ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ನಡವಳಿ

ವಿಷಯ: ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿನ ರಾಜಾಜಿನಗರದ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳಲ್ಲಿ ರಸ್ತೆ ವಿಭಜಕಗಳ **ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಅಂದಾಜುಪಟ್ಟಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ಮತ್ತು** ಟೆಂಡರ್‌ಗೆ ಅನುಮೋದನೆ ನೀಡಲಾಗಿದ್ದು, ಇದರ ಬದಲಾಗಿ ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಕೂಡುವ ಸ್ಥಳದಲ್ಲಿ ಅಂಡರ್ ಪಾಸ್ ಬದಲಾಗಿ ಇಂಟಿಗ್ರೇಟೆಡ್ ಮೇಲ್ಸೇತುವೆ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಪಟ್ಟಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ಮತ್ತು ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಮೊತ್ತಕ್ಕೆ ಅನುಮೋದನೆ ನೀಡುವ ಬಗ್ಗೆ.

ಓದಲಾಗಿದೆ: 1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 502 ಎಂಎನ್‌ವೈ 2015, ದಿನಾಂಕ: 11-02-2016.

2. ಆಯುಕ್ತರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ರವರ ಪತ್ರ ಸಂಖ್ಯೆ: ಮು.ಆ/ಯೋ-ಕೇ/ಪಿಆರ್/1349/2017-18, ದಿನಾಂಕ: 04-10-2017.

3. ಆಯುಕ್ತರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ರವರ ಪತ್ರ ಸಂಖ್ಯೆ: ಮು.ಆ(ಯೋಜನೆ)/ಪಿಆರ್/299/2017-18, ದಿನಾಂಕ: 21-12-2017.

4. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 185 ಎಂಎನ್‌ವೈ 2017, ದಿನಾಂಕ: 26-12-2017.

5. ಆಯುಕ್ತರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ರವರ ಪತ್ರ ಸಂಖ್ಯೆ: ಮು.ಆ(ಯೋಜನೆ)/ಪಿಆರ್/1399/2017-18, ದಿನಾಂಕ: 31-01-2018 ಮತ್ತು 17-02-2018.

* * * * *

ಪ್ರಸ್ತಾವನೆ:

ಮೇಲೆ (1) ರಲ್ಲಿ ಓದಲಾದ ದಿನಾಂಕ: 11-02-2016ರ ಆದೇಶದಲ್ಲಿ, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿನ ರಾಜಾಜಿನಗರದ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿ ಜಂಕ್ಷನ್‌ಗಳಲ್ಲಿ ವಾಹನ ದಟ್ಟಣೆಯನ್ನು ಕಡಿಮೆ ಮಾಡಿ ಸಿಗ್ನಲ್ ಮುಕ್ತ ರಸ್ತೆಯನ್ನಾಗಿ ಮಾಡಲು ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಹಾಗೂ ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ಜಂಕ್ಷನ್‌ಗಳಲ್ಲಿ ರಸ್ತೆ ವಿಭಜಕಗಳ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಗಳ ರೂ.78.64 ಕೋಟಿಗಳಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ಮತ್ತು ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ.ವಿ.ಆರ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈವೇಟ್ ಲಿಮಿಟೆಡ್ ರವರಿಗೆ ರೂ.89.86 ಕೋಟಿಗಳ ಮೊತ್ತಕ್ಕೆ ಟರ್ನ್‌ಕೀ ಆಧಾರದಲ್ಲಿ ಟೆಂಡರ್ ಅನುಮೋದನೆಯನ್ನು ನೀಡಲಾಗಿರುತ್ತದೆ.

2. ಮೇಲೆ (2), (3) ಮತ್ತು (5) ರಲ್ಲಿ ಓದಲಾದ ದಿನಾಂಕ: 04-10-2017, 21-12-2017, 31-01-2018 ಮತ್ತು 17-02-2018ರ ಪ್ರಸ್ತಾವನೆಯಲ್ಲಿ, ದಿನಾಂಕ: 28-06-2017 ರಂದು ಆಯುಕ್ತರು ಹಾಗೂ ಇತರರು

...2..

ಯೋಜನೆಯ ಕಾಮಗಾರಿಯ ಸ್ಥಳ ಪರಿವೀಕ್ಷಣೆ ಮಾಡಲಾಗಿದ್ದು, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯಲ್ಲಿ ಕೈಗೊಳ್ಳಲು ಪ್ರಸ್ತಾಪಿಸಿರುವ ದ್ವಿಮುಖ ಸಂಚಾರದ ಅಂಡರ್‌ಪಾಸ್ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯಿಂದ ಹಲವಾರು ಸಮಸ್ಯೆಗಳು ಉದ್ಭವವಾಗಲಿದ್ದು, ಅದರಲ್ಲಿ ಪ್ರಮುಖವಾಗಿ ಈ ಕೆಳಕಂಡ ಸಮಸ್ಯೆಗಳ ಬಗ್ಗೆ ಪ್ರಸ್ತಾಪಿಸಿರುತ್ತಾರೆ.

a) ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯಲ್ಲಿ ಅಂಡರ್‌ಪಾಸ್ ನಿರ್ಮಾಣ ಮಾಡುವುದರಿಂದ ಸುಮಾರು 23 ಹಳೆಯ ಮತ್ತು ಬೃಹತ್ ಮರಗಳನ್ನು ತೆರವುಗೊಳಿಸಬೇಕಾಗಿರುತ್ತದೆ.

b) ಹಾಲಿ ಸರ್ವೀಸ್ ರಸ್ತೆಯ ಅಗಲವು 20 ಅಡಿಗಳಿಂದ 16 ಅಡಿಗಳಿಗೆ ಕಡಿತವಾಗಿ ರಸ್ತೆಯು ಕಿರಿದಾಗುತ್ತದೆ. ಹಾಗೂ ಇದರಿಂದ ವಾಹನಗಳ ಸುಗಮ ಸಂಚಾರ ಮತ್ತು ಸಾರ್ವಜನಿಕರಿಗೆ ಅನಾನುಕೂಲ ಉಂಟಾಗುತ್ತದೆ.

c) ಅಂಡರ್‌ಪಾಸ್ ನಿರ್ಮಾಣ ಮಾಡುವ ಸ್ಥಳದಲ್ಲಿ ಪ್ರಮುಖ ಎಂ.ಆರ್.ಎಸ್.ಗ್ರಿಡ್ ಘಟಕವಿದ್ದು, ಕೆ.ಪಿ.ಟಿ.ಸಿ.ಎಲ್. ಸಂಸ್ಥೆಯ 66 ಕೆ.ವಿ. ಮತ್ತು 11 ಕೆವಿ ಕೇಬಲ್‌ಗಳನ್ನು ಸ್ಥಳಾಂತರಿಸಬೇಕಿರುತ್ತದೆ. ಈ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುವಾಗ ಕೇಬಲ್‌ಗಳಿಗೆ ದಕ್ಕೆಯಾಗುವ ಸಾಧ್ಯತೆಗಳಿದ್ದು, ನಿರ್ಮಾಣ ಕಾರ್ಯದಲ್ಲಿ ವಿಳಬಂವಾಗುವ ಸಂಭವವಿರುತ್ತದೆ.

d) ಅಂಡರ್ ಪಾಸ್ ಕಾಮಗಾರಿಯ ಪಥದಲ್ಲಿ ಬೃಹತ್ ನೀರಿನ ಕೊಳವೆಗಳನ್ನು ಸ್ಥಳಾಂತರಿಸಬೇಕಾಗಿರುತ್ತದೆ.

e) ಶಿವನಗರ 8ನೇ ಮುಖ್ಯರಸ್ತೆಯ ಜಂಕ್ಷನ್‌ನಲ್ಲಿ ಅನ್ನಪೂರ್ಣೇಶ್ವರಿ ಮತ್ತು ಗಣಪತಿ ದೇವಾಲಯವನ್ನು ತೆರವುಗೊಳಿಸಬೇಕಾಗಿದ್ದು, ದೇವಾಲಯಗಳನ್ನು ತೆರವುಗೊಳಿಸುವುದು ಸ್ಥಳೀಯ ನಾಗರೀಕರ ಭಾವನಾತ್ಮಕ ವಿಷಯವಾಗಿರುತ್ತದೆ. ಹಾಗೆಯೇ ಅಂಡರ್‌ಪಾಸ್ ನಿರ್ಮಿಸಲು ಪ್ರಸ್ತಾಪಿಸಿರುವ ಸ್ಥಳದಲ್ಲಿನ ಎರಡೂ ಬದಿಗಳಲ್ಲಿ ಮನೆಗಳು ಮತ್ತು ವಾಣಿಜ್ಯ ಕಟ್ಟಡಗಳಿದ್ದು, ಕೆಳಸೇತುವೆ ನಿರ್ಮಿಸಲು ಸುಮಾರು 8.5 ಮೀಟರ್ ಆಳದವರೆಗೆ ಅಗೆಯಬೇಕಾಗಿರುವುದರಿಂದ ಈ ಕಟ್ಟಡಗಳ ಅಡಿಪಾಯಕ್ಕೆ ಧಕ್ಕೆಯಾಗಿ ಸಾರ್ವಜನಿಕರ ಆಸ್ತಿಗಳಿಗೆ ಹಾನಿಯಾಗುವ ಸಂಭವವಿರುತ್ತದೆ.

3. ಮೇಲ್ಕಂಡ ಪ್ರಸ್ತಾವನೆಯ ಅಂಶಗಳ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಶಿವನಗರ 8 ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಗಳಲ್ಲಿ ಹಾಲಿ ಪ್ರಸ್ತಾಪಿಸಿರುವ ಅಂಡರ್‌ಪಾಸ್ ನಿರ್ಮಾಣಕ್ಕೆ ಬದಲಾಗಿ ಇಂಟಿಗ್ರೇಟೆಡ್ ಮೇಲ್ಸೇತುವೆ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ಮಿಸಬೇಕಾಗಿರುತ್ತದೆ. ಆಯುಕ್ತರು, ಬಿಬಿಎಂಪಿ ರವರು ದಿನಾಂಕ: 22-07-2017 ರಂದು ಕಾಮಗಾರಿಯ ಸ್ಥಳ ಪರಿವೀಕ್ಷಣೆಯನ್ನು ಕೈಗೊಂಡಿರುತ್ತಾರೆ. ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆಯಲ್ಲಿ ರಚಿತವಾಗಿರುವ ತಾಂತ್ರಿಕ ಸಲಹಾ ಸಮಿತಿಯ ಸಭೆಗಳ ದಿನಾಂಕ: 05-08-2017 ಮತ್ತು 30-08-2017 ರಂದು ವಿಷಯವನ್ನು ಮಂಡಿಸಲಾಗಿದ್ದು, ಸದರಿ ಸಭೆಗಳಲ್ಲಿ ಶಿವನಗರ 8 ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಗಳಲ್ಲಿ ಹಾಲಿ ಪ್ರಸ್ತಾಪಿಸಿರುವ ಅಂಡರ್‌ಪಾಸ್ ಕಾಮಗಾರಿಗೆ ಬದಲಾಗಿ ಇಂಟಿಗ್ರೇಟೆಡ್ ಮೇಲ್ಸೇತುವೆ ನಿರ್ಮಿಸುವ ಪ್ರಸ್ತಾವನೆಗೆ ಅನುಮೋದನೆ ನೀಡಿರುತ್ತದೆ.

4. ತಾಂತ್ರಿಕ ಸಲಹಾ ಸಮಿತಿಯು ಅನುಮೋದಿಸಿದಂತೆ ರಾಜಾಜಿನಗರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ (ಅಂಡರ್‌ಪಾಸ್ ಕಾಮಗಾರಿಗೆ ಬದಲಾಗಿ) ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡು ಸ್ಥಳಗಳಲ್ಲಿ ಫ್ಲೈಓವರ್ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ

...3...

ಪ್ರಸ್ತಾವನೆಯನ್ನು ತಯಾರಿಸಿಕೊಂಡು, ಈ ಕಾಮಗಾರಿಯು Lumpsum, Fixed Price, No variation, Contract ಆಗಿರುವುದರಿಂದಲೂ ಹಾಗೂ ಕಾಮಗಾರಿಯು ಈಗಾಗಲೇ ಪ್ರಗತಿಯಲ್ಲಿರುವುದರಿಂದ, ಈ ಅಂಶಗಳನ್ನು ಬೇರೆ ಗುತ್ತಿಗೆದಾರರಿಂದ ನಿರ್ವಹಿಸಲು ಸಾಧ್ಯವಿಲ್ಲದೆ ಇದ್ದರಿಂದ, ಹಾಲಿ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುತ್ತಿರುವ ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ.ವೆಂಕಟರಾವ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈ. ಲಿ. ರವರೊಂದಿಗೆ ಮೇಲಿನ ಅಂಶಗಳನ್ನು ನಿರ್ವಹಿಸುವ ಬಗ್ಗೆ ಚರ್ಚಿಸಲಾಗಿರುತ್ತದೆ.

5. ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆಯ ಆಯುಕ್ತರು, ಹಾಲಿ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುತ್ತಿರುವ ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ.ವೆಂಕಟರಾವ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈ. ಲಿ. ರವರೊಂದಿಗೆ ಬಿಬಿಎಂಪಿಯು ಚರ್ಚಿಸಿದ್ದು, ಸರ್ಕಾರದಿಂದ ಟೆಂಡರ್ ಅನುಮೋದನೆಯಾದಂತೆ ಒಟ್ಟಾರೆ ಟೆಂಡರ್ ಮೊತ್ತವು ರೂ.89.86 ಕೋಟಿಗಳಾಗಿದ್ದು (ಶೇ.14.27 ರಷ್ಟು ಹೆಚ್ಚು). ಅದರಲ್ಲಿ ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯ ಕೆಳಸೇತುವೆ ನಿರ್ಮಾಣಕ್ಕೆ ರೂ.49.77 ಕೋಟಿಗಳಾಗುತ್ತದೆ. ಸದರಿ ಜಂಕ್ಷನ್‌ನಲ್ಲಿ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯನ್ನು ಒಟ್ಟುಗೂಡಿಸುವ ಸಮಗ್ರ ಮೇಲುಸೇತುವೆಯ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ಮಾಣ ಮಾಡಲು ರೂ.65.27 ಕೋಟಿಗಳ ಮೊತ್ತವಾಗುತ್ತಿದ್ದು (ಲೋಕೋಪಯೋಗಿ ಇಲಾಖೆಯ 15-16ನೇ ಸಾಲಿನ ದರಗಳನ್ನು ಆದರಿಸಿ + Tender Premium 14.27% ರಷ್ಟು ಹೆಚ್ಚು). ಈ ಮೊತ್ತಕ್ಕೆ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುವ ಬಗ್ಗೆ ಗುತ್ತಿಗೆದಾರರನ್ನು ಬಿಬಿಎಂಪಿಯು ಕೋರಿರುತ್ತದೆ. ಆದರೆ ಬದಲಾದ ಕಾಮಗಾರಿಯ ಸ್ಥಿತಿಯಲ್ಲಿ ಗುತ್ತಿಗೆದಾರರು ಫ್ಲೈಓವರ್ ಕಾಮಗಾರಿಗಳನ್ನು ನಿರ್ಮಿಸುವ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಕಾಮಗಾರಿಯನ್ನು ಮೇಲುಸೇತುವೆಗಳನ್ನೊಳಗೊಂಡಂತೆ ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತವಾದ ರೂ.112.07 ಕೋಟಿಗಳಲ್ಲಿ (2015-16ನೇ ಸಾಲಿನ ದರಗಳಂತೆ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಮೊತ್ತ ರೂ.93.41 ಕೋಟಿಗಳು ಹಾಗೂ ಇದರ ಮೇಲೆ ಶೇ.19.98% ರಷ್ಟು ಹೆಚ್ಚು ಟೆಂಡರ್ ಪ್ರೀಮಿಯಂನೊಂದಿಗೆ) ಮಾತ್ರ ನಿರ್ವಹಿಸಲು ಸಿದ್ದವಿರುವುದಾಗಿ ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ.ವೆಂಕಟರಾವ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈ.ಲಿ. ರವರು ತಮ್ಮ ಪತ್ರದ ದಿನಾಂಕ: 19-09-2017 ರಲ್ಲಿ ತಿಳಿಸಿರುತ್ತಾರೆ ಎಂದು ವರದಿಯಲ್ಲಿ ತಿಳಿಸಿರುತ್ತಾರೆ.

6. ರಾಜಾಜಿನಗರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ (ಅಂಡರ್‌ಪಾಸ್ ಕಾಮಗಾರಿಗೆ ಬದಲಾಗಿ) ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡು ಸ್ಥಳಗಳಲ್ಲಿ ಫ್ಲೈಓವರ್ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಪಟ್ಟಿ ಮತ್ತು ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತದ ಪ್ರಸ್ತಾವನೆಯನ್ನು ತಯಾರಿಸಿ ಸರ್ಕಾರದ ಅನುಮೋದನೆಗಾಗಿ ಸಲ್ಲಿಸಿದ್ದು, ಮಂಜೂರಾದ ಟೆಂಡರ್ ಮೊತ್ತ ಮತ್ತು ಪರಿಷ್ಕೃತ ಪ್ರಸ್ತಾವನೆಯಂತೆ ಪರಿಷ್ಕರಿಸಿದ ಟೆಂಡರ್ ಮೊತ್ತದ ವಿವರಗಳು ಈ ಕೆಳಕಂಡಂತಿವೆ.

ಅನುಮೋದನೆಯಾಗಿರುವ ಟೆಂಡರ್‌ಗಳ ವಿವರಗಳು (As per PWD SR 2015-16)			ಪರಿಷ್ಕೃತ ಟೆಂಡರ್ ಮೊತ್ತದ ವಿವರಗಳು (As per PWD SR 2015-16)			ಹೆಚ್ಚುವರಿ ಮೊತ್ತ
1	ಮಂಜುನಾಥನಗರ ಮುಖ್ಯ ರಸ್ತೆ ಕೂಡುರಸ್ತೆಯಲ್ಲಿ ದ್ವಿಮುಖ ಸಂಚಾರದ ಮೇಲು ಸೇತುವೆ.	ರೂ. 18.18 ಕೋಟಿಗಳು	1	ಮಂಜುನಾಥನಗರ ಮುಖ್ಯ ರಸ್ತೆ ಕೂಡುರಸ್ತೆಯಲ್ಲಿ ದ್ವಿಮುಖ ಸಂಚಾರದ ಮೇಲು ಸೇತುವೆ.	ರೂ. 18.18 ಕೋಟಿಗಳು	----
2	ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯ ರಸ್ತೆ (ದೋಬಿಘಾಟ್ ಜಂಕ್ಷನ್) ಕೂಡು ಸ್ಥಳಗಳಲ್ಲಿ ದ್ವಿಮುಖ ಸಂಚಾರದ ಇಂಟಗ್ರೇಟೆಡ್ ಅಂಡರ್‌ಪಾಸ್	ರೂ. 49.77 ಕೋಟಿಗಳು	2	ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯ ರಸ್ತೆ (ದೋಬಿಘಾಟ್ ಜಂಕ್ಷನ್) ಕೂಡು ಸ್ಥಳಗಳಲ್ಲಿ ದ್ವಿಮುಖ ಸಂಚಾರದ ಇಂಟಗ್ರೇಟೆಡ್ ಮೇಲುಸೇತುವೆ ನಿರ್ಮಾಣ	ರೂ. 71.98 ಕೋಟಿಗಳು	ರೂ. 22.21 ಕೋಟಿಗಳು

...4.

3	ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಯ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ ವಿಕಮುಖ ಸಂಚಾರದ ಮೇಲು ಸೇತುವೆ ನಿರ್ಮಾಣ	ರೂ. 21.91 ಕೋಟಿಗಳು	3	ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಯ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ ವಿಕಮುಖ ಸಂಚಾರದ ಮೇಲು ಸೇತುವೆ ನಿರ್ಮಾಣ	ರೂ. 21.91 ಕೋಟಿಗಳು	----
	ಒಟ್ಟು ಮೊತ್ತ	ರೂ. 89.86 ಕೋಟಿಗಳು		ಒಟ್ಟು ಮೊತ್ತ	ರೂ. 112.07 ಕೋಟಿಗಳು	ರೂ. 22.21 ಕೋಟಿಗಳು

7. ಹಾಗೆಯೇ ಆಯುಕ್ತರ ವರದಿಯಂತೆ ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿನ ವೆಸ್ಟ್ ಆಫ್ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ವಿಭಜಕಗಳ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಸರ್ಕಾರದಿಂದ ಮಂಜೂರಾದ ಮೂಲ ಅಂದಾಜು ಮೊತ್ತ, ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಮೊತ್ತದ ವಿವರಗಳು ಈ ಕೆಳಕಂಡಂತಿವೆ.

1	ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 502 ಎಂಎನ್‌ವೈ 2015, ಬೆಂಗಳೂರು, ದಿನಾಂಕ: 11.02.2016 ರಂತೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ನೀಡಿರುವ ಕಾಮಗಾರಿಯ ಅಂದಾಜು ಮೊತ್ತ.	ರೂ. 78.64 ಕೋಟಿಗಳು.
2	ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 502 ಎಂಎನ್‌ವೈ 2015, ಬೆಂಗಳೂರು, ದಿನಾಂಕ: 11.02.2016 ರಂತೆ ಟೆಂಡರ್‌ಗೆ ಅನುಮೋದನೆ ನೀಡಿರುವ ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತ.	ರೂ. 89.86 ಕೋಟಿಗಳು (2015-16ನೇ ಸಾಲಿನ ದರಗಳಿಗೆ ಹೋಲಿಸಿದಾಗ ಶೇಕಡಾ 14.27%ರಷ್ಟು ಹೆಚ್ಚು)
3	ಕಾಮಗಾರಿಯನ್ನು ವಹಿಸಿಕೊಂಡಿರುವ ಗುತ್ತಿಗೆದಾರರು	M/s. M. Venkatrao Infra Projects Pvt Ltd.
4	ಮೇಲಿನ ಗುತ್ತಿಗೆ ಮೊತ್ತದಲ್ಲಿ ಶಿವನಗರದ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯಲ್ಲಿ ಅಂಡರ್ ಪಾಸ್ ನಿರ್ಮಿಸುವ ಕಾಮಗಾರಿಯ ಮೊತ್ತ (Including Tender Premium @ 14.27%)	ರೂ. 49.77 ಕೋಟಿಗಳು
5	ಮೂಲ ಯೋಜನೆಯಂತೆ ಕಾಮಗಾರಿಯಲ್ಲಿ ನಿರ್ವಹಿಸುವ ಅಂಶಗಳ ಮೊತ್ತ (Including Tender Premium @ 14.27%)	ರೂ. 40.09 ಕೋಟಿಗಳು
6	ಪರಿಷ್ಕೃತ ಪ್ರಸ್ತಾವನೆಯಂತೆ ಶಿವನಗರದ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಯಲ್ಲಿ Integrated ಫ್ಲೈಓವರ್ ನಿರ್ಮಾಣವೂ ಒಳಗೊಂಡಂತೆ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಮೊತ್ತ(2015-16ನೇ ಸಾಲಿನ ದರಗಳಂತೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಮೊತ್ತ ರೂ.93.4021 ಕೋಟಿ+TP @ 14.27% ಸೇರಿ)	ರೂ. 106.73 ಕೋಟಿಗಳು
7	ಗುತ್ತಿಗೆದಾರರು ನೀಡಿರುವ ಒಪ್ಪಿಗೆ ಪತ್ರದಂತೆ, ಗುತ್ತಿಗೆದಾರರು ಒಪ್ಪಿರುವ ಪರಿಷ್ಕೃತ ಕಾಮಗಾರಿಯ ಗುತ್ತಿಗೆ ಮೊತ್ತ (TP @ 19.98% above)	ರೂ. 112.07 ಕೋಟಿಗಳು
8	ಗುತ್ತಿಗೆದಾರರು ಸಲ್ಲಿಸಿರುವ ಒಪ್ಪಿಗೆ ಮೊತ್ತದಂತೆ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತವನ್ನು ಮಂಜೂರಾದ ಮೂಲ ಅಂದಾಜು ಮೊತ್ತಕ್ಕೆ ಹೋಲಿಸಿದಾಗ	ಶೇಕಡಾ 42.51% ರಷ್ಟು ಹೆಚ್ಚು.
9	ಗುತ್ತಿಗೆದಾರರು ಸಲ್ಲಿಸಿರುವ ಒಪ್ಪಿಗೆ ಮೊತ್ತದಂತೆ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಗುತ್ತಿಗೆ ಮೊತ್ತವನ್ನು ಮಂಜೂರಾದ ಗುತ್ತಿಗೆ ಮೊತ್ತಕ್ಕೆ ಹೋಲಿಸಿದಾಗ	ಶೇಕಡಾ 24.72% ರಷ್ಟು ಹೆಚ್ಚು.

...5...

8. ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆಯ ಆಯುಕ್ತರು ಈ ಕೆಳಕಂಡ ಅಂಶಗಳಿಗೆ ಅನುಮೋದನೆಯನ್ನು ಕೋರಿರುತ್ತಾರೆ.

1. ರಾಜಾಜಿನಗರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ ಈ ಹಿಂದೆ ಮಂಜೂರಾದ ಸಮಗ್ರ ಕೆಳಸೇತುವೆ ಬದಲಾಗಿ ಸಮಗ್ರ ಮೇಲುಸೇತುವೆಯನ್ನು ನಿರ್ಮಿಸಲು ಅನುಮೋದನೆ.

2. ರಾಜಾಜಿನಗರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ ರಸ್ತೆ ವಿಭಜಕಗಳ ನಿರ್ಮಾಣ (Flyovers) ಕಾಮಗಾರಿಯ ರೂ.97.20 ಕೋಟಿಗಳ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜುಪಟ್ಟಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ.

3. ಈ ಯೋಜನೆಯನ್ನು ಹಾಲಿ ನಿರ್ವಹಿಸುತ್ತಿರುವ ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ. ವೆಂಕಟರಾವ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈ.ಲಿ. ರವರು ಪರಿಷ್ಕೃತ ಪ್ರಸ್ತಾವನೆಯಂತೆ ಒಪ್ಪಿಗೆ ಸೂಚಿಸಿರುವ ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತವಾದ ರೂ.112.07 ಕೋಟಿಗಳಿಗೆ (ಶೇಕಡಾ 19.98% ರಷ್ಟು ಹೆಚ್ಚು) ಈ ಯೋಜನೆಯನ್ನು ವಹಿಸಿಕೊಡಲು ಅನುಮೋದನೆ.

9. ಮೇಲೆ (4) ರಲ್ಲಿ ಓದಲಾದ ದಿನಾಂಕ: 26-12-2017ರ ಆದೇಶದಲ್ಲಿ, 2017-18ನೇ ಸಾಲಿನಲ್ಲಿ ಬೆಂಗಳೂರಿಗೆ ವಿಶೇಷ ಮೂಲಭೂತ ಸೌಕರ್ಯಕ್ಕೆ ಬಂಡವಾಳ ಬೆಂಬಲ ಯೋಜನೆಯಡಿ ಒದಗಿಸಿರುವ ರೂ.2191.00 ಕೋಟಿಗಳ ಅನುದಾನದ ಅಡಿಯಲ್ಲಿ ಕೈಗೊಳ್ಳುವ ಕಾಮಗಾರಿಗಳ ಕ್ರಿಯಾ ಯೋಜನೆಗೆ ಕೆಲವೊಂದು ಷರತ್ತಿಗೊಳಪಟ್ಟು ಸರ್ಕಾರದ ಅನುಮೋದನೆಯನ್ನು ನೀಡಲಾಗಿದ್ದು, ಅನುಬಂದ-5ರ ಕ್ರಮ ಸಂಖ್ಯೆ: 09 ರಲ್ಲಿ "Construction of grade separators along the selected stretch West of Chord Road at Manjunath Nagar Main Road Junction, Shivanagar 8th Main Road Junction And Shivanagar & Basaveshwara Nagar 1st Main Road junction work" ರ ಕಾಮಗಾರಿಗೆ ರೂ.40.00 ಕೋಟಿಗಳ ಅನುದಾನವನ್ನು ನಿಗಧಿಪಡಿಸಲಾಗಿರುತ್ತದೆ.

10. ಮೇಲ್ಕಂಡ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಸರ್ಕಾರವು ಕೂಲಂಕಶವಾಗಿ ಪರಿಶೀಲಿಸಿ, ಈ ಕೆಳಕಂಡಂತೆ ಆದೇಶಿಸಿದೆ.

ಸರ್ಕಾರಿ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 639 ಎಂಎನ್‌ವೈ 2017,
ಬೆಂಗಳೂರು, ದಿನಾಂಕ: 24-03-2018.

ಪ್ರಸ್ತಾವನೆಯಲ್ಲಿ ವಿವರಿಸಿರುವಂತೆ, ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 502 ಎಂಎನ್‌ವೈ 2015, ದಿನಾಂಕ: 11-02-2016 ರಲ್ಲಿ ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿನ ರಾಜಾಜಿನಗರದ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಮತ್ತು ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳಲ್ಲಿ ರಸ್ತೆ ವಿಭಜಕಗಳ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಅಂದಾಜುಪಟ್ಟಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ಮತ್ತು ಟೆಂಡರ್‌ಗೆ ಅನುಮೋದನೆ ನೀಡಲಾಗಿರುವ ಆದೇಶವನ್ನು ಭಾಗಶಃ ಪರಿಷ್ಕರಿಸಿ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆ ಕೂಡುವ ಸ್ಥಳದಲ್ಲಿ ಅಂಡರ್ ಪಾಸ್ ಬದಲಿಗೆ ಇಂಟಿಗ್ರೇಟೆಡ್ ಮೇಲ್ಸೇತುವೆ ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಪಟ್ಟಿಗಳಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ ಮತ್ತು ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಗುತ್ತಿಗೆ ಮೊತ್ತಕ್ಕೆ ಈ ಕೆಳಕಂಡ ಅಂಶಗಳಿಗೆ ಪರತ್ತುಗಳನ್ವಯ ಸರ್ಕಾರದ ಅನುಮೋದನೆಯನ್ನು ನೀಡಿದೆ.

1. ರಾಜಾಜಿನಗರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಶಿವನಗರ 8ನೇ ಮತ್ತು 1ನೇ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ, ಈ ಹಿಂದೆ ಮಂಜೂರಾದ ಸಮಗ್ರ ಕೆಳಸೇತುವೆ ಬದಲಾಗಿ ಸಮಗ್ರ ಮೇಲುಸೇತುವೆಯನ್ನು ನಿರ್ಮಿಸುವ ಕಾಮಗಾರಿಗೆ ಅನುಮೋದನೆ.

...6.

2. ನಾಗವಿನಾರ ಕಾರ್ಡ್ ರಸ್ತೆಯಲ್ಲಿನ ಮಂಜುನಾಥನಗರ ಮುಖ್ಯರಸ್ತೆ, ಶಿವನಗರ 8ನೇ ಮತ್ತು 18ನೇ ಮುಖ್ಯರಸ್ತೆ ಹಾಗೂ ಬಸವೇಶ್ವರನಗರ ಮುಖ್ಯರಸ್ತೆಗಳ ಕೂಡುಸ್ಥಳಗಳಲ್ಲಿ ರಸ್ತೆ ವಿಭಜಕಗಳ (Flyover ಗಳ ನಿರ್ಮಾಣ) ನಿರ್ಮಾಣ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಮೊತ್ತವಾದ ರೂ.97.20 ಕೋಟಿಗಳ ಪರಿಷ್ಕೃತ ಅಂದಾಜುಪಟ್ಟಿಗೆ ಆಡಳಿತಾತ್ಮಕ ಅನುಮೋದನೆ.

3. ಮೇಲಿನ ಪರಿಷ್ಕೃತ ಯೋಜನೆಯನ್ನು ಹಾಲಿ ಕಾರ್ಯ ನಿರ್ವಹಿಸುತ್ತಿರುವ ಗುತ್ತಿಗೆದಾರರಾದ ಮೆ॥ ಎಂ.ವೆಂಕಟರಾವ್ ಇನ್‌ಫ್ರಾ ಪ್ರಾಜೆಕ್ಟ್ಸ್ ಪ್ರೈ.ಲಿ. ರವರಿಗೆ ಪರಿಷ್ಕೃತ ಪ್ರಸ್ತಾವನೆಯಂತೆ ಒಪ್ಪಿಗೆ ಸೂಚಿಸಿರುವ ಒಟ್ಟಾರೆ ಗುತ್ತಿಗೆ ಮೊತ್ತವಾದ ರೂ.112.07 ಕೋಟಿಗಳಿಗೆ (ಶೇ.19.98% ಎಸ್ಸಾರ್ ಹೆಚ್ಚು) ಆ ಯೋಜನೆಯನ್ನು ವಹಿಸಿಕೊಡಲು ಅನುಮೋದನೆ.

4. ಹಾಗೆಯೇ ಮೇಲಿನ ಪರಿಷ್ಕೃತ ಯೋಜನೆಗೆ ಬೇಕಾಗುವ ರೂ.22.21 ಕೋಟಿಗಳ ಹೆಚ್ಚುವರಿ ಅನುದಾನವನ್ನು 2017-18ನೇ ಸಾಲಿನ ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಆಇ 185 ಎಂಎನ್‌ವೈ 2017, ದಿನಾಂಕ: 26-12-2017ರ ಬಿ.ಬಿ.ಎಂ.ಪಿ.ಯ ಕ್ರಿಯಾ ಯೋಜನೆಯಲ್ಲಿ ಅನುವು ಮಾಡಿಕೊಂಡಿರುವ ರೂ.40.00 ಕೋಟಿಗಳ ಅನುದಾನದಿಂದ ಭರಿಸಲು.

ಷರತ್ತುಗಳು:

1. ಮೇಲಿನ ಕಾಮಗಾರಿಯನ್ನು ಎಲ್ಲಾ ಜಾಲ್ತಿ ನಿಯಮಗಳನ್ನು ಪಾಲಿಸಿಕೊಂಡು ಅನುಷ್ಠಾನಗೊಳಿಸುವುದು.
2. ಮೇಲಿನ ಕಾಮಗಾರಿಯನ್ನು ಸರ್ಕಾರದಿಂದ ಮಂಜೂರಾದ ಮೊತ್ತದ ಮಿತಿಯಲ್ಲಿಯೇ ಯಾವುದೇ ಹೆಚ್ಚುವರಿಯಾಗದಂತೆ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಕ್ರಮವಹಿಸತಕ್ಕದ್ದು.
3. ಮೇಲಿನ ಕಾಮಗಾರಿಗೆ 3rd Party Quality Monitors ಗಳನ್ನು ನೇಮಿಸಿಕೊಂಡು ಉತ್ತಮ ಗುಣಮಟ್ಟದಿಂದ ಕಾಮಗಾರಿಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಕ್ರಮವಹಿಸತಕ್ಕದ್ದು.
4. ಜಾಲ್ತಿ ನಿಯಮಗಳನ್ವಯ ಮೇಲಿನ ಕಾಮಗಾರಿಯ ಒಟ್ಟಾರೆ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ಪಟ್ಟಿಯನ್ನು ಕಾಮಗಾರಿಯ ಅಂತಿಮ ಬಿಲ್ಲನ್ನು ಪಾವತಿಸುವುದಕ್ಕಿಂತ ಮೊದಲು ಹಾಗೂ ಕಾಮಗಾರಿಯನ್ನು ಪೂರ್ಣಗೊಳಿಸುವುದಕ್ಕಿಂತ ಮೊದಲು ಸರ್ಕಾರದ ಅನುಮೋದನೆಯನ್ನು ಕಡ್ಡಾಯವಾಗಿ ಪಡೆದುಕೊಳ್ಳತಕ್ಕದ್ದು.
5. ಉಳಿದಂತೆ ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಆಇ 502 ಎಂಎನ್‌ವೈ 2015, ದಿನಾಂಕ: 11-02-2016 ರಲ್ಲಿ ಯಾವುದೇ ಬದಲಾವಣೆ ಇರುವುದಿಲ್ಲ.

ಈ ಆದೇಶವನ್ನು ದಿನಾಂಕ: 19-03-2018 ರಂದು ನಡೆದ ಸಚಿವ ಸಂಪುಟ ಸಭೆಯ ವಿಷಯ ಸಂಖ್ಯೆ: ಸಂ: 336/2018 ರಲ್ಲಿ ಕೈಗೊಂಡ ನಿರ್ಣಯದಂತೆ ಹೊರಡಿಸಲಾಗಿದೆ.

ಕರ್ನಾಟಕ ರಾಜ್ಯಪಾಲರ ಆಜ್ಞಾನುಸಾರ
ಮತ್ತು ಅವರ ಹೆಸರಿನಲ್ಲಿ,

(ಕೆ. ವಿಕೇಶ್ ಬಾಬು)
ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿ
ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ (ಬಿ.ಬಿ.ಎಂ.ಪಿ.).

ಇದಕ್ಕೆ

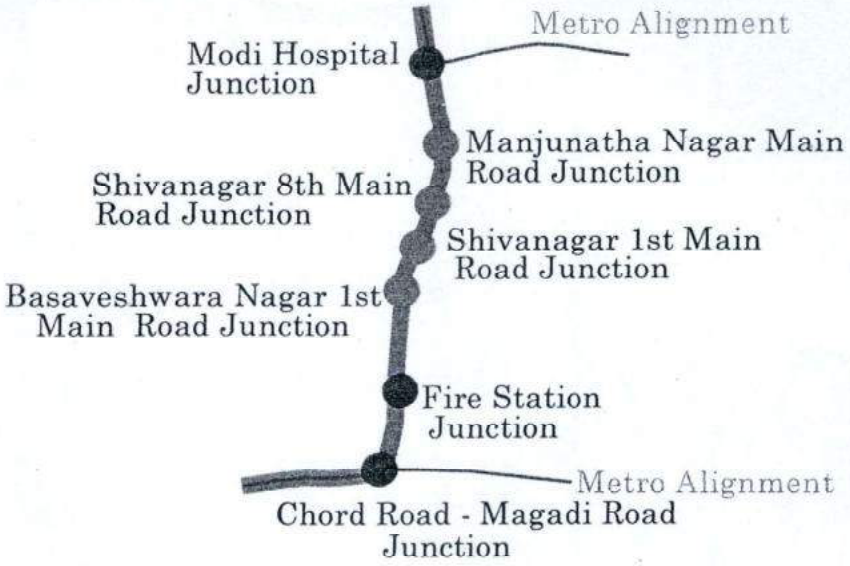
1. ಮಹಾಲೇಖಪಾಲರು, ಲೆಕ್ಕ ತಪಾಸಣೆ/ಲೆಕ್ಕಪತ್ರ, ಕರ್ನಾಟಕ ಬೆಂಗಳೂರು.
2. ಸರ್ಕಾರದ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಯವರು, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.

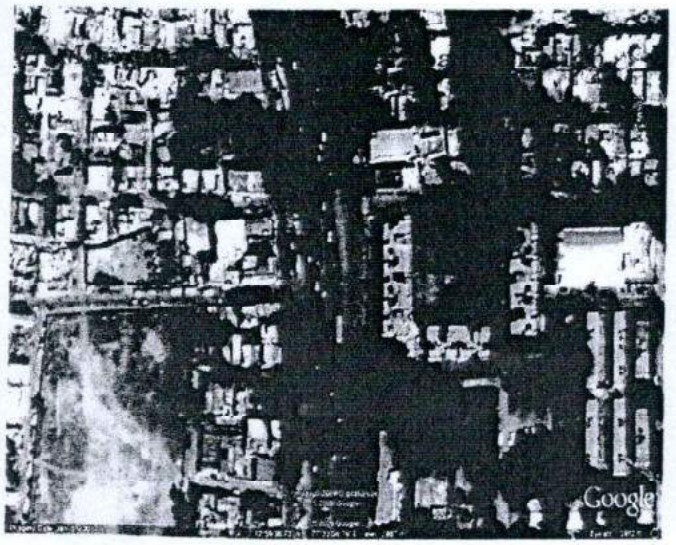
...7.

3. ವ್ಯವಸ್ಥಾಪಕ ನಿರ್ದೇಶಕರು, ಬೆಂಗಳೂರು ಮೆಟ್ರೋ ರೈಲು ನಿಗಮ ನಿಯಮಿತ, ಬೆಂಗಳೂರು.
4. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿ, ಆರ್ಥಿಕ ಇಲಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
5. ಮಾನ್ಯ ಮುಖ್ಯಮಂತ್ರಿಯವರ ಪ್ರಧಾನ ಕಾರ್ಯದರ್ಶಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
6. ಮಾನ್ಯ ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಮತ್ತು ನಗರ ಯೋಜನಾ ಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
7. ಆಯುಕ್ತರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.
8. **ವಿಶೇಷ ಆಯುಕ್ತರು (ಯೋಜನೆ), ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.**
9. ಸರ್ಕಾರದ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಯವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ (ಸಚಿವ ಸಂಪುಟ), ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು (ವಿಷಯ ಸಂಖ್ಯೆ: ಸಿ: 336/2018, ದಿನಾಂಕ: 19-03-2018).
10. ಪ್ರಧಾನ ಅಭಿಯಂತರರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.
11. ಮುಖ್ಯ ಅಭಿಯಂತರರು (ರಸ್ತೆ ಮೂಲಭೂತ ಸೌಲಭ್ಯ), ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.
12. ಮುಖ್ಯ ಲೆಕ್ಕಾಧಿಕಾರಿಗಳು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.
13. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿ, ಆರ್ಥಿಕ ಇಲಾಖೆ, (ಮೆಚ್ಚ 3 ಮತ್ತು 9) ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
14. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ.
15. ಸರ್ಕಾರದ ಉಪ ಕಾರ್ಯದರ್ಶಿಗಳು-3 ರವರ ಆಪ್ತ ಸಹಾಯಕರು, ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ.
16. ಅಧೀಕ್ಷಕ ಅಭಿಯಂತರರು (ತಾಂತ್ರಿಕ ಕೋಶ), ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ.
17. ಶಾಪಾ ರಕ್ಷಾ ಕಡತ/ಹೆಚ್ಚುವರಿ ಪ್ರತಿಗಳು.

File NO: 30

BRUHAT BANGALORE MAHANAGARA PALIKE





Proposed Improvement to Corridor along Selected Stretch of Chord Road

Detailed Project Report

October 2012

MANASA CONSULTANTS
CONSULTING ENGINEERS AND DESIGNERS
No. 140B, 2nd Floor, 9th Cross
Margosa Road, Malleshwaram
Bangalore – 560 003
☎ 23318602, 41127135 Fax: 41281946
email: manasaconsultants@airtelmail.in

CONTENTS

List of Annexures

Annexures

Annexure A.4.2 At Shivanagar 8th Main Road Junction

1. Detailed Direction wise Traffic Flow

Annexure A.4.3 At Shivanagar 1st Main Road Junction

1. Detailed Direction wise Traffic Flow

Annexure A.4.4 At Basaveshwara Nagar 1st Main Road Junction

1. Detailed Direction wise Traffic Flow

Annexure A.4.5 Geotechnical Investigation Report

a. Shivanagar 8th Main Road Junction
b. Shivanagar 1st Main Road Junction
c. Basaveshwara Nagar 1st Main Road Junction

Chapter 1

Introduction

CHAPTER 1
INTRODUCTION

1.1 Background

1.1.1 Bangalore, the Capital of Karnataka is the Fifth Largest City in the Country and is growing at a rate, which is significantly higher than that of others. Due to the Growth in Economic Activities, the City is attracting migrants. To serve this Influx of Population, Residential Layouts are being developed. But adequate Transport Infrastructure Facilities such as Roads, Grade Separators, Subways, Mass Transit System, etc. to match this demand are conspicuously absent. The additional demand is to be catered by the already Saturated Road Network. Due to the Inherent Road Network in Bangalore, there are on the average 2 Major and 2 Minor Junctions per kilometer of Road Length. This has resulted in increase in Travel Time due to frequent Bottlenecks and Breakdowns.

1.1.2 The Urban Form of Bangalore is characterized by a Radio – Concentric System structured by Ring Roads, Five Major Radial Roads and Five Secondary Radial Roads. The Five Major Radial Roads are Mysore Road (SH – 17) in the South / South West, Old Madras Road (NH – 4) in the North / North East, Bellary Road in the North, Hosur Road (NH – 7) in the South – East and Tumkur Road in the North – West. Similarly, the Five Secondary Radial Roads include Magadi Road (SH – 17E) in the West, Kanakapura Road (NH – 209) in the South, Bannerghatta Road (SH – 48) in the South, Varthur Road and Whitefield Road (SH – 37) in the East. The differentiated development of the City based on Geographical Sectors and the Star like Growth Array along the Major Roads, mark the change from a Concentric Spatial Growth to a Sectorial and Linear Radial Development.

1.1.3 The City had a population of 24.75 Lakh in 1981 and 65.00 Lakh in 2001. The extent of Developed Area has also increased considerably, in 1971 the Area was 174.7 Sq. km. and today it is about 800 Sq. km. In absence of Adequate Mass Transportation System, the use of personal motor vehicles for intra – city travel has increased substantially. This has resulted in growth of motor vehicles, which is four times the rate of population growth in the last two decades (1.91 Lakh vehicles in 1981 and 23 Lakh vehicles in 2005). The Public Transport System (Bus) is overstressed carrying about 50 Lakh Commuters in a daily basis. Congested Streets and Longer Route Length due to Urban Sprawl have only served to reduce Bus Frequencies further. In a recent study done by CRRI, it has been reported that annual traffic growth rates vary in the range of 2 – 4% in the central zone, 5 – 7% in the intermediate zone and 8 – 9% on the regional roads in Bangalore City. CRRI study also reported delays of 26.8 sec per km of travel and 9.9 seconds per minute of travel.

1.1.4 The combined effect of all these on the Road Network of Bangalore is Delay and Congestion beyond Tolerable Limits. Vehicular Conflicts at the Intersections are being eliminated by Traffic Signals but at the Expense of Delays and Long Queues. The Peak Hour has spread over a longer period of time, since there are no Perceptible Capacity Augmentation / Conflict Reduction Measures. Traffic related Problems have become Regular Phenomena on Bangalore Roads, due to the Vast Developments. This fact is substantiated by the Traffic Study Results at various Road Networks and Intersections of the City. Most of the Major Junctions of the Core City have crossed the mark of 1000

PCUs in the Peak Hour. Though number of Grade Separators have been constructed and are being constructed, most of them are located in the Developed Part of the City and causing a Trigger of Congestion at adjacent Junctions. Traffic Management Measures such as One Way Systems, Parking Restrictions, Junctions Improvements, etc. are being implemented to ease the Congested Street Network. But the ever increasing Traffic is fast deteriorating the Limited Improvement in Level of Service these Traffic Management Measures can offer.

1.1.5 As a Comprehensive Development Programme for Improvement of Road Network, the Bruhat Bangalore Mahanagara Palike (BBMP) has planned Grade Separated Junction, Widening of Roads, Strengthening of Pavement Base and Sub – Base, Improvement to Pedestrian Facilities, Provision for Car Parking, etc. BBMP has constituted a separate cell to coordinate the Widening of Major Roads in Bangalore City in the face of Land Acquisition Challenges. This Response is the Answer to the severe strain on the Urban Infrastructure, which is inevitable due to the very rapid rate of growth in traffic. Travel Demands of Passengers have increased many folds in the last two decades. Unfortunately, Growth in the Infrastructure is not commensurate with the growing demands of traffic. There is an exigent need to effectively manage the Traffic and Transportation Systems to optimize the Solutions with Short Term and Long Term Measures.

1.1.6 One of the Practical Steps towards Optimal Solutions that will also give an Immediate Relief to Traffic Scenario is Capacity Augmentation. Capacity Augmentation is not possible without widening the high – density corridors. Increasing the capacity of important corridors is inescapable in the long run even if it entails Land Acquisition at high cost. The Land Acquisition is proposed through a Process of Conferring Development Rights (Transfer of Development Rights), by which the owner of the land who has surrendered the part of the land towards infrastructure projects would be allowed to carry out construction based on enhanced Floor Space Index (FSI) conferred by the TDRs.

1.1.7 BBMP is already maintaining about 3500 Km. of road out of which 2820 Km. is asphalted surface, 129 Km. is of concrete surface, 476 Km. is of metalled surface and 75 Km. is of other surface. The annual expenditure on construction and strengthening has been increasing from Rs. 600 million in 2001 to Rs. 800 million in 2004.

1.1.8 Bangalore has 332 Km. of Arterial Roads, 210 Km. of Sub – Arterial Roads and 2958 Km. of Local and Feeder Roads. Several Corridors that carry traffic from the Hub of the City to other Parts of the City are being widened on fast track in a phased manner. In this regard, BBMP has taken a Proactive Approach and taken steps to widen Roads that cater to High Volume of Traffic.

The existing Road Network System of Bangalore is a major concern, both in terms of Conditions of Roads and the Structure of the Network. The Basic Structure is Radio – Concentric with about Ten Major Roads converging on the Centre. The Roads themselves are crowded and their Convergence creates Heavy Congestion.

1.2 Sustainable Operation of the Road Network

Road transport has a significant role to play in achieving a balance between Meeting Economic and Social Needs and Preserving the Environment. Both lack of or inadequacies in the Capacity of Roads have affected the Economic Growth and Bad Roads have been recognized as Bottlenecks for all Economic Activities.

Improving the Efficiency of the way the Road Network is operated and used is a Key Aspect of Sustainable Transport.

There are several tools which can be used to deliver Sustainable Operation of the Road Networks and to assess Targets and Effectiveness, including

1. Integrated Transport Planning.
2. Improved Design.
3. Roadside Management.
4. Traffic Management.
5. Incidents / Congestion Management.
6. Road Safety Management.
7. Traffic Law Enforcement.
8. Travel Demand Management.
9. Integrated Transept Modes.
10. Road User Information.
11. Management of Road User and Travel Behaviour.
12. Technology Use.
13. Intelligent Transport System.
14. Asset Management and Road Maintenance.
15. Heavy Vehicle / Long – Distance Buses Management.
16. Data Collection and Analysis System.
17. Vehicle Emissions Control.

BBMP has adopted the Traffic and Transport Sector Master Plan, which has been developed as part of the Comprehensive Development Plan (CDP) for Bangalore by Bangalore Development Authority (BDA) with the above criteria as Benchmarks in the Selection, Identification and Prioritization of Road Projects.

In Bangalore, Roads are approaching full capacity utilization thereby hindering Economic Growth; conversely, lack of basic Road Access is hindering growth of the Economic Activities in the City particularly for the Business Establishments and for the poor. It is estimated that about 80% of the Arterial Road Network in Bangalore is already heavily congested. The Coverage and Quality of local roads remain inadequate to serve the needs of the Industry, Government, Businesses and Citizens.

1.3 Need for the Project

The Project Corridor is a part of Chord Road and is one of the busiest stretches in the City. The Project Corridor is located in North West Quadrant of Bangalore and connects NH – 4 at Yeshwanthapura on northern side with Mysore Road (SH – 17) on southern side and it starts at Manjunath Nagar Main Road Junction, which is 450m away from the Modi Hospital Junction, and ends at Chord Road – Magadi Road Junction. Such is the

density of vehicles that the Traffic Signals have become redundant along this Corridor. Stretching around 10 km between Yeshwanthpur and Mysore Road, the peak hour traffic along the Chord Road Corridor is more than 6000 PCU / hr. This Road is not spared even on Holidays as it is the Gateway to Wonderla in Bidadi, Mysore, etc. on Southern Side and to Tumkur, Hassan, Chikmagalur, etc. on northern side. The movement of vehicles has increased on Chord Road as it connects NH – 4 to Mysore Road. The Study Area is located in Thickly Developed Residential and Commercial Area and is surrounded by some of the well know establishments like Yeshwanthpur Railway Station, Iskon Temple, Vivekananda College, Mother Teresa Hospital, Navarang Theatre, Modi Hospital, etc.

The National Highway Authority of India (NHAI) is developing Elevated Corridor along NH – 4, this Development will definitely will increase the afflux of Traffic in this Corridor. Further, in this Corridor, Metro Work is being carried upto Modi Hospital Junction on the northern side and Chord Road – Magadi Road Junction downwards on the southern side. But, this Metro Rail Facility will not cater to the need of the to and from Traffic between Yeshwanthpura and Mysore Road. Further, with the spurt in the economy, the Land Use Patterns of this Northern Part of the City Area have been changing at a very fast pace since 10 years. Many of the Self Containing Residential Areas in and around this Corridor, such as Rajajinagar, Mahalakshmi Layout, Malleshwaram, Basaveshwara Nagar, are being converted into Partial Commercial Establishments. With this change in the Land Use Pattern, Traffic along this Corridor has been increased considerably in last 10 years time. Many large Residential Site are being converted into Apartments / Flats, Mini Township (Brigade Gateway) in and around this Corridor and a site that would house either a family or two now will be able to house multiple number of families and with this the number of Vehicle / Traffic also will increase manifold in a couple of years. The existing Grade Separators along this Corridor (Flyover at Yeshwanthpura Circle, Underpass at Modi Hospital Junction and Underpass at Chord Road – Magadi Road Junction) are providing Uninterrupted, Seamless Traffic Flow along a part of this Corridor.

These being the Background, the Bruhath Bangalore Mahanagara Palike has proposed to construct Grade Separator at Major Junctions and to close Median at Minor Junctions with Appurtenant Link Improvements from Manjunath Nagar Main Road Junction to Chord Road – Magadi Road Junction along Chord Road covering a total of 6 Junctions (out of which, 4 Junctions have been taken for improvement) for a total length of 2.9 km in order to provide Uninterrupted, Seamless Traffic Flow and to Increase Level of Service along the Corridor.

1.4 Existing Junctions along the Project Corridor

The following Junctions are present along the Project Corridor.

- Manjunath Nagar Main Road Junction – Three Arm ('T' Shaped) Junction.
- Shivanagar 8th Main Road Junction – Four Arm Junction.
- Shivanagar 1st Main Road Junction – Four Arm Junction.
- Basaveshwara Nagar 1st Main Road Junction – Three Arm ('T' Shaped) Junction.
- Junction near Fire Station – Four Arm Junction.
- Chord Road – Magadi Road Junction – Four Arm Junction.

1.5 Junctions proposed for Improvements

The following Junctions have been taken for the proposed Improvements.

- Manjunath Nagar Main Road Junction.
- Shivanagar 8th Main Road Junction.
- Shivanagar 1st Main Road Junction.
- Basaveshwara Nagar 1st Main Road Junction.

