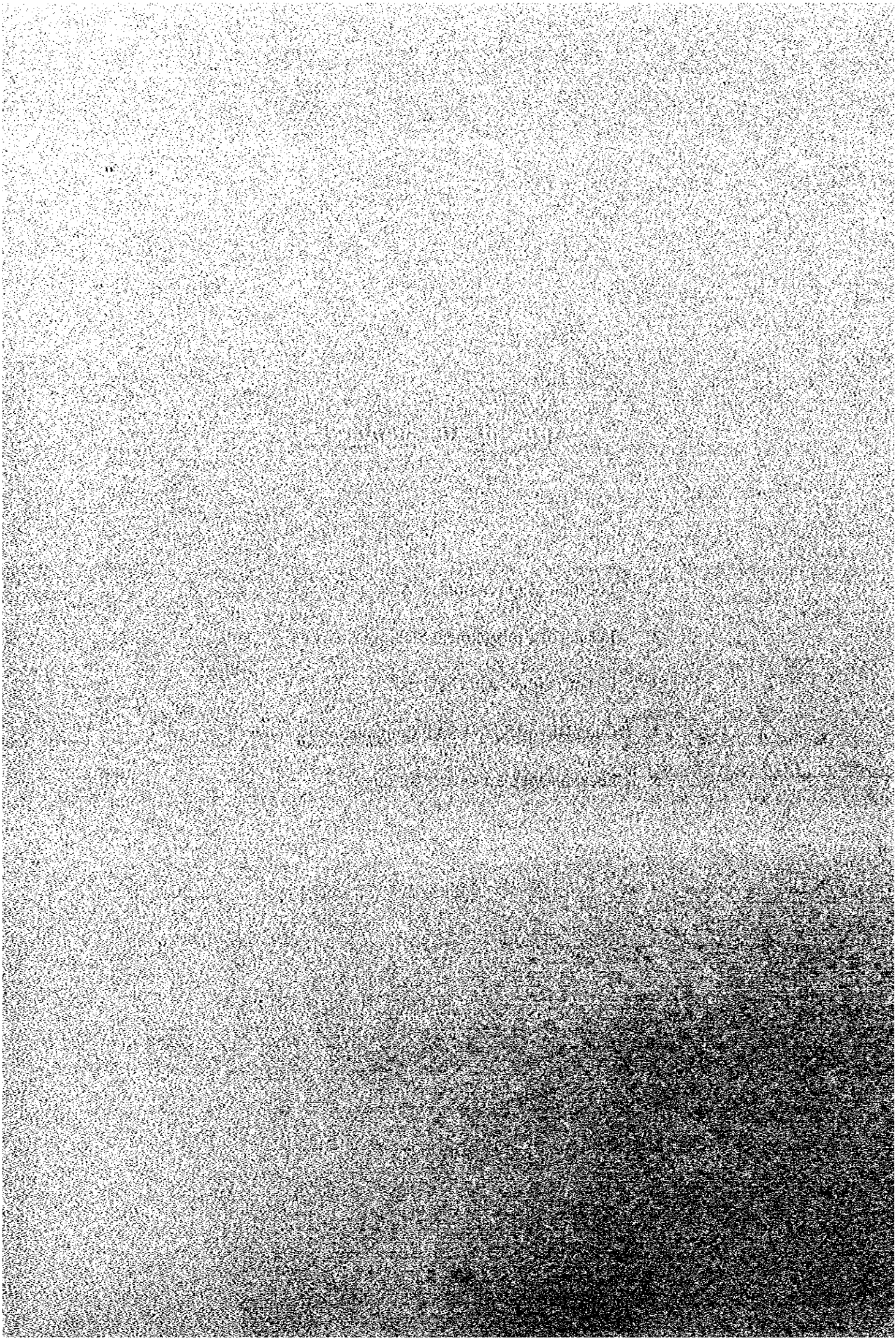
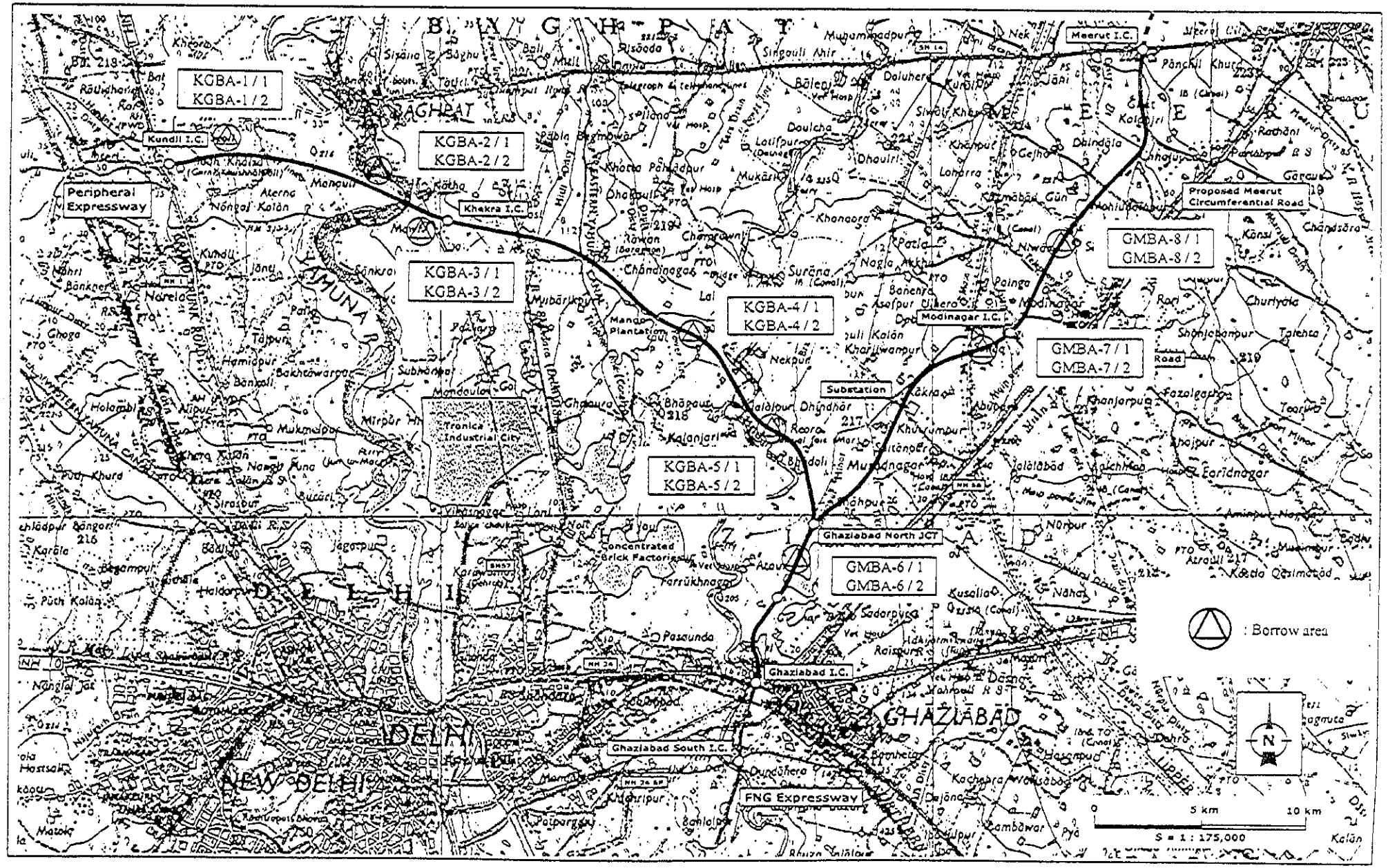
# Appendix to Chapter 9

1. Location Map for Borrow Area
2. Results of Embankment Stability Analysis
3. List of Bridges and Culverts
4. Cumulative 18 kip ESAL Computation Results
5. Location Map for Quarry Sites



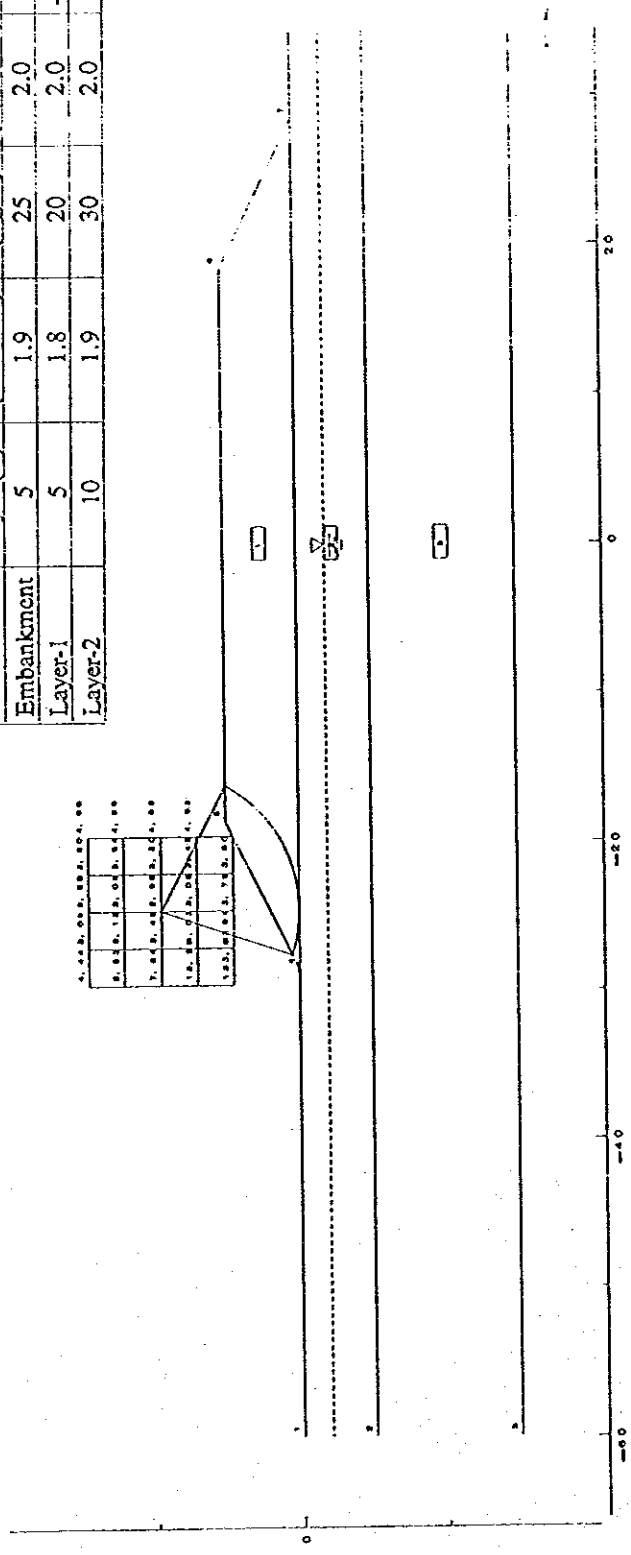
## Appendix 9.1: Location Map for Borrow Area



## Appendix 9.2: Results of Embankment Stability Analysis

| Stability of analysis: | | Embankment |
|---|---|---|
| Height of embankment: | H = | 5 m |
| Width of embankment: | W = | 37 m |
| Minimum safety factor: | Fs min = | 2.987 |
| Radius of arc: | R = | 9.50 m |
| Resisted moment: | Mr = | 433.88 ton f * m |
| Sliding moment: | Ms = | 145.27 ton f * m |

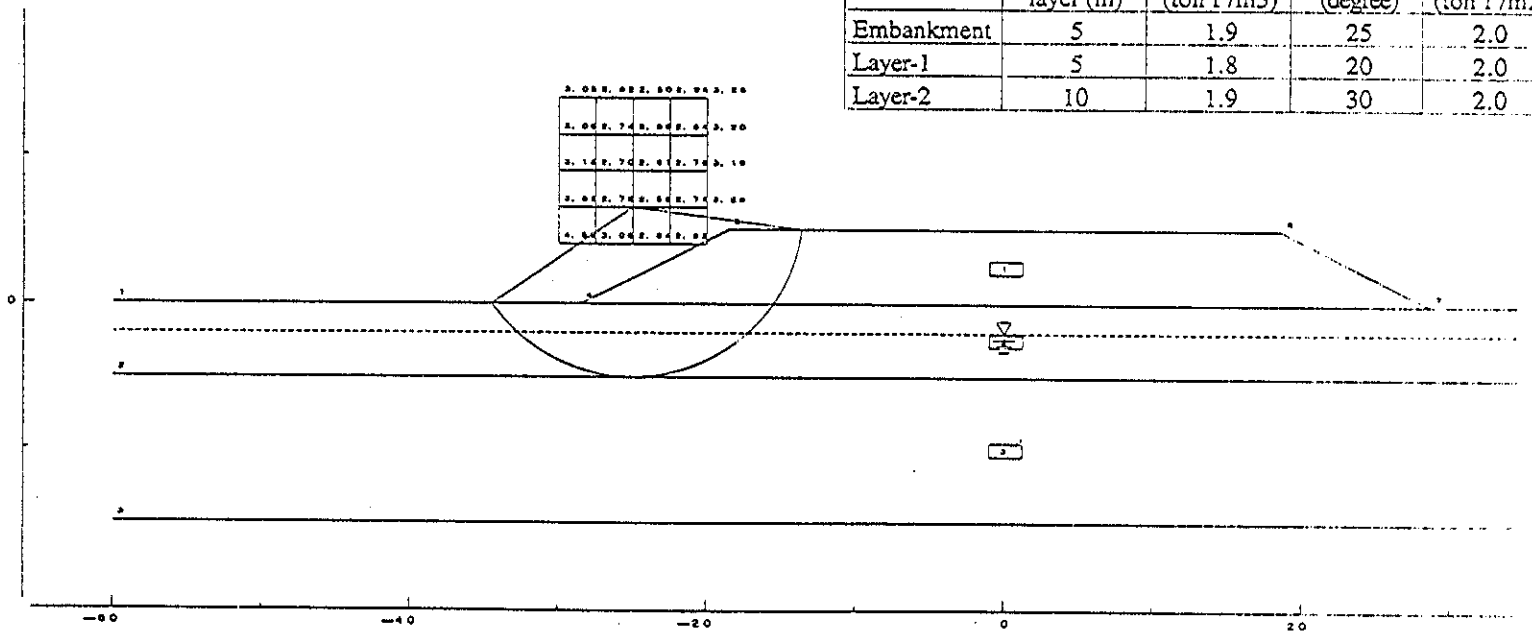
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 5 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |



Calculation result of embankment stability (Embankment height = 5 m)

| Stability of analysis: | | Ground | |
|---|---|---|---|
| Height of embankment: | H = | 5 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 2.582 | |
| Radius of arc: | R = | 11.49 | m |
| Resisted moment: | Mr = | 1,267.37 | ton f * m |
| Sliding moment: | Ms = | 490.82 | ton f * m |

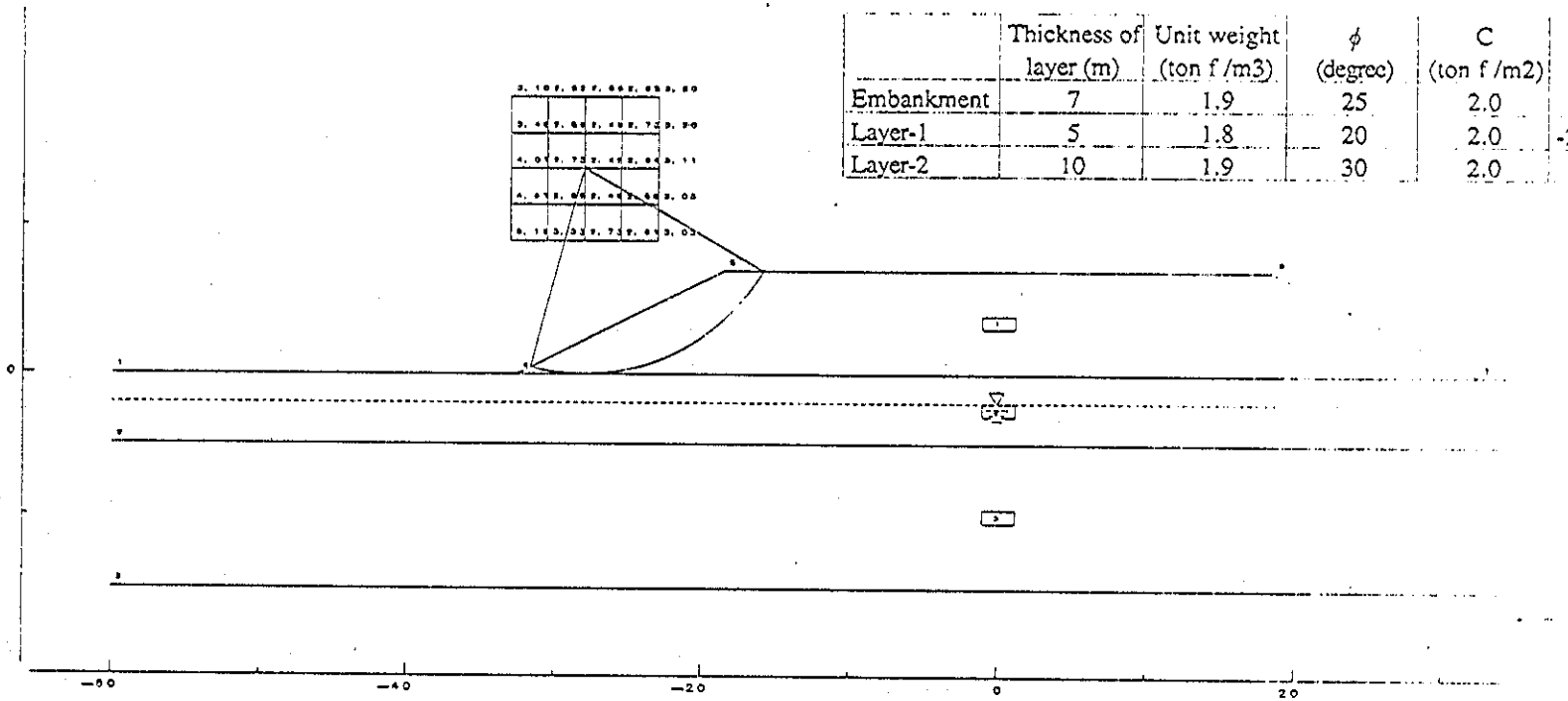
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 5 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of ground stability (Embankment height = 5 m)**

| Stability of analysis: | | Embankment | |
|---|---|---|---|
| Height of embankment: | H = | 7 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 2.456 | |
| Radius of arc: | R = | 14.00 | m |
| Resisted moment: | Mr = | 975.19 | ton f * m |
| Sliding moment: | Ms = | 397.11 | ton f * m |

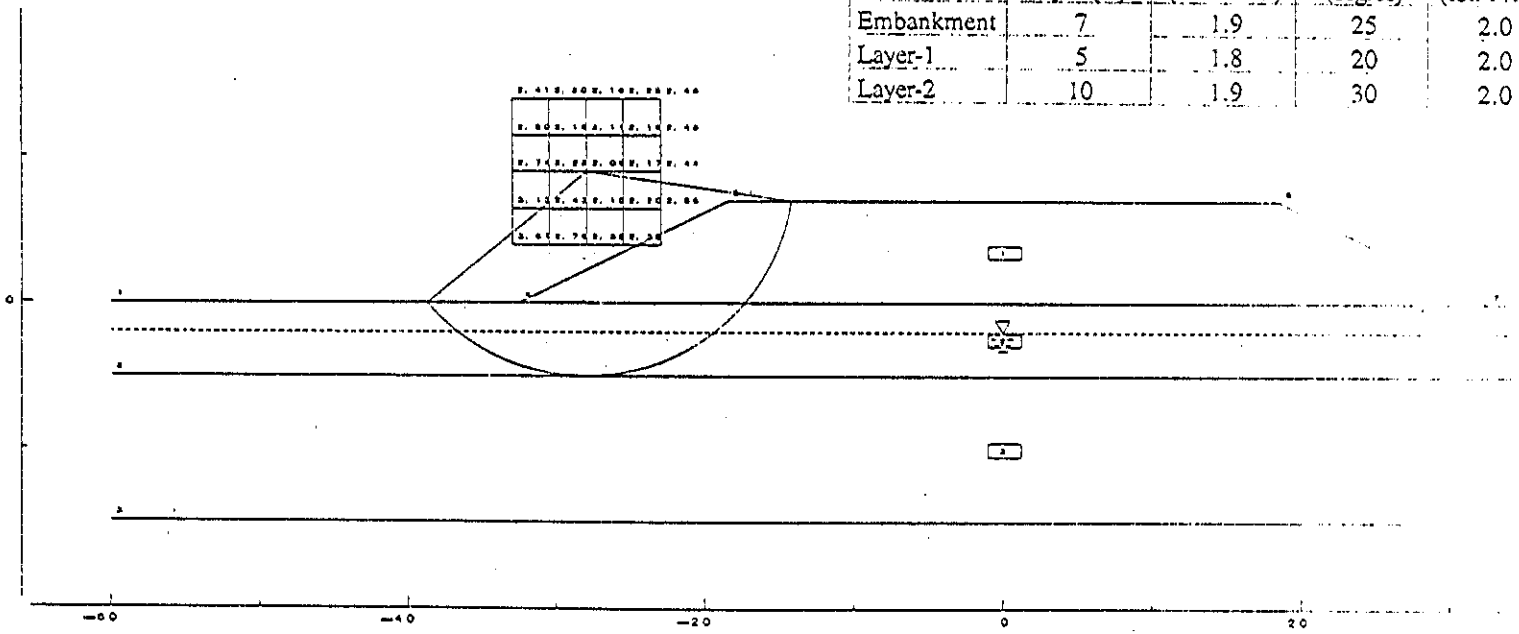
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 7 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of embankment stability (Embankment height = 7 m)**

| Stability of analysis: | | Ground | |
|---|---|---|---|
| Height of embankment: | H = | 7 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 2.097 | |
| Radius of arc: | R = | 13.99 | m |
| Resisted moment: | Mr = | 1,935.54 | ton f * m |
| Sliding moment: | Ms = | 922.86 | ton f * m |

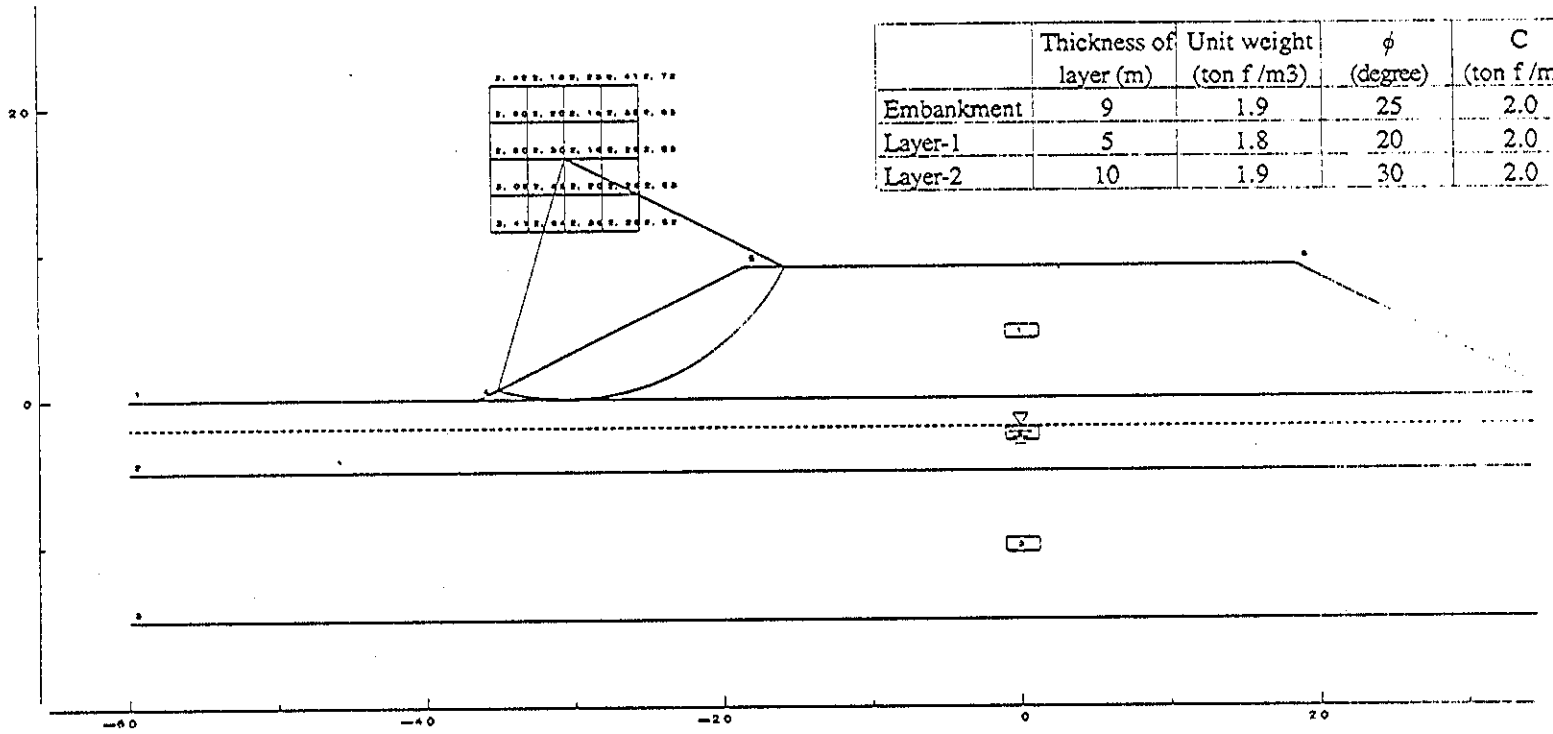
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 7 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of ground stability (Embankment height = 7 m)**

| Stability of analysis: | | Embankment | |
|---|---|---|---|
| Height of embankment: | H = | 9 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 2.168 | |
| Radius of arc: | R = | 16.50 | m |
| Resisted moment: | Mr = | 1,608.44 | ton f * m |
| Sliding moment: | Ms = | 742.00 | ton f * m |

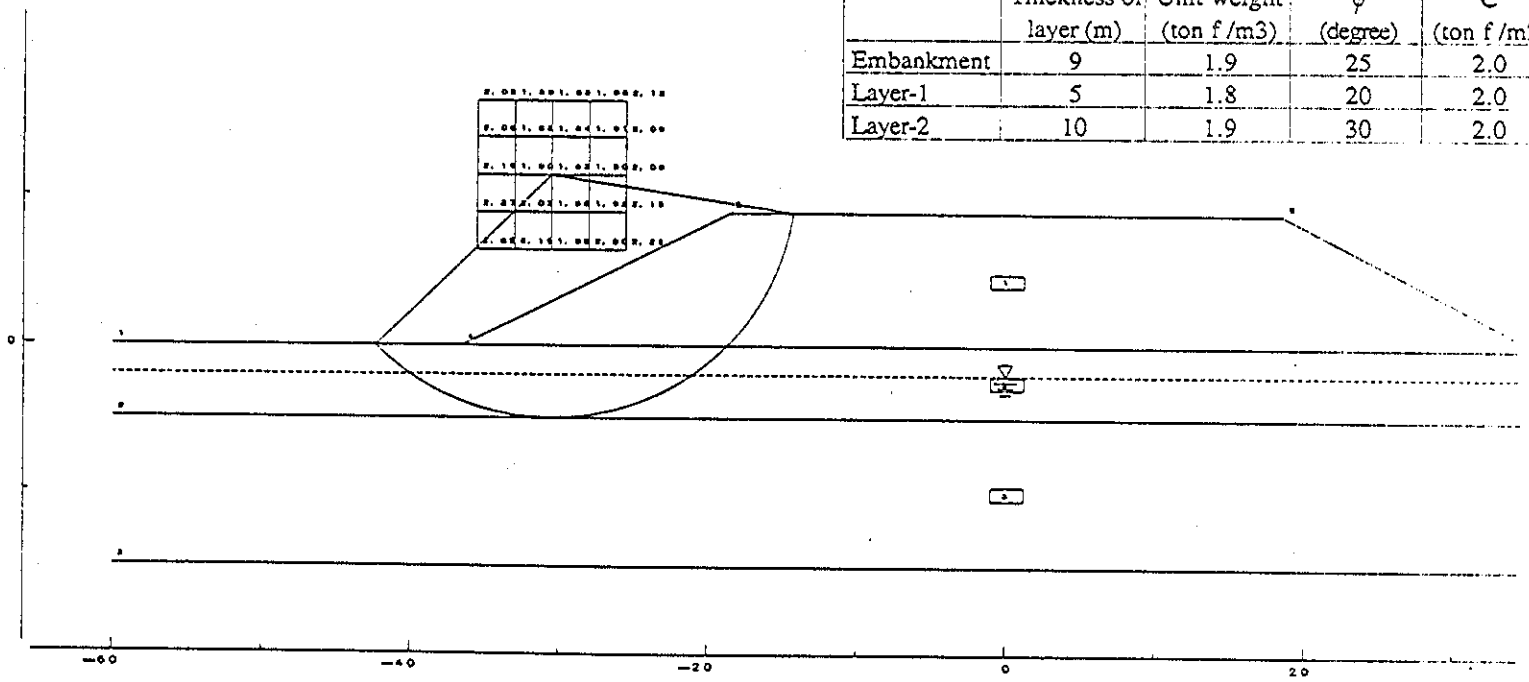
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 9 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of embankment stability (Embankment height = 9 m)**

| Stability of analysis: | | Ground | |
|---|---|---|---|
| Height of embankment: | H = | 9 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 1.836 | |
| Radius of arc: | R = | 16.49 | m |
| Resisted moment: | Mr = | 2,827.78 | ton f * m |
| Sliding moment: | Ms = | 1,540.17 | ton f * m |

