

Civil Engineering Writing Project - Language Unit 7

INFORMATION FLOW IN SENTENCES: MOVING FROM KNOWN TO NEW

I. What do you need to know about effective writing in civil engineering practice?

Effective writing makes it easy for readers to understand the writer's intended meaning. This is an especially important factor in engineering, where accurate, precise information is crucial. One of the most important ways to facilitate readers' understanding is to structure information to meet their expectations. In other words, if information appears where readers expect it to be, they interpret meaning more easily. Language Unit 6 covered the expectations for sequencing the components of information that are typical in engineers' documents. This unit covers the sentence level. Specifically, it teaches you how to meet readers' expectations by placing known information before new information in sentences.



What experienced engineering practitioners and readers say

You always start with what's known.

In our experience, the misplacement of old and new information turns out to be the No. 1 problem in American professional writing today. (Gopen and Swan, 1990, p. 555)

II. Information Flow: The Known-New Contract

A) Readers process information by moving from "known" (already established) information to new information. Think of it like a journey. It is hard to find your way to a new place if you don't know where you are starting. As a writer, then, you want to facilitate readers' journey through each of your sentences: orient readers by giving them known information first, and then move to new information.

Known information is usually the subject of the sentence, and it may also be in an introductory phrase. It tells readers the topic for the sentence, and the following, new information tells them something new about it. Because readers strongly expect this flow of information, it is sometimes called a contract between writer and reader: the known-new contract.

What makes information "known"?

There are five main processes, exemplified below with example from engineering practitioners' writing:

1. An item was **previously introduced** in the text (referred to with the same word, a pronoun or a synonym), for example:

- a. **The Davis Avenue (26th Street) bridge** is located in Middleton, Oregon. **The bridge** was constructed in 1949...
(Bridge Type, Size, and Location Report)

b. The mean functional floodplain width based on these measurements is 53 feet. This finding is consistent with the procedure and intent of the fluvial performance standard. *(Hydraulics Report)*

2. An item is **known from the context of the situation**, for example:

a. This report documents.... – This report refers to the object the reader is reading

3. An item is **easily inferable from previous statements**, for example:

a. Geotechnical exploration has been completed for this project. Boring information is contained in Appendix H of this report. *(Executive Summary of a Report)*

Boring information is not a synonym for geotechnical exploration, but anyone familiar with geotechnical investigations knows boring logs are regularly part of them. Readers who aren't familiar will have to guess that boring information is related to the geotechnical exploration. Accurately predicting what is inferable to readers is part of writing judgment; it requires careful consideration of your audience.

4. An item is part of **shared background information** that is easily available in readers' minds, for example:

a. A Pavement Design Memorandum has been prepared by ODOT and is provided in Attachment C. Based on a discussion at the Design Acceptance Workshop, the pavement design memo will be revised for final design to replace...

(Report submitted to the Oregon Dept of Transportation - ODOT)

Readers know certain things from their knowledge of the world and of engineering. For this example, readers familiar with the Oregon Department of Transportation know that big projects have a Design Acceptance Workshop. Therefore, although the workshop is new to this text, the readers (members of ODOT) will have the knowledge of such workshops readily available in their minds as they read about an ODOT project.

Judging shared background information is as tricky as judging what is inferable. You must consider your audience's background carefully.

5. An **"anchor" of known information** is in a phrase with new information, for example:

a. The bridge site is located within the Portland Basin of southwestern Washington, between the Cascade Range to the east and the Columbia River to the south and west. The relatively flat, low-lying basin contains deep Missoula Flood deposits. *(Report)*

Readers can handle a small amount of new information integrated into a phrase if it is "anchored" by known information. Here the second sentence adds *relatively flat, low-lying* as new information, but it is anchored by the known *basin*, which was mentioned in the previous sentence.

- b. During the 2010 Highway 495 corridor study, a significant amount of public involvement took place... [Many details about the public involvement including open houses and other events]... A summary of the public involvement is included in the Appendix. (Report)

The underlined subject begins with new information – *a summary* – but that summary is anchored in readers’ minds with its connection to *the public involvement*, mentioned in the previous sentence.

What makes information “new”?

An item of information is new if readers cannot immediately bring it to mind as they read. This includes

- new ideas
- ideas that were mentioned so long ago in the text that readers won’t have them in mind
- ideas that are part of the readers’ world knowledge but are so unrelated to the topic that readers won’t have them readily accessible.

