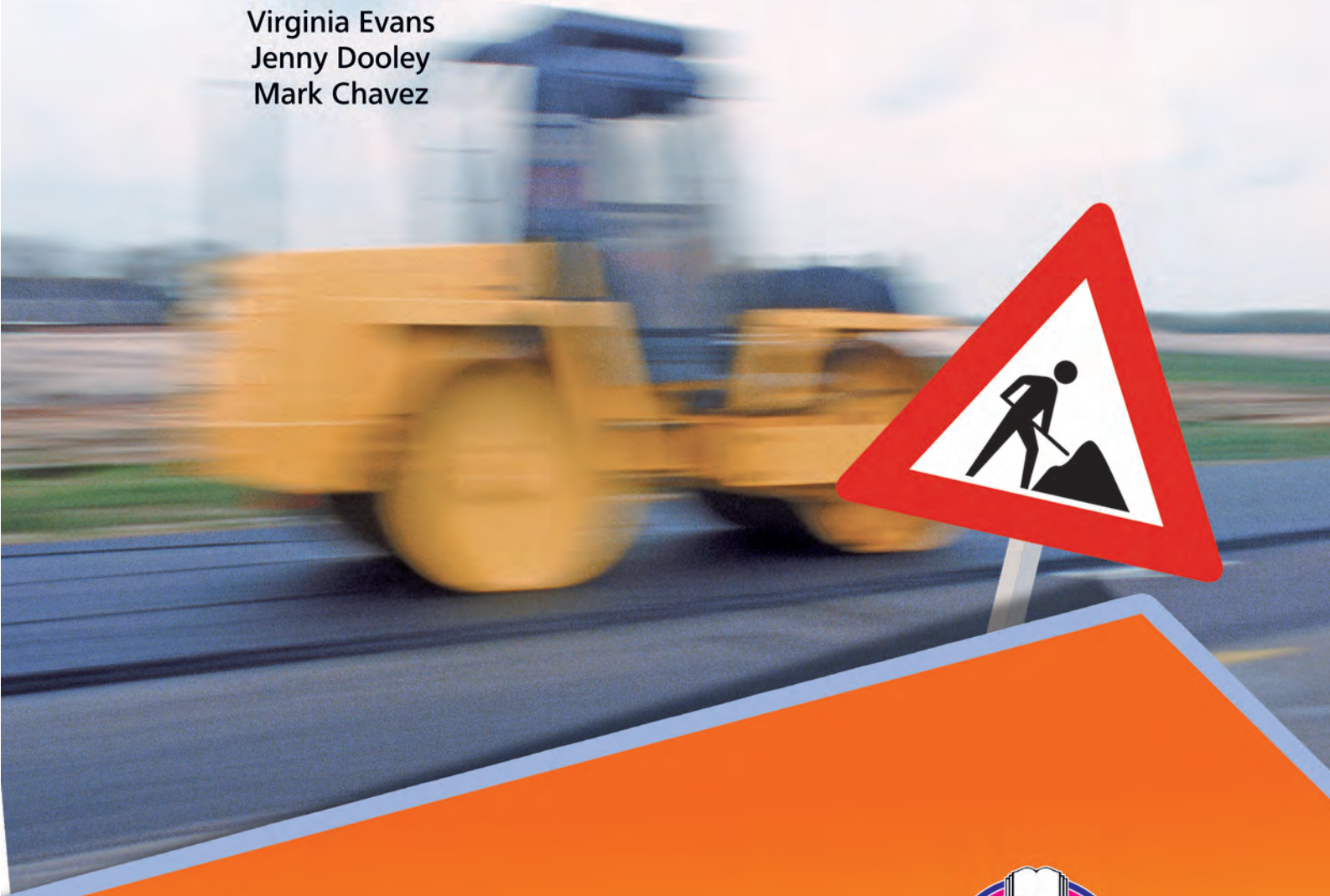
CAREER PATHS

Construction II

# Roads & Highways

Virginia Evans
Jenny Dooley
Mark Chavez



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CAREER PATHS

# Construction II

# Roads & Highways

Book 1

Virginia Evans
Jenny Dooley
Mark Chavez

Express Publishing

## Scope and Sequence

| Unit | Topic | Reading context | Vocabulary | Function |
|---|---|---|---|---|
| 1 | Types of Roads | Web page | alley, avenue, boulevard, cul-de-sac, dead end, freeway, highway, road, street, toll road | Giving directions |
| 2 | Parts of a Road | Newspaper article | corner, curb, gutter, lane, median, pavement, roadway, shoulder, storm drain, surface | Giving a reminder |
| 3 | Parts of a Highway | Newspaper article | breakdown lane, bypass, divider, exit, express lane, fast lane, interchange, guardrail, off ramp, on ramp | Talking about deadlines |
| 4 | Types of intersections | Book chapter | 4-way, box junction, continuous flow intersection, intersection, jughandle, roundabout, the right way, T junction, traffic circle, turn lane, u-turn | Listing an exception |
| 5 | Materials | Informational pamphlet | asphalt, bitumen, Bituminous Surface Treatment (BST), concrete, fly ash, gravel, lime, rebar, rubber, steel | Listing options |
| 6 | Numbers | Chart | add, and, comes to, divided by, equals, -hundred, is, less, minus, multiplied by, plus, point, subtract, -ths, times | Talking about numbers |
