

# Evolution of the Landscape along the Clear Creek Corridor, Colorado—Urbanization, Aggregate Mining, and Reclamation

By Belinda Arbogast,<sup>1</sup> Daniel H. Knepper, Jr.,<sup>1</sup> Roger A. Melick,<sup>1</sup> and John Hickman<sup>2</sup>

<sup>1</sup>U.S. Geological Survey, Denver Federal Center, Box 25046, MS 973, Denver, CO 80225-0046  
<sup>2</sup>Cumberland Co., Inc., 6300 South Syracuse Way, Englewood, CO 80111

## Introduction

Six sites along the valley of Clear Creek between Golden, Colorado, and the confluence of Clear Creek with the South Platte River in the northern part of Denver (see *Index Map*) were selected to illustrate the evolution of the present-day landscape in the valley in terms of sand and gravel mining, reclamation, and landscape modification. Five of the sites were previously described by Sheridan (1967) to illustrate land usage at that time and to determine the potential for development at each site.

Aerial photographs, including those used by Sheridan (1967), were selected for each of the sites to illustrate how each site has changed over the years. Each of the aggregate resource maps was georeferenced to a UTM projection, and the appropriate parts of the Digital Raster Graphs of the 1994 versions of U.S. Geological Survey 1:24,000-scale topographic maps were overlaid to provide points of reference. The distribution of the alluvial deposits that can be used for high-quality aggregate is shown on the aggregate resource map of each site, and a brief description of each alluvial deposit is provided.

To illustrate the topography of the sites, each aggregate resource map includes a detailed topographic map draped over a sun-shaded Digital Elevation Model. The aggregate resource maps show the locations where selected ground photographs were taken that portray how the sites look to an observer today. Additional photographs illustrate various aspects of the sites that are of ecological or historical interest.



Index Map

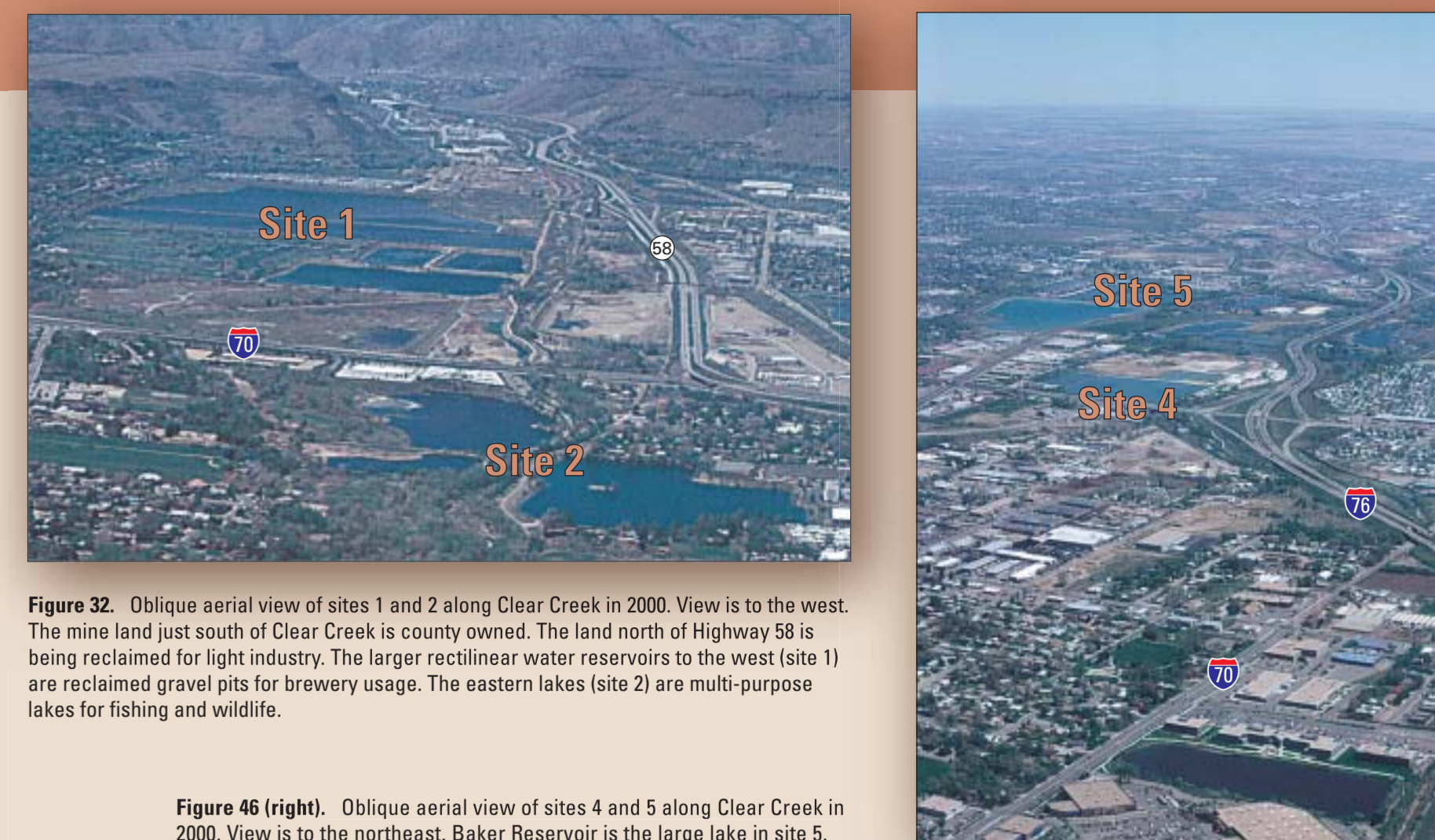
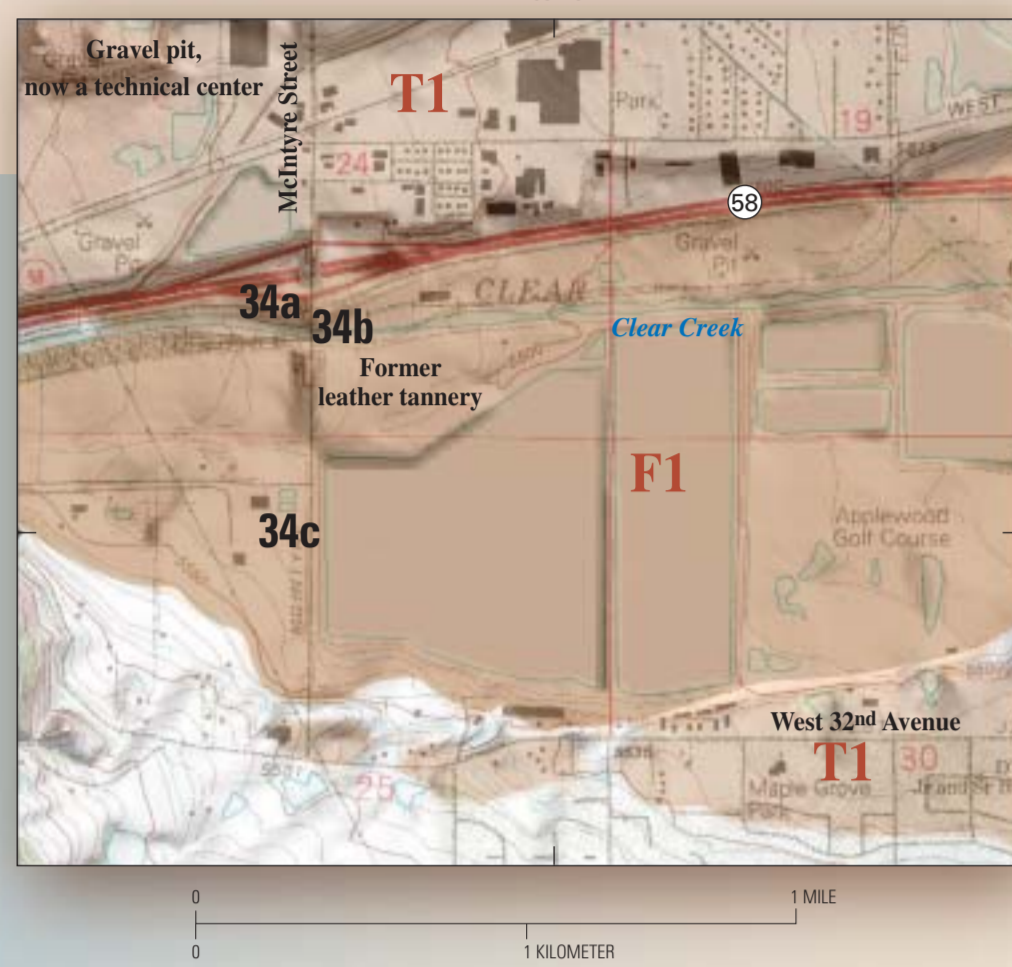


Figure 32. Oblique aerial view of sites 1 and 2 along Clear Creek in 2000. View is to the west. The mine land just south of Clear Creek is currently owned. The land north of Highway 26 is being reclaimed for light industry. The larger rectangular water reservoirs to the west (site 1) are reclaimed gravel pits for brewery usage. The eastern lakes (site 2) are multi-purpose lakes for fishing and wildlife.

Figure 48 (right). Oblique aerial view of sites 4 and 5 along Clear Creek in 2000. View is to the northeast. Baker Reservoir is the large lake in site 5.

## Site 1 Clear Creek at McIntyre Street

Figure 33 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 is the modern flood-plain deposits. Unit T1 is a low terrace deposit that corresponds to the Louvers Alluvium. Both of these units contain coarse gravel that makes high-quality natural aggregate; they are the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1955



The straight-sided polygons on this aerial photograph indicate that much of the modern Clear Creek flood plain south of the creek was being used for agriculture. North of the creek, the flood plain was moderately vegetated (dark), depicting a substantial number of trees, but lacks distinctive polygonal field patterns. The braided drainage pattern of Clear Creek indicates that the natural channel had not yet been significantly altered. Colorado Highway 96, the major four-lane divided highway connecting Golden with Interstate 76, had not yet been constructed.

Gravel was being extracted from terrace deposits north of Clear Creek at sites west of McIntyre Street (G1) and at the northern edge of the photograph adjacent to the vegetated flood plain (G2). Directly to the south, gravel was being extracted from the Clear Creek flood plain by operations both north (G3) and south (G4) of the stream. (Aerial photograph from U.S. Geological Survey.)