Judging what is new for readers can be challenging. Readers do not want texts to be repetitive, but they become confused if the writer considers information known when they consider it new.

Effective Information Flow in Engineering Practitioner Writing – Example 1	
Project Background	
Example	Explanation
<p><i>From a feasibility study for a roadway improvement. The previous section introduced the idea that the road improvement could be tied to a bridge replacement project. The report is submitted to the state Department of Transportation.</i></p> <p><u>Existing Powell River Bridge.</u></p> <p>The existing bridge¹, constructed in 1959, is a 163' long three-span reinforced concrete T-beam structure. According to the as-built plans, it² was designed to accommodate the <u>planned high water elevation of 229'</u>. The minimum existing soffit elevation³ is 231'. The calculated water surface elevation for the 50-year flood⁴ is <u>233.1'</u>.</p> <p>Therefore, <u>the clearance of the existing bridge</u>⁵ is insufficient for the 50-year flood event.</p>	<p>The section heading is inferable information from the previous section.</p> <p>Sentence 1 begins with known information established in the heading. The new information describes its age and characteristics.</p> <p>The sentence 2 subject refers to the same known object (<i>the bridge</i>). The sentence has an introductory phrase with inferable information for these readers (structures have plans). This introductory phrase also fulfills readers’ expectations to know the basis for information. The new information concerns high water.</p> <p>Sentence 3 begins with information that is inferable (bridges have soffits under which water must run).</p> <p>Sentence 4 begins with information that is new in the text but known from readers’ experience (elevations of floods are an important consideration in bridge design); for a reader unfamiliar with bridge design, this subject might</p>

	<p>seem entirely new, but that is not the audience for this report.</p> <p>Sentence 5 begins with a connecting word that marks the concluding interpretation (<i>therefore</i>). The subject is inferable (the difference between the existing elevation and calculated surface is the “clearance”) and is also anchored by the known <i>existing bridge</i>. The end of sentence 5 might be considered inferable information if the writer wanted to assume readers would do the subtraction, but that would be a poor assumption for the important conclusion: clearance is insufficient for the 50-year flood.</p>
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Notice how much harder it is to follow the ideas when new information comes before known information:
Existing Powell River Bridge.
 Woodward Engineering constructed a 163’ long three-span reinforced concrete T-beam structure in 1959. This is the existing bridge. The planned high water was an elevation of 229’, according to the as-built plans for the bridge. Clearance for the 50-year flood event is unlikely for the existing bridge because the minimum existing soffit elevation is 231’, but the calculated 50-year water surface elevation is 233.1.

Effective Information Flow in Engineering Practitioner Writing – Example 2 Reporting Data	
Example	Explanation
<p><i>From a foundation report (geotechnical input for the design of the preferred foundation option for a bridge replacement project).</i></p> <p><i>In the previous section, Subsurface Exploration, boreholes and testpits have been introduced. The methods, the purposes, and the numbers of the boreholes and testpits were covered.</i></p> <p>Subsurface Conditions. ... <u>Interior Bent.</u> BH-3¹ encountered fill consisting of soft to medium stiff silt with gravel to ±1.5 feet. The fill² is underlain by medium stiff silt with sand to ±7.5 feet. The silt³ is underlain by loose sand from ±7.5 to 11 feet. Below the sand⁴, medium</p>	<p>Many engineers find it challenging to describe data in a coherent way. This example from a geotechnical report illustrates the use of regular given-new information ordering to make a coherent flow.</p> <p>The Interior Bent paragraph illustrates data reporting when several different layers of data must be kept distinguished. (In this case, each type of soil layer will appear in the following analysis section as a different analysis.)</p> <p>The first sentence begins with known information (BH-3) introduced in the previous section and tells new information about fill. Sentence 2 begins with known information (<i>the fill</i>) and presents new information about it (<i>underlain with</i></p>

stiff to very stiff clay extends to ±20.3 feet. The clay⁵ is underlain by stiff to very stiff silt and medium dense to dense sand to ±102 feet, followed by the Troutdale Formation to 105.2 feet (the limit of our exploration). The Troutdale⁶ consists of very dense sandy gravel.

Test Pits. The subsurface conditions encountered in TP-1 to TP-8¹ were relatively consistent. The generalized profile² consists of soft to hard, clayey silt with low to medium plasticity to a depth of ±5 feet (limit of the excavation).

silt). Sentence 3 begins with the known silt and adds new information (*underlain by sand*). Sentence 4 has an introductory phrase referring to the known sand; it is followed by a new information subject (*medium stiff to very stiff clay*). Sentence 5 uses the known clay as the subject and presents new information about two layers under it, the second of which is the Troutdale Formation. Sentence 6 begins with the already-mentioned Troutdale and provides new information about it.

