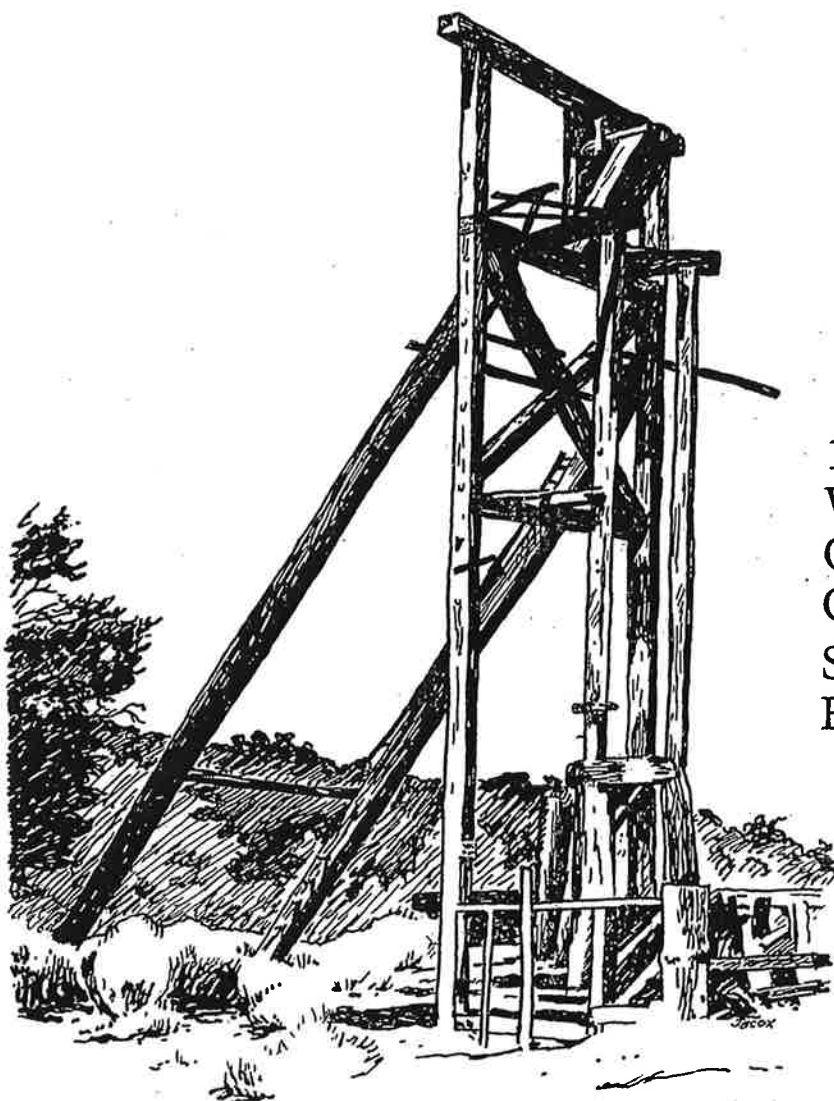


# MINING HISTORY AND PLACE NAMES OF THE COMSTOCK AREA

A Field Trip Guidebook

September 19, 1987



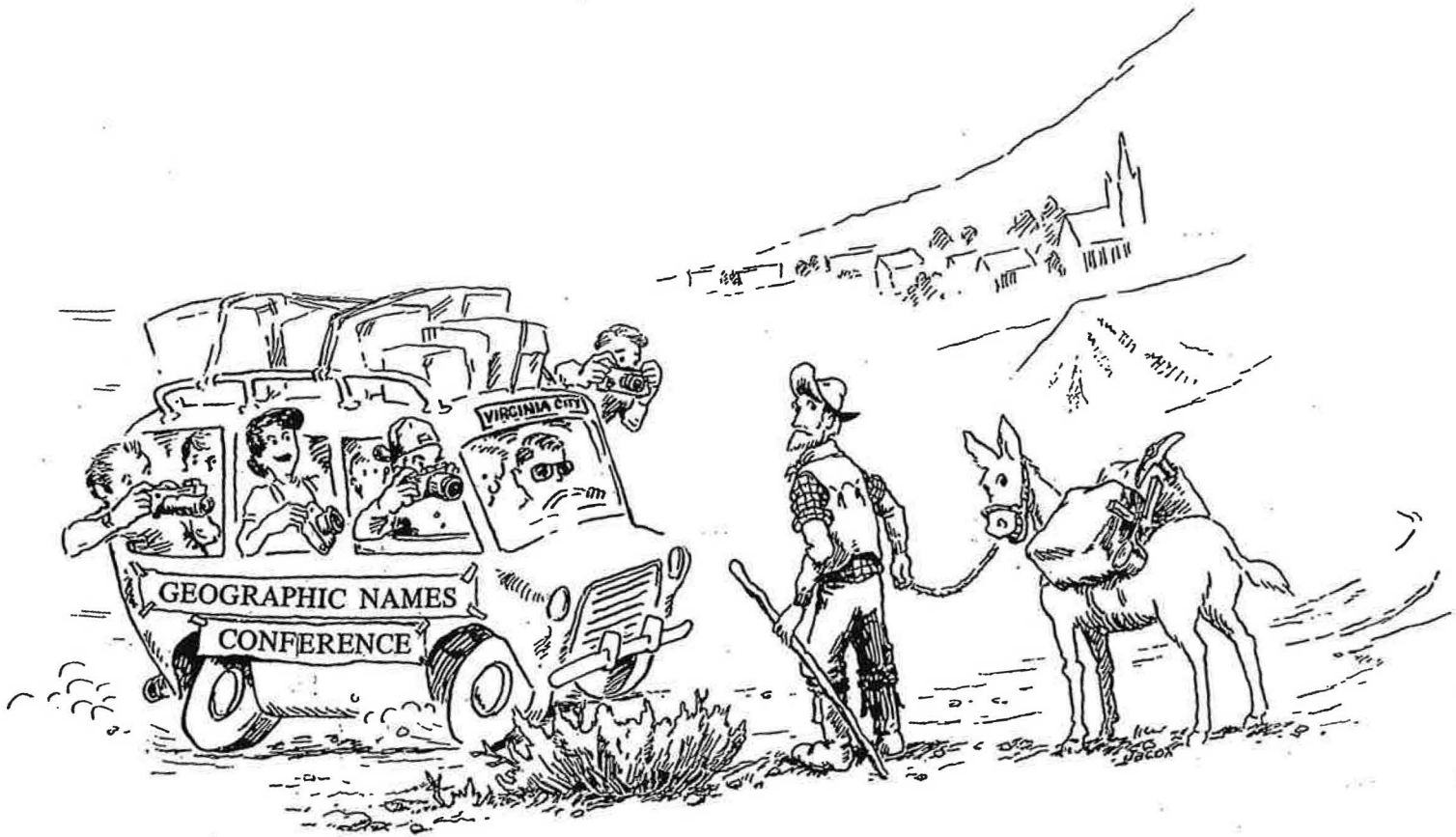
11th ANNUAL  
WESTERN STATES  
GEOGRAPHIC NAMES  
CONFERENCE

September 17-19, 1987  
Reno, Nevada

Open-file Report 87-6



Nevada Bureau of Mines & Geology  
Mackay School of Mines  
University of Nevada-Reno



# MINING HISTORY AND PLACE NAMES OF THE COMSTOCK AREA

## A Field Trip Guidebook

September 19, 1987

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*Field trip chairman:* Ron Hess, NBMG

*Assisted by:* Gene Faust, USGS, and Mike Tracy, NBMG

*Road log by:* Becky Weimer, NBMG

*Speakers:* Terrill Kramer, UNR, Geography Dept.

Joe Tingley, NBMG

Robert Nylan, Nevada State Museum

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### HELD IN CONJUNCTION WITH:

11th Annual Western States Geographic Names Conference,  
September 17-19, 1987, Reno, Nevada

### HOSTED BY:

Nevada Bureau of Mines and Geology, Mackay School of Mines,  
University of Nevada-Reno, Reno, Nevada 89557-0088

## FIELD TRIP STAFF

**Ronald H. Hess** is a Geologic Information Specialist for the Nevada Bureau of Mines and Geology. A native Nevadan, he has an avid interest in Nevada history and is a prospector at heart. Currently holds a B.S. in geography from the University of Nevada-Reno.

**Eugene Faust** has been State Resident Cartographer for the U.S. Geological Survey since July 1980 and is sponsored by the Nevada Bureau of Mines and Geology. He has been the Executive Secretary for the Nevada State Board on Geographic Names since its formation by the 1985 session of the Nevada Legislature and signed into law by the Governor on May 7, 1985. He graduated from Central Washington State University with a B.S. in chemistry and a B.S. in mathematics.

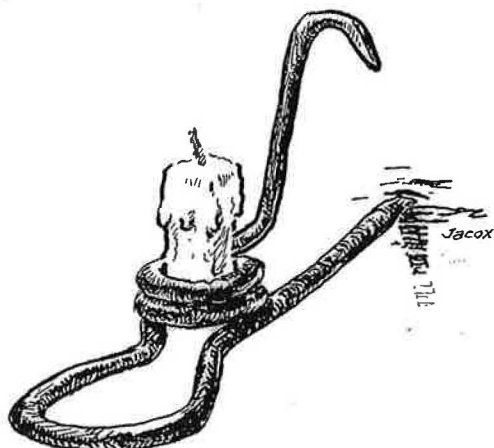
**Mike Tracy** is Associate Planner with the Tahoe Regional Planning Agency. He was formerly a cartographer with the Nevada Bureau of Mines and Geology and has a B.S. in geography from the University of Nevada-Reno.

**Becky Weimer** graduated from Indiana University with a B.A. in geology and has been a Geologic Information Specialist at the Nevada Bureau of Mines and Geology since 1974. She is currently working on a series of geologic and historical roadlogs for the Reno area.

**Terrill J. Kramer** has been Associate Professor of Geography at the University of Nevada-Reno since 1968. He is an author of the book "Geography of Nevada" (in press) and has published papers on agricultural resources, land-use, and suburbanization. He has M.A. and Ph.D. degrees in geography from the University of Illinois.

**Joe Tingley** is Economic Geologist with the Nevada Bureau of Mines and Geology. He has a vivid enthusiasm for mining history and holds an M.S. in mining engineering from the University of Nevada-Reno.

**Robert Nysten** is Acquisitions Registrar for the Nevada State Museum. He has been with the museum since 1984 and currently holds a master's degree in history from the University of Nevada-Reno.



*These individuals gave unselfishly of their time and talents to make this field trip a success. There is no way I can repay their efforts but they have my gratitude and my thanks.*

*Susan L. Tingley, Conference Chairman*



## INTRODUCTION

I would like to welcome everybody to the 11th Annual Western States Geographic Names Conference Field Trip entitled "Mining history and place names of the Comstock area".

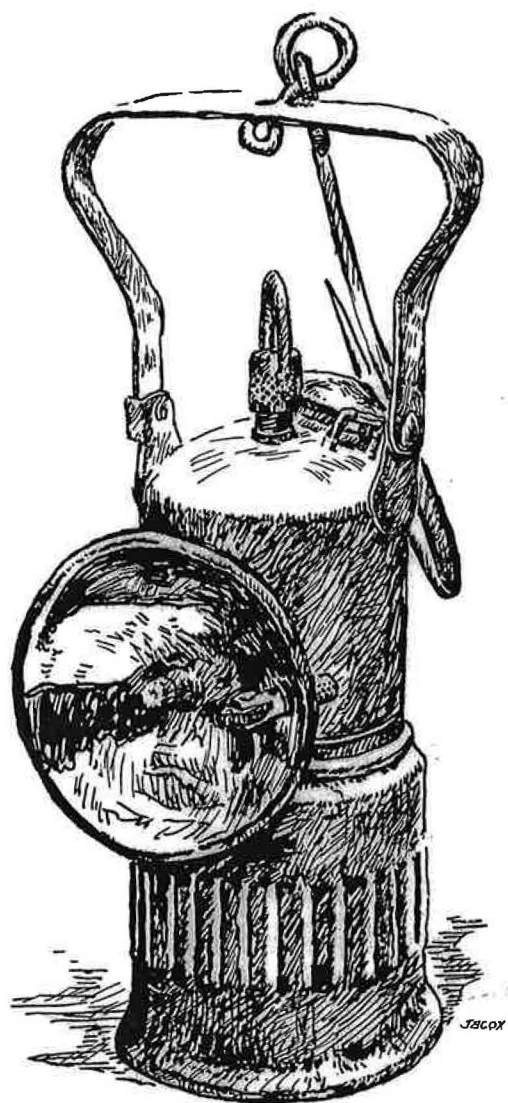
The Comstock and surrounding towns and valleys that we will travel through today are the areas where the majority of early Nevada history was created. On this field trip we will try to impart to you a feeling for the historical geography of the Comstock when it was discovered, its importance to the early development of the state, its slow decline, and finally the Comstock today. We will accomplish this with the aid of the historic and current maps, historic photo's, and detailed roadlog which are included in this field trip guidebook. There will also be presentations by several speakers at different points along the route. If at any time during the trip you have a comment or a question do not hesitate to ask, that's what we are here for.

The field trip staff and I would like to thank everyone attending the field trip and we hope that everybody finds it enjoyable.

Sincerely,

A handwritten signature in dark ink, reading "Ronald H. Hess". The script is cursive and fluid, with the first name "Ronald" being more prominent than the last name "Hess".

Ronald H. Hess



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## Mining History and Place-Names of the Comstock Area Field Trip Synopsis

Our trip will begin with a continental breakfast at the College Inn at 7:30 A.M. We will then leave and proceed south through the Truckee Meadows, up Geiger Grade, stopping at the lookout point where Professor Kramer of the Geography Department, University of Nevada-Reno, will speak on the geography and place-names of the surrounding area. From here we will proceed to the cemetery overlook of Virginia City to hear Joe Tingley, of the Nevada Bureau of Mines and Geology, give a historical summary of the Comstock Lode. Next stop will be downtown Virginia City where you can wander through the old shops, museums, and saloons for a while.

After returning to the bus, we will continue through historic Gold Hill and Silver City and then on to our lunch stop in Carson City, the state capitol of Nevada. A buffet lunch will be served at the Carson City Nugget where Bob Nylín, Acquisitions Registrar of the Nevada State Museum, will speak about the Nevada State Museum, past and present. After lunch there will be guided tours of the museum and its underground mine, or you may want to take in the old state capitol building or the million dollar gold display at the Carson Nugget.

After this we will load the bus one last time and proceed north through Washoe Valley, by historic Bowers Mansion, and then past Steamboat Springs, returning to Reno at approximately 3:00 P.M.

We hope that you have enjoyed this excursion into Nevada's past and present. The following is a list of publications for those interested in learning more about the history and geography of the surrounding area. These publications are available on the University of Nevada-Reno campus at the offices indicated.

1. The Comstock Guidebook by J.M Townley \$1.95  
NBMG publications office.
2. Virginia & Truckee by L. Beebe and C. Clegg \$3.95  
College Bookstore and State Museum.

- |    |  |         |
|----|--|---------|
| 3. | The History of the Comstock Lode 1850-1920<br>NBMG publications office.  | \$4.50  |
| 4. | Early Engineering Works Contributory to the<br>Comstock.<br>NBMG publications office.                          | \$3.00  |
| 5. | Storey County Place Names by M.B. Ansari<br>NBMG publications office and the Nevada<br>Historical Society.     | \$9.50  |
| 6. | Silent Cordilleras by A. McLane<br>NBMG publications office and the Nevada<br>Historical Society.              | \$6.50  |
| 7. | Nevada Place Names, A Geographical Dictionary<br>by Helen S. Carlson<br>College Bookstore and University Press | \$15.00 |
| 8. | History of Nevada, 2nd Edition by Russell R.<br>Elliott.<br>College Bookstore.                                 | \$13.95 |

# CARSON CITY-COMSTOCK-BOWERS MANSION HISTORIC LOOP TOUR \*

The Comstock. The four and one-half miles up Gold Canyon housed at one time a population of 35-40,000 persons. The entire area is redolent of the brawling, bawdy history of Nevada's turbulent past.

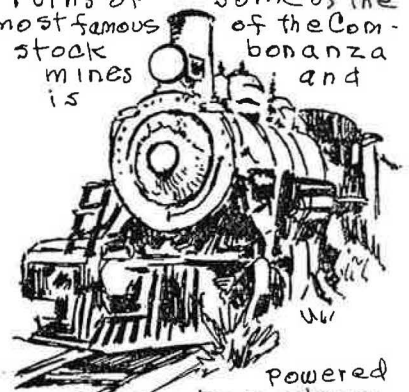


A "must" before embarking on your Virginia City trek is an orientation stop at the Visitor's Center across from the Delta Saloon Parking lot on the center of the main street. A continuous, well-narrated and illustrated film sets forth the points of interest. The Center is open from 9 to 7 p.m. summer-to 5 p.m. winter and provides you with a detail map. Donations are accepted.

Bowers Mansion. Elley Orum, born in the Scottish highlands, had 21 Mormon husbands prior to 1858, when she married Sandy Bowers, joining her 10 foot claim on the Comstock Lode to Sandy's adjoining 10 feet. Their holdings made them millionaires and they built a mansion in Washoe Valley, traveling all over Europe to furnish and complete it at a cost of \$407,000. Both had little knowledge of business and were the targets of roques and "slick operators" until, after Sandy's death in 1868, the demise of her beloved daughter, Persia, and the loss of her mine, mill, and home, poor Elley was dependent on her earnings as a "sestress" for her livelihood. The Mansion and grounds have become a County Park with swimming and picnic facilities. The building is open daily for guided tours from early May until October 31 from 11 to 1:30 to 4:30 for a small fee.

The Virginia & Truckee Railroad is by far the most noted of all American short lines. Completed in 1869, it ran up to 45 trains daily and, along with hauling millions of dollars in gold and silver ore from the mines, numbered among its passengers dignitaries from all over the world.

The V&T rolls again over a portion of its original right-of-way through the ruins of some of the most famous of the Comstock bonanza mines and is

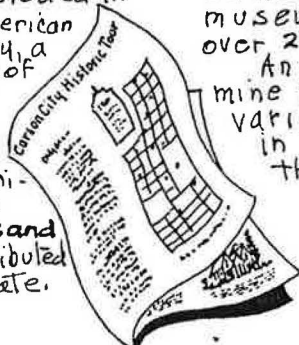


powered by a steam locomotive. The company runs 10-12 round trips daily from Memorial Day through early October.