## 1965



By 1965, all evidence of farming in the flood plain south of Clear Creek was gone. Gravel extraction had expanded from G1 eastward across McIntyre Street, including the interchange area of the yet-to-be built Colorado Highway 98 (G1). The operation at G2 appears to have been completed, but a new operation had opened up immediately to the east. A major expansion of the gravel extraction occurred to the south, and southwest of G3. The Rolling Hills Country Club (now Applewood Golf Course) had been established over an unmined part of the Clear Creek flood-plain gravel deposits. (Aerial photograph from Sheridan, 1967, p. 34.)

## 1978



By 1978, dramatic changes had taken place along the Clear Creek valley at McIntyre Street. The major four-lane divided highway connecting Golden with Interstate 76, Colorado Highway 98, complete with an interchange at McIntyre Street, had been constructed across the northern part of the site, including areas where gravel had previously been extracted. The channel of Clear Creek had been straightened, narrowed, and moved to the north. The vegetation in the flood plain north of the original channel was virtually gone, and gravel was being extracted from all of the flood plain south of the new channel and east of McIntyre Road, except for the Applewood Golf Course property. Gravel extraction had been completed at the sites of Coors Lake B-2 and the small ponds north of the golf course, and the pits were being used for water storage. (Aerial photograph from U.S. Geological Survey.)

## 1992



By 1992, gravel extraction was complete. The pits at Coors Lake B-4 and the "A" Water Lakes had already been put into use as water storage for the Applewood Golf Course. Extraction of gravel in the pit that contains the easternmost of the "A" Water Lakes actually encroached on the golf course property. The "B" Lakes are the first-class-level reservoirs reclaimed by the aggregate industry from sand and gravel pits in the State. (Aerial photograph from U.S. Geological Survey.)

## Ground Views along Clear Creek at McIntyre Street

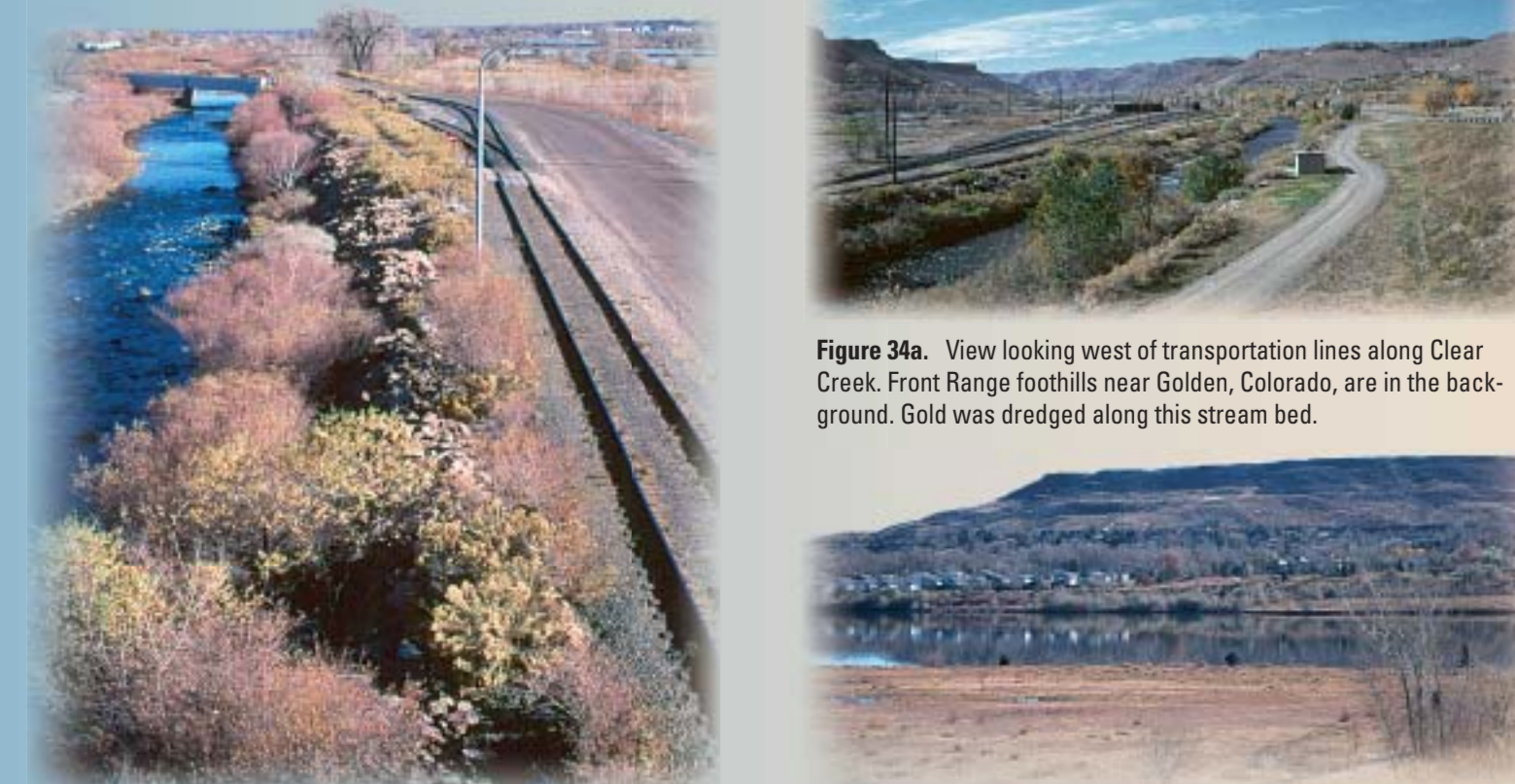


Figure 34a. View looking west of transportation lines along Clear Creek. From Range foothills near Golden, Colorado, are in the background. Gold was dragged along this stream bed.

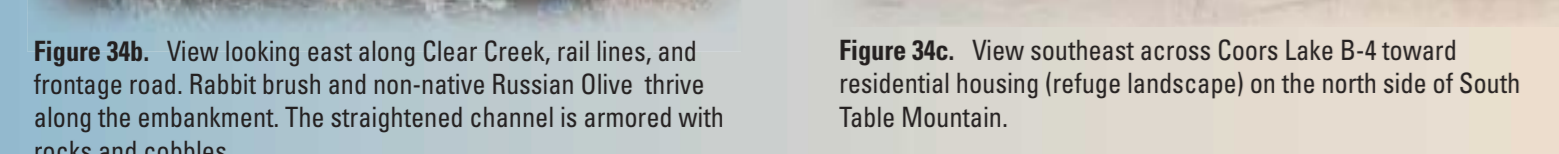
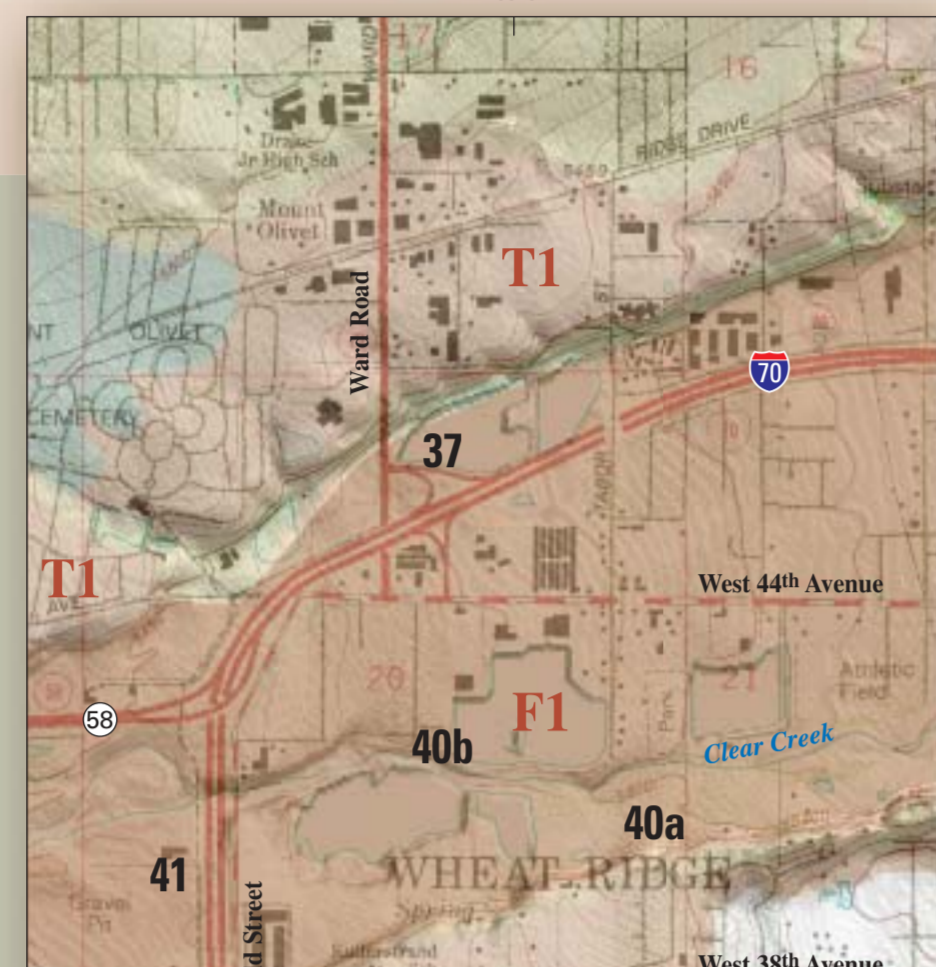


Figure 34b. View looking east along Clear Creek, rail line, and Interstate road. Rabbit brush and non-native Russian Olive thrive along the embankment. The straightened channel is armored with rocks and cobbles.

## Site 2 Clear Creek at Youngfield Street

Figure 35 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 is the modern flood-plain deposits. Unit T1 is a low terrace deposit that corresponds to the Louvers Alluvium. Both of these units contain coarse gravel that makes high-quality natural aggregate; they are the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1937



This view shows agrarian and open space as the predominant land uses in July 1937. The Clear Creek flood plain is shown in the bottom half of the photograph. The braided creek channel, dark vegetation, and polygonal field patterns are similar to site 1. However, the reclamation and use and final land forms are markedly different. (Aerial photograph from U.S. Department of Agriculture.)