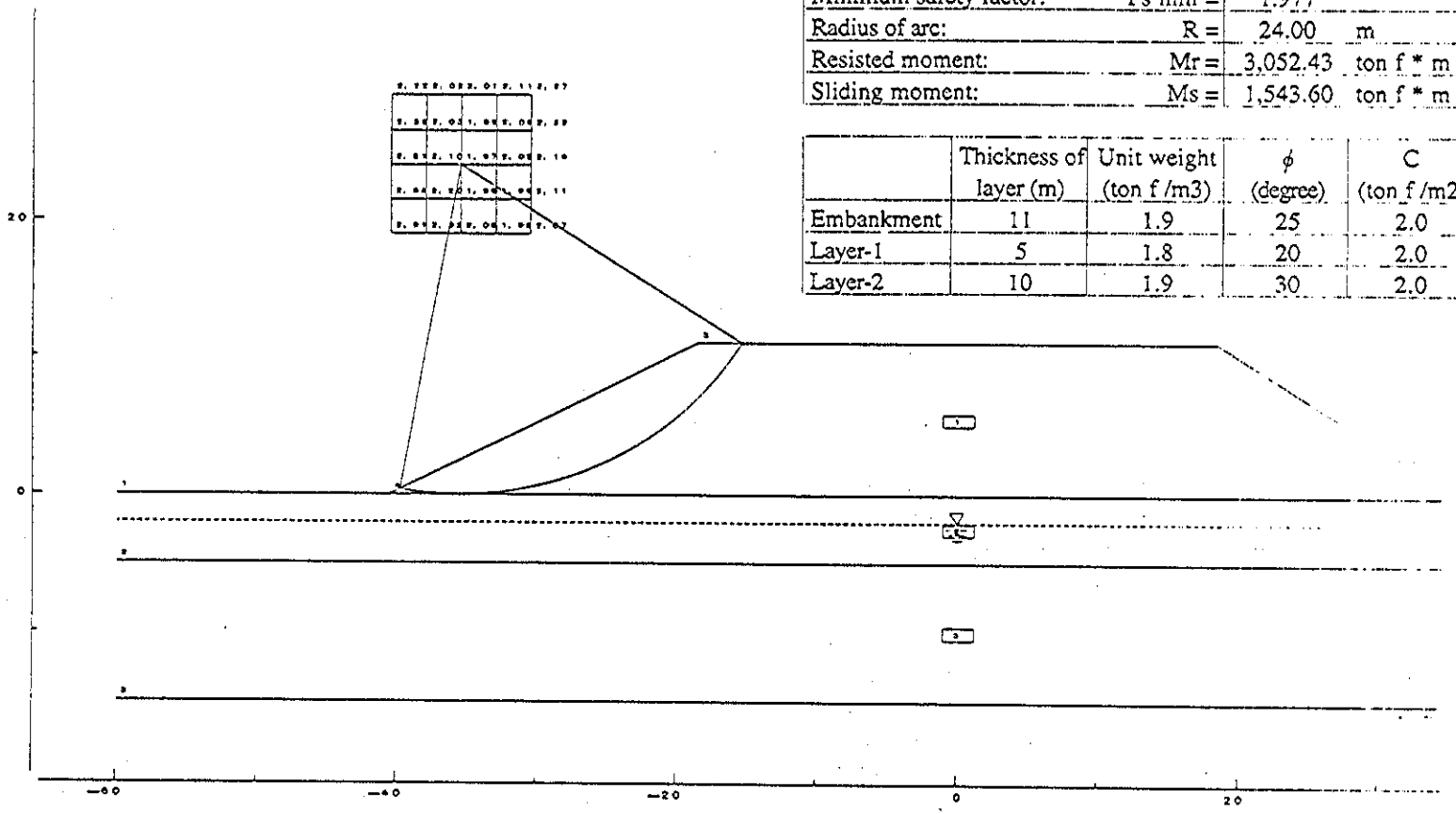
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 9 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of ground stability (Embankment height = 9 m)**

| Stability of analysis: | | Embankment | |
|---|---|---|---|
| Height of embankment: | H = | 11 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 1.977 | |
| Radius of arc: | R = | 24.00 | m |
| Resisted moment: | Mr = | 3,052.43 | ton f * m |
| Sliding moment: | Ms = | 1,543.60 | ton f * m |

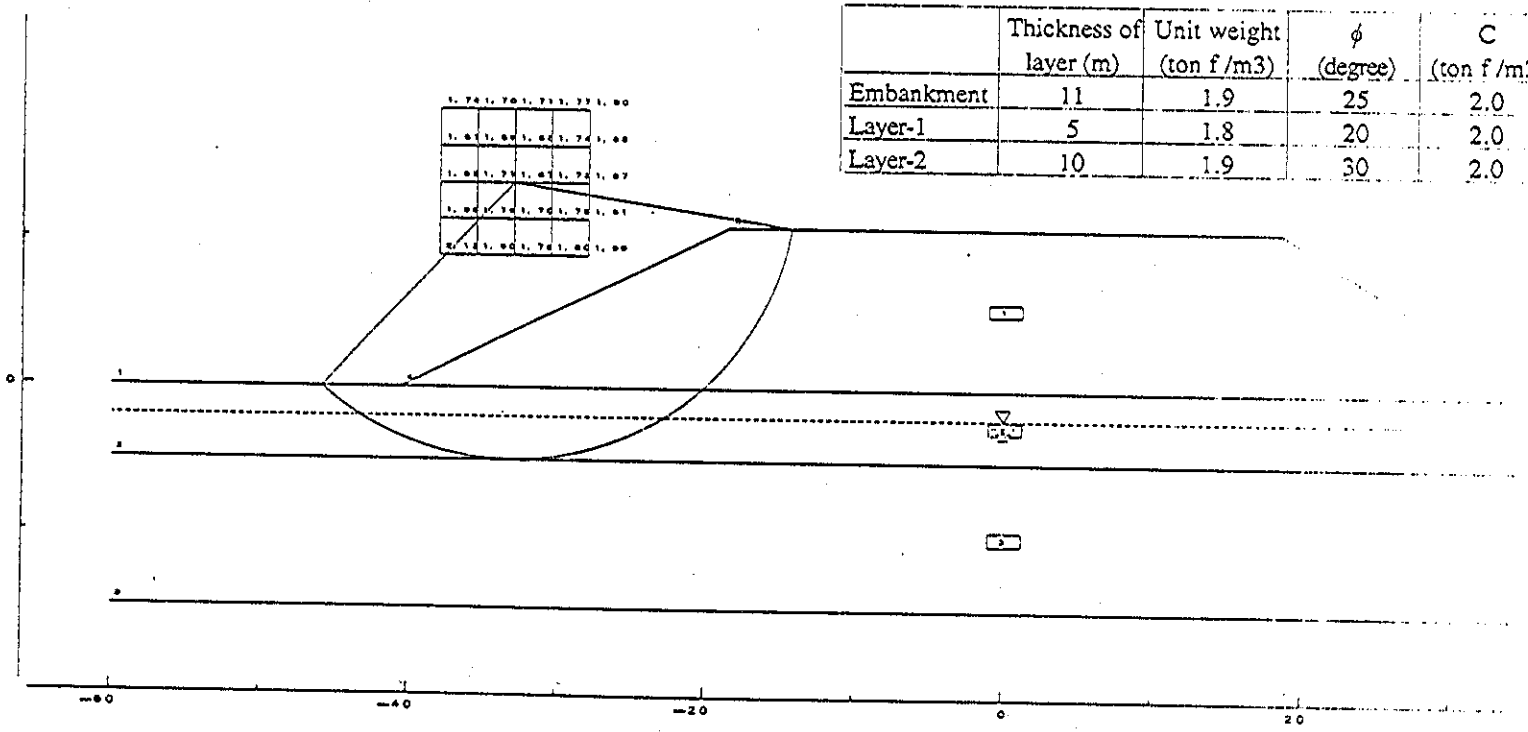
| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 11 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of embankment stability (Embankment height = 11 m)**

| Stability of analysis: | | Ground | |
|---|---|---|---|
| Height of embankment: | H = | 11 | m |
| Width of embankment: | W = | 37 | m |
| Minimum safety factor: | Fs min = | 1.676 | |
| Radius of arc: | R = | 18.99 | m |
| Resisted moment: | Mr = | 3,951.75 | ton f * m |
| Sliding moment: | Ms = | 2,358.20 | ton f * m |

| | Thickness of layer (m) | Unit weight (ton f /m3) | $\phi$ (degree) | C (ton f /m2) | Ground water level (m) |
|---|---|---|---|---|---|
| Embankment | 11 | 1.9 | 25 | 2.0 | |
| Layer-1 | 5 | 1.8 | 20 | 2.0 | -2 m from top |
| Layer-2 | 10 | 1.9 | 30 | 2.0 | |




**Calculation result of ground stability (Embankment height = 11 m)**

**Appendix 9.3: List of Bridges and Culverts**

Bridge List ( Throughway Bridge )
Route : Kundli - Ghaziabad

| Station (km) | Length (m) | Span | Crossing | Remarks |
|---|---|---|---|---|
| 0 - 10 | 90 | 25+40+25 | National Highway No.1 | Out of Construction |
| 0 + 600 | 25 | 25 | Kundli IC Ramp | Out of Construction |
| 0 + 990 | 11 | 11 | Village Road | Relocation L = 750m |
| 1 + 975 | 20 | 20 | 1 L Minor (Distributary) | Relocation CT/IR L = 180m |
| 3 + 400 | 11 | 11 | Village Road | Relocation L = 170m |
| 7 + 120 | 11 | 11 | Village Road | Relocation L = 160m |
| 11 + 975 | 25 | 25 | Yamuna River | |
| 12 + 600 | 600 | 15 @ 40 | Yamuna River | Guide Bunds |
| 14 + 100 | 40 | 40 | State Highway No.57 | Relocation (VR) L = 350m |
| 18 + 440 | 40 | 40 | Railway | |
| 18 + 555 | 11 | 11 | Village Road | |
| 19 + 230 | 20 | 20 | Khekra Distributary | Relocation CT/IR L = 170m |
| 19 + 610 | 20 | 20 | Mitli Distributary | Relocation CT/IR L = 170m |
| 21 + 840 | 40 | 40 | Eastern Yamuna Canal | |
| 22 + 230 | 11 | 11 | Village Road | Relocation L = 360m |
| 22 + 640 | 20 | 20 | Daula Drain (Irrigation) | Relocation CT/IR L = 190m |
| 25 + 195 | 11 | 11 | Village Road | Relocation L = 160m |
| 29 + 540 | 11 | 11 | Village Road | |
| 31 + 300 | 11 | 11 | Village Road | Relocation L = 270m |
| 33 + 300 | 240 | 6 @ 40 | Hindan River | Guide Bunds |
| 36 + 880 | 11 | 11 | Village Road | |
| 38 + 490 | 11 | 11 | Village Road | Relocation L = 230m |
| 39 + 660 | 20 | 20 | Sultanpur Minor (Distribution) | Relocation CT/IR L = 250m |
| 39 + 855 | 11 | 11 | District Road | |

Total : L = 1,206 22Nos
L= 11m 11Nos
L= 20m 5Nos
L= 25m 1No
L= 40m 3Nos
L=240m 1No
L=600m 1No