| 7 | Measurements | Conversion chart | imperial, kilogram, kilometer, meter, metric, metric ton, mile, pound, short ton, yard | Estimating numbers |
| 8 | Tools | Sign out sheet | broom, dustpan, jackhammer, measure wheel, pickax, rake, round point shovel, sledgehammer, square shovel, wheelbarrow | Suggesting a replacement |
| 9 | Safety Equipment | Poster | dust mask, earplugs, face shield, first aid kit, goggles, grip gloves, hard hat, kneepads, leather gloves, PPE, safety glasses, steel-toe boots | Listing requirements |
| 10 | Basic Actions | Email | clear, drop off, load, mark off, measure, pick up, remove, spread, sweep, unload | Giving instructions |
| 11 | Machines | Website | articulated truck, backhoe, bulldozer, cement mixer, compactor, grader, loader, scraper, screed, sweeper, vibratory roller | Predicting needs |
| 12 | Communications | Advertisement | confirm, communicate, consult, contact, email, fax, PDF, scan, smart phone, two-way radio | Providing options |
| 13 | Soil | Report | bearing test, California Bearing Ration (CBR) test, clay, compaction, penetration test, sand, shear test, silt, soil, stability, sub grade | Asking about results |
| 14 | Describing Landscapes 1 | Report | bend, body of water, flat, grade, hill, mountainous, rolling, sharp, valley | Asking for advice |
| 15 | Describing Landscapes 2 | Email | curve, dip, dogleg, drop, rise, slight, slope, steep, straightaway, terrain | Describing progress |

