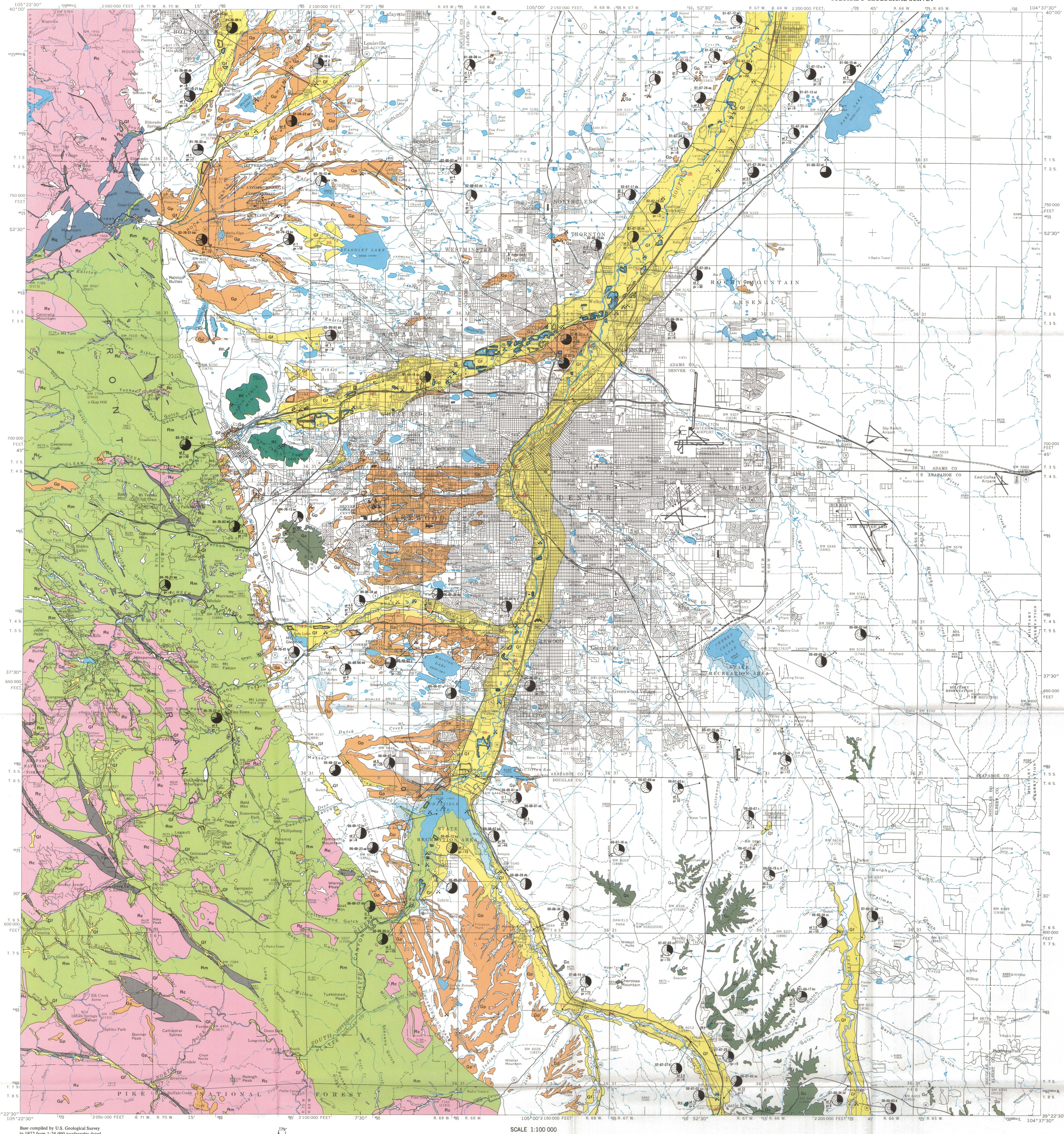
Prepared in cooperation with the
COLORADO GEOLOGICAL SURVEY



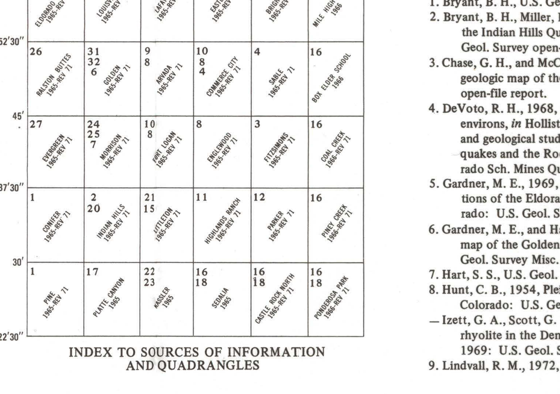
Base compiled by U.S. Geological Survey in 1972 from 1:24,000 quadrangles dated 1965–1966. Limited revision from aerial photographs taken 1971
50,000-foot grid based on Colorado coordinate system, central zone
5000-meter Universal Transverse Meracator grid ticks, zone 13, shown in blue
Metric elevations are shown in parentheses

APPROXIMATE MEAN DECLINATION, 1974

SCALE 1:100 000

1 0 1 2 3 4 5 MILES
5000 0 5000 10,000 15,000 20,000 25,000 FEET
1 0 1 2 3 4 5 KILOMETERS

DATUM IS MEAN SEA LEVEL



INDEX TO SOURCES OF INFORMATION AND QUADRANGLES

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MAP SHOWING POTENTIAL SOURCES OF GRAVEL AND CRUSHED-ROCK AGGREGATE IN THE GREATER DENVER AREA, FRONT RANGE URBAN CORRIDOR, COLORADO

By
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1974

INTRODUCTION

Gravel and (or) crushed-rock aggregate are essential commodities for urban development, but supplies in many places are exhausted or otherwise eliminated by urban growth. Gravel resources may be exhausted by exploitation, covered by urban spread, or eliminated from production by zoning. This conflict between a growing need and a progressively reduced supply can be forestalled by informed land-use planning. Fundamental to intelligent decisions on land use is knowledge of the physical character, distribution, and quantity of the gravel resources of an area, and of the alternative resource of rock suitable for crushing. This map has been prepared to supply data basic to land-use planning in the Front Range Urban Corridor.

High-quality gravel in the Front Range Urban Corridor is restricted largely to areas beneath flood plains of major streams and to low terraces along these streams. Gravel of lower, but locally high, quality is widespread in higher terraces and on pediments (mesas or benches); the quality of some of this gravel can be improved by washing, crushing, and grading. Cemented gravel (conglomerate), especially the less well cemented phases, also provides local sources of generally low quality gravel.

Rock suitable for processing into crushed-rock aggregate is plentiful in the older rocks of the mountains and in certain volcanic rocks of the foothills and plains.

Potential sources of gravel or of aggregate have been grouped into seven map units—three of gravel and four of crushed-rock aggregate. A potential source of gravel, as here defined and mapped, contains 20 percent or more of granule- and pebble-size stones (smaller than 2½ in. or 6.4 cm, but retained on a No. 10 U.S. Standard sieve). The minimum gravel content was placed arbitrarily at 20 percent of the deposit because this is the most likely economic limit under the most adverse foreseeable conditions. The map units are based on differences in physical characteristics, which, in turn, determine relative quality for different uses.

SOURCES OF GRAVEL

The physical characteristics that have been used to divide the potential sources of gravel into the three groups or units shown on the map are dependent on age of the deposits, which also primarily determines their topographic location. The highest quality gravel is the youngest, the least altered (soundest), and the least cemented and contains the least amount of calcium carbonate in the form of interstitial caliche. These are the gravel deposits of the flood plains and lower terraces of the major streams and their tributaries. The poorest quality gravel, being older and more weathered, contains an abundance of unsound stones and much calcium carbonate. This gravel forms a few high terraces, covers pediments (remnants form mesa tops, benchlands, and interstream divides less than 325 ft or 99 m above present stream level), and occurs as high-level remnants in the mountains. The oldest gravel commonly is well cemented and difficult to disaggregate and, therefore, is unlikely to be used as a source of commercial gravel.

