NEW MEXICO STATE HIGHWAY DEPARTMENT GEOLOGY AND AGGREGATE RESOURCES DISTRICT V



Prepared by Geology Section New Mexico State Highway Department Materials and Testing Laboratory, Design Division

In cooperation with U.S. Department of Transportation Federal Highway Administration

GEOLOGY AND AGGREGATE RESOURCES DISTRICT V





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The primary members and duties of those involved in this work follows and those not listed are the staff and members of the Materials Laboratory and Research Bureau.

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	ERAS	PERIODS (of time) or SYSTEMS (of rock)	EPOCHS or SERIES	APPROXIMATE TIME IN YEARS SINCE BEGINNING OF EACH	PHYSICAL AND BIOLOGICAL FEATURES	
		QUATERNARY	Recent	10,000-15,000	Development of man.	
			Pleistocene	1,000,000	Ice sheets over Europe and North America; appearance of early man.	
	<u>ں</u>	TERTIARY	Pliocene	11,000,000	Development of modern plants and animals; formation of mountains in western America.	
	CENOZO		Miocene	25,000,000	Highest development of larger mammals; formation of mountains, including the Alps, Andes, and Himalayas.	
			Oligocene	40,000,000	Development of higher mammals.	
			Eocene & Paleocene	70,000,000	Rise to dominance of mammals; appearance of ancestral horse and primates.	
		CRETACEOUS		135,000,000	Extinction of dinosaurs; development of early mammals and flowering plants; deposit of chalk beds.	
	MESOZOIC	JURASSIC		180,000,000	Appearance of flying reptiles and birds; dom- inance of dinosaurs; appearance of primitive mammals; abundance of coniferous trees.	
		TRIASSIC		230,000,000	Appearance of dinosaurs; dominance of rep- tiles; appearance of cycadaceous trees.	
		PERMIAN		280,000,000	Development of reptiles; decline of huge plants of the Mississippian and Pennsyl- vanian.	
		PENNSYLVANIAN		310,000,000	Age of coal; formation of coal beds from luxuriant plant life in warm, swampy forests; great fernlike trees; appearance of primi- tive conifers; abundance of insect life; first appearance of reptiles; development of amphibians.	
		MISSISSIPPIAN		345,000,000		
	0201C	DEVONIAN		400,000,000	Age of fish; appearance of primitive amphi- bians; development of primitive plant life on dry continents.	
	PALE	SILURIAN		425,000,000	Appearance of scorpions, the first animals to live on dry land; extensive coral reefs.	
		ORDOVICIAN		500,000,000	Floods and recessions of shallow seas; de- posits of limestone, lead, and zinc ores; abundance of marine invertebrate life; ap- pearance of a few primitive fishlike verte- brates.	
				600,000,000	Shallow seas over much of the land; forma- tion of sedimentary rocks; development of marine invertebrate life, including brachio- pods, snails, sponges, and trilobites.	
	IRIAN	PROTEROZOIC		1,500,000,000	Formation of mountains; deposits of iron ore; abundance of lime secreting algae; appear- ance of sponges.	
	PRECAMB	ARCHEOZOIC	ut ti. St	2,000,000,000+	Great volcanic activity; formation of igneous rocks; some microscopic algae; probably some protozoa.	
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STRUCTURAL UNITS OF NEW MEXICO



LEGEND FOR BASE MAP UNITS

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Federal Aid Interstate Highway Nu	mber	<u> </u>
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County Line		
Indian Reservation, Military Reservation, National Park,		
National Monument , National		
or Bird Refuge Line		

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	Post Office	

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Farms,	Church
Dwellings,	Cemetary15
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	Radio Station
	Correctional Institution
	Sawmill
	Drive-in Theater
	Fire Station
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Legend



Chuska Mtns.



San Juan Basin



Chaco Plateau



Totah Section

San Juan County

Introduction

San Juan County was named for the existing river and created from the western part of Rio Arriba County by the Territorial Legislature on February 4, 1887. It occupies a rectangular position of approximately 5,476 miles in the extreme northwest corner of the state.

The principal towns are Farmington, the largest, cultural and economic hub of the area; Aztec, the county seat; and Shiprock, the largest within the Navajo Indian Reservation. Smaller communities outside the reservation are Waterflow, Kirtland and Bloomfield. Smaller communities within the reservation include Newcomb, Sheep Springs and Naschitti. In addition, numerous trading posts are spotted throughout the county and serve as important local marketing centers in an otherwise isolated area. The total population of the county is estimated at 52,517 (1970 census).

The highway network consists of two routes of the federal system which are complemented by numerous roads of the state system and many roads of industrial and other interests. U.S. Highway 666 is the principal north-south route, connecting Shiprock to Colorado on the north and to Gallup and I-40 on the south. U.S. Highway 550 connects Farmington to Shiprock on the west and to Aztec and Colorado on the north. The Shiprock-Farmington portion of U.S. Highway 550 is one of the most heavily traveled two-lane roads in New Mexico and partial conversion to a four-lane highway commenced in 1973.

State Highway 44 links Farmington to Albuquerque and to I-25 on the south, via Cuba. State Highway 17 links Farmington to Chama on the east and to Colorado on the north, via La Plata. Other roads of the state system include State Highway 504, which links Shiprock to the Four Corners area; State Highways 95, 96 and 504, which link the southeastern part of the area to Cuba and Chama; State Highway 56, which provides access from State Highway 44 to Chaco Canyon National Monument; and State Highway 371, which runs from Farmington south toward Bisti for some 16 miles where it then becomes a part of the county system. Within the last five years the state system has expanded considerably to meet the heavy travel demands that have accompanied the development of Navajo Lake and Navajo Lake State Park. State Highway 511 provides access to the lake from Colorado on the north and from State Highway 17 and Farmington on the west; State Highway 173 provides access to the lake from the community of La Plata on State Highway 17 as well as from Aztec on U.S. 550; and State Highway 539 runs a short distance from the lake to the airstrip on a high mesa overlooking the lake. In addition to the federal and state primary systems, much of San Juan County is laced with pipeline and oilfield service roads, many of them well maintained. These roads, combined with those of county interests and those of the enterprising Navajo Tribe, provide exceptional access to vast and sparsely populated land.

The economy of San Juan County is based on a wide spectrum of oil, gas and mining interests. At present, the oil and gas industry is stable, with the near "boom-town" conditions of the 1950's having subsided to more normal, longterm growth that continued to be a vital economic stimulus to the area. More dramatic is the recent interest in the exploitation of enormous near-surface coal reserves for use as fuel for generation of electricity. In this energy-conscious decade, the future of the county as a great energy center appears promising. In addition to the mineral wealth of the area, the county also realizes a boosted economy from agricultural pursuits. Particularly along the flood plains of the San Juan and Animas rivers, vegetable growing and fruit products are recognized as some of the finest in the state.

The climate of San Juan County is typical of the semiarid to arid American Southwest, with most of the precipitation coming in the form of summertime thundershowers, generally during the months of July and August. During winter, Pacific frontal systems supply some moisture, contribution is generally light, except in the higher elevations of the Chuska Mountains and the higher uplands rimming the county on the north and east. Precipitation records at Farmington and Shiprock indicate an annual precipitation of less than 10 inches. Summers are hot and temperatures near 100° are common; winters are characterized by cool, generally sunny days with cold nights. The mean annual temperature at Farmington is about 51°.

The lands of the county are of diverse ownership. The Navajo Indian Reservation comprises the western one-third of the county. Adjoining it on the east and a few miles north of Waterflow and Fruitland is the New Mexico portion of the Ute Mountain Indian Reservation. Along the eastern side of the area, in the northeastern corner, lies the Jicarilla Apache Indian Reservation. Immediately west and south of this reservation lie tracts of the Santa Fe and Carson national forests. Near the southeast corner of New Mexico County lies Chaco Canyon National Monument. Elsewhere, the lands of the area are either privately held or are of state ownership, including Navajo Lake State Park astride the San Juan-Rio Arriba county line.

Physiography

San Juan County is situated within the Colorado Plateau province. The province in the Four Corners area has been subdivided into two sections, the Navajo section and the San Juan section. The Navajo section includes the single Chuska Mountains, which form a tableland astride the Arizona-New Mexico state line. The San Juan section is divided into four subdivisions: the dominant San Juan Basin, the Chuska lowlands, which lie east of the forenamed mountains, and the Chaco Plateau, which consists principally of an upland formed on Tertiary rocks overlooking the lower-lying Chuska lowlands from the east. Added to this subdividion is the Totah section, which in this report includes the valleys of San Juan, La Plata and Animas rivers and their associated gravel terraces.

NAVAJO SECTION

Chuska Mountains

The Chuska Mountains have long been of interest to geological scientists, the most recent being Blagbrough (1965) whose unique paper deals chiefly with the periglacial features of the higher portions of the range. As described by Blagbrough et al., the Chuskas constitute a prominent upland formed on the Chuska Sandstone and volcanic rocks of Tertiary age. Within the New Mexico portion, Beautiful Mountain 8,945 feet forms the northern terminus from which the mountains trend southeasterly and maintain an overall elevation of about 9,000 feet in a series of plateau-like summits which are separated by steep, intervening canyons and cliffs. The highest part of the Chuskas lies near the southwestern corner of the county, where the area around Washington Pass rises above 9,300 feet; thereafter, the mountains lessen gradually in altitude southward. Below the flat, crestal portions of the range, the flanks are rather steep-sided, owing to the tendency of the Chuska Sandstone to weather back into steep scarps.

Aside from the obvious topographic prominence, the most striking feature of the Chuska Mountains is the enormous landslide sheets that lie along the base of the eastern flank, extending from about the latitude of Toadlena to well south of the San Juan County Line. In terms of size, this system of slides is probably the most spectacular in New Mexico. As noted by Watson and Wright (1963), the slide mass can be divided into three distinct families which are distinguished by elevation, topographic expression, degree of erosion and other factors. The oldest (lowest) slide mass lies from an elevation of near 7,600 feet to about 7,000 feet. This group has a hummocky appearance and lacks the strong lineation of the higher masses. Owing to its relative age, this slide mass shows a comparatively advanced stage of erosion and dissection. In places, pediment deposits cover the lowest mass. The middle slide mass lies at an elevation of about 8,000 feet. The topography here is less hummocky and more linear along the mountain front than the lower mass. Some large blocks of Chuska Sandstone are evident, as well as some smaller-sized Chuska rubble. The highest slide lies from 8,600 to 8,400 feet and is overlooked by a steep escarpment (200 to 300 feet high), formed by the Chuska Sandstone. This mass shows striking parallelism with the mountain front and also discrete ridges and trough topography; the ridges descend in elevation down the mountain side. The projections are capped by Chuska Sandstone rubble and some gigantic blocks of the Chuska which have eroded from the escarpment above.

SAN JUAN SECTION

San Juan Basin

The San Juan Basin constitutes one of the major physiographic, tectonic and geographic divisions of New Mexico. The basin proper embraces approximately 15,000 square miles with the central portion occupying the bulk of San Juan County. The boundaries of the basin are located outside of the county: on the west by the Chuska Mountains and Fort Defiance uplift, on the east by the Nacimiento–San Pedro uplift, on the south by the Zuni uplift, and on the north by the Precambrian cores of the San Juan Mountains.

The central part of the basin possesses an axis that strikes northeasterly through the Gobernador area. The interior of the downwarp has a depth of 2,500-8,000 feet (Kelly, 1951), and actually features a monoclinal tendency with a long, low-dipping south limb and a relatively short north limb. The dip of outcropping Tertiary rocks are gentle and regional in nature.

Chuska Lowlands

As defined here the Chuska lowlands constitute the area from the base of the Chuska Mountains, east to the contact between Cretaceous and Tertiary rocks, and from the Colorado-New Mexico state line south to the San Juan-McKinley county line. For the most past, the lowlands are surfaced by Cretaceous shales. Typically, these shales make up a rather monotonous landscape of extensive, sparsely vegetated, drab plains and badlands. However, exceptions to this monotony are numerous. They include: the prominent Hogback monocline, isolated sandstone-capped mesas that rise precipitously above the shale lowlands, particularly in the Stoney Buttes area, a small portion of great Mesa Verde that extends a short distance into New Mexico from the north, rather small Rock Ridge monocline, the famous Shiprock and other igneous bodies that sporadically dot the plains, and the canyonland country north of the Chuska Mountains that lies astride the New Mexico-Arizona state line.

The Hogback monocline forms an imposing topographic element of the Chuska valley. The monocline faces east with the east-dipping front strongly accentuated by flatirons formed on resistant Cretaceous sandstones. These sandstones contact with the less resistant intervening shales which produce prominent strike valleys. The San Juan River breaches the monocline a short distance west of Waterflow. From the river north, the structure trends north-easterly in a broadly sinuous trace for about 25 miles, crossing the Colorado line approximately in conjunction with State Road 17. From the river south, the hogback trends southwesterly toward the McKinley County Line for some 25 miles, where it lessens greatly in altitude and deformational intensity and merges with the east flank of Tocito dome. It assumes a moderate regional dip and soon loses its identity as it approaches the structural high of the Defiance uplift near Newcomb, New Mexico.

In several areas of the Chuska lowlands isolated mesas rise as much as 400 feet above the surrounding badlands and provide a considerable topographic and scenic variety in the terrain. The most prominent mesas lie behind (west of) the Hogback monocline and north of the San Juan River. These mesas, capped by the Cliff House and Point Lookout sandstones, are the southern terminus of great Mesa Verde of Colorado. Far to the south along Chaco Wash, the Stoney Buttes constitute another area of sandstone-capped mesas. These mesas are formed by the gentle, regional dip slope of the Cliff House Sandstone that caps out along the southern flank of the basin. In addition, deposits of "red dog" (baked shale) form resistant ledges and mesas in the Stoney Buttes area and in numerous other places throughout the basin and these deposits add additional topographic diversity and a rich, reddish hue to an otherwise subdued and rather somber terrain.

Rock Ridge is a north-trending, east-facing monocline with rather prominent flatirons of resistant Gallup Sandstone. This feature, in comparison to the Hogback monocline, is much less conspicuous topographically; however, it is quite prominent locally inasmuch as it rises abruptly from the low plains. The ridge can be divided into two rather distinct parts: the southern portion, which constitutes a part of Beautiful Mountain anticline; and the northern portion, which is the easternmost part of Red Rock monocline.

West of Rock Ridge but north of the Chuskas, and astride the Arizona-New Mexico state line, Jurassic and Triassic rocks are exposed. Because of the differential weathering of the sandstones and shales, the terrain becomes rougher, and changes from the desert plains to a much more dissected, varicolored, canyonland country. Also, another area of Jurassic and Triassic rocks lies immediately west of the Chuskas at the southwest corner of the county. This location is the Manuelito plateau of Fenneman (1938) which is characterized by high mesas and intervening valleys. The Manuelito plateau is an outlier of the Definance plateau of Arizona but separated from it by the broad expanse of Black Salt Valley.

In discussion of the igneous features of the Chusak lowlands, Shiprock is by far the most prominent. This famous landmark is a great volcanic neck that rises vertically some 1,600 feet above the shale plains. It is truly an impressive sight. The summit is strongly notched and serrated with several jagged spires, the highest being 7,178 feet. The walls, which are vertical to near-vertical, are lined with massive columnar strips which tend to give the mass an overall fluted appearance. At lower elevations, massive ribs and columns serve as steps or breaks in the otherwise sheet faces. The base is surrounded by a prominent talus slope which is considerably more extensive on the western side. Also at the base are two diametrically opposed dike systems; the main, or south dike, extends almost due south for approximately 6 miles; the smaller east-west dike is less conspicuous and somewhat shorter in length than the main dike. In plain view, the mass and the associated dike systems are T-shaped with Shiprock as the point of intersection. Shiprock is divided elliptically in an east-west view and slightly elongated in a north-south direction.

Other igneous features include Bennett and Barber peaks, Ford Butte, Mitten Rock, the Thumb and a few other unnamed smaller bodies. Radiating dikes are generally associated with these features.

Chaco Plateau

The Chaco plateau is an upland formed on Tertiary rocks. The boundaries are as follows: on the east, the plateau boundary is the upland plain of younger rocks (Tertiary) that extend along the Rio Arriba county line and dip gradually westward into the basin interior; on the north, the Colorado state line, and on the west and south by Tertiary and Cretaceous rocks. In some respects, the Chaco plateau is not physiographically distinct from the Chuska lowlands, except in its eastern portions, but the division is made because of vegetal changes from desertic shrubs and grass of the lowlands to the pinon-juniper association of the plateau and because of the overall higher elevation. The plateau itself is roughly divisible into two units: the Huerfano unit, or the area surfaced by the Tertiary Nacimiento Formation and the Ojo Alamo Sandstone; and the Gobernador unit or the area which is surfaced by the Tertiary San Juan Formation.

The Huerfano unit represents a topographic step or physiographic transitional zone from the shale flatlands of the Chuska lowlands to the pinonjuniper upland and mesa-canyon country of the Gobernador unit. The Huerfano unit is principally a desertic plain that is cut by rather broad but locally steep-walled canyons with alluviated bottomlands. Much of the surface of the unit south of the San Juan River is veneered by eolian cover or dune fields. The dune fields are strongly aligned with the prevailing southwesterly winds.

The Gobernador unit of the Chaco plateau is comprised of timbered, mesacanyon country ranging in elevation from about 6,500 to 8,000 feet. Local relief is often variable owing to the deep stream canyons which have incised the sandstone of the Tertiary San Jose Formation. The sandstones comprising most of the San Jose Formation tend to form steep-sided canyons and a total relief of well over 500 feet from mesa-tops to canyon bottoms is not uncommon.

Totah Section

The term Totah is a localized county place name translated from the Indian language meaning "place of three rivers." It is aptly applied to the San Juan, Animas and La Plata drainages which confluence near the city of Farmington.

The Totah section has been arbitrarily adapted as a physiographic subdivision of the San Juan section because of its geomorphic significance of associated gravel terraces which represent large reserves of aggregate resources.

Recently, detailed work has done much to clarify the geomorphology of the San Juan, Animas and La Plata rivers. Bandorian (1969) concentrated his investigation along the Animas River east of Farmington. Pastuszak (1969) worked along the La Plata and San Juan rivers west of Farmington. Prior to these investigators, Richmond (1965) mapped and dated the moraines and outwash terraces of the Animas River at Durango, Colorado. Utilizing the work of these investigators, a brief summary of their conclusions is discussed.

At Durango, Richmond (1965) recognized five moraines in the Animas River Valley. The highest, a bedrock bench veneered with Durango till (Atwood and Mather, 1932) lying some 300 feet above and east of the river, was correlated as Illinoian Sangamon Ridge glaciation. Directly athwart the river at Animas City (north Durango), lie two terminal moraines that form separate, prominent ridges that are breached by the river near their western edges, but are othewise little dissected. These two moraines are of Late Wisconsin-Pinedale age. Immediately downstream from these moraines lie isolated morainal remnants of Early Wisconsin Bull Lake age. In addition, Richmond found two very high, gravelly surfaces at Bridgetimber and Mesa mountains and correlated these two surfaces as being of Nebraska Washaki Point and Kansan Cedar Ridge age, respectively.

Downstream in New Mexico, Bandorian (1969) delineated six separate levels of Animas River terraces and two higher surfaces not designated as terraces. He assigned local geographic names to each terrace set and to the higher surfaces, and tentatively tied these to the dated moraines in the river valley at Durango. Pastuszak (1969) worked to the west of Bandorian along the San Juan and La Plata rivers and recognized four terraces, an erosion surface plus an additional level referred to as Recent.

Listed below is a summary chart adapting mapping symbols of this report to the terrace names of Bandorian and Pastuszak. In presenting this chart, no age correlation is intended. Because of the scale of highway department maps, present geomorphic features in fine detail are omitted. For this reason, some lumping of terraces or higher surfaces is unavoidable.

Bandorian (1969)	Pastuszak (1969)	NMSHD (1964)
Animas River	San Juan, La Plata Rivers	San Juan, Animas, La Plata Rivers
	Recent Level	Qal, Qaa or Qt
Terrell Ditch Terrace		Qt ₂
Bald Mesa Terrace	Jackson Lake Terrace	Qt ₃
Cedar Hill Terrace		Qt ₃
(City of Aztec) (Airport Terrace)	(City of Farmington) (Airport Terrace)	Qt ₄
Arch Rock Terrace	Martin Mesa Twin Mounds	Qt ₅
Aztec Terrace Ditch Canyon Surface	Hood Mesa Erosion Surface (Not mapped)	
Mesa Mountain Surface		Qop

The stepped sequence of terraces and higher surface along the San Juan-Animas-La Plata river system typifies the geomorphic framework of streams that rise in high glaciated headlands but flow through presently semiarid lowlands. The morphologic history of such streams is a complex and much controverted problem that centers chiefly about the importance of structural controls over climatic controls. Within New Mexico, structural controls imposed by the subsident Rio Grande trough or the epeirogenically raised San Juan Basin undoubtedly influenced the system position and regime of the Rio Grande and the San Juan River systems, respectively. But as noted by Kottlowski, et al. (1965, p. 287), the influence of structure was probably more prominent during the early Pleistocene, whereas the influence of climatic change was more dominant in later Pleistocene time. The fact that the terraces along the Animas River in New Mexico can be traced directly to late Pleistocene (Wisconsin) moraines and outwash at Durango certainly supports this contention. Thus it can be reasonably stated that at least since Wisconsin time, structural controls on the San Juan-Animas-La Plata rivers may have been operative, but the controlling or initiating factor on stream morphology was and probably still is climatic change.

Climatic terraces, which the San Juan River system terraces essentially are, invariably present the problem of glacial-interglacial stadia of Pleistocene time. When do streams entrench and when do streams aggrade their channels? This is a very complex problem, largely conjectural, and no simple answer can be generally applied because so many variables are involved. Some of these variables include: the amount and type of precipitation, amount and type of vegetal cover, temperature, seasonal and mean, local topography, local baselevel control, and other factors. If one hypothetically assumes a glacial maxima at Durango, what would be the effect on the San Juan River system in the Farmington-Shiprock area? During any glacial maxima, production of debris by the glacier would be at a maximum, meltwater would be at a minimum. It is reasonable to assume, under these conditions, that the resultant choking of stream waters would cause channel aggradation.

Conversely, during interglacial times, the resulting torrents of meltwater and decrease in load would cause channel entrenchment. But how far downstream does a glacial stream remain a glacial stream? It is not unlikely that during glaciation, the Farmington area could have been under a lush vegetal cover, especially if it repeatedly received moisture form regional storms and not sporadic cloudbursts, a likely case during the pluvials associated with cool (or cold) glacial maxima. The resultant vegetal cover could greatly reduce sediment yield and resupply to streams; this could result in gradual clearing of channels downstream and thereby result in channel entrenchment. This presents the possibility of reversal of stream regiment, as could well be the case for long, glacial streams.

During interglacial time, the torrential release of meltwaters during deglaciation and accompanying decrease in load, would cause channel entrenchment. But downstream in the Farmington-Shiprock area, if vegetal impairment accompanies the trend toward aridity, erosion of the watershed and the resultant increase in load to streams could ultimately result in channel aggradation. Actually, channel aggradation during interglacial stages is more easily envisioned as taking place after an initial erosive surge of meltwaters when the water supply decreases and sediment yield along the vegetally impaired watershed increases.

Schumm (1965), in his scheme of river activity for a stream flowing through interior regions of a continent with glaciated headlands, depicted a cyclic sequence as follows:

Late interglacial-stability Early glacial and glacial-erosion Late glacial-early interglacial-deposition Late interglacial-stability

Bandorian (1969) and Pastuszak (1969) stated that erosion (down-cutting) was dominant during interglacial times along the Animas, San Juan and La Plata rivers and that glacial maxima were times of deposition and formation of floodplains. Both Bandorian and Pastuszak also cited evidence of entrenchment of deposits that have been aggraded since postglacial time. The fact that both entrenchment and deposition have occurred along the San Juan River since postglacial time certainly attests to the hazards involved in attempting to determine stream regimen during postglacial and interglacial stadia. The interglacial stadia was probably more complex climatically and more protracted in length than the current postglacial.

Drainage

The San Juan River is the master stream of San Juan County. On its course through New Mexico, it flows in a broad arc, bowed to the south from its point of entry into New Mexico near latitude 37 degrees north to its point of egress near the Four Corners Monument. Upon its entry into New Mexico, the San Juan River is impounded by Navajo Lake. From the spillway of the lake, its valley gradually widens as it approaches the town of Bloomfield. From Bloomfield to its departure from the state, it flows in a broad, verdant valley, straddled by a step-like sequence of terraces and the spectacular sandstone cliffs.

The Animas River heads high in the San Juan Mountains of Colorado. On its descent through New Mexico, it flows almost due south from Colorado to near the community of Cedar Hill, where it turns sharply southwest; its valley broadens, then joins the San Juan River at Farmington. Along most of the course from Cedar Hill to the San Juan, the Animas is flanked by a multiple array of stepped terraces.

The smaller La Plata River rises in the La Plata Mountains of Colorado and flows southerly in a fairly broad valley into the San Juan River immediately west of Farmington. As with the Animas and San Juan rivers, the La Plata also has a stepped sequence of terraces astride its valley, but in terms of number and complexity this sequence is not as striking as the others.

Most of the remaining minor drainageways of San Juan County lie within the Chaco plateau. In the Huerfano area south of San Juan River, Gallegos Canyon and Blanco Canyon are the largest streams, both of which are ephemeral. Gallegos Canyon occurs west of Blanco Trading Post and reaches northerly to the San Juan River a few miles east of Farmington. In its upper and middle reaches, it strikes northwesterly; but near the Simpson Trading Post, it becomes convex westward and turns to a course slightly east of north, probably shifting monoclinally because of subtle surface structure. Blanco Canyon drainage heads just east of Nageezi and flows northward to the San Juan River via Canon Largo. Slightly north of Chaco National Monument, three relatively short ephemeral streams called Choukai, Escarbada, and Kinnebeto washes flow southwestward to the Chaco River.

In the Gobernador area and south of the San Juan River, several very long streams, each with an intricate system of side-canyon tributaries, drain to the master stream. Most of the streams have similar directional drainage patterns in that they all head in the highlands that constitute the eastern rim of San Juan Basin, drain westerly southwesterly in their upper regions, then turn northwesterly in fairly wide arcs and drain to the San Juan. Canon Largo, Carrizo Creek, Gobernador Canyon and La Jara Creek are the principal example streams.

Geologic History

Precambrian rocks are known only in the subsurface of San Juan County, but exposures are found within the core of the San Juan Mountains to the north in Colorado. The limited available information suggests that the Precambrian Era was characterized by complex, recurrent metamorphism and profound crustal movements.

Early Paleozoic sediments are generally thin, consisting principally of quartzose sandstone, shale and some dolomite. Ordovician and Silurian rocks are unknown and are missing either because of non-deposition or because of stripping prior to Devonian time. Late Devonian seas transgressed across the area, depositing first the generally clastic Elbert Formation, followed by deposition of the Ouray Limestone. With the onset of deposition of the Ouray, carbonate deposition prevailed throughout the Late Devonian, the Mississippian and through much of Pennsylvanian time. Prior to deposition of Pennsylvanian sediments, the area became emergent, and much of the pre-Pennsylvanian rocks were removed. An extensive erosional surface formed on the exposed Mississippian rocks and karst topography was widespread.

The initial transgression of the Pennsylvanian sea resulted in clastic deposition of the Molas Formation followed immediately by clastic incursion and carbonate deposition. The Zuni and Uncompany positives became very active and the area of the San Juan Basin was a broad geosyncline that lay between the two highlands on the south and north, respectively. Reefs with bordering wedges of evaporites were deposited, as in the Paradox basin to the northwest. As the positive areas continued to be active, clastic detritus was continually shed into the bordering areas. Later, these clastics were repeatedly swept far out into the geosyncline and as deposition began to exceed subsidence, the seas withdrew. A fluviatile-piedmont environment prevailed throughout the area by early Permian time.

Return of the Permian sea occurred during Yeso and San Andres time, but the greater part of San Juan Basin was probably not affected by these transgressions. By Late Triassic time, the area was a broad, emergent plain. Fluviatile sediments of considerable thickness accumulated on this plain, beginning with the Shinarump Conglomerate and the basal sandstones of the lower Chinle Formation, followed by the finer clays and shales of the upper Chinle Formation. Floodplain and fluviatile conditions continued throughout Jurassic time, although some localized, shallow marinal incursions occurred sporadically during the period, as in the case of the Todilto Limestone. With the deposition of the fluviatile-floodplain Morrison Formation, the area once again lay emergent at the end of the Jurassic Period.

The widespread continental conditions that had largely prevailed during the Triassic and Jurassic periods ended with the widespread transgression of the Cretaceous sea. The Dakota Sandstone represents the transgressive front of this sea, which was followed by the dark marinal muds of the Mancos Shale. After this initial transgression, several relatively minor transgressive-regressive cycles occurred. These smaller strand-line incursions were followed by a major regression which allowed the swamps, deltas and floodplain deposits that constitute the Mesa Verde Formation to move in from the west. The Point Lookout Sandstone marks this major regression. The seaway was in turn ended by a second major transgression characterized by the upper sandstone of the Mesa Verde Formation and Cliff House Sandstone. As with the Dakota-Mancos sequence, the Cliff House transgression was followed by the marine muds of the Lewis Shale. Final retreat of the Cretaceous sea was marked by the regressive Pictured Cliffs Sandstone. As the seas retreated, the swamp and floodplain deposits of the Kirtland-Fruitland formations followed. Many of the present structural features such as the bold monoclines, anticlines and the San Juan basin were formed during the Laramide orogeny which marks the transitional period from a marine to a terrestrial environment at the close of the Cretaceous Period. As the Cretaceous seas regressed, accumulation of terrestrial detritus flooded the area. The terrestrial detrital filling of the basin can be divided into the Ojo Alamo Sandstone and the Nacimiento and San Jose formations. An epeirogenic uplift followed that elevated the entire area.

The detrital filling and uplift of the area was soon influenced by an erosional cycle that characterized most of Pleistocene time. This erosion has formed much of the picturesque landscape of the present. Early Pleistocene conditions were evidently marked by extensive planation and pedimentation, Richmond (1962). Late Wisconsin time was largely a period of deep entrenchment by streams that produced high, gravel-capped surfaces to the north near Durango. Small remnants of such high surfaces in the area between the Animas and Los Pinos rivers have been noted, as well as larger pediment remnants within the basin interior; these remnants are quite possibly pre-Wisconsin in age. Bryan and McCann (1936) believed scattered remnants of the Ortiz surface could be traced to the western front of the Nacimiento Mountains. Thus the pre-Wisconsin history of the San Juan Basin was characterized by an exceedingly large pediment system which extended great distances from the highlands to the basin interior. Presumably, each succeeding glacial-interglacial cycle resulted in baselevel lowering, followed by a long-term stable period during which the pediments were cut, then later aggraded by gravel or finer alluvium. However, since Wisconsin time, major streams have steadily entrenched their courses. Instead of cutting broad pediment surfaces of regional extent, they have cut terraces on localized pediments which are in close proximity to the streams themselves.

Since Recent time, major streams have tended to aggrade their channels, although some entrenchment has taken place. Sand dunes and eolian deposits of historical age now cover much of the area. The arroyo-cutting that has occurred since 1880 may be man-caused and may signal the beginning of a new cycle of entrenchment.

Stratigraphy

QUATERNARY

Alluvium (Qal): Sand, silt and clay with local stringers of fine-grained gravel;

includes unconsolidated deposits of valley fill; stippled in areas of higher gravel concentration.

- Alluvial apron deposits (Qaa): Wedge-like deposits of sand, silt and clay lying within major valleys and being moved by sheet-wash toward their streams.
- Landslide debris (Qls) and (Ql): Large subangular boulders mixed with sand, silt and clay; includes mud flows, rock flows and rock slides.
- Eolian deposits (Qe): Wind-blown sand, primarily active or recently active dune areas.
- Terrace deposits (Qt): Recent to post-glacial deposits of poorly to well-sorted sand and gravel.
- Terrace deposits (Qt₂): Pinedale age clay, silt, sand and gravel along and above present stream channels.
- Terrace deposits (Qt3): Late Bull Lake age sand, silt and gravel above Pinedale age.
- Terrace deposits (Qt₄): Early Bull Lake sand, silt and gravel lying immediately above late Bull Lake gravels.
- Terrace deposits (Qt5): Pre-Wisconsin sand, silt and gravel capping the higher hills along present stream channels.
- Alluvial fan deposits (Qaf): Poorly sorted, braided, fan-like deposits of subangular gravel, sand, silt and clay; boulder-size gravel common.
- Pediment deposits (Qp): Fine to medium grained sands with minor silts and well to poorly sorted gravel in various stages of dissection.
- Older pediment deposits (Qop): High level, older, well-sorted sand and gravel.

TERTIARY

- San Jose Formation (Tsj): Gray-to-yellow and purple clay; white siltstone; white-to-yellow, fine-grained massive-bedded sandstone; locally includes petrified wood near base.
- Chuska Sandstone (Tc): Massive, white to gray cross-bedded sandstone with thin interbedded quartz and chert conglomerate, siltstone, shale and petrified wood pebbles.
- Nacimiento Formation (Tn): Tan, medium-grained, thin-bedded sandstone with interbedded gray and brown shale; includes conglomerate tongues and minor silicified marl lenses; veneer gravels exist locally.
- Basalt (Tb): Lava flows consisting mainly of trachybasalt and lapilli tuff ejecta of the Washington Pass area in the Chuska Mountains.
- *Andesite sill (Tia): Augite andesite sill intruding the Animas Formation; includes lamprophyre dikes along the eastern margin of the San Juan Basin.
- Volcanics Undifferentiated (Tv): Brecciated sedimentary volcanic rocks, stratified tuffaceous agglomerate and lithic tuff.
- Intrusive rocks (Ti): Dikes and sills consisting mainly of tuff-breccia, monchiquite and minette; includes fragments of sedimentary and plutonic rocks.

TERTIARY-CRETACEOUS

- Animas Formation (TKa): Interbedded white-to-yellow sandstone and shale, thin-bedded chert and quartzite conglomerate; includes thin coal beds locally.
- Ojo Alamo Sandstone (TKoa): Yellow-tan to brown, medium-grained sandstone with thin lenses of shale and sandstone.

CRETACEOUS

- Kirtland-Fruitland Formation (Kkf): Greenish-gray and black shale; tan finegrained interbedded Farmington sandstone member; thin-bedded conglomerate; yellowish-brown and tan cross-bedded sandstone and coal.
- Pictured Cliffs Sandstone (Kpc): Tan, cross-bedded, medium to massivebedded fine to medium-grained sandstone.
- Lewis Shale (Kl): Light to dark-gray marine shale, clay, sandstone with thin calcareous lenses and limestone concretions.
- Cliff House Sandstone (Kch): Gray and tan cross-bedded medium to finegrained sandstone; includes interbedded gray shale.
- Menefee Formation (Kmf): Alternating beds of brown and tan, massive to thinbedded sandstone; concretionary limestone; includes coal seams and scattered ironstones.
- Point Lookout Sandstone (Kpl): Massive light gray to yellow sandstone with thin-bedded gray shale.
- Crevasse Canyon Formation (Kcc): Interbedded non-marine drab shale, claystone, siltstone, coal and fine-grained thin buff sandstone.
- Gallup Sandstone (Kg): Brown, tan, and pinkish-gray thin to massive-bedded sandstone interbedded with gray and brown carbonaceous shale; locally includes coal lenses.
- Mancos Shale (Km): Predominantly gray shale with lenses of fine-grained sandstone, siltstone, thin limestone beds, concretionary limestone and fossiliferous calcareous shale; includes the Satan Tongue and Mulatto Tongue Members.
- Dakota Sandstone (Kd): Yellow, brown and tan sandstone interbedded with variegated clays, brown carbonaceous shale and lenses of coal.

JURASSIC

- Morrison Formation (Jm): Variegated purple, green and gray shale, mudstone and siltstone; tan and gray sandstone with conglomerate; includes the Brushy Basin, Burro Canyon, Westwater Canyon, Recapture, Salt Wash and Cow Springs members.
- San Rafael Group (Jsr): Moderate reddish-brown, greenish-gray to light yellow, fine to medium-grained cross-bedded sandstone; gray coarse-gained sandstone and argillaceous siltstone; includes Zuni Sandstone, Summerville Formation, Cow Springs and Bluff Sandstone members.
- Todilto Formation (Jt): Olive-gray, fine-grained limestone; pale red-purple mudstone; minor gypsum, reddish-brown sand and siltstone.

JURASSIC-TRIASSIC

Wingate Sandstone (JTrw): Reddish-brown fine-grained cross-bedded sandstone and siltstone; includes the Lukachukai Member.

TRIASSIC

Chinle Formation (Tru): Interbedded red shale, conglomerate limestone, darkbrown sandy, shale and minor petrified wood; includes Owl Rock, Petrified Forest, Sonsela Sandstone and Shinarump Conglomerate Members.

PERMIAN

*Cutler Formation (Pc): Variegated beds of earthy and sandy limestone, bright red sandstone, conglomerate and shale.

*NOTE: For information only since these deposits or formations do not occur in San Juan County but do occur on 30' quadrangle maps which are part of San Juan County.

Aggregate Resources

San Juan County is rather limited in aggregate resources except along the major drainageways in the northern or north-central part of the county. An almost unlimited supply of axial river gravel lies astride and in the San Juan, Animas and La Plata rivers. The Los Pinos River also has gravel within its channel but terrace gravels are rather scant along its course. These gravels are primarily quartzite, they are well graded and vary in grain size from boulders to sand. The silt size particles usually average less than 5 percent of the bulk and the cobbles and boulders that require crushing are extremely abrasive; otherwise, the engineering properties of these gravels is rated as excellent. They require from 5½ to 6 percent asphalt when making bituminous surfacing and moderate amounts of lime, cement or other additives improves their anti-stripping qualities.

Pediment gravels are scattered sporadically about the southern two-thirds of the county. The engineering properties of these gravels are rated as fair to poor. Usable quantities are very difficult to locate for a normal size road construction job, nevertheless many miles of road between Shiprock and Gallup have been built from pediment gravels. The large clasts in these deposits are primarily soft, sub-angular to slabby sandstone which usually have engineering properties marginally within or below that required for most construction products.

Numerous tests were run on materials (sandstone and limey sandstone) within San Juan County to show the engineering characteristics of these materials since a large portion of the county is devoid of good aggregates. It is believed that further research on some of the sandstone products may show them to be a feasible material for building roads. As the roadway system expands within the county the economics of the situation almost demands that further research and experimentation be done with these products.

Baked shale "Red Dog" has been used rather extensively in parts of western New Mexico for untreated base course for roads but there has been little success to date in designing a satisfactory mix for asphalt products. In San Juan County there are several rather extensive deposits of this material in the Fruitland Formation near Bisti and in the Menefee Formation near White Rock. Further research and experimentation may develop a satisfactory mix using "Red Dog," which will be quite an asset in an aggregate-poor area.

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Rio Arriba County

Introduction

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One of the seven original counties established under Mexican rule, Rio Arriba was reorganized to its present limits in 1852. The name translates in Spanish to "upper river," in reference to the northern reaches of the Rio Chama. The county occupies approximately 5,860 square miles and maintains primarily a rural population of 25,170 (1970 census). The principal cities are Espanola, located in the extreme southeast corner of the county; Chama, situated near the Colorado border at the southern base of Cumbres Pass; and Tierra Amarilla (Spanish meaning, "golden land"), the county seat.

Economic endeavors of Rio Arriba County run the entire gamut of general occupational livelihoods typical of the early settlement of the Rocky Mountain-Southeast; mining ventures, farming, livestock raising and logging. In recent years, recreation has played an important role in the county's development; fishing, camping, hunting and winter sports. With the rebirth of the Cumbres and Toltec Scenic (narrow gauge) Railroad a further stimulus to tourism is anticipated.

Two major U.S. highways cross the county and provide adequate access to inhabitable areas; U.S. 84 stems from Espanola on the south to Chama on the north. The newly constructed "high road," recently designated as U.S. 64, extends in an east-west alignment from the Tusas area over Brazos Pass to Tierra Amarilla, Chama and Dulce. Four principal New Mexico highways serve the mountain villages of the southern and eastern parts of the county. State Highway 96 goes from Gallina in the southwest through Capulin, Coyote, Youngsville and Abiquiu to the west of El Rito. Unpaved Highway 100 connects El Rito and Vallecitos on the west side of Ortega Mountain. Paved State Highway 111 provides access to Vallecitos from La Madera along the east side of Ortega Mountain. State Highway 519 parallels the southern Tusas Valley and joins the villages of Petaca and Las Tablas. In the northern part of the county, State Highway 17 provides a short scenic passageway over 10,020-foot Cumbres Pass into Colorado. Along the western border of the county, State Highway 537 runs north and south through the Jicarilla Apache Indian Reservation and serves the Lybrook Oil Fields west of Lindrith.

The variation in elevation in Rio Arriba County causes widely different climatic zones. In the "high country" of the Tusas and Jemez mountains, the winters are severe with periods of extreme cold and wetness; summers remain cool prompted by frequent afternoon and evening thundershowers. In the lower elevations of the county, particularly on the plains along the western border, the climate is semiarid.

The vegetation varies with the elevation; pine, spruce, fir and aspen occupy the lofty ridge lines of the highlands, with intermediate zones blanketed by scrub oak, pinon, and juniper. In the basinal areas to the west, various range grasses, cacti and brush provide sporadic land cover.

Physiography

Rio Arriba County is physiographically diverse, situated within three major

provinces; the Colorado Plateau province, the Southern Rocky Mountain province, and the Basin and Range province.

COLORADO PLATEAU PROVINCE

San Juan Basin

The western one-third of Rio Arriba County is situated within the San Juan Basin (see San Juan County).

Chama Basin

Chama basin is a relatively shallow structural and topographic lowland that is a subsidiary of the larger San Juan Basin, separated from the latter on the west by the Gallina uplift. The elongated, north-plunging depression is bounded on the east by the Tusas uplift and on the north and south by the volcanic piles of the San Juan and Jemez mountains, respectively.

