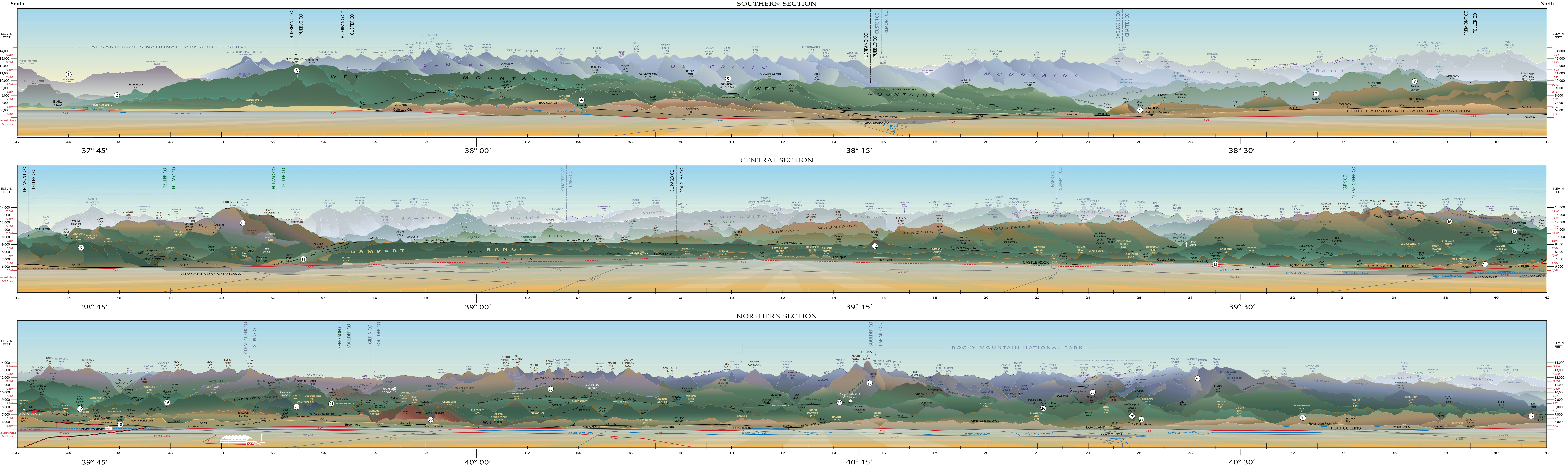


# COLORADO ROCKY MOUNTAIN FRONT PROFILES

By Larry M. Scott  
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## EXPLANATION:

The *Colorado Rocky Mountain Front Profiles* are elevation profiles of the mountains from the Continental Divide (where visible) eastward toward the High Plains. Each mesa, hill, ridge, mountain top, and points between were plotted by intersecting its elevation with its position in latitude<sup>1</sup>. The profiles are shown in three equal sections from south to north.

Each profile is a one-degree section starting in the black at 37° 42', the central section at 38° 42', and the northern section at 39° 42'. As the south-north extent of Colorado lies between 37° and 41° latitude, these profiles represent 75% of the Colorado Rocky Mountain "Front Range". The Front Range generally refers to all the mountains that descend to the plains from the Pikes Peak massif in the south, north to the Wyoming border and inclusive of all summits west to the Continental Divide. South of Pikes Peak, the mountains begin to descend in a southeasterly direction all the way to Canon City where the Arkansas River cuts through the Royal Gorge and flows out onto the piedmont. South of Canon City, the Wet Mountains form a barrier that drops to the plains along Interstate-25 (I-25). Further south (not shown) the mountains lay further westward in a broad stretch, dramatically reappearing in the form of the Spanish Peaks, which extend eastward from the spine of the southernmost Sangre de Cristo Mountains in Colorado to the Culebra Range. To the north beyond Rocky Mountain National Park, the mountains descend steadily to the Cache la Poudre River, marking the terminus of the Northern Section.

The Sangre de Cristos on the Southern Section impede the view of the Continental Divide, which, after dropping down from the last of the great Sawatch Range peaks, lies further west and lower than the Sangres. Similarly, on the Northern Section, the Continental Divide retreats westward from Rocky Mountain National Park across the intersecting Never Summer Range just north of Mount Nimbus.