The quality of the gravel for different uses is further determined by the types of rock it contains. These types reflect the rocks in the source area of the stream that carried the gravel. Some rocks are more resistant to abrasion than others, some are more resistant to chemical alteration than others, and some are reactive with high-alkali cement, though others are not.

Because the physical characteristics that determine relative quality for different uses are determined by source area as well as age, the gravel of units other than the cemented gravel is described by stream-valley location. The major gravel-producing streams are the South Platte River and its tributaries—Clear Creek, Bear Creek, Plum Creek, and Cherry Creek—and South Boulder Creek and Coal Creek, which flow northward to join the Saint Vrain River, a major tributary of the South Platte.

GRAVEL DEPOSITS UNDERLYING FLOOD PLAINS AND TERRACES

South Boulder Creek. – South Boulder Creek emerges from the mountains a few miles south of the north edge of the mapped area and flows northeastward. It drains a terrain mostly of Boulder Creek Granite but partly of quartzite; these lithologies predominate in the gravel. Granule and pebble gravel constitute about 50 percent of most deposits; sand and oversize gravel (cobbles and boulders) make up about 25 percent each.

Coal Creek. – Coal Creek flows from the mountains a few miles south of South Boulder Creek, and it, too, drains a terrain of Boulder Creek Granite and quartzite of Coal Creek, a terrain in which quartzite predominates over granite. East of the mountains, Coal Creek has cut its channel downward through an older cobbly and bouldery (80 percent) quartzitic pediment deposit into the underlying sedimentary bedrock. Cobbles and boulders (oversize material) constitute nearly half of the gravel along Coal Creek; granules and pebbles form only about a third. The remainder is sand. The unusually abundant oversize material probably is derived from the older pediment gravel.

South Platte River. – The South Platte River emerges from the mountains southwest of Denver and flows northeastward through the central part of the Denver metropolitan area. Much of the flood plain of the South Platte River in the Denver area has been covered by urban development, and large volumes of high-quality gravel have been eliminated from use. However, gravel along the South Platte has been much used, upstream from the junction of Bear Creek and downstream from the junction of Clear Creek. This gravel contains abundant stones of granitic rocks, quartz, and pegmatite, and lesser amounts of gneiss and schist. In the Denver metropolitan area, pebble and granule gravel generally constitute about 50 percent of the deposit, and sand about 50 percent. Fines and oversize material generally are lacking or constitute negligible amounts of the deposit. The deposit commonly ranges from about 20 to 35 feet (6–11 m) in thickness, but locally, in Brighton, is as much as 50 feet (15 m) thick.

Clear Creek. – The valley of Clear Creek has been a major source of gravel for many years. Although a substantial part of this deposit has been exhausted, much high-quality gravel remains. Clear Creek drains an area composed mostly of metamorphic rocks but also partly of granitic rocks. Granitic rocks, however, constitute about 60–70 percent of the gravel and metamorphic rocks only 15–30 percent. This reversal of proportions between source area and gravel constituents probably reflects the difference in resistance to abrasion and disintegration between the granitic rocks and the metamorphic rocks. Near the mountain front and for several miles downstream, cobbles and boulders form about one-third of the gravel, granule and pebble gravel about one-half, and sand and fines the remainder. The percentage of oversize material decreases downstream from the mountain front, however, and near the junction with the South Platte River, the gravel of Clear Creek contains little oversize material and more pebble gravel. The amount of sand in the deposit remains about the same throughout. The thickness of the deposit commonly ranges from 20 to 30 feet (6–9 m), but decreases to 7 to 10 feet (2–3 m) near the margins of the valley.

Bear Creek. – Bear Creek and its tributary, Turkey Creek, also drain an area predominantly of gneiss and schist that contains scattered large bodies of granitic rock. The gravel east of the mountains has been used less than the gravel along either Clear Creek or the main stem of the South Platte River. Cobbles and boulders compose more than 25 percent of the gravel near the mountain front, but the percentage of oversize material decreases rapidly downstream and constitutes a negligible part of the deposit only a few miles from the mountain front. The granule and pebble fraction of the gravel along Bear Creek is consistently near 50 percent. The deposit commonly is 15–20 feet (4.6–6 m) thick.

Plum Creek. – Plum Creek is a north-flowing stream that joins the South Platte River south of Littleton. Its East Fork heads on the north side of the South Platte–Arkansas River drainage divide to the south, and its West Fork heads in the mountains south of the map area. Much of the gravel along Plum Creek has been derived from the Dawson Formation, which is composed almost entirely of reworked granitic material. Gravel derived from the mountains also consists of granite, inasmuch as the mountainous part of the Plum Creek drainage is underlain by Pikes Peak Granite. Gravel in the area drained by the East Fork contains pebbles of rhyolitic ash-flow tuff, a dense silicic volcanic rock that is likely to react deleteriously with high-alkali cement if used for concrete aggregate. Granule and pebble sizes compose about 50 percent of the gravel along Plum Creek. Sand composes about 50 percent. The gravel of Plum Creek commonly is 15–35 feet (4.6–11 m) thick but locally is as much as 60 feet (18 m) thick.

Cherry Creek. – Cherry Creek also heads on the north side of the South Platte–Arkansas River drainage divide, east of Plum Creek, and flows northward to join the South Platte in Denver. Gravel, except for very local pockets, forms a significant part of the Cherry Creek sediments only in Douglas County. This gravel is derived from the Dawson Formation and the Castle Rock Conglomerate and is composed mainly of granitic fragments with only minor volcanic constituents. Although granule and pebble sizes compose about 50 percent of the Cherry Creek deposits, the gravel is predominantly in the small size ranges and is unlikely to be much utilized as a source of commercial gravel. The Cherry Creek deposits range from 20 to more than 50 feet (6–15 m) in thickness.

GRAVEL DEPOSITS OF PEDIMENTS (MESA TOPS) AND UPLAND TERTIARY REMNANTS IN THE MOUNTAINS

The gravel deposits of this unit lie mostly on broad flats 80–100 feet (24–30 m) or more above stream level between the mountain front and the South Platte River. These deposits commonly contain large amounts of chalky calcium carbonate, especially in the upper few feet. Stones other than quartzite commonly have been downgraded physically and chemically by the processes of weathering. The deposits generally are 10–20 feet (3–6 m) thick, but they are not likely to be sources of high-quality gravel except locally. In the mountains, scattered patches of older gravel lie several hundreds of feet above main stream levels.

Most of this gravel was deposited by streams emerging from the mountains, shifting from side to side and probably merging laterally. The deposits, therefore, reflect the character of the rocks in adjacent drainage areas to the west. At Rocky Flats, east of Coal Creek Canyon, for example, the deposits contain as much as 80-percent quartzite, which was derived from the mountains adjacent to Coal Creek.

The amount of oversize material (cobbles and boulders) in the gravel of this unit is highly variable and ranges from zero to more than 25 percent. Deposits at Rocky Flats and adjacent to Bear Creek contain large amounts of oversize material, but deposits adjacent to the South Platte River and Plum Creek contain little or no oversize material and, generally, more than 50 percent of granule and pebble sizes.

CEMENTED GRAVEL (CONGLOMERATE)

Cemented gravel (conglomerate) is a generally inferior source of gravel in the Front Range Urban Corridor and is limited in its occurrence to three general areas. Conglomerate forms the upper part of Green Mountain, west of Denver. The lower 50 feet (15 m) of this deposit is a cobble and boulder conglomerate that contains some andesite (volcanic rock) pebbles, as well as gneiss, pegmatite, quartzite, and sandstone (Scott, 1972). Andesite decreases in abundance upward. The lower 50 feet (15 m) of conglomerate is overlain by 150 feet (46 m) of sandstone and conglomerate, overlain by 250 feet (76 m) of interbedded thin-bedded claystone, siltstone, sandstone, and conglomerate, which, in turn, is overlain by about 200 feet (61 m) of conglomerate in the upper part of the formation.

