Training module 11

HSDPT Trial exam (Part A)

Navigation guide

The navigation icons below appear at various stages through this and other training modules in the top right-hand corner of your screen. They will help to guide you and indicate when the next screen is ready to be viewed.

Left-click on this icon to view the NEXT screen. When there is a sequence of animated text or graphics this icon will only appear at the end of the animation.

Left-click on this icon to go back to the PREVIOUS screen.

Left-click on this icon to go back to a Menu.
Note: This icon will always take you back to the HOME screen from any Menu.

Left-click on this icon to close the hyperlink you have opened.

Whenever this icon appears on any screen it indicates there is a sequence of text or graphic animation. You will need to left-click each time to go FORWARDS. To refresh the screen use the ← Backspace key or ← arrow key on your keyboard. If you wish to replay the whole animation sequence you will need to continue pressing the Backspace or arrow key until the screen has completely refreshed.

Please Note: You can EXIT any Training Module you have open from the Training Module HOME screen simply by clicking on EXIT or pressing the Esc button on your keyboard.

Objective and prerequisite

Objective and exam structure:

- To test understanding in data acquisition for high strain dynamic pile testing.

- The trial exam is in two parts (A1 and A2). Part A1 questions do not refer to any data sets. All questions in this trial exam are multiple-choice as in the High Strain Dynamic Pile Testing Examination (Part A). It is envisaged that this trial exam (Part A) will take you between 30 and 45 minutes to complete. If you complete it in under 30 minutes you are doing very well.

Prerequisite :

The questions assume the trainee has completed the following Training Modules or equivalent training in high strain dynamic pile testing :

- Modules 2 and 3 or equivalent

Module Outline

Module 11: HSDPT Trial exam (Parts A1 and A2)

Sections
Trial exam (Part A1) – 12 general questions Trial exam (Part A2) – 8 questions with data **Duration :** ~ 30 minutes

Trial Exam (Part A1)

Questions 1–12

The following twelve (12) questions do NOT refer to any data record. Units of measure where applicable are given in SI, Metric and English/US. To select an answer from the multiple-choices, left-click on the radio button. To deselect an answer left-click again on the radio button. Click on the navigation buttons (top right of screen) to go to next question.

Note:
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Question 1

For most preformed driven piles the **minimum acceptable** number of properly functioning transducers is …….

- A. 2 strain and 1 acceleration
- B. 2 strain and 2 acceleration
- C. 2 strain and 4 acceleration
- D. 3 strain and 3 acceleration
- E. 4 strain and 2 acceleration

Question 2

For cast-in-situ and spiral welded piles, **best practice** is to use the following number of properly functioning transducers …….

- A. 2 strain and 1 acceleration
- B. 2 strain and 2 acceleration
- C. 2 strain and 4 acceleration
- D. 3 strain and 3 acceleration
- E. 4 strain and 2 acceleration

Question 3

Which of the following is TRUE. The modulus of concrete used in dynamic pile tests…….

- A. never varies outside the range 200,000 – 210,000 MPa [2,040 – 2,140 T/cm^2] (29,000 – 30,500 ksi)
- B. never varies outside the range 40,000 – 42,000 MPa [408 – 430 T/cm^2] (5,800 – 6,100 ksi)
- C. is a function of concrete strength, specific weight, age, strain and strain rate
- D. is only a function of concrete strength and age
- E. is only a function of concrete specific weight

Question 4

The strain in the reinforcement of a simply (regularly) reinforced concrete pile is …….

- A. greater than the concrete strain by the modular ratio factor
- B. less than the concrete strain by the modular ratio factor
- C. unrelated to the concrete strain
- D. related to the relative areas of steel and concrete
- E. approximately equal to the concrete strain

Question 5

Which strategy will not reduce bending stresses during driving ?

- A. Align the piling leads with the pile axis
- B. Use a lower hammer stroke
- C. Reduce hammer cushion thickness
- D. Centre the pile hammer over the pile
- E. Increase pile cushion thickness

Question 6

Accelerometers are used to compute pile-top velocity and displacement. The reliability of the computed quantities (from least to most reliable) is :

- A. **Maximum displacement (DMX); final displacement (DFN); maximum velocity (VMX)**
- B. **Final displacement (DFN); maximum displacement (DMX); maximum velocity (VMX)**
- C. **Final displacement (DFN); maximum velocity (VMX); maximum displacement (DMX)**
- D. **Maximum velocity (VMX); maximum displacement (DMX); final displacement (DFN)**
- E. **Maximum displacement (DMX); maximum velocity (VMX); final displacement (DFN)**

Question 7

A pile material has a weight density of 24 kN/m3 [2.45 T/m3] (0.152 k/ft3) and a modulus of 30,000 MPa [306 T/cm2] (4,350 ksi). The wave speed is ….

- A. 4130 m/s (13,550 ft/s)
- B. 4000 m/s (13,120 ft/s)
- C. 3840 m/s (12,600 ft/s)
- D. 3660 m/s (12,000 ft/s)
- E. 3500 m/s (11,500 ft/s)

Question 8

Two pile materials have the same wave speed. The modulus of material A is twice that of material B. Which statement is TRUE ?

- A. **The mass density of material A is twice that of material B**
- B. **The mass density of material A is half that of material B**
- C. **The mass density of material A is 1.414 times that of material B**
- D. **The mass density of material A is 0.707 times that of material B**
- E. **The mass density of the two materials are equal**

Question 9

A simply (regularly) reinforced concrete pile suffers **minor** distributed cracking over the pile length during installation. Which of the following are affected ?

- A. **Pile modulus, pile-top wave speed and overall wave speed**
- B. **Pile modulus and overall pile wave speed**
- C. **Pile modulus and pile-top wave speed**
- D. **Pile-top wave speed and overall wave speed**
- E. **Only overall wave speed**

Question 10

Which way of attaching strain transducers would be most appropriate for a **thick-walled** steel pipe pile filled to the top with concrete ?

