PE
civil engineering
transportation
practice exam
About NCEES
The National Council of Examiners for Engineering and Surveying (NCEES) is a nonprofit organization made up of engineering and surveying licensing boards from all U.S. states and territories. Since its founding in 1920, NCEES has been committed to advancing licensure for engineers and surveyors in order to protect the health, safety, and welfare of the American public.

NCEES helps its member licensing boards carry out their duties to regulate the professions of engineering and surveying. It develops best-practice models for state licensure laws and regulations and promotes uniformity among the states. It develops and administers the exams used for engineering and surveying licensure throughout the country. It also provides services to help licensed engineers and surveyors practice their professions in other U.S. states and territories.

Updates on exam content and procedures
Visit us at ncees.org/exams for updates on everything exam-related, including specifications, exam-day policies, scoring, and corrections to published exam preparation materials. This is also where you will register for the exam and find additional steps you should follow in your state to be approved for the exam.

Exam-day schedule
Be sure to arrive at the exam site on time. Late-arriving examinees will not be allowed into the exam room once the proctor has begun to read the exam script. The report time for the exam will be printed on your Exam Authorization. Normally, you will be given 1 hour between morning and afternoon sessions.

Admission to the exam site
To be admitted to the exam, you must bring two items: (1) your Exam Authorization and (2) a current, signed, government-issued identification.

Examinee Guide
The NCEES Examinee Guide is the official guide to policies and procedures for all NCEES exams. All examinees are required to read this document before starting the exam registration process. You can download it at ncees.org/exams. It is your responsibility to make sure that you have the current version.

NCEES exams are administered in either a computer-based format or a pencil-and-paper format. Each method of administration has specific rules. This guide describes the rules for each exam format. Refer to the appropriate section for your exam.

Scoring and reporting
NCEES typically releases exam results to its member licensing boards 8–10 weeks after the exam. Depending on your state, you will be notified of your exam result online through your MyNCEES account or via postal mail from your state licensing board. Detailed information on the scoring process can be found at ncees.org/exams.

Staying connected
To keep up to date with NCEES announcements, events, and activities, connect with us on your preferred social media network.
CIVIL AM PRACTICE EXAM
101. A 227-ft length of canal is to be lined with concrete for erosion control. With 12% allowance for waste and overexcavation, the volume (yd$^3$) of concrete that must be delivered is most nearly:

(A) 234  
(B) 280  
(C) 292  
(D) 327

102. Based on the straight-line method of depreciation, the book value at the end of the 8th year for a track loader having an initial cost of $75,000, and a salvage value of $10,000 at the end of its expected life of 10 years is most nearly:

(A) $10,000  
(B) $15,000  
(C) $23,000  
(D) $48,750

103. The budgeted labor amount for an excavation task is $4,000. The hourly labor cost is $50 per worker, and the workday is 8 hours. Two workers are assigned to excavate the material. The time (days) available for the workers to complete this task is most nearly:

(A) 3  
(B) 4  
(C) 5  
(D) 12.5
501. The following information applies to a four-lane freeway.

- Volume: 2,400 vph (in one direction)
- Peak hour factor: 0.90
- Base free-flow speed: 60 mph
- 5% truck traffic in peak hour
- 12-ft lanes
- 10-ft outside shoulders
- 3 interchanges in 6 miles
- Level terrain
- No recreational vehicles

The level of service (LOS) for the freeway is most nearly:

(A) LOS A
(B) LOS B
(C) LOS C
(D) LOS D

502. The figure shows a major weave segment of a freeway. The following data apply:

- Flow rate A-C = 4,200 pcph
- Flow rate B-C = 600 pcph
- Flow rate A-D = 500 pcph
- Flow rate B-D = 400 pcph

If the mean speed of the traffic in the weave segment is 56 mph and the segment is very long, the density in the middle of the segment (pc/mile/lane) is most nearly:

(A) 34
(B) 32
(C) 28
(D) 25
503. For a lane group at a signalized intersection, which of the following factors will change the saturation flow rate from the base saturation flow rate provided in the *Highway Capacity Manual*?

(A) Lane widths of 11 ft
(B) Level terrain
(C) Peak hour factor of 0.92
(D) Inclusion of left-turns with protected phasing

504. A speed study concludes that the 85th percentile speed of free-flowing traffic is 56.2 mph. Which of the following posted speed limit signs most nearly meets the guidance for speed limit signs?