The vertical elevation scale starts from a baseline of 1,250 (red), only features east of the highway shown only for relative location purposes. An exception is the high ground of the Black Forest, Palmer Divide and buttes north to the Castle Rock area which obscure the highway. Dashed lines mark the location of hidden features such as I-25 (red) and the South Platte River (blue) as it emerges from the mountains south of Denver. Where visible, the Continental Divide is shown as a (purple) dashed line. A (black) dashed line indicates hidden topography where the South Platte River emerges. The circled numbers refer to explanations of the geographic and geologic features as follows:

## SOUTHERN SECTION:

### 1 GREAT SAND DUNES NATIONAL PARK AND PRESERVE

As the tallest dune deposits in North America this distinctive feature needs little introduction, especially since attaining National Park status in 2000. The dunes lie just behind the mountains shown in a natural pocket ringed by the Carbonate Mountain to the south and Mount Seven to the north. These are wind-blown deposits (loess) from northeast-trending winds blowing across the vast San Luis Valley and accumulating in an embayment at the base of the Sangre de Cristo Range (#5). An ongoing process, the sand began to accumulate during the Middle Pleistocene (~400,000 years ago). The process continues to this day, making them one of Colorado's youngest geologic features.

### 2 HUEFANO BUTTE/BADITO CONE

Remnants of Colorado's violent volcanic past, these neighboring landforms from the Late Oligocene (~25 million years ago) are the remains of volcanic plugs. Huefano Butte appears as a dark promontory on the open plains adjacent to the north-northwest lanes of I-25 and is easily accessible from either direction. Both features were important trail markers for early trappers and fortune-seekers heading into the mountains. There was once a busy hotel, saloon, and post office located on the Huefano River, just north of the butte.

### 3 GREENHORN MOUNTAIN/WET MOUNTAINS

The Wet Mountains block the view of the dramatic Sangre de Cristo Range from the plains. Ironically, the mountains are not that wet as most moisture is "rung out" by the higher Sangre de Cristo Range to the west. Greenhorn Mountain, named after the Comanche war chief Cuerno Verde (Green Horn), killed nearby by Spanish explorers, comprises the

## SOUTHERN SECTION (CONTINUED)

entire southern section of the Wet Mountains and is the high, dark mountain visible for miles when passing by on I-25. Some have said it was named for the *Greenhorn*—a somewhat derogatory term given to the fortune-seekers who headed west from eastern cities, with little knowledge of pioneer living. The magnificent Wet Mountain Valley lies between the two ranges and features one of Colorado's most scenic driving routes (CO-69).

### 4 BEULAH

Beulah is a small, rural community southwest of the city of Pueblo. It is known for being the quarry site of the unique red marble that covers the interior walls of the ground floor in the State Capitol building in Denver. Beulah sits on an alternate route into the mountains via CO-78, connecting with CO-165, an altogether quiet and scenic byway.

### 5 SANGRE DE CRISTO MOUNTAINS

As one of Colorado's most dramatic mountain ranges, the Sangre de Cristos rise along a prominent fault at the eastern margin of the Rio Grande Rift. The Rift is a major tectonic boundary that runs through the entire state of New Mexico, up along the eastern side of the San Luis Valley, and continues along the front of the Sawatch Range in the upper Arkansas River Valley. While the step-sided ranges are not visible from the I-25 corridor, they come into view abruptly after one passes through the Wet Mountains on CO-96 westbound from McKenzie Junction. They are Colorado's youngest mountains, rising 25-30 million years ago.

### 6 ROYAL GORGE/ARKANSAS RIVER

The Royal Gorge is the 1,000-foot-deep gorge cut into hard Precambrian (~1.7 billion years old) granite and gneiss as a result of the erosive action of the Arkansas River. This down-cutting began in the Pliocene ~3.5 million years ago, and continues today. During this same time period the Black Canyon of the Gunnison, Big Thompson (#28), Glenwood, Cache la Poudre (#32), and other Colorado canyons were formed. Erosion a few thousand years or so, the Arkansas produced one of today's most impressive gorges. The Gorge is itself not visible from anywhere on the plains along the Front Range because of its northwest-southeast orientation. The canyon is shown because it is a noteworthy feature.