- A. **Drilling holes in the steel, but attaching anchors to the concrete**
- B. **Drilling and tapping holes into the steel, and bolting direct to the steel**
- C. **Cutting windows in the steel pipe, and attaching anchors to the concrete**
- D. **Attach transducers to a follower (dolly) with the same area as the steel pipe**
- E. **Attach transducers to an unfilled steel pipe extension welded to the pile top**

Question 11

Sensors are attached to a steel follower (dolly) driving a concrete pile below ground level. On the basis of dynamic pile testing requirements, the follower should have…..

- A. a similar perimeter to the concrete pile
- B. a similar cross-sectional area to the concrete pile
- C. a similar weight/unit length to the concrete pile
- D. a similar impedance to the concrete pile
- E. no specific requirement other than structural adequacy

Question 12

Large tension stresses (average across the section) which damage concrete piles can be associated with…..

- A. driving long piles through soft sediments
- B. driving long piles onto hard rock underlying soft sediments
- C. driving short piles onto hard rock underlying stiff sediments
- D. options A or B
- E. options A or C

End of Trial Exam (Part A1)

Trial Exam (Part A2)

SI units >

Metric units >

English/US units >

Trial Exam (Part A2)

Questions 13–20 (SI units)

The next eight (8) questions refer to the data record that accompanies the question. To select an answer from the multiple-choices, left-click as previously on the radio button. To deselect an answer left-click again on the radio button. Click on the navigation buttons (top right of screen) to go to next question.

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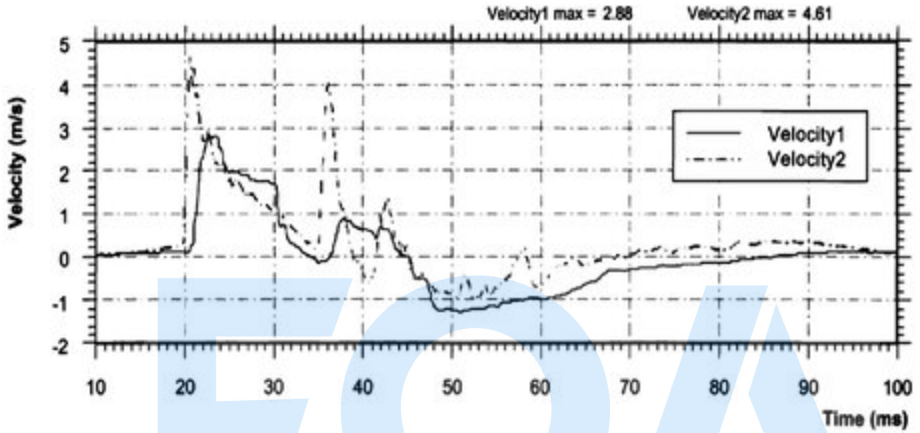
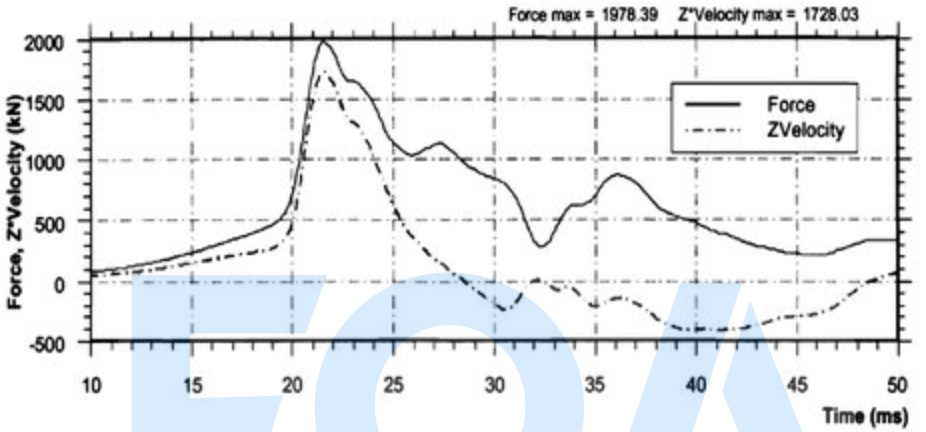
Question 13



The velocity measurements indicate ……

- A. One or more accelerometers which are loose or malfunctioning
- B. No issue with either accelerometer
- C. Pile damage
- D. A calibration error with one accelerometer
- E. 50 to 60 Hz electrical interference (e.g. also referred to as electrical noise)

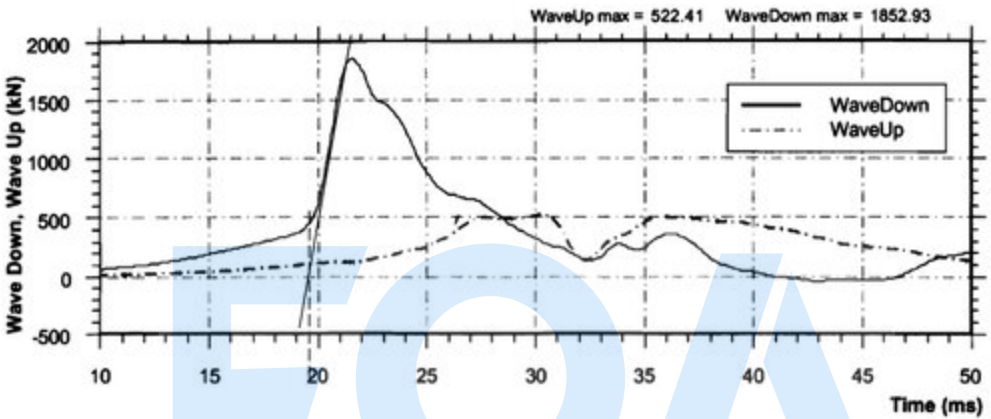
Question 14



The force-time and velocity-time responses show a gradual increase before time=20ms, followed by a sudden rise to peak at time=22ms. This is because……

- A. **The transducers are malfunctioning**
- B. **The hammer is a diesel hammer**
- C. **The hammer is striking the pile through a follower (dolly)**
- D. **The hammer cushion is too thin**
- E. **There is high shaft resistance near the transducers**