A well-cemented conglomerate, the Castle Rock Conglomerate, underlies the divide between Plum Creek and Cherry Creek. This conglomerate is generally less than 50 feet (15 m) thick. The most abundant pebbles are granite, gneiss, quartzite, and white vein quartz. There are some chert pebbles and rhyolitic ash-flow tuff pebbles (Richardson, 1915). Although the deposit contains some boulders 1 foot (30 cm) or more in diameter, pebbles slightly larger than 2 inches (5 cm) are most common. The sandy matrix of the conglomerate is cemented by silica; hence, most of the formation would have to be quarried and crushed for reduction to aggregate. Locally, however, the basal part of the deposit is less well cemented than elsewhere and, hence, is more exploitable.

Conglomeratic phases in the Dawson Formation form two extensive areas of outcrop—one is the northwesternmost area of this unit in Douglas County, and the other extends from a point southeast of Parker to the El Paso County line. Granitic stones constitute most of these deposits; little material is oversize.

SOURCES OF CRUSHED-ROCK AGGREGATE

Four kinds of rock are potential sources of crushed-rock aggregate. The rocks of three of these units—quartzite, coarse-grained igneous rocks, and foliated metamorphic rocks—occur only in the mountains. Fine-grained igneous rocks are found only east of the mountains.

QUARTZITE

The quartzite of Coal Creek probably is one of the best potential sources of high-quality crushed-rock aggregate in the Front Range Urban Corridor. The quartzite, containing some interlayered schist, forms a northeast-trending belt, about 2 miles wide, across Coal Creek near its mouth. This quartzite is white, red gray, and black, fine to coarse grained, conglomeratic, well bedded, and very hard.

FINE-GRAINED IGNEOUS ROCKS

North and South Table Mountains. – Dark-gray porphyritic lava flows, suitable for crushed-rock aggregate, cap North and South Table Mountains near Golden. The rocks are hard and dense, have a fine-grained matrix, and are very resistant to abrasion. The capping flow on North and South Table Mountains has been extensively quarried for riprap, ballast, and crushed rock. Three flows are present on both mountains, but the lowermost flow wedges out southward and is nonexistent on the south rim of South Table Mountain. The flows aggregate about 240 feet (73 m) in thickness.

Ralston dike. – The probable eruptive source of the Table Mountain flows is the Ralston dike, a massive medium-grained dark-gray igneous rock that crops out near Upper Long Lake, northwest of North Table Mountain. This rock is similar in mineralogy, chemistry, and physical characteristics (hard, dense, and abrasion resistant) to the Table Mountain flows, but the grain size is somewhat coarser.

Rhyolitic ash-flow tuff. – Light-gray fine-grained volcanic rock, classified as rhyolitic ash-flow tuff and containing 74 percent silica, forms a caprock on three small buttes north and northwest of Castle Rock. Most of this rock is composed of devitrified glass shards; it is likely to be reactive in concrete and, therefore, would be unsuitable as concrete aggregate unless special low-alkali cement is used. The rock has been quarried extensively for use as crushed rock for road metal, and, to a lesser extent, as building stone. It is more widespread in the Colorado Springs–Castle Rock area (I–857–A) to the south of this map area. This rock is part of a once-continuous ash-flow sheet probably less than 50 feet (15 m) thick (Izett, Scott, and Obradovich, 1969).

COARSE-GRAINED IGNEOUS ROCKS

Coarse-grained igneous rocks, mostly granitic in composition, are distributed widely in the mountains. Some of them are potential sources for crushed-rock aggregate. For the most part, they represent intrusive formations of three different ages—the Pikes Peak Granite, the Silver Plume Quartz Monzonite, and the Boulder Creek Granodiorite. The Silver Plume, which is the best source of crushed-rock aggregate among the coarse-grained igneous rocks, forms small intrusive bodies mostly in the mountains between the north margin of the Pikes Peak Granite and the town of Morrison. The Pikes Peak forms a large batholith in the southern third of the Front Range Urban Corridor, and the Boulder Creek forms a large batholith in the central part of the Corridor and several isolated bodies in other parts of the mountain area.

All these coarse-grained igneous rocks commonly are weathered or decomposed by chemical alteration to depths of tens of feet in many places beneath ridgelines and upland surfaces. In the canyon walls and valley bottoms, the rocks tend to be less altered. The decomposed rock consists largely of separated but nearly unaltered mineral grains and is, in effect, simply a disaggregated granite. In places, however, the mineral constituents are altered to clay. Disaggregated granite has been used extensively in some parts of the mountains as road-surfacing material.

On crushing, some of the coarser grained igneous rocks break along mineral-grain boundaries and, hence, lack sufficient toughness to make good crushed aggregate. This characteristic is especially true of the Pikes Peak Granite. Laboratory tests, therefore, may be needed to verify potential aggregate sources in these rocks. Much of the unweathered coarse-grained igneous rock, however, particularly the Silver Plume Quartz Monzonite, constitutes a large and widespread potential source of crushed-rock aggregate.

Silver Plume Quartz Monzonite. – The Silver Plume Quartz Monzonite forms generally small irregular bodies between the main batholiths of the Boulder Creek Granodiorite and Pikes Peak Granite. The rock is gray to pinkish buff, commonly medium grained but locally grades from fine to coarse grained (Sheridan, Reed, and Bryant, 1972), and generally has tightly interlocked crystals. In parts of the rock, planar arrangements of feldspar crystals form vague to pronounced foliation.

Boulder Creek Granodiorite. – The Boulder Creek Granodiorite likely ranks below the Silver Plume in quality as a potential source of crushed-rock aggregate, but some parts will provide crushed rock of high quality. It forms a large, nearly continuous, batholith lying mainly north of Coal Creek. Boulder Creek also occurs as scattered small bodies south of the main body. The Boulder Creek is light- to dark-gray medium- to fine-grained locally porphyritic granite, granodiorite, or quartz monzonite; the quartz monzonite is a border phase at the southern margin of the batholith. The Boulder Creek commonly is foliated by flow structure.

Pikes Peak Granite. – The coarse grain of much of the Pikes Peak Granite facilitates mechanical and chemical disintegration of this rock and renders it generally unsuitable as a source of crushed-rock aggregate. The naturally disintegrated Pikes Peak Granite, though, has been extensively used as road-surfacing material on secondary roads. The Pikes Peak Granite forms virtually all of the mountains of the Corridor from the North Fork South Platte River southward. Most of the Pikes Peak Granite is pink to reddish-tan medium- to coarse-grained granitic rock. Fine- to medium-grained phases are abundant locally, especially in the southern part of the batholith.

METAMORPHIC ROCKS

Metamorphic rocks, mostly gneisses and schists, compose those parts of the mountains not formed of igneous rocks. The metamorphic rocks range widely in their suitability as sources of crushed-rock aggregate. At present, gneisses are being exploited locally. The metamorphic rocks lie mainly between the Pikes Peak and Boulder Creek batholiths, between Platte Canyon and Coal Creek. The metamorphic rocks, other than the quartzite of Coal Creek, include a wide variety of mostly biotitic gneisses, some migmatites, some quartzo-feldspathic gneisses generally lacking in biotite, and some calc-silicate gneisses. Most of the gneisses are interlayered with a variety of rock types, including schists. Mica schist forms a large area mainly between Golden Gate Canyon and Ralston Creek. Hornblendite and amphibolite occur as discrete bodies and as interlayers with other metamorphic rocks.

These varied metamorphic rocks probably are mainly reconstituted older sedimentary rocks. Light-colored gneisses, amphibolites, and hornblendites probably are reconstituted volcanic rocks.