### 7 GARDEN PARK/PHANTOM CANYON

Both of these features are located on gravel roads that head, in parallel, into the high country north of Canon City to the historic gold fields of Cripple Creek and Victor, an area known today as the Gold Belt. Garden Park is the site of many of Colorado's most important dinosaur track and fossil discoveries and is located six miles north of Canon City on the Shelf Road, which leads on to Cripple Creek. A large natural rock window may be seen along this route. Phantom Canyon features a dramatic twisting climb that passes in front of Cooper Mountain and below the rock towers of Nipple Mountain into Victor, one of Colorado's most authentic mining towns. This well-maintained road connects the northern and southern segments of CO-67.

## CENTRAL SECTION:

### 9 CHEYENNE MOUNTAIN

Cheyenne Mountain is the very prominent mountain southeast of Pikes Peak that is visible to anyone travelling north or south on I-25 as it protrudes onto the High Plains. It is one of the easternmost points in all of the Rocky Mountains, eclipsed only by Raton Mesa (Fishers Peak) at the New Mexico border. It is also the granite fortress of one of the world's most secure military intelligence installations, the North American Aerospace Defense Command, or NORAD. Built in the mid-1960s in response to Cold War threats, operations are now primarily based at Peterson Air Base in Colorado Springs. The east flank of the mountain is also home to Cheyenne Mountain State Park, which features 20 miles of hiking trails.

## CENTRAL SECTION (CONTINUED)

### 10 PIKES PEAK

Pikes Peak is undoubtedly Colorado's most famous landmark and is the high point of a one billion-year-old *batolith* (a very large igneous intrusion) of pink-colored granite that dominates the region. It extends approximately 80 miles north to south, and about 40 miles east to west. As the batolith slowly cooled and solidified into granite, it was later exposed by erosion while being uplifted during the *Laramide Orogeny* (the uplifting event responsible for much of today's Rocky Mountains), of 40 to 80 million years ago. Much of this solidified batolith remains hidden under the earth's surface.

### 11 GARDEN OF THE GODS

One of Colorado's most well-known geologic features, the Garden of the Gods consists of colorful sedimentary layers of sandstone, conglomerate, and limestone. These rocks were deposited horizontally but were bent and tilted vertically during the mountain building process that created Pikes Peak and most of the Front Range. The tallest of these hogbacks (outcrops of steeply dipping strata, commonly sedimentary) at Garden of the Gods is 320 feet high. The name originates from early surveyors who thought it was a fit place for "gods to assemble."

### 12 RAMPART RANGE/DEVILS HEAD

Devils Head is the rocky summit of the approximately 35-mile-long Rampart Range, a line of low mountains between the South Platte River at Waterton Canyon to the foot of Pikes Peak at Manitou Springs. Although the Rampart Range consists mostly of resistant Pikes Peak Granite, it is a post-Laramide erosion surface which accounts for its generally level top. The Rampart Range Road is a Civilian Conservation Corps constructed gravel road that runs along the top of the range for its entire 60-mile length and is accessible from either end but has few interesting roads in between. The road is within the same time period the Black Canyon of the Gunnison, Big Thompson (#28), Glenwood, Cache la Poudre (#32), and other Colorado canyons were formed. Erosion a few thousand years or so, the Arkansas produced one of today's most impressive gorges. The Gorge is itself not visible from anywhere on the plains along the Front Range because of its northwest-southeast orientation. The canyon is shown because it is a noteworthy feature.

### 13 WATERTON CANYON/SOUTH PLATTE RIVER

Waterton Canyon, as the lowest elevation point on the Central Section (the blue dashed line), is where the South Platte River leaves the mountains for the plains. The Canyon was the original gateway to the mountains in the 1870s when the Denver, South Park, and Pacific Railroad laid a track along it. This line was active until the Depression year of 1937 when the rails were pulled up and sold for scrap. The canyon's first six miles of roadbed is now a popular hiking, biking, and wildlife viewing recreation area. Strotia Springs Reservoir, completed in 1983, dams the canyon at this point. The first leg of the nearly 500-mile-long Colorado Trail also starts here.