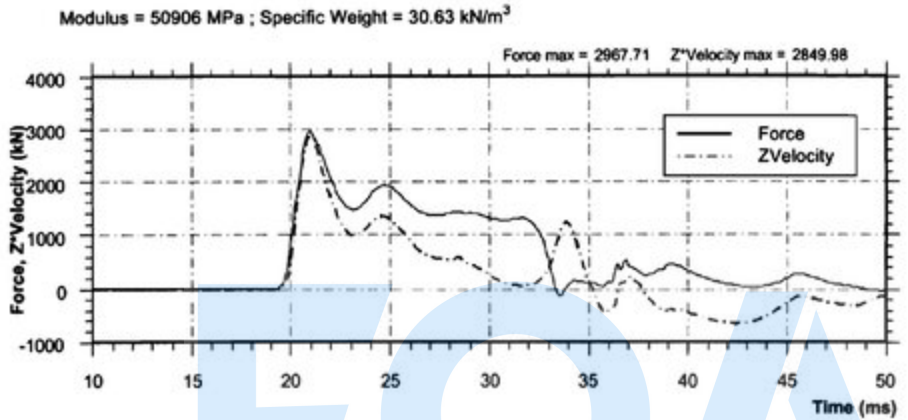
Question 15



Assuming that the "peak impact" first occurs at approximately time = 21.5 ms, the peak impact first reaches the pile toe (bottom) ….(Note: see also previous question for (F and Zv) plot for this blow)

- A. at time = 27 ms
- B. at time = 30 ms
- C. at time = 32 ms
- D. after time = 32 ms
- E. before time= 27 ms

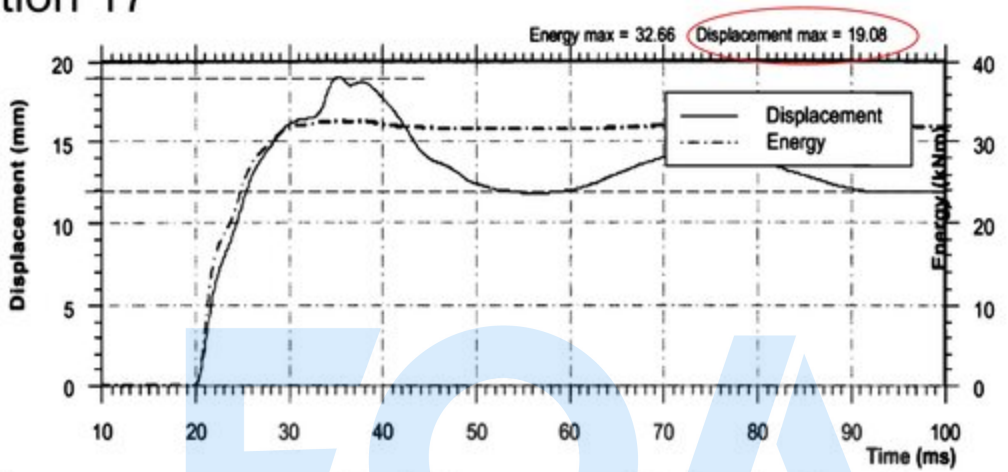
Question 16



Assuming all transducers are correctly calibrated and the gauges are at least 5m from soil resistance, what value of pile-top wavespeed should be used to reanalyse the data? (Note: Fmax, Z*Vmax, Modulus and Specific Weight are given. Use gravitational constant, g= 9.81 m/s^2)

- A. 4445 m/s
- B. 4237 m/s
- C. 4040 m/s
- D. 3880 m/s
- E. 3670 m/s

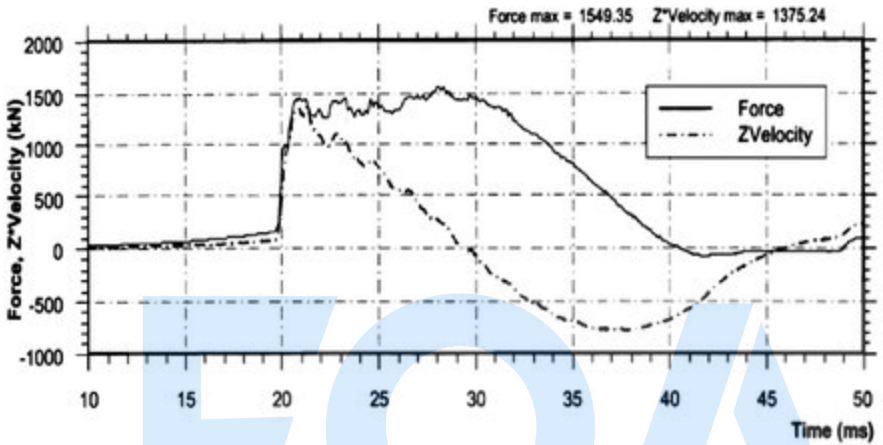
Question 17



If the pile movement was not physically measured during the blow, the expected temporary compression (rebound) of the pile during this blow would be approximately……