EXPLANATION OF MAP UNITS

Gf GRAVEL DEPOSITS UNDERLYING FLOOD PLAINS AND TERRACES – Source of best quality gravel for concrete aggregate and road metal. Pebbles generally well rounded and sound; gravel contains little interstitial lime ($CaCO_3$). Pebble composition reflects kinds of bedrock exposed in source area; gneiss, granite, pegmatite, and quartzite are most common. Little or no reactive constituents

Gp GRAVEL DEPOSITS OF PEDIMENTS (MESA TOPS) AND UPLAND TERTIARY REMNANTS IN THE MOUNTAINS – Generally poor quality for concrete aggregate; locally useful as a source of road metal or subgrade material. Cobbly and bouldery near the mountains; pebbly to sandy farther east. Many unsound stones. Much caliche lime ($CaCO_3$) as cement and as coatings on stones

Gc CEMENTED GRAVEL (CONGLOMERATE) – Difficult to disaggregate for use as gravel. Less well cemented phases have been used locally as road metal. Conglomeratic layers in the Dawson Formation in Arapahoe County provide local sources of gravel. Composed mainly of Precambrian rock types slightly to moderately well cemented

Castle Rock Conglomerate in Douglas and Elbert Counties commonly is very well cemented, in part by siliceous cement, but locally its base is only slightly cemented. Contains stones of volcanic, quartzitic, and crystalline rocks

Green Mountain Conglomerate, on Green Mountain in Jefferson County, contains abundant cobbles, boulders, and volcanic material. Composed of gneiss, pegmatite, quartzite, and sandstone. Little is known of the variations in natural cementation in this conglomerate because of the poor quality of exposures

Rf FINE-GRAINED IGNEOUS ROCKS – Dikes, flows, sills, and ash-flow tuffs occur in a number of localities adjacent to the mountains. North and South Table Mountains, near Golden, are capped by dark-gray porphyritic lavas that total as much as 240 feet (73 m) in thickness on North Table Mountain and 150 feet (46 m) in thickness on South Table Mountain. This rock has been quarried and crushed in the past. Similar dike rock forms knobs and ridges surrounding and southeast of Upper Long Lake, between Ralston Creek and Leyden Creek north of Golden. Light-gray rhyolitic ash-flow tuff as much as 15 feet (4.6 m) thick locally underlies the Castle Rock Conglomerate and caps buttes or mesas southward from a point about 6 miles (10 km) north of Castle Rock. This rock has been quarried both as building stone and as a source of crushed aggregate for road metal, but its suitability for concrete aggregate is diminished by reactive constituents

Rc COARSE-GRAINED IGNEOUS ROCKS – Crop out widely in the mountains. These rocks, with the probable exceptions of the Pikes Peak Granite and the pegmatites, are potential sources of high-quality crushed-rock aggregate. The Pikes Peak Granite is a nearly homogeneous pink granite or quartz monzonite that forms most of the mountainous area south of the North Fork South Platte River. The Silver Plume is a gray to pink quartz monzonite that forms scattered bodies between the Pikes Peak Granite and the town of Evergreen. The Boulder Creek forms scattered granodiorite bodies between the North Fork South Platte River and Coal Creek and forms a nearly continuous body north from Coal Creek. Quartz monzonite locally forms a border phase of the Boulder Creek. Small bodies of pegmatite, a very coarse grained dike rock, are abundant in the mountains but are generally not suitable for crushed aggregate

Rm METAMORPHIC ROCKS – Foliated metamorphic rocks underlie most of the mountainous part of the area from Jarre Creek north. These rocks generally are not as good a source of crushed-rock aggregate as the igneous rocks, but some of the more gneissic rocks have been so utilized. Biotite gneiss is the most abundant rock type. Mica schist, generally unsuitable for crushing, underlies 18–20 square miles (29–32 km^2) mainly between Golden Gate Canyon and Ralston Creek. Large areas of quartzo-feldspathic gneiss, calc-silicate gneiss, and amphibolite or hornblendite lie mostly south of Clear Creek. These rocks have highly varied suitability for crushing

Rq QUARTZITE – The quartzite of Coal Creek near the mouth of Coal Creek Canyon between Golden and Boulder is a white, gray, red, and black fine- to coarse-grained well-bedded quartzite that is a potential source of high-quality crushed-rock aggregate

SHEAR ZONE – Crushed or broken rock along a major fault; generally much altered. Undesirable as a source of crushed-rock aggregate, but sometimes excavated for road subgrade material or backfill

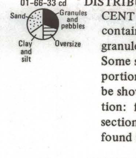
BOUNDARY OF DEPOSIT OR LINE OF CONTACT BETWEEN DEPOSITS

BURIED OR ABANDONED STREAM CHANNEL UNDER BEEBE DRAW UNDERLAIN BY GRAVEL – Commonly at a depth of 35–50 feet (11–15 m)

LARGE GRAVEL PIT

GRAVEL PIT – Either operating or abandoned

ROCK QUARRY

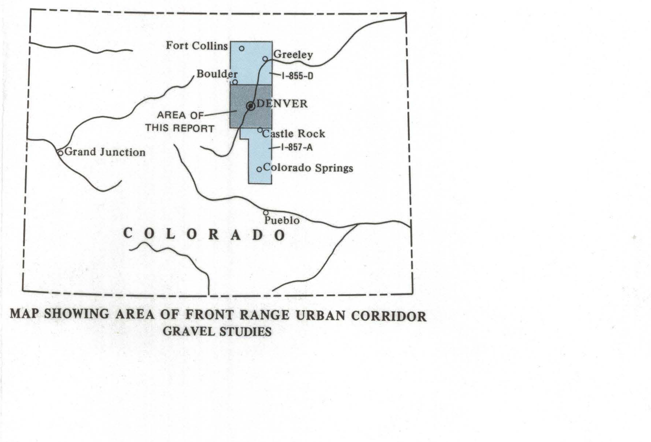


DISTRIBUTION OF GRAIN SIZES IN GRAVEL DEPOSIT, IN PERCENT BY WEIGHT – Diagram indicates analysis of a sample that contained 15-percent clay and silt, 35-percent sand, 30-percent granules and pebbles, and 20-percent oversize (cobbles and boulders). Some sampled localities are indicated where extent of gravel-bearing portion of formation is not known, or where extent is too small to be shown on the map. Number adjacent to diagram is land-net location: first number is township, second number is range, third is section, and letters are sectional subdivisions. Numerical data are found in accompanying table

sd 2 / gv 8 / cl — ABBREVIATED LOG OF DEPOSIT – From data furnished by Colorado Division of Highways and U.S. Geological Survey. Thicknesses shown are in feet

cl	Clay	sd	Sand	ss	Sandstone
gv	Gravel	sh	Shale	st	Silt

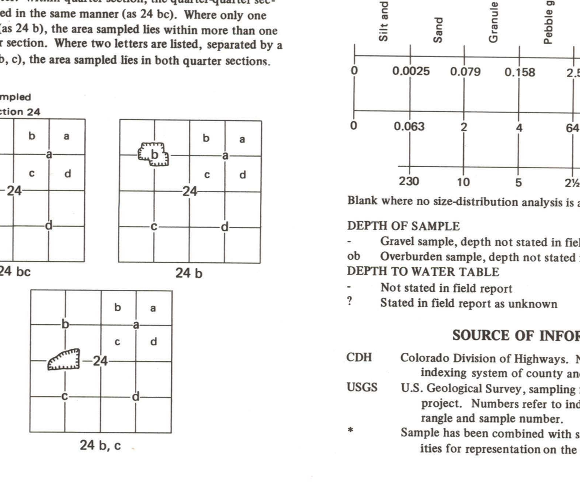
20 THICKNESS OF GRAVEL DEPOSIT – In feet



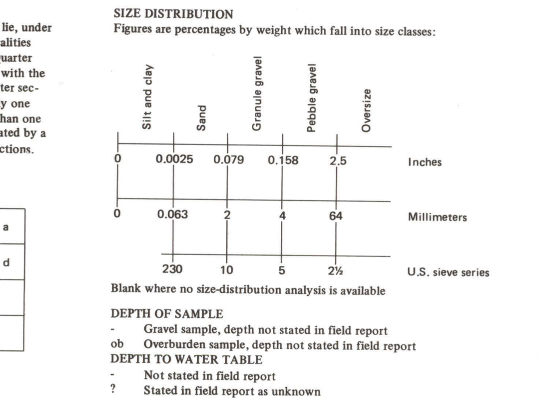
MAP SHOWING AREA OF FRONT RANGE URBAN CORRIDOR GRAVEL STUDIES

EXPLANATION OF TABLE

SAMPLE LOCALITY
Sample localities are listed by the section in which they lie, under the heading of township and range. Within the section, localities are listed by quarter section and quarter-quarter section. Quarter sections are lettered a, b, c, d, counterclockwise, beginning with the northeast quarter. Within quarter section, the quarter-quarter sections are lettered in the same manner (as 24 bc). Where only one letter is listed (as 24 b), the area sampled lies within more than one quarter-quarter section. Where two letters are listed, separated by a comma (as 24 b, c), the area sampled lies in both quarter sections.



