History of U. S. Highway 40 over Berthoud Pass

The road we now call U. S. Highway 40 has always been known as an amazing road. One of the author's favorite quotes is taken from a ***Colorado Highways*** magazine dated January 19, ***1924***[1]. It reads:

> " A wave of her Fairy Godmother's wand brought jewels, clothes, footmen, horses and carriages to Cinderella, transformed her from an ordinary kitchen maiden to a much sought after, charming magnetic Court Lady.
> A similar transformation was performed when Berthoud Pass, formerly a mountain trail, was converted into a beautiful scenic highway in a remarkably short time. The wand in this instance was the will of the people, their money, the Bureau of Public Roads, United States Forest Service, the Highway Officials of the State of Colorado, and the brains of the engineering and contracting profession, plus steam shovels, horses, plows, scrapers, and honest sweat of those employed in the herculean task of presenting this unique and model highway to the world.
>
> As you ascend Berthoud Pass, winding its way through primeval forests, where but a few years ago the mountain lion stalked his prey, the eagle soared, and the bob cat went his way unmolested, you are brought face to face with the modern ingenuity of man. You behold a road that is a masterpiece of engineering skill, a lasting memorial to the brave hearts and staunch souls who had a part in its building.
>
> Traversing the transcontinental divide it carries you through a country rich in the mythical lore of the Indians, through scenes of the wild rush as the gold strikes were made – it brings back reminiscent thought of pioneer struggles, and hardships. It opens up a vista avenue of lodge pole pines, cavernous gorges, fascinating valleys, and panoramic views incorporating a number of our more important peaks whose hoary and lightning-scarred crowns are resting places for fleecy clouds."

[1] Monahan, George M. Colorado Highways January 19, 1924 "Berthoud Pass – A Trail Transformed"

Much of what was written in 1924 could also apply to the road today. The "brains of the engineering and contracting profession", plus the employees of what is now called the Colorado Department of Transportation or CDOT has continued to transform that same road into a highway recognized today for its amazing use of technology for the safety of the traveling public and the challenges of protecting a fragile mountain environment.

U. S. Highway 40 uses the footprint of the "new" auto road or the Midland Trail Auto Road whose construction started in 1920 and was completed in 1923. This road was built under a partnership agreement between the U. S. Forest Service and the then Colorado State Highway Department with a budget of $220,000. The previous road over the Pass was the Georgetown – Empire – Middle Park **Wagon Road**, with construction starting in 1860 and finally finished in 1875. The new auto road of 1920 shared little of the footprint of the wagon road over Berthoud Pass. (See "Where is the wagon road?" for more information about the wagon road.)

In the same Colorado Highway magazine article[1], dated January 19, 1924the author writes that the United States Forest Service, the Colorado State Highway Department and the county agencies reached an agreement in the fall of 1919 for an appropriation of $220,000 to build the road over Berthoud Pass. The agreement specified:

> "that this road should be sixteen feet in width, on straightaways with an increased width at curves, which at the time was government standard for mountain roads. The new construction work was to start at a point seven and a half miles from the town of Empire on the eastern side of the pass and extend toward the summit a distance of approximately six miles, or to a point nearly a mile from the summit. On the western slope the work was to commence a mile from the summit and extend four miles in a westerly direction… On the eastern side it connected up with the old road**, but on the western side it left a disconnected section of road a mile from any place where it could possibly be joined with the old road…**This, naturally, was undesirable, but at the time it was undoubtedly the best that could be done. The Forest Service had no more money and there was none in sight available for the work."

Again in the same article, it states that instead of the 9 miles of highway that was agreed on, Mr. J. W. Johnson, District Manager and Mr. C. E. Learned, Senior Highway Engineer, of the United States Bureau of Public Roads were able to build 16.6 miles of continuous road. They were able to build 7.6 miles more than expected and the road instead of 16 feet wide, except for one mile was a full 18 feet in width. All of this was completed with the original appropriation. Truly an amazing feat and road!

What is now U. S. Highway 40 has also been called *the Midland Trail Auto Road* as well as the *Victory Highway* or *the Nation's Memorial Road*. It is difficult to date when U. S. Highway 40 was called the Victory Highway. The road's name was to honor the soldiers who had fought and died during World War I or the Great War which ended on November 11, 1918. The named highway started in New York City, and continued to

[1] Monahan, George M. Colorado Highways January 19, 1924 "Berthoud Pass – A Trail Transformed"

Baltimore, Maryland; Columbus, Ohio; Indianapolis, Indiana, across the Midwest including St. Louis, Missouri; Hays, Kansas, Denver, Colorado (over Berthoud Pass), to Salt Lake City, Utah; Reno, Nevada and ending in San Francisco, California.