- A. Nil
- B. 2.3 mm
- C. 7.0 mm
- D. 12.0 mm
- E. 19.1 mm

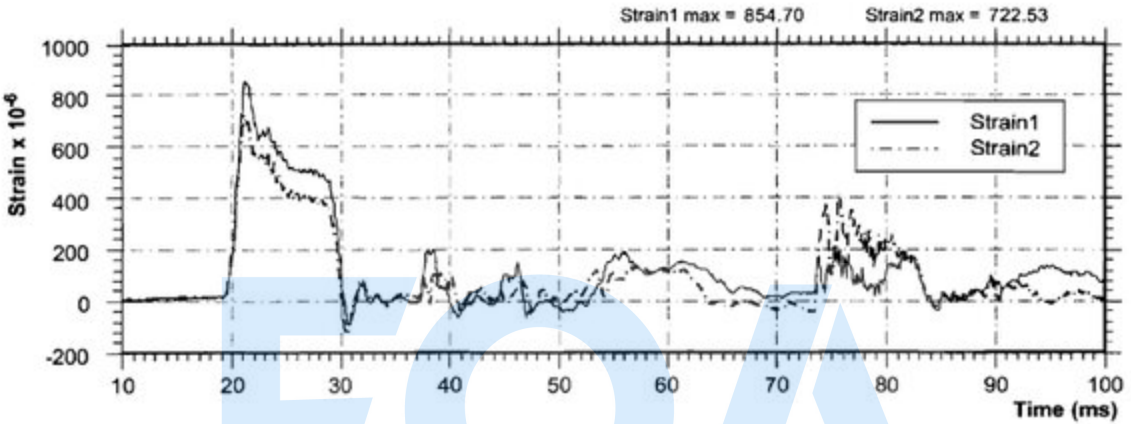
Question 18



This steel pipe has strength grade 350 MPa. Knowing only the data provided, the pile length is ……

- A. 20 m
- B. 21.1 m
- C. 28.4 m
- D. 32.1 m
- E. Not possible to determine

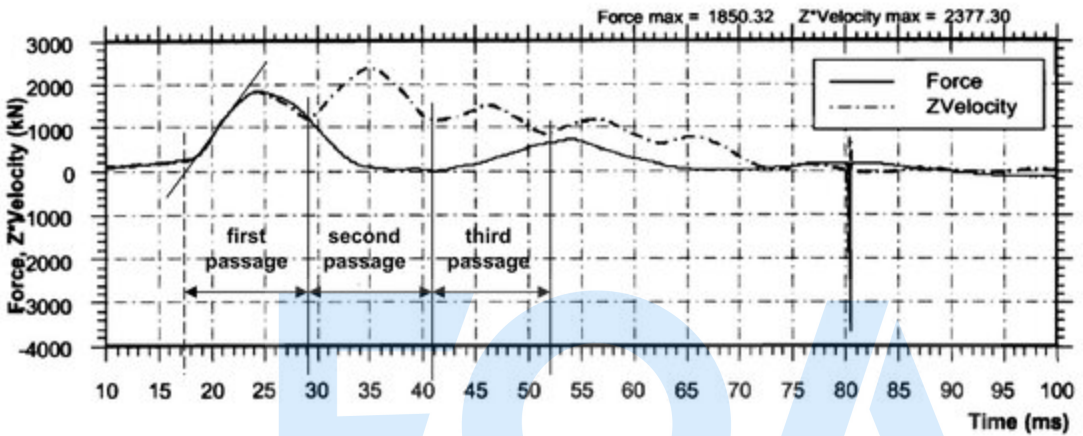
Question 19



The strain measurements indicate .....

- A. One or more transducers which are loose or malfunctioning
- B. Some bending
- C. Bad electrical interference at the start of recording
- D. A calibration error with one transducer
- E. Major cable or connection problems

Question 20



The pile has a length of 20.1 m. Out of the following options, choose the closest value to the average wave speed in the pile over three passages of the wave up and down the pile ….

- A. 5120 m/s
- B. 4500 m/s
- C. 4100 m/s
- D. 3930 m/s
- E. 3600 m/s

End of Trial Exam (Part A2)

Trial Exam (Part A2)

Questions 13–20 (Metric units)

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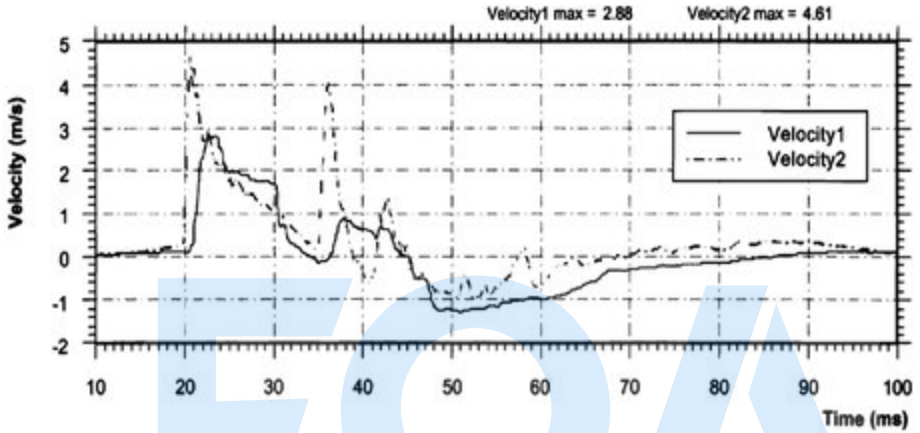

The velocity measurements indicate ……

- A. One or more accelerometers which are loose or malfunctioning
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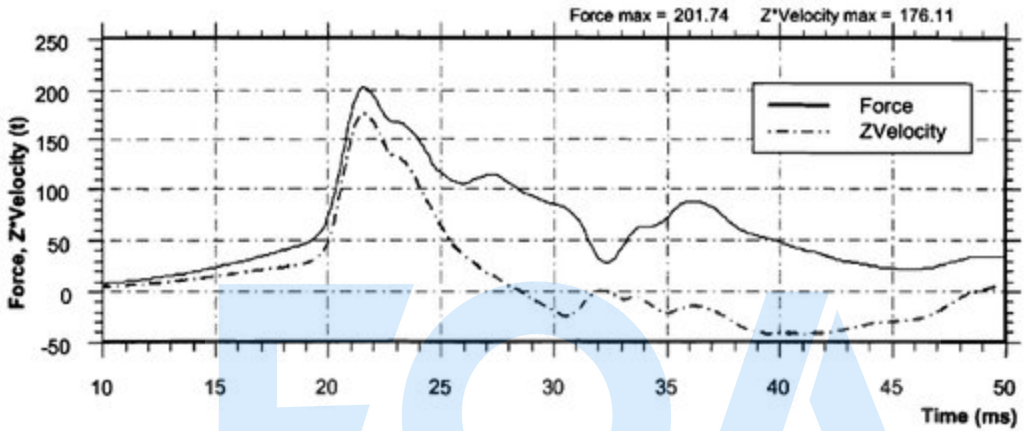

