SOLVED PROBLEM HIGHWAY ENGINEERING

Solved Problem: Highway Engineering

Question: A highway curve has a radius of 300 m and is superelevated by 0.10 m. Determine the maximum safe speed for a vehicle traveling on the curve with a coefficient of friction between the tires and pavement of 0.12.

Answer:

The maximum safe speed for a vehicle traveling on a curved road is given by the equation:

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V = ?(Rg?)
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where:

- V is the vehicle speed (m/s)
- R is the radius of the curve (m)
- g is the acceleration due to gravity (9.81 m/s²)
- ? is the coefficient of friction between the tires and pavement

Substituting the given values into the equation, we get:

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V = ?(300 m * 9.81 m/s² * 0.12) = 17.15 m/s
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Converting to kilometers per hour:

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V = 17.15 m/s * (3600 s/hr) / (1000 m/km) = 61.55 km/hr
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Therefore, the maximum safe speed for the given highway curve is 61.55 km/hr.

Question: A highway is designed for a maximum speed of 100 km/hr. What is the minimum radius of a curve that can be used on this highway if the coefficient of friction between the tires and pavement is 0.15?

Answer:

Rearranging the maximum safe speed equation:

$R = V^2 / (g?)$

Substituting the given values into the equation, we get:

$R = (100\ km/hr)^2 / (9.81\ m/s^2 * 0.15) = 648\ m$

Therefore, the minimum radius of a curve that can be used on the highway is 648 m.

Question: A highway has a grade of 5%. If the coefficient of friction between the tires and pavement is 0.10, what is the maximum acceleration that can be achieved by a vehicle traveling uphill on the grade?

Answer:

The maximum acceleration that can be achieved by a vehicle traveling uphill on a grade is given by the equation:

$a = g(? - \sin ?)$

where:

- a is the acceleration (m/s^2)
- g is the acceleration due to gravity (9.81 m/s^2)
- ? is the coefficient of friction between the tires and pavement
- ? is the grade angle

Converting the grade from percentage to radians:

$? = 5\% * (?/180) = 0.0873\ rad$

Substituting the given values into the equation, we get:

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a = 9.81 m/s² * (0.10 - sin 0.0873 rad) = 0.89 m/s²
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Therefore, the maximum acceleration that can be achieved by a vehicle traveling uphill on the grade is 0.89 m/s².

Question: A highway bridge has a length of 200 m and a grade of 3%. What is the difference in elevation between the ends of the bridge?

Answer:

The difference in elevation between the ends of the bridge is given by the equation:

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?h = L * sin ?
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where:

- ?h is the difference in elevation (m)
- L is the length of the bridge (m)
- ? is the grade angle

Converting the grade from percentage to radians:

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? = 3% * (?/180) = 0.0524 rad
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Substituting the given values into the equation, we get:

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?h = 200 m * sin 0.0524 rad = 17.32 m
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Therefore, the difference in elevation between the ends of the bridge is 17.32 m.

Question: A highway is being designed to accommodate a traffic volume of 10,000 vehicles per day. The design speed is 80 km/hr and the average vehicle occupancy is 1.2 persons per vehicle. What is the required number of lanes for the highway?

Answer:

The required number of lanes for the highway is given by the equation:

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N = Q / (C * V * D)
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where:

- N is the number of lanes
- Q is the traffic volume (vehicles per day)
- C is the capacity per lane (vehicles per hour per lane)
- V is the design speed (km/hr)
- D is the average vehicle occupancy (persons per vehicle)

Assuming a lane capacity of 2,000 vehicles per hour per lane, we get:

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N = 10,000 / (2,000 * 80 * 1.2) = 5.21
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Therefore, the required number of lanes for the highway is 5 (rounding up to the nearest integer).

Q&A on Steel Designers Manual 2017 (AzeriPark)

1. What is the Steel Designers Manual 2017? A: The Steel Designers Manual 2017 (AzeriPark) is a comprehensive reference guide for steel designers, fabricators, and engineers. It provides detailed information on structural steel design, including calculations, tables, and design examples.

2. What is new in the 2017 edition of the Steel Designers Manual? A: The 2017 edition includes several updates and revisions, including:

- New sections on cold-formed steel design and fire resistance
- Revised tables and calculations for various sections
- Expanded coverage of seismic design

3. Where can I find the Steel Designers Manual 2017? A: The Steel Designers Manual 2017 can be purchased from various online retailers and bookstores. It is also available as a digital download from the publishers.