## 1965



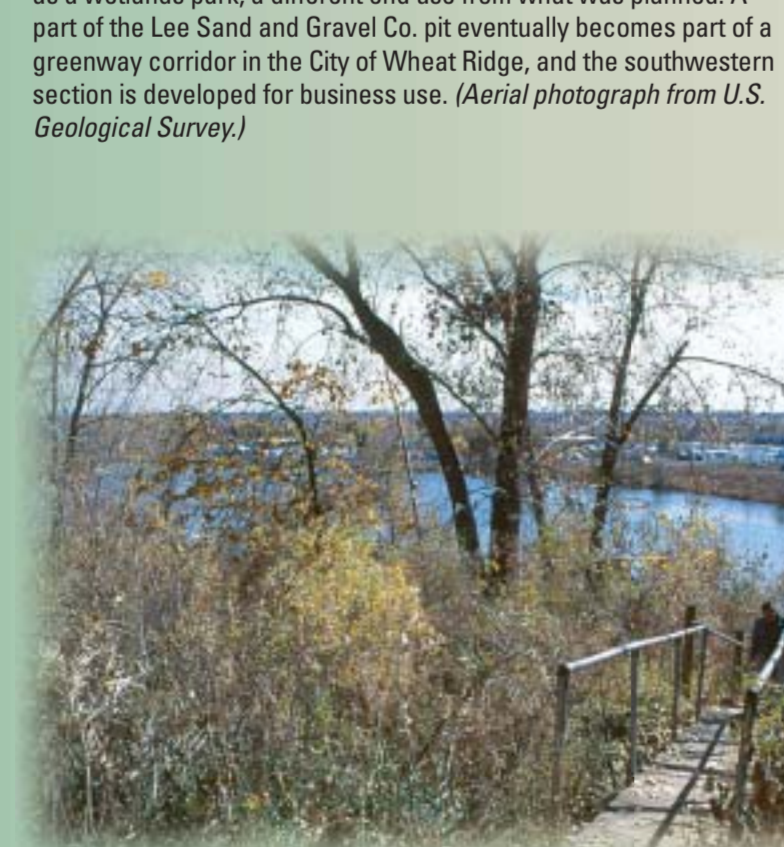
By 1965, there were extensive sand and gravel pits in operation, large amounts of farming and riparian vegetation were gone, and the vegetation along the southern terrace appears relatively constant to area extent. Sheridan (1967) noted the aggregate resource between Clear Creek and the Brennan Sand and Gravel Co. Plant No. 11 became unavailable due to residential development. During this time, Plant No. 11 was being considered for housing development, a recreation center, or water storage for the city of Anvada. The Lee Sand and Gravel Co. site was being backfilled along Youngfield Street frontage for residential or business use. (Aerial photograph from Sheridan, 1967, p. 31.)

## 1978



By 1978, dramatic changes had taken place along the Clear Creek valley at McIntyre Street. The major four-lane divided highway connecting Golden with Interstate 76, Colorado Highway 98, complete with an interchange at McIntyre Street, had been constructed across the northern part of the site, including areas where gravel had previously been extracted. The channel of Clear Creek had been straightened, narrowed, and moved to the north. The vegetation in the flood plain north of the original channel was virtually gone, and gravel was being extracted from all of the flood plain south of the new channel and east of McIntyre Road, except for the Applewood Golf Course property. Gravel extraction had been completed at the sites of Coors Lake B-2 and the small ponds north of the golf course, and the pits were being used for water storage. (Aerial photograph from U.S. Geological Survey.)

## Views of West Lake



## Views of West Lake

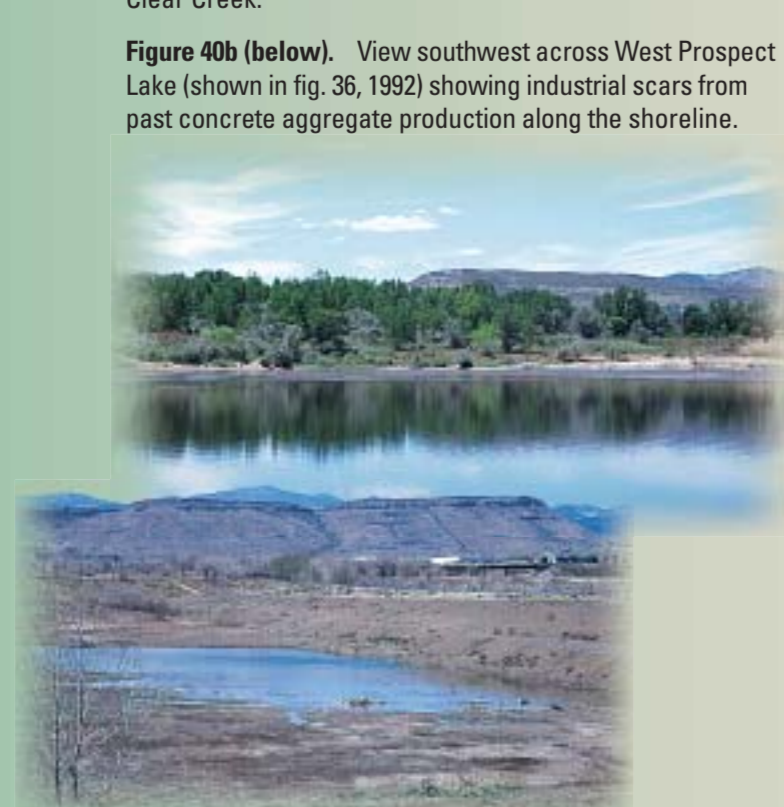


Figure 40b (below). View southwest across West Prospect Lake (shown in fig. 36, 1992) showing industrial scars from past concrete aggregate production along the shoreline.

## Views of West Lake

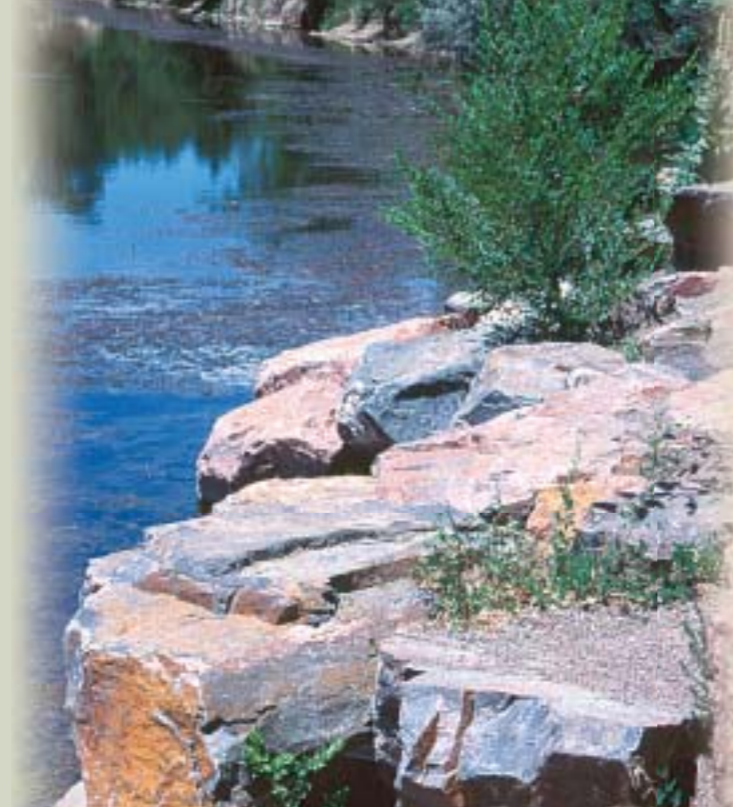
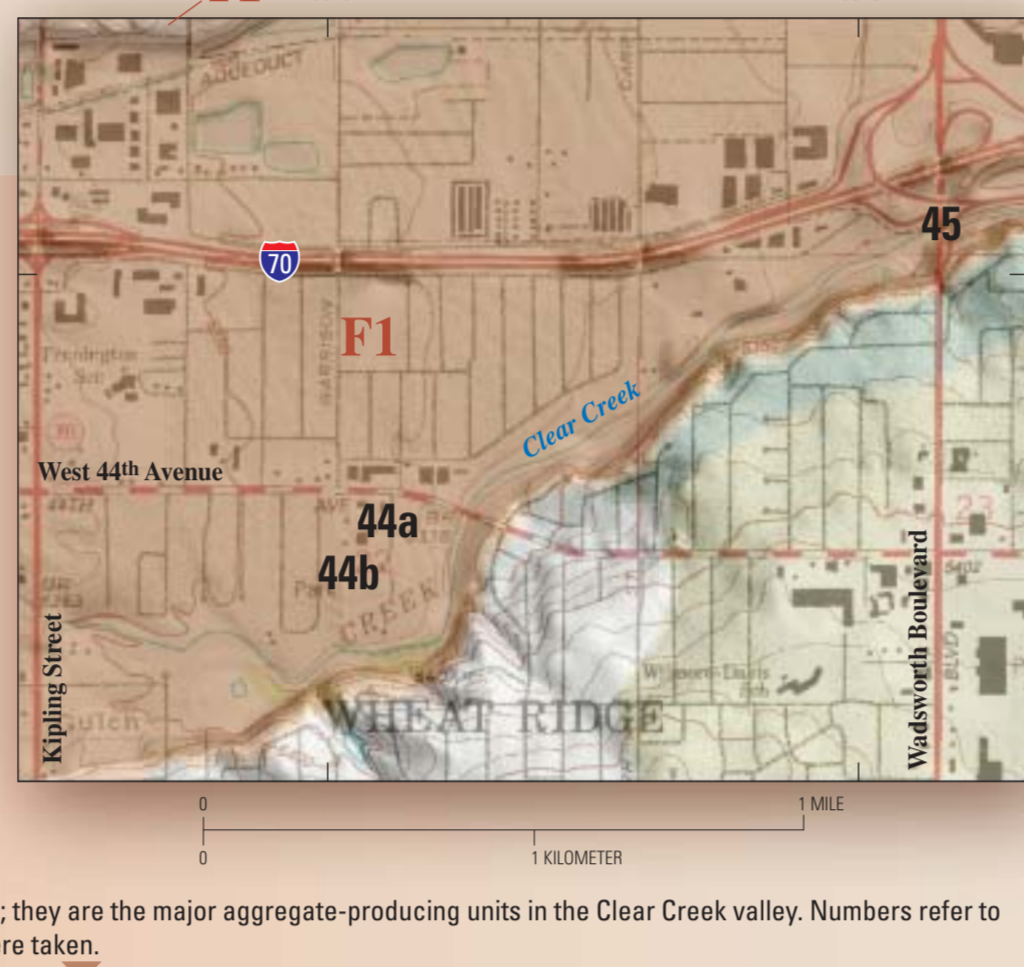


Figure 40c (below). View southwest across West Prospect Lake (shown in fig. 36, 1992) showing industrial scars from past concrete aggregate production along the shoreline.