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CAREER PATHS

# Construction II

# Roads & Highways

Book 2

Virginia Evans
Jenny Dooley
Mark Chavez

Express Publishing

## Scope and Sequence

| Unit | Topic | Reading context | Vocabulary | Function |
|---|---|---|---|---|
| 1 | Surveying | Guide | accumulated error, accurate, chain surveying, geodetic surveying, measuring tape, plane surveying, point, position, ranging rod, station peg, surveying, triangulation | Talking about time |
| 2 | Surveying Equipment | Email | automatic level, digital level, GPS, gyroscopic theodolite, laser level, optical level, optical micrometer, optical plumb, optical scale reading, optical square, theodolite, total station | Making comparisons |
| 3 | Plans | Email | centerline, cross section, detail drawing, elevation, exaggerate, horizontal scale, longitudinal section, map, plan, scale, transverse section, vertical scale | Expressing a concern |
| 4 | Setting Out Lines | Handbook | calculate, curve ranging, link, nylon line, radiused corner, repeated alignment, right-angle, set out, steel pin, straight, swing, take off | Asking for clarification |
| 5 | Earthworks 1 | Web page | backfill, clear, compact, embankment, excavate, existing base, fill, mill, preparation, remove | Talking about prices |
| 6 | Earthworks 2 | Web page | erosion control, fascine construction, gabion wall, geotextile, lime stabilization, load-bearing capacity, marsh, plastic mesh, slope reinforcement, stabilize, swamp | Offering solutions |
| 7 | Drainage | Newspaper article | cambered, drain, drainage, drainage area, gradient, manhole, saturation, self-cleansing velocity, sewer line, standing water, storm water, subsoil drainage | Asking for advice |
| 8 | Pipes | Product listing | bolting, caulking, corrugated metal pipe, culvert, flange, flexible, gasket, joint, pipe, polyethylene, rigid, socket, welding | Expressing confusion |
| 9 | Drains | Workman's guidebook | cross drain, discharge, edge drain, fin drain, French drain, land drain, pipe underdrain, sand drain, siphon, slope drain, soakaway, trench | Disagreeing with an opinion |
| 10 | Flexible Pavement 1: Structure | Textbook chapter | base course, binder course, capping layer, flexible construction, pavement, sub-base course, sub-grade course, surface course | Correcting an error |
| 11 | Flexible Pavement 2: Design | Email | assess, axle weight, commercial vehicle, cumulative, design life, design thickness, estimate, private vehicle, standard axles, traffic growth, traffic load | Confirming information |
| 12 | Flexible Pavement 3: Surfacing | Inspection report | abrasion, aggregate, friction test, grade, polished stone value, PSV test, rolled asphalt, skid-resistant, split friction, surface | Delivering bad news |
| 13 | Flexible Pavement 4: Defects | Article | alligator cracking, bleeding, block cracking, defect, excess, irregularity, raveling, reflective cracking, rutting, shoving, slippage, transverse cracking, uneven | Describing road damage |
| 14 | Rigid Pavement 1: Slabs and Joints | Publication | CRCP, joint, joint groove, JRC, rigid pavement, URC, sealant, slab, transverse joint | Asking about progress |
| 15 | Rigid Pavement 2: Formwork | Email | by hand, cube-crushing test, expansion joint, formwork, slump test, small-scale, strike, tamp, tamper bar, vertical temperature gradient, warping joint | Talking about completion |

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CAREER PATHS

# Construction II

# Roads & Highways

Book 3

Virginia Evans
Jenny Dooley
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## Scope and Sequence