The rocks of the basin are diffuse and vary in age. Along the eastern and northern margins, late Cretaceous shales and sandstones are turned up against the Precambrian core of the Tusas Mountains. To the south, isolated sedimentary rocks, ranging from Pennsylvanian to Late Jurassic, comprise the spectacular red-rock country that abuts the Jemez plateau. Along the western limits, the Chama basin has rocks similar in age to the Paleocene and early Eocene sediments of the San Juan Basin.

Gallina Uplift

The Gallina uplift in Rio Arriba County is a three to five-mile wide faulted zone that is a northern extension of the Nacimiento-San Pedro uplift in Sandoval County.

The linear zone of the Gallina uplift consists of structurally high late Paleozoic and Mesozoic rocks that are basically anticlinal domal structures that plunge in a northeasterly direction. At least three separate dome structures parallel the axis of the uplift. The southernmost dome is approximately eight miles long and four miles wide. It is situated a short distance north of the village of Gallina. The medial high, the smallest of the three, two miles long and one mile wide, occurs in the canyon of the Rio Gallina. The northern structure at Gallina Mountain is approximately four miles long and two miles wide.

The Gallina uplift and its associated fault zone is nearly vertical throughout its twenty-four mile length. The rocks are primarily faulted down to the west and up to the east. Numerous, transitional fault-links between the domes modify the throws in places. Reverse-up on the west and down on the east is sometimes observed (Bingler, 1968). South of El Vado Dam the domal uplifts cease, but continuation of the Gallina fault zone (now trending northwestward) has produced slightly folded structures that extend east of Archuleta Mesa, near Dulce, into Colorado. This anticlinal trend is the Archuleta anticlinorium and is, in part, a subsurface extension of the Gallina uplift.

The major linear structure of the uplift and the less-pronounced anticlinorium is not only of structural importance in Rio Arriba County, but also serves as a physiographic dividing line, separating the Chama basin on the east from the large San Juan Basin to the west.

SOUTHERN ROCKY MOUNTAIN PROVINCE

Tusas Uplift

The Tusas uplift is one of the major physiographic divisions in northcentral New Mexico. The highlands contain Precambrian crystalline rocks that mark a central spine of several thousand feet. The uplift trends in a northwestsoutheast direction for approximately 50 miles between the Colorado border and the village of Ojo Calliente. The uplift is the principal divide separating the Chama basin on the west from the Rio Grande depression on the east.

The present surface exposures of the ancient rocks of the Tusas uplift were caused by erosion of the mountain mass before the volcanic accumulations of the San Juan volcanic field took place. The present elevated position of the Tusas highlands resulted from displacement during the Laramide orogeny coupled with late Tertiary fault adjustments. The volcanic accumulations, primarily the Conejos Formation, conceal the limits of the faults that produced the uplift.

Jemez Volcanic Plateau

A small portion of south-central Rio Arriba County is included in the Jemez volcanic plateau (see Los Alamos County).

BASIN AND RANGE PROVINCE (Rio Grande Depression)

Espanola Basin

The extreme southeast corner of Rio Arriba County is a part of the Espanola basin. The Espanola basin, in this report, is considered in a physiographic sense only and includes that area of Rio Arriba County that is surfaced by sediments of the Santa Fe Group and associated basalt flows and dikes. The basin is a lowland formed by the Rio Grande and its principal tributaries, the Chama River, Rio Ojo Calliente and El Rito Creek and constitutes the northernmost of a series of intermountain basins through which the Rio Grande flows in New Mexico. The sector is sharply defined in most places by significantly higher topographic elements and strikingly different rock types. On the south, the border is arbitrarily designated as the Rio Arriba south county line. On the north, it is delineated by the Precambrian core of the southern end of the Ortega Mountains and its flanking apron of volcanics, and on the east, it is bordered by the basalt flows of Taos plateau, the Picuris Mountains, and the Sangre de Cristo Mountains.

The basin can be divided into a southern and northern portion, divided by the Rio Grande. Where it emerges from its confining gorge through Picuris Mountains, the Rio Grande valley steadily widens to Velarde where it suddenly expands and arcuately flows southwesterly to southerly in a broad verdant strip to its confluence with the Chama River near San Juan Pueblo. At San Juan Pueblo, it maintains a southerly course through Espanola in an ever broadening valley, then flows south out of the area and through the deep gorge of White Rock Canyon.

The southern portion of Espanola Basin, or that area east and south of the Rio Grande, is composed principally of intricately drained slopes with badland characteristics. The principal tributaries of these badlands, such as Rio Penasco, Rio Truchas, Canada Ancha and others, form rather straight and discrete northwesterly drainageways to the Rio Grande; however, their side tributaries form badlands in a myriad of short drainageways aligned generally in a north-south direction. Not all of the southern portion is badlands, a notable exception is the townsite of Truchas, where the expansive Truchas surface has developed. The Truchas surface has been discussed briefly elsewhere in this report, but is treated more fully in this section. The Truchas surface of Cabot (1938) was considered by him to be a pediment; Miller, Montgomery and Sutherland (1963) considered it to be an alluvial fan. We consider it to be both, but in a different sense than either Cabot or Miller et al.

Under our hypothesis, the Truchas surface formed originally as a large alluvial fan resulting from debris derived from the Truchas Peaks. The surface of the fan itself was later pedimented, then covered with a rather thick deposit of gravel ranging in size from fine gravel to rather large boulders. This pediment (map symbol Qop) now occurs principally as long "pediment fingers" which form high gravel-capped ridges. As dissection of the pediment began, a lower compound was selectively cut at a lower level (map symbol Qp). This younger pediment is unique in that it is formed principally on north-facing slopes and it is steeply inclined to the north, while at the same time it parallels the westerly alignment of its older compound. Because of its propensity to form on north- facing slopes, the implication is that climatic control, such as solifluction of some form of ice sculpture by perennial snow banks, may have played a part in its formation. If this is the case, the younger feature is not a "pediment" in the strictest sense of the term. A third surface lies below the two pediments. This third surface (map symbol Qaf), formed on the original fan material, as such, can be considered as an exhumed surface.

The northern portion of the Espanola Basin, or that area north and west of the Rio Grande, is composed of the broad valleys of the Chama River, El Rito Creek and Rio Ojo Caliente, the higher interstream divide areas, and the still higher borders of the mountainous elements.

Each of the three major tributary streams are characterized by a sequence of terraces that progressively step up to the surrounding higher elements. Along the west bank of Chama River, these flanking terraces are particularly well developed and rise to the volcanic upland of the Jemez Mountains in a broad band as much as 3 miles wide. South of El Rito, El Rito Creek also displays a particularly well preserved sequence of terraces which step up to and abut, in part, the southernmost end of the volcanic apron of the Tusas-Ortega Mountains. On the eastern side of Rio Ojo Caliente, the terraces rise from the valley edge to the foot of high Black Mesa. Elsewhere, the terraces rise to the lower parts of the interstream divides, which typically are a series of low, deeply eroded hills. To the north, these low hills of the divide areas abruptly give way to the much higher volcanic mesas and hills flanking the Precambrian core of the Ortega Mountains. Accordingly, Chama River, El Rito Creek, and Rio Ojo Caliente form rather steep canyons as they encounter the more resistant rocks of these higher topographic elements.

Near the central part of the Abiquiu sector, between the Rio Ojo Caliente and the Rio Grande, Black Mesa rises boldly above the river lowlands. This very prominent feature is a long, basalt-capped arm appended to the great Taos Plateau. It trends southwesterly across the lowlands, paralleling the Rio Grande and ends abruptly at the Chama River near Hernandez. Within the Espanola Basin, Black Mesa is 16 miles long and 4 miles wide and maintains an elevation near 7,000 feet, rising 1,300 feet above the surrounding valley. But aside from its topographic prominence, the most striking feature of Black Mesa is the enormous number of landslides that completely blanket its south flank.

These slides, referred to as the Black Mesa slides, are a classic example of landslide development in northern New Mexico. A thick plate of basalt overlies incompetent beds and exerts great weight which causes shear failure in the weaker beds. The Rio Grande causes additional instability by constantly cutting out support at the toes of the sides. Still another contributing factor to the problem of the Black Mesa slides may be its broad southern exposure. Black Mesa may have experienced periglacial conditions during the Wisconsin glaciopluvials, and if so, its south flank could have been susceptible to large volumes of snow meltwater. These meltwaters would have been a constant lubricant for the slip surfaces of the slides. In support of this possibility, very few slides exist

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Taos County

Introduction

Taos County is one of the original counties in New Mexico that was established under Mexican Rule in 1844. It was reorganized and designated an American political division by the Territorial Legislature on January 9, 1852. The total area of the county encompasses 2,257 square miles. The county seat is Taos, a Spanish farm word that corrupts the Tewa Indian word, "tu-o-ta," meaning "down at the village." The place name is in direct reference to the famous Taos Indian Pueblo, located a short distance north of the city.

The pueblo at Taos was a busy center of Indian life long before Coronado arrived in New Mexico in 1540. Early in the seventeenth century, the site was colonized by the Spanish. In the years that followed, Taos became famous as a meeting place of the Rocky Mountain-Southwest; soldiers, trappers, traders, and mountain men walked its streets. It later became the home of the celebrated scout, Kit Carson, and, in turn, developed as a center of southwestern frontier history.

Today, Taos retains much of its ancient charm. The area has become renowned as a tourist resort, as well as a colony for writers and artists. Once known as the "granary of the west," the county still produces farm crops, livestock and lumber. Excellent hunting and fishing attracts thousands of sportsmen. In recent years, an equal number of winter enthusiasts have taken advantage of superb skiing facilities.

Taos County is an important mineral producer. In the past, small deposits of gold, silver, lead and copper were extracted. These minerals, however, are insignificant to the economy today. The Harding pegmatite mine has been one of the nation's leading producers of beryl and other strategic minerals, but it is inactive at present, also. World-famous deposits of molybdenum and perlite are presently being mined near Questa and at No Agua Mountain, respectively.

The main transportation routes in Taos County are U.S. 64, a major eastwest highway which crosses the central portion of the county; U.S. 285, a principal pathway into southern Colorado which extends along the extreme western border of the county, and N.M. 68, which goes south from Taos to Espanola and Santa Fe. In addition, two scenic state highways penetrate the bordering mountains; State Route 38 completes a northern circle that connects the Red River and Moreno valleys; State Route 3 commences in the southern part of the county on U.S. Hill Pass and extends northerly along the Sangre de Cristo Front to the Colorado state line.

No railroads or commercial airlines serve the county.

The climate of Taos County varies directly with altitude. The Sangre de Cristo Mountains have a relatively humid climate, while that of the western plateau is semiarid. Average annual precipitation at Red River, altitude 8,680 feet, is about 22 inches. At Taos, altitude 6,960 feet, precipitation averages about 12 inches. Temperatures also vary with altitude; from subzero minimum winter readings in the high mountains to 90°F summer maximum recordings on the Taos plateau. In general, winters are long and stimulating, with heavy snowfall in the mountains. Summers are characterized by warm days and cool nights. The heaviest rainfall is during July and August, usually in the form of afternoon thundershowers. Snowbanks commonly survive the summer months on the higher peaks.

Due to the extremes in altitude and the subsequent precipitation pattern, there is a broad range of vegetative life zones. Five of the six life zones found in New Mexico exist in Taos County—with only the lower Sonoran Zone absent. Sagebrush is characteristic of the semiarid Taos plateau, although cottonwood trees, willows and Ponderosa pines thrive along the Rio Grande and its tributaries. Pinons, junipers, chamisa, scrub oak and mountain mahogany are restricted to foothill areas and higher elevations on south-facing mountain slopes. Ponderosa pine are found between 7,800 and 8,000 feet, usually interspaced with Douglas fir, spruce and aspen with increasing altitudes. Above timberline, only the hardy, cold-resistant alpine grasses, sedges, mosses and lichens survive.

Physiography

Taos County lies within two physiographic provinces; the Southern Rocky Mountain province and the Basin and Range province. The combination of the two presents one of the more striking contrasts in New Mexico—the towering Sangre de Cristo mountains on the east and the broad San Luis basin to the west. Wheeler Peak, 13,160 feet above sea level, is the highest point in New Mexico and stands shoulder to shoulder with other imposing peaks of the range that extend northward into Colorado. The lowest elevation in the county is 5,870 feet in the Rio Grande Gorge at the Rio Arriba County line.

SOUTHERN ROCKY MOUNTAIN PROVINCE

Sangre de Cristo Mountains (see Santa Fe County)

In Taos County several mountainous masses are recognized within the Sangre de Cristo chain. These highland areas are differentiated on the basis of perennial drainage, geologic structure and rock types. The more prominent uplands and their higher peaks are invariably composed of resistant Precambrian plutonic and metamorphic rocks with localized exceptions of certain portions of the range where volcanic and plutonic rocks of Tertiary age are found. Softer, gently-folded and faulted limestones, sandstones and shales of Paleozoic Age constitute more subdued terrain. All upland masses of the Sangre de Cristo Mountains in New Mexico trend north-south, with the exception of the Picuris Mountains in the southern part of the county which are generally aligned in a northwest-southeast direction.

Culebra Mountains

The Culebra (Spanish meaning "snake") Mountains represent the northernmost highlands of the Sangre de Cristo Range in New Mexico. Their bare ridge lines, crowned by 13,005-foot Costilla Peak, extend 12 miles from the Colorado state line into Taos County. The southern terminus of the mountains is placed at the narrow Amalia Valley, which is occupied by the northwestward-flowing Rio Costilla.

Picuris Mountains

The Picuris (Keresan, meaning "those who paint") Mountains, sometimes referred to as the Picuris prong, are anomalous in trend to other highland areas in the Sangre de Cristo Range. Situated in a northwest-southeast alignment, the mountains occupy a 12-mile length in the southern part of the county. They are a rugged uplift of Precambrian metamorphic and plutonic rocks that culminate in 10,810-foot Picuris Peak. The mountains are separated from the main chain by the drainage of the Rio Rancho; on the west the mountains terminate abruptly in spectacular cliffs cut by the Rio Grande at the Embudo constriction.

Taos Mountains

The beautiful, forested highlands that rise directly behind the city of Taos are referred to as the Taos Mountains. Geographically, the mountains represent the central portion of the Sangre de Cristo Range in Taos County. The prominent, uplifted ridge line extends for about 30 miles in a paralleling east front to the Taos plateau; terminating at the Rio Costilla on the north and the Rio Rancho on the south. The Taos Mountains hold the highest of all summits in New Mexico with 12 major peaks that exceed 12,000 feet in elevation.

BASIN AND RANGE PROVINCE

In 1938, the term Rio Grande depression was coined (Bryan, p. 197) to describe the series of basins followed by the Rio Grande from southern Colorado through New Mexico to El Paso, Texas. Throughout this length of the river, eight principal structural basins were outlined, clearly separated from one another by canyons or topographic constrictions. Bryan (1938) likened the Rio Grande to: "a stream flowing from one sand-filled tub to another through narrow troughs" (op. cit., p. 198).

San Luis Basin

The northernmost structural lowland of the Rio Grande depressional system is the San Luis basin, an agricultural gem that is bounded on the east by the uplifted Sangre de Cristo Range and hinged on the west by the San Juan Mountains and the Tusas highlands. Its width is 50 miles; its length, a surprising 150 miles, stretching from Poncha Pass north of Alamosa to the Embudo Constriction 60 miles south into New Mexico.

The San Luis basin is a rather complex graben possessing an eastward tilt. The basin commenced its subsidence during Miocene time and has continued to subside to the present. Kelly (1956) has suggested that the wide-scale volcanic activity to the west and corresponding sedimentation from the adjacent uplifted mountains to the east represents a date (25 m.y.) similar to the initial development of the Rio Grande depression.

Several intermontane characteristics of the San Luis basin has prompted writers to subdivide the basin into five parts (Upson, 1939), Larsen and Cross (1956), et al.; to wit; the Alamosa basin; the San Luis Hills; the Costilla plains; the Culebra reentrant; and that part which includes approximately two-thirds of Taos County, the Taos plateau.

Taos Plateau

The Taos plateau is a broad, featureless surface which lies south of the San Luis Hills (along the Colorado–New Mexico border) to the Embudo constriction 60 miles to the south. Its distinguishing features include the sporadic shield volcanoes and cinder cones which stand as high as 1,800 feet above the floor of the plateau, the deep entrenchment to the Rio Grande, and the broad, westward-sloping piedmont plains which mantle the Sangre de Cristo front. On the west side of the Rio Grande Gorge, the surface of the plateau is essentially made up of basalt belonging to the Servilleta Formation. In several areas, the lava cap is known to be broken by normal faults and by deformations caused by the regional eastward tilt of the basin.

East of the Rio Grande, the plateau has quite different features in that the basalt has been covered by a considerable accumulation of alluvium derived from outwash from the Sangre de Cristos.

Costilla Plains

North of Questa, the level surface of the alluvium is very little dissected and has achieved a gradient balance in its depositional character. This feature is quite evident near the Colorado state line, and it is this portion that has warranted the divisional term, Costilla plains.

Taos Piedmont

South of Questa, along the entire front of the mountains to below Taos, vast pediment outwashes are deeply dissected by large canyons issuing from the uplands. The term "Taos piedmont" is applied here to identify this pronounced depositional feature and to further suggest an additional physiographic division of the basin. The Taos piedmont slopes quite steeply near the mountains before grading into a gradual lessening plain which terminates at the Rio Grande Gorge. The basalt of the Hinsdale is exposed along the western limits of the piedmont as the alluvial cover becomes thinner. Nearer the mountains, however, where the deep, outward-flowing tributaries exhibit several hundred feet of outwash material in their canyon walls, the basalt is either missing or is not exposed. The extent and limits of the lava projections probably do not exceed an eastward line past State Highway 3.

Drainage

The master stream of the Taos area is the Rio Grande which flows in a southerly direction through the central part of the county. Where it enters the state of New Mexico, the river commences to entrench itself in a narrow, sinuous basalt gorge which deepens to 600 feet at mid-county and to a culmination exceeding 1,000 feet at Embudo. For most of its 60 miles through the county, the Rio Grande has presented a formidable obstacle to east-west passage across northern New Mexico. Only in recent years, since the construction of Taos Gorge bridge (1965), have travelers had access to the west plateau without negotiating the tedious crossings at Dunn Bridge west of Arroyo Hondo or at Pilar to the south.

There are no perennial streams west of the Rio Grande Gorge. Numerous arroyo patterns do meander across the lava plateau but function as carriers of water only during periods of rainfall.

The major discharge of waters is from east of the gorge where rather large rushing streams, fed by the springs and snowfields of the lofty Sangre de Cristo Mountains, plunge into the plains below and confluence with the Rio Grande. The stream courses are, from north to south: the Rio Costilla, Red River, Cristobal Creek, Rio Hondo, Rio Pueblo de Taos, Rio Fernando de Taos, and the Rio Rancho.

In the southwestern part of the county, the Picuris Mountains create a separate pattern of drainage. Two major streams, the Rio Pueblo and the Rio Penasco, drain the high meadows on the southern side of the uplands. Their confluence near Picuris Pueblo, and, in turn, the Rio de las Trampas, all join to form Embudo Creek which empties into the Rio Grande a short distance south of the Taos-Rio Arriba County line.

General Geology and Geologic History

The oldest Precambrian rocks (510-3,000 m.y.) in Taos County are part of a metamorphic complex which is best exposed in the Taos and Picuris mountains of the Sangre de Cristo Range. After a prolonged period of cyclic metamorphism and intrusion, there was widespread emplacement of the Embudo Granite, which forms the bulk of the core of the range. For the most part, metaquartzite predominates along with gneiss and granulites. Cerro Azul is an isolated exposure of metaquartzite near the southern edge of the Taos plateau. Locally, mafic gneiss, schist and amphibolite also occur within the metamorphic series. The metaquartzite and gneiss are largely metasedimentary clastic rocks, whereas, the more mafic units probably represent basalt flows, sills and dikes. The metaquartzite appears to be the youngest part of the series, and the mafic units the oldest. The higher peaks of the Taos and Picuris highlands are invariably composed of resistant metaquarzite or gneiss.

In all areas, rocks of the metamorphic complex are intruded by granite, pegmatite and diabase dikes which are also Precambrian in age. The most pronounced area underlain by Precambrian granite is the Costilla massif within the Culebra Mountains. Texture varies from aplite to pegmatite, although most typically the rock is medium-grained, pinkish to cream in color, with local pegmatite and aplite phases. Migmatite zones occur where granite has intruded the older metamorphic complex. Pegmatite dikes, some over 50 feet thick and 2,000 feet long, are especially numerous in the Picuris Mountains where they are associated with beryllium, tantalum and lithium mineralization. Diabase dikes occur sparsely throughout areas of altered gabbro. Both rock types are referred to as Precambrian in age since they do not intrude younger rocks.

During Cambrian and Silurian periods of early Paleozoic time all of Taos County was part of a huge landmass and very little, if any, deposition occurred. In Devonian and Mississippian times, seas transgressed onto the lower elevations of this landmass and thin discontinuous deposits leveled the pre-existing Precambrian surfaces. Rocks assigned to the Devonian (255-315 m.y.) crop out on high peaks and around glacial cirques of the Taos Mountains. Isolated exposures are at Bear Lake, Old Mike, Wheeler Peak, Horseshoe Lake and Lost Lake (Clark, 1966). They have been assigned to the Espiritu Santo Formation of Devonian (?) age. The basal unit consists of a few feet of brown conglomeratic sandstone including pebbles of Precambrian rock. Gray colored, thin to medium bedded limestones and dolomite overlie the sandstone. They are only sparsely fossiliferous and age dating by fossils is inconclusive. Total aggregate thickness may be 25 feet. Exposures are also found in the eastern foothills of the Picuris Mountains.

Cropping out within the same areas as the Espiritu Santo Formation and overlying it are beds of limestone breccia, sandstone, limestone and shale totaling perhaps 40 feet. Fossils collected within the sequence indicate a Mississippian (230-255 m.y.) age and it is correlated with the Tererro Formation of the Pecos area further to the south.

Deposition continued on into late Pennsylvanian time when there is some evidence of orogenic activity which partially rejuvenated the Sangre de Cristos. Thick deposits of sand, gravel and silt were laid down and later consolidated into rocks of the Pennsylvanian age (205-230 m.y.) Magdalena Group. These crop out over extensive hilly areas of the Picuris front and locally along the crest of the Sangre de Cristos as erosional remnants, or within structural depressions. Correlating and mapping individual units is difficult due to heavy forest and soil cover. Most cartographers have elected to map the units as Pennsylvanian undivided, and that approach is followed in this report. Another problem of the Pennsylvanian arises from the nomenclature itself. Two drastically different approaches have been used: 1) recognition of gross lithologic units and 2) major subdivisions based on fusilinid zones. From the first approach, such formational names as Sandia and Madera have been derived, both from gross lithologic subdivisions recognizable in the Sandia Mountains east of Albuquerque. It has been argued that subdivision based on gross lithology has many pitfalls. Pennsylvanian strata in New Mexico are cyclic with vertical repetition of rock types through thousands of feet of section. Furthermore, rapid lateral facies changes have been recognized. Thus, formations mapped as rock stratigraphic units in the Sandia Mountains do not necessarily correlate as time-stratigraphic or bio-stratigraphic units in the northern Sangre de Cristo Mountains. As a result of this debate, complete series (time-stratigraphic) subdivision has been achieved based on fusilinid zonation. Further refinement, using faunal zones along with detailed mapping and petrographic study, has resulted in the recognition of rock-stratigraphic formations based on both fauna and lithology. The group name Magdalena has been rejected because it is virtually synonymous with the systemic term Pennsylvanian. Sandia and Madera as formational names should be discarded since they are confusing in this area of New Mexico.

The lower Pennsylvanian (Morrowian-middle Desmoinesian) La Pasada Formation consists of about 1,000 feet of cyclic carbonate and clastic rocks. Clastics generally decrease upward in the section and include siltstones, sandtones and mudstones. Carbonate rock-types predominate especially toward the top but the cyclic nature is retained. Limestone and gray shales are typical. Rapid lateral facies changes occur, however, the sorting and texture of clastic units may also vary laterally, sometimes abruptly. In the Sangre de Cristo Mountains south of Taos County, Pennsylvanian age rocks, referred to as the La Pasada Formation, generally predominate. In Taos County, the lateral equivalent of the La Pasada Formation, known as the Flechado Formation, predominates as far as the beds of early Pennsylvanian age are concerned. The Flechado-La Pasada formational transition occurs at about the Taos-Rio Arriba-Mora county juncture betwen Jicarilla Ridge of the Truchas Mountains on the south to Jicarita Peak in Taos County on the north. The transition is considered to merely represent a regional facies change from a stable, shallow shelf environment on the east and south to a subsiding, relatively deep trough environment to the north and west. It is composed of some 2,500 feet of low-feldspar sandstone and shale. The Flechado Formation in Taos County, typical of northern New Mexico Pennsylvanian sections, can be distinguished readily from the overlying Alamitos Formation by an increase in the percentage of feldspar. The vertical transition is one of orthoquartzite in the Flechado Formation to arkose in the Alamito Formation. The base of the Flechado Formation is marked by beds of olive brown siltstones with scattered chert nodules (Sutherland, 1966). The Mississippian-Pennsylvanian contact is unconformable, at some locations even angular. Sparsely fossiliferous arkosic limestones and limy arkoses are relatively more abundant near the top of the formation but do not dominate the section.

The Alamitos Formation at Taos is approximately equivalent to the arkosic limestone member of the Madera Formation of Brill (1950) farther south near Pecos. It consists of about 4,000 feet of arkosic sandstone, shale, limestone and conglomerate. A section composed of 50 percent sandstone and conglomerate would be typical. Again, limestones, where present, are more likely to be found in the upper one-third of the section.

The sequence of arkose and red beds that overlie the Alamitos Formation is called the Sangre de Cristo Formation (180-210 m.y.). It is best exposed in eastern Taos County. Arkosic sandstones, red siltstone and shale and few thin limestone units comprise the formation. The base is locally unconformable, but intertonguing with Pennsylvanian strata of Virgilian age has been observed in areas outside of Taos County. Siltstones and shales in the upper part of the formation contain fossil plants that indicate a Permian (125-180 m.y.) age. Thus, the formation is regarded as straddling the systemic boundary between Pennsylvanian (Virgilian) and Permian (?) time. Where the Sangre de Cristo Formation is in contact with the underlying Alamito Formation, the base is usually placed at the top of the highest Alamito limestone bed although arkoses of both formations can be deceptively similar.

The unconformable contact between Pennsylvanian and Jurassic sediments indicated that any Permian, Triassic or early Jurassic strata which may have been deposited were subsequently eroded away. During late Jurassic time, mudstones, siltstones and sandstone of the Morrison were deposited before lower Cretaceous seas began to invade the region. Unconformably overlying the Morrison Formation along the Taos-Colfax county line is a small outcrop area of rocks of Cretaceous age (100-125 m.y.). The lowermost strata include in ascending order: the Dakota Sandstone, the Graneras Shale, the Greenhorn Limestone, the Carlisle Shale, the Fort Hays Limestone, the upper part of the Niobrara Formation, and the Pierre Shale. All of the preceding formations are marine in origin. The youngest Cretaceous units are marginal marine and continental in origin and include the Trinidad Sandstone and the overlying Vermejo Formation. Differentiation of each Cretaceous unit in Taos County is not practical, due to the extremely confined outcrop belt and dense forest cover.

The end of Cretaceous deposition was marked by the Laramide Revolution that raised the entire Sangre de Cristo range above sea level. These epeirogenic movements in Montana time of the Laramide were followed by several orogenic episodes as shown by the angular unconformities and lithologic changes in the sedimentary rocks of the Tertiary era.

Structurally, a large portion of the county is influenced by the Taos horst which exposes Precambrian metamorphic rocks. This horst is about 18 miles long and 10 miles wide with vertical displacement of more than 7,000 feet. It is bordered on the east by the Moreno Valley and on the west by the Rio Grande depression and is truncated on the north by the Red River graben, which is also several miles wide and about 14 miles long. Like the Taos horst, the Red River graben is complexly broken up with cross faults, thrusts, dip-slip movements, high-angle normal faults and folding.

In late Miocene time, a series of north-south-trending basins began to subside, eventually forming the Rio Grande depression along the western edge of the Sangre de Cristos. The fluvial sediments and volcanics filling this trough through Pleistocene age formed the Santa Fe Group. Within this group, the Picuris Tuff is the oldest, consisting of conglomerates made up of boulders of Tertiary volcanics and Precambrian igneous and metamorphics and water-laid tuffs. Another member, the Tesuque Formation, consists of sandstones and conglomerates deposited during middle Miocene to Pliocene time. Exposed at the surface over most of the southeastern part of the San Luis basin is the thick deposit of basalts, sands and gravels of the Servilleta Formation. This member of the Santa Fe Group includes all the volcanic cones and vents of the basin through Recent time.

Even as far south as the Picuris range, accompanying these vast epeirogenic movements was intense hydrothermal alteration and subsequent mineralization.

Rocks of Tertiary age (1-60 m.y.) in Taos County vary considerably in mode of origin, lithology and relative age. Clastic sedimentary rocks as well as plutonic and volcanic rocks occur over widely scattered areas from the mountainous uplifts on the east and south to the great structural depression on the west. Lithologic names are used for most of the complex extrusive sequences of variable composition in the Taos Mountains, where correlation and age relationships are difficult.

The oldest Tertiary rocks are red to gray sandstones and conglomerates exposed along stream divides and valley slopes of the Latir Creek drainage basin of the Taos Mountains. Thickness varies from a few hundred feet to over 1,000 feet. Clasts within the conglomerates are largely Precambrian and thin lenses of limestone occur in some of the sandstones. The rocks are dated only relatively, as there are no fossils and they are overlain by Tertiary volcanics.

Igneous intrusions are injected into the sedimentary rocks during the Eocene epoch. Most of the volcanic activity followed the sedimentation of the gravels and led to the widespread deposits of tuffaceous sediments. The Picuris area was uplifted along north-south normal faults, structurally causing the east-west drainage pattern to develop.

Volcanic rocks comprise much of the mountain area between Red River on the south and the Rio Costillo-Comanche Creek drainage on the north. The oldest volcanics are andesitic tuffs, flows, and breccias that crop out along the lower levels of the major stream valleys. They lie unconformably on rocks of Precambrian, Devonian, Mississippian and Early Tertiary (?) age. Interbedded with both the flows and tuffs are lenticular sandstone, siltstone and conglomerate beds, and in some areas, such as Latir Peak, thin basalt flows occur. Thickness varies abruptly for the flows and breccias, but the tuffs are more consistent in thickness. The surface upon which the flows and breccias were deposited was apparently somewhat dissected, and topographically low areas received greater thicknesses of volcanics. Rhyolite flows and tuffs overlie the andesite sequence east of Latir Peak and south of the Rio Costillo.

Porphyritic latite makes up Latir Peak and prominent peaks to the south. It has a fine-grained to glassy groundmass, and the color ranges from light gray in most areas to red near Latir Peak. Thick flows, sills and dikes comprise the Latir Peak latite and it is known to be younger than the underlying latite sequence. The age relationship of the latite to the rhyolite flows and tuffs is not clear. In many places, the latite appears to intrude the flows; elsewhere, the rhyolite appears to depositionally overlie the latite. Many local unconformities are undoubtedly present and account for some of the confusing relationships.

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The rhyolite flows and tuffs are well exposed near Latir Peak on both sides of the Rito Latir. They are generally grayish in color and include about 1,000 to 1,500 feet of interbedded tuffs, some of which are welded, and breccia flows.

Intrusives of rhyolitic composition cut many of the Tertiary volcanic and intrusive rocks. They are especially numerous in the Latir Peak-Comanche Creek area. Both plugs and dikes occur which may represent feeders for the rhyolite flows that overlie the Latir Peak latite.

Stocks of Tertiary granites of two distinct compositions occur in the Taos Mountains. The older of the two stocks has a porphyritic texture with large phenocrysts of pink orthoclase. Rock textures indicate varying degrees of cataclastic alteration, and individual stocks are known to intrude older rocks of Precambrian, Paleozoic and Tertiary age. This older granite intrudes the Latir Peak latite and appears to be younger than the latite and probably older than the rhyolite flows. Outcrops are scattered throughout the Taos Mountains. Stocks of alaskite porphyry, albite granite or soda granite occur primarily to the south in the mountains and within the Red River graben. These are the youngest Tertiary granite stocks in the area.

Other similar intrusives of lesser significance occur northwest of Arroyo Hondo and north of Tres Piedras.

Late Tertiary deposits include high level terrace gravels in the Red River and Rio Costillo drainage areas from the Wheeler Peak vicinity on the south to the Colorado state line on the north.

Thick deposits of volcanic debris, sand, silt and gravel mark the ending of Tertiary and the beginning of Quaternary time. The Quaternary sediments are unitized into the Santa Fe Group. The massive thicknesses of these beds represent an accumulation of sediments eroded from the mountains to the east as well as from the volcanics, which were active through Miocene time. In Pliocene and Pleistocene time, the layers of sand and gravel belonging to the Servilleta Formation which some include as a member of the Santa Fe Group, were deposited along with intermittent basalt flows. Parts of Taos County were uplifted again, raising the range to its present highland area. Recent erosion has stripped away much of the Santa Fe Group, with some being covered by recent basalt flows. In some areas, Quaternary deposits form an extensive veneer, completely obscuring the underlying Santa Fe and basalt. During the Pliocne, basalt flows and cinder cones covered large portions of Taos County while widespread alluviation continued to present time.

Quaternary deposits (present-1 m.y.) consist of alluvial fans, stream alluvium, glacial moraines, mudflows, landslides and dune sand.

On the high divides, above the 9,900-foot elevation contour, north and south at Placer Creek and above Foster Park Canyon in the Red River drainage basin, the deposits are composed chiefly of cobbles and boulders of Precambrian mica quartzite, granite gneiss and porphyritic andesite. Thickness is probably highly variable and is estimated not to exceed 50 feet. It is worthwhile to note that these deposits lie at elevations of 800 to 1,000 feet above the Red River. The age of the gravel is definitely post-Miocene since it rests on volcanic rocks of that age and is probably early Pliocene preceding the late Miocene orogeny that formed the present landscape.

Along the western flank of the Taos Mountains are a series of coalescing alluvial fans which spread out onto the Taos Plateau for a distance of one to five miles beyond the mountain front. These deposits grade westward toward the Rio Grande Gorge into well sorted gravels, sand and silt. The predominant constituents of the cobble, boulder and pebble-sized clasts consist of Precambrian and Tertiary volcanic, plutonic and metamorphic rocks. Quartzites, latites and granite-gneisses are most common. Thicknesses are at least 50 to 100 feet and may exceed 100 feet where significant normal faulting has accompanied fan building and deposition. Toward the Rio Grande and Ute Mountain, the better sorted gravel and sand deposits overlie Quaternary-Tertiary basalts and interfinger with Quaternary alluvial fans locally around the mountain.

Stream alluvium is abundant throughout Taos County but is especially prolific along the Rio Costillo, Red River and Rio Hondo. Alluvium normally reflects locally derived lithologies but may be predominately masked by rock types ultimately derived in headwater areas, usually resistant Precambrian quartzites, gneisses and granites. Maximum sizes are usually erratic, varying from sand and silt to boulders and cobbles. Sorting is poor, and thicknesses do not usually exceed 25 feet.

In Pleistocene time, extensive glaciation and related periglacial and solifluction conditions with post-glacial erosion existed and made a lasting mark on the Sangre de Cristos, as seen by the numerous cirques, moraine deposits, terraces and alluvial fills.

There are small well-defined morainal deposits issued from more than 60 glacial cirques in Taos County. In general, the oldest moraines extend to the lower elevations and the youngest glacial deposits are perched at the highest elevations. Richmond (1963) recognized seven Wisconsin substages of glaciation and more than one moraine in each substage. The oldest and topographically lowest substage was termed Bull Lake and extended down to the 9,400foot contour line. It is largely forest covered, dissected and extremely difficult to map. Bull Lake moraine extends up to the 9,700-foot elevation. The best example of this glaciated feature is a mature terminal moraine at Wheeler Peak Village, some 6 miles in length. Above the Bull Lake, between 9,700 feet and 11,000 feet is the Pinedale substage. It is better exposed than the older Bull Lake but is still largely forest covered. Hummocky topography with cirque dams and cirque lakes characterize Pinedale moraine; its dissection is moderate. Good examples of Pinedale moraine are found at Horse Lake, Lost Lake and Horseshoe Lake. Above 11,000 feet, the term Temple Lake is used for small relatively undissected moraines, rock glaciers and protalus ramparts, all which are at or above timberline. The high circues around Wheeler Peak are termed Old Mike and Gold Hill. The youngest (neoglacial) Pleistocene glacial deposits are very small rock accumulations in the highest cirques above 12,000 feet. These accumulations also feed active rock streams or talus streams where, due to either altitude or constant movement, they prevent vegetation from becoming established.

Poorly sorted boulders, cobbles and pebbles with silt, sand and clay matrixes characterize most of the moraines below 11,000 feet. Above 11,000 feet, matrix material may be lacking or is substantially coarser, and rock clasts are somewhat more angular. The oldest moraines are covered by soil and may show signs of disintegration of the clasts.

Morainal composition varies considerably, depending on the local cirque headwall lithology, but the more resistant Precambrian granite-gneisses and quartzites tend to predominate, as do the harder volcanic rock types.

Mudflow deposits are almost exclusively restricted to the Red River Canyon below the town of Red River, in the vicinity of the molybdenum mine near Sulfur Gulch and Hottentot Canyon. The material is derived from very steep, highly dissected slopes developed in soft, hydrothermally altered Tertiary volcanic rock. At times, during torrential summer rains, the material may move with enough volume to clog culverts and block State Highway 38. The material consists of angular cobbles and pebbles set in a sandy or silty matrix which hardens upon drying. Maximum mudflow thickness usually does not exceed 35 feet (Schilling, 1956).

Several massive landslide deposits occur in Taos County; in upper Red River Canyon southwest of Red River Pass; along the Rio Grande Gorge between Pilar and Taos-Rio Arriba county line; and below Larkspur Point along the upper Rio Lucero and at Ditch Cabin in SE¹/₄ Section 6, T. 27 N., R. 15 E.

At Foster Park on the upper Red River, the landslide is ascribed to slumping of oversteepened, water-saturated andesite breccia along a major fault zone in the valley walls (Clark, 1966).

In the Rio Grande Gorge, south of Pilar, massive toreva blocks of Tertiary-Quaternary basalt are responsible for slumps along the steep canyon walls where soft underlying Santa Fe sediments are incompetent. Extensive spring activity and pronounced erosion and undercutting by the Rio Grande are important contributory factors.

Below Larkspur Point on the Upper Rio Lucero, Pennsylvanian limestone and shale have caused displacements in massive block, probably along a fault zone (Clark, 1966). Pennsylvanian strata are similarly disturbed in a smaller landslide at the Ditch Cabin site.

A dune field, approximately 30 square miles in area, lies between the Rio Grande Gorge on the east and Cerro Azul on the west. The dunes lack distinctive geomorphic form, they represent thin coverings, probably not exceeding 10-15 feet, and are stabilized by scrub grasses and other vegetation over most areas. The sand owes its origin to the unconsolidated beds of the Santa Fe Formation to the west which undoubtedly were lifted by prevailing westerly winds and deposited on the Taos Plateau as currents began to slow and lift above the Sangre de Cristo Mountains to the east.

Stratigraphy

QUATERNARY

- Alluvium (Qal): Sand, gravel, silt and clay; poorly sorted gravel in stream channels; includes local terrace deposits; stippled area denotes gravel or more granular deposits.
- *Alluvial apron deposits (Qaa): Wedge-like deposits of minor gravel, sand and silt lying adjacent to stream beds; includes valley fill and local alluvial fans.
- Landslide debris (Ql): Large subangular boulders mixed with sand, silt and clay; includes rock flows, mud flows and rock slides.
- Eolian deposits (Qe): Wind-blown sand, primarily active or recently active dune areas.
- Glacial deposits (Qgl): Eskers; lateral, ground and terminal moraines; glacial drift and deposits formed by the action of ice.
- Terrace deposits (Qt): Poorly to well-sorted sand, silt and gravel located immediately adjacent to stream and arroyo beds.
- Terrace deposits (Qt₂): Sand, silt and gravel occupying low terrace levels from 10 to 15 feet above present drainage areas.
- Terrace deposits (Qt₃): Sand, silt and gravel occupying middle terrace levels from 15 to 30 feet above present drainage areas; usually directly overlying lower terrace levels.

- Terrace deposits (Qt₄): Fair to well-sorted sand, silt and gravel occupying higher terrace levels from 30 feet plus.
- Terrace deposits (Qt5): Pre-Wisconsin Age sand, silt and gravel capping higher hills.
- Alluvial fan deposits (Qaf): Poorly-sorted, coarse, braided deposits of subangular gravel, sand, silt and clay; boulder-size gravel common.
- Pediment deposits (Qp): Poorly to well-sorted gravel, sand and silt in various stages of dissection.
- Alluvial fan deposits of volcanic origin (Qafv): Clay, silt, cinders, volcanic breccia and poorly-sorted gravel surrounding the more prominent basalt peaks.
- Gravel deposits (Qg): Unconsolidated pebble to boulder-size gravel capping terraces and pediments.
- Older pediment deposits (Qp): High-level, older, well-sorted sand and gravel; includes gravel overlying Precambrian quartzite and granite.
- Cinders (Qc): Volcanic domes and cones of pumice, perlite, tuff, ash and other scoria.
- *Andesite (Qa): Aphanitic andesite and quartz latite of San Antonio Mountain area.