## Site 3 Clear Creek at West 44th Avenue

Figure 43 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 consists of the modern flood-plain deposits. Unit T1 is a low terrace deposit that corresponds to the Louvers Alluvium. Both of these units contain coarse gravel that can be used to make high-quality natural aggregate; they are the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1937



This aerial photograph shows areas of intensive agriculture in a region that became one of the finest truck-gardening areas in Colorado. Sheridan (1967) reported three attempts in the 1940's to obtain sand and gravel operating permits on the indicated acreage. All requests were denied due to protests of area residents. (Aerial photograph from Sheridan, 1967, p. 21.)

## 1965



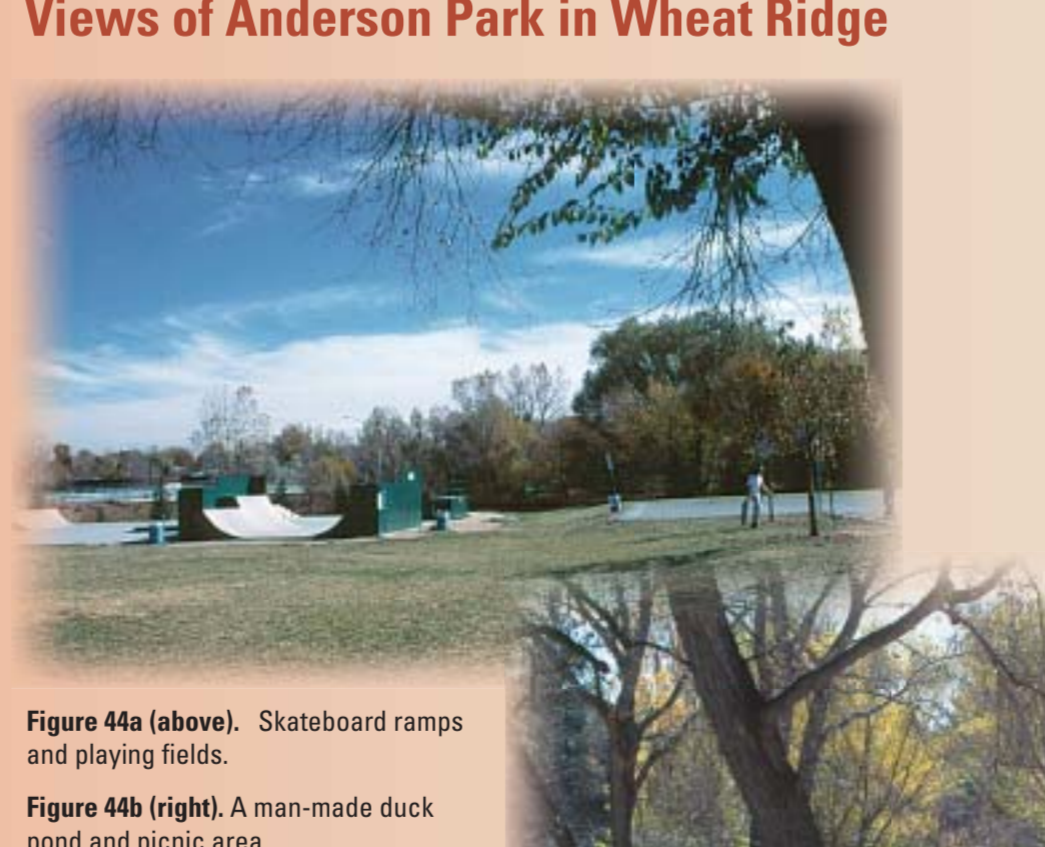
By 1965, urban residential development resulted in loss of aggregate resource and agricultural land (Sheridan, 1967, p. 21, 23). Homes lined the creek terraces, and patches of dark-green vegetation were fragmented and reduced. (Aerial photograph from Sheridan, 1967, p. 22.)

## 1992

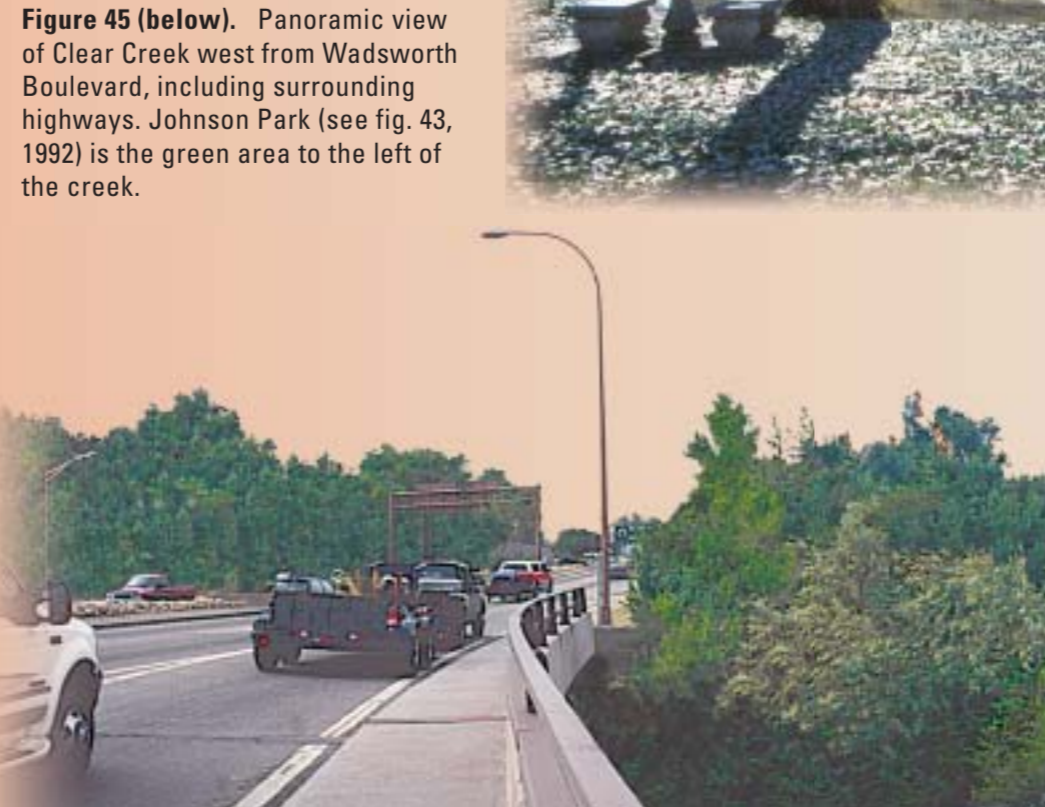


This view in April 1992 shows Anderson Park just south of West 44th Avenue, and Johnson Park west of Wadsworth Boulevard. The aggregate mineral reserve could have been removed during an interim land use but residential pressure was against mining in the area. Birdland Park, in the northwest corner of the site, is an example of a park reclaimed from a former gravel pit. (Aerial photograph from U.S. Geological Survey.)

## Views of Anderson Park in Wheat Ridge



## Views of Anderson Park in Wheat Ridge



Development of the mineral resources of this area have resulted in a combination of wildlife/greenbelt and recreation landforms. Sometimes it is difficult to distinguish artificially created water reservoir forms from naturally occurring ones. The water reservoirs reclaimed from sand and gravel pits on this site appear organic and curvilinear while the channel of Clear Creek is artificially straightened. (Aerial photograph from U.S. Geological Survey.)

## Views of Anderson Park in Wheat Ridge

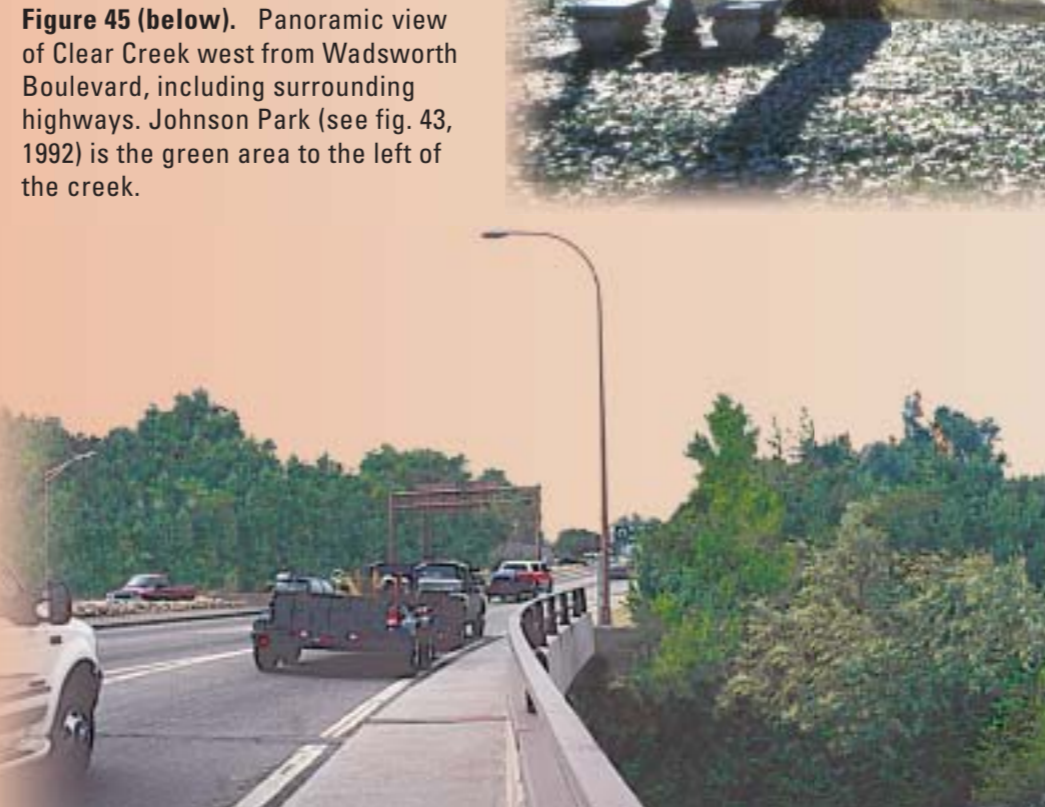
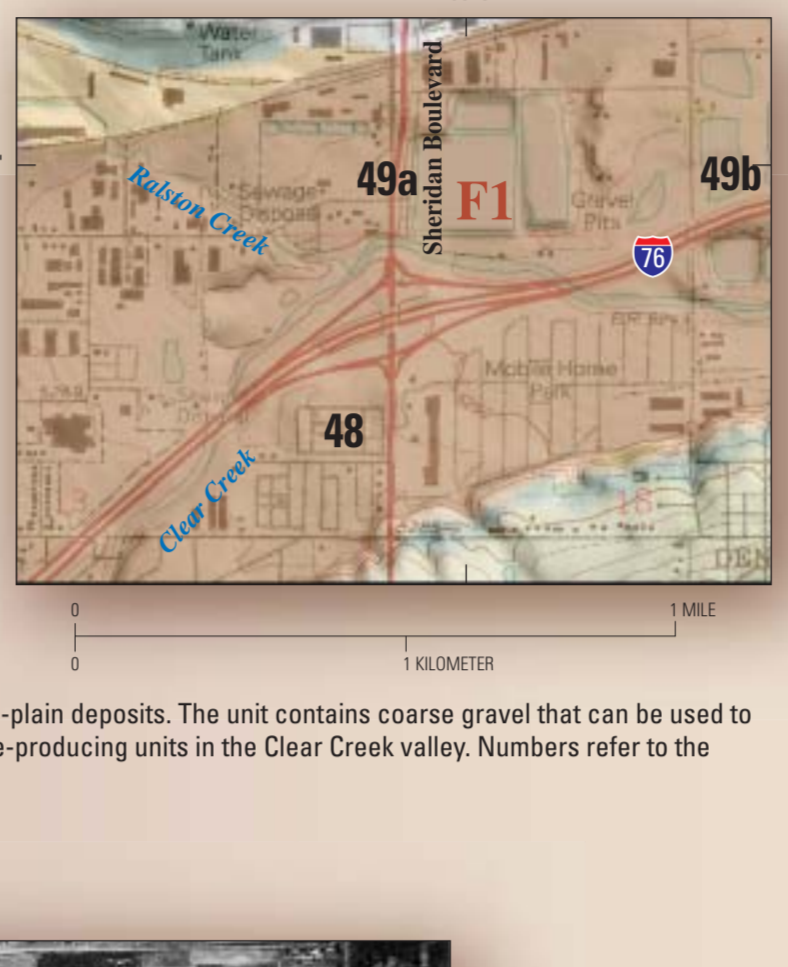