4. Who should use the Steel Designers Manual 2017? A: The Steel Designers Manual 2017 is essential for anyone involved in the design, fabrication, or engineering of steel structures. It is a valuable resource for students, engineers, architects, and contractors.

5. How can I use the Steel Designers Manual 2017 effectively? A: To effectively use the Steel Designers Manual 2017, it is crucial to:

- Understand the fundamentals of structural steel design
- Be familiar with the code requirements and standards
- Know how to apply the information and calculations in the manual
- Seek professional guidance when necessary

The Jordan Rules: An Inside Look at a Turbulent Season

Q: What is "The Jordan Rules"? A: The Jordan Rules is a book by Sam Smith that chronicles the 1990-91 Chicago Bulls season, during which the team won their first NBA championship. The book provides an in-depth look at the personalities and relationships within the team, particularly focusing on the relationship between Michael Jordan and coach Phil Jackson.

Q: What makes this book so compelling? A: The Jordan Rules is both a sports history and a character study. It offers a rare glimpse into the inner workings of a championship team, and it does so by focusing on the human drama that unfolded during the season. The book provides insights into Jordan's competitive nature, Jackson's leadership style, and the challenges faced by a team trying to win its first championship in decades.

Q: What are some of the key revelations in the book? A: The book reveals that Jordan was a ruthless competitor who demanded the best from himself and his teammates. It also shows that Jackson was a master manipulator who knew how to motivate his players. Additionally, the book sheds light on the tension that existed between Jordan and some of his teammates, particularly Scottie Pippen.

Q: Why should readers be interested in "The Jordan Rules"? A: The Jordan Rules is a must-read for any fan of Michael Jordan, the Chicago Bulls, or the NBA. It is a gripping and insightful account of one of the most successful seasons in NBA history. The book offers a unique perspective on the challenges and triumphs faced by a championship team.

Q: What is the lasting legacy of "The Jordan Rules"? A: The Jordan Rules has been praised for its honesty and its ability to capture the essence of the 1990-91 Chicago Bulls season. It has become a classic of sports literature and has helped to shape the way we think about Michael Jordan and the Bulls. The book continues to be a source of inspiration and motivation for athletes and fans alike.

Tak Putus Dirundung Malang: Sutan Takdir Alisjahbana

Sutan Takdir Alisjahbana, sastrawan dan budayawan Indonesia yang lahir pada 11 Februari 1898 di Tapanuli Utara, Sumatera Utara. Sepanjang hidupnya, ia mengalami berbagai peristiwa menyedihkan yang tak henti-hentinya menimpanya.

1. Masa Kecil yang Traumatis

Sejak kecil, Sutan Takdir telah mengalami kehilangan orang yang dicintainya. Ibunya meninggal saat ia berusia 10 tahun, disusul oleh kakak perempuannya tiga tahun kemudian. Tragedi yang ia alami di masa kanak-kanak ini meninggalkan luka yang mendalam di jiwanya.

2. Kegagalan Pernikahan

Pada tahun 1927, Sutan Takdir menikahi Sariasih, namun pernikahan mereka kandas pada tahun 1930. Perceraian ini merupakan pukulan berat bagi Sutan Takdir, yang sangat menghargai hubungan keluarga.

3. Kesulitan Finansial

Sebagai seorang cendekiawan, Sutan Takdir sering mengalami kesulitan finansial. Ia sempat bekerja sebagai jurnalis dan guru untuk menghidupi keluarganya. Namun, upah yang ia peroleh tidak mencukupi untuk memenuhi kebutuhan hidupnya.

4. Perjuangan Melawan Penyakit

Pada tahun 1968, Sutan Takdir didiagnosis menderita kanker paru-paru. Bertahun-tahun ia menjalani pengobatan, namun penyakit ini terus menggerogoti tubuhnya. Ia wafat pada 17 Juli 1994 di Jakarta, pada usia 96 tahun.

5. Warisan dan Pengaruh

Meskipun hidupnya kerap diwarnai kesedihan, Sutan Takdir Alisjahbana meninggalkan warisan yang luar biasa bagi bangsa Indonesia. Ia dikenal sebagai pelopor pembaruan tata bahasa Melayu dan salah satu bapak sastra modern Indonesia. Karyanya, seperti "Layar Terkembang", "Tatabahasa Baru Bahasa Indonesia", dan "Indonesia: Masa Lampau dan Masa Datang", terus menginspirasi generasi penerusnya.

> *steel designers manual 2017 azeripark*, *the jordan rules the inside story of a turbulent season with michael jordan and the chicago bulls*, *tak putus dirundung malang sutan takdir alisjahbana*

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