QUATERNARY-TERTIARY

- Gravel deposits (QTg): Older, poorly sorted, crudely bedded, pebble to boulder gravel; locally includes thin, discontinuous lenses of silt, sand and water-laid tuff.
- Older alluvial fan deposits (QTaf): Highly-dissected, poorly-sorted sand, silt and gravel; gravel deposits are braided, discontinuous, pebble to bouldersize.
- Santa Fe Formation (QTsf): Pinkish-brown to yellowish-tan, poorly consolidated, cross-bedded, arkosic sandstone and siltstone; locally wellcemented by dark-stained calcite or silica; well consolidated, thin beds where intertongued with tuffaceous conglomerate of the Los Pinos Formation; interbedded basalt flows and sand and gravel of the Servilleta Formation; white tuff and volcanic conglomerate of the Picuris Tuff; and sandstones, siltstones and conglomerates of the Tesuque Formation.

*Older cinders (QTc): Cinders and scoria of older volcanos.

Older basalt flows (QTb): Gray to reddish-black, dense, locally porphyritic and vesicular basalt flows, dikes and cinder cones.

TERTIARY

- Altered rock (Ta): Areas of hydrothermal alteration where the rock units are undivided.
- *Los Pinos Formation (Tlp): Gray to tan graywacke, tuffaceous graywacke, sandstone, siltstone, pebble-to-boulder conglomerate, breccia; local masses of greenish-brown amygdaloidal basalt; well-cemented sand lenses.
- *Jarita Basalt Member (Tlpj): Greenish-gray to dark rusty-brown, vesicular and locally porphyritic amygdaloidal basalt.
- Early Tertiary sediments (Ts): Gray to red shale, sandstone and conglomerate.
- Picuris Tuff (Tp): Coarse basal conglomerate; yellow, white, green and red clay; volcanic breccia; water-laid volcanic tuff; interbedded coarse and fine gravels and thin basaltic flows; includes marl beds and thin shale.

Basalt (Tb): Partly amygdaloidal, gray-green to black lava flows.

- Amalia Formation (Tam): Sandstone, conglomearte, basalt, rhyolite and welded tuff.
- Volcanic rocks undivided (Tv): Rhyolite, andesite, latite and other associated volcanic rocks.
- *Dacite porphyry (Tdp): Dikes, sills, pipes, laccoliths and stocks of dacite porphyry, porphyritic andesite and lamprophyre; includes stringers and interbedded sedimentary rocks.

Tertiary granite (Tgr): Cream to light pink porphyritic granite.

TERTIARY-CRETACEOUS

Poison Canyon and Raton Formations (TKp): Coarse-grained yellow sandstone, coal and fine-grained yellow and gray sandstone.

CRETACEOUS

- Cretaceous undifferentiated (K): Gray marine limestone, thin-layered black shale, and thin layered orange shale composed of altered volcanic ash; includes the Fort Hays, Carlisle, Greenhorn and Graneros Formations.
- *Vermejo Formation and Trinidad Sandstone (Kvt): Yellow and gray beach sandstone alternating with coastal-swamp shale and coal; includes lightgray sandstone.
- Pierre Shale and upper Niobrara Formation (Kpn): Black marine shale, lensing orange-stained limestone and altered volcanic ash.
- *Greenhorn Limestone Member of Mancos Formation (Kmgl): Thin-bedded, dark-gray limestone and shale.
- Dakota Sandstone (Kd): Coarse-grained, massive, cross-bedded, pale-orange to yellowish-brown, chert-bearing quartz sandstone; quartz-pebble conglomearte; dark-gray, fissile, carbonaceous shale; thin, interbedded coal.

JURASSIC

*Jurassic undivided (J): Massive orange to light-buff sandstone; lenses of tan and white pebble conglomerate; pink and gray gypsum with thinlylaminated gray limestone and unconsolidated siltstone; white to pink cross-bedded calcareous sandstone; includes Morrison, Todilto and Entrada formations.

JURASSIC-TRIASSIC

Jurassic and Triassic undivided (JTr): Red, gray, and brown shale and sandstone; light-gray cross-bedded dune sandstone; lensing limestone conglomerate.

TRIASSIC

*Triassic undivided (Tr): Maroon to brownish-red, sometimes calcareous, fine-grained sandstone; maroon and green shale and siltstone; massive gray to buff-sandstone and thin-bedded purplish conglomerate; includes the Chinle Formation and Santa Rosa Sandstone. ź

PERMIAN

- *Bernal Formation (Pb): Orange, lavender and reddish brown siltstone; finegrained sandstone; shale and thin-bedded white to brown gypsum.
- *Glorieta Sandstone (Pg): Massive, even-grained, white sandstone, weathering to reddish brown; includes thin interbedded siltstone and shale.

PERMIAN-PENNSYLVANIAN

Sangre de Cristo Formation (PPsc): Maroon to brownish-red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, nodular non-arkosic limestone; siltstone and shale.

PENNSYLVANIAN

Pennsylvanian undivided (₱): Interbedded, dark-green siltstone; mudstone; brown sandstone; clastic, sandy, brownish-gray limestone and thin conglomerate.

MISSISSIPPIAN-DEVONIAN

Mississippian-Devonian undivided (MD): Dark-gray, white, cavernous and massive limestone; red and gray shale; fine to medium-grained, evenbedded, pale yellowish-brown to grayish-red quartz sandstone.

PRECAMBRIAN

- *Precambrian undivided (p€): White and gray, coarse-grained granite; thinlayered, pebble-conglomerate; contains various metamorphic combinations of muscovite, granite, schist and quartz.
- Precambrian granite ($p \in g$): Massive, pink to pinkish-orange, porphyritic granite.
- Precambrian quartzite (pEq): Massive, cross-bedded, grayish-white, vitreous, pebbly, medium to fine-grained quartzite; includes thin pebble-conglomerate layers.
- Precambrian metamorphics (p€m): Pink to cream microcline-rich granite and granite gneiss; pegmatites; gray to cream massive quartzite; mica gneiss and schist; and coarse-grained pink granodiorite.
- *NOTE: For information only, since these deposits or formations do not occur in Taos County but do occur on 30' quadrangle maps which are a part of Taos County.

Aggregate Resources

Gravel is the most important aggregate resource in Taos County. Other aggregate resources include quarry basalt, volcanic and plutonic rocks of varied lithology, quartzite, and to a minor extent, limestone. Gravel is so abundant, however, and located within easy haul distance to most highway construction projects, that it far surpasses all other rock types in importance. Virtually all gravel deposits that are presently being extracted in Taos County are thick, laterally extensive, and situated at the surface with minimal overburden thicknesses.

GRAVEL

Gravel occurs in a variety of geologic settings including Quaternary pediment, alluvial fan, stream, terrace and glacial deposits. Unlimited quantities of high quality gravel occur primarily in various pediment and alluvial fan deposits along the western flank of the Culebra and Taos Mountains in the north-central part of the county. Large quantities of lesser quality gravel including greater fractions of sand and clay are contained in stream, terrace and glacial deposits as well as older Tertiary formations such as the Santa Fe, Amalia and Los Pinos formations. Limited quantities of fair to poor quality pediment gravels also occur along the western border of the county west of the Rio Grande.

Pediment and Alluvial Fan Deposits

The principal gravel pits developed to date are located along State Highway 3 between Taos and Costilla west of the mountains. North of Questa, the deposits are primarily Quaternary alluvial fans, but some production has been from older fan and pediment deposits from Questa south to Taos. The latter deposits are more highly dissected and lithic clasts are decomposed to a greater extent. Both types of deposits grade westward toward the Rio Grande into extensive sheets of finer gravel and sand. Few of these sheet deposits of sand and gravel occur west of the Rio Grande Gorge except near Taos in the vicinity of the Rio Grande Gorge bridge and State Highway 3. These deposits are relatively thin and overlie basalt flow-sheets that mantle the Taos Plateau.

Alluvial fans fringe the many shield volcanoes and basaltic cinder cones of the Taos Plateau. Lithic constituents include primarily andesite in and around the shield domes, and scoria, perlite and basalt flows marginal to the cinder cones. Little of this material has been developed to date because of the lack of proximity to construction areas and in some cases, relative inaccessibility.

Stream Alluvium and Terrace Gravels

The most important stream and terrace gravel deposits in Taos County for road aggregate occur near the mouth of the Rio Hondo Canyon north of Taos and for several miles along the trunk stream of the Rio Costillo east of the village at Costillo.

Material along the Rio Costillo and Rio Hondo range in size from pebbles to boulders with cobble-sized material predominating. This size range will necessitate a certain amount of crushing and screening. Two factors serve as deterrents to the exploitation of stream and terrace gravels in and along these streams; 1) the proximity to large quantities of excellent quality pediment and alluvial fan gravel beyond the canyon-mountain front area to the west, and 2) aesthetic considerations within the scenic canyons themselves where beautiful alpine environments should be protected and preserved.

LIGHTWEIGHT AGGREGATE

Huge quantities of scoria, basaltic ash, cinders and perlite occur over the Taos Plateau around the extrusive shield domes and cinder cones. Although little of these materials has been developed for major road building purposes to date, future reserves are unlimited, high quality perlite itself will not be sought for road aggregate because of the existing premium prices set by the mining industry and the competitive nature of that industry which extract perlite on a major scale in the area. Poor grades of perlitic ash may be developed, however, and produced for aggregate at low, non-competitive prices. The lightweight qualities of these materials can decrease per-mile haulage costs and may be desirable in certain types of concrete structures.

LIMESTONE, QUARTZITE AND OTHER QUARRY STONE

Little quarry stone has been developed in Taos County primarily because of the proximity in most areas of abundant gravel.

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Los Alamos County

Introduction

The last significant change in the political boundary system of New Mexico occurred in 1949 with the creation of Los Alamos County. During World War II the federal government acquired approximately 110 square miles of land from neighboring Santa Fe and Sandoval counties for use in nuclear research, seeking development of an atomic bomb. The facility today, known as the Los Alamos Scientific Laboratory, functions in peacetime pursuits under the management of the U.S. Atomic Energy Commission and the University of California.

The city of Los Alamos, the county seat, and a satellite community to the east, White Rock, represent an approximate population of 17,043 (1970 census).

Situated high on an eastern slope of the Jemez Mountains, the county area possesses a semiarid continental climate. The average precipitation is slightly more than 18 inches; the majority of which falls during the summer and early fall months. Heavy snows are sometimes frequent in the winter months. Accumulation of 50 inches is the annual average. At an elevation of 7,330 feet, the pine-forested setting of the county offers cool and pleasant summers. Maximum temperatures reach 90 degrees. Summer nights are cool, usually in the mid 50's. Winters are sometimes severe with freezes recorded in all months except July and August. Daytime temperatures in the high 30's and 40's can usually be expected. During winter nights, temperatures dip well below freezing, with occasional sharp below-zero readings.

The transportation routes of Los Alamos County are centralized with one major access, State Highway 4. This paved, all-weather roadway extends through the county from the Rio Grande Valley on the east to the mountainous interior of the Jemez "high country" on the west. An alternate branch of the highway, called the East Jemez Road, extends through the city of Los Alamos, while the main route skirts the southern edge of the county and serves the town of White Rock and visitors to the famed cliff dwellings at Bandelier National Monument. A series of unmarked, paved connections provide additional passageways throughout the research laboratory sections of the county.

Physiography

Los Alamos County is situated within the Basin and Range province of north-central New Mexico. The representative of the range physiographic unit is the Jemez volcanic plateau.

JEMEZ VOLCANIC PLATEAU

The Jemez Mountains are located along the western margin of the Rio Grande depression, bounded on the north by the Chama Basin; on the east by the Espanola Basin; on the south by the Santo Domingo Basin; and on the west by the Nacimiento uplift. The mountains are a complex set of volcanic accumulations of Tertiary and Quaternary aged rocks that are maturely eroded into dissected upland plateaus and mesas.

The central core of the mountains is represented by a vast caldera, a subcircular depression called Valle Grande (Spanish, meaning "big valley"), that is 12 to 16 miles in diameter and 200 to 2,200 feet deep. Valle Grande is the largest caldera in the U.S. and second largest in the world only to Mt. Aso, in Japan, by one mile in diameter.

Along the eastern rim of the caldera, a series of bench-type, ash-flow slopes occur that break the overall topographic symmetry of the mountains. These flat-topped, finger-like projections, which extend to the valley of the Rio Grande, are referred to as the Pajarito Plateau. The term has a greater geographic significance than geological, but in recent years has been accepted by some writers as a physiographic subdivision.

Drainage

The drainage of Los Alamos County is lacking of any major perennial streams. The Rio Grande fronts the eastern edge of the county but is not characteristically an influencing agent. Frijoles Canyon, along the Sandoval County line to the south, maintains a small annual flow.

The setting of the county on the eastern benchland of the Jemez Mountains provides for numerous ephemeral, canyon-like waterways that drain the upper reaches of the highlands eastward to the Rio Grande. The more prominent canyons include, from north to south: Pine Springs, Rendija, Bayo, Los Alamos, and Pajarito.

Geologic History

The volcanic rocks of the Jemez Mountains unconformably overlie igneous, metamorphic and sedimentary units of Precambrian through Late Tertiary rocks (Wood and Northrop, 1946).

The area now occupied by the Jemez Mountains was once a large sedimentary basin situated within a depository area between the Sangre de Cristo Mountains on the east and the Nacimiento Mountains on the west. Volcanism probably began in early to middle Pliocene time with the eruption of basaltic units. This was accompanied by large-scale faulting through the central range mass. It has been suggested that the Rio Grande once flowed along this fault zone (west of its present position) in a manner that accounts for the high level deposits of Puye gravel that overlie quartzite river gravels of the once ancestral flow of the Rio Grande. During the volcanic rise of the mountains, the drainage line has since re-established its course to its present position.

Following the ejection of basalt, the outpourings continued with successive effusions of andesites, dacites, quartz latites and associated rhyolites. During Pleistocene time, after a period of quiescence and erosion, catastrophic explosions of hot ash flows, now called the Bandelier Tuff, boiled out from a multiple set of vents that resulted in the structural doming of the caldera floor. The central mountains owe their present topographic form to the collapse of the magma caldera chamber caused by a subsurface void readjustment following the ejection of the ashflows. The subsequent recent alluvial fillings of the chamber has produced the beautiful high montane setting of Valle Grande.

Stratigraphy

QUATERNARY

Alluvium (Qal): Sand, gravel, silt and clay; includes local terrace deposits.

- Alluvium and bolson deposits (Qab): Silt, sand, clay and minor caliche soil.
- Rhyolite (Qr): Gray lithoidal rhyolite, rhyolite tuffs and breccias; includes the Cerror Toledo Rhyolite.
- Bandelier tuff (Qt): Predominantly nonwelded to densely welded ashflow consisting of rhyolite ash and pumice; contains lithic inclusions; includes the Tshirege and Otowi Members.

QUATERNARY-TERTIARY

High level gravels (QTg): Well-rounded pebbles, cobbles and quartzitic boulders; contains minor volcanic rocks; interbedded with pediment gravels; includes gravels of the Rio Grande and Chama rivers and their tributaries and of the Puye Formation.

TERTIARY

Tschicoma Formation (Tt): Coarsely porphyritic dacite, rhyodacite and quartz latite occurring in thick massive flows and domes.

Aggregate Resources

Los Alamos County is limited in its supply of good sand and gravel. Only the pediments and terraces along the tributaries of the Rio Grande provide any sufficient amount of good road building material. Due to the county's proximity to good sand and gravel located immediately outside of the county line on State Road 4 and its unusually small area, only a relatively short haul road, a maximum of 20 miles, is required to deliver anywhere within the county.

Rhyolite, latite and tuff throughout the county offer less than marginal quality products to meet engineering construction standards. Pumice can be mined profitably for use in building blocks and other uses.

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Physiography of Santa Fe County



Legend



Jemez Plateau

Pojoaque Badlands



Santa Fe Piedmont



Rio Grande Trough



Sangre de Cristo Mtns.



Cerros del Rio



San Pedro-Ortiz Mtns.



Estancia Basin

Glorieta Mesa

Santa Fe County

Introduction

Santa Fe County is an elongate-shaped political division occupying approximately 1,973 square miles in north-central New Mexico. The county was established by the Territorial Legislature on January 9, 1852. Named for the capital city of Santa Fe (Spanish meaning "holy faith"), the limits of the county prevailed through a series of modifications and adjustments (1864, 1882, and 1905), achieving its present boundary after the creation of Los Alamos County in 1949.

Principal towns of the county include Santa Fe (population 41,167), the capital and county seat whose historical and tri-cultural (Spanish, Indian and Anglo) atmosphere has made it one of the more interesting cities in the United States.

South of Santa Fe are the Spanish communities of Cerrillos, Golden, Madrid, La Cienega and Galisteo. Formerly thriving mining towns, these settlements are now only sleepy villages supporting a reduced population. North of the Capital City are numerous rustic settlements of Spanish origin that typify rural northern New Mexico. Some of these include: Cundiyo, Sanctuario, Chupadera, and Pojoaque; all of which retain the "adobe culture" of yesterday and whose inhabitants partly cling to the noble traditions of the past. In addition, the Indian culture is still very much in existence. In the extreme northern parts of the county lie various pueblos, including all of Pojoaque, Tesuque, Nambe and San Ildefonso, as well as part of Santo Domingo Pueblo.

The climate of Santa Fe County varies considerably, owing to the extremes in altitudes. In the forested regions of the Sangre de Cristos, peaks rise in excess of 12,000 feet, constituting a topographic barrier to movements of air flow. Throughout the remaining mesas, hills and plains of the county, elevations fluctuate between 6,000 and 7,500 feet. Temperatures and precipitation differ markedly with these elevations. Climatological data reveal that a mean of 14 inches usually falls in the lower regions, mostly in the late summer and fall months. Heavy concentrations of snowfall in the winter months increase as the landforms elevate through the bordering foothills into the ''high country.'' Temperatures, likewise, vary with the wide range of elevations. Summer days are generally warm (lower 90's), decreasing to nighttime readings in the mid 50's. Commencing with the fall period, temperatures decline gradually. The mean annual recordings during the winter at Santa Fe average about 42°.

An extensive highway system provides easy access to most parts of the county. With Santa Fe as the hub, the federal system radiates outward to the southwest, east and north. Interstate Route 25 runs southwest from Santa Fe to provide an expressway link to the city of Albuquerque. U.S. Highways 285 and 84 generally run north and south through the county. Numerous state highways connect with these primary routes to provide access into rural regions. The most heavily-traveled include State Highway 14 which connects the rather isolated communities of the southern part of the county. State Highway 22 winds through the central portions of the county joining rural inhabitants north and south of Santa Fe. State Highway 4 traverses the northern quarter of the county providing access to Los Alamos on the west and the mountain villages to the east.

A branch line of Santa Fe Railroad runs from Santa Fe south to Lamy, where it connects with the main transcontinental route. At this writing, there are no commercial airlines serving the Santa Fe area.

Occupational endeavors of the county are directed mainly toward the tourist industry centered about the city of Santa Fe. A considerable labor force is employed in the city by offices of county, state and federal agencies.

The rural areas of the county account for livelihoods in stock raising, farming, fruit-growing, mining operations, and forest products.

Physiography

Santa Fe County is physiographically diverse. Along most of its eastern boundary rise the lofty forests of the Sangre de Cristo Mountains, the southernmost section of the Southern Rocky Mountain province. The remainder of the county is divided into various sections of the Basin and Range Province, to wit: Estancia and Galisteo basins and Glorieta Mesa to the south; the Rio Grande depression on the west; and in mid-county, the Santa Fe piedmont, the basaltmantled surface called Cerros del Rio, and a series of isolated highlands informally termed the western intrusives.

SOUTHERN ROCKY MOUNTAIN PROVINCE

The Sangre de Cristo Mountains constitute the southern termination of a major chain of highlands that runs north of Santa Fe some 200 miles into south-central Colorado. The mountains, in turn, are in continuity with the major range of the Rocky Mountains proper. The range defined here includes, from north to south, Sierra Mosca (11,801), Capulin Peak (12,221), Santa Fe Baldy (12,622), Lake and Penitente peaks (12,409 and 12,249) and Thompson Peak (10,554). South of Thompson Peak, the altitude of the range lessens considerably and becomes a series of low foothills that fade into the bordering alluvial plain just south of U.S. 285-85-84 southeast of Santa Fe. Viewed from the west, peaks of the Sangre de Cristo Mountains have a rounded, subdued appearance that is in marked contrast to the higher, sharper peaks that typify the bulk of the range that extends north into Colorado; however, when viewed from the east, the effects of glaciation are more prominent, and the mountains have a sculptured appearance, but still not to the degree of the peaks to the north.

Several cirques with associated tarns and morainal deposits occur in the higher portions of the mountains. All of the cirques lie at altitudes above 11,000 feet; the tarns are refrained by low morainal dams with high, forested, steep downstream fronts. The morainal debris extends no more than 3 miles or so downstream from the lip of the cirques (Richmond 1962). The largest cirque lies on the east side of Santa Fe Baldy and is the site of Lake Katherine, the largest and most notable tarn of the mountains. Two smaller cirques are cut in the northeast and east sides of Capulin Peak; both retain small tarns, similar to Lake Johnson. Lake Peak is probably the most extensively glaciated, having cirques on its northeast, northwest and southeast sides. Lake Nambe is retained in the southeastern cirque. In the vicinity of all the cirques of the Sangre de Cristos, ground water is normally plentiful. As a result, solufluction on unprotected slopes and in the high valleys is a local but effective agent of transportation, usually in the form of small landslides, nondescript, bouldery hummocks, and small bogs; however, elsewhere in New Mexico solufluction has been the triggering cause for large earth movements, near or on high mountain roads, and its potential as a major agent of mass-wasting in an alpine environment should not be discounted.

The effect of rather recent peri-glaciation is shown within the northwestern and northeastern cirques of Lake Peak. There are small rock streams, boulder fields, and abundant talus; and in the northeastern cirque, a small but classical protalus rampart lies at the northwestern base of Penitente Peak. Lake Stewart and Spirit Lake lie east of and downstream from Lake Katherine. These are morainal lakes, occupying depressions in the large, forested mass of morainal debris.

Because of their altitude and high amounts of precipitation, the Sangre de Cristos are quite naturally the headland source of innumerable perennial streams which are tributary to the Rio Grande and Pecos rivers. Only those tributary to the Rio Grande are of concern here. Many of these streams, although perennial in the headlands, take on arroyo characteristics upon reaching the permeable valley fill of the lowlands. Also, several of the major streams undergo decided shifts in direction upon leaving the mountains, generally deflecting from westerly to more northwesterly courses. Such shifts can be readily attributed to both lithologic and structural control at the contact of the resistant bedrock of the mountains and the soft valley fill, where the northerly aligned faults that border the Rio Grande depression occur. Rio del Medio, Rio Pojoaque, and Big Tesuque Creek, the major Rio Grande tributaries of the northern half of the highlands, all have such shifts in drainage. Conversely, from the Santa Fe River and south, the streams tend to maintain their established course direction upon leaving the highlands; in this respect, the Santa Fe River is unique in that it deflects from west to southwest. The Santa Fe River is also unique in that it shows a marked change in direction within its mountain reach, shifting from south-southwest to west. This is probably the result of control by joint and fracture systems within the bedrock of the mountains.

BASIN AND RANGE PROVINCE

Estancia Basin

The Estancia Basin occupies the southern quarter of Santa Fe County (see Torrance County).

Galisteo Basin

Galisteo Basin lies immediately north of the drainage divide that separates the northern head of the closed Estancia Basin from the westerly, throughflowing drainage of the Rio Grande. The basin is somewhat unique insofar as it lies at or near the junction of three great physiographic provinces—the Basin and Range, the Southern Rocky Mountains and the Great Plains.

Because of the structural complexity and the juxtaposition to the Rio Grande structural depression, the Galisteo Basin is here placed within the Basin and Range province. The northern boundary is the intersection of the sedimentary rocks of the lowlands with the granitic foothills of the Sangre de Cristo Mountains, and thus is the provincial boundary between the Basin and Range and the Southern Rocky Mountains. The southern boundary is the divide between the internally drained Estancia Basin and the through-flowing Galisteo Creek. The eastern boundary is the western edge of Glorieta Mesa of which the not-too-distant eastern rim constitutes the boundary of the Great Plains province; the western boundary is open to the Basin and Range country of the Rio Grande trough. Unfortunately, these boundaries are not as well defined in the field as their description might imply, for seldom are physiographic divisions as clear-cut as one would have them; but on the whole, it seems that the province junction concept of the Galisteo basin is appropriate.

The Galisteo basin was affected by Laramide tectonics, the first of several disturbances that continued to shape it during most of Cenozoic time.

The initial subsidence, followed by emplacement of the Ortiz-San Pedro South Mountain intrusives, plus the establishment of the complex Tijeras, Los Jollas and Los Angeles fault system, as well as later Pleistocene subsidence have made the basin a complex structural entity in the otherwise structurally uncomplicated area.

Glorieta Mesa

Glorieta Mesa is a great tableland that covers much of southeastern Santa Fe and southeastern San Miguel counties. The north-south line of the two counties can be conveniently used to divide the mesa into two sections: the Ojo de la Vaca (western) section, which lies entirely within Santa Fe County and which is almost entirely surfaced by Triassic rocks. The Rencona section is not in the study area and will not be discussed here, except to state that this section is essentially an extensive lower level, or floor, of the higher Ojo de la Vaca section.

The Ojo de la Vaca section is composed principally of interbedded sandstone, shale and mudstone of Triassic age. Because of the interbedded nature of these rocks, the mesa surface is highly irregular, the more resistant sandstones forming innumerable knobs, hills, mesitas, and larger "mesas on the mesa" such as Fangio Mesa. The lower areas are sometimes developed into parks grassy, open, steppe-like areas that are in control of most of the mesa, which is heavily wooded with pinon, juniper and scattered Ponderosa pine.

On the north the mesa is strikingly defined by a bold, steep, digital escarpment that trends northeasterly from the vicinity of Canoncito settlement to the mesa apex at Glorieta village, then southeasterly for many miles beyond the study area. On the west and south, the mesa is not as sharply defined, but imperceptibly blends into open rangeland country and the north-south ridge of the Pedernal Hills of central New Mexico. According to Fenneman (1931), the north escarpment of Glorieta Mesa defines the northern end of the Sacramento section of the Basin and Range Province. It also sharply defines the provincial boundary between the Basin and Range and Southern Rocky Mountain provinces, and at the same time serves as a transition zone from the complex subsident Rio Grande trough and its bordering mountain blocks on the west side of the open expanses of the Great Plains.

Santo Domingo Basin

The Santo Domingo Basin forms the northern head of the much larger Albuquerque-Belen basin. Because only a minute part of the basin lies within the report area, that being along the western base of Cerros del Rio, no further discussion is deemed necessary, except to state that Santo Domingo Basin is typical of the other intermontane basins of the Rio Grande in that: its limbs are generally the outcrop limb of sediments of the Santa Fe group; a steppedsequence of river terraces and pedimented surfaces lie directly astride the river and slope long distances from bordering highlands; and volcanic sediments are found within the basin or along its periphery.

Rio Grande Depression

The structural trough of the Rio Grande is divided into two basinal features, the Espanola and Santo Domingo enclosures, that bound the county on the north and northwest. A small portion of the Espanola basin is included in the northwestern part of Santa Fe County (*see Rio Arriba County*).

Geologic History

A brief outline of the geologic history is presented here, which is largely a summary of the work of previous investigators, namely Spiegel and Baldwin (1963) and Miller, Montgomery and Sutherland (1963).

The Precambrian history of the Sangre de Cristo area is exceedingly complex. After initial deposition of sands, there followed a prolonged period of metamorphism and intrusion, in several cycles, ending finally with widespread emplacement of the Embudo Granite, which now forms the bulk of the Sangre de Cristo Mountains.

During most of Early and Middle Paleozoic time, the Sangre de Cristo area, as well as northern New Mexico and probably much of southwestern United States, was part of an extensive landmass and rocks of the Cambrian through Silurian were not deposited. Some thin, discontiuous sediments of possible Devonian or Mississippian age were deposited as shallow seaways infiltrated the lower areas of the floundering landmass, these initial marine incursions filled in and leveled the old Precambrian terrace. Transgression of the sea continued during early Pennsylvanian time as clastics were shed from the positive landmass. The initial flood of clastic debris gradually gave way to a decidedly more carbonate environment during Pennsylvanian time, the landmass apparently was rejuvenated by widespread orogenic activity as reflected by large amounts of arkosic debris that is found in the Upper Pennsylvanian and Lower Permian sediments.

During Permian time widespread alluviation interspersed with rather brief incursions of carbonate seas prevailed. The marine invasions gradually ceased by Late Permian time, and continental conditions prevailed throughout the Jurassic and Triassic periods, reflecting a renewal of the old Paleozoic landmass. Marine and near-marine deposits covered the area during the Cretaceous Period, as reflected by the sediments south of Santa Fe, in the Lamy-Galisteo area. The Mancos shale represents the last marine invasion of the Sangre de Cristo area. At the end of Cretaceous time, the area became a gigantic floodplain. The intense Laramide orogeny at or near the end of the Cretaceous Period rejuvenated the entire area. It appears that the Laramide movements actually occurred along the older Precambrian and Pennsylvanian lines of weakness, and that these movements merely rejuvenated these old features, but intensely so. The end result of Laramide tectonics was the formation of mountainous areas which were surrounded by local depositional basins of accumulation, as Stearns has pointed out.

The Cenozoic Era in Santa Fe County was a time of complex and varied geological events. The filling of the local depositional basins formed by Laramide tectonics began. Widespread igneous and volcanic outpourings, on a grand scale began during Oligocene time. The complex intrusive assemblage of the western intrusives are part of these igneous events, which have continued to recur sporadically and with varying intensity throughout the remainder of Cenozoic time.

During Miocene time, uplift began which led to the formation of the Sangre de Cristo Mountains and the bordering Rio Grande trough. The uplift caused renewed erosion of the highlands and the subsequent accumulation of the valley fill in the subsident trough. These valley fill sediments now comprise the Santa Fe Formation. This erosion-deposition cycle continued throughout Pliocene and into Recent times. In addition, the basalt flows of the Cerros del Rio plateau and the enormous volcanic pile of the Jemez country erupted periodically, much of it during Quaternary time.

That the Rio Grande trough itself was alternately subsident and quiescent was thereby the determinant for stream regimen. During the active periods, entrenchment of the Rio Grande and its tributaries occurred; during quiescent periods, channels were aggraded or even became stable. It can be assumed that during periods of quiescence the broad pediments and pedimentary deposits, such as those of the Ortiz series, were cut and graded to former levels of the Rio Grande. With subsequent entrenchment, such surfaces now lie high above the river. These high surfaces were quite extensive and are in contrast to the stream aligned, local terrace deposits that presently lie along both the Rio Grande and its tributaries. This change from the broad, high plains to a more confined system of terraces is certainly an obvious result of a stream system which was constantly undergoing entrenchment; however, this may also be a function of increasing climatic influence (as suggested by Kottlowski, et al., 1956) during Wisconsin glaciation. In support of this, terraces along tributaries of the Rio Grande within Santa Fe County have been tied, by numerous investigators, to Wisconsin morainal deposits high in the Sangre de Cristo Mountains. Dated terraces of Recent age along Rio Tesuque (Miller and Wendorf, 1958) indicate that climate has continued to control the stream regime of Santa Fe County and elsewhere throughout the southwest.

Stratigraphy

QUATERNARY

- Alluvium (Qal): sand, gravel, silt and clay; includes local terrace deposits; stippled area denotes gravel deposits.
- Lake deposits (Qld): lacustrine deposits of silt, gypsiferous silt, sand and clay.
- Alluvial apron deposits (Qaa): wedge-like deposits of minor gravel, sand, silt and clay lying adjacent to stream beds; includes valley fill and local alluvial fans.
- Landslide debris (Ql): large subangular boulders mixed with sand, silt and clay; includes mud flows, rock flows and rock slides.
- Eolian deposits (Qe): wind-blown sand, primarily active or recently active dune areas.
- Alluvium and bolson deposits (Qab): silt, sand, clay and minor caliche soil; includes lake deposits and local deposits of relatively well-established windblown sand.
- Glacial deposits (Qgl): lateral and terminal moraines, eskers, glacial drift and deposits formed by the action of ice.
- Terrace deposits (Qt): poorly to well-sorted sand, silt and gravel located immediately adjacent to stream and arroyo beds.
- Terrace deposits (Qt₂): sand, silt and gravel occupying low terrace levels from 10 to 15' above the present drainage system.
- Terrace deposits (Qt₃): sand, silt and gravel occupying middle terrace lvels from 15 to 30' above the present drainage areas and immediately overlying lower terrace levels.
- Terrace deposits (Qt₄): fairly to well-sorted sand, silt and gravel occupying higher terrace levels from 30' plus; equivalent to the Airport Surface and contains post-Ancha deposits.
- Alluvial fan deposits (Qaf): poorly-sorted, coarse, braided deposits of subangular gravel, sand, silt and clay; boulder-size gravel common.
- Pediment deposits (Qp): sand, silt and well to poorly-sorted gravel in various stages of dissection; locally covered with thin caliche ranging from soft and modular to hard in the southern part of Santa Fe County.
- Caliche pediment deposits (Qpc): caliche caprock, moderately indurated to hard caliche and soft, sometimes modular caliche; often overlying bedrock.
- Caliche and gravel deposits (Qpcg): thick-to-thin deposits of hard-to-soft modular caliche overlying heterogeneous deposits of well-sorted sand and gravel.

- Older pediment deposits (Qop): high level, older, well-sorted sand and gravel; includes gravel overlying Precambrian granite and quartzite.
- Basalt (Qb): gray to black, dense, locally porphyritic and vesicular, recent basalt flows in the La Bajada area.
- Basalt (Qb₂): dense, dark-gray basalt; primarily the most recent flows of the Cuerbio and Servilleta Basalts and slightly older flows of the La Bajada area.
- Basalt (Qb₃): dense, dark-gray basalt; primarily the older flows of the Cuerbio and Servilleta Basalts and oldest of the La Bajada area.
- Valles rhyolite (Qvr): thick flow of porphyritic obsidian, well-bedded rhyolite pumice, partly-welded rhyolitic ash-flow deposits and porphyritic rhyolite found in the Jemez Mountain area of Santa Fe County; includes the Banco Bonito, El Cajete, Battleship Rock, Valle Grande, Redondo Creek and Deer Canyon Members.
- Rhyolite (Qr): gray lithoidal rhyolite, rhyolite tuffs and breccias; includes the Cerro Toledo Rhyolite.
- Cinders (Qc): volcanic domes and cones of pumice, perlite, tuff, ash and other scoria.
- Bandelier tuff (Qbt): predominantly non-welded to densely welded ash-flow consisting of rhyolite ash and pumice; contains lithic inclusions; includes the Tshirege and Otowi Members Quaternary-Tertiary.
- High level gravels (QTg): well-rounded pebbles, cobbles and quartzitic boulders; contains minor volcanic rocks; interbedded with pediment gravels; includes gravels of the Rio Grande River, its tributaries and of the Puye formation.
- Older pediment depoists (QTp): weakly cemented volcanic gravel derived from pedimentation of the Keres Group and Cochiti formation.
- Santa Fe Formation (QTsf): sand, silt, gravel, clay, conglomerate, arkosic sandstone and siltstone; includes the Tuerto gravel, the Ancha and Tesuque formations, the Coyote and Cuerbio basalts, with the Cochiti, Domingo and Tano Members; in some areas the Espinaso formation.

TERTIARY

- Espinaso Formation (Tes): breccia, sandstone, conglomerate, tuff and various volcanic debris; in the Cerrillos Hills area includes monzonite, augite, biotite, syenite, trachyte and hornblende porphyries.
- Galisteo Formation (Tg): gray, buff and reddish-brown sandstone and gray to reddish-brown and purple mudstones.
- Basalt (Tb): predominantly olivine-augite, thin and multiple flows.
- Volcanics undifferentiated (Tv): bedded rhyolite, tuffs, tuff breccias, minor basalts and lava flows.
- Rhyolite undivided (Trh): volcanic domes and shallow intrusions of thick lava flows and bedded tuffs; includes the lower part of the Cochiti formation in the western part of Santa Fe County.
- Monzonite (Tm): igneous bodies of predominantly monzonite or latite composition.
- Tschicoma Formation (Tt): coarsely porphyritic dacite, rhyodacite and quartz latite occurring in thick massive flows and domes.
- Paliza Canyon Formation (Tpa): predominantly various andesites; including basalt flows, flow breccias, tuff breccias and minor dikes.

Intrusives undivided (Ti): pipes, dikes, sills, stocks and laccoliths of diorite, andesite and various other igneous material.

CRETACEOUS

- Mesa Verde Formation (Kmv): massive, interbedded white to buff sandstone and gray shale with minor coal beds; lower shales intertongue with Mancos shale.
- Mancos Shale (Km): medium-gray-to-black, laminated, calcareous shale; finegrained, tan sandstone and calcarenite; with thin-bedded gray limestone; includes the Niobrara shale, Juana Lopez, Carlile shale, Greenhorn Limestone and Graneros Shale Members.
- Dakota Sandstone (Kd): well-cemented medium-grained, buff, red and white quartzitic sandstone; separated by thin gray, black or variegated shale.

JURASSIC

- Jurassic undifferentiated (J): massive orange-to-light-buff sandstone; lenses of tan and white pebble conglomerate; pink and gray gypsum with thinlylaminated gray limestone and unconsolidated siltstone; white to pink cross-bedded calcareous sandstone; includes Morrison, Todilto and Entrada Formations.
- Morrison Formation (Jm): variegated mudstone; massive orange-to-light-buff sandstone and lenses of tan and white pebble conglomerate.
- Entrada-Todilto Formations (Jet): thinly-laminated, gray limestone with pink and gray, gypsiferous, unconsolidated siltstone; white to pink crossbedded calcareous sandstone.

TRIASSIC

- Triassic undifferentiated (Tr): maroon to brownish-red, sometimes calcareous, fine-grained sandstone; maroon and green shale and siltstone; massive gray to buff-brown sandstone and thin-bedded purplish conglomerate; includes the Chinle formation, Santa Rosa Sandstone, Shinarump conglomerate and the Dockum Group.
- Chinle Formation (TRc): brown mudstone, brown-to-red lenticular sandstone; interbedded red shale, conglomeratic limestone and dark-brown sandy shale with minor petrified wood.
- Santa Rosa Sandstone (TRs): red, brown, purplish, coarse-grained, massive, cross-bedded sandstone; locally includes a pebble conglomerate at the base and a buff-white coarse sandstone at the top.

PERMIAN

Bernal Formation (Pb): orange, lavender and reddish-brown siltstone; finegrained sandstone; shale and thin-bedded white-to-brown gypsum.

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- San Andres Limestone Formation (Psa): light to dark gray, massive-bedded, sometimes cherty, coarse- to fine-grained, poorly fossiliferous and dolomitic limestone, with minor sandstone and siltstone; includes thinbedded gypsum in the southern part of Santa Fe County.
- Glorieta Sandstone (Pg): massive, even-grained, white sandstone, weathering to reddish-brown; includes thin interbedded siltstone and shale.
- Yeso Formation (Py): orange-red, tan-brown and buff, even-bedded sandstone; pink and yellow shale; gypsiferous siltstone; shale and brown, earthy, thin-bedded limestone; locally includes the San Ysidro Formation.
- Yeso Limestone (Pyl): gray-to-earthy, cavernous, thin-bedded limestone.

Lower Permian undivided (P): tan and buff, even-bedded sandstone; pink and yellow shale; gray cavernous and locally gypsiferous limestone; reddishbrown, lenticular sandstone and mudstone; thin-bedded pellet limestone and red, brown and black shale; includes the Glorieta Sandstone, Yeso and Abo Formations.

PERMIAN-PENNSYLVANIAN

Sangre de Cristo Formation (PCsc): maroon-to-brownish red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, modular nonarkosic limestone, siltstone and shale.

PENNSYLVANIAN

- Pennsylvanian undifferentiated (P): gray limestone, carbonaceous shale and brown sandstone of the Madera and Sandia formations.
- Madera Limestone (Pm): light to dark gray, coarse- to fine-grained and fossiliferous limestone; dark-gray, reddish-brown and green shale; reddish-brown sandstone and arkosic conglomerate.
- Sandia Formation (₱s): black shale; coarsely crystalline, light-gray to blue limestone; gray to greenish-gray and brownish sandstone; carbonaceous shale; locally conglomeratic and thin-bedded coal.

MISSISSIPPIAN-DEVONIAN

Mississippian and Devonian undivided (MD): dark-gray, white, cavernous and massive limestone; red and gray shale; includes the Terrero Formation.

PRECAMBRIAN

- Precambrian undivided (p€): granite, gneiss, schist and metamorphics of various origin and composition.
- Precambrian granite (p€g): coarse-grained granite, locally epidotized; includes pegmatite, aplite and lamprophyre dikes.
- Precambrian quartzite $(p \in q)$: white-to-black fine-grained, cross-laminated quartzite.
- Precambrian metamorphics (p€m): muscovite, quartz-muscovite, amphibolite schist, granitic gneiss, metadiabase, meta-andesite and chlorite schist.

Aggregate Resources

Santa Fe County has a large variety of rock that will make suitable aggregate for roads and the building industry. The city of Santa Fe is the greatest user of aggregate now. The interstate road system is primarily complete at Santa Fe, but it is expected that there will remain a great demand for aggregate if the building industry continues at its present pace. There is also a rather extensive city street system to be built over the next several years. There will remain a moderate demand for aggregate throughout the county, since most of the secondary and county roads need or will require some improvement during the next several years.

Gravel will remain the primary aggregate source for some time; however, quarry rock will become more attractive as gravel sources become depleted and haul distances become greater. The long-range need for aggregates should be established for the county and reserves put aside for future construction, for it becomes more difficult daily to establish quarry and gravel pits because of environmental restrictions, particularly on federal and state lands. The whole state seems to be getting ahead of itself in environmental restrictions before adequate aggregate reserves are established to save future tax dollars. There is such a diversity of terrain and geology throughout the county, that locating the most economical source for a particular construction job becomes very complex. In the high country, Sangre de Cristo Mountains, there probably will not be a great demand for aggregate, but quarry stone should be considered in any sizable construction job. The county will continue to draw moderately heavily on its sand and gravel sources, particularly near Santa Fe, Pojoaque and Espanola.