## Carson City Historic Tour

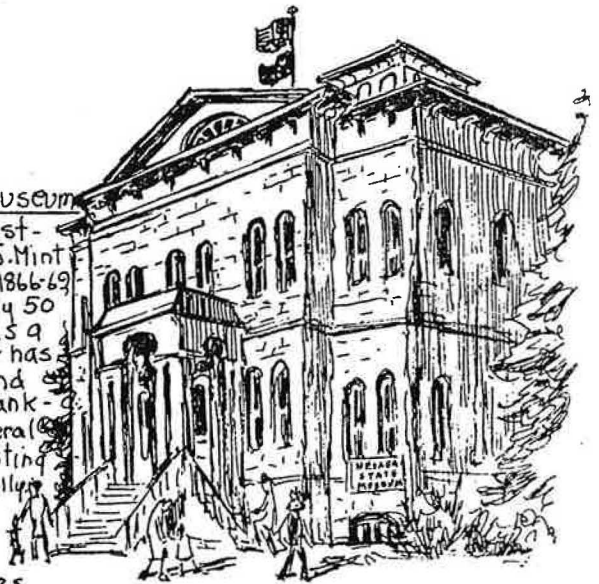
The Carson City Chamber of Commerce has published a free, self-guiding map of the city's most prominent historic district illustrated with drawings of 24 homes and three churches, many of which are included in the Historic American Building Survey, a joint venture of the Library of Congress and the American Institute of Architects. Several hundred thousand have been distributed to visitors to date.

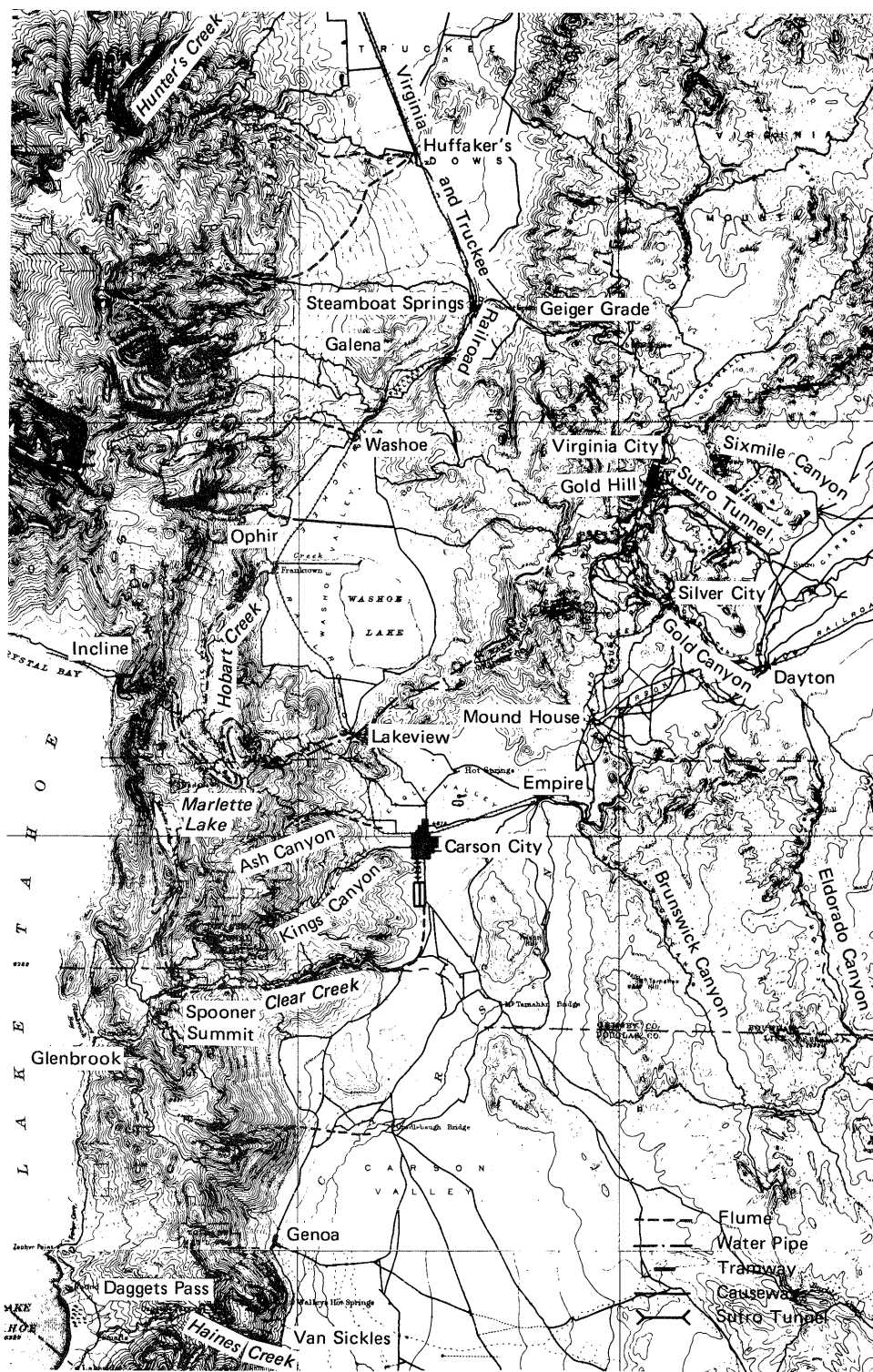


## The Nevada State Museum

is housed in the historically important U.S. Mint Building. Constructed in 1866-69, it had a coinage of nearly 50 million dollars. Opened as a State Museum in 1941, it has expanded its services and exhibits until it is now ranked as one of the best general museums in the West hosting over 250,000 visitors annually. An excellent replica mine illustrative of various operations in Nevada occupies the vaulted basement.

A "run-through" can be accomplished in 1 1/2 hours but the visitor could well spend the entire day. The hours are from 8:30 to 4:30 daily except for Christmas, New Year's & Thanksgiving.

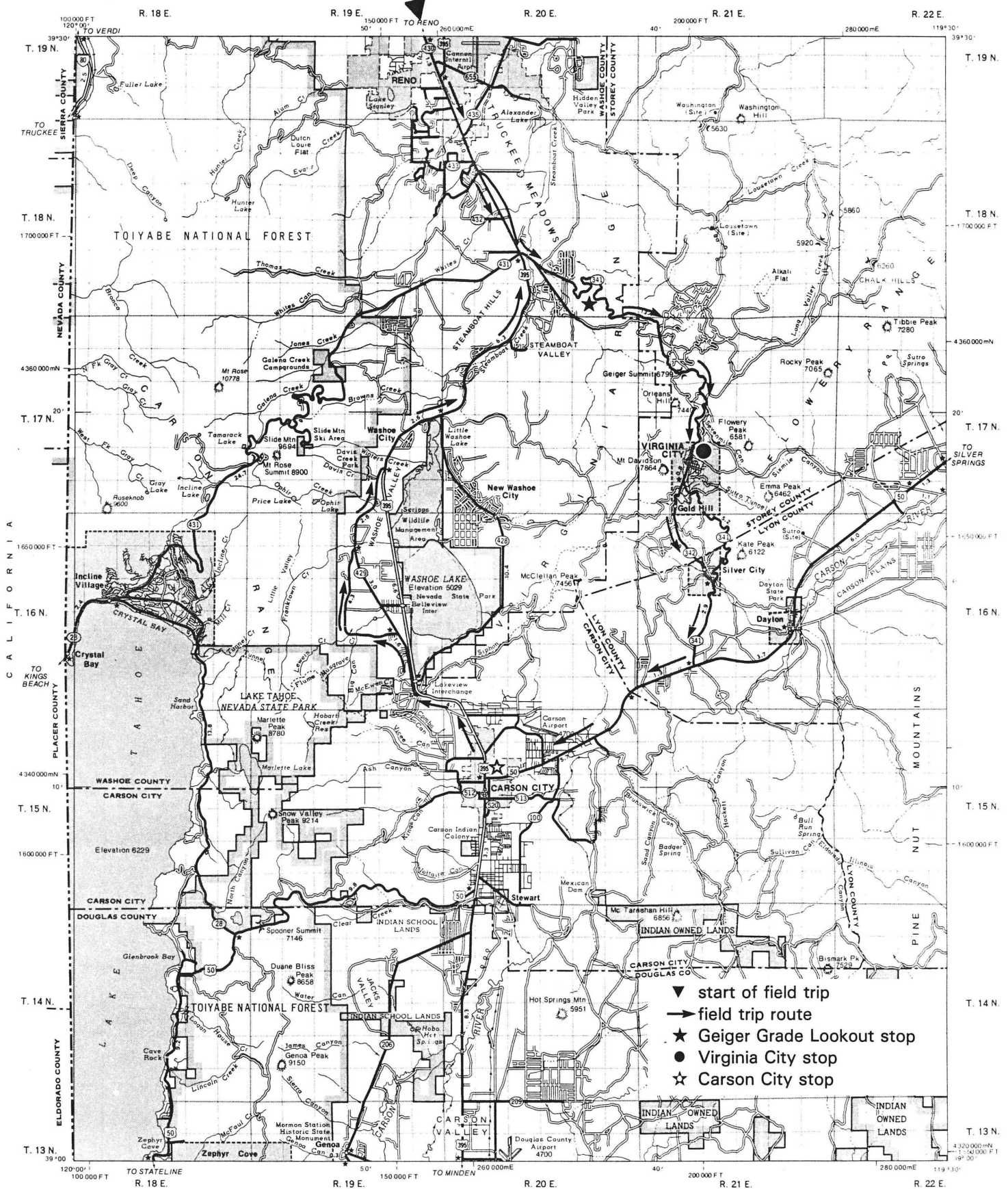




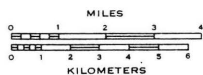
Major Flumes, Water Lines, and Other Engineering Features Contributory to the Comstock  
in the 1870's. (Revised 1978, Nevada Bureau of Mines and Geology. Base Map: 1893  
U. S. Geological Survey 30' Carson City and Markleeville Quadrangles.)



# FIELD TRIP GUIDE



Transverse Mercator Projection  
Mount Diablo Base and Meridian  
30,000 Foot Grid Based on Nevada  
Coordinate System West Zone  
20,000 Meter Universal Transverse  
Mercator Grid Zone 11  
Horizontal and Vertical Control Data on  
File at Carson City, Nevada  
Mileage Shown Between Stars  
Note:  
Dashed lines show the protrusion by the  
Bureau of Land Management of unsurveyed  
areas in the rectangular system of surveys

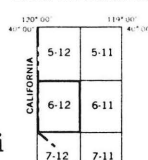


Copyright 1980  
Nevada Department of Transportation

## KEY TO ENLARGEMENTS



## LOCATION DIAGRAM



## QUADRANGLE LOCATION



## GENERAL HIGHWAY MAP

### QUADRANGLE 6-12

1980  
CARSON CITY, DOUGLAS, LYON,  
STOREY AND WASHOE COUNTIES

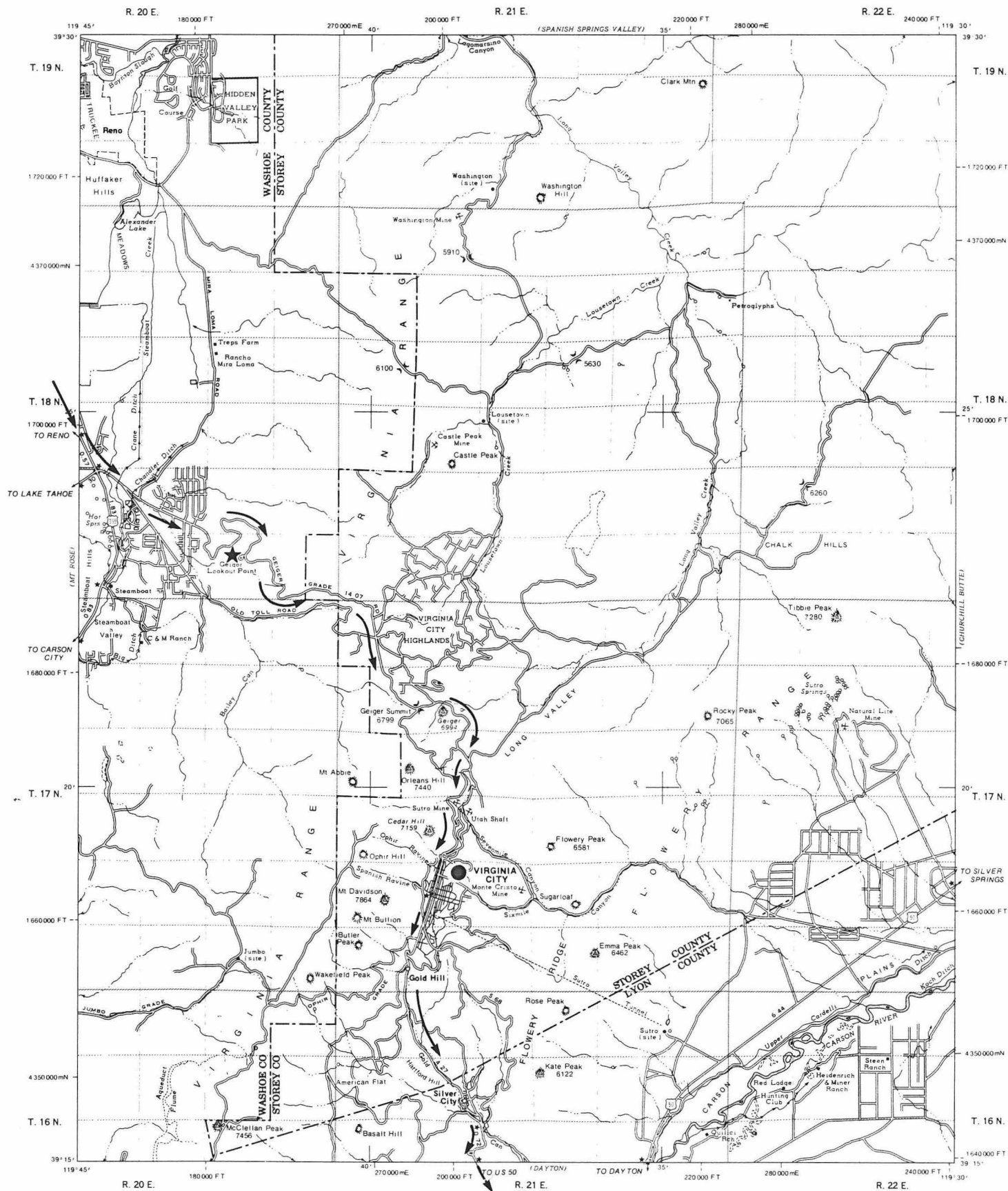
PREPARED BY

NEVADA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION

IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

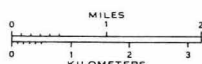
FOR SALE BY THE NEVADA DEPARTMENT OF TRANSPORTATION  
1263 SOUTH STEWART STREET, CARSON CITY, NEVADA 89712  
An index and price list of map coverage available upon request





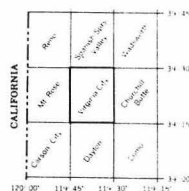
Transverse Mercator Projection  
Mount Diablo Base and Meridian  
20,000 Foot Grid Based on Nevada  
Coordinate System West Zone  
10,000 Meter Universal Transverse  
Mercator Grid Zone 11

- field trip route
- ★ Geiger Grade Lookout stop
- Virginia City stop



Copyright 1978  
State Highway Department

#### LOCATION DIAGRAM



#### GENERAL HIGHWAY MAP VIRGINIA CITY 1978

LYON, STOREY AND WASHOE COUNTIES  
PREPARED BY  
NEVADA STATE HIGHWAY DEPARTMENT  
PLANNING SURVEY DIVISION

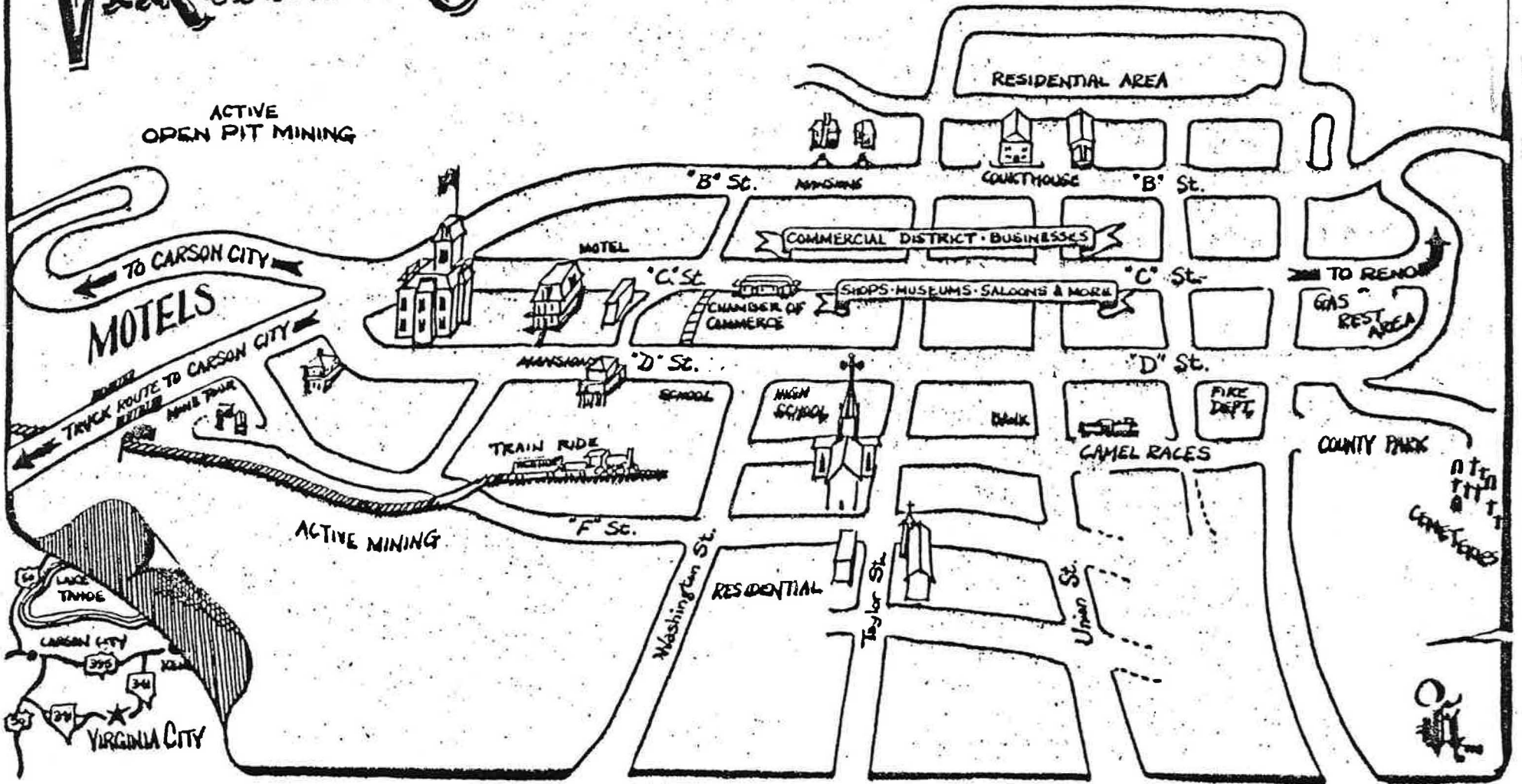
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