Key Map of the Project Corridor proposed for Improvements is enclosed in **Annexure A.1.1.**

1.6 Contents of the Report

The Methodology, as detailed in the Project Proposal, has been followed for carrying out the necessary Investigations and Preparation of this Feasibility Report.

This Report includes the following.

- Chapter 2: Objectives and Scope of Study
- Chapter 3: Study Corridor
- Chapter 4: Field Studies and Analysis
- Chapter 5: Corridor Improvement Scheme
- Chapter 6: Project Cost
- Chapter 7: Conclusion
- Chapter 8: Photographs
- Chapter 9: Drawings

MANASA CONSULTANTS

Annexure A.1.1

Key Map of the Project Corridor

Chapter 2

Objectives and Scope of Study

CHAPTER 2
OBJECTIVES AND SCOPE OF STUDY

2.1 Objective

The Project has been taken up to address the Traffic related Problems on the Project Corridor. The Study Corridor is located in the North West Quadrant of Bangalore City and connects NH – 4 on the Northern Side with Mysore Road (State Highway – 17) on the Southern Side. It starts from Manjunath Nagar Main Road Junction and ends at Chord Road – Magadi Road Junction. The Study Corridor interfaces with NH – 4 at Yeshwanthpur, Magadi Road (SH – 17E) near Chord Road – Magadi Road Junction

The Primary Objectives of the Study are

- To effectively and optimally manage Traffic on the Corridor.
- To conduct necessary Surveys and Investigations to arrive at Alignment Alternatives for Traffic Improvement along the Corridor.
- To suggest Optimal and Feasible Grade Separation Schemes and Appurtenant Link Improvement Measures to reduce travel time.
- To improve the existing Junctions to streamline Traffic Flow at Grade Level.
- To improve the Environmental Conditions of the Corridor by reducing Idle Time.
- To reduce the Vehicle Operation Cost of the Road Users.
- To reduce Traffic Accidents.

To summarize, the Main Objective of the Study of this Corridor is to offer to the Road Users commuting through this Corridor Comprehensive Connectivity, Convenience, Comfort, Affordability, Safety and Aesthetics.

2.2 Project Scope

The Scope of the Study to be carried out by the Consultant involves the following.

- Review of Available Data and Reports.
- Topographical Survey of the Corridor.
- Necessary Traffic Survey to obtain Data and its Analysis for the Concept Proposal.
- Geotechnical Investigation.
- Work out Traffic Management / Diversion and Traffic Engineering Schemes during Project Execution.
- Work out Land Acquisition Details.
- Coordinate with the Concerned Departments to collect the Details for all Existing Surface and Underground Utilities and Realignment of Existing Utilities interfering in the Execution of the Project.
- Detailed Engineering Designs along with Detailed Estimate of the approved Concept.
- To study the Environmental and Social Impacts that can be caused due to the Construction.
- Project Scheduling.
- Preparation of Bid Documents to finalize the Execution Agency.

2.3 Approach Methodology

The Activities that are involved in the Preparation of Feasibility Report for Proposed Improvement to Corridor along Selected Stretch of Chord Road are briefed below.

2.3.1 Stage 1

- To define the Objective and Scope of Work.
- To plan Approach and Methodology, Data Collection.
- Carry out Field Reconnaissance Survey that includes Site Appreciation, Identification of Survey Locations and Site Constraints.

2.3.2 Stage 2

- Data Collection
  - Engineering Surveys and Investigations
    1. Classified Turning Traffic Volume Survey.
    2. Origin Destination Survey.
    3. Vehicular Delay and Accumulation Survey.
    4. Occupancy Survey.
    5. Topographic Survey.
    6. Geotechnical Investigation.
  - Secondary Data
    1. Economic Indicators affecting Traffic Growth.
    2. Past Accident Data.
    3. Details of any on going Road Improvements, Junction Improvements, Grade Separator Schemes; Footpath Improvement Scheme; Metro Rail Alignment along the Project Stretch.
    4. Environmental and Social Impact Assessment.

- Analysis of Traffic Volume Count in deciding the Alignment of Grade Separation Scheme and other Corridor Improvement Schemes.
- Analysis of Surface Level Improvements based on the Traffic Data and Proposed Grade Separation Scheme.
- Analysis of Traffic Circulation at Surface Level of the Proposed Scheme.
- Design suitable Traffic Improvement Measures to reduce Conflicting Traffic Stream.
- Preparation of Layout Drawings and Longitudinal Sections of all the Proposals conceptualized.
- Study the Existing Utilities present in the Area and Planning of Realignment of those Utilities, which will obstruct the execution, in concurrence with BBMP and other concerned Departments.
- Work out Land Acquisition Details, if any, for the Proposed Alternatives.
- Costing based on Block / Line Estimate.

2.4 Design Philosophy

The Technical Proposal given in this Feasibility Report consists of Preliminary Design Details, Drawings and all Technical Data / details based on the Studies and Investigations as stated in Section 2.2.

The Design Standards that will be adopted in the Design of Corridor Improvement Schemes shall be in accordance with the Codal Provisions of India as stipulated by the Indian Road Congress (IRC), Indian Standard Specifications (IS) and the Ministry of Road Transport & Highways (MoRT&H). Deviations may be considered in planning parameters, if absolutely necessary, considering the Dense Urban Conditions from the

Chapter 3

Study Corridor

CHAPTER 3
STUDY CORRIDOR

3.1 Study Corridor

- The Study Corridor is located in the North West Quadrant of Bangalore City and connects NH – 4 on the Northern Side with Mysore Road (State Highway – 17) on the Southern Side. It starts from Manjunath Nagar Main Road Junction and ends at Chord Road – Magadi Road Junction.
- Total Length of the Corridor – 2.9 km.
  Important Junctions along the Corridor
  - Manjunath Nagar Main Road Junction – Three Arm ('T' Shaped) Junction.
  - Shivanagar 8th Main Road Junction – Four Arm Junction.
  - Shivanagar 1st Main Road Junction – Four Arm Junction.
  - Basaveshwara Nagar 1st Main Road Junction – Three Arm ('T' Shaped) Junction.
  - Junction near Fire Station – Four Arm Junction.
  - Chord Road – Magadi Road Junction – Four Arm Junction.

Key Map of the Study Corridor is enclosed in **Annexure A.1.1** and the Existing Views of the Junctions are enclosed in **Chapter 8 – Photographs.**

- Two Way Movements with at least four lane are seen throughout this Corridor. Some Stretches are wider with Road Divider. Boulevard of varying Width has separated the Service Roads from the Main Carriageway in almost throughout the Corridor. Footpath is present on either side throughout the Corridor.
- The Study Area caters to considerable local and through amount of outside traffic commuting between NH – 4 and SH – 17.
- Many large Residential Sites have been / are being converted into Apartments / Flats along this Corridor and a site that would house either a family or two now will be able to house multiple number of families and with this the number of Vehicle / Traffic also has increased manifold.
- The Study Area is located in Thickly Developed Residential and Commercial Area and is surrounded by some of the well known Establishments like Yeshwanthpur Railway Station, Iskon Temple, Mysore Sandal Soap Factory, Vivekananda College, Mother Teresa Hospital, Navarang Theatre, Modi Hospital, Rajaji Nagar Industrial Town, National Public School, Community Halls, etc.
- The Local Public Transportation is primarily being met by the Bangalore Metropolitan Transport Corporation (BMTC), originating at Majestic Bus Stand, Yeshwanthpur Bus Stand and destined to Basaveshwara Nagar, KHB Colony, Vijay Nagar, Rajaji Nagar, Yeshwanthpur, etc.
- The Study Corridor interfaces with NH – 4 at Yeshwanthpur, Magadi Road (SH – 17E) near Chord Road – Magadi Road Junction.

3.2 Project Junctions

3.2.1 Manjunath Nagar Main Road Junction

3.2.1.1 Physical Details

This Junction is located in Well Developed Residential and Commercial Area of North Western Part of Bangalore City on the Chord Road and is 460m away from Modi Hospital Road – Chord Road Junction. This is a typical three legged Intersection. The Details of the Arms forming this Intersection are as follows.

Chord Road towards Modi Hospital Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.1m wide Central Median. ROW of this Road varies between 45m and 46m. There also exist Service Roads of Width varies between 6m and 8m on either side of the Main Carriageway within ROW. Service Roads and Main Carriageway have been separated by Boulevard of varying Width of 3.5m – 6m on either side. The Gradient is slopping towards the Junction. Thickly developed Commercial and Residential Establishments are present along this Stretch of Road.

Chord Road towards Shivanagar 8th Main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.3m wide Central Median. ROW of this Road varies between 40m and 46m. There also exists a Service Road of varying Width of 6.0m – 6.5m on the West Side of the Main Carriageway within ROW. Boulevard of Width around 4.5m has separated the Service Road with the Main Carriageway on the Western Side of this Stretch of Road. The Gradient is slopping away from the Junction. Thickly developed Commercial and Residential Establishments are present along this Stretch of Road. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on the Eastern Side of this Stretch of Road.

Road towards Manjunath Nagar Side of the Intersection

This Part of the Road is undivided bi directional. ROW of this Road varies between 10m and 11m. The Gradient is slopping away from the Junction. Either side of this Stretch is populated with thickly developed Residential and Commercial Establishments.

3.2.1.2 Existing Traffic Regulations

- Two directional movements are permitted in all the three arms of the Junction. It is permitted to move from each arm towards all other two arms in the Junction.

3.2.1.3 Site Constraints

- Public Service Facilities such as KPTCL, BESCOM are present along the Chord Road.

3.2.2 Shivanagar 8th Main Road Junction

3.2.2.1 Physical Details

This Junction is located in Well Developed Residential and Commercial Area of North Western Part of Bangalore City on the Chord Road and is 370m away from Manjunath Nagar Main Road Junction. This is a typical four legged Intersection. The Details of the Arms forming this Intersection are as follows.

Chord Road towards Manjunath Nagar Main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.1m – 1.4m wide Central Median. ROW of this Road varies between 33m and 40m. There also exists a Service Road of varying Width of 6.2m – 8.8m on the West Side of the Main Carriageway within ROW. Boulevard of Width around 3.5m has separated the Service Road from the Main Carriageway on the Western Side of this Stretch of Road. The Gradient is slopping towards the Junction. Thickly developed Commercial and Residential Establishments are present along this stretch of Road. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on the Eastern Side of this Stretch of Road.

Chord Road towards Shivanagar 1st Main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.86m wide Central Median. ROW of this Road varies between 38m and 39m. There also exists a Service Road of varying Width of 6.5m – 8m on the West Side of the Main Carriageway within ROW. Boulevard of Width around 3.25m has separated the Service Road from the Main Carriageway on the Western Side of this Stretch of Road. The Gradient is slopping away from the Junction. Thickly developed Commercial and Residential Establishments are present along this stretch of Road. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on the Eastern Side of this Stretch of Road.

Road towards Shivanahalli Side of the Intersection

This part of the Road is undivided bi directional. ROW of this Road varies between 11m and 13m. The Gradient is slopping towards the Junction. Either side of this Stretch is populated with thick Residential and Commercial Establishments.

Road towards Prakash Nagar Side of the Intersection

This part of the Road is undivided bi directional. ROW of this Road varies between 13m and 14m. The Gradient is slopping away from the Junction. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on either side of the Stretch of Road.

3.2.2.2 Existing Traffic Regulations

- Two directional movements are permitted in all the four arms of the Junction. It is permitted to move from each arm towards all other three arms in the Junction except the right turn from Chord Road to Shivanahalli.

3.2.2.3 Site Constraints

- Public Service Facilities such as KPTCL, BESCOM are present along the Chord Road.
- Temple is situated within the ROW along the Chord Road.

3.2.3 Shivanagar 1st Main Road Junction

3.2.3.1 Physical Details

This Junction is located in Well Developed Residential and Commercial Area of North Western Part of Bangalore City on the Chord Road and is around 250m away from the

Shivanagar 8th Main Road Junction. This is a typical four legged Intersection. The Details of the Arms forming this Intersection are as follows.

Chord Road towards Shivanagar 8th main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.86m wide Central Median. ROW of this Road varies between 38m and 39m. There also exists a Service Road of varying Width of 6.5m – 8m on the West Side of the Main Carriageway within ROW. Boulevard of Width around 3.25m has separated the Service Road from the Main Carriageway on the Western Side of this Stretch of Road. The Gradient is slopping towards the Junction. Thickly developed Commercial and Residential Establishments are present along this Stretch of Road. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on the Eastern Side of this Stretch of Road.

Chord Road towards Basaveshwara Nagar 1st Main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.4m wide Central Median. ROW of this Road varies between 39m and 45m. There also exist Service Roads of Width varies between 6m and 7m on either side of the Main Carriageway within ROW. Service Roads and Main Carriageway have been separated by Boulevard of Width varying between 3m and 6m on either side. The Gradient is slopping away from the Junction. Well developed Commercial and Residential Establishments, Community Hall are present along this Stretch of Road.

Road towards Shivanagar Side of the Intersection

This Part of the Road is undivided bi directional. ROW of this Road varies between 18m to 20m. The Gradient is slopping towards the Junction. Either side of this Stretch is populated with thick Residential and Commercial Developments.

Road towards Majestic, Bashyam Circle Side of the Intersection

This Part of the Road is undivided bi directional. ROW of this Road varies between 17m and 19m. The Gradient is slopping towards the Junction. Either side of this Stretch is populated with thickly developed Residential and Commercial Establishments. Public Service Stations such as Karnataka Power Transmission Corporation Ltd. (KPTCL) is present on the Northern Side of this Stretch of Road.

3.2.3.2 Existing Traffic Regulations

Two directional movements are permitted in all the four arms of the Junction. It is permitted to move from each arm towards all other two arms in the Junction.

3.2.3.3 Site Constraints

- Public Service Facilities such as KPTCL is present along the Chord Road, i.e. on Northern Side of this Stretch of Road.

3.2.4 Basaveshwara Nagar 1st Main Road Junction

3.2.4.1 Physical Details

This Junction is located in Well Developed Residential and Commercial Area of North Western Part of Bangalore City on the Chord Road and is 400m away from the Shivanagar 1st Main Road Junction. This is a typical three legged Intersection. The Details of the Arms forming this Intersection are as follows.

Chord Road towards Shivanagar 1st Main Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1.4m wide Central Median. ROW of this Road varies between 39m and 45m. There also exist Service Roads of Width varies between 6m and 7m on either side of the Main Carriageway within ROW. Service Roads and Main Carriageway have been separated by Boulevard of Width varying between 3m and 6m on either side. The Gradient is slopping towards from the Junction. Well developed Commercial and Residential Establishments, Community Halls are present along this Stretch of Road.

Chord Road towards Chord Road – Magadi Road Junction Side of the Intersection

This Part of the Road is divided bi directional with 1m wide Central Median. ROW of this Road varies between 48m and 60m. There also exist Service Roads of Width varies between 6m and 7.5m on either side of the Main Carriageway within ROW. Service Road and Main Carriageway have been separated by Boulevard of Width varying between 1.5m. and 3m on the Eastern Side. Temple Property of Width varying between 7m and 17m separates the Service Road from the Main Carriageway on the Western Side of this Stretch of Road. The Gradient is slopping away from the Junction. Well developed Commercial and Residential Establishments, Community Halls are present along this Stretch of Road.

Road towards Basaveshwara Nagar Side of the Intersection

This Part of the Road is undivided bi directional. ROW of this Road varies between 17m and 18m. The Gradient is slopping away from the Junction. This Stretch of Road passes through thick Residential and Commercial Establishments on both the sides.

3.2.4.2 Existing Traffic Regulations

Two directional movements are permitted in all the three arms of the Junction. It is permitted to move from each arm towards all other two arms in the Junction.

3.2.4.3 Site Constraints

- Well Established Temples are present along the Chord Road on the Western Side near the Junction.

Topographical Maps of all the four (4) junctions are enclosed in Chapter 9 – Drawings.

The Existing Vehicle Turning Movements at the Junctions are enclosed in Annexure A.3.1.

3.3 Street Lighting Pattern

Road Side Street Lighting Arrangement along the Project Stretch is inadequate. Though there are sufficient numbers of Street Lighting provided along the Project Corridor, the presence of Road Side Trees in close proximity to the Light Poles obstruct the effective illumination.

3.4 Bus Stops

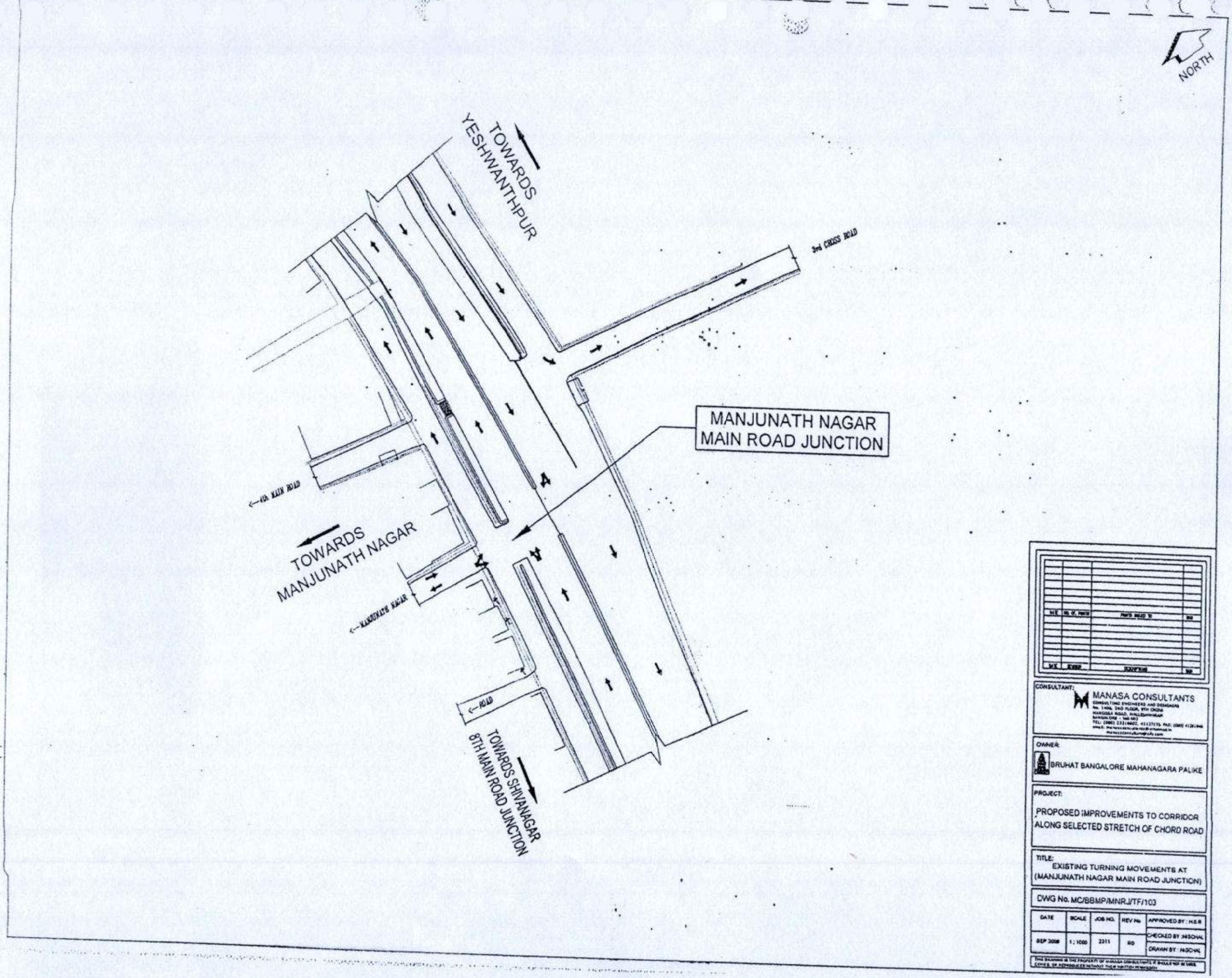
The presence of Bus Stops on the Intersecting Arms of the Junctions hinders the Smooth Traffic Movement along the Intersecting Arms of the Project Junctions.

3.5 Pedestrian Movement

The presence of Bus Stops, Community Halls, Well Developed Commercial Areas and their related activities in the vicinity of the Junctions leads to hazardous movement pattern of the Pedestrians across the Road, thus reducing the Safety Aspects. Further, presence of Trees and other Utilities on the Footpath reduces the Effective Width of the Footpath and in turn obstructs the Pedestrian Movement.

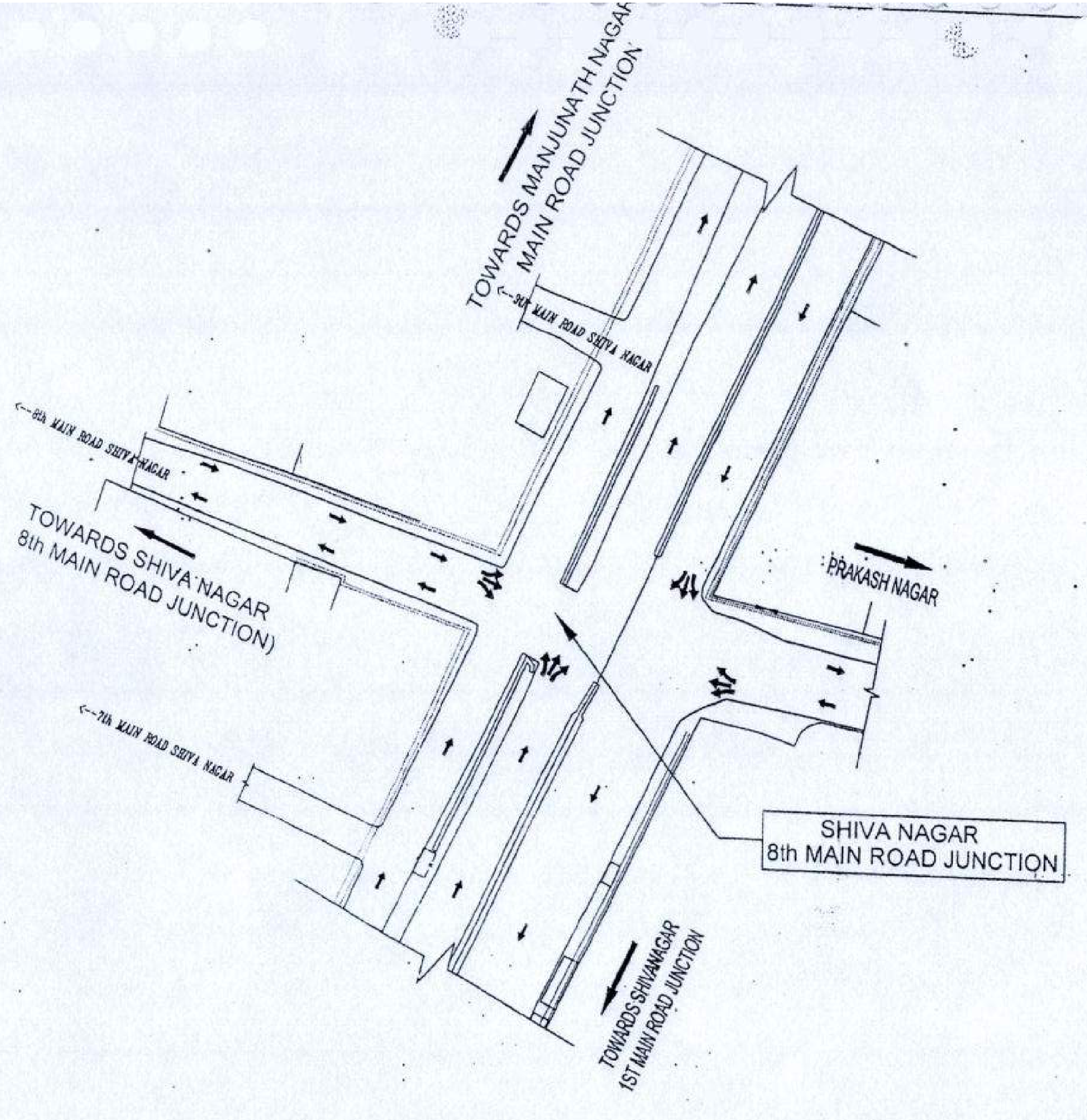
Annexure A.3.1

Existing Vehicle Turning Movements At the Junctions



NORTH
TOWARDS YESHWANTHPUR
3rd CROSS ROAD
MANJUNATH NAGAR MAIN ROAD JUNCTION
TOWARDS MANJUNATH NAGAR
TOWARDS SHIVANAGAR 8TH MAIN ROAD JUNCTION
CONSULTANT:
MANASA CONSULTANTS
OWNER:
BRUHAT BANGALORE MAHANAGARA PALIKE
PROJECT:
PROPOSED IMPROVEMENTS TO CORRIDOR ALONG SELECTED STRETCH OF CHORD ROAD
TITLE:
EXISTING TURNING MOVEMENTS AT (MANJUNATH NAGAR MAIN ROAD JUNCTION)
DWG No. MC/BBMP/MNRJ/TF/103
DATE
SCALE
JOB NO.
REV No
APPROVED BY : H.S.R
CHECKED BY : NISCHAL
DRAWN BY : NISCHAL
SEP 2008
1 : 1000
2311
R0

NORTH



CONSULTANT: MANASA CONSULTANTS

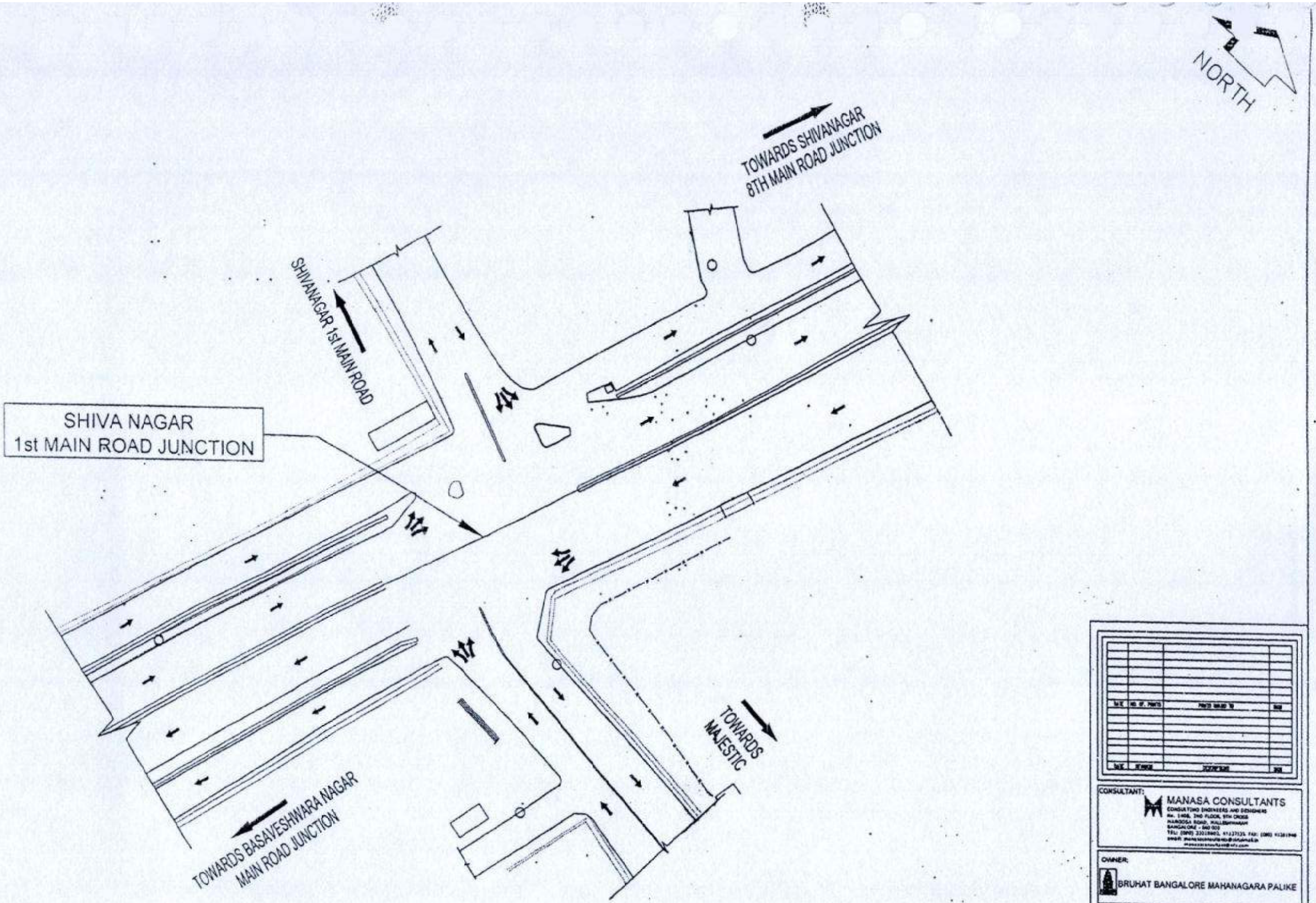
OWNER: BRUHAT BANGALORE MAHANAGARA PALIKE

PROJECT: PROPOSED IMPROVEMENTS TO CORRIDOR ALONG SELECTED STRETCH OF CHORD ROAD

TITLE: EXISTING TURNING MOVEMENTS AT (SHIVA NAGAR 8th MAIN ROAD JUNCTION)

DWG No. MC/BBMP/S8thMRJ/TF/204A

DATE	SCALE	JOB NO.	REV No.	APPROVED BY : H.S.R
SEP 2009	1 : 1000	2311	R0	CHECKED BY : NISCHAL
				DRAWN BY : NISCHAL



CONSULTANT: MANASA CONSULTANTS

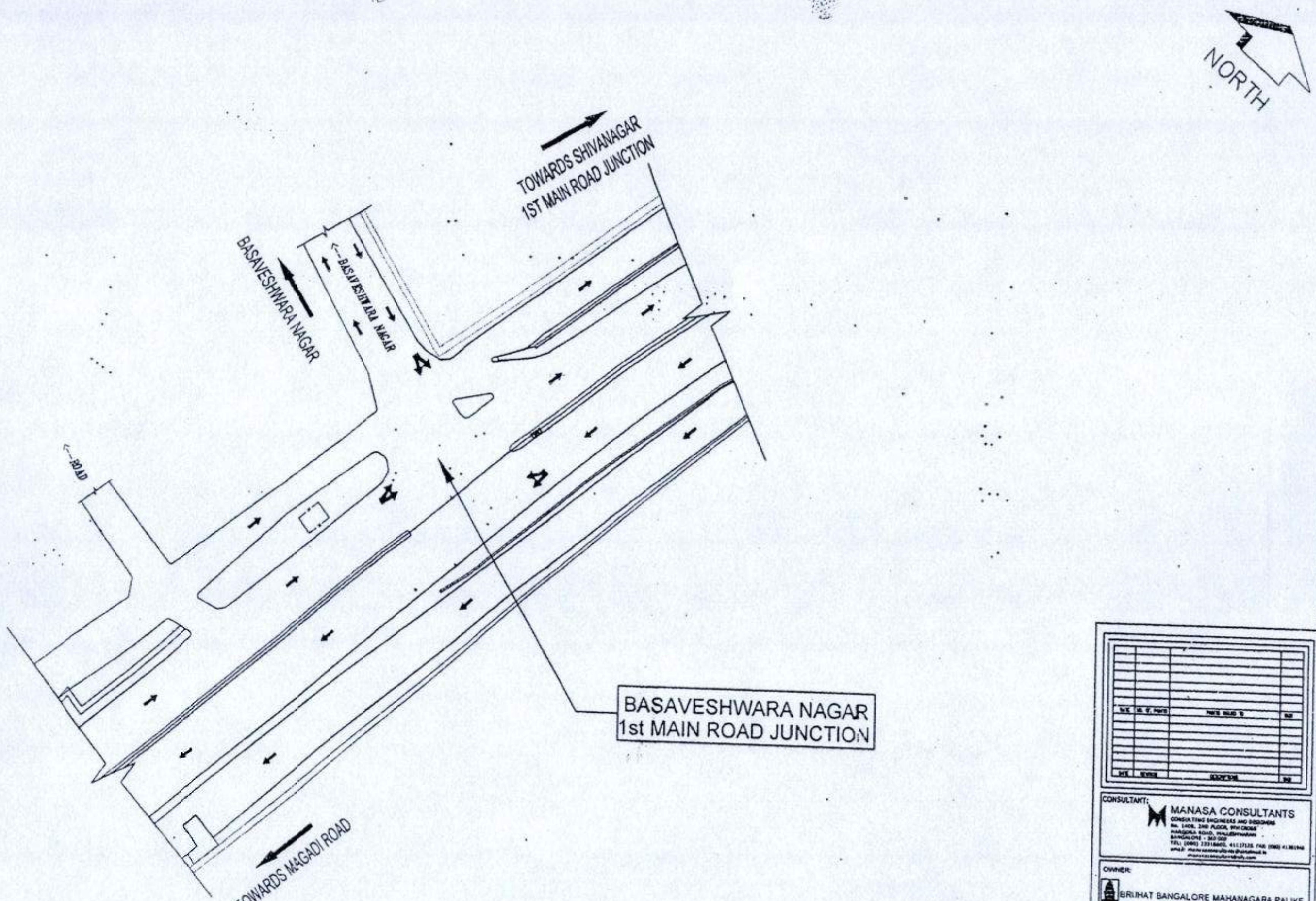
OWNER: BRUHAT BANGALORE MAHANAGARA PALIKE

PROJECT: PROPOSED IMPROVEMENTS TO CORRIDOR ALONG SELECTED STRETCH OF CHORD ROAD

TITLE: EXISTING TURNING MOVEMENTS AT (SHIVA NAGAR 1st MAIN ROAD JUNCTION)

DWG No. MC/BBMP/S1stMRJ/TF/204B

DATE	SCALE	JOB NO.	REV No.	APPROVED BY : H.S.R
SEP 2006	1 : 1000	2311	R0	CHECKED BY : NISCHAL
				DRAWN BY : NISCHAL



CONSULTANT:

MANASA CONSULTANTS

CONSULTING ENGINEERS AND DESIGNERS

OWNER:

BRUHAT BANGALORE MAHANAGARA PALIKE

PROJECT:

PROPOSED IMPROVEMENTS TO CORRIDOR ALONG SELECTED STRETCH OF CHORD ROAD

TITLE: EXISTING TURNING MOVEMENTS AT (BASAVESHWARA NAGAR 1st MAIN ROAD JUNCTION)

DWG No. MC/BBMP/B1stMRJ/TF/303

DATE	SCALE	JOB NO.	REV No.	APPROVED BY : H.S.R
SEP 2009	1 : 1000	2311	R0	CHECKED BY : NISCHAL
				DRAWN BY : NISCHAL

Chapter 4

Field Studies and Analysis

CHAPTER 4
FIELD STUDIES AND ANALYSIS

4.1 General

This Chapter presents the various Studies (Reconnaissance Survey, Traffic Survey, Topographical Survey, Geotechnical Investigation, etc.) and thereafter the Data, obtained as a Result of these Studies, Analysis carried out by the Consultant. The Results of Analysis form Inputs for Planning and Design of Proposed Corridor Improvement Scheme, Traffic Forecast and Economic Analysis.

4.2 Reconnaissance Survey

Reconnaissance Survey has been carried out along the Corridor and at the Junctions and the Physical Characteristics of the Corridor and Junctions such as Road Geometrics, Pavement Structure, Traffic Controls (Signs, Signals, Road Markings and Parking Restrictions), Side Walks, Shoulders, Adjacent Land Use, Service Lines (For Example Water, Electricity, Telephone), Storm Water Drains and the Intensity of Non – Traffic Activities, which encroach upon Road Space (such as Hawkers, Builder's Materials, Market Stalls, etc.) have been studied. The Data recorded have been detailed out in **Chapter 3 – Study Corridor**.

4.3 Traffic Surveys

To establish the Vehicular Traffic Flow Characteristics such as Hourly variation, Composition, Peak Hour Flows along the Corridor and at the Junctions. Turning Movement Survey of Vehicles at Junctions has been conducted.

4.3.1 Methodology for Traffic Surveys

4.3.1.1 Turning Movement Survey of Vehicles at Junctions

24 hours Manual Traffic Counts have been conducted to cover all the Vehicular Movements at the Junction. The Vehicle Classification System adopted for the Study is given in **Table 4.1**.

Table 4.1
Vehicle Classification System

Motorised Traffic		Non – Motorised Traffic
2 – Wheelers, Auto Rickshaw, Passenger Car: Car, Taxi and Jeep		Bicycle, Cycle Rickshaw, Animal Drawn Vehicle, Hand Drawn Cart
Utility Vehicle: Van and Tempo		
Bus	Mini Bus Standard Bus	
Truck	Light Commercial Vehicle (LCV)	
	Heavy Commercial Vehicle (HCV)	
Farm Vehicle	Agricultural Tractor (AgT)	
	Agricultural Tractor & Trailer (AgTT)	

The Turning Movement Survey has been conducted to obtain Information on Mode wise and Direction wise Turning Movement of Traffic at the Intersection. The Survey has been conducted for 24 hours (0600 hrs. to 0600 hrs.) covering Morning and evening peak hours.

Traffic Counting has been carried out manually in two twelve – hour shifts by trained enumerators, using hand tally. The Count Data have been recorded at 15 minute intervals using hand tallies and total per hour for each vehicle category has been computed. The Traffic Volume Count Data has been processed using the commonly used Spreadsheet Package. The processed Hourly Traffic Volume Data has been compiled Direction wise.

The Peak Hourly Directional Vehicular Movement Data has been used to plan and design the Improvement Scheme such as Grade Separation and At Grade Intersections with Traffic Signals.

4.4 Analysis of Traffic Study Data

The Data and Pertinent Information collected from the Traffic Surveys have been analysed using the Utility Software Packages (MS – EXCEL) to obtain the required Information concerning Traffic Characteristics at the Intersections in the Corridor. Findings and the brief Discussions thereon are presented in this Section.

4.4.1 Analysis of Turning Movement Count Data

Data have been processed on quarter hourly basis to establish the most appropriate Peak Hours. Data collected from Surveys have been computerised and analysed to study Hourly Variation of Traffic, Peak Hour Flows, Traffic Composition, etc. and are presented **Junction wise** below. The Counts **have been classified by** Category of Vehicles and by Direction of Movement. The various Vehicle Types having different Sizes and Characteristics have been converted into Equivalent Passenger Car Units. The Passenger Car Unit (PCU) Factors recommended by Indian Road Congress in "Guidelines for Capacity of Urban Roads in Plain Areas" (IRC: 106 – 1990) have been used. The same are detailed in **Table 4.2.**

Table 4.2

Recommended PCU Factors for Various Types of Vehicles in Urban Roads

Sl. No.	Vehicle Type	Equivalent PCU Factors	
		% Composition of Vehicle Type	
		Up to 10%	10% and above
A	Fast Vehicles		
1	Two wheelers, Motorcycle or Scooter, etc.	0.5	0.75
2	Passenger car, Pick – up Van	1.0	1.0
3	Auto Rickshaw	1.2	2.0
4	Light Commercial Vehicle	1.4	2.0
5	Truck or Bus	2.2	3.7
6	Agricultural Tractor Trailer	4.0	5.0
B	Slow Vehicles		
1	Cycle	0.4	0.5
2	Cycle Rickshaw	1.5	2.0
3	Tonga (Horse drawn vehicle)	1.5	2.0
4	Hand Cart	2.0	3.0

(Source: IRC: 106 – 1990)

4.5 Manjunath Nagar Main Road Junction

4.5.1 Hourly Variation of Traffic

Hourly Variation of Traffic Flow is presented in **Fig. 4.1**. The Hourly Traffic Volume observed at the Junction varied in the range of 436 – 8131 PCUPH (Passenger Car Unit per Hour). Peak Hour Flows are observed during 1000 – 1100 hrs. in the morning (8139 PCU) and 1800 – 1900 hrs. in the evening (6898 PCU). This Junction handles more than 5000 PCU / hr. for most part of the day (0800 – 2000 hrs.). This is due to prolonged congestion, which has "forced" the Peak Hour Flows over several hours giving Near Peak Flow for more periods of the day. The Detailed Direction wise Traffic Flow at Manjunath Nagar Main Road Junction is given in **Annexure A.4.1**.

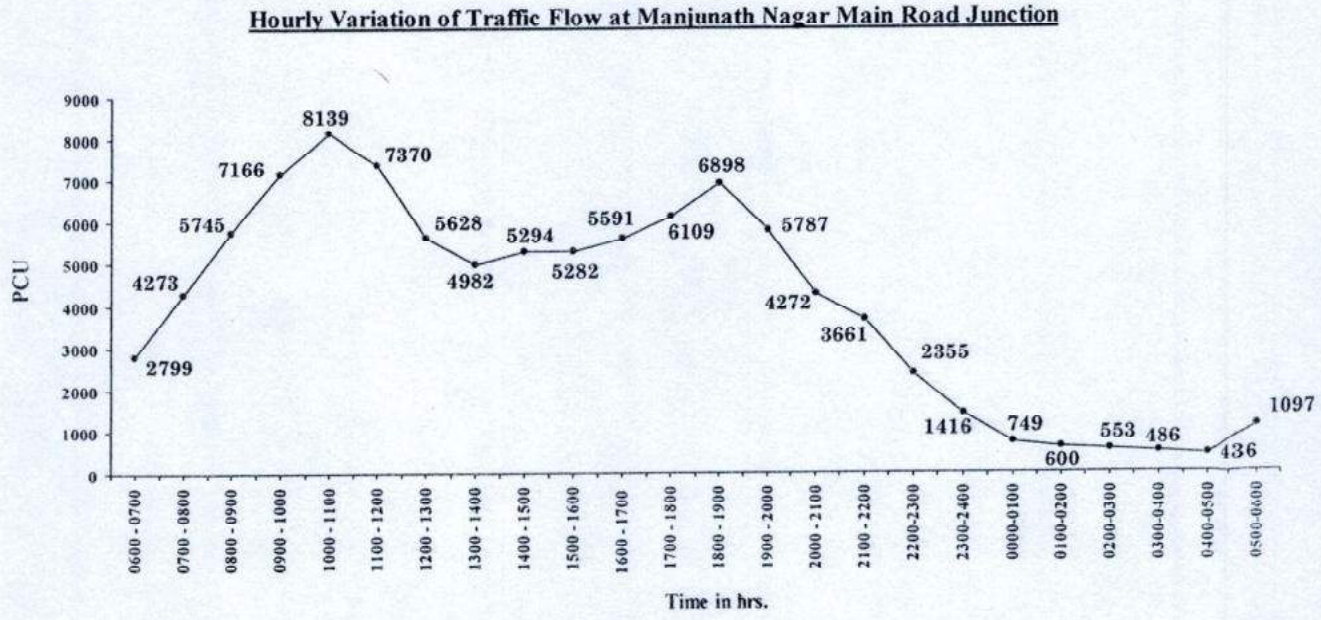


Fig. 4.1

4.5.2 Direction wise Traffic

Peak Hour Direction wise Flow is presented in **Fig. 4.2** for Manjunath Nagar Main Road Junction. The Major Flow is along Chord Road in which current Peak Hour Flow is 6677 PCU, which amounts to 82.01% of Junction Volume.

4.6 Shivanagar 8th Main Road Junction

4.6.1 Hourly Variation of Traffic

Hourly Variation of Traffic Flow is presented in **Fig. 4.3**. The Hourly Traffic Volume observed at the Junction varied in the range of 524 – 9156 PCUPH (Passenger Car Unit per Hour). Peak Hour Flows are observed during 1000 – 1100 hrs. in the morning (9157 PCU) and 1800 – 1900 hrs. in the evening (8083 PCU). This Junction handles more than 5500 PCU / hr. for most part of the day (0800 – 2000 hrs.). This is due to prolonged congestion, which has "forced" the Peak Hour Flows over several hours giving Near Peak

Flow for more periods of the day. The Detailed Direction wise Traffic Flow at Shivanagar 8th Main Road Junction is given in **Annexure A.4.2**.

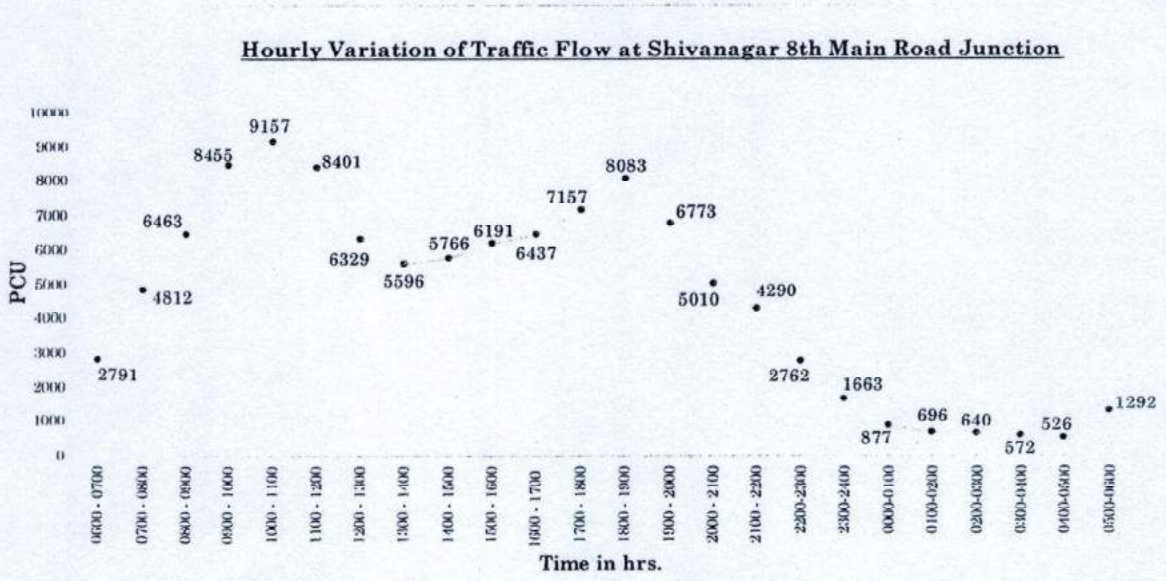


Fig. 4.3

4.6.2 Direction wise Traffic

Peak Hour Direction wise Flow is presented in **Fig. 4.4** for Shivanagar 8th Main Road Junction. The Major Flow is along Chord Road in which current Peak Hour Flow is 6850 PCU, which amounts to 74.81% of Junction Volume.

4.7 Shivanagar 1st Main Road Junction

4.7.1 Hourly Variation of Traffic

Hourly Variation of Traffic Flow is presented in **Fig. 4.5**. The Hourly Traffic Volume observed at the Junction varied in the range of 631 – 10471 PCUPH (Passenger Car Unit per Hour). Peak Hour Flows are observed during 1000 – 1100 hrs. in the morning (10471 PCU) and 1800 – 1900 hrs. in the evening (9791PCU). This Junction handles more than 6500 PCU / hr. for most part of the day (0800 – 2000 hrs.). This is due to prolonged congestion, which has "forced" the Peak Hour Flows over several hours giving Near Peak Flow for more periods of the day. The Detailed Direction wise Traffic Flow at Shivanagar 1st Main Road Junction is given in **Annexure A.4.3**.

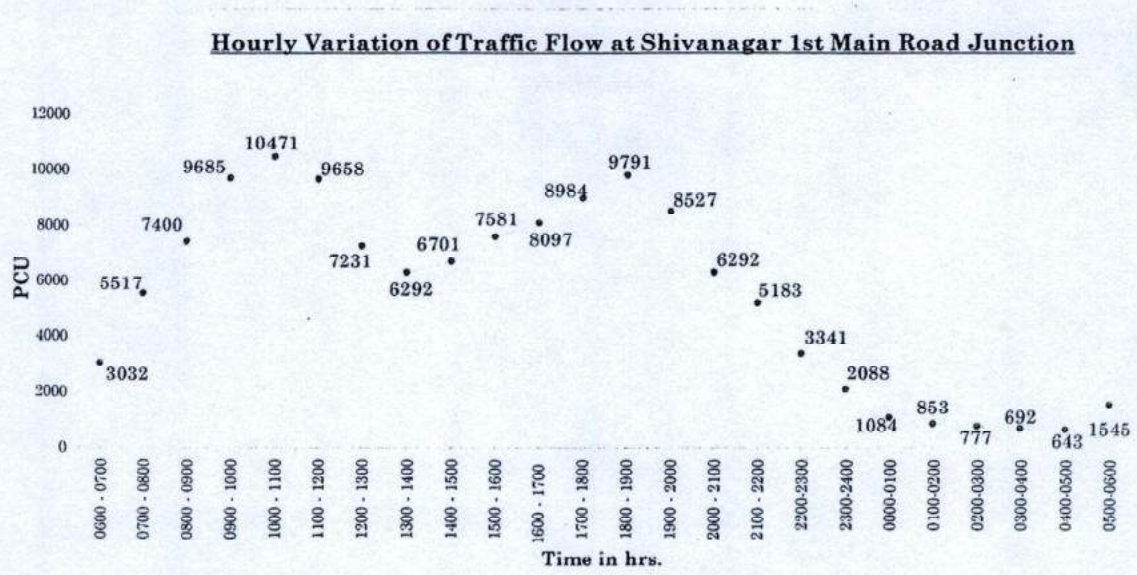


Fig. 4.5

4.7.2 Direction wise Traffic

Peak Hour Direction wise Flow is presented in **Fig. 4.6** for Shivanagar 1st Main Road Junction. The Major Flow is along Chord Road in which current Peak Hour Flow is 6861 PCU, which amounts to 65.52% of Junction Volume.

4.8 Basaveshwara Nagar 1st Main Road Junction

4.8.1 Hourly Variation of Traffic

Hourly Variation of Traffic Flow is presented in **Fig. 4.7**. The Hourly Traffic Volume observed at the Junction varied in the range of 529 – 8109 PCUPH (Passenger Car Unit per Hour). Peak Hour Flows are observed during 1000 – 1100 hrs. in the morning (8109 PCU) and 1800 – 1900 hrs. in the evening (7616PCU). This Junction handles more than 5000 PCU / hr. for most part of the day (0800 – 2000 hrs.). This is due to prolonged congestion, which has "forced" the Peak Hour Flows over several hours giving Near Peak Flow for more periods of the day. The Detailed Direction wise Traffic Flow at Basaveshwara Nagar 1st Main Road Junction is given in **Annexure A.4.4**.

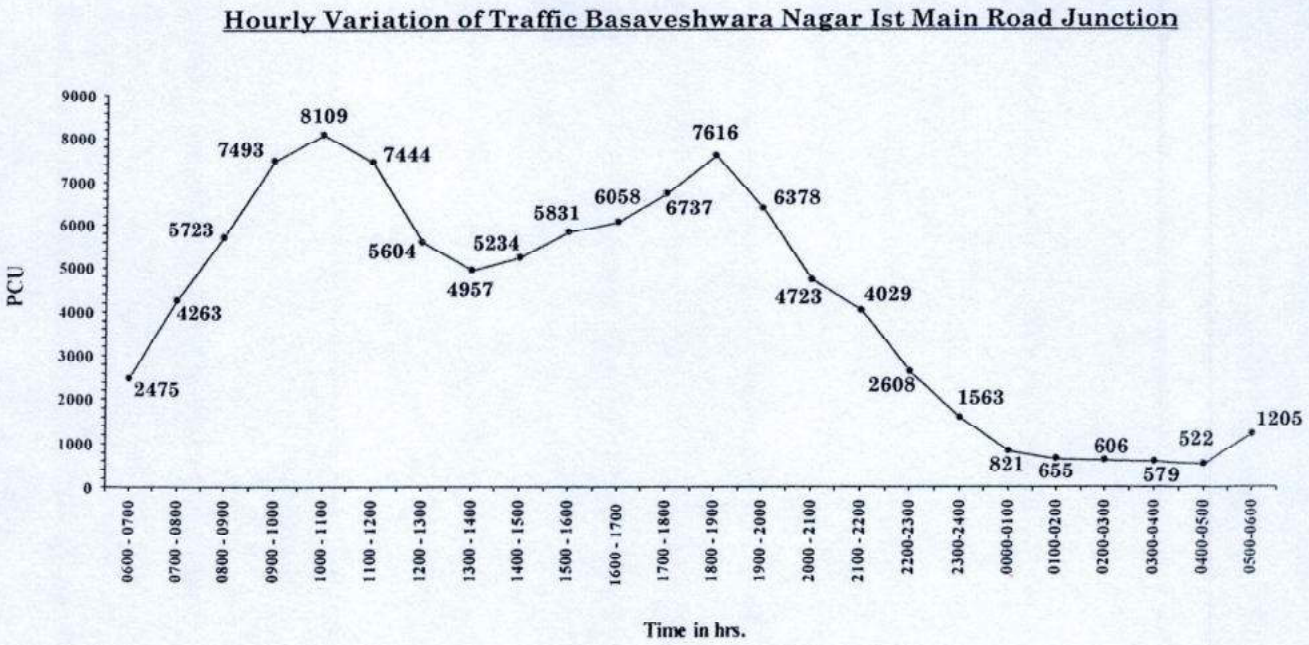


Fig. 4.7

4.8.2 Direction wise Traffic

Peak Hour Direction wise Flow is presented in **Fig. 4.8** for Basaveshwara Nagar 1st Main Road Junction. The Major Flow is along Chord Road in which current Peak Hour Flow is 6128 PCU, which amounts to 75.57% of Junction Volume.

4.9 Topographic Survey

A Comprehensive Topographic Survey has been conducted all along the Corridor using Total Station Equipment to accurately map the Area and obtain the Present Information on Road Width, Adjoining Land Use, Building Offsets and Levelling Data using Auto Level. The GTS Bench Mark has been transferred to the Site by carrying out Fly Leveling and the Bench Marks have been established at Site. The entire Levelling has been carried out using GTS Bench Mark. The Profiles and Levels of the Road Network within the Study Area have been also captured by taking Longitudinal and Cross Section Levels. The Extent of Survey has been limited to 100m beyond the Battery Limit on both the sides of the Corridor and to 200m on all the Cross Roads joining with the Corridor. The Details have been captured adequately for Planning and Designing of proposed Corridor Improvement Scheme. The Data captured is in 3 – D Format, which have been directly downloaded to Computers and is compatible for Modern Design Softwares. Topographical Map is given in **Chapter 9 – Drawings**.

The Existing Site Features collected during Topographical Survey are enumerated in **Chapter 3 – Study Corridor.**

4.10 Geotechnical Investigation

Geotechnical Investigation has been carried out with the Primary Objective of establishing the Ground Condition at the Site for the following Junctions, where Improvements have been proposed, along the Corridor and evaluating the Bearing Pressure and other Engineering Design Parameters through the Field and Laboratory Tests.