| Unit | Topic | Reading context | Vocabulary | Function |
|---|---|---|---|---|
| 1 | Curb Types | Email | barrier curb, curb, curb and cutter, curb cut, cut stone curb, half-batter curb, integral curb, radius curb, splayed curb, straight curb, vertical curb | Asking for repetition |
| 2 | Installing Curbs | Instructions | bonding, curb bed, curb line, curbing machine, dry bed, epoxy resin, haunching, haunch, precast, wet bed, windrow | Correcting an error |
| 3 | Paving Sidewalks | Website | block paving, bonding pattern, cobble, dry method, five-spot method, hydraulically pressed slab, interlocking paving, lay, open-mold slab, paving slab, sidewalk, whole bed method | Discussing prices |
| 4 | Bridges 1: Types | Web page | abutment, beam bridge, cable, cable-stayed bridge, cantilever, cantilever bridge, double-decked bridge, moveable bridge, simply supported, suspension bridge | Asking about experience |
| 5 | Bridges 2: Parts | Inspection report | anchor span, approach span, bent, bent cap, dead load, deck, end bent, hammerhead pier, live load, parapet, pier | Supporting an opinion |
| 6 | Fencing | Email | ancillary work, barbed wire, chain link fence, concrete wall, fencing, field side, livestock, post and rail fencing, post and wire fencing, snow fencing, strained wired fence, timber | Changing a plan |
| 7 | Site Safety | Poster | collapse, electrocution, evacuate, gas line, hazard, injury, personnel, power line, site, sloped, underground cable, vigilant | Talking about future events |
| 8 | Traffic Control | Manual | closure, detour, merge, merging taper, shifting taper, reflective, single file, stop/go board, traffic control, traffic flow, two-way | Expressing concern |
| 9 | Signage | Notice | approach speed, color scheme, crossing sign, guide sign, hazard, minimum visibility, mounting height, orientation, placement, range, regulatory sign, sitting, stop sign, warning sign | Confirming information |
| 10 | Street Furniture | Email | bench, bollard, bus stop, guard rail, mailbox, median barrier, phone booth, street furniture, streetlight, taxi stand, traffic light, trash can | Making a recommendation |
| 11 | Testing Materials 1 | Web page | aggregate, batch plant, bituminous materials, EVT, penetrometer, quartering, riffling, ring and ball test, sample, standard sieve test, standard tar viscometer, viscosity | Making an appointment |
| 12 | Testing Materials 2 | Order form | compacting factor test, consistency, cube, cube test, degree of compactibility test, flow table test, hopper, sampling plan, silt test, slum test, trap door, Vebe test, workability | Asking for repetition |
| 13 | Bridge Maintenance | Inspection report | apron, de-icing salt, inspection report, invert, sand blast, scouring, shrinkage crack, spalling, steam clean, structural crack | Discussing pros and cons |
| 14 | Road Maintenance 1 | Newspaper article | deteriorate, cyclic, improvement, maintain, maintenance, patching, repaint, routine, resurface, structural, sweeping, widen | Correcting an error |
| 15 | Road Maintenance 2 | Contractor bid notices | bush hammering, de-ice, fatted up, high pressure water retexturing, inject, physical abrasion, plowing, pressure grouting, retexturing, rock salt, rotating discs, salt, shot blasting, snow removal | Asking about costs |

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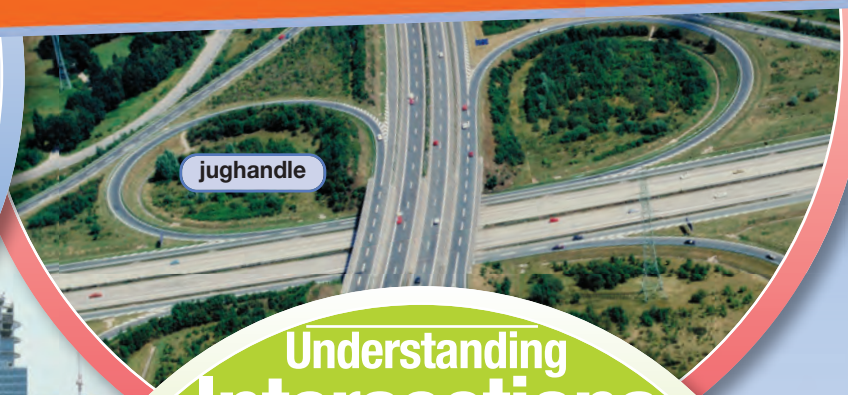
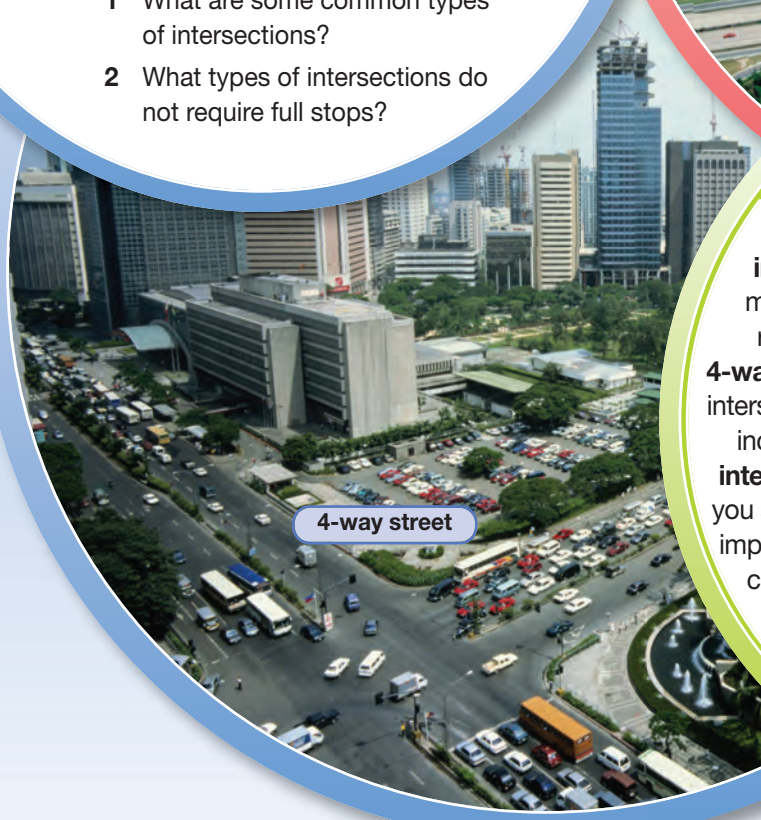
# 4 Types of Intersections

