

Highway Capacity

1. The 2000 Highway Capacity Manual is a legal standard for planning, operating and designing highways.
Yes
No
2. The 2000 Highway Capacity Manual is 100% accurate.
Yes
No
3. A capacity at a location along a freeway is the most vehicles which have ever passed the location in one direction during one hour.
Yes
No
4. The capacity past a tow truck parked adjacent to a freeway lane would usually be less than the capacity when there is no tow truck present.
Yes
No
5. There was congestion along a freeway because of maintenance work. One lane was closed for several hours. The congestion was nonrecurring congestion.
Yes
No
6. Calculate the rate of flow as veh/hr where 140 vehicles pass a location during 15-minutes.
7. Calculate the volume to capacity ratio for the peak 15 minutes at a location along an urban freeway if the 1/4-hr volumes during the afternoon peak are 1500, 1850, 1800 and 1400 vehicles and the capacity is probably about 7600 vph.
8. The most traffic recorded during an hour along a rural highway where there are counts 24 hours per day every day of a year was 2688 vehicles. This would be the peak hour.
Yes
No
9. Volumes during 15-minute intervals of a peak hour were 750, 850, 800 and 700 vehicles. Calculate the peak hour factor.

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10. Traffic conditions along a rural two-lane highway are excellent when the level of service is D.
- Yes
- No
11. For capacity calculations, a pickup truck with four tires is a truck.
- Yes
- No
12. One truck is equivalent to approximately two passenger cars along freeways on level terrain.
- Yes
- No
13. An intersection at a suburban area will be reconstructed. It would be appropriate to obtain traffic count data for design on a Monday during early January.
- Yes
- No
14. There is a 1-mile, +4% grade along a rural freeway. There is no existing congestion. The freeway must be widened. Truck speed data for level of service and capacity calculations could be obtained using radar.
- Yes
- No
15. A highway will be constructed from a valley to a summit. The first significant grade will be +6% for 3/4-mile. The speed of an average truck at the top of this grade would probably to approximately 26 mph.
- Yes
- No
16. Most recurrent freeway congestion is caused by traffic demand for all through lanes exceeding the capacity of the through lanes.
- Yes
- No

17. Typical capacities along urban freeways during commute peak periods are approximately 2250 to 2400 passenger cars per hours, but would be less measured as vehicles per hour due to the effect of trucks, when present.

Yes

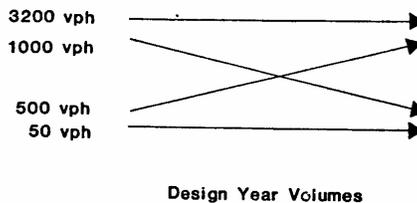
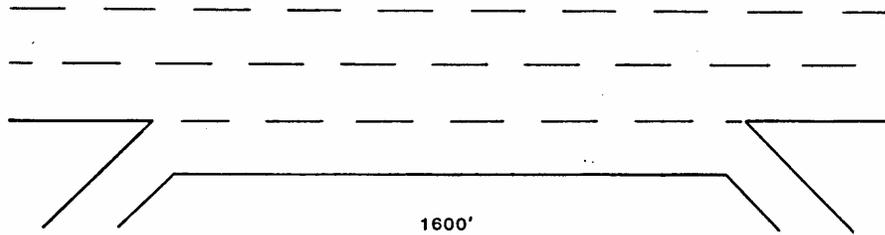
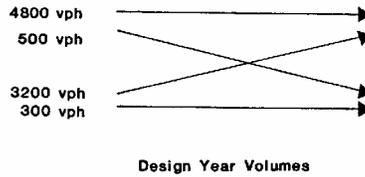
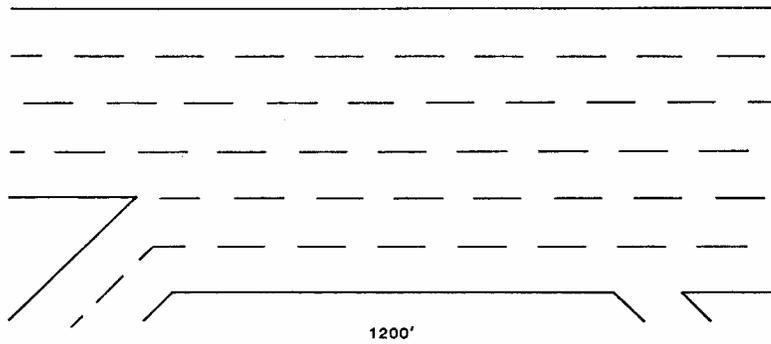
No