Geotechnical Investigation Reports for each of the following Junctions are enclosed in **Annexure A.4.5**.

- Shivanagar 8th Main Road Junction.
- Shivanagar 1st Main Road Junction.
- Basaveshwara Nagar 1st Main Road Junction.

Annexure A.4.1

At Manjunath Nagar Main Road Junction

1.Detailed Direction wise Traffic Flow

Manjunath Nagar Main Road Junction

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0600-0700	1-2	294	103	244	50	22	33	4	6	0	3	1	760	863
	1-3	110	36	31	11	8	0	1	0	0	1	0	198	216
	2-1	332	111	288	58	33	40	8	11	0	3	9	893	1023
	2-3	95	43	41	22	10	0	3	0	0	6	0	220	249
	3-1	121	30	28	14	17	0	2	0	0	4	5	221	240
	3-2	88	41	35	10	7	0	0	0	0	1	0	182	209
	Total	1040	364	667	165	97	73	18	17	0	18	15	2474	2799
0700-0800	1-2	450	157	374	76	33	51	6	9	0	4	2	1162	1318
	1-3	168	54	47	16	12	0	2	0	0	2	0	301	327
	2-1	508	170	441	89	51	62	12	17	0	5	13	1368	1569
	2-3	145	65	62	33	15	0	4	0	0	9	0	333	376
	3-1	185	46	42	21	26	0	3	0	0	6	7	336	365
	3-2	135	62	53	15	11	0	0	0	0	2	0	278	318
	Total	1591	554	1019	250	148	113	27	26	0	28	22	3778	4273
0800-0900	1-2	607	212	504	102	44	68	8	12	0	5	2	1564	1773
	1-3	226	73	64	22	16	0	2	0	0	2	0	405	440
	2-1	684	228	594	120	68	83	16	23	0	6	18	1840	2109
	2-3	195	88	84	44	20	0	5	0	0	12	0	448	506
	3-1	249	62	57	28	35	0	3	0	0	7	9	450	489
	3-2	182	84	71	20	14	0	0	0	0	2	0	373	427
	Total	2143	747	1374	336	197	151	34	35	0	34	29	5080	5745
0900-1000	1-2	757	264	629	128	55	85	10	15	0	7	3	1953	2214
	1-3	281	91	79	27	20	0	3	0	0	3	0	504	548
	2-1	854	285	742	149	85	103	20	28	0	8	22	2296	2630
	2-3	244	109	105	55	25	0	7	0	0	15	0	560	632
	3-1	311	77	71	34	44	0	4	0	0	9	11	561	609
	3-2	227	105	89	25	17	0	0	0	0	3	0	466	533
	Total	2674	931	1715	418	246	188	44	43	0	45	36	6340	7166

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1000-1100	1-2	958	332	789	160	69	107	13	19	0	8	4	2459	2786
	1-3	360	115	100	34	25	0	4	0	0	4	0	642	696
	2-1	865	287	747	151	86	104	20	29	0	8	22	2319	2656
	2-3	209	93	89	47	21	0	6	0	0	13	0	478	539
	3-1	427	114	105	51	65	0	6	0	0	13	17	798	878
	3-2	262	112	95	26	19	0	0	0	0	3	0	517	585
	Total	3081	1053	1925	469	285	211	49	48	0	49	43	7213	8139
1100-1200	1-2	779	272	647	131	57	88	10	15	0	7	3	2009	2278
	1-3	289	94	81	28	20	0	3	0	0	3	0	518	563
	2-1	878	293	762	154	88	106	20	29	0	8	23	2361	2705
	2-3	251	113	108	57	25	0	7	0	0	15	0	576	650
	3-1	319	79	73	35	45	0	4	0	0	9	12	576	625
	3-2	233	108	91	25	18	0	0	0	0	3	0	478	548
	Total	2749	959	1762	430	253	194	44	44	0	45	38	6518	7370
1200-1300	1-2	594	208	494	100	43	67	8	12	0	5	2	1533	1739
	1-3	221	72	62	21	16	0	2	0	0	2	0	396	432
	2-1	670	224	582	117	67	81	16	22	0	6	18	1803	2066
	2-3	191	86	82	43	19	0	5	0	0	12	0	438	494
	3-1	244	60	56	27	35	0	3	0	0	7	9	441	479
	3-2	178	82	70	19	14	0	0	0	0	2	0	365	418
	Total	2098	732	1346	327	194	148	34	34	0	34	29	4976	5628
1300-1400	1-2	525	184	436	89	38	59	7	11	0	5	2	1356	1538
	1-3	195	63	55	19	14	0	2	0	0	2	0	350	381
	2-1	593	198	515	104	59	72	14	20	0	6	16	1597	1830
	2-3	169	76	73	38	17	0	5	0	0	11	0	389	439
	3-1	216	53	49	24	31	0	3	0	0	6	8	390	424
	3-2	158	73	62	17	12	0	0	0	0	2	0	324	371
	Total	1856	647	1190	291	171	131	31	31	0	32	26	4406	4982

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1400-1500	1-2	559	195	464	94	41	63	8	11	0	5	2	1442	1635
	1-3	208	67	59	20	15	0	2	0	0	2	0	373	406
	2-1	630	210	547	110	63	76	15	21	0	6	17	1695	1942
	2-3	180	81	77	41	18	0	5	0	0	11	0	413	466
	3-1	229	57	52	26	33	0	3	0	0	7	9	416	452
	3-2	167	77	66	18	13	0	0	0	0	2	0	343	393
	Total	1973	687	1265	309	183	139	33	32	0	33	28	4682	5294
1500-1600	1-2	557	195	462	94	41	63	8	11	0	5	2	1438	1632
	1-3	207	67	58	20	15	0	2	0	0	2	0	371	404
	2-1	628	210	545	110	63	76	15	21	0	6	17	1691	1938
	2-3	179	81	77	41	18	0	5	0	0	11	0	412	465
	3-1	228	57	52	25	33	0	3	0	0	7	9	414	451
	3-2	167	77	65	18	13	0	0	0	0	2	0	342	392
	Total	1966	687	1259	308	183	139	33	32	0	33	28	4668	5282
1600-1700	1-2	590	206	490	100	43	67	8	12	0	5	2	1523	1728
	1-3	219	71	62	21	16	0	2	0	0	2	0	393	428
	2-1	665	222	578	116	67	81	16	22	0	6	17	1790	2053
	2-3	190	85	82	43	19	0	5	0	0	12	0	436	491
	3-1	242	60	55	27	34	0	3	0	0	7	9	437	474
	3-2	177	82	69	19	14	0	0	0	0	2	0	363	416
	Total	2083	726	1336	326	193	148	34	34	0	34	28	4942	5590
1700-1800	1-2	644	225	535	109	47	73	9	13	0	6	3	1664	1888
	1-3	239	78	67	23	17	0	3	0	0	3	0	430	468
	2-1	727	243	631	127	73	88	17	24	0	7	19	1956	2242
	2-3	208	93	89	47	21	0	6	0	0	13	0	477	538
	3-1	264	65	60	29	38	0	4	0	0	8	10	478	519
	3-2	193	89	76	21	15	0	0	0	0	3	0	397	454
	Total	2275	798	1458	356	211	161	39	37	0	40	32	5402	6109

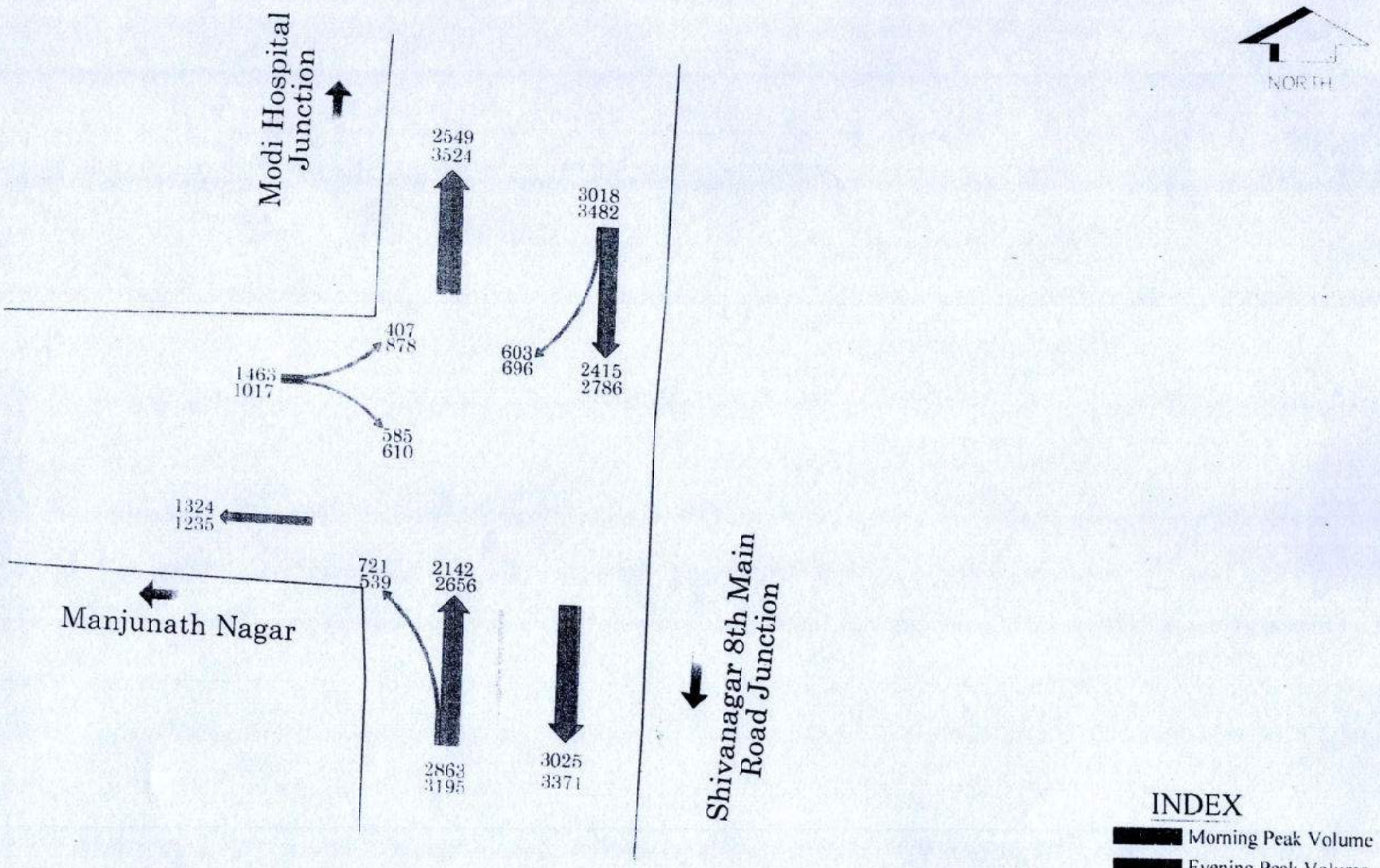
Time Period	Direction	Fast Moving Vehicles							Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1800-1900	1-2	754	297	706	143	62	96	11	17	0	7	3	2096	2415
	1-3	322	98	85	29	21	0	3	0	0	3	0	561	603
	2-1	670	235	612	123	70	85	16	23	0	6	18	1858	2142
	2-3	281	125	119	63	28	0	7	0	0	17	0	640	721
	3-1	209	51	47	23	29	0	3	0	0	6	8	376	407
	3-2	264	119	101	28	20	0	0	0	0	3	0	535	610
	Total	2500	925	1670	409	230	181	40	40	0	42	29	6066	6898
1900-2000	1-2	611	213	508	103	44	69	8	12	0	5	2	1575	1785
	1-3	227	74	64	22	16	0	2	0	0	2	0	407	443
	2-1	689	230	598	121	69	84	16	23	0	6	18	1854	2126
	2-3	197	88	85	44	20	0	5	0	0	12	0	451	509
	3-1	251	62	57	28	36	0	3	0	0	7	9	453	492
	3-2	183	85	72	20	14	0	0	0	0	2	0	376	431
	Total	2158	752	1384	338	199	153	34	35	0	34	29	5116	5787
2000-2100	1-2	450	157	374	76	33	51	6	9	0	4	2	1162	1318
	1-3	167	54	47	16	12	0	2	0	0	2	0	300	326
	2-1	508	170	441	89	51	62	12	17	0	5	13	1368	1569
	2-3	145	65	62	33	15	0	4	0	0	9	0	333	376
	3-1	185	46	42	21	26	0	3	0	0	6	7	336	365
	3-2	135	62	53	15	11	0	0	0	0	2	0	278	318
	Total	1590	554	1019	250	148	113	27	26	0	28	22	3777	4272
2100-2200	1-2	385	135	320	65	28	44	5	8	0	4	2	996	1130
	1-3	143	47	40	14	10	0	2	0	0	2	0	258	281
	2-1	434	145	377	76	44	53	10	15	0	4	12	1170	1343
	2-3	124	56	53	28	13	0	4	0	0	8	0	286	323
	3-1	158	39	36	18	23	0	2	0	0	5	6	287	312
	3-2	116	53	45	13	9	0	0	0	0	2	0	238	272
	Total	1560	475	871	214	127	97	23	23	0	25	20	3255	3661

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
2200-2300	1-2	247	87	206	42	18	28	4	5	0	2	1	564	727
	1-3	92	30	26	9	7	0	1	0	0	1	0	145	181
	2-1	279	93	242	49	28	34	7	10	0	3	8	663	864
	2-3	80	36	34	18	8	0	2	0	0	5	0	161	206
	3-1	102	25	23	12	15	0	2	0	0	3	4	161	203
	3-2	74	34	29	8	6	0	0	0	0	1	0	134	174
	Total	874	305	560	138	82	62	16	15	0	15	13	1828	2355
2300-2400	1-2	147	52	122	25	11	17	2	3	0	2	1	382	434
	1-3	55	18	36	6	4	0	1	0	0	1	0	101	110
	2-1	166	56	144	29	17	20	4	6	0	2	5	449	516
	2-3	48	22	21	11	5	0	2	0	0	3	0	112	127
	3-1	61	15	14	7	9	0	1	0	0	2	3	112	122
	3-2	44	21	18	5	4	0	0	0	0	1	0	93	107
	Total	521	184	335	83	50	37	10	9	0	11	9	1249	1416
0000-0100	1-2	77	27	64	13	6	9	1	2	0	1	1	201	229
	1-3	29	10	8	3	2	0	1	0	0	1	0	54	59
	2-1	87	29	75	16	9	11	2	3	0	1	3	236	271
	2-3	25	11	11	6	3	0	1	0	0	2	0	59	67
	3-1	32	8	8	4	5	0	1	0	0	1	2	61	67
	3-2	23	11	9	3	2	0	0	0	0	1	0	49	56
	Total	273	96	175	45	27	20	6	5	0	7	6	660	749
0100-0200	1-2	60	21	50	11	5	7	1	2	0	1	1	159	182
	1-3	23	8	7	3	2	0	1	0	0	1	0	45	49
	2-1	68	23	59	12	7	9	2	3	0	1	2	186	215
	2-3	20	9	9	5	2	0	1	0	0	2	0	48	54
	3-1	25	7	6	3	4	0	1	0	0	1	1	48	53
	3-2	18	9	8	2	2	0	0	0	0	1	0	40	46
	Total	214	77	139	36	22	16	6	5	0	7	4	526	600

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0200-0300	1-2	55	20	46	10	4	7	1	2	0	1	1	147	169
	1-3	21	7	6	2	2	0	1	0	0	1	0	40	44
	2-1	63	21	54	11	7	8	2	3	0	1	2	172	199
	2-3	18	8	8	4	2	0	1	0	0	2	0	43	48
	3-1	23	6	6	3	4	0	1	0	0	1	1	45	50
	3-2	17	8	7	2	2	0	0	0	0	1	0	37	43
	Total	197	70	127	32	21	15	6	5	0	7	4	484	553
0300-0400	1-2	49	17	40	9	4	6	1	1	0	1	1	129	147
	1-3	18	6	6	2	2	0	1	0	0	1	0	36	40
	2-1	55	19	48	10	6	7	2	2	0	1	2	152	175
	2-3	16	7	7	4	2	0	1	0	0	1	0	38	43
	3-1	20	5	5	3	3	0	1	0	0	1	1	39	42
	3-2	15	7	6	2	2	0	0	0	0	1	0	33	38
	Total	173	61	112	30	19	13	6	3	0	6	4	427	486
0400-0500	1-2	43	15	36	8	4	5	1	1	0	1	1	161	131
	1-3	16	6	5	2	2	0	1	0	0	1	0	42	37
	2-1	49	17	42	9	5	6	2	2	0	1	2	190	156
	2-3	14	7	6	4	2	0	1	0	0	1	0	46	41
	3-1	18	5	4	2	3	0	1	0	0	1	1	46	39
	3-2	13	6	6	2	1	0	0	0	0	1	0	39	32
	Total	153	56	99	27	17	11	6	3	0	6	4	521	436
0500-0600	1-2	113	40	94	19	9	13	2	3	0	1	1	451	337
	1-3	42	14	12	4	3	0	1	0	0	1	0	116	84
	2-1	127	43	111	23	13	16	3	5	0	2	4	531	399
	2-3	37	17	16	9	4	0	1	0	0	3	0	129	98
	3-1	47	12	11	6	7	0	1	0	0	2	2	129	96
	3-2	34	16	14	4	3	0	0	0	0	1	0	107	83
	Total	400	142	258	65	39	29	8	8	0	10	7	1463	1097

HOURLY TRAFFIC VOLUME AT MANJUNATH NAGAR MAIN ROAD JUNCTION

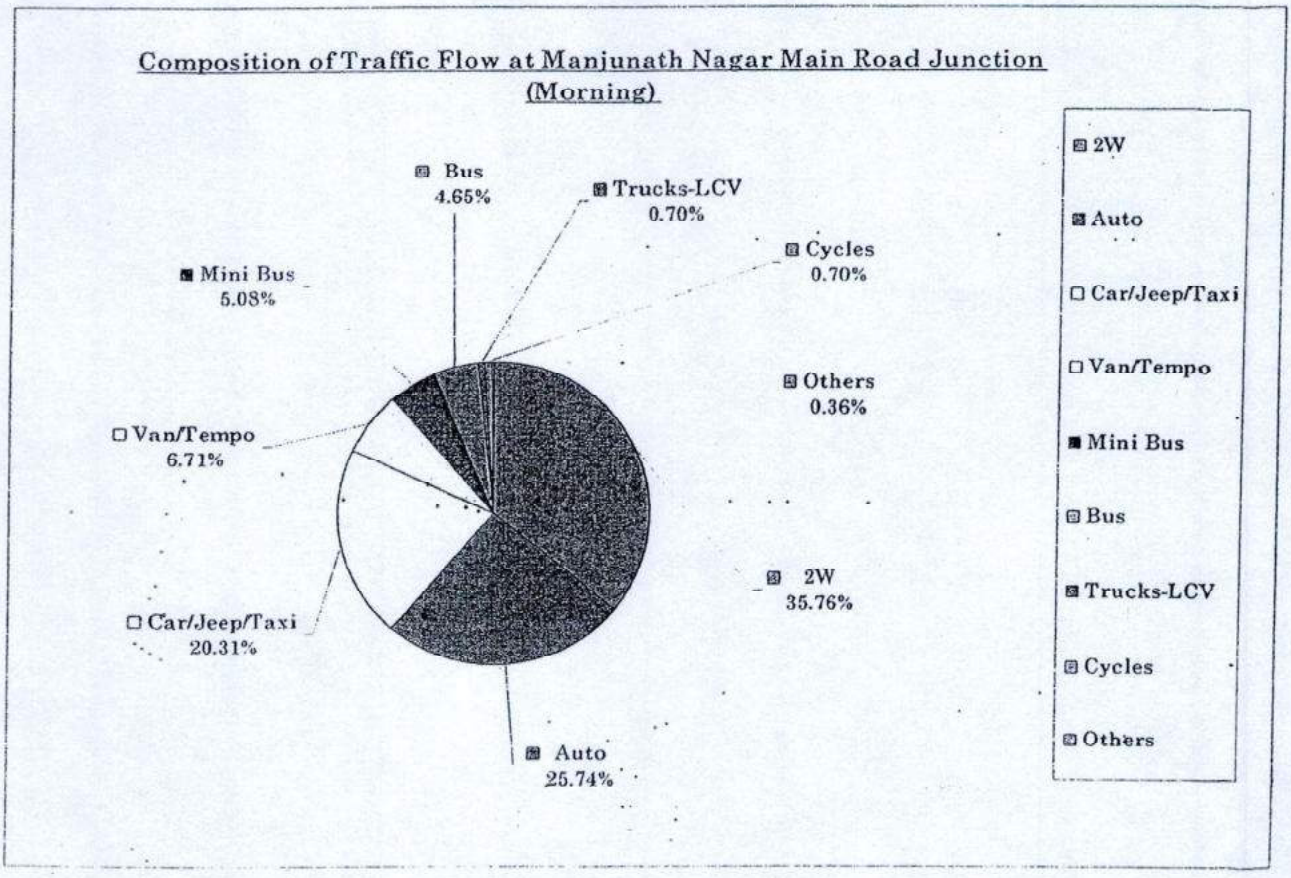
Time Period	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total Pcus
	Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
							LCV	HCV					
0600-0700	1040	364	667	165	97	73	18	17	0	18	15	2474	2799
0700-0800	1591	554	1019	250	148	113	27	26	0	28	22	3778	4273
0800-0900	2143	747	1374	336	197	151	34	35	0	34	29	5080	5745
0900-1000	2674	931	1715	418	246	188	44	43	0	45	36	6340	7166
1000-1100	3081	1053	1925	469	285	211	49	48	0	49	43	7213	8139
1100-1200	2749	959	1762	430	253	194	44	44	0	45	38	6518	7370
1200-1300	2098	732	1346	327	194	148	34	34	0	34	29	4976	5628
1300-1400	1856	647	1190	291	171	131	31	31	0	32	26	4406	4982
1400-1500	1973	687	1265	309	183	139	33	32	0	33	28	4682	5294
1500-1600	1966	687	1259	308	183	139	33	32	0	33	28	4668	5282
1600-1700	2083	726	1336	326	193	148	34	34	0	34	28	4942	5591
1700-1800	2275	793	1458	356	211	161	39	37	0	40	32	5402	6109
1800-1900	2500	925	1670	409	230	181	40	40	0	42	29	6066	6898
1900-2000	2158	752	1384	338	199	153	34	35	0	34	29	5116	5787
2000-2100	1590	554	1019	250	148	113	27	26	0	28	22	3777	4272
2100-2200	1360	475	871	214	127	97	23	23	0	25	20	3235	3661
2200-2300	874	305	560	138	82	62	16	15	0	15	13	1828	2355
2300-0000	521	184	335	83	50	37	10	9	0	11	9	1249	1416
0000-0100	273	96	175	45	27	20	6	5	0	7	6	660	749
0100-0200	214	77	139	36	22	16	6	5	0	7	4	526	600
0200-0300	197	70	127	32	21	15	6	5	0	7	4	484	553
0300-0400	173	61	112	30	19	13	6	3	0	6	4	427	486
0400-0500	153	56	99	27	17	11	6	3	0	6	4	524	436
0000-0000	400	142	258	65	39	29	8	8	0	10	7	1463	1097

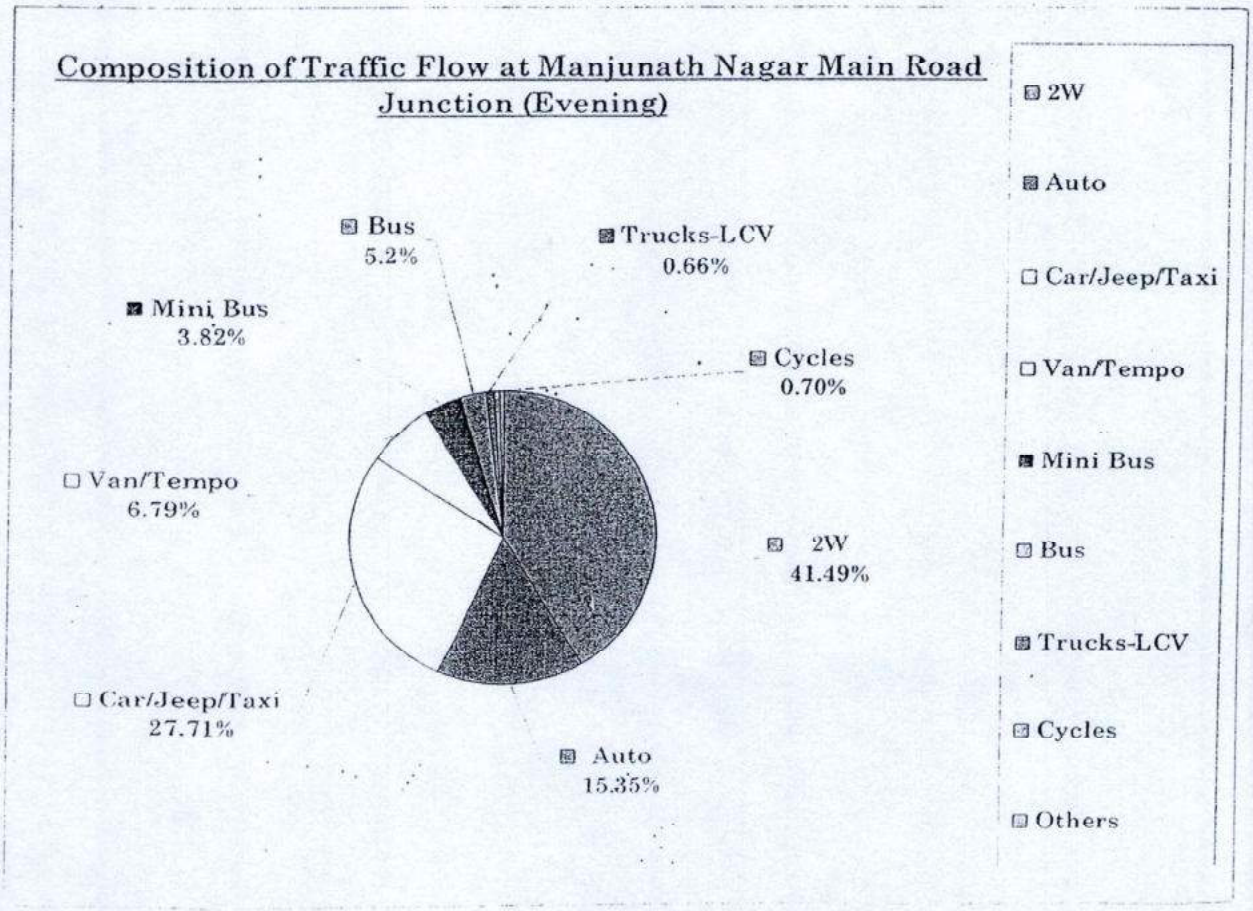


	Peak Hour
Mor.	1000 hrs. - 1100 hrs.
Eve.	1800 hrs. - 1900 hrs.

Mor. Peak Volume in PCU	8139
Eve. Peak Volume in PCU	6898

Fig 4.2 Peak Hour Direction Wise Flow - Manjunath Nagar Main Road Junction


Composition of Traffic Flow at Manjunath Nagar Main Road Junction (Morning)
Bus 4.65%
Trucks-LCV 0.70%
Cycles 0.70%
Mini Bus 5.08%
Others 0.36%
Van/Tempo 6.71%
2W 35.76%
Car/Jeep/Taxi 20.31%
Auto 25.74%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Cycles
Others


Composition of Traffic Flow at Manjunath Nagar Main Road Junction (Evening)
Bus 5.2%
Trucks-LCV 0.66%
Mini Bus 3.82%
Cycles 0.70%
Van/Tempo 6.79%
2W 41.49%
Car/Jeep/Taxi 27.71%
Auto 15.35%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Cycles
Others

Annexure A.4.2

At Shivanagar 8th Main Road Junction

1.Detailed Direction wise Traffic Flow

Shivanagar 8th Main Road Junction

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0600-0700	1-2	132	81	69	30	28	47	16	13	0	3	0	419	577
	1-3	100	57	45	23	16	0	9	7	0	2	0	259	321
	1-4	58	4	3	2	0	0	0	0	0	2	0	69	57
	2-1	124	70	61	51	8	45	17	12	0	4	0	392	513
	2-3	100	64	51	38	7	0	7	5	0	3	0	275	329
	2-4	58	8	6	3	0	0	0	0	0	2	0	77	69
	3-1	120	66	58	49	7	0	16	9	0	3	0	328	388
	3-2	88	49	38	22	19	0	8	6	0	3	0	233	291
	3-4	50	8	6	3	0	0	0	0	0	3	0	70	64
	4-1	40	9	6	2	0	0	0	0	0	2	0	59	57
	4-2	58	6	5	2	0	0	0	0	0	2	0	73	63
	4-3	36	12	7	2	0	0	0	0	0	2	0	59	61
	Total	964	434	355	227	85	92	73	52	0	31	0	2313	2791
0700-0800	1-2	232	142	121	53	49	81	27	22	0	4	0	731	1006
	1-3	175	99	79	40	27	0	15	11	0	2	0	448	554
	1-4	101	6	4	2	0	0	0	0	0	2	0	115	95
	2-1	218	123	106	88	13	79	29	20	0	6	0	682	893
	2-3	175	112	88	67	11	0	11	8	0	4	0	476	569
	2-4	101	13	9	4	0	0	0	0	0	2	0	129	116
	3-1	211	115	101	85	11	0	27	15	0	4	0	569	671
	3-2	155	85	67	38	33	0	13	9	0	4	0	404	503
	3-4	87	13	9	4	0	0	0	0	0	4	0	117	106
	4-1	71	15	9	2	0	0	0	0	0	2	0	99	95
	4-2	101	9	8	2	0	0	0	0	0	2	0	122	105
	4-3	63	20	11	2	0	0	0	0	0	2	0	98	101
	Total	1090	624	612	387	144	160	122	85	0	38	0	3990	4512

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0800-0900	1-2	311	191	162	70	66	109	37	29	0	5	0	980	1350
	1-3	234	133	107	54	37	0	20	15	0	3	0	603	746
	1-4	135	8	5	3	0	0	0	0	0	3	0	154	126
	2-1	292	164	143	119	17	107	39	27	0	8	0	916	1199
	2-3	234	150	119	90	15	0	15	10	0	5	0	638	763
	2-4	135	17	13	5	0	0	0	0	0	3	0	173	154
	3-1	282	155	135	114	15	0	37	20	0	5	0	763	901
	3-2	208	114	90	51	44	0	17	13	0	5	0	542	676
	3-4	116	17	13	5	0	0	0	0	0	5	0	156	141
	4-1	94	20	13	3	0	0	0	0	0	3	0	133	128
	4-2	135	13	10	3	0	0	0	0	0	3	0	164	141
	4-3	85	27	15	3	0	0	0	0	0	3	0	133	137
	Total	2261	1009	825	520	194	216	165	114	0	51	0	5355	6468
0900-1000	1-2	408	250	212	92	86	143	48	38	0	7	0	1284	1767
	1-3	307	174	140	70	48	0	26	19	0	4	0	788	974
	1-4	178	10	7	4	0	0	0	0	0	4	0	203	166
	2-1	383	216	187	155	23	140	51	35	0	10	0	1200	1572
	2-3	307	197	155	117	19	0	19	13	0	7	0	834	996
	2-4	178	23	16	7	0	0	0	0	0	4	0	228	204
	3-1	370	203	178	149	19	0	48	26	0	7	0	1000	1180
	3-2	272	149	117	67	57	0	23	16	0	7	0	708	882
	3-4	152	23	16	7	0	0	0	0	0	7	0	205	186
	4-1	124	26	16	4	0	0	0	0	0	4	0	174	167
	4-2	178	16	13	4	0	0	0	0	0	4	0	215	184
	4-3	111	35	19	4	0	0	0	0	0	4	0	173	178
	Total	2968	1322	1076	680	252	283	215	147	0	69	0	7012	8455

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1000-1100	1-2	477	294	249	108	101	167	56	45	0	8	0	1505	2073
	1-3	328	188	151	76	52	0	28	21	0	4	0	848	1050
	1-4	56	39	26	13	0	0	0	0	0	13	0	147	164
	2-1	556	306	266	221	32	198	72	50	0	14	0	1715	2238
	2-3	360	225	178	134	22	0	22	15	0	8	0	964	1147
	2-4	60	43	31	13	0	0	0	0	0	7	0	154	178
	3-1	297	163	143	120	16	0	39	21	0	6	0	805	950
	3-2	206	118	93	53	45	0	18	13	0	5	0	551	691
	3-4	23	16	20	8	4	0	0	0	0	2	0	88	87
	4-1	35	32	20	4	0	0	0	0	0	4	0	95	116
	4-2	73	38	31	8	0	0	0	0	0	8	0	158	173
	4-3	105	78	43	8	0	0	0	0	0	8	0	242	289
	Total	2576	1540	1251	766	272	365	235	165	0	87	0	7272	9157
1100-1200	1-2	406	249	211	92	85	142	48	38	0	7	0	1278	1759
	1-3	305	173	139	70	48	0	26	19	0	4	0	784	969
	1-4	176	10	7	4	0	0	0	0	0	4	0	0	165
	2-1	381	214	186	154	22	139	51	35	0	10	0	1192	1560
	2-3	305	195	154	117	19	0	19	13	0	7	0	829	990
	2-4	176	22	16	7	0	0	0	0	0	4	0	225	201
	3-1	368	202	176	148	19	0	48	26	0	7	0	994	1173
	3-2	271	148	117	66	57	0	22	16	0	7	0	704	876
	3-4	151	22	16	7	0	0	0	0	0	7	0	203	183
	4-1	123	26	16	4	0	0	0	0	0	4	0	173	166
	4-2	176	16	13	4	0	0	0	0	0	4	0	213	183
	4-3	110	35	19	4	0	0	0	0	0	4	0	172	177
	Total	2948	1312	1070	677	250	281	214	147	0	69	0	6767	8401

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1200-1300	1-2	305	187	159	69	64	107	36	29	0	5	0	961	1323
	1-3	230	130	104	52	36	0	19	15	0	3	0	589	729
	1-4	133	8	5	3	0	0	0	0	0	3	0	152	125
	2-1	286	161	140	116	17	104	38	26	0	8	0	896	1172
	2-3	230	147	116	88	15	0	15	10	0	5	0	626	749
	2-4	133	17	12	5	0	0	0	0	0	3	0	170	152
	3-1	277	152	133	112	15	0	36	19	0	5	0	749	884
	3-2	204	112	88	50	43	0	17	12	0	5	0	531	662
	3-4	114	17	12	5	0	0	0	0	0	5	0	153	139
	4-1	93	19	12	3	0	0	0	0	0	3	0	130	124
	4-2	133	12	10	3	0	0	0	0	0	3	0	161	138
	4-3	83	26	15	3	0	0	0	0	0	3	0	130	133
	Total	2221	988	806	509	190	211	161	111	0	51	0	5248	6329
1300-1400	1-2	269	165	140	61	57	94	32	26	0	5	0	849	1169
	1-3	203	115	92	46	32	0	17	13	0	3	0	521	644
	1-4	117	7	5	3	0	0	0	0	0	3	0	135	111
	2-1	253	142	124	103	15	92	34	23	0	7	0	793	1037
	2-3	203	130	103	78	13	0	13	9	0	5	0	554	662
	2-4	117	15	11	5	0	0	0	0	0	3	0	151	135
	3-1	244	134	117	98	13	0	32	17	0	5	0	660	779
	3-2	180	98	78	44	38	0	15	11	0	5	0	469	584
	3-4	101	15	11	5	0	0	0	0	0	5	0	137	124
	4-1	82	17	11	3	0	0	0	0	0	3	0	116	111
	4-2	117	11	9	3	0	0	0	0	0	3	0	143	123
	4-3	73	23	13	3	0	0	0	0	0	3	0	115	118
	Total	1959	872	714	452	168	186	143	99	0	50	0	4643	5596

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1400-1500	1-2	278	170	144	63	58	97	33	26	0	5	0	874	1202
	1-3	209	119	95	48	33	0	18	13	0	3	0	538	665
	1-4	121	7	5	3	0	0	0	0	0	3	0	139	114
	2-1	260	147	127	106	16	95	35	24	0	7	0	817	1071
	2-3	209	134	106	80	13	0	13	9	0	5	0	569	679
	2-4	121	16	11	5	0	0	0	0	0	3	0	156	140
	3-1	252	138	121	101	13	0	33	18	0	5	0	681	803
	3-2	185	101	80	46	39	0	16	11	0	5	0	483	601
	3-4	104	16	11	5	0	0	0	0	0	5	0	141	128
	4-1	84	18	11	3	0	0	0	0	0	3	0	119	114
	4-2	121	11	9	3	0	0	0	0	0	3	0	147	126
	4-3	76	24	13	3	0	0	0	0	0	3	0	119	122
	Total	2020	901	733	466	172	192	148	101	0	50	0	4783	5766
1500-1600	1-2	298	183	155	67	63	104	35	28	0	5	0	938	1292
	1-3	225	128	102	51	35	0	19	14	0	3	0	577	713
	1-4	130	7	5	3	0	0	0	0	0	3	0	148	121
	2-1	280	158	137	114	17	102	37	26	0	7	0	878	1151
	2-3	225	144	114	86	14	0	14	10	0	5	0	612	731
	2-4	130	17	12	5	0	0	0	0	0	3	0	167	150
	3-1	271	148	130	109	14	0	35	19	0	5	0	731	862
	3-2	199	109	86	49	42	0	17	12	0	5	0	519	647
	3-4	111	17	12	5	0	0	0	0	0	5	0	150	136
	4-1	91	19	12	3	0	0	0	0	0	3	0	128	122
	4-2	130	12	10	3	0	0	0	0	0	3	0	158	136
	4-3	81	26	14	3	0	0	0	0	0	3	0	127	131
	Total	2171	968	789	498	185	206	157	109	0	50	0	5138	6191

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1600-1700	1-2	310	190	161	70	65	109	37	29	0	5	0	976	1344
	1-3	233	133	106	53	37	0	20	15	0	3	0	600	743
	1-4	135	8	5	3	0	0	0	0	0	3	0	154	126
	2-1	291	164	142	118	17	106	39	27	0	8	0	912	1194
	2-3	233	149	118	89	15	0	15	10	0	5	0	634	758
	2-4	135	17	13	5	0	0	0	0	0	3	0	173	154
	3-1	281	154	135	113	15	0	37	20	0	5	0	760	898
	3-2	207	113	89	51	44	0	17	13	0	5	0	539	672
	3-4	116	17	13	5	0	0	0	0	0	5	0	156	141
	4-1	94	20	13	3	0	0	0	0	0	3	0	133	128
	4-2	135	13	10	3	0	0	0	0	0	3	0	164	141
	4-3	85	27	15	3	0	0	0	0	0	3	0	133	137
	Total	2255	1005	820	516	193	215	165	114	0	51	0	5844	6437
1700-1800	1-2	345	211	179	78	73	121	41	33	0	6	0	1087	1497
	1-3	259	147	118	59	41	0	22	17	0	3	0	666	825
	1-4	150	9	6	3	0	0	0	0	0	3	0	171	141
	2-1	323	182	158	131	19	118	43	30	0	9	0	1013	1326
	2-3	259	166	131	99	17	0	17	11	0	6	0	706	844
	2-4	150	19	14	6	0	0	0	0	0	3	0	192	172
	3-1	313	171	150	126	17	0	41	22	0	6	0	846	998
	3-2	230	126	99	57	49	0	19	14	0	6	0	600	748
	3-4	129	19	14	6	0	0	0	0	0	6	0	174	157
	4-1	105	22	14	3	0	0	0	0	0	3	0	147	141
	4-2	150	14	11	3	0	0	0	0	0	3	0	181	156
	4-3	94	30	17	3	0	0	0	0	0	3	0	147	152
	Total	2508	1116	911	574	216	239	183	127	0	57	0	5930	7157

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1800-1900	1-2	478	277	235	102	95	158	53	42	0	7	0	1447	1976
	1-3	278	159	127	64	44	0	24	18	0	3	0	717	889
	1-4	124	7	5	3	0	0	0	0	0	3	0	0	116
	2-1	516	289	251	209	30	187	68	47	0	13	0	1610	2106
	2-3	302	195	154	117	19	0	19	13	0	7	0	826	987
	2-4	83	11	8	3	0	0	0	0	0	2	0	107	96
	3-1	179	100	88	74	10	0	24	13	0	4	0	492	582
	3-2	258	141	111	63	54	0	21	15	0	6	0	669	833
	3-4	87	13	9	4	0	0	0	0	0	4	0	117	106
	4-1	78	17	11	3	0	0	0	0	0	3	0	112	108
	4-2	151	14	11	3	0	0	0	0	0	3	0	182	156
	4-3	83	24	13	3	0	0	0	0	0	3	0	126	127
	Total	2617	1247	1023	648	252	345	209	148	0	58	0	6405	8083
1900-2000	1-2	327	200	170	74	69	114	38	31	0	6	0	1029	1416
	1-3	246	140	112	56	38	0	21	16	0	3	0	632	782
	1-4	142	8	6	3	0	0	0	0	0	3	0	162	133
	2-1	306	172	150	124	18	112	41	28	0	8	0	959	1256
	2-3	246	157	124	94	16	0	16	11	0	6	0	670	801
	2-4	142	18	13	6	0	0	0	0	0	3	0	182	163
	3-1	296	162	142	119	16	0	38	21	0	6	0	800	944
	3-2	218	119	94	54	46	0	18	13	0	6	0	568	707
	3-4	122	18	13	6	0	0	0	0	0	6	0	165	149
	4-1	99	21	13	3	0	0	0	0	0	3	0	139	133
	4-2	142	13	11	3	0	0	0	0	0	3	0	172	148
	4-3	89	28	16	3	0	0	0	0	0	3	0	139	143
	Total	2375	1056	864	545	203	226	172	120	0	56	0	5617	6777

Time Period	Direction	Fast Moving Vehicles: Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks: LCV	HCV	Slow Moving Vehicles: Animal/ Hand Drawn	Cycles	Others	Total Vehicles	Total PCU'S
2000-21000	1-2	241	148	125	55	51	84							
	1-3	181	103	83	42	28	0	28	23	0	4	0	759	1045
	1-4	105	6	4	2	0	0	15	12	0	2	0	466	577
	2-1	226	127	111	92	14	83	0	0	0	2	0	119	98
	2-3	181	116	92	70	12	0	30	21	0	6	0	710	931
	2-4	105	14	10	4	0	0	12	8	0	4	0	495	592
	3-1	219	120	105	88	12	0	0	0	0	2	0	135	122
	3-2	161	88	70	40	34	0	28	15	0	4	0	591	697
	3-4	90	14	10	4	0	0	14	10	0	4	0	421	525
	4-1	73	15	10	2	0	0	0	0	0	4	0	122	111
	4-2	105	10	8	2	0	0	0	0	0	2	0	102	98
	4-3	66	21	12	2	0	0	0	0	0	2	0	127	110
	Total	1753	782	640	403	151	167	0	0	0	2	0	103	106
2100-2200	1-2	206	127	107	47	44	72	127	89	0	38	0	4150	5010
	1-3	155	88	71	36	24	0	24	20	0	4	0	651	897
	1-4	90	5	4	2	0	0	13	10	0	2	0	399	493
	2-1	193	109	95	79	12	71	0	0	0	2	0	0	84
	2-3	155	99	79	60	10	0	26	18	0	5	0	608	797
	2-4	90	12	8	4	0	0	10	7	0	4	0	424	506
	3-1	187	103	90	75	10	0	0	0	0	2	0	116	104
	3-2	138	75	60	34	29	0	24	13	0	4	0	506	597
	3-4	77	12	8	4	0	0	12	8	0	4	0	360	447
	4-1	63	13	8	2	0	0	0	0	0	4	0	105	95
	4-2	90	8	7	2	0	0	0	0	0	2	0	88	84
	4-3	56	18	10	2	0	0	0	0	0	2	0	109	93
	Total	1500	669	547	347	129	143	0	0	0	2	0	88	91
								109	76	0	37	0	3454	4290

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
2200-2300	1-2	131	80	68	30	28	46	16	13	0	3	0	415	571
	1-3	98	56	45	23	16	0	9	7	0	2	0	256	318
	1-4	57	4	3	2	0	0	0	0	0	2	0	68	57
	2-1	123	69	60	50	8	45	17	12	0	4	0	388	509
	2-3	98	63	50	38	7	0	7	5	0	3	0	271	325
	2-4	57	8	6	3	0	0	0	0	0	2	0	76	69
	3-1	119	65	57	48	7	0	16	9	0	3	0	324	383
	3-2	87	48	38	22	19	0	8	6	0	3	0	231	289
	3-4	49	8	6	3	0	0	0	0	0	3	0	69	63
	4-1	40	9	6	2	0	0	0	0	0	2	0	59	57
	4-2	57	6	5	2	0	0	0	0	0	2	0	72	63
	4-3	36	12	7	2	0	0	0	0	0	2	0	59	61
	Total	952	428	351	225	85	91	73	52	0	31	0	2288	2762
2300-2400	1-2	79	48	41	18	17	28	10	8	0	2	0	251	346
	1-3	59	34	27	14	10	0	5	4	0	1	0	154	191
	1-4	34	2	2	1	0	0	0	0	0	1	0	40	33
	2-1	74	42	36	30	5	27	10	7	0	2	0	233	306
	2-3	59	38	30	23	4	0	4	3	0	2	0	163	195
	2-4	34	5	4	2	0	0	0	0	0	1	0	46	42
	3-1	71	39	34	29	4	0	10	5	0	2	0	194	229
	3-2	53	29	23	13	11	0	5	4	0	2	0	140	175
	3-4	30	5	4	2	0	0	0	0	0	2	0	43	39
	4-1	24	5	4	1	0	0	0	0	0	1	0	35	33
	4-2	34	4	3	1	0	0	0	0	0	1	0	43	38
	4-3	22	7	4	1	0	0	0	0	0	1	0	35	36
	Total	463	273	208	135	51	55	41	31	0	18	0	1377	1663

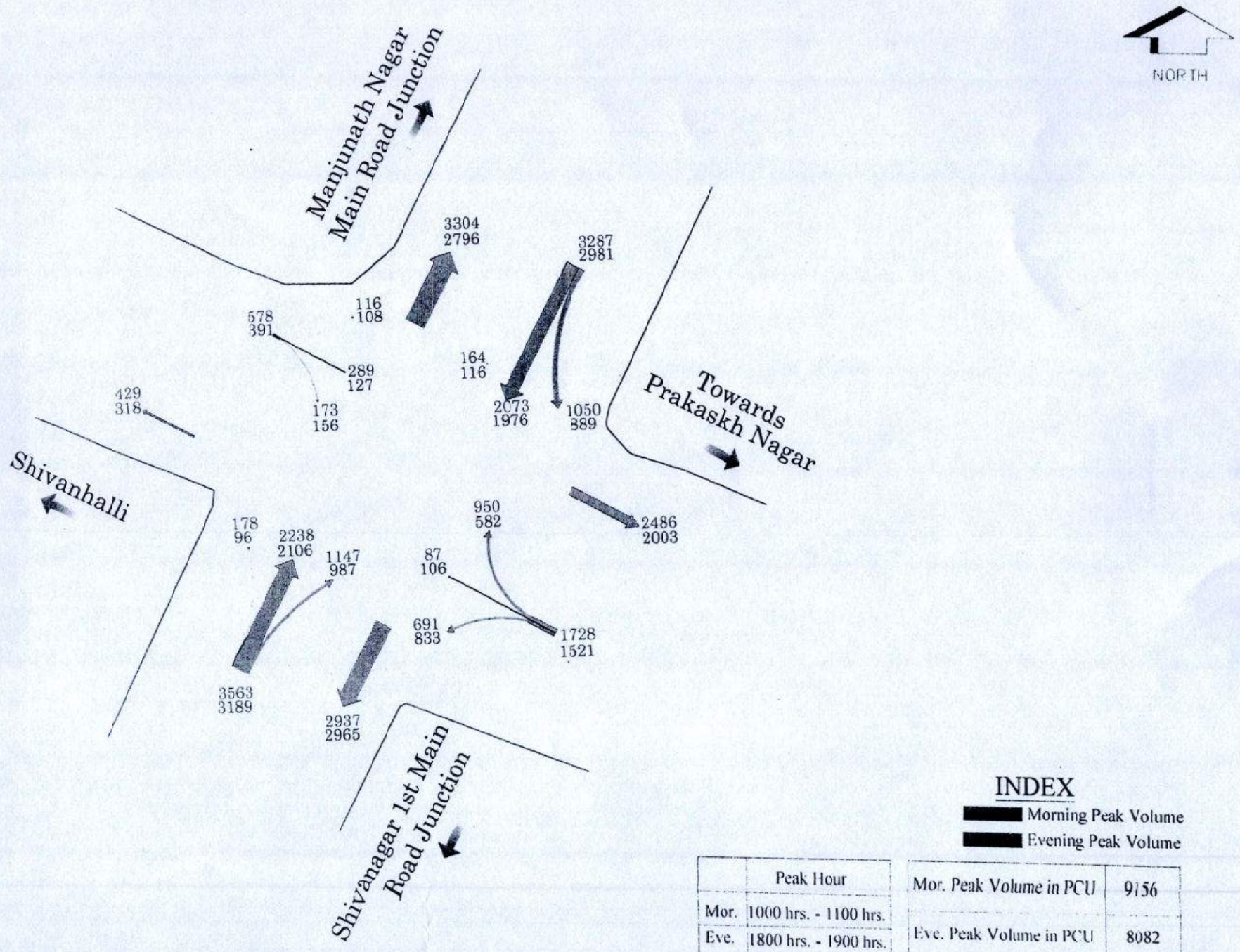
Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0000-0100	1-2	41	25	21	10	9	15	5	4	0	1	0	131	181
	1-3	31	18	14	7	5	0	3	2	0	1	0	81	100
	1-4	18	1	1	1	0	0	0	0	0	1	0	22	18
	2-1	38	22	19	16	3	14	5	4	0	1	0	122	161
	2-3	31	20	16	12	2	0	2	2	0	1	0	86	103
	2-4	18	3	2	1	0	0	0	0	0	1	0	25	23
	3-1	37	20	18	15	2	0	5	3	0	1	0	101	119
	3-2	27	15	12	7	6	0	3	2	0	1	0	73	91
	3-4	15	3	2	1	0	0	0	0	0	1	0	22	21
	4-1	13	3	2	1	0	0	0	0	0	1	0	20	19
	4-2	18	2	2	1	0	0	0	0	0	1	0	24	21
	4-3	11	4	2	1	0	0	0	0	0	1	0	19	20
	Total	298	136	111	73	27	29	23	17	0	12	0	726	877
0100-0200	1-2	32	20	17	8	7	12	4	3	0	1	0	104	143
	1-3	24	14	11	6	4	0	2	2	0	1	0	64	79
	1-4	14	1	1	1	0	0	0	0	0	1	0	18	15
	2-1	30	17	15	12	2	11	4	3	0	1	0	95	125
	2-3	24	16	12	10	2	0	2	1	0	1	0	68	82
	2-4	14	2	2	1	0	0	0	0	0	1	0	20	18
	3-1	29	16	14	12	2	0	4	2	0	1	0	80	95
	3-2	22	12	10	6	5	0	2	2	0	1	0	60	75
	4-3	12	2	2	1	0	0	0	0	0	1	0	18	16
	4-1	10	2	2	1	0	0	0	0	0	1	0	16	15
	4-2	14	2	1	1	0	0	0	0	0	1	0	19	17
	4-3	9	3	2	1	0	0	0	0	0	1	0	16	16
	Total	234	107	89	60	22	23	18	13	0	12	0	578	696

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0200-0300	1-2	29	18	15	7	6	10	4	3	0	1	0	93	128
	1-3	22	13	10	5	4	0	2	2	0	1	0	59	74
	1-4	13	1	1	1	0	0	0	0	0	1	0	17	14
	2-1	27	16	14	11	2	10	4	3	0	1	0	88	116
	2-3	22	14	11	9	2	0	2	1	0	1	0	62	74
	2-4	13	2	2	1	0	0	0	0	0	1	0	19	17
	3-1	26	15	13	11	2	0	4	2	0	1	0	74	88
	3-2	20	11	9	5	4	0	2	2	0	1	0	54	67
	3-4	11	2	2	1	0	0	0	0	0	1	0	17	16
	4-1	9	2	2	1	0	0	0	0	0	1	0	15	14
	4-2	13	2	1	1	0	0	0	0	0	1	0	18	16
	4-3	8	3	2	1	0	0	0	0	0	1	0	15	15
	Total	213	99	82	54	20	20	18	13	0	12	0	510	640
0300-0400	1-2	26	16	14	6	6	9	3	3	0	1	0	84	116
	1-3	19	11	9	5	3	0	2	2	0	1	0	52	64
	1-4	11	1	1	1	0	0	0	0	0	1	0	15	13
	2-1	24	14	12	10	2	9	4	3	0	1	0	79	105
	2-3	19	13	10	8	2	0	2	1	0	1	0	56	68
	2-4	11	2	1	1	0	0	0	0	0	1	0	16	15
	3-1	23	13	11	10	2	0	3	2	0	1	0	65	78
	3-2	17	10	8	5	4	0	2	1	0	1	0	48	60
	3-4	10	2	1	1	0	0	0	0	0	1	0	15	14
	4-1	8	2	1	1	0	0	0	0	0	1	0	13	12
	4-2	11	1	1	1	0	0	0	0	0	1	0	15	13
	4-3	7	3	2	1	0	0	0	0	0	1	0	14	15
	Total	186	88	71	50	19	18	16	12	0	12	0	472	572