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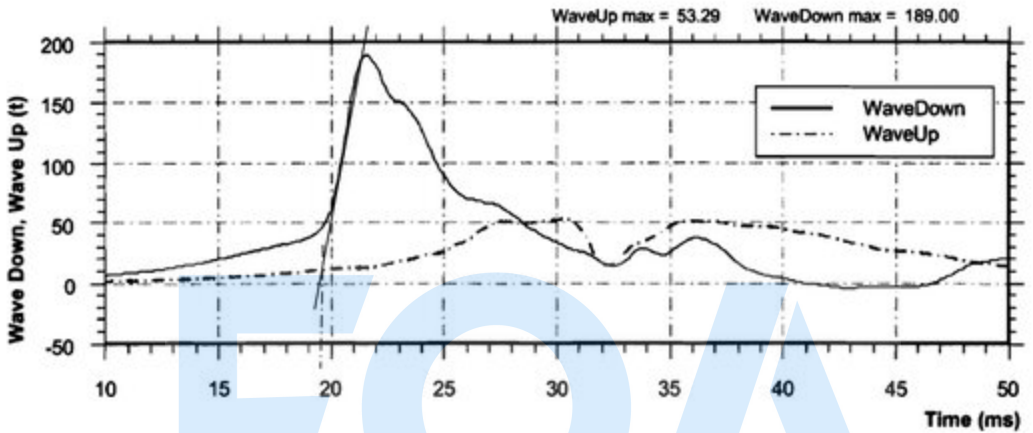

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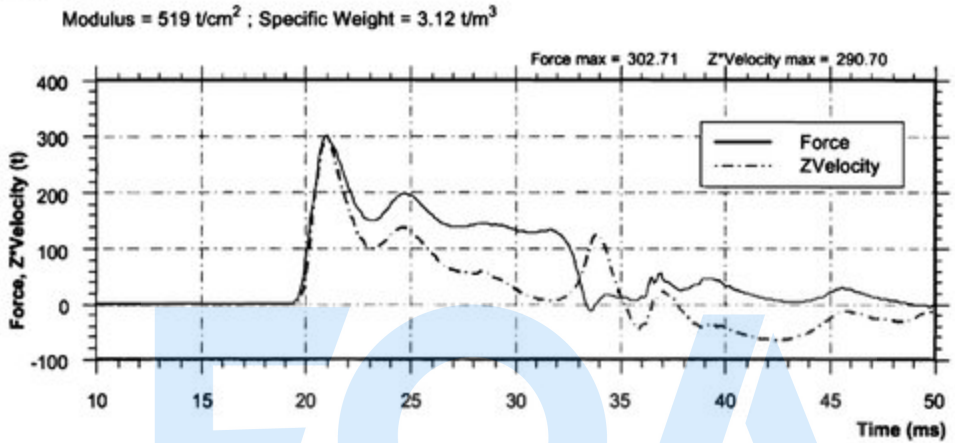
Question 16



Assuming all transducers are correctly calibrated and the gauges are at least 5m from soil resistance, what value of pile-top wavespeed should be used to reanalyse the data? Note: Fmax, Z*Vmax, Modulus and Specific Weight are given. Use gravitational constant, g= 9.81 m/s^2

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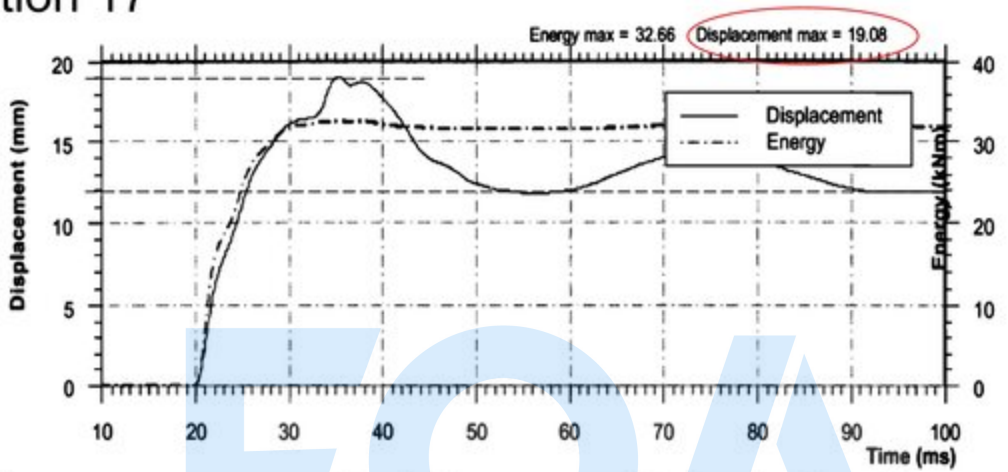