xiii

NEVADA'S HISTORIC BIRTHPLACE

# VIRGINIA CITY

ACTIVE  
OPEN PIT MINING

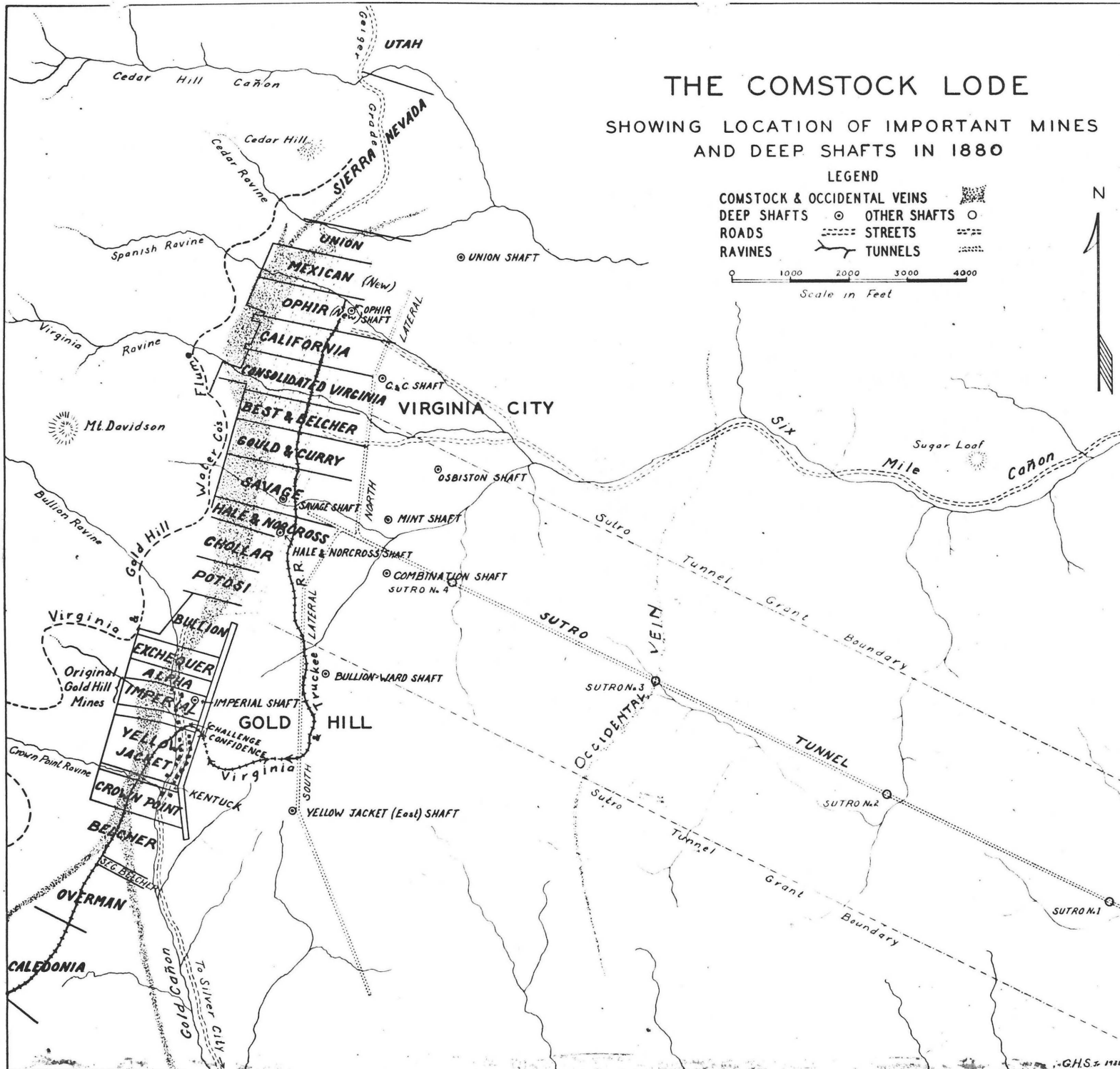


# THE COMSTOCK LODGE

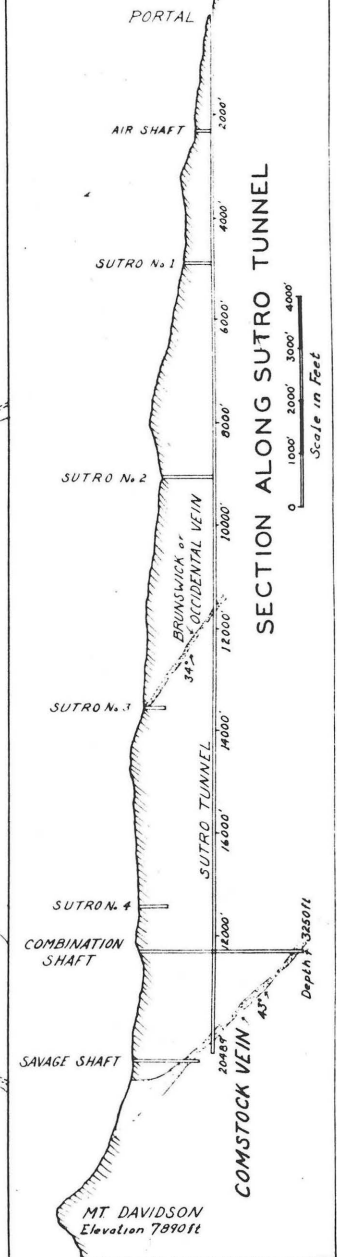
SHOWING LOCATION OF IMPORTANT MINES  
AND DEEP SHAFTS IN 1880

LEGEND  
COMSTOCK & OCCIDENTAL VEINS  
DEEP SHAFTS ○ OTHER SHAFTS ○  
ROADS ——— STREETS ———  
RAVINES ——— TUNNELS ———

Scale in Feet  
0 1000 2000 3000 4000



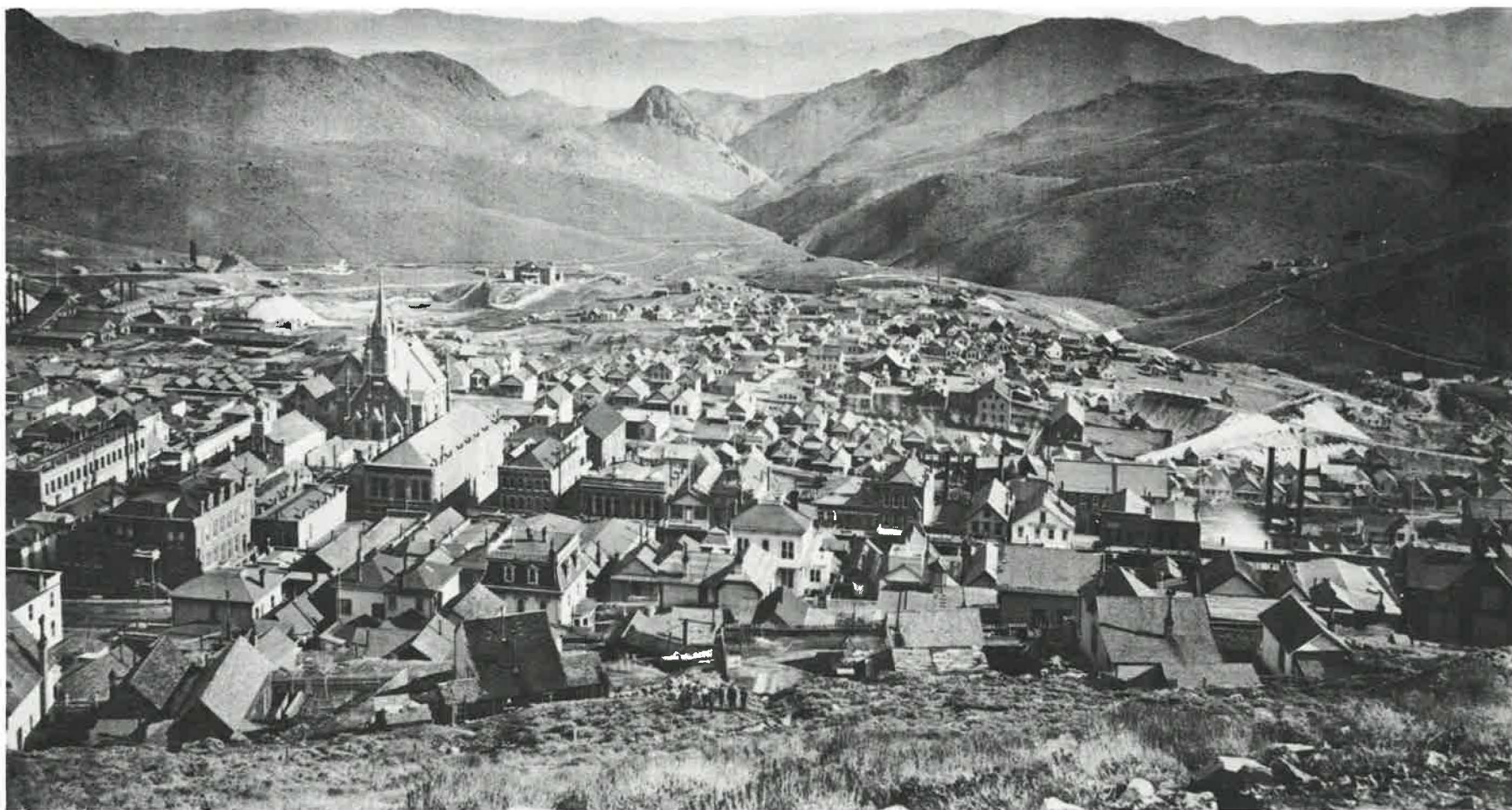
## SECTION ALONG SUTRO TUNNEL



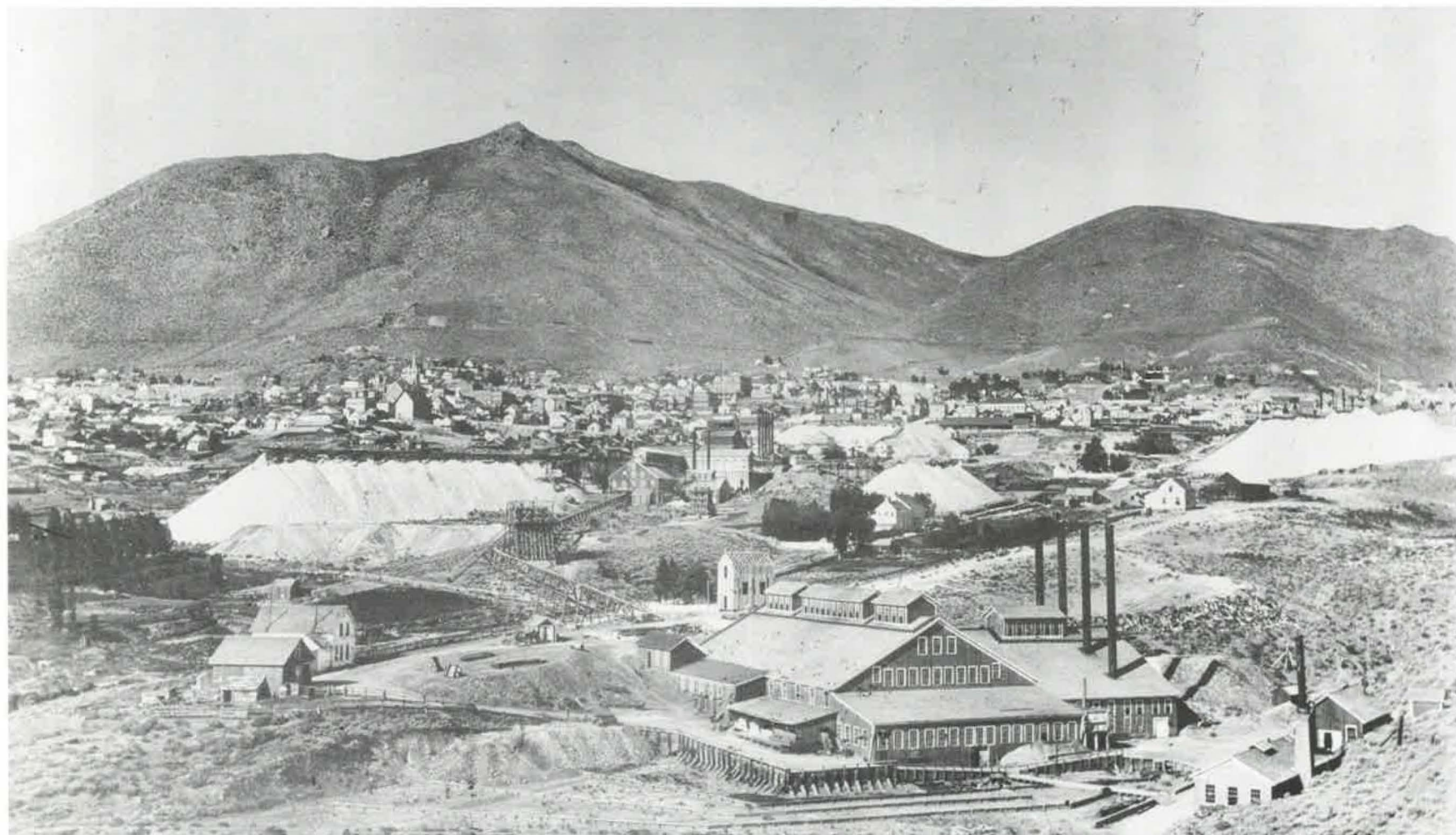


The California Company's stage standing in front of the International Hotel in 1865. Those stages used the Henness Pass route to California, while the Pioneer Company's stages traveled the Placerville route.



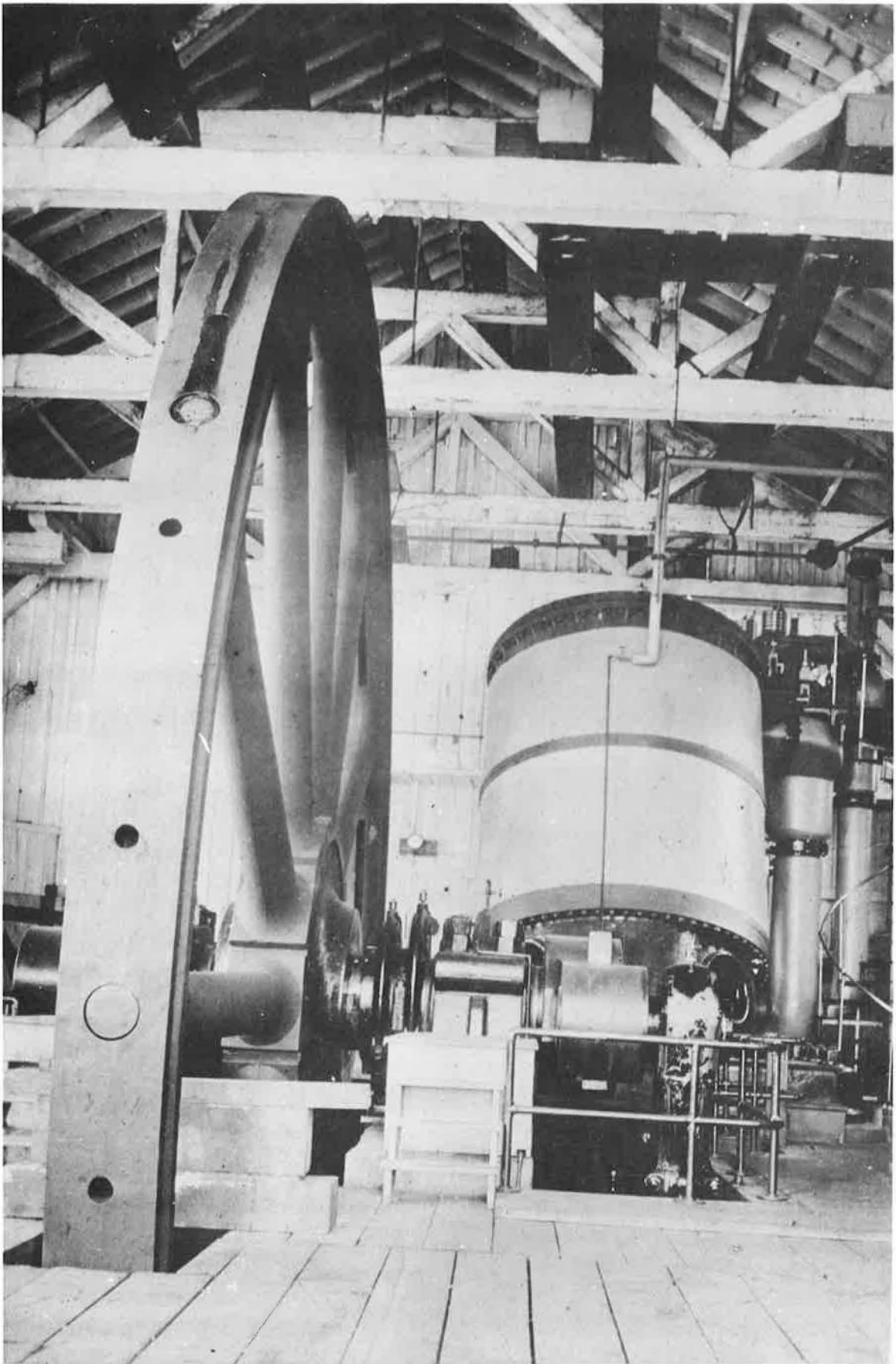


The central part of Virginia City in 1878 from the water flume, looking eastward and down Six Mile Canyon (Sugarloaf Peak can be seen at the mouth of the canyon). The rebuilt Catholic Church marks the southern limit of the great fire of October 26, 1875. The tall brick Odd Fellows Building which stands southwest of the Church was not burned. The Gould & Curry hoist and large white dump are at the right. The large building in the middle distance is the Sisters' Hospital. The C & C hoisting works are at the lower left with the top of the pan mill showing below.