Culvert List

Route : Kundli - Ghaziabad

| Station (km) | Size (m) W*H | Over-burden (m) | Length (m) | Crossing | Remarks |
|---|---|---|---|---|---|
| 1 + 360 | 3*3 | 5 | 58 | Cart Track | |
| 2 + 360 | 3*3 | 2 | 46 | Cart Track | |
| 2 + 710 | 3*3 | 1 | 42 | Cart Track | |
| 2 + 975 | 3*3 | 1 | 42 | Cart Track | Relocation L = 100m |
| 3 + 740 | 3*3 | 2 | 46 | Cart Track | Relocation L = 210m |
| 4 + 150 | 3*3 | 2 | 46 | Cart Track | |
| 4 + 865 | 3*3 | 1 | 42 | Cart Track | Relocation L = 190m |
| 5 + 395 | 3*3 | 2 | 46 | Cart Track / Drain | |
| 6 + 150 | 3*3 | 1 | 42 | Cart Track | |
| 7 + 470 | 3*3 | 3 | 50 | Cart Track | Relocation L = 80m |
| 7 + 980 | 3*3 | 1 | 42 | Cart Track | Relocation L = 410m |
| 8 + 465 | 3*3 | 3 | 50 | Cart Track | |
| 9 + 570 | 3*3 | 1 | 42 | Cart Track / Drain | Relocation L = 200m |
| 10 + 525 | 3*3 | 2 | 46 | Cart Track (River Bank) | Relocation L = 120m |
| 13 + 205 | 3*3 | 4 | 54 | Cart Track | |
| 15 + 400 | 3*3 | 1 | 42 | Cart Track | Relocation L = 260m |
| 16 + 430 | 3*3 | 1 | 42 | Cart Track | Relocation L = 200m |
| 16 + 660 | 3*3 | 3 | 50 | Cart Track | |
| 17 + 110 | 3*3 | 3 | 50 | Cart Track | |
| 17 + 425 | 3*3 | 1 | 42 | Cart Track | |
| 18 + 155 | 3*3 | 5 | 58 | Cart Track | |
| 19 + 430 | 3*3 | 5 | 58 | Basi Drain | |
| 21 + 605 | 3*3 | 2 | 46 | Cart Track | |
| 23 + 900 | 3*3 | 1 | 42 | Cart Track / Drain | Relocation L = 750m |
| 24 + 900 | 3*3 | 2 | 46 | Cart Track | |
| 26 + 475 | 3*3 | 1 | 42 | Cart Track | |
| 26 + 720 | 6*3 | 3 | 50 | Daula Drain | |
| 27 + 675 | 3*3 | 1 | 42 | Cart Track | |
| 29 + 300 | 3*3 | 1 | 42 | Cart Track | Relocation L = 1470+210m |
| 31 + 0 | 3*3 | 1 | 42 | Cart Track | Relocation L = 240m |
| 31 + 600 | 3*3 | 1 | 42 | Cart Track | |
| 33 + 470 | 3*3 | 3 | 50 | Cart Track | |
| 34 + 635 | 3*3 | 2 | 46 | Cart Track | Relocation L = 300m |
| 34 + 850 | 3*3 | 2 | 46 | Cart Track | Relocation L = 170m |
| 35 + 190 | 3*3 | 1 | 42 | Cart Track | |
| 36 + 555 | 3*3 | 4 | 54 | Sonda Drain | |
| 37 + 300 | 3*3 | 1 | 42 | Cart Track / Drain | Relocation L = 150m |
| 39 + 190 | 3*3 | 3 | 50 | Cart Track | Relocation L = 190m |
| 39 + 770 | 6*3 | 5 | 58 | Bhikampur Drain | |

Total :

Box Culvert 3(W)*3(H)*1Cell 37Nos (1,710m)

Box Culvert 3(W)*3(H)*2Cells 2Nos (108m)

Pipe Culvert List

Route : Kundli - Ghaziabad

| Station (km) | Size (m) D*No | Over-burden (m) | Length (m) | Crossing | Remarks |
|---|---|---|---|---|---|
| 24 + 650 | 1*1 | 3 | 50 | Drain | |
| 25 + 700 | 1*1 | 5 | 58 | Drain | Detour L = 230m |
| Total : Pipe Culvert 1(D)*1(No) | | | 2Nos (108m) | | |

Bridge List ( Throughway Bridge )

Route : Ghaziabad - Meerut

| Station (km) | Length (m) | Span | Crossing | Remarks |
|---|---|---|---|---|
| 1 + 525 | 11 | 11 (8lanes) | Village Road | |
| 3 + 680 | 11 | 11 (8lanes) | Village Road | |
| 5 + 460 | 11 | 11 (8lanes) | Village Road | Relocation CT/IR L = 270m |
| 7 + 755 | 11 | 11 (8lanes) | Village Road | |
| 11 + 300 | 11 | 11 | District Road | Relocation L = 80m |
| 12 + 895 | 20 | 20 | Tikri Distributary | Relocation CT/IR L = 250m |
| 15 + 25 | 11 | 11 | Village Road | |
| 16 + 235 | 11 | 11 | District Road | |
| 19 + 460 | 20 | 20 | Kuaila Minor (Distributrary) | Relocation CT/IR L = 460m |
| 20 + 840 | 90 | 25+40+25 | Upper Ganga Canal | Relocation (V/R) L = 120m |
| 22 + 640 | 20 | 20 | Jalalabad Distributary | Relocation CT/IR L = 180m |
| 23 + 325 | 11 | 11 | Village Road | Relocation L = 500m |
| 26 + 490 | 11 | 11 | District Road | |
| 32 + 150 | 11 | 11 | Village Road | Relocation L = 470m |
| 34 + 455 | 20 | 20 | Left Bhola Distributary | Relocation CT/IR L = 300m |
| 35 + 865 | 20 | 20 | Sheikhpuri Drain | Detour L = 180m |
| 37 + 480 | 20 | 20 | Sheikhpuri Drain | Detour L = 870m |
| 39 + 10 | 20 | 20 | Sheikhpuri Drain | Detour L = 170m |
| 39 + 750 | 25 | 25 | Meerut IC Ramp | Out of Construction |
| 39 + 940 | 20 | 20 | Puth Distributary | Out of Construction |
| 40 + 240 | 40 | 40 | State Highway No.14 | Out of Construction |

| | | |
|---|---|---|
| Total : | L = 340 | 18Nos |
| L= 11m | 6Nos | (6lanes) |
| L= 11m | 4Nos | (8lanes) |
| L= 20m | 7Nos | |
| L= 90m | 1No | |

Box Culvert List

Route : Ghaziabad - Meerut

| Station (km) | Size (m) W*H | Over-burden (m) | Length (m) | Crossing | Remarks |
|---|---|---|---|---|---|
| 0 + 800 | 3*3 | 1 | 49 | Cart Track | |
| 2 + 795 | 3*3 | 1 | 49 | Cart Track | |
| 4 + 270 | 3*3 | 2 | 53 | Cart Track | |
| 5 + 945 | 3*3 | 4 | 61 | Cart Track | |
| 7 + 490 | 3*3 | 3 | 57 | Cart Track | |
| 8 + 345 | 3*3 | 2 | 53 | Cart Track | |
| 10 + 510 | 3*3 | 1 | 42 | Cart Track | |
| 10 + 735 | 6*3 | 4 | 54 | Bhikampur Drain | |
| 11 + 575 | 3*3 | 1 | 42 | Cart Track | |
| 12 + 200 | 3*3 | 2 | 46 | Cart Track | Relocation L = 350m |
| 15 + 475 | 3*3 | 1 | 42 | Cart Track | |
| 17 + 890 | 3*3 | 1 | 42 | Cart Track | |
| 19 + 0 | 3*3 | 1 | 42 | Cart Track | Relocation L = 110m |
| 20 + 60 | 3*3 | 1 | 42 | Cart Track | Relocation L = 130m |
| 21 + 950 | 3*3 | 1 | 42 | Cart Track | Relocation L = 150m |
| 23 + 880 | 3*3 | 1 | 42 | Cart Track | |
| 25 + 800 | 3*3 | 1 | 42 | Cart Track | |
| 26 + 190 | 3*3 | 3 | 50 | Cart Track | |
| 26 + 705 | 3*3 | 2 | 46 | Cart Track | Relocation L = 55m |
| 28 + 730 | 3*3 | 2 | 46 | Cart Track | |
| 29 + 255 | 3*3 | 2 | 46 | Cart Track | |
| 29 + 725 | 6*3 | 2 | 46 | Qadiribad Drain | Detour of Drain L = 240m |
| 31 + 350 | 3*3 | 1 | 42 | Cart Track | |
| 32 + 630 | 3*3 | 3 | 50 | Cart Track | |
| 33 + 35 | 3*3 | 1 | 42 | Cart Track | |
| 33 + 300 | 3*3 | 1 | 42 | Cart Track | Relocation L = 60m |
| 33 + 830 | 3*3 | 2 | 46 | Cart Track | |
| 34 + 175 | 3*3 | 5 | 58 | Cart Track | Relocation L = 260m |
| 34 + 720 | 3*3 | 2 | 46 | Cart Track | Relocation L = 190m |
| 36 + 180 | 3*3 | 1 | 42 | Cart Track | |
| 37 + 735 | 3*3 | 1 | 42 | Cart Track | Relocation L = 430m |
| 38 + 895 | 3*3 | 1 | 42 | Cart Track | Relocation L = 150m |

Total :

Box Culvert 3(W)*3(H)*1Cell 30Nos (1,386m)

Box Culvert 3(W)*3(H)*2Cells 2Nos (100m)

Pipe Culvert List

Route : Ghaziabad - Meerut

| Station (km) | Size (m) D*No | Over-burden (m) | Length (m) | Crossing | Remarks |
|---|---|---|---|---|---|
| 1 + 200 | 1*1 | 5 | 58 | | |
| 25 + 35 | 1*2 | 1 | 42 | Sherpur Minor (Distributary) | |
| 26 + 380 | 1*2 | 5 | 58 | Mawi Minor (Distributary) | |
| 27 + 665 | 1*2 | 2 | 46 | Niwari Drain | |
| 27 + 940 | 1*1 | 2 | 46 | Aghera Minor (Distributary) | |
| 31 + 920 | 1*2 | 5 | 58 | Kalaniri Minor(Distributery) | |
| 32 + 370 | 1*2 | 5 | 58 | Dhidala drain | |
| 34 + 975 | 1*1 | 2 | 46 | Drain | |

Total :

Pipe Culvert 1(D)*1(No) 3Nos (134m)

Pipe Culvert 1(D)*2(Nos) 5Nos(262m)

Bridge List ( Flyover )

Rute : Kundli - Ghaziabad & Ghaziabad - Meerut

| IC | Location of Ramp | Length (m) | Span | Crossing |
|---|---|---|---|---|
| Kundli IC | NH No.1 Side | 50 | 2@25 | National Highway No.1 |
| Khekra IC | Expressway Side | 50 | 2@25 | Expressway (Throughway) |
| Ghaziabad IC | Expressway Side | 80 | 2@40 | Expressway (Throughway) |
| | NH No.24 Side | 80 | 2@40 | National Highway No.24 |
| Modinagar IC | Expressway Side | 50 | 2@25 | Expressway (Throughway) |

Bridge List ( Box Culvert)

Rute : Kundli - Ghaziabad & Ghaziabad - Meerut

| JCT | Location of Ramp | Size (m) | Length (m) | Crossing |
|---|---|---|---|---|
| Ghaziabad JCT | Kundli - Ghaziabad | 10.5(W)*5(H) | 90 | GM Expressway |
| | Meerut - Kundli | 7.5(W)*5(H) | 45 | GM Expressway |
| | | 7.5(W)*5(H) | 40 | KG Ramp |

Bridge List ( L = 11m )

Route : Kundli - Ghaziabad

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| 0 + 990 | 226.66 | 218.50 | 8.16 |
| 3 + 400 | 223.69 | 217.60 | 6.09 |
| 7 + 120 | 222.72 | 215.20 | 7.52 |
| 18 + 555 | 231.35 | 220.50 | 10.85 |
| 22 + 230 | 230.42 | 219.40 | 11.02 |
| 25 + 195 | 225.79 | 217.00 | 8.79 |
| 29 + 540 | 217.35 | 210.00 | 7.35 |
| 31 + 300 | 214.35 | 207.30 | 7.05 |
| 36 + 880 | 214.36 | 207.50 | 6.86 |
| 38 + 490 | 218.86 | 211.50 | 7.36 |
| 39 + 855 | 221.93 | 215.00 | 6.93 |

Route : Ghaziabad - Meerut

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| *1 + 525 | 207.30 | 200.80 | 6.50 |
| *3 + 680 | 213.75 | 206.20 | 7.55 |
| *5 + 460 | 219.64 | 213.00 | 6.64 |
| *7 + 755 | 220.88 | 214.00 | 6.88 |
| 11 + 300 | 219.76 | 212.20 | 7.56 |
| 15 + 25 | 219.65 | 212.20 | 7.45 |
| 16 + 235 | 219.85 | 213.50 | 6.35 |
| 23 + 325 | 224.28 | 217.50 | 6.78 |
| 26 + 490 | 224.73 | 218.50 | 6.23 |
| 32 + 150 | 226.65 | 220.00 | 6.65 |
| + | | | 0.00 |

* : 8lanes

Bridge List ( L = 20m )

Route : Kundli - Ghaziabad

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| 1 + 975 | 224.58 | 218.00 | 6.58 |
| 19 + 230 | 227.37 | 220.40 | 6.97 |
| 19 + 615 | 227.85 | 220.50 | 7.35 |
| 22 + 640 | 226.05 | 217.80 | 8.25 |
| *39 + 660 | 222.65 | 213.50 | 9.15 |

* : Road PL - Canal PL = 8.15

Route : Ghaziabad - Meerut

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| **12 + 895 | 222.36 | 213.40 | 8.96 |
| 19 + 460 | 223.86 | 216.90 | 6.96 |
| 22 + 640 | 225.37 | 217.40 | 7.97 |
| 34 + 455 | 228.70 | 220.40 | 8.30 |
| *35 + 865 | 224.72 | 219.40 | 5.32 |
| *37 + 480 | 225.63 | 220.50 | 5.13 |
| *39 + 10 | 227.40 | 221.60 | 5.80 |

* : Clearance height for drain is more than 3.0m.