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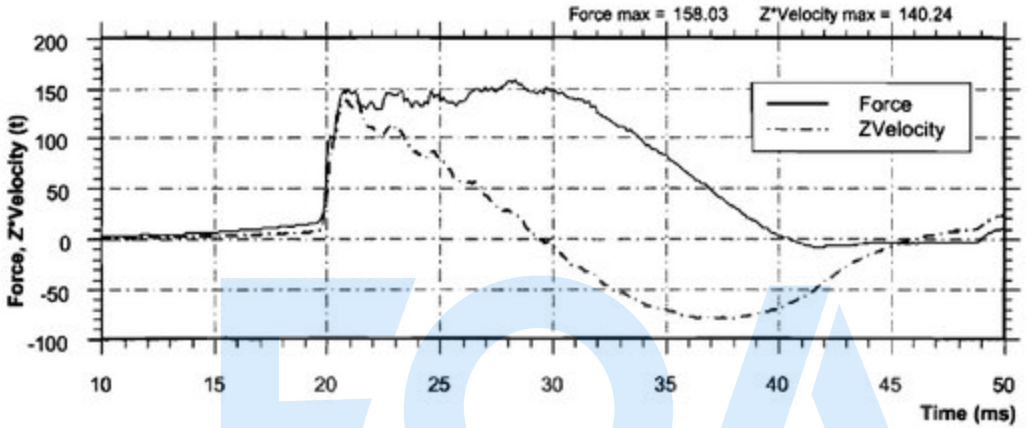
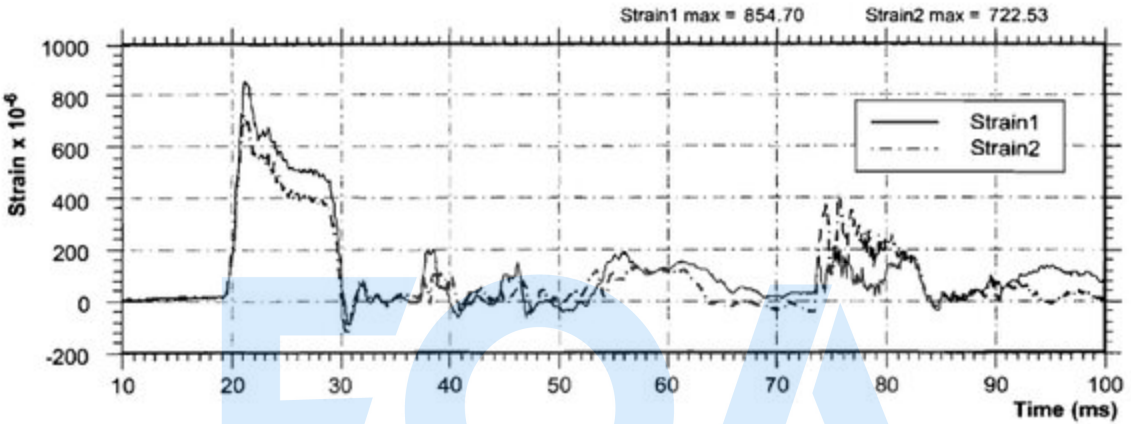


This steel pipe has strength grade 3.57 t/cm2. Knowing only the data provided, the pile length is ……

- A. 20 m
- B. 21.1 m
- C. 28.4 m
- D. 32.1 m
- E. Not possible to determine

Question 19



The strain measurements indicate .....

- A. One or more transducers which are loose or malfunctioning
- B. Some bending
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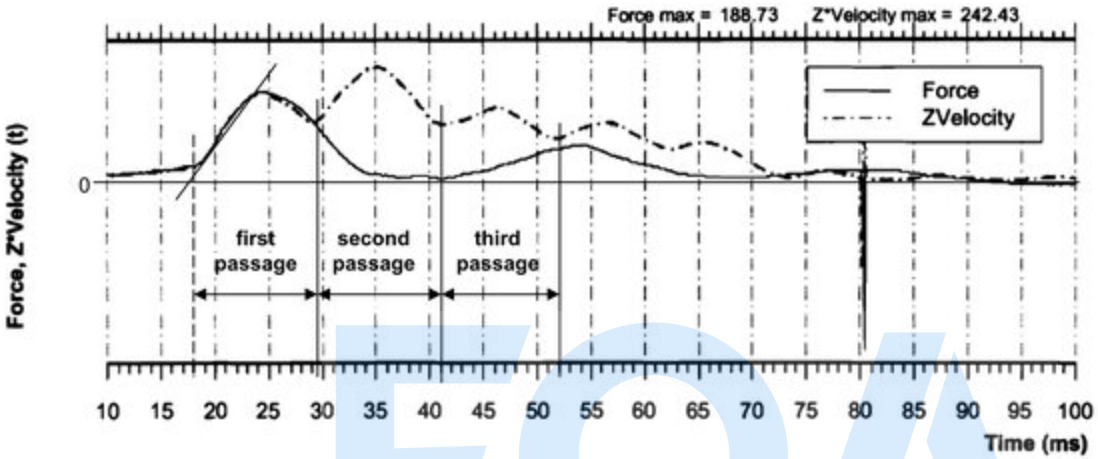
Question 20



The pile has a length of 20.1 m. Out of the following options, choose the closest value to the average wave speed in the pile over three passages of the wave up and down the pile ….

- A. 5120 m/s
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End of Trial Exam (Part A2)

Trial Exam (Part A2)

Questions 13–20 (English/US units)

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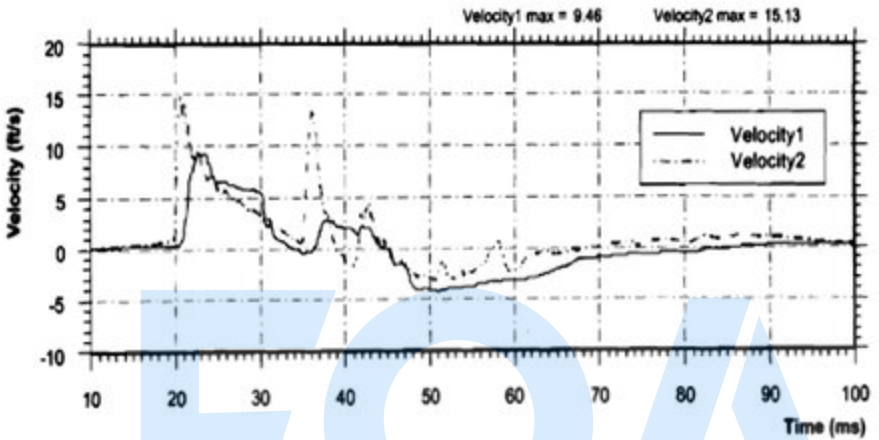