The test pit section illustrates reporting when data are so similar they can be combined. Sentence 1 begins with known information (subsurface conditions in already-mentioned testpits); it provides the new information that they were consistent. The subject of sentence 2 has known information in two ways: *generalized* refers back to *relatively consistent* and *profile* is inferable from *subsurface conditions* (i.e. soil profiles are typically part of a subsurface condition description).

Notice how much harder it is to follow the ideas when new information comes before known information:

Interior Bent. Fill consisting of soft to medium stiff silt with gravel was encountered to ±1.5 feet in BH-3. Medium stiff silt with sand underlay the fill to ±7.5 feet. Loose sand underlay the silt from ±7.5 to 11 feet.

Even if the depths are placed at the beginning of each sentence (a weak but slightly more inferable organization), the writing remains choppy:

Interior Bent. Up to ±1.5 feet, fill consisting of soft to medium stiff silt with gravel was encountered in BH-3. To ±7.5 feet medium stiff silt with sand underlay the fill. From ±7.5 to 11 feet loose sand underlay the silt.

Effective Information Flow in Engineering Practitioner Writing – Example 3
Describing a Collection of Features

Example	Explanation
<p><i>From a report about a roadway improvement project. The previous paragraphs have described the main purposes of the project, which concern changes in traffic lanes around the intersection of Patterson Road and Highway 492 (additional left turn lanes, a right turn lane, etc.).</i></p> <p>¹Additional features of the project include the following: ²West of the intersection, sidewalks and on-street bike lanes will be added on Patterson Road, and ³a planter strip will be added between the sidewalks and roadway on both sides of the road. ⁴Roadside illumination will be included along Patterson Road. ⁵An off-street bicycle/pedestrian path will be located on the east side of Highway 492 from the intersection south to the campus of Lakeside Community College.</p>	<p>Sentence 1 begins with “anchored” information (anchored by <i>the project</i>, which was previously mentioned). The new information in sentence 1 (<i>include the following</i>) sets up the entire rest of the sentence. The subjects of sentences 2, 3, 4 and 5 are all new items for the text, but each one is inferable as one of the additional features that was mentioned in the first sentence. In other words, having heard that additional features follow, readers assume that each new item (sidewalks, planter strip, roadside illumination, etc.) is one of the features. . Sentence 2 also has an anchored introductory phrase (<i>west of the intersection</i>, anchored by the already-mentioned <i>intersection</i>).</p>

B) Known-new information ordering in sentences is useful also because readers naturally give the last part of the sentence more emphasis. The new information should be the most interesting thing for the reader. Putting it at the end of the sentence naturally gives it emphasis:

<u>First part of sentence</u>	<u>Last part of sentence</u>
Subject	Predicate
Known information	New information
Orientation, topic	Place of emphasis -- interesting new content about the topic

The last sentence of Example 1 illustrates these principles well. The writer led up to the conclusion, putting it in the place of greatest emphasis (end of sentence and end of paragraph):

Therefore, the clearance of the existing bridge is insufficient for the 50-year flood event.
 known subject - orientation, topic new information - place of emphasis

C) No guideline in writing is absolute, and occasionally it is effective to place new information before known information because it has a strong impact. It can show a contrast:

Ground water was not measured during the subsurface investigation due to the mud rotary drilling methods. However, two piezometer borings were drilled next to borings BH-2 and BH-5 to monitor ground water levels.

(Report – Subsurface Exploration section)

Two piezometer borings is new information. It is marked with the contrasting word *however* so readers know this information will contrast with the preceding sentence. A short subject (*two piezometer borings*) also helps effectiveness.

New information in an introductory phrase might also reflect the expected sequencing of information as described in Part 1. This usually happens with *based on...*, for example:

The wall is designed for a maximum height of 7 feet above finished grade and approximately 290 feet long. Based on the site plan provided by the city, the wall will be located on a level ground surface.

The site plan provided by the city is new information, but it is typical for engineering writing to tell the source for information before the information itself. (In Part 1, data sources come before data reporting). Readers are unlikely to be confused by this phrase. The subject of the sentence (*the wall*) is known information.

MYTH BUSTER

Can't a writer just place transition words between sentences?