QUARRY ROCK

Basaltic Lavas

Basaltic lavas are distributed over a very large area west of Santa Fe from La Bajada to Otowi Junction on S.R. 4. These lavas, except near Otowi Junction, are Quaternary in age. Cinder cones and a cinder cover are common throughout the lava field. As a construction material for roads, cinders have not proven to be very durable; however, they have become quite valuable as a decorative stone, and thousands of tons of cinders have been removed from this area over recent years. Through selective exploration it is possible to establish durable quality aggregate in the flow rock. Ordinarily, the best rock is exposed near the edges of the flows, or along drainageways where the cinder cover has been subjected to erosion. The older flows near Otowi do not have the cinder cover and excellent quality aggregates may be produced there.

Monzonite

Monzonite is exposed rather erratically from just north of I-25 at La Bajada, southerly through South Mountain. Monzonite largely makes up the core of this discontinuous range of mountains. The monzonite is in various stages of decapitation and decomposition and Cretaceous rocks in various stage of contact metamorphism lie along the lower slopes. Fair to good quality quarries have been established in this rock, but so far they have not been used. Here again, one must be selective in establishing a pit, for different degrees of decomposition from chemical weathering occur throughout the range.

Precambrian Rock

Granite, quartzite, phyllite, and other metamorphic rocks represent the lithology of the Sangre de Cristo Range. Granite has consistently been unpopular in the construction industry in New Mexico, particularly in road construction, over the past 30 years. In many areas, because of its crystalline structure and weak cleavage planes, it will not pass the durability test or abrasion test. Likewise, in many areas, granite becomes amorphous and more durable under abrasive conditions. There are many local areas throughout the Sangre de Cristo Range where the granite remains amorphous and good quality aggregate can be produced from relatively large areas. There are also areas that have been affected by hydrothermal alteration and deep chemical weathering that are not suitable for aggregate production. By selective exploration, good quality aggregates can be produced from many areas of the range.

Durable quartzite and other metamorphics are exposed locally in the loftier regions of the range. No detailed search has been made for these materials, since the availability of other materials near the roadway system would obviate their use.

Caliche

Good quality caliche is scarce in Santa Fe County. There are a few nodular deposits along the northern periphery of old Lake Estancia and some scab-like, laminated deposits occur on Glorieta Mesa, northeast of White Lakes. Usable quarries may be developed in this area by selective subsurface exploration.
Limestone

Usable limestone occurs in two different geological systems of rock in Santa Fe County, Permian and Pennsylvanian. The primary exposures of Permian San Andres limestone are along the upper ledges of Glorieta Mesa escarpment, the southern extension of Glorieta Mesa east of White Lakes, and local outcrops north of I-40 between Clines Corners and Moriarty. Pennsylvanian limestone is exposed on the fading dip-slope of the Sandia Mountains at Edgewood, northwest of South Mountain, and along the flanks of the Sangre de Cristo Range north and west of Glorieta.

The Permian seas were rather shallow in this area during San Andres time. Consequently, the limestone is rather thin and often gypsiferous. The possibility of developing a pit of sufficient size for road construction along the northern escarpment of Glorieta is rather remote, because it becomes covered rapidly by the Bernal Formation; however, selective exploration is not discouraged, should the need arise for aggregate in this area. Through further exploration, good to excellent aggregate can be produced from quarries east of White Lakes, and fair to good aggregate can be produced in the area north of I-40 between Clines Corners and Moriarty.

Good to excellent quality aggregate can be produced from Pennsylvanian limestone in Santa Fe County. The limestone deposits are relatively thick, often interbedded with marine shales and sandstone. They often interlense with continental red shales near contact with the Sangre de Cristo Formation. Care should be taken in exploring and mining these deposits, for the product may easily be contaminated by interlensing shale.

SAND AND GRAVEL

Stream and Terrace Deposits

Principally, there are five streams that furnish sand and gravel for Santa Fe County, the Rio Grande, Santa Cruz River, Pojoaque River, Tesuque River, Santa Fe River, and Galisteo Creek.

The Rio Grande and Santa Cruz are awkwardly located to be a primary source of supply for the county, but the Rio Grande and its associated floodplain and terrace deposits may well be the main source of supply for concrete aggregate in the Santa Fe area, as other sources are depleted.

The Santa Cruz can be written off except for local, very small quantities because of cultural development along its floodplain. The Santa Cruz has excellent cobble-size quality gravel. It is well-graded through cobble-size clasts, rounded to sub-angular, the clasts are primarily granite and metamorphic rock derived from the Sangre de Cristos. The groundwater table is shallow and the thickness of the deposit exceeds 20 feet.

From Espanola southerly to Otowi Bridge, in the Rio Grande, gravel may be extracted for use in Santa Fe County. The river and floodplain are well choked with axial gravels. Subtle terrace deposits lie adjacent to the floodplain. At Otowi Bridge, the river enters a narrow canyon with relatively high cliffs that extend downstream to Cochiti Lake. Here the gravel has either become covered or flushed into the downstream area. Extensive supplies reaching several miles into the terraces bordering the Rio Grande occur in, around and downstream from Cochiti Lake. These deposits lie outside of Santa Fe County, but they should not be discounted as a source of supply.

All of the Rio Grande gravels are well-graded, well-rounded, with grain sizes from fine sand through boulder gravel. The clasts are primarily quartzite and igneous with abrasive qualities in the range of 20% (L.A.W.). In the vicinity of Albuquerque there has been considerable evidence of reactivity in products made from the Rio Grande deposits. This should be investigated thoroughly before use of any pit along the Rio Grande for portland cement concrete.

The Pojoaque River and its floodplain are floored with fair quality sand and gravel. Its deposits are more fine-grained than the other major rivers of northern Santa Fe County. It will be difficult to establish pits of any size, because of cultural development. The deposits are fairly well-graded through cobble size. The clasts are primarily granite and metamorphics, being derived from the Sangre de Cristo Range.

Gravel deposits of the Tesuque River are in a similar state as those of Pojoaque. The supplies of more coarse-grained materials are involved with cultural development. However, in its lower reaches downstream from the village of Tesuque, there are generous supplies of fine-grained materials that are suitable for concrete and plaster sand. Many small ephemeral arroyos west and northwest of Santa Fe in the "bad-lands" region are floored with plaster and concrete quality sand.

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Santa Fe River and its associated terrace system daily become more engulfed by cultural development. Santa Fe (city) proper sits on millions of tons of good quality sand and gravel. A few untouched areas remain in the vicinity of the airport.

The deposits are generally fairly well-graded though boulder size. The clasts are granite and metamorphic, derived from the Sangre de Cristos. Some of the larger gravels in the older terraces are in various stages of decomposition and tend to break down to sand size materials when crushed or under abrasion.

Galisteo Creek is not noted for good quality aggregates; however, in its upper reaches near Canoncito, several hundred thousand tons were removed to construct I-25, and maintenance forces continually produce material downstream from the village of Lamy. At Canoncito, the deposits are depleted for the most part. At Lamy, the deposits become recharged with fine-grained materials during flood stages of the creek. Where Galisteo Creek crosses I-25 south of La Bajada, fine aggregates can be produced from the floor of the creek. On the south floodplain below La Bajada, more coarse-grained gravels were encountered below several tens of feet of silty clay overburden to depths of 90 feet. A shallow groundwater table will be involved with any pit operation here. The presence of more select aggregates here usually obviates the use of Galisteo deposits.

Alluvial Fan Deposits

Alluvial fans flank the Ortiz Mountains, San Pedro Mountain and South Mountain. These deposits are typically very coarse-grained with more than 40 percent plus two-inch material, very large boulders are common. They are an excellent source for a crusher operation. The clasts are angular to sub-angular through the finer-grained sizes. They are primarily igneous and metamorphic, very durable. These deposits have not been fully explored to date, since the need has been somewhat limited. Unlimited supplies are available if the need arises.

Pediment Gravel

Fair quality pediment gravels occur locally in Santa Fe County. The supplies in most areas are rather limited. There has not been a great amount of exploration of these deposits in the past, usually because of the presence of other more select materials in the vicinity. Along the flanks of the Sangre de Cristos, they appear as isolated, flat-topped buttes or mesas. Here the clasts are subrounded to angular, medium-graded granite and metamorphic rocks, somewhat decomposed but durable products can be manufactured.

Flanking South Mountain northwest of Moriarty, gravel pits can be developed locally in the pediment deposits. There has not been any primary stream regimen flowing across this piedmont. The gravel deposits are braided and crop out locally in recent erosional channels. The clasts are medium wellgraded through cobble size, mixed igneous and sedimentary, with fair abrasive and soundness qualities. Selective subsurface exploration can develop pits suitable for primary construction jobs.

Older Gravel Deposits

Older gravel deposits, commonly referred to as Puye gravel, cap the mesa in the extreme northwest corner of Santa Fe County. Fair to good pits have been developed in these deposits in Los Alamos County. The deposits are gapgraded through boulder size materials. The clasts are sub-rounded to angular, primarily igneous rocks derived from the Valle Grande volcanic complex with pumice, welded tuff, basalt and rhyolite. Durable aggregate has been produced from this deposit and it remains a reliable source for a relative small network of roads in this part of the county.

Refer to the Geology and Aggregate Resource maps and their associated Material Pit summary sheets for further information concerning aggregates for Santa Fe County.

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Physiography of Torrance County



200 to 300 feet above the basin floors. Encino basin is slightly larger and is veneered with Pleistocene lake and recent playa deposits. Thin playa deposits and sand dunes occupy Pinos Wells basin.

EASTERN MESAS AND CANYON LANDS

North, east and south of Pinos Wells and Encino basins are rolling dissected mesalands of moderate to low relief. They are largely capped by resistant limestone and sandstones of Permian and Triassic age with shallow intervening canyons and valleys cut in soft Permian siltstone and decomposed sill-like diabasic intrusions near Duran. Pintada Canyon, near Derramadero, is the most prominent canyon and the surrounding mesas are the most rugged. Here local relief may be as much as 500 feet; whereas, most of the mesalands surrounding the basins generally rise less than 300 feet above valley bottom.

NORTHEASTERN PLAINS

North of Pintada Canyon lies the only area of Great Plains topography within Torrance County. Surficial deposits of Tertiary-Quaternary gravel and caliche veneer the relatively level to gently rolling plains from Palma south to Pintada Canyon and eastward beyond the Torrance-Guadalupe county line. These plains are part of the Pecos Valley section of the Great Plains and are 500 to 1,000 feet lower than the pine-covered mesas of the Basin and Range country west of Palma. The average elevations is 6,000 feet over most of the plains in Torrance County. Underlying the surficial deposits are limestone, sandstone and shale of Permian and Triassic age. Bedrock is exposed in Pintada Canyon and its tributaries as well as around some of the many deflation and solution basins that dot the plains. During wet seasons, these basins are filled with fresh water from surface run-off and have accumulated within their centers thin deposits of sand, silt and clay. Largely stabilized deposits of eolian sand and silt rim the leeward eastern sides of the larger basins. Few of these depressions are more than 50 feet below the surrounding plains.

CHUPADERO MESA AND GALLINAS MOUNTAINS

South of Estancia Valley and standing some 500 feet higher is an extensive plateau-like upland known as Chupadero Mesa which forms much of southwestern Torrance County. It is capped by resistant Permian sandstone and limestone and extends for about 30 miles west and east along the Torrance-Socorro-Lincoln county line and north for some 12 miles to the vicinity of Mountainair on the west and Willard on the east. On the southeast, Chupadero Mesa abuts the Gallinas Mountains at the Torrance-Lincoln county line. The largest portion of the Gallinas Mountains lies in Lincoln County and North Peak is the most prominent of the Gallinas Mountain peaks that lie in Torrance County. Chupadero Mesa slopes gently to the southwest but over most of its surface the elevation averages about 7,000 feet.

DRAINAGE

All surface drainage in Torrance County is intermittent and most of it is into closed basins. Two important drainage divides define surface drainage outside of the closed basin; the Manzano Mountains-Chupadero Mesa divide on the west and the Pedernal Hills axis on the east. West of the Manzano Mountains and Chupadero Mesa, surface flow is toward the Rio Grande; surface flow east of the Pedernal Hills is toward the Pecos River. Between the two drainage divides, run-off is into the closed Estancia, Encino and Pinos Wells basins, where it ends in salt playas. The western slopes of the Manzano Mountains and Chupadero Mesa are drained by numerous canyons and arroyos into the Rio Grande Valley, the largest of which are Abo Canyon west of Mountainair and Chupadero Arroyo southwest of Chupadero Mesa. In the northeastern plains, drainage that fails to enter local depressions, enters Pintada Canyon and flows eastward to the Pecos River near Santa Rosa in Guadalupe County. Another closed basin, termed the "Vaughn basin," lying mostly in Guadalupe County receives surface flow from extreme southeastern Torrance County.

Geologic History

PRECAMBRIAN

The rocks in Torrance County reflect an extremely complex geologic history, including periods of marine inundation, volcanism, mountain-building, erosion and continental sub-aerial sedimentation.

During Precambrian time and throughout much of New Mexico, thousands of feet of quartzose sands and shales were deposited below or near sea level. These sediments were in turn overlain by equally thick volcanic extrusions of rhyolitic and basic lavas. Several stages of granitic intrusion and regional metamorphism altered these sediments and volcanics into the thick sequence of quartzite, schist, gneiss and greenstone exposed today along the Manzano Mountains and in the Pedernal Hills.

The mountainous uplands produced by Precambrian orogeny, known as the Pedernal highlands, underwent erosion throughout much of early Paleozoic time, and no record of Paleozoic deposition exists in Torrance County until Mississippian and Pennsylvanian time. At this time, a deep north-south oriented marine trough called the Rowe-Mora basin formed to provide an access of a late Mississippian marine transgression from the south. The Rowe-Mora basin was largely co-extensive with the present Estancia basin; the ancestral Pedernal highlands to the east and the ancestral Zuni highlands to the west. Unstable shelf conditions continued through Pennsylvanian time when influxes of arkosic debris from the Pedernal highlands mixed with shallow carbonate deposits to form the Madera Limestone.

The Pennsylvanian-Permian transition was one of marine regression as continental red beds of sand, silt and clay, largely derived from the Pedernal highland, spread over the old Pennsylvanian carbonate shelf. The Bursum Formation represents this period of transition.

Early Permian time ensued with continental deposits of the Abo Formation flooding off the highlands of the area to form a broad piedmont alluvial plain. Arid conditions characterized much of Yeso time as hundreds of feet of gypsiferous sand, silt, and limestone were deposited. For the first time since the beginning of Paleozoic time, the Pedernal highland was at least partially buried. This floundering of the old highland was probably caused by a progressive marine invasion from the south and east, resulting in a deposit of the clean transgressive sand of the Glorieta Sandstone and the stable carbonate shelf of the San Andres Limestone. A marine regression set in during Bernal time reflecting the rise of the ancestral Rocky Mountains to the north and west. Humid conditions lingered long enough after San Andres time for a karst condition to develop over the existing limestone terrain, as red beds of Late Permian and Triassic age began filling the sinks on top of the San Andres Limestone.

The Mesozoic Era was generally a time of continentality, when a vast floodplain of sand, gravel, silt, and clay of the Santa Rosa Sandstone and Chinle Formation was built across the subdued terrain. The Pedernal highland was probably rejuvenated by the regional mountain-building of the ancestral Rocky Mountains and stood above the landscape much as it does today. Deposition ceased through Jurassic time, but resumed during the Cretaceous Period as marine or near-marine conditions prevailed for the last time during the Cretaceous inundation.

The Laramide orogeny was the beginning of Cenozoic time and marked the beginning of the broad structural features evident today in Torrance County. On the west lay part of the broad anticlinal dome which probably extended across New Mexico from north to south, the precursor of the great Rio Grande trough. Later, the Manzano Mountains formed from the eastern limb of this structural feature. On the east, persistent Pedernal Hills occupied their present position. Between the hills and the higher Manzanos, the Estancia basin began to subside, probably in late Pliocene time, during renewed and intense Basin and Range tectonic activity. In response to such tectonic activity, intensive alluviation spread debris from the highland area across much of central and south-central New Mexico. Pediment deposits flanked the Estancia basin, originating from the Manzano Mountains and the flatter slopes of the Pedernal Hills.

As depicted by Titus (1969), the stratigraphy of the valley fill of the Estancia basin consists of an older alluvial unit on the lacustrine and a younger eolian unit. The alluvial unit is believed to have been deposited in a slowly subsiding basin under sub-aerial conditions while the valley was being drained by a through-flowing river. This unit is exposed around the basin periphery, but is covered by the lacustrine unit within the basin interior. The lacustrine unit was deposited during the life of several lakes; it is divided into a lower lake sequence and an upper lake sequence separated by a medial sand, which represents a dessication cycle between a two-lake sequence. The eolian unit is the result of constant dessication and deflation during the arid cycle of the last several thousand years. A generalized chronology of the basin is as follows:

1. During late Pliocene time, in response to regional Basin and Range tectonics, downwarping of the basin began.

2. As downwarping continued, the alluvial unit slowly filled the basin, continuing throughout much of Pleistocene time. At the topographic spillway at the southeast end of the basin, drainage then flowed northeasterly toward the area of Vaughn. The alluvial unit, at least the lower part, is correlative with the pediment deposits of the flanking Manzano and Pedernal highlands and is concomitant with the regional alluviation of the High Plains to the east.

3. Sometime prior to closure of the basin, probably in early Wisconsin time, caliche accreted over the alluvial unit, indicating a period of structural and climatic stability. This caliche now lies exposed on points of higher elevation of the basin periphery and is also downwarped under the lacustrine blanket of the basin interior.

4. Basin closure occurred during early or late Wisconsin time and was synchronized with regional pluviation, which resulted in a sequence of pluvial lake stages. Water levels, as many as three, fluctuated with the regional climatic shifts that characterized late Wisconsin climate. The cyclic nature of the lacustrine chronology seems to correlate with pluvialinterpluvial periods that accompanied the known late Wisconsin glacialinterglacial periods that accompanied the known late Wisconsin glacialinterglacial events of the Rocky Mountains, and the attendant climatic shifts of the adjacent, unglaciated High Plains.

Concerning the lakes, Titus (1969) recognizes three separate stages which he calls early Lake Estancia, late Lake Estancia and a shallow, post-glacial stage of short duration. The two principal stages were results of the Tahokan and San Jon pluvials of late Wisconsin Pinedale glaciation. The third resulted from the minor preglacial Temple Lake stage of neo-glaciation. The alluvial unit of Titus (1967) is correlated with the Terry pluvial of early Wisconsin Bull Lake glaciation.

5. As the lake disappeared, the ensuing dessication and subsurface collapse shaped the present interbasin playa system, and subsequent deflation and dune-building have continued to enlarge the playas to modify the basin floor, all within the last several thousand years.

Titus (1969) has described the pre-lake environment of the Estancia basin as that of a slowly subsiding basin that was open and drained by a throughflowing river. This river flowed across a topographic spillway at the southeastern end of the basin, near present-day Cedarvale, then flowed northeasterly into the Pinos Wells and Encino basins. Neither Titus nor Bachhuber projected the river's course beyond Encino, other than to indicate that a northward course into Pintado Canyon either as river flow (or overflow) from the lake chain was a possibility. Kelley (1972), on the other hand, presents a case for a southeasterly overflow course from Encino to Vaughn, then south a few miles below Vaughn, where the water disappeared into the sub-surface through karst topography. Kelley further states; "physiographic evidence does not indicate that the Estancia to Encino Lake chain ever fed a surface stream tributary to the Pecos River." It is true that present physiographic evidence does not indicate a through-flowing tributary to the Pecos River, but localized gravel deposits provide support that such a stream did exist.

In a recent publication, Geology and Aggregate Resources of New Mexico (1972), State Highway Department, District 11, De Baca County, a rather large geomorphic entity was presented which was informally called the Achen Ranch surface. (Much of Achen Ranch surface is Buchanan Mesa of Kelley's report.) The above report considered the Achen Ranch surface to be of post-Llano Estacado age, as did Mourant and Shomaker (1970), although others have considered it as an outlier of the Llano Estacado. A post-Llano Estacado age was assigned to Achen Ranch surface because the maturity of the caliche profile that has accreted over the surface and forms the physiographic surface indicates that it is younger than the more advanced profiles of the Llano Estacado proper, both in terms of thickness and sequential development; the thinness or absence of Ogallala sediments under the surface is indicative of post-Ogallala stripping; and topographic projection precludes Achen Ranch surface equivalency to the Llano Estacado. Certain other higher surfaces in the vicinity of the Achen Ranch surface (near Vaughn) were not discussed in the report, but as Kelly has correctly pointed out, these surfaces are equivalent to the Llano Estacado, as indicated by the maturity of the caliche profiles and topographic position. Thus, the Achen Ranch surface is a geomorphic and physiographic "island" that lies between and below the Llano Estacado proper and its equivalent outliers near Vaughn.

It seems reasonable to assume that the hypothetical river in question probably originated from the Estancia-Pinos Wells-Encino basin chain of lakes. Its headland source may have been in the southern end of the Sangre de Cristo Mountains to the north. The river flowed out of the southern end of the Estancia basin, through the spillway denoted by Titus; thence northeasterly through the Pinos Wells-Encino area; thence easterly toward Vaughn, out onto the Achen Ranch surface then into what is now the broad trench of Rio Portales Valley. Admittedly then, it is difficult to explain how stream waters could have negotiated the karst topography of the Vaughn area, inasmuch as some areas near Vaughn now act as a veritable sponge for surface waters. Never the less, stream waters did indeed negotiate the karst, as attested by the gravel deposits underlying the caliche of the Achen Ranch surface.

General Geology and Stratigraphy

Precambrian plutonic and metamorphic rocks are exposed along the western face of the Manzano Mountains and in the Pedernal Hills and part of the Gallinas Mountain. Sedimentary rocks of Pennsylvanian and Permian age form the eastern dip slopes of the Manzano Mountains. The eastern and southern mesalands are eroded in Permian sandstones, limestones, siltstones and local Tertiary igneous centers. Triassic and Permian strata overlain by Tertiary and Quaternary deposits of sand, gravel, silt clay and caliche form the northeastern plains of Torrance County. In Estancia, Encino and Pinos Wells basins, lacustrine, bolson and pediment deposits are found, all Tertiary and Quaternary in age.

In Torrance County, Precambrian rocks crop out on the western slopes and

miles in length. It is intruded along the Yeso-Glorieta contact and ranges in thickness from a few feet at the north to more than 50 feet near the county line. Another sill is located about five miles southwest of Abo and is entirely within the Yeso Formation.

By far the largest sill is north and west of Duran; much of it along State Road 3 between Duran and Encino. It is poorly exposed and deeply weathered over much of its extent where it tends to be masked by colluvium from the surrounding Yeso Formation which it intrudes. In places, outcrops appear to be more dike-like but good intrusive contacts and attitudes are difficult to identify. In general, the sill and accompanying dike swarms seem to be restricted to the Yeso where resistant limestone beds in the upper part of the formation have probably served as a barrier above which the intrusions have not penetrated.

The dikes and sills are compositionally diabases, where they are aphanitic, but phaneritic varieties approach compositions of hornblende diorites and syenodiorites.

Sedimentary Rocks

Tertiary sedimentary deposits include sand, gravel, clay and sill of fluvial origin and caliche. Although these deposits are widespread over Torrance County, they are primarily found in and around the large closed lake basins and intermittently covering the plains of the northeast. The deposits of Estancia basin are correlative with beds in the upper part of the Santa Fe Group north of the basin and based on this correlation, are considered Pliocene-Pleistocene in age. Similar deposits are found ringing the basin and covering high pediment surfaces beyond the basin on all sides. A dissected apron of such deposits fringes the Pedernal Hills and continues eastward where it merges with thicker, more extensive deposits on the plains toward the Pecos River. The plains deposits are remarkably like the Ogallala Formation even farther east on the Llano Estacado of the High Plains, and have been mapped as "Ogallala" which is largely Pliocene-Pleistocene in age. The Santa Fe Group and the Ogallala Formation are considered age equivalents by most workers and physical continuity of these deposits across Torrance County helps to substantiate their correlation. For the purposes of this report, all deposits considered Santa Fe Group or Ogallala Formation in age are mapped as geomorphic or lithological units rather than as formational units. Geomorphically mapped units include pediment and bolson deposits (QTp and Qab respectively). Lithologic units include caliche-gravel deposits and caliche deposits (Qcg and Qc respectively).

QUATERNARY SYSTEM

Bolson (Valley Fill) Deposits

Bolson or valley fill deposits in Estancia basin consist of reddish-brown to tan silt and sand interbedded with gravel lenses. Gravel becomes increasingly abundant and coarser up the valley slope, especially to the west. Basinward, below as much as 100 feet of Pleistocene lake sediment, these deposits are almost entirely fine sands, silt and some fine gravel and caliche. The caliche essentially marks the top of the bolson fill and is as much as 20 feet thick in the subsurface. Where the caliche horizon is near or at the surface, as in T. 9 N., R. 9 E., T. 4-5 N., R. 8-9 E. and T. 5 N., R. 12 E., it is usually relatively soft and has been reworked by lake shoreline and pediment processing into fine, poor quality gravel.

North and west of Mountainair, the bolson fill is very coarse-grained and contains cobbles, pebbles and boulders of Precambrian quartzite, gneiss and schist. Here it resembles a pediment gravel at the surface, but is probably more than 50 feet thick in places. A facies transition undoubtedly exists between the valley fill or bolson of Estancia Valley and the upslope pediment gravels which grade into the valley from the flanks of the Manzano Mountains. Titus (1969) correlates these upslope gravels with the gravelly bolson fill which lies at depth

below the Pleistocene lake sediments of Estancia Valley. He further regards them as Pliocene (?) and Pleistocene in age, probably equivalent in age to the Santa Fe Group north of Estancia basin and the Ogallala Formation to the east. Due to their distinctive geomorphological expression as surficial piedmont deposits lying between the mountain highland and the valley, they have been mapped as pediment gravels in this report. Other pediment gravels occur around the Pedernal Hills, especially on the eastern flank.

Pediment Deposits

The high distinctive pediment gravel deposits that grade away from the Manzano Mountains are best developed northwest of the town of Mountainair and south of Canon Colorado. They are as much as 50 to 100 feet thick and consist of coarse, well-rounded to subrounded boulders, cobbles and pebbles of quartzite, schist, limestone and gneiss. They lie above an old erosional surface cut on the Abo and Yeso Formation. The interstitial material is predominately sandy or silty and largely derived from these two formations. The mountainward portion of these gravels is densely forested and subjected to a rather humid climatic regime; however, valleyward, semiarid conditions prevail and weak caliche horizons and interstitial caliche coatings are common.

Finer grained, rather poorly sorted gravel flanks the eastern slope of the Pedernal Hills, west of U.S. 285 and north of Negra. Although the principle constituent is quartzite derived from the Pedernal Hills, there is a large portion of silt and caliche, the later occurs as both lithic fragments and encrustations. The Pedernal pediment gravels are rather thick compared to the Manzano pediment.

Another type of pediment deposit covers large areas of the plains of northeastern Torrance County. Caliche is a major constituent and forms a thick, rather indurated caprock as well as filling interstices. Limestone, quartzite, sandstone and caliche constitute lithic fragments. Thickness may vary within short distances, but 20 feet is typical. The deposit rests chiefly on San Andres Limestone and sandstone and shale of the Santa Rosa Sandstone and Bernal Formation. Typically, the sheetlike deposit is thickest on the interfluves but is breached by Pintada Arroyo and its tributaries. It is considered to be correlative with the Ogallala Formation of Pliocene-Pleistocene age. South of Pintada Arroyo and northeast of Encino along the Torrance-Guadalupe county line, coarse-grained, well-rounded quartzite gravel caps the western limb of the "Vaughn syncline" and may be equivalent to the pediment gravels of the Pedernal Hills and the northeastern plains. Erosional remnants of indurated caliche form a caprock locally over the pediment gravels of this area.

Alluvial Fan Deposits

A complex of coalescing alluvial fans debouch from the steep canyons of the Manzano Mountains into the Rio Grande Valley in extreme western Torrance County. Comanche, Encino, Sand and Sais canyons are the main sources of these deposits. Two distinctive types of fan deposits are discernible on the basis of geomorphological expression. The younger fans are deltoid in plan with steep axial slopes, arcuate distal toes and sharp headward apexes. Older fan deposits are highly dissected and stand high above the intervening younger fans. Their surfaces slope valleyward very gently to be abruptly terminated at probable fault scarps which align north to south parallel to the mountain front. The younger fan material is angular, bouldery, poorly-sorted and chaotic. Subrounded cobbles and pebbles and sparse boulders comprise the older fan material, most of which is fair to moderately-well sorted. Interstitial material is silty or sandy, and as in the younger fans, quartzite clasts constitute the bulk of the lithic fragments. The thickness of the fan deposits is conjectural except where their feather edges are exposed near the mountain front. Both types of fan deposits undoubtedly thicken rapidly basinward, perhaps to hundreds of feet.

Alluvial fan deposits have been mapped around the Rattlesnake Hills

southeast of Willard, along the north rim of Chupadero Mesa and on the north slopes of the Gallinas Mountains. Boulder-sized clasts in these deposits are rare, with cobble, pebble and sand-sized material most common. Around Rattlesnake Hills, granite-gneiss and amphibolite debris is common. Sandstone, caliche and limestone pebbles are abundant along the Chupadero escarpment, and rhyolite and syenite debris constitutes the fan material around the Gallinas Mountains. Each of these three fan deposits have apparently been modified to some extent by lake shore erosional processes of Pleistocene Lake Estancia, which occupied the Estancia Valley. As a result, they form smooth, relatively undissected surfaces, which are covered with locally well sorted, fine gravel.

Lake Playa and Dune Deposits

Extensive lake deposits occur in Estancia and Encino basins and small restricted playa lake deposits are found in solution-deflation depressions on the northeastern plains. Saline playa incrustations occur near the center of Pinos Wells basin, but this basin lacks the type of lacustrine deposits found in the Estancia and Encino basins.

In Estancia basin three intervals of lake deposits have been identified. The lower lake interval is the most extensive and varied lithologically. High shoreline beach facies of gravel, sand bars and spits rim the basin between elevations 6,250 to 6,360 feet and are especially well preserved on the east and north sides of the basin. The lower lake interval in the subsurface toward the center of the basin consists of gray and tan silt and clay which rests on a buried caliche zone at the top of the Pliocene (?)-Pleistocene valley fill. A clean wellsorted Eolian sand unit overlies the lower lake interval. The middle lake interval is gray and tan in color and contains much gypsum along with clay. At least 12 beach strandlines of the upper lake interval have been identified between elevations 6,100 through 6,200 feet (Harbour, 1958). Offshore bars and sand spits and bay mouth bars are among the geomorphic expressions of these strandline deposits. A prominent offshore bar composed of gypsiferous sand is part of the upper lake sequence on the eastern side of Laguna del Perro. At Lucy, T. 5 N., R. 10 E., Sec. 24, a prominent sand and gravel spit projects northward from U.S. 60 for more than a mile. Evidence of the latest and third lake interval is well preserved below 6,148-foot elevation. About one mile east of the Lucy spit, an unusually well preserved offshore bar composed of gypsiferous sand and silt trends north and south for a distance of about 20 miles. This offshore bar effectively bars a large embayment centered in T. 6 N., R. 11 E. Below 6,148-foot contour toward the sline playas, a series of gypsum dunes were leveled by the last lake stand.

All beach and strandline deposits reflect local pre-existing sediments or bedrock lithologies. In T. 9 N., R. 10 E. east of Moriarty, beach gravels of the oldest lake stand are largely derived from Precambrian quartzite at Lobo Hill and nearby Glorieta Sandstone and San Andres Limestone. The gravel is pebble-sized with a fine and coarse-grained sand matrix and occasional cobblesized clasts. Farther south in the eastern half of T. 7 N., R. 10 E. and the western half of T. 7 N., R. 11 E., caliche from the earliest Estancia basin fill has been ripped up by wave action and distributed by longshore currents as pebble and cobble-sized gravel deposits. The underlying bedrock is Glorieta Sandstone and San Andres Limestone and these rock types, although present as clasts, contribute a predominately fine silty matrix to the caliche gravel. Similarly, remnants of beach gravel from the highest lake stand on the southwestern side of Estancia basin reflect a provenance largely of Madera Limestone and Abo Sandstone from the eastern slopes of the Manzano Mountains. Clasts within the sand and gravel spit at Lucy are largely derived from nearby outcrops of Glorieta Sandstone and Precambrian amphibolites. The short-lived, most recent stand of Lake Estancia was restricted to areas floored by fine-grained clayey lake bottom deposits of the earlier stands. Deposits of this stand, therefore, consist largely of gypsiferous sand and silt.

A thick gypsiferous dune field lies leeward from the recent saline playas in

Estancia basin. The dunes are composed of sand, silt and clay-sized particles, gypsum and calcium carbonate. The dune field is about six miles in width toward the center of the playa area, eighteen miles in length, and the highest dunes stand 170 feet above the playa floor. Dune thicknesses average 50 to 100 feet.

Playas occupy depressions upwind from the dunes but cut sharply into dune deposits. The playa sediment rests on dense clay and silt beds of lacustrine origin. Maximum playa sediment thickness is about eight to ten feet. Much of the year the playa surfaces are flooded with saline water and playa sediment commonly consists of saturated mesh of medium to coarse-grained gypsum crystals set in a matrix of silt and clay. The playas are elongated from north to south, the longest and largest of which is Laguna del Perro, east of Willard and north of U.S. 60.

Stream Alluvium and Terrace Deposits

Alluvial deposits of gravel, sand, silt and clay occupy the beds of Recent ephemeral streams and their valley floors. The character of these deposits changes abruptly, even within any single drainageway. The largest streams drain the Manzano eastern slope and include Abo Canyon, Canon Colorado and Manzano Arroyo. Small, poorly-sorted deposits of silty, subangular, fine to coarse-grained gravel and sand occupy these channels and also form associated, older, lateral terrace deposits. The alluvium thins and coarsens rapidly toward headward areas where it occurs only as sparse stringers along bends in the stream beds. Downstream the deposits thicken but still do not exceed 20 or 30 feet. These Manzano Mountain streams reflect a provenance of limestone, sandstone and quartzite and contain clasts of these rock types primarily.

Chavez Draw east of Moriarty is a rather large ephemeral stream that drains into the northeastern corner of Estancia Valley. It is about ¼ mile wide along most of this course, but is floored by very thin fine sand, silt and very fine to medium-grained gravel of caliche, sandstone and limestone. Minor quartzite is flushed in by its principal northwestern tributary, Canada de la Puerta. The alluvium in Chavez Draw probably thickens to a maximum of 15 feet along its mid-course.

Pintada Arroyo in the northeastern part of the county is alluviated along its headwater course just east on U.S. 285 east of Pedernal Peak with sandy, quartzose gravel. Farther east, the stream bed is eroded to bedrock with narrow terrace alluvium hanging marginally along the arroyo. The volume of limestone and sandstone clasts in the gravel fraction increases progressively downstream away from the Precambrian Pedernal source area along with an increased proportion of fine sand, silt, and clay in the matrix.

Tabet Draw, which drains a part of Chupadero Mesa south of Willard and Mountainair, is floored by fine limestone gravel and sand where it reached the floor of Estancia Valley.

Buffalo Draw, draining south from Moriarty onto the lake bed of Estancia Valley, is filled with fine-grained sand and silt alluvium and lacks gravel.

Eolian Sand Deposits

East and south of Estancia Valley, wind-blown deposits of quartzose sand have accumulated. These deposits are largely derived from erosion of dry, sandy areas in Estancia Valley where sand is lifted and carried by the prevailing westerly wind to the eastern edge of the valley where it is dropped as the wind loses velocity against the valley slope. North of Lucy siding and near the mouth of Chavez Draw actively migrating dunes cover hundreds of acres.

A large elongated dune area, largely stabilized by vegetation, is located between Cedarvale and Progresso. The source for this tremendous volume of quartzose sand is apparently the Glorieta Sandstone outcrop area immediately to the southwest.

A minor dune area is located along Pintada Arroyo north of Encino and has its source area along the dry sandy wash itself.

Stratigraphy

QUATERNARY

- Alluvium (Qal): Sand, gravel, silt and clay; includes local terrace deposits; stippled area denotes granular or gravelly deposits.
- * Alluvial apron (Qaa): Wedge-like deposits of minor gravel, sand, silt and clay lying within major valleys and being moved by sheet-wash toward their streams.
- Lake deposits (Qld): Lacustrine deposits of gypsiferous silt, sand and clay; includes evaporites in playas.
- Beach deposits (Qbd): Discontinuous, braided deposits of fine to coarse-grained sand, silt and well-sorted lensing gravel.
- Eolian deposits (Qe): Wind-blown sand, largely unstabilized, active dunes; includes loess deposits on the leeward shorelines of Pleistocene lakebeds, largely stabilized.
- Alluvium and bolson deposits (Qab): Silt, sand, clay and minor caliche soil; includes lake deposits and local deposits of relatively well-stablized windblown sand.
- Alluvial fan deposits (Qaf): Coarse, poorly-sorted, braided deposits of subangular gravel, sand, silt and clay; boulder-size gravel common.
- Pediment deposits (Qp): Well to poorly sorted gravel, sand and silt in various stages of dissection; locally covered with thin caliche ranging from soft and nodular to hard; includes pebble to boulder size subangular to rounded Precambrian fragments.
- Terrace deposits (Qt): Poorly to well-sorted sand, silt and gravel; includes minor travertine cemented gravels.
- Gravel deposits (Qg): Polygenetic heterogeneous deposits of sand and gravel overlying bedrock; derivd mainly from higher and older pediment surfaces.
- Caliche pediment deposits (Qpc): Caliche caprock, moderately indurated to hard caliche and soft, sometimes nodular caliche; often overlying bedrock.
- Caliche and gravel deposits (Qpcg): Thin to thick deposits of hard to soft nodular caliche overlying heterogeneous deposits of well-sorted sand and gravel.
- Older pediment deposits (Qop): High level, older, well-sorted sand and gravel; includes gravel overlying Precambrian granite and quartzite.

TERTIARY

Intrusives undivided (Ti): Dikes, plugs and sills of diorite, andesite, syenite and rhyolite.

CRETACEOUS

*Dakota Sandstone (Kd): Well cemented medium grained, buff, red and white quartzitic sandstone; separated by thin gray, black or variegated shale.

TRIASSIC

Triassic undifferentiated (TR): Maroon to brownish-red, sometimes calcareous, fine-grained sandstone; massive gray to buff-brown sandstone and thinbedded purplish conglomerate; includes the Chinle Formation, the Santa Rosa Sandstone, the Shinarump Conglomerate of the Dockum Group. Santa Rosa Sandstone (Trs): Red, brown, purplish, coarse-grained, massive, cross-bedded sandstone; locally includes a pebble conglomerate at the base and a buff-white coarse sandstone at the top.

PERMIAN

- Bernal Formation (Pb): Orange, lavender and reddish brown siltstone, finegrained sandstone, shale and thin-bedded white to brown gypsum.
- San Andres Limestone Formation (Psa): Light to dark gray, massive bedded, sometimes cherty, coarse to fine-grained, poorly fossiliferous and dolomitic limestone, with minor sandstone and siltstone; includes massive bedded gypsum in the southern part of Torrance County.
- Glorieta Sandstone (Pg): Massive, even grained, white sandstone; weathers to reddish-brown; includes interbedded siltstone and shale.
- Mesita Blanca Sandstone (Pym): Massive-bedded and cross-bedded, fine to medium-grained, orange-red sandstone; included with the Yeso Formation in the northern part of the county.
- Yeso Formation (Py): Orange-red, tan-brown and buff, even-bedded sandstone; pink and yellow shale; gypsiferous siltstone; shale and brown, earthy, thin-bedded limestone; locally includes the San Ysidro Formation and Mesita Blanca Sandstone.
- Yeso Limestone (Pyl): Gray to earthy, cavernous, thin-bedded limestone.
- Abo Formation (Pa): Reddish-brown, lenticular, fine-grained sandstone and mudstone; pellet limestone and red, brown and black shale; often thin, pebble conglomerate at the base.
- *Sangre de Cristo Formation (Psc): Maroon to brownish-red, arkosic conglomerate; motley to brown, red and variegated sandstone; thin, nodular non-arkosic limestone; siltstone and shale.

PENNSYLVANIAN

- *Bursum Formation (Pb): Purple and maroon shale, thin limestone, quartz sandstone and limestone conglomerate.
- Madera Formation (PM): Massive bedded, light to dark gray, coarse to fine grained and fossiliferous limestone; dark gray, reddish-brown and green shale; reddish-brown sandstone and arkosic conglomerate.
- Sandia Formation (PS): Coarsely crystalline, light gray to blue limestone; black shale; gray to greenish-gray and brownish sandstone; carbonaceous shale; locally conglomeratic and thin-bedded coal.
- Pennsylvanian undifferentiated (₱MS): Gray limestone, carbonaceous shale and brown sandstone of the Madera and Sandia Formation.

PRECAMBRIAN

- Precambrian granite (P€): Gray, massive, medium to coarse grained granite, locally epidotized; includes pegmatite, aplite and lamprophyre dikes.
- Precambrian quartzite ($P \in$): White to black fine-grained, cross-laminated quartzite.
- Precambrian metamorphics (PC): Muscovite, quartz-muscovite and amphibolite schist, granitic gneiss, meta-diabase, meta-andesite, chlorite, schist.
- Precambrian undivided (PE): Granite, gneiss, schist and metamorphics of various origins and compositions.
- *NOTE: For information only, as these deposits and formations do not occur in Torrance County, but do occur on 30' quadrangle maps which are a part of Torrance County.

Aggregate Resources

On the basis of geology, three broad areas of aggregate resources can be delineated. Quarry stone from the Madera Limestone and local pediment gravels can be utilized for road building aggregate in western Torrance County. In the central part of the county, coincident with the closed basins, gravel and quarry caliche are limited. Suitable bedrock quarry stone is almost totally lacking. To the east, including the Pedernal Hills, caliche, gravel and limestone and quartzite can be exploited.