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0400-0500	1-2	23	15	12	6	5	9	3	3	0	1	0	77	107
	1-3	18	10	8	4	3	0	2	2	0	1	0	48	60
	1-4	10	1	1	1	0	0	0	0	0	1	0	14	12
	2-1	22	13	11	9	2	8	3	2	0	1	0	71	94
	2-3	18	12	9	7	2	0	2	1	0	1	0	52	63
	2-4	10	2	1	1	0	0	0	0	0	1	0	15	14
	3-1	21	12	10	9	2	0	3	2	0	1	0	60	72
	3-2	16	9	7	4	4	0	2	1	0	1	0	44	55
	3-4	9	2	1	1	0	0	0	0	0	1	0	14	13
	4-1	7	2	1	1	0	0	0	0	0	1	0	12	12
	4-2	10	1	1	1	0	0	0	0	0	1	0	14	12
	4-3	7	2	2	1	0	0	0	0	0	1	0	13	13
	Total	171	81	64	45	18	17	15	11	0	12	0	434	526
0500-0600	1-2	61	37	32	14	13	22	8	6	0	1	0	194	268
	1-3	46	26	21	11	8	0	4	3	0	1	0	120	149
	1-4	27	2	1	1	0	0	0	0	0	1	0	32	27
	2-1	57	32	28	23	4	21	8	6	0	2	0	181	238
	2-3	46	30	23	18	3	0	3	2	0	1	0	126	151
	2-4	27	4	3	1	0	0	0	0	0	1	0	36	33
	3-1	55	30	27	22	3	0	8	4	0	1	0	150	177
	3-2	41	22	18	10	9	0	4	3	0	1	0	108	135
	3-4	23	4	3	1	0	0	0	0	0	1	0	32	30
	4-1	19	4	3	1	0	0	0	0	0	1	0	28	27
	4-2	27	3	2	1	0	0	0	0	0	1	0	34	30
	4-3	17	6	3	1	0	0	0	0	0	1	0	28	29
	Total	410	200	164	104	40	43	35	24	0	13	0	1069	1292

HOURLY RATIO VOLUME AT SHIVANAGAR 8th MAIN ROAD JUNCTION

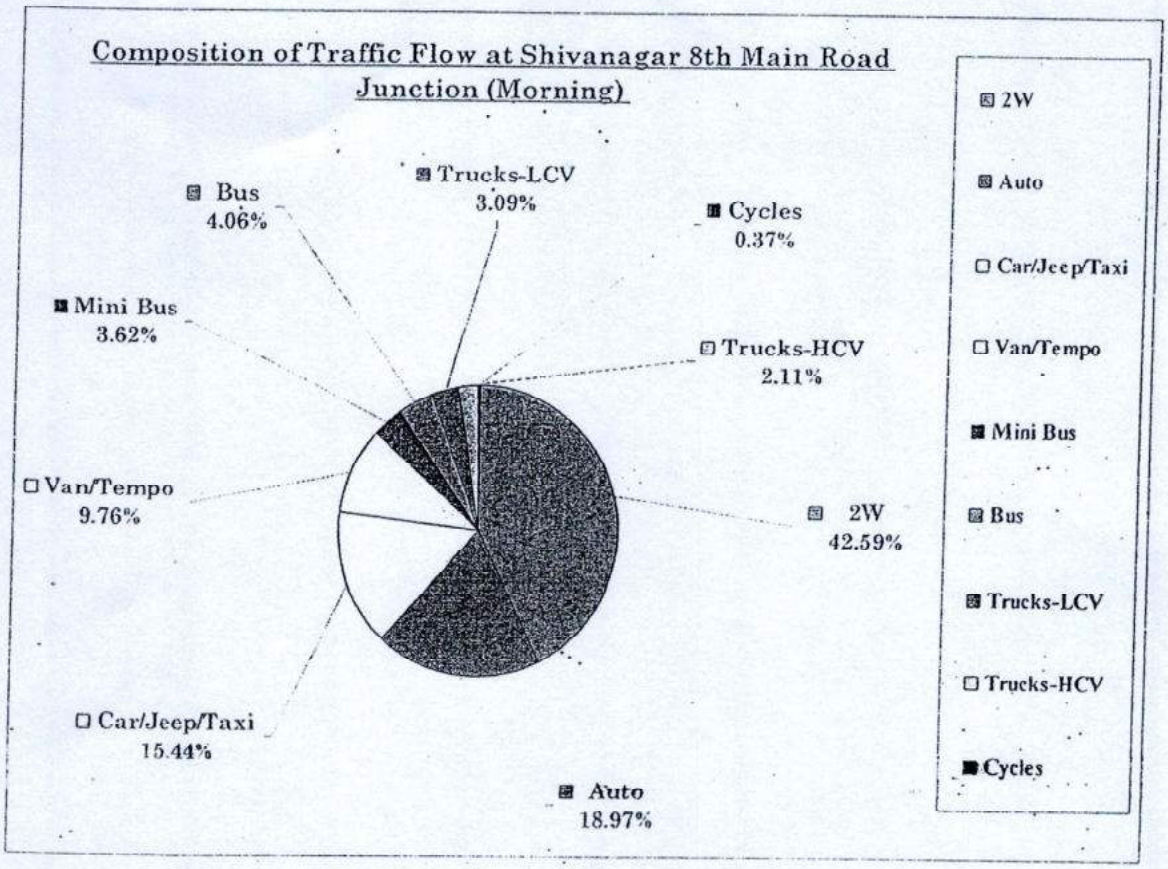
Time Period	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
	Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
							LCV	HCV					
0600-0700	964	434	355	227	85	92	73	52	0	31	0	2313	2791
0700-0800	1690	752	612	387	144	160	122	85	0	38	0	3990	4812
0800-0900	2261	1009	825	520	194	216	165	114	0	51	0	5355	6463
0900-1000	2968	1322	1076	680	252	283	215	147	0	69	0	7012	8455
1000-1100	2576	1540	1251	766	272	365	235	165	0	87	0	7272	9157
1100-1200	2948	1312	1070	677	250	281	214	147	0	69	0	6767	8401
1200-1300	2221	988	806	509	190	211	161	111	0	51	0	5248	6329
1300-1400	1959	872	714	452	168	186	143	99	0	50	0	4643	5596
1400-1500	2020	901	733	466	172	192	148	101	0	50	0	4783	5766
1500-1600	2171	968	789	498	185	206	157	109	0	50	0	5133	6191
1600-1700	2255	1005	820	516	193	215	165	114	0	51	0	5334	6437
1700-1800	2507	1116	911	574	216	239	183	127	0	57	0	5930	7157
1800-1900	2617	1247	1023	648	252	345	209	148	0	58	0	6405	8083
1900-2000	2375	1056	864	545	203	226	172	120	0	56	0	5617	6773
2000-2100	1753	782	640	403	151	167	127	89	0	38	0	4150	5010
2100-2200	1500	669	547	347	129	143	109	76	0	37	0	3454	4290
2200-2300	952	428	351	225	85	91	73	52	0	31	0	2288	2762
2300-0000	573	258	212	135	51	55	44	31	0	18	0	1377	1663
0000-0100	298	136	111	73	27	29	23	17	0	12	0	726	877
0100-0200	234	107	89	60	22	23	18	13	0	12	0	578	696
0200-0300	213	99	82	54	20	20	18	13	0	12	0	531	640
0300-0400	186	88	71	50	19	18	16	12	0	12	0	472	572
0400-0500	171	81	64	45	18	17	15	11	0	12	0	434	526
0500-0600	446	200	164	104	40	43	35	24	0	13	0	1069	1292

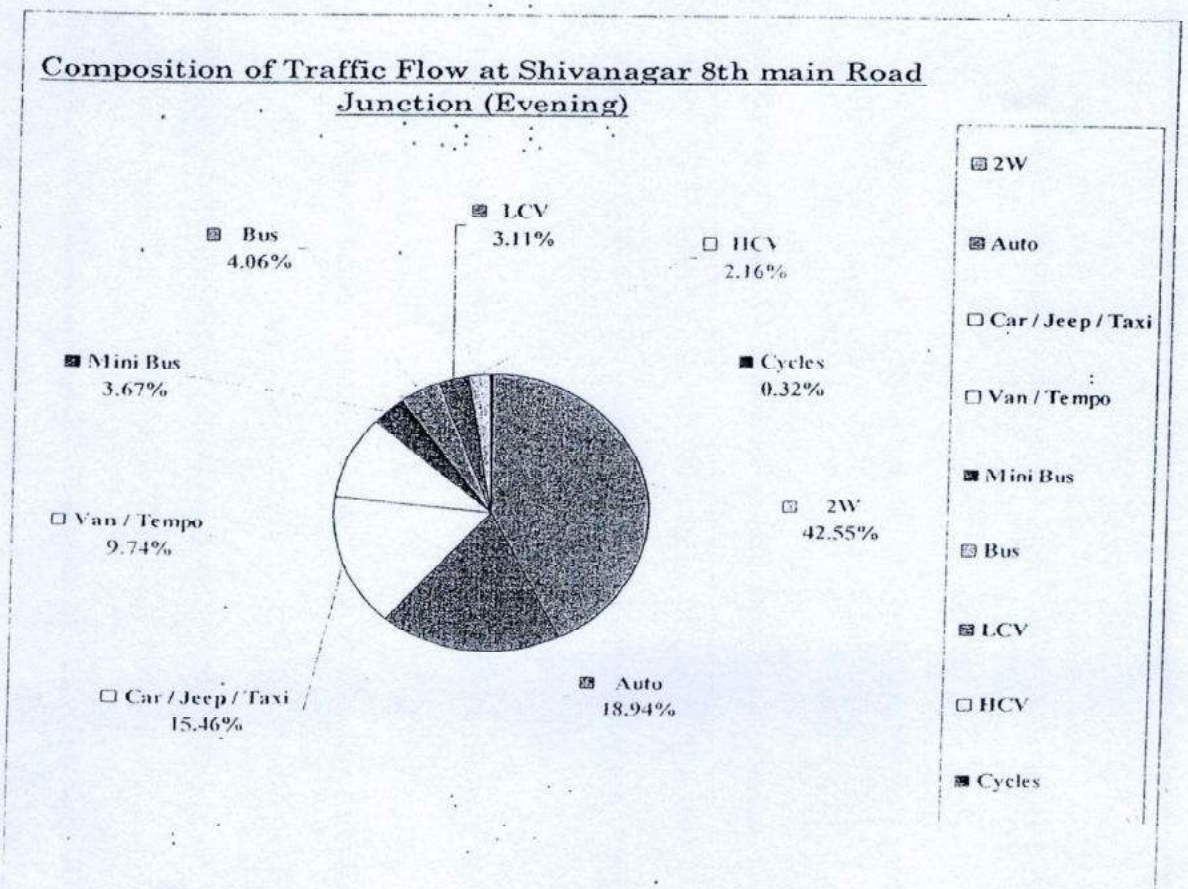


	Peak Hour
Mor.	1000 hrs. - 1100 hrs.
Eve.	1800 hrs. - 1900 hrs.

Mor. Peak Volume in PCU	9156
Eve. Peak Volume in PCU	8082

Fig 4.4 Peak Hour Direction Wise Flow - Shivanagar 8th Main Road Junction


Composition of Traffic Flow at Shivanagar 8th Main Road Junction (Morning)
Bus 4.06%
Trucks-LCV 3.09%
Cycles 0.37%
Mini Bus 3.62%
Trucks-HCV 2.11%
Van/Tempo 9.76%
2W 42.59%
Car/Jeep/Taxi 15.44%
Auto 18.97%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Trucks-HCV
Cycles


Composition of Traffic Flow at Shivanagar 8th main Road Junction (Evening)
Bus 4.06%
LCV 3.11%
HCV 2.16%
Mini Bus 3.67%
Cycles 0.32%
Van / Tempo 9.74%
2W 42.55%
Car / Jeep / Taxi 15.46%
Auto 18.94%
2W
Auto
Car / Jeep / Taxi
Van / Tempo
Mini Bus
Bus
LCV
HCV
Cycles

Annexure A.4.3

At Shivanagar 1st Main Road Junction

1.Detailed Direction wise Traffic Flow

Shivanagar 1st Main Road Junction

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0600-0700	1-2	188	57	80	25	20	31	11	2	0	2	0	416	493
	1-3	108	32	44	15	16	13	7	0	0	1	0	236	278
	1-4	86	22	37	12	12	7	3	0	0	1	0	180	204
	2-1	205	57	85	21	18	29	8	2	0	2	0	427	494
	2-3	116	34	47	17	18	14	6	0	0	1	0	253	298
	2-4	95	20	36	10	12	6	2	0	0	1	0	182	200
	3-1	80	11	15	6	7	8	5	0	0	1	0	133	143
	3-2	116	34	48	16	14	12	8	0	0	1	0	249	288
	3-4	84	12	16	6	8	9	4	0	0	1	0	140	152
	4-1	84	10	16	6	6	9	4	0	0	1	0	136	144
	4-2	59	10	15	2	3	4	2	0	0	1	0	96	100
	4-3	89	23	41	14	15	13	6	0	0	1	0	202	238
	Total	1310	322	480	150	149	155	66	4	0	14	0	2650	3032
0700-0800	1-2	345	105	146	46	36	57	19	4	0	4	0	757	902
	1-3	199	58	80	27	29	24	13	0	0	2	0	428	508
	1-4	158	39	68	21	22	13	5	0	0	2	0	325	370
	2-1	376	103	155	38	33	54	15	4	0	4	0	777	904
	2-3	213	61	86	30	33	25	11	0	0	2	0	459	542
	2-4	174	36	66	18	21	10	4	0	0	2	0	327	361
	3-1	147	19	27	11	13	15	8	0	0	2	0	239	260
	3-2	213	61	88	29	25	21	15	0	0	2	0	450	522
	3-4	153	21	29	11	15	16	7	0	0	2	0	250	276
	4-1	153	18	29	10	11	16	7	0	0	2	0	242	260
	4-2	108	18	27	4	5	7	4	0	0	2	0	171	181
	4-3	163	41	75	25	27	24	11	0	0	2	0	366	433
	Total	2402	580	876	270	270	282	119	8	0	28	0	4791	5517

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0800-0900	1-2	465	141	196	61	49	76	26	5	0	5	0	1024	1212
	1-3	267	78	108	36	38	32	17	0	0	3	0	579	679
	1-4	213	53	91	28	30	17	7	0	0	3	0	442	499
	2-1	507	139	208	51	45	72	19	5	0	5	0	1051	1214
	2-3	286	82	116	40	45	34	15	0	0	3	0	621	731
	2-4	234	49	89	24	28	13	5	0	0	3	0	445	485
	3-1	198	26	36	15	17	19	11	0	0	3	0	325	347
	3-2	286	82	118	38	34	28	19	0	0	3	0	608	699
	3-4	206	28	38	15	19	21	9	0	0	3	0	339	365
	4-1	206	24	38	13	15	21	9	0	0	3	0	329	347
	4-2	145	24	36	5	7	9	5	0	0	3	0	234	241
	4-3	219	55	101	34	36	32	15	0	0	3	0	495	581
	Total	3232	781	1175	360	363	3744	157	10	0	40	0	6492	7400
0900-1000	1-2	608	185	256	80	64	100	34	6	0	6	0	1339	1586
	1-3	350	102	141	47	50	42	23	0	0	3	0	758	890
	1-4	278	69	119	36	39	23	9	0	0	3	0	576	652
	2-1	663	182	273	67	58	94	25	6	0	6	0	1374	1586
	2-3	375	108	152	53	58	45	20	0	0	3	0	814	958
	2-4	306	64	116	31	36	17	6	0	0	3	0	579	631
	3-1	259	34	47	20	23	25	14	0	0	3	0	425	456
	3-2	375	108	155	50	45	36	25	0	0	3	0	797	917
	3-4	270	36	50	20	25	28	12	0	0	3	0	444	479
	4-1	270	31	50	17	20	28	12	0	0	3	0	431	455
	4-2	190	31	47	6	9	12	6	0	0	3	0	304	313
	4-3	287	72	133	45	47	42	20	0	0	3	0	649	762
	Total	4231	1022	1539	472	474	492	206	12	0	42	0	8490	9685

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1000-1100	1-2	666	203	279	87	69	108	36	6	0	6	0	1460	1727
	1-3	397	111	153	51	54	45	24	0	0	3	0	838	976
	1-4	309	75	129	39	42	24	9	0	0	3	0	630	709
	2-1	725	198	297	72	63	102	27	6	0	6	0	1496	1725
	2-3	408	117	165	57	63	48	21	0	0	3	0	882	1037
	2-4	340	69	126	33	39	18	6	0	0	3	0	634	687
	3-1	269	36	51	21	24	27	15	0	0	3	0	446	480
	3-2	406	117	168	54	48	39	27	0	0	3	0	862	991
	3-4	288	39	54	21	27	30	12	0	0	3	0	474	512
	4-1	293	33	54	18	21	30	12	0	0	3	0	464	488
	4-2	200	32	50	6	9	12	6	0	0	3	0	318	326
	4-3	303	76	144	48	51	45	21	0	0	3	0	691	813
	Total	4604	1106	1670	507	510	528	216	12	0	42	0	9195	10471
1100-1200	1-2	608	185	256	80	64	99	33	6	0	6	0	1337	1582
	1-3	350	102	141	47	50	42	22	0	0	3	0	757	889
	1-4	278	69	119	36	39	22	9	0	0	3	0	0	650
	2-1	663	182	273	66	58	94	25	6	0	6	0	1373	1585
	2-3	374	108	152	53	58	44	20	0	0	3	0	812	955
	2-4	306	64	116	31	36	17	6	0	0	3	0	579	631
	3-1	259	33	47	20	22	25	14	0	0	3	0	423	451
	3-2	374	108	154	50	44	36	25	0	0	3	0	794	913
	3-4	270	36	50	20	25	28	11	0	0	3	0	443	478
	4-1	270	31	50	17	20	28	11	0	0	3	0	430	454
	4-2	190	31	47	6	9	11	6	0	0	3	0	303	311
	4-3	286	72	132	44	47	42	20	0	0	3	0	646	760
	Total	4228	1021	1537	470	472	488	202	12	0	42	0	7897	9658

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1200-1300	1-2	454	138	191	60	48	74	25	5	0	5	0	1000	1184
	1-3	261	76	105	35	37	31	17	0	0	3	0	565	662
	1-4	208	52	89	27	29	17	7	0	0	3	0	432	488
	2-1	495	136	203	50	44	70	19	5	0	5	0	1027	1187
	2-3	279	80	113	39	44	33	15	0	0	3	0	606	713
	2-4	228	48	87	23	27	13	5	0	0	3	0	434	473
	3-1	193	25	35	15	17	19	11	0	0	3	0	318	341
	3-2	279	80	115	37	33	27	19	0	0	3	0	593	681
	3-4	201	27	37	15	19	21	9	0	0	3	0	332	359
	4-1	201	23	37	13	15	21	9	0	0	3	0	322	340
	4-2	142	23	35	5	7	9	5	0	0	3	0	229	236
	4-3	214	54	99	33	35	31	15	0	0	3	0	484	568
	Total	3155	762	1146	352	355	366	156	10	0	40	0	6842	7284
1300-1400	1-2	394	120	166	52	41	65	22	4	0	4	0	868	1028
	1-3	227	66	91	31	33	27	15	0	0	2	0	492	578
	1-4	180	45	77	24	25	15	6	0	0	2	0	374	423
	2-1	429	118	177	43	38	61	17	4	0	4	0	891	1030
	2-3	243	70	98	34	38	29	13	0	0	2	0	527	621
	2-4	198	41	75	20	24	11	4	0	0	2	0	375	409
	3-1	168	22	31	13	15	17	9	0	0	2	0	277	298
	3-2	243	70	100	33	29	24	17	0	0	2	0	518	596
	3-4	175	24	33	13	17	18	8	0	0	2	0	290	314
	4-1	175	20	33	11	13	18	8	0	0	2	0	280	295
	4-2	123	20	31	4	6	8	4	0	0	2	0	198	204
	4-3	186	47	86	29	31	27	13	0	0	2	0	421	495
	Total	2741	663	998	307	310	320	136	8	0	28	0	5511	6292

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1400-1500	1-2	420	128	177	56	44	69	23	4	0	4	0	925	1095
	1-3	242	71	97	33	35	29	16	0	0	2	0	525	618
	1-4	192	48	82	25	27	16	6	0	0	2	0	398	451
	2-1	458	126	189	46	40	65	18	4	0	4	0	950	1097
	2-3	259	75	105	37	40	31	14	0	0	2	0	563	663
	2-4	211	44	80	21	25	12	4	0	0	2	0	399	435
	3-1	179	23	33	14	16	18	10	0	0	2	0	295	317
	3-2	259	75	107	35	31	25	18	0	0	2	0	552	635
	3-4	187	25	35	14	18	19	8	0	0	2	0	308	333
	4-1	187	21	35	12	14	19	8	0	0	2	0	298	314
	4-2	132	21	33	4	6	8	4	0	0	2	0	210	215
	4-3	198	50	92	31	33	29	14	0	0	2	0	449	528
	Total	2924	707	1065	328	329	340	145	8	0	28	0	5872	6701
1500-1600	1-2	476	145	200	63	50	78	26	5	0	5	0	1048	1241
	1-3	274	80	110	37	39	33	18	0	0	3	0	594	697
	1-4	218	54	93	28	31	18	7	0	0	3	0	452	511
	2-1	519	142	213	52	46	74	20	5	0	5	0	1076	1243
	2-3	293	84	119	41	46	35	16	0	0	3	0	637	750
	2-4	239	50	91	24	28	13	5	0	0	3	0	453	493
	3-1	203	26	37	16	18	20	11	0	0	3	0	334	357
	3-2	293	84	121	39	35	28	20	0	0	3	0	623	716
	3-4	211	28	39	16	20	22	9	0	0	3	0	348	375
	4-1	211	24	39	13	16	22	9	0	0	3	0	337	356
	4-2	149	24	37	5	7	9	5	0	0	3	0	239	245
	4-3	224	56	104	35	37	33	16	0	0	3	0	508	597
	Total	3310	797	1203	369	373	385	162	10	0	40	0	6349	7581

December 2009

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1600-1700	1-2	509	155	214	67	53	83	28	5	0	5	0	1119	1324
	1-3	293	86	118	40	42	35	19	0	0	3	0	636	747
	1-4	233	58	99	30	33	19	7	0	0	3	0	482	545
	2-1	555	152	228	56	49	79	21	5	0	5	0	1150	1328
	2-3	313	90	127	44	49	37	17	0	0	3	0	680	800
	2-4	256	53	97	26	30	14	5	0	0	3	0	484	526
	3-1	217	28	40	17	19	21	12	0	0	3	0	357	382
	3-2	313	90	129	42	37	30	21	0	0	3	0	665	764
	3-4	226	30	42	17	21	23	10	0	0	3	0	372	401
	4-1	226	26	42	14	17	23	10	0	0	3	0	361	381
	4-2	159	26	40	5	7	10	5	0	0	3	0	255	262
	4-3	240	60	111	37	40	35	17	0	0	3	0	543	638
	Total	3540	854	1287	395	397	409	172	10	0	40	0	7104	8097
1700-1800	1-2	565	172	238	75	59	92	31	6	0	6	0	1244	1472
	1-3	325	95	131	44	46	39	21	0	0	3	0	704	826
	1-4	258	64	110	34	36	21	8	0	0	3	0	534	603
	2-1	616	169	253	62	54	87	23	6	0	6	0	1276	1473
	2-3	348	100	141	49	54	41	18	0	0	3	0	754	886
	2-4	284	59	108	29	34	16	6	0	0	3	0	539	588
	3-1	241	31	44	18	21	23	13	0	0	3	0	394	421
	3-2	348	100	144	46	41	34	23	0	0	3	0	739	849
	3-4	251	34	46	18	23	26	11	0	0	3	0	412	445
	4-1	251	29	46	16	18	26	11	0	0	3	0	400	422
	4-2	177	29	44	6	8	11	6	0	0	3	0	284	292
	4-3	266	67	123	41	44	39	18	0	0	3	0	601	707
	Total	3980	949	1428	438	438	556	189	12	0	42	0	7881	8984

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1800-1900	1-2	644	197	266	83	66	103	35	6	0	6	0	1406	1662
	1-3	322	99	125	38	45	40	19	0	0	3	0	691	817
	1-4	278	69	119	36	39	22	9	0	0	3	0	575	650
	2-1	584	162	243	59	52	84	23	5	0	5	0	1217	1408
	2-3	373	108	152	53	58	45	20	0	0	3	0	812	957
	2-4	225	48	87	23	27	13	5	0	0	3	0	431	471
	3-1	354	46	65	27	31	35	19	0	0	4	0	581	623
	3-2	322	93	133	43	38	31	22	0	0	3	0	685	787
	3-4	541	72	99	39	50	55	22	0	0	6	0	884	952
	4-1	191	22	36	12	14	20	8	0	0	2	0	305	322
	4-2	311	51	79	10	14	19	10	0	0	5	0	499	513
	4-3	228	60	111	37	40	35	17	0	0	3	0	531	629
	Total	4373	1027	1515	460	474	502	209	11	0	46	0	861	9791
1900-2000	1-2	536	163	226	71	56	88	30	5	0	5	0	1180	1397
	1-3	308	90	124	42	44	37	20	0	0	3	0	668	784
	1-4	245	61	105	32	34	20	8	0	0	3	0	508	574
	2-1	585	161	241	59	51	83	22	5	0	5	0	1212	1399
	2-3	330	95	134	47	51	39	17	0	0	3	0	716	842
	2-4	270	56	102	27	32	15	5	0	0	3	0	510	555
	3-1	228	30	42	17	20	22	13	0	0	3	0	375	402
	3-2	330	95	136	44	39	32	22	0	0	3	0	701	806
	3-4	238	32	44	17	22	25	10	0	0	3	0	391	422
	4-1	238	27	44	15	17	25	10	0	0	3	0	379	399
	4-2	168	27	42	5	8	10	5	0	0	3	0	268	275
	4-3	253	64	117	39	42	37	17	0	0	3	0	572	673
	Total	3729	901	1357	415	416	433	179	10	0	40	0	7480	8527

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
2000-21000	1-2	394	120	166	52	41	65	22	4	0	4	0	868	1028
	1-3	227	66	91	31	33	27	15	0	0	2	0	492	578
	1-4	180	45	77	24	25	15	6	0	0	2	0	374	423
	2-1	429	118	177	43	38	61	17	4	0	4	0	891	1030
	2-3	243	70	98	34	38	29	13	0	0	2	0	527	621
	2-4	198	41	75	20	24	11	4	0	0	2	0	375	409
	3-1	168	22	31	13	15	17	9	0	0	2	0	277	298
	3-2	243	70	100	33	29	24	17	0	0	2	0	518	596
	3-4	175	24	33	13	17	18	8	0	0	2	0	290	314
	4-1	175	20	33	11	13	18	8	0	0	2	0	280	295
	4-2	123	20	31	4	6	8	4	0	0	2	0	198	204
	4-3	186	47	86	29	31	27	13	0	0	2	0	421	495
	Total	2741	663	998	307	310	320	136	8	0	28	0	5511	6292
2100-2200	1-2	324	99	137	43	34	53	18	3	0	3	0	714	845
	1-3	187	55	75	25	27	22	12	0	0	2	0	405	476
	1-4	148	37	63	20	21	12	5	0	0	2	0	0	348
	2-1	354	97	146	36	31	50	14	3	0	3	0	734	847
	2-3	200	58	81	28	31	24	11	0	0	2	0	435	512
	2-4	163	34	62	17	20	9	3	0	0	2	0	310	338
	3-1	138	18	25	11	12	14	8	0	0	2	0	228	245
	3-2	200	58	83	27	24	20	14	0	0	2	0	428	493
	3-4	144	20	27	11	14	15	6	0	0	2	0	239	259
	4-1	144	17	27	9	11	15	6	0	0	2	0	231	244
	4-2	102	17	25	3	5	6	3	0	0	2	0	163	168
	4-3	153	39	71	24	25	22	11	0	0	2	0	347	407
	Total	2257	549	822	254	255	262	111	6	0	26	0	4234	5183

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
2200-2300	1-2	208	63	88	28	22	34	12	2	0	2	0	459	543
	1-3	120	35	48	16	17	15	8	0	0	1	0	260	306
	1-4	95	24	41	13	14	8	3	0	0	1	0	199	226
	2-1	227	63	94	23	20	32	9	2	0	2	0	472	545
	2-3	128	37	52	18	20	16	7	0	0	1	0	279	329
	2-4	105	22	40	11	13	6	2	0	0	1	0	200	219
	3-1	89	12	16	7	8	9	5	0	0	1	0	147	159
	3-2	128	37	53	17	16	13	9	0	0	1	0	274	317
	3-4	93	13	17	7	9	10	4	0	0	1	0	154	168
	4-1	93	11	17	6	7	10	4	0	0	1	0	149	158
	4-2	65	11	16	2	3	4	2	0	0	1	0	104	107
	4-3	98	25	46	16	16	15	7	0	0	1	0	224	264
	Total	1449	353	528	164	165	172	72	4	0	14	0	2921	3341
2300-2400	1-2	129	39	54	17	14	21	7	2	0	2	0	285	338
	1-3	74	22	30	10	11	9	5	0	0	1	0	162	191
	1-4	59	15	25	8	9	5	2	0	0	1	0	124	141
	2-1	140	39	58	14	13	20	6	2	0	2	0	294	341
	2-3	79	23	32	12	13	10	5	0	0	1	0	175	207
	2-4	65	14	25	7	8	4	2	0	0	1	0	126	138
	3-1	55	7	10	5	5	6	3	0	0	1	0	92	99
	3-2	79	23	33	11	10	8	6	0	0	1	0	171	198
	3-4	57	8	11	5	6	6	3	0	0	1	0	97	106
	4-1	57	7	11	4	5	6	3	0	0	1	0	94	101
	4-2	41	7	10	2	2	3	2	0	0	1	0	68	71
	4-3	58	15	27	9	10	9	4	0	0	1	0	133	157
	Total	893	219	326	104	106	107	48	4	0	14	0	1821	2088

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0000-0100	1-2	65	20	27	9	7	11	4	1	0	1	0	145	173
	1-3	37	11	15	5	6	5	3	0	0	1	0	83	99
	1-4	30	8	13	4	5	3	1	0	0	1	0	65	75
	2-1	70	20	29	7	7	10	3	1	0	1	0	148	173
	2-3	40	12	16	6	7	5	3	0	0	1	0	90	107
	2-4	33	7	13	4	4	2	1	0	0	1	0	65	71
	3-1	28	4	5	3	3	3	2	0	0	1	0	49	53
	3-2	40	12	17	6	5	4	3	0	0	1	0	88	101
	3-4	29	4	6	3	3	3	2	0	0	1	0	51	55
	4-1	29	4	6	2	3	3	2	0	0	1	0	50	54
	4-2	21	4	5	1	1	2	1	0	0	1	0	36	38
	4-3	31	8	14	5	5	5	3	0	0	1	0	72	85
	Total	453	114	166	55	56	56	28	2	0	12	0	942	1084
0100-0200	1-2	50	16	21	7	6	9	3	1	0	1	0	114	137
	1-3	29	9	12	4	5	4	2	0	0	1	0	66	79
	1-4	23	6	10	3	4	2	1	0	0	1	0	50	57
	2-1	55	15	23	6	5	8	3	1	0	1	0	117	136
	2-3	31	9	13	5	5	4	2	0	0	1	0	70	82
	2-4	25	6	10	3	3	2	1	0	0	1	0	51	57
	3-1	22	3	4	2	2	3	2	0	0	1	0	39	43
	3-2	31	9	13	5	4	3	3	0	0	1	0	69	79
	4-3	23	3	5	2	3	3	1	0	0	1	0	41	45
	4-1	23	3	5	2	2	3	1	0	0	1	0	40	43
	4-2	16	3	4	1	1	1	1	0	0	1	0	28	29
	4-3	24	6	11	4	4	4	2	0	0	1	0	56	66
	Total	352	88	131	44	44	46	22	2	0	12	0	741	853

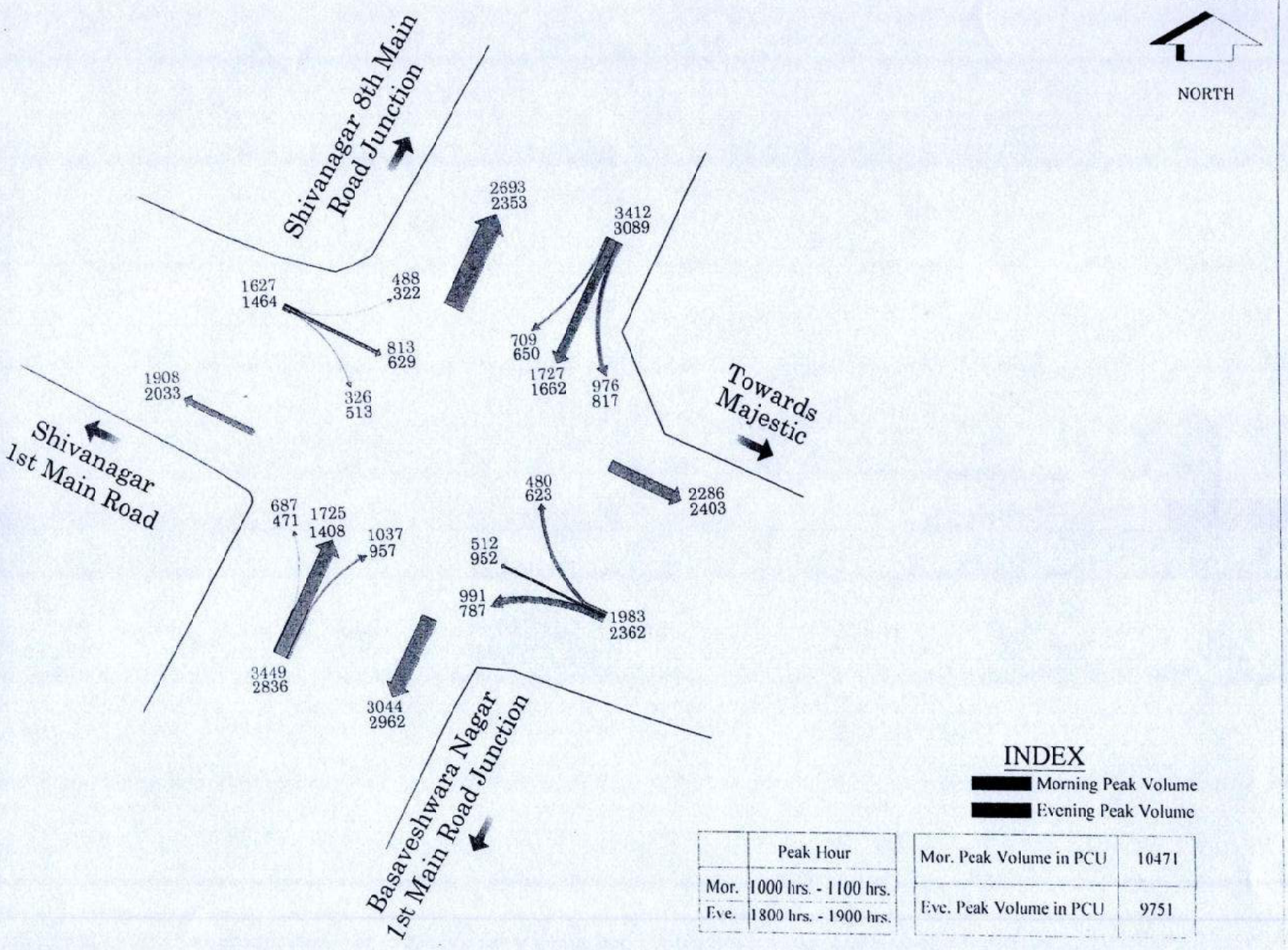
Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0200-0300	1-2	47	14	19	6	5	8	3	1	0	1	0	104	124
	1-3	26	8	11	4	4	4	2	0	0	1	0	60	71
	1-4	21	6	9	3	3	2	1	0	0	1	0	46	53
	2-1	49	14	20	5	5	7	2	1	0	1	0	104	122
	2-3	28	8	12	4	5	4	2	0	0	1	0	64	76
	2-4	23	5	9	3	3	2	1	0	0	1	0	47	52
	3-1	19	3	4	2	2	2	2	0	0	1	0	35	38
	3-2	28	8	12	4	4	3	2	0	0	1	0	62	72
	3-4	20	3	4	2	2	3	1	0	0	1	0	36	40
	4-1	20	3	4	2	2	3	1	0	0	1	0	36	40
	4-2	14	3	4	1	1	1	1	0	0	1	0	26	28
	4-3	21	6	10	4	4	4	2	0	0	1	0	52	63
	Total	316	81	118	40	40	43	20	2	0	12	0	672	777
0300-0400	1-2	40	12	17	6	5	7	3	1	0	1	0	92	110
	1-3	23	7	10	4	4	3	2	0	0	1	0	54	64
	1-4	18	5	8	3	3	2	1	0	0	1	0	41	47
	2-1	43	12	18	5	4	7	2	1	0	1	0	93	109
	2-3	25	7	10	4	4	3	2	0	0	1	0	56	65
	2-4	20	5	8	2	3	2	1	0	0	1	0	42	48
	3-1	17	3	4	2	2	2	1	0	0	1	0	32	35
	3-2	25	7	10	4	3	3	2	0	0	1	0	55	63
	3-4	18	3	4	2	2	2	1	0	0	1	0	33	36
	4-1	18	2	4	2	2	2	1	0	0	1	0	32	34
	4-2	13	2	4	1	1	1	1	0	0	1	0	24	25
	4-3	19	5	9	3	4	3	2	0	0	1	0	46	55
	Total	279	70	106	38	37	34	19	2	0	12	0	600	692

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep /Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0400-0500	1-2	37	12	16	5	4	6	2	1	0	1	0	84	100
	1-3	21	7	9	3	3	3	2	0	0	1	0	49	58
	1-4	17	5	8	3	3	2	1	0	0	1	0	40	47
	2-1	40	11	17	4	4	6	2	1	0	1	0	86	100
	2-3	23	7	10	4	4	3	2	0	0	1	0	54	64
	2-4	19	4	7	2	3	1	1	0	0	1	0	38	42
	3-1	16	2	3	2	2	2	1	0	0	1	0	29	32
	3-2	23	7	10	3	3	3	2	0	0	1	0	52	61
	3-4	17	3	3	2	2	2	1	0	0	1	0	31	34
	4-1	17	2	3	1	2	2	1	0	0	1	0	29	31
	4-2	12	2	3	1	1	1	1	0	0	1	0	22	23
	4-3	18	5	8	3	3	3	2	0	0	1	0	43	51
	Total	260	67	97	33	34	34	18	2	0	12	0	557	643
0500-0600	1-2	96	29	40	13	10	16	6	1	0	1	0	212	251
	1-3	55	16	22	8	8	7	4	0	0	1	0	121	142
	1-4	43	11	19	6	6	4	2	0	0	1	0	92	104
	2-1	103	29	43	11	9	15	4	1	0	1	0	216	250
	2-3	58	17	24	9	9	7	3	0	0	1	0	128	150
	2-4	48	10	18	5	6	3	1	0	0	1	0	92	101
	3-1	40	6	8	3	4	4	3	0	0	1	0	69	75
	3-2	58	17	24	8	7	6	4	0	0	1	0	125	144
	3-4	42	6	8	3	4	5	2	0	0	1	0	71	78
	4-1	42	5	8	3	3	5	2	0	0	1	0	69	73
	4-2	30	5	8	1	2	2	1	0	0	1	0	50	52
	4-3	45	12	21	7	8	7	3	0	0	1	0	104	123
	Total	660	163	243	77	76	81	35	2	0	12	0	1340	1545

December 2009

HOURLY TRAFFIC VOLUME AT SHIVANAGAR 1ST MAIN ROAD JUNCTION

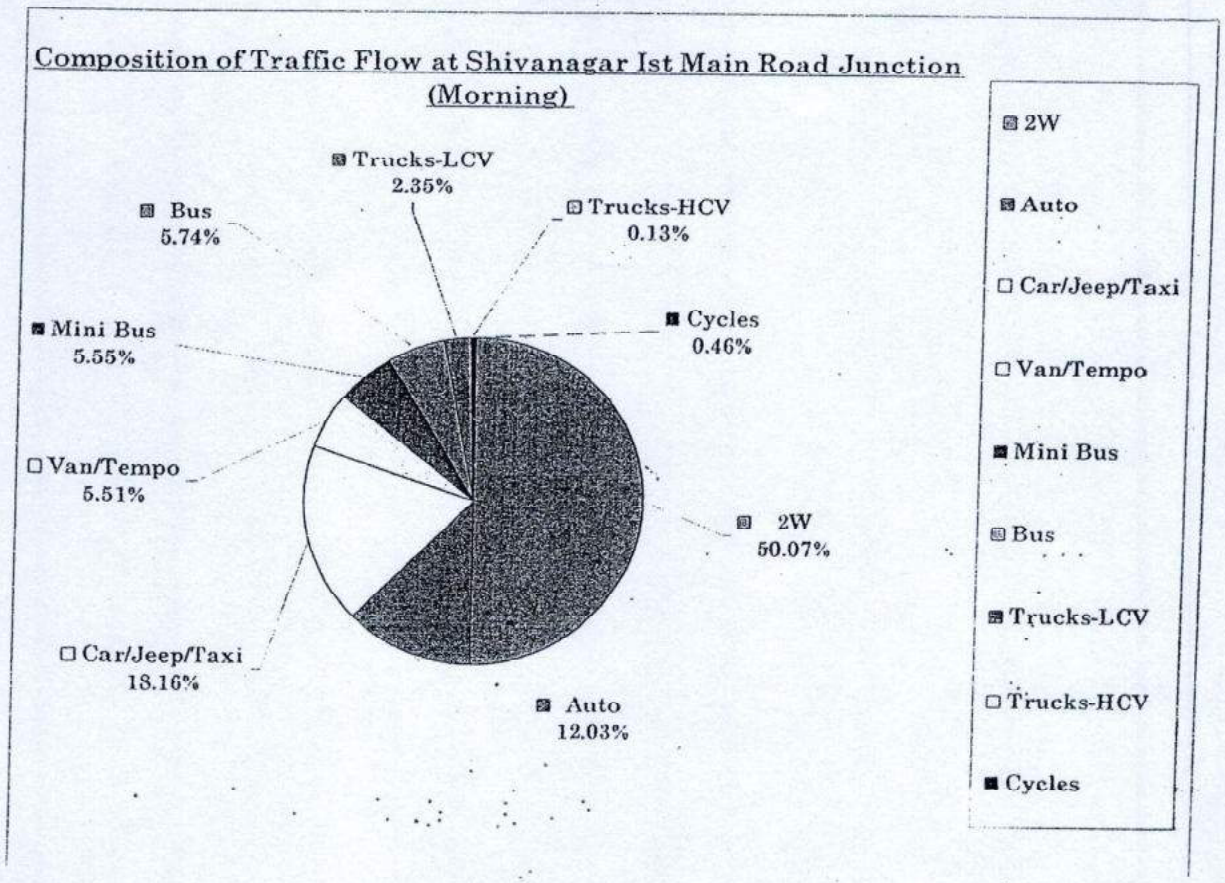
Time Period	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total Pcus
	Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
							LCV	HCV					
0600-0700	1310	322	480	150	149	155	66	4	0	14	0	2650	3032
0700-0800	2402	580	876	270	270	282	119	8	0	28	0	4791	5517
0800-0900	3232	781	1175	360	363	374	157	10	0	40	0	6492	7400
0900-1000	4231	1022	1539	472	474	492	206	12	0	42	0	8490	9685
1000-1100	4604	1106	1670	507	510	528	216	12	0	42	0	9195	10471
1100-1200	4228	1021	1537	470	472	488	202	12	0	42	0	7897	9658
1200-1300	3155	762	1146	352	355	366	156	10	0	40	0	6342	7231
1300-1400	2741	663	998	307	310	320	136	8	0	28	0	5511	6292
1400-1500	2924	707	1065	328	329	340	143	8	0	28	0	5872	6701
1500-1600	3310	797	1203	369	373	385	162	10	0	40	0	6649	7581
1600-1700	3540	854	1287	395	397	409	172	10	0	40	0	7104	8097
1700-1800	3930	949	1428	438	438	455	189	12	0	42	0	7881	8984
1800-1900	4373	1027	1515	460	474	502	209	11	0	46	0	8617	9791
1900-2000	3729	901	1357	415	416	433	179	10	0	40	0	7480	8527
2000-2100	2741	663	998	307	310	320	136	8	0	28	0	5511	6292
2100-2200	2257	549	822	254	255	262	111	6	0	26	0	4234	5183
2200-2300	1449	353	528	164	165	172	72	4	0	14	0	2921	3341
2300-0000	893	219	326	104	106	107	48	4	0	14	0	1821	2088
0000-0100	453	114	166	55	56	56	28	2	0	12	0	942	1084
0100-0200	352	88	131	44	44	46	22	2	0	12	0	741	853
0200-0300	316	81	118	40	40	43	20	2	0	12	0	672	777
0300-0400	279	70	106	38	37	37	19	2	0	12	0	600	692
0400-0500	260	67	97	33	34	34	18	2	0	12	0	557	643
0500-0600	660	163	243	77	76	81	35	2	0	12	0	1349	1545

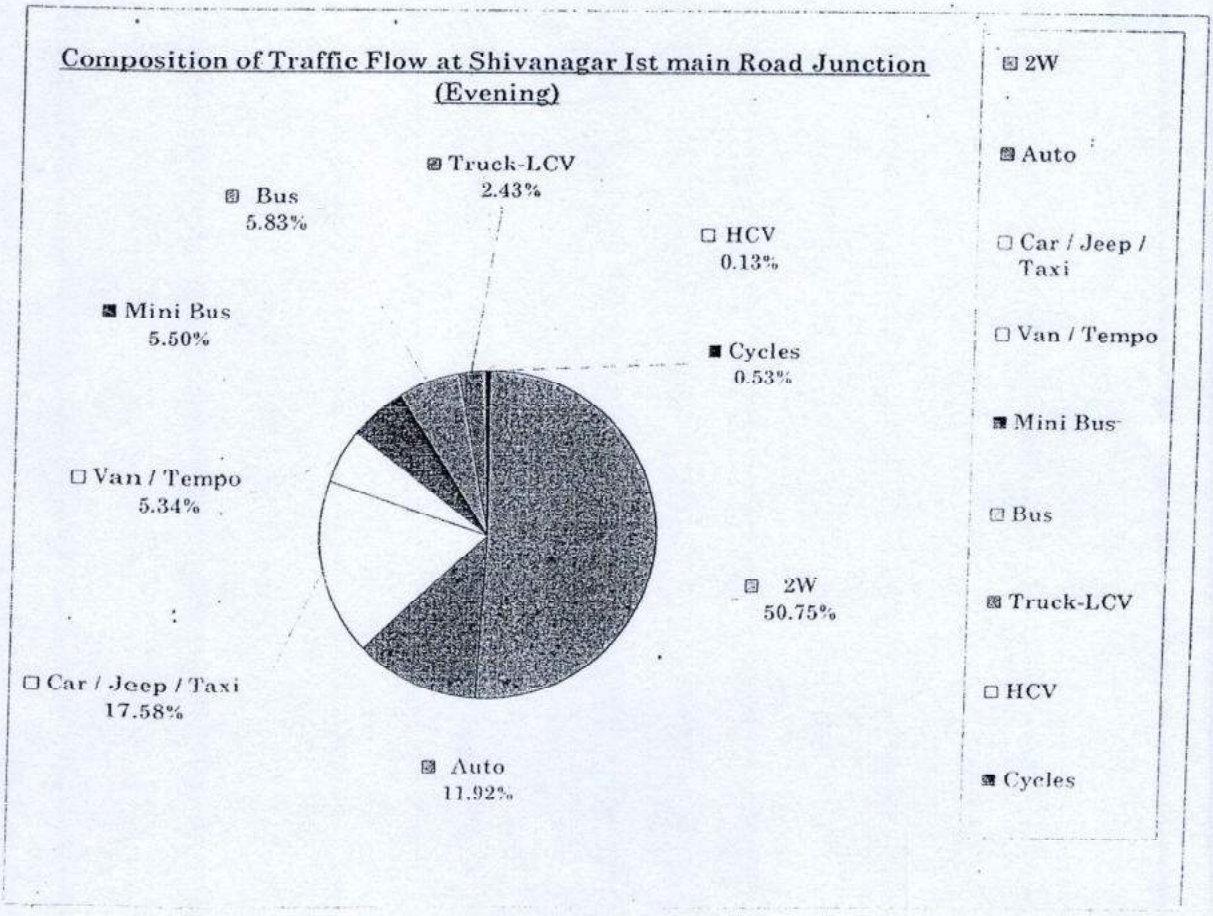


	Peak Hour
Mor.	1000 hrs. - 1100 hrs.
Eve.	1800 hrs. - 1900 hrs.