Figure 45 (below). Panoramic view of Clear Creek west from Wadsworth Boulevard, including surrounding highways, Johnson Park (see fig. 43, 1992) is the green area to the left of the creek.

## Site 4 Confluence of Clear Creek and Ralston Creek at Sheridan Boulevard

Figure 47 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 consists of the modern flood-plain deposits. It contains coarse gravel that can be used to make high-quality natural aggregate; it is one of the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1951



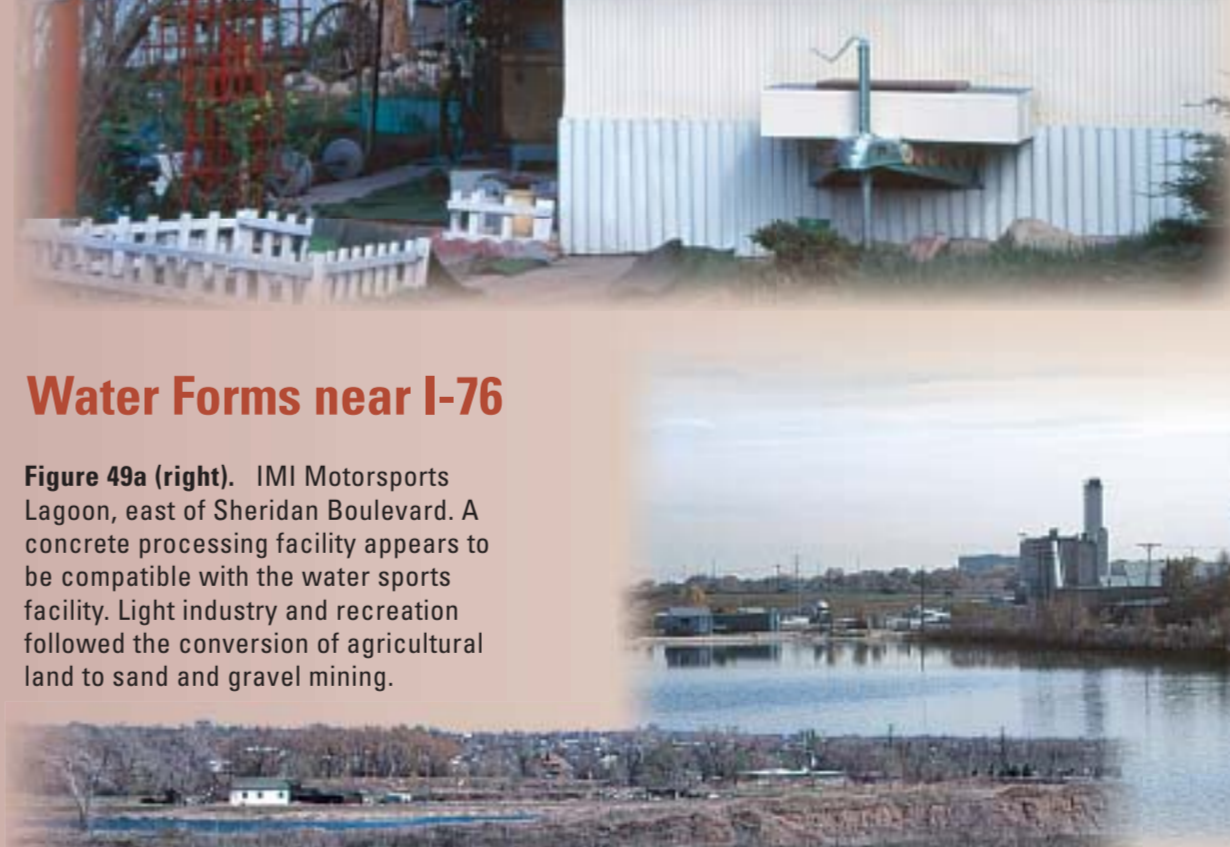
## 1964



## 1978



## Street Scene near Clear Creek and Sheridan Boulevard

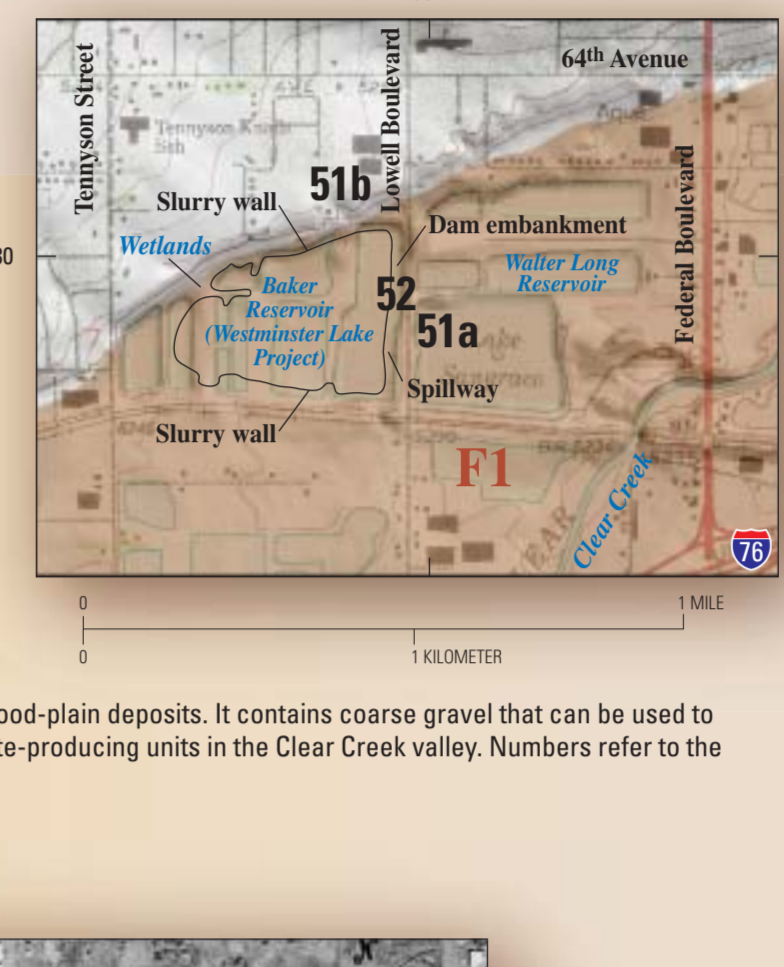


## Water Forms near I-76



## Site 5 Clear Creek at Lowell Boulevard

Figure 50 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 consists of the modern flood-plain deposits. It contains coarse gravel that can be used to make high-quality natural aggregate; it is one of the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1951