## Get ready!

**1 Before you read the passage, talk about these questions.**

1 What are some common types of intersections?
2 What types of intersections do not require full stops?




## Understanding Intersections

It's important to understand the different types of **intersections**. Intersections can be grouped into two main categories. The first category is intersections that require vehicles to come to a full stop. These include **4-ways**, **T-junctions**, and **box junctions**. The second type of intersection allows traffic to flow without stopping. This group includes **roundabouts**, **traffic circles**, **continuous flow intersections**, and **jughandles**. At any type of intersection, you should know the regulations that apply. For example, it's important to know which vehicle has **the right of way**. This changes by nation and region. Likewise, check how to enter a **turn lane** and whether or not **U-turns** are permitted.

*Driving Around the World*
*Chapter 10*

## Reading

**2 Read the chapter. Then, choose the correct answers.**

1 What is the purpose of the passage?
- **A** to describe the safety features of intersection types
- **B** to give the pros and cons of full stop intersections
- **C** to list different types of intersections
- **D** to explain the right of way in different intersections

2 Which intersection requires a driver to stop?
- **A** roundabout
- **B** T-junction
- **C** traffic circle
- **D** jughandle

3 Which of the following does NOT change by region or nation?
- **A** how to enter turn lanes
- **B** whether U-turns are allowed
- **C** if box junctions require stops
- **D** which vehicle has the right of way

## Vocabulary

**3 Match the words or phrases (1-7) with the definitions (A-G).**

1 __ roundabout
2 __ traffic circle
3 __ jughandle
4 __ T-junction
5 __ box junction
6 __ 4-way
7 __ continuous flow intersection

- **A** an intersection where one road ends at a right angle
- **B** an intersection where vehicles follow a gradual bend
- **C** an indirect route over an intersection
- **D** an intersection that contains yellow cross-hatching
- **E** a road that eliminates left turns at intersections by leading drivers to another turn location
- **F** an intersection where traffic coming from all four directions must stop
- **G** a circular area at an intersection that allows for vehicles to pass between two roads

**4** **Fill in the blanks with the correct words or phrases from the word bank.**

**WORD BANK**

intersection  the right of way
U-turn  turn lane

1 At the next _____, take a left.
2 At a 4-way intersection, the vehicle on the right has _____.
3 It's illegal to make a(n) _____ on this road.
4 This street has a(n) _____ for both left turns as well as right turns.