(A) 50 mph, 55 mph, 60 mph, 65 mph
(B) 50 mph, 55 mph
(C) 55 mph, 60 mph
(D) 60 mph, 65 mph

Horizontal length of side slope = \(14 \times \frac{3}{2} = 21.0\) ft

Slope length = \(\sqrt{(14)^2 + (21)^2} = 25.24\) ft

Cross-sectional area of lining = \([2 \times 25.24 + 9] \frac{7}{12} = 34.70\) ft²

Volume of lining = \(\frac{34.70 \times 227}{27} = 291.7\) yd³

Delivered volume = \(291.7\) yd³ × 1.12 = 327 yd³

THE CORRECT ANSWER IS: (D)


\[ D = \frac{75,000 - 10,000}{10} \]

\[ D = 6,500 \]

Book value after 8 years = \(75,000 - 8(6,500) = 23,000\)

THE CORRECT ANSWER IS: (C)


Crew cost = \(2(50/\text{hr}) = 100/\text{hr}\)

Days allowed = \(\frac{4,000}{(8/\text{hr/day})(100/\text{hr})} = 5\) days

THE CORRECT ANSWER IS: (C)


Activities: \(7 + 4 + 5\)

Days: \(30 + 10 + 10 = 50\) days

THE CORRECT ANSWER IS: (D)
TRANSPORTATION PM SOLUTIONS

Compute the free-flow speed (FFS):

\[
FFS = BFFS - f_{LW} - f_{RLC} - 3.22 \times TRD^{0.84}
\]

where:

- \(BFFS = 60 \text{ mph} \) (given)
- \(f_{LW} = 0 \) (12-ft lanes)
- \(f_{RLC} = 0 \) (10-ft shoulders)
- \(TRD = \frac{6 \text{ ramps}}{6 \text{ miles}} = 1 \text{ ramp/mile} \)

\[
FFS = 60 - 0 - 0 - 3.22 (1)^{0.84} = 56.8 \text{ mph}
\]

Compute \(f_{HV}\), p.12-35, level terrain \(E_T = 2.0\):

\[
f_{HV} = \frac{1}{1 + P_T (E_T - 1)} = \frac{1}{1 + 0.05 (2.0 - 1)} = 0.95
\]

Computer flow rate:

\[
v_p = \frac{V}{(PHF)(N)(f_{HV})} = \frac{2,400}{(0.9)(2)(0.95)} = 1,404 \text{ pcphpl}
\]

Compute density:

\[
Density = \frac{volume}{speed} = \frac{v_p}{S}
\]

\(S = FFS_{adj}\) if \(v_p \leq BP\)

\(FFS_{adj} = FFS \times SAF\), assume \(SAF = 1.0\)

So \(FFS_{adj} = 56.8 \text{ mph}\)

\(BP = [1,000 + 40 (75 - FFS_{adj})] \times CAF^2\)

\(BP = [1,000 + 40 (75 - 56.8)] \times 1.0^2 = 1,728\)

\(1,728 > 1,404 \quad \therefore \quad S = 56.8 \text{ mph}\)

\[
Density = \frac{1,404 \text{ pcphpl}}{56.8 \text{ mph}} = 24.7 \text{ pcpmpl}
\]

Find LOS: From p. 12-19, LOS = C

**THE CORRECT ANSWER IS: (C)**
TRANSPORTATION PM SOLUTIONS


Total volume = 4,200 + 500 + 600 + 400 = 5,700
Speed given = 56 mph
Number of lanes, N = 4
See p. 13-29, Eqn. 13-23

Since the weaving segment is very long, assume the middle acts like a basic freeway segment (p. 13-21).

\[
D = \frac{V}{N} = \frac{\left(\frac{5,700}{4}\right)}{56} = \frac{1,425}{56} = 25.44 \text{ pc/mile/lane}
\]

THE CORRECT ANSWER IS: (D)


Left-turns with protected phasing (exclusive or shared lanes) decrease saturation flow rate.

THE CORRECT ANSWER IS: (D)


When a speed limit is to be posted, it should be within 10 km/hr or 5 mph of the 85th percentile speed of the free-flowing traffic.

\[
\begin{align*}
56.2 + 5 \text{ mph} &= 61.2 \\
56.2 - 5 \text{ mph} &= 51.2
\end{align*}
\]

55 or 60 mph

THE CORRECT ANSWER IS: (C)