Filler material of adequate quantity and quality can be found throughout the county. By far, the best sources are from well-sorted dune areas east and south of Estancia Valley.

Special problems relating to aggregate resource utilization occur within the county; 1) the lack of water for washing gravels to be used as concrete aggregate, and 2) a deficiency of suitable aggregate material in the widespread Yeso Formation. Little can be said about the scarcity of water in the county except to reiterate that there are no through-flowing or perennial streams to supply the quantities required for washing of gravel on large projects. The typical gypsiferous, fine-grained siltstones and sandstones of the Yeso Formation are to be avoided as contaminant, due to their inherent high plasticity and solubility. Thin gray limestones within the Yeso Formation offer some potential of local aggregate use; however, their overall low soundness values and limited occurrence make them unsuitable for major highway construction.

QUARRY STONE

High quality quarry stone can be obtained in almost unlimited quantities from the Madera and San Andres Limestones and from Precambrian quartzite. To a much lesser extent, adequate small-project and maintenance supplies of good or fair quality stone can be developed from caliche horizons that occur sporadically around the Estancia Valley and over the northeastern plains. Limestone from the Yeso Formation and diabase sill and dike rock are generally unacceptable for most highway construction use in Torrance County.

Limestone

Limestone is, by far, the primary source of quarry stone both in terms of production and available reserves. Virtually, all of this supply is derived from either the Madera Limestone in the Manzano Mountain area or from the San Andres Limestone atop Chupadero Mesa or east of the Pedernal Hills.

Bedding thickness of 50 feet or more are common in the Madera Limestone and Los Angeles wear and soundness values are excellent for all road-building purposes, including both asphalt and concrete mixes. Clay shale seams within the Madera limestone beds are rarely numerous or thick enough to present plasticity problems. Bedding is somewhat thinner in the San Andres Limestone than in the Madera Limestone but entirely adequate for large scale production. Minor beds of gypsum, sandstone and siltstone occur sporadically throughout the section but can be avoided with the exercise of reasonable care on the part of loader operators. Los Angeles wear and soundness values of San Andres Limestone are generally comparable to that of the Madera Limestone. Some potential exists for the production of a limited supply of fair to good quality limestone from the Yeso Formation in eastern Torrance County; however, extreme caution must be exercised as to thickness and continuity of the horizon in the selection of prospective sites, as well as careful sampling and laboratory testing for adequate Los Angeles wear and soundness results for contamination with silt and clay of excessive plasticity. Yeso limestones offer the greatest potential for use in Yeso terrain where more acceptable material is scarce and haul distances excessive.

Quartzite

More than adequate supplies of quartzite and gneiss exist in and around the Pedernal Hills, east of Estancia Valley. In the past, these rock types have contributed negligible quantities of quarry stone in the county, primarily because of their remoteness from areas of demand and their proximity to more suitable gravel deposits.

Caliche

Almost without exception, all caliche in Torrance County is poorly consolidated and nodular. Most of it may be worked without blasting and is well suited for maintenance use, but reserves are not large and cannot be relied on for major projects. The most important caliche production thus far has come from an area about 12 miles east of Moriarty and north of I-40. Here, the caliche horizon is about 15 feet thick.

In general, caliche is relatively unimportant in Torrance County at the present time; however, subsurface evidence suggests that indurated to nodular caliche, as much as 29 feet thick, occurs beneath Estancia basin. This horizon is covered by lake deposits over much of the area but exploration may be warranted near the basin rim, especially to the south where local exposures occur in railroad excavations southwest of Pedernal siding.

GRAVEL

High quality gravel sources are generally scarce in Torrance County. The best sources, however, are undoubtedly found in alluvial fans and pediments marginal to the Manzano Range, beach gravels of Estancia Valley, and pediment-like caliche gravels of the northeastern plains.

Pediment Gravel

By far, the most important source of gravel in Torrance County is to be found in pediment deposits. Pediment deposits occur on the southeastern end of the Manzano Mountains, as well as around the Pedernal Hills and across the northeastern plains. The coarsest pediment material in the county is found along the southeastern flank of the mountains, north and west of the town of Mountainair. Poorly sorted pebble, cobble, and boulder size quartzite, schist and limestone gravel is most typical. Silty and clayey matrix material should be screened out and some crushing is necessary to break down the larger cobble and boulder clasts.

Better sorted, but finer grained pediment material is found around Rattlesnake Hills east of Willard, but thicknesses are variable and may not be adequate for the development of large project pits. Pediment gravels fringing the Pedernal Hills are typically capped by weak or moderately hard caliche horizons or contain abundant caliche pebble-size clasts. Moderate sized pits may be developed, but further exploration is needed to delineate their thickness and lateral extent.

Extensive sheet deposits of pediment and caliche on the northeastern plains of the county are the primary sources of gravel in terms of size gradiation, quality and quantity. These Ogallala-like gravels are sometimes capped by a resistant caliche horizon up to several feet thick or they are cemented by an indurated caliche matrix. They may be exploited as quarry stone or as gravel aggregate as required. There appears to be an ample supply for large highway projects.

Alluvial Fan Gravels

Two types of alluvial fan gravel occur in Torrance County; 1) poorly sorted, younger fan material which debouches from the western canyons of the Manzano Mountains, and 2) better sorted, older dissected alluvial fan deposits that stand higher than the younger fans and slope gently toward the Rio Grande Valley beyond the county line. The older fan gravels offer good potential for excellent quality material in quantities sufficient for most projects; however, haul distance may be excessive for future road projects not located relatively near the mountain front.

Beach Gravel

Extensive, but thin, beach gravels rim Estancia Valley and are exploitable where they have accumulated in sufficient quantity as bars and spits in proximity to high quality source areas. Much of the eastern slope of the Manzano Mountains has yielded low quality gravels derived from sandstone, shales and limestones. On the other hand, the resistant quartzite, schist and gneiss of the Pedernal Hills have yielded somewhat higher quality gravels along the eastern edge of Estancia Valley. These are usually clean well-sorted, pebble-size gravels that unfortunately occur only locally as deposits large enough to exploit. The Lobo Hill and Lucy siding areas are considered optimum of exploration, with only the former area having sizeable past production. A small area on the western rim of Encino Valley, two miles south of Encino, deserves further exploration and may prove to be a desirable maintenance supply for the otherwise aggregate-deficient Encino Valley.

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MATERIAL PIT SUMMARY

Bit Number	5613	5684	5685	5846
Pit Number		SW 1/4 26	not sectionalized	N 1/2 36
Section Township & Bongo		30N 18W	Navaio Indian Res.	30N 8W
Location Township & Range	SUN IOW	San Juan	San Juan	San Juan
County	San Juan			Q'+(3)
Formation	φ +(4)	and s gravel	dravel	sand & aravel
Rock Type	sand & gravel		svenite	quartzite & various
Source Rock (Gravel)	various	various	fair	excellent
Quality of Material	pood	doog		
Thickness of Material	9' plus	10' plus	o prus	
Thickness of Cap (Caliche)	-	-	-	ebalo.
Material Underlying Formation	shale	shale	sandstone & share	Share
Vegetation	qrass	grass	grass and sage	yrdss Clat
Local Terrain	rolling	rolling	rolling	Tiat .
Thickness of Overburden	1'	1 *	1	and the second
P. I. (Overburden)	10- N.P.	9	S.N.P.	
Estimated Quantity (cu. yds)	120,000	100,000	150,000 plus	100,000
Los Angeles Wear	17.2	23.6	25.1	18.0
Soundness Loss	11 8	3.4	7.8	. 4
Average Maximum Size	0"	6"	10"	10"
% Retained on 2" Sieve	70	30	45	27
Crushed to:	20 Do received	as received	as received	as received
orushed to:		5/	54	69
B:+ 1"		25	41	51
	44	19	36	39
Average 72	52	10	32	30
% Passing No. 4	21		28	25
No. 10	. 18	14	1 3	5
No. 200	2	2		NP
Plasticity Index	, N.P.	N.P.	IN • 1 •	1
Remarks:				
	6770	6773	7121	* 0797
Pit Number	p/32	not sectionalized	SF 1/A 27	not sectionalized
Section	not sectionalized	not sectionarized	to the first second sec	
Location Township & Range		Novolo Indian Ros	SUN I ZW	Navajo Indian Res.
County	Navalo inutan Res.	Navajo Indian Res.	SUN I/W San Luan	Navajo Indian Res. San Juan
	San Juan	Navajo Indian Res. San Juan	SON I/W San Juan Ot(4)	Navajo Indian Res. San Juan Ot(2)
Formation	San Juan Q†(3)	Navajo Indian Res. San Juan Qt(5)	30N 17W San Juan Qt(4) sand & gravel	Navajo Indian Res. San Juan Qt(2) gravel
Formation Rock Type	San Juan Q†(3) sand & gravel	Navajo Indian Res. San Juan Q†(5) sand & gravel	30N 17W San Juan Qt(4) sand & gravel	Navajo Indian Res. San Juan Qt(2) gravel igneous
Formation Rock Type Source Rock (Gravel)	San Juan Q†(3) sand & gravel various	Navajo Indian Res. San Juan Q†(5) sand & gravel various	30N I/W San Juan Qt(4) sand & gravel various	Navajo Indian Res. San Juan Qt(2) gravel igneous
Formation Rock Type Source Rock (Gravel) Quality of Material	Navajo Indian Res. San Juan Q†(3) sand & gravel various excellent	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent	SON 17W San Juan Q+(4) sand & gravel various excellent	Navajo Indian Res. San Juan Qt(2) gravel igneous good
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	Navajo findran Res. San Juan Ot(3) sand & gravel various excellent 10' plus	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8'	30N 17W San Juan Q+(4) sand & gravel various excellent 6' plus	Navajo Indian Res. San Juan Q+(2) gravel igneous good 25'
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche)	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus	Navajo Indian Res. San Juan Q†(5) sand & gravel various excellen† 8' -	30N 17W San Juan Qt(4) sand & gravel various excellent 6' plus	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25'
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25! - sandstone
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden	Navajo Indian Kes. San Juan Qt(3) sand & gravel various excellent IO' plus - shale grass rolling 0-2'	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l'	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3'	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly -
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. L (Overburden)	Navajo Indran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S N P	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P.	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly -
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. vds.)	Navajo Indran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S.N.P. 250,000 plus	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200.000	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.)	Navajo Indran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S.N.P. 250,000 plus	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200,000	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000 23.3	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000 25.5
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S.N.P. 250,000 plus 19.6	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200,000 19.6	SON 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000 23.3 2.5	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000 25.5 2.6
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S.N.P. 250,000 plus 19.6 1.8	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200,000 19.6 2.7 7"	Son 17W San Juan Qt(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000 23.3 2.5 7"	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000 25.5 2.6 13"
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling 0-2' S.N.P. 250,000 plus 19.6 1.8 8"	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200,000 19.6 2.7 7"	Son 17W San Juan Q+(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000 23.3 2.5 7"	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000 25.5 2.6 13" 15
Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve	Navajo findran Kes. San Juan Ot(3) sand & gravel various excellent 10' plus - shale grass rolling O-2' S.N.P. 250,000 plus 19.6 1.8 8" 38	Navajo Indian Res. San Juan Qt(5) sand & gravel various excellent 8' - shale & sandstone grass rolling l' S.N.P. 200,000 19.6 2.7 7" 26	Son 17W San Juan Q+(4) sand & gravel various excellent 6' plus - sandstone & shale grass hilly 0-3' 8 75,000 23.3 2.5 7" 29 as received	Navajo Indian Res. San Juan Qt(2) gravel igneous good 25' - sandstone grass hilly - 8,000 25.5 2.6 13" 15 as received

as received

62

52

38

30

28

7 , S.N.P. as received

63

47

30

21

19

1

N.P.

88 75

68

60

56

24

N.P.

0797: gradation not representative

69

55

40

30

27

5

S.N.P.

as received

Crushed to:

2"

1"

1∕2"

No. 4

No. 10

No. 200

Pit

Average

% Passing

Plasticity Index Remarks:

7

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MATERIAL PIT SUMMARY

4

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à'

Pit Numbe	er	0798	0799	0800	0801
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
	County	San Juan	San Juan	San Juan	San Juan
Formation	1	Qal	Km	Qal	Qp
Rock Type	e	sand & gravel	limestone	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	igneous		various	igneous
Quality of	Material	good	good	excellen†	excellent
Thickness	of Material	81	two 2' members	51	5'plus
Thickness	of Cap (Caliche)		_	-	-
Material U	nderlying Formation	sandstone	sandstone & shale	sand	sandstone & shale
Vegetation	1	grass & juniper	grass	willow	grass
Local Terr	ain	hilly	rolling	river bottom	rolling
Thickness	of Overburden	0-2'	0-3'	0-1'	0-2'
P. I. (Overl	burden)	S.N.P.	12	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	60,000 plus	5,000 plus	25,000	50,000 plus
Los Angele	es Wear	30.0	26.3	15.4	28.1
Soundness	Loss	7.9	45.6	1.5	10.4
Average M	aximum Size	25"		5"	18"
% Retained	d on 2" Sieve	31	-	28	38
	Crushed to:	as received	11	as received	as received
	2"	57	-	76	73
Pit	1"	4	100	57	57
Average	1/2"	34	57	42	46
% Passing	No. 4	28	22	33	35
	No. 10	24	11	31	29
	No. 200	3	2	2	2
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

Pit Number		0802	0803	0804
S	Section	not sectionalized	not sectionalized	not sectionalized
Location T	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
С	County	San Juan	San Juan	San Juan
Formation		Ti	Qal	Kmf
Rock Type		monchiquite	sand & gravel	sandstone
Source Rock (C	Gravel)	_	volcanic & various	-
Quality of Mate	erial	good	good	good
Thickness of M	laterial	150'plus	5' plus	4'
Thickness of Ca	ap (Caliche)	_	-	-
Material Under	rlying Formation	-	sandstone	sandstone & shale
Vegetation		grass	grass	grass
Local Terrain		rolling	wash bottom	hilly
Thickness of O	verburden	_	0-1'	0-4'
P. I. (Overburde	len)	-	S.N.P.	S.N.P.
Estimated Quar	ntity (cu. yds.)	500,000 plus	75,000	25,000 plus
Los Angeles We	ear	40.7	27.0	27.8
Soundness Loss	s	10.1	10.8	7.3
Average Maxim	num Size	-	8"	<u> </u>
% Retained on	2" Sieve	-	21	_
Ci	Crushed to:		as received	11
2'	,,,		83	-
Pit <u>1</u> '	»	100	67	100
Average ½	2"	57	54	45
% Passing N	lo. 4	25	40	7
N	lo. 10	15	31	9
N	lo. 200	4	4	2
Plasticity Index	K	N.P.	N.P.	N.P

Remarks:

QUAD No.1

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	Qal	Alluvium	Kmf	Menefee Formation
	Qaa	Alluvial Apron deposits	Крі	Point Lookout sandstone
	Qe	Eolian sand		
	Q;	Terrace deposits (Post glacial)		
RNARY	-9t2	Terrace deposits(Pinedale)		
QUATER	Org	Terrace deposits(Late Bull Lake)		
	Q14	Terrace deposits(Early Bull Lake)		
	Qt5	Terrace deposits (Pre-Wisconsin)		
	Qp	Pediment deposits		
	Qop	Older Pediment deposits		
ARY .	Tsj	San Jose Formation		
TERTIZ	Tn	Nacimiento shale		
	ТКоа	Ojo Alamo sandstone		
	Kki	Kirtland and Fruitland Formations		
	Крс	Pictured Cliffs sandstone		
LACEOUS	K 1	Lewis shale		
CRE	Kch	Cliff House sandstone		



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MATERIAL PIT SUMMARY

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Pit Number	1	5615	5638	5/61	
Sect	tion	NE 1/4 29	NW 1/4 1	NW 1/4 13	NW 1/4 19
Location Tow	vnship & Range 🛽	30N 12W	29N 13W	29N 13W	29N 12W
Cou	inty	San Juan	San Juan	San'Juan	San Juan
Formation	+	O+(3)	$O \pm (A)$	O+(A)	0+(2)
Deals True	+			cand & gravel	sand & gravel
коск туре		sand & graver	sand & gravei		such a graver
Source Rock (Gra	avel)	various	various	limestone & various	quarizite & various
Quality of Materia	al	good	boop	good	excellent
Thickness of Mate	erial	lo' plus	8' plus	9' plus	6' plus
Thickness of Cap	(Caliche)	-	- P	_	-
Material Underlyi	ing Formation	conditione	sandstone	sandstone	sandstone
Vegetation		salustone	saliusione		sade & drass
vegetation	4	grass	Juniper	grass	
Local Terrain	, I	hilly	hilly	hilly	
Thickness of Over	rburden	2-4'	2-4'	21	3'
P. I. (Overburden)) [8-13	10 - N.P.	5	S.N.P.
Estimated Quanti	ity (cu. yds)	200.000 plus	200 000 plus	50.000	100.000 plus
Los Angeles Wear		22 0	10 6	26,0	26 8
Soundance Less	· . +			12.2	20 . 0
Soundness Loss		5.5	3.6		<u> </u>
Average Maximun	n Size	15"	9"	בי	10"
% Retained on 2"	' Sieve	40	35	30	25
Crus	shed to:	as received	as received	as received	as received
2"	··· †	53	64	46	68 I
Pit 1"	ł	18		24	59
				12	<u></u>
Average 72		12		12	<u> </u>
% Passing No.	4	4	14	8	40
No.	10	13	12	7	38
No.	200		2		9
Plasticity Index	t	N.P.	N . P .	N.P.	N.P.
Remarks	1				
			· · ·		
- · · · · · · · · · · · · · · · · · · ·	· T			0942	09.47
Pit Number	Ţ	6146	6147	0842	0843
Pit Number	tion	6146 SE 1/4 20	6147 SE 1/4 23	0842 not sectionalized	0843 NE 1/4 15
Pit Number Sect Location Tow	tion wnship & Range	6146 SE 1/4 20 29N 12W	6147 SE 1/4 23 29N 12W	0842 not sectionalized Ute Mtn. Indian Res.	0843 NE 1/4 15 32N 13W
Pit Number Sect Location Tow Cou	tion wnship & Range unty	6146 SE 1/4 20 29N 12W San Juan	6147 SE 1/4 23 29N 12W San Juan	0842 not sectionalized Ute Mtn. Indian Res. San Juan	0843 NE 1/4 15 32N 13W San Juan
Pit Number Sect Location Tow Cou Formation	tion vnship & Range unty	6146 SE 1/4 20 29N 12W San Juan Q†(3)	6 47 SE /4 23 29N 2W San Juan Q†(2)	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf	0843 NE 1/4 15 32N 13W San Juan Ot
Pit Number Sect Location Tow Cou Formation	tion vnship & Range inty	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone	0843 NE 1/4 15 32N 13W San Juan Qt gravel
Pit Number Sect Location Tow Cou Formation Rock Type Source Bock (Cre	tion wnship & Range inty	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone	0843 NE 1/4 15 32N 13W San Juan Qt gravel
Pit Number Sect Location Cou Formation Rock Type Source Rock (Gra	tion vnship & Range inty avel)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone	0843 NE 1/4 15 32N 13W San Juan Qt gravel various
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia	tion wnship & Range inty avel) al	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair	0843 NE 1/4 15 32N 13W San Juan Qt gravel various
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Mate	tion vnship & Range inty avel) al erial	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7	6 47 SE /4 23 29N 2W San Juan Qt(2) sand & gravel quartzite excellent ' plus	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4'	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6'
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Mater	tion wnship & Range inty avel) al erial (Caliche)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 71	6 47 SE /4 23 29N 2W San Juan Qt(2) sand & gravel quartzite excellent ' plus	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4'	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6'
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Mater Thickness of Cap Material Underlyi	tion wnship & Range inty avel) al erial (Caliche) ing Formation	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 71 - sandstone	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent II' plus - sandstone & silt	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Mater Thickness of Cap Material Underlyi Vegetation	tion wnship & Range inty avel) al erial (Caliche) ing Formation	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 71 - sandstone grass & sage	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper
Pit Number Sect Location Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Mater Thickness of Cap Material Underlyi Vegetation Local Terrain	tion wnship & Range inty avel) al erial (Caliche) ing Formation	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 71 - sandstone grass & sage hilly	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent II' plus - sandstone & silt grass hilly	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain	tion wnship & Range inty avel) al erial (Caliche) ing Formation	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2'	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2'	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2'	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3'
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden	6 46 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2'	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S N P	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P.
Pit Number Sect Location Sect Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden)	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P.	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage <u>&</u> juniper hilly 0-3' S.N.P. 55 000
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8
Pit Number Sect Location Sect Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7"	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11"	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8"
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun % Retained on 2"	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.)	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8"
Pit Number Location Sect Location Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun % Retained on 2"	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) : n Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20 as received	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent II' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 II'' 28 as received	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun % Retained on 2" Crus	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) : n Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7'' 20 as received 70	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 60	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 60
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun % Retained on 2" Crus 2"	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) m Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20 as received 79	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 57	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69
Pit Number Sect Location Tow Course Course Formation Rock Type Source Rock (Grag Quality of Materiat Thickness of Materiat Thickness of Materiat Thickness of Cap Materiat Material Underlyit Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quantit Los Angeles Wear Soundness Loss Average Maximung Retained on 2" Pit 1"	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) m Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20 as received 79 64	6 47 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent il' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 53	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - - 1" -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54
Pit Number Sect Location Tow Course Course Formation Rock Type Source Rock (Grag Quality of Material Thickness of Material Thickness of Material Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximun % Retained on 2" Crus Pit 1" Average '4'"	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) : n Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20 as received 79 64 46	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravei quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 53 49	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - - 1" -	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41
Pit Number Sect Location Tow Course Course Formation Rock Type Source Rock (Grag Quality of Materiat Thickness of Materiat Thickness of Cap Material Underlyit Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quantit Los Angeles Wear Soundness Loss Average Maximum Crus % Retained on 2" 1" Pit 1" Average ½" % Passing No.	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) m Size ' Sieve shed to:	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7" 20 as received 79 64 46 29	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 53 49 45	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - - 1" - 100 49 18	0843 NE 1/4 15 32N 13W San Juan Qt gravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41 33
Pit NumberLocationSectLocationTowCourseCourseFormationRock TypeSource Rock (GradingQuality of MaterialQuality of MaterialMaterialThickness of CapMaterial UnderlyiVegetationLocal TerrainThickness of OverP. I. (Overburden)Estimated QuantiLos Angeles WearSoundness LossAverage Maximum% Retained on 2"CrusPit1"Average½"% PassingNo.No.No.	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) n Size ' Sieve shed to: 4 10	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7'' 20 as received 79 64 46 29 25	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 53 49 45 43	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone - fair 4' - sandstone pinon & juniper mountainous 0-2' S.N.P. 100,000 22.0 8.8 - 1" - 100 49 18 9	0843 NE 1/4 15 32N 13W San Juan Qt qravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41 33 28
Pit Number Sect Location Tow Course Course Formation Rock Type Source Rock (Grading Quality of Material Quality of Material Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximum % % Retained on 2" Crus Pit 1" Average ½" % Passing No. No. No	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) n Size ' Sieve shed to: 4 10 200	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7'' 20 as received 79 64 46 29 25 3	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11'' 28 as received 69 53 49 45 43 2	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone 	0843 NE 1/4 15 32N 13W San Juan Qt qravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41 33 28 12
Pit Number Sect Location Tow Course Course Formation Rock Type Source Rock (Grading the second se	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) " Sieve shed to: 4 10 200	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7'' 20 as received 79 64 46 29 25 3	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11'' 28 as received 69 53 49 45 43 2 N.P.	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone 	0843 NE 1/4 15 32N 13W San Juan Qt qravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41 33 28 12 8
Pit Number Sect Location Sect Tow Cou Formation Rock Type Source Rock (Gra Quality of Materia Thickness of Materia Thickness of Cap Material Underlyi Vegetation Local Terrain Thickness of Over P. I. (Overburden) Estimated Quanti Los Angeles Wear Soundness Loss Average Maximum % Retained on 2" Pit 1" Average % Passing No. No. No. Plasticity Index	tion wnship & Range inty avel) al erial (Caliche) ing Formation rburden) ity (cu. yds.) " n Size ' Sieve shed to: 4 10 200	6146 SE 1/4 20 29N 12W San Juan Qt(3) sand & gravel various good 7' - sandstone grass & sage hilly 2' 8 100,000 18.4 6.2 7'' 20 as received 79 64 46 29 25 3 N.P.	6147 SE 1/4 23 29N 12W San Juan Qt(2) sand & gravel quartzite excellent 11' plus - sandstone & silt grass hilly 2' 10 175,000 20.4 3.1 11" 28 as received 69 53 49 45 43 2 N.P.	0842 not sectionalized Ute Mtn. Indian Res. San Juan Kmf sandstone 	0843 NE 1/4 15 32N 13W San Juan Qt qravel various good 6' - shale sage & juniper hilly 0-3' S.N.P. 55,000 18.6 3.8 8" 31 as received 69 54 41 33 28 12 8

QUADRANGLE PAGE 2 (2)

Belocies - Bellet correction over a reveal

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CONSTRUCTION MATERIALS INVENTORY

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MATERIAL PIT SUMMARY

	0847
Pit Number 0844 0845	0846 pot costionalized
. [Section SW 1/4 27 NW 1/	4 21 not sectionalized not sectionalized
Location Township & Range 32N 13W 32N 1	IW Ute Mtn. Indian Res. Ute Mtn. Indian Res.
County San Juan San J	San Juan San Juan
$D_{\text{restriction}} = O_{\text{restriction}} = O_{re$	Op Kkf
Formation VIC	sandstone
Rock Type gravel sand	& graver congromerate candorono
Source Rock (Gravel) various quart	zite & igneous sandstone & various
Quality of Material good good	
Thickness of Material 5' $ -4' $	
Thickness of Cap (Caliche) – –	
Material Underlying Formation sandstone & shale sands	tone sandstone & shale sandstone
Vegetation iuniper iunif	er grass grass
	ainous billy hilly
$\frac{1}{2} = \frac{1}{2} = \frac{1}$	0-21
Thickness of Overburden $U-2^{+}$	
P. I. (Overburden) S.N.P. S.N.P.	5.N.F. 150,000
Estimated Quantity (cu. yds) 00,000 2,000) prus 100,000 i 20,000
Los Angeles Wear 16.4 27.2	39.6
Soundness Loss 1.8	10.8 0.6
Average Maximum Size A^{11} 7^{11}	3" –
# Patained on 2" Sieve 25	-
% Retained on 2 sieve 25	aceived I"
Pit 1" 56 81	
Average 1/2" 42 71	
% Passing No. 4 30 60	40 19
No. 10 26 54	23 9
No 200 " 9	7 2
N D	N.P. N.P.
Plasticity index	
Bit Number 0848 0849	0850 0851
Pit Number 0848 0849 NW 1/4/19 SW	0850 0851 /4 14 NF 1/4 19 NW 1/4 9
Pit Number 0848 0849 Section NW 1/4 19 SW 1 Section XIN 13W 29N	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W
Pit Number 0848 0849 Section NW 1/4 19 SW 1 Location Township & Range 31N 13W 29N	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W Juan San Juan San Juan
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSan	0850 0851 /4 4 NE /4 9 NW /4 9 4W 29N 3W 29N 3W Juan San Juan San Juan 0+ 0+ (4)
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQa1	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W Juan San Juan San Juan 0t 0t 0t (4)
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsand	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W Juan San Juan San Juan Qt Qt Qt (4) & gravel sand & gravel gravel
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsancSource Rock (Gravel)variousvarious	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W Juan San Juan San Juan Qt Qt (4) Qt (4) & gravel sand & gravel gravel ous various various
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpQalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of Materialgoodgood	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan JuanQtQt (4)& gravelsand & qravelgravelousvariousvariousexcellentvery good
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpOalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan Juan0t0t (4)& gravelsand & qravelgravelousvariousvariousexcellentvery good6' plus10'
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpOalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan Juan0t0t (4)& gravelsand & gravelousvariousvariousexcellentvery good6' plus10'
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpOalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Cap (Caliche)-Material Underlying Formationsilt & shalesance	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan Juan0tQt (4)& gravelsand & gravelousvariousvariousexcellentvery good6' plus10'& siltsandstoneshale
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpOalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Cap (Caliche)-Material Underlying Formationsilt & shalesance	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan JuanQtQt (4)& gravelsand & qravelousvariousvariousexcellentvery good6' plus10'1 & siltsandstoneshalessjunipergrass
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Cap (Caliche)-Material Underlying Formationsilt & shalesanceVegetationsage & junipergrass	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan JuanQtQt (4)& gravelsand & qravelousvariousvariousexcellentvery good6' plus10'1 & siltsandstoneshaleex floorhillyhilly
Pit Number08480849SectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'Thickness of Cap (Caliche)Material Underlying Formationsilt & shalesandVegetationsage & junipergrassLocal Terrainhillyval	08500851/4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan JuanQtQt (4)& gravelgravelousvariousvariousexcellentvery good6' plus10'1 & siltsandstoneshaleey floorhilly0-3'
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'Thickness of Cap (Caliche)Waterial Underlying Formationsilt & shalesanceVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'Material Underlying Formationsilt & shalesanceVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'P. I. (Overburden)S.N.P.S.N.P.	/4 14 0850 0851 $14W$ $NE 1/4 19$ $NW 1/4 9$ $14W$ $29N 13W$ $29N 13W$ $Juan$ $San Juan$ $San Juan$ Qt $Qt (4)$ & gravelsand & qravel ous $various$ $various$ $various$ $excellent$ $very good$ $6' plus$ $10'$ $ 1 & silt$ sandstone ss $juniper$ $ey floor$ $hilly$ $0-3'$ $0-4'$ $P.$ $S.N.P.$ $S.N.P.$ $S.N.P.$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'-Material Underlying Formationsilt & shalesandVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'P. I. (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'-Material Underlying Formationsilt & shalesanceVegetationsage & junipergrassLocal TerrainhillyvalThickness of OverburdenS.N.P.S.N.P.F. I. (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.1	0850 0851 /4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan Juan $0t$ $0t$ (4)& gravelgravelousvariousvariousexcellentvery good6' plus10'1 & siltsandstonessjuniperey floorhilly 000 plus100,000100,000100,000 plus17.634.6
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodThickness of Material6'10'Thickness of Cap (Caliche)-Material Underlying Formationsilt & shaleVegetationsage & juniperUccal Terrain0-2'P. I. (OverburdenS.N.P.Estimated Quantity (cu. yds.)50,000Los Angeles Wear41.9Soundness Loss22.1	0850 0851 /4 14NE 1/4 19NW 1/4 914W29N 13W29N 13WJuanSan JuanSan Juan 0^{+} 0^{+} (4)& gravelsand & qravelqravelousvariousvariousexcellentvery good6' plus10'1 & siltsandstoneshalessjunipergrassey floorhilly0-3'000 plus100,000100,000 plus17.634.65.322.5
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodQuality of Material6'10'Thickness of Cap (Caliche)-Vegetationsage & juniperVegetationS.N.P.Local TerrainhillyThickness of OverburdenS.N.P.Estimated Quantity (cu. yds.)50,000Los Angeles Wear41.9Soundness Loss22.1Summers5''Average Maximum Size5''	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodMaterial Underlying Formationsilt & shalesanceVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'P. I. (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.1Soundness Loss22.15.4Average Maximum Size5''13''% Betained on 2'' Sieve1342	0850 0851 /4 14 NE 1/4 19 NW 1/4 9 14W 29N 13W 29N 13W Juan San Juan San Juan 0t Qt (4) & gravel sand & qravel gravel ous various various excellent very good 6' plus 10' - - 1& silt sandstone ss juniper grass ey floor hilly 0-3' 0-4' P. S.N.P. 000 plus 100,000 100,000 100,000 plus 17.6 34.6 5.3 22.5 9" 4" 31 10
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodMaterial Underlying Formationsilt & shalesanceVegetationsage & junipergrassLocal TerrainhillyvalThickness of OverburdenS.N.P.S.N.P.F. I. (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.2Soundness Loss22.15.4Average Maximum Size5''13''% Retained on 2'' Sieve1342	$/4$ 14 NE $1/4$ 19 NW $1/4$ 9 $14W$ $29N$ $13W$ $29N$ $13W$ $Juan$ San JuanSan Juan 0^+ 0^+ (4) & gravelsand & qravelgravelousvariousvariousexcellentvery good6' plus $10'$ 1 & siltsandstoneshalessjunipergrassey floorhilly $0-3'$ $0-3'$ $0-4'$ S.N.P.S.N.P. 000 plus $100,000$ 17.6 34.6 5.3 22.5 $9''$ $4''$ 31 10
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W San Juan29N SanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariQuality of MaterialgoodgoodThickness of Material6'10'Thickness of Cap (Caliche)-Material Underlying Formationsilt & shaleVegetationsage & juniperUccal TerrainhillyN. P.S.N.P.P. I. (Overburden)S.N.P.Estimated Quantity (cu. yds.)50,000Los Angeles Wear41.9Soundness Loss22.1Average Maximum Size5''Y13''% Retained no 2'' Sieve13% Retained no 2'' Sieve13% Retained no 2'' Sieve3% Retained to:as receivedas receivedas% Retained to:as received	4 4 NE 1/4 19 NW 1/4 9 $14W$ 29N 13W 29N 13W $3uan$ San Juan San Juan $0t$ $0t$ (4) $gravel$ sand & qravel gravel ous various various $very$ good 6' plus 10' $-$ - - $1 &$ silt sandstone shale ss juniper grass ous $0-3'$ $0-4'$ 000 plus 100,000 100,000 plus 17.6 34.6 5.3 22.5 $9''$ $4''$ 31 10 received as received as received
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W29NCountySan JuanSanFormationQpQalRock Typesand & gravelsanceSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodQuality of Material6'10'Thickness of Cap (Caliche)-Material Underlying Formationsilt & shaleVegetationsage & juniperUccal TerrainhillyvalThickness of Overburden0-2'0-5'P. I. (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.913''% Retained on 2'' Sieve1342Crushed to:as receivedas2''8075	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W San Juan29N San 	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range31N 13W29NCountySan JuanSanFormationOpQalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodQuality of Material6'10'Thickness of Cap (Caliche)Material Underlying Formationsilt & shalesandVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'P. L (Overburden)S.N.P.S.N.P.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.1Soundness Loss22.15.4Average Maximum Size5''13''Pit1''7348Average½''6432	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Pit Number08480849LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W29NCountySan JuanSanFormationOp OpQalRock Typesand & gravelsandSource Rock (Gravel)variousvariousQuality of MaterialgoodgoodQuality of MaterialgoodgoodThickness of Cap (Caliche)Material Underlying Formationsilt & shalesandVegetationsage & junipergrassLocal TerrainhillyvalThickness of Overburden0-2'0-5'P. I. (Overburden)S. N. P.S. N.Estimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.1Soundness Loss22.15.4Average Maximum Size5''13''% Retained on 2'' Sieve1342Pit1''7348Average½''6432% PassingNo. 44724	4 4 $14 4 9$ $14 9 13 30 13 30 13 30 13 30 13 30 13 30 13 30 13 30 13 13$
Pit Number08480845LocationSectionNW 1/4 19SW 1LocationTownship & Range County31N 13W San Juan29N San JuanFormationOp OpQal Rock TypeSand & gravel sand & gravelsand goodSource Rock (Gravel)variousvariousvari Quality of Material GoodgoodgoodQuality of MaterialgoodQuality of MaterialGoodgoodgoodQuality of MaterialG'Material Underlying Formationsilt & shalesandVegetationsage & junipergrassLocal TerrainhillyvalThickness of OverburdenO-2'O-5'P. I. (Overburden)S.N.P.S.NEstimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.1Soundness Loss22.15.4Quality % Retained on 2'' Sieve1342Pit1''7348Average½''6432% PassingNo. 44724No. 103421	$4 4$ NE $1/4 9$ NW $1/4 9$ $14W$ $29N 3W$ $29N 3W$ $29N 3W$ $3uan$ $San Juan$ $San Juan$ $0t$ $0t (4)$ δ gravel $sand \& qravel$ $qravel$ ous $various$ $various$ $various$ $various$ $various$ $excellent$ $very good$ $6' plus$ $10'$ $ 4 \& silt$ $sandstone$ $shale$ ss $juniper$ $grass$ $ey floor$ $hilly$ $hilly$ $0^{-3'}$ $0^{-4'}$ $p.$ $S.N.P.$ $S.N.P.$ $0000 plus$ $100,000$ $100,000 plus$ 5^{-3} 22.5 $9''$ $9''$ $4''$ 31 received 82 68 71 53 49 44 34 36 29 31 10
Pit Number08480845LocationSectionNW 1/4 19SW 1LocationTownship & Range County $31N 13W$ $29N$ CountySan JuanSanFormation Qp QalRock Typesand & gravelsanceSource Rock (Gravel)variousvariQuality of MaterialgoodgoodQuality of MaterialgoodgoodQuality of MaterialgoodgoodQuality of Materialft & shalesanceVegetationsage & junipergrassVegetationS.N.P.S.NLocal TerrainhillyvalThickness of Overburden $0-2'$ $0-5'$ P. I. (Overburden)S.N.P.S.NEstimated Quantity (cu. yds.)50,000100Los Angeles Wear41.918.4Soundness Loss22.15.4Average Maximum Size5''13''Pit1''7348Average½''6432% PassingNo. 44724No. 103421No. 200866	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

MATERIAL PIT SUMMARY

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		0853	0854	
Pit Number	1 0852	not sectionalized	not sectionalized	1
Section	SW 1/4 28		Navaio Indian Res.	
Location Township &	& Range 30N 13W	Navajo indian kes.		
County	San Juan	San Juan	San Juan	
Formation	O+(5)	Kkf	Qp	1
Deals Type		limv sandstone	sand & gravel	
Rock Type	gravei		various	
Source Rock (Gravel)	various		aood	
Quality of Material	good	fair	41	
Thickness of Material	4'	31	4	
Thickness of Cap (Calich	ne) _	_	-	
Material Underlying For	mation	sandstone, shale & coal	sandstone	1
Material Onderlying Por	sanusione	aracs	grass	ł
Vegetation	juniper		rolling	
Local Terrain	mountainous	nilly		
Thickness of Overburder	n _	2	0-2	
P I (Overburden)		S.N.P.	S.N.P.	
Estimated Quantity (2)		25 000	15,000 plus	
Estimated Qualitity (cu	. yus) 20,000	22,000	17.8	
Los Angeles Wear	25.9	22.0	2.0	
Soundness Loss	2.2	39.4	2.9	
Average Maximum Size	0"	-	Ζ	1
% Retained on 2" Sieve	30	_	8	1
Cristian and Children and An		1 11	as received	
Crusned to	as received	I	90	
2"	40	-	76	
Pit 1"	27	100	70	
Average ^{1/2} "	23	64	68	
% Passing No. 4	20	21	63	
// i assing	20	10	60	
NO. 10	19		19	
No. 200	6	Ζ	N D	
Plasticity Index	. N.P.	N.P.		
Remarks:	·			
			0057	
Pit Number	0855	0856	0857	
Pit Number	0855 NW 1/4 34	0856 NE 1/4 29	0857 SW 1/4 22	••
Pit Number Section	0855 NW 1/4 34	0856 NE 1/4 29 27N 12W	0857 SW 1/4 22 27N 11W	••
Pit Number Location Township	0855 NW 1/4 34 5 & Range 28N 13W	0856 NE 1/4 29 27N 12W San Juan	0857 SW 1/4 22 27N 11W San Juan	
Pit Number Location Section County	0855 NW 1/4 34 5 & Range 28N 13W San Juan	0856 NE I/4 29 27N I2W San Juan	0857 SW 1/4 22 27N 11W San Juan	•••
Pit Number Location Section County Formation	0855 NW 1/4 34 28N 13W San Juan Qe	0856 NE 1/4 29 27N 12W San Juan Koa	0857 SW 1/4 22 27N IIW San Juan Qop	••
Pit Number Location Section County Formation Rock Type	0855 NW 1/4 34 28N 13W San Juan Qe blow sand	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate	0857 SW 1/4 22 27N IIW San Juan Qop sand	•••
Pit Number Location Section Location Township County Formation Rock Type Source Bock (Gravel)	0855 NW 1/4 34 28N 13W San Juan Qe blow sand	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various	0857 SW 1/4 22 27N IIW San Juan Qop sand eolian	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Outpits of Material	0855 NW 1/4 34 28N 13W San Juan Qe blow sand	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good	0857 SW 1/4 22 27N IIW San Juan Qop sand eolian good	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material	0855 NW 1/4 34 San Juan Qe blow sand - fair	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 31	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10'	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3'	0857 SW I/4 22 27N IIW San Juan Qop sand eolian good 10'	
Pit Number Location Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calic	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3'	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10'	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying Formation	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - silt & sand	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Vegetation	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - silt & sand grass	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - ormation silt & sand grass rolling	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' silt sage rolling	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd Country	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - ormation silt & sand grass rolling en 0-1'	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6'	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1'	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. L (Overburd Level)	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - ormation silt & sand grass rolling en 0-1'	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P.	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' 	
Pit NumberLocationSectionLocationTownshipCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (CalidMaterial Underlying ForVegetationLocal TerrainThickness of OverburdP. I. (Overburden)	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - ormation silt & sand grass rolling en 0-1' S.N.P.	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5.000	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100.000	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (cuantity)	$\begin{array}{c cccc} & 0855 \\ & \text{NW} & 1/4 & 34 \\ & \text{San Juan} \\ & \text{Qe} \\ & \text{blow sand} \\ & - \\ & fair \\ & 4' & plus \\ \hline \\ & \text{che} \end{pmatrix} & - \\ \hline \\ & \text{silt & sand} \\ & grass \\ & rolling \\ en & 0-1' \\ & \text{S.N.P.} \\ & \text{u. yds.} \end{pmatrix} & 100,000 \end{array}$	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.F. 52	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (cultors Angeles Wear	$\begin{array}{c cccc} & 0855 \\ & \text{NW} & 1/4 & 34 \\ & \text{San Juan} \\ & \text{Qe} \\ & \text{blow sand} \\ & - \\ & fair \\ & 4' & plus \\ \hline \\ & \text{che} \end{pmatrix} & - \\ \hline \\ & \text{ormation} & \text{silt & sand} \\ & & \text{grass} \\ & & \text{rolling} \\ en & & 0-1' \\ & & \text{S.N.P.} \\ u. yds. \end{pmatrix} & 100,000 \\ & - \end{array}$	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (culos Angeles Wear Soundness Loss	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - ormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 -	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (culos Angeles Wear Soundness Loss Average Maximum Size Size	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) en 0-1' S.N.P. u.yds.) 100,000 - - - - - - - - - - - - -	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2"	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 -	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (culos Angeles Wear Soundness Loss Average Maximum Size % Patrined on 2 th Size	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) en 0-1' S.N.P. u.yds.) 100,000 - - - - - - - - - - - - -	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 -	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (culos Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Siever	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - e - e - e - e - e - e - - - - - - - - - - - - -	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburd P. I. (Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Siew Crushed	0855 NW 1/4 34 o & Range 28N 13W San Juan Qe blow sand - fair 4' plus che) - prmation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - e - e - to: as received	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - as received	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Crushed 2''	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) che) en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received -	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Crushed 2'' Pit 1''	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received -	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siev Pit 1'' Average 14''	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e e - to: as received - No. 10: 100	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Pit 1'' Average ½'' % Retained on 2.'' Siew Crushed 2'' Pit Average ½''	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received - No. 10: 100 No. 40: 99	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68 58	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100 No. 40: 98	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Pit 1'' Average ½'' % Passing No. 4 No. 4 No. 4	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) - prmation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received - No. 10: 100 No. 40: 99 No. 80: 55	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68 58 52	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good To' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100 No. 40: 98 No. 80: 57	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Pit 1'' Average ½'' % Passing No. 4 No. 10 No. 10	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received - No. 10: 100 No. 40: 99 No. 80: 55 No. 200: 5	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68 58 52 16	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good i0' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100 No. 40: 98 No. 80: 57 No. 200: 13	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Pit 1'' Average ½'' % Passing No. 4 No. 10 No. 200	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received - No. 10: 100 No. 40: 99 No. 80: 55 No. 200: 5	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68 58 52 16	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good 10' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100 No. 40: 98 No. 80: 57 No. 200: 13 N.P.	
Pit Number Location Section Location Township County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Calid Material Underlying For Vegetation Local Terrain Thickness of Overburden) Estimated Quantity (cu Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Siew Pit 1'' Average ½'' % Passing No. 4 No. 10 No. 200 Plasticity Index Interval	0855 NW 1/4 34 San Juan Qe blow sand - fair 4' plus che) pormation silt & sand grass rolling en 0-1' S.N.P. u.yds.) 100,000 - e - to: as received - No. 10: 100 No. 40: 99 No. 80: 55 No. 200: 5 N.P.	0856 NE 1/4 29 27N 12W San Juan Koa conglomerate various good 3' - sandstone grass hilly 0-6' S.N.P. 5,000 18.3 3.3 2" 10 as received 100 86 68 58 52 16 N.P.	0857 SW 1/4 22 27N 11W San Juan Qop sand eolian good TO' - silt sage rolling 1' S.N.P. 100,000 S.E.: 52 - - as received - No. 10: 100 No. 40: 98 No. 80: 57 No. 200: 13 N.P.	