The velocity measurements indicate ……

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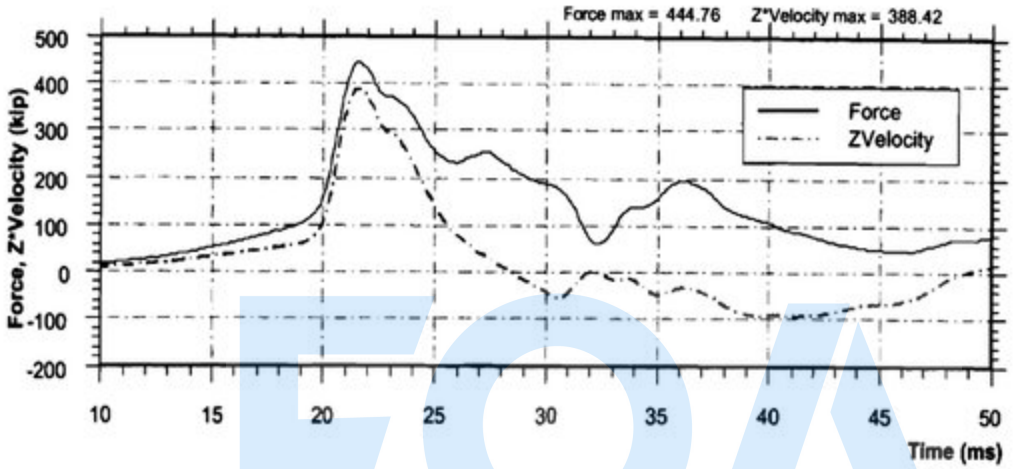

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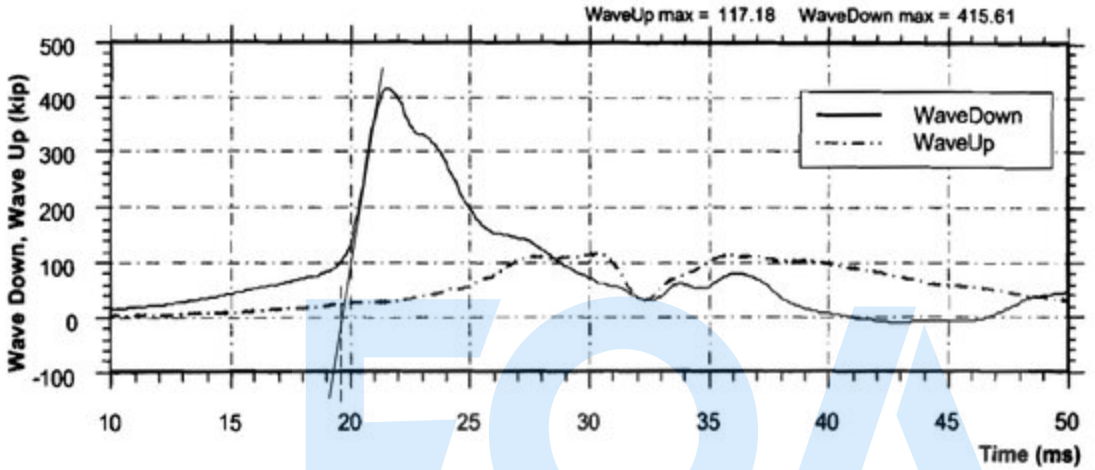

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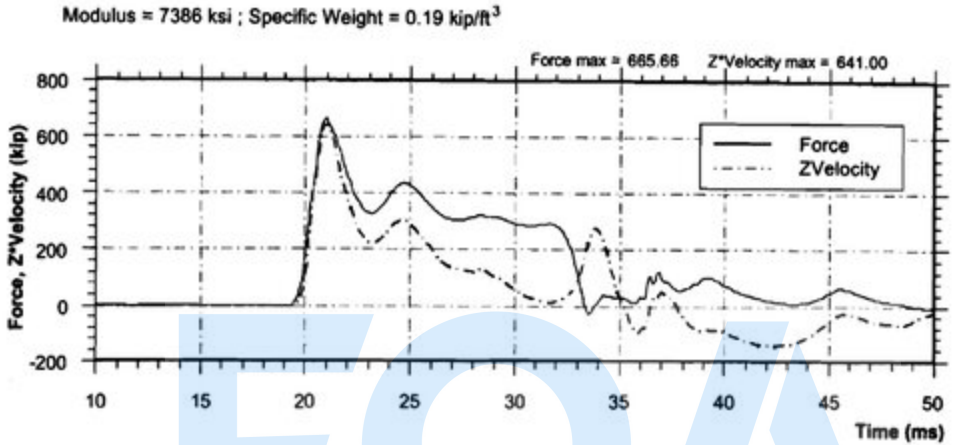
- D. **after time = 32 ms**
- E. **before time= 27 ms**

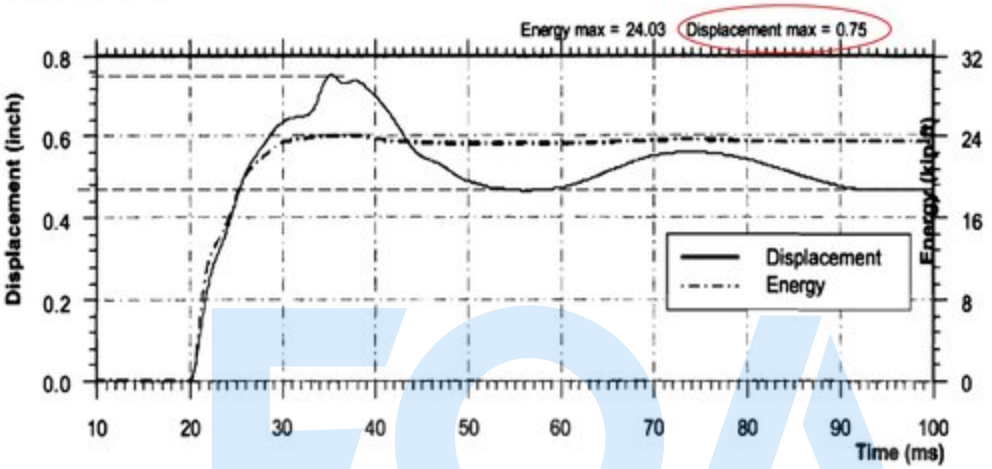
Question 16



Assuming all transducers are correctly calibrated and the gauges are at least 5m from soil resistance, what value of pile-top wavespeed should be used to reanalyse the data? Note: Fmax, Z*Vmax, Modulus and Specific Weight are given. Use gravitational constant, g= 32.18 ft/s^2