### 14 HOGBACK RIDGE/DINOSAUR RIDGE/RED ROCKS

Hogback Ridge is the exposed, upturned edge of sedimentary rocks of the Denver Basin that were bent and thrust upward during the uplifting of the Front Range about 70 million years ago. The Denver Basin is a closed depression that consists of multiple layers of sedimentary deposits shed off the uplifted mountain blocks, interspersed with sediments of the Cretaceous Western Interior Seaway that once covered most of Colorado. The hard, resistant "basement rock" of Precambrian age lies some 7,000 feet below these sediment layers. The 300-million-year-old "red rocks" are granitic, intruded alluvial material derived from the ancestral Rocky Mountains that have resisted erosion, leaving them exposed directly against the 1.7-billion-year-old Precambrian rock of the Front Range. This is known as a geologic nonconformity and is highlighted by a hogback plaque in the north parking lot of the Red Rocks Amphitheater. Dinosaur Ridge, at the northern end of the ridge, became recognized as a world-famous fossil site when, in 1877, a massive trove of dinosaur bones was discovered. Later, in 1937, road excavation crews discovered significant dinosaur tracks.

### 15 SQUAW AND CHIEF MOUNTAINS

These two features appear as the same mountain on the skyline west of Denver and are easily recognized once identified. For most of the year, a large patch of snow occupying the northeast-facing slope of Squaw Mountain is visible from around the metro area. Chief Mountain is the higher point behind (west) on this ridge which is traversed by CO-103 over Squaw Pass. The panorama views from this high-altitude road are accessed from the Denver Metro area by exiting I-70 at El Rancho and heading south on CO-74 to CO-103 intersection at Bergen Park, or from the CO-103 exit in Idaho Springs.

### 16 MOUNT BLUE SKY (FORMERLY MOUNT EVANS) SCENIC BYWAY

Mount Blue Sky (14,256 ft) summit toll road is North America's highest paved road and offers dramatic views in all directions as it winds its way above timberline beyond Echo Lake. Conceived by Denver Mayor Robert Speer as part of his mountain parks plan, it was built between 1917 and 1927 and remains a very popular excursion today. Access is via CO-103 from Idaho Springs to Echo Lake or continue west on the high ridge from Squaw Pass to Echo Lake (#15).

## NORTHERN SECTION:

### 17 CLEAR CREEK CANYON

Long before there was an I-70 to access the high country there were only Native American foot trails along Clear Creek. In 1858, after trace amounts of gold were discovered in Cherry Creek south of Denver, gold seekers soon began looking in the mountains. Early in January 1859, George Jackson found gold at Jacksons Bar, where Chicago Cook joins Clear Creek in present-day Idaho Springs. The gold rush was on and the canyon became the gateway to the mining camps, most notably those in the Central City area via North Clear Creek. The Colorado Central Railroad (1871-1939) occupied the canyon in those days, later becoming the roadbed for US-6. The road was not completed in the canyon until 1952 due to political infighting and the time needed to complete six tunnels in the narrow spots. Rockfall remains a constant threat along the Canyon with a notably large event closing the road in the summer of 2005 for almost three months—the longest full-road closure in state history.

### 18 NORTH AND SOUTH TABLE MOUNTAINS

These two basaltic-capped mesas are more obvious reminders of Colorado's extensive volcanic past, much of which is not easily recognized by the casual observer. The columnar-jointed ramparts are the result of rapidly cooling lava that created a hard capped resistant to erosion. Nothing remains of the 64-million-year-old volcano except its intrusive roots near Ralston Buttes and Reservoir several miles to the north. South Table Mountain was the first place in the world where the Cretaceous-Tertiary (K/T) boundary was described—helping explain the extinction of the dinosaurs 65 million years ago.

### 19 GOLDEN GATE CANYON/DOUGLAS MOUNTAIN

This secondary canyon cut into the Front Range north of Golden accesses Golden Gate Canyon State Park. At the Panorama Point Scenic Overlook in the park, one can see a 100-mile expanse of the Continental Divide. Along the way, the main road—CO-46 in Gilpin County, County Road 70 in Jefferson County—passes beneath Douglas Mountain (9,653 ft). The southeast spur of Douglas Mountain is very prominent on the skyline when looking directly west from the steps of the Denver Museum of Nature and Science (DMNS) in City Park, or when travelling westbound on I-70 from the city.