You may have learned in the past that you can improve the flow of your sentences by using transition words – words like *therefore*, *in conclusion*, or *first....second...* These words show the relationship between sentences and can make your ideas easier for readers to follow. However, if your writing violates the known-new contract, just adding transition words will not improve it substantially.

Here is the ineffective version of Example 1 with transitions added:

Woodward Engineering constructed a 15' long three-span reinforced concrete T-beam structure in 1966. Consequently, this is the existing bridge. The planned high water was an elevation of 229', according to the as-built plans for the bridge. However, clearance for the 50-year flood event is unlikely for the existing bridge because the minimum existing soffit elevation is 231', but the calculated 50-year water surface elevation is 233.1.

The information still does not flow smoothly.

Revising for known-new information order will have a much greater effect than just adding transition words.

Preliminary Practice. Identifying known and new information.

Tell whether the underlined items are known or new. For all known information, explain why it is known. For known information that is previously mentioned or inferable, tell what previous item it relates to.

- a. *Initial section of Project Scoping Notes – Heron Creek Bridge*

Problem Identification:

The existing 31' wide x 254' long bridge, constructed in 1960, utilized precast prestressed slabs supported on timber trestle piles and caps. The timber piles and caps have rot and have had to be temporarily repaired in 1996 and again in 2006. The bridge is structurally deficient with a sufficiency rating of 19. The bridge rail is substandard and there are no approach guardrails.

- b. *From a stormwater report (written to the jurisdiction to demonstrate that water quality, detention, and conveyance regulations are being met in order to obtain a site development permit). Previous sections of the report have described the project and the site, including that water quality will be achieved with a swale and a description of the area for the swale.*

Water Quality

Swale

The water quality swale proposed for the site has been designed using the Clean Water Services Design and Construction Manual 2007. It is a U-shaped swale that is 108 feet long with a slope of 0.5 percent. It has one inlet and one outlet. The treatment area has a two-foot flat-bottom area and 4:1 side slopes. In order to make the swale fit in the tract dedicated for water quality, retaining walls will be installed on 3 sides and a curb will be installed in the center to direct flow.


IV. Techniques for Revising Your Own Writing

Few writers have a first draft that follows the known-new contract well. When initially composing, most writers find it too difficult to consider their ideas and the readers’ desire for known-new ordering at the same time. The key is to check the information flow when you revise. Look at sentences in the draft: Is given information first, the subject of the sentence? Is it followed by new information?

This does not mean repeating ideas. It means restructuring sentences.

The following are specific techniques to try as your revise for information flow. Read each technique and apply it to the practice revision that follows. If necessary, invent details to make the revisions effective (but only for this practice – never for real content!).

Technique 1: Revise sentences to have a short “known information” subject followed by the verb.	
Original Needing Revision	Revision
1. In order to accomplish the goals, we anticipate the following activities would be required. <u>Research into existing topography, hydrology including historical flood levels, sightlines and priority specimen locations, geotechnical</u>	In order to accomplish the goals, we have planned the following activities. First, <u>we</u> will investigate five areas: existing topography, hydrology, sightlines and priority specimen locations, geotechnical properties of the soil

<p><u>properties of the soil and availability of construction access to sites along the creek</u> would all be necessary. Once this research was complete we would develop.... <i>(Progress report)</i></p>	<p>and construction access to sites along the creek. Then we will develop....</p>
<p>Explanation</p> <ul style="list-style-type: none"> • The original is confusing because <i>research into...</i> appears as new information in the first place in the sentence. The writers may have meant <i>research</i> as inferable information from <i>the following activities</i>, but readers expect a list of activities, not a list of research topics. Furthermore, the end of the sentence (the area of emphasis) repeats given information (restating “would all be necessary”). • The revision uses a short, known subject (<i>we</i>) and uses the verb <i>investigate</i> to express one activity. The areas of investigation are listed in the end of the sentences, which appropriately puts them in the area of emphasis. The sequence of activities is also made explicit with connectors <i>First</i> and <i>Then</i>. • Example 1 is also made more effective by more concise wording (for example, <i>we anticipate the following activities would be required</i> → <i>we have planned the following activities</i> and <i>once this research was complete</i> → <i>then</i>) and changing <i>would</i> to <i>will</i>. <i>Would</i> is conditional/hypothetical but the writers have these activities planned. 	
<p>Original</p>	<p>Needing Revision</p>
<p>2. The difference in weight was due to human error. The pan at the bottom of the sieves was dropped while being measured. The material was swept back into the pan and measured. <u>That</u> is likely the cause of the increase in weight. <i>(Lab report)</i></p>	<p>...was dropped while being measured. When the material was swept back into the pan and measured, <u>dirt from the floor had been added</u>. <u>That additional dirt</u> was likely the cause of the increase in weight.</p>
<p>Explanation</p> <ul style="list-style-type: none"> • The original is confusing because <i>that</i> does not refer to anything in the previous sentences. Readers will wonder <i>that what?</i> The important information (how material was added) has been omitted. • The revision adds the missing information and then uses a subject that refers to a previously stated item (<i>that additional dirt</i>). Checking for known-new information is one way to make sure you have written all the steps in your thinking. <p> Be especially careful about <i>this</i> or <i>that</i> as subjects. Do they refer to a missing or vague idea that you need to add, or can readers easily pick out what they refer to? Putting a noun after <i>this</i> or <i>these</i> often helps make given information clear (e.g. <i>that</i> → <i>that additional dirt</i>). If you cannot figure out what noun to use, restructure your sentences.</p>	