Mor. Peak Volume in PCU	10471
Eve. Peak Volume in PCU	9751

Fig 4.6 Peak Hour Direction Wise Flow - Shivanagar 1st Main Road Junction


Composition of Traffic Flow at Shivanagar Ist Main Road Junction (Morning)
Trucks-LCV 2.35%
Bus 5.74%
Trucks-HCV 0.13%
Cycles 0.46%
Mini Bus 5.55%
Van/Tempo 5.51%
2W 50.07%
Car/Jeep/Taxi 18.16%
Auto 12.03%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Trucks-HCV
Cycles


Composition of Traffic Flow at Shivanagar Ist main Road Junction (Evening)
Truck-LCV 2.43%
Bus 5.83%
HCV 0.13%
Mini Bus 5.50%
Cycles 0.53%
Van / Tempo 5.34%
2W 50.75%
Car / Jeep / Taxi 17.58%
Auto 11.92%
2W
Auto
Car / Jeep / Taxi
Van / Tempo
Mini Bus
Bus
Truck-LCV
HCV
Cycles

Annexure A.4.4

At Basaveshwara Nagar 1st Main Road Junction

1.Detailed Direction wise Traffic Flow

Basaveshwara Nagar Junction

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0600-0700	1-2	249	87	207	42	18	28	4	5	0	2	0	642	728
	1-3	93	30	26	9	7	10	1	0	0	1	0	177	204
	2-1	281	94	244	49	28	34	7	10	0	3	0	750	861
	2-3	80	36	35	18	8	14	2	0	0	5	0	198	238
	3-1	102	26	24	12	15	17	2	0	0	3	0	201	239
	3-2	75	35	30	8	6	12	0	0	0	1	0	167	204
	Total	880	308	566	138	82	115	16	15	0	15	0	2135	2475
0700-0800	1-2	430	150	357	73	31	49	6	9	0	4	0	1109	1258
	1-3	160	52	45	16	11	18	2	0	0	2	0	306	352
	2-1	485	162	421	85	49	59	11	16	0	5	0	1293	1484
	2-3	139	62	60	31	14	25	4	0	0	9	0	344	414
	3-1	176	44	40	20	25	29	3	0	0	5	0	342	405
	3-2	129	60	51	14	10	20	0	0	0	2	0	286	349
	Total	1519	580	974	239	140	200	26	25	0	27	0	3680	4263
0800-0900	1-2	579	202	481	98	42	65	8	12	0	5	0	1492	1692
	1-3	215	70	61	21	15	24	2	0	0	2	0	410	473
	2-1	653	218	567	114	65	79	15	22	0	6	0	1739	1995
	2-3	187	84	80	42	19	33	5	0	0	12	0	462	556
	3-1	238	59	54	26	34	38	3	0	0	7	0	459	542
	3-2	174	80	68	19	13	26	0	0	0	2	0	382	464
	Total	2046	713	1311	320	188	265	33	34	0	34	0	4944	5723
0900-1000	1-2	759	265	630	128	55	85	10	15	0	7	0	1954	2215
	1-3	282	91	79	27	20	31	3	0	0	3	0	536	617
	2-1	856	286	743	150	85	104	20	28	0	8	0	2280	2616
	2-3	244	110	105	55	25	43	7	0	0	15	0	604	728
	3-1	311	77	71	34	44	50	4	0	0	9	0	600	608
	3-2	227	105	89	25	17	34	0	0	0	3	0	500	598
	Total	2679	934	1717	419	246	347	44	43	0	45	0	6474	7403

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1000-1100	1-2	631	221	524	107	46	71	9	13	0	6	0	1628	1847
	1-3	486	158	137	47	34	53	5	0	0	5	0	925	1065
	2-1	660	222	577	116	66	81	16	22	0	6	0	1766	2029
	2-3	399	180	172	90	40	70	10	0	0	24	0	985	1187
	3-1	349	86	79	38	49	56	5	0	0	10	0	672	793
	3-2	443	205	174	48	34	67	0	0	0	5	0	976	1188
	Total	2968	1072	1663	446	269	398	45	35	0	58	0	8952	10109
1100-1200	1-2	753	263	625	127	55	85	10	15	0	7	0	1940	2201
	1-3	280	91	79	27	20	31	3	0	0	3	0	534	616
	2-1	849	283	737	149	85	103	20	28	0	8	0	2262	2595
	2-3	243	109	104	55	25	43	7	0	0	15	0	601	725
	3-1	309	76	70	34	44	50	4	0	0	9	0	596	704
	3-2	226	104	88	25	17	34	0	0	0	3	0	497	604
	Total	2660	926	1703	417	246	346	44	43	0	45	0	6430	7444
1200-1300	1-2	567	198	471	96	41	64	8	11	0	5	0	1461	1657
	1-3	211	68	59	20	15	23	2	0	0	2	0	400	460
	2-1	639	213	555	112	64	78	15	21	0	6	0	1703	1954
	2-3	183	82	78	41	19	32	5	0	0	11	0	451	544
	3-1	232	58	53	26	33	38	3	0	0	7	0	450	532
	3-2	170	78	67	19	13	26	0	0	0	2	0	375	456
	Total	2002	697	1283	314	185	261	33	32	0	33	0	4840	5604
1300-1400	1-2	497	174	413	84	36	56	7	10	0	4	0	1281	1454
	1-3	187	61	53	18	13	21	2	0	0	2	0	357	412
	2-1	566	189	491	99	57	69	13	19	0	5	0	1508	1732
	2-3	162	73	69	37	17	29	5	0	0	10	0	402	486
	3-1	206	51	47	23	29	33	3	0	0	6	0	398	470
	3-2	150	69	59	17	12	23	0	0	0	2	0	332	404
	Total	1768	617	1132	278	164	231	30	29	0	29	0	4278	4957

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1400-1500	1-2	529	185	439	89	39	60	7	11	0	5	0	1364	1549
	1-3	197	64	55	19	14	22	2	0	0	2	0	375	433
	2-1	596	199	518	104	60	72	14	20	0	6	0	1589	1823
	2-3	170	77	73	39	17	30	5	0	0	11	0	422	508
	3-1	217	54	50	24	31	35	3	0	0	6	0	420	497
	3-2	159	73	62	17	12	24	0	0	0	2	0	349	424
	Total	1868	652	1197	292	173	243	31	31	0	32	0	4519	5231
1500-1600	1-2	625	218	519	105	45	70	8	12	0	5	0	1607	1821
	1-3	214	69	60	21	15	23	2	0	0	2	0	406	467
	2-1	649	217	564	114	65	79	15	22	0	6	0	1731	1987
	2-3	185	83	80	42	19	33	5	0	0	12	0	459	553
	3-1	236	58	54	26	34	38	3	0	0	7	0	456	538
	3-2	173	80	68	19	13	26	0	0	0	2	0	381	463
	Total	2082	725	1345	327	191	269	33	34	0	34	0	5040	5831
1600-1700	1-2	613	214	509	103	45	69	8	12	0	5	0	1578	1790
	1-3	228	74	64	22	16	25	2	0	0	2	0	433	499
	2-1	691	231	600	121	69	84	16	23	0	6	0	1841	2113
	2-3	197	89	85	45	20	35	5	0	0	12	0	488	589
	3-1	251	62	57	28	36	41	3	0	0	7	0	485	574
	3-2	184	85	72	20	14	28	0	0	0	2	0	405	493
	Total	2164	755	1687	339	200	282	34	35	0	34	0	5280	6058
1700-1800	1-2	681	238	566	115	50	77	9	14	0	6	0	1756	1993
	1-3	253	82	71	24	18	28	3	0	0	3	0	482	555
	2-1	768	256	667	134	77	93	18	26	0	7	0	2046	2348
	2-3	219	99	94	50	22	39	6	0	0	14	0	543	654
	3-1	279	69	64	31	40	45	4	0	0	8	0	540	638
	3-2	204	94	80	22	16	31	0	0	0	3	0	450	548
	Total	2404	838	1542	376	223	313	40	40	0	41	0	5317	6737

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
1800-1900	1-2	740	262	623	126	54	84	10	15	0	6	0	1920	2181
	1-3	422	140	121	41	30	47	4	0	0	4	0	809	935
	2-1	566	185	481	97	55	67	13	19	0	5	0	1488	1703
	2-3	372	162	155	81	36	63	9	0	0	22	0	900	1078
	3-1	306	74	68	33	43	48	4	0	0	9	0	585	688
	3-2	419	172	146	40	28	56	0	0	0	4	0	865	1031
	Total	2825	995	1594	418	246	365	40	34	0	50	0	6556	7616
1900-2000	1-2	645	225	536	109	47	73	9	13	0	6	0	1663	1886
	1-3	240	78	68	23	17	26	3	0	0	3	0	458	527
	2-1	727	243	631	127	73	88	17	24	0	7	0	1937	2223
	2-3	208	93	89	47	21	37	6	0	0	13	0	514	619
	3-1	264	65	60	29	38	43	4	0	0	8	0	511	604
	3-2	193	89	76	21	15	29	0	0	0	3	0	426	518
	Total	2277	793	1460	356	211	296	39	37	0	40	0	5509	6378
2000-2100	1-2	476	167	396	80	35	54	7	10	0	4	0	1229	1396
	1-3	177	58	50	17	13	20	2	0	0	2	0	339	392
	2-1	537	179	467	94	54	65	13	18	0	5	0	1432	1643
	2-3	154	69	66	35	16	27	4	0	0	10	0	381	459
	3-1	195	48	45	22	28	32	3	0	0	6	0	379	448
	3-2	143	66	56	16	11	22	0	0	0	2	0	316	385
	Total	1682	587	1080	264	157	220	29	28	0	29	0	4076	4728
2100-2200	1-2	407	142	338	69	30	46	6	8	0	4	0	1050	1191
	1-3	151	49	43	15	11	17	2	0	0	2	0	290	334
	2-1	459	153	398	80	46	56	11	15	0	4	0	1222	1403
	2-3	131	59	56	30	13	23	4	0	0	8	0	324	390
	3-1	167	41	38	19	24	27	2	0	0	5	0	323	381
	3-2	122	56	48	13	10	19	0	0	0	2	0	270	329
	Total	1437	500	921	226	134	188	25	23	0	25	0	3479	4029

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
2200-2300	1-2	262	92	217	44	19	30	4	6	0	3	0	563	769
	1-3	97	32	28	10	7	11	1	0	0	1	0	154	216
	2-1	295	99	256	52	30	36	7	10	0	3	0	657	905
	2-3	85	38	36	19	9	15	3	0	0	6	0	173	254
	3-1	108	27	25	12	16	18	2	0	0	3	0	173	251
	3-2	79	36	31	9	6	12	0	0	0	1	0	144	211
	Total	926	324	593	146	87	122	17	16	0	17	0	1864	2608
2300-2400	1-2	157	55	130	27	12	18	2	3	0	2	0	406	461
	1-3	58	19	17	6	4	7	1	0	0	1	0	113	131
	2-1	177	59	153	31	18	22	4	6	0	2	0	472	542
	2-3	51	23	22	12	5	9	2	0	0	3	0	127	153
	3-1	64	16	15	7	9	11	1	0	0	2	0	125	148
	3-2	47	22	19	5	4	7	0	0	0	1	0	105	128
	Total	554	194	356	88	52	74	10	9	0	11	0	1348	1563
0000-0100	1-2	80	28	67	14	6	9	2	2	0	1	0	209	238
	1-3	30	10	9	3	3	4	1	0	0	1	0	61	72
	2-1	91	31	79	16	9	11	3	3	0	1	0	244	280
	2-3	26	12	12	6	3	5	1	0	0	2	0	67	81
	3-1	33	9	8	4	5	6	1	0	0	1	0	67	81
	3-2	24	12	10	3	2	4	0	0	0	1	0	56	69
	Total	284	102	185	46	28	39	8	5	0	7	0	704	821
0100-0200	1-2	75	22	52	11	5	7	1	2	0	1	0	176	196
	1-3	24	8	7	3	2	3	1	0	0	1	0	49	57
	2-1	71	24	62	13	7	9	2	3	0	1	0	192	221
	2-3	21	9	9	5	2	4	1	0	0	2	0	53	63
	3-1	26	7	6	3	4	5	1	0	0	1	0	53	64
	3-2	19	9	8	2	2	3	0	0	0	1	0	44	54
	Total	236	79	144	37	22	31	6	5	0	7	0	567	655

Time Period	Direction	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
		Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
								LCV	HCV					
0200-0300	1-2	59	21	49	10	5	7	1	2	0	1	0	155	178
	1-3	22	7	7	3	2	3	1	0	0.	1	0	46	53
	2-1	66	22	57	12	7	8	2	3	0	1	0	178	205
	2-3	19	9	8	5	2	4	1	0	0	2	0	50	61
	3-1	24	6	6	3	4	4	1	0	0	1	0	49	58
	3-2	18	8	7	2	2	3	0	0	0	1	0	41	50
	Total	208	73	134	35	22	29	6	5	0	7	0	519	606
0300-0400	1-2	55	20	46	10	4	7	1	2	0	1	0	146	168
	1-3	21	7	6	2	2	3	1	0	0	1	0	43	51
	2-1	63	21	54	11	7	8	2	3	0	1	0	170	197
	2-3	18	8	8	4	2	4	1	0	0	2	0	47	57
	3-1	23	6	6	3	4	4	1	0	0	1	0	48	58
	3-2	17	8	7	2	2	3	0	0	0	1	0	40	49
	Total	197	70	127	32	21	29	6	5	0	7	0	494	579
0400-0500	1-2	50	18	42	9	4	6	1	1	0	1	0	161	151
	1-3	19	6	6	2	2	2	1	0	0	1	0	44	45
	2-1	57	19	49	10	6	7	2	2	0	1	0	188	176
	2-3	17	8	7	4	2	3	1	0	0	1	0	50	53
	3-1	21	6	5	3	3	4	1	0	0	1	0	50	53
	3-2	15	7	6	2	2	3	0	0	0	1	0	41	45
	Total	179	64	115	30	19	25	6	3	0	6	0	534	522
0500-0600	1-2	119	42	99	20	9	14	2	3	0	1	0	450	353
	1-3	45	15	13	5	4	5	1	0	0	1	0	123	103
	2-1	134	45	117	24	14	17	4	5	0	2	0	525	417
	2-3	39	18	17	9	4	7	1	0	0	3	0	139	118
	3-1	49	12	12	6	7	8	1	0	0	2	0	138	114
	3-2	36	17	14	4	3	6	0	0	0	1	0	115	99
	Total	422	149	272	68	41	57	9	8	0	10	0	1490	1205

December 2009

HOURLY TRAFFIC VOLUME AT BASAVESHWARA NAGAR Ist MAIN ROAD

Time Period	Fast Moving Vehicles								Slow Moving Vehicles			Total Vehicles	Total PCU'S
	Two Wheeler	Auto	Car/Jeep/ Taxi	Van/ Tempo	Mini Bus	Bus	Trucks		Animal/ Hand Drawn	Cycles	Others		
							LCV	HCV					
0600-0700	880	308	566	138	82	115	16	15	0	15	0	2135	2475
0700-0800	1519	530	974	239	140	200	26	25	0	27	0	3680	4263
0800-0900	2046	713	1311	320	188	265	33	34	0	34	0	4944	5723
0900-1000	2679	934	1717	419	246	347	44	43	0	45	0	6474	7493
1000-1100	2968	1072	1663	446	269	398	45	35	0	56	0	6952	8109
1100-1200	2660	926	1703	417	246	346	44	43	0	45	0	6430	7444
1200-1300	2002	697	1283	314	185	261	33	32	0	33	0	4840	5604
1300-1400	1768	617	1132	278	164	231	30	29	0	29	0	4278	4957
1400-1500	1868	652	1197	292	173	243	31	31	0	32	0	4519	5234
1500-1600	2082	725	1345	327	191	269	33	34	0	34	0	5040	5831
1600-1700	2164	755	1387	339	200	282	34	35	0	34	0	5230	6058
1700-1800	2404	838	1542	376	223	313	40	40	0	41	0	5817	6737
1800-1900	2825	995	1594	418	246	365	40	34	0	50	0	6567	7616
1900-2000	2277	793	1460	356	211	296	39	37	0	40	0	5509	6378
2000-2100	1682	587	1080	264	157	220	29	28	0	29	0	4076	4723
2100-2200	1437	500	921	226	134	188	25	23	0	25	0	3479	4029
2200-2300	926	324	593	146	87	122	17	16	0	17	0	1864	2608
2300-0000	554	194	356	88	52	74	10	9	0	11	0	1348	1563
0000-0100	284	102	185	46	28	39	8	5	0	7	0	704	821
0100-0200	236	79	144	37	22	31	6	5	0	7	0	567	655
0200-0300	208	73	134	35	22	29	6	5	0	7	0	519	606
0300-0400	197	70	127	32	21	29	6	5	0	7	0	494	579
0400-0500	179	64	115	30	19	25	6	3	0	6	0	534	522
0500-0600	422	143	272	68	41	57	9	8	0	10	0	1490	1205

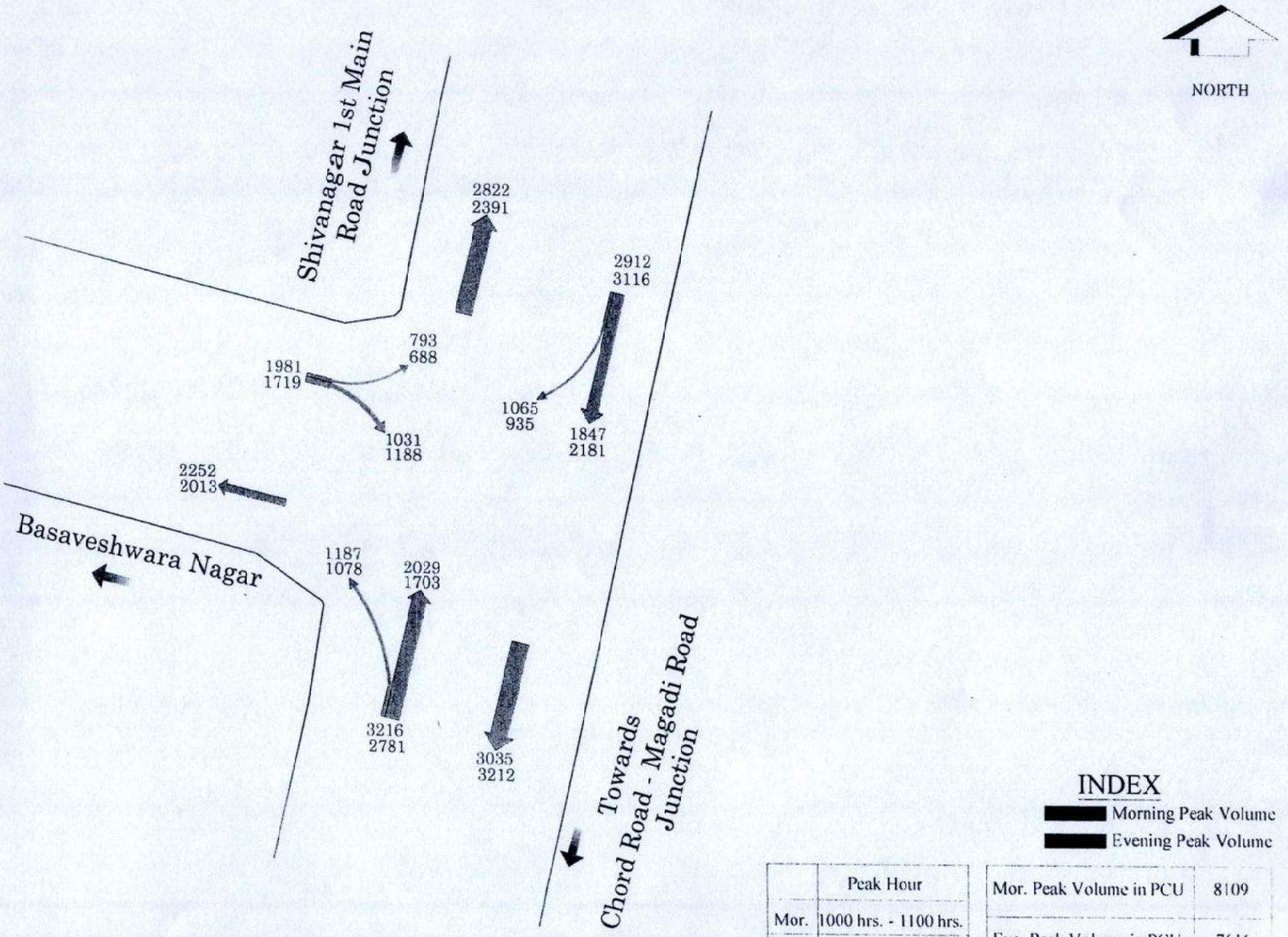
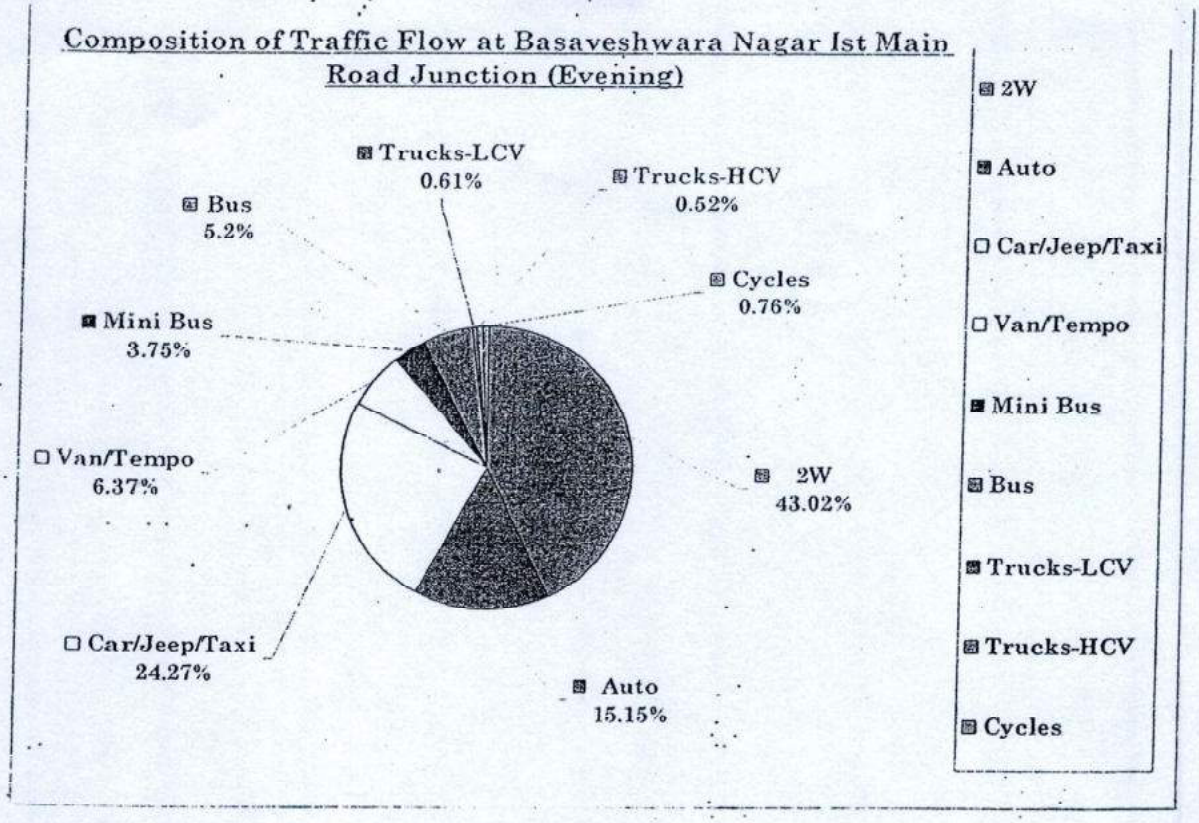
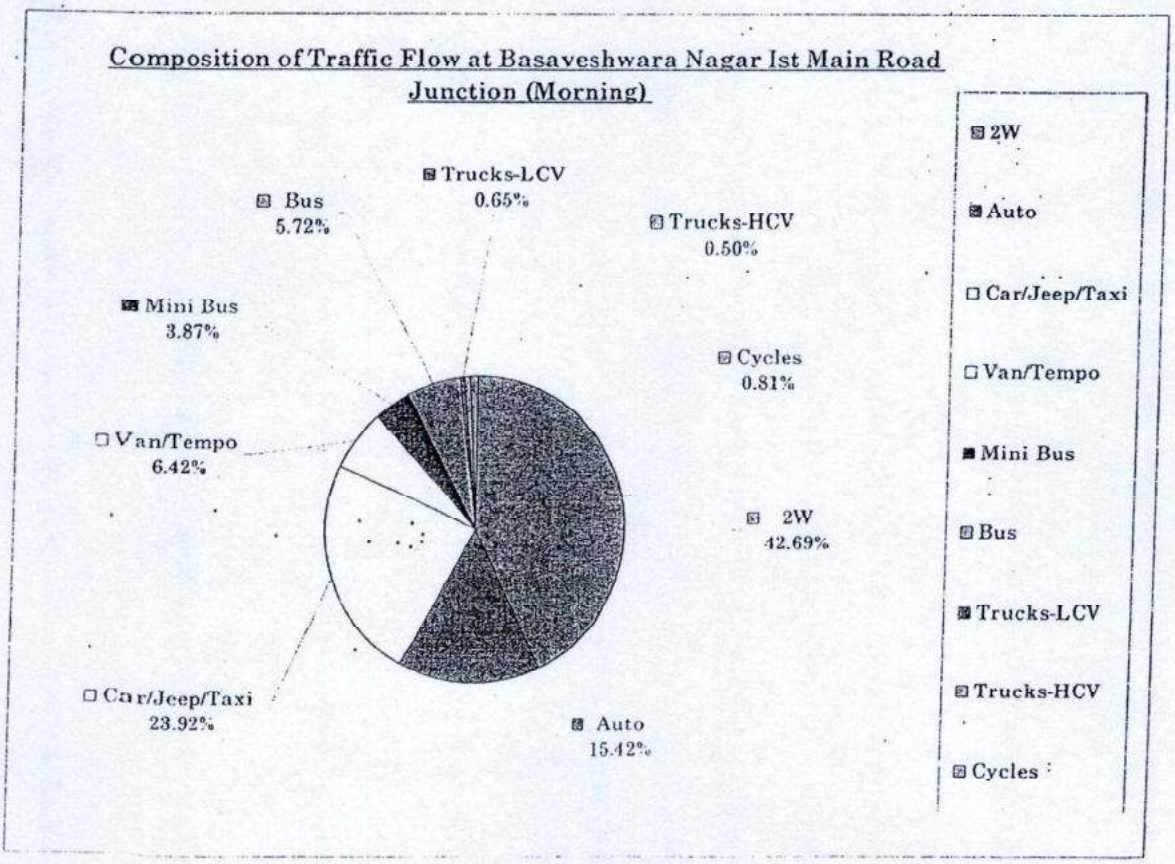


Fig 4.8 Peak Hour Direction Wise Flow - Basaveshwara Nagar 1st Main Road Junction


Composition of Traffic Flow at Basaveshwara Nagar Ist Main Road Junction (Evening)
Trucks-LCV 0.61%
Trucks-HCV 0.52%
Bus 5.2%
Cycles 0.76%
Mini Bus 3.75%
Van/Tempo 6.37%
2W 43.02%
Car/Jeep/Taxi 24.27%
Auto 15.15%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Trucks-HCV
Cycles


Composition of Traffic Flow at Basaveshwara Nagar Ist Main Road Junction (Morning)
Trucks-LCV 0.65%
Bus 5.72%
Trucks-HCV 0.50%
Mini Bus 3.87%
Cycles 0.81%
Van/Tempo 6.42%
2W 42.69%
Car/Jeep/Taxi 23.92%
Auto 15.42%
2W
Auto
Car/Jeep/Taxi
Van/Tempo
Mini Bus
Bus
Trucks-LCV
Trucks-HCV
Cycles

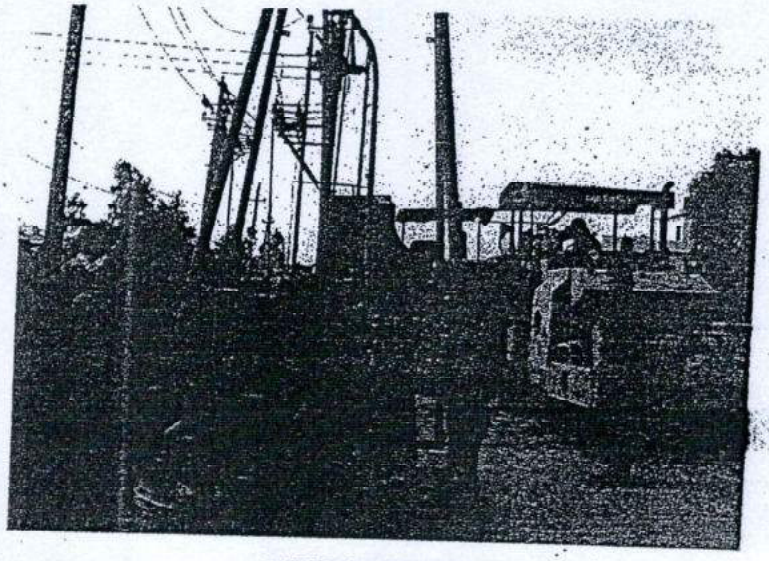
Annexure A.4.5

Geotechnical Investigation Report

Shivanagar 8th Main Road Junction

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT SHIVANAHALLI CIRCLE, WEST OF CHORD ROAD, BANGALORE.

JOB NO. : SEA/BBMP/MANASA/GT/SHIVANAHALLI CIRCLE/042/09-10



REPORT FOR

Bruhat Bangalore Mahangara Palike
N.R. Square, Bangalore.

CONSULTANT

M/s. MANASA CONSULTANTS
Consulting Engineers and Designers
#140B, 2nd Floor, 9th Cross, Margosa Road,
Malleshwaram, Bangalore – 560003.

MAY 2009

SHEETAL ENGINEERING ASSOCIATES
(Building, Geo-Tech & Highway Material Research Laboratory)

Office :
No.43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamrajpet, Bangalore – 560 018,
Ph No: 080 – 26740503 / 9448354103
Email:bcs_sheetal@rediffmail.com

Laboratory :
No.12A, 2nd Main Road, 9th Cross,
Chamrajpet, Bangalore – 560 018,
Ph: 080 - 32449401
Email: bcs_sheetal@yahoo.com

Contents

B. Chandrashekar

SHEETAL ENGINEERING ASSOCIATES
43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamarajpet, BANGALORE - 560 018

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT SHIVANAHALLI CIRCLE, WEST OF CHORD ROAD, BANGALORE.

1. Introduction

The foundation is part of an engineered system that transmits to, and into, the underlying soil or rock the loads supported by foundation and it's self-weight. The resulting soil stresses-except at the ground surface-are in addition to those presently existing in the earth mass from its self-weight and geological history. Also the successful performance of Foundation Structure depends as much as adopting standards of good load distribution successfully to the ground.

Investigation of the underground conditions at a site is prerequisite to the economical design of the substructure elements. It is also necessary to obtain sufficient information for successful performance of foundation and substructure.

The elements of Geotechnical Site Investigation depend heavily on the project but generally should provide the following;

- Information to determine the type of foundation required (shallow or deep).
- Information to allow the geotechnical engineer to make a recommendation on the allowable load capacity of the foundation.
- Sufficient data / laboratory tests to make settlement predictions.
- Location of Ground Water Table (or determination of whether, it is in the construction zone).
- Information so that the identification and solution of construction problems.
- Identification potential problems (settlements, existing damage etc).

M/s. Manasa Consultants, Bangalore proposes to construct Under pass at Shivanahalli Circle, WOC Road, Bangalore.

M/s SHEETAL ENGINEERING ASSOCIATES (Building, Geo-Tech & Highway Material Research Laboratory), Chamarajpet, Bangalore was assigned to carry out the GeoTechnical Investigation work at the above said project site locations with a view to furnish the detailed Geo-Technical Information of the nature and sub-soil strata for detailed Foundation Designs.

2. Location of Investigation Site

1. The locations of Field Geotechnical investigations were carried out at Shivanahalli Circle, WOC Road, Bangalore.

The Plan Showing Location of Borehole Investigations were carried out is enclosed vide Figure No. 1 to 5.

3. Objectives and Scope of Work

3.1 Objectives

The objectives of Geo-Technical Investigation are to evaluate the following:

- To ascertain the sub-soil strata at project Site
- To study standing Ground Water Level
- To study the physical and engineering properties of soil strata
- To evaluate allowable safe bearing capacity of soils to design foundations
- To Recommend type and depth of foundation
- To recommend improvements to the weak soil strata if any

3.2. Scope of the Work

The Scope of Geo-technical Investigations includes the following Insitu and Laboratory Tests.

3.2.1. Field Investigations

i) Boring 2 Nos. of 150mm / Nx size Boreholes in all kinds of soils, Soft Rock and Hard Rock up to 10.0 m or up to 3.0 m in Bed Rock whichever encounter early using Rotary operated Drilling Rig.
ii) Determination of natural density as per IS: 2720 Part 29.
iii) Conducting field-testing such as Standard Penetration Tests as per IS: 2131-1981.
iv) Collecting Undisturbed Sand Samples as per IS: 8763 – 1978.
v) Collecting disturbed and undisturbed soil samples at Ground level in the Boreholes as per IS: 1892-1979.

3.2.2. Laboratory Testing

The scope of Laboratory Testing is as follows:

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3 / Section 1&2) - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) – 1985 & IS: 2720 (Part 6, 20, 40 & 41) - 1977.
iv) Determination of natural moisture content as per IS 2720 (Part 18) - 1978.
v) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vi) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
vii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – Part III
viii) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143.

3.3. Report

This comprises preparing a detailed report including soil profiles, physical and engineering properties of soil/rock samples based on laboratory as well as field investigation/tests, recommendations regarding allowable bearing pressure, type and depth of foundations and improvement to existing Foundation Soils, Allowable Load on Piles, type, size and depth of Piles etc and submission of Detailed Technical Report with complete relevant recommendations in Triplicate.

4.0. Schedule of Investigations

4.1. Field Investigations

To study sub-soil strata, field investigations were carried out by drilling 07 Nos. 150 mm dia Boreholes using Calyx operated Rig up to a maximum depth of 10.0 m below existing ground at the proposed project Site at the specified locations.

Plans showing location of Borehole Investigations was carried out is enclosed vide Fig. No.1.

Table 4.1 Details of Ground Level and termination depth of each Borehole

Sl. No	Investigation Locations	BH No.	Termination Depth from EGL (m)
1	Shivanahalli Circle, Opp. Fish Land Bar	BH 1	9.00
2	Shivanahalli Circle, Near KPTCL	BH 2	10.00

BH: Borehole through Rotary Rig

4.5 Ground Topography, Geology of the area and Sub-soil Details

The ground topography, geology at the Site location and sub-soil details at the Site location on Shivanahalli Circle, Rajajinagar, WOC Road was studied and recorded in the Borehole logs.

4.6 Laboratory Tests

The following laboratory tests were conducted on the collected disturbed, undisturbed soil samples and Rock Core Samples.

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3)/Section 1 - 1980 and IS: 2720 – (Part 3)/Section 2 - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) - 1985, IS: 2720 (Part 6, 20, 40 and 41) - 1977.
iv) Determination of natural moisture content as per IS: 2720 (Part 18) - 1978.
v) Determination of natural density as per IS: 2720 (Part 29)
vi) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vii) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
viii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – (Part 3)
ix) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143

5.0 Results and Discussions

The results of field investigations and laboratory tests are presented in Borehole logs cum sub-soil profile and laboratory tests results.

5.1. Soil Profile and Classification

The ground topography at the Bridge Site locations is fairly level and slightly varying from Location to locations. General Subsoil profile is interpreted from borehole. For this purpose whenever necessary, field borehole logs have been corrected on the basis of laboratory tests conducted on samples.

- Top Ground Soil: Brownish Sand y Clay (SC) / Brownish Silty Sand (SM) / Brownish Silt with Low Compressibility (ML)

- Underlain Strata 1: Brownish / Whitish Soft Disintegrated Weathered Rock.(SDWR)
- Deeper Strata: Grayish / Whitish Soft Rock (Gneiss)

5.2. Standard Penetration Number

The results of SPT test at all the boreholes s at various depths confirm that the Soil / Sandy Strata is medium stiff and Rocky strata are soft. The observed 'N' values at all the Boreholes locations are indicated on the borehole logs cum sub-soil profiles (Tables 6.3 to 6.7.)

5.3. Specific Gravity

The specific Gravity of Soil / Sand is indicated in the Borehole Log cum Lab Test Results vide Table Nos 6.3 to 6.7.

5.4. Liquid Limit and Plastic Limit

The Liquid Limit of sub soil is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

4.2 Standard Penetration Tests

Standard Penetration Tests (SPT) was conducted using split spoon sampler as per IS: 2131-1981 at various depths in Boreholes to determine 'N' values as well as relative density and stiffness of the soil.

Table 4.2 Details of SPT Tests conducted in Boreholes

Sl. No	Location Details	BH No.	SPT Depth (m) & SPT Values (Blows)					
			1.5/2.5	3.00	4.5/5.50	6.0	6.5/7.5	9.0/10.0
1	Shivanahalli Circle	BH 1	8+10+10	9+8+4	15+16+18	20+22+25	30+28+32	28+33+38
2	Shivanahalli Circle	BH 2	2+3+3	5+5+8	10+15+19	15+22+28	20+25+30	25+30+32/ 32+32+38

BH: Borehole through Rotary Rig R: Refusal (N>100 Blows for 30 cm penetrations)
UDS: Undisturbed Soil Samples R: Rebound (No Penetrations)

4.3 Sampling

4.3.1 Disturbed / Representative Soil Samples (DS/RS) and UDS Soil Samples

Disturbed/Representative samples (DS/RS) were collected during drilling and also during SPT Tests. The Representative Samples from the split spoon sampler and UDS samples using 100 mm thin walled Shelby tubes were also collected. The samples recovered were packed in polythene bags, labeled and sent to the laboratory for carrying out relevant laboratory testing.

Table 4.3 Details of Soil Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth of Sampling (m)	Type of Sampling
1	Shivanahalli Circle	BH 1	1.50, 3.00, 4.50, 6.00, 7.50, 9.00	SPT
2	Shivanahalli Circle	BH 2	1.50, 3.00, 4.50, 6.00, 7.50, 9.00, 10.00	SPT

DS: Disturbed Soil Samples UDS: Undisturbed Soil Samples

4.3.2 Rock Core Samples

Rock Core Samples were collected during field investigations, labeled and numbered and arranged in Core Boxes. The collected Rock Core Samples along with Core Boxes were sent to the laboratory for testing.

Table 4.4 Details of Rock Core Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth (m)	Core Recovery (%)	RQD (%)
1	Shivanahalli Circle	BH 1	--	--	--
2	Shivanahalli Circle	BH 2	--	--	--

4.4 Water Table Level

During field investigations the standing Water Table levels were studied and recorded in the Borehole log vide Table Nos. 6.3 to 6.7.

4.5 Ground Topography, Geology of the area and Sub-soil Details

The ground topography, geology at the Site location and sub-soil details at the Site location on Shivanahalli Circle, Rajajinagar, WOC Road was studied and recorded in the Borehole logs.

4.6 Laboratory Tests

The following laboratory tests were conducted on the collected disturbed, undisturbed soil samples and Rock Core Samples.

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3)/Section 1 - 1980 and IS: 2720 – (Part 3)/Section 2 - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) - 1985, IS: 2720 (Part 6, 20, 40 and 41) - 1977.
iv) Determination of natural moisture content as per IS: 2720 (Part 18) - 1978.
v) Determination of natural density as per IS: 2720 (Part 29)
vi) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vii) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
viii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – (Part 3)
ix) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143

5.0 Results and Discussions

The results of field investigations and laboratory tests are presented in Borehole logs cum sub-soil profile and laboratory tests results.

5.1. Soil Profile and Classification

The ground topography at the Bridge Site locations is fairly level and slightly varying from Location to locations. General Subsoil profile is interpreted from borehole. For this purpose whenever necessary, field borehole logs have been corrected on the basis of laboratory tests conducted on samples.

- Top Ground Soil: Brownish Sand y Clay (SC) / Brownish Silty Sand (SM) / Brownish Silt with Low Compressibility (ML)

- Underlain Strata 1: Brownish / Whitish Soft Disintegrated Weathered Rock.(SDWR)
- Deeper Strata: Grayish / Whitish Soft Rock (Gneiss)

5.2. Standard Penetration Number

The results of SPT test at all the boreholes s at various depths confirm that the Soil / Sandy Strata is medium stiff and Rocky strata are soft. The observed 'N' values at all the Boreholes locations are indicated on the borehole logs cum sub-soil profiles (Tables 6.3 to 6.7.)

5.3. Specific Gravity

The specific Gravity of Soil / Sand is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.4. Liquid Limit and Plastic Limit

The Liquid Limit of sub soil is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.5 Cohesive Strength and Friction Angle

The Cohesive strength of underlain of sub soii observed is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.6 Differential Free Swelling Index

The Free Swelling Index of underlain of Soil / Sand observed is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.7. Rock Depth or Refusal Strata

The details of SDWR and Soft Rock Gneiss Rock is encountered at different depths below existing bed level and indicated in the Borehole logs.

5.8. Water Table Level

The details of Water Table encountered during field investigations are indicated in the Borehole logs.

Table 5.1 Details of Ground Water Table depth

Sl. No	Bridge Details	BH No.	Water Table Depth from EGL (m)
1	Shivanahalli Circle	BH 1	0.90
2	Shivanahalli Circle	BH 2	3.20

6.0. Recommendations

6.1 Allowable Safe Bearing Capacity of Soils, Soft Weathered Rock (SDWR) and Soft Rock

The safe bearing pressure of soil has been evaluated as per IS 6403-1982, IS 8009 part I-1993, IS 1904 as per Terzaghi / Thomlinson's Theory, based on 'N' values (Teng's) Theory considering the following criteria.

i) Local Shear failure condition
ii) Settlement criteria: Based on 'N' values as per IS 8009
iii) Unconfined Compressive Strength of Rock Core

RCC Open / Strip Foundation may be adopted through and allowable Safe Bearing Capacity for minimum 3.0 m width of Footing and Foundations.

Table 6.1 Recommended Safe Bearing Capacity of Soils, SDWR and Soft Rock

No	BH No.	Depth below EGL (m)	Type of strata	Recommended Bearing Capacity (T/Sq.m)	
				Ultimate Bearing Capacity	Safe Bearing Capacity
SHIVANAHALLI CIRCLE					
1	BH 1	2.00	Yellowish Red Sandy Soil	38.50	15
2	BH 1	3.00	Yellowish Red Sandy Soil	42.50	17
3	BH 1	4.50	Yellowish Red Sandy Soil	45.00	18
4	BH 1	6.00	Grayish Yellow Soft Rock	70.00	28

SHIVANAGAR CIRCLE					
1	BH 2	2.00	Reddish Sandy Soil	38.50	15
2	BH 2	3.00	Reddish Sandy Soil	42.50	17
3	BH 2	4.50	Reddish Sandy Soil	45.00	18
4	BH 2	6.00	Grayish Yellow Soft Rock	70.00	28

FS in Soils / Sand = 2.5 FS in SDWR = 2.5 FS in Soft & hard rock = 8.00

6.2. Additional Recommendations

- The minimum confined depth of foundation shall be 2.0 m for open Foundations in soils of SDWR.
- Necessary Ground Anchor shall be provided by Soft Rock and Hard Rock.

Table - 6.1 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at Shivanahalli Cilce, West of Chord Road, Bangalore.

Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.

Consultant : M/s. Manasa Consultants, Bangalore

Location : Shivanahalli Circle

Borehole No : BH 1

Method : Rotary Boring through Calyx Rig

Date of Execution : 29.04.2009

Ground Water Level : 0.90m

Borehole Level : Not Known

Borehole Termination Depth : 9.00m

Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis			LL	PI	FSI	IS / AASHTO Classification	Insitu Moisture Content	Insitu Density	Triaxial Strength Parameters	
				Gravel	Sand	Silt + Clay							Cohesive Strength (Cu)	Angle of Internal Friction (ϕ cu)
				%	%	%	%	%			%	gm / cc	kg / cm²	degrees
0.000														
0.500														
1.000			DS @ 1.0 m											
1.500		Yellowish Red Sandy Soil	SPT @ 1.5 m N = 8+10+10	9.00	80.40	10.60	23.90	NP	NP	SP A-3	7.50	1.85	0.09 Direct shear	26.09
3.000			SPT @ 3.0m N = 9+8+4											
4.500			SPT @ 4.50m N = 15+16+18											

Depth Below Ground (m)	Legend	Sub Soil Strata	Type of Samples	Core Length	Core Recovery	RQD	Type of Rock		Sp. Gr.	Water Absorption	Unit Weight	UCC Strength - (Unsaturated)	UCC Strength (saturated)	Remarks
				(cms)	%	%				%	(gm / cc)	T / m2	T / m2	
6.000		Grayish Yellow Soft Rock (SDWR)	SPT @ 6.00m N = 20+22+25	WASHED SAMPLE										
7.500				WASHED SAMPLE										
9.000														

Table - 6.2 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at Shivanahalli Cilce, West of Chord Road, Bangalore.
Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.
Consultant : M/s. Manasa Consultants, Bangalore
Location : Shivanahalli Circle
Borehole No : BH 2
Method : Rotary Boring through Calyx Rig

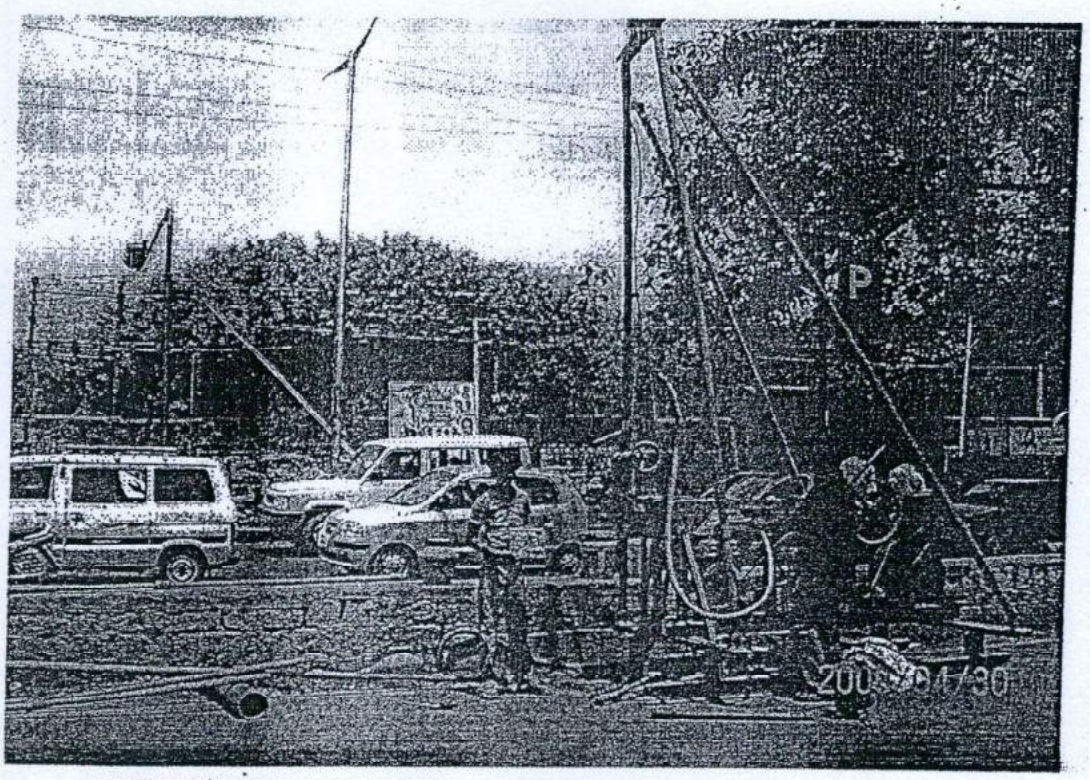
Date of Execution : 30.04.2009
Ground Water Level : 3.20m
Borehole Level : Not Known
Borehole Termination Depth : 10.00 m
Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis: Gravel %	Sand %	Silt + Clay %	LL %	PI %	FSI	IS / AASHTO Classific.	Insitu Moisture Content %	Insitu Density gm / cc	Triaxial Strength Parameters: Cohesive Strength (Cu) kg / cm²	Angle of Internal Friction degrees
0.000														
0.500														
1.000			DS at 1.00 m											
1.500		Reddish Sandy Soil	SPT @ 1.5 m N = 2+3+3	5.25	62.25	32.50	27.00	NP	NP	SP A-3	8.50	1.82	0.00 Direct shear	27.00
2.000														
2.500														
3.000			SPT @ 3.00m N = 5+5+8											

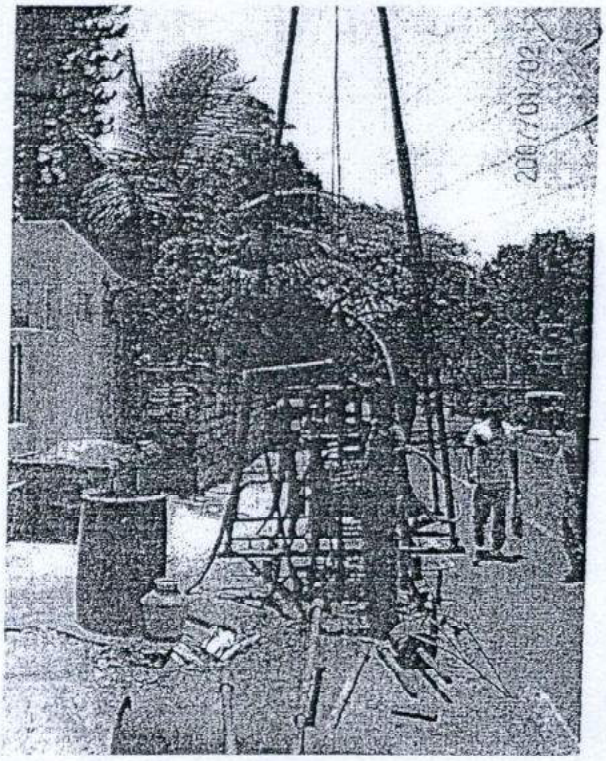
Depth Below Ground (m)	Legend	Sub Soil Strata	Type of Samples	Core Length (cms)	Core Recovery %	RQD %	Type of Rock	Sp. Gr.	Water Absorption %	Unit Weight (gm / cc)	UCC Strength (Unsaturated) T / m2	UCC Strength (saturated) T / m2	Remarks
4.500			SPT @ 4.50m N = 10+15+19										
6.000		Grayish Yellow Soft Rock (SDWR)											
7.500													
9.000													
10.000													

Sheetal Engineering Associates ★ Bangalore

PHOTOS



SHIVANAHALLI CIRCLE, OPP FISH LAND BAR, WOC ROAD/ BH-1



SHIVANAHALLI CIRCLE, NEAR KPTCL, WOC ROAD/ BH-2

Shakti Engineering Associates Bangalore

Annexure 1.1 to 1.6

Specimen SBC and Settlement Calculations ; BH 1 at 1.50 m Depth

Terzaghi's Bearing Capacity Factors :

ϕ	Nc	Nq	Nγ
0	5.70	1.00	0.00
5	7.30	1.60	0.50
10	9.60	2.70	1.20
15	12.90	4.40	2.50
20	17.70	7.40	5.00
25	25.10	12.70	9.70
30	37.20	22.50	19.70
34	52.60	36.50	30.00
35	57.80	41.40	42.40
40	95.70	81.30	100.40
45	172.30	173.30	297.50
48	258.30	287.90	780.10
50	347.50	415.10	1153.20

Water Table Correction Factors:

Wq	Wr
1.00	1.00

(No Water Table is Encountered)

0.50	0.50

(If Water Table touches the FL)

1.1 SAFE BEARING CAPACITY BASED ON TERZAGHI'S THEORY :

a) Calculation of Bearing Capacity Factors:

ϕ	Nc	Nq	Nγ
26	27.52	14.66	11.7

Na= SPT = 20

b) Calculation of SBC :

UBC (kg/Sq.cms) = 1.3 CNc + 0.5*γ*D*Wq*Nq +0.4 * γ *B*Wγ *Nγ

C	ϕ	γ	L	B	D	Nc
0	26	0.00182	1290	2400	150	28
(Kg/Sq.cms)	(degrees)	(kg/Cu.cms)	(cms)	(cms)	(cms)	(Blows)

UBC(T/Sq.m)	SBC(T/sq.m)
74.94942	29.97977
(T/Sq.mts)	(T/Sq.mts)

1.2. SAFE BEARING CAPACITY BASED ON TENG'S THEORY :

N = Standard Penetration Number = 20

Q safe = 0.0167*N*B*Wq + 0.027*(100+N*N)*D*Wγ = 14.3043 (T/Sq.mts)

1.3. SAFE SETTLEMENT PRESSURE BASED ON TENG'S THEORY :

Rd = Depth Correction Factor = 1+(0.2D/B) <= 1.2 1.023

1.023

Qssp (T/Sq.m) = 3.5 (N-3)*((B+0.3)/(2B)) **2 Wγ Rd

Qssp (T/Sq.m) = 3.5x(20-3)*((1290+0.3)/2x1290)^2x1x1.0232558139 15.938

1.4. SAFE BEARING CAPACITY AS PER IS 6403 -1982 :

ϕ	Nc	Nq	Nγ
0	5.14	1.00	0.00
5	6.50	1.60	0.40
10	8.30	2.50	1.20
15	11.00	3.90	2.60
20	14.80	6.40	5.40
25	20.70	10.70	10.90
30	30.10	18.40	22.40
32	35.60	23.20	30.20
34	42.20	29.40	41.00
36	50.60	37.80	56.50
38	61.40	48.90	78.00
40	75.30	64.20	109.40
45	133.90	134.90	270.00
50	318.100	319.10	763.00

a) Bearing Capacity Factors (IS 6403):

ϕ	Nc	Nq	Nγ
25	20.7	10.7	10.9

b) Water Table Correction Factors:

Water Table may rise to founding level in

Wq	Wr
0.50	0.50

c) Depth Factors:

Dc = 1.03721708 Dq=Dγ= 1.01860854

d) Shape Factors:

Sc = 1.10 for Square & circle

Sq = 1.05 for Square & circle

Sγ = 0.60 for Square

e) Load Inclination Factors:

Ic = 1.00

Iq = 1.00

Iγ = 1.00

Quit (T/Sq.m) = C Nc Sc Dc Ic +q (Nq-1) Sq Dq Iq Wq+ 0.5 γ B Nγ Sγ Iγ Wγ

Quit (T/Sq.m) = 53.28

(The Factor of Safety is recommended as per the Type of Soil, Type of footing and

Factor of Safety = 2.5 Qsafe = (T/Sq.m) Quit/FS = 21.312

Minimum of the Above Three SBC (T/Sq.m) = 14.3 14.30

Actual Recommended = 14 14.00 T/Sq.m

(Minimum of Above four methods)

1.5. ALLOWABLE SETTLEMENT, AS PER IS 8009 -1982 BASED ON N VALUES :

NC=28 B = 12.9 m Settlement Factor = 0.014

Recommended SBC = 14.00T/Sq.m = 1.40 kg/Sq.cms

Allowable Settlement (mm) = 28.00 < 50 mm as per IS 1904, Hence Safe

Hence the Foundation is safe against allowable settlement of 50 mm with 14.00 T/sq.m SBC as per IS 1904

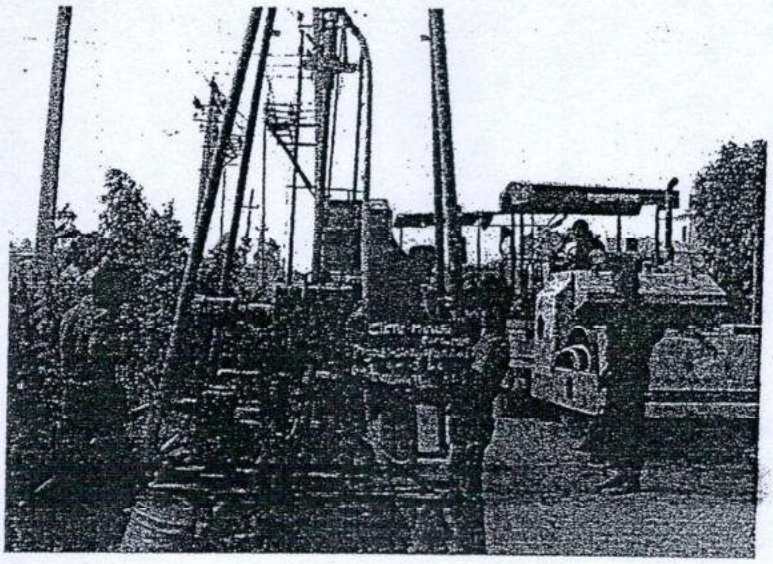
Sheetal Engineering Associates Bangalore

Shivanagar 1st Main Road Junction

1st Main

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT SHIVANAGAR CIRCLE, D.B. JUNCTION, WEST OF CHORD ROAD, BANGALORE.

JOB NO. : SEA/BBMP/MANASA/GT/SHIVANAGAR CIRCLE/041/09-10



REPORT FOR

Bruhat Bangalore Mahangara Palike
N.R. Square, Bangalore.

CONSULTANT

M/s. MANASA CONSULTANTS
Consulting Engineers and Designers
#140B, 2nd Floor, 9th Cross, Margosa Road,
Malleshwaram, Bangalore – 560003.

MAY 2009

SHEETAL ENGINEERING ASSOCIATES

(Building, Geo-Tech & Highway Material Research Laboratory)

Office :
No.43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamrajpet, Bangalore – 560 018,
Ph No: 080 – 26740503 / 9448354103
Email:bcs_sheetal@rediffmail.com

Laboratory :
No.12A, 2nd Main Road, 9th Cross,
Chamrajpet, Bangalore – 560 018,
Ph: 080 - 32449401
Email: bcs_sheetal@yahoo.com

Contents

B. Chandrashekar

SHEETAL ENGINEERING ASSOCIATES
#43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamarajpet, BANGALORE - 560 018.

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT SHIVANAGAR CIRCLE, D.B. JUNCTION, WEST OF CHORD ROAD, BANGALORE.

1. Introduction

The foundation is part of an engineered system that transmits to, and into, the underlying soil or rock the loads supported by foundation and it's self-weight. The resulting soil stresses-except at the ground surface-are in addition to those presently existing in the earth mass from its self-weight and geological history. Also the successful performance of Foundation Structure depends as much as adopting standards of good load distribution successfully to the ground.

Investigation of the underground conditions at a site is prerequisite to the economical design of the substructure elements. It is also necessary to obtain sufficient information for successful performance of foundation and substructure.

The elements of Geotechnical Site Investigation depend heavily on the project but generally should provide the following;

- Information to determine the type of foundation required (shallow or deep).
- Information to allow the geotechnical engineer to make a recommendation on the allowable load capacity of the foundation.
- Sufficient data / laboratory tests to make settlement predictions.
- Location of Ground Water Table (or determination of whether, it is in the construction zone).
- Information so that the identification and solution of construction problems.
- Identification potential problems (settlements, existing damage etc).

M/s. Manasa Consultants, Bangalore proposes to construct Under pass at Shivanagar Circle, WOC Road, Bangalore.

M/s SHEETAL ENGINEERING ASSOCIATES (Building, Geo-Tech & Highway Material Research Laboratory), Chamarajpet, Bangalore was assigned to carry out the GeoTechnical Investigation work at the above said project site locations with a view to furnish the detailed Geo-Technical Information of the nature and sub-soil strata for detailed Foundation Designs.

2. Location of Investigation Site

1. The locations of Field Geotechnical investigations were carried out at Shivanagar Circle, D.B. Junction, WOC Road, Bangalore.

The Plan Showing Location of Borehole Investigations were carried out is enclosed vide Figure No. 1 to 5.

3. Objectives and Scope of Work

3.1 Objectives

The objectives of Geo-Technical Investigation are to evaluate the following:

- To ascertain the sub-soil strata at project Site
- To study standing Ground Water Level
- To study the physical and engineering properties of soil strata
- To evaluate allowable safe bearing capacity of soils to design foundations
- To Recommend type and depth of foundation
- To recommend improvements to the weak soil strata if any

3.2. Scope of the Work

The Scope of Geo-technical Investigations includes the following Insitu and Laboratory Tests.

3.2.1. Field Investigations

i) Boring 2 Nos. of 150mm / Nx size Boreholes in all kinds of soils, Soft Rock and Hard Rock up to 10.0 m or up to 3.0 m in Bed Rock whichever encounter early using Rotary operated Drilling Rig.
ii) Determination of natural density as per IS: 2720 Part 29.
iii) Conducting field-testing such as Standard Penetration Tests as per IS: 2131-1981.
iv) Collecting Undisturbed Sand Samples as per IS: 8763 – 1978.
v) Collecting disturbed and undisturbed soil samples at Ground level in the Boreholes as per IS: 1892-1979.