### 20 COAL CREEK CANYON/WONDERVU

Coal Creek Canyon (CO-972) provides access to the mountains from Arvada and connects to the Peak to Peak Scenic Byway at a junction just south of Nederland. The road climbs steadily, passing under the dark and dramatic cliffs of Crescent Mountain and tops out at the aptly named Wondervu, another place to view a wide sweep of the Continental Divide.

## NORTHERN SECTION (CONTINUED)

### 21 EAST PORTAL/ROLLINS PASS

As the Denver and Rio Grande mainline tracks begin to ascend from the plains at Coal Creek Canyon, climbing westward towards the Continental Divide, they traverse northward around El Dorado Mountain and pass through a dozen or more rock tunnels. At Rollinsville, the tracks follow the valley road up to the East Portal of the Moffat Tunnel. Conceived by railroad pioneer David Moffat, the tunnel extends more than six miles under the Continental Divide. Finished in 1928 it served as a more economic rail route connecting Denver to Salt Lake City and the West Coast. The route initially climbed over Rollins Pass, but snowfall and maintenance issues made it impractical. Today, the existing 4x4 road is no longer passed because of a tunnel collapse near the Divide. The base of the Winter Park ski area lies at the west end of the tunnel and is the destination of a popular "Ski Train" from downtown Denver.

### 22 DAVIDSON MESA/THE FLATIRON

Davidson Mesa is the high point prominently situated on westbound US-36 immediately before descending into the Boulder Valley. A pullout overlook offers an expansive view of The Flatirons, the peaks of the Continental Divide, and Longs Peak to the north. The Flatirons are Pennsylvanian in age (about 300 million years ago), similar to the rock spires of Red Rocks Amphitheater (#14), Rollinsburg State Park, and Garden of the Gods (#11). "Flatirons" refers to the shape of these tilted beds looking like the bottom of a flat iron. The color is derived from iron oxide minerals in the sediment eroded from the Ancestral Rocky Mountains. The beds, originally flat-lying, were later tilted upwards when the Front Range rose during the Laramide Orogeny (40-80 million years ago), Colorado's signature mountain-building event that was responsible for much of the present-day scenery.

### 23 NIWOT RIDGE/ARAPAHOE MORAIN

Niwot Ridge is a very pronounced east-west trending ridge protruding out from the heart of the Indian Peaks and is locally visible from all directions east of the Continental Divide. The Arapaho Moraine forms an impressive ridge of boulders off its southeastern flank and is the result of glaciation during the end of the last ice age about 12,000 years ago. Above a string of lakes that sit behind the moraine is Arapaho Glacier, Colorado's largest remaining ice field and southernmost glacier in the Rocky Mountains. The glacier is also a critical water supply for the City of Boulder. Interestingly, today's remaining small glaciers are not remnants of glaciers from the last true ice age, but formed during the "Little Ice Age" (1200 and 1880 A.D.).

### 24 PEAK TO PEAK SCENIC HIGHWAY/CHAPEL ON THE ROCK

This secondary canyon cut into the Front Range north of Golden accesses Golden Gate Canyon State Park. At the Panorama Point Scenic Overlook in the park, one can see a 100-mile expanse of the Continental Divide. Along the way, the main road—CO-46 in Gilpin County, County Road 70 in Jefferson County—passes beneath Douglas Mountain (9,653 ft). The southeast spur of Douglas Mountain is very prominent on the skyline when looking directly west from the steps of the Denver Museum of Nature and Science (DMNS) in City Park, or when travelling westbound on I-70 from the city.

### 25 LONGS PEAK/CHASM LAKE

Though likely encountered earlier, the peak is named after one Major Stephen Long of an early government survey party. The prominent peak (14,255 ft) was noted during their approach from the plains in 1820. Because of its technical difficulty, it was not summited until well after the settling of Estes Park in 1859. The first recorded ascent was by William N. Byer, the founder of the Rocky Mountain News, as part of an expedition led by John Wesley Powell and his brother N. Beyer. Longs Peak is the resistant core of granite left over from a mass intrusion of molten material, a *batolith*, much like Mount Evans (#16) and Pikes Peak (#10). Longs Peak, Mount Evans, and Pikes Peak make up the three-sentinel "fourteens" visible from the plains. Longs Peak is also the farthest away from any other fourteen and is the only fourteen north of I-70. Chasm Lake, reached by a moderate hike from the Longs Peak trailhead, offers one of Colorado's most dramatic viewpoints as it sits directly below the sheer 2,000 foot east face of Longs Peak.