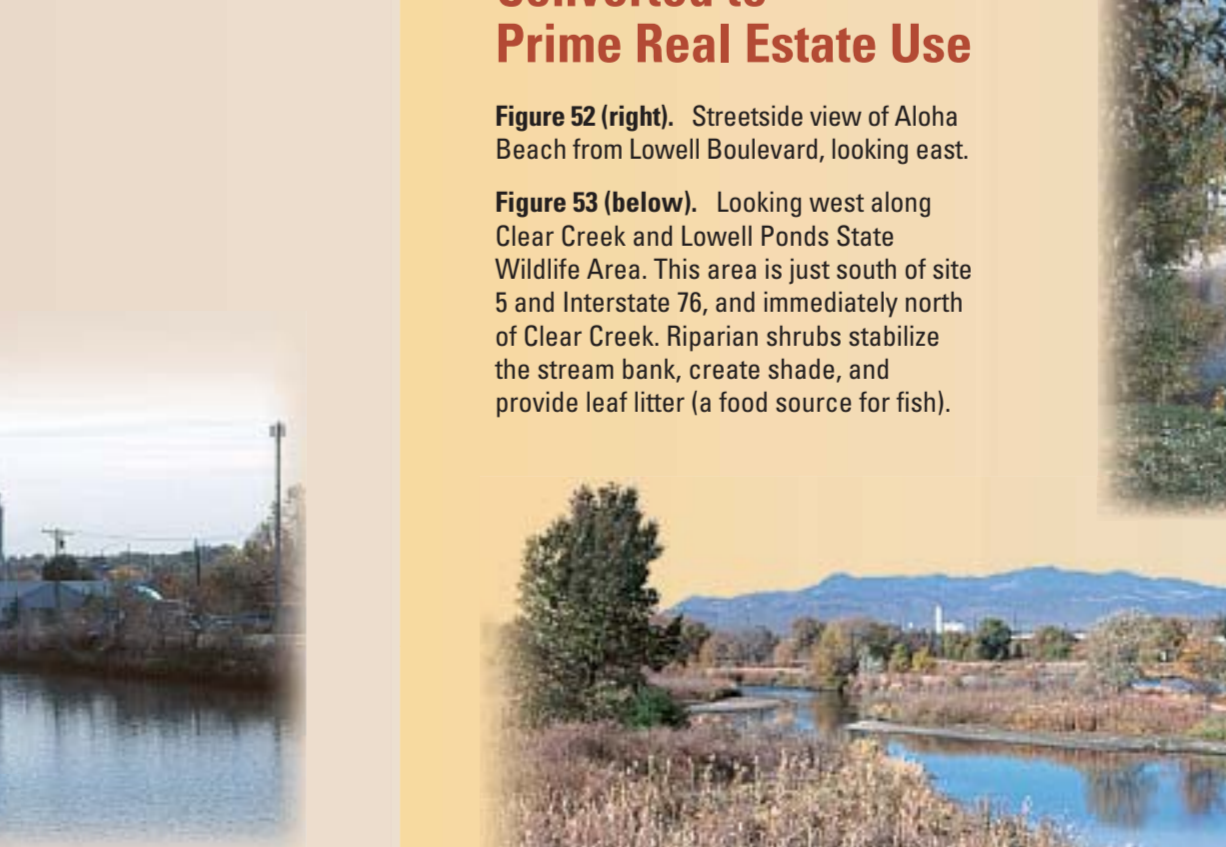
## 1964



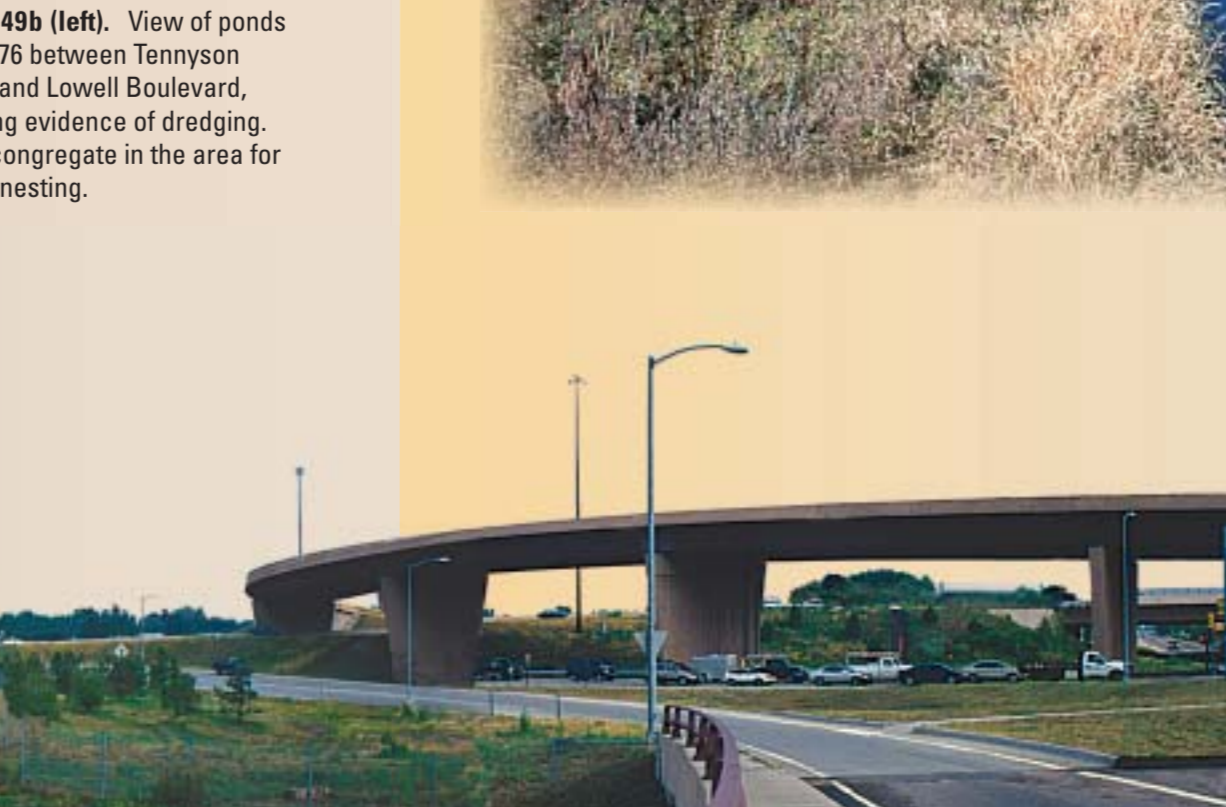
## 1978



## Street Scene near Clear Creek and Sheridan Boulevard

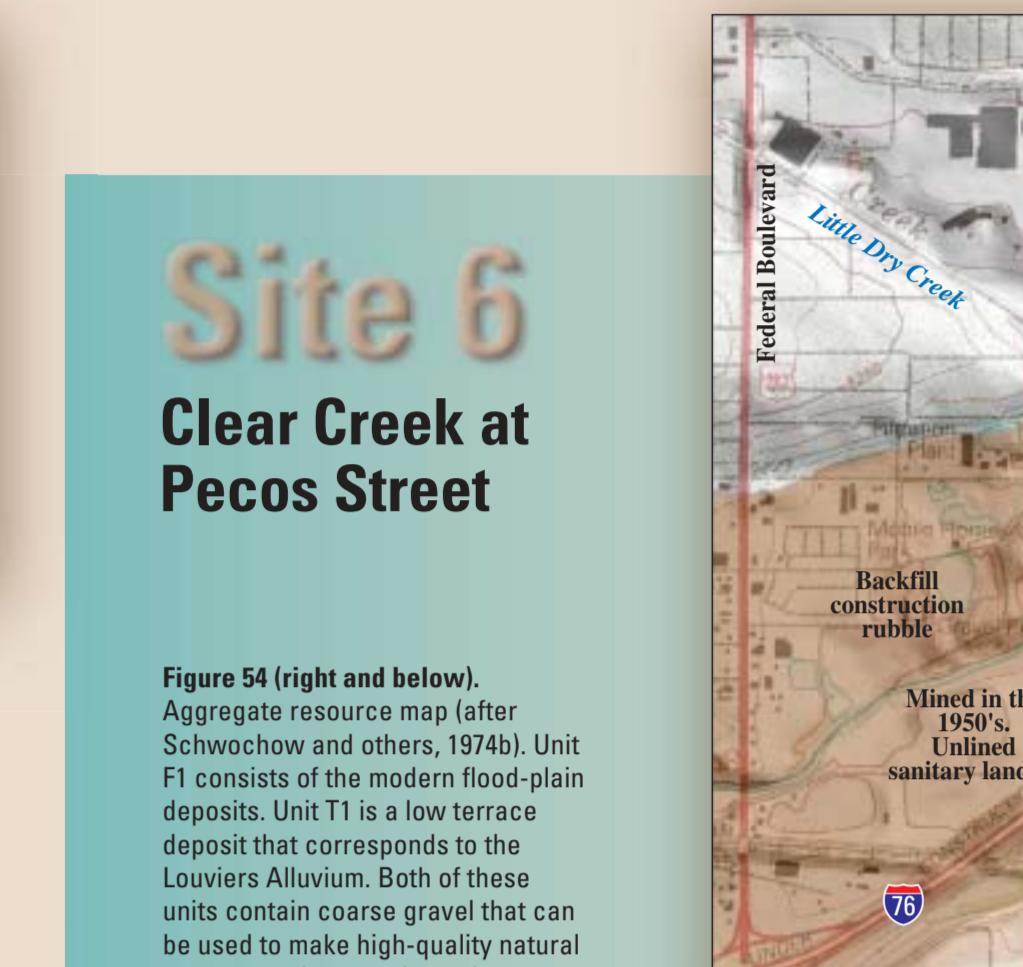


## Water Forms near I-76



## Site 6 Clear Creek at Pecos Street

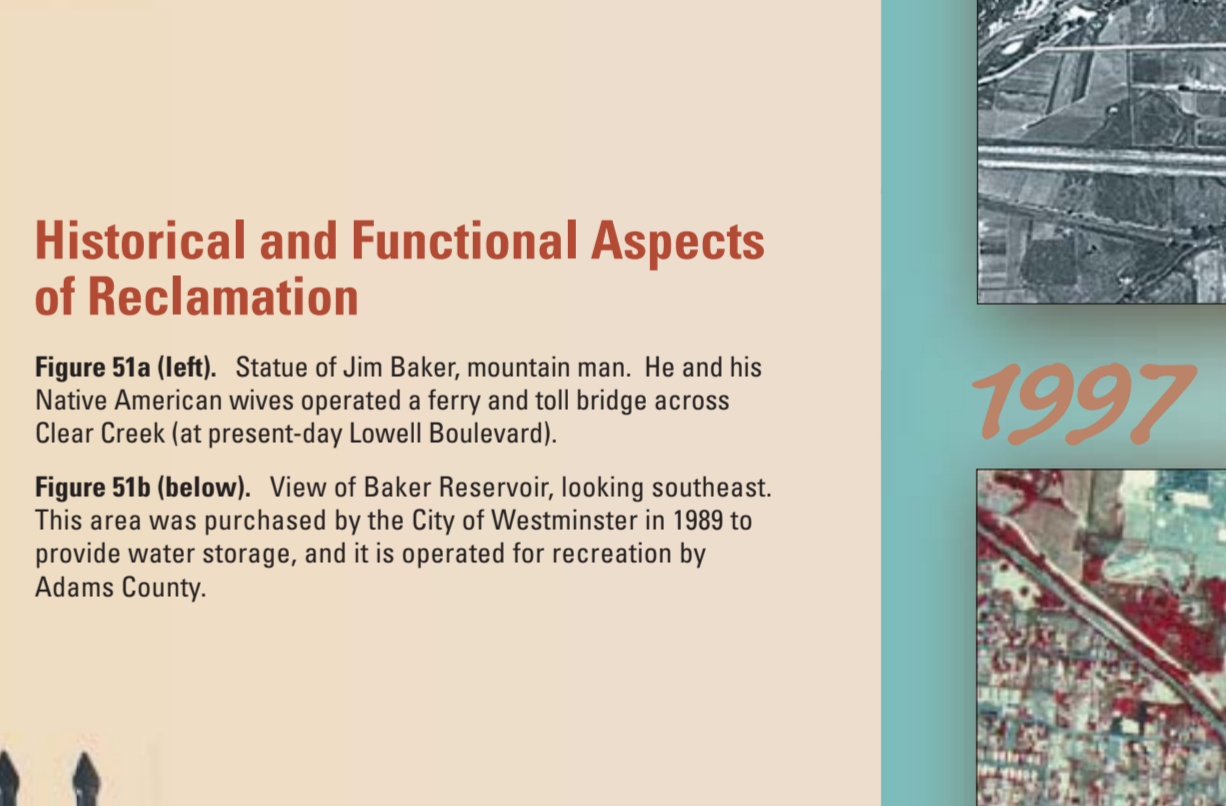
Figure 54 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 consists of the modern flood-plain deposits. It contains coarse gravel that can be used to make high-quality natural aggregate; it is one of the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1937