18. Five-minute counts were obtained immediately beyond a congested area along an urban freeway for three days. There were no incidents. The congestion lasted approximately 1-1/4 hours each day. The capacities for the three days were 5650 vph, 5700 vph, and 5675 vph. Calculate the approximate capacity.

19. A freeway with three lanes per direction will be constructed at a city. There will be no significant grades. The afternoon commute peak period volumes a year after construction will be approximately 2600 vph for one direction of travel. The peak hour factor will be approximately 0.85. There will probably be extensive recurrent congestion during most afternoon commute peak periods.

Yes

No



20. There is a freeway with two lanes per direction at an urban area. Recurrent congestion occurs prior to and along most of a one-mile, +4% grade. The freeway will be widened. The capacity of the two lanes along the upgrade should be calculated using the 2000 Highway Capacity Manual procedures.

Yes

No

21. A freeway will be constructed at a rural, mountainous area. There will be two lanes per direction. There will be a three-mile, +5% grade. Peak periods will occur on weekends and holidays. Approximately 4% of the vehicles will be trucks during peak periods. Calculate the approximate capacity along the upgrade. Use an fp factor for population effects of 0.80.

22. There are many procedures that may be used to calculate approximate capacities at weaving areas.

Yes

No

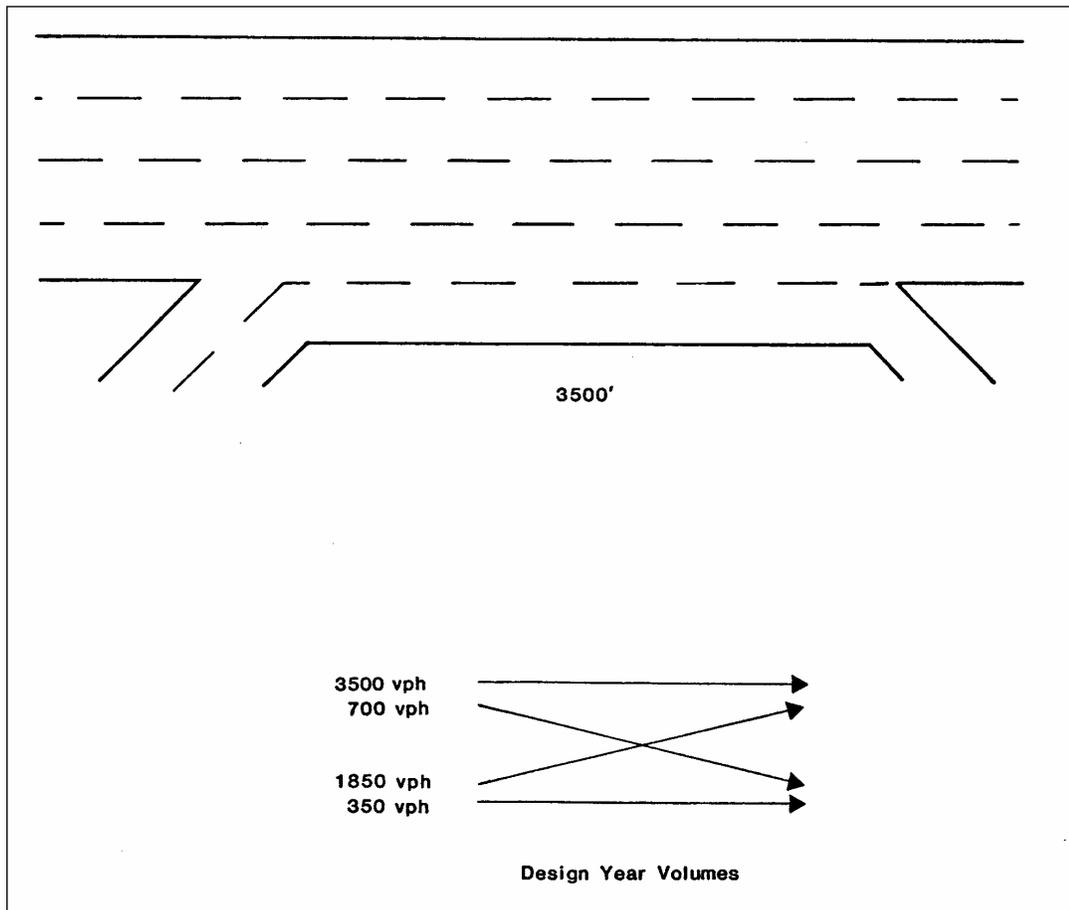
23. There is a freeway with four through-lanes per direction at an urban area. There are no significant grades. Approximately 3% of the vehicles are trucks during peak periods. Afternoon peak periods last approximately 3-1/2 hrs. A freeway-to-freeway interchange will be reconstructed. There will be a two-lane connector joining the four through-lanes, then five lanes for 3500 ft., and then a one-lane off-ramp. Refer to the sketch below. Volumes would probably not exceed the sign hourly volumes because of upstream geometric constraints along both freeways.