Practice 1. Restructure these sentences to use a short, known-information subject. Also include other revisions to increase effectiveness.

- a. Facilities to accommodate a bikeway in the form of a bicycle boulevard were included at 34th St. in all design alternatives. This primarily took the form of restricting motor vehicle movements across...
(Report)

b. **Scope of Work**

Stormwater treatment and infiltration, traffic improvements, and community green spaces were included in the scope of the project. (Report)

c. **Conclusions**

An overview of our findings can be found in appendix F. This shows that the glacial till, classified as silty clay, will be sufficient for the core of the compacted fill earth dam. (Lab report)

d. **The Mechanical Properties of Wood**

Abstract

The bending test and compressions tests perpendicular and parallel to the grain were used in the wood lab experiment. (Lab Report)

Technique 2: Place lists of new information after the main verb of the sentence.	
Original Needing Revision	Revision
<p>1. Study Issues <u>Field observations, previously completed studies, guidelines published by agencies with jurisdictional authority, and our team’s collective experience with similar projects</u> were used to develop a list of issues to consider. (Report – feasibility study)</p>	<p>Study Issues 1A. <u>A list of potential study issues</u> was developed based upon field observations, previously completed studies, guidelines published by the various agencies with jurisdictional authority, and our team's collective experience with similar projects. or 1B. <u>We</u> developed a list of potential study issues based on...</p>
<p>Explanation.</p> <ul style="list-style-type: none"> The original has a long subject with four items of new information before the verb. Readers might infer that these are related to “study issues,” but even if they do, two other problems exist: <ol style="list-style-type: none"> The place of emphasis at the end of the sentence is a closer restatement of study issues (a list of issues to consider). The items themselves deserve the emphasis. Too many words occur before the verb (<i>were used</i>). Reading is easiest when subjects and verbs are close together and verbs are early in sentences (see unit ###). This original requires readers to hold too much in their minds before the verb. Especially when there are several items of new information, it is important to place them after the verb in the sentence and to place known information first. In 1A, the subject is known from being anchored by the word <i>study issues</i>. 1B uses <i>we+active voice</i>. In both revisions, the list of items occurs at the place of emphasis (the end of the sentence). Either could be effective as long as responsibility was already made clear earlier in the document (see unit 3). 	

Practice 2. Restructure the following so that lists of new information occur after the main verb. Also include other revisions for effectiveness.

a. **Subsurface Exploration**

Subsurface data was obtained for engineering analysis from multiple site borings and subsequent lab test data. Standard penetration test (SPT) blow counts, soil classifications, and multiple disturbed and undisturbed soil samples collected at a depth of 10-12 feet below ground surface were included in boring logs. (Tech Memo)

b. **Project Deliverables**

A written progress report and presentation, and a written final report and final presentation, due by the end of winter term and spring term, respectively, comprise the deliverables for this project. (Report)

c. **Purpose**

The purpose of this stormwater report is to provide the jurisdiction with the necessary information to obtain a site development permit. Water quality, detention, and conveyance are addressed in this stormwater. The site plan, conveyance calculations, hydrographs used in calculating the runoff rates and volumes, and soil information are also included in this report.