Virginia City looking westward toward Mt. Davidson. The California pan mill is in the foreground; the crushing plant of 80 stamps is beyond the pan mill, just below the C & C hoisting works. Crushed ore was flumed to the mill.





Cornish pump engine and fly wheel, Union Shaft, 1880. The fly wheel weighed 110 tons. The pump rod in this shaft was 2,500 feet long; it could pump two million gallons of water every 24 hours.



Upper Gold Hill in 1875, looking toward the Divide. The Yellow Jacket hoisting works are at the lower right; the Imperial-Empire hoisting works at the top center. The long white dump of the Little Gold Hill group of mines shows at the upper left, beyond which lay the Bullion Mine. The track of the V & T Railroad shows at the lower left. The hill in the background was known as Fort Homestead.



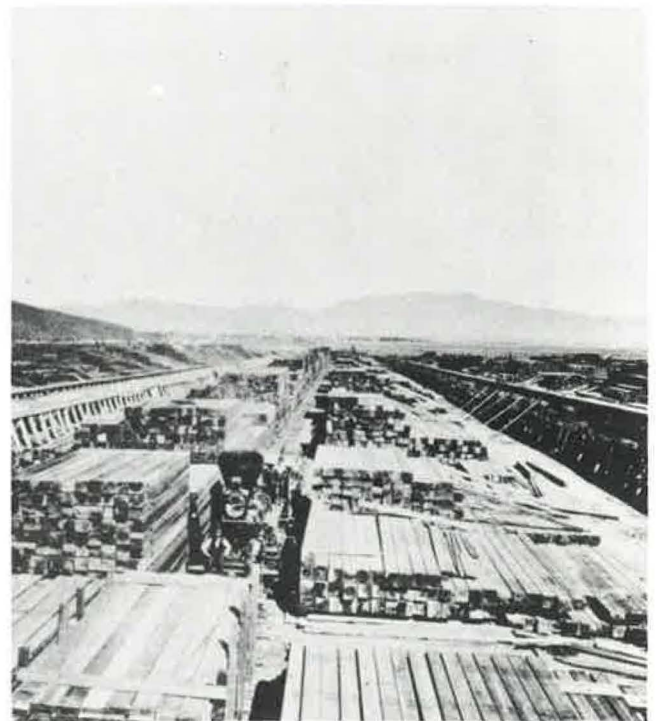


Ox teams in the woods.

Hauling logs to the mills.



Load of lumber cresting Spooner Summit, between Lake Tahoe and Carson City.



Lumber yard at the east end of the Clear Creek flume, one mile south of Carson City.

Logging in the Lake Tahoe area, source of timbers for the Comstock mines.

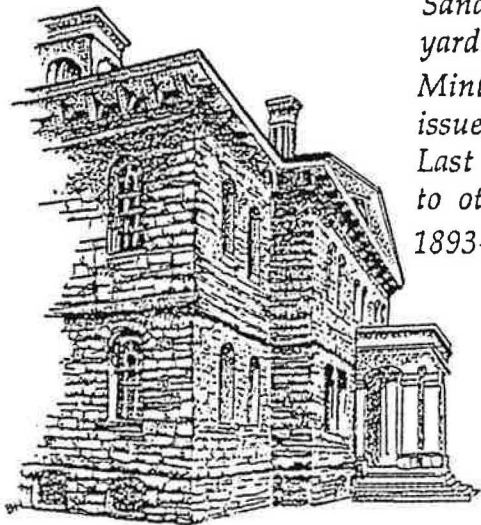
# NEVADA STATE MUSEUM

*CARSON CITY: Founded in 1858 by Abe Curry and William Ormsby.*

*NEVADA: Admitted to the Union October 31, 1864. Thirty-sixth state.*

*COIN PRESS: Weight 12,000 pounds. After use in Carson City it was loaned to Denver and then San Francisco. At one point it was headed for the scrap heap. It was purchased for \$225 and overhauled in 1975 at a cost of \$40,000 in San Francisco.*

*CARSON CITY MINT: Construction started and cornerstone laid in 1866. Total cost: \$427,000. Sandstone blocks used in construction quarried from penitentiary yard. First coin press arrived in 1869. Weight: 16 tons. Mint opened January 6, 1870. Operated for 24 years. Minted 57 issues of gold, 53 issues of silver. Mint closed for 4 years in 1885. Last coins were minted in 1893. Machinery dismantled and sent to other mints upon permanent closure in 1893. 1893-1933: Building served as an assay office. 1936: Building put up for sale.*



*Judge Clark J. Guild saw possibility of converting mint building to a museum. Contacted Senator Pat McCarran who initiated a bill in Washington permitting the State of Nevada to buy the building. In 1939, the Nevada Legislature appropriated \$5,000 for the purchase.*

*MUSEUM OPENED: Nevada Day, October 31, 1941*

*GUILD HALL OPENED: October 31, 1959*

*CALHOUN ANNEX OPENED: October 31, 1971*

*TRADE DOLLARS: First coined July 22, 1873. Minted 4,500. First mint on West Coast to make them. Minted to keep American traders in Orient from paying an extra price for Mexican dollars, the medium used in trading circles. Last year for trade dollars: 1887.*

*MUSEUM LOBBY: Eleven coats of paint removed from woodwork. Underneath: pine and redwood on wainscoat.*

*PAINTINGS IN LOBBY: Abe Lincoln and Abe Curry were painted by Walter Long. Mr. Long was one of the museum's Curator of Exhibits.*

*CAPITOL BUILDING: Built in 1870. MINE OPENED: October 31, 1950.*

## RENO - VIRGINIA CITY - CARSON CITY - WASHOE VALLEY - STEAMBOAT ROADLOG

by Becky Weimer

mileage/cumulative

0.0/0.0      Begin the trip at the site of the Reno arch on Virginia Street and Commercial Row (just south of the railroad tracks). CONTINUE SOUTH ON VIRGINIA STREET (U.S. HIGHWAY 395). You are now passing through Reno's main gambling area.

### RENO ARCH

Reno's first arch was built across Virginia Street in October 1926, and read "Reno Transcontinental Highway Exposition, June 25 to August 1" to signify the completion of U.S. Highway 40. After the exposition, a public contest was initiated by the mayor and the city council to find a permanent slogan for Reno. Finally, in March 1929, a new slogan was hung on the arch which said "Reno--The Biggest Little City In The World". In 1934, the slogan was considered too "small townish" and the slogan was reduced to a green neon "Reno" for the next year and a half, after which time the entire slogan was restored. A new arch structure, bearing the same slogan, was dedicated on New Year's eve, 1963. The arch was removed during the 1986-87 downtown renovation project, and a new arch was erected in July 1987. The 1926 arch now stands in Paradise Park.

0.2/0.2      Crossing the Truckee River, named for Chief Truckee of the Paiute Nation; "Truckee" means "all right" or "very well". The Truckee River drains the Lake Tahoe basin and other valleys to the north of the lake. It flows north out of Lake Tahoe, then east through Reno, and takes a final bend north at Wadsworth to end in Pyramid Lake--a total distance of about 100 miles.

### RENO AREA HISTORY

The Emigrant Trail to California followed the Truckee River canyon westward from Wadsworth to the Reno-Sparks area. At the mouth of the canyon, on the eastern border of the Truckee Meadows, the trail turned south hugging the foothills of the Virginia Range and continued on to the springs at the north end of Rattlesnake Mountain. This route avoided vast marshlands that existed in the eastern part of the valley at that time. The marshlands were caused by the Truckee River backing up at the entrance to the canyon. (The Army Corps of Engineers has since alleviated this ponding of the river by deepening the river channel at the canyon mouth.) From Rattlesnake Mountain, trails branched to the north and south across the western half of the Truckee Meadows to the Sierra

Nevada. The weary travelers rested, and let their stock graze in the lush meadows before pushing onward.

Jamison's Station was the first trading post in the area. It was established in 1852 near the mouth of the Truckee River canyon (just east of the present sewage plant) and along the emigrant trail between the foothills and the marshlands.

In 1859, C. W. Fuller established a toll ferry, and in 1860 built a toll bridge, across the Truckee River. The toll bridge washed out in 1862. A year later, Fuller sold his bridge site to Myron C. Lake who rebuilt the bridge. The site then became known as Lake's Crossing (located at the present Lake Street bridge in downtown Reno). Lake allowed local users to cross his bridge at no cost, but fees from other users helped him become a very wealthy, though fairly unpopular, man. He maintained toll roads, hotels, a tavern and a store to accommodate the travelers and freight, much of which was destined for the Comstock.

As the Central Pacific (now Southern Pacific) Railroad advanced its line eastward over the Sierra Nevada, plans were made to establish a town at the site of Lake's Crossing and Lake deeded 40 acres to the railroad company for a townsite. The first train arrived on June 18, 1868.

At first, the new town was unofficially called "End of the Track". "Argenta" was then proposed by someone from the Central Pacific Railroad; however, in those times of post-Civil War patriotism, it was customary to name places after war heroes. Finally, an official of the railroad named the town after Major General Jesse Lee Reno (the family name was originally spelled "Renault"). He was a West Point graduate and Union officer who was killed in battle at South Mountain, Maryland in 1862.

The Virginia and Truckee Railroad (referred to as the V&T Railroad in the remainder of this roadlog) linked Reno to Virginia City in 1872, boosting Reno's prosperity as a railway distribution and trading point.

In 1900, Reno became popular for another reason. Famous people began to visit to take advantage of Nevada's 6-month divorce law.

Gambling was first licensed in Nevada in 1879. From 1910 to 1930, gambling was periodically outlawed and legalized until it was most recently legalized again in 1931. (For more detailed accounts of Reno's history and the men who helped make it, read The Compleat Nevada Traveler by D. W. Toll, 1985, Gold Hill Publishing Company, Inc., Gold Hill, Nevada, pages 48-60; and Tough Little Town on the Truckee, Reno, 1868-1900 by J. M. Townley, 1983, Jamison Station Press, Reno, Nevada.)

Today, Reno is famous as a center of tourism. The population of the Truckee Meadows reached nearly 167,000 in 1986. The Chamber of Commerce has established a 48-mile "Scenic Drive" through Reno for those wishing to see more and know more about Reno than what the downtown area offers.

2.5/2.7      Moana Lane intersection. In the early 1900's, a spa was located a short distance to the west at the Moana Hot Springs. It featured a geothermally heated swimming pool,



which is still in use today. In 1907, a trolley line linked the spa to downtown Reno; this delighted the spa's patrons who bemoaned the lengthy carriage ride from downtown.

#### MOANA HOT SPRINGS

A large geothermal area, approximately 4 to 5 square miles in area, is centered around the Moana Hot Springs (NE/4,S26,T19N,R19E). The hot water has been used for commercial and residential heating for almost 50 years. Some wells within this area produce water ranging from 160° to 205°F at depths of from 100 to 300 feet. Most of these systems use thermostatically controlled pumps to circulate city water through down-hole heat exchangers and then through finned-tube baseboard heaters. The heat source is presumed to be a cooling body of magma at an undetermined depth.

- 0.2/2.9      Junction House historical marker on the left in front of the Copper Kettle Motel.

#### JUNCTION HOUSE

This was a "converging point" for many of Nevada's earliest emigrant trails and toll roads. By 1853, a permanent settlement known as Junction House (later called Anderson's) was established here. It was a "stopping place for thousands" and "a station for such toll roads of the 1860's as the turnpike to Washoe City, the Myron Lake road to Oregon, the Geiger road to Virginia City, and the important Henness Pass route to California". The Truckee Meadows post office was established here in September 1862, and served nearby ranches for the next 10 years (after Nevada State Historical Marker No. 4).

Anderson's was later purchased by John Sparks, governor of Nevada during 1903-06, and the site became known as the Sparks Ranch. A few years ago, the main ranch house and pump house, which stood just to the right of the road, were moved south to Pleasant Valley, and are slowly being restored.

- 0.1/3.0      Peckham Lane intersection. Peckham Lane is named after George E. Peckham, a prosperous farmer in the Truckee Meadows in the mid-1860's. It closely follows the route of the emigrant trail northwestward from Rattlesnake Mountain.
- 0.2/3.2      Reno-Sparks Convention Center on the left. Just inside the main entrance is a marker noting the route of the V&T Railroad through this area.

#### LAKE MANSION

Just south of the convention center is the Lake Mansion, which was originally located at the corner of California and Virginia Streets. It was built in 1877 by rancher and businessman W. J. Marsh. In 1879, Marsh sold the house to Myron Lake, owner of the Lake's Crossing toll bridge over the Truckee River. Lake rented the house to a variety of tenants, and then lived in it for a short time from 1883 until his sudden death in 1884. The mansion was moved to this location in 1973.

## GLENDALE SCHOOL

Behind the Lake Mansion is the Glendale School, Nevada's oldest remaining school building. Constructed in 1864, it was in continuous use until 1958. It was moved here in 1976 from the townsite of Glendale, in eastern Sparks.

- 1.3/4.5 Del Monte Lane intersection. To the left are the Huffaker Hills, named after G. W. Huffaker who operated a ranch and V&T Railroad station here. Rattlesnake Mountain is the high, northernmost hill. Springs at the north end of Rattlesnake Mountain refreshed travelers on the emigrant trail through the Truckee Meadows. The hills are the worn-down remnants of volcanos that spewed out lava some 13 million years ago.

## LOCAL GEOGRAPHY AND GEOLOGY

You are traveling through the southern Truckee Meadows, which is drained by Steamboat Creek. It flows along the extreme eastern boundary of the meadows, between the Huffaker Hills and the more distant Virginia Range, northward to the Truckee River. On the west, the meadows are bounded by the Carson Range, part of the Sierra Nevada. "Sierra" comes from the Spanish word "serra" meaning "saw" and is widely applied to mountain ranges having a saw-toothed appearance from a distance; "Nevada" is also Spanish and means "snow clad" or "snowy".

This valley is part of the Great Basin, as is much of Nevada, where none of the streams reach the sea, but instead flow into "sinks" (basins with no outlet) where the water evaporates in the dry desert air. The Great Basin, in turn, is part of the Basin and Range geomorphic province, an area of mountain ranges and valley basins that began forming some 30 million years ago. Long, narrow blocks of the land were faulted slowly upward to form mountains, while the intervening basins were dropped slowly downward. Rock eroded from the rising mountains was carried into the valleys, filling them with layer after layer of sand and gravel. This process--uplift and erosion of the mountains, down-dropping and filling of the valleys--continues today. Scarps along the base of the mountains mark the location of faults along which the relative upward-downward movement has taken place.

- 3.7/8.2 Zolezzi Lane intersection. GET VEHICLE INTO LEFT LANE.
- A rhyolite dome (rhyolite has about the same composition as granite) is being quarried for lightweight aggregate at the base of the Virginia Range at 10:00. The Steamboat Hills are ahead at 1:00.
- 1.3/9.5 TURN LEFT ONTO STATE ROUTE 341 to Virginia City. Ahead is the Virginia Range.
- 0.3/9.8 Toll Road (on the right) follows the route of the original Geiger-Tilton Toll Road (Geiger Grade) to Virginia City (high-axle or 4-wheel-drive vehicles only). Built in 1862, shortly after the discovery of the Comstock Lode,

this became the main road between Virginia City and the Truckee Meadows before the construction of the V&T Railroad.

- 1.3/11.1      Begin ascending the Virginia Range on the new Geiger Grade.

#### THE VIRGINIA RANGE

You are passing through the pinyon-juniper life zone which consists of pinyon pine (the Nevada state tree), juniper, bitterbrush, rabbit brush, sagebrush (the Nevada state flower), mountain mahogany, Jeffrey pine, and willows. Willows are found only along water courses. The Jeffrey pines grow where the soil is especially acid (note the stands growing on the bleached, pastel-colored rocks as you climb the Grade, and on the old mine dumps around Virginia City). Wildlife in this area includes the sagehen, black-billed magpie, several species of sparrow, pinyon jay, sage thrasher, mountain bluebird (the Nevada state bird), desert jackrabbit, Nevada cottontail, chipmunks, pocket mice, Great Basin rattlesnake, deer, mountain lions, bobcats, coyotes, and wild horses.

The Virginia range has a dry, sunny, desert climate with hot days and cool nights in the summer; and cool to warm days and cold nights in the winter. Annual precipitation ranges from 8 to more than 16 inches at the higher elevations. Nevada is a desert because it is in the rain shadow of the Sierra Nevada. Moisture-laden clouds moving eastward from the Pacific Ocean meet the Sierran land-barrier and are forced to rise over the range, losing their moisture as rain and snow before they descend into Nevada. This region east of the Sierra Nevada is also known for the violent, downslope winds known as Washoe Zephyrs--cool, heavier mountain air that flows down the eastern slopes of the Sierra Nevada much like a flash flood, gaining momentum and destructive power as it goes.

Mark Twain, upon his arrival in Carson City at the end of a long trans-continental stagecoach journey from the East, described his first encounter with a "Washoe Zephyr" in his 1872 publication, Roughing It:

"...it was two o'clock, now, and according to custom the daily "Washoe Zephyr" set in; a soaring dust drift about the size of the United States set up edgewise came with it, and the capital of Nevada Territory disappeared from view. Still, there were sights to be seen which were not wholly uninteresting to newcomers; for the vast dust cloud was thickly freckled with things strange to the upper air - things living and dead, that flitted hither and thither, going and coming, appearing and disappearing among rolling billows of dust - hats, chickens, and parasols sailing in the remote heavens; blankets, tin signs, sagebrush and shingles a shade lower; doormats and buffalo robes lower still; shovels and coal skuttles on the next grade; glass doors, cats and little children on the next; disrupted lumberyards, light buggies, and wheelbarrows on the next, and down only thirty or forty feet above ground was a scurrying storm of emigrating roofs and vacant lots.

"The "Washoe Zephyr"...is a peculiarly Scriptural wind, in that no man knoweth "whence it cometh." That is to say, where it originates. It comes right over the mountains from the west, but when one crosses the

ridge he does not find any of it on the other side! It probably is manufactured on the mountaintop for the occasion, and starts from there. It is a pretty regular wind, in the summertime. Its office hours are from two in the afternoon till two the next morning; and anybody venturing abroad during those twelve hours needs to allow for the wind or he will bring up a mile or two to leeward of the point he is aiming at. And yet the first complaint a Washoe visitor to San Francisco makes, is that the sea winds blow so, there! There is a good deal of human nature in that."

