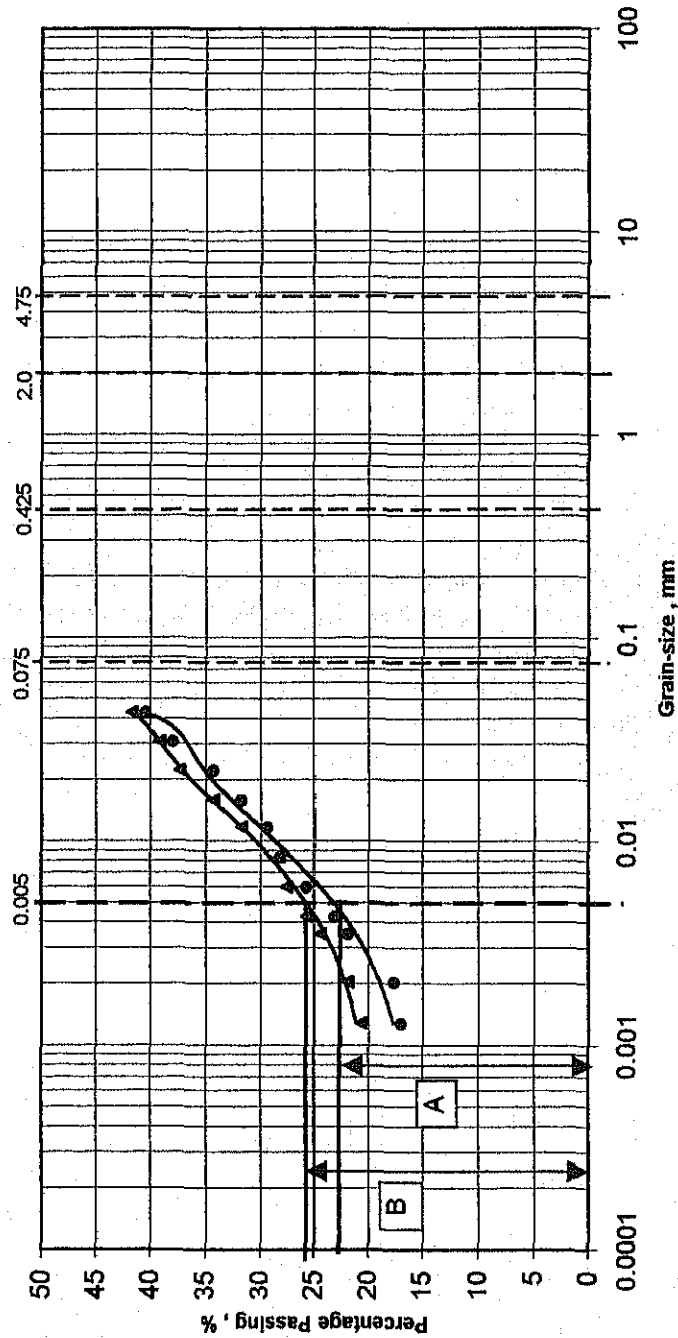
Tested by : Chou Sarem

Comments  
 A= 22.5 %  
 B= 26 %  
 % Dispersion = 86.54

Remark :  
 dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

PARTICLE SIZE DISTRIBUTION CURVE



|                 |      |        |            |  |  |        |        |
|-----------------|------|--------|------------|--|--|--------|--------|
| CLAY            | SILT |        | SAND       |  |  | GRAVEL | COBBLE |
|                 | Fine | Medium | Coars.     |  |  |        |        |
| HYDROMETER TEST |      |        | SIEVE TEST |  |  |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