** : Road PL - Canal PL = 6.86

Bridge List ( L = 25m )

Route : Kundli - Ghaziabad

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| 11 + 975 | 221.72 | 214.00 | 7.72 |

Route : Ghaziabad - Meerut

| Station (km) | PL (m) | GL (m) | H (m) |
|---|---|---|---|
| + | | | 0.00 |

# Appendix 9.4: Cumulative 18 kip ESAL Computation Results

**Cumulative 18-kip ESAL for Flexible Pavement**

| | Section | Vehicle Type | AADT Forecast (HV) 2006 | 2016 | 2026 | ESAL Factor | Lane Factor* A | B | Analysis Period ESAL** | Performance Period ESAL Combination** 1st Period | 2nd Period | 3rd period | 4th period | 5th period | 6th period | 7th period | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **30 yrs** | **9.3 yrs** | **5.7 yrs** | **4.0 yrs** | **3.5 yrs** | **3.2 yrs** | **2.8 yrs** | **2.5 yrs** | **31.0 yrs** |
| 1 | Kundli | Large Bus | 7,556 | 12,075 | 19,594 | 0.63 | 0.8 | 0.6 | 39,573,812 | 7,913,149 | 6,879,169 | 6,094,387 | 5,223,103 | 5,153,609 | 5,213,044 | 5,290,796 | Initial: |
| | | LCV | 5,444 | 8,700 | 14,118 | 0.19 | 0.8 | 0.6 | 8,599,600 | 1,719,570 | 1,494,880 | 1,324,343 | 1,135,008 | 1,119,907 | 1,132,822 | 1,149,718 | 49mil (9.3 yrs) |
| | | 2-Axle Truck | 10,685 | 17,076 | 27,709 | 2.18 | 0.8 | 0.6 | 193,649,630 | 38,722,033 | 33,662,375 | 29,822,140 | 25,558,619 | 25,218,557 | 25,509,397 | 25,889,868 | Overlay: 6 times |
| | Khekra | Multi-Axle Truck | 1,730 | 2,765 | 4,486 | 0.26 | 0.8 | 0.6 | 3,739,324 | 747,712 | 650,012 | 575,858 | 493,530 | 486,964 | 492,580 | 499,927 | |
| | | Total | 25,441 | 40,656 | 65,974 | | | | **245,562,367** | **49,102,464** | **42,686,436** | **37,816,727** | **32,410,260** | **31,979,036** | **32,347,844** | **32,830,309** | **259,173,076** |
| | | | | | | | | | **30 yrs** | **11.1 yrs** | **5.8 yrs** | **4.1 yrs** | **3.6 yrs** | **2.9 yrs** | **2.5 yrs** | | **30.0 yrs** |
| 2 | Khekra | Large Bus | 5,690 | 10,264 | 18,515 | 0.63 | 0.8 | 0.6 | 36,307,652 | 7,964,617 | 6,763,185 | 5,960,952 | 5,275,430 | 5,144,435 | 5,199,032 | | Initial: |
| | | LCV | 4,100 | 7,395 | 13,341 | 0.19 | 0.8 | 0.6 | 7,889,846 | 1,730,754 | 1,469,676 | 1,295,347 | 1,146,379 | 1,117,913 | 1,129,777 | | 49mil (11.1 yrs) |
| | | 2-Axle Truck | 8,046 | 14,514 | 26,182 | 2.18 | 0.8 | 0.6 | 177,667,075 | 38,973,882 | 33,094,825 | 29,169,195 | 25,814,675 | 25,173,668 | 25,440,831 | | Overlay: 5 times |
| | Junction | Multi-Axle Truck | 1,303 | 2,350 | 4,239 | 0.26 | 0.8 | 0.6 | 3,430,705 | 752,576 | 639,053 | 563,250 | 498,475 | 486,097 | 491,256 | | |
| | | Total | 19,158 | 34,558 | 62,339 | | | | **225,295,279** | **49,421,828** | **41,966,739** | **36,988,744** | **32,734,959** | **31,922,113** | **32,260,896** | | **225,295,279** |
| | | | | | | | | | **30 yrs** | **12.5 yrs** | **6.5 yrs** | **5.7 yrs** | **4.2 yrs** | **3.6 yrs** | | | **32.5 yrs** |
| 3 | Meerut | Large Bus | 4,409 | 9,166 | 13,758 | 0.63 | 0.8 | 0.6 | 27,424,768 | 7,936,265 | 6,801,609 | 6,030,881 | 5,154,363 | 5,174,600 | | | Initial: |
| | | LCV | 3,177 | 6,604 | 9,913 | 0.19 | 0.8 | 0.6 | 5,959,548 | 1,724,593 | 1,478,026 | 1,310,543 | 1,120,070 | 1,124,468 | | | 49mil (12.5 yrs) |
| | | 2-Axle Truck | 6,235 | 12,962 | 19,456 | 2.18 | 0.8 | 0.6 | 134,199,762 | 38,835,145 | 33,282,846 | 29,511,381 | 25,222,246 | 25,321,275 | | | Overlay: 4 times |
| | Modinagar | Multi-Axle Truck | 1,010 | 2,099 | 3,150 | 0.26 | 0.8 | 0.6 | 2,591,363 | 749,897 | 642,683 | 569,857 | 487,035 | 488,947 | | | |
| | | Total | 14,846 | 30,862 | 46,323 | | | | **170,175,441** | **49,245,900** | **42,205,165** | **37,422,662** | **31,983,714** | **32,109,291** | | | **192,966,731** |
| | | | | | | | | | **30 yrs** | **11.9 yrs** | **5.8 yrs** | **4.2 yrs** | **3.3 yrs** | **2.7 yrs** | **2.3 yrs** | | **30.2 yrs** |
| 4 | Modinagar | Large Bus | 5,086 | 9,422 | 18,661 | 0.63 | 0.8 | 0.6 | 36,134,138 | 7,970,186 | 6,786,432 | 6,053,408 | 5,242,799 | 5,261,952 | 5,315,453 | | Initial: |
| | | LCV | 3,665 | 6,789 | 13,446 | 0.19 | 0.8 | 0.6 | 7,852,141 | 1,731,964 | 1,474,728 | 1,315,438 | 1,139,288 | 1,143,450 | 1,155,076 | | 49mil (11.9 yrs) |
| | | 2-Axle Truck | 7,192 | 13,324 | 26,389 | 2.18 | 0.8 | 0.6 | 176,818,006 | 39,001,135 | 33,208,576 | 29,621,617 | 25,654,999 | 25,748,722 | 26,010,521 | | Overlay: 5 times |
| | Junction | Multi-Axle Truck | 1,164 | 2,157 | 4,273 | 0.26 | 0.8 | 0.6 | 3,414,310 | 753,102 | 641,249 | 571,986 | 495,391 | 497,201 | 502,256 | | |
| | | Total | 17,125 | 31,724 | 62,832 | | | | **224,218,595** | **49,456,387** | **42,110,985** | **37,562,449** | **32,532,477** | **32,651,326** | **32,983,306** | | **227,296,931** |
| | | | | | | | | | **30 yrs** | **10.6 yrs** | **5.7 yrs** | **3.9 yrs** | **3.3 yrs** | **2.8 yrs** | **2.4 yrs** | **2.1 yrs** | **30.8 yrs** |
| 5 | Junction | Large Bus | 7,958 | 14,526 | 25,504 | 0.63 | 0.6 | 0.5 | 39,519,551 | 7,899,934 | 6,771,756 | 5,999,338 | 5,227,015 | 5,263,541 | 5,221,160 | 5,184,385 | Initial: |
| | | LCV | 5,734 | 10,467 | 18,376 | 0.19 | 0.6 | 0.5 | 8,587,809 | 1,716,698 | 1,471,539 | 1,303,688 | 1,135,858 | 1,143,796 | 1,134,586 | 1,126,594 | 49mil (10.6 yrs) |
| | | 2-Axle Truck | 11,254 | 20,542 | 36,066 | 2.18 | 0.6 | 0.5 | 193,384,111 | 38,657,367 | 33,136,762 | 29,357,031 | 25,577,764 | 25,756,497 | 25,549,111 | 25,369,155 | Overlay: 6 times |
| | Ghaziabad | Multi-Axle Truck | 1,822 | 3,326 | 5,839 | 0.26 | 0.6 | 0.5 | 3,734,197 | 746,464 | 639,862 | 566,877 | 493,900 | 497,351 | 493,347 | 489,872 | |
| | | Total | 26,796 | 48,910 | 85,870 | | | | **245,225,669** | **49,020,463** | **42,019,919** | **37,226,934** | **32,434,538** | **32,661,185** | **32,398,204** | **32,170,005** | **257,931,248** |
| | | | | | | | | | Average Years | **11.1 yrs** | **5.9 yrs** | **4.4 yrs** | **3.6 yrs** | **3.0 yrs** | **2.5 yrs** | **0.9 yrs** | **31.4 yrs** |
| | | | | | | | | | Cumulative | **11 yrs** | **17 yrs** | **21 yrs** | **25 yrs** | **28 yrs** | **30 yrs** | **31 yrs** | |

* Lane Distribution Factor: A: 2006-2026, B: 2026-2036

** Directional Factor=50%

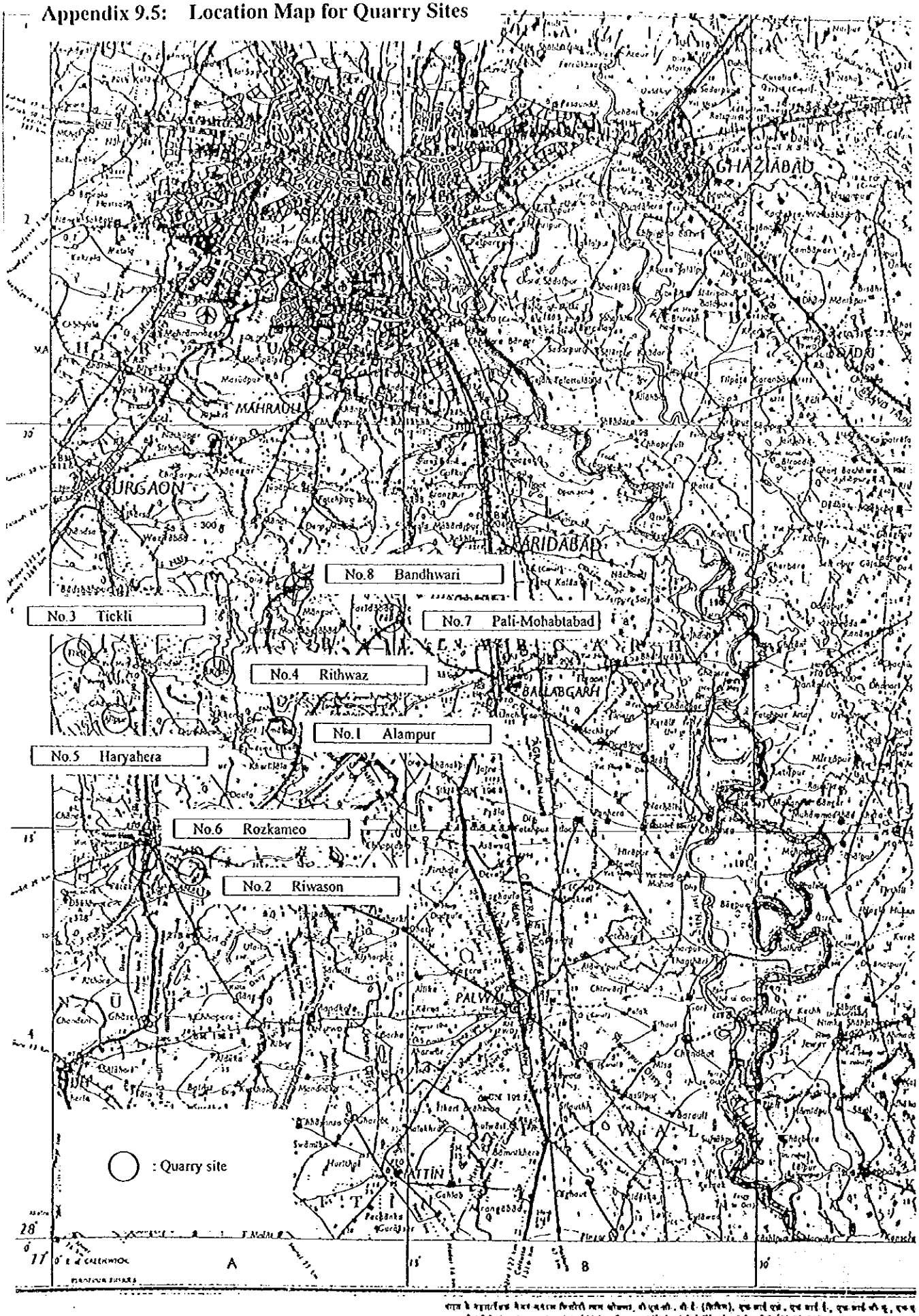
**Cumulative 18-kip ESAL for Rigid Pavement**