3.2.2. Laboratory Testing

The scope of Laboratory Testing is as follows:

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3 / Section 1&2) - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) – 1985 & IS: 2720 (Part 6, 20, 40 & 41) - 1977.
iv) Determination of natural moisture content as per IS 2720 (Part 18) - 1978.
v) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vi) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
vii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – Part III
viii) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143.

3.3. Report

This comprises preparing a detailed report including soil profiles, physical and engineering properties of soil/rock samples based on laboratory as well as field investigation/tests, recommendations regarding allowable bearing pressure, type and depth of foundations and improvement to existing Foundation Soils, Allowable Load on Piles, type, size and depth of Piles etc and submission of Detailed Technical Report with complete relevant recommendations in Triplicate.

4.0. Schedule of Investigations

4.1. Field Investigations

To study sub-soil strata, field investigations were carried out by drilling 07 Nos. 150 mm dia Boreholes using Calyx operated Rig up to a maximum depth of 10.0 m below existing ground at the proposed project Site at the specified locations.

Plans showing location of Borehole Investigations was carried out is enclosed vide Fig. No.1.

Table 4.1 Details of Ground Level and termination depth of each Borehole

Sl. No	Investigation Locations	BH No.	Termination Depth from EGL (m)
1	Shivanagar Circle, Opp. H.K. Residence	BH 1	9.20
2	Shivanagar Circle, Opp. Variar Bakeri	BH 2	4.00

BH: Borehole through Rotary Rig

4.2 Standard Penetration Tests

Standard Penetration Tests (SPT) was conducted using split spoon sampler as per IS: 2131-1981 at various depths in Boreholes to determine 'N' values as well as relative density and stiffness of the soil.

Table 4.2 Details of SPT Tests conducted in Boreholes

Sl. No	Location Details	BH No.	SPT Depth (m) & SPT Values (Blows)					
			1.5/2.5	3.50/4.00	4.5/5.50	6.0	6.5/7.5	9.0/10.0
1	Shivanagar Circle	BH 1	10+11+14	--- REBOUND	--	--	--	--
2	Shivanagar Circle	BH 2	18+25+50	REBOUND	--	--	--	--

BH: Borehole through Rotary Rig R: Refusal (N>100 Blows for 30 cm penetrations)
UDS: Undisturbed Soil Samples R: Rebound (No Penetrations)

4.3 Sampling

4.3.1 Disturbed / Representative Soil Samples (DS/RS) and UDS Soil Samples

Disturbed/Representative samples (DS/RS) were collected during drilling and also during SPT Tests. The Representative Samples from the split spoon sampler and UDS samples using 100 mm thin walled Shelby tubes were also collected. The samples recovered were packed in polythene bags, labeled and sent to the laboratory for carrying out relevant laboratory testing.

Table 4.3 Details of Soil Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth of Sampling (m)	Type of Sampling
1	Shivanagar Circle	BH 1	1.50, 3.00	SPT
2	Shivanagar Circle	BH 2	1.50, 3.00	SPT

DS: Disturbed Soil Samples UDS: Undisturbed Soil Samples

4.3.2 Rock Core Samples

Rock Core Samples were collected during field investigations, labeled and numbered and arranged in Core Boxes. The collected Rock Core Samples along with Core Boxes were sent to the laboratory for testing.

Table 4.4 Details of Rock Core Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth (m)	Core Recovery (%)	RQD (%)
1	Shivanagar Circle	BH 1	--	--	-
2	Shivanagar Circle	BH 2	4.00	31.6	0.00

4.4 Water Table Level

During field investigations the standing Water Table levels were studied and recorded in the Borehole log vide Table Nos. 6.3 to 6.7.

5.5 Cohesive Strength and Friction Angle

The Cohesive strength of underlain of sub soil observed is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.6 Differential Free Swelling Index

The Free Swelling Index of underlain of Soil / Sand observed is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.7. Rock Depth or Refusal Strata

The details of SDWR and Soft Rock Gneiss Rock is encountered at different depths below existing bed level and indicated in the Borehole logs.

5.8. Water Table Level

The details of Water Table encountered during field investigations are indicated in the Borehole logs.

Table 5.1 Details of Ground Water Table depth

Sl. No	Bridge Details	BH No.	Water Table Depth from EGL (m)
1	Shivanagar Circle	BH 1	1.20
2	Shivanagar Circle	BH 2	0.30

6.0. Recommendations

6.1 Allowable Safe Bearing Capacity of Soils, Soft Weathered Rock (SDWR) and Soft Rock

The safe bearing pressure of soil has been evaluated as per IS 6403-1982, IS 8009 part I-1993, IS 1904 as per Terzaghi / Thomlinson's Theory, based on 'N' values (Teng's) Theory considering the following criteria.

i) Local Shear failure condition
ii) Settlement criteria: Based on 'N' values as per IS 8009
iii) Unconfined Compressive Strength of Rock Core

RCC Open / Strip Foundation may be adopted through and allowable Safe Bearing Capacity for minimum 3.0 m width of Footing and Foundations.

Table 6.1 Recommended Safe Bearing Capacity of Soils, SDWR and Soft Rock

No	BH No.	Depth below EGL (m)	Type of strata	Recommended Bearing Capacity (T/Sq.m)	
				Ultimate Bearing Capacity	Safe Bearing Capacity
SHIVANAGAR CIRCLE					
1	BH 1	2.00	Reddish sandy soil	38.83	15
2	BH 1	3.00	Yellowish Brown soft Rock	62.50	25
3	BH 1	4.50	Greenish Brown soft Rock	68.50	27
4	BH 1	6.00	Greenish Brown soft Rock	70.00	28

SHIVANAGAR CIRCLE					
1	BH 2	1.50	Brownish Yellowish Sandy Soil	38.83	15
2	BH 2	3.00	Brownish Yellowish Sandy Soil	45.00	18
3	BH 2	4.00	Whitish Black Hard Rock	1850	225.00

FS in Soils / Sand = 2.5 FS in SDWR = 2.5 FS in Soft & hard rock = 8.00

Sheetal Engineering Associates Bangalore

6.2. Additional Recommendations

- The minimum confined depth of foundation shall be 2.0 m for open Foundations in soils or SDWR.
- Necessary Ground anchor shall be provided by Soft Rock and Hard Rock.

Table - 6.1 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at Shivangar Cilce, O.B. Junction, West of Chord Road, Bangalore.

Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.

Consultant : M/s. Manasa Consultants, Bangalore

Location : Shivangar Circle

Borehole No : BH 1

Method : Rotary Boring through Calyx Rig

Date of Execution : 04.05.2009

Ground Water Level :

Borehole Level : Not Known

Borehole Termination Depth : 9.20 m

Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis			LL	PI	FSI	IS / AASHTO Classific-ation	Insitu Moisture Content	Insitu Density	Triaxial Strength Parameters	
				Gravel	Sand	Silt + Clay							Cohesive Strength (Cu)	Angle of Internal Friction (ϕ cu)
				%	%	%	%	%			%	gm / cc	kg / cm^2	degrees
0.000		Reddish Sandy Soil	DS @ 1.0 m	6.50	60.50	33.00	26.00	NP	NP	SP A-3	6.20	1.84	0.00	27.00
0.500														
1.000														
1.500			SPT @ 1.5 m N = 10+11+14											
1.900														
2.000														
2.500														
3.000														
			Type of Samples	Core Length	Core Recovery	RQD	Type of Rock		Sp. Gr.	Water Absorption	Unit Weight	UCC Strength (Unsaturated)	UCC Strength (saturated)	Remarks
				(cms)	%	%				%	(gm / cc)	T / m2	T / m2	
		Yellowish Brown Soft Rock												
4.000														
4.500														
5.000														
6.000		Greenish Black Soft Rock												
7.000														
7.500														
8.000		Yellowish Black Medium Rock												
9.200														

Sheetal Engineering Associates Bangalore

Table - 6.2 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at Shivangar Circe, D.B. Junction, West of Chord Road, Bangalore.
Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.
Consultant : M/s. Manasa Consultants, Bangalore
Location : Shivangar Circle
Borehole No : BH 2
Method : Rotary Boring through Calyx Rig

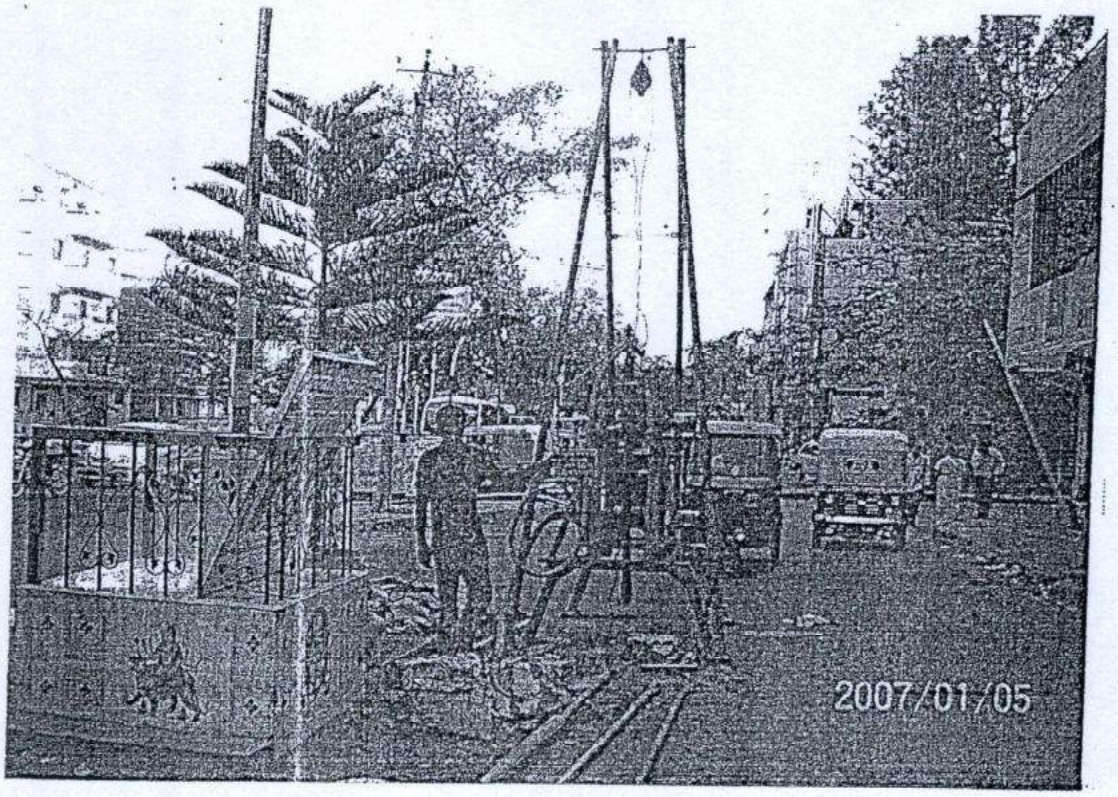
Date of Execution : 05.05.2009
Ground Water Level :
Borehole Level : Not Known
Borehole Termination Depth : 4.00m
Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis			LL	PI	FSI	IS / AASHTO Classific-	Insitu Moisture Content	Insitu Density	Triaxial Strength Parameters	
				Gravel	Sand	Silt + Clay							Cohesive Strength (Cu)	Angle of Internal Friction
				%	%	%	%	%			%	gm / cc	kg / cm²	degrees
0.000		Reddish Sandy Soil	DS at 1.00 m											
0.500														
1.000														
1.500			SPT @ 1.5 m N = 18+25+50	5.00	80.20	14.80	25.00	NP	NP	SP A-3	8.00	1.85	0.00	28.00 Direct Shear
2.000		Brownish Yellowish Sandy Soil	DS at 2.00 m											
2.500														
3.000														

Depth Below Ground (m)	Legend	Sub Soil Strata	Type of Samples	Core Length	Core Recovery	RQD	Type of Rock	Sp. Gr.	Water Absorption	Unit Weight	UCC Streagth (Unsaturated)	UCC Strength (saturated)	Remarks
				(cms)	%	%			%	(gm / cc)	T / m2	T / m2	
4.000		Whitish Black Hard Rock	Rock core Sample	6.2 7.9 8.4 9.1	31.6	0	Charnokite	2.71	0.55	2.75	1850		Medium Rock

Sheetal Engineering Associates Bangalore

PHOTOS



SHIVANAGAR CIRCLE, D.B. JUNCTION, WOC ROAD/ BH-1

SHIVANAGAR CIRCLE, D.B. JUNCTION, WOC ROAD/ BH-2

Annexure 1.1 to 1.6

Specimen SBC and Settlement Calculations : BH 1 at 1.50 m

Terzaghi's Bearing Capacity Factors :

ϕ	Nc	Nq	Nγ
0	5.70	1.00	0.00
5	7.30	1.69	0.50
10	9.60	2.70	1.20
15	12.90	4.40	2.50
20	17.70	7.40	5.00
25	25.10	12.70	9.70
30	37.20	22.50	19.70
34	52.60	36.50	30.00
35	57.80	41.40	42.40
40	95.70	81.30	100.40
45	172.30	173.30	297.50
48	258.30	287.90	780.10
50	347.50	415.10	1153.20

Water Table Correction Factors:

Wq	Wr
1.00	1.00

(No Water Table is Encountered)

0.50	0.50

(If Water Table touches the FL)

1.1 SAFE BEARING CAPACITY BASED ON TERZAGHI'S THEORY :

a) Calculation of Bearing Capacity Factors:

ϕ	Nc	Nq	Nγ
28	32.36	18.58	15.7

Na= SPT = 50

b) Calculation of SBC :

UBC (kg/Sq.cms) = 1.3 CNc + 0.5*γ*D*Wq*Nq +0.4 * γ*B*Wγ *Nγ

C	ϕ	γ	L	B	D	Nc
0	28	0.00185	1290	2400	150	70
(Kg/Sq.cms)	(degrees)	(kg/Cu.cms)	(cms)	(cms)	(cms)	(Blows)

UBC(T/Sq.m)	SBC(T/Sq.m)
100.71585	40.28634
(T/Sq.mts)	(T/Sq.mts)

1.2. SAFE BEARING CAPACITY BASED ON TENG'S THEORY :

N = Standard Penetration Number = 50

Q safe = 0.0167*N*B*Wq + 0.027*(100+N*N)*D*Wγ = 68.56575 (T/Sq.mts)

1.3. SAFE SETTLEMENT PRESSURE BASED ON TENG'S THEORY :

Rd = Depth Correction Factor = 1+(0.2D/B) <= 1.2 1.023

Qssp (T/Sq.m) = 3.5 (N-3)*((B+0.3)/(2B)) **2 Wγ Rd 1.023

Qssp (T/Sq.m) = 3.5x(50-3)*((1290+0.3)/2x1290)^2x1x1.02325581395 44.062

1.4. SAFE BEARING CAPACITY AS PER IS 6403 -1982 :

ϕ	Nc	Nq	Nγ
0	5.14	1.00	0.00
5	6.50	1.60	0.40
10	8.30	2.50	1.20
15	11.00	3.90	2.60
20	14.80	6.40	5.40
25	20.70	10.70	10.90
30	30.10	18.40	22.40
32	35.50	23.20	30.20
34	42.20	29.40	41.00
36	50.60	37.80	56.50
38	61.40	48.90	78.00
40	75.30	64.20	109.40
45	133.90	134.90	270.00
50	319.100	319.10	763.00

a) Bearing Capacity Factors (IS 6403):

ϕ	Nc	Nq	Nγ
28	26.34	15.32	17.8

b) Water Table Correction Factors:

Water Table may rise to founding level in

Wq	Wr
0.50	0.50

c) Depth Factors:

Dc = 1.03870417 Dq=Dγ= 1.01935209

d) Shape Factors:

Sc =	1.12	for Square & circle
Sq =	1.06	for Square & circle
Sγ =	0.60	for Square

e) Load Inclination Factors:

Ic =	1.00
Iq =	1.00
Iγ =	1.00

Qult (T/Sq.m) = C Nc Sc Dc Ic +q (Nq-1) Sq Dq iq Wq+ 0.5 γ B Nγ Sγ Iγ Wγ

Qult (T/Sq.m) = 86.38

(The Factor of Safety is recommended as per the Type of Soil, Type of footing and

Factor of Safety = 2.5 Qsafe = Qult/FS = 34.552

Minimum of the Above Three SBC (T/Sq.m) =	(T/Sq.m) 34.55	34.60

Actual Recommended = 15 15.00 T/Sq.m

(Minimum of Above four methods)

1.5. ALLOWABLE SETTLEMENT AS PER IS 8009 -1982 BASED ON N VALUES :

For Nc=70Blows B = 12.9m Settlement Factor = 0.015

Recommended SBC = 15.00T/Sq.m = 1.50 kg/Sq.cms

Allowable Settlement (mm) = 22.50 < 50 mm as per IS 1904, Hence Safe

Hence the Foundation is safe against allowable settlement of 50 mm with 15.00 T/sq.m SBC as per IS 1904

1.6 : SBC of Rock Based on UCC Strength of Rock at 3.0 m

SBC OF ROCK as Per UCC STRENGTH OF ROCK

Crushing Strength of Rock = 1850.00 T/Sq.m

Factor of Safety in Rock = 8.00

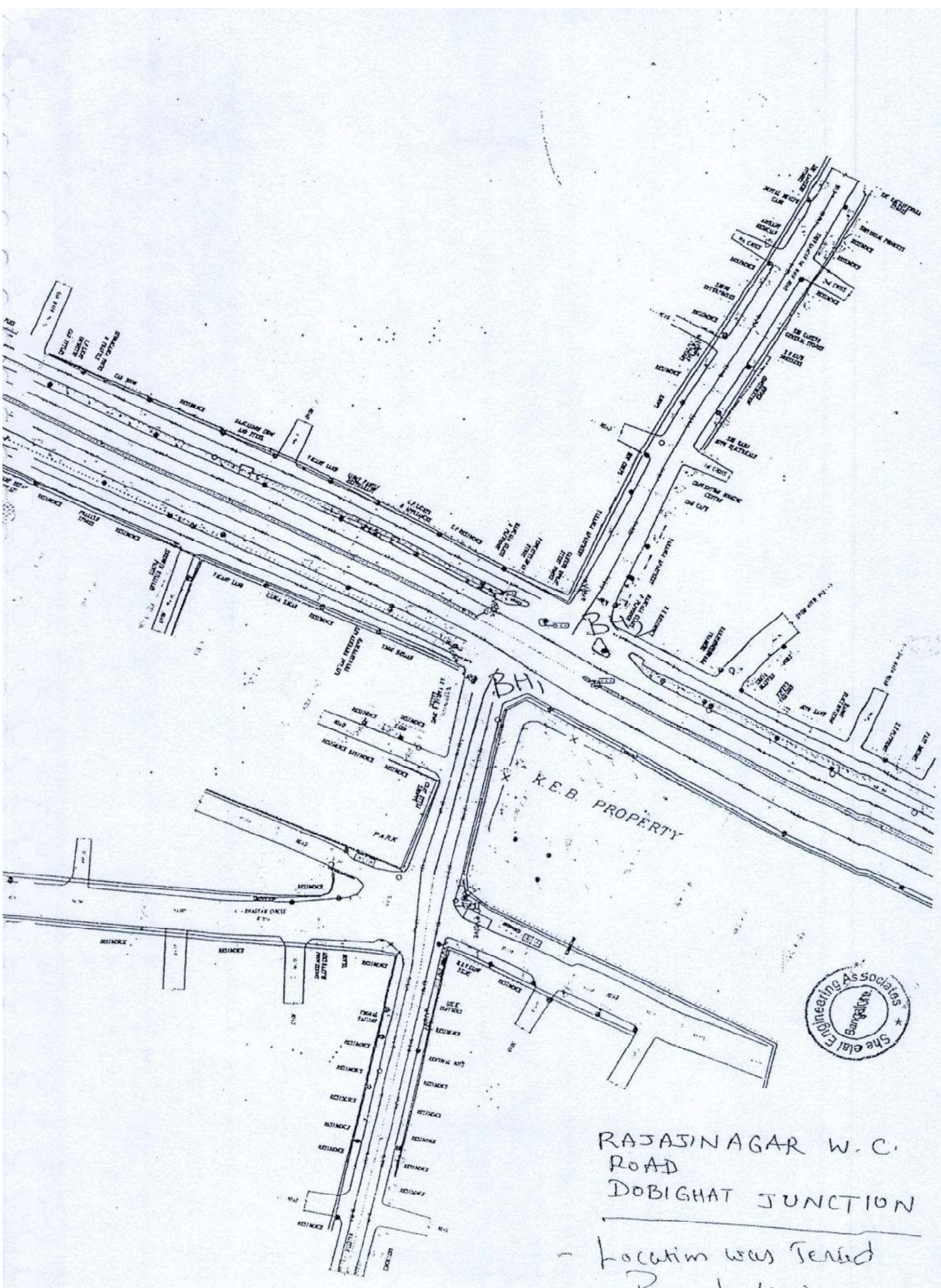
SBC of Rock = Crushing Strength / FS = 231.25 T/Sq.m

Recommended SBC of Rock as per IRC 78 = 225.00 T/Sq.m

Sheetal Engineering Associates Bangalore

References

1. SP 36- part I-1987., " Compendium of Indian Standards on Soil Engineering " – Laboratory Testing of soils.
2. SP 36-part II-1988., "Compendium of Indian Standards on Soil Engineering "- Field Testing of soils for civil Engineering purposes.
3. Lambe and Whitman. "Soil Testing" manual and handbook.
4. K.R.Arora., "Soil Mechanics and Foundation Engineering " A Textbook of standard publications, New Delhi
5. Gopal Ranjan And ASR Rao., "Basic And Applied Soil Mechanics " A Textbook of New Age International publications, New Delhi.
6. B.C. Punmia., " Soil Mechanics and Foundations " A text Book, Laxmi publications New Delhi.
7. M.J. Thomson., "Foundation Engineering" Wiley Eastern Publishers, New Delhi.
8. Joseph E Bowles., "Foundation Analysis and Design" McGraw-Hill Companies, Inc, New Delhi.
9. Jumkis "Rock Mechanics" Text book, affiliated East West Pvt ltd. New Delhi.
10. Manfred R Haussman "Engineering Principles of Ground Modifications" Text book, McGraw Hill Publishing Co., Singapore
11. IS 11315-part 11: Method for Quantitative Description of discontinuities in Rock masses – Core recovery and rock quality.
12. IS 11315- part12: Method for quantitative Description of discontinuities in rock masses – Drill Core Study.
13. IS 1904 : Code of Practice For Design and Construction of Foundations in Soils: General Requirements
14. IS 8009 – Part I : Estimation of Allowable Settlement of Shallow Foundations
15. IS 6403 – 1982 : Estimation of Allowable Bearing Pressure of Shallow Foundations
16. Soil Survey of India Maps.
17. Geological Survey of India Maps.



RAJAJINAGAR W.C. ROAD
DOBIGHAT JUNCTION

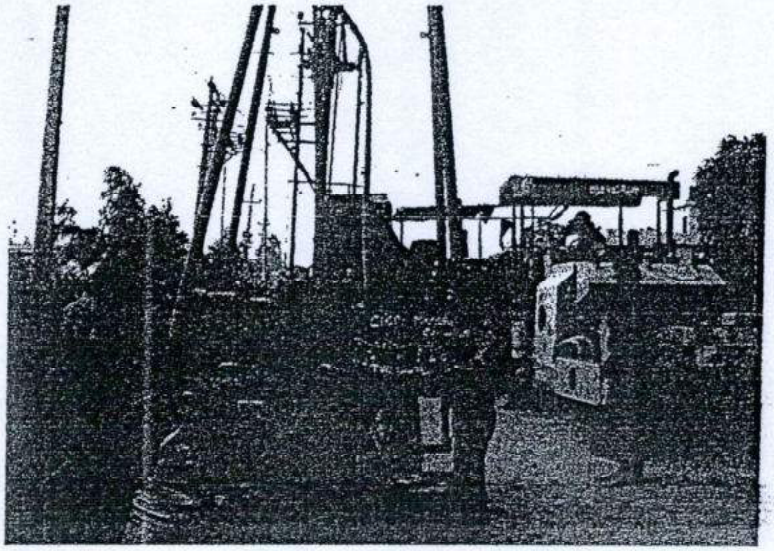
- Location was Tested Bore holes

Basaveshwara Nagar 1st Main Road

Junction

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT BASAVESHWARANAGAR MAIN ROAD JUNCTION, RAJAJINAGAR, WEST OF CHORD ROAD, BANGALORE.

JOB NO. : SEA/BBMP/MANASA/GT/Basaveshwaranagar Main Road Junction/043/09-10



REPORT FOR

Bruhat Bangalore Mahangara Palike
N.R. Square, Bangalore.

CONSULTANT

M/s. MANASA CONSULTANTS
Consulting Engineers and Designers
#140B, 2nd Floor, 9th Cross, Margosa Road,
Malleshwaram, Bangalore – 560003.

MAY 2009

SHEETAL ENGINEERING ASSOCIATES
(Building, Geo-Tech & Highway Material Research Laboratory)

Office :
No.43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamrajpet, Bangalore – 560 018,
Ph No: 080 – 26740503 / 9448354103
Email:bcs_sheetal@rediffmail.com

Laboratory :
No.12A, 2nd Main Road, 9th Cross,
Chamrajpet, Bangalore – 560 018,
Ph: 080 - 32449401
Email: bcs_sheetal@yahoo.com

Contents

B. Chandrashekar

SHEETAL ENGINEERING ASSOCIATES
43, Ground Floor, 2nd Cross, R.C. Agrahara,
Chamarajpet, BANGALORE - 560 018.

REPORT ON GEOTECHNICAL INVESTIGATION FOR PROPOSED CONSTRUCTION OF UNDERPASS AT BASAVESHWARANAGAR MAIN ROAD JUNCTION, RAJAJINAGAR, WEST OF CHORD ROAD, BANGALORE.

1. Introduction

The foundation is part of an engineered system that transmits to, and into, the underlying soil or rock the loads supported by foundation and it's self-weight. The resulting soil stresses-except at the ground surface-are in addition to those presently existing in the earth mass from its self-weight and geological history. Also the successful performance of Foundation Structure depends as much as adopting standards of good load distribution successfully to the ground.

Investigation of the underground conditions at a site is prerequisite to the economical design of the substructure elements. It is also necessary to obtain sufficient information for successful performance of foundation and substructure.

The elements of Geotechnical Site Investigation depend heavily on the project but generally should provide the following;

- Information to determine the type of foundation required (shallow or deep).
- Information to allow the geotechnical engineer to make a recommendation on the allowable load capacity of the foundation.
- Sufficient data / laboratory tests to make settlement predictions.
- Location of Ground Water Table (or determination of whether, it is in the construction zone).
- Information so that the identification and solution of construction problems.
- Identification potential problems (settlements, existing damage etc).

M/s. Manasa Consultants, Bangalore proposes to construct under pass at Basaveshwaranagar Main Road Junction, Rajajinagar, West of Chord Road, Bangalore.

M/s SHEETAL ENGINEERING ASSOCIATES (Building, Geo-Tech & Highway Material Research Laboratory), Chamarajpet, Bangalore was assigned to carry out the GeoTechnical Investigation work at the above said project site locations with a view to furnish the detailed Geo-Technical Information of the nature and sub-soil strata for detailed Foundation Designs.

2. Location of Investigation Site

1. The locations of Field Geotechnical investigations were carried out at Basaveshwaranagar Main Road Junction, Rajajinagar, West of Chord Road, Bangalore.

The Plan Showing Location of Borehole Investigations were carried out is enclosed vide Figure No. 1 to 5.

3. Objectives and Scope of Work

3.1 Objectives

The objectives of Geo-Technical Investigation are to evaluate the following:

- To ascertain the sub-soil strata at project Site
- To study standing Ground Water Level
- To study the physical and engineering properties of soil strata
- To evaluate allowable safe bearing capacity of soils to design foundations
- To Recommend type and depth of foundation
- To recommend improvements to the weak soil strata if any

3.2. Scope of the Work

The Scope of Geo-technical Investigations includes the following Insitu and Laboratory Tests.

3.2.1. Field Investigations

i) Boring 2 Nos. of 150mm / Nx size Boreholes in all kinds of soils, Soft Rock and Hard Rock up to 10.0 m or up to 3.0 m in Bed Rock whichever encounter early using Rotary operated Drilling Rig.
ii) Determination of natural density as per IS: 2720 Part 29.
iii) Conducting field-testing such as Standard Penetration Tests as per IS: 2131-1981.
iv) Collecting Undisturbed Sand Samples as per IS: 8763 – 1978.
v) Collecting disturbed and undisturbed soil samples at Ground level in the Boreholes as per IS: 1892-1979.

3.2.2. Laboratory Testing

The scope of Laboratory Testing is as follows:

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3 / Section 1&2) - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) – 1985 & IS: 2720 (Part 6, 20, 40 & 41) - 1977.
iv) Determination of natural moisture content as per IS 2720 (Part 18) - 1978.
v) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vi) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
vii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – Part III
viii) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143.

3.3. Report

This comprises preparing a detailed report including soil profiles, physical and engineering properties of soil/rock samples based on laboratory as well as field investigation/tests, recommendations regarding allowable bearing pressure, type and depth of foundations and improvement to existing Foundation Soils, Allowable Load on Piles, type, size and depth of Piles etc and submission of Detailed Technical Report with complete relevant recommendations in Triplicate.

4.0. Schedule of Investigations

4.1. Field Investigations

To study sub-soil strata, field investigations were carried out by drilling 07 Nos. 150 mm dia Boreholes using Calyx operated Rig up to a maximum depth of 10.0 m below existing ground at the proposed project Site at the specified locations.

Plans showing location of Borehole Investigations was carried out is enclosed vide Fig. No.1.

Table 4.1 Details of Ground Level and termination depth of each Borehole

Sl. No	Investigation Locations	BH No.	Termination Depth from EGL (m)
1	Basaveshwaranagar Main Road Junction	BH 1	7.00
2	Basaveshwaranagar Main Road Junction	BH 2	7.00

BH: Borehole through Rotary Rig

4.2 Standard Penetration Tests

Standard Penetration Tests (SPT) was conducted using split spoon sampler as per IS: 2131-1981 at various depths in Boreholes to determine 'N' values as well as relative density and stiffness of the soil.

Table 4.2 Details of SPT Tests conducted in Boreholes

Sl. No	Location Details	BH No.	SPT Depth (m) & SPT Values (Blows)					
			1.5/2.5	3.00	4.5/5.50	6.0	6.5/7.5	9.0/10.0
1	Basaveshwaranagar Main Road Junction	BH 1	10+12+15	12+15+18	18+19+24	--	--	--
2	Basaveshwaranagar Main Road Junction	BH 2	6+8+12	9+13+16	13+18+22	--	--	--

BH: Borehole through Rotary Rig R: Refusal (N>100 Blows for 30 cm penetrations)
UDS: Undisturbed Soil Samples R: Rebound (No Penetrations)

4.3 Sampling

4.3.1 Disturbed / Representative Soil Samples (DS/RS) and UDS Soil Samples

Disturbed/Representative samples (DS/RS) were collected during drilling and also during SPT Tests. The Representative Samples from the split spoon sampler and UDS samples using 100 mm thin walled Shelby tubes were also collected. The samples recovered were packed in polythene bags, labeled and sent to the laboratory for carrying out relevant laboratory testing.

Table 4.3 Details of Soil Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth of Sampling (m)	Type of Sampling
1	Basaveshwaranagar Main Road Junction	BH 1	1.50, 3.00, 4.50	SPT
2	Basaveshwaranagar Main Road Junction	BH 2	1.50, 3.00, 4.50	SPT

DS: Disturbed Soil Samples UDS: Undisturbed Soil Samples

4.3.2 Rock Core Samples

Rock Core Samples were collected during field investigations, labeled and numbered and arranged in Core Boxes. The collected Rock Core Samples along with Core Boxes were sent to the laboratory for testing.

Table 4.4 Details of Rock Core Samples collected from Boreholes

Sl. No	Bridge Details	BH No.	Depth (m)	Core Recovery (%)	RQD (%)
1	Basaveshwaranagar Main Road Junction	BH 1	--	--	-
2	Basaveshwaranagar Main Road Junction	BH 2	--	--	--

4.4 Water Table Level

During field investigations the standing Water Table levels were studied and recorded in the Borehole log vide Table Nos. 6.3 to 6.7.

4.5 Ground Topography, Geology of the area and Sub-soil Details

The ground topography, geology at the Site location and sub-soil details at the Site location on Rajajinagar, West of Chord Road to Basaveswaranagar Main Road Junction Road was studied and recorded in the Borehole logs.

4.6 Laboratory Tests

The following laboratory tests were conducted on the collected disturbed, undisturbed soil samples and Rock Core Samples.

i) Grain Size Analysis as per IS: 2720 (Part 4) – 1985.
ii) Specific Gravity as per IS: 2720- (Part 3)/Section 1 - 1980 and IS: 2720 – (Part 3)/Section 2 - 1980.
iii) Atterberg Limits as per IS: 2720 (Part 5) - 1985, IS: 2720 (Part 6, 20, 40 and 41) - 1977.
iv) Determination of natural moisture content as per IS: 2720 (Part 18) - 1978.
v) Determination of natural density as per IS: 2720 (Part 29)
vi) Determination Differential Free Swelling Index as per IS: 2720 (Part 40) - 1977
vii) Determination of Triaxial Strength tests by CU method as per IS: 2720 – (Part 10) - 1973
viii) Determination of Unit Weight, Specific Gravity and Water Absorption of Rock Core Samples as per IS: 2386 – (Part 3)
ix) Determination of Unconfined Compressive Strength of Rock Core Samples as per IS: 9143

5.0 Results and Discussions

The results of field investigations and laboratory tests are presented in Borehole logs cum sub-soil profile and laboratory tests results.

5.1. Soil Profile and Classification

The ground topography at the Bridge Site locations is fairly level and slightly varying from Location to locations. General Subsoil profile is interpreted from borehole. For this purpose whenever necessary, field borehole logs have been corrected on the basis of laboratory tests conducted on samples.

- Top Ground Soil: Brownish Sand y Clay (SC) / Brownish Silty Sand (SM) / Brownish Silt with Low Compressibility (ML)
- Underlain Strata 1: Brownish / Whitish Soft Disintegrated Weathered Rock.(SDWR)
- Deeper Strata: Grayish / Whitish Soft Rock (Gneiss)

5.2. Standard Penetration Number

The results of SPT test at all the boreholes s at various depths confirm that the Soil / Sandy Strata is medium stiff and Rocky strata are soft. The observed 'N' values at all the Boreholes locations are indicated on the borehole logs cum sub-soil profiles (Tables 6.3 to 6.7.)

5.3. Specific Gravity

The specific Gravity of Soil / Sand is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

5.4. Liquid Limit and Plastic Limit

The Liquid Limit of sub soil is indicated in the Borehole Log cum Lab Test Results vide Table Nos. 6.3 to 6.7.

3	BH 1	3.00	Brownish Gravely Soil	55.00	22
4	BH 1	4.50	Brownish Gravely Soil	60.00	24
5	BH 1	6.00	Blackish Whitish Fractured weathered Rock	70.00	28

BASAVESHWARANAGAR MAIN ROAD JUNCTION					
1	BH 2	1.50	Brownish Whitish Gravely Soil	45.00	18
2	BH 2	2.00	Brownish Whitish Gravely Soil	50.00	20
2	BH 2	3.00	Brownish Whitish Yellowish Weathered Rock	55.00	22
3	BH 2	4.50	Brownish Whitish Gravely Soil	60.00	24
4	BH 2	6.00	Yellowish Whitish Weathered Rock	70.00	28

FS in Soils / Sand = 2.5 FS in SDWR = 2.5 FS in Soft & hard rock = 8.00

Sheetal Engineering Associates Bangalore

6.2. Additional Recommendations

- The minimum confined depth of foundation shall be 2.0 m for open Foundations in soils or SDWR.
- Necessary Ground Anchor shall be provided by Soft Rock or Hard Rock.

Table - 6.1 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at Basaveshwaranagar Main Road Junction, Rajajinagar, West of Chord Road, Bangalore.

Date of Execution : 06.05.2009

Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.

Consultant : M/s. Manasa Consultants, Bangalore

Location : Basaveshwaranagar Main Road Junction

Ground Water Level :

Borehole Level : Not Known

Borehole No : BH 1

Method : Rotary Boring through Calyx Rig

Borehole Termination Depth : 7.00m

Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis			LL	PI	FSI	IS / AASHTO Classific-ation	Insitu Moisture Content	Insitu Density	Triaxial Strength Parameters	
				Gravel	Sand	Silt + Clay							Cohesive Strength (Cu)	Angle of Internal Friction (ϕ_{cu})
				%	%	%	%	%			%	gm / cc	kg / cm^2	degrees
0.000		Brownish Whitish Gravely Soil	DS @ 1.0 m											
0.500														
1.000														
1.500			SPT @ 1.5 m N = 10+12+15	10.0	62.0	28.0	27.2	NP	NP	SM A-2-4	9.1	1.9	0.0	25.5
3.000		Brownish Gravely soil	SPT @ 3.0m N = 12+15+18											
4.500			SPT @ 4.50m N = 18+19+24											
			Type of Samples	Core Length	Core Recovery	RQD	Type of Rock		Sp. Gr.	Water Absorption	Unit Weight	UCC Strength (Unsaturated)	UCC Strength (saturated)	Remarks
		Blackish Whitish soft Fractured Weathered Rock		(cms)	%	%				%	(gm / cc)	T / m2	T / m2	
6.000			WASHED SAMPLE											
		Blackish Whitish soft Fractured Weathered Rock												
7.000														

Sheetal Engineering Associates Bangalore

Table - 6.2 Borehole Log, Sub-Soil Profile & Laboratory Test Results

Subject : Geotechnical Investigation was carried out for Construction of Underpass at
Client : M/s. Bruhat Bangalore Mahanagara Palike, Bangalore.
Consultant : M/s. Manasa Consultants, Bangalore
Location : Basaveshwaranagar Main Road Junction

Borehole No : BH 2
Method : Rotary Boring through Calyx Rig

Date of Execution : 06.05.2009
Ground Water Level :
Borehole Level : Not Known
Borehole Termination Depth : 7.00m
Page No / Sheet No : 1 of 1

Depth Below Ground (m)	Legend	Sub Soil Strata	Sample Type / SPT Value	Grain Size Analysis			LL	PI	FSI	IS / AASHTO Classification	Insitu Moisture Content	Insitu Density	Triaxial Strength Parameters	
				Gravel	Sand	Silt + Clay							Cohesive Strength (Cu)	Angle of Internal Friction (ϕ cu)
				%	%	%	%	%			%	gm / cc	kg / cm^2	degrees
0.000														
0.500		Brownish Whitish Gravely Soil												
1.000			DS @ 1.0 m											
1.500			SPT @ 1.5 m N = 6+8+12	9.50	57.20	33.30	30.00	NP	NP	SM A-2-4	6.85	1.88	0.00	26.00
		Brownish Whitish Yellowish Weathered Rock												
3.000			SPT @ 3.0m N = 9+13+16											
		Brownish Whitish Gravely Soil												
4.500			SPT @ 4.50m N = 13+18+22											
			Type of Samples	Core Length	Core Recovery	RQD	Type of Rock		Sp. Gr.	Water Absorption	Unit Weight	UCC Strength (Unsaturated)	UCC Strength (saturated)	Remarks
				(cms)	%	%				%	(gm / cc)	T / m2	T / m2	
		Yellowish Whitish Fractured Weathered Rock												
6.000														
		Yellowish Whitish Fractured Weathered Rock	WASHED SAMPLE											
7.000														

Shestal Engineering Associates Bangalore

References

1. SP 36- part I-1987., " Compendium of Indian Standards on Soil Engineering " – Laboratory Testing of soils.
2. SP 36-part II-1988., "Compendium of Indian Standards on Soil Engineering "- Field Testing of soils for civil Engineering purposes.
3. Lambe and Whitman. "Soil Testing" manual and handbook.
4. K.R.Arora., "Soil Mechanics and Foundation Engineering " A Textbook of standard publications, New Delhi
5. Gopal Ranjan And ASR Rao., "Basic And Applied Soil Mechanics " A Textbook of New Age International publications, New Delhi.
6. B.C. Punmia., " Soil Mechanics and Foundations " A text Book, Laxmi publications New Delhi.
7. M.J. Thomson., "Foundation Engineering" Wiley Eastern Publishers, New Delhi.
8. Joseph E Bowles., "Foundation Analysis and Design" McGraw-Hill Companies, Inc, New Delhi.
9. Jumkis "Rock Mechanics" Text book, affiliated East West Pvt ltd. New Delhi.
10. Manfred R Haussman "Engineering Principles of Ground Modifications" Text book, McGraw Hill Publishing Co., Singapore
11. IS 11315-part 11: Method for Quantitative Description of discontinuities in Rock masses – Core recovery and rock quality.
12. IS 11315- part12: Method for quantitative Description of discontinuities in rock masses – Drill Core Study.
13. IS 1904 : Code of Practice For Design and Construction of Foundations in Soils: General Requirements
14. IS 8009 – Part I : Estimation of Allowable Settlement of Shallow Foundations
15. IS 6403 – 1982 : Estimation of Allowable Bearing Pressure of Shallow Foundations
16. Soil Survey of India Maps.
17. Geological Survey of India Maps.

Annexure 1.1 to 1.6

Specimen SBC and Settlement Calculations : BH 1 at 1.50 m Depth

Terzaghi's Bearing Capacity Factors :

ϕ	Nc	Nq	Nγ
0	5.70	1.00	0.00
5	7.30	1.60	0.50
10	9.60	2.70	1.20
15	12.90	4.40	2.50
20	17.70	7.40	5.00
25	25.10	12.70	9.70
30	37.20	22.50	19.70
34	52.60	36.50	30.00
35	57.80	41.40	42.40
40	95.70	81.30	100.40
45	172.30	173.30	297.50
48	258.30	287.90	780.10
50	347.50	415.10	1153.20

Water Table Correction Factors

Wq	Wr
1.00	1.00

(No Water Table is Encountered)

Wq	Wr
0.50	0.50

(If Water Table touches the FL)

1.1 SAFE BEARING CAPACITY BASED ON TERZAGHI'S THEORY :

a) Calculation of Bearing Capacity Factors:

ϕ	Nc	Nq	Nγ
25	27.52	14.66	11.7

Na= SPT = 27

b) Calculation of SBC :

UBC (kg/Sq.cms) = 1.3 CNc + 0.5*γ*D*Wq*Nq +0.4 * γ *B*Wγ *Nγ

C	ϕ	γ	L	B	D	Nc
0	26	0.00188	1290	2400	150	37.8
(Kg/Sq.cms)	(degrees)	(kg/Cu.cms)	(cms)	(cms)	(cms)	(Blows)

UBC(T/Sq.m)	SBC(T/Sq.m)
77.42028	30.96811
(T/Sq.mts)	(T/Sq.mts)

1.2. SAFE BEARING CAPACITY BASED ON TENG'S THEORY :

N = Standard Penetration Number = 27

Q safe = 0.0167*N*B*Wq + 0.027*(100+N*N)*D*Wγ = 23.053005 (T/Sq.mts)

1.3. SAFE SETTLEMENT PRESSURE BASED ON TENG'S THEORY :

Rd = Depth Correction Factor = 1+(0.2D/B) <= 1.2 1.023

1.023

Qssp (T/Sq.m) = 3.5 (N-3)*((B+0.3)/(2B)) **2 Wγ Rd

Qssp (T/Sq.m) = 3.5x(27-3)((1290+0.3)/2x1290)^2x1x1.0232558139 22.5

1.4. SAFE BEARING CAPACITY AS PER IS 6403 -1982 :

ϕ	Nc	Nq	Nγ
0	5.14	1.00	0.00
5	6.50	1.60	0.40
10	8.30	2.50	1.20
15	11.00	3.90	2.60
20	14.80	6.40	5.40
25	20.70	10.70	10.90
30	30.10	18.40	22.40
32	35.50	23.20	30.20
34	42.20	29.40	41.00
36	50.60	37.80	56.50
38	61.40	48.90	78.00
40	75.30	64.20	109.40
45	133.90	134.90	270.00
50	319.100	319.10	763.00

a) Bearing Capacity Factors (IS 6403):

ϕ	Nc	Nq	Nγ
25	20.7	10.7	10.9

b) Water Table Correction Factors:

Water Table may rise to founding level in

Wq	Wr
0.50	0.50

c) Depth Factors:

Dc = 1.03721708 Dq=Dγ= 1.01660854

d) Shape Factors:

Sc = 1.10 for Square & circle
Sq = 1.05 for Square & circle
Sγ = 0.60 for Square

e) Load Inclination Factors:

Ic = 1.00
Iq = 1.00
Iγ = 1.00

Qult (T/Sq.m) = C Nc Sc Dc Ic +q (Nq-1) Sq Dq iq Wq+ 0.5 γ B Nγ Sγ Iγ Wγ

Qult (T/Sq.m) = 55.04

(The Factor of Safety is recommended as per the Type of Soil, Type of footing and

Factor of Safety = 2.5 Qsafe = Qult/FS = 22.016

(T/Sq.m)

Minimum of the Above Three SBC (T/Sq.m) = 22.02 22.00

Actual Recommended = 18 18.00 T/Sq.m

(Minimum of Above four methods)

1.5. ALLOWABLE SETTLEMENT AS PER IS 8009 -1982 BASED ON N VALUES :

NC=37.8 B = 12.9 m Settlement Factor = 0.018

Recommended SBC = 18.00T/Sq.m = 1.80 kg/Sq.cms

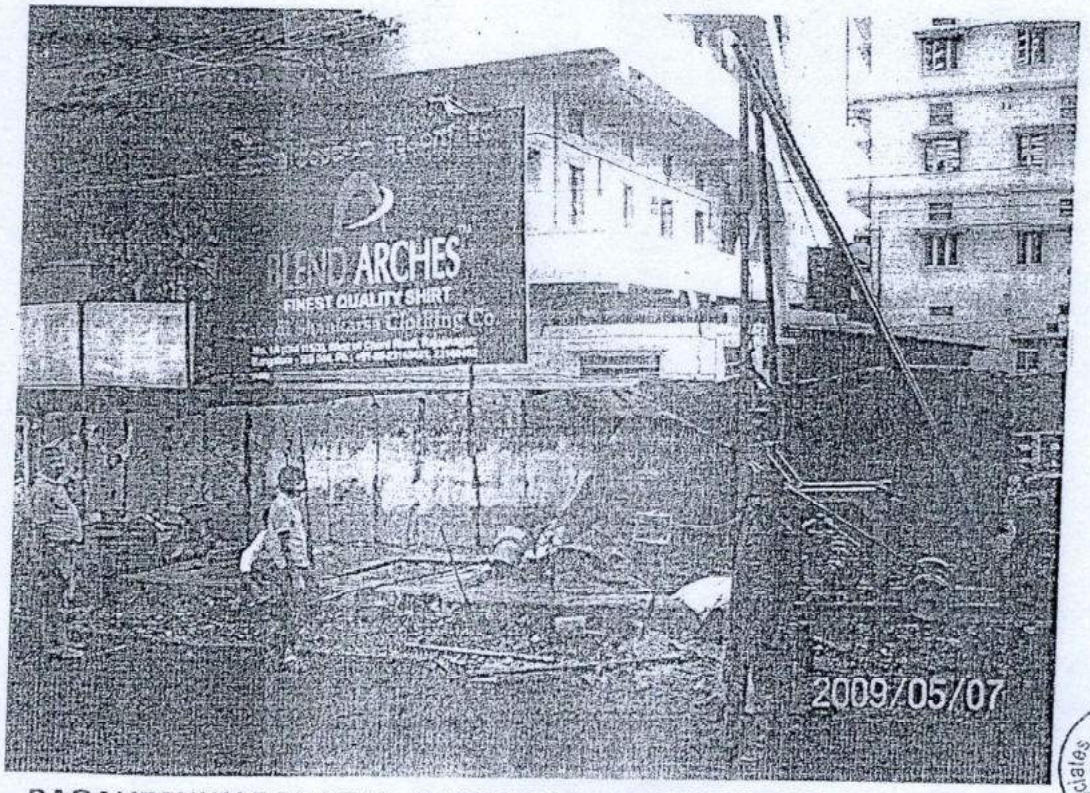
Allowable Settlement (mm) = 36.00 < 50 mm as per IS 1904, Hence Safe

Hence the Foundation is safe against allowable settlement of 50 mm with 18.00 T/sq.m SBC as per IS 1904

Sheetal Engineering Associates Bangalore

PHOTOS

BASAVESHWARANAGAR MAIN ROAD JUNCTION, RAJAJONAGAR,
WEST OF CHORD ROAD/ BH-1



BASAVESHWARANAGAR MAIN ROAD JUNCTION, RAJAJONAGAR,
WEST OF CHORD ROAD / BH-2

VISHNU MOTORS
PROPOSED COMMERCIAL COMPLEX
EMCO ENTERPRISES
KABADI SHANKAR'S KALYANA MANTAPA
KABADI SHANKAR'S CLOTHING COMPANY
RESIDENCE
MEAN LIGHT & CO
H.E.V. CORPORATION PVT. LTD
SOLAR MOTORS
PRE-OWNED CARS
60th CROSS ROAD
SWIMMING POOL
GIRIA'S
REGISTER OFFICE
RESIDENCE
KRYSALIS GARDEN
KABADI SHANKAR'S CLOTHING COMPANY
BASAVESHWARA NAGAR
R.C. HAIR STYLE
BALAJI TEMPO SERVICE
SAGAR GIFT CENTRE
SHYAM UPAHAR HOTEL
SRIKANTHESHWAR KALYANA MANTAPA
DECO VERIFIED INC
G.D. BAR AND RESTAURANT
SHIVA PRABHU KALYANA MANTAPA
ANUGRAHA FAMILY RESTUARANT
ROAD
ROAD
- Location of Tented Rest hotel.
Shreetal Engineering Associates
Bangalore
BASAVESHWARA MAIN ROAD
RAJAJINAGAR W.C. ROAD

Chapter 5

Corridor Improvement Scheme

CHAPTER 5
CORRIDOR IMPROVEMENT SCHEME

5.1 General

The Proposal for Corridor Improvement includes Junction Improvements by proposing Grade Separator at Major Junctions and closing of Median at Minor Junctions, Link Improvements such as Provision of Footpath, etc. Other Improvements such as Improvements to Drainage System, Provision of Effective Illumination, Lane Marking, Provision of Studs and Delineators, etc. have been accommodated in the Project Proposal.

The Concepts proposed for each Project Junction are briefly explained below.

5.2 Manjunath Nagar Main Road Junction

At this Junction, a four lanes divided bi directional Flyover has been proposed along Chord Road.

Following are the Salient Features of the Flyover at Manjunath Nagar Main Road Junction.

- Total Length of Flyover — 202.13m
- Number of Lane — 4 lanes divided bi directional
- Carriageway Width — 7.5m X 2
- Length of Obligatory Span — 30.00m
- Vertical Clearance — 4.5m
- Ruling Gradient — 5% (1 in 20)
- Length of Viaduct towards Shivanagar 8th Main Road Junction — 20.00m
- Length of Viaduct towards Modi Hospital Junction — 20.00m
- Length of Solid Ramp towards Shivanagar 8th Main Road Junction — 66.94m
- Length of Solid Ramp towards Modi Hospital Junction — 65.19m

Layout Plan and Longitudinal Section are presented in **Drawing No. MC / BBMP / 2311 / MNMRJ / GAD / 202A**, At Grade Plan is presented in **Drawing No. MC / BBMP / 2311 / MNMRJ / ATGP / 202B** and Cross Section Details are given in **Drawing No. MC / BBMP / 2311 / MNMRJ / CSD / 203** respectively.

5.3 Shivanagar 8th Main Road Junction and Shivanagar 1st Main Road Junction

As the Junctions are in close proximity to each other (distance between these two Junctions is 240m), the Proposals for both of these Junctions have been integrated.

A four lanes divided bi directional Underpass by integrating both the Junctions has been proposed along Chord Road with 2.5m wide Footpath on either side of the Underpass at grade level.

Following are the Salient Features of the Integrated Underpass.

- Total Length of Underpass — 600.08m
- Number of Lane — 4 lanes divided bi directional

- Carriageway Width 7.5m X 2
- Length of Covered Portion at Shivanagar 8th Main Road Junction 55.00m
- Length of Covered Portion at Shivanagar 1st Main Road Junction 50.00m
- Vertical Clearance 5.5m
- Ruling Gradient 5% (1 in 20)
- Length of Approach Ramp towards Basaveshwara Nagar 1st Main Road Junction 100.62m
- Length of Approach Ramp towards Manjunath Nagar Main Road Junction 186.41m
- Length of Integrated Ramp 208.05m
- Width of Footpath at Grade Level 2.5m
- Required Land acquisition 75.27Sqm

Layout Plan and Longitudinal Section are presented in **Drawing No. MC / BBMP / 2311 / S1M&8MRJ / GAD / 402**, Cross Section and Drainage Details are presented in **Drawing No. MC / BBMP / 2311 / S1M&8MRJ / CS&DD / 403** and Land Acquisition Details are presented in **Drawing No. MC / BBMP / 2311 / S1M&8MRJ / LAD / 404** respectively.

5.4 Basaveshwara Nagar 1st Main Road Junction

At this Junction, a two lanes unidirectional Flyover has been proposed along Chord Road for Traffic Movement from Chord Road – Magadi Road Junction Side to Modi Hospital Road Junction Side.

Following are the Salient Features of the Flyover at Basaveshwara Nagar 1st main Road Junction.

- Total Length of Flyover 358.23m
- Number of Lane 2 lanes unidirectional
- Carriageway Width 7.5m
- Length of Obligatory Span 30.00m
- Vertical Clearance 4.5m
- Ruling Gradient 5% (1 in 20)
- Length of Viaduct towards Shivanagar 1st Main Road Junction 20.00m
- Length of Viaduct towards Chord Road – Magadi Road Junction 40.00m
- Length of Solid Ramp towards Shivanagar 1st Main Road Junction 59.84m
- Length of Solid Ramp towards Chord Road – Magadi Road Junction 208.39m

Layout Plan and Longitudinal Section are presented in **Drawing No. MC / BBMP / 2311 / BN1STMRJ / GAD / 502A**, At Grade Plan is presented in **Drawing No. MC / BBMP / 2311 / BN1STMRJ / ATGP / 502B** and Cross Section Details are given in **Drawing No. MC / BBMP / 2311 / BN1STMRJ / CSD / 503** respectively.