GRAIN-SIZE ANALYSIS

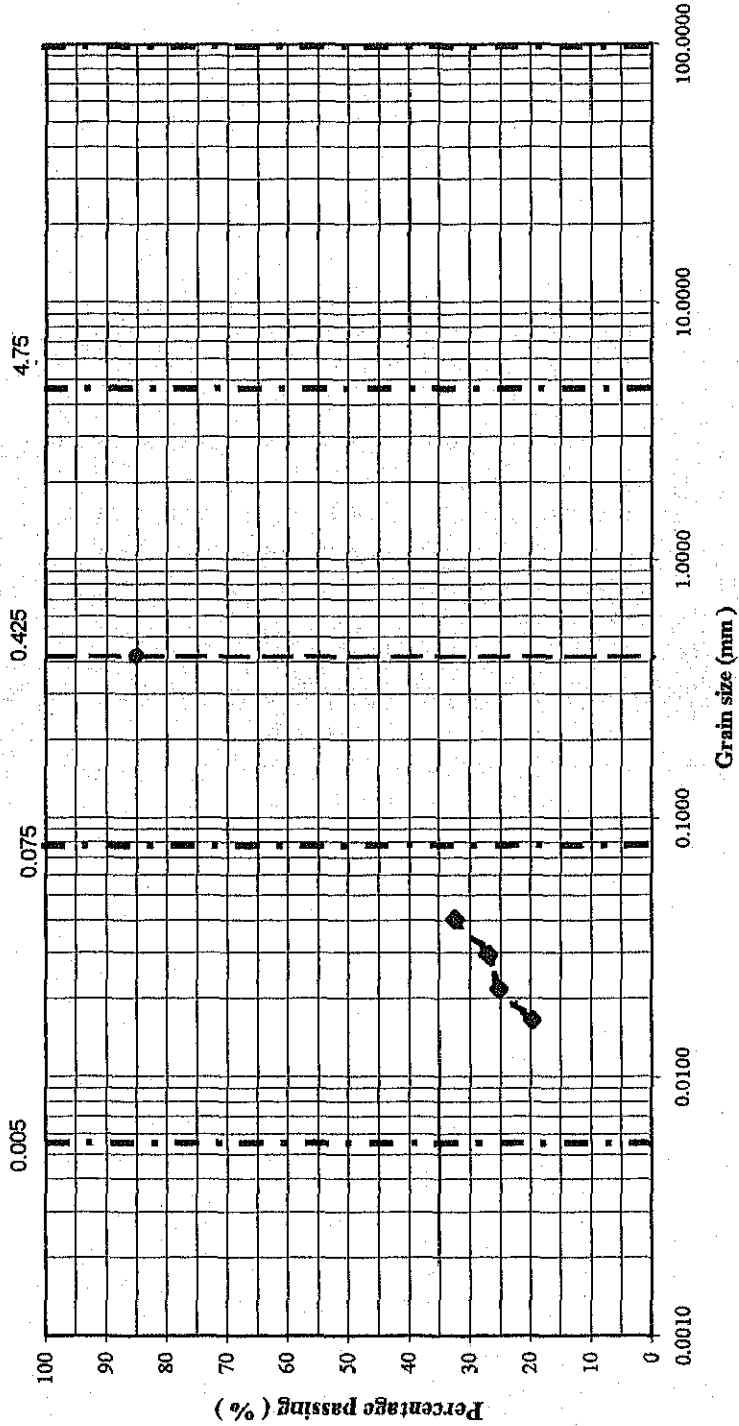
Sample No.: 45  
 Depth: \_\_\_\_\_

Testing Date : 14-Jun-06

Checked by : Ket Chansavuth

Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



Sample Description :

|                 |      |      |            |        |        |      |
|-----------------|------|------|------------|--------|--------|------|
| CLAY            | SILT | Fine | Medium     | Coarse | GRAVEL | Cobb |
|                 |      | SAND |            |        |        |      |
| HYDROMETER TEST |      |      | SIEVE TEST |        |        |      |

Remark :

| HYDROMETER TEST |          | SIEVE TEST      |          |
|-----------------|----------|-----------------|----------|
| Grain size (mm) | %passing | Grain size (mm) | %passing |
| #DIV/0!         | 10.94    |                 |          |
| #DIV/0!         | 10.94    |                 |          |
| #DIV/0!         | 10.94    |                 |          |
| #DIV/0!         | 10.94    |                 |          |
| #DIV/0!         | 10.94    |                 |          |
| #DIV/0!         | 10.94    |                 |          |
| 0.01658         | 19.68    |                 |          |
| 0.02183         | 25.15    |                 |          |
| 0.02960         | 26.97    |                 |          |
| 0.04056         | 32.44    |                 |          |
| 0.075           |          |                 | 85.04    |
| 0.125           |          |                 |          |
| 0.250           |          |                 |          |
| 0.425           |          |                 |          |
| 1               |          |                 |          |
| 2               |          |                 |          |
| 4.75            |          |                 |          |
| 8               |          |                 |          |
| 16              |          |                 |          |
| 31.5            |          |                 |          |
| Silt :          |          |                 | %        |
| Clay :          |          |                 | %        |
| Sand :          |          |                 | %        |
| Gravel :        |          |                 | %        |