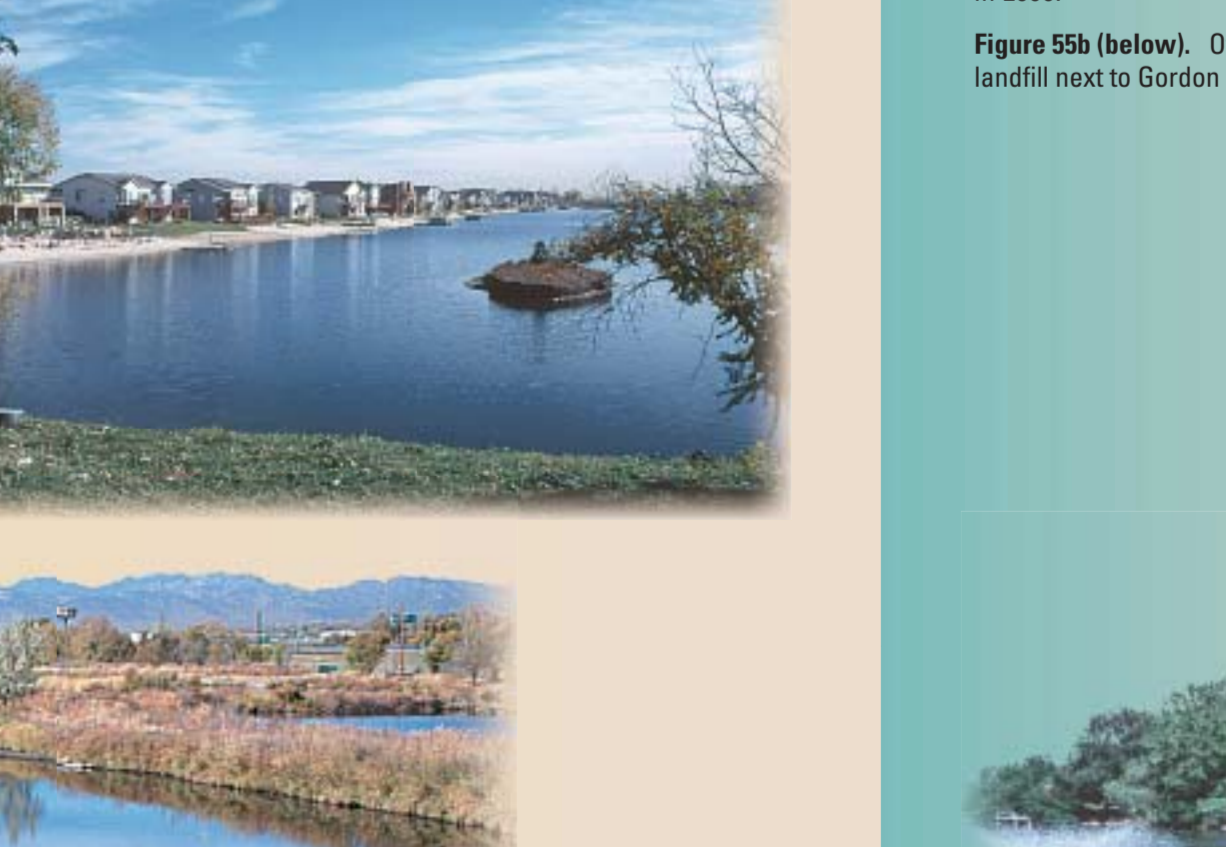
## 1964



## 1978



## Street Scene near Clear Creek and Sheridan Boulevard

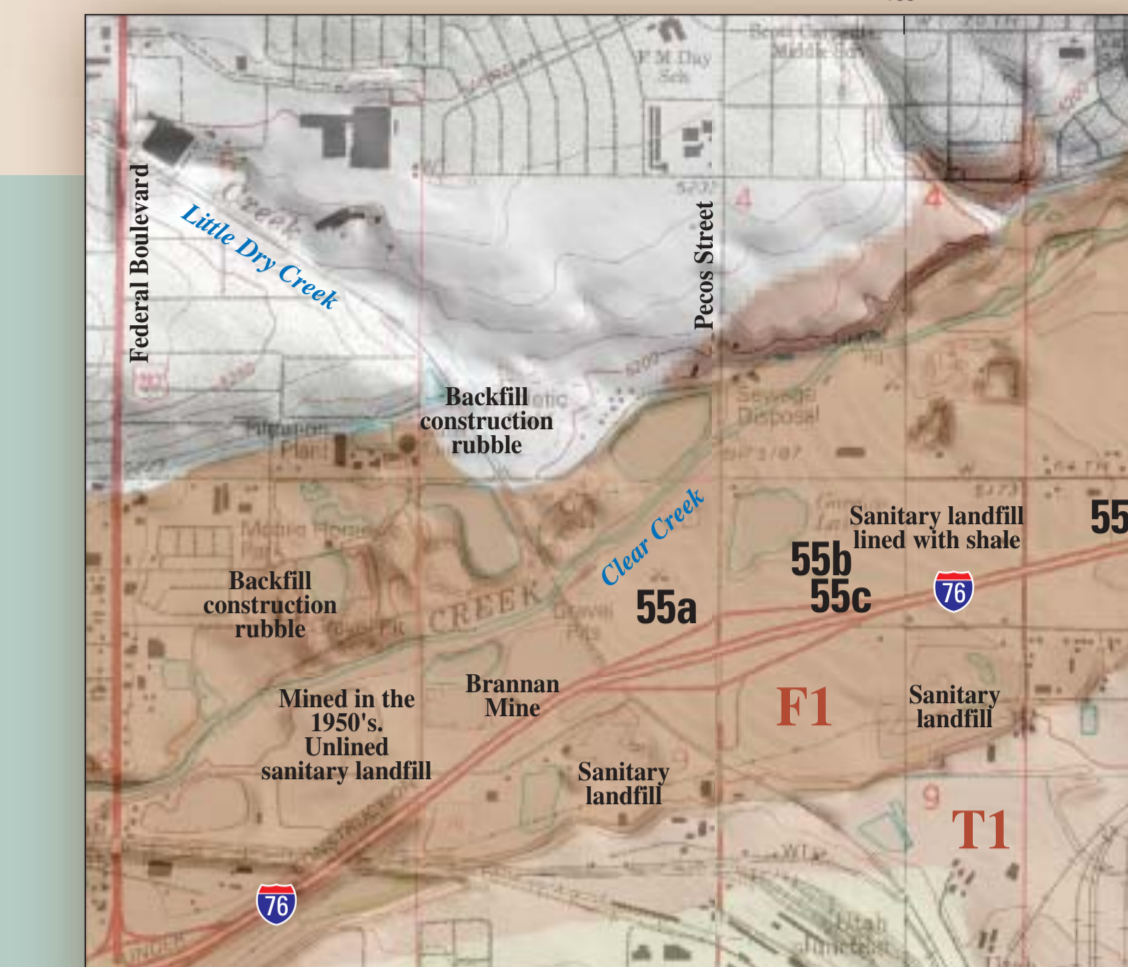


## Water Forms near I-76



## Site 6 Clear Creek at Pecos Street

Figure 54 (right and below). Aggregate resource map (after Schwabach and others, 1974b). Unit F1 consists of the modern flood-plain deposits. It contains coarse gravel that can be used to make high-quality natural aggregate; it is one of the major aggregate-producing units in the Clear Creek valley. Numbers refer to the locations where ground photographs were taken.