- A. **14,580 ft/s**
- B. **13,900 ft/s**
- C. **13,250 ft/s**
- D. **12,730 ft/s**
- E. **12,050 ft/s**

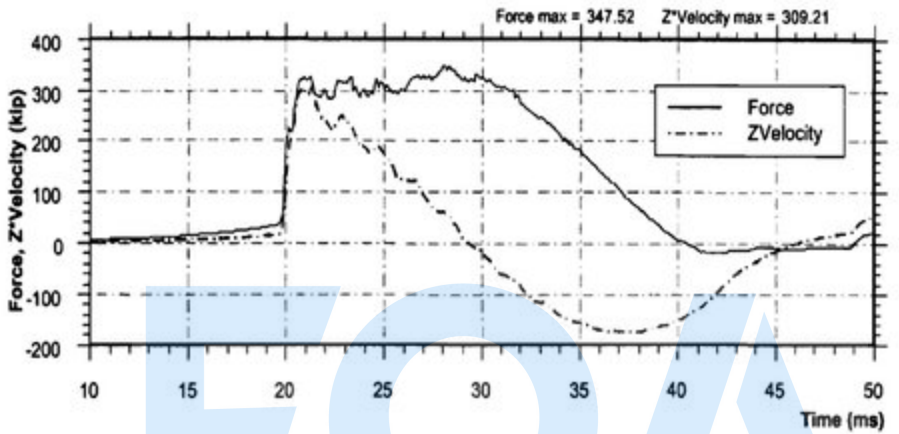
Question 17



If the pile movement was not physically measured during the blow, the expected temporary compression (rebound) of the pile during this blow would be approximately……

- A. Nil
- B. 0.09 inches
- C. 0.27 inches
- D. 0.47 inches
- E. 0.75 inches

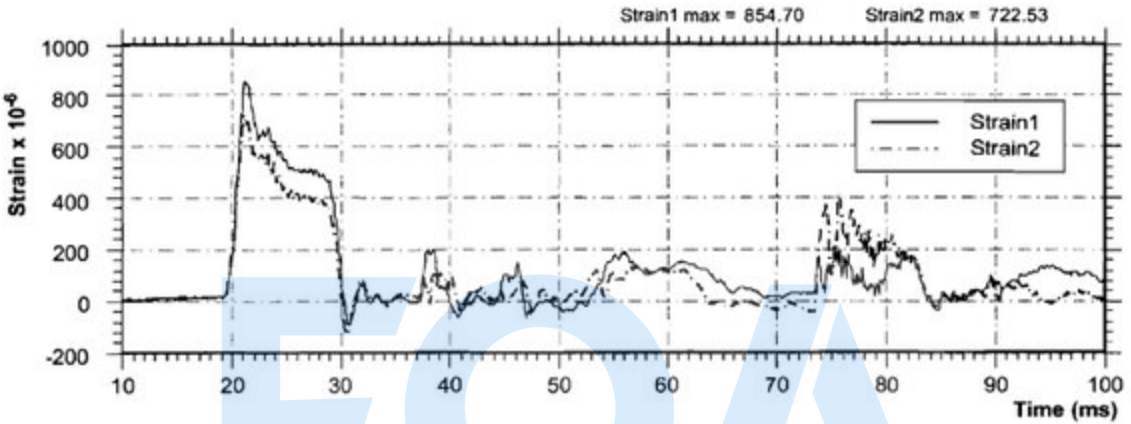
Question 18



This steel pipe has strength grade 50.8 ksi. Knowing only the data provided, the pile length is ……

- A. 65.6 ft
- B. 69.2 ft
- C. 93.0 ft
- D. 105.3 ft
- E. Not possible to determine

Question 19



The strain measurements indicate .....

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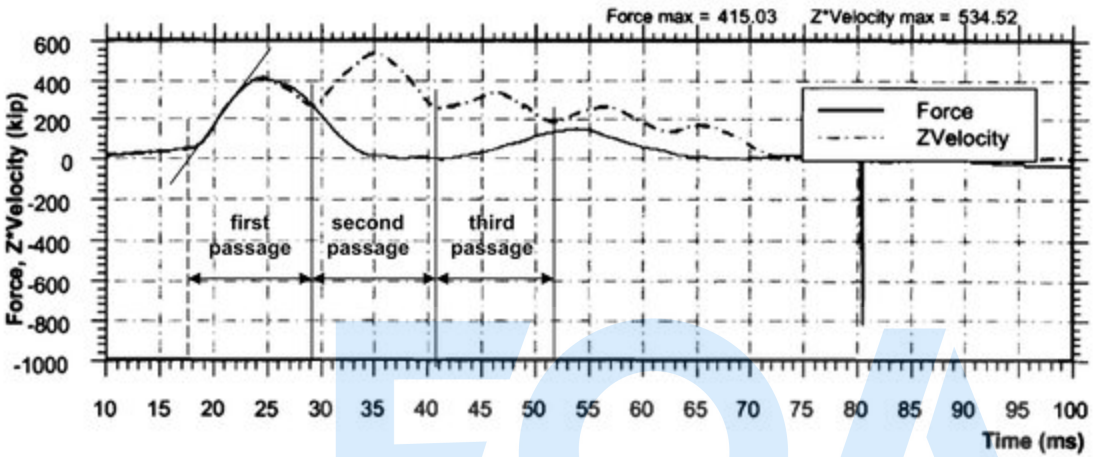
Question 20



The pile has a length of 65.9 ft. Out of the following options, choose the closest value to the average wave speed in the pile over three passages of the wave up and down the pile ….

- A. 16,800 ft/s
- B. 14,760 ft/s
- C. 13,450 ft/s
- D. 12,890 ft/s
- E. 11,800 ft/s

End of Trial Exam (Part A2)