As you climb up the winding road, notice the pastel-colored rocks in the roadcuts. They have been altered (changed in composition and appearance) by heat and acid solutions related to volcanic activity. Most of this range is composed of volcanic rocks which are about 11,000 feet thick. These rocks range from 30 million years old (when basin-range faulting first began in this area) to as young as 1 million years old.

- 1.2/12.3 Pits on the right. Clay (altered volcanic rock) was mined from these pits, hauled to Reno, and used for brick-making during the first half of this century.
- 1.9/14.2 Geiger Lookout (elevation 5,540 feet). PARK. WALK DOWN THE PATH TO THE OVERLOOK. Below, from right to left, are Reno and the Truckee Meadows, Steamboat Hot Springs (area of light-colored rock), Steamboat Hills in the mid-foreground, and Washoe Valley to the far left. Towering thousands of feet above this basin (elevation 4,000 feet) is the Carson Range--from right (north) to left (south) on the skyline are Peavine Mountain (elevation 8,266 feet), Mount Rose (elevation 10,776 feet), and Slide Mountain (elevation 9,698 feet).

#### THE CARSON RANGE

The Carson Range is structurally part of the Basin and Range geomorphic province, because Basin-range-type faults bound the east and west flanks of the range; mineralogically, however, it is part the Sierra Nevada geomorphic province--the major rock type in both ranges is granodiorite. Uplift of the range began around 6 million years ago (along with the Sierra Nevada directly behind it, to the west). Mount Rose appears darker than the other peaks because it is topped with a layer of darker volcanic rocks. Note the huge, sloping fan-pediment surface extending eastward from the Carson Range. The slope has been accentuated by the continued downward tilting of the eastern Truckee Meadows.

#### STEAMBOAT SPRINGS

A geological and historical description of Steamboat Springs is given at the end of this roadlog. From this vantage point, however, note the pine trees growing only in the white, altered areas behind the main spring terrace. The plume of steam issuing from the hill above and to the left of the main terrace (on the far side of U.S. Highway 395) is the site of a small power plant that is scheduled to be in production before the end of 1987. Four or five wells will be producing 300°F fluids from depths of about 3,000 feet to provide 12.5



megawatts of energy to the local power company. One other small power plant, located northwest of the main spring terrace, has been supplying 7.5 megawatts to the local power company since 1986 from three wells producing up to 340°F fluids from depths of 500 to 1,000 feet.

This is also a good place to see the vegetation characteristic of the pinyon-juniper life zone. CONTINUE AHEAD ON HIGHWAY 341.

0.2/14.4 This area burned during the summer of 1985.

1.0/15.4 In the canyon ahead and to the right, the original Geiger Grade can be seen. In October 1869, two locomotives to be used on the V&T Railroad were hauled up this road by ox-drawn wagons. The "Virginia" made it in three weeks, but the "Carson" had to be dismantled, hauled up in pieces, and then reassembled.

0.4/15.8 Leaving Washoe County. Entering Storey County.

#### WASHOE

"Washoe" is a popular place name in this part of Nevada. The word, originally spelled "Wassau", is from a native American tribe that inhabited the Lake Tahoe area. Various meanings include "person", "to wash", "rye grass", or "tall bunch grass". "With the discovery of the Comstock Lode in 1859, a large area of western Utah Territory along the eastern slope of the Sierra Nevada, which had previously been known as the Eastern Slope, became known as Washoe. In the early 1860's, there was a strong movement to call the new territory and later the new state Washoe, rather than Nevada or several other names" (Ansari, 1986).

1.1/16.9 Geiger Grade historical marker on the right.

#### THE GEIGER GRADE

"Constructed by Davison M. Geiger and John H. Tilton in 1862, this toll road was the most direct connection between the Comstock Lode and the Truckee Meadows until replaced by the present paved highway in 1936. Concord stages, mud wagons, and ten-mule freighters carried thousands of passengers and millions in precious cargo across this section of the Virginia Range, and many are the tales of unpredictable winds, snows, landslides, and the everlasting danger of lurking highwaymen which could be told of this precipitous stretch of road" (Nevada State Historical Marker No. 211).

1.9/18.8 Geiger Summit (elevation 6,799 feet).

0.5/19.3 Lousetown historical marker on the left.

#### LOUSETOWN

Lousetown, a corruption of the name Louisa Town, was located about 7 miles north of here. It was established in the 1860's as a station on two toll roads: the Virginia and Truckee Toll Road from Lockwood on the Truckee River, and the Virginia City Toll Road from Glendale in the Truckee Meadows. These roads met at Lousetown and formed a single route south to Virginia City. The town had

only a handful of buildings including lodging places and wagon/blacksmith shops. A few miles to the south of here in Long Valley, a flat area was developed into Nevada's first horse racing track, which also hosted trap shoots and prize fights. With completion of the new Geiger-Tilton Toll Road from the Truckee Meadows to Virginia City in 1862, most of the traffic was passing 7 miles south of Lousetown, and by the 1870's it had become a ghost town.

- 1.7/21.0      Ahead (south), are the buildings and mine dumps of Virginia City. To the right is Mount Davidson.

#### MOUNT DAVIDSON

Mount Davidson was originally called Sun Mountain, because it caught the first rays of the morning sun. Its name was changed around 1859 to honor Donald Davidson, a representative of a British banking firm who helped in financing the Comstock mines. The line of pits along the base of Mount Davidson roughly defines the Comstock Lode.

- 1.5/22.5      Entering Virginia City (elevation 6,220 feet, population 750).
- 0.1/22.6      Comstock Lode historical marker and roadside rest on the left.
- 0.1/22.7      Approaching the Carson Street intersection (no street sign).

#### OPTIONAL SIDE TRIP

OPTIONAL SIDE TRIP to the original Ophir discovery site: TURN RIGHT (WEST) ON CARSON STREET and proceed uphill for about 3 blocks to where the street makes an abrupt turn to the right. Stop. To the left (south) is the Virginia City Pit where surface outcrops of the Comstock Lode were mined for several hundred feet downward in 1859-60, and again in the 1920's. RETURN TO the State Route 341 (C Street) and Carson Street intersection (mileage point 22.7). CONTINUE SOUTH ON STATE ROUTE 341 through Virginia City.

- 0.4/23.1      Visitor's Bureau on the right. Here you may obtain maps, walking tours, photos, and other tourist information for Virginia City. Take time to tour this historic town. Most of the buildings date from 1876; they were reconstructed after the great fire of 1875 destroyed most of the town. Interesting places to tour include Piper's Opera House, the Fourth Ward School, the Territorial Enterprise, the Court House, and various museums, churches, mansions, cemeteries, and mines which are open to the public most of the year. Train rides are also available on a restored section of the V&T track between Virginia City and Gold Hill from late May through late September.

## THE COMSTOCK LODGE

The story of the Comstock Lode--the great silver and gold bonanza--began in 1849 south of Virginia City near the town of Dayton, an immigrant and Pony Express stop then known as Spafford Hall's Station. Passing immigrants began to pan the streams nearby in what came to be called Gold Canyon. For nearly a decade, transient miners washed the gravels of Gold Canyon pocketing a total of around \$600,000; but the bonanza lay farther up the hill toward Mount Davidson.

Early in 1859, gold was discovered by two independent parties at both ends of the Comstock Fault (about a mile apart). Patrick McLaughlin and Peter O'Riley discovered ore on the north end of the fault near Ophir Ravine. James Finney (familiarily known as "Old Virginny"), Jack Yount, Alec Henderson and John Bishop were the first to stake claims on the south end of the fault at Gold Hill. James Finney had earlier staked claims in Ophir Ravine in 1858, but had not developed them. Only after a few years of work did it become apparent that these two strikes were located on the same mineralized vein.

Besides being known as a good prospector and one of the first discoverers of the Comstock Lode, "Old Virginny" was also known for his generosity, goodwill, and imbibing. The early miners at Virginia City acknowledged him and his efforts by naming the town after him.

The "Comstock" name was less formally established. Henry T. P. Comstock was a lazy loudmouth who became one of the original locaters at Ophir Ravine by cutting himself in on McLaughlin and O'Riley's claim, insisting they were digging on his property. It was a preposterous lie. He had no title to the government land, but he talked so loud and long that the other two cut him in on their claim just for the sake of peace. He did none of the work on the claim, but spent his time bragging up and down the length of Mount Davidson about his property. Thus, the other miners came to call it "Comstock's Lode". He also claimed to be one of the original locaters at Gold Hill.

As the 1859 miners washed the gravel for gold, they were impeded by a blue clay that clogged the equipment. They continued to discard it until some was taken to an assay office in Grass Valley, California. The results showed the miners had been throwing away rock worth up to \$3,000 a ton in silver and \$900 a ton in gold. This news leaked-out and the "rush to Washoe" was on.

The early miners came from every possible occupation, and endured incredible hardships in the hope that they would "strike it rich". They were very unsystematic in their search for ore and few succeeded in obtaining great wealth. A few farsighted entrepreneurs sought financial backing from the important banks of the day and formed large companies to explore and develop the Comstock Lode in an organized manner. These companies then hired the independent miners as laborers paying \$3 to \$4 per day. The profits for the companies and their owners were enormous.

The mining boom continued through 1878 as discoveries were made deeper along the lode. In 1871, the Crown Point Bonanza, a concentration of gold and silver found 1,000 feet below the surface, yielded \$35 million, boosting that mine's stock from \$2 to over \$1,800 per share. The Big Bonanza discovered in 1873 on the 1,400-foot level of the Consolidated Virginia Mine produced \$105 million.

The city thrived on speculation of mining properties. Fortunes were made and lost overnight--regardless of social standing. Those who suddenly found themselves possessing new wealth usually soon lost it if they did not also possess wisdom and foresight.

Exploration continued as deep as 3,200 feet along the Comstock fault (making some of the Comstock mines the deepest in the world), but no new bonanzas were found. Technical difficulties slowed exploration in the 1880's, and by World War II production had all but ceased. A brief flurry of exploration activity began in the mid-1960's. Mining resumed in the Gold Hill area in the late 1970's, but by 1985 all activity had again ceased. Total production from this mining district is over 190 million ounces of silver and 8 million ounces of gold--worth billions at today's market prices.

#### COMSTOCK GEOLOGY

The Comstock Lode is a huge crack or fault system filled in many places with fabulously rich silver-gold ore. It extends in a north-south direction along the eastern base of Mount Davidson from the Sierra Nevada Mine on the north end of Virginia City to the Overman Mine at the south end of Gold Hill, a distance of about 3 miles.

The ore was formed 12 to 13 million years ago during mountain-building activity in this area. Faults split the earth, lava poured out, and associated hot fluids and gases, rich in precious elements, rose upward through the faults (cracks) and crystallized as metallic gold and sulfides of silver (argentite), zinc (sphalerite), lead (galena), copper (chalcopyrite), and iron (pyrite), along with abundant quartz and calcite.

#### COMSTOCK MINING CONDITIONS

Mining on the Comstock was exceedingly hazardous. The deeper mines were extremely hot and humid; air temperature in the workings commonly reached 100°-125° F and rock temperatures as high as 167° F were recorded. Hot water also plagued the lower depths of these mines. Fog was ever present in the upper levels where the hot, moist mine air mixed with the cooler surface air. Many men suffered pneumonia from these temperature variations. The moisture rotted the timbers and caused the rock to swell and crumble. Rockfalls and massive cave-ins were a constant, and often fatal, hazard. Air circulation was very poor. Along with the stench from animal and human feces, food scraps, and residual vapors from blasting, the build up of carbon dioxide within the mines from these sources would cause dizziness, headaches, nausea, and weakness. Poisoning from residual blasting vapors could cause extreme symptoms of insanity or blindness. More men died from poor air circulation than from any other cause in the early years of Comstock mining. The most serious ailment contracted by miners was "miners consumption" (silicosis), which is caused by breathing quartz (high-silica) dust. The disease varied in severity; but often contributed to the fatal respiratory conditions of pneumonia and tuberculosis. These problems taxed the mining companies financially and the miners physically.

## COMSTOCK ENGINEERING INNOVATIONS

The boom years of 1863 through 1880 brought about major engineering innovations to help solve some of the problems of deep underground mining. Some of these are still in use today.

Dynamite or giant powder, composed of nitroglycerine mixed with stabilizing fillers such as sawdust, was invented in 1866 by Swedish chemist Alfred Nobel. By 1868, dynamite had replaced black powder as the principal blasting agent in the mines. Nobel's invention brought him fortune as well as fame; he later used part of his wealth to establish the Nobel Peace Prizes, still awarded annually for outstanding individual contributions in a variety of fields.

The Burleigh drill, which was powered by compressed air, greatly reduced the time and effort needed to drill blast holes in the rock and, as an added benefit, helped to ventilate the mines.

Braided, flat, woven wire cable was first developed in 1863 by English immigrant Andrew S. Hallidie of San Francisco to hoist the heavy ore buckets up from the deep Sierra Nevada Mine. The cable was 4 inches wide, 1/2 inch thick and could raise up to 10 tons of weight. He went on to invent the endless underground cable and the mechanical gripping device for the underside of the cable cars still in use on the cable car system in San Francisco.

The square-set timbering method was developed in 1860 for the Ophir Mining Company by Philipp Deidesheimer, a young German immigrant engineer, especially for the type of soft, wet, crumbly rock encountered in the Comstock Lode fault zone. Some of the ore zones being mined were tens of feet wide; when air entered newly dug shafts the clay-rich rock would expand causing the rock mass to swell and move, break normal timbering, and cave in. Deidesheimer's system was adopted in mines around the world. Had he patented his invention, he would have received millions in royalties. He once told his best friend, "If all goes well and these square sets protect the lives of the miners, what more could a man ask for?" (P. I. Earl, 1986).

The surrounding hills, as far distant as Peavine Mountain and the entire Lake Tahoe basin, were totally denuded of timber to provide the square-set timbers for the mines and fuel for boilers to power the huge Cornish pumps.

Cornish pumps, imported, as the name implies, from the deep tin mines of Cornwall, were developed to their maximum here on the Comstock, but they still couldn't keep up with the amount of water issuing from the depths of the mines.

## THE SUTRO TUNNEL

Around 1863, Adolph Sutro, another German engineer, conceived the idea of digging a tunnel into the Flowery Range to drain the Comstock mines at the 1,650-foot level. The mines would benefit by being ventilated and drained of the constant flow of hot water. Sutro hoped to profit by charging the mines to truck ore out of their lower levels through his tunnel; and perhaps he would strike a rich vein himself in the process of digging the tunnel. Initially, support was strong from the mine owners, the banks, the Nevada Legislature

(which in 1865 gave Sutro an exclusive franchise to the tunnel for 50 years), and Congress (which passed the Sutro Tunnel Act in 1866); however, it weakened just 2 years later when the bankers (led by William Sharon, head of the Bank of California in Virginia City) and mine owners decided Virginia City would lose its inflow of cash to the mills and related businesses which would be built at the other end of Sutro's Tunnel on the Carson River and in Carson City.

In 1869, however, the miners rallied behind Sutro after a bad underground fire in the Yellow Jacket Mine killed many men. Money to build the tunnel was secured from a London bank, other European sources, and the miner's union. Work finally began on the tunnel in October 1869.

The tunnel reached the Savage shaft in July 1878, almost 9 years after ground-breaking, but by then the Comstock mines had progressed as much as 1,500 feet below the level which the tunnel was to drain, and the bonanza days were over. Had the tunnel been completed in the early 1870's, it would have saved the mining companies millions of dollars in pumping costs alone.

The Sutro Tunnel stretches in a straight line from the eastern front of the Flowery Range (1 mile north of U.S. Highway 50 and 2-1/4 miles northeast of Dayton) to a drift on the Savage shaft, a distance of 20,498 feet (almost 4 miles). It was 8 to 9 feet wide and 7 feet high. In all, the tunnel cost \$6.5 million, including interest, to complete. It was never paid back in royalties after completion of the tunnel. Sutro quietly sold his stock in the tunnel shortly after it was finished, netting less than \$1 million, and moved to San Francisco in 1881. He invested his stock-sale money in San Francisco real estate and became a multimillionaire. His land holdings in San Francisco grew to include the famous Cliff House, Sutro Baths, and all of the area now known as Sutro Heights. He became active in politics and served as Mayor of San Francisco from 1895 to 1897. His health began to fail during his term as mayor; and, suffering from diabetes and "senile dementia", he died in 1898.

#### COMSTOCK WATER SUPPLY

In the early days of mining on the Comstock, water was freely taken from the small snow-melt streams and springs issuing from Mount Davidson. Tunnels dug into the mountain in search of ore often provided additional water. In time, however, the water became as valuable as the ore being sought.

In May 1862, two companies which had been collecting and distributing water to the local area were consolidated into the Virginia and Gold Hill Water Company. By the end of 1863, however, only 900,000 gallons per day could be supplied to Virginia City. Each succeeding year, as the city grew, the fear of draught increased. Fall and winter were the driest seasons.

Mining had waned on the Comstock in the late 1860's and into 1871, when the Crown Point Bonanza was discovered. This revived interest in mining, and the future of Virginia City once again seemed secure. Thus, in 1871 the Virginia and Gold Hill Water Company was reorganized; its goal was to supply larger quantities of better quality water to Virginia City. The company engineers had already considered pumping water up from the Carson River, but such an undertaking was found to be uneconomical. Then they began looking at the Carson Range, with its thick annual spring snowpack...



The new company chiefs decided to retain J.B. Overton as supervisor, and put him in charge of surveying, constructing, and later, maintaining an integrated system of dams, reservoirs, flumes, tunnels, and pipelines to carry water from the Carson Range to Virginia City.

One of the most difficult surveying problems to be solved was establishing the elevations and routes of all the water sources and conveyance structures so that the water would arrive in Gold Hill and Virginia City at the speed and in the amount desired.

In the midst of this, an even more critical engineering problem was revealed. The hydrostatic pressure that would be created in a pipeline crossing the low spot in the proposed water system at Lakeview Summit (between the Carson Range and the Virginia Range) was greater than any pipe had ever been subjected to. A pipeline had to be designed that could withstand these unprecedented pressures.

Hermann Schussler, a German immigrant and chief engineer for the Spring Valley Water Works of San Francisco, was called in to design the "Washoe pressure pipe"—an inverted siphon. He had built other pipelines to resist extreme hydrostatic pressures by using iron plates rolled to a cylindrical shape and then riveted at the seams.