Chapter 6

Project Cost

CHAPTER 6
PROJECT COST

6.1 Rate Analysis

As part of the Detailed Project Report (DPR), Rate Analysis of each of the Item has been prepared by adopting PW, P & IWTD SR 2011 – 12, Bangalore Circle and NHSR 2009 – 10, National Highways Circle, Bangalore. The Rates as given in PW, P & IWTD SR are to be enhanced by 8% for additional weightages for the Works to be executed under Extra Ordinary Conditions for Bangalore Metropolitan Limits. Items not covered in PW, P & IWTD SR / NHSR have been based on Market Rates.

6.2 Detailed Cost Estimate

As part of the DPR, Detailed Cost Estimate has been prepared for the Grade Separated Structures and Surface Level Roads based on Detailed Engineering Design.

6.3 Project Cost

The Rates of the various Items of Works have been analysed keeping in view of the Basic Rates as per SR and their respective lead.

The Abstract of the Project Cost is detailed in **Table 6.1**. For the proposed Corridor Improvement Scheme, total Cost of the Project has been worked out as **Rs. 5800.00 Lakh**. Further, the **Abstract of the Junction** wise Project Cost is detailed in **Table 6.2, 6.3** and **6.4** respectively.

The Detailed Cost Estimate is presented in **Annexure A.6.1**.

Table 6.1
Abstract of Project Cost

Sl. No.	Particulars	Cost in Rs.
1.	Proposed Construction of Flyover at Manjunath Nagar Main Road Junction	104751000
2.	Proposed Construction of Underpass by integrating Shivanagar 8th and 1st Main Road Junctions	276893896
3.	Proposed Construction of Flyover at Basaveshwara Nagar 1st Main Road Junction	132998000
	Construction Cost	**514642896**
4.	Utility Shifting Cost (as per Actual Estimate)	42600000
5.	Cost for Contingencies including Consultancy Charges for DPR Preparation and Project Management Consultancy (@ 3% of Construction Cost)	15439287
6.	Cost of Land Acquisition for an Area of 75.27 Sqm at Rs. 4200.00 per Sft.	4757817
7.	Cost for Topographical Survey and Soil Investigation	760000
8.	Landscaping Works	1800000
	Total	**580000000**

Table 6.2
Abstract of Project Cost for Construction of Flyover at Manjunath Nagar Main Road Junction

Sl. No.	Particulars	Cost in Rs.
1.	Construction of Surface Level Roads / Slip Roads	15511249
2.	Drain Works	
	a. Construction of Road Side Drain and Footpath	13444974
	b. Construction of Culverts across Roads	1277501
	c. Construction of Retaining Wall	2311737
3.	Construction of Median, Kerb and Reconstruction of Retaining Wall along Service Road	1644432
4.	Road Furniture and other Works	3650109
5.	Construction of Flyover Works	37140607
6.	Construction of Flyover Approaches	21600528
7.	Site Clearance and Dismantling	1339864
8.	Construction of Diversion Road	5650000
9.	Electrical Works	1180000
	Construction Cost	**104751000**

Manasa Consultants

MANASA CONSULTANTS

ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
(ಯೋಜನೆ ವಿಭಾಗ ಕೇಂದ್ರ-1)
ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ

Table 6.3
Abstract of Project Cost for Proposed Construction of Underpass by integrating Shivanagar 8th and 1st Main Road Junction

Sl. No.	Particulars	Cost in Rs.
1.	Site Clearance and Dismantling	116400
2.	Slip Road and Surface Level Road including Median, Kerb and Road Furniture	3956380
3.	Cross Drainage, Longitudinal Drainage, Footpath and Reconstruction of Compound	
	a. Culvert	20660000
	b. Road Side Drains and Footpath	26357996
	c. Reconstruction of Compound and Retaining Wall along Service Road	10700000
4.	Construction of Covered Portion of Underpass	65155100
5.	Construction of Retaining Wall	79550000
6.	Construction of Ramp	35617000
7.	Construction of Drainage Facilities to Underpass	7626000
8.	Construction of Diversion Road	12484000
9.	Electrical Works	6240000
	Construction Cost	**276893896**

Table 6.4
Abstract of Project Cost for Construction of Flyover at Basaveshwara Nagar 1st Main Road Junction

Sl. No.	Particulars	Cost in Rs.
1.	Construction of Surface Level Roads / Slip Roads	20754000
2.	Drain Works	
	a. Construction of Road Side Drain and Footpath	16660000
	b. Construction of Culverts across Roads	11340000
	c. Construction of Retaining Wall	19200000
3.	Construction of Median, Kerb and Reconstruction of Retaining Wall along Service Road	28610000
4.	Road Furniture and other Works	47790000
5.	Construction of Flyover Works	35538000
6.	Construction of Flyover Approaches	37025000
7.	Site Clearance and Dismantling	15440000
8.	Construction of Diversion Road	80930000
9.	Electrical Works	26900000
	Construction Cost	**329980000**

Manasa Consultants

MANASA CONSULTANTS

BRUHAT BANGALORE MAHANAGARA PALIKE

Project: Proposed Improvements Corridor along Selected Stretch of Chord Road

Name of the Work: Construction of Flyover at Manjunath Nagar Main Road Junction

Abstract of Detailed Cost Estimate

Sl. No.	Particulars	Cost in Rs.
1	Surface Level Roads / Slip Roads	15511249
2	Drain Works	
	a. Road Side Drain and Footpath	13444974
	b. Culverts across Roads	1277501
	c. Construction of Retaining Wall	2311737
3	Median, Kerb and Reconstruction of Retaining wall along Service Road	1644432
4	Road Furniture and other Works	3650109
5	Flyover Works	37140607
6	Flyover Approaches	21600528
7	**Site Clearance and Dismantling**	**1339864**
8	Diversion Road	5650000
9	Electrical Works	1180000
	Construction Cost	104751000

MAMA CONSULTANTS

Annexure A.6.1

Detailed Cost Estimate

BRUHAT BANGALORE MAHANAGARA PALIKE

Project: Proposed Improvements Corridor along Selected Stretch of Chord Road

Name of the Work: Construction of Flyover at Manjunath Nagar Main Road Junction

Detailed Cost Estimate

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
1.00	SURFACE LEVEL ROADS/ SLIP ROADS								
1.01	KSRRB M300-11. Excavation for road way in soil by mechanical means including cutting and pushing the earth to site of embankment upto a distance of 100 meters (average lead 50 meters). including trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections complete as per specifications. MoRT&H Specification No. 301	Cum							
	(P.No.150, I.No.19.11 of PW, P & IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	1.09	1711.30		
	RHS		1	200.00	8.47	1.09	1846.46		
	Below Obligatory Span		1	30.00	25.00	1.09	817.50		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	1.09	575.52		
			1	22.00	8.25	1.09	197.84		
							5148.62		
						Say	5148.71	70.36	362273.53
1.02	KSRRB M100-4.2. Haulage of materials by tipper including cost of loading, unloading and stacking complete as per specifications. MoRT&H Chapter 1 Case-I : Surface Road	Cum							
	(P. No.147 of PW, P&IWTD S.R 2009-10)								
	Qnty same as item no 1.01								
	For 20Km Rs. 2 X 1.3 X 20 = (52.00 + 62.20) X 1.08= 123.34		1	5148.71	..	..	5148.71	123.34	635041.8914
1.03	KSRRB M300-55. Construction of subgrade and earthen shoulders with approved material gravel / murrum with all lifts & leads, transporting to site, spreading grading to required slope and compacted to meet requirement of Table 300-2 complete as per specifications (including cost of earth, watering charges & compaction by vibratory roller) MORTH Specification No. 305	Cum							
	(P.No.156, I.No.19.62 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.50	785.00		
	RHS		1	200.00	8.47	0.50	847.00		
	Below Obligatory Span		1	30.00	25.00	0.50	375.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.50	264.00		
			1	22.00	8.25	0.50	90.75		
	Filling Tree Roots area		3	2.00	2.00	2.50	30.00		
							2391.75		
						Say	2392.00	174.96	418504.32

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
1.04	KSRRB M400-7 Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per specifications. For Coarse graded granular sub-base material as per 400-2 For Grading I Material.	Cum							
	(P.No.164, I.No.20.6.1 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.20	314.00		
	RHS		1	200.00	8.47	0.20	338.80		
	Below Obligatory Span		1	30.00	25.00	0.20	150.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.20	105.60		
			1	22.00	8.25	0.20	36.30		
	Towards Manjunath Nagar		1	50.00	6.00	0.20	60.00		
	3rd Cross Road		1	50.00	6.50	0.20	65.00		
							1069.70		
							1070.00	1050.84	1124398.8
1.05	KSRRB M400-17. Providing laying, spreading and compacting graded stones aggregate to wet mix macadam specifications including premixing the material with water at OMC in mechanical mix plant carriage of mixed method of tipper to site, laying in uniform layers with paver in sub base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density complete as per Specifications. MORTH Specification No. 406.	Cum							
	(P.No.166, I.No.20.18 PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.25	392.50		
	RHS		1	200.00	8.47	0.25	423.50		
	Below Obligatory Span		1	30.00	25.00	0.25	187.50		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.25	132.00		
			1	22.00	8.25	0.25	45.38		
	Towards Manjunath Nagar		1	50.00	6.00	0.20	60.00		
	3rd Cross Road		1	50.00	6.50	0.20	65.00		
							1305.88		
						Say	1306.00	1060.56	1385091.36
1.06	KSRRB M500-6. Providing and applying Primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.60 kg/sqm using mechanical means complete as per specifications. MORTH Specification No.502	Sqm							
	(P.No.171, I.No.21.6 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	--	1570.00		
	RHS		1	200.00	8.47	--	1694.00		
	Below Obligatory Span		1	30.00	25.00	--	750.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	--	528.00		
			1	22.00	8.25	--	181.50		
	Towards Manjunath Nagar		1	50.00	6.00	--	300.00		
	3rd Cross Road		1	50.00	6.50	--	325.00		
							5348.50		
						Say	5348.50	40.59	217076.36

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
1.07	KSRRB 500-8 Providing and applying tack coat on granular surface treated with primer at 3 Kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machienries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No. 172 I.No.21.8 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	--	1570.00		
	RHS		1	200.00	8.47	--	1694.00		
	Below Obligatory Span		1	30.00	25.00	--	750.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	--	528.00		
			1	22.00	8.25	--	181.50		
	Towards Manjunath Nagar		1	50.00	6.00	--	300.00		
	3rd Cross Road		1	50.00	6.50	--	325.00		
							5348.50		
						Say	5348.50	19.98	106863.03
1.08	KSRRB 500-11. Providing and laying bituminous macadam on prepared surface with crushed coarse aggregates as per design mix formula for base / binding course including loading of aggregaters with F.E. loader, hot mixing of stone aggregates and bitumen in hot mix plant 40 tonne capacity, transporting the mixed material in tipper to paver and laying mixed materials with paver finisher to the required level and grade, rolling by power roller to acheive the deisred density, 50 / 75 mm compacted thickness with 3.3% bitumen but excluding cost of primer / tack coat with lead upto 1km including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5 with 60 / 70 grade bitumen	Cum							
	(P.No.172 I.No. 21.11.2 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.05	78.50		
	RHS		1	200.00	8.47	0.05	84.70		
	Below Obligatory Span		1	30.00	25.00	0.05	37.50		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.05	26.40		
			1	22.00	8.25	0.05	9.08		
	Towards Manjunath Nagar		1	50.00	6.00	0.05	15.00		
	3rd Cross Road		1	50.00	6.50	0.05	16.25		
							267.43		
						Say	267.50	6490.58	1736231.22
1.09	KSRRB M500-7: Providing and applying tack coat on the prepared black topped surfaces at 2.5kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No.172 I.No.21.7 of PW,P&IWTD SR of 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	--	1570.00		
	RHS		1	200.00	8.47	--	1694.00		
	Below Obligatory Span		1	30.00	25.00	--	750.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	--	528.00		
			1	22.00	8.25	--	181.50		
	Towards Modi Hospital Junction		1	100.00	18.00	--	1800.00		
			2	100.00	7.50	--	1500.00		
	Towards Manjunath Nagar		1	100.00	6.00	--	600.00		
	3rd Cross Road		1	100.00	6.50	--	650.00		
							9273.50		
						Say	9273.50	16.46	152634.39

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
1.10	KSRRB M500-17. Providing and laying **dense graded bituminous macadam with 100-120 TPH batch type** HMP producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 4.0 to 4.5% by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignmnet, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.7 complete in all respects as per specifications. Bitumen 60/70 MoRT&H Specification No. 507 .	Cum							
	(P.No. 174 I.No.21.19.2 of PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.05	78.50		
	RHS		1	200.00	8.47	0.05	84.70		
	Below Obligatory Span		1	30.00	25.00	0.05	37.50		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.05	26.40		
			1	22.00	8.25	0.05	9.08		
	Towards Modi Hospital Junction		1	100.00	18.00	0.05	90.00		
			2	100.00	7.50	0.05	75.00		
	Towards Manjunath Nagar		1	100.00	6.00	0.05	30.00		
	3rd Cross Road		1	100.00	6.50	0.05	32.50		
							463.68		
						Say	**464.00**	8856.14	**4109249.146**
1.11	KSRRB M500-7: Providing and applying **tack coat on the prepared black topped surfaces at 2.5kg per 10** sqm. heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all **materials, labour, HOM of machineries complete as per** specifications. MORTH Chapter 5	Sqm							
	(P.No. 172 I.No.21.7 of PW,P&IWTD SR of 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	--	1570.00		
	RHS		1	200.00	8.47	--	1694.00		
	Below Obligatory Span		1	30.00	25.00	--	750.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	--	528.00		
			1	22.00	8.25	--	181.50		
	Towards Modi Hospital Junction		1	100.00	18.00	--	1800.00		
			2	100.00	7.50	--	1500.00		
	Towards Manjunath Nagar		1	100.00	6.00	--	600.00		
	3rd Cross Road		1	100.00	6.50	--	650.00		
	Cross Roads		5	50.00	6.50	--	1625.00		
			1	50.00	8.50	--	425.00		
							11323.50		
						Say	11323.50	16.46	186375.75
1.12	KSRRB M500-19. Providing and laying **bituminous concrete 40 mm thick** with 100 - 120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 5.4 to 5.6% of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification. clause No. 500.9 complete in all respects as per specifications. MORTH Specification No. 509 with 30-45mm compacted thickness (grading II) with 6% 60/70 grade using 40-60 HMP	Cum							

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
	(P.No.175 of I.No.21.22.4 in PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.04	62.80		
	RHS		1	200.00	8.47	0.04	67.76		
	Below Obligatory Span		1	30.00	25.00	0.04	30.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.04	21.12		
			1	22.00	8.25	0.04	7.26		
	Towards Modi Hospital Junction		1	100.00	18.00	0.04	72.00		
			2	100.00	7.50	0.04	60.00		
	Towards Manjunath Nagar		1	100.00	6.00	0.04	24.00		
	3rd Cross Road		1	100.00	6.50	0.04	26.00		
	Cross Roads		5	50.00	6.50	0.04	65.00		
			1	50.00	8.50	0.04	17.00		
							452.94		
						Say	453.00	11208.63	5077508.85
								TOTAL	15511248.65
									15511249
2.00	**DRAIN WORKS**								
	a) For Road side Drains								
2.01	**KSRRB M300-11. Excavation for road way in soil by mechanical means including cutting and pushing the earth to site of embankment upto a distance of 100 meters (average lead 50 meters), including trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections complete as per specifications. MoRT&H Specification No. 301**	Cum							
	(P.No.150, I.No.19.11 of PW, P & IWTD S.R 2011-12)								
	Road side Drain								
	LHS		1	272.00	1.10	1.35	403.92		
	Between Main Carriageway and Service Road		1	320.00	1.10	0.95	334.40		
	RHS (Drain and Utility Duct)		1	295.00	2.25	1.35	896.06		
	Towards Manjunath Nagar		2	100.00	1.10	1.35	297.00		
	Cross Roads		2X7	50.00	1.10	1.35	1039.50		
	For Catch Drain		57	0.70	0.80	0.80	25.40		
	For Rain water Hervesting	1	29	2.00	0.50	2.05	60.15		
							3056.43		
						Say	3056.50	70.36	215061.453
2.02	**KSRRB M2100-13. Plain Cement Concrete M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100**	Cum							
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	For Drain Bed								
	Road side Drain								
	LHS		1	272.00	1.10	0.10	29.92		
	Between Main Carriageway and Service Road		1	320.00	1.10	0.10	35.20		
	RHS (Drain and Utility Duct)		1	295.00	2.25	0.10	66.38		
	Towards Manjunath Nagar		2	100.00	1.10	0.10	22.00		
	Cross Roads		2X7	50.00	1.10	0.10	77.00		
	For Catch Drain		57	0.70	0.80	0.10	3.18		
	For Rain water Harvesting	1	29	2.00	0.50	0.10	2.93		
							236.60		
						Say	237.00	3724.92	882806.04

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
2.03	KSRRB 2200-5.9. Design mix M20 with OPC cement @ 320kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.69cum and fine aggregates @ 0.46cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 i) Upto 5 m height	Cum							
	(P.No.227, I.No.28.7.9 of PW, P& IWTD SR 2011-12)								
	For Drain Bottom slab								
	LHS								
	Between Main Carriageway and Service Road		1	272.00	0.90	0.15	36.72		
	RHS (Drain and Utility Duct)		1	320.00	0.90	0.15	43.20		
	Towards Manjunath Nagar		1	295.00	2.05	0.15	90.71		
	Cross Roads		2	100.00	0.90	0.15	27.00		
	For Catch Drain		2X7	50.00	0.90	0.15	94.50		
	For Rain water Hervesting		57	0.60	0.70	0.20	4.76		
	Side Walls	1	29	2.00	0.40	0.10	2.35		
	LHS								
	Between Main Carriageway and Service Road		2	272.00	0.15	1.00	81.60		
	RHS (Drain and Utility Duct)		2	320.00	0.15	0.60	57.60		
	Towards Manjunath Nagar		3	295.00	0.15	1.00	132.75		
	Cross Roads		4	100.00	0.15	1.00	60.00		
	For Catch Drain		14x2	50.00	0.15	1.00	210.00		
		1	57	0.40	0.20	0.30	1.36		
		2	57	0.70	0.20	0.30	4.76		
		1	57	2.00	0.10	0.20	2.27		
	Top Slab								
	LHS		1	256.00	0.90	0.10	23.04		
	Between Main Carriageway and Service Road		1	300.00	0.90	0.10	27.00		
	RHS (Drain and Utility Duct)		1	277.00	2.05	0.10	56.79		
	Towards Manjunath Nagar		2	94.00	0.90	0.10	16.92		
	Cross Roads		2X7	44.00	0.90	0.10	55.44		
							1028.77		
						Say	1029.00	4931.28	5074287.12
2.04	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Steel at 70 kg/cum :								
			--	--	--	--	72.03		
						Say	72.50	68274.71	4949916.156
2.05	Providing and fixing RCC Precast cover slab of 100mm thick for drain in cement concrete 1:1.5:3 using graded granite jelly 20mm and down size with steel reinforcement, including form work, lift charges, curing and concrete finished surfaces on both sides etc, complete and as per the directions of Engineer in-Charge.	Sqm							
	(Data Rate)								
	Utility Duct and Drain Cover Slab								
	LHS								
	Between Main Carriageway and Service Road		1	16.00	0.90	--	14.40		
	RHS (Drain and Utility Duct)		1	20.00	0.90	--	18.00		
	Towards Manjunath Nagar		1	18.00	2.05	--	36.90		
	Cross Roads		2	6.00	0.90	--	10.80		
	For Tree Surrounding		2X7	3.00	0.90	--	37.80		
			25	1.35	1.50	--	50.63		
							168.53		
						Say	169.00	1465.00	247585.00

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
2.06	Providing and laying reinforced cement concrete pipe NP3 of 300mm dia for culverts including pointing ends, and fixing collars with cement mortar 1:2 including cost of all materials, labour curing complete as per specifications. Specification No.KSRB 1000, 2300 MoRT&H Specification No. 1000 / 2300	Rmt							
	(Pg.No. 257, I.No. 34.6.1 of PW, P&IWTD SR 2011-12)								
	For Catch Drain at 10m interval	1	57	2.00	--	--	113.40		
						Say	113.50	1506.60	170999.10
2.07	KSSRB M2200 - 8. Providing weep holes in Brick masonry / Plain / Reinforced concrete abutment, wing wall / return wall with 100mm dia AC pipe, extending through the full width of the structure with slope of 1V:20H towards drawing.foce. Complete as per drawing and Technical Specifications complete as per specifications. MORTH Specification No. 2706 & 2200	mtr.							
	P.No 229 , INo 28.10 of PW,P&IWTD S.R 2011-12)								
	LHS	1	28	--	--	--	28.00		
	Between Main Carriageway and Service Road	1	33	--	--	--	33.00		
	RHS (Drain and Utility Duct)	1	31	--	--	--	31.00		
	Towards Manjunath Nagar	2	11	--	--	--	22.00		
	Cross Roads	2X7	6	--	--	--	84.00		
							198.00		
						Say	198.00	148.23	29349.54
2.08	KSRRB 2100-6: Filling the foundations trenches using approved sand as per drawing and technical specifications in 250mm layers, wherever necessary watering and ramming, including cost of all materials, labour complete as per specifications. MoRT&H Chapter 12	Cum							
	P.No 221, I.No 27.14 of PW, P & IWTD SR 2011-12)								
	For Rain water Harvesting	29	1	1.00	1.00	0.05	1.47		
						Say	1.50	1726.92	2590.38
2.09	Providing & Filling of Aggregates to required depth in drain trench including cost of all materials, labour with all lead & lifts etc.,complete as per drawing and technical specification 20mm nominal size	Cum							
	(Data Rate)								
	For Rain water Harvesting	29	1	1.00	1.00	0.075	2.20		
						Say	2.50	1194.00	2985.00
2.10	Providing & Filling of Boulders to required depth in drain trench including cost of all materials, labour with all lead & lifts etc.,complete as per drawing and technical specification 40mm nominal size	Cum							
	(Data Rate)								
	For Rain water Harvesting	29	1	1.00	1.00	0.40	11.74		
						Say	12.00	894.00	10728.00

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
2.11	KSRB 14.6-1: Providing & laying heavy duty cobble stones 75mm thick interlock pavers,using cement & course sand for manufacture of blocks of approved size ,shape and colour with a minimum compressive strength of 281 kg per sqm over 50mm thick sand bed (Avg thickness) and compacting with plate vibrator having 3 tons compaction force thereby forcing part of sand underneath to come up in between joints,final compaction of paver surface joints into its final level,including cost of materials, labour and HOM of machineries specifications. Specification No. KBS	Sqm							
	(P.No.108. of I.No.14.7 in PW,P&IWTD SR 2011-12)								
	For Rainwater harvesting	29	1	1.00	1.00	--	29.34		
	Footpath								
	LHS		1	272.00	1.50	--	408.00		
	RHS (Drain and Utility Duct)		1	295.00	1.50	--	442.50		
	Towards Manjunath Nagar		2	100.00	1.00	--	200.00		
	Between Service Road and Main Carriageway		1	300.00	2.25	--	675.00		
							1754.84		
						Say	1755.00	776.52	1362792.6
2.12	M.S Grating for Catch Drains	Sqm							
	(Data Rate)		57	0.50	0.50	--	14.18		
						Say	14.50	8765.00	127092.50
2.13	KSRB 2.3: Filling available Excavated Earth (excluding rock) in sides of foundations upto plinth in layers not exceeding 20cms in depth, compacting each deposited layer by ramming after watering with lead upto 50m and lift upto 1.5 m including cost of all labour complete as per specifications. Specification No.KBS 2.9	Cum							
	(P.No.6, I.No.2.10 of PW, P&IWTD S.R 2011-12)								
	LHS		2	272.00	0.10	1.00	54.40		
	Between Main Carriageway and Service Road		2	320.00	0.10	0.60	38.40		
	RHS (Drain and Utility Duct)		2	295.00	0.10	1.00	59.00		
	Towards Manjunath Nagar		2	100.00	0.10	1.00	20.00		
	Cross Roads		4X7	50.00	0.10	1.00	140.00		
			57	0.50	0.10	0.70	1.98		
							313.78		
						Say	314.00	97.20	30520.80
2.14	KSRRB M100-4.1. Cost of Haulage including Loading and Unloading of Stone Boulder / Stone aggregates / Sand / Kanker / Moorum.Placing tipper at loading point, loading with front end loader,dumping , turning for return trip, excluding time for haulage and return trip complete as per specifications. MORTH-100/ Chapter 1 Case-I : Surface Road	Cum							
	(P.No.147. of PW, P&IWTD SR 2011-12)								
	Qnty same as item no 2.01- 2.13								
	For 20Km Rs. 2 X 1.3 X 20 = (52.00 + 62.2)X1.08=123.34		1	2742.50	--	--	2742.50	123.34	338259.95
									13444973.64
								TOTAL	13444974
2b)	Culverts Across the Roads								
2.16	KSRRB M2100-2.1 Earthwork in excavation for foundation of structures as per drawing and technical specifications. Including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications. B. Mechanical Means (i) Depth upto 3m MORTH Specification No. 304 (Add 10% dewatering charges)	Cum							
	(P.No. 220, I.No. 27.4 of PW, P & IWTD SR 2011-12)								
	8m Length	7	1	8.00	1.40	1.60	125.44		

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
	10m Length		1	10.00	2.65	1.60	42.40		
	15m Length		1	15.00	1.40	1.60	33.60		
							201.44		
						Say	201.50	40.99	8258.679
2.17	KSRRB M2100-13. Plain Cement Concrete M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100	Cum							
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	Culvert								
	8m Length	7	1	8.00	1.35	0.10	7.56		
	10m Length	1	1	10.00	2.60	0.10	2.60		
	15m Length	1	1	15.00	1.35	0.10	2.03		
					3.00		12.19		
						Say	12.50	3724.92	46561.5
2.18	KSRRB 2200-5.18. Design mix M35 with OPC cement @ 390kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.68cum and fine aggregates @ 0.45cum, with superplastisiser @ 3lts confirming to IS9103-1999 ~~Reaffirmed-2008~~ i) Upto 5 m height								
	(P.No.228, I.No.28.7.18 of PW, P& IWTD SR 2011-12)								
	Bottom slab								
	8m Length	7	1	8.00	1.15	0.25	16.10		
	10m Length	1	1	10.00	2.40	0.25	6.00		
	15m Length	1	1	15.00	1.15	0.25	4.31		
	Side Walls								
	8m Length	7	2	8.00	1.00	0.25	28.00		
	10m Length	1	3	10.00	1.00	0.25	7.50		
	Top Slab								
	8m Length	7	1	8.00	1.15	0.25	16.10		
	10m Length	1	1	10.00	2.40	0.25	6.00		
							84.01		
						Say	84.50	5489.64	463874.58
2.19	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Steel at 120kg/cum								
			--	--	--	--	10.14		
						Say	10.50	68274.71	716884.41
2.20	KSSRB M220 - 8. Providing weep holes in Brick masonry / Plain / Reinforced concrete abutment, wing wall / return wall with 100mm dia AC pipe, extending through the full width of the structure with slope of 1V.20H towards drawing foce. Complete as per drawing and Technical Specifications complete as per specifications. MORTH Specification No. 2706 & 2200	Nos./ Mtr							
	P.No 229 , INo 28.10 of PW,P&IWTD S.R 2011-12)								
	8m Length		12	--	--	--	12.00		
	10m Length		3	--	--	--	3.00		
	15m Length		4	--	--	--	4.00		
							19.00		
						Say	19.00	148.23	2816.37

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
2.21	KSRB 2.6: Providing and filling sand in foundation upto plinth to required depth for sub soil treatment including watering ramming with all lead and lift complete as per Specifications. Specification. No. KBS 2.10.2	Cum							
	P.No 6 , I.No 2.13 of PW,P&IWTD S.R 2011-12)								
	8m Length	7	2	8.00	0.10	1.00	11.20		
	10m Length	1	2	10.00	0.10	1.00	2.00		
	15m Length	1	2	15.00	0.10	1.00	3.00		
							16.20		
						Say	16.50	1303.56	21508.74
2.22	KSRRB M100-4.1: Cost of Haulage including loading and unloading of stone Boulder / Stone aggregates / Sand /Kankar / Moorum KSRRB M100-1: Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip complete as per specifications. MoRT&H Chapter 1	Cum							
	(P. No.147 of PW, P & IWTD S.R 2011-12)								
	Qnty same as item No. 2.16								
	For 20Km Rs. 2.00 X 1.3 X 20 = (52.00 + 62.20)X1.08=123.34		.1	142.60	--	--	142.60	123.34	17587.914
									1277492.192
2.23	Misscelleneous and Rounding off								8.50
								TOTAL	1277501
2c)	Construction of Retaining Wall								
2.24	KSRRB M2100-2.1 Earthwork in excavation for foundation of structures as per drawing and technical specifications. Including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications, B. Mechanical Means (i) Depth upto 3m MORTH Specification No. 304 (Add 10% dewatering charges)								
	(P.No. 220, I.No. 27.4 of PW, P & IWTD SR 2011-12)								
	Retaining Wall		1	45.00	2.90	3.10	404.55		
			1	45.00	2.30	1.95	201.83		
			1	45.00	1.58	1.10	77.96		
							684.34		
						Say	684.50	40.99	28054.917
2.25	KSRRB M100-4.2. Haulage of materials by tipper including cost of loading, unloading and stacking complete as per specifications. MoRT&H Chapter 1 Case-I : Surface Road	Cum							
	(P. No.147 of PW, P&IWTD S.R 2011-12)								
	Qnty same as item no. 2.24								
	For 20Km Rs. 2.00 X 1.30 X 20 = (52.00 + 62.20)X1.08=122.47		--	--	--	--	684.50		
						Say	684.50	122.47	83830.72
2.26	KSRB M 2200 5 - 1: M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.63cum and fine aggregates @ 0.42cum i) Upto 5m height.	Cum							
	P.No. 226 I.No 28.7.1 of PW,P&IWTD SR 2011-12)								
	Retaining Wall		1	45.00	2.40	0.15	16.20		
			1	45.00	1.80	0.15	12.15		

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
			1	45.00	1.08	0.15	7.26		
							35.61		
						Say	36.00	3938.76	141795.36
2.27	KSRRB 2200-5.18. Design mix M35 with OPC cement @ 390kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.68cum and fine aggregates @ 0.45cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 i) Upto 5 m height	Cum							
	(P.No.228, I.No.28.7.16 of PW, P& IWTD SR 2011-12)								
	Retaining Wall								
	Bottom Slab		1	45.00	2.20	0.20	19.80		
			1	45.00	1.33	0.25	14.91		
			1	45.00	1.60	0.20	14.40		
			1	45.00	0.95	0.10	4.28		
			1	45.00	0.88	0.20	7.88		
	Stem		1	45.00	0.33	2.50	36.56		
			1	45.00	0.25	1.50	16.88		
			1	45.00	0.20	0.75	6.75		
							121.44		
						Say	121.50	5489.64	666991.26
2.28	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Qty same as item no 2.24								
	Considering 150kg/cum				--	--	18.23		
						Say	18.50	68274.71	1263082.054
2.29	KSSRB M2200-9. Providing and laying Filter Media with granular materials / stone crushed aggregates satisfying the requirements laid down in clause 2500.4.2.2. of MORTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and Technical Specification complete as per specifications MORTH Specification No. 710.1.4 of IRC: 78 & 2200	Cum							
	(P.No.229, I.No.28.13 of PW,P&IWTD S.R 2011-12)								
	Retaining Wall		1	45.00	0.60	2.00	54.00		
			1	45.00	0.60	1.00	27.00		
			1	45.00	0.60	0.25	6.75		
							87.75		
						Say	88.00	665.28	58544.64
2.30	KSRRB M2200 - 8.1. Back filling behind abutment, wing wall and return wall complete as per drawing and Technical Specification complete as per specifications. A. Granular Material MORTH Specification No. 710.1.4 of IRC: 78 & 2200	Cum							
	(P.No.229, I.No.28.11 of PW,P&IWTD S.R 2011-12)								
	Retaining Wall		1	45.00	0.60	2.00	54.00		
			1	45.00	0.60	1.00	27.00		
			1	45.00	0.60	0.25	6.75		
							87.75		
						Say	88.00	275.40	24235.2

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
2.31	KSSRB M2200 - 8. Providing weep holes in Brick masonry / Plain / Reinforced concrete abutment, wing wall / return wall with 100mm dia AC pipe, extending through the full width of the structure with slope of 1V:20H towards drawing foce. Complete as per drawing and Technical Specifications complete as per specifications. MORTH Specification No. 2706 & 2200	Nos./ Mtr							
	P.No 229 , INo 28.10 of PW,P&IWTD S.R 2011-12)								
	Retaining Wall								
	Box Portion		2X3X40	0.65	--	--	156.00		
	Retaining Wall		4X3X10	0.65	--	--	78.00		
							234.00		
						Say	234.00	148.23	34685.82
2.32	KSRRB 800-1. Painting two coats after filling the surface with synthetic enamel paint in approved shades on new plastered concrete surfaces, with materials, labour complete as per specifications. MORTH Chapter 8	Sqm							
	(P.No.191, I.No. 24.1 of PW,P&IWTD SR 2011-12)								
	Crash Barrier								
	Retaining Wall		2	19.85	--	2.30	91.31		
						Say	91.50	48.49	4437.02
2.33	KSRRB M2700-5. Drainage Spouts complete as per drawing and Techncial specification complete as per specifications. MORTH Specification No. 2705	No.							
	(P.No.250, I.No.32.5 of PW,P&IWTD S.R 2011-12)								
	At 4m interval on both sides		2	3	--	--	5	1216.08	6080.40
									2311737.384
								TOTAL	2311737

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
3.00	**Median, Kerb & Re - Construction of Retaining Wall along Service Road**								
3.01	Providing and fixing **Pre cast solid concrete kerb** stones made out of CC 1:2:4 and finished with CM 1:3 plastering and finishing cutting etc., complete Size 450 x 200 x 400 mm	No.							
	(P.No.28, I.No.5.29.1 of PW,P&IWTD S.R 2011-12)								
	For Road Kerb								
	LHS		1	300.00	--	--	667.00		
	RHS		1	300.00	--	--	667.00		
	Towrads Modi Hospital Jn. up to Abutment		1	30.00	--	--	67.00		
	Towrads Shivnagar 8th Main Jn. up to Abutment		1	30.00	--	--	67.00		
	For Median Kerb								
	Towrads Modi Hospital Jn.		2	25.00	--	--	111.00		
	Towrads Shivnagar 8th Main Jn.		2	100.00	--	--	444.00		
							2023.00	290.52	587721.96
	Re Construction of Retaining Wall along Service Road								
3.02	KSRB 2 - 2.1: **Earthwork excavation** for foundation of buildings, culverts, water supply, sanitary lines and electrical conduits either in pits or in trenches 1.5m.and above in width, in **ordinary soil** not exceeding 1.5m. in depth including dressing the bottom and sides of pits and trenches, stacking the excavated soil clear from edges of excavation with lead upto 50 m. after breaking of clods **complete as per specifications. Specification No.** KBS 2.1(a) / 2.3.5	Cum							
	(P.No.5, I.No.2.3 of PW, P & IWTD S.R 2011-12)								
	Retaining wall		1	200.00	0.90	1.05	189.00		
						Say	189.00	144.72	27352.08
3.03	KSRB 4-1.3: Providing and laying **in position plain cement concrete of mix M7.5** with OPC cement @180kgs, with 40mm and down size graded granite metal coarse aggregates 0.85cum and fine aggregates @0.57cum machine mixed, concrete laid in layers not exceeding 15 cms.thick, well compacted, in foundation and plinth, including cost of all materials, labour, HOM machinery, curing complete as per specifications. Specification No. KBS 4.1, 4.2	Cum							
	(P.No.12, I.No.4.3 of PW, P&IWTD S.R 2011-12)								
	Retaining wall		1	200.00	0.90	0.15	27.00		
						Say	27.00	3799.44	102584.88
3.04	KSRB 5.2-3: Providing and constructing **granite / trap / basalt size stone masonry in foundation** with **cement mortor** 1:6, stone hammered dressed in courses not less than 20cms high, bond stones at 2m. apart in each course including cost of materaials, labour, curing complete asper specifications. Specifcation No. KBS 5.1.13.	Cum							
	(P.No.25, I.No.5.6 of PW, P&IWTD S.R 2011-12)								
	For Retaining Wall								
	1st Footing		1	200.00	0.75	0.225	33.75		
	2nd footing		1	200.00	0.60	0.45	54.00		
							87.75		
						Say	88.00	2773.44	244062.72

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
3.05	KSRB 5.3-3: Providing and constructing granite / trap / basalt size stone masonry in basement with cement mortor 1:6, edges of stones chistle dressed in courses not less than 15cms high, bond stones at 2m. apart in each course including cost of materaials, labour, curing complete asper specifications. Specifcation No. KBS 5.1.13.	Cum							
	(P.No.26, I.No.5.9 of PW, P&IWTD S.R 2011-12)								
	For Retaining Wall		1	200.00	0.45	2.00	180.00		
						Say	180.00	3246.48	584366.40
3.06	KSRB 4-1.6: Providing and laying in position plain cement concrete of mix M15 with cement @240kgs, with 20mm and down size graded granite metal coarse aggregates @0.878cum and fine aggregates @0.459cum, machine mixed, concrete laid in layers not exceeding 15 cms.thick well compacted in foundation, plinth and cills, including cost of all materials, labour, HOM of machinery, curing complete as per specifications. Specification No.KBS 4.1,4.2	Cum							
	(P.No.12, I.No 4.6 of PW, P&IWTD S.R 2011-12)								
	For Plinth at Basement Lvl		1	200.00	0.45	0.10	9.00		
	At Top Coping		1	200.00	0.45	0.10	9.00		
							18.00		
						Say	18.00	4275.72	76962.96
3.07	KSRB 2.3 : Filling available excavated earth (excluding rock) in sides of foundations upto plinth in layers not exceeding 20 cms. in depth, compacting each deposited layer by ramming after watering with lead upto 50 m. and lift upto 1.5 m. including cost of all labour complete as per specifications. Specification No. KBS 2.9	Cum.							
	(Pg.No. 6, I.No. 2.10 of PW, P & IWTD S.R 2011-12)								
	For foundation								
	Same as Qty of Item No.3.02-3.03-3.04		--	--	--	--	74.00		
						Say	74.00	97.20	7192.80
3.08	KSRRB M100-4.1: Cost of Haulage including loading and unloading of stone Boulder / Stone aggregates / Sand /Kankar / Moorum KSRRB M100-1: Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip complete as per specifications. MoRT&H Chapter 1	Cum							
	Conveying up to 20km by Mechanical means.								
	(Page No.147 of PW, P & IWTD S.R 2011-12)								
	Qnty same as item no 3.02-3.07		--	--	--	--	115.00	123.34	14184.10
3.09	Misscelleneous Charges								3.90
									16 44431.80
								TOTAL	1644432

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
4.00	ROAD FURNITURE & OTHER WORK								
4.01	KSRS M800 - 13. Road Marking with Hot Applied Thermoplastic Compound with Reflectrising Glass Beads on Bituminous Surface: - Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads at 250 gms per sqm. area, thickness of 2.5mm is exclusive of surface applied glass beads as per IRC:35. The finished surface to be level, uniform and free from streaks and holes complete as per specifications. MORTH Specification No. 803.	Sqm							
	(P.No.193, I.No 24.15 of PW,P&IWTD 2011-12)								
	On Flyover								
(a)	Lane Marking line		2	202.00	0.15	--	60.60		
(b)	Edge line		4	202.00	0.20	--	161.60		
(c)	Directional arrows		4	5.00	0.90	--	18.00		
	On Surface								
(a)	Lane Marking line		2	202.00	0.15	--	60.60		
			4	120.00	0.15	--	72.00		
	Towards Manjunath Nagar		2	100.00	0.15	--	30.00		
	3rd Cross Road		2	100.00	0.15	--	30.00		
(b)	Edge line								
			4	322.00	0.15	--	193.20		
	Towards Manjunath Nagar		2	100.00	0.15	--	30.00		
	3rd Cross Road		2	100.00	0.15	--	30.00		
(c)	Pedestrain crossings		2	30.00	0.15	--	9.00		
			1	10.50	0.15	--	1.58		
			71	3.00	0.50	--	105.75		
(d)	Directional arrows		10	5.00	0.90	--	45.00		
							847.33		
						Say	847.50	429.84	364289.40
4.02	KSRRB 800-1. Painting two coats after filling the surface with synthetic enamel paint in approved shades on new plastered concrete surfaces, with materials, labour complete as per specifications. MORTH Chapter 8	Sqm							
	(P.No.191, I.No. 24.1 of PW,P&IWTD SR 2011-12)								
	For Kerb Painting								
	For Road Kerb								
	LHS		1	300.00	--	0.60	180.00		
	RHS		1	300.00	--	0.60	180.00		
	Towrads Modi Hospital Jn. up to Abutment		1	30.00	--	0.60	18.00		
	Towrads Shivnagar 8th Main Jn. up to Abutment		1	30.00	--	0.60	18.00		
	For Median Kerb								
	Towrads Modi Hospital Jn.		2	25.00	--	0.60	30.00		
	Towrads Shivnagar 8th Main Jn.		2	100.00	--	0.60	444.00		
							870.00	48.49	42188.04
4.03	KSRRB M800-15. Road Delinators: Supplying and Installation of delineators (road way indicators, hazard markers, object markers), 80 - 100 cm high above ground level, painted black and white in 15 cm wide strips, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and conforming to IRC - 79 and the drawings complete as per specifications. MORTH Specification No. 805.	Each							
	(P.No.194, I.No.24.19 of PW,P&IWTD SR 2011-12)								
	For Every 5m interval								
	On Flyover		40	--	--	--	40		
	On Surface Road		40	--	--	--	40		
							80	365.04	29203.2

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
4.04	Retro Reflectorised Traffic Signs								
	KSRRB M800-2. Retro-Reflectorised Traffic Signs: Providing and fixing of Retro-reflectorised cautionary, mandatory, informatory sign as per IRC:67 made of high intensity grade sheeting vide clause 800.1.3, fixed over Aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75mm x 75mm x 6mm firmly fixed to the ground by, means of properly designed foundation with M15 grade cement concrete 45cm x 45cm x 60cm, 60cm below ground level as per approved drawing complete as per specifications. MORTH Specification No. 801.								
	(P.No.191, I.No.24.2 of PW,P&IWTD SR 2011-12)								
(i)	60cm circular.								
a)	No parking board	Each	3	--	--	--	3.00		
b)	Speed limit board	Each	3	--	--	--	3.00		
c)	Compulsary ahead or left turn	Each	3	--	--	--	3.00		
d)	Overtaking prohibited board	Each	3	--	--	--	3.00		
e)	No stopping sign board	Each	6	--	--	--	6.00		
							18.00	2539.08	45703.44
(ii)	90cm equilateral triangle								
a)	Pedestrian crossing sign boards	Each	4	--	--	--	4.00		
b)	No Pedestrian crossing sign boards	Each	4	--	--	--	4.00		
							8.00	2924.64	23397.12
(iii)	Informatory sign boards								
(a)	90cm high octagon	Each	4	--	--	--	4.00	3632.04	14528.16
4.05	KSRRB M800-20. Tubular Steel Railing on Medium Weight Steel Channel (ISMC Series) 100 mm x 50mm: - Providing, fixing and erecting 50 mm dia steel pipe railing in 3 rows duly painted on medium weight steel channels (ISMC series) 100 mm x 50mm, 1.2 metres high above ground, 2 m centre to centre, complete as per approved drawings as per specifications. MORTH Specification No. 808.	Rmt							
	(P.No.195 &195, I.No.24.24 of PW,P&IWTD SR 2011-12)								
			1	270.00	--	--	270.00		
			1	270.00	--	--	270.00		
			2	100.00	--	--	200.00		
							740.00	1246.32	922276.8
4.06	KSRRB M800-35 Providing and fixing of road stud 100 x 100 mm, die cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphlatic surface by drilling hole 30 mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS: 873 part 4: 1973 complete as per specifications.	Nos.							
	(P.No.197&198, I.No.24.41 of PW,P&IWTD SR 2011-12)								
	Spaced at Five meter interval								
	For Every 5m Interval								
	L=202 X 6 = 1212m								
	No's = 1212/5 = 242		242	--	--	--	242		
	on Surface								
	L=300*4=1200m								
	No's = 1200/5 = 240		240	--	--	--	240		
							482	290.52	140146.848
4.07	Providing Over head Gantry	As per Sub estimate		1.00	--	--	1.00	1587593.76	1587593.76
4.08	Providing Cantilever Gantry	As per Sub estimate		2.00	--	--	2.00	238864.04	477728.08
									3847054.846
4.09	Miscellaneous and Rounding off								3053.76
								TOTAL	3850109

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in R
5.00	FLYOVER WORKS								
5.01	KSRRB M2100-2.1 Earthwork in excavation for foundation of structures as per drawing and technical specifications. Including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications, B. Mechanical Means (i) Depth upto 3m MORTH Specification No. 304 (Add 10% dewatering charges)	Cum							
	(P.No. 220, I.No. 27.4 of PW, P & IWTD SR 2011-12)								
	a. Pile cap for 1000 dia piles		8	5.60	5.60	1.95	489.22		
						Say	489.50	40.99	20062.647
5.02	KSRRB M2100-13. Plain Cement Concrete M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100								
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	a. Pile cap for 1000 dia piles		8	4.60	4.60	0.15	25.39		
						Say	25.50	3724.92	94985.46
5.03	KSRRB 1100 - 3.1 - Bored cast - in - situ RCC Pile ith OPC cement design mix M-35 @ 390kgs, with 20mm and down size graded granite metal coarse aggregartes @ 0.68cum and fine aggregates @ 0.45cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008, excluding Reinforcement complete as per Drawing and Technical Specifications and removal of excavated earth with all lifts and lead upto 1000m complete as per specifications.	Rmt							
a	KSRRB M1100-3.2 B. Pile Diameter = 1000mm, MoRT&H specifications No. 1100, 1600 & 1700		32	1m f	--	15.00	480.00	7701.48	3696710.4
	(P.No.201, I.No.25.4 of PW,P&IWTD S.R 2011-12)								
5.04	(A) Doing Initial vertical load test for a design pile load of 270 Tons including cost of all equipment, men and material, reaction piles etc (if required) required for the setup complete as per drawing and technical specification and as directed by the Engineer in Charge.	Nos							
	(P.No.150, I.No.12.37(a) of NH S.R 2009-10)		2	--	--	--	2.00	171720.00	343440.00
	(B) Doing Horizontal load test for a design pile load of 20 Tons including cost of all equipment, men and material, reaction piles etc (if required) required for the setup complete as per drawing and technical specification and as directed by the Engineer in Charge.	Nos							
	(P.No.150, I.No.12.37(b) of NH S.R 2009-10)		2	--	--	--	2.00	212000.00	424000.00
5.05	KSRRB M1200-47: Providing steel liner 10mm thick for curbs and 6mm thick for seining of wells including fabricating and setting out as per detailed drawing complete as per specifications. MORTH Specifications No.1200 & 1900	MT							
	(P.No.217, I.No.26.125 of PW,P&IWTD S.R 2011-12)								
			32	8.00	0.15	--	37.88		
						Say	38.00	65134.8	2475122.4

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
5.06	KSRRB M1100 - 11.2 Cement Concrete for Reinforced Concrete in Pile Cap complete as per Drawing and Technical Specification complete as per specifications. D.RCC with OPC cement design mix M35 @ 390kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.68cum and fine aggregates @ 0.45cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008. Case - II: Using Batching Plant, Transit Mixer and Concrete Pump. MORTH Specification No. 1100, 1500 & 1700.								
	(P.No.203, I.No.25.25 of PW,P&IWTD S.R 2011-12)								
	a. Pile cap for 1000 dia piles	Cum	8	4.30	4.30	1.50	221.88		
						Say	222.00	4990.68	1107930.96
5.07	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	For Piles & Pile Cap - 100kg/cum		--	--	--	--	60.12		
						Say	60.50	68274.71	4130619.689
5.08	KSRRB 2200-5.18. Design mix M35 with OPC cement @ 390kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.68cum and fine aggregates @ 0.45cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 i) Upto 5 m height	Cum							
	(P.No.228, I.No.28.7.18 of PW, P& IWTD SR 2011-12)			Area					
	Pier		8	1.77		2.50	35.40		
	Tressel Beam		4	12.50	1.80	1.50	135.00		
	Pedestal		12	1.80	0.90	0.30	5.83		
							176.23		
						Say	176.50	5489.64	968921.46
5.09	KSRRB M2300-10.2. Furnishing and Placing Reinforced / Prestressed cement concrete in super - structure as per drawing and Technical Specification complete as per specifications. RCC with OPC cement design mix M-40 @ 420kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.67cum and fine aggregtaes @ 0.44 cum with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 Case - II: Using Batching Plant, Transit Mixer & Cocnrete Pump MORTH Specification No. 1500, 1600 & 1700, Height 5m to 10m	Cum							
	(P.No.239, I.No.29.22.2 of PW,P&IWTD S.R 2011-12)								
	Deck slab		1	70.00	17.00	0.25	297.50		
	Girder for 30m Span		1	7.00	21.00		147.00		
	Girder for 20m Span		2	7.00	12.75		178.50		
	End Diaphgram		2	15.90	0.75	2.00	47.70		
			4	15.90	0.75	1.80	85.86		
	Crash Barrier								
	Area of Crash Barrier =0.386 Sqm		2	70.00	0.386		54.04		
	Central Median		1	70.00	1.00	0.30	21.00		
							831.60		
						Say	832.00	6299.64	5241300.48
5.10	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Considering 180kg/cum for Pier		--	--	--	--	6.37		
	Considering 250kg/cum for Tressel Beam		--	--	--	--	33.75		
	Considering 150kg/cum for Pedestal		--	--	--	--	0.87		
							41.00		
						Say	41.00	68274.71	2799262.93
5.11	KSRRB M2300 - 14. Supplying, fitting and placing TMT bar reinforcement in super - structure complete as per drawing and technical specifications complete as per specifications MORTH Specification No. 1600 Super structure	MT							
	(P.No.241, I.No.29.29 of PW, P&IWTD S.R 2011-12)								
	Considering 150kg/cum for Slab and Girder		--	--	--	--	93.45		
	Considering 250kg/cum for End Diaphgram		--	--	--	--	33.39		
	Considering 150kg/cum for Crash Barrier		--	--	--	--	8.11		
							134.95		
						Say	135.00	69013.85	9316869.318
5.12	KSRRB M2300 - 15. High tensile steel wires / strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications complete as per specifications MORTH Specification No. 1800	MT							
	(P.No.241 I.No.29.30 of PW,P&IWTD S.R 2011-12)								
	Considering 725kg/Girder for 20m span		--	--	--	--	10.15		
	Considering 1100kg/Girder for 30m span		--	--	--	--	7.70		
							17.85		
						Say	18.00	159100.20	2863803.60
5.13	KSRRB M2200-15: Supplying, fitting and fixing in position true to line and level POT - PTFE bearings consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel making surface complete assembly to be of cast steel / fabricated structural steel, metal and elastomer elements to be as per IRC: 83 Part I and II respectively and other parts conforming to BS: 5400 section 9.1 and 9.2 and clause 2000.6 of MORTH Specification complete as per drawing and approved Technical specifications complete as per specifications. MORTH Specification No.2000 & 2200.								
	(P.No.230, I.No.28.19 of PW,P&IWTD S.R 2011-12)								
	a) Guided/ fixed PTFE bearings 500MT vertical Capacity	Nos.	--	--	--	--	1.00	184140.00	184140.00
	b) Guided/ fixed PTFE bearings 320MT vertical Capacity	Nos.	--	--	--	--	2.00	117849.60	235699.20
5.14	KSRRB M2200 -12: Supplying, fitting & fixing in position true to line and level sliding plate bearing with PTFE surfcace sliding on stainless steel complete including all accessories as per drawings and Technical specifications and BS: 5400, section 9.1 & 9.2 (for PTFE) and clause 2000.4 of MORTH specifications, complete as per specifications. MORTH Specifications No.2000 & 2200								
	(P.No.229&230, I.No.28.16 of PW,P&IWTD S.R 2011-12)								
	a) Guided/ free PTFE bearings 500MT vertical Capacity	Nos.	--	--	--	--	5.00	1149.12	5745.60
	b) Guided/ free PTFE bearings 320MT vertical Capacity	Nos.	--	--	--	--	10.00	1149.12	11491.20

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
5.20	KSRRB M500-19. Providing and laying **bituminous concrete 40 mm thick** with 100 - 120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 5.4 to 5.6% of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification No. 509 **with 30-45mm compacted thickness (grading II) with 6% 60/70 grade using 40-60 HMP**	Cum							
	(P.No.175 of I.No.21.22.4 in PW,P&IWTD S.R 2011-12)								
	Fly over section								
			2	70.00	7.50	0.04	42.00		
						Say	42.00	11208.63	470762.00
5.21	KSRRB M2700-5. **Drainage Spouts** complete as per drawing and Technical specification complete as per specifications. MORTH Specification No. 2705	No.							
	(P.No.250, I.No.32.5 of PW,P&IWTD S.R 2011-12)								
	At 8m interval on both sides		2	9	--	--	18	1216.08	21281.40
5.22	KSRRB 13-9.1: Providing and fixing to wall, ceiling and floor, high density **polythylene pipes 6.00 kgf/sq.cm working pressure 160mm outside diameter** with special Flange, compression type fittings, wall clips, making good the wall, ceiling and floor including cost of all materials, labour charges, HOM of equipments and testing complete as per specifications. Specification No. KBS 13.2.15.2/13.9	m							
	(Market Rate)								
	PVC Pipe for rain water disposal		2	82	--	--	164.00	1400.00	229600.00
5.23	KSRRM M2700-4. Providing fitting and fixing **mild steel railing** complete as per drawing and technical Specification. Complete as per MORTH Specification No. 2703.2, 1900	m							
	(P.No. 250, I.No. 32.4 of PW, P & IWTD S.R 2011-12)		2	70.00	--	--	140.00	2762.64	386769.6
5.24	KSRB 2.3 : **Filling available excavated earth (excluding rock)** in sides of foundations upto plinth in layers not exceeding 20 cms. in depth, compacting each deposited layer by ramming after watering with lead upto 50 m. and lift upto 1.5 m. including cost of all labour complete as per specifications. Specification No. KBS 2.9	Cum.							
	(Pg.No. 6, I.No. 2.10 of PW, P & IWTD S.R 2011-12)								
	For foundation								
	Same as Qty of Item No.5.01-5.02-5.06		--	--	--	--	242.00		
						Say	242.00	97.20	23522.4
5.25	KSRRB M100-4.2. **Haulage** of materials by tipper including cost of loading, unloading and stacking complete as per specifications. MoRT&H Chapter 1 Case-I : Surface Road	Cum							
	(P. No.147 of PW, P&IWTD S.R 2011-12)								
	Qnty same as item no 5.01-5.24								