## 1937



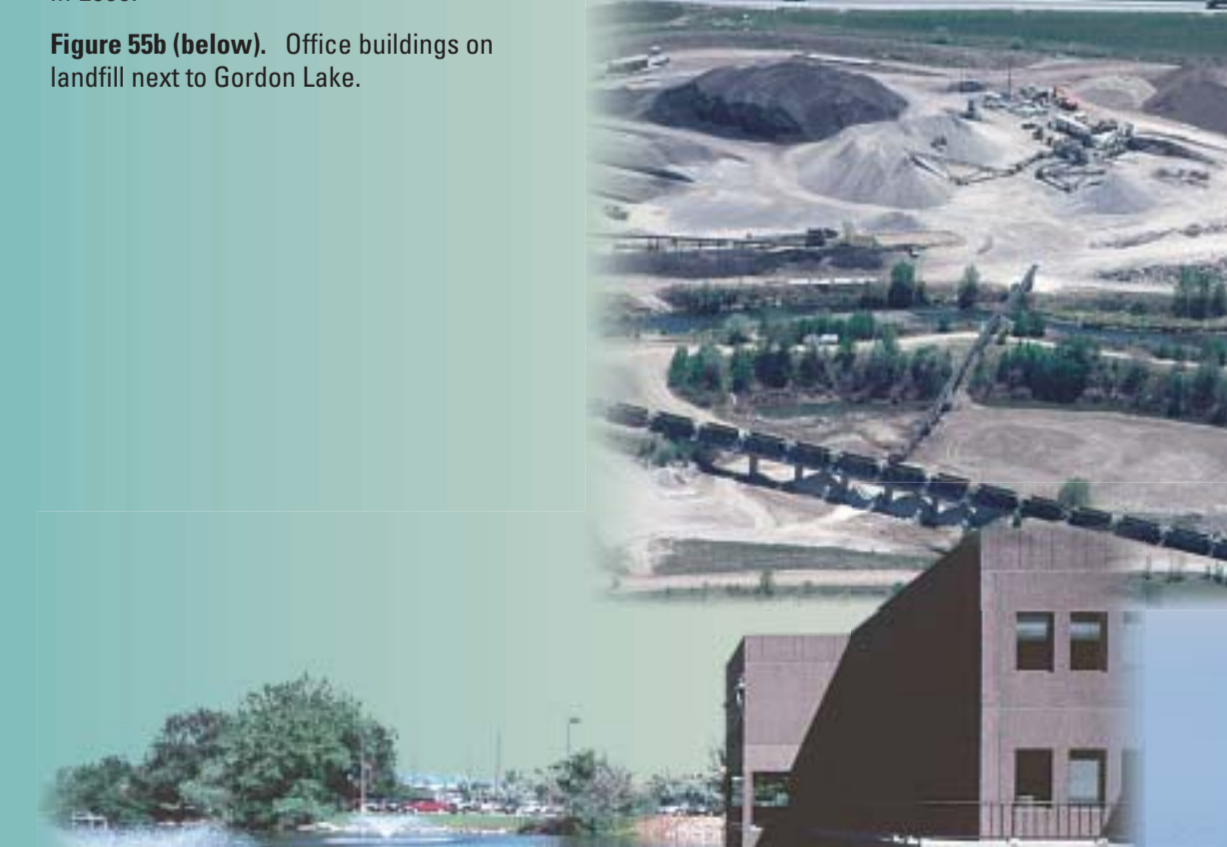
## 1964



## 1978



## Street Scene near Clear Creek and Sheridan Boulevard



## Water Forms near I-76

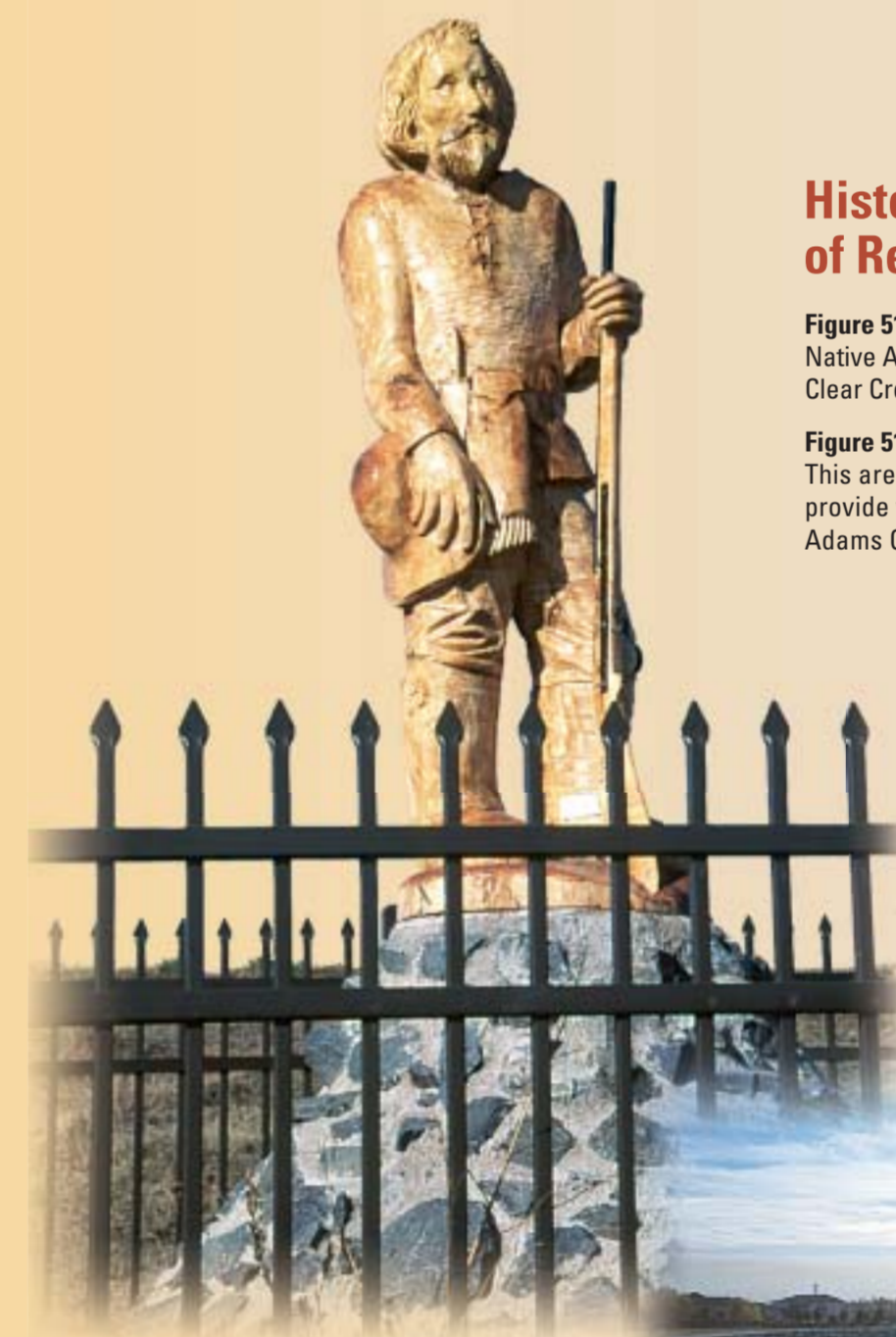
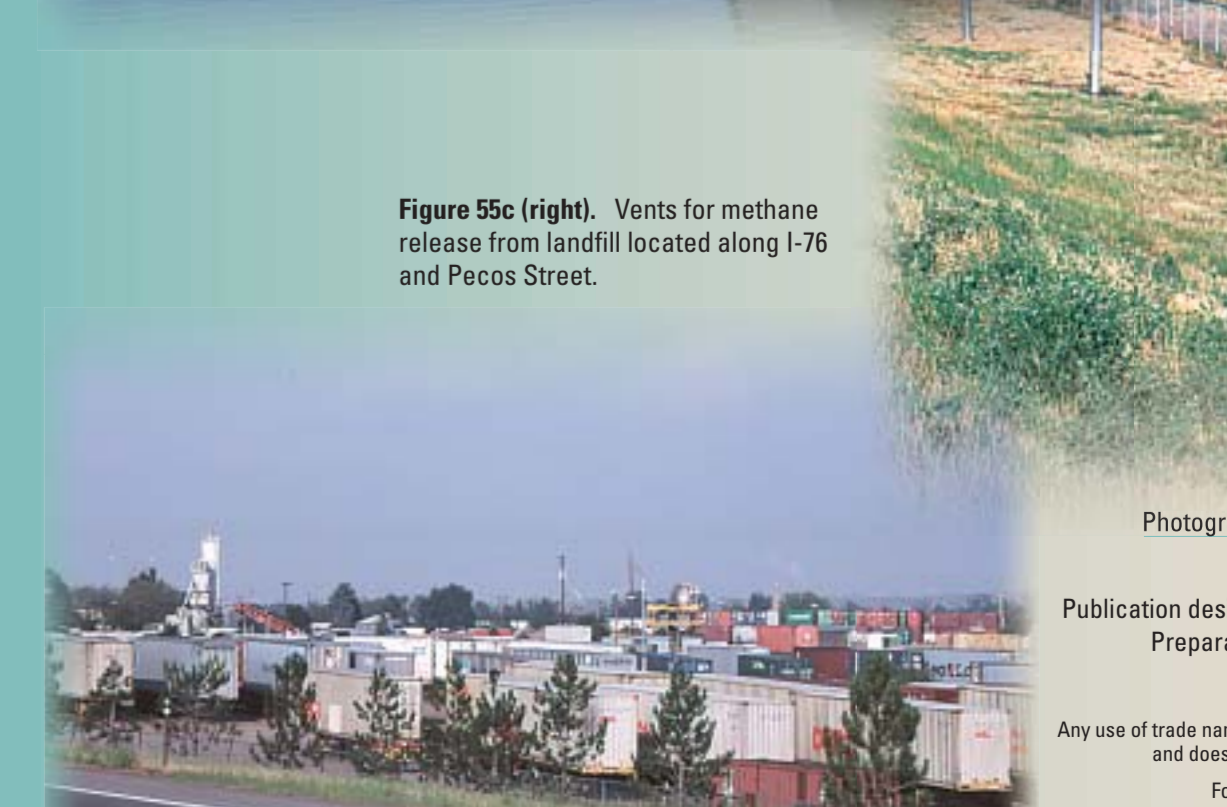


Figure 51a (left). Oblique aerial view of automobile and rail-trail transportation network and an aggregate recycling plant in 2000.

Figure 51b (below). Office buildings on landfill near to Gordon Lake.

Figure 51c (right). Vents for methane release from landfill located along I-76 and Pecos Street.

Figure 52 (right). Streetside view of Alpha Beach from Lowell Boulevard, looking east.

Figure 53 (below). Looking west along Clear Creek and Lowell Pecos State Wildlife Area. This area is just south of site 5 and Interstate 76, and immediately north of Clear Creek. Riparian shrubs stabilize the stream bank, create shade, and provide leaf litter (a food source for fish).

Figure 49a (right). IMI Motorsports Lagoon, east of Sheridan Boulevard. A concrete processing facility appears to be compatible with the water sports facility. Light industry and recreation followed the conversion of agricultural land to sand and gravel mining.

Figure 49b (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49c (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49d (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49e (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49f (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49g (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49h (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49i (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49j (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49k (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49l (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49m (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

## Historical and Functional Aspects of Reclamation

Figure 51a (left). Oblique aerial view of automobile and rail-trail transportation network and an aggregate recycling plant in 2000.

Figure 51b (below). Office buildings on landfill near to Gordon Lake.

Figure 51c (right). Vents for methane release from landfill located along I-76 and Pecos Street.

Figure 52 (right). Streetside view of Alpha Beach from Lowell Boulevard, looking east.

Figure 53 (below). Looking west along Clear Creek and Lowell Pecos State Wildlife Area. This area is just south of site 5 and Interstate 76, and immediately north of Clear Creek. Riparian shrubs stabilize the stream bank, create shade, and provide leaf litter (a food source for fish).

Figure 49a (right). IMI Motorsports Lagoon, east of Sheridan Boulevard. A concrete processing facility appears to be compatible with the water sports facility. Light industry and recreation followed the conversion of agricultural land to sand and gravel mining.

Figure 49b (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49c (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49d (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49e (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49f (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49g (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49h (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49i (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49j (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49k (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49l (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49m (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49n (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49o (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49p (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49q (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49r (left). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.

Figure 49s (right). View of ponds from I-76 between Tavinsay Street and Lowell Boulevard, showing evidence of dredging. Birds congregate in the area for spring nesting.