**5** **Listen and read the chapter again. What are the two main types of intersections?**

## Listening

**6** **Listen to a conversation between a city planner and a construction manager. Mark the following statements as true (T) or false (F).**

1 __ The design calls for a T-junction at 10th Street and Route 9.
2 __ A roundabout will not fit in the area.
3 __ The man suggests using a jughandle.

**7** **Listen again and complete the conversation.**

**Planner:** Ms. Reed, I have an idea for the **1** _____ _____ 10th Street and Route 9.
**Manager:** Sure, James. What is it?
**Planner:** Well, the plan **2** _____ _____ a four-way stop.
**Manager:** Yes, that's correct.
**Planner:** I think that will **3** _____ _____ traffic.
**Manager:** It will. But there's no room for a **4** _____ there.
**Planner:** I know. But I think we could fit a **5** _____.
**Manager:** You know, that's a good idea. Let's **6** _____ _____ _____ at the plans.

## Speaking

**8** **With a partner, act out the roles below based on Task 7. Then, switch roles.**

**USE LANGUAGE SUCH AS:**

*I have an idea for ...*
*I think that will ...*
*We could fit a ...*

**Student A:** You are a city planner. Talk to Student B about:

- a planned intersection
- the current plan
- a change to the plan

**Student B:** You are a project manager. Talk to Student A about an intersection.

## Writing

**9** **Use the conversation from Task 8 to complete the construction manager's email.**

To: _____
From: _____
Subject: _____

Dear _____,

The Route 9 plan calls for a _____ intersection. I think this will _____. A _____ will not fit. Instead, I suggest we use _____. Let me know what you think.

Sincerely,

_____


roundabout

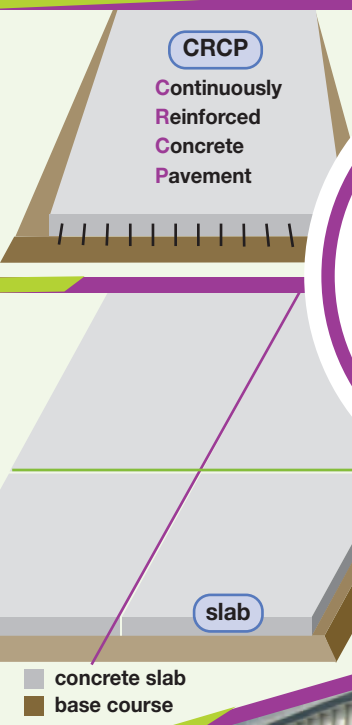

T-junction


U-turn

# 14 Rigid Pavement 1: Slabs and Joints

RIGID PAVEMENT DESIGN STANDARDS

## III. RESPONDING TO LOAD AND ENVIRONMENTAL STRESS: JOINTS




Joints are the most effective way to control cracking in concrete. Only **CRCP** does not require joints in its design.

**III.I Transverse Joints** – For jointed **URC** pavement, transverse joints are spaced between 12 and 20 feet. For **JRC** pavement, transverse joints are spaced between 25 and 50 feet. It is necessary to use dowel bars to strengthen transverse joints. Position bars at mid-depth of the **slab** before pouring the concrete.

**III.II Longitudinal Joints** – Provide longitudinal joints if a lane is wider than 15 feet. It is necessary to use tie bars to strengthen longitudinal joints. Position bars at mid-depth of the slab before pouring the concrete.

**III.III Sealing Technique** – Cut all **joint grooves** after the concrete has set. Ensure that all grooves are clean before applying the sealant. Place the **sealant** as evenly and as quickly as possible.





## Get ready!

**1 Before you read the passage, talk about these questions.**

1 What are some joints used in pavement construction?

2 What type of pavement is reinforced with steel?

## Reading

**2 Read the publication. Then, mark the following statements as true (T) or false (F).**

1 __ JRC pavement requires fewer transverse joints than URC pavement.

2 __ Longitudinal joints are required on CRCP roads wider than fifteen feet.

3 __ Both longitudinal and transverse joints need joint grooves and sealant.