| | Section | Vehicle Type | AADT Forecast (HV) | | | ESAL | Lane Factor* | | Analysis Period | Performance Period ESAL** Combination | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2006 | 2016 | 2026 | Factor | A | B | ESAL** | 1st | 2nd | 3rd | Total |
| | | | | | | | | | **30 yrs** | **18.8 yrs** | **10.0 yrs** | **6.9 yrs** | **35.7 yrs** |
| 1 | Kundli | Large Bus | 7,556 | 12,075 | 19,594 | 0.61 | 0.8 | 0.6 | 38,317,501 | 19,900,667 | 16,000,321 | 16,022,600 | Initial: |
| | \| | LCV | 5,444 | 8,700 | 14,118 | 0.18 | 0.8 | 0.6 | 8,146,990 | 4,231,240 | 3,401,956 | 3,406,693 | 135mil (18.8 yrs) |
| | \| | 2-Axle Truck | 10,685 | 17,076 | 27,709 | 2.34 | 0.8 | 0.6 | 207,862,447 | 107,955,929 | 86,797,569 | 86,918,426 | Overlay: 2 times |
| | Khekra | Multi-Axle Truck | 1,730 | 2,765 | 4,486 | 0.44 | 0.8 | 0.6 | 6,328,088 | 3,286,570 | 2,642,433 | 2,646,112 | |
| | | Total | 25,441 | 40,656 | 65,974 | | | | **260,655,025** | **135,374,406** | **108,842,279** | **108,993,832** | **353,210,517** |
| | | | | | | | | | **30 yrs** | **20.9 yrs** | **9.4 yrs** | | **30.3 yrs** |
| 2 | Khekra | Large Bus | 5,690 | 10,264 | 18,515 | 0.61 | 0.8 | 0.6 | 35,155,028 | 19,904,991 | 15,905,542 | | Initial: |
| | \| | LCV | 4,100 | 7,395 | 13,341 | 0.18 | 0.8 | 0.6 | 7,474,591 | 4,232,159 | 3,381,804 | | 135mil (20.9 yrs) |
| | \| | 2-Axle Truck | 8,046 | 14,514 | 26,182 | 2.34 | 0.8 | 0.6 | 190,706,861 | 107,979,383 | 86,283,418 | | Overlay: 1 time |
| | Junction | Multi-Axle Truck | 1,303 | 2,350 | 4,239 | 0.44 | 0.8 | 0.6 | 5,805,809 | 3,287,284 | 2,626,780 | | |
| | | Total | 19,158 | 34,558 | 62,339 | | | | **239,142,289** | **135,403,817** | **108,197,545** | | **243,601,362** |
| | | | | | | | | | **30 yrs** | **24.5 yrs** | **11.6 yrs** | | **36.1 yrs** |
| 3 | Meerut | Large Bus | 4,409 | 9,166 | 13,758 | 0.61 | 0.8 | 0.6 | 26,554,140 | 19,892,351 | 16,017,268 | | Initial: |
| | \| | LCV | 3,177 | 6,604 | 9,913 | 0.18 | 0.8 | 0.6 | 5,645,888 | 4,229,472 | 3,405,559 | | 135mil (24.5 yrs) |
| | \| | 2-Axle Truck | 6,235 | 12,962 | 19,456 | 2.34 | 0.8 | 0.6 | 144,049,286 | 107,910,817 | 86,889,503 | | Overlay: 1 time |
| | Modinagar | Multi-Axle Truck | 1,010 | 2,099 | 3,150 | 0.44 | 0.8 | 0.6 | 4,385,383 | 3,285,197 | 2,645,232 | | |
| | | Total | 14,846 | 30,862 | 46,323 | | | | **180,634,697** | **135,317,837** | **108,957,562** | | **244,275,399** |
| | | | | | | | | | **30 yrs** | **21.7 yrs** | **8.7 yrs** | | **30.4 yrs** |
| 4 | Modinagar | Large Bus | 5,086 | 9,422 | 18,661 | 0.61 | 0.8 | 0.6 | 34,987,023 | 19,876,986 | 16,077,332 | | Initial: |
| | \| | LCV | 3,665 | 6,789 | 13,446 | 0.18 | 0.8 | 0.6 | 7,438,870 | 4,226,205 | 3,418,330 | | 135mil (21.7 yrs) |
| | \| | 2-Axle Truck | 7,192 | 13,324 | 26,389 | 2.34 | 0.8 | 0.6 | 189,795,474 | 107,827,468 | 87,215,335 | | Overlay: 1 time |
| | Junction | Multi-Axle Truck | 1,164 | 2,157 | 4,273 | 0.44 | 0.8 | 0.6 | 5,778,063 | 3,282,660 | 2,655,151 | | |
| | | Total | 17,125 | 31,724 | 62,832 | | | | **237,999,430** | **135,213,319** | **109,366,149** | | **244,579,468** |
| | | | | | | | | | **30 yrs** | **20.1 yrs** | **8.9 yrs** | **5.9 yrs** | **34.9 yrs** |
| 5 | Junction | Large Bus | 7,958 | 14,526 | 25,504 | 0.61 | 0.6 | 0.5 | 38,264,962 | 19,875,634 | 16,033,408 | 16,026,454 | Initial: |
| | \| | LCV | 5,734 | 10,467 | 18,376 | 0.18 | 0.6 | 0.5 | 8,135,819 | 4,225,917 | 3,408,991 | 3,407,512 | 135mil (20.1 yrs) |
| | \| | 2-Axle Truck | 11,254 | 20,542 | 36,066 | 2.34 | 0.6 | 0.5 | 207,577,440 | 107,820,129 | 86,977,055 | 86,939,333 | Overlay: 2 times |
| | Ghaziabad | Multi-Axle Truck | 1,822 | 3,326 | 5,839 | 0.44 | 0.6 | 0.5 | 6,319,411 | 3,282,436 | 2,647,897 | 2,646,749 | |
| | | Total | 26,796 | 48,910 | 85,870 | | | | **260,297,633** | **135,204,116** | **109,067,351** | **109,020,049** | **353,291,516** |
| | | | | | | | | | Average Years | **21.2 yrs** | **9.7 yrs** | **2.6 yrs** | **33.5 yrs** |
| | | | | | | | | | Cumulative | **21 yrs** | **31 yrs** | **33 yrs** | |

* Lane Distribution Factor: A: 2006-2026, B: 2026-2036

** Directional Factor=50%

# Appendix 9.5: Location Map for Quarry Sites

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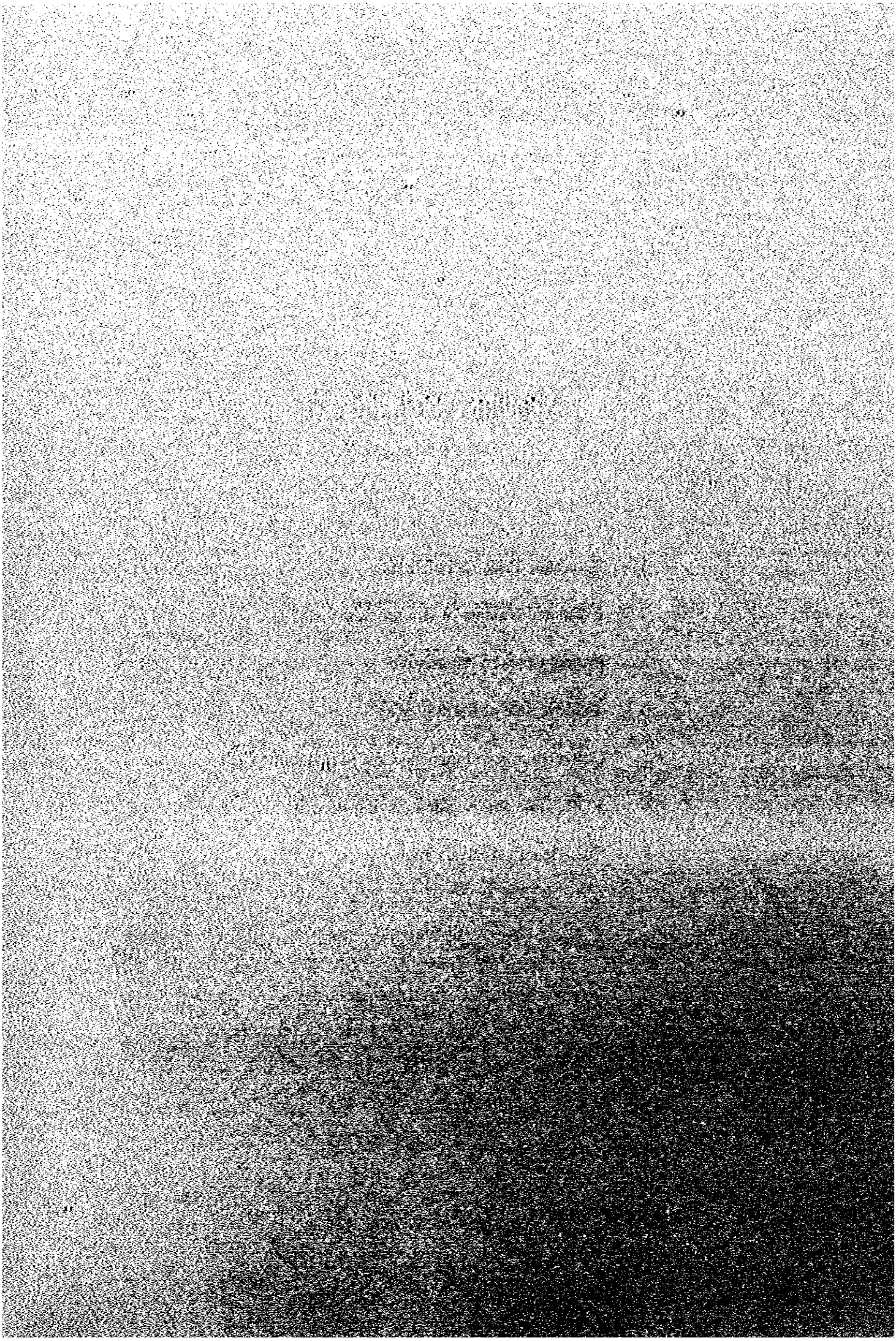
1980



1:250,000

# Appendix to Chapter 11

1. Economic Price Calculations
2. Estimated Number of Households
3. Project Costs by Alternatives
4. Shadow Rate of Right of Way
5. Conversion from Financial Cost to Economic Cost
6. VOC, Time and Accident Saving Benefit
7. Cost-Benefit Analysis Table



**Appendix Table 11.1.1 Calculation of Economic Price of Small Bus**

Unit: Rupee

| Item | Calculation | Economic Cost | | Financial Cost |
|---|---|---|---|---|
| | | Cost | Tax/duty | Cumulative |
| a) CKD & Assembling Costs | | 218,947 | | 218,947 |
| b) Excise Duty(Include Cess) | 27.98% | | 85,071 | 304,018 |
| c) Whole sale price | | | | 304,018 |
| d) Dealer Commission | 2.81% | 8,775 | | 8,775 |
| e) Retail price | | | | 312,793 |
| f) Sales Tax | 8% | | 25,023 | 337,817 |
| g) Registration Tax | 4% of Item(e) | | 12,512 | 350,328 |
| On the road price(Financial Cost) | | **227,722** | 122,606 | **350,328** |
| Cost Component % | | **65%** | **35%** | **100%** |

Source: Association of Indian Automobile Manufacturers

Note: CKD= Complete Knock Down

**Appendix Table 11.1.2 Calculation of Economic Price of Large Bus**

Unit: Rupee

| Item | Calculation | Economic Cost | | Financial Cost |
|---|---|---|---|---|
| | | Cost | Tax/duty | Cumulative |
| a) CKD & Assembling Costs | | 329,134 | | 329,134 |
| b) Excise Duty(Include Cess) | 15.13% | | 58,653 | 387,787 |
| c) Whole sale price | | | | 387,787 |
| d) Dealer Commission | 3.48% | 13,969 | | 13,969 |
| e) Retail price | | | | 401,756 |
| f) Sales Tax | 8% | | 32,140 | 433,896 |
| g) Registration Tax | 4% of Item(e) | | 16,070 | 449,967 |
| On the road price(Financial Cost) | | **343,103** | 106,863 | **449,967** |
| Cost Component % | | **76%** | **24%** | **100%** |

Source: Association of Indian Automobile Manufacturers

Note: CKD= Complete Knock Down

**Appendix Table 11.1.3 Calculation of Economic Price of Small Truck**

Unit: Rupee

| Item | Calculation | Economic Cost | | Financial Cost |
|---|---|---|---|---|
| | | Cost | Tax/duty | Cumulative |
| a) CKD & Assembling Costs | | 237,269 | | 237,269 |
| b) Excise Duty(Include Cess) | 17.63% | | 50,766 | 288,036 |
| c) Whole sale price | | | | 288,036 |
| d) Dealer Commission | 2.98% | 8,850 | | 8,850 |
| e) Retail price | | | | 296,886 |
| f) Sales Tax | 8% | | 23,751 | 320,636 |
| g) Registration Tax | 4% of Item(e) | | 11,875 | 332,512 |
| On the road price(Financial Cost) | | **246,119** | 86,393 | **332,512** |
| Cost Component % | | **74%** | **26%** | **100%** |

Note: CKD= Complete Knock Down

Source: Association of Indian Automobile Manufacturers

**Appendix Table 11.1.4 Calculation of Economic Price of Large Size Truck**

Unit: Rupee

| Item | Calculation | Economic Cost | | Financial Cost |
|---|---|---|---|---|
| | | Cost | Tax/duty | Cumulative |
| a) CKD & Assembling Costs | | 418,306 | | 418,306 |
| b) Excise Duty(Include Cess) | 15.13% | | 74,544 | 492,850 |
| c) Whole sale price | | | | 492,850 |
| d) Dealer Commission | 3.60% | 18,429 | | 18,429 |
| e) Retail price | | | | 511,280 |
| f) Sales Tax | 8% | | 40,902 | 552,182 |
| g) Registration Tax | 4% of Item(e) | | 20,451 | 572,633 |
| On the road price(Financial Cost) | | **436,736** | 135,897 | **572,633** |
| Cost Component % | | **76%** | **24%** | **100%** |

Note: CKD= Complete Knock Down

Source: Association of Indian Automobile Manufacturers

**Appendix Table 11.1.5 Calculation of Economic Price of Motorcycle**

Unit: Rupee

| Item | Calculation | Economic Cost | | Financial Cost |
|---|---|---|---|---|
| | | Cost | Tax/duty | Cumulative |
| a) CKD & Assembling Costs | | 19,353 | | 19,353 |
| b) Excise Duty(Include Cess) | 22.93% | | 5,757 | 25,111 |
| c) Whole sale price | | | | 25,111 |
| d) Dealer Commission | 26.72% | 9,154 | | 9,154 |
| e) Retail price | | | | 34,264 |
| f) Sales Tax | 8% | | 2741 | 37,006 |
| g) Registration Tax | 4% of Item(e) | | 1371 | 38,376 |
| On the road price(Financial Cost) | | **28,507** | 9,869 | **38,376** |
| Cost Component % | | **74%** | **26%** | **100%** |

Note: CKD= Complete Knock Down

Source: Association of Indian Automobile Manufacturers

## Appendix Table 11.1.6 Basic Data Estimated Number of Households

by Income Group in India (up to 2007)

Unit: Million Household

| Annual Income Level (Rupee) | Under 2255 Lowest | 22501-4500 Second | 45001-7000 Third | 70001-9600 Fourth | Above 9600 Highest | Average |
|---|---|---|---|---|---|---|
| No. of Household (1994-95) | 86,100 | 44,900 | 18,000 | 4,400 | 4,600 | 158,000 |
| Component (%) | 54.49% | 28.42% | 11.39% | 2.78% | 2.91% | 100% |
| No. of Household (2000-02) | 59,300 | 72,200 | 23,500 | 13,600 | 12,100 | 180,700 |
| Component (%) | 32.82% | 39.96% | 13.00% | 7.53% | 6.70% | 100% |
| No. of Household (2006-07) | 39,900 | 78,500 | 36,600 | 21,400 | 22,700 | 199,100 |
| Component (%) | 20.04% | 39.43% | 18.38% | 10.75% | 11.40% | 100% |
| Estimated Annual Income per Worker by Income Group (1999) | | | | | | |
| Annual Income by one Household | 11,300 | 33,750 | 57,500 | 83,000 | 109,000 | 294,550 |
| Annual Income Per Capita. 1) | 2,047 | 6,114 | 10,417 | 15,036 | 19,746 | 53,361 |
| Component (%) | 3.84% | 11.46% | 19.52% | 28.18% | 37.01% | 100.00% |
| No. of Household (1000) | 59,300 | 72,200 | 23,500 | 13,600 | 12,100 | 180,700 |
| Component (%) | 20.04% | 39.43% | 18.38% | 10.75% | 11.40% | 100% |

Source: Based on study National Council of Applied Economic Research, New Delhi.