After the surveys and calculations were completed, it was concluded that in addition to the dams, reservoirs, and flumes, a pressure pipeline 7 miles long and 11.5 inches in diameter would be required for the system to function.

Construction began in 1872. The plates used to construct the pipeline were made of English wrought iron at the Risdon Iron Works in San Francisco. They varied in thickness from 0.065 to 0.34 inches, depending on the pressures they would be enduring. Enough overlap was left for double-riveting of the joints. This riveting was done on site during construction of the pipeline. Lead caulk was used to seal the joints; and the entire pipeline was coated inside and out with asphaltum and coal tar to protect against rust. Air intake and blow-off valves were installed at regular intervals along the pipeline to prevent collapse of the pipe due to the extreme water pressure and/or vacuums created during the absence of water in the line.

Early in August 1873, water entered the system from Hobart Creek Reservoir (elevation 7,542 feet, and located 3 miles west of Lakeview Summit) and flowed north down Franktown Creek for a short distance before being diverted into the aquaduct (built at a constant elevation of 7,160 feet) which curved back to the south toward the head of the pipeline located 1.5 miles above Lakeview. The water entered the pipeline (or inverted siphon) and flowed eastward, passing through the lowest point in the entire system at Lakeview Summit (elevation 5,160 feet). The water exited the pipeline at an elevation of 6,680 feet near the southwest end of the Virginia Range about a mile southwest of McClellan Peak. It continued northeastward by flume and aquaduct around the west side of the range to the range crest (about a mile northeast of McClellan Peak) where it met and paralleled the Ophir Grade most of the way to water storage tanks (at an elevation of 6,480 feet) near Bullion Ravine above Gold Hill and near Spanish Ravine in Virginia City. The entire water system was 21 miles long and at full capacity transported 2,000,000 gallons of water per day.

The first pipeline channeled water mainly from the Hobart Creek area in the Carson Range. After the Big Bonanza was discovered on the Comstock in 1873, plans were made for more aqueducts and a second pipeline across Lakeview Summit. It was constructed near the first pipeline in late 1875, the same year that the Great Fire leveled most of Virginia City. Later, Marlette Reservoir (located a mile west of Hobart Creek Reservoir) was deepened (by raising the dam) and connected by miles of flumes to the existing system to provide additional water. In 1887, a third pressure pipe was laid across Lakeview Summit near the other two.

When completed, the water supply system included 3 reservoirs, over 21 miles of pressure pipes (inverted siphons) across Lakeview Summit, about 46 miles of covered box flumes, and a 3,994-foot tunnel--much of which was built at elevations of 7,000 to 8,000 feet. Additional water was obtained from flume systems originally built by the lumber companies to transport timber to the Carson and Washoe Valleys for milling. Water storage tanks, reservoirs, and pipelines were also built on the receiving end of the system to supply water to the Virginia City, Gold Hill and Silver City area. The system was still in use when the State of Nevada acquired and improved it in 1963, and still serves Virginia City today.

#### GROWTH AND DECLINE OF VIRGINIA CITY

Virginia City began as a shanty town with people inhabiting structures made of any available material, including old clothes, boxes, barrels, and tin cans. Some early miners dug holes in the mountainsides for shelter. They would spend their spare time in the saloons, rather than go back to their hovels. Food and fuel were scarce. Timber was at such a premium in this desert environment that it was used in the mines first, and for buildings or fuel second. Winter on the Comstock was exceptionally rugged on the early miners, but their thirst for wealth made them insensitive to the cold, hunger, and fatigue. By the early 1870's, the buildings were being constructed of stone or brick, sewer and gas lines were installed, and all the services and trappings of a metropolitan city were well-established.

In 1876, Virginia City's best year, the population peaked at 25,000 permanent residents, and the mines produced over \$36 million. Another 9,000 to 10,000 people were residing in neighboring Gold Hill, and thousands more were living in the smaller, surrounding mining camps. Virginia City had over 100 saloons, six churches, four banks, Piper's Opera House, and the V&T Railroad with as many as 50 trains a day passing through town. "It was an amalgam of a San Francisco and a Gary, Indiana" (Toll, 1985). A great fire destroyed three-quarters of the city in 1875. Although rebuilding began immediately, the rich ore was diminishing fast and Virginia City was never to regain its original glory. By 1890 only 6,000 residents remained in town, and by 1923 the population had dwindled to 1,500.

#### CONCLUSION

The impact of the Comstock Lode on Nevada is summed up by Glass and Glass (1975): "Discovery and subsequent development of the Comstock Lode constituted the most important event in Nevada's early history. Nevada became world famous, established itself as a state of the Union, helped to finance the Civil War,



contributed to the building of the West, and gave wealth, poverty, fame, or notoriety to hundreds of people during the boom years". If you want to read more about Virginia City and the Comstock mines, the following references are an excellent place to begin: The History of the Comstock Lode, 1850-1920 by G. H. Smith: Nevada Bureau of Mines and Geology Bulletin No. 37 (1943); Comstock Mining and Miners by E. Lord: U.S. Geological Survey Monograph 4 (1883) now published by Howell-North Books, San Diego, California; Early Engineering Works Contributory to the Comstock by J. D. Galloway: Nevada Bureau of Mines and Geology Bulletin 45 (1947); The Story of the Water Supply for the Comstock by H. A. Shamberger: U.S. Geological Survey Professional Paper 779.

- 0.5/23.6      Junction of State Routes 341 and north end of Route 342. CONTINUE STRAIGHT AHEAD ON STATE ROUTE 342 (C Street). Everything south of this intersection was called "The Divide". It was a satellite community between Virginia City and Gold Hill and marks the head of Gold Canyon.

On the right is the Loring Pit, named for W. J. Loring, mine manager. It was mined during the 1930's Depression for low-grade silver ore valued at \$2.00 to \$3.00 per ton. About 460,000 tons of ore were extracted yielding \$1,437,000.

- 0.3/23.9      Ophir Grade historical marker on the right (just before the maintainance station). Entering Gold Hill (population 68). The road descends steeply into the head of Gold Canyon, which stretches about 6 miles southeastward to Dayton and the Carson River.

#### THE OPHIR (JUMBO) GRADE

The earliest miners on the Comstock had to break the ore into small pieces and haul it in boxes or sacks by mule over the Sierra Nevada to the nearest market, which was San Francisco. The Ophir Grade was then built in 1860 by the Ophir Mining Company to haul ore westward down to Washoe Lake for milling at its mill, and transport lumber from the sawmills there back up to the Comstock mines. When the V&T Railroad was built in 1871 linking Virginia City to mills on the Carson River, the road was no longer needed. A brief mining boom in the Jumbo district (over the hill to the west) opened the grade again in the early 1900's.

- 0.2/24.1      Greiner's Bend was named for John and William Greiner whose home on this bend became a showplace because of its beautiful front yard.

On the right, near the bottom of the bend is the abandoned Houston International Minerals Corporation pit. Formerly the site of the Consolidated Imperial Pit, Houston renewed mining here in 1979, but closed the mine in 1981 when they lost their battle with local townspeople to relocate the highway and enlarge the pit. This pit also marks the original discovery site on the south end of the Comstock Lode by James Finney and his associates in 1859.

- 0.3/24.4      The red building off the road to the right is the Gold Hill Depot for the famous V&T Railroad. Just beyond it is the Yellow Jacket Shaft and the Crown Point Ravine which the railroad crossed on an impressive 85-foot high and 500-foot long trestle.

The former California Bank building on the right is now an art gallery. The Gold Hill Hotel, next on the right, was built in 1859 and is Nevada's oldest hotel. Ahead, also on the right, are the gray buildings of the Crown Point Mill.

- 0.9/25.3      On the left is the New York Mine. Ahead, to the left, is the headframe of the Keystone Mine.

Continuing down the canyon, the large open pits on the right were excavated along the Silver City branch of the Comstock Fault and were successively mined in the 1860's, early 1900's, and again in the 1940's and 1950's. Since the early 1920's, 200,000 tons of ore mined from here have yielded \$1,200,000.

- 1.2/26.5      Passing through Devil's Gate, site of a toll station on the Virginia City-Dayton Toll Road in the 1860's.

#### THE DEVIL'S GATE TOLL ROAD

The present highway closely follows the original Virginia City-Dayton Toll Road, also known as the Devil's Gate Toll Road. Before construction of the V&T Railroad in 1870, this toll road carried the slow, heavy traffic of teams pulling ore (at \$5.50 per ton) from the Virginia City mines down to the Carson River mills for processing, and then returning uphill with timber (at \$15 per cord) from the Lake Tahoe area for fuel and square-sets for the mines, along with every other kind of merchandise, food, and machinery needed in the boomtown. The toll road cost \$2,000 to \$3,000 per mile to build. The teamsters haulage rates were 2 to 3 times higher than those charged later by the railroad.

A small community grew up around the Devil's Gate Toll Station in late 1859. Extra teams were corralled here and the area was a reputed hangout for bandits. Andrew Marsh wrote the following description of Devil's Gate in the early 1860's: "It was dark before we reached this point, and the scene impressed me as strangely weird and almost diabolical. All around us was heard the clatter and thunder of quartz mills, from each of which gleamed the furnace fires like the eyes of demons..."

- 0.1/26.6      Entering Silver City, the third of the three major communities on the Comstock Lode. Most of the gold and silver produced here came from thin veins within 300 feet of the ground surface on the Silver City fault (the southern extension of the Comstock Fault), although some mines were explored to depths of over 800 feet.

- 0.2/26.8      Historical monument to the Grosh brothers on the right.

## HOSEA AND ETHAN ALLEN GROSH

Hosea and his brother Ethan Allen began placer mining in Gold Canyon in 1852. There were very few others at this time who knew that silver occurred with the gold in the area. The brothers were intelligent and systematic miners. They were in the midst of developing their "monster ledge" prospect (on the Silver City branch of the Comstock fault) when they both died in 1857, Hosea of blood poisoning (due to a self-inflicted pick wound in his foot) in Silver City, and Ethan Allen in a Sierran winter storm. Had they lived, they might have been the first to discover the Comstock Lode. Hosea Grosh is buried in the Silver City cemetery east of town. An impressive monument, placed there in 1865 by a member of President Abraham Lincoln's cabinet, marks his grave.

- 0.5/27.3      McCones Foundries historical marker on the right. On the hillside above the marker is the Dayton Mine and mill, erected in 1934. This marks the south end of the productive zone of the Silver City branch of the Comstock Fault.
- 0.1/27.4      Junction with south end of State Route 341 on the left. CONTINUE STRAIGHT AHEAD ON STATE ROUTE 342. The road now leaves Gold Canyon, which extends another 5 miles southeastward to Dayton and the Carson River. The lower 4 miles of this canyon was the scene of placer mining 10 years prior to the discovery of the Comstock Lode in early 1859.
- Many shafts and prospect holes dot the landscape for the next few miles. The miners were trying to locate a southern extension of the Comstock Lode--if there is one, it has not been found to this day.
- Ahead and to the left are the Pine Nut Mountains. In the distance at 1:00 is the Carson Range.
- 2.5/29.9      Ahead on the right is a wooden sign marking the Pony Express Trail, the inscription is on the other side.
- 0.3/30.2      Junction U.S. Highway 50 and State Route 342. TURN RIGHT ON U.S. HIGHWAY 50 to Carson City.
- 0.2/30.4      Entering Mound House (elevation 4,913 feet).
- 1.4/31.8      Mound House historical marker on the right.

## MOUND HOUSE

Mound House was settled in the late 1860's around Mound Station, a toll stop on the Carson-Comstock stage road. The V&T Railroad arrived here in 1869, and in 1871 Mound House was established as a transfer point for people and freight traveling on by coach or wagon to Dayton, Pine Grove or Sutro. For the first few years it was no more than a wood and water stop, and began to decline when the Comstock mines ran out of ore. In 1881, the V&T Railroad finished a narrow

gauge line, the Carson & Colorado, to the mining camps of southwestern Nevada and southeastern California. Business boomed for the first 3 years, followed by about 20 more impoverished years. When the Tonopah and Goldfield silver and gold strikes occurred just after 1900, Mound House became an intolerable bottleneck in the busy rail system. In 1905, the Southern Pacific which had acquired the Carson & Colorado, built 28 miles of standard gauge line from its new station at Hazen (on the transcontinental Central Pacific Railroad) to the Churchill siding (on the Carson & Colorado). This ended the interchange at Mound House. About this time gypsum deposits were discovered near here (the gypsum mine is visible in the hills to the right). From 1914 to 1920, the gypsum was mined and milled here for plaster with a total production of about \$452,000. The V&T Railroad ended all operations in the area by 1939, and Mound House was soon abandoned.

0.7/32.5      Leaving Storey County and entering Carson City (formerly Ormsby County). In 1969, Ormsby County and its county seat, Carson City, were combined into one municipal government. The January 1987 population reached 37,200.

1.9/34.4      Entering the historic town of Empire City.

#### EMPIRE CITY

Empire City was first called Dutch Nick's, for Nicholas Ambrosia, who built a way station here on the Carson River Route of the California Emigrant Trail in 1855. A town was officially laid out in 1860, and the name was changed to Empire. The lumber and ore milling industries kept the town thriving. Timber from the Lake Tahoe basin was floated down flumes on the east side of the Carson Range to Huffaker's (south of Reno), Lakeview Summit (between Washoe and Eagle Valleys), and Carson City. From these points it was floated down the Carson River or hauled by wagon (or flatcar beginning in 1870) to Empire and processed in the sawmills before being hauled to Virginia City to help meet the insatiable needs of the Comstock mines. Empire faded away as mining activity dwindled on the Comstock.

0.2/34.6      Historical marker on the left at Akron Way commemorates the mills that were built along the Carson River to process the ore from the Comstock Lode.

#### MILLING THE COMSTOCK ORES

By the end of 1861, more than 76 mills with a total of 1,153 stamps had been built for the crushing and separating of Comstock ore. These mills were located first in Virginia City, Six Mile Canyon, Gold Canyon, and in Washoe Valley, and later along the Carson River from Dayton to Empire. They had a combined capacity for crushing 1,200 tons of ore daily, but there was ore for only half of them. Many had been built entirely on speculation. After 1878, the mills began closing down as the Comstock mines failed.

Recovery of gold and silver from the Comstock ores presented a formidable challenge to the miners of the 1860's. More complex than the easily milled gold ores of California, Comstock silver ores required treatment by methods reminiscent of those of medieval alchemy. Experimenting to devise a process that would efficiently release the gold and silver from the enclosing rock

extended over several years and culminated in the development of the Washoe Process (developed chiefly by millman A. B. Paul) and the Washoe Pan Mill (invented by a few ingenious California mill builders). The Washoe Process was a mechanical combination of two other centuries-old processes (crushing of the ore, and chemical recovery of the precious metals) used by early Comstock miners. It accomplished in 6 hours what had formerly taken 4 to 6 weeks, and recovered a significantly greater percentage of the precious metals.

Previous to the Washoe Process, the early miners crushed the ore in arrastras, or crude drag-stone mills. The pulverized ore, called pulp, was then mixed with water, mercury, salt, and copper sulfate. This mixture was spread on an open floor, or patio, that was exposed to the sun's heat, and was turned with shovels or trampled by stock animals. Eventually, the metal sulfides in the ore were converted to chlorides, liberating the precious metals. The gold and silver in the ore readily united with the mercury to form amalgam, an alloy of mercury and the precious metals.

At a typical 1870's Carson River (Washoe Pan) mill, the ore was delivered by the V&T Railroad and dumped into huge hoppers. The Carson River provided the steady force needed to turn the huge water wheels that powered the mechanical stamps (huge pestles raised by water or steampower). The stamps crushed the ore into sand-sized particles, or pulp. This material was then mixed with salt, mercury, and water in huge steam-heated pans. Large internal blades stirred the mixture for 6 to 12 hours until the precious metals became trapped in the mercury. This dough-like mass, called charge, was then placed in settlers where the mercury-gold-silver amalgam settled to the bottom and was released and collected. Finally, the mercury was boiled off in retorts, leaving the bullion (pure gold and/or silver).

During the stamping stage, much of the ore escaped being crushed into the optimum sand-sized particles. These larger and smaller grains passed through the mill and were discharged into the river as waste. The river was later dredged for its high gold and silver content.

The environmental impact of the milling operations on the Carson River was enormous. Poisonous chemicals and rock waste were flushed into the river. Unknown amounts of mercury are still contained in the river bottom sediments and provide a continuing source of mercury pollution downstream. In 1980, four companies sought permits to dredge the riverbed for its precious metals; they were ultimately turned down in 1986 by the Nevada Department of Conservation after a 2-year study by the State Environmental Protection Division revealed high mercury levels in the river and its fish population, especially downstream and in Lahontan Reservoir. The mercury levels exceed federal standards, and it is felt that disruption of the sediments would cause additional contamination.

#### 0.6/35.2      Entering New Empire.

The Nevada Maximum Security Prison is located at the base of Prison Hill (on the left). Hot springs are located along the fault on the northwest side of the hill. In the early 1860's, Abraham Curry operated a hotel and swimming pools at these warm springs which were enjoyed by weary loggers, miners, and travelers. Curry's Warm Springs

Hotel was leased in 1862 to serve as the Territorial Prison with Curry as its warden. The state later purchased the property, which remains the site of the maximum security prison.

Sandstone was quarried and faced at the north end of Prison Hill by inmates for many buildings in Carson City (including the Capitol, U.S. Mint, and the Prison), Virginia City, Reno, and also for the Brunswick Mill.

Footprints and skeletal remains of birds and mammals are preserved in the sandstone, including ground sloth, mammoth, horse, bison, deer, peccary, wolf, possibly sabre-tooth tiger, and many species of birds.

0.5/35.7      Entering Carson City urban limits. Carson City stands at an elevation of 4,700 feet, and is the capital and governmental center of Nevada. It is situated in Eagle Valley which is bounded on the east by the Pine Nut Mountains (left) and the Virginia Range (right), and on the west by the Carson Range (ahead).

#### CARSON CITY

Settlement began in the valley around 1851 when W. L. "Frank" Hall and several business associates established a trading post on the California Emigrant Trail at the present site of Carson City. Ranches, a hotel, stores, saloons, and livery stables were soon built. A few years later, Hall's property was bought-out by Abraham Curry and his partners for \$500 in gold plus some horses. Curry's townsite was platted in 1858 and included a "capitol square". The village was named in honor of John Fremont's famous scout, Christopher "Kit" Carson. The Comstock Lode was discovered a few months later, and Carson City soon replaced Genoa (to the south) as the transportation and freight center for this region.