## Vocabulary

**3 Match the words or phrases (1-6) with the definitions (A-F).**

1 __ URC
2 __ JRC
3 __ CRCP
4 __ transverse joint
5 __ joint groove
6 __ longitudinal joint

**A** a type of concrete that uses both joints and steel to control cracking

**B** a joint that is always perpendicular to the centerline of a road

**C** a joint that runs down the centerline of a road

**D** concrete without any materials added to make it stronger

**E** a narrow cut along a joint in which the sealant is placed

**F** a type of concrete pavement that uses only steel to control cracking

**4 Fill in the blanks with the correct words or phrases from the word bank.**

WORD BANK

sealant joint rigid pavement slab

1 The worker placed a(n) _____ in the concrete so that it would not crack.

2 The _____ protected the joint he placed from dirt or water damage.

3 The short ramp to the highway was made of a single _____ of concrete.

4 Because the ramp used _____, it could withstand heavy loads and a lot of stress.

**5** 🎧 **Listen and read the publication again. Where is sealant applied?**

## Listening

**6** 🎧 **Listen to a conversation between a construction company owner and a manager. Choose the correct answers.**

1 What is the conversation mainly about?

**A** the progress of two projects
**B** how to finish a project faster
**C** the types of joints being installed
**D** the benefits of different concrete types

2 What does the man say about jointed reinforced concrete?

**A** It is stronger than URC.
**B** It is harder to install than URC.
**C** It is more expensive than URC.
**D** It requires fewer joints than URC.

**7** 🎧 **Listen again and complete the conversation.**

**Owner:** Everything's **1** _____ _____. We might finish the entire project by fall.

**Manager:** How about the Green Street project? Is it going well?

**Owner:** **2** _____ _____ _____. The engineers are still redesigning the joints. It's starting to get pretty expensive.

**Manager:** What if we used **3** _____ _____ concrete? Would that be cheaper than URC?

**Owner:** Not at all! The price of steel is rising. So using reinforced concrete would be **4** _____ _____.

**Manager:** I see. Is there any way to **5** _____ _____?

**Owner:** I have a **6** _____ _____. But we'll talk about that later.

## Speaking

**8** **With a partner, act out the roles below based on Task 7. Then, switch roles.**

**USE LANGUAGE SUCH AS:**

*Did you visit the ...?*
*Is it going well?*
*What if we used ...?*

**Student A:** You are a construction company owner. Talk to Student B about:

- two road projects
- the progress of the projects
- types of concrete to use

**Student B:** You are a manager. Talk to Student A about two projects.

## Writing

**9** **Use the conversation from Task 8 to fill out the project updates.**

JACKSON CONSTRUCTION

### Main Street Project

Type of concrete being used: _____

Project status: _____

_____

JACKSON CONSTRUCTION

### Green Street Project

Type of concrete being used: _____

Project status: _____

_____

# Glossary

**4-way** [N-COUNT-U4] A **4-way** is an intersection at which traffic coming from all four directions must stop before proceeding.

**add** [V-T-U6] To **add** numbers is to combine them.

**alley** [N-COUNT-U1] An **alley** is a narrow passageway between buildings or houses that connects one street to another.

**and** [CONJ-U6] **And** is used when combining or adding numbers. For example, one and one equals two.

**articulated truck** [N-COUNT-U11] An **articulated truck** is a vehicle that has a joint about which it can pivot, allowing it to turn sharply.

**asphalt** [N-UNCOUNT-U5] **Asphalt** is a sticky, black liquid that is combined with a solid such as crushed stone to form a road covering.

**avenue** [N-COUNT-U1] An **avenue** is a public road that runs perpendicular to a street.

**backhoe** [N-COUNT-U11] A **backhoe** is a machine with a large digging bucket at the end of a two-piece articulated arm.

**bearing test** [N-COUNT-U13] A **bearing test** is a test on sub grade soil to determine its stability and ability to handle loads.