SIZE DISTRIBUTION
Figures are percentages by weight which fall into size classes:



Blank where no size-distribution analysis is available

DEPTH OF SAMPLE
- Gravel sample, depth not stated in field report
ob Overburden sample, depth not stated in field report

DEPTH TO WATER TABLE
- Not stated in field report
? Stated in field report as unknown

SOURCE OF INFORMATION
CDH Colorado Division of Highways. Numbers refer to their indexing system of county and pit number.
USGS U.S. Geological Survey, sampling for the purpose of this project. Numbers refer to indexing system of quadrangle and sample number.
* Sample has been combined with samples from nearby localities for representation on the map as a composite sample.

TABLE OF SAMPLE DATA

SAMPLE LOCALITY (SECTION 1/4-1/4-SEC.)	SIZE DISTRIBUTION (PERCENT): SILT AND CLAY	SAND	GRANULE GRAVEL	PEBBLE GRAVEL	OVERSIZE	DEPTH OF SAMPLE: FEET	METERS	DEPTH TO WATER TABLE: FEET	METERS	SOURCE OF INFORMATION
TOWNSHIP 1 SOUTH, RANGE 66 WEST										
15 ab	26	52	6	9	7	1 - 4	0.3-1.2	?	?	CDH 12-17
	2	31	15	37	15	4 - 15	1.2-4.6			
	3	35	14	40	7	3 - 11	0.9-3.4			
33 cd	0	28	13	59	0	12 - 15	3.7-4.6	-	-	USGS 2-11
TOWNSHIP 1 SOUTH, RANGE 67 WEST										
12 aa	3	63	13	21	0	0 - 4	0 -1.2	0	0	CDH 12-66
a,b	21	73	1	5	0	0 - 6	0 -1.8	8	2.4	CDH 12-67
	97	3	0	0	0	6 - 9	1.8-2.7			
	6	62	23	9	0	9 - 12	2.8-3.7			
	35	35	10	20	0	0 - 3	0 -0.9			CDH 12-27
	3	41	15	41	0	3 - 13	0.9-4.0			
	2	37	21	38	2	2 - 11	0.6-3.4			
13 cd	81	17	2	0	0	0 - 12	0 -3.7	14	4.3	CDH 12-25
	5	35	22	38	0	12 - 15	3.7-4.6			
	4	52	11	29	4	0 - 14	0 -4.3			
14 a	1	56	14	29	0	0 - 4	0 -1.2	4	1.2	CDH 12-65
	3	69	12	16	0	0 - 4	0 -1.2			
ba	18	30	5	47	0	0 - 4	0 -1.2	?	?	CDH 12-64
	13	28	8	50	1	4 - 8	1.2-2.4			
	49	36	3	12	0	0 - 4	0 -1.2			
	17	73	3	7	0	4 - 12	1.2-3.7			
	22	20	7	48	3	0 - 5	0 -1.5			
15 c	76	11	2	11	0	0 - 10	0 -3.0	?	?	CDH 12-63
	13	28	5	52	2	0 - 9	0 -2.7			
	30	59	2	9	0	0 - 8	0 -2.4			
	29	50	3	18	0	0 - 6	0 -1.8			
20 b	25	34	11	30	0	0 - 4	0 -1.2	?	?	CDH 12-32
	68	25	3	4	0	4 - 8.5	1.2-2.6			
	45	54	1	0	0	8.5- 17	2.6-5.2			
	25	22	10	38	5	5.5- 7	1.7-2.1			
	41	58	1	0	0	9.5- 17	2.9-5.2			
	11	38	8	43	0	6 - 8.5	1.8-2.6			
26 ab	34	60	4	2	0	0 - 5	0 -1.5	21	6.4	CDH 12-2
	4	84	9	3	0	5 - 7	1.5-2.1			
	1	34	7	57	1	7 - 21	2.1-6.4			
ca	53	38	5	4	0	0 - 1.5	0 -0.5	14	4.3	CDH 12-10*
	3	58	14	25	0	1.5- 13	0.5-4.0			
db	29	49	11	11	0	0 - 2	0 -0.6	?	?	CDH 12-19*
	0	56	14	30	0	2 - 12	0.6-3.7			
34 d	1	58	22	19	0	1.5- 8	0.5-2.4	9	2.7	CDH 12-26
	56	37	2	5	0	0 - 2	0 -0.6			
	2	55	20	23	0	1.5- 5.5	0.5-1.7			
35 ab	67	27	2	4	0	0 - 1.5	0 -0.5	20	6.1	CDH 12-23
	1	24	12	54	9	1.5- 6.5	0.5-2.0			
	2	30	10	49	9	6.5- 11	2.0-3.4			
TOWNSHIP 1 SOUTH, RANGE 68 WEST										
8 cc	10	42	10	38	0	0 - 7	0 -2.1	?	?	CDH 12-33
	19	39	7	32	3	0 - 6	0 -1.8			
	15	37	12	36	0	0 - 3	0 -0.9			
	15	55	4	25	1	8 - 9.5	2.4-2.9			
TOWNSHIP 1 SOUTH, RANGE 69 WEST										
18 cc	7	24	3	29	37	2 - 10	0.6-3.0	8	2.4	CDH 7-2
	37	56	3	4	0	0 - 1	0 -0.3			
	7	19	4	25	45	1 - 7	0.3-2.1			
	37	62	1	0	0	0 - 4	0 -1.2			
	3	18	3	37	39	4 - 10	1.2-3.0			
	33	46	3	18	0	0 - 2	0 -0.6			
TOWNSHIP 1 SOUTH, RANGE 70 WEST										
9 b	0	20	5	53	22	0 - 12	0 -3.7	4	1.2	CDH 7-9
db	3	25	6	41	25	0 - 8	0 -2.4	-	-	CDH 7-18
	3	21	8	42	26	0 - 6	0 -1.8			
21 bc	2	15	4	54	25	1.5- 7	0.5-2.1	5.5	1.7	CDH 7-4
	2	21	4	33	40	0 - 8	0 -2.4			
	28	60	5	7	0	0 - 3	0 -0.9			
	2	20	4	37	37	0 - 10	0 -3.0			
	13	43	6	33	5	0 - 3	0 -0.9			
	2	26	5	39	28	0 - 10	0 -3.0			
	1	25	5	29	40	0 - 10	0 -3.0			
23 ad	9	23	7	61	0	1 - 7	0.3-2.1	?	?	CDH 7-1
	48	38	3	11	0	0 - 4	0 -1.2			
	23	30	3	44	0	0 - 1	0 -0.3			
	8	32	4	56	0	0 - 1	0 -0.3			
	8	16	5	47	24	1 - 5	0.5-1.3			
	9	21	6	39	25	0.5- 8	0.2-2.4			
	6	22	5	33	34	4 - 9.5	1.2-2.9			
	11	17	4	60	8	0 - 0.5	0 -0.2			
	10	22	9	46	13	0.5- 8	0.2-2.4			
33 cc	5	27	4	24	40	0 - 8	0 -2.4	8.5	2.6	CDH 7-3
	4	19	3	23	51	3 - 8.5	0.9-2.6			
	16	58	3	23	0	0 - 3	0 -0.9			
	5	25	4	34	32	0 - 8	0 -2.4			
TOWNSHIP 2 SOUTH, RANGE 67 WEST										
9 cc	1	39	13	47	0	0 - 3	0 -0.9	-	-	CDH 12-68*
	36	60	3	1	0	0 - 5	0 -1.5			