A letter in the *Colorado Highways* magazine dated April 1923 refers to the Victory Highway near Kremmling. The Mohawk Hobbs Grade and Surface Guide for the Victory Highway is dated 1926.

The 1926 Mohawk-Hobbs Grade and Surface Guide describes the conditions of the road and what to expect along the way. Included is the following information:

> BERTHOUD PASS SUMMIT; elevation 11,313 ft.; the highest pass on a trunk highway in the U. S. It almost reaches timber line, which is 12,500 ft.; ice freezes almost every morning; the pass is usually open from June 1st to Nov 1st. The road is remarkably wide and good and no grade exceeds 7%; most of the way it is only 4%; some cars go over on high gear. Berthoud Pass Inn serves meals, $1- $1.50, also lunch and refreshments. 4 furnished cabins being built, gas and oil sold and later they may have a mechanic; no phone at present.
>
> BERTHOUD FALLS STORE; gas, oil and telephone; may have mechanic; five furnished cabins $2.
>
> National Forest Camp, free (W.C.)
>
> GLEN ARBOR LODGE; a large and good resort hotel; running water in all rooms; American Plan $3.00 a day.
>
> EMPIRE, COLO.; pop 100; sustained by gold and silver mines nearby;
> No garage; one country hotel; light mechanical service at Empire Filling Sta.; camp.

In November 1925, the U. S. Secretary of Agriculture approved a national highway system. East-west routes carried even numbers and north-south routes were designated with odd numbers. The principal east-west routes had route numbers ending in zero. Records found at the Pioneer Village Museum in Hot Sulphur Springs, state that the highway was still called the Victory Highway in 1935 but by 1938, the road was called U. S. Highway 40.

In 1930, improvements were made to the road which included widening and paving the road. Stone culverts replaced metal culverts.

In 1931, Berthoud Pass was open year round.

The *Rocky Mountain News* for May 1, 1938 includes an article stating that there are 66,000 skiers in Colorado with 26,000 skiers using Berthoud Pass.

On July 4, 1938, a celebration and parade was held at the summit of Berthoud Pass to celebrate the completion of paving of U. S. Highway 40, the first paved east-west connection.

A 1955 USDA Forest Service map shows the following recreation sites on Berthoud Pass. Jim Creek campground (now removed), Midland campground (now a group campsite), Spruce Lodge campground (Robbers Roost), DAR picnic ground (now removed), 2nd Creek campground (now removed), Floral Park picnic ground (now removed), Big Bend picnic ground (improved by CDOT – 2005), Clear Creek picnic ground, and the Empire Guard Station (now removed). Lori Denton, Recreation/Wilderness Program Manager for the Clear Creek Ranger District of the Arapaho National Forest provided information that the Mizpah Campground was built in 1962.

In 1962, the west or Grand County side of Berthoud Pass was widened to three lanes.

In 1969, a Man landed on the Moon.

In 1973, the Eisenhower Tunnel was completed.

In 1987, a survey was conducted for the Berthoud Tunnel Project by archeologists. In 1991, a Feasibility Study Report was completed and presented on the Berthoud Tunnel Project by the Berthoud Tunnel Building Authority. (See MP 237-238)

In 1999, ***the Berthoud Pass Mountain Access Project*** began; this new project would keep the road over Berthoud Pass an amazing highway for the traveling public well into the 21st century. Locals from both sides of the Pass and the author remember the construction process well. The challenge for CDOT was to widen a narrow mountain road that was heavily used by locals, the summer tourist and the winter skier. The project was finished in 2006, but already the locals take the road for granted and visiting tourists zoom by unaware of the marvelous technology used to make their mountain experience much safer. The author decided that this project was also an important part of the history of Berthoud Pass and so descriptions of many of those features have been added to the sections of the auto tour where they are found. For this section, an overview of what is found is included.

The project's years of construction were from 1999 to 2006 and cost $60,000,000. The project started near the summit at mileage post 242.6 and finished at 252.1.

The author had met Brian Pinkerton, the CDOT West Program Engineer, during the 1999-2006 widening project on Berthoud Pass. He was asked to provide a quote about the Berthoud Pass Mountain Access Project. Below are his words.