### 26 ESTES PARK

The valley, ringed by mountains, was used by Native Americans in the summer months who referred to the valley as the "circle". It was later settled by the family of Joel Estes in 1859. Though they did not stay long because of its harsh winters, word of its beauty spread and it was not long before the first mountain guides began to set up shop. The first serious promoter of the park and its eventual steward, Estes Park Mills, arrived in 1902. He is often cited as the father of Rocky Mountain National Park which was dedicated in 1915.

### 27 HORSESHOE PARK/TRAIL RIDGE ROAD

The wide, lush meadow of Horseshoe Park lies just beyond the Fall River entrance (US-34) of Rocky Mountain National Park. It provides a dramatic and scenic setting for visitors to witness the elk rutting season every fall. US-34 turns into Trail Ridge Road connecting Estes Park with Grand Lake via Trail Ridge and Fall River Passes at elevations near or above 12,000 feet for seven miles. The road overlooks most of the mountains in the park, and the very deep Forest Canyon below. The headwaters of the Big Thompson River are in this canyon (#28). The canyon and surrounding mountain forms are the result of heavy glaciation that reached a climax between 130,000 and 150,000 years ago on through the last great Ice Age that ended about 12,000 years ago.

### 28 BIG THOMPSON CANYON

The upper reaches of the Big Thompson River drain the heart of Rocky Mountain National Park via Forest Canyon before passing through Estes Park and cutting down through the northern Front Range on the way to the plains and the city of Loveland. This dramatic canyon was the scene of several catastrophic events including those of July 31, 1976, when a foot of rain fell in its upper reaches, causing the devastating Big Thompson Canyon flood. Hundreds of structures were destroyed and there were 144 fatalities. In September of 2013, Big Thompson and many surrounding canyons in Boulder and Larimer Counties again flooded catastrophically when up to 17 inches of rain fell over four days, destroying hundreds of structures, washing out roads, flooding farm land, and claiming eight lives.

### 29 DEVILS BACKBONE

This intriguing mile-long feature looks like an igneous dike but is actually composed of a vertical bed of sandstone exposed at the top of an *anticline* (an arch-like fold in rocks). It is not visible from the plains, but is hidden behind the first hogback west of Loveland on US-34.

### 30 MUMMY RANGE

The Mummy Range is comprised of all the other high peaks in the Rocky Mountain National Park not connected to Longs Peak or any other peaks along the spine of the Continental Divide. Most of these summits exceed 13,000 feet. Considered a sub-range of the Front Range, they are not associated with the other peaks despite their height, and are located in the more remote northern end of the Park. The range is said to look like a mummy in profile.

### 31 HORSETOOTH MOUNTAIN

This prominent Fort Collins landmark sits behind the reservoir of the same name that is contained between two hogbacks that lie parallel to the base of the mountains. Horsetooth Mountain has a popular hiking trail and provides excellent views of the higher mountains to the west.

### 32 CACHE LA POUDDRE CANYON

The Cache la Poudre River forms the northernmost major canyon cutting through the Colorado Front Range. Like the Big Thompson, Clear Creek Canyon, and the Royal Gorge, it was also incised within the last 1-5 million years. Each of these canyons developed as a result of a simultaneous uplift that accelerated the cutting action. The name "Cache la Poudre" translates loosely as "hide the powder" (italic) and refers to an incident in the 1820s when French trappers were forced to hide their gunpowder along the banks of the river.

Sources: Geologic time period and age-related information from *Messages in Stone, Colorado's Colorful Geology*, edited by Dr. Vince Matthews, available from the Colorado Geological Survey.

Elevations taken from National Geographic TOPOI software. Edited by Karen A. Berry, John C. Hopkins, John W. Keller, and Matthew L. Morgan.

<sup>1</sup>The horizon line (viewing elevation) is approximately the half-way point of the vertical scale (9,500 ft). The plains are shown with no vertical scale as they are typically higher than the elevation base which is I-25 (shown in red).

Each cross-section equals one degree of latitude (about 85.7 miles) between 37° 42', 38° 42', and 39° 42'. Each minute of latitude is about 1.43 miles. Vertical exaggeration is approximately 1:2.25.