In 1861, the first Territorial Legislature met in Curry's Warm Springs Hotel and created Ormsby County, with Carson City as its seat. Major William M. Ormsby, killed in the 1860 Pyramid Lake Indian War, had been one of Carson City's prominent citizens. In 1864, Nevada became the 36th state to enter the Union, with Carson City as its capital. James W. Nye, a politician from New York, was appointed by President Abraham Lincoln as the first Territorial Governor of Nevada. He later became one of Nevada's first U.S. senators. Agriculture was very important in this area in the 1850's; beginning in the 1860's, however, the nearby Comstock mines (and after 1900, the Tonopah and Goldfield booms to the south) were the most important element of Carson City's economy. Along with being a freight and stageline center, Carson City was a terminus of the flumes bringing timber from the Lake Tahoe basin.

The decline of the Comstock mines in the 1880's greatly affected Carson City's economy, but the ongoing business of government was a steadying factor as trade and traffic declined.

2.3/38.0      Stewart Street intersection. To the left is the old V&T roundhouse built in December 1872. Ten tracks converged



on a turntable here. The machine shop, foundry, and repair shops extended for a block and a half, and were surrounded by many smaller railroad maintainance shops. Carson City was the main headquarters for the V&T Railroad; by 1874, 36 trains a day passed through here travelling south to Minden, east to Mound House and Virginia City, and north to Reno.

0.2/38.2      Junction U.S. Highway 50 and U.S. Highway 395 (main north-south street in Carson City). TURN LEFT (SOUTH) ON U.S. HIGHWAY 395.

0.1/38.3      Washington Street. The low yellow building on the left is the former Carson City Depot for the V&T Railroad, Nevada's most famous railroad.

#### THE VIRGINIA & TRUCKEE RAILROAD

After years of discontent over the stiff freight charges levied by the teamsters, a number of groups initiated proposals to construct a railroad system in this region to link the mines, cities, and logging and milling centers. Railroads were being built all around the rest of the United States, and were proving to be very beneficial. Over a number of years, the Nevada legislature granted charters to various promoters wishing to build the railroad, but none of them managed to begin construction before the deadline mandated in the contract.

In the spring of 1864, the newest branch of the Bank of California was opened in Virginia City, with William Sharon appointed as head agent. Sharon soon became the driving force behind the idea to build a railroad from the Comstock mines to the Carson River mills. As head of the bank in Virginia City, he realized that what was good for the prosperity of the mines, was even better for the prosperity of the bank; more economical ways had to be found to get the ore to the mills and the supplies to the mines if mining on the Comstock was to remain profitable.

In 1865, he met in San Francisco with Darius Ogden Mills (president of the Bank of California) and William C. Ralston (cashier for the bank and a financial genius) to convince them of the need for this railroad. They agreed, and all that remained to be done was to locate the route of the railroad and apply for the charter to build it, but Sharon's plan was even broader. He meant to acquire the wealth of the Comstock for the Bank of California.

Sharon undertook and accomplished "one of the shrewdest financial coups of all the buccaneering saga of nineteenth century American finance. He set about acquiring for the bank possession of all the reducing mills in the Nevada bonanzas. Most of these were in hard straits due to the declining production of the mines, and with infinite guile, Sharon allowed their owners to overextend themselves and write overdrafts against the Bank's Virginia City branch until, turning on the mill owners with the ferocity of the grey wolf, he was able to foreclose on seven of the biggest mills on the banks of the Carson River. These were organized into the Union Mining and Milling Company, and, within two years were joined by ten lesser properties, so that by the year 1869 the Bank of California, without in any way involving itself in the speculative business of mining precious metals, a form of investment which met with the implacable

disapproval of Mills, still had an absolute strangle hold on the mining industry in the Comstock. Without credit from the monopolistic bank, no mine in all the Comstock could operate, and unless its ores were reduced in the mills controlled by the bank there would, it was explained, be no credit forthcoming" (Beebe and Clegg, 1949). As a result of these and other actions, Sharon became a powerful, but detested ruler on the Comstock for the next decade. He continued to deal in stock speculation, which eventually brought about his demise.

On March 6, 1868, after a number of changes were made in the route and sufficient funds were raised to assure the railroad's construction, the Nevada Legislature reissued the railroad charter to the newly incorporated Virginia And Truckee Railroad Company, with the Bank of California as major financier and builder. Sharon was a master at fundraising. Along with the bank's funding, Sharon managed to obtain in two months the sum of \$1,200,000 from large personal contributions from himself and other bank heads, the county governments, and the mining companies (to be used as partial credit for rail fees in the future). Under this system "the risks of constructing the road [were] equally shared, even if its direct profits were not [to be] divided" (Lord, 1883).

Surveying of the railroad route began in late 1868. Sharon's now famous December 1968 interview with Isaac E. James, a leading mining surveyor, went as follows: "Can you run a rail from Virginia City to the Carson River?" "Yes." replied James. "Do it then, at once!" ordered Sharon.

In February 1869, construction began on the railroad in Gold Hill. Many of the workmen were Chinese, recently released from labor on the Central Pacific line to the north. Thirty-eight construction camps were established along the 21 miles of road, and by early summer more than 1,200 workmen were spiking down the 40 to 60 pound iron to untreated ties on the standard gage railroad.

One of the greatest problems facing the railroad builders was the 1,575-foot drop in elevation from Virginia City to the Carson River valley. They managed to hold the maximum descending grade to 2.2% by wrapping "the railroad around the hills - with a curvature equivalent to 17 complete circles in the 13.5-mile route between the two points" (Myrick, 1962, v. 1). This, the toughest portion of the entire railroad was completed at a cost of \$1,750,000, or \$83,300 per mile.

The first locomotive arrived in Carson City on August 6, 1869, and track laying commenced there (toward Gold Hill) on September 28. Henry M. Yerington, general manager and superintendent of the railroad, drove a silver spike into a tie to signal the event. On November 29 of that same year, the first train ran between Carson City and Gold Hill.

The rails were rolled in England and shipped around Cape Horn. The locomotives arrived overland from the Baldwin Locomotive Works in Philadelphia. Three of the five locomotives were delivered to Carson City by wagon from Reno: the other two were hauled by ox-drawn wagons from Reno up the Geiger Grade to Virginia City. The ties were cut from Sierran timber, and some of the other rolling stock was obtained from the Central Pacific Railroad.

By January 29, 1870, the railroad extended from Gold Hill to Virginia City, and the Comstock was finally linked to Carson City. Six tunnels were included in this route totalling 2,400 feet.

Originally, the V&T was only to be about 15-20 miles long, from the Comstock to the Carson River mills and to Dayton and perhaps Carson City, but with a transcontinental railroad being built through Reno (it arrived there in 1868) it would have been foolish to neglect a connection with this main line.

Thus, construction of the railroad between Reno and Carson City began on July 22, 1871 in Reno on the Truckee River at the north end of Holcomb Avenue. It connected there with the transcontinental Central Pacific Railroad tracks that lay north of the river at present-day Third Street-Commercial Row (between Center Street and Wells Avenue).

The track reached Steamboat Springs on November 7, 1871; and by August 24, 1872, the V&T linked Virginia City and Carson City to Reno and the rest of the nation. The track stretched along the western border of Washoe Valley to Lakeview Summit, and from there along the western boundary of Eagle Valley before turning eastward into Carson City.

When completed, the railroad stretched a total of 52.2 miles, with 37 additional miles of spurs and siding built to various mines and mills. By 1874, as many as 50 trains travelled on the line each day. During maximum traffic the railroad operated 24 locomotives, 10 passenger cars, 4 express cars, and 361 freight cars (including ore cars). Wood, hay, machinery, and ice were the main commodities hauled from Reno, Washoe Valley, and Carson City up to Virginia City. Virtually all outgoing freight from Virginia City was ore bound for processing in the Carson River mills near Empire.

The V&T's fortune was inextricably tied to production on the Comstock. 1876 and 1877 were the best years--then came the slump. For the next 20 years the railroad managed to operate on a subsistence level by greatly curtailing its service. From 1886 to 1901 many miles of spur tracks were removed.

When the Southern Pacific, which had acquired the Carson & Colorado, built the "Hazen cut-off" in 1905, the V&T was eliminated as a route through Mound House to the transcontinental Southern Pacific line. The V&T then began surveying new routes to such places as Aurora, Masonic, Wabuska, Wellington, and Bridgeport; these routes, however, were never built.

The brief recovery of mining in Virginia City and other parts of Nevada in the early 1900's, and agricultural development in the Carson Valley enabled the V&T to increase its service and to lay additional spurs to Minden in 1906, to the Merrimac Mill on the Carson River in 1910, and to American Flat in the early 1920's. The railroad continued paying dividends until 1924, but deficits were reported each year thereafter until abandonment in 1950. Darius Ogden Mills acquired the railroad in 1933 and kept it running with his personal funds until his death in 1937. Creditors took over in 1938. The Carson City to Virginia City track was pulled up in 1941. The scrap was sold to Japan for \$52,000, which allowed the rest of the line to operate during World War II. In 1950, the railroad was abandoned following extended hearings concerning the lack of money for repairs, upgrading, and inspection requirements. The last train ran to Minden on May 30, 1950. The rest of the track was junked. Much of the rolling stock was sold to other railroads, and some went to motion picture companies. Recently, some of the rolling stock was reacquired and now resides in the V&T Railroad Museum on the south edge of Carson City.

0.1/38.4 Robinson Street intersection. On the right is the Nevada State Museum. This building was constructed in 1866 with sandstone quarried at the Nevada State Prison east of town. It originally housed the U.S. Mint; nearly \$50 million in gold and silver coins bearing the "CC" mint mark were minted here from February 1870 to June 1893. The building then served as a federal assay office until 1933. After that, it stood vacant for a while until a local judge, Clark Guild, persuaded the Nevada Legislature to purchase it for use as a museum.

A historic walking-tour of Carson City is available at the museum bookstore. Another walking tour of the city has been published by David Toll in his 1985 book, The Compleat Nevada Traveler, p. 72-75.

Nugget Casino on the left. LUNCH STOP. To park, turn left on Robinson Street, then turn left again into the parking lot on the east side of the casino. Just inside the main (northwest corner) entrance of the Nugget is one of the finest collections of gold nuggets and crystals in the world.

Just south of the Nugget is the State Library (built in 1891, it served as the U.S. Post Office and Federal Court until 1970), the State Capitol (completed in 1870, Nevada's sixth year of statehood), and the new State Legislature building.

0.0/0.0 FOLLOWING LUNCH AND A MUSEUM TOUR, RETURN NORTH TO THE INTERSECTION OF U.S. HIGHWAYS 395 and 50 to resume the roadlog. PROCEED NORTH ON U.S. HIGHWAY 395. BEGIN MILEAGE AT 0.00.

1.8/1.8 Begin to climb up Lakeview Summit that separates Eagle Valley (Carson City) and Washoe Valley (ahead). Note the old V&T Railroad bed midway up the hillside to the left. The roadlog route now parallels the old V&T line along the western border of Washoe and Pleasant Valleys to Steamboat Springs and on into Reno.

The burned area on the left was due to lightning strikes June 26, 1987.

GET IN RIGHT LANE OF TRAFFIC. PREPARE TO TAKE EASTLAKE BLVD. EXIT.

1.9/3.7 Lakeview Summit (elevation 5,160 feet). Entering Washoe County. Lakeview was established in 1872 by the Virginia and Gold Hill Water Company. It also operated as a flag station for the V&T Railroad, and was a Post Office from 1881 to 1883 and from 1890 to 1894. The Victorian house on the left was that of the watermaster for the

water company. The inverted siphon/pressure pipeline for the Virginia City water supply passes under the highway at this point. (See page 12 of this roadlog for additional information on the inverted siphon and the Comstock water supply.)

- 0.1/3.8 TAKE THE EASTLAKE BLVD. EXIT to the right. At the stop sign TURN LEFT ON EASTLAKE BLVD. and pass under the freeway. At the next stop sign TURN RIGHT ONTO OLD U.S. HIGHWAY 395 (Nevada State Route 429) and proceed north.

You have now descended into Washoe Valley. Washoe Lake is on the right. This shallow natural lake is the result of the saturated condition of the basin-fill. It dried completely during extreme drought once in the 1930's, and almost completely in 1977.

Ore was transported from Virginia City down the Ophir Grade (you can still see the road in the foothills on the right) and westward across a causeway built in the north end of the lake to the Ophir Mill (ahead on the left, at the base of Slide Mountain) prior to the completion of the V&T Railroad to the Carson River.

Note the good view of Slide Mountain with its landslide scar ahead on the left. The most recent slide occurred May 30, 1983 and caused much destruction and one death (more details on this will be given later).

The road follows the base of the Carson Range through Jeffrey pine forests and meadowlands. The burned area in the hills to the left was caused by a lightning-strike fire in the summer of 1980.

- 2.0/5.8 Franktown Road on the left. Continue straight ahead.
- 2.9/8.7 Franktown historical marker on the right.

#### FRANKTOWN

Franktown was founded by Mormons in 1852, a year after Nevada's first settlement at Genoa. Four-acre lots were laid out and the town grew rapidly. In 1857, however, about 350 Mormon families sold their property and returned to Salt Lake City, as directed by Brigham Young. The Mormon settlers received poor compensation for their property; so, in 1862, the town's ex-leader, Orson Hyde, placed a curse on the people of Washoe and Carson Valleys in a letter read to the Utah Legislature, of which he was then a member. The letter read, in part:

"The Lord has signified to me....that as we have been under circumstances that compelled us to submit to your terms, that He will place you under circumstances that will compel you to submit to ours, or do worse....That mill and those land claims were worth \$10,000.... the use of that property, or its increased value since, is \$10,000 more, making our present demand \$20,000....Now if the above sum be sent to me in Great Salt Lake City, in cash, you shall have a clean receipt

therefore, in the shape of honorable quitclaim deeds to all the property owned in Washoe Valley....But if you shall think best to repudiate our demand....all right. We shall not take it up again in this world....[but] this demand of ours, remaining uncanceled....You shall be visited of the Lord of Hosts with thunder and with earthquake and with floods, with pestilence and with famine until your names are not known amongst men, for you have rejected the authority of God.... and given yourselves up to serve the god of this world; to rioting in debauchery, in abominations, drunkenness and corruption....You have chuckled and gloried in taking the property of the Mormons....I have no sordid desire for gold, and have manifested it by my long silence and manifest indifference; and should not say anything now had not the visions of the Almighty stirred up my mind....I care not what our mill and land claims are [worth]....twenty thousand dollars is our demand; and you can pay it to us....and find mercy, if you will thenceforth do right, or despise the demand and perish....Without hypocrisy, deceit or falsehood, I remain as heretofore, a servant of God".

By 1860, however, Franktown was still prospering. A \$250,000 sixty-stamp mill was erected to process Comstock ore, and sawmills west of town supplied lumber to the mines. Franktown declined, as did Washoe City to the north, as the mills closed--it had become cheaper to ship Comstock ore by rail to mills on the Carson River, rather than by wagon to Franktown. By 1880, only five businesses were still operating here. Today, only building foundations and a V&T watertank mark the townsite.

0.1/8.8 Franktown road on the left; crossing Franktown Creek.

On February 2, 1881, heavy rain falling on the mountain snowpack caused a man-made dam on Franktown Creek (about 2 miles above town) to fail. The resulting torrent destroyed most of the settlement and killed a few residents. Granite boulders, gravel, and sand deposits dumped by the floodwaters are still visible along the road. It would seem Orson Hyde's curse had finally descended upon Franktown.

0.8/9.6 Bowers Mansion State park on the left. The mansion is open for tours. There are also picnic and playground areas, and a swimming pool that is fed by water from hot springs issuing from the frontal fault that separates the mountains and valley.

#### BOWERS MANSION

The stories vary about the Bowers' early days on the Comstock and how they actually acquired their great fortune. One version has Sandy Bowers and Mrs. Ellen "Eilley" Gowan, rather simpleminded folk, serving as waiters in a Gold Hill restaurant. Miners who regularly patronized the eatery decided it would be great fun to induce the two to marry, promising them \$1 million in stock certificates if they would go through with it. Sandy and Eilley did marry, and were presented with a bushel of certificates (at this time the certificates were routinely used for wallpaper and fuel in the miners' crude abodes) at the wedding celebration. Not long after, rich veins were struck in the Gold Hill



mines, and the stock certificates became very valuable. The Bowers sold the stock for over \$1 million.

Another version casts Sandy as an illiterate Scottish prospector in Gold Canyon who held claim to a 10-foot wide piece of ground on the Comstock Lode near the original discovery site at Gold Hill. Mrs. Ellen Cowan owned the adjoining claim, and also ran a boarding house for miners. The two married. Their claims were found to be on exceedingly rich ground, and they became very wealthy when they sold their property.

Suddenly millionaires, and easy prey to flatterers and scheming "advisors", they threw a lavish party in Virginia City and then departed for Europe (at the advice of their "friends") to become polished in accordance with their new economic and social station. During this trip, Eilley was presented to the Queen of England in the costliest dress of the day.

In 1861, building commenced on their mansion in Washoe Valley. They were again advised that this was the proper thing to do, and spent several more years abroad purchasing furnishings for the place. The structure alone cost from \$400,000 to \$600,000 to build--with much of that going to middlemen. The windows were French plate; marble mantles were shipped around Cape Horn; and the door knobs were solid silver. The house was finished in 1864.

Sandy was a convivial sort and filled the mansion with guests almost every night, all eating and drinking and dancing to a live orchestra. Naturally, Sandy had no trouble keeping his house full of merrymakers, and soon enough the money ran out. Sandy and Eilley tried adding on rooms to take in summer boarders. They issued invitations to their old "friends" to come stay with them for "\$25 per". The friends quickly vanished. Sandy died in 1868, and Eilley lived on in the mansion, progressively closing more of it off as the money dwindled. It was finally sold "under the sheriff's hammer" to pay off old debts.

Eilley moved back to Virginia City and lived out her days on a meager existence made by telling fortunes. She used the same crystal ball that had "guided" her money-spending decisions through the years of wealth. She died in 1903, the same year that Reno saloonkeeper Henry Ritter bought the mansion property and renovated it into a resort for the public. The warm springs were turned into swimming pools, and some of the rooms into dining and resting areas for weary travelers or private parties. The V&T Railroad ran special trains here for picnickers and other groups.