Persons per household as per 1991 Census (excluding Assam and J&K): 5.52

## Appendix Table 11.2.1 Initial Project Cost of Expressway by Alternatives (Financial Price)

(Cost by Section and % of Foreign Portion)

K-G &G-M Case 80.75km

| Item | Segment 1 | | Segment 2 | | Segment 3 | | Segment 4 | | Segment 5 | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | % of F./P. | G.Total |
| Construction | 1,981,841 | 164,219 | 2,431,593 | 148,014 | 677,884 | 41,294 | 1,546,070 | 94,105 | 1,260,027 | 76,704 | 7,897,415 | 524,336 | 6% | **8,421,751** |
| Land Acquisition | 376,177 | 0 | 455,066 | 0 | 552,670 | 0 | 241,352 | 0 | 277,123 | 0 | 1,902,388 | 0 | 0% | **1,902,388** |
| Engineering | 202,428 | 48,225 | 243,348 | 58,017 | 101,906 | 24,314 | 150,889 | 35,972 | 129,405 | 30,854 | 827,976 | 197,382 | 19% | **1,025,358** |
| Total | 2,560,446 | 212,444 | 3,130,007 | 206,031 | 1,332,460 | 65,608 | 1,938,311 | 130,077 | 1,666,555 | 107,558 | 10,627,779 | 721,718 | | **11,349,497** |

Kundli-Ghaziabad Case 49.00km

Unit: 1,000Rs.

| Item | Segment 1 | | Segment 2 | | Segment 3 | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | % of F./P. | G.Total |
| Construction | 1,981,841 | 164,219 | 2,431,593 | 148,014 | 677,884 | 41,294 | 5,091,318 | 353,527 | 6.5% | **5,444,845** |
| Land Acquisition | 376,177 | 0 | 455,066 | 0 | 552,670 | 0 | 1,383,913 | 0 | 0.0% | **1,383,913** |
| Engineering | 202,428 | 48,225 | 243,348 | 58,017 | 101,906 | 24,314 | 547,682 | 130,556 | 19.2% | **678,238** |
| Total | 2,560,446 | 212,444 | 3,130,007 | 206,031 | 1,332,460 | 65,608 | 7,022,913 | 484,083 | | **7,506,996** |

Ghaziabad-Meerut Case 39.55km

| Item | Segment 4 | | Segment 5 | | Segment 3 | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | Local/P. | Foreign/P | % of F./P. | G.Total |
| Construction | 1,546,070 | 94,105 | 1,260,027 | 76,704 | 677,884 | 41,294 | 3,483,981 | 212,103 | 6% | **3,696,084** |
| Land Acquisition | 241,352 | 0 | 277,123 | 0 | 552,670 | 0 | 1,071,145 | 0 | 0% | **1,071,145** |
| Engineering | 150,889 | 35,972 | 129,405 | 30,854 | 101,906 | 24,314 | 382,200 | 91,140 | 19% | **473,340** |
| Total | 1,938,311 | 130,077 | 1,666,555 | 107,558 | 1,332,460 | 65,608 | 4,937,326 | 303,243 | 6% | **5,240,569** |

Note: Engineering cost is round off to decimal place.

**Appendix Table 11.2.2. Cost of Overlay and Widening (Financial Cost and Economic Cost)**

K-G &G-M Section 80.75km 1000Rs

| | Financial Cost | | | | | Economic Cost | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Widening | | Ope.Ment. | Overlay(1) | Overlay(2) | Widening | Ope.Ment. | Overlay(1) | Overlay(2) |
| Construction | 1,994,442 | 2,193,886 | 32,986 | 722,773 | 982,032 | 1,952,523 | | | |
| Land Acquisition | | | | | | | | | |
| Engineering | 199,444 | 219,388 | | | | 192,983 | | | |
| Contingency | 218,114 | | | 71,227 | 97,968 | | | | |
| | 2,412,000 | 2,412,000 | 32,986 | 794,000 | 1,080,000 | 2,145,507 | 23,118 | 632,799 | 860,734 |

Kundli-Ghaziabad Section 49.00km

| | Widening | | Ope.Ment. | Overlay(1) | Overlay(2) | Widening | Ope.Ment. | Overlay(1) | Overlay(2) |
|---|---|---|---|---|---|---|---|---|---|
| Construction | 1,341,849 | 1,476,034 | 21,012 | 425,840 | 596,197 | 1,313,646 | | | |
| Land Acquisition | | | | | | | | | |
| Engineering | 134,185 | 147,604 | | | | 129,838 | | | |
| Contingency | 146,966 | | | 42,160 | 58,803 | | | | |
| | 1,623,000 | 1,623,000 | 21,012 | 468,000 | 655,000 | 1,443,485 | 14,727 | 372,985 | 522,019 |

Ghaziabad-Meerut Section 39.55km

| | Widening | | Ope.Ment. | Overlay(1) | Overlay(2) | Widening | Ope.Ment. | Overlay(1) | Overlay(2) |
|---|---|---|---|---|---|---|---|---|---|
| Construction | 935,874 | 1,029,461 | 18,267 | 368,196 | 485,607 | 916,204 | | | |
| Land Acquisition | | | | | | | | | |
| Engineering | 93,587 | 102,946 | | | | 90,555 | | | |
| Contingency | 102,539 | | | 36,804 | 48,393 | | | | |
| | 1,132,000 | 1,132,000 | 18,267 | 405,000 | 534,000 | 1,006,759 | 12,803 | 322,775 | 425,585 |

## Appendix Table 11.2.3 Shadow Rate of Right of Way (Land Productivity)

Unit: 1000Rs.

| Items of Right of Way | Market Price | | | Economic Price | | |
|---|---|---|---|---|---|---|
| | Required Area (ha) | Total Cost | Adjusted Cost Solatium(-30%) | Present Value of Productivity 688,842/ha | Adjustment | Shadow Rate |
| Village Area | 572 | 1,187,954 | 831,568 | 394,018 | 788,035 | |
| Agriculture Area | 186 | 386,293 | 270,405 | 128,125 | 128,125 | |
| Vacant | 158 | 328,141 | 229,699 | 108,837 | 10,884 | |
| Total | 916 | 1,902,388 | 1,331,672 | 630,979 | 927,043 | 69.6% |

## Appendix Table 11.2.4 Conversion to Economic Cost from Financial Cost

K-G &G-M Case 80.75km

Unit: 1000 Rs.

| Items | Investment Costs in Market Price | Foreign Portion | Local Portion | | | | | Overall Conversion Factor | Investment Costs in Economic Prices |
|---|---|---|---|---|---|---|---|---|---|
| | | | Tradable Goods | Non-tradable Goods | Skilled Labor | Unskilled Labor | Transfer (Tax) | | |
| Conversion Factor | | 1.00 | 1.00 | 1.07 | 1.00 | 0.72 | 0.00 | | |
| Construction | 8,421,751 | 0.07 | 0.03 | 0.72 | 0.03 | 0.07 | 0.10 | 0.91 | 7,620,656 |
| Engineering | 1,025,358 | 0.19 | 0.00 | 0.24 | 0.43 | 0.04 | 0.10 | 0.89 | 911,168 |
| Land Acquisition | 1,902,388 | | | 1.00 | | | 0.00 | 0.70 | 1,324,348 |
| Total | 11,349,497 | | | | | | | | 9,856,172 |
| Routine Mainte. | | | 0.02 | 0.44 | 0.21 | 0.23 | 0.10 | 0.75 | |
| Periodic Repair | | | 0.03 | 0.67 | 0.05 | 0.15 | 0.10 | 0.83 | |

## Appendix Table 11.2.5 Conversion to Economic Cost from Financial Cost

Kundli-Ghaziabad Case 49.00km

Unit: 1000 Rs.

| Items | Investment Costs in Market Price | Foreign Portion | Local Portion | | | | | Overall Conversion Factor | Investment Costs in Economic Prices |
|---|---|---|---|---|---|---|---|---|---|
| | | | Tradable Goods | Non-tradable Goods | Skilled Labor | Unskilled Labor | Transfer (Tax) | | |
| Conversion Factor | | 1.00 | 1.00 | 1.07 | 1.00 | 0.72 | 0.00 | | |
| Construction | 5,444,845 | 0.07 | 0.03 | 0.72 | 0.03 | 0.07 | 0.10 | 0.91 | 4,926,920 |
| Engineering | 678,238 | 0.19 | | 0.24 | 0.43 | 0.04 | 0.10 | 0.89 | 602,705 |
| Land Acquisition | 1,383,913 | | | 1.00 | | | | 0.70 | 963,411 |
| Total | 7,506,996 | | | | | | | | 6,493,036 |

## Appendix Table 11.2.6 Conversion to Economic Cost from Financial Cost

Ghaziabad-Meerut Case 39.55km

Unit: 1000 Rs.

| Items | Investment Costs in Market Price | Foreign Portion | Local Portion | | | | | Overall Conversion Factor | Investment Costs in Economic Prices |
|---|---|---|---|---|---|---|---|---|---|
| | | | Tradable Goods | Non-tradable Goods | Skilled Labor | Unskilled Labor | Transfer (Tax) | | |
| Conversion Factor | | 1.00 | 1.00 | 1.07 | 1.00 | 0.72 | 0.00 | | |
| Construction | 3,696,084 | 0.07 | 0.03 | 0.72 | 0.03 | 0.07 | 0.10 | 0.91 | 3,344,505 |
| Engineering | 473,340 | 0.19 | | 0.24 | 0.43 | 0.04 | 0.10 | 0.89 | 420,626 |
| Land Acquisition | 1,071,145 | | | 1.00 | | | 0.00 | 0.70 | 745,678 |
| Total | 5,240,569 | | | | | | | | 4,510,808 |

## Appendix Table 11.3.1

### Vehicle Operating Cost Saving Benefit

(K-G)+(G-M) Expressway,80.75km 1000Rs

| Year | P.Car | Bus | Truck | Motorcycle | Total/year |
|---|---|---|---|---|---|
| 2006 | 1,155 | -22 | 148 | 414 | 508,243 |
| 2007 | 1,348 | -19 | 225 | 686 | 671,799 |
| 2008 | 1,558 | -16 | 303 | 968 | 843,704 |
| 2009 | 1,772 | -13 | 381 | 1,259 | 1,019,770 |
| 2010 | 1,989 | -10 | 460 | 1,561 | 1,199,784 |
| 2011 | 2,210 | -7 | 538 | 1,871 | 1,383,531 |
| 2012 | 2,433 | -4 | 616 | 2,191 | 1,570,788 |
| 2013 | 2,659 | -2 | 694 | 2,520 | 1,761,324 |
| 2014 | 2,887 | 1 | 771 | 2,858 | 1,954,902 |
| 2015 | 3,117 | 3 | 847 | 3,205 | 2,151,277 |
| 2016 | 3,347 | 5 | 922 | 3,560 | 2,350,192 |
| 2017 | 3,945 | 27 | 1,259 | 3,799 | 2,709,140 |
| 2018 | 4,575 | 51 | 1,651 | 4,051 | 3,098,463 |
| 2019 | 5,239 | 76 | 2,105 | 4,316 | 3,520,984 |
| 2020 | 5,937 | 103 | 2,631 | 4,595 | 3,979,819 |
| 2021 | 6,672 | 132 | 3,236 | 4,888 | 4,478,414 |
| 2022 | 7,445 | 161 | 3,932 | 5,197 | 5,020,574 |
| 2023 | 8,257 | 193 | 4,731 | 5,521 | 5,610,509 |
| 2024 | 9,110 | 226 | 5,644 | 5,862 | 6,252,874 |
| 2025 | 10,006 | 262 | 6,688 | 6,220 | 6,952,817 |
| 2026 | 10,947 | 299 | 7,878 | 6,596 | 7,716,036 |
| 2027 | 11,934 | 338 | 9,232 | 6,991 | 8,548,835 |
| 2028 | 12,970 | 380 | 10,772 | 7,407 | 9,458,196 |
| 2029 | 14,055 | 423 | 12,519 | 7,843 | 10,451,845 |
| 2030 | 15,193 | 469 | 14,499 | 8,300 | 11,538,341 |
| 2031 | 16,386 | 517 | 16,740 | 8,780 | 12,727,158 |
| 2032 | 17,635 | 568 | 19,275 | 9,284 | 14,028,793 |
| 2033 | 18,943 | 621 | 22,138 | 9,813 | 15,454,872 |

## Appendix Table 11.3.2 Time Saving Benefit

(K-G)+(G-M) Expressway,80.75km Mill.Rs/year

| Year | P.Car | Bus | Truck | Motorcycle | Total |
|---|---|---|---|---|---|
| 2006 | 1,742 | 189 | | 1,267 | 3,198 |
| 2007 | 1,934 | 207 | | 1,383 | 3,525 |
| 2008 | 2,145 | 227 | | 1,509 | 3,880 |
| 2009 | 2,374 | 248 | | 1,644 | 4,265 |
| 2010 | 2,623 | 271 | | 1,789 | 4,683 |
| 2011 | 2,894 | 296 | | 1,947 | 5,137 |
| 2012 | 3,189 | 323 | | 2,116 | 5,628 |
| 2013 | 3,510 | 352 | | 2,298 | 6,161 |
| 2014 | 3,859 | 383 | | 2,495 | 6,737 |
| 2015 | 4,238 | 417 | | 2,707 | 7,362 |
| 2016 | 4,649 | 454 | | 2,934 | 8,037 |
| 2017 | 4,978 | 486 | | 3,184 | 8,648 |
| 2018 | 5,323 | 521 | | 3,451 | 9,294 |
| 2019 | 5,685 | 557 | | 3,736 | 9,978 |
| 2020 | 6,066 | 595 | | 4,039 | 10,700 |
| 2021 | 6,466 | 635 | | 4,363 | 11,464 |
| 2022 | 6,885 | 677 | | 4,709 | 12,272 |
| 2023 | 7,326 | 722 | | 5,077 | 13,125 |
| 2024 | 7,788 | 769 | | 5,469 | 14,026 |
| 2025 | 8,273 | 818 | | 5,887 | 14,978 |
| 2026 | 8,782 | 869 | | 6,332 | 15,984 |
| 2027 | 9,316 | 924 | | 6,806 | 17,045 |
| 2028 | 9,875 | 981 | | 7,310 | 18,166 |
| 2029 | 10,461 | 1,041 | | 7,846 | 19,348 |
| 2030 | 11,076 | 1,104 | | 8,417 | 20,596 |
| 2031 | 11,720 | 1,170 | | 9,023 | 21,913 |
| 2032 | 12,395 | 1,239 | | 9,668 | 23,302 |
| 2033 | 13,101 | 1,312 | | 10,354 | 24,767 |

## Apendix Table 11.3.3
## Traffic Accident on Ordinary Highway and Expressway

(Accident/100,000,000 vehicle･Km)

| Year | Other Road | Expressway | | Ratio | |
|---|---|---|---|---|---|
| | Death | Accident | Death | Accident | Death |
| 1966 | 229 | 95 | 38 | 42% | 16% |
| 1967 | 223 | 78 | 39 | 35% | 18% |
| 1968 | 219 | 61 | 32 | 28% | 15% |
| 1969 | 210 | 56 | 31 | 27% | 15% |
| 1970 | 179 | 60 | 28 | 33% | 16% |
| 1971 | 162 | 60 | 22 | 37% | 14% |
| 1972 | 144 | 53 | 18 | 37% | 12% |
| 1973 | 120 | 49 | 16 | 41% | 13% |
| 1974 | 104 | 42 | 12 | 41% | 11% |
| 1975 | 93 | 35 | 12 | 37% | 13% |
| 1976 | 86 | 34 | 11 | 40% | 13% |
| 1977 | 76 | 34 | 10 | 45% | 13% |
| 1978 | 72 | 28 | 9 | 39% | 12% |
| 1979 | 69 | 24 | 7 | 34% | 10% |
| 1980 | 69 | 21 | 6 | 30% | 9% |
| 1981 | 69 | 20 | 6 | 29% | 9% |
| 1982 | 72 | 19 | 6 | 27% | 8% |
| 1983 | 73 | 21 | 7 | 29% | 9% |
| Average | 126.12 | 43.9 | 17.12 | 34.93% | 12.49% |

Source: Japan Ecpressway Public Corperation and Japan National Police Agency.