**bend** [N-COUNT-U14] A **bend** is a part of a road that curves.

**bitumen** [N-UNCOUNT-U5] **Bitumen** is a sticky, tar-like form of petroleum that is a binding agent in asphalt.

**Bituminous Surface Treatment (BST)** [N-UNCOUNT-U5] **Bituminous Surface Treatment (BST)** is a layer of asphalt and fine aggregate used as a roadway seal, especially on a roadway with low traffic volume.

**body of water** [N-COUNT-U14] A **body of water** is a geographical feature that is made up of water, such as a lake or an ocean.

**boulevard** [N-COUNT-U1] A **boulevard** is a wide avenue that often has trees or flowers on the sides.

**box junction** [N-COUNT-U4] A **box junction** is a type of intersection that contains yellow cross-hatching. Cars may only enter the specified area when their exit is clear.

**breakdown lane** [N-COUNT-U3] A **breakdown lane** is an area on a highway that is reserved for vehicles that have broken down and are waiting for repair.

**broom** [N-COUNT-U8] A **broom** is a tool with a long handle and bristles at the bottom that is used to push materials across a surface.

**bulldozer** [N-COUNT-U11] A **bulldozer** is a construction vehicle that travels on tracks with a large blade on its front to push large amounts of material.

**bypass** [N-COUNT-U3] A **bypass** is a highway or road that allows vehicles to go around business routes or local traffic.

**California Bearing Ratio (CBR) test** [N-COUNT-U13] A **California Bearing Ratio (CBR) test** is a penetration soil test that measures the pressure required to penetrate a soil sample in a standard area.

**cement mixer** [N-COUNT-U11] A **cement mixer** is a machine that combines water with cement, sand or gravel to form concrete.

**clay** [N-UNCOUNT-U13] **Clay** is a very fine material found in nature and made of various minerals.

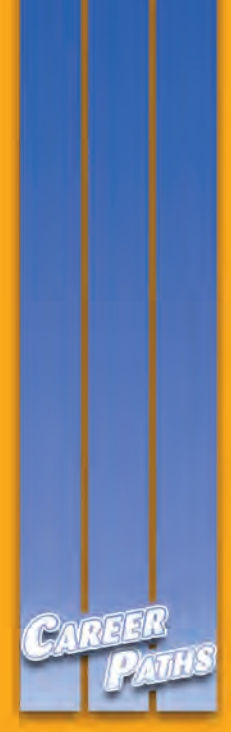
**clear** [V-T-U10] To **clear** an area is to remove objects from it.

**come to** [PHRASAL V-U6] To **come to** a number is to equal that number.

**communicate** [V-I or T-U12] To **communicate** is to express information in a way that can be understood by others.

**compaction** [N-UNCOUNT-U13] **Compaction** is the process of pressing something together to make it denser.

**compactor** [N-COUNT-U11] A **compactor** is a vehicle used to flatten soil, gravel, rock, or asphalt when constructing a road.




Construction II

# Roads & Highways

***Career Paths: Construction II—Roads & Highways*** is a new educational resource for construction professionals who want to improve their English communication in a work environment. Incorporating career-specific vocabulary and contexts, each unit offers step-by-step instruction that immerses students in the four key language components: reading, listening, speaking, and writing. ***Career Paths: Construction II—Roads & Highways*** addresses topics including types of roads, parts of a highway, measurements, earthworks, pavements, curbs, bridges, traffic control and site safety.

The series is organized into three levels of difficulty and offers a minimum of 400 vocabulary terms and phrases. Every unit includes a test of reading comprehension, vocabulary, and listening skills, and leads students through written and oral production.

**Included Features:**

- A variety of realistic reading passages
- Career-specific dialogues
- 45 reading and listening comprehension checks
- Over 400 vocabulary terms and phrases
- Guided speaking and writing exercises
- Complete glossary of terms and phrases

The **Teacher's Book** contains a full answer key and audio scripts.

The **audio CDs** contain all recorded material.

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