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
	For 20Km RS. 2.00 X 1.3 X 20 = (52.00+ 62.20)X1.08=123.34		1	247.50	--	--	247.50	123.34	30526.65
									37140606.55
								TOTAL	37140607
6.00	FLYOVER APPROACHES WORKS								
6.01	KSRRB M2100 - 1.1. Earthwork in excavation for foundation of structures as per drawing and technical specifications, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications. I. Ordinary Soil - A. Manual Means (i) Depth upto 3m. MORTH Specification No. 304	Cum							
	Add 10% extra for dewatering charges								
	(P.No.220, I.No.27.1 of PW,P&IWTD S.R 2011-12)								
	R.E Wall		2	66.94	1.50	1.50	301.23		
			2	65.19	1.50	1.50	293.36		
			2	17.00	1.50	1.50	76.50		
							671.09		
						Say	671.50	87.16	58525.254
6.02	KSRRB M2100-13. Plain Cement Concrete M15 with OPC cement @ 240kgs. with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100	Cum							
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	a. R.E Wall		2	66.94	1.50	0.15	30.12		
			2	65.19	1.50	0.15	29.34		
			2	17.00	1.50	0.15	7.65		
	b. Friction Slab		2	66.94	2.00	0.15	40.16		
			2	65.19	2.00	0.15	39.11		
	c. Approach Slab		2	17.00	4.00	0.15	20.40		
							166.79		
						Say	167.00	3724.92	622061.64
6.03	KSRRB M2100 - 17.1. Plain / Reinforced Cement Concrete design mix M25 with OPC cement @ 340kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.70cum and fine aggregates @ 0.47cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008, Open Foundation complete as per Drawing and Technical Specifications Case - 1: Using Concrete Mixer. MORTH Specification No. 1500, 1700 & 2100.	Cum							
	(P.No. 223, I.No.27.30 of PW,P&IWTD S.R 2011-12)								
	R.E Wall		2	66.94	1.40	0.30	56.23		
			2	65.19	1.40	0.30	54.76		
			2	17.00	1.40	0.30	14.28		
							125.27		
6.04	KSRRB M2300- For T-Beam and slabs, including launching of precast girder by launching truss upto 40m span.					Say	125.50	4878.36	612234.18

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
	KSRRB M2300-10.2. Furnishing and Placing Reinforced / Prestressed cement concrete in super - structure as per drawing and Technical Specification complete as per specifications. RCC with OPC cement design mix M40 @ 420kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.67cum and fine aggregates @ 0.44cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 Case-II: Using Batching Plant, Transit Mixer & Cocnrete Pump MORTH Specification No. 1500, 1600 & 1700. **Height 5m to 10m**	Cum							
	(P.No.239, I.No.29.22.2 of PW,P&IWTD S.R 2011-12)								
	Friction Slab		2	66.94	2.00	0.40	107.10		
			2	65.19	2.00	0.40	104.30		
	Approch Slab		2	17.00	4.00	0.30	40.80		
	Area of Crash Barrier = 0.386 Sqm		2	132.13	0.386		102.00		
	Central Median		1	132.13	1.00	0.30	39.64		
							393.85		
						Say	394.00	6299.64	2482058.16
6.05	KSRRB M2300 - 14. Supplying, fitting and placing TMT bar reinforcement in super - structure complete as per drawing and technical specifications complete as per specifications MORTH Specification No. 1600 Super structure	MT							
	(P.No.241, I.No.29.29 of PW, P&IWTD S.R 2011-12)								
	Considering 150kg/cum		--	--	--	--	71.96		
						Say	72.00	69013.85	4968996.97
6.06	KSRRB M2200 - 8.1. Back filling behind abutment, wing wall and return wall complete as per drawing and Technical Specification complete as per specifications. A. Granular material MORTH Specification No. 710.1.4 of IRC: 78 & 2200	Cum							
	(P.No.229, I.No.28.11 of PW,P&IWTD S.R 2011-12)								
	R E wall		2	66.94	1.20	1.05	168.69		
			2	65.19	1.20	1.05	164.28		
			2	17.00	1.20	1.05	42.84		
							375.81		
						Say	376.00	275.40	103550.4

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
6.07	Providing, casting, erection and assembling of 180 mm thick pre-cast RCC facia panel of M35 grade aesthetically finished cruciform shape mechanically stabilized reinforced earth wall to the required line. grade and cross sections with hot dip high adherence strips and panel lugs of required length having width and thickness of 40 x 5mm at	Sqm							
	specified interval. Panels are to be seated in each other using two numbers EPDM rubber seating pad per panel. vertical joints should be covered with Geo-textile filter cloth glued to the panel and horizontal joints to be provided with 25 mm dia. polyethylene foam joint filler, 160 mm dia. PVC pipe of 10 Kg./cm2 wrapped with non woven geo textile with perforation of 5mm dia. at staggered intervals of 10 cm c/c etc., complete as per approved drawing and specification including cost of hot dip high adherence strip, legs, geo-textile cloth, EPDM pad, polyethylene foam, joint fillers, tie strips ,fasteners and all accessories, coping beam(if any), drainage layer, drain pipe etc cost of all materials, form work, cost of HYSD reinforcement steel and fabrication design with all lead and lift, loading, unloading, stacking, hire charges of machineries as approved by the Engineer Member.								
	(Market Rate)								
	for RE walls on the sides		2	66.94	--	3.78	505.40		
			2	65.19	--	3.78	492.18		
	for RE walls behind abutments		1	17.00	--	6.20	105.40		
			1	17.00	--	6.20	105.40		
							1208.38		
						Say	1208.50	5500.00	6646750.00
6.08	KSSRB M2200 - 9. Providing and laying Filter Media with granular materials / stone crushed aggregates satisfying the requirements laid down in clause 2500.4.2.2. of MORTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and Technical Specification complete as per specifications MORTH Specification No. 710.1.4 of IRC: 78 & 2200	Cum							
	(P.No.229, I.No.28.13 of PW,P&IWTD S.R 2011-12)								
			2	66.94	0.60	3.28	263.07		
			2	65.19	0.60	3.28	256.20		
							519.27		
						Say	519.50	665.28	345612.96
6.09	KSRRB M300.53. Construction of embankment with approved material Gravel / Murrum with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement Table 300-2 complete as per specifications. (which includes cost of gravel / murrum, watering charges & compaction by vibratory roller) MORTH Specification No. 305	Cum							
	(P.No.156, I.No.19.60 of PW,P&IWTD S.R 2011-12)								
			1	66.94	16.00	3.28	3507.66		
			1	65.19	16.00	3.28	3415.96		
							6923.61		
						Say	6924.00	146.88	1016997.12

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
6.10	KSRRB M400-7 Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per specifications. For Coarse graded granular sub-base material as per 400-2 For Grading I Material.	Cum							
	(P.No.164, I.No.20.6.1 of.PW,P&IWTD S.R 2011-12)								
			1	66.94	16.00	0.20	214.21		
			1	65.19	16.00	0.20	208.61		
							422.82		
						Say	423.00	1050.84	444505.32
6.11	KSRRB M400-17. Providing laying, spreading and compacting graded stones aggregate to wet mix macadam specifications including premixing the material with water at OMC in mechanical mix plant carriage of mixed method of tipper to site, laying in uniform layers with paver in sub base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density complete as per Specifications. MORTH Specification No. 406.	Cum							
	(P.No.166, I.No.20.18 PW,P&IWTD S.R 2011-12)								
			1	66.94	16.00	0.25	267.76		
			1	65.19	16.00	0.25	260.76		
							528.52		
						Say	529.00	1060.56	561036.24
6.12	KSRRB M500-6. Providing and applying Primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.60 kg/sqm using mechanical means complete as per specifications. MORTH Specification No.502	Sqm							
	(P.No.171, I.No.21.6 of PW,P&IWTD S.R 2011-12)								
			2	66.94	7.50	--	1004.10		
			2	65.19	7.50	--	977.85		
							1981.95		
						Say	1982.00	40.59	80442.24
6.13	KSRRB 500-8 Providing and applying tack coat on granular surface treated with primer at 3 Kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machienries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No. 172 I.No.21.8 of PW,P&IWTD S.R 2011-12)								
			2	66.94	7.50	--	1004.10		
			2	65.19	7.50	--	977.85		
							1981.95		
						Say	1982.00	19.98	39600.36

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
6.14	KSRRB 500-11. Providing and laying **bituminous macadam** on prepared surface with crushed coarse aggregates as per design mix formula for base / binding course including loading of aggregaters with F.E. loader, hot mixing of stone aggregates and bitumen in hot mix plant 40 tonne capacity, transporting the mixed material in tipper to paver and laying mixed materials with paver finisher to the required level and grade,rolling by power roller to acheive the deisred density, 50 / 75 mm compacted thickness with 3.3% bitumen but excluding cost of primer / tack coat with lead upto 1km including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5 with 60 / 70 grade bitumen	Cum							
	(P.No.172 I.No. 21.11.2 of PW,P&IWTD S.R 2011-12)		2	66.94	7.50	0.075	75.31		
			2	65.19	7.50	0.075	73.34		
							148.65		
						Say	149.00	6490.61	967100.23
6.15	KSRRB M500-7: Providing and applying **tack coat on the prepared black topped** surfaces at 2.5kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No.173 I.No.21.7 of PW,P&IWTD SR of 2011-12)								
			2	66.94	7.50	--	1004.10		
			2	65.19	7.50	--	977.85		
							1981.95		
						Say	1982.00	16.46	32622.13
6.16	KSRRB M500-17. Providing and laying **dense graded bituminous macadam** with 100-120 TPH batch type HMP producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 4.0 to 4.5% by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignmnet, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.7 complete in all respects as per specifications. Bitumen 60/70 MoRT&H Specification No. 507	Cum							
	(P.No. 174 I.No.21.19.2 of PW,P&IWTD S.R 2011-12)		2	66.94	7.50	0.05	50.21		
			2	65.19	7.50	0.05	48.89		
							99.10		
						Say	99.50	8856.14	881185.97
6.17	KSRRB M500-7: Providing and applying **tack coat on the prepared black topped** surfaces at 2.5kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No.172 I.No.21.7 of PW,P&IWTD SR of 2011-12)								
			2	66.94	7.50	--	1004.10		
			2	65.19	7.50	--	977.85		
							1981.95		
						Say	1982.00	16.46	32622.13

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
6.18	KSRRB M500-19. Providing and laying bituminous concrete 40 mm thick with 100 - 120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 5.4 to 5.6% of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification No. 509 with 30-45mm compacted thickness (grading II) with 6% 60/70 grade using 40-60 HMP	Cum							
	(P.No.175 of I.No.21.22.4 in PW,P&IWTD S.R 2011-12)								
			2	66.94	7.50	0.04	40.16		
			2	65.19	7.50	0.04	39.11		
							79.28		
						Say	79.50	11208.63	891085.99
6.19	KSRRM M2700 -4. Providing fitting and fixing mild steel railing complete as per drawing and technical Specification. Complete as per MORTH Specification No. 2703.2, 1900	m							
	(P.No. 250, I.No. 32.4 of PW, P & IWTD S.R 2011-12)								
			2	132.13	--	--	264.26		
						Say	264.50	2762.64	730718.28
6.20	KSRRB M100-4.2. Haulage of materials by tipper including cost of loading, unloading and stacking complete as per specifications. MoRT&H Chapter 1 Case-I : Surface Road	Cum							
	(P. No.147 of PW, P&IWTD S.R 2011-12)								
	Qnty same as item no 6.01								
	For 20Km RS. 2.00 X 1.3 X 20 = (52.00 + 62.20)X1.08=123.34								
			1	671.50	--	--	671.50	123.34	82822.81
									21600528.4
								TOTAL	21600528
7.00	SITE CLEARANCE AND DISMANTLING								
7.01	KSRRB 200-2: Cutting of trees girth from 600mm to 900mm including cutting of trunks, branches and removal of stumps stacking of serviceable materials with all lead & lift, earth filling in the depressions / pit, labour charges complete as per specifications. MORTH Specification Clause No.201.	Each							
	(P.No.143, I.No.18.2 of PW,P&IWTD S.R 2011-12)		--	--	--	--	2	290.142	580.284
7.02	KSRRB 200-4: Cutting of trees girth from 1800 to 2700mm including cutting of trunks, branches and removal of stumps stacking of serviceable materials with a lead of 100 metres, earth filling in the depressions / pit, labour charges complete as per specifications. MORTH Specification Clause No.201.	Each							
	(P.No.143, I.No.18.4 of PW, P&IWTD SR 2011-12)								
			--	--	--	--	1	1208.52	1208.52

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
7.03	KSRRB M200-12.1. Dismantling of existing structures like culverts, Bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceble material and stacking the serviceable material with all lifts complete as per specifications. i) Lime/Cement Concrete. I.By Manual means, A. Lime Concrete, Cement Concrete Grade M-10 & below PCC	Cum							
	(P.No.144, I.No.18.17 of PW,P&IWTD S.R 2011-12)								
	Drain Bed								
	LHS		1	251.00	1.90	0.10	47.69		
	Between Main Carriageway and Service Road		1	300.00	1.70	0.10	51.00		
	RHS		1	295.00	1.90	0.10	56.05		
	Retaining Wall		1	200.00	0.45	0.40	36.00		
							190.74		
						Say	191.00	244.08	46619.28
7.04	KSRRB M200-15.2. Dismantling of existing structures like culverts, Bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceble material and stacking the serviceble material with all lifts complete as per specifications. ii) Dismantling Stone Masonary B. Rubble Stone Masonry, in Cement Mortar. SSM	Cum							
	(P.No.145, I.No.18.27 of PW,P&IWTD S.R 2011-12)								
	For Drain								
	LHS		2	251.00	0.45	1.00	225.90		
	RHS		2	295.00	0.45	1.00	265.50		
	Retaining Wall		1	200.00	0.45	1.50	135.00		
							626.40		
						Say	626.50	194.40	121791.6
7.05	Removing of Footpath slab	Sqm							
	(P.No.268, I.No. 37.56 of PW,P&IWTD S.R 2011-12)								
	Removing of Drain Precast -Slab								
	LHS		1	176.00	1.90	--	334.40		
						Say	334.50	95.80	32043.762
7.06	Removing BS Slab of Drain and Stacking	Sqm							
	(P.No.28, I.No. 5.32 of PW,P&IWTD S.R 2011-12)								
	LHS		1	75.00	2.00	--	150.00		
	RHS		1	295.00	3.50	--	1032.50		
	Between Main Carriageway and Service Road		1	60.00	1.80	--	108.00		
	Kerb LHS		1	251.00	0.40	--	100.40		
	Kerb RHS		1	295.00	0.40	--	118.00		
	Median Kerb		2	300.00	0.40	--	240.00		
							1748.90		
						Say	1749.00	47.52	83112.48

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
7.07	KSRRB 200-22.1: Dismantling of flexible pavements and disposal of dismantled materials upyo a lead of 1000 meters, stacking serviceable and unserviceable materials seperately complete as per specifications II. By Mechanical Means: A. Bituminous courses. MORTH Specification No. 202.	Cum							
	(P.No.146, I.No.18.46 of PW, P&IWTD S.R 2011-12)								
	Flyover		1	200.00	17.00	0.15	510.00		
	LHS		1	75.00	6.50	0.15	73.13		
	RHS		1	125.00	8.50	0.15	159.38		
							742.50		
						Say	742.50	160.16	118921.77
7.08	KSRRB 200-22.2: Dismantling of flexible pavements and disposal of dismantled materials upto a lead of 1000 metres, stacking serviceable and unserviceable materials seperately complete as per specifications I. By Manual Means: B. Granular courses. MoRT&H Specification No. 202.	Cum							
	(P.No.146, I.No.18.45 of PW, P&IWTD S.R 2011-12)								
	Flyover		1	200.00	17.00	0.30	1020.00		
	LHS		1	75.00	6.50	0.30	146.25		
	RHS		1	125.00	8.50	0.30	318.75		
							1485.00		
						Say	1485.00	317.52	471517.2
	Dismantling of Existing Culverts								
7.09	KSRRB M200-12.1. Dismantling of existing structures like culverts, Bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceble material, disposal of unserviceble material and stacking the serviceable material with all lifts complete as per specifications. i) Lime/Cement Concrete.I.By Manual means, A. Lime Concrete, Cement Concrete Grade M-10 & below PCC	Cum							
	(P.No.144, I.No.18.17 of PW,P&IWTD S.R 2011-12)								
	Bed Concrete								
	8m Length	8	1	8.00	1.90	0.10	12.16		
	14m Length	1	1	14.00	1.90	0.10	2.66		
							14.82		
						Say	15.00	244.08	3661.20
7.10	KSRRB M200-15.2. Dismantling of existing structures like culverts, Bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceble material and stacking the serviceable material with all lifts complete as per specifications. ii) Dismantling Stone Masonary B. Rubble Stone Masonry, in Cement Mortar. SSM	Cum							
	(P.No.145, I.No.18.27 of PW,P&IWTD S.R 2011-12)								
	SSM								
	8m Length	8	2	8.00	0.45	1.00	57.60		
	14m Length	1	2	14.00	0.45	1.00	12.60		
							70.20		
						Say	70.50	194.40	13705.20

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
7.11	KSRRB M200-13.1. Dismantling of existing structures like culverts, Bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts complete as per specifications. By mechanical means, A. Cement concrete Grade M-15 & M-20.	Cum							
	(P.No.144, I.No.18.20 of PW,P&IWTD S.R 2011-12)								
	Deck Slab								
	8m Length	8	1	8.00	1.70	0.25	27.20		
	14m Length	1	1	14.00	1.70	0.25	5.95		
							33.15		
						Say	33.50	324.00	10854.00
7.12	KSRRB M200-17.1. Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T & P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts complete as per specifications. iii) Dismantling stone masonry. A. Steel Work in all types of sections upto a Height of 5m above plinth level excluding cutting of rivet including dismembering. MoRT&H Specification No.202	MT							
	(P.No.145, I.No.18.33 of PW,P&IWTD S.R 2011-12)								
	Consider 100kg/Cum for Slab		1	33.50	--	--	3.35		
						Say	3.50	928.80	3250.80
7.13	KSRRB M100-4.1. Cost of Haulage including Loading and Unloading of Stone Boulder / Stone aggregates / Sand / Kanker / Moorum.Placing tipper at loading point, loading with front end loader,dumping , turning for return trip, excluding time for haulage and return trip complete as per specifications. MORTH-100 Chapter 1 Case-I : Surface Road	Cum							
	(P.No.141&147, of PW, P&IWTD SR 2011-12)								
	Qnty same as item No. 7.04, 7.10								
	For 20Km RS. 2 X 1.8 X 20 = (72.00 + 62.20) X 1.08 = 144.94		1	697.00	--	--	697.00	144.94	101023.18
7.14	KSRRB M100-4.1. Cost of Haulage including Loading and Unloading of Stone Boulder / Stone aggregates / Sand / Kanker / Moorum.Placing tipper at loading point, loading with front end loader.dumping , turning for return trip, excluding time for haulage and return trip complete as per specifications. MORTH-100/ Chapter 1 Case-I : Surface Road	Cum							
	(P.No.141&147, of PW, P&IWTD SR 2011-12)								
	Qnty same as item No. 7.05,7.06,(7.08 X 0.10),(7.09 X 0.45 X 0.20),7.12,7.14,7.16 & 7.17		1	2675.35	--	--	2675.35		
	For 20Km Rs. 2 X 1.3 X 20 = (52 + 62.20) X 1.08 = 123.34					Say	2675.50	123.34	329996.17
7.15	KSRRB M100-4.2. Haulage of materials by tipper Including cost of loading, unloading and stacking complete as per specifications. MoRT&H Chapter 1 For Steel	Cum							
	(P. No.141&147 of PW,P&IWTD S.R 2011-12)								
	Qnty same as item No.7.12								
			1	3.50	--	--	3.50	451.12	1578.906
									1339864.352
								TOTAL	1339864

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
8.00	Diversion Road								
8.01	KSRRB M500-7: Providing and applying tack coat on the prepared black topped surfaces at 2.5kg per 10 sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of road surface) including cost of all materials, labour, HOM of machineries complete as per specifications. MORTH Chapter 5	Sqm							
	(P.No.172 I.No.21.7 of PW,P&IWTD SR of 2011-12)				Avg				
	Surface level Roads								
	LHS		1	200.00	7.85	--	1570.00		
	RHS		1	200.00	8.47	--	1694.00		
	Below Obligatory Span		1	30.00	25.00	--	750.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	--	528.00		
			1	22.00	8.25	--	181.50		
	Towards Modi Hospital Junction		1	100.00	18.00	--	1800.00		
			2	100.00	7.50	--	1500.00		
	Towards Manjunath Nagar		1	100.00	6.00	--	600.00		
							8623.50		
						Say	8623.50	16.46	141935.91
8.02	KSRRB M500-19. Providing and laying bituminous concrete 40 mm thick with 100 - 120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder at 5.4 to 5.6% of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification clause No. 500.9 complete in all respects as per specifications. MORTH Specification No. 509 with 30-45mm compacted thickness (grading II) with 6% 60/70 grade using 40-60 HMP	Cum							
	(P.No.175 of I.No.21.22.4 in PW,P&IWTD S.R 2011-12)								
	Surface level Roads								
	LHS		1	200.00	7.85	0.04	62.80		
	RHS		1	200.00	8.47	0.04	67.76		
	Below Obligatory Span		1	30.00	25.00	0.04	30.00		
	Towards Shivnagar 8th Main Jn.		1	22.00	24.00	0.04	21.12		
			1	22.00	8.25	0.04	7.26		
	Towards Modi Hospital Junction		1	100.00	18.00	0.04	72.00		
			2	100.00	7.50	0.04	60.00		
	Towards Manjunath Nagar		1	100.00	6.00	0.04	24.00		
							344.94		
						Say	345.00	11208.63	3866 976.936
8.03	KSRRB M800-43: Installation of a steel portable barricade with horizontal rail 300mm wide, 2.5m in length fitted on a 'A' frame made with 45x45x5mm angle iron section, 1.5m in height, horizontal rail painted (2coats) with yellow and white stripes, 150mm in width at an angle of 45degree, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55-2001 complete as per specifications.	Each							
	(P.No.198, I.No.24.44 of PW,P&IWTD SR 2011-12)								
			175	--	--	--	175.00	2214.00	387 450.00

Sl. No.	Description of Work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
8.04	Supplying, fabricating, erecting, and fixing in position, inserts and embedment, Truss, clamps, brackets, insert plates and all miscellaneous steel works as shown in drawing and as directed by the Engineer at all depths, using MS angles, channels, steel beams, rails, tees, plates, flats, rounds squares etc., of various sizes and other structural section confirming IS 2062 grade A, medium class GI pipes etc., including straightening, cutting, fabricating, welding, bending to slope fixing to position, welding to insert plate embeded in concrete and inclusive of 2coats of enamel paint over one coat of metal primer. The rate quoted is to include the cost of all materials, labour, tools, tackets, cranes, devices and plants, Welding Electrodes, Bolts, Nuts, Washers, Clamps, connections, Shims and Packing Pieces etc., required for the Work as per the specifications and Drawings complete with all lead and lifts as directed by the Engineer-in-charge.	MT							
	Data Rate								
	MS Sheet 2mm thick for Barricading		--	--	--	--	9.42		
	400x 1.5 x 0.002 x 7850 =10692kg Say 10.69MT					Say	9.50	61000.00	579500.00
8.05	KSSRRB M800 - 46. Positioning of a smart flagman with a yellow vest and a yellow cap and a red flag 600 x 600 mm securely fastened to a staff 1 m in length for guiding the traffic complete as per specifications.	Each							
	(P.No.199, I.No.24.49 of PW,P&IWTD 2011-12)								
	Considering 5 Nos. per day for a period of 15months		2250	--	--	--	2250.00	281.88	634230
8.06	Providing and fixing Project Display Board of size 1.80 vertical x 1.60 mtrs. Horizontal made of cold rolled coil 16 Gauge (1.6mm thickness) sheeting strengthened by welding to MS angle of size 35x35x5mm iron framework on all sides, extra cross vertical angle fixed using nuts and bolts, base of the board shall be cleaned, applying red oxide	Nos.							
	and black paint by sprayer on both sides of the board and all MS iron frameworks, background of the facing side of the board painted in traffic yellow, project information written in English / Kannada / Hindi, painting letters and numeral in black, fixed on a mild steel angle iron post 75 mm x 75 mm x 6mm, 2Nos. firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60cm below ground level and the board 2.8m from ground level as per approved drawing including cost of all materials, labour, unloading, curing backfilling, transporting etc., complete.								
	(P. No.81, Item no 8.47 of NHSR 2009-10)		4	--	--	--	4.00		
							4.00	7960.60	31842.40
									5641935.247
8.07	Miscellaneous and Rounding off								8064.75
								TOTAL	5650000.00

BRUHAT BANGALORE MAHANAGARA PALIKE

Project: Proposed Improvements Corridor along Selected Stretch of Chord Road

Over Head & Cantilever Gantry Detailed Estimation

Sl. No.	Description of work	Unit	No.	Length m	Breadth m	Depth m	Quantity	Rate in Rs.	Amount in Rs.
4.07	OVER HEAD GANTRY OF SPAN 30M								
4.07.1	KSRRB M2100-2.1 Earthwork in excavation for foundation of structures as per drawing and technical specifications. Including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications, B. Mechanical Means (i) Depth upto 3m MORTH Specification No. 304 (Add 10% dewatering charges)	Cum							
	(P.No. 220, I.No. 27.4 of PW, P & IWTD SR 2011-12)								
	Gantry		3	3.90	3.90	1.80	82.13		
						Say	82.50	45.08	3719.48
4.07.2	KSRRB M2100-13. Plain Cement Concrete :M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100	Cum							
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	Gantry		3	3.90	3.90	0.10	4.56		
						Say	5.00	3724.92	18624.60
4.07.3	KSRRB M2100-14 Reinforced cement concrete M20 with OPC cement @ 300kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.69cum and fine aggregates @ 0.46cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008, in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No.1500,1700 & 2100	Cum							
	(P.No.222, I.No.27.25 of PW, P&IWTD SR 2011-12)								
	Column footing		2	3.70	3.70	0.60	16.43		
						Say	16.50	4401.00	72616.50
4.07.4	KSRRB 2200-5.9. Design mix M20 with OPC cement @ 320kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.69cum and fine aggregates @ 0.46cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 i) Upto 5 m height	Cum							
	(P.No.227, I.No.28.7.9 of PW, P& IWTD SR 2011-12)								
	Column upto GL		2	2.50	2.50	1.10	13.75		
						Say	14.00	4931.28	69037.92
4.07.5	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Gantry :								
	Mat Reinforcement					Unit Wt/Rmt			
	Main bar 25 nos 12mm dia	3	25	4.40	--	0.89	293.70		
	Distribution bar 25 nos 12mm dia	3	25	4.40	--	0.89	293.70		
	Column pedestal								
	Main bar 16 nos 16mm dia	3	16	4.50	--	1.58	341.28		
	Stirrups 8mm dia bar 200mm c/c								
	Vertical	3	27	7.40	--	0.394	236.16		
	Horizontal	3	9	7.40	--	0.394	78.72		
	Diagonal	3	9	6.70	--	0.394	71.27		
						Sub Total	1314.84	Kgs	
	Add 5% for Wastage						65.74		

Sl. No.	Description of work	Unit	No.	Length	Breadth	Depth	Quantity	Rate in Rs.	Amount in Rs.
				m	m	m			
						Total	1380.58	Kgs	
						Qty in MT	1.38		
						Say	1.50	68274.71	102412.06
4.07.6	Supplying, fabricating, erecting, and fixing in position, inserts and embedments, Truss, clamps, brackets, insert plates and all miscellaneous steel works as shown in drawing and as directed by the Engineer at all depths, using MS angles, channels, steel beams, rails, tees, plates, flats, rounds squares etc., of various sizes and other structural section confirming IS 2062 grade A, medium class GI pipes etc., including straighting, cutting, fabricating, welding, bending to slope fixing to position, welding to insert plate embeded in concrete and inclusive of 2coats of enamel paint over one coat of metal primer. The rate quoted is to include the cost of all materials, labour, tools, tackets, cranes, devices and plants, wastage etc., as per specifications and drawings complete. Including cost of bolts, nuts, washers, clamps, welding, electrodes, and connections required for the work. Rate to include shims and packing peices etc., complete with all lead and lifts as directed by the Engineer-in-charge.	MT							
	(Data Rate) Gantry								
	Structural steel on pedestal					Unit Wt/Rmt			
	M S Base plate 20mm thick								
	3x2.5mx2.5mx0.02mx7850kg/cum = 2943.75 kgs		--	--	--	--	2943.75		
	Anchor bolt 25mm dia 16 nos 3.42 kg/No		3	16.00	--	3.42	164.16		
	Stiffner plate 12mm thick 4 nos per each pedestal								
	Vertical Plate								
	3x4X2.3mx0.4mx0.012mx7850kg/cum = 1039.97 kgs		--	--	--	--	1039.97		
	Stiffners								
	3x16X0.1mx0.3mx0.012mx7850kg/cum = 135.65 kgs		--	--	--	--	135.65		
	Vertical structural sections								
	ISA 100x100x8mm @ 12.1kg/m	3	4	8.69	--	12.10	1261.79		
	Horizontals								
	ISA 65x65x6mm @5.8kg/m	3	16	2.00	--	5.80	556.80		
	Diagonal sections								
	ISA 75x75x6mm @ 6.8kg/m	3	20	2.65	--	6.80	1081.20		
	Horizontal structural sections								
	ISA 75x75x6mm @ 6.8kg/m	1	2	34.00	--	6.80	462.40		
	ISMC 125x65x65mm @13.1kg/m	1	2	34.00	--	13.10	890.80		
	Vertical								
	ISA 65x65x6mm @5.8kg/m	2	17	1.00	--	5.80	197.20		
	Horizontal								
	ISA 65x65x6mm @5.8kg/m	2	17	2.00	--	5.80	394.40		
	Diagonal sections								
	Front & Back	2	34	2.24	--	6.80	1035.78		
	Botom & Top	2	34	2.24	--	6.80	1035.78		
	Covering of truss								
	Ms Plate 5mm thick @ 39.2 kg/Sqm								
	Top	1	34	2.00	--	39.20	2665.60		
	Gusset Plate								
	A-type Vertical Joint								
	3x20X0.3mx0.4mx0.008mx7850kg/cum = 452.16 kgs		--	--	--	--	452.16		
	B-type Top Horizontal Joint								
	2x7X0.15mx0.15mx0.008mx7850 kg/cum = 19.78 kgs		--	--	--	--	19.78		
	C-type								
	2x3X0.30mx0.30mx0.008mx7850 kg/cum = 33.91 kgs		--	--	--	--	33.91		
	Sides								
	2x17X0.30mx0.30mx0.008mx7850kg/cum = 192.17 kgs		--	--	--	--	197.17		
						Total	14568.29	Kgs	
						Qty in MT	14.57		
						Say	15.00	61000.00	915000.00

Sl. No.	Description of work	Unit	No.	Length	Breadth	Depth	Quantity	Rate in Rs.	Amount in Rs.
				m	m	m			
4.07.7	KSRRBM800-5.2. Providing and Erecting overhead signs with a corrosion resistant 2mm thick aluminium alloy sheet reflectorised with high intensity retro-reflective sheeting of encapsulated lense type with vertical & lateral clearance given in clause 800.2.2 and 800.2.3 and installed as per cluse 800.2.7 over a designed support system of aluminium alloy or galvanised steel trestles and trusses of sections and type as per structural design requirements and approved plans complete as per specifications. B.Aluminium Alloy Plate for Over Head Sign MORTH Specification No. 802	Sqm							
	(P.No.192, I.No.24.6 of PW,P&IWTD SR 2011-13)								
	Covering of truss								
	Top		2	34.00	--	1.00	68.00		
							68.00	5648.40	384091.20
4.07.8	KSRB 15.18.1: **Applying red lead ready mix priming coat over new steel or other metal surface** including preparing the surface after throughly cleaning oil, grease, dirt and othe foreign matter, and scoured with wire brushes, fine steel wool. sand papers including cost of materials, labour, complete as per specifications.	Sqm							
	(P.No.127, I.No.15.73 of PW,P&IWTD SR 2011-12)								
	Gantry		12	2.00	--	8.70	208.80		
	Top Truss		2	30.00	--	1.00	60.00		
			2	30.00	--	2.00	120.00		
	Covering Truss								
	Ms Plate 5mm thick @ 39.2 kg/Sqm		1	30.00	--	2.00	60.00		
							448.80		
						Say	449.00	23.76	10668.24
4.07.9	KSRB 15.18.2: **Providing and applying enamel metal paint** two coats (Excluding priming coat) over new steel or other metal surface brushing to give an even shade after cleaning oil, grease, dirt and other foreign matter, including cost of materails, labour, complete as per specifications.	Sqm							
	(P.No.127, I.No.15.74 of PW,P&IWTD SR 2011-12)								
	Quantity same as Primer Coat		--	--	--	--	68.00	76.68	5214.24
4.07.10	KSRB 2.4: **Refilling available excavated earth** around pipe lines, cables in layers not exceeding 20cms in depth, compacting earth deposited layer by ramming after watering with lead upto 50m and lift upto 1.5m including cost of all labour complete as per specfiications.	Cum							
	(P.No.6, I.No.2.11 of PW,P&IWTD SR 2011-12)								
			--	--	--	--	61.00	58.32	3557.52
4.07.11	KSRRB M100-4.1: **Cost of Haulage including loading and unloading of** stone Boulder / Stone aggregates / Sand /Kankar / Moorum KSRRB M100-1: Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip complete as per specifications. MORTH Chapter 1	Cum							
	conveying up to 20km by mechanical means.								
	(P.No.141&147 of PW,P&IWTD S.R 2011-12)			--	--	--	21.50	123.34	2652.00
									15 87593.76
									15 87593.76

Sl. No.	Description of work	Unit	No.	Length	Breadth	Depth	Quantity	Rate in Rs.	Amount in Rs.
				m	m	m			
4.08	CANTILEVER GANTRY								
4.08.1	KSRRB M2100-2.1 Earthwork in excavation for foundation of structures as per drawing and technical specifications. Including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material complete as per specifications, B. Mechanical Means (i) Depth upto 3m MORTH Specification No. 304 (Add 10% dewatering charges)	Cum							
	(P.No. 220, I.No. 27.4 of PW, P & IWTD SR 2011-12)								
	Cantilever Gantry		1	2.15	2.15	1.50	6.93		
						Say	7.00	45.08	316.00
4.08.2	KSRRB M2100-13. Plain Cement Concrete M15 with OPC cement @ 240kgs, with 40mm and down size graded granite metal coarse aggregates @ 0.84cum and fine aggregates @ 0.56cum in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No. 1500, 1700 & 2100	Cum							
	(P.No.222, I.No.27.24 of PW,P&IWTD S.R 2011-12)								
	Cantilever Gantry		1	2.15	2.15	0.10	0.46		
						Say	0.50	3724.92	1862.46
4.08.3	KSRRB M2100-14 Reinforced cement concrete M20 with OPC cement @ 300kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.69cum and fine aggregates @ 0.46cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008, in Open foundation complete as per Drawing and Technical Specifications. MORTH Specification No.1500,1700 & 2100	Cum							
	(P.No.222, I.No.27.25 of PW, P&IWTD SR 2011-12)								
	Column footing		1	1.95	1.95	0.40	1.52		
						Say	2.00	4401.00	8802.00
4.08.4	KSRRB 2200-5.9. Design mix M20 with OPC cement @ 320kgs, with 20mm and down size graded granite metal coarse aggregates @ 0.69cum and fine aggregates @ 0.46cum, with superplastisiser @ 3lts confirming to IS9103-1999 Reaffirmed-2008 i) Upto 5 m height	Cum							
	(P.No.227, I.No.28.7.9 of PW, P& IWTD SR 2011-12)								
	Column upto GL		1	0.60	0.60	1.00	0.36		
						Say	0.50	4931.28	2466.00
4.08.5	KSRRB M2200 - 6. Supplying, fitting and placing TMT bar reinforcement in sub - structure complete as per drawing and technical specifications complete as per specifications. MORTH Specification No. 1600 & 2200	MT							
	(P.No.229, I.No.28.8 of PW, P&IWTD SR 2011-12)								
	Mat Reinforcement								
	Main bar 10 nos 10mm dia bar		10	2.40	--	--	24.00		
	10x2.4 = 24.00 x 0.62kg/m						14.88	Kgs	
	Distribution bar 10 nos 10mm dia bar		10	2.40	--	--	24.00		
	10x2.4 = 24.00x 0.62kg/m						14.88	Kgs	
	Column pedestal								
	Main bar 4 nos 16mmdia bar		4	2.60	--	--	10.40		
	4x2.6 = 10.40 x 1.57kg/m						16.33	Kgs	
	Main bar 4 nos 12mmdia bar		4	2.60	--	--	10.40		
	4x2.6 = 10.40 x 0.89kg/m						9.26	Kgs	
	Stirrups 10 nos 8mm dia bar		10	2.50	--	--	25.00		
	10x2.5 = 25.00 x 0.39kg/m						9.75	Kgs	
						Total	65.09	Kgs	
						Qty in MT	0.07		
						Say	0.10	68274.71	6827.00

Sl. No.	Description of work	Unit	No.	Length	Breadth	Depth	Quantity	Rate in Rs.	Amount in Rs.
				m	m	m			
4.08.6	Supplying, fabricating, erecting, and fixing in position, inserts and embedments, Truss, clamps, brackets, insert plates and all miscellaneous steel works as shown in drawing and as directed by the Engineer at all depths, using MS angles, channels, steel beams, rails, tees, plates, flats, rounds squares etc., of various sizes and other structural section confirming IS 2062 grade A, medium class GI pipes etc., including straighting, cutting, fabricating, welding, bending to slope fixing to position, welding to insert plate embeded in concrete and inclusive of 2coats of enamel paint over one coat of metal primer. The rate quoted is to include the cost of all materials, labour, tools, tackets, cranes, devices and plants, wastage etc., as per specifications and drawings complete. Including cost of bolts, nuts, washers, clamps, welding, electrodes, and connections required for the work. Rate to include shims and packing peices etc., complete with all lead and lifts as directed by the Engineer-in-charge	MT							
	(Data rate)								
	M S Base plate 16mm thick								
	0.6mx0.6mx0.016mx7850kg/cum = 45.22 kgs			--	--	--	45.22	Kgs	
	Anchor Bolt 25mm bolt 750mm long 8nos		8	0.75	--	--	6.00		
							20.52	Kgs	
	Stiffner plate 12mm thick 4 nos								
	4x0.3mx0.15mx0.012mx7850kg/cum		--	--	--	--	16.96	Kgs	
	NB 300 @ 45Kg/m		1	6.00	--	--	6.00		
							270.00	Kgs	
	Base Plate 12mm above NB 300								
	2x0.85mx0.85mx0.012mx7850kg/cum = 45.22 kgs			--	--	--	136.12	Kgs	
	Stiffner plate								
	4x0.3mx0.15mx0.012mx7850kg/cum		--	--	--	--	16.96	Kgs	
	NB 80 @ 49.5Kg/m								
	Horizontal		4	4.30	--	--	17.20		
	Top & Bottom		10	0.75	--	--	7.50		
	Diagonal		8	2.05	--	--	16.40		
							41.10		
							2034.45	Kgs	
	NB 50 @ 5.1Kg/m								
	Vertical		10	1.80	--	--	18.00		
							91.80	Kgs	
	NB 100 @ 12.1Kg/m								
	Cantilever Supporting Bar		2	1.00	--	--	2.00		
							24.20	Kgs	
	Covering of Truss								
	MS Plate 5mm thick @ 39.2kg/sqm		2	4.30	--	2.00	17.20		
							674.24	Kgs	
						Total	3330.46	Kgs	
						Qty in MT	3.33		
						Say	3.50	61000.00	213500.00
4.08.7	KSRB 15.18.1: Applying red lead ready mix priming coat over new steel or other metal surface including preparing the surface after throughly cleaning oil, grease, dirt and othe foreign matter, and scoured with wire brushes, fine steel wool, sand papers including cost of materials, labour, complete as per specifications.	Sqm							
	(P.No.127, I.No.15.73 of PW,P&IWTD SR 2011-12)								
	Cantilever Gantry								
	NB 300		1	0.94	--	6.00	5.66		
	Horizontal sides		2	4.30	--	1.80	15.48		
	Top & Bottom		2	4.30	--	0.75	6.45		
	Covering for Truss								
	MS Plate 5mm thick		2	4.30	--	2.00	17.20		
							44.79		
						Say	45.00	23.76	1069.20

Sl. No.	Description of work	Unit	No.	Length	Breadth	Depth	Quantity	Rate in Rs.	Amount in Rs.
				m	m	m			
4.08.8	KSRB 15.18.2: **Providing and applying enamel metal paint** two coats (Excluding priming coat) over new steel or other metal surface brushing to give an even shade after cleaning oil, grease, dirt and other foreign matter, including cost of materails, labour, complete as per specifications.	Sqm							
	(P.No.127, I.No.15.74 of PW,P&IWTD SR 2012-13)		--	--	--	--	45.00	76.68	3450.60
4.08.9	KSRB 2.4: **Refilling available excavated earth** around pipe lines, cables in layers not exceeding 20cms in depth, compacting earth deposited layer by ramming after watering with lead upto 50m and lift upto 1.5m including cost of all labour complete as per specfiications.	Cum							
	(P.No.6, I.No.2.11 of PW,P&IWTD SR 2012-13)								
4.08.10	KSRRB M100-4.1: **Cost of Haulage including loading and unloading** of stone Boulder / Stone aggregates / Sand /Kankar / Moorum KSRRB M100-1: Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip complete as per specifications. MORTH Chapter 1	Cum	--	--	--	--	4.50	58.32	262.44
	Conveying up to 20km by Mechanical means.								
	(P.No.141&148 of PW,P&IWTD S.R 2012-13)			--	--	--	2.50	123.34	308.34
									238864.04
								Total	238864.04

BRUHAT BANGALORE MAHANAGARA PALIKE

Project: Proposed Improvements Corridor along Selected Stretch of Chord Road

Name of the Work: Construction of Flyover at Manjunath Nagar Main Road Junction

Flyover Electrical Estimate

Sl. No.	Description of Work	Unit	Quantity	Rate in Rs.	Amount in Rs.
9.01	Supplying and fixing of Philips make Velocity street light fixtures suitable for 250 Watt SON - T PIA sodium vapour lamp SGP 338 / 250 SON - T sea green, or equivalent with following parameters Housing made out of LM6 high pressure die cast recyclable aluminium alloy ofr sturdiness and excellent corrosion resistance the finish should be powdwe coated sea green housing for improved aesthetics and better environmental protection. The lamp compartment should consist of electrochemicslly anodized, high purity POT reflector with a soecifically designed ribbed profile for better uniformity and high spacing to mounting ratio, All electrical accessories such as energy efficient low loss open construction copper ballast with tw.130 deg., semi parallel ignitor and siemens EPCOS make power pafactor improvement capacitor should be provided prewored upto terminal block. All accessories are to be mounted toa removablr gear plate for ease of maintenance. All electrical connections of the control gear module with the rest of the luminarie are click fix, foolproof and require use of no., tools.				
	Control gear compartment opens from top. Heat resistant toughned curved glass bowl for the lamp compartment, which is sealed replacement, is by opening the top compartment to ensure ingress protection of IP66 for the lamp compartment. Flexible optics to achieve optimum light distribution to suit different road and installetion parameter. Specially designed dual pole mounting arrangement bottom as well as lateral pole mounting suitable for mounting on pole dial., 42mm-70mm luminarie shall fully confirmed to safety norms according to IEC598/ENEC60598 make philips or GE.	Nos	12	10500.00	126000.00
9.02	SON-T PLUS PIA 250W HPSV TUBULAR LAMP Supplying and fixing 250W high pressure sodium vapour lamp of tubular design with lead free environment- friendly glass, without built in ignitor and having a luminous efficacy not less than 125 lumen/watt with a restricting time-30seconds suitable for fixing in the velocity sodium vapour street light fitting for operation on single phase 230V 50Hz, AC power supply and confirming to IS9974 PART I and II (latest)	Nos	12	9500.00	114000.00
9.03	Fixing metal halide Street light fitting over existing pole / wall ceiling including clamps, bolts, nuts and wiring using suitable capacity wires complete (SR 2010-11) Page 26, Item 5.	Nos	24	130.00	3120.00
9.04	Supplying and fixing telescopic M.S.bracket fabricated by using 0.5m length 4" dia telescopic M.S.pipe with 2" dia 1.5m long M.S.bracket all are welded with suitable angle using 6mm thick M.S.sheet, grip bolt & nuts as required suitable for 9 to 12 mtrs M.S.tubular pole or octogonal pole with necessary two coats of approved painting, with all other accessories etc complete				
	a) Single bracket 1 X 1.5 Mtr.Length (SR 2010-11) Page 26, Item 4(b).	Nos	12	1005.00	12060.00

Sl. No.	Description of Work	Unit	Quantity	Rate in Rs.	Amount in Rs.
	c) Double bracket 2 X 1.5 Mtr.Length (SR 2010-11) Page 26, Item 4(c).	Nos	6	1200.00	7200.00
9.05	Fabricating,supplying and erecting sawged tubular pole of height 9Mtr having three sections and providing two coats of red oxide paint and finished with two coats of enamaled paint of approved quaility and color and M.S.Base plate of suitable size welded at the bottom of the pole(as per IS)and 40mm dia GI/flexible PVC pipe of 1Mtr. length fitted to the heavy guage polycarbonate control box including 5way connector of size 167x125x82mm for 7.5M pole /200x160x98mm for remaining length of pole with front opening cover, with locking arrangements and suitable capacity MCB/DP switch. The pole shall be erected n cement concrete work(1:2:4)including excavation and refilling of planting depth of the pole to the to the ground level and the coping CC shall be upto 0.6M above ground level as per 2713-7				
	C) 10 Mtr (5.2Mtr Hb 139.7mm dia 4.85mm thick x 2.4 Mtr Hm, 114.3mm dia 4.50mm thick x 2 M Ht, 88.9mm dia 3.25mm thick as per IS 410 SP 29	Nos	18	18050.00	324900.00
9.06	Supply , installation,testing & commissioning of outdoor type feeder piller board with TVM meter as per power distribution schematic diagram enclosed The rates shall include all necessary foundation & civil works (MKT Rate)	No	1	80000.00	80000.00
9.07	Supplying, providing, testing and commissioning of 1.1 KV class single core 3/20mm stranded copper cable PVC insulated and sheathed for street lights from the control points located on pole supports at 2.0m above ground level complete and as directed by the Engineer in charge (SR 2010-11) Page 9, Item 20(I) (c)	Mtrs	467	25.00	11675.00
9.08	Supplying, providing, testing and commissioning of 50mm GI pipe at pole supports to enclose the UG cable etc., complete and as directed by the Engineer in charge including digging erection etc. (SR 2010-11) Page 69, Item 15(b).	Mtrs	40	260.00	10400.00
	ELECTRIFICATION - BOX TUNNEL				
9.09	Supplying high pressure 150 Watts metal halide street light luminare suitable for use with high pressure metalhallide lamp with integrated control gear.The fitting shall be on non corrosive high pressure die cast alluminum housing with low copper content gray powder coated finish including wiring, suitable to operate on 230/250V 50Hz AC supply including heavy duty copper biased,igniter, condenser and 150watts metal halide lamp.(SR 2010-11) page 19, Item 13.(II).(a)	Nos	6	5450.00	32700.00
9.10	Fixing metal halide Street light fitting over existing pole / wall ceiling including clamps, bolts, nuts and wiring using suitable capacity wires complete (SR 2010-11) Page 26, Item 5.	Nos	6	130.00	780.00
9.11	Supplying and fixing of Porcelain fuse channel with cut out on existing wooden/panel using necessary nuts, bolts and washers etc., complete 63 Amps	Nos	4	219.00	876.00
9.12	Supplying and fixing of class A (medium duty) GI pipe of wall thickness not less than 3.25mm on pole/wall/drain crossing with necessary clamping arrangements for UG cable 50mm.	Rmtr	50	260.00	13000.00
9.13	Fabricating supplying and mounting MS box made out...SWG suitable for floor/wall mounting, fully weather proof with provision for better heat dissipation, provided with hinged front cover, equipped with tamper proof locking arrangements, with suitable size clamps with necessary cable b entry pipe with 16SWG	Nos	20	600.00	12000.00

Sl. No.	Description of Work	Unit	Quantity	Rate in Rs.	Amount in Rs.
9.14	Supplying and fixing angle iron frame work fabricated out of M.S. angle iron.. And M.S.flat...with bolts,washers etc., and painted with 2 coats of red oxide and then two coats of approved paint 40X40X6mm	Mtrs	10	210.00	2100.00
9.15	**Supplying of L.T. Cables**				
	Supplying of L.T.UG cable having aluminium conductor PVC insulated sheathed, galvanised, steel wire/steel tape armoured cable with PVC outer sheathing 1.1 KV class (conforming to IS 1554)				
9.15.1	3.5C x 50 Sqmm XLPE cable	Mtrs.	25	250.00	6250.00
	(SR 2010-11) page 67, Item 10(I)(g)				
9.15.2	3.5C x 25 Sqmm XLPE cable	Mtrs.	20	215.00	4300.00
	(SR 2010-11) page 67, Item 10(I)(e)				
9.15.3	4C x 16 Sqmm XLPE cable	Mtrs.	267	150.00	40050.00
	(SR 2010-11) page 67, Item 10(I)(d)				
9.16	**Laying of L.T. Underground cables**				
	Labour charges for laying of 1.1 KV class UG cable when supplied departmentally / agency in existing trench GI pipe / stoneware pipe / on wall / on pole as required				
9.16.1	3.5C x 50 Sqmm XLPE cable	Mtrs.	25	8.00	200.00
	(SR 2010-11) page 68, Item 11.(I).(b)				
9.16.2	3.5C x 25 Sqmm XLPE cable	Mtrs.	20	8.00	160.00
	(SR 2010-11) page 68, Item 11.(I).(b)				
9.16.3	4 C x 16 Sqmm XLPE cable	Mtrs.	267	5.00	1335.00
	(SR 2010-11) page 67, Item 10(I)(a)				
9.18	**End Termination of above cables with glands crimping type copper sockets.**				
9.18.1	3.5C x 50 Sqmm XLPE cable (SR 2010-11)	Nos	5	340.00	1700.00
	Page 69 & 72 item 17(d) & 26( ) ( )				
9.18.2	3.5C x 25 Sqmm XLPE cable (SR 2010-11)	Nos	5	215.00	1075.00
	Page 69 & 72 item 17(d) & 26( ) ( )				
9.18.3	4C x 16 Sqmm XLPE cable (SR 2010-11)	Nos	36	150.00	5400.00
	Page 69 & 72 item 17(d) & 26( ) ( )				
9.19	Supplying and fixing L.T.cast iro pot heads suitable for 1.1KV class UG Cable filled with necessary bitumen/insulating compound with terminals, clamps,bolts,nut and washers etc.,				
a)	35 sqmm (SR 2010-11) page 69, Item 16(e)	Nos	1	313.00	313.00
b)	25 sqmm (SR 2010-11) page 69, Item 16(e)	Nos	1	286.00	286.00
9.20	Digging of trench of 0.6 mtr deepx0.50 mtr wide refilling the ternch to the required ground level and consolidating etc., complete(as per civil SR KSRB 1-2,P-7)				
	a. In soil(hard)	Rmtr	400	50.00	20000.00
	(SR 2010-11) Page 68, Item 12(b)				

Sl. No.	Description of Work	Unit	Quantity	Rate in Rs.	Amount in Rs.
	EARTHING				
9.21	Supplying fixing, wiring earth electrode for grounding conduits, I.C.cutouts and other equipments on the meter board using 40mm dia 2.90 thick GI pipe 2.5 mtr long buried in a pit ... The pit should be filled with equal proportion of salt and charcoal 150mm alround the pipe to complete depth. The connection from the pipe to the conduit etc, is to be established through GI wire of size as oer ISI specification 7.3.3. of IS 732 using 12mm dia bolts, nuts, washers and checknuts etc, the pipe shall have 16 through holes of 12.2mm dia. (SR 2010-11) page-67,item-7	Nos.	4	1500.00	6000.00
9.22	Supply & laying following GI Flat/wires as Earthing conductors from equipment to earth stations.				
9.23	25 x 6mm G.I.Flat (SR 2010-11)Page 67.9 (b)	Mtrs.	40	140.00	5600.00
9.24	8 SWG G.I Wire (SR 2010-11) Page-74, item 30.I.(c)	Mtrs.	270	20.00	5400.00
	Miscellaneous				
9.25	Providing and laying reinforced cement concrete pipe NP2 150mm dia for culverts including pointing ends, and fixing collars with cement mortar 1:2 including cost of all materials, labour, curing complete as per specifications. Specifications. No. KSRB 1000, 2300	Mtrs.	.80	389.00	31120.00
	(Pg No. 225, I.No.34.7.1 of PW,P&IWTD SR 2011-12)				
9.26	Video Surveillance Systems consisting of outdoor fixed cameras, video encoders, video management software, recording servers, etc for outdoor surveillance of the construction site locally as well as from a remote location	LS	--	--	300000.00
					1180000.00
			Total Amount in Rs.		1180000.00

BRUHAT BANGALORE MAHANAGARA PALIKE

Project: Proposed Improvements Corridor along Selected Stretch of Chord Road

Name of the Work: Construction of Intergrated Underpass at Shivanagara 1st & 8th Main Road Junction

Abstract of Detailed Cost Estimate

Sl. No.	Particulars	Cost in Rs.
1	Site Clearance and Dismantling	1164000
2	Slip Road and Surface Level Road including Median, Kerb and Road Furniture	39563800
3	Cross Drainage, Longitudinal Drainage, Footpath and Reconstruction of Compound	
	a. Culvert	2066000
	b. Road Side Drains and Footpath	26357996
	c. Reconstruction of Compound and Retaining Wall along Service Road	1070000
4	Covered Portion	65155100
5	Construction of Retaining Wall	79550000
6	Construction of Ramp	35617000
7	Drainage Facilities to Underpass	7626000
8	Diversion Road	12484000
9	Electrical Works	6240000
	Construction Cost	276893896

MANASA CONSULTANTS

ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
(ಯೋಜನೆ ವಿಭಾಗ ಕೇರ್ಪ್ರ--1)
ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