> "In the mid-1990s CDOT was in the process of creating 28 "Strategic Corridors" statewide that would receive "off the top" funding from additional revenues coming to CDOT from the legislature. For many years, critical corridors in the state had

been under funded due to their very high cost, which would require siphoning off too many funds from other needs. The creation of the ‘7th pot’ of funding to fund these 28 corridors (normally construction funds had been divided up into the 6 CDOT regions, so this was a new special funding pot) put the process in motion to begin substantial work on these needed improvements. US 40 over Berthoud pass, on the "east" side of the divide, was selected as one of those strategic corridors. Along with the funding, though, came the pressure to put the money to use quickly, so that taxpayers could see their dollars at work.

“A highway widening project in such a sensitive environmental area necessitated CDOT to embark on an Environmental Assessment (EA), which is a federally mandated study to evaluate environmental and social impacts of a proposed action, in this case, widening of the highway. CDOT began the EA in 1996. Not long into the process, it became clear that there were two opposing pressures at work--1) the great need for safety and mobility improvements on the highway, especially with the growth on the other side of the divide in Winter Park, and 2) the tremendous concern over historical environmental damage to the mountain due to the highway, and concern over increased damage.

“CDOT worked hard to engage the many interested stakeholders in looking at proposed solutions. A breakthrough occurred when CDOT and corridor partners saw the potential to address several longstanding environmental problems, while at the same time widening and straightening the highway to improve safety and mobility. Perhaps most notable of those improvements was the strategic decision by CDOT to incorporate state of the art water quality features on the project. Historically, traction sand and erosion from the highway had caused untold damage to the surrounding forest, wetlands, and water quality. CDOT proposed an ultra-wide paved shoulder, calculated to hold most of the highway's plowed snow and traction sand, and a sophisticated system of inlets and detention ponds that would capture most of the erosion and traction sand. Further, CDOT would sculpt the slopes with retaining walls and vegetation to minimize future erosion.

“In addition to these impressive commitments, CDOT also addressed several other environmental concerns on the project--wetlands were reconstructed, several wildlife under crossings were put in place, and a major effort was put forth to improve the highway aesthetics. Because the highway goes through US Forest land, the USFS was instrumental in working with CDOT to reach consensus.

“The result was unanimous support from the highway community, the environmental community, and the local stakeholders, allowing the project to proceed. The project has won numerous local, national, and international awards for excellence.”

Brian Pinkerton

RTD/Fastracks Liaison
City and County of Denver

The Project Goals for the total project were many:

1. To increase the number of vehicles using the highway
2. To increase safety along the entire corridor
3. Develop a contained drainage system
4. Stabilize landslides and eliminate slope erosion
5. Provide snow storage areas adjacent to the highway shoulders
6. Improve water and wetland quality
7. Support wildlife migration routes

This Colorado Department of Transportation (CDOT) drawing shows how several goals could be met under one design. A single wall was used on the fill side. Behind the wall and under the new widened road, a special layering process of dirt and geotech material or mechanically stabilized earth provided a strong base. These single walls could be up to 40 feet high and provided an integral drainage rundown system. On the cut side, specially designed walls were installed. The walls provided slope stabilization, eliminating previous problems of land, rock and some of the snow slides. Landscaping was added between the tiers making them more attractive and stable. (Check out the area

between mileage posts 246 and 247, because this technology was used both for the fill and cut sides.)

Much thought was given to the design and appearance of the walls. The colors and texture of the walls were carefully planned to blend with the surrounding forest landscape. One of the lessons learned was from the appearance of the white efflorescence on the walls. "Efflorescence is a white chalky appearance that results when evaporation of salt-laden water deposits salt crystals on the wall surface. On the Berthoud Pass East retaining walls, efflorescence is primarily a result of calcium and carbon in the gravel *baggie* system behind the block facing." [1] The baggie system is a gravel drainage system. For future construction, a new method to attach the walls will be used which will eliminate the gravel, therefore reducing efflorescence in the block and on the walls.

At the time (October 2011) of this writing, repairs are being made to the walls along the section of the highway that CDOT has called Mud-slide. In the past, before the widening project, water draining off the mountain cause mudslides, thus the name. Additional information about the lessons learned and applied to these walls can be found in the MP 246-247.

The snow storage areas provided wide shoulders in summer months. The design of the three lanes allowed safer travel uphill as slower vehicles could be passed. Designated passing areas were also provided for those traveling down the mountain.

One of the most important objectives was to improve the water quality impacted by the highway's traction sand applied during the winter driving season. The CDOT snow plow drivers push snow into the snow storage areas adjacent to the highway, where it melts; leaving sand deposits that can be collected and removed. Snow is also blown up onto the upper tiers of the cut walls, where it melts and is carried into the sediment catch basins.