	1	26	6	67	0	0 - 2	0 -0.6			
	2	37	11	49	1	0 - 3	0 -0.9			
16 bb	1	46	16	37	0	0 - 3	0 -0.9	3	0.9	CDH 12-45*
	1	43	18	38	0	0 - 3	0 -0.9			
	1	50	16	33	0	0 - 3	0 -0.9			
	0	40	13	47	0	0 - 3	0 -0.9			
17 db	2	42	14	42	0	2 - 28	0.6-8.5	5	1.5	CDH 12-73
	35	57	5	3	0	0 - 3	0 -0.9			
	54	35	2	9	0	3 - 12	0.9-3.7			
	3	30	15	52	0	12 - 29	3.7-8.8			
	44	51	4	1	0	0 - 3	0 -0.9			
	3	41	18	38	0	10 - 31	3.0-9.4			
	3	43	16	38	0	12 - 29	3.7-8.8			
	3	21	9	67	0	2 - 29	0.6-8.8			
	4	30	16	50	0	6 - 31	1.8-9.4			
	38	61	1	0	0	0 - 2	0 -0.6			
	5	38	14	43	0	2 - 29	0.6-8.8			
	2	51	13	34	0	0 - 4	0 -1.2			
	3	41	11	45	0	4 - 6	1.2-1.8			
	2	60	7	31	0	4 - 9	1.2-2.7			
	2	45	13	40	0	4 - 6	1.2-1.8			
20 cb	27	57	4	12	0	0 - 3	0 -0.9	-	-	CDH 12-56
	3	45	18	34	0	3 - 13	0.9-4.0			
	23	70	2	5	0	0 - 3	0 -0.9			
	1	39	19	41	0	3 - 13	0.9-4.0			
29 b	25	53	7	15	0	0 - 2.5	0 -0.8	-	-	CDH 12-20*
	3	38	15	44	0	2.5- 15	0.8-4.6			
	13	58	8	21	0	15	4.6			
	3	28	13	47	9	2 - 7.5	0.6-2.3			
	30	55	5	10	0	0 - 1.5	0 -0.5			
	3	44	17	36	0	1.5- 14	0.5-4.3			
30 dd	4	56	10	30	0	0 - 33	0 -10.1	30	9.1	CDH 12-70*
	5	36	18	40	1	0 - 14	0 -4.3			
TOWNSHIP 2 SOUTH, RANGE 68 WEST										
25 dc	56	44	0	0	0	0 - 10	0 -3.0	7	2.1	CDH 12-61
	7	90	3	0	0	10 - 17	3.0-5.2			
	10	22	7	54	7	2 - 8	0.6-2.4			
	57	34	3	6	0	0 - 3	0 -0.9			
	7	42	9	35	7	3 - 6	0.9-1.8			
	65	35	0	0	0	0 - 9	0.9-2.7			
	53	38	4	5	0	0 - 4	0 -1.2			
	4	67	16	12	1	4.5- 9	1.4-2.7			
36 dc	58	31	3	8	0	0 - 1.5	0 -0.5	6	1.8	CDH 12-74
	2	55	18	25	0	1.5- 10	0.5-3.0			
TOWNSHIP 2 SOUTH, RANGE 69 WEST										
3 aa	14	36	7	41	2	0 - 9	0 -2.7	?	?	CDH 11-43
	7	78	3	12	0	9 - 12	2.7-3.7			
	46	44	2	8	0	0 - 6	0 -1.8			
	10	26	5	56	3	0 - 8	0 -2.4			
	35	62	2	1	0	0 - 8	0 -2.4			
	27	72	0	1	0	0 - 9	0 -2.7			
	24	16	5	55	0	0 - 3	0 -0.9			
	75	24	1	0	0	0 - 4	0 -1.2			
	42	55	2	1	0	0 - 4	0 -1.2			
	86	14	0	0	0	0 - 5	0 -1.5			
	25	75	0	0	0	7 - 15	2.1-4.6			
	74	24	1	1	0	0 - 7	0 -2.1			
	62	36	1	1	0	7 - 12	2.1-3.7			
dd	29	28	3	25	15	0 - 6	0 -1.8	?	?	CDH 11-41
	32	30	5	33	0	0 - 3	0 -0.9			
	45	37	4	14	0	3 - 10	0.9-3.0			
	13	32	6	46	3	0 - 12	0 -3.7			
	13	31	6	50	0	0 - 4	0 -1.2			
	12	41	5	40	2	0 - 4	0 -1.2			
	8	85	1	6	0	4 - 10	1.2-3.0			
	15	60	4	21	0	1.5- 5	0.5-1.5			
	7	26	6	54	7	0 - 7	0 -2.1			
	50	33	2	15	0	0 - 3	0 -0.9			
	11	25	5	55	4	2 - 8	0.6-2.4			
	30	35	3	32	0	0 - 15	0 -4.6			
TOWNSHIP 2 SOUTH, RANGE 70 WEST										
12 ab	14	24	5	43	14	0 - 4	0 -1.2	?	?	CDH 11-42
	17	22	4	38	19	0 - 4	0 -1.2			
	10	24	8	45	13	0 - 10	0 -3.0			
	30	41	3	9	17	0 - 6	0 -1.8			
	14	22	7	20	37	0 - 10	0 -3.0			
	15	17	5	44	19	0 - 4	0 -1.2			
21 bb	37	24	6	32	1	0 - 3	0 -0.9	?	?	CDH 11-8
	9	18	6	41	26	0 - 8	0 -2.4			
23 bc	12	23	7	42	16	0 - 9	0 -2.7	?	?	CDH 11-9
TOWNSHIP 3 SOUTH, RANGE 66 WEST										
3 a,d	28	71	1	0	0	0 - 2	0 -0.6	8	2.4	CDH 12-6
	8	29	26	37	0	2 - 17	0.6-5.2			
	80	19	1	0	0	ob	ob			
	2	30	4	61	3	-	-			
	7	22	2	65	4	0.3- 12	0.1-3.7			CDH 12-7
	75	24	1	0	0	0 - 3	0 -0.9			
cc	2	13	10	61	14	-	-	-	-	USGS 10-1
TOWNSHIP 3 SOUTH, RANGE 69 WEST										
14 dc	2	19	4	42	33	0 - 5	0 -1.5	3	0.9	CDH 11-13
	41	49	4	6	0	0 - 3	0 -0.9			
TOWNSHIP 3 SOUTH, RANGE 70 WEST										
1 dd	4	24	4	40	28	1 - 9	0.3-2.7	?	?	CDH 11-10
	38	49	3	10	0	0 - 1	0 -0.3			
32 aa	4	24	4	61	7	-	-	25	7.6	CDH 11-3
	17	71	9	3	0	ob	ob			
TOWNSHIP 4 SOUTH, RANGE 69 WEST										
34 ad	71	29	0	0	0	0 - 11	0 -3.4	6	1.8	CDH 11-36
	36	64	0	0	0	0 - 6	0 -1.8			
	7	45	5	43	0	6 - 12	1.8-3.7			
	49	50	1	0	0	0 - 9	0 -2.7			
	7	66	7	20	0	9 - 12	2.7-3.7			
	68	31	1	0	0	0 - 12	0 -3.7			
	24	70	2	4	0	0 - 4	0 -1.2			
	5	33	3	43	16	4 - 12	1.2-3.7			
	31	57	2	10	0	0 - 5	0 -1.5			
	7	40	6	40	7	5 - 9	1.5-2.7			
	2	65	2	16	15	1 - 6	0.3-1.8			
	13	72	3	12	0	1 - 6	0.3-1.8			
	31	69	0	0	0	0 - 5	0 -1.5			
	4	72	12	12	0	5 - 12	1.5-3.7			
	36	62	1	1	0	0 - 2	0 -0.6			
	2	63	8	25	2	2 - 12	0.6-3.7			
35 da	61	28	2	9	0	0 - 5	0 -1.5	5	1.5	CDH 11-28
	22	19	4	47	8	5 - 18	1.5-5.5			
	11	48	9	32	0	0 - 5	0 -1.5			
	3	29	7	61	0	0 - 12	0 -3.7			
TOWNSHIP 4 SOUTH, RANGE 70 WEST										
3 dd	26	58	6	10	0	0 - 1.5	0 -0.5	?	?	CDH 11-5