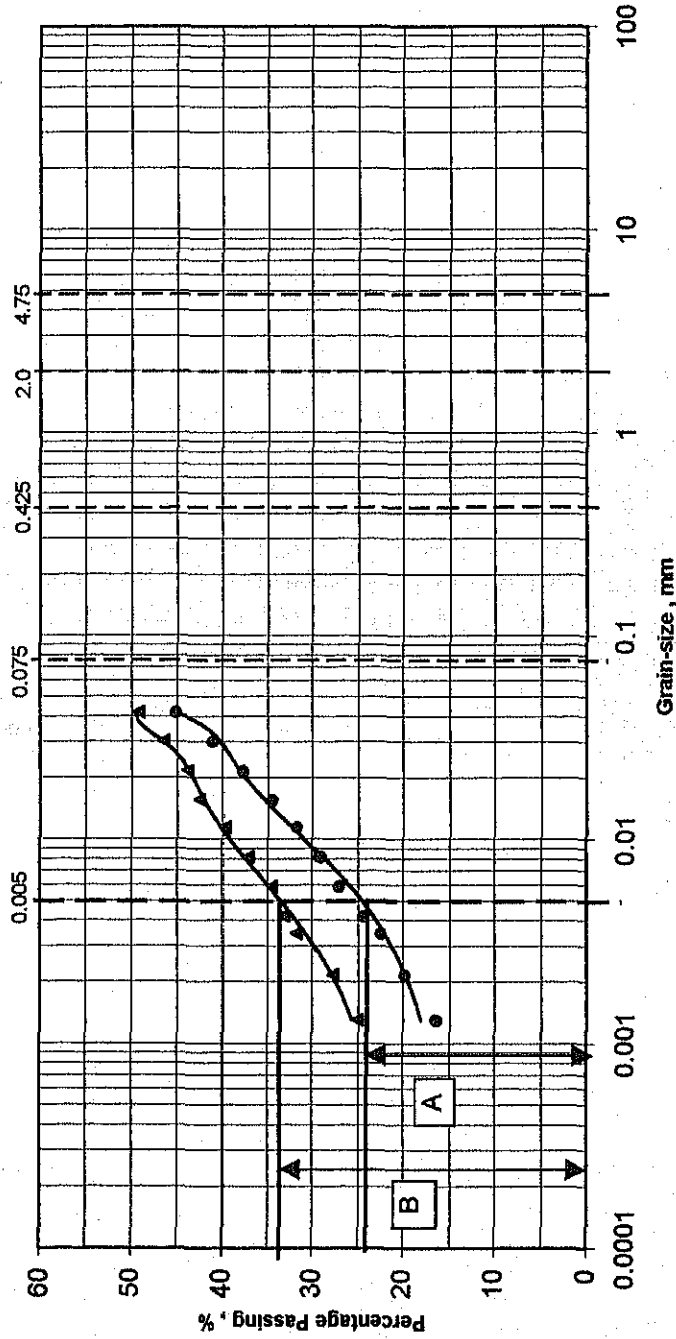
PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

Sample No.: 4\_6 Testing Date : 20-Jun-06  
 Depth : \_\_\_\_\_

Checked by Ket Chansavuth  
 Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



Comments  
 A= 24.5 %  
 B= 34 %  
 % Dispersion = 72.06

Remark :  
 dw - Specimen soaked in Distilled Water  
 da - Specimen soaked in Dispersing Agent

| CLAY            | SAND |        |        | GRAVEL | COBBLE |
|-----------------|------|--------|--------|--------|--------|
|                 | Fine | Medium | Coars. |        |        |
| HYDROMETER TEST |      |        |        |        |        |
| SIEVE TEST      |      |        |        |        |        |



PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

HYDROMETER DISPERSIVITY TEST

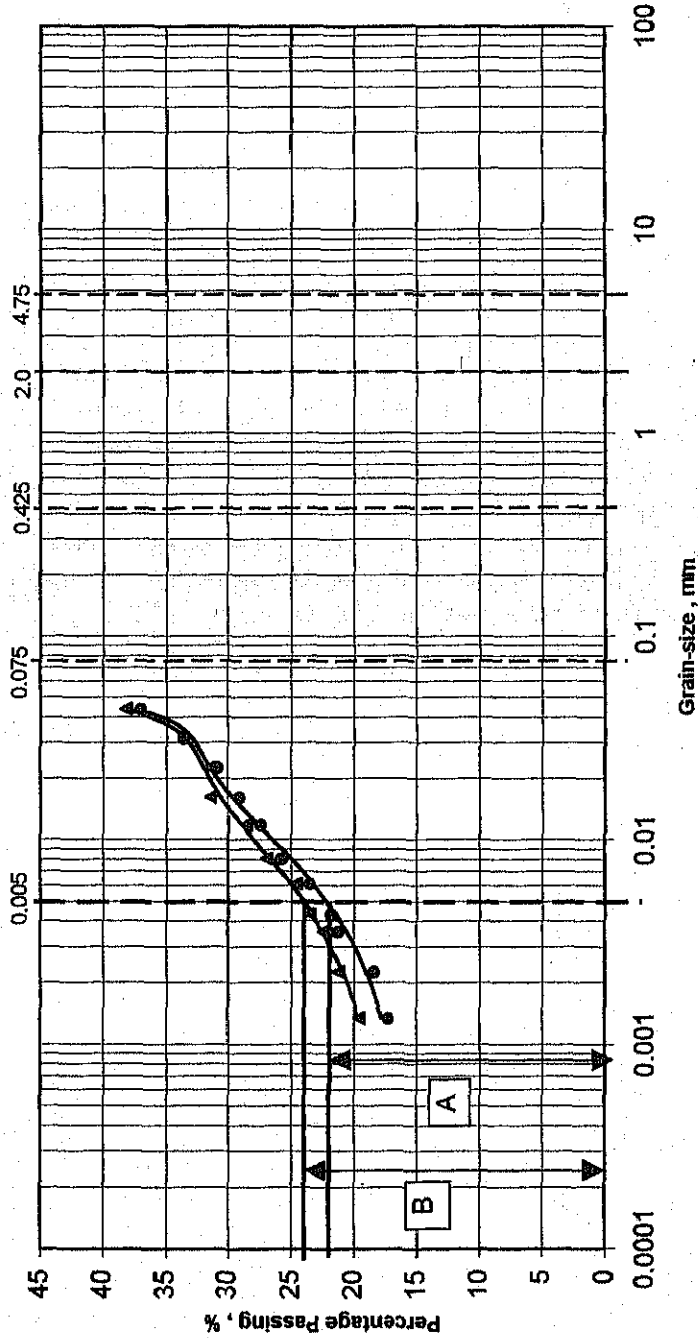
Sample No.: 4\_7 Testing Date : 20-Jun-06

Depth : \_\_\_\_\_

Checked by Ket Chansavuth

Tested by : Chou Sarem

PARTICLE SIZE DISTRIBUTION CURVE



Comments  
 A= 22 %  
 B= 24 %  
 % Dispersion = 91.67

Remark :  
 dw - Specimen soaked in Distilled Water

da - Specimen soaked in Dispersing Agent

| CLAY            | SILT |        |        | SAND |  |  | GRAVEL | COBBLE |
|-----------------|------|--------|--------|------|--|--|--------|--------|
|                 | Fine | Medium | Coars. |      |  |  |        |        |
|                 |      |        |        |      |  |  |        |        |
| HYDROMETER TEST |      |        |        |      |  |  |        |        |
| SIEVE TEST      |      |        |        |      |  |  |        |        |

PROJECT: THE STUDY ON THE ROAD NETWORK DEVELOPMENT

|  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
|--|---|------------|--------|--------|------|---|------|--------|--------|------|--|--|--|--|-----------------|--|------------|--|
| <b>HYDROMETER DISPERSIVITY TEST</b>  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Sample No.: <u>4_8</u>   | Testing Date : <u>20-Jun-06</u>   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Depth : _____  | _____   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
|  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Comments<br>A= 50 %<br>B= 51 %<br><br>% Dispersion = <b>98.04</b>  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Checked by Ket Chansavuth<br>Tested by : Chou Sarem  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Remark :<br>dw - Specimen soaked in Distilled Water<br>da - Specimen soaked in Dispersing Agent  |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLAY</td> <td style="width: 25%;">SILT</td> <td style="width: 25%;">SAND</td> <td style="width: 25%;">COBBLE</td> </tr> <tr> <td></td> <td style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Fine</td> <td>Medium</td> <td>Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> </td> <td></td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">HYDROMETER TEST</td> <td colspan="2" style="text-align: center;">SIEVE TEST</td> </tr> </table> | CLAY  | SILT       | SAND   | COBBLE |      | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Fine</td> <td>Medium</td> <td>Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine | Medium | Coars. | SAND |  |  |  |  | HYDROMETER TEST |  | SIEVE TEST |  |
| CLAY   | SILT  | SAND       | COBBLE |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
|  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Fine</td> <td>Medium</td> <td>Coars.</td> </tr> <tr> <td colspan="3" style="text-align: center;">SAND</td> </tr> </table> | Fine       | Medium | Coars. | SAND |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| Fine   | Medium  | Coars.     |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| SAND   |   |            |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |
| HYDROMETER TEST  |   | SIEVE TEST |        |        |      |   |      |        |        |      |  |  |  |  |                 |  |            |  |