Use weaving capacity analysis. Do not use a peak hour factor. Use a factor on one truck equals two cars to change the vehicles per hour to passenger car equivalents per hour.

The design would be appropriate.

Yes

No



24. A local interchange with a one-lane off-ramp may be constructed 1200-ft. beyond where a two-lane connector joins four through lanes along an urban highway. There are six lanes for almost one-mile beyond the merge. There is a sketch on the next page. There are no significant grades. Approximately 1% of the vehicles are trucks during afternoon peak periods. Peak periods last approximately three hours. The design hourly volumes would be about the most traffic that could get to the area.

Use weaving capacity analysis. Use a passenger car equivalent of one truck equals two cars to change the vehicles per hour to passenger car equivalents per hour.

This design would be appropriate.

Yes

No

25. A freeway with three lanes per direction will be constructed at a town. There will be no significant grades. Approximately 5% of the vehicles will be trucks during peak periods. Peak periods will probably last less than an hour. The peak hour factor will be approximately 0.80. There will be a one-lane on-ramp, an auxiliary lane, and a one-lane off-ramp 1600-ft. beyond the on-ramp. There will be no other ramps within 4000-ft. There is a sketch on the following page.

Use weaving capacity analysis to calculate if the design would be appropriate at LOS "C". Convert the design hour volume to a peak 15-minute flow rate by dividing the volumes by the PHF.

26. It is often appropriate in large urban areas when planning weaving areas to increase or decrease the design hour volumes for the through lanes to capacity volumes at rates of approximately 2000 vph, which could arrive at or leave the weaving area. It is also often appropriate at such urban areas to increase or decrease the design hour ramp volumes at weaving areas. It is occasionally appropriate to also adjust the design hour volumes when planning weaving areas at towns and at rural areas.

Yes

No

27. There is an urban freeway with four lanes per direction. The outer lane will be closed for pavement repair. The capacity of the other three lanes would likely be an average of about 1500 vph per lane.

Yes

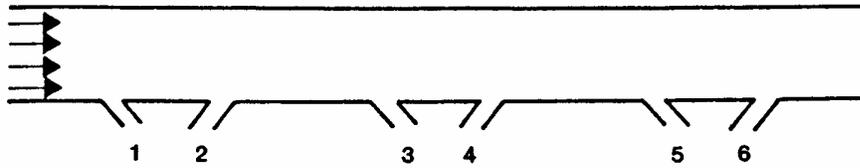
No

28. There is a freeway with two lanes per direction at a mountainous rural area where weekend and holiday peak periods occur. There is a four-mile +5% grade. Four percent of the vehicles are trucks during Saturday peak periods. One lane will be closed for pavement repair along two miles of the upgrade. Capacity would probably be about 1500 vph.