The mansion was acquired by Washoe County in 1946 for a public museum and park.

0.3/9.9      Bowers Fire Station on the left. Just ahead, the road crosses the debris (boulders, gravel, and sand) from the 1983 mudflow and earlier landslides that have rumbled down Ophir Canyon from Slide Mountain. Note the hummocky terrain of older slide debris. This landscape was thought to be of glacial origin until the mid-1960's.

## SLIDE MOUNTAIN

Slide Mountain is composed mainly of granodiorite (granite) with fractures roughly paralleling the steep eastern face of the mountain. This provides a prime condition for landslides that can be triggered by unseasonably heavy precipitation and/or earthquakes. The material has moved downslope from an elevation of 9,400 feet to 5,000 feet. The large landslide has been active since prehistoric time. Geologists studying the degree of weathering on the slide material can count at least 10 slides or debris flows in the past 100,000 years.

0.5/10.4      Crossing the most recent Ophir Creek mud and debris flow  
of May 30, 1983.

### 1983 OPHIR CREEK DEBRIS FLOW

"At 11:53 or 11:54 A.M. on May 30, 1983, a mass of rock, soil, and vegetation suddenly slid down the steep southeast-facing slope of Slide Mountain. The area of mass movement involved 40 to 50 acres and the movement was very swift. Much of the moving mass slid into the north half of Upper Price Lake, a small pond covering about 4 to 5 acres on Ophir Creek. The sudden movement of debris into the lake created a surge of water that rapidly exited the pond and flowed into Lower Price Lake, and the cumulative contents of both lakes, about 20 to 30 acre-feet of muddy water, rushed down the steep (roughly 25% gradient) canyon of Ophir Creek below the lakes. The flood wave gouged debris from the canyon bottom and sides that consisted mainly of an unconsolidated heterogeneous mass of earlier landslide deposits. It incorporated this debris, mixed with trees and vegetation that lined the canyon floor, into an increasingly abrasive mixture of water and debris that gained momentum as it increased its mass during downstream transit. After about a mile, the channel gradient decreases to about 12 to 13%, but most of the material continued to move and the mass progressively increased as the bulldozing action persisted. After about 8 to 9 minutes of travel, this high-momentum debris wave, with a leading edge about 30 feet tall, reached the canyon mouth [here] where the channel abruptly widens and flattens. After travelling about 2.5 miles at an average velocity of 18 to 20 miles per hour (25 to 30 feet per second), the boulder-laden flood wave encountered and destroyed two homes in its path. It overtook four of five people racing to escape its wrath, killed one and injured the other three. It then continued across this road and downstream depositing large quantities of debris as the channel further expanded onto the fan, and the gradient rapidly decreased. Maximum depth of fill across this road was about 9 feet. About 0.1 mile below this road, the moving mass destroyed one home and seriously damaged two others. Large boulder movement ceased just beyond this line of homes, but fine-grained, viscous run-out moved at least 0.2 mile farther to the edge of and onto the new U.S. 395 freeway, temporarily closing the southbound lanes. Fine-grained run-out continued to and along the west edge of the freeway for at least an hour. The mass movement of material from the slopes of Slide Mountain that began this disaster was probably triggered by increased hydraulic forces in the fractures and joints of the granodiorite bedrock. An abnormally heavy snowpack had been melting rapidly during several preceeding days of above-normal atmospheric temperature" (Glancy and others, 1984).

- 0.4/10.8      Ophir townsite historical marker on the right. Ophir's largest population of 300 was reached around 1862 or 1863. By 1871, only 41 residents were left.

#### THE OPHIR MILL

About 1/4 mile to the east of here on new U.S. Highway 395 are the remains of the Ophir Mill, the largest ore-crushing mill in Washoe Valley for the Comstock mines. It was erected in 1861 at a cost of \$500,000 by the Ophir Mining Company of Virginia City and had 72 stamps. The fuel was timber from the nearby forests, of which the mining company owned thousands of acres; ample water was available in Washoe Valley. Ore was transported from Virginia City down the steep Ophir Grade and across a mile-long wooden causeway built across the north end of Washoe Lake. (When the lake level is low, the stumps of the old pilings that supported the tramway can be seen marking the route.) The mill operated from 1861 to 1866, after which the mills along the Carson River offered more economical processing for the Comstock ore.

- 0.5/11.3      Davis Creek County Park on the left.
- 0.4/11.7      Junction of old and new U.S. Highway 395. TURN LEFT ON NEW U.S. HIGHWAY 395 and CONTINUE NORTH TO RENO.
- 0.2/11.9      On the right, the Winters House, built in 1861 with profits from the Comstock mines, is all that remains of Theodore Winters' ranch, which boasted stables and a race track for thoroughbred horses.

#### THEODORE WINTERS

Theodore Winters was the first man to breed race horses in Nevada, and was for a long time regarded as "King of the Turf". He was a thorough turfman, honest, determined, energetic, and a good judge of men and horses. Some of the most famous races were held between Winters' horses and those of his most determined but unsuccessful Nevada rival, prominent Virginia City attorney Charles Bryan, whose courtroom style and enormous earnings merit discussions of their own. The competition between these two men was fierce, and the lengths to which they went--the scheming, the planning, the cost of buying the finest pedigreed race horses--is legendary.

Winters went on to compete in California at the Bay District Racetrack in San Francisco, and was generally the winner. The crowning event of his career was winning the the American Derby in Chicago with his undefeated racer "Del Rio Rey", bred right here on his Washoe Valley ranch.

The ranch was the site of many social activities. In attendance at an 1864 Christmas party were Governor James W. Nye and Samuel Clemens (Mark Twain). Winters was elected Territorial Representative in 1862. He died in 1906, and the ranch was tied up in inheritance litigation for years.

- 0.9/12.8      Entering Old Washoe City. The old log cabin ahead on the left was built for a movie set.

## WASHOE CITY

Washoe City was founded in 1861 and became the county seat in the same year. It soon became a major lumber- and ore-milling center for the Comstock mines. This general area had some 15 sawmills, 10 stamp mills, and four small towns, Franktown, Ophir, Washoe City, and Galena. The economy was further boosted by judges, lawyers, doctors, and farmers working at their trades in the area. "Restaurants, stores, saloons, livery stables, feed yards, drugstores, post office, bath house and shaving emporium all opened up; and in October 1862 the Washoe Times made its first appearance...churches, a school, and a hospital were built and in 1863 the county built an imposing brick court house and jail" (Paher, 1970, p. 43). By the mid-1860's, the Washoe City population may have reached 6,000 at times. Milling and lumbering activity started to decline in 1862. New mills built along the Carson River and the completion of the V&T Railroad from Carson City to Virginia City in 1869 eliminated the need for the Washoe Valley area mills that had been conducting business with the Comstock mines via wagons on the difficult Ophir Grade. By 1880, the population had declined to about 200.

- 0.5/13.3      On the right is the former Washoe City Jail (stone building). Just behind the building is the abandoned right-of-way of the V&T Railroad.
- 0.5/13.8      Crossing Steamboat Creek which flows north out of Washoe Lake through a deeply incised channel in Washoe Hill, then flows northeastward through Pleasant Valley and Steamboat Hot Springs, and finally along the eastern margin of the Truckee Meadows and into the Truckee River.
- Ascending the south side of Washoe Hill. Little Washoe Lake is on the right.
- 0.4/14.2      Eastlake Blvd. on the right. You are now leaving Washoe Valley and descending into Pleasant Valley.
- The hills in this area are the eroded remains of thick layers of lava flows which erupted from volcanos in the area over millions of years.
- This area of abundant sagebrush and bitterbrush is a winter habitat for the Sierra Nevada muledeer herd. Many artifacts have been found around the summit of Washoe Hill suggesting that early hunters concentrated their hunting activities along this natural game route.
- 1.0/15.2      You are now passing through the center of the Galena mining district.

## GALENA MINING DISTRICT

On the far left (at 10:00) the Commonwealth or Union Mine, site of the original discovery of lead-silver ore in this district, can be seen at the mouth of Galena Canyon. Other mines in this district were located in the Steamboat Hills directly ahead, and in the foothills of the Virginia Range to the right. The

town of Galena was located about 3 miles to the northwest, on the north side of Galena Creek. It was founded as a mining camp in 1860, but later was a center for the lumbering operations in the Carson Range.

The Commonwealth Mine was the major mine in this district; a mill and a smelter were built here soon after the 1860 discovery, but the operation proved unsuccessful and was abandoned. Attempts to revive the district were made in 1906-07, 1911-42, 1943-45, and 1947-56. Lead-silver-zinc-copper ore worth \$232,000 was mined during 1943-45; only minor amounts of ore were shipped during other periods (after Bonham, 1969).

The Commonwealth Mine now belongs to the University of Nevada Mackay School of Mines and is used by the Mining Engineering Department as a teaching facility.

- 0.4/15.6      Crossing Steamboat Creek. Boulder deposits at the edge of the fields to the left (about 10:00) are from the June 11, 1927 flooding of Brown's Creek. A thunderstorm caused the small Grass Lake Reservoir dam (located 4.5 miles upstream) to fail.
- 0.8/16.4      Crossing Galena Creek.
- 0.9/17.3      Ahead, note the pastel colors of the Geiger Grade altered area in the Virginia Range (discussed earlier).
- 2.0/19.3      Steamboat Hot Springs terrace on the left. Note also the steaming wells on the right.

#### STEAMBOAT HOT SPRINGS

The hot springs are about 3 million years old, and get their heat from molten rock that still remains under this area at an unknown depth. Surface water seeps downward along cracks (faults) that cross this area and is heated; then it rises to the surface as steam and hot water.

As the hot water rises, it picks up minerals from the surrounding rocks. When the mineral-laden water reaches the surface, it cools and deposits the minerals as sinter on the terraces. The sinter contains gold, silver, arsenic, antimony, mercury, thallium, tungsten, copper, lead, and zinc. Sulfur, antimony, and mercury were deposited in large enough quantities that they were mined in the past. These hot springs show how metallic ore deposits are formed--water, heat, minerals, and time are the main ingredients needed to form deposits that can be later located and mined.

Man has utilized the springs in many other ways. In the 1850's, the springs had become a favorite camping grounds for westward-bound travelers. By 1857, the name "Steamboat" (named for the puffing sight and sound of the escaping steam) was firmly affixed to this loosely knit area of shanties, liveries, and crude hotels that had cropped up on the Virginia Road. With the discovery of the Comstock Lode in 1859, the Steamboat settlement began to grow. By 1862, the new Geiger-Tilton Toll Road from The Truckee Meadows passed by here before turning eastward toward the Virginia City. In April 1860, Felix Monet claimed the springs and 80 acres of neighboring land as his property. By 1862, Steamboat had a commercial bathhouse, cottages, and a hospital. The neighbors were not



all friendly with each other and fought over their title to the land, which in 1867 resulted in most of the settlement being destroyed by fire. Early in 1871, the resort had been rebuilt and improved upon by Charles Culling (or Cullen) who had won the last round of battles against Dr. Ellis, Monet's successor. A fine hotel, drugstore, cottages, and medicinal baths made this a fashionable spa.

By November of 1871, the V&T Railroad was operating between Reno and Steamboat, and Steamboat's growth mushroomed as it became an important Comstock shipping transfer point. When the railroad was completed south to Carson City in August 1872, Steamboat once again became important mainly as a resort. Following the death of Culling (he fell into a hot spring and was scalded), a string of owners, all promising new attractions and improvements, held title to the resort. The Galena mining "boom" was even promoted in the area, but by 1900 the resort had almost completely deteriorated.

Steamboat Hot Springs Resort still operates today on the east side of U.S. Highway 395. The Steamboat Post Office, established in 1880, is still operating.

The springs at Steamboat are near boiling, and exploration wells drilled since the 1950's have recorded temperatures as high as 442°F at depths greater than 3,000 feet. Many wells have been drilled, at first to supply the spas, then to heat homes. The hot water has also been used as a flameless source of heat for the manufacture of plastic explosives. Recent uses include using steam to generate electricity.

1.3/20.6      Junction U.S. Highway 395 with State Routes 431 and 342.  
CONTINUE AHEAD (NORTH) ON U.S. HIGHWAY 395 TO RENO.

END OF ROADLOG.

## BIBLIOGRAPHY

- Angel, M., ed. (1881) History of Nevada: Thompson and West, Oakland, California.
- Ansari, M. B. (1986) Comstock place names - the names of Storey County, Nevada: Camp Nevada Monograph No. 7, Camp Nevada, Reno, Nevada.
- Basso, D., ed. (1979) Nevada historical marker guidebook: Falcon Hill Press, Sparks, Nevada.
- Basso, D. (1986) Ghost trails in our midst: Falcon Hill Press, Sparks, Nevada.
- Beebe, L. and Clegg, C. (1949) Virginia & Truckee: Grahame Hardy; reprinted in 1980 by Howell-North Books, La Jolla, California.
- Bonham, H. F. (1969) Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines and Geology Bulletin 70.
- Carlson, H. S. (1974) Nevada place names: University of Nevada Press, Reno, Nevada.
- Curran, H. (1982) Fearful crossing - The Central Overland Trail through Nevada: Great Basin Press, Reno, Nevada .
- Davis, S. P., ed. (1913) The history of Nevada, Volumes 1 and 2: Elms Publishing Company, Los Angeles, California; reprinted by Nevada Publications, Las Vegas, Nevada.
- Earl, P. I. (1986) This was Nevada: Nevada Historical Society, Reno, Nevada.
- Fiero, B. (1986) Geology of the Great Basin: University of Nevada Press, Reno, Nevada.
- Galloway, J. D. (1947) Early engineering works contributory to the Comstock: Nevada Bureau of Mines and Geology Bulletin 45.
- Garside, L. J. and Schilling, J. H. (1979) Thermal waters of Nevada: Nevada Bureau of Mines and Geology Bulletin 91.
- Glancy, P. A., Harrill, J. R., Jacobson, R. L., and Mifflin, M. D. (1984) Guidebook for a field tour of the hydrogeology of the Carson and Truckee River basins, Nevada, in Western Geological Excursions Guidebook - Volume 3 (Fieldtrip No. 4): Geological Society of America Annual Meeting, November 5-8, 1984, Reno, Nevada, p. 55-146.

- Glass, M. E. and Glass, A. (1975) Western Nevada: Nevada Historical Society Guidebook Series.
- Glass, M. E. and Glass, A. (1983) Touring Nevada: University of Nevada Press, Reno, Nevada.
- Helfrich, D., Helfrich, H., and Hunt, T., compilers (1984) Emigrant trails west: Trails West, Inc., Reno, Nevada.
- Houghton, J. G., Sakamoto, C. M., and Gifford, R. O. (1975) Nevada's weather and climate: Nevada Bureau of Mines and Geology Special Publication 2.
- Houghton, S. G. (1976) A trace of desert waters - The Great Basin story: Arthur H. Clark Company, Glendale, California; reprinted by Howe Brothers, Salt Lake City, Utah.
- Hudson, D. M. and Carr, T. (1987) Field Trip No. 11 - Comstock Lode/Steamboat Springs precious metals deposits, Nevada, in Bulk mineable precious metal deposits of the western United States: Symposium of the Geological Society of Nevada, April 6-8, 1987, Reno, Nevada, p. 395-418.
- Hunt, T. H. (1974) Ghost trails to California: American West Publishing Company, Palo Alto, California.
- Lord, E. (1883) Comstock mining and miners: U.S. Geological Survey Monograph 4.
- Mack, E. M. and Sawyer, B. W. (1965) Here is Nevada - A history of the state: Western Printing & Publishing Company, Sparks, Nevada.
- Moore, J. G. and Archbold, N. L. (1969) Geology and mineral deposits of Lyon, Douglas, and Ormsby Counties, Nevada: Nevada Bureau of Mines and Geology Bulletin 75.
- Myrick, D. F. (1962-63) Railroads of Nevada and eastern California, 2 volumes: Howell-North Books, Berkeley, California.
- Nevada Department of Transportation (1986) Nevada map atlas (sixth edition): Nevada Department of Transportation, Carson City, Nevada.
- Nevada Emigrant Trail Marking Committee, Inc. (1976) The Overland Emigrant Trail to California: Nevada Historical Society, Reno, Nevada.
- Paher, S. W. (1970) Nevada ghost towns and mining camps: Howell-North Books, Berkeley, California.
- Paher, S.W. (1980) Nevada - an annotated bibliography: Nevada Publications, Las Vegas, Nevada.

- Shamberger, H. A. (1972) The story of the water supply for the Comstock: U.S. Geological Survey Professional Paper 779.
- Shinn, C. H. (1896, reprinted 1980) The story of the mine - as illustrated by the great Comstock Lode of Nevada: University of Nevada Press, Reno, Nevada.
- Slemmons, D. B., Jones, A. E., and Gimlett, J. I. (1965) Catalog of Nevada earthquakes, 1852-1960: Seismological Society of America Bulletin, v. 55, no. 2.
- Smith, G. H. (1943) The history of the Comstock Lode, 1850-1920: Nevada Bureau of Mines and Geology Bulletin 37.
- Smith, A. M. (1932) The mines and mills of Silver City, Nevada: Nevada Bureau of Mines and Geology Bulletin 15.
- Stewart, J. H. (1980) Geology of Nevada: Nevada Bureau of Mines and Geology Special Publication 4.
- Thompson & West, publishers (1881) History of Nevada with illustrations and biographical sketches of its prominent men and pioneers: Thompson and West, Oakland, California; reprinted in 1958 by Howell-North Books, Berkeley, California.
- Toll, D. W. (1985) The compleat Nevada traveller: Gold Hill Publishing Company, Inc., Gold Hill, Nevada.
- Townley, J. M. (1983) Tough little town on the Truckee - Reno, 1868-1900: Great Basin Studies Center, Jamison Station Press, Reno, Nevada.
- Townley, J. M. (1984) The Comstock guidebook: Jamison Station Press, Reno, Nevada.
- Twain, Mark (1872) Roughing it: American Publishing Company, Hartford, Connecticut; New American Library, Inc., New York, New York.
- Varna Enterprises, Inc. (1972) Map of pioneer trails, 1541-1876: Varna Enterprises, Van Nuys, California.
- Weimer, B. S. (1987) Geologic roadlogs: Reno-Steamboat Springs, Steamboat-Virginia City-Carson City-Steamboat, Steamboat-Carson City-Carson Valley-Daggett Pass-Lake Tahoe-Mount Rose Summit-Steamboat, Reno-Wadsworth-Pyramid Lake-Reno: Nevada Bureau of Mines and Geology Open File Report 87-4.