	4	30	9	57	0	1.5- 14	0.5-4.3			
	10	23	9	58	0	1.5- 14	0.5-4.3			
	4	45	11	40	0	1.5- 14	0.5-4.3			
	4	29	8	45	14	-	-			
	18	57	9	16	0	0.5- 1	0.2-0.3			
13 bc	21	29	5	18	27	0 - 2	0 -0.6	?	?	CDH 11-47
	16	49	8	23	4	2 - 8	0.6-2.4			
	11	41	10	19	19	8 - 12	2.4-3.7			
	20	49	8	19	4	2 - 10	0.6-3.0			
	7	32	6	30	25	2 - 12	0.6-3.7			
	11	47	4	22	16	2 - 11	0.6-3.4			
31 bb	12	55	6	24	3	0 - 1	0 -0.3	8	2.4	CDH 11-7
	13	29	7	27	24	1 - 8	0.3-2.4			
	2	22	7	31	38	0 - 8	0 -2.4			
	4	44	7	39	6	0 - 8	0 -2.4			
TOWNSHIP 4 SOUTH, RANGE 70 WEST CONTINUED										
	3	50	8	23	16	0 - 8	0 -2.4			
	2	41	6	24	27	0 - 8	0 -2.4			
	2	25	6	32	35	0 - 8	0 -2.4			
TOWNSHIP 5 SOUTH, RANGE 66 WEST										
2 bd	3	65	13	19	0	-	-	-	-	USGS 13-1
9 aa	5	51	19	25	0	-	-	-	-	USGS 14-1
30 ab	31	57	8	4	0	0 - 2	0 -0.6	?	?	CDH 10-27
	5	70	13	12	0	2 - 12	0.6-3.7			
	48	47	3	2	0	0 - 3	0 -0.9			
	11	48	18	23	0	3 - 12	0.9-3.7			
	9	64	15	12	0	0 - 12	0 -3.7			
TOWNSHIP 5 SOUTH, RANGE 67 WEST										
26 db	6	55	20	19	0	1 - 9	0.3-2.7	15	4.6	CDH 10-11
TOWNSHIP 5 SOUTH, RANGE 68 WEST										
4 b,c	64	35	1	0	0	ob	ob	-	-	CDH 10-37
	1	52	16	30	1	-	-			
7 a	5	21	6	53	15	-	-	-	-	CDH 10-51
	5	35	6	36	18	-	-			
8 a	2	34	11	49	4	1 - 18	0.3-5.5	-	-	CDH 10-52
	56	32	3	9	0	0 - 1	0 -0.3			
TOWNSHIP 5 SOUTH, RANGE 69 WEST										
2 c	15	40	17	28	0	0 - 4	0 -1.2	?	?	CDH 11-45
	6	18	8	54	14	0 - 25	0 -7.6			
	8	22	5	52	13	0 - 25	0 -7.6			
	16	46	8	30	0	0 - 7	0 -2.1			
	19	46	7	28	0	0 - 10	0 -3.0			
6 dd	11	37	3	27	22	0 - 6	0 -1.8	?	?	CDH 11-46
32 ac	5	28	7	60	0	-	-	-	-	USGS 20-2
TOWNSHIP 5 SOUTH, RANGE 70 WEST										
1 b	59	38	2	1	0	0 - 1	0 -0.3	?	?	CDH 11-29
	8	35	10	40	7	0 - 5	0 -1.5			
	7	22	5	30	36	2 - 13	0.6-4.0			
	4	28	8	37	23	2 - 13	0.6-4.0			
	17	16	4	40	23	2 - 13	0.6-4.0			
	24	35	6	30	5	2 - 13	0.6-4.0			
	10	20	5	36	29	2 - 13	0.6-4.0			
	10	20	4	39	27	2 - 13	0.6-4.0			
	16	23	3	32	26	2 - 13	0.6-4.0			
	6	31	5	27	31	2 - 13	0.6-4.0			
22 cc	26	69	2	3	0	0 - 6	0 -1.8	3	0.9	CDH 11-30
	2	23	7	60	8	2 - 6	0.6-1.8			
	2	78	11	9	0	0 - 4	0 -1.2			
TOWNSHIP 6 SOUTH, RANGE 66 WEST										
7 c	7	59	16	18	0	0 - 6	0 -1.8	-	-	CDH 47-39*
	5	59	9	27	0	1.5- 4	0.5-1.2			
	36	58	3	3	0	0 - 1.5	0 -0.5			
	4	54	12	25	5	0 - 10	0 -3.0			
	72	19	6	3	0	0 - 2	0 -0.6			
	10	58	17	15	0	2 - 8	0.6-2.4			
	8	70	14	8	0	0 - 10	0 -3.0			
	8	52	16	22	2	0 - 8	0 -2.4			
	6	56	14	18	6	0 - 10	0 -3.0			
cd	9	49	20	18	4	0 - 11	0 -3.4	8	2.4	CDH 47-29*
	50	46	2	2	0	0 - 14	0 -4.3			
	8	58	18	16	0	0 - 8	0 -2.4			
19 a,d	23	57	8	12	0	2 - 18	0.6-5.5	?	?	CDH 47-32
	7	63	18	12	0	0 - 9	0 -2.7			
	4	54	18	24	0	0 - 6	0 -1.8			
	27	55	10	8	0	5 - 11	1.5-3.4			
34 cc	27	39	8	21	5	0 - 1	0 -0.3	?	?	CDH 47-7
	5	62	16	12	5	1 - 12	0.3-3.7			
	32	48	11	9	0	0 - 1.5	0 -0.5			
	6	49	17	19	9	1.5- 12	0.5-3.7			
	32	57	6	5	0	0 - 1.5	0 -0.5			
	2	48	28	20	2	1.5- 14	0.5-4.3			
	66	30	3	1	0	0 - 3	0 -0.9			
	4	51	17	13	15	3 - 10	0.9-3.0			
	7	26	11	18	38	0 - 14	0 -4.3			
TOWNSHIP 6 SOUTH, RANGE 67 WEST										
3 b	14	57	20	9	0	4 - 12	1.2-3.7	?	?	CDH 10-12
	10	48	24	18	0	5 - 8	1.5-2.4			
	12	47	27	14	0	9 - 21	2.7-6.4			
	11	77	10	2	0	8 - 30	2.4-9.1			
	32	67	1	0	0	0 - 5	0 -1.5			
	8	78	10	4	0	0 - 20	0 -6.1			
	54	45	1	0	0	0 - 5	0 -1.5			
	10	64	17	9	0	15 - 17	4.6-5.2			
	15	67	13	5	0	7.5- 20	2.3-6.1			
	10	62	15	13	0	0 - 16	0 -4.9			
	12	64	17	7	0	3 - 11	0.9-3.4			
6 aa	1	64	21	14	0	-	-	-	-	USGS 22-1
13 aa	16	41	10	28	5	0 - 10	0 -3.0	-	-	CDH 47-36*
	7	50	13	23	7	0 - 10	0 -3.0			
	29	59	9	3	0	0 - 4	0 -1.2			
	12	52	10	19	7	0 - 10	0 -3.0			
ad	5	44	12	29	10	0 - 8	0 -2.4	-	-	CDH 47-35
	5	47	13	29	6	0 - 10	0 -3.0			
	9	35	10	33	13	0 - 10	0 -3.0			
	45	45	3	7	0	0 - 6	0 -1.8			
	13	64	16	7	0	0 - 2	0 -0.6			
	3	27	14	32	24	2 - 10	0.6-3.0			
	61	37	1	1	0	0 - 3.5	0 -1.1			
	8	38	7	37	10	3.5- 10	1.1-3.0			
18 cc	2	62	20	16	0	-	-	-	-	USGS 22-3
TOWNSHIP 6 SOUTH, RANGE 68 WEST										
7 bd	2	55	21	22	0	0 - 20	0 -6.1	66	20.1	CDH 47-60
	8	86	5	1	0	20 - 50	6.1-15.2			
	17	69	9	5	0	50 - 66	15.2-20.1			
20 db	0	44	34	22	0	15 - 16	4.6-4.9	-	-	USGS 21-9
34 cc	21	54	15	10	0	0 - 2	0 -0.6	?	?	CDH 47-63
	5	57	20	18	0	0 - 15	0 -4.6			
	7	52	18	23	0	0 - 11	0 -3.4			
	4	57	19	20	0	0 - 20	0 -6.1			
	4	51	20	25	0	0 - 20	0 -6.1			
	6	53	19	22	0	0 - 19	0 -5.8			
TOWNSHIP 6 SOUTH, RANGE 69 WEST										
1 aa	8	36	11	41	4	1 - 8	0.3-2.4	12	3.7	CDH 11-40
	52	34	5	9	0	0 - 1	0 -0.3			
	14	30	4	47	5	1 - 6	0.3-1.8			
	3	31	12	41	13	0 - 15	0 -4.6			
	8	60	21	11	0	0 - 15	0 -4.6			
	6	38	13	29	14	0 - 10	0 -3.0			
ab	6	57	18	19	0	0 - 9	0 -2.7	?	?	CDH 11-24
	8	47	19	26	0	2 - 7	0.6-2.1			
	3	23	32	42	0	0 - 8	0 -2.4			
	37	56	5	2	0	ob	ob			
	3	52	19	26	0	-	-			
	2	28	10	60	0	1 - 15	0.3-4.6			
	2	31	5	62	0	1 - 15	0.3-4.6			
	1	43	17	34	5	1 - 15	0.3-4.6			
	49	39	5	7	0	ob	ob			
	57	43	0	0	0	0 - 13	0 -4.0			CDH 11-38
	30	68	2	0	0	13 - 18	4.0-5.5			
	7	33	11	49	0	4 - 9	1.2-2.7			
3 ad	4	38	5	40	13	0 - 30	0 -9.1	?	?	CDH 11-37
	19	58	8	15	0	0 - 5	0 -1.5			
	18	70	3	9	0	0 - 11	0 -3.4			
	43	55	2	0	0	11 - 20	3.4-6.1			
	14	35	4	40	7	4 - 6	1.2-1.8			
12 ba	29	58	9	4	0	0 - 2.5	0 -0.8	5	1.5	CDH 47-28
	30	55	10	5	0	2.5- 10	0.8-3.0			
	31	68	1	0	0	0 - 12	0 -3.7			
	2	46	17	35	0	0 - 15	0 -4.6			
	1	35	18	46	0	15 - 30	4.6-9.1			
	1	35	14	50	0	30 - 42	9.1-12.8			
bc	1	55	19	25	0	0 - 3	0 -0.9	3	0.9	CDH 11-14
	1	47	18	34	0	3 - 10	0.9-3.0			
	1	87	8	4	0	0 - 2	0 -0.6			
	1	50	21	28	0	2 - 10	0.6-3.0			
	2	77	12	9	0	0 - 1	0 -0.3			
	1	50	22	27	0	1 - 10	0.3-3.0			
	32	61	4	3	0	0 - 1	0 -0.3			
	1	35	18	46	0	1 - 10	0.3-3.0			
23 ad	1	24	7	57	11	-	-	-	-	USGS 21-7
24 cb	0	37	20	43	0	-	-	-	-	USGS 21-8
26 cc	3	46	11	36	4	0 - 6	0 -1.8	6	1.8	CDH 11-20
	2	33	11	49	5	6 - 10	1.8-3.0			
	21	79	0	0	0	0 - 2	0 -0.6			
	1	26	5	46	22	2 - 5	0.6-1.5			
	2	25	7	62	4	5 - 11	1.5-3.4			
	6	46	12	26	10	0 - 6	0 -1.8			
	1	26	8	65	0	6 - 10	1.8-3.0			
	3	74	13	10	0	0 - 3	0 -0.9			
	83	17	0	0	0	3 - 5	0.9-1.5			
	2	60	9	18	11	0 - 5	0 -1.5			
	21	55	5	19	0	0 - 12	0 -3.7			
27 dd	62	35	3	0	0	0 - 6	0 -1.8	?	?	CDH 11-21
	3	30	6	57	4	3 - 10	0.9-3.0			
	3	38	3	46	10	3 - 12	0.9-3.7			
	5	42	9	39	5	2 - 8	0.6-2.4			
TOWNSHIP 7 SOUTH, RANGE 66 WEST										
3 aa	6	54	18	22	0	0 - 9	0 -2.7	?	?	CDH 47-8
17 bc	53	42	4	1	0	2 - 3.5	0.6-1.1	?	?	CDH 47-51
	7	32	2	23	36	3.5- 8	1.1-2.4			
	16	76	3	3	0	6 - 10	1.8-3.0			
34 cd	3	62	21	14	0	0 - 8	0 -2.4	8	2.4	CDH 47-19*
	39	59	2	0	0	0 - 10	0 -3.0			
	3	67	19	11	0	0 - 2	0 -0.6			
	43	53	3	1	0	2 - 5	0.6-1.5			
	74	25	1	0	0	0 - 5	0 -1.5			CDH 47-20
	12	66	11	11	0	5 - 12	1.5-3.7			
	50	43	4	3	0	0 - 2	0 -0.6			
	5	67	17	11	0	2 - 10	0.6-3.0			
TOWNSHIP 7 SOUTH, RANGE 67 WEST										
3 cc	6	66	15	13	0	0 - 10	0 -3.0	-	-	CDH 47-41
	17	65	11	7	0	ob	ob			
	8	53	17	22	0	0 - 10	0 -3.0			
	86	14	0	0	0	ob	ob			
	7	49	18	26	0	0 - 10	0 -3.0			
	8	79	6	7	0	0 - 10	0 -3.0			
	5	45	24	26	0	0 - 3	0 -0.9			
	6	45	21	28	0	0 - 8	0 -2.4			
26 cc	9	36	4	34	17	0 - 5	0 -1.5	-	-	CDH 47-38
	9	48	3	31	9	0 - 5	0 -1.5			
27 b	8	45	27	20	0	1 - 10	0.3-3.0	-	-	CDH 47-2
	14	58	10	18	0	0 - 1	0 -0.3			
	7	44	29	20	0	2 - 11	0.6-3.4			
	6	54	20	20	0	2 - 9	0.6-2.7			
	3	55	26	16	0	2 - 9	0.6-2.7			
	60	37	2	1	0	0 - 2	0 -0.6			
	5	58	19	18	0	4 - 10	1.2-3.0			
	22	73	2	3	0	0 - 4	0 -1.2			
TOWNSHIP 7 SOUTH, RANGE 68 WEST										
14 cc	6	57	18	19	0	0 - 18	0 -5.5	?	?	CDH 47-48
	4	56	18	22	0	0 - 18	0 -5.5			
	22	68	5	5	0	0 - 1.5	0 -0.5			
	10	54	18	18	0	0 - 18	0 -5.5			
TOWNSHIP 8 SOUTH, RANGE 66 WEST										
3 ac	37	54	5	4	0	0 - 2	0 -0.6	?	?	CDH 47-3
	2	36	15	29	18	2 - 8	0.6-2.4			
	17	60	11	12	0	0 - 1.5	0 -0.5			
d	3	62	18	17	0	0 - 24	0 -7.3	23	7.0	CDH 47-69
	4	57	20	19	0	0 - 25	0 -7.6			
TOWNSHIP 8 SOUTH, RANGE 67 WEST										
2 ac	27	48	7	18	0	0 - 1.5	0 -0.5	?	?	CDH 47-53
	6	34	10	50	0	1.5- 11	0.5-3.4			
	7	80	7	6	0	11 - 15	3.4-4.6			
b	51	36	8	5	0	0 - 2	0 -0.6	?	?	CDH 47-21*
	3	41	23	33	0	2 - 7	0.6-2.1			
	3	44	28	25	0	7 - 12	2.1-3.7			
	2	55	23	20	0	12 - 13	3.7-4.0			
ca	5	44	28	23	0	0 - 15	0 -4.6	?	?	CDH 47-54*
	5	46	24	25	0	0 - 8	0 -2.4			
	5	55	23	17	0	8 - 15	2.4-4.6			
c	2	49	26	23	0	0 - 5	0 -1.5	-	-	CDH 47-37*

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