There are 15 sediment catch basins on Berthoud Pass. There are twelve on the Clear Creek side of the Pass and three on the Grand County side, including the "tub". (See MP 238-239) The purpose of the basins is to collect the 3 – 4,000 tons of traction sand that is used during the winter months and to prevent it from going into the various streams on the Pass. It is felt that 50 – 60% of the sand used is collected by the new drainage systems installed. More about the three designs used are explained in various sections of the Auto Tour.

One of the most important and challenging items to address for CDOT was protection of wetlands. Creative minds and designs found ways to impact already existing wetlands less. When a wetland is destroyed during the widening process, another is required by state and federal law to be constructed to replace it. Two were added, one at the summit of the Pass and one in Floral Park.

[1] Colorado Department of Transportation Environmental Programs Denver, Colorado
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Another important challenge was addressing ways to eliminate animal/vehicle conflicts and yet maintain natural animal migration paths.

According to the publication, *EnCompass: The AAA Companion*[1], from 1993 to 2002, there were 24, 678 animal-vehicle collisions reported on Colorado highways. Twenty-three persons were killed and 2, 233 persons were injured and 22,388 resulted in property damage. Among the animals killed in Colorado were 8,4000 deer, 1,612 elk, 95 antelope, 141 bears, 32 coyote, 6 lynx, 9 moose, 16 mountain lions, 1 badger and 2 beavers.

A report[2] published by *Ecology and Society* using 2007 data states that cost in dollars are:

Description	Deer	Elk	Moose
Vehicle repair cost per collision	2,622	4,550	5,600
Human injuries per collision	2,702	5,403	10,807
Towing, accident attendance, investigation	125	375	500
Hunting value animal per collision	116	397	387
Carcass removal	50	75	100

On Berthoud Pass, CDOT has provided three differently designed animal underpasses. The largest and most used is a 12" x 24feet steel arch. The smallest one is only 4' x 5' and designed for small animals but especially lynx. The medium size one is 8' x 10' and has a skylight in it. In talking with the designer, CDOT found out because this one has a slight bend, it is not used as much as the other two. New underpasses are designed straight, so the animal can see through to the other side. The underpasses are monitored twice a year and some of the tracks that have been seen are bear, mountain lion, raccoon, bobcat, deer, elk, bighorn sheep, skunk, and a variety of small mammals such as mice, coyote, rabbits and "even crows have left their tracks". CDOT has also provided the high deer fences along the highway for additional safety for the animals as well as the traveling public.

U. S. Highway 40 is now the CDOT responsibility of Tony DeVito, CDOT Region 1 Transportation Director. He writes the following about *the Berthoud Pass Mountain Access Project:*

> "This project, first and foremost, improved traffic safety and reduced congestion on a route used by more than two million vehicles each year. In addition, it was an honor to be recognized for being innovative and maintaining the highest standards for designing and constructing a project that preserved the natural environment, the route's historical characteristics and provided safe crossings for wildlife through their natural habitat."

[1] http://www.aaa.com/aaa/006/Encompass/2005/jan/jan_Insurance.html
[2] Ecology and Society 14(2):15
http://www.ecologyandsociety.org/voll4/iss2/art15/

Colorado State Patrol Trooper Heather Cobler, Public Information Office, has provided the following information about US Highway 40 between mileage post 258 and 231, or the area covered by the Auto Tour. In 2010, there were 76 crashes, but no deaths with 9 injuries. Also in 2010, there were 510 citations given by the CSP in the Auto Tour area. There were 449 citations given between mileage posts 231 and 243 which is on the Grand County side of the Pass and administered out of Craig, Colorado. There were 62 citations given between mileage posts 243 – 258 which is on the Clear Creek County side of the Pass and is administered out of Denver, Colorado.

A driver on the Pass can be ticketed by the Colorado State Patrol as well as the Sheriff Departments of Grand and Clear Creek County. The Colorado State Patrol officers have as their motto: "Courteous but firm". The officers carry a Smith & Weston M & P .40 as well as a shotgun. They also have the option to carry a rifle.

Cell coverage on the Clear Creek side of the Pass is not available after passing the Glen Arbor Ranch heading north. Sometimes there is limited cell coverage at the "landslide" switchback between mileage post 247 and 246. Cell coverage is available spottily on the Grand County side of the Pass.

Cell coverage for 911 is also spotty because of the mountain environment. A cell 911 call maybe picked up from other locations not on the Pass and transferred to the needed emergency agencies.