Yes

No

29.



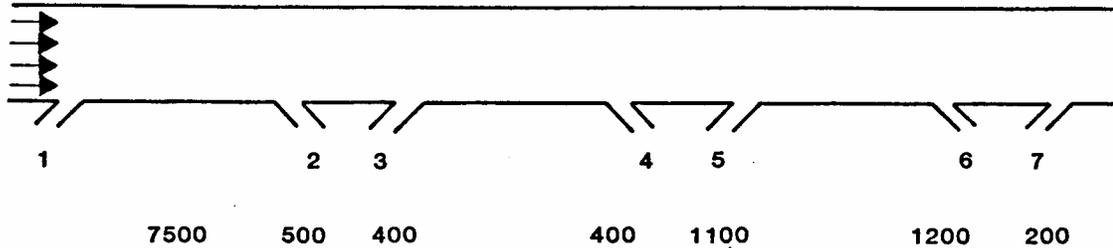
There is recurrent congestion from Ramp 1 to just beyond Ramp 6.

Widening the freeway from Ramp 2 to Ramp 5 would eliminate the congestion.

Yes

No

30. There is a freeway in an urban area where peak periods last approximately three hours. There are no significant grades. There are no parallel streets nearby. There is recurrent freeway congestion from near Ramp 3 to just beyond Ramp 5. Capacities average about 2000 per lane. An origin-destination survey was done.



Peak Traffic Demand Rates

Widening the freeway from Ramp 5 to Ramp 6 would probably initially eliminate significant recurrent congestion.

Yes

No

31. There are very accurate procedures which can be used to calculate capacities along rural two-lane highways.

Yes

No

32. There is a two-lane highway in a mountainous area beyond a valley. There are not many locations where passing can safely be done. The volume upgrade is 500 vph. At a location 15 miles from the valley, most of the vehicles would be rather evenly spaced at approximately 7-second intervals.

Yes

No

33. The 2000 Highway Capacity Manual's distance criteria for no passing zones for level of service and capacity calculations for two-lane highways is where the passing sight distance is 1500-ft or less.

Yes

No

34. There is a two-lane highway at a valley area. The pavement is 32-ft. wide except for a length of 25-ft. at a culvert where it is 28-ft. wide. If volumes at or near capacity were to occur, the critical location would probably be at the culvert.

Yes

No

35. The peak hour volume along a rural two-lane highway is 360 vph total of both directions. Approximately 1% of the vehicles are trucks and approximately 3% are recreational vehicles with six or more tires during peak periods. The directional distribution is 32-ft. wide. There are many obstructions adjacent to the shoulders. There are no passing zones along 95% of the distance. The design speed is 60 mph. The area is mountainous. However, there are no significant grades. The typical profile grade is only about 0.5%. The peak hour factor is 0.90.

Calculate the level of service during the peak hour.

36. The AADT along a two-lane highway is 4000. The pavement is 40-ft. wide. There would usually be significant traffic operational problems.

Yes

No

37. There are many procedures for calculating the capacity of signalized intersections.

Yes

No

38. The 2000 Highway Capacity Manual's complex procedure for calculating levels of service at signalized intersections is generally accurate.

Yes

No

39. The best way to obtain delay data for an existing signalized intersection is to use the 2000 Highway Capacity Manual and calculate the delay.
- Yes
- No
40. Signal timing affects the amount of delay at signalized intersections.
- Yes
- No
41. At a signalized intersection, the level of service is F only when the traffic demand exceeds the capacity.
- Yes
- No
42. Using critical movement analysis, the sum of the critical volumes of 1450 vph is usually appropriate for the design of signalized intersections at suburban areas.
- Yes
- No
43. Peak hour factors or peak 15-minute rates should usually be used for the design of signalized intersections along most conventional state highways.
- Yes
- No
44. The rates on the following sketch are for the peak 15 minutes of a peak hour. The rates are the totals per direction for left-turning vehicles, through vehicles and right-turning vehicles. There are separate phases for all left-turn lanes. Calculate the sums of the critical volumes.