Technique 3: Add a framing sentence at the beginning of a paragraph.	
Original Needing Revision	Revision
<p>Alternatives.</p> <p>1. <u>A bridge in the vicinity of the current bridge, a bridge located in the central region of the garden, and a bridge at the east end of the garden</u> were considered. <u>Figure 3</u> highlights the key advantages and disadvantages of each location. Based on these considerations, the preferred bridge location is in the center of the garden. (Report)</p>	<p>Alternatives.</p> <p><u>The design team considered three alternatives for the bridge location and evaluated them for the six design criteria. The alternatives</u> were:</p> <p>1) the vicinity of the current bridge 2) the center of the garden 3) the east end of the garden.</p> <p><u>Based on the evaluation of the design criteria (Figure 3),</u> alternative 1 fulfills ... Alternative 2 has... Alternative 3 has... Therefore, the preferred bridge location is alternative 2, the center of the garden.</p>
<p>Explanation.</p> <ul style="list-style-type: none"> • In this paragraph, the authors are presenting their argument for the preferred bridge location. In the original, sentence 1 begins with a long subject that is new information. Readers might guess that these are alternatives, but this long subject puts a heavy load on readers who are waiting for the verb and wondering “where are we going with this?” The second sentence begins with new information (<i>Figure 3</i>) and ends with anchored information (<i>the key advantages and disadvantages of each location</i>). • The revision provides an opening sentence that starts known information (<i>the design team</i>) and also prepares readers what is to come. This framing sentences prepares readers for three alternatives and it prepares them to see those three alternatives against the six design criteria. 	

(The design criteria were mentioned previously.) The second sentence begins with known information and lists the alternatives. The third sentence uses known information to introduce Figure 3. More description of each alternative’s advantages and disadvantages needs to be added.

- Like the original, the revision ends with the preferred location stated at the end of the sentence and end of the paragraph so it receives emphasis.
- The revision also applies Technique 2. It places the list of new information (the alternative locations) after the verb. It also applied Technique 1, using short, known subjects (e.g. *the design team* and *the alternatives*).

Practice 2. Add a framing sentence to the beginning of these paragraphs. Also include other revisions for effectiveness.

- a. **Scope.** The first task was to determine the optimal location for the new bridge such that it would be accessible by the current trails, requiring little or no modification to them, while remaining elevated enough to be above the high water mark. The next task was to design the structure and select a building material for the superstructure that would be inexpensive and manageable from a construction point of view. It was decided that the scope was to include the design of the superstructure, the substructure, and the foundation of the new pedestrian bridge. The superstructure design was to include (but not limited to) the girders, lateral bracing system, decking, and rails. The substructure was to include the bents and their bracing system. The foundation was to include any necessary piles, footings, and soil remediation necessary to transfer the bridge loads to the ground. Special considerations such as ADA requirements, building code requirements, and environmental impacts were to be taken into consideration as part of the design process also.

(Report)

b. **Data Collection Plans**

The first two and last two weeks will be at the two intersections that were selected for the new “before” and “after” analysis. The first two weeks will include collecting data for the “before” results. The last two weeks will include collecting data for the “after” results. The third and fourth weeks will consist of data collection for the previously established intersection study.

(Report)

More Practice

Revise the following to increase effectiveness, paying particular attention to information flow. Apply the techniques above and those from Part 1. Revise other features as needed for effective communication.

- a. **Summary of Project.** [Note: This is the only paragraph in the “Summary of Project” section.] The City of Henderson Transportation Department received 60 requests from business owners to install on-street bicycle corrals in front of their business in 2010. Improved customer-to-parking ratios, an enhanced pedestrian experience and better visibility of storefronts are reasons for the popularity of the bike corrals. Made up of a series of inverted U-shaped bike racks with a painted or raised lip that borders them, the bike corrals and their installation typically involve the removal of at least one or two on-street parking spots, leaving pedestrian needs on the sidewalk unaffected but greatly increasing the availability of bicycle parking. It is believed that the visibility of storefronts and customer attraction is increased by the installation of bike corrals. Business may experience a positive economic impact from the bike corrals. The City of Henderson has plans to continue to

install more bike corrals around the city. However, the impact on surrounding businesses is not well known. The City of Henderson Transportation Department has suggested that they would like to have our team set up a framework for any further studies that would attempt to quantify the corrals' impact on businesses. Through quantitative and qualitative data, the City of Henderson would like to determine if the time and money spent installing the bike corrals is justified. Human interaction will be needed for some data, which could insert some bias into the data.

- b. Choose a series of sentences from your own writing that has an ineffective use of known and new information. Revise to increase the effectiveness. Show the original and your revision.

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