## Appendis Table 11.3.4 Fatal Accident Saving Benefit

(K-G)+(G-M) Expressway,80.75km

| Year | Vehicle/km | No. of Fatal Accident/100MillonV.K | | | Benefit |
|---|---|---|---|---|---|
| | Expressway | Without | With | Saving | Mill.Rs |
| 2006 | 489,600 | 617 | 77 | 540 | 125 |
| 2007 | 525,131 | 662 | 83 | 579 | 135 |
| 2008 | 563,243 | 710 | 89 | 621 | 144 |
| 2009 | 604,124 | 761 | 95 | 666 | 155 |
| 2010 | 647,974 | 816 | 102 | 714 | 166 |
| 2011 | 695,010 | 876 | 109 | 766 | 178 |
| 2012 | 745,463 | 939 | 117 | 822 | 191 |
| 2013 | 799,583 | 1,007 | 126 | 882 | 205 |
| 2014 | 857,634 | 1,081 | 135 | 946 | 220 |
| 2015 | 919,905 | 1,159 | 145 | 1,014 | 236 |
| 2016 | 986,700 | 1,243 | 155 | 1,088 | 253 |
| 2017 | 1,022,071 | 1,288 | 161 | 1,127 | 262 |
| 2018 | 1,059,378 | 1,335 | 167 | 1,168 | 271 |
| 2019 | 1,098,767 | 1,384 | 173 | 1,212 | 282 |
| 2020 | 1,140,390 | 1,437 | 179 | 1,257 | 292 |
| 2021 | 1,184,415 | 1,492 | 186 | 1,306 | 303 |
| 2022 | 1,231,025 | 1,551 | 194 | 1,357 | 315 |
| 2023 | 1,280,416 | 1,613 | 202 | 1,412 | 328 |
| 2024 | 1,332,802 | 1,679 | 210 | 1,470 | 342 |
| 2025 | 1,388,413 | 1,749 | 219 | 1,531 | 356 |
| 2026 | 1,447,500 | 1,824 | 228 | 1,596 | 371 |
| 2027 | 1,510,335 | 1,903 | 238 | 1,665 | 387 |
| 2028 | 1,577,214 | 1,987 | 248 | 1,739 | 404 |
| 2029 | 1,648,455 | 2,077 | 259 | 1,818 | 422 |
| 2030 | 1,724,407 | 2,173 | 271 | 1,901 | 442 |
| 2031 | 1,805,444 | 2,275 | 284 | 1,991 | 463 |
| 2032 | 1,891,976 | 2,384 | 298 | 2,086 | 485 |
| 2033 | 1,984,446 | 2,500 | 312 | 2,188 | 508 |

**Appendix Table 11.4.1 Cost Benefit Analysis for Investment Justification**

K-G Section 49.00km — Unit: Million Rs

| No. | year | Economic Cost | | | Economic Benefits | | | | Present Worth | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Capital Periodic | Routine & Operation | Total | Passenger Time Saving | Vehicle VOC Saving | Traffic Accident | Total | Discount Factor | Cost | Benefit |
| 1 | 2000 | 94 | | 94 | | | | | 0.79 | 74 | |
| 2 | 2001 | 607 | | 607 | | | | | 0.62 | 376 | |
| 3 | 2002 | 962 | | 962 | | | | | 0.49 | 469 | |
| 4 | 2003 | 1,279 | | 1,279 | | | | | 0.38 | 491 | |
| 5 | 2004 | 1,733 | | 1,733 | | | | | 0.30 | 523 | |
| 6 | 2005 | 1,818 | | 1,818 | | | | | 0.24 | 432 | |
| 7 | 2006 | | 16 | 16 | 1,792 | 336 | 74 | 2,202 | 0.19 | 3 | 412 |
| 8 | 2007 | | 16 | 16 | 1,796 | 381 | 78 | 2,255 | 0.15 | 2 | 332 |
| 9 | 2008 | | 16 | 16 | 1,792 | 433 | 83 | 2,307 | 0.12 | 2 | 267 |
| 10 | 2009 | | 16 | 16 | 1,778 | 491 | 88 | 2,357 | 0.09 | 1 | 215 |
| 11 | 2010 | | 16 | 16 | 1,755 | 555 | 93 | 2,402 | 0.07 | 1 | 172 |
| 12 | 2011 | | 16 | 16 | 1,720 | 625 | 98 | 2,443 | 0.06 | 1 | 138 |
| 13 | 2012 | | 16 | 16 | 1,672 | 702 | 104 | 2,478 | 0.04 | 1 | 110 |
| 14 | 2013 | | 16 | 16 | 1,609 | 787 | 110 | 2,505 | 0.03 | 1 | 88 |
| 15 | 2014 | | 16 | 16 | 1,529 | 880 | 116 | 2,525 | 0.03 | 0 | 70 |
| 16 | 2015 | | 16 | 16 | 1,431 | 981 | 123 | 2,535 | 0.02 | 0 | 55 |
| 17 | 2016 | 389 | 16 | 405 | 1,312 | 1,092 | 130 | 2,534 | 0.02 | 7 | 43 |
| 18 | 2017 | | 16 | 16 | 1,823 | 1,529 | 144 | 3,496 | 0.01 | 0 | 47 |
| 19 | 2018 | | 16 | 16 | 2,364 | 2,005 | 159 | 4,529 | 0.01 | 0 | 48 |
| 20 | 2019 | | 16 | 16 | 2,937 | 2,524 | 177 | 5,638 | 0.01 | 0 | 47 |
| 21 | 2020 | | 16 | 16 | 3,545 | 3,088 | 196 | 6,828 | 0.01 | 0 | 45 |
| 22 | 2021 | | 16 | 16 | 4,187 | 3,702 | 218 | 8,107 | 0.01 | 0 | 42 |
| 23 | 2022 | 1,856 | 16 | 1,872 | 4,867 | 4,372 | 242 | 9,480 | 0.00 | 8 | 38 |
| 24 | 2023 | | 16 | 16 | 5,585 | 5,101 | 269 | 10,955 | 0.00 | 0 | 35 |
| 25 | 2024 | | 16 | 16 | 6,344 | 5,897 | 299 | 12,540 | 0.00 | 0 | 31 |
| 26 | 2025 | | 16 | 16 | 7,146 | 6,765 | 333 | 14,244 | 0.00 | 0 | 28 |
| 27 | 2026 | 544 | 16 | 560 | 7,992 | 7,714 | 371 | 16,076 | 0.00 | 1 | 25 |
| 28 | 2027 | | 16 | 16 | 8,885 | 8,749 | 414 | 18,048 | 0.00 | 0 | 22 |
| 29 | 2028 | | 16 | 16 | 9,827 | 9,882 | 462 | 20,170 | 0.00 | 0 | 19 |
| 30 | 2029 | | 16 | 16 | 10,820 | 11,120 | 516 | 22,456 | 0.00 | 0 | 17 |
| 31 | 2030 | 544 | 16 | 560 | 11,867 | 12,475 | 576 | 24,919 | 0.00 | 0 | 15 |
| 32 | 2031 | | 16 | 16 | 12,970 | 13,960 | 645 | 27,575 | 0.00 | 0 | 13 |
| 33 | 2032 | | 16 | 16 | 14,132 | 15,586 | 722 | 30,441 | 0.00 | 0 | 11 |
| 34 | 2033 | 94 | 16 | 110 | 15,356 | 17,370 | 810 | 33,536 | 0.00 | 0 | 10 |
| | | 9,921 | 443 | 10,364 | 148,830 | 139,101 | 7,648 | 295,579 | 27.06% | 2,395 | 2,395 |

**Appendix Table 11.4.2 Cost Benefit Analysis for Investment Justification**

G - M Section 39.55km — Unit: Million Rs

| No. | year | Economic Cost | | | Economic Benefits | | | | Present Worth | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Capital Periodic | Routine & Operation | Total | Passenger Time Saving | Vehicle VOC Saving | Traffic Accident | Total | Discount Factor | Cost | Benefit |
| 1 | 2000 | 65 | | 65 | | | | | 0.80 | 52 | |
| 2 | 2001 | 456 | | 456 | | | | | 0.64 | 291 | |
| 3 | 2002 | 456 | | 456 | | | | | 0.51 | 232 | |
| 4 | 2003 | 431 | | 431 | | | | | 0.41 | 175 | |
| 5 | 2004 | 1,509 | | 1,509 | | | | | 0.32 | 489 | |
| 6 | 2005 | 1,593 | | 1,593 | | | | | 0.26 | 412 | |
| 7 | 2006 | | 14 | 14 | 598 | 311 | 46 | 955 | 0.21 | 3 | 197 |
| 8 | 2007 | | 14 | 14 | 648 | 386 | 50 | 1,084 | 0.16 | 2 | 178 |
| 9 | 2008 | | 14 | 14 | 701 | 462 | 54 | 1,217 | 0.13 | 2 | 160 |
| 10 | 2009 | | 14 | 14 | 759 | 535 | 59 | 1,352 | 0.10 | 1 | 142 |
| 11 | 2010 | | 14 | 14 | 821 | 606 | 64 | 1,491 | 0.08 | 1 | 125 |
| 12 | 2011 | | 14 | 14 | 888 | 675 | 69 | 1,632 | 0.07 | 1 | 109 |
| 13 | 2012 | | 14 | 14 | 961 | 740 | 75 | 1,776 | 0.05 | 1 | 95 |
| 14 | 2013 | | 14 | 14 | 1,039 | 802 | 81 | 1,922 | 0.04 | 1 | 82 |
| 15 | 2014 | | 14 | 14 | 1,123 | 859 | 88 | 2,071 | 0.03 | 0 | 70 |
| 16 | 2015 | | 14 | 14 | 1,214 | 911 | 96 | 2,222 | 0.03 | 0 | 60 |
| 17 | 2016 | 337 | 14 | 350 | 1,312 | 959 | 104 | 2,375 | 0.02 | 8 | 51 |
| 18 | 2017 | | 14 | 14 | 1,535 | 1,148 | 106 | 2,790 | 0.02 | 0 | 48 |
| 19 | 2018 | | 14 | 14 | 1,773 | 1,355 | 108 | 3,236 | 0.01 | 0 | 45 |
| 20 | 2019 | | 14 | 14 | 2,026 | 1,581 | 111 | 3,717 | 0.01 | 0 | 41 |
| 21 | 2020 | | 14 | 14 | 2,294 | 1,829 | 113 | 4,236 | 0.01 | 0 | 37 |
| 22 | 2021 | | 14 | 14 | 2,579 | 2,100 | 115 | 4,794 | 0.01 | 0 | 34 |
| 23 | 2022 | 793 | 14 | 807 | 2,881 | 2,397 | 118 | 5,396 | 0.01 | 5 | 30 |
| 24 | 2023 | | 14 | 14 | 3,202 | 2,722 | 121 | 6,045 | 0.00 | 0 | 27 |
| 25 | 2024 | | 14 | 14 | 3,542 | 3,078 | 124 | 6,744 | 0.00 | 0 | 24 |
| 26 | 2025 | | 14 | 14 | 3,902 | 3,470 | 127 | 7,499 | 0.00 | 0 | 21 |
| 27 | 2026 | 444 | 14 | 458 | 4,284 | 3,899 | 130 | 8,313 | 0.00 | 1 | 19 |
| 28 | 2027 | | 14 | 14 | 4,688 | 4,371 | 133 | 9,192 | 0.00 | 0 | 17 |
| 29 | 2028 | | 14 | 14 | 5,116 | 4,889 | 137 | 10,142 | 0.00 | 0 | 15 |
| 30 | 2029 | | 14 | 14 | 5,569 | 5,459 | 141 | 11,169 | 0.00 | 0 | 13 |
| 31 | 2030 | 444 | 14 | 458 | 6,047 | 6,086 | 145 | 12,278 | 0.00 | 0 | 11 |
| 32 | 2031 | | 14 | 14 | 6,554 | 6,776 | 149 | 13,479 | 0.00 | 0 | 10 |
| 33 | 2032 | | 14 | 14 | 7,088 | 7,536 | 154 | 14,778 | 0.00 | 0 | 9 |
| 34 | 2033 | 130 | 14 | 143 | 7,654 | 8,374 | 159 | 16,186 | 0.00 | 0 | 8 |
| | | 6,658 | 385 | 7,043 | 80,799 | 74,314 | 2,976 | 158,089 | 25.29% | 1,678 | 1,678 |