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QUADRANGLE PAGE 3 (1)

MATERIAL PIT SUMMARY

— · — ·			5870	59 <i>1</i>
Pit Number	5/149		NW 1/A 23	SE 1/1 3
Section	NW 1/4 1/	SE 1/4 32		
Location Township & Range	29N 9W	SIN IIW	Son Luon	Son Luon
County	San Juan	San Juan		
Formation	Q+(3)	QŦ	QT(S)	ΨT(5)
Rock Type	sand & gravel	gravel	sand & gravel	sand & gravel
Source Rock (Gravel)	various	various	quartzite & limestone	various
Quality of Material	excellent	excellent	excellent	excellent
Thickness of Material	10'	7'plus	91	10'
Thickness of Cap (Caliche)		-	-	-
Material Underlying Formation	sandstone	sandstone	sandstone	conglomerate & sandstone
Vegetation	arass	juniper	juniper	juniper
Local Terrain	billy	hilly	mountainous	hilly
Thickness of Overburden	21	6'	2-4'	[!
P I (Overburden)	S N P	9	S.N.P.	0
Estimated Quantity (cu. vds)	35 000 plus	225,000	90.000	40.000
Los Angeles Wear	22,000 pras	22 8	19.8	19.6
Soundnass Loss	19.0	ZZ•0 Z Z	6.9	2.9
Augusta Manimum Siza	2.4			811
Werage Maximum Size		27	29	31
% Retained on 2 Sieve	44		as received	as roceived
Crushed to:	as received	as received		50
2"	46	42	74	29
Pit 1"	23	24	23	33
Average ¹ /2"	13	17	49	21
% Passing No. 4	10	14	36	16
No. 10	9	12	33	4
No. 200	2	2	2	2
Plasticity Index	N.P.	N.P.	N.P.	N.P.
Remarks:				
Pit Number	5942	5943	5970	59109
Pit Number Section	5942 SE 1/4 5	5943 SW 1/4 4	5970 SW 1/4 27	59109 SE /4 10
Pit Number Section Location Township & Range	5942 SE 1/4 5 31N 10W	5943 SW 1/4 4 3IN IOW	5970 SW 1/4 27 29N 11W	59109 SE /4 10 30N W
Pit Number Location Section Location Township & Range County	5942 SE 1/4 5 31N 10W San Juan	5943 SW 1/4 4 3IN 10W San Juan	5970 SW 1/4 27 29N 11W San Juan	59109 SE /4 10 30N W San Juan
Pit Number Section Location Township & Range County Formation	5942 SE 1/4 5 31N 10W San Juan 0t	5943 SW 1/4 4 31N 10W San Juan Qt(3)	5970 SW 1/4 27 29N 11W San Juan Q+(2)	59109 SE /4 10 30N W San Juan Tn
Pit Number Location Section Location Township & Range County Formation Rock Type	5942 SE 1/4 5 31N 10W San Juan Qt gravel	5943 SW 1/4 4 31N 10W San Juan Qt(3) gravel	5970 SW 1/4 27 29N 11W San Juan Q+(2) gravel	59109 SE /4 10 30N W San Juan Tn filler sand
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel)	5942 SE 1/4 5 3IN IOW San Juan Qt qravel various	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel Limestone & various	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone	59109 SE /4 0 30N W San Juan Tn filler sand
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Ouality of Material	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent	5970 SW 1/4 27 29N 11W San Juan Q+(2) gravel quartzite & limestone excellent	59109 SE /4 0 30N W San Juan Tn filler sand - excellent
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8'	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10'	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Can (Caliche)	5942 SE I/4 5 3IN IOW San Juan Qt qravel various qood 8'	5943 SW 1/4 4 3IN 10W San Juan Qt(3) qravel limestone & various excellent 10'	5970 SW 1/4 27 29N IIW San Juan Qt(2) gravel quartzite & limestone excellent 12' plus	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone	5970 SW 1/4 27 29N IIW San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale grass	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent l0' - sandstone juniper	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly	5970 SW 1/4 27 29N 11W San Juan Q+(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Ouerburden	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3'	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3'	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10'	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor '
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. L. (Overburden)	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor Q-3' S N P	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P.	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor ' S.N.P.
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80 000	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300 000	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20 000	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor l' S.N.P. 45.000 plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.)	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18 0	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14"	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus -
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9"	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent l0' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14"	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6"	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus -
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" Sieve	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 20 roceived	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - -
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale qrass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2"	5942 SE 1/4 5 3IN 10W San Juan Qt qravel various qood 8' - sandstone & shale qrass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40	5970 SW 1/4 27 29N 11W San Juan Q+(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1"	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale qrass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt qrass & sage canyon floor 1' S.N.P. 45,000 plus - - as received
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½"	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale qrass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52 38	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27 20	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36 26	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received -
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52 38 26	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27 20 15	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36 26 19	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received -
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit Average %/2" % Passing No. 4 No. 10	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52 38 26 22	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27 20 15 13	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36 26 19 17	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received - - -
Pit NumberLocationSection Township & Range CountyFormation Rock TypeSource Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2'' Pit Average % Passing No. 4 No. 10 No. 200	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale grass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52 38 26 22 5	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27 20 15 13 3	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36 26 19 17 8	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received - - 100 7 S.N.P.
Pit NumberLocationSection Township & Range CountyFormation Rock TypeSource Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' SievePit 1'' Average % Passing No. 4 No. 10 No. 200Plasticity Index	5942 SE 1/4 5 31N 10W San Juan Qt qravel various qood 8' - sandstone & shale qrass valley floor 0-3' S.N.P. 80,000 20.7 1.6 9" 22 as received 67 52 38 26 22 5 N.P.	5943 SW 1/4 4 31N 10W San Juan Qt(3) qravel limestone & various excellent 10' - sandstone juniper hilly 3' 9 300,000 20.0 3.3 14" 38 as received 40 27 20 15 13 3 N.P.	5970 SW 1/4 27 29N 11W San Juan Qt(2) gravel quartzite & limestone excellent 12' plus - sandstone grass & sage hilly 2-10' S.N.P. 20,000 18.0 0.6 6" 39 as received 54 36 26 19 17 8 N.P.	59109 SE /4 10 30N W San Juan Tn filler sand - excellent 6' plus - sandstone & silt grass & sage canyon floor 1' S.N.P. 45,000 plus - - as received - - 100 7 S.N.P.

QUADRANGLE PAGE 3 (2)

CONSTRUCTION MATERIALS INVENTORY

MATERIAL PIT SUMMARY

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Pit Numbe	er – – – – – – – – – – – – – – – – – – –	59110	6207	6208	6209
	Section	NE 1/4 35	SW 1/4 11	SW 174 22	22
Location	Township & Range	3IN IIW	30N IIW	30N IOW	30N 9W
	County	San Juan	San Juan	San Juan	San Juan
Formation		Q†	Tn	Tn	Qal
Rock Type	e	filler sand	filler sand	filler sand	filler sand
Source Ro	ck (Gravel)	-			_
Quality of	Material	good	excellent	good	good
Thickness	of Material	6' plus	9'plus	9'plus	9'plus
Thickness	of Cap (Caliche)		_		
Material U	nderlying Formation	silt & gravel	sandstone & silt	sandstone	sandstone
Vegetation	1	sage	grass & sage	juniper	juniper
Local Terr	ain	hilly	valley floor	hilly	hilly
Thickness	of Overburden	2'	[*	0-2'	0-2'
P. I. (Over	burden)	S.N.P.	S.N.P.	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	60,000	55,000 plus	60,000	75,000
Los Angele	es Wear	_	-		
Soundness	Loss				
Average M	aximum Size	-			_
% Retained	d on 2" Sieve	4	-		
	Crushed to:	as received	as received	as received	as received
•	2"	88			
Pit	1"	84			
Average	1/2"	83	_		_
% Passing	No. 4	81		-	
	No. 10	79	100	100	100
	No. 200	8	6	8	5
Plasticity I	Index	S.N.P.	N.P.	N.P.	N.P.

Remarks:

Pit Numbe	r	6410	6449	6453	6544
	Section	NE 1/4 19	NW 1/4 6	SE 1/4 15	SW 1/4 16
Location	Township & Range	30N 8W	30N 7W	30N 8W	30N 8W
	County	San Juan	San Juan	San Juan	San Juan
Formation	l	Q+	Qop	Q+(5)	Q+(2)
Rock Type	e	sand & gravel	sand & gravel	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	quartzite & various	guartzite & limestone	quartzite & limestone	various
Quality of	Material	excellen†	excellent	excellent	good
Thickness	of Material	7'	l6' plus	7'plus	8'
Thickness	of Cap (Caliche)	_	0-2'	<u></u>	
Material U	nderlying Formation	sandstone & shale	sandstone	sandstone	sandstone
Vegetation	1	juniper	juniper	juniper	grass & sage
Local Terr	ain	mountainous	mountainous	mountainous	hilly
Thickness	of Overburden	4'	3'	6'	2-4'
P. I. (Over	burden)	5	9	15	S.N.P.
Estimated	Quantity (cu. yds.)	30,000 plus	50,000	80,000	40,000
Los Angele	es Wear	19.6	22.4	18.4	22.0
Soundness	Loss	2.7	cal. cap: 36.6 S&G: 5.1	2.9	1.6
Average M	aximum Size	8"	30"	12"	7"
% Retained	1 on 2" Sieve	28	33	23	25
	Crushed to:	as received	as received	as received	as received
	2"	69	69	76	63
Pit	1"	54	50	64	52
Average	1/2"	32	32	56	40
% Passing	No. 4	24	27	47	28
	No. 10	21	25	43	25
	No. 200	3	5	3	8
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

MATERIAL PIT SUMMARY

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Pit Number		0845	0857	0858	0859
	Section	NW 1/4 21	SE 1/4 21	SW 1/4 13	NW 1/4 23
Location	Township & Range	32N I I W	27N 11W	32N 8W	3IN IIW
	County	San Juan	San Juan	San Juan	San Juan
Formation		Qp	Qop	Qop	Q+(4)
Rock Type		sand & gravel	sand	gravel	gravel
Source Rock	k (Gravel)	quartzite & iqneous	eolian	various	various
Quality of M	laterial	good	good	good	good
Thickness of	f Material	1-4'	l0' plus	25' plus	101
Thickness of	f Cap (Caliche)		-		-
Material Und	derlying Formation	sandstonę	sil†	-	sandstone
Vegetation		iuniper	sage	pinon & juniper	juniper & sage
Local Terrai	in j	mountainous	rolling	mesa top	hilly
Thickness of	f Overburden	0-2'	11	0-3'	2'
P. I. (Overbu	urden)	Ş.N.P.	S.N.P.	-	S.N.P.
Estimated Q	uantity (cu. yds)	2.000 plus	100,000	200,000 plu <u>s</u>	75,000
Los Angeles	Wear	27.2	Sand Equi <u>v: 52</u>	29.0	23.6
Soundness L	Loss	.6	-	6.1	2.9
Average Max	ximum Size	7"	-	12"	8"
% Retained of	on 2" Sieve	17	-	50	33
	Crushed to:	as received	as received	as received	as received
	2"	100	-	52	63
Pit	1"	8	-	35	42
Average	1/2"	71	No. 10: 100	26	32
% Passing	No. 4	60	No. 40: 98	20	25
	No. 10	54	No. 80: 57	17	21
	No. 200	9	No. 200: 13	8	8
Plasticity Ind	dex	9	N.P.	13	N.P.
Remarks:					
		Leoca	0861	0962	0863
Pit Number	Section		0861 SF 1/4 15	0862 NW 1/4 22	0863 SF 1/4 8
Pit Number	Section	0860 S 1/2 18	0861 SE 1/4 15	0862 NW 1/4 22 29N 10W	0863 SE 1/4 8
Pit Number	Section Township & Range	0860 S 1/2 18 30N 9W	0861 SE 1/4 15 30N 8W San Juan	0862 NW 1/4 22 29N 10W San Juan	0863 SE 1/4 8 29N 9W San Juan
Pit Number	Section Township & Range County	0860 S 1/2 18 30N 9W San Juan	0861 SE 1/4 15 30N 8W San Juan 0+(5)	0862 NW 1/4 22 29N 10W San Juan Q+(2)	0863 SE 1/4 8 29N 9W San Juan Qal
Pit Number Location Formation Rock Type	Section Township & Range County	0860 <u>S 1/2 18</u> 30N 9W San Juan Ti	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel	0863 SE I/4 8 29N 9W San Juan Qal filler sand
Pit Number Location Formation Rock Type	Section Township & Range County	0860 S_1/2_18 30N_9W San_Juan Ti diorite	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various	0863 SE I/4 8 29N 9W San Juan Qal filler sand
Pit Number Location Formation Rock Type Source Rock Quality of M	Section Township & Range County k (Gravel) Material	0860 S_1/2_18 30N_9W San_Juan Ti diorite - fair	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent	0862 NW 1/4 22 29N IOW San Juan Q+(2) sand & gravel various excellent	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of	Section Township & Range County k (Gravel) Material f Material	0860 S 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10'	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 81
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Thickness of	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche)	0860 <u>S 1/2 18</u> 30N 9W San Juan Ti diorite - fair 3' x 10' plus -	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10'	0863 SE I/4 8 29N 9W San Juan Qal filler sand - good 8 ¹
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Thickness of Material Und	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation	0860 <u>S 1/2 18</u> 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 81 - sandstone
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Uno Vegetation	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation	0860 S 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 - sandstone juniper & sage
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Uno Vegetation Local Terrai	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in	0860 S 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous	0862 NW 1/4 22 29N IOW San Juan Q+(2) sand & gravel various excellent IO' - sandstone grass & sage hilly	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ^T - sandstone juniper & sage hilly
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Une Vegetation Local Terrai Thickness of	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden	0860 <u>S 1/2 18</u> 30N 9W San Juan <u>Ti</u> diorite - fair 3' x 10' plus - sandstone & shale juniper hilly -	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2'	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2'	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3'
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Univ Vegetation Local Terrai Thickness of P. I. (Overbu	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden)	0860 <u>S 1/2 18</u> 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly -	0861 SE 1/4 15 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12	0862 NW 1/4 22 29N 10W San Juan Ot(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P.	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P.
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.)	0860 <u>S 1/2 18</u> 30N 9W San Juan <u>Ti</u> diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ¹ - sandstone Juniper & sage hilly 0-3' S.N.P. 20,000
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.)	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Une Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) S Wear Loss	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' × 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 -
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Univ Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average Max	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 -	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14"	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9"	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ¹ - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 -
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Univ Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average May % Retained	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - - 15,000 14.8 14.1 - -	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ¹ - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 -
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average Mas % Retained	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to:	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - 17	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34 as received	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone Juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average May % Retained	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to: 2"	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - -	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34 as received 60	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received -
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average May % Retained	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1"	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - - 15,000 14.8 14.1 - - 100	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34 as received 60 41	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - as received -
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average Max % Retained of Pit Average	Section Township & Range County k (Gravel) Material f Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) S Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1" 1/2"	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' × 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - 100 58	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34 as received 60 41 26	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50 35	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received - No. 10: 100
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Univ Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average Max % Retained Pit Average % Passing	Section Township & Range County k (Gravel) Material f Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1" ½" No. 4	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - 11'' - 100 58 24	0861 <u>SE 1/4 15</u> 30N 8W San Juan Qt(5) sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 20.0 3.6 14" 34 as received 60 41 26 17	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50 35 26	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ¹ - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - as received - - No. 10: 100 No. 40: 57
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Univ Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average Max % Retained of Pit Average % Passing	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) S Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - 100 58 24 12	0861 <u>SE 1/4 15</u> <u>30N 8W</u> San Juan <u>Qt(5)</u> sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 <u>20.0</u> <u>3.6</u> 14" <u>34</u> as received <u>60</u> <u>41</u> <u>26</u> <u>17</u> <u>14</u>	0862 NW 1/4 22 29N 10W San Juan Qt(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50 35 26 22	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8 ¹ - sandstone Juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received - No. 10: 100 No. 40: 57 No. 80: 21
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average May % Retained Pit Average % Passing	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - 100 58 24 12 2	0861 <u>SE 1/4 15</u> <u>30N 8W</u> San Juan <u>Qt(5)</u> sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 <u>20.0</u> <u>3.6</u> 14" <u>34</u> as received <u>60</u> <u>41</u> <u>26</u> <u>17</u> <u>14</u> <u>2</u>	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50 35 26 22 6	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received - No. 10: 100 No. 40: 57 No. 80: 21 No. 200: 8
Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai Thickness of P. I. (Overbu Estimated Q Los Angeles Soundness L Average May % Retained of Pit Average % Passing	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden urden) Quantity (cu. yds.) s Wear Loss ximum Size on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 dex	0860 <u>S</u> 1/2 18 30N 9W San Juan Ti diorite - fair 3' x 10' plus - sandstone & shale juniper hilly - 15,000 14.8 14.1 - - 15,000 14.8 14.1 - - 100 58 24 12 2 N.P.	0861 <u>SE 1/4 15</u> <u>30N 8W</u> San Juan <u>Qt(5)</u> sand & gravel quartzite & limestone excellent 8' plus - sandstone juniper mountainous 2' 12 100,000 <u>20.0</u> <u>3.6</u> 14" <u>34</u> as received <u>60</u> <u>41</u> <u>26</u> 17 14 <u>2</u> N.P.	0862 NW 1/4 22 29N 10W San Juan Q+(2) sand & gravel various excellent 10' - sandstone grass & sage hilly 0-2' S.N.P. 300,000 plus 22.0 7.0 9" 32 as received 66 50 35 26 22 6 N.P.	0863 SE 1/4 8 29N 9W San Juan Qal filler sand - good 8' - sandstone juniper & sage hilly 0-3' S.N.P. 20,000 - - - as received - No. 10: 100 No. 40: 57 No. 80: 21 No. 200: 8 S.N.P.

CONSTRUCTION MATERIALS INVENTORY

MATERIAL PIT SUMMARY

	,			and a standard ten at	2000 V V		 · · · ·
Pit Number		0864		0865		0866	
•	Section	SW 1/4 9		SE 1/4 35	-	NW 1/4 12	
Location	Township & Range	29N 9W		28N IIW		27N 9W	
	County	San Juan		San Juan		San J uan	
Formation	-	Oal	1	Qp		Q†	
Rock Type		sand & gravel		sand		sand & gravel	
Source Roo	vk (Gravel)			-	U	various	
Quality of	Material	various		dood		aood	
Thickness (of Material				1	101	,
Thickness	of Can (Caliche)	9			1	-	
Matarial U	derlying Formation			cil+		sandstone	
Vagatation	lucifying I of mation	sangstone & shale		sado & junine	r	sage & juniper	
		şage				hilly	
	in Countrates	hilly		11 F F F		11	
I nickness (or Overburden						
P. I. (Overt	urden)	5.N.P.		5.N.F.			
Estimated	Quantity (cu. yds)	60,000		100,000		700,000	
Los Angele	s Wear	24.6		_		55.5 05 5	
Soundness	Loss	12.8		Sand Equiv:	52	25.5	
Average Ma	aximum Size	7"		-		3"	
% Retained	on 2" Sieve	30		-	1	8	
	Crushed to:	as received		as received		as received	
	2"	64		-		86	
Pit	1"	48		-		74	
Average	1⁄2"	4		<u>No. 10</u> : 100		64	
% Passing	No. 4	39		No. 40: 93		54	
	No. 10	38		No. 80: 49		48	
	No. 200	6		No. 200: 11		9	
Plasticity I	ndex	N.P.		N.P.		N.P.	
Remarks:							
Dit Numb				0868	· · ·		
	Section			NW = 1/2 = 10			
Location	Tourship & Donco			32N QW			
Location	Township & Kange			San Juan			
The second	County						
Formation	l	φτ(3)		ΨP araval			
коск Тур		qravei		giaver ito			
Source Ro	ck (Gravel)	quartzite & Igneo	us	quarizite			
Quality of	Material	dood		excellent			н. с
Thickness	of Material	10'		1-4			
Thickness	of Cap (Caliche)	-		-			л і
Material U	nderlying Formation	sandstone		sandstone & s	snale		
Vegetation	1	juniper		pinon & junip	per	1	
Local Terr	ain	mountainous		mountainous			
Thickness	of Overburden	1		0-2'			
P. I. (Over	burden)	4		9			ļ
Estimated	Quantity (cu. yds.)	50,000 plus		l,000 plus			
Los Angel	es Wear	20.0		28.7			· _ · _ [
Soundness	Loss	1.9		8.6			

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8.6
8"
32
as received
61
33
29
26
24

21

10

Plasticity Index Remarks:

Pit

Average % Passing

Average Maximum Size

% Retained on 2" Sieve

2"

1"

½"

No. 4

No. 10

No. 200

Crushed to:

10"

69

44

33 25

22

8

N.P.

as received

32

Qal	Alluvium	
QdQ	Alluvial Apron deposits	
.0°.0.	Landslide debris	r
500°56	Terrace deposits (post-glacial)	1
entre of	Terrace deposits (Pinedale)	
0.000	Terrace deposits (Late Bull Lake)	
Qt5	Terrace deposits (Pre-Wisconsin)	
Qop	Older Pediment deposits	
Ττ	Intrusive rocks undivided	
	Andesite Sill	
Tsj	San Jose Formation	
ТКа	Animas Formation	
Kkt	Kirtland-Fruitland Formation	í.
KI	Lewis shale	
• • //.	Developed Pit or Quarry Prospect Pit or Quarry Fault Downthrown side	

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QUATERNARY

TERTIARY

CRETACEOUS

QUAD No. 4



MATERIAL PIT SUMMARY

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Dia Number	5950	5860	58137	5931
I Pit Number		NW 1/4 25	SE 1/4 29	E 1/2 30
Section	SW 1/4 2/		32N 2W	30N 2W
Location Township & Range	SUN SW	Die Aprila	Rio Arriba	Rio Arriba
County	Rio Arriba		021	Ti
Formation	Qal	Vai .	cond and dravel	monzonite
Rock Type	sand	sand		-
Source Rock (Gravel)	-	-	various	fair
Quality of Material	fair	good	goog	
Thickness of Material	15'	2' plus	6' plus	9 X 30 prus
Thickness of Cap (Caliche)	-	-	-	-
Material Underlying Formation	silt	sand	shale and sandstone	-
Vegetation	chamisa and grass	chamisa and oak	grass and oak	juniper and chamisa
Local Terrain	hilly	hilly	canyon floor	hilly
Thickness of Overburden	21	51	0-4	
P I (Overburden)	L	13	S.N.P.	-
Estimated Quantity (cu. vds)	30,000	60,000	40,000	10.000 plus
Los Angeles West	20,000		24.4	19.2
Los Angeles wear	-	-	12 2	19.9
Soundness Loss	-	-		-
Average Maximum Size	-	-	12	_
% Retained on 2" Sieve	-		, <u>2</u> 2	
Crushed to:	as received	as received	as received	I .
[2"	-	100	58	-
Pit 1"	. –	99	41	100
Average ¹ /2"	100	97	29	58
% Passing No. 4	99	94	19	24
No. 10	98	84	14	13
No. 200	28		2	4
Plasticity Index		NP	N. P.	8
Pamarka:	, N. F.	118 1 8.		
FOZI do como	acad diarite dike 900' we			
5951: decomp	Used afor the arrie see we			
Pit Number	5932	6712	6713	0670
Pit Number	5932 NW 1/4 22	6712 SE 1/4 17	6713 SE 1/4 6	0670 SE 1/4 27
Pit Number Section Location	5932 NW 1./4 22	6712 SE 1/4 17 29N 3W	6713 SE 1/4 6 28N 3W	0670 SE 1/4 27 32N 6W
Pit Number Section Location County	5932 NW 1/4 22 30N 2W	6712 SE 1/4 17 29N 3W	6713 SE 1/4 6 28N 3W Rio Assiba	0670 SE 1/4 27 32N 6W Bio Arriba
Pit Number Location Section Township & Range County	5932 NW 1/4 22 30N 2W Rio Arriba	6712 SE 1/4 17 29N 3W Rio Arriba	6713 SE i/4 6 28N 3W Rio Arriba	0670 SE 1/4 27 32N 6W Rio Arriba
Pit Number Location Section Township & Range County Formation	5932 NW 1/4 22 30N 2W Rio Arriba Qal	6712 SE 1/4 17 29N 3W Rio Arriba Tsj	6713 SE 1/4 6 28N 3W Rio Arriba Tsj	0670 SE 1/4 27 32N 6W Rio Arriba Ot
Pit Number Location Section Township & Range County Formation Rock Type	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel)	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand	6712 SE 1/4 17 29N 3W Rio Arriba Tsj <u>sand and s</u> andstone	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand fair	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone fair	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone fair	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18'	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15'	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone fair 4' plus	0670 SE I/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit NumberLocationSectionTownship & RangeCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18'	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15'	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone fair 4' plus	0670 SE I/4 27 32N 6W Rio Arriba Ot gravel various good I0'_plus
Pit NumberLocationSectionLocationTownship & RangeCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying Formation	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone fair 4' plus shale	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus sandstone
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetation	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly	6713 SE i/4 6 28N 3W Rio Arriba Tsi sandstone - fair 4' plus - shale oak and pine mountainous	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3'	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6'	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone fair 4' plus shale oak and pine mountainous 3'	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. L (Overburden)	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S N P	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clav and shale sage hilly 0 - 6' N.P 8	6713 SE 1/4 6 28N 3W Rio Arriba Tsi sandstone fair 4' plus shale oak and pine mountainous 3' N.P 8	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (an uds.)	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P.	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clav and shale sage hilly 0 - 6' N.P 8 700,000	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Value of Waterial	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clav and shale sage hilly 0 - 6' N.P 8 700,000	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus sandstone sage lake shoreline 0 - 3' 8 475,000 24 8
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone 	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus sandstone sage lake shoreline 0 - 3' 8 475,000 24.8 13.4 8"
Pit NumberLocationSectionLocationTownship & RangeCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 -	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus -	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus sandstone sage lake shoreline 0 - 3' 8 475,000 24,8 13.4 8"
Pit NumberLocationSectionLocationTownship & Range CountyFormationCountyFormationQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" Sieve	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 -	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 -	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus -	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - as received	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - as received	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - as received	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2"	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - as received	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - - as received	6713 SE i/4 6 28N 3W Rio Arriba Tsi sandstone 	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1"	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - - - - - - - - -	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - - as received	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone 	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to:2"Pit1"Average½"	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - - - - - - - -	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - - as received	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - - - - - - - - - - - -	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus
Pit Number Location Section Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2'' Pit 1'' Average ½'' % Passing No. 4	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - - - - - - - -	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - - as received	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone fair 4' plus 	0670 SE 1/4 27 32N 6W Rio Arriba Qt gravel various good 10'_plus
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to:2"Pit1"Average% PassingNo. 4No. 10	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - - - as received - - 100	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clav and shale sage hilly 0 - 6' N.P 8 700,000 - - as received - - 100	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - - - - - - - - - - - -	0670 SE 1/4 27 32N 6W Rio Arriba Qt gravel various good 10'_plus
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SieveCrushed to:2''Pit1''Average% PassingNo. 4No. 10No. 200	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - - - as received - - 100 23	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clav and shale sage hilly 0 - 6' N.P 8 700,000 - - as received - - 100 38	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - - - - - - - - - - - -	0670 SE 1/4 27 32N 6W Rio Arriba Qt gravel various good 10'_plus
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to:2"Pit1"Average% PassingNo. 4No. 10No. 200Plastioitty Leday	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - as received - 100 23 N P	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - as received - 100 38 N.P.	6713 SE i/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - - - - - - - - - - - -	0670 SE 1/4 27 32N 6W Rio Arriba Qt gravel various good 10'_plus
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 200 Plasticity Index Bemarket	5932 NW 1/4 22 30N 2W Rio Arriba Qal sand - fair 18' - sandstone and shale oak and spruce mountainous 0 - 3' S.N.P. 40,000 - - as received - 100 23 N. P.	6712 SE 1/4 17 29N 3W Rio Arriba Tsj sand and sandstone - fair 8 - 15' - clay and shale sage hilly 0 - 6' N.P 8 700,000 - - - as received - 100 38 N. P.	6713 SE 1/4 6 28N 3W Rio Arriba Tsj sandstone - fair 4' plus - shale oak and pine mountainous 3' N.P 8 290.000 plus - - - - - - - - - - - - -	0670 SE 1/4 27 32N 6W Rio Arriba Ot gravel various good 10'_plus

MATERIAL PIT SUMMARY

Pit Numbe	er l	0671	0672
	Section	W 1/2 13	NE 1/4 20
Location	Township & Range	32N 2W	30N 2W
	County	Rio Arriba	Rio Arriba
Formatior	1	Tia	Tsi
Rock Typ	e	igneous	sand and sandstone
Source Ro	ock (Gravel)		-
Quality of	Material	boop	fair
Thickness	of Material	40' plus	20' plus
Thickness	of Cap (Caliche)		
Material U	nderlying Formation	sandstone	shale
Vegetatior	1	pine	pine and oak
Local Terr	ain	mountainous	mountainous
Thickness	of Overburden	0 - 2'	0 - 3'
P. I. (Over	burden)	S.N.P.	10 to N.P.
Estimated	Quantity (cu. yds)	200,000	440,000 plus
Los Angel	es Wear	21.4	
Soundness.	Loss	3-8	-
Average M	aximum Size		#
% Retaine	d on 2" Sieve		-
	Crushed to:		as received
	2"		
Pit	1"	<u>i00</u>	
Average	1/2"	46	No. 4: 100
% Passing	No. 4	17	No. 10: 55
	No. 10	9	No. 80: 30
	No. 200	2	No. 200: 22
Plasticity I	Index	N. P.	N. P.
Remarks:			

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Pit Numbe	er		
	Section		
Location	Township & Range		
	County		
Formation			
Rock Typ	e		
Source Ro	ck (Gravel)		
Quality of	Material		
Thickness	of Material		
Thickness	of Cap (Caliche)		
Material U	nderlying Formation		
Vegetation	1		
Local Terr	ain		
Thickness	of Overburden		
P. I. (Over	burden)		
Estimated	Quantity (cu. yds.)		
Los Angel	es Wear		
Soundness	Loss		
Average M	aximum Size		
% Retained	1 on 2" Sieve		-
	Crushed to:		•
	2"		
Pit	1"		
Average	1/2"		
% Passing	No. 4		
	No. 10		
	No. 200		
Plasticity I	ndex	[
Remarks:	•	-	

QUAD No. 5

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MATERIAL PIT SUMMARY

Pit Numbe	er '	5863	58136	59111	6051
•	Section	NE 1/4 30	SE 1/4 20	NW 1/4 29	not sectionalized
Location	Township & Range	32N IW	32N IW	32N IW	Tierra Amarilla Grant
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation	1	Qal	Qal	Qal	Q†
Rock Typ	e	gravel	sand and gravel	sand and gravel	gravel
Source Ro	ock (Gravel)	various	various	various	quartzite and various
Quality of	Material	good	good	good	good
Thickness	of Material	4' plus	6' plus	7'plus	10'
Thickness	of Cap (Caliche)		-	-	-
Material U	nderlying Formation		-	shale and sandstone	sandstone
Vegetatior	n	grass	grass	grass	grass, chamisa, juniper
Local Terr	ain	canyon floor	canyon floor	canyon floor	hilly
Thickness	of Overburden	0-4'	2'	3'	0-3'
P. I. (Over	burden)	S.N.P.	9	б	S.N.P.
Estimated	Quantity (cu. yds)	50,000	100,000	100,000	100,000
Los Angele	es Wear	20.8	20.0	21.2	30.8
Soundness	Loss	9.9	11.3	3.4	6.6
Average M	aximum Size	13"	11"	12"	10"
% Retained	d on 2" Sieve	15	25	20	31
	Crushed to:	as received	as received	as received	as received
	2"	83	58	81	71
Pit	1"	55	39	55	59
Average	1/2"	37	32	37	50
% Passing	No. 4	23	24	25	41
	No. 10	18	20	20	35
	No. 200	. 1	6		15
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

5863: water at 18"

58136: water at 4'

Pit Numbe	er	6454	6564	6648	7002
	Section	NE 1/4 30	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	32N IW	Tierra Amarilla Grant	Tierra Amarilla Grant	Tierra Amarilla Grant
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formatior	n	Qal	QTg	Qal	Q†
Rock Typ	e	sand and gravel	sand and gravel	sand and gravel	sand and gravel
Source Ro	ock (Gravel)	various	-	various	various
Quality of	f Material	good	fair	excellent	dood
Thickness	of Material	6' plus	12' plus	12' plus	8' plus
Thickness	of Cap (Caliche)	_	-		_
Material U	Inderlying Formation		shale	clay	shale
Vegetatior	n	grass	pinon and juniper	scrub oak	grass and juniper
Local Terr	rain	canyon floor	mountainous	river botton	mountainous
Thickness	of Overburden	2'	3	0-3'	0-5'
P. I. (Over	burden)	6	13	S.N.P.	9
Estimated	Quantity (cu. yds.)	50,000	20,000	175,000	300,000
Los Angele	es Wear	20.4	29.2	18.8	24.8
Soundness	s Loss	8.4	3.1	8.3	4.6
Average M	aximum Size	13"	5"	17"	4"
% Retained	d on 2" Sieve	15	30	55	44
	Crushed to:	as received	as received	as received	as received
	2"	85	70	52	50
Pit	1"	76	60	40	38
Average	1/2"	66	49	29	30
% Passing	No. 4	51	33	20	23
	No. 10	42	24	13	18
	No. 200	4	6	2	3
Plasticity I	ndex	N.P.	9	N.P.	6

Remarks:

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6648: water at 5'

MATERIAL PIT SUMMARY

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Pit Numbe	er [7012	7014	7015	0653
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Tierra Amarilla Grant	Tierra Amarilla Grant	Tierra Amarilla Grant	Tierra Amarilla Grant
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation	1	0a1	0+	Kmas	0+
Rock Typ	e	gravel	gravel and sand	Limestone	oravel
Source Ro	ck (Gravel)	guartzite and various	quartzite	-	various
Quality of	Material		good		
Thickness	of Material		01	101	
Thickness	of Can (Caliche)	12	8	10	
Material II	Inderlying Formation			-	
Vagatation		snale	clay, slit, sandstone	sandstone, shale	silf and sand
Vegetation	1	grass	grass	grass	ponderosa
Local Terr		stream bed	stream bed	mountainous	mountainous stream bed
Inickness	of Overburden	2'		4'	
P. I. (Over	burden)	14			
Estimated	Quantity (cu. yds)	335,000	200,000	175,000	385,000
Los Angel	es Wear	20.0	21.6	24.0	23.6
Soundness	Loss	1.8	0.5	1.4	2.3
Average M	aximum Size	20"	10"		21"
% Retaine	d on 2" Sieve	60	49		36
	Crushed to:	as received	as received	1 1/2"	as received
	2"	44	78	100	70
Pit	1"	38	58	60	49
Average	1/2"	31	42	23	38
% Passing	No. 4	25	30	12	
	No. 10	18	22		21
	No. 200	10	7	/	2
Plasticity	Index	4	/	N D	<u>y</u>
Pit Numbe	er]	0671	0869	0870	0871
Pit Numbe	er	0671 WI/2 13	0869 NF 1/4 17	0870	0871
Pit Number	er Section Township & Range	0671 W1/2 13 32N 2W	0869 NE 1/4 17	0870 not sectionalized	0871 not sectionalized
Pit Number	er Section Township & Range County	0671 W1/2 13 32N 2W	0869 NE 1/4 17 31N IW	0870 not sectionalized Tierra Amarilla Grant	0871 not sectionalized Tierra Amarilla Grant
Pit Number	er Section Township & Range County	0671 W1/2 13 32N 2W Rio Arriba	0869 NE 1/4 17 31N IW Rio Arriba	0870 not sectionalized Tierra Amarilla Grant Rio Arriba	0871 not sectionalized Tierra Amarilla Grant Rio Arriba
Pit Number Location Formation	er Section Township & Range County	0671 WI/2 I3 32N 2W Rio Arriba Tia	0869 NE 1/4 17 31N IW Rio Arriba Ti	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb
Pit Number Location Formation Rock Typ	er Section Township & Range County n e	0671 WI/2 13 32N 2W Rio Arriba Tia andesite	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate
Pit Numb Location Formation Rock Typ Source Ro	er Section Township & Range County 1 e bock (Gravel)	0671 WI/2 13 32N 2W Rio Arriba Tia andesite igneous	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate
Pit Number Location Formation Rock Typ Source Ro Quality of	er Section Township & Range County n e ock (Gravel) Material	0671 WI/2 13 32N 2W Rio Arriba Tia andesite igneous good	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair
Pit Number Location Formation Rock Typ Source Rc Quality of Thickness	er Section Township & Range County n e bock (Gravel) Material of Material	0671 WI/2 13 32N 2W Rio Arriba Tia andesite igneous good 40' plus	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness	er Section Township & Range County n e bock (Gravel) TMaterial of Material of Cap (Caliche)	0671 WI/2 13 32N 2W Rio Arriba Tia andesite igneous good 40' plus -	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus -
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U	er Section Township & Range County n e bock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation	0671 WI/2 13 32N 2W Rio Arriba Tia andesite igneous good 40' plus - sandstone	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus - shale	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus - silt and clay	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus - sandstone
Pit Numb Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation	er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n	0671 W1/2 13 32N 2W Rio Arriba Tia andesite igneous good 40' plus - sandstone pine	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus - shale chamisa, juniper	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus - silt and clay aspen and pine	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus - sandstone aspen, fir, oak
Pit Numb Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr	er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain	0671 W1/2 13 32N 2W Rio Arriba Tia andesite igneous good 40' plus - sandstone pine mountainous	0869 NE 1/4 17 31N 1W Rio Arriba Ti lamprophyre dike fair 4'X50' plus - shale chamisa, juniper hilly	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus silt and clay aspen and pine mountainous	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus - sandstone aspen, fir, oak mountainous
Pit Number Location Formation Rock Typ Source Rc Quality of Thickness Thickness Material U Vegetation Local Terr Thickness	er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden	0671 WI/2 13 32N 2W Rio Arriba Tia andesite iqneous qood 40' plus - sandstone pine mountainous 0-2'	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus - shale chamisa, juniper hilly -	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus - silt and clay aspen and pine mountainous 0-3'	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus - sandstone aspen, fir, oak mountainous -
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Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated	er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden tburden) Quantity (cu. yds.)	0671 WI/2 13 32N 2W Rio Arriba Tia andesite iqneous qood 40' plus - sandstone pine mountainous 0-2' S.N.P. 200,000	0869 NE 1/4 17 31N IW Rio Arriba Ti lamprophyre dike fair 4'X50' plus - shale chamisa, juniper hilly - I0,000 plus	0870 not sectionalized Tierra Amarilla Grant Rio Arriba Ogl gravel igneous good 10' plus - silt and clay aspen and pine mountainous 0-3' - 5.000 plus	0871 not sectionalized Tierra Amarilla Grant Rio Arriba Tbb arkosic conglomerate - fair 10' plus - sandstone aspen, fir, oak mountainous - 450,000
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Remarks:

MATERIAL PIT SUMMARY

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Pit Number	0872	0875	and a second
Section	not sectionalized	not sectionalized	· · · · · · · · · · · · · · · · · · ·
Location Township & Ran	e Tierra Amarilla Grant	Tierra Amarilla Grant	
County	Rio Arriba	Rio Arriba	
Formation	Qb	Qop	
Rock Type	basalt	gravel	
Source Rock (Gravel)	-	quartzite and various	· · · ·
Quality of Material	acod	qood	and the second
Thickness of Material			
	15.		
Thickness of Cap (Caliche)	-	-	
Material Underlying Formatior	silt and shale	silt and shale	
Vegetation	grass	pine	
Local Terrain	hilly	hilly	
Thickness of Overburden	0-21	0-21	
P. I. (Overburden)	SNP-10	SNP	
Estimated Quantity (cu. vds)	225 000		_
Los Angeles Ween	225,000		
Los Angeles wear	23.1	57.2	
Soundness Loss	0.3	8.4	
Average Maximum Size	_	6"	
% Retained on 2" Sieve		41	
Crushed to:	1"	as received	
2"	-	72	
Pit 1"	100	49	
Average 1/2"	<u>100</u>	36	
% Passing No 4	47		
No. 4			
No. 10	10	19	
No. 200	2	9	
Plasticity Index	N.P.	N.P.	
Remarks:			
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Location Township & Ran	ge 📘		
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QUAD No. 6

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QUADRANGLE PAGE 6 (1)

MATERIAL PIT SUMMARY

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Pit Number	. I	5881	6418	6434	6525
S	Section	SE 1/4 18	S 1/2 15	not sectionalized	not sectionalized
Location T	fownship & Range	29N 9E	28N 8E	Tierra Amarilla Grant	Tierra Amarilla Grant
C	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation		Qp	0al	Qal	Qal
Rock Type		gravel	sand & gravel	sand & gravel	sand & gravel
Source Rock (C	Gravel)	igneous and guartzite	various	quartzite	various
Quality of Mate	erial	fair	dood	excellent	fair
Thickness of M	laterial	l0' plus	6!	5'	
Thickness of Ca	ap (Caliche)				– – – – – – – – – – – – – – – – – – –
Material Under	rlying Formation	silt	clavey sand	clavey sand & gravel	sand & gravel
Vegetation		grass and juniper	drass	dambel oak	gambel oak
Local Terrain		hillv	valley floor	mountain stream bed	stream bed
Thickness of O	verburden	0-3'	21	2 51	
P. I. (Overburde	len)	8	- <u>+</u>	8	10
Estimated Quar	ntity (cu. yds)	175 000		200 000	250 000
Los Angeles We	ear	26.7	33 2	13 2	33.2
Soundness Loss	s	21		キン・2 ス ス	2.0
Average Maxim	num Size	- 7"		9"	9"
% Retained on	2" Sieve	12	25	20	50
	Crushed to:	as received	as received	as received	as received
2	2"	53	76	87	53
Pit 1	"	44	67	5, 65	37
Average ¹ / ₂	2"	39	58	40	26
% Passing N	No. 4	33	45	25	
N	No. 10	29	33	18	9
N	No. 200	13	12	3	
Plasticity Index	x	8	5	N - P -	
Remarks:		·			
Pit Number	r.	6558	6562	0142	0648
Pit Number	Section	6558 not sectionalized	6562	0142 NF 1/4 2	0648 NW 1/4 34
Pit Number	Section Fownship & Range	6558 not sectionalized Tierra Amarilla Grant	6562 not sectionalized Tierra Amarilla Gr	0142 NE 1/4 2 Cant 26N 4E	0648 NW 1/4 34 27N 8E
Pit Number S Location T	Section Fownship & Range County	6558 not sectionalized Tierra Amarilla Grant Rio Arriba	6562 not sectionalized Tierra Amarilla Gr Rio Arriba	0142 NE 1/4 2 Tant 26N 4E Rio Arriba	0648 NW 1/4 34 27N 8E Bio Arriba
Pit Number S Location Formation	Section Fownship & Range County	6558 not sectionalized Tierra Amarilla Grant Rio Arriba PGa	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ol	0142 NE 1/4 2 ant 26N 4E Rio Arriba On	0648 NW 1/4 34 27N 8E Rio Arriba P6m
Pit Number S Location T Formation Rock Type	Section Fownship & Range County	6558 not sectionalized Tierra Amarilla Grant Rio Arriba P&q guartzite	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel	0142 NE 1/4 2 Tan† 26N 4E Rio Arriba Qp gravel	0648 NW I/4 34 27N 8E Rio Arriba P&m Leptite
Pit Number Location S Location T C Formation Rock Type Source Rock ((Section Fownship & Range County Gravel)	6558 not sectionalized Tierra Amarilla Grant Rio Arriba P&q quartzite -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite	0142 NE 1/4 2 Tant 26N 4E Rio Arriba Qp gravel various	0648 NW I/4 34 27N 8E Rio Arriba P C m Ieptite
Pit Number S Location Formation Rock Type Source Rock (C Quality of Mate	Section Fownship & Range County Gravel) terial	6558 not sectionalized Tierra Amarilla Grant Rio Arriba PGq quartzite - excellent	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good	0142 NE 1/4 2 Tant 26N 4E Rio Arriba Op gravel various fair	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite -
Pit Number S Location Formation Rock Type Source Rock (C Quality of Mate Thickness of M	Section Fownship & Range County Gravel) terial faterial	6558 not sectionalized Tierra Amarilla Grant Rio Arriba P6q quartzite - excellent 25'	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6'	0142 NE 1/4 2 Cant 26N 4E Rio Arriba Qp gravel various fair 4'	0648 NW I/4 34 27N 8E Rio Arriba PGm leptite - good 20' plus
Pit Number S Location Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca	Section Fownship & Range County Gravel) terial faterial Cap (Caliche)	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peg quartzite - excellent 25' -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6'	0142 NE 1/4 2 26N 4E Rio Arriba Qp gravel various fair 4' -	0648 NW I/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus
Pit Number S Location T Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under	Section Fownship & Range County Gravel) terial faterial faterial cap (Caliche) rlying Formation	6558 not sectionalized Tierra Amarilla Grant Rio Arriba P&q quartzite - excellent 25' -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel	0142 NE 1/4 2 Z6N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone	0648 NW 1/4 34 27N 8E Rio Arriba PEm leptite - good 20' plus - guartzite
Pit Number Location T C Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation	Section Fownship & Range County Gravel) terial faterial Cap (Caliche) rlying Formation	6558 not sectionalized Tierra Amarilla Grant Rio Arriba P6g quartzite - excellent 25' - aspen, grass & ponderosa	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp	0142 NE 1/4 2 Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa
Pit Number SLocation Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain	Section Fownship & Range County Gravel) terial faterial Cap (Caliche) rlying Formation	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous	0142 NE 1/4 2 NE 1/4 2 Arant 26N 4E Rio Arriba Op gravel various fair 4' - shale & sandstone juniper & gambel hilly	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa Mountainous
Pit Number SLocation Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O	Section Fownship & Range County Gravel) terial faterial faterial faterial rap (Caliche) rlying Formation	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3'	0142 NE 1/4 2 NE 1/4 2 Arant 26N 4E Rio Arriba Op gravel various fair 4' - shale & sandstone ben juniper & gambel hilly 6"	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3'
Pit Number SLocation T Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde	Section Fownship & Range County Gravel) terial faterial Cap (Caliche) rlying Formation everburden len)	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14	0142 NE 1/4 2 NE 1/4 2 Aio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P.
Pit Number Location S Location T C Formation Rock Type Source Rock (C Quality of Material Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburded Estimated Quar	Section Fownship & Range County Gravel) terial faterial Cap (Caliche) rlying Formation Overburden len) untity (cu. yds.)	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - - unlimited	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000	0142 NE 1/4 2 NE 1/4 2 Z6N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250.000
Pit Number SLocation S Location T C Formation Rock Type Source Rock (C Quality of Mater Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde Estimated Quar Los Angeles We	Section Fownship & Range County Gravel) terial faterial cap (Caliche) rlying Formation everburden len) untity (cu. yds.) ear	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0	0142 NE 1/4 2 NE 1/4 2 Aio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4
Pit Number Location S Location T C Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde Estimated Quar Los Angeles We Soundness Loss	Section Fownship & Range County Gravel) terial faterial Pap (Caliche) rlying Formation everburden len) intity (cu. yds.) ear	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1	0142 NE 1/4 2 NE 1/4 2 Sant 26N 4E Rio Arriba Op gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4
Pit Number S Location Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburdd Estimated Quar Los Angeles We Soundness Loss Average Maxim	Section Fownship & Range County Gravel) terial faterial f	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12"	0142 NE 1/4 2 NE 1/4 2 NE 1/4 2 Arant 26N 4E Rio Arriba Op gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5"	0648 NW 1/4 34 27N 8E Rio Arriba PGm leptite - good 20' plus - quartzite ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4
Pit Number SLocation Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of Ov P. I. (Overburde Estimated Quar Los Angeles We Soundness Loss Average Maxim % Retained on	Section Fownship & Range County Gravel) terial fateria fat	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60	0142 NE 1/4 2 NE 1/4 2 NE 1/4 2 Arant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 -
Pit Number Location T C Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde Estimated Quar Los Angeles We Soundness Loss Average Maxim % Retained on	Section Fownship & Range County Gravel) terial faterial faterial cap (Caliche) rlying Formation everburden len) mtity (cu. yds.) ear is num Size 2" Sieve Crushed to:	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4 -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received	0142 NE 1/4 2 NE 1/4 2 NE 1/4 2 Arant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1"	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - -
Pit Number Location S Location T C Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde Estimated Quar Los Angeles We Soundness Loss Average Maxim % Retained on C 2'	Section Fownship & Range County Gravel) terial faterial faterial cap (Caliche) rlying Formation expression werburden len) intity (cu. yds.) ear is num Size 2" Sieve Crushed to:	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43	0142 NE 1/4 2 NE 1/4 2 Ant 26N 4E Rio Arriba Op gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1"	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - I"
Pit Number S Location T C Formation Rock Type Source Rock (C Quality of Material Output Thickness of M Thickness of Ca Material Underly Vegetation Local Terrain Thickness of Or P. I. (Overburded Estimated Quart Los Angeles Wet Soundness Loss Average Maxim % Retained on % Retained on Cr 2' Pit 1'	Section Fownship & Range County Gravel) terial faterial faterial cap (Caliche) rlying Formation ear s num Size 2" Sieve Crushed to: "	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - unlimited 43.6 1.4 -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29	0142 NE 1/4 2 Pant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1" - 100	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - 1" -
Pit Number S Location T C Formation Rock Type Source Rock (C Quality of Material Output Thickness of M Thickness of Ca Material Underly Vegetation Local Terrain Thickness of Or P. I. (Overburded Estimated Quarticles Loss Average Maxim % Retained on 2' Pit 1' Average ½	Section Fownship & Range County Gravel) terial faterial f	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - - unlimited 43.6 1.4 - 1" -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29 21	0142 NE 1/4 2 rant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 10 65	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - 1" - 100 60
Pit Number S Location T CC Formation Rock Type Source Rock (C Quality of Mate Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of OP P. I. (Overburde Estimated Quar Los Angeles We Soundness Loss Average Maxim % Retained on Cr 2' Pit 1' Average % Passing N	Section Fownship & Range County Gravel) terial faterial f	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - aspen, grass & ponderosa mountainous - - unlimited 43.6 1.4 - 1" -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29 21 15	0142 NE 1/4 2 rant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1" - 100 65 41	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - l" - 100 60 25
Pit Number S Location T C Formation Rock Type Source Rock (C Quality of Material C Thickness of M Thickness of Ca Material Under Vegetation Local Terrain Thickness of O P. I. (Overburde Estimated Quar Los Angeles Weg Soundness Loss Average Maxim % % Retained on C 2' Pit 1' Average ½ % % Passing Nu Nu	Section Fownship & Range County Gravel) terial faterial f	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - - aspen, grass & ponderosa mountainous - - unlimited 43.6 1.4 - 1" -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29 21 15 12	0142 NE 1/4 2 rant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1" - 100 65 41 33	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - l" - 100 60 25 8
Pit Number S Location T C Formation Rock Type Source Rock (C Quality of Material C Thickness of M Thickness of CA Material Underly Vegetation Local Terrain Thickness of O P. I. (Overburded Estimated Quarily Los Angeles Wee Soundness Loss Average Maximily % Retained on C % Passing Ni Ni Ni	Section Fownship & Range County Gravel) terial faterial faterial cap (Caliche) rlying Formation ear is num Size 2" Sieve Crushed to: 2" is is oum Size 2" Sieve Crushed to: 2" is	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - - aspen, grass & ponderosa mountainous - - unlimited 43.6 1.4 - 1'' -	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29 21 15 12 4	0142 NE 1/4 2 Pant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 1" - 100 65 41 33 21	0648 NW 1/4 34 27N 8E Rio Arriba P&m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - l'' - 100 60 25 8 2
Pit Number S Location T C Formation Rock Type Source Rock (C Quality of Material C Thickness of M Thickness of C Material Underly Vegetation Local Terrain Thickness of O P. I. (Overburded Estimated Quart Los Angeles Wee Soundness Loss Average Maxim % % Retained on C Pit 1" Average ½ % Passing N N N Plasticity Index N	Section Fownship & Range County Gravel) terial faterial f	6558 not sectionalized Tierra Amarilla Grant Rio Arriba Peq quartzite - excellent 25' - - aspen, grass & ponderosa mountainous - - unlimited 43.6 1.4 - 1" - 100 66 22 11 1 N.P.	6562 not sectionalized Tierra Amarilla Gr Rio Arriba Ql sand & gravel quartzite good 6' - clay & gravel gambel oak and asp mountainous 3' 14 50,000 38.0 2.1 12" 60 as received 43 29 21 15 12 4 7	0142 NE 1/4 2 Pant 26N 4E Rio Arriba Qp gravel various fair 4' - shale & sandstone juniper & gambel hilly 6" 13 25,000 46.0 13.8 5" 10 10 10 65 41 33 21 13	0648 NW 1/4 34 27N 8E Rio Arriba P6m leptite - good 20' plus - quartzite oak ponderosa mountainous 0-3' S.N.P. 250,000 25.4 5.4 - - 1" - 100 60 25 8 2 N.P.

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MATERIAL PIT SUMMARY

Pit Numbe	' - '	0649	0650	065	0652
ł · I	Section	W 1/2 6	SW 1/4 5	SE 1/4 33	32
Location	Township & Range	26N 9E	28N 7E	29N 7E	29N 7E
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation		PEq	PEm	PEm	P C m
Rock Type	2	muscovitić quartzite	hornblende-chlorite schist	quartz diorite gneiss	granitic gneiss
Source Ro	ck (Gravel)	_	-		_
Quality of	Material	fair	good	good	good
Thickness	of Material	100' plus	20' plus	40' plus	20' plus
Thickness	of Cap (Caliche)	-	-	-	_
Material U	nderlying Formation	quartzite	-	quartzite	-
Vegetation	1	juniper & ponderosa	ponderosa & aspen	ponderosa	pine, gambel oak
Local Terr	ain	mountainous	mountainous	mountainous	mountainous
Thickness	of Overburden	0-4'	'	2'	1,
P. I. (Overl	burden)	S.N.P.		S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	unlimited	525,000	115,000	100,000
Los Angele	es Wear	47.3	43.2	41.6	29.4
Soundness	Loss	8.4	6.2	19.3	10.4
Average M	aximum Size	_	_	_	—
% Retained	1 on 2" Sieve	-	_	_	-
	Crushed to:	1 **	"	1 "	"
	2"	_	_	_	-
Pit	1"	100	100	100	100
Average	1/2"	66	61	47	62
% Passing	No. 4	32	28	21	26
	No. 10	21	18	12	15
	No. 200	2	55	3	5
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

Pit Numbe	21	0653	0654	0655	0656
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Tierra Amarilla Grant	Tierra Amarilla Grant	Tierra Amarilla Grant	Tierra Amarilla Grant
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation	1	Q+	PEq	Tr	Qg
Rock Typ	e	gravel	specularitic quartzite	conglomerate	gravel
Source Ro	ck (Gravel)	various	-	quartzite, leptite, gneiss	quartzite
Quality of	Material	good	excellent	good	excellen†
Thickness	of Material	l0' plus	85'	50'plus	20' plus
Thickness	of Cap (Caliche)	-	_	-	_
Material U	nderlying Formation	silt & sand	_	quartzite	quartzite
Vegetation	1	ponderosa	pine & aspen	pine, aspen & grass	pine, aspen & grass
Local Terr	ain	mountainous stream bed	mountainous	mountainous	mountainous
Thickness	of Overburden		0-2'	0-3'	-
P. I. (Over	burden)	N.P.	S.N.P.	S.N.P.	-
Estimated	Quantity (cu. yds.)	385,000	1,500,000	275,000	400,000
Los Angel	es Wear	23.6	26.0	34.1	29.2
Soundness	Loss	2.3	1.0	4.	2.0
Average M	aximum Size	21"		-	-
% Retaine	d on 2" Sieve	36	-	-	
	Crushed to:	as received	"	ן יי	
	2"	70	-	-	_
Pit	1"	49	100	100	100
Average	1/2"	38	56	72	55
% Passing	No. 4	28	23	29	18
	No. 10	21	13	17	10
	No. 200	9	3	3	3
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

QUADRANGLE PAGE 6 (3)

MATERIAL PIT SUMMARY

Dit Numba		0657	0658	0659	0660
' Fit Numbe	r I Section	not coctionalized	SE 1/4 29	6	SE 1/4 2
	Section	Corcon National Forest	30N 9E	30N 9Ë	30N 8E
Location	Township & Range		Rio Arriba	Rio Arriba	Rio Arriba
	County			Qa	Qaf
Formation	1	re gp	hasal+	andesite	silt & gravel
Rock Type	e	porphyritic granite		-	basalt & andesite
Source Ro	ock (Gravel)	-	rood	excellent	poor
Quality of	Material	excellent		2.0001 plus	25' plus
Thickness	of Material	20' plus	14		_
Thickness	of Cap (Caliche)			_	basalt
Material U	Inderlying Formation		5111	arass ponderosa, aspen	arass
Vegetatior	n	aspen, douglas fir, gampel oak	yrass Rtilv	mountainous	mountain slope
Local Terr	rain	mountainous	0.21		0-21
Thickness	of Overburden			_	7
P. I. (Over	burden)	S.N.P.	3.N.F.	- 4 000 000 plus	200.000 plus
Estimated	l Quantity (cu. yds)	600,000	400,000	10.0	29.2
Los Angel	les Wear	26.6	22.8		5 2
Soundness	s Loss	3.7	8.1	• /	12"
Average M	laximum Size	-		-	۰ <u>۲</u>
% Retaine	ed on 2" Sieve	-	-	- 	as received
	Crushed to:	1"	1 0	1 "	
	2"	i _	-	-	15
Pit	1"	100	100		50
Average	1/2"	55	61	55	50
% Passing	No. 4	23	28	19	
	No. 10	13		10	45
	No. 200	2	4		32
Plasticity	Index	N.P.	N.P.	N.P.	8

Remarks:

Pit Numb	ber	0661	0662	0663	0664	
	Section	W 1/2 35	S 1/2 26	S 1/2 19	S 1/2 35	
Location	Township & Range	3IN 7E	32N 8E	32N 8E	32N 7E	
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba	1.
Formatio	n	TIpJ	Qb	ТІр	Тс	
Rock Typ	pe	amygdaloidal basalt	basa †	conglomerate	olivine latite	
Source R	ock (Gravel)		-	igneous		
Quality o	f Material	good	good	fair	excellent	
Thickness	s of Material	lO' plus	35'	7' plus	120' plus	. I.
Thickness	s of Cap (Caliche)	-		-	-	
Material U	Inderlying Formation	silt & gravel	conglomerate	basal+	-	-
Vegetatio	n	pine & grass	grass	chamisa	pine	
Local Ter	rain	mountainous	canyon r i m	hilly	mountainous	
Thickness	s of Overburden	0-2'	0-1		-	
P. I. (Ove:	rburden)		S.N.P.	-	-	
Estimated	l Quantity (cu. yds.)	150,000	990,000	150,000	660,000 plus	
Los Angel	les Wear	25.0	20.4	28.4	16.9	
Soundnes	s Loss	10.6	17.7	39.5	2.9	·
Average N	faximum Size	-	-	-	-	_
% Retaine	d on 2" Sieve	-	-	-	_	
	Crushed to:	1 #	1 ''	1"	1"	
	2"	-	-	-	-	
Pit	1"	100	100	100	100	
Average	1⁄2"	67	64	64	55	
% Passing	No. 4	28	27	31	22	
	No. 10	16	16	19	12	
	No. 200	3	4	4	2	
Plasticity	Index	N.P.	N.P.	N.P.	N.P.	

Remarks:

		* **		0667
Pit Numbe	r	0665	0666	
	Section	NW 1/4 7	not sectionalized	
Location	Township & Range	3IN 7E	Carson National Forest	26N 8E
t	County	Rio Arriba	Rio Arriba	Rio Arriba
Formation		T+m	T+m	Qp
Rock Type	- -	welded tuff	tuff breccia	gravel
Source Po	ok (Gravel)			quartzite
Source Ro	CK (Graver)	apped		fair
Quality of	Material	good	dood	
Thickness	of Material	IZ' plus	40° plus	to prus
Thickness	of Cap (Caliche)	-	-	-
Material U	nderlying Formation	silt & conglomerate	quartzite	SILT
Vegetation	ı T	grass, cedar, aspen, gambel oak	pine, aspen & grass	pine, gambel oak & chamisa
Local Terr	ain	mountainous	mountainous	mountainous
Thickness	of Overburden	1	0-3'	2'
P. I. (Overl	burden)	SNP	S.N.P.	S.N.P.
Estimated	Quantity (cu vds)	770,000		110.000
Lon Angel	Quantity (cu. yus)		7,000,000	64. 2
LOS Angen	es wear	29.5		14.6
Soundness	Loss	23.7	41.7	14.0
Average M	aximum Size	-	-	9"
% Retained	d on 2" Sieve	–	—	19
	Crushed to:	"	"	as received
	2"	_	-	62
Pit	1"	100	100	55
Average	1/2"	59	68	42
% Passing	No 4	25	30	26
10 I assing	N- 10			18
	NO. 10		10	7
i	No. 200	3		
Plasticity 1	Index	N.P.	N.P.	N.P.
Remarks:				
Pit Numb				
	er .	0668	0669	
	Section	0668 W /2 2	0669 NW 1/4	
Location	Section Township & Range	0668 W 1/2 12 26N 6E	0669 NW 1/4 11 27N 4E	
Location	Section Township & Range County	0668 W 1/2 12 26N 6E Rio Arriba	0669 NW 1/4 11 27N 4E Rio Arriba	
Location	Section Township & Range County	0668 W 1/2 12 26N 6E Rio Arriba Tr	0669 NW 1/4 II 27N 4E Rio Arriba Qal	
Location Formation	Section Township & Range County	0668 W 1/2 12 26N 6E Rio Arriba Tr	0669 NW 1/4 II 27N 4E Rio Arriba Qal gravel	
Location Formation Rock Typ	Section Township & Range County n	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various	
Location Formation Rock Typ Source Ro	Section Township & Range County n be bock (Gravel)	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite	0669 NW 1/4 27N 4E Rio Arriba Qal gravel various	
Location Formation Rock Typ Source Ro Quality of	Section Township & Range County n De Dock (Gravel) f Material	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good	0669 NW 1/4 27N 4E Rio Arriba Qal gravel various fair	
Location Formation Rock Typ Source Ro Quality of Thickness	Section Township & Range County n oe ock (Gravel) f Material of Material	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus	0669 NW 1/4 27N 4E Rio Arriba Qal gravel various fair 2'	
Location Formation Rock Typ Source Ro Quality of Thickness Thickness	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche)	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus	0669 NW 1/4 27N 4E Rio Arriba Qal gravel various fair 12'	
Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U	Section Township & Range County n be ock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Junderlying Formation n	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass	т.,
Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation n rain	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor	r
Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation n rain of Overburden	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2'	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4'	
Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. L. (Over	Section Township & Range County n be ock (Gravel) f Material of Material of Cap (Caliche) Junderlying Formation n rain of Overburden	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden)	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150.000	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated	Section Township & Range County n be ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.)	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33 2	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32 0	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel	Section Township & Range County n be ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3 7	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness	Section Township & Range County n be ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M	Section Township & Range County n be cock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11"	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0	r
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be cock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size cd on 2" Sieve	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16"	· · · · · · · · · · · · · · · · · · ·
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be cock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size cd on 2" Sieve Crushed to:	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be bock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size id on 2" Sieve Crushed to: 2"	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1"	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be bock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1"	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" -	
Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1" ½"	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) l Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40 31	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42 27	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Oven Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be cock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) l Quantity (cu. yds.) les Wear s Loss faximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40 31 28	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42 27 22	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n be cock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) l Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40 31 28 13	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42 27 22 11	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	Section Township & Range County n be cock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) l Quantity (cu. yds.) les Wear s Loss faximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Index	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40 31 28 13 7	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42 27 22 11 12	
Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing Plasticity Remarks:	Section Township & Range County n be cock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Index	0668 W 1/2 12 26N 6E Rio Arriba Tr conglomerate quartzite good 30' plus - sandstone aspen, spruce & ponderosa mountainous 2' 5 150,000 33.2 3.7 11" 36 as received 84 57 40 31 28 13 7	0669 NW 1/4 11 27N 4E Rio Arriba Qal gravel various fair 12' - shale & sandstone grass valley floor 0-4' 7 200,000 32.0 2.0 16" 41 1" - 100 42 27 22 11 12	

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MATERIAL PIT SUMMARY

Bit Number	Ĩ 5444	56102	5876	5878
Fit Nulliver	not sectionalized	not sectionalized	11	NE 1/4 10
Leastion Township & Range	Carson National Forest	Sangre de Cristo Grant	27N 9F	29N 9E
Location Township & Kange			Taos	Taos
County		00		Oafv
Formation		yy cond i gravel	sand & gravel	gravel
Rock Type	sand & gravel	Saliu a graver		portite & rhyolite
Source Rock (Gravel)	various	various	fate	
Quality of Material	dood	excellent		
Thickness of Material	l2'plus	40' plus	15' plus	12
Thickness of Cap (Caliche)		-	.	-
Material Underlying Formation	gravel	gravel	conglomerate	SIIT
Vegetation	willows, pine	saqe	pinon & sage	arass
Local Terrain	floodplain	plain	rolling to flat	hilly
Thickness of Overburden	-	2'	4'	3-6'
P. I. (Overburden)	_	8	13	sandy N.P.
Estimated Quantity (cu. yds)	1 unlimited	unlimited	10,000 pluş	50,000 plus
Los Angeles Wear	23.1	26.0	28.0	57.6
Soundness Loss		_	-	-
Average Maximum Size	6"	6"	36''	6"
Werage maximum Size		25	30-40	5 -10
		as received	as received	as received
	2/4		71	89
	-		67	יי דר יי
Pit 1"	100	40	دن 57	71
Average 1/2"	74	52	22	/1
% Passing No. 4	40	21	41	60
No. 10	28	15	32	49
No. 200	5	1	4	13
Plasticity Index	1 N.P.	N.P.	N.P.	N, P,
Remarks:	1			
Pit Number	6107	6628	6639	0160
Pit Number	6107 NF 1/4 3	6628 not sectionalized	6639 E 1/2 6	0160 not sectionalized
Pit Number Section Location Townshin & Rang	6107 NE 1/4 3 26N LIE	6628 not sectionalized Sangre de Cristo Grant	6639 E 1/2 6 29N 13 F	0160 not sectionalized Sangre de Crișto
Pit Number Section Location Township & Rang	6107 NE 1/4 3 26N 11E Taos	6628 not sectionalized Sangre de Cristo Grant Taos	6639 E 1/2 6 29N 13 E Taos	0160 not sectionalized Sanqre de Cristo Taos
Pit Number Section Location Township & Rang County	6107 NE 1/4 3 26N 11E Taoş	6628 not sectionalized Sangre de Cristo Grant Taos Og	6639 E 1/2 6 29N 13 E Taos Oaf	0160 not sectionalized Sanqre de Cristo Taos Og
Pit Number Section Location Township & Rang County Formation	6107 NE 1/4 3 26N 11E Taos Qq	6628 not sectionalized Sangre de Cristo Grant Taos Og	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel	0160 not sectionalized Sangre de Cristo Taos Og sand & gravel
Pit Number Section Location Township & Rang County Formation Rock Type	6107 NE 1/4 3 26N IIE Taos Qq sand & gravel	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel	0160 not sectionalized Sangre de Cristo Taos Og sand & gravel various
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	6107 NE I/4 3 26N IIE Taos Qq sand & gravel various	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material	6107 NE 1/4 3 26N IIE Taos Qq sand & qravel various good	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 81
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	6107 NE 1/4 3 26N IIE Taos Qq sand & qravel various qood I2' plus	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus	0160 not sectionalized Sanqre de Cristo Taos Oq sand & qravel various good 8'
Pit Number Section Location Township & Rang County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche)	6107 NE 1/4 3 26N 11E Taos Qq sand & gravel various good 12' plus	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus	0160 not sectionalized Sanqre de Crișto Taos Oq sand & qravel various good 8'
Pit Number Section Location Township & Rang County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	6107 NE 1/4 3 26N 11E Taos Qq sand & gravel various good 12' plus - basalt	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation	6107 NE 1/4 3 26N 11E Taos Qq sand & gravel various good 12' plus - basalt sage	6628 not sectionalized Sangre de Cristo Grant Taos Og sand & gravel various excellent 40'plus - gravel sage	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass
Pit Number Section Location Township & Rang County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Local Terrain	6107 NE I/4 3 26N IIE Taos Oq sand & gravel various good I2' plus - basalt sage flat	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden	6107 NE I/4 3 26N IIE Taos Qq sand & gravel various good I2' plus - basalt sage flat 4-10'	6628 not sectionalized Sangre de Cristo Grant Taos Og sand & gravel various excellent 40'plus - gravel sage plains 2'	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3'	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat l'
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various qood 12' plus - basalt sage flat 4-10' 14-25	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plajn 3' 4	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat l' N.P.
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. vds.)	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various good 12' plus - basalt sage flat 4-10' 14-25 unlimited	6628 not sectionalized Sangre de Cristo Grant Taos Og sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat l' N.P. unlimited
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various good 12' plus - basalt sage flat 4-10' 14-25 unlimited 26	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat l' N.P. unlimited 29.6
Pit Number Section Location Tøwnship & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various good 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat l' N.P. unlimited 29.6 5.8
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various qood 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9 6"	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6"	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9"	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2"
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Ratained on 2 ^m Simm	$\begin{array}{c} 6107\\ NE 1/4 3\\ 26N 11E\\ Taos\\ Qq\\ sand & qravel\\ various\\ qood\\ 12' plus\\ -\\ basalt\\ sage\\ flat\\ 4-10'\\ 14-25\\ unlimited\\ 26\\ 3.9\\ 6''\\ 27\end{array}$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6"	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9"	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2"
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve	$\begin{array}{c} 6107\\ NE 1/4 3\\ 26N 11E\\ Taos\\ Qq\\ sand & qravel\\ various\\ qood\\ 12' plus\\ -\\ basalt\\ sage\\ flat\\ 4-10'\\ 14-25\\ unlimited\\ 26\\ 3.9\\ 6''\\ 27\\ as received\end{array}$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various qood 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9 6" 27 as received	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65	0160 not sectionalized Sanqre de Cristo Taos Oq sand & qravel various good 8' - silt sagebrush & qrass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2''	6107 NE 1/4 3 26N 11E Taos Qq sand & gravel various good 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9 6" 27 as received 83	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50	0160 not sectionalized Sanqre de Cristo Taos Oq sand & qravel various good 8' - silt sagebrush & qrass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2'' Pit 1''	$\begin{array}{c} 6107\\ \text{NE I/4 3}\\ 26\text{N IIE}\\ \text{Taos}\\ \text{Qq}\\ \text{sand & qravel}\\ \text{various}\\ \text{qood}\\ 12' \text{ plus}\\ -\\ \text{basalt}\\ \text{sage}\\ \text{flat}\\ 4-10'\\ 14-25\\ \text{unlimited}\\ 26\\ 3.9\\ 6''\\ 27\\ \text{as received}\\ 83\\ 66\\ 10\end{array}$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 78	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2'' Pit 1'' Average ½''	$\begin{array}{c} 6107\\ \text{NE I/4 3}\\ 26\text{N IIE}\\ \text{Taos}\\ \text{Qq}\\ \text{sand & qravel}\\ \text{various}\\ \text{qood}\\ 12' \text{ plus}\\ -\\ \text{basalt}\\ \text{sage}\\ \text{flat}\\ 4-10'\\ 14-25\\ \text{unlimited}\\ 26\\ 3.9\\ 6''\\ 27\\ \text{as received}\\ 83\\ 66\\ 49\\ \end{array}$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65 48	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 38	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61 44
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4	$\begin{array}{c ccccc} & 6107 \\ & NE \ 1/4 \ 3 \\ 26N \ 11E \\ & Taos \\ Qq \\ & sand & qravel \\ & various \\ qood \\ & 12' \ plus \\ & - \\ & basalt \\ & sage \\ & flat \\ & 4-10' \\ & 14-25 \\ & unlimited \\ & 26 \\ & 3.9 \\ & 6'' \\ & 27 \\ & as \ received \\ & 83 \\ & 66 \\ & 49 \\ & 35 \end{array}$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65 48 32	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 38 25	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61 44
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Pit 1" Average ½" % Passing No. 4 No. 10 No. 10	6107 NE 1/4 3 26N 11E Taos Qq sand & gravel various good 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9 6" 27 as received 83 66 49 35 30	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65 48 32 23	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 38 25 18	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61 44 34
Pit NumberLocationSectionLocationTøwnship & Rang CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SievePit1''Pit1''Average½''% PassingNo. 4No. 10No. 200	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65 48 32 23 3	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 38 25 18 3	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61 44 34 9
Pit Number Section Location Tøwnship & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 200 Plasticity Index	6107 NE 1/4 3 26N 11E Taos Qq sand & qravel various qood 12' plus - basalt sage flat 4-10' 14-25 unlimited 26 3.9 6" 27 as received 83 66 49 35 30 4 N.P.	6628 not sectionalized Sangre de Cristo Grant Taos Qg sand & gravel various excellent 40'plus - gravel sage plains 2' 7 unlimited 23.6 7.2 6" 22 as received 81 65 48 32 23 3 N.P.	6639 E 1/2 6 29N 13 E Taos Qaf sand & gravel various excellent 20' plus - gravel sage plain 3' 4 unlimited 18 7.7 9" 35 as received 65 50 38 25 18 3 N.P.	0160 not sectionalized Sangre de Cristo Taos Oq sand & gravel various good 8' - silt sagebrush & grass flat 1' N.P. unlimited 29.6 5.8 2" 5 as received 91 74 61 44 34 9 N.P.

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Pit Number	•	0161		0167	
	Section	not sectionalized	$\frac{-0102}{F1/2}$ 3	U165	0.1.6.4
Location	Township & Range	Sanare de Cristo Grant	E 172 J		. S 1/2 .35
	County				29N 12E
Formation	county			laos	Taos
Rock Type		yy cond i anaval	γq	Qq "	Qtg
Source Post	(Crowel)	sand & gravel	sand & gravel	gravel & sand	grave
Ouality of M	(Glavel)	various	various	various	various
Quality of M		good	excellent	good	fair
Thickness of	Material	10'	6' plus	12' plus	20' plus
I hickness of	Cap (Caliche)	-	<u>-</u>	-	-
Material Und	lerlying Formation	sand & gravel	-	-	clay & gravel
Vegetation		sagebrush & grass	sage	sage & grass	ninon & juninor
Local Terrair	n	flat	flat	flat	mountainous
Thickness of	Overburden	6'	1-3'	21	
P. I. (Overbus	rden)	11	N.P.	NP	1-5
Estimated Qu	uantity (cu. yds)	unlimited	unlimited	unlimitod	
Los Angeles	Wear	22.4	30.8		unlimited
Soundness Lo	OSS	_		20.4	
Average Max	imum Size	Δ ¹¹	2!!	2.1	
% Retained o	on 2" Sieve	25	2		4"
	Crushed to		1	.10	15
	2"		-	as received	as received
D:+	1 ''	81	100	100	90
1 11 Augusta	1/ ??	/0	73	93	67
Average	1/2	58	53	80	ΔΔ
% Passing	No. 4	45	33	58	28
	No. 10	37	24	46	20
4	No. 200	8	1	7	
Plasticity Ind	1	N.P.	N.P.	N P	4
	lex				14
Remarks:	lex				• •
Remarks:	0163: wate	rat II'			
Remarks:	0163: wate	r at II'			
Remarks:	0163: wate 0164: conta	r at II' ains clay lenses			
Remarks:	0163: wate 0164: conta	r at II' ains clay lenses			
Remarks:	0163: wate 0164: cont	r at II' ains clay lenses			
Remarks:	0163: wate 0164: conta	r at II' ains clay lenses			
Remarks:	0163: wate 0164: conta	r at II' ains clay lenses 0165	Q166	0167	0168
Remarks:	0163: wate 0164: conta Section	r at II' ains clay lenses 0165 W 1/2 36	0166 12	0167 NW 1/4 23	Ω168 NE 1/4 26
Remarks: Pit Number Location	0163: wate 0164: cont 0164: cont Section Township & Range	n at II' ains clay lenses 0165 W 1/2 36 29N 12E	Q166 12 28N 12E	0167 NW 1/4 23 28N 12F	0168 NE 1/4 26 28N 12E
Remarks: Pit Number Location	0163: wate 0164: cont 0164: cont Section Township & Range County	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos	0166 12 28N 12E Taos	0167 NW 1/4 23 28N 12E Taos	0168 NE 1/4 26 28N 12E Taos
Remarks: Pit Number Location Formation	OI63: wate OI64: cont Section Township & Range County	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos Qtg	0166 12 28N 12E Taos 0Taf	0167 NW 1/4 23 28N 12E Taos 0Taf	0168 NE 1/4 26 28N 12E Taos 021
Remarks: Pit Number Location Formation Rock Type	OI63: wate OI64: cont OI64: cont Section Township & Range County	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos Otg silty sand	0166 12 28N 12E Taos 0Taf	0167 NW 1/4 23 28N 12E Taos OTaf	0168 NE 1/4 26 28N 12E Taos Qal
Remarks: Pit Number Location Formation Rock Type Source Rock	OI63: wate OI64: cont OI64: cont Section Township & Range County (Gravel)	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos Otg silty sand granite	Q166 12 28N 12E Taos QTaf gravel various	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel	0168 NE 1/4 26 28N 12E Taos Qal gravel
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma	OI63: wate OI64: cont OI64: cont Section Township & Range County (Gravel) aterial	oli65 W 1/2 36 29N 12E Taos Otg silty sand granite	Q166 12 28N 12E Taos QTaf gravel various	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various	NI68 NE 1/4 26 28N 12E Taos Qal qravel various
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of	O163: wate O164: conta Section Township & Range County (Gravel) aterial Material	olicity lenses 0165 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus	0166 12 28N 12E Taos QTaf gravel various poor	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good	NI68 NE 1/4 26 28N 12E Taos Oal gravel various poor
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Thickness of	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Can (Caliche)	olio5 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus	0166 12 28N 12E Taos QTaf gravel various poor 20' plus	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12'	NI68 NE 1/4 26 28N 12E Taos Qal qravel various poor 20' plus
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Thickness of Material Under	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation	0165 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus	0166 12 28N 12E Taos QTaf gravel various poor 20' plus	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12'	NI68 NE /4 26 28N I2E Taos Qal gravel various poor 20' plus
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vacatoria	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Thickness of Material Under Vegetation	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation	olio5 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel pinon & juniper
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Thickness of Material Under Vegetation Local Terrain	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus gravel hilly	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation	n at II' ains clay lenses 0165 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus gravel hilly	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6'	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4'	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6'
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden)	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4'	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6'
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur Estimated Qu	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) mantity (cu. yds.)	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus	0166 12 28N 12E Taos OTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4' 8	NI68 NE /4 26 28N I2E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur Estimated Qu Los Angeles W	O163: wate O164: conta O164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) mantity (cu. yds.) Vear	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus	0166 12 28N 12E Taos OTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited 30.8	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4' 8 5,000 plus	NI68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo	Ol63: wate Ol63: wate Ol64: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss	oli65 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel hilly - 500,000 plus	Ol66 12 28N 12E Taos OTaf gravel various poor 20' plus - gravel pinon & juniper hilly O-6' 10 unlimited 30.8 29.3	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4' 8 5,000 plus 27.6	NI68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maria	Ol63: wate Ol63: wate Ol64: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size	oli65 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel hilly - 500,000 plus	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6"	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5	NI68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of 1 Thickness of 0 Material Under Vegetation Local Terrain Thickness of 0 P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Beteined	Ol63: wate Ol63: wate Ol64: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size	oli65 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel hilly - 500,000 plus	Q166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6"	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5"	NI68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or	Ol63: wate Ol63: wate Ol64: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size n 2" Sieve	oli65 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel hilly - 500,000 plus	Ol66 12 28N 12E Taos OTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6"	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25	NI68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8"
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or	Ol63: wate Ol63: wate Ol64: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to:	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus -	Ol66 12 28N 12E Taos OTaf gravel various poor 20' plus - qravel pinon & juniper hilly O-6' 10 unlimited 30.8 29.3 6" 20 as received	0167 NW 1/4 23 28N 12E Taos OTaf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received	NI68 NE 1/4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of Material Under Vegetation Local Terrain Thickness of P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2"	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus -	0166 12 28N 12E Taos QTaf gravel various poor 20' plus - qravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6" 20 as received 78	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69	NI68 NE 1/4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden tden) uantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2" 1"	oli65 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus - -	0166 12 28N 12E Taos QTaf gravel various poor 20' plus - qravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6" 20 as received 78 61	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53	<pre> nl68 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55</pre>
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) lantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2" 1" ½"	olio5 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus - -	0166 12 28N 12E Taos QTaf gravel various poor 20' plus - gravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6" 20 as received 78 61 47	0167 NW 1/4 23 28N 12E Taos QTaf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40	<pre> N168 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55 42</pre>
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) lantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2" 1" ½" No. 4	olio5 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel hilly - 500,000 plus - -	0166 12 28N 12E Taos QTaf gravel various poor 20' plus - qravel pinon & juniper hilly 0-6' 10 unlimited 30.8 29.3 6" 20 as received 78 61 47 30	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40 24	<pre> N168 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55 42 28</pre>
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average	Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) lantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	olio5 W 1/2 36 29N 12E Taos Otq silty sand granite good 50' plus - gravel hilly - 500,000 plus - - - - - - - - - - - - -	$\begin{array}{c} 0166\\ 12\\ 28N 12E\\ Taos\\ 0Taf\\ gravel\\ various\\ poor\\ 20' plus\\ -\\ qravel\\ pinon & juniper\\ hilly\\ 0-6'\\ 10\\ unlimited\\ 30.8\\ 29.3\\ 6''\\ 20\\ as received\\ 78\\ 61\\ 47\\ 30\\ 20\\ \end{array}$	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40 24	Λ168NENENEZ8N12ETaosQalqravelvariouspoor20' plus-qravelpinon & juniperhilly3-6'13unlimited45.6-8"25as received73554228
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of Ma Thickness of C Material Under Vegetation Local Terrain Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Coverburden cden) uantity (cu. yds.) Vear Dess mum Size n 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	olio 0165 W 1/2 36 29N 12E Taos Otg silty sand granite good 50' plus - gravel - 500,000 plus - - - - - - - - - - - - -	$\begin{array}{c} 0166\\ 12\\ 28N 12E\\ Taos\\ 0Taf\\ grave \\ various\\ poor\\ 20' plus\\ -\\ qravel\\ pinon & juniper\\ hilly\\ 0-6'\\ 10\\ unlimited\\ 30.8\\ 29.3\\ 6''\\ 20\\ as received\\ 78\\ 61\\ 47\\ 30\\ 20\\ 20\\ 2\end{array}$	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40 24 16	<pre>N168 NE /4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55 42 28 19</pre>
Pit Number Location Formation Rock Type Source Rock Quality of Material Under Vegetation Local Terrain Thickness of C Material Under Vegetation Local Terrain Thickness of C P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average % Passing Indication Indication Indication Soundness Average % Passing Indication Average % Passing Indication	lex 0163: wate 0164: conta Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) lantity (cu. yds.) Vear oss mum Size n 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	0165 W 1/2 36 29N 12E Taos Qtq silty sand granite good 50' plus - gravel - 500,000 plus - - - - - - - - - - - - -	$\begin{array}{c} 0166\\ 12\\ 28N 12E\\ Taos\\ 0Taf\\ gravel\\ various\\ poor\\ 20' plus\\ -\\ qravel\\ pinon & juniper\\ hilly\\ 0-6'\\ 10\\ unlimited\\ 30.8\\ 29.3\\ 6''\\ 20\\ as received\\ 78\\ 61\\ 47\\ 30\\ 20\\ 20\\ 2\\ 10\\ \end{array}$	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage, pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40 24 16 3	<pre>N168 NE 1/4 26 28N 12E Taos Qal qravel various poor 20' plus - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55 42 28 19 4</pre>
Pit Number Location Formation Rock Type Source Rock Quality of Material Under Thickness of 10 Material Under Vegetation Local Terrain Thickness of 00 Vegetation Local Terrain Thickness of 00 P. I. (Overbur Estimated Qu Los Angeles W Soundness Lo Average Maxin % Retained or Pit Average % Passing In Plasticity Inde	Section Township & Range County (Gravel) aterial Material Cap (Caliche) erlying Formation Overburden rden) mantity (cu. yds.) Wear oss mum Size n 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 ex	0165 W 1/2 36 29N 12E Taos Qtq silty sand granite good 50' plus - gravel - 500,000 plus - - - - - - - - - - - - -	$\begin{array}{c} 0166\\ 12\\ 28N 12E\\ Taos\\ 0Taf\\ gravel\\ various\\ poor\\ 20' plus\\ -\\ qravel\\ pinon & juniper\\ hilly\\ 0-6'\\ 10\\ unlimited\\ 30.8\\ 29.3\\ 6''\\ 20\\ as received\\ 78\\ 61\\ 47\\ 30\\ 20\\ 2\\ 10\\ \end{array}$	0167 NW 1/4 23 28N 12E Taos 0Taf sand & gravel various good 12' - gravel sage. pinon & juniper hilly 1-4' 8 5,000 plus 27.6 7.5 5" 25 as received 69 53 40 24 16 3 6	Λ168 NE 1/4 26 28N 12E Taos Qal qravel various poor 20' plus - - qravel pinon & juniper hilly 3-6' 13 unlimited 45.6 - 8" 25 as received 73 55 42 28 19 4 9

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		0170	0171	0172
Pit Number	0169		UI/I	not continualized
Section	NE 1/4 33		nor sectionalized	Astasia Langung Const
Location Township & Range	28N 12E	Z/N TIE		Antonie Leroux Grant
County	Taos	laos	laos	1805
Formation	Qal	Qg	Olg	Vig .
Rock Type	sand & gravel	sand & gravel	sand & gravel	sand & gravel
Source Rock (Gravel)	various	various	various	granite & various
Quality of Material	fair	excellent	good	good
Thickness of Material	10' plus	15' plus	15'	25' plus
Thickness of Cap (Caliche)	-	-	- <u>.</u>	-
Material Underlying Formation	clay	basalt	silty gravel	gravel
Vegetation	sage, pinon & pine	sage & grass	sage	pine, juniper & saqe
Local Terrain	hilly	flat	hilly	hilly
Thickness of Overhurden	_	1-3'	4'	4'
P. L. (Overburden)		12	12	9
F. I. (Overburden)		unlimited	unlimited	unlimited
Estimated Quantity (cu. yus)	760,000 prus	20 4	32 8	32 0
Los Angeles wear	55.Z	20.4	52.0	13 7
Soundness Loss	18.2		-	1 . , /
Average Maximum Size	2"	8''	6	2" 75
% Retained on 2" Sieve	8	25	50	35
Crushed to:	as received	as received	as received	as received
2"	93	88	58	72
Pit 1"	82	64	43	55
Average ¹ / ₂ "	71	44	33	38
% Passing No. 4	55	27	20	25
No 10	30	18	13	17
No. 10	5	3	3	3
NO. 200				10
Plasticity Index	N.P.		N • L •	10
Remarks:				
Pit Number	0173	0174	0175	0176
Pit Number	0173 not sectionalized	0174	0175 not sectionalized	0176 not sectionalized
Pit Number Section Location Township & Range	0173 not sectionalized Antonie Leroux Grant	0174 not sectionalized Antonie Leroux Grant	0175 not sectionalized Carson National Forest	0176 not sectionalized Carson National Forest
Pit Number Section Location Township & Range County	0173 not sectionalized Antonie Leroux Grant Taos	0174 not sectionalized Antonie Leroux Grant Taos	0175 not sectionalized Carson National Forest Taos	0176 not sectionalized Carson National Forest Taos
Pit Number Section Location Formation	0173 not sectionalized Antonie Leroux Grant Taos Oal	0174 not sectionalized Antonie Leroux Grant Taos OTo	0175 not sectionalized Carson National Forest Taos nEm	0176 not sectionalized Carson National Forest Taos Tgr
Pit Number Section Location Formation Pock Type	0173 not sectionalized Antonie Leroux Grant Taos Qal sand & gravel	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel	0175 not sectionalized Carson National Forest Taos pGm quartzite	0176 not sectionalized Carson National Forest Taos Tqr gravel
Pit Number Section Location Formation Rock Type Source Back (Cravel)	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic	0176 not sectionalized Carson National Forest Taos Tqr qravel granite
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various	Ol74 not sectionalized Antonie Leroux Grant Taos OTg gravel various	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 31 plus
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor 20' plus	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche)	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor 20' plus	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus -	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying Formation	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus _ silt & clay	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor 20' plus - gravel	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus - clay
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetation	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor 20' plus - gravel sage, pine & juniper	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus - clay pine
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal Terrain	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly	0174 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel sage, pine & juniper hilly	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus - clay pine mountainous
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of Overburden	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6"	0174 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel sage, pine & juniper hilly 3'	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Naterial	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6"	0 74 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel sage, pine & juniper hilly 3' 13	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous -	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous -
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited	0 74 not sectionalized Antonje Leroux Grant Taos OTg qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus clay & gravel pine mountainous 100,000 plus	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles Wear	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited	0 74 not sectionalized Antonję Leroux Grant Taos OTg qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossSoundness Loss	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited -	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5"	0174 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9"	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6"
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Bateined on 2 ^m Sinva Sinva	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6'' 6 unlimited - 4.9 5'' 30	0174 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel sage, pine & juniper hilly 3' 13 unlimited 27.6 - 9"	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - - unlimited 50.4 3.8 6"
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Councient of the set o	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6 unlimited - 4.9 5" 30	0174 not sectionalized Antonie Leroux Grant Taos OTg qravel various poor 20' plus - qravel sage, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus - clay pine mountainous - - unlimited 50.4 3.8 6" 90
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received	0174 not sectionalized Antonie Leroux Grant Taos OTg gravel various poor 20' plus - gravel sage, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel qranite excellent 3' plus - clay pine mountainous - - unlimited 50.4 3.8 6" 90 1"
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to: 2'' 2''	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - - unlimited 50.4 3.8 6" 90 1"
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SieveCrushed to: 2''Pit1''	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 -	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clav & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1"
Pit NumberLocationSectionLocationTownship & RangeCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SievePit1''Average½''	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47 36	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 34	0175 not sectionalized Carson National Forest Taos p6m quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1"
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"Pit1" Average% PassingNo. 4	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& gravel various good 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47 36 25	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 34 22	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus clav & gravel pine mountainous 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1"
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" Sieve% Retained on 2" SieveCrushed to: 2"Pit1" Average% PassingNo. 4 No. 10	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47 36 25 17	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel sage, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 34 22 15	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1"
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to:2"Pit1"Average½"% PassingNo. 4No. 10No. 200	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47 36 25 17 7	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 34 22 15 3	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1" - 100 46 17 10 2	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1" - 100 66 26 15 2
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" Sieve $%$ Retained on 2" SieveCrushed to: 2" $%$ PassingNo. 4 No. 10 No. 200Plasticity IndexNo.	0173 not sectionalized Antonie Leroux Grant Taos Qal sand_& qravel various qood 27' plus - silt & clay pinon & juniper hilly 6" 6 unlimited - 4.9 5" 30 as received 63 47 36 25 17 7 N.P.	0174 not sectionalized Antonie Leroux Grant Taos OTq qravel various poor 20' plus - qravel saqe, pine & juniper hilly 3' 13 unlimited 27.6 - 9" 45 as received 75 51 34 22 15 3 14	0175 not sectionalized Carson National Forest Taos pGm quartzite metamorphic excellent 10' plus - clay & gravel pine mountainous - 100,000 plus 29.6 0.9 10" 90 1" 90 1" 90 1"	0176 not sectionalized Carson National Forest Taos Tqr qravel granite excellent 3' plus - clay pine mountainous - unlimited 50.4 3.8 6" 90 1" - 100 66 26 15 2 N.P.

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Pit Number	0177	0178		0180
Section	S 1/2 26	NE 1/4 21	SE 1/4 13	34
Location Township & Range	30N 9E	29N 9E	29N_10E	29N 11E
County	Taos	Rio Arriba	Taos	Taos
Formation	QC	0p	Qafv	Qaf
Rock Type	cinders	silt & gravel	basalt	sand & gravel
Source Rock (Gravel)	Ciliders	Janoous	ianeous	ianeous
Quality of Material	_	fair	nood	aood
Thickness of Material	good		4004	
Thickness of Material	100' plus	5'	0	,
Thickness of Cap (Calche)	-	-	-	···· -
Material Underlying Formation		sandstone	clay	sand & clay
Vegetation	pinon & juniper	sage & grass	sagebrush & grass	sagebrush & grass
Local Terrain	hilly	rolling hills	low hills	rolling hills
Thickness of Overburden	-	1-21	1-31	4'
P. I. (Overburden)	-	10	6	6
Estimated Quantity (cu. yds)	unlimited	unlimited	unlimited	5,000 plus
Los Angeles Wear	35 0	33.2	26.8	32.4
Soundness Loss	11.0	12.4	5.8	6.1
Average Maximum Size		10"	511	5"
W Detained on 2" Sieve	0	25	20	ך ק
% Retained on 2 Sieve	50	20	20	/
Crushed to:	as received	as received	as received	
2"	86	15	63	83
Pit 1"	58	62	51	68
Average ¹ /2"	30	51	48	58
% Passing No. 4	17	35	45	44
No. 10	12	24	37	32
No. 200	2	7	16	5
Plasticity Index		10	N.P.	N.P.
Remarks:				
-	r			
Pit Number	0 86	0187	0188	0189
Section	SF 1/4 21	SW 1/4 3	W 1/2 13	NE 1/4 7
Location Township & Range	31N 9F	30N 9F	29N LIF	30N 13E
County	Taos	Taos	Taos	Taos
County	1405		1403	
Formation			0-	0af
Rock Type		yalv walaanian	Qa andanita	Oaf
	cinders	volcanics	Qa andesite	Qaf sand & gravel
Source Rock (Gravel)	cinders volcanic	volcanics igneous	Qa andesite iqneous	Qaf sand & gravel various
Source Rock (Gravel) Quality of Material	cinders volcanic good	volcanics igneous good - fair	Qa andesite iqneous qood	Qaf sand & gravel various excellent
Source Rock (Gravel) Quality of Material Thickness of Material	cinders volcanic good i00' plus	volcanics igneous good - fair 50'	Qa andesite iqneous qood 300' plus	Qaf sand & gravel various excellent 15' plus
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche)	cinders volcanic good 100' plus -	volcanics igneous good - fair 50'	Qa andesite iqneous qood 300' plus	Oaf sand & gravel various excellent 15' plus
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	cinders volcanic good 100' plus - -	volcanics igneous good - fair 50' -	Qa andesite iqneous qood 300' plus - -	Oaf sand & gravel various excellent 15' plus - sand & gravel
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation	cinders volcanic good 100' plus - - sagebrush	volcanics igneous good - fair 50' - sagebrush & grass	Qa andesite iqneous qood 300' plus - - pinon & sagebrush	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain	cinders volcanic good 100' plus - - sagebrush cone	volcanics igneous good - fair 50' - sagebrush & grass mountain slope	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden	cinders volcanic good 100' plus - - sagebrush cone -	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2'	Qa andesite iqneous qood 300' plus - pinon & sagebrush mountainous	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. L. (Overburden)	cinders volcanic good i00' plus - - sagebrush cone -	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7	Qa andesite iqneous qood 300' plus - pinon & sagebrush mountainous -	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l'
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)	cinders volcanic good 100' plus - - sagebrush cone - - -	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l' 6 unlimited
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.)	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50 0	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28 8	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l' 6 unlimited 14 8
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l' 6 unlimited 14.8 2 9
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1	Qaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l' 6 unlimited 14.8 2.9
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 -	volcanics igneous good - fair 50' - - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3"	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - unlimited 46.0 5.1	Qaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3"
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat l' 6 unlimited 14.8 2.9 3" 25
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 "	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received	Qa andesite iqneous qood 300' plus - pinon & sagebrush mountainous - unlimited 46.0 5.1 - 99	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2"	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 "	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82	Qa andesite iqneous qood 300' plus - pinon & sagebrush mountainous - unlimited 46.0 5.1 - 99 "	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1"	cinders volcanic good i00' plus - - sagebrush cone - - unlimited 50.0 - - - 75 " -	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56	Qa andesite iqneous qood 300' plus - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 I"	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½"	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - - 100 64	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56 41	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 1"	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70 49
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 1" -	volcanics igneous good - fair 50' - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56 41 26	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 1" - 100 71 31	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70 49 32
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 " 100 64 41 32	volcanics igneous good - fair 50' - - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56 41 26 20	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 1" - 100 71 31 19	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70 49 32 22
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 200	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 1" - 100 64 41 32 7	volcanics igneous good - fair 50' - - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56 41 26 20 9	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 1" - 100 71 31 19 2	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70 49 32 22 3
Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 200 Plasticity Index	cinders volcanic good 100' plus - - sagebrush cone - - unlimited 50.0 - - 75 I" - 100 64 41 32 7 S.N.P	volcanics igneous good - fair 50' - - sagebrush & grass mountain slope 2' 7 unlimited 28.8 8.1 3" 10 as received 82 56 41 26 20 9 S.N.P.	Qa andesite iqneous qood 300' plus - - pinon & sagebrush mountainous - - unlimited 46.0 5.1 - 99 1" - 100 71 31 19 2 S.N.P.	Oaf sand & gravel various excellent 15' plus - sand & gravel sagebrush & grass flat 1' 6 unlimited 14.8 2.9 3" 25 as received 90 70 49 32 22 3 S.N.P.

QUADRANGLE PAGE 7. (5)

MATERIAL PIT SUMMARY

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Pit Number	0190	0898			
Section	not sectionalized	not sectionalized	NW 1/4 22	SE 17.4L8	
Location Township & Range	Sangre de Cristo Grant	Sangre de Cristo, Grant	ZAN IDE	ZYN ISE	
County	Taos			laos	
Formation	Qg			peq	
Rock Type	san <u>d</u> & gravel	Dasalt & rhyoilite	voicanics	quartzite	
Source Rock (Gravel)	various	-	andesite & latite	, .	
Quality of Material	excellent		good		
Thickness of Material	50° prus	io' pius	46 DIUS	b) prus	
Inickness of Cap (Canche)	-			-	
Material Onderlying Formation	sand & gravel		-	-	
	sagebrush & grass	Juniper & prion	pinon & juniper	pine	
Local Terrain Thickness of Overburden	TIAT		mountathous		
P. L. (Overburden)	-	S N D	-		
Fatimated Quantity (cu. yds)	-	400 0001 pluc	unlimited	unlimited	
Los Angeles Wear		400,000 prus			
Los Angeles wear	24.0 6 7		5 5	16	
Average Maximum Size		1.0		4.V	
We have a set of the s	25	•••	-	_	
Cruchad to:	20 page received		·	-	
2"		· _	-	I _	
Pit 1"	ری 73	-	100	-	
	ر ر 50	46		100	
Werage 72	59	46	40	49	
% rassing No. 4	41	41 13		12	
No. 200	32	7	7		
Plasticity Index					
Pamarka:	3.N.F.				
					• • •
Pit Number	0901	0902	0903	0911	
Section	not sectionalized	E 1/2 27	SW 1/4 28	32	
Location Township & Range	Carson National Forest	28N 10E	28N 9E	29N 13E	
County	Taos	Taos	Rio Arriba	Taos	
Formation	peq	ОТР	Tlp	Qal	
Rock Type	granite	basalt	qravel	sand & gravel	
Source Rock (Gravel)	-	-	igneous	various	
Quality of Material	boop	good	boop	good	
Thickness of Material	105' plus	25' plus	6' plus	12' plus	
Thickness of Cap (Caliche)	-	_			
Material Underlying Formation	-	SIIT	SIIT	gravel	
Vegetation	pine	grass & sage	pine	WILLOWS	1
Local Terrain	mountainous	hilly	mountainous	fioodplain	1.0.1
Thickness of Overburden	-	-		-	
P. I. (Overburden)	-	275 000 -100	3.N.F.	-	
Estimated Quantity (cu. yds.)	unlimited	275,000 plus	20 5		
Los Angeles Wear	18.4	22.2 2.9	29.0	21.2	·
Soundness Loss	10.9	2.0	U.7 1 Z!!	-	
Average Maximum Size	-	-	15	0	-
% Retained on 2" Sieve	-		40 1 ¹¹	as received	_1
Crushed to:	L''	'	'		
2"	-	-		-	
Pit 1"		54	57		
Average ¹ /2 ¹	20	25	25	100	
% rassing No. 4	20	15	4	32	
No. 10	2	3	2	6	
No. 200 Plasticity Index		N.P.	N.P.	N.P.	
Remarks	19.01 •			···· ·	

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Pit Number	0912		,		
Section	30		т	· · · · · · · · · · · · · · · · · · ·	
Location Township & Range	29N 13E				
County	Taos				
Formation	QTg				
Rock Type	sand & gravel			-	
Source Rock (Gravel)	various			• • •	
Quality of Material	poor			u	
Thickness of Material	15' plus				
Thickness of Cap (Caliche)	-		, 		
Material Underlying Formation	gravel		· · · · ·		
Vegetation	sage & juniper				
Local Terrain	rolling hills			1	
Thickness of Overburden	4'			н. — — — — — — — — — — — — — — — — — — —	
P. I. (Overburden)	12-17	(manage-production)			
Estimated Quantity (cu. yds)	unlimited				
Los Angeles Wear	20.0				
Soundness Loss	-		1		
Average Maximum Size	4''				
% Retained on 2" Sieve	35		· · · ·		
Crushed to:	3/4"				
2"	-				
Pit 1"	100				
Average ¹ /2"	76				
% Passing No. 4	44				i
No. 10	26				-
No. 200	4				
Plasticity Index	7				
Remarks:					
-					
Pit Number		At			
Pit Number Section					
Pit Number Section Location Township & Range					
Pit Number Section Location Township & Range County					
Pit Number Section Location Township & Range County Formation		1			
Pit Number Section Location Formation Rock Type		1			
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	• · · · ·				
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material					, , ,, ,,
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material					,
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Cap (Caliche)		1			· · · · ·
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation		I	- -		, , , , , , , , , , , , , , , , , , ,
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Vegetation		1	-		, , , , , , , , , , , , , , , , , , , ,
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain					• • • • • • •
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden					· · · · · · · · · · · · · · · · · · ·
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)					-
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.)					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear			-		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size					· · · · · · · · · · · · · · · · · · ·
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve		· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to:					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" 2"					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1"					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½"					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 10					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average % Passing No. 4 No. 10 No. 200					
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½" % Passing No. 4 No. 10 No. 200 Plasticity Index Index					
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SievePit1"Average½"% PassingNo. 4No. 10No. 200Plasticity IndexRemarks:					
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SievePit1"Average½"% PassingNo. 4No. 10No. 200Plasticity IndexRemarks:					

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DATE OF INVENTORY GEOLOGY FEB. 1975 AGGREGATE RESOURCES FEB. 1975 Longlinds When two Cosmics Sould party or 1 Inch - 3 Miles in the state second DATE OF INVENTORY TAOS COUNTY 1965 COLFAX COUNTY 2964 EAGLE NEST QUADRANGLE 8

QUAD No. 13

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MATERIAL PIT SUMMARY

Pit Numbe	er '	5847	6912	0822	0823
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
	County	San Juan	San Juan	San Juan	San Juan
Formation Rock Type Source Rock (Gravel)		Qp	Qp	Qls	Qop
Rock Type Source Rock (Gravel) Quality of Material		gravel	gravel	metabasalt	gravel
Rock Type Source Rock (Gravel) Quality of Material Thickness of Material		sandstone & various	sandstone	-	volcanic
Quality of Material		fair	poor	good	fair
Thickness	of Material	8'	9'	4' plus	5'
Thickness	of Cap (Caliche)		-	_	-
Material U	nderlying Formation	sandstone	siltstone & shale	sandstone & silt	sandstone
Vegetation	1	qrass	grass	juniper	grass
Local Terr	ain	hilly	hilly	mountainous	hilly
Thickness	of Overburden	0-3'	1-3'	0-3'	'
P. I. (Overl	burden)	S.N.P.	7-N.P.	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	100,000	6,000	unlimited	200,000
Los Angele	es Wear	48.7	49.6	15.8	14.2
Soundness	Loss	2.	21.6	1.9	1.7
Average M	aximum Size	7"	7"	3'	4"
% Retained	1 on 2" Sieve	28	24	80	19
	Crushed to:	as received	as received	<u> ''</u>	as received
	2"	72	68		87
Pit	1"	58	<u> </u>	100	67
Average	1/2"	46	42	48	52
% Passing	No. 4	32	32	19	42
1	No. 10	26	27	11	38
	No. 200	5	4	2	7
Plasticity I	ndex	<u>N.P.</u>	N.P.	<u>N.P.</u>	N.P.
Remarks:					
L		·····			
Pit Numbe	er l	0824	0825	0826	0827
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
t	County	San Juan	San Juan	San Juan	San Juan
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·	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
	County	San Juan	San Juan	San Juan	San Juan
Formation	1	Kg	Kpi	Kmf	Kf
Rock Type		sandstone	sandstone	sandstone	baked shale
Source Ro	ock (Gravel)	-		_	-
Quality of	Material	poor	poor	good	good
Thickness	of Material	30'	8'	four 3' beds	12'
Thickness	of Cap (Caliche)	-	_		_
Material U	Inderlying Formation	shale	shale	shale	sandstone
Vegetation	1	grass	grass	grass	grass
Local Terr	ain	hilly	hilly	hilly	hilly
Thickness	of Overburden	0-2'	_	-	-
P. I. (Over	burden)	S.N.P.	-	-	
Estimated	Quantity (cu. yds.)	100,000 plus	10,000	50,000 plus	150,000
Los Angel	es Wear	99.6	88.1	15.8	24.8
Soundness	Loss	-	-	1.0	1.8
Average M	aximum Size	-	_	-	-
% Retaine	d on 2" Sieve	-	_	-	
	Crushed to:	**	[¹¹	10	11
i	2"	_		_	
Pit	1"	100	100	100	100
Average	1/2"	79	68	48	57
% Passing	No. 4	55	42	28	24
L	No. 10	49	36	10	15
	No. 200	6	5	2	4
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.

Remarks:

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MATERIAL PIT SUMMARY

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Pit Numbe	er I	0828	0829	0830	0831
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian R e s.	Navajo Indian Res.
	County	San Juan	San Juan	San Juan	San Juan
Formation		Q+	Ti	Kmf	Крс
Rock Type	e	sand & gravel	minette & tuff breccia	quartzitic sandstone	sandstone
Source Ro	ck (Gravel)	various	_	-	_
Quality of	Material	boop	boop	good	poor
Thickness	of Material	5' plus	200' plus	3'	15'
Thickness	of Cap (Caliche)		_	-	-
Material U	nderlying Formation	sandstone & shale	-	sandstone	silt & shale
Vegetation	1	grass	grass	grass	grass
Local Terr	ain	rolling	mountain	hilly	hilly
Thickness	of Overburden	!		[*	0-3'
P. I. (Overl	burden)	S.N.P.	_	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	125,000 plus	500,000 plus	25,000 plus	100,000
Los Angele	es Wear	39.0	33.0	26.0	94.1
Soundness	Loss	14.8	11.6	27.6	-
Average M	aximum Size	3"	-	-	_
% Retained	1 on 2" Sieve	16			-
	Crushed to:	as received	"	11	11
	2"	93		_	-
Pit	1"	83	100	100	100
Average	1/2"	70	58	55	69
% Passing	No. 4	49	25	22	34
	No. 10	38	15	3	28
	No. 200	8	3	2	3
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.
Daniel					

Remarks:

Pit Numbe	er	0832	0833	0834	0835
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
	County	San Juan	San Juan	San Juan	San Juan
Formation		Kd	Qp	TRC	Qal
Rock Typ	e	sandstone	sand & gravel	sandstone	sand & gravel
Source Ro	ock (Gravel)	_	sandstone	_	sandstone & various
Quality of	Material	poor	poor	fair	poor
Thickness	of Material	10'	10'	30' plus	8'
Thickness	of Cap (Caliche)			-	_
Material U	Inderlying Formation	shale & sandstone	sandstone & shale	shale	coal & sandstone
Vegetation	n	juniper	grass	juniper	grass
Local Terr	rain	mountainous	hilly	mountainous	hilly
Thickness	of Overburden	-	1	0-5'	0-3'
P. I. (Over	burden)	-	S.N.P.	-	S.N.P.
Estimated	Quantity (cu. yds.)	15,000	150.000	35,000 plus	100,000
Los Angel	es Wear	57.2	50.8	50.7	49.4
Soundness	s Loss	_	53.6	36.6	43.4
Average M	aximum Size		10"	_	3"
% Retaine	d on 2" Sieve		36	_	28
,	Crushed to:	"	as received	*1	as received
	2"		84	_	73
Pit	1"	100	50	100	61
Average	1/2"	53	38	53	53
% Passing	No. 4	23	34	21	40
	No. 10	16	33	3	30
	No. 200	2		2	4
Plasticity I	Index	N.P.	N.P.	N.P.	N.P.

Remarks:

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QUADRANGLE PAGE 13 (3)

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Pit Number	0836	0837	0838	0839
Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location Township & Range	Navaio Indian Res.	Navajo Indian Res.	Navajo Indian Res.	Navajo Indian Res.
County	San Juan	San Juan	San Juan	San Juan
Formation	БС	ТЬ	Тс	QP
Rock Type	sandstone	basalt	sandstone	gravel
Source Rock (Gravel)		_	_	sandstone
Quality of Material	. –	fair	noor	fair
Quality of Material			501 plus	81
Thickness of Material	- 4'	Ju prus	- pros	0-3'
Thickness of Cap (Caliche)		-	_	silt & sandstone
Material Underlying Formation	silt	-		
Vegetation	qrass	pine	prne	
Local Terrain	rolling	mountainous	mountatious	$\bigcirc 2!$
Thickness of Overburden	2	2	-	
P. I. (Overburden)	9	S.N.P.	-	5.N.F.
Estimated Quantity (cu. yds)	150,000 plus	500 , 000	500,000 plus	50,000
Los Angeles Wear	21.2	48.3	93.1	48.4
Soundness Loss	50.4	53.1	-	14.6
Average Maximum Size	-	-	-	5"
% Retained on 2" Sieve	_	-	-	22
Crushed to:	111	1 11	!!	as received
2"	- ·	_	-	73
Pit 1"	100	100	100	54
Average 1/2"	58	63	23	42
% Passing No 4	24	28	12	30
No. 10	24	16	9	26
No. 200		3		5
Disstisity Index			N P.	N.P.
Plasticity Index	N.F.	IN • I •	1 X • 1 •	
Pit Number	0840	0841		
Pit Number Section	0840 not sectionalized	0841 not sectionalized		
Pit Number Section Location Township & Range	0840 not sectionalized Navajo Indian Res.	0841 not sectionalized Navajo Indian Res.		
Pit Number Section Location Township & Range County	0840 not sectionalized Navajo Indian Res. San Juan	0841 not sectionalized Navajo Indian Res. San Juan		
Pit Number Section Location Township & Range County Formation	0840 not sectionalized Navajo Indian Res. San Juan Qe	0841 not sectionalized Navajo Indian Res. San Juan Kch		
Pit Number Section Location Formation Rock Type	0840 not sectionalized Navajo Indian Res. San Juan Qe sand	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone		
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	0840 not sectionalized Navajo Indian Res. San Juan Qe sand	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone		
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor	••••••••••••••••••••••••••••••••••••••	
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus		
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche)	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus -	• • • • • • • • • • • • • • • • • • •	
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Versetation Versetation	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone arass	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass		
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Local Terrain	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly		
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Our burden	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-21	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3'		
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden R L (Overburden)	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S N P	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S N.P.		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P.	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400 000 plus		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Kenter State	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Output	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 -		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Sieve	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 -		
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Crushed to:	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - - as received	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 -		
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Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SieveCrushed to: 2''Pit1''	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - - as received - No. 10 100	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - I''		
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"Pit1" AverageY2"Y2"	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - as received - No. 10 100 No. 40 90	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - 100 61		
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SievePit1"Average½"% PassingNo. 4	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - as received - No. 10 100 No. 40 90 No. 80 56	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - 1" - 100 61 31		
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SieveCrushed to: 2''Pit1'' Average% PassingNo. 4 No. 10	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - as received - No. 10 100 No. 40 90 No. 80 56 No. 100 44	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - - 100 61 31 24		
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. 1. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"Pit1" Average% PassingNo. 4 No. 10 No. 200	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - as received - No. 10 100 No. 40 90 No. 80 56 No. 100 44 No. 200 15	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - - 1" - 100 61 31 24 6		
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"2"Pit1" Average% PassingNo. 4 No. 10 No. 200Plasticity IndexNo. 10	0840 not sectionalized Navajo Indian Res. San Juan Qe sand - fair 6' plus - silt & sandstone grass rolling 0-2' S.N.P. 100,000 plus - 9.0 - - as received - No. 10 100 No. 40 90 No. 80 56 No. 100 44 No. 200 15 N.P.	0841 not sectionalized Navajo Indian Res. San Juan Kch sandstone - poor 50' plus - shale grass hilly 0-3' S.N.P. 400,000 plus 94.0 - - - 100 61 31 24 6 N.P.		

QUAD No.14





MATERIAL PIT SUMMARY

Pit Numbe	r	6110	6111	0787	0788
	Section	not sectionalized	NW1/4 26	NW1/4 17	SE1/4 32
Location	Township & Range	Navajo Indian Res.	22N 13W	26N 12W	26N 12W
	County	San Juan	San Juan	San Juan	San Juan
Formation		Kmf	Q†	ТКоа	Qal
Rock Type	;	baked sandstone & shale	e sand & gravel	sandstone & conglomera	tesand
Source Ro	ck (Gravel)	-	various	-	sand & conglomerate
Quality of	Material	fair	good	fair	good
Thickness	of Material	8' plus	10'plus	15' plus	4' plus
Thickness	of Cap (Caliche)		-	-	_
Material U	nderlying Formation	sandstone	sandstone	shale	sandstone
Vegetation		grass	grass	scrub brush	some grass
Local Terr	ain	hilly	hilly	flat to hilly	flat to hilly
Thickness	of Overburden	-4	1-4'	-	_
P. I. (Overt	ourden)	10-N.P.	5-N.P.		_
Estimated	Quantity (cu. yds)	150,000	60,000	50,000 plus	25,000 plus
Los Angele	es Wear	40.0	34.0	-	-
Soundness	Loss	6.0	10.9	-	-
Average M	aximum Size	-	3"	3" (conglomerate)	"
% Retained	l on 2" Sieve		3	1	1
	Crushed to:	2"	as received	1/2"	as received
	2"	100	100	-	_
Pit	1"	57	95	-	-
Average	1/2"	27	82	100	
% Passing	No. 4	13	67	46	_
	No. 10	8	49	92	100
	No. 200	2	6	16	5
Plasticity I	ndex	N.P.	N.P.	S.N.P.	S.N.P.

Remarks:

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Pit Numbe	r	0789	0790	0791	0792
	Section	NWI/4 9	NWI/4 17	NWI/4 18	E 1/2 31
Location	Township & Range	24N I 3W	26N 12W	22N 12W	22N 12W
	County	San Juan	San Juan	San Juan	San Juan
Formation		Qe	Qal	Kch	Kmf
Rock Type	e	blow sand	sand	sandstone	baked shale
Source Ro	ck (Gravel)	sandstone	sandstone	-	_
Quality of	Material	good	-	fair	good
Thickness	of Material	5' plus	6' plus	25' plus	6'
Thickness	of Cap (Caliche)	_	_	-	-
Material U	nderlying Formation	shale	sandstone	shale	shale
Vegetation	l	grass & scrub brush	grass	grass	qrass
Local Terr	ain	slightly hilly	flat to hilly	hilly	hills & cliffs
Thickness	of Overburden	0-2"	-		5-13'
P. I. (Over	burden)	S.N.P.			S.N.P.
Estimated	Quantity (cu. yds.)	50,000 plus	100,000 plus	unlimited	25,000 plus
Los Angele	es Wear	-	-	95.9_	sh=28.7 ss=98.5
Soundness	Loss	-	-		sh=11.5
Average M	aximum Size	1/10"	1/10"	_	-
% Retained	1 on 2" Sieve	-	-	_	-
	Crushed to:	as received	as received	"	11
	2"		_	100	-
Pit	1"	-	-	90	100
Average	1/2"	-	-	62	68
% Passing	No. 4		-	39	31
	No. 10	100	100	33	17
	No. 200		5	6	3
Plasticity I	ndex	S.N.P.	S.N.P.	S.N.P.	sh=S.N.P.

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Remarks:

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Pit Number	0793	0796	0 I I	и. и и и и и и и и и и и и и и и и и и	1
Section	SWI/4 29	not sectionalized		1 I II II II I	
Location Township & Range	24N 13W	Navajo Indian Res.	1 - 1		1
County	San Juan	San Juan			
Formation	Kkf	Kmf			ł
Rock Type	limy sandstone	limy sandstone		-	
Source Rock (Gravel)	-	-			۲. ۲
Quality of Material	very qood	very good			
Thickness of Material	6'	1-3'			ľ
Thickness of Cap (Caliche)	-	-			
Material Underlying Formation	sandstone & shale	shale to sandy shale		11 C	
Vegetation	qrass	grass			
Local Terrain	hilly	hilly			
Thickness of Overburden	0-21	0-10'			
P. I. (Overburden)	S.N.P.	S.N.P.			
Estimated Quantity (cu. yds)	1,0 <u>0</u> 0 plu <u>s</u>	75,000 plus			
Los Angeles Wear	24.4	28.1			
Soundness Loss	7.5	21.6			
Average Maximum Size	-	semi-massive			
% Retained on 2" Sieve	-	-			
Crushed to:	1"	1"			
2"	-	-			
Pit 1"	100	100			
Average ¹ /2"	45	52			
% Passing No. 4	20	21			
No. 10	12	12			
No. 200	5	3			-
Plasticity Index	S.N.P.	S.N.P.			
Remarks:					

Pit Numb	er
	Section
Location	Township & Range
	County
Formatio	n
Pock Typ	
Course De	a ala (Canaval)
Source K	OCK (Graver)
Quality of	i Material
Thickness	s of Material
Thickness	s of Cap (Caliche)
Material U	Underlying Formation
Vegetatio	n
Local Ter	rain
Thickness	s of Overburden
	rburden)
Fetimatad	1 Quantity (cu. vds.)
Louinated	Le Ween
Los Ange	les wear
Soundnes	ss Loss
Average M	Aaximum Size
% Retaine	ed on 2" Sieve
	Crushed to:
	2"
Pit	1"
Average	1/2"
% Passing	No. 4
, .	No. 10
	No. 200
D1	Ind. 200
Plasticity	Index
Remarks:	





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			<u> </u>	6122	6222
Pit Number	r	5972		not sectionalized	not sectionalized
	Section	not sectionalized	not sectionalized	licarilla Anacha Res	Jicarilla Apache Res.
Location	Township & Range	Jicarilla Apache Res.	Jicarilla Apache Res.	Dia Applia	Rio Arriba
F	County	Rio Arriba	Rio Arriba		Tsi
Formation		Tsj	Isj		sand
Rock Type	3	sand	sand	sanu	
Source Roo	ck (Gravel)		•••		
Quality of	Material	good	fair	<u>tair</u>	<u> </u>
Thickness	of Material	5' plus	9' plus	6' plus	2.
Thickness	of Cap (Caliche)				<u> </u>
Matarial II.	inderlying Formation	sandstone	sandstone	silt	sandstone
Waterial U		scattered ninon	juniper & sade	saqe	juniper & sage
vegetation		httly	hillv	rolling	<u>hilly</u>
Local Terr	of Overhunder	<u> </u>	4'	0-3'	<u> </u>
I nickness	burden)		9	S.N.P.	S.N.P.
P. I. (Over)	ourden)	3.N.F.	200.000	155.000 nlus	100,000 plus
Estimated	Quantity (cu. yds)	100,000 plus	200,000	-	
Los Angele	es Wear			S F • 43	S.E.: 39
Soundness	s Loss	S. E.: 61			-
Average M	laximum Size				
% Retaine	d on 2" Sieve				as received
	Crushed to:	as received	as received	as received	
	2"				
Pit	1"	no.4: 94	-	-	- 10
Average	1/2"	no.10: 82		no.10: 100	<u>no.10: 100</u>
% Passing	No. 4	no.40: 36		<u>no.40: 92</u>	no.40: 98
, wooning	No. 10	no 80 · 16	100	no.80: 54	<u>no.80: 73</u>
	No. 200	no 200 · 07	22	no.200: 27	no.200: 34
D1-	Index	C N D	N.P.	N.P.	N.P.
			0874	0875	0876
Pit Numb	ber	6503	0874	0875 SW 1/4 26	0876 NE 1/4 31
Pit Numb	ber Section	6503 not sectionalized	0874 not sectionalized	0875 SW 1/4 26 23N 5W	0876 NE 1/4 31 21N 5W
Pit Numb	ber Section Township & Range	6503 not sectionalized Jicarilla Apache Res.	0874 not sectionalized Jicarilla Apache Res.	0875 SW 1/4 26 23N 5W Sandoval	0876 NE 1/4 31 21N 5W Sandoval
Pit Numb	ber Section Township & Range County	6503 not sectionalized Jicarilla Apache Res. Rio Arriba	0874 not sectionalized Jicarilla Apache Res. Rio Arriba	0875 SW 1/4 26 23N 5W Sandoval	0876 NE 1/4 31 21N 5W Sandoval Qp
Pit Numb Location Formatic	ber Section 1 Township & Range County 0n	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti	0875 SW 1/4 26 23N 5W Sandoval Op	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel
Pit Numb Location Formatic Rock Ty	ber Section Township & Range County on /pe	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre	0875 SW 1/4 26 23N 5W Sandoval Op gravel	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel
Pit Numb Location Formatic Rock Ty Source R	ber Section Township & Range County on /pe Rock (Gravel)	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair
Pit Numb Location Formatic Rock Ty Source R Quality of	ber Section 1 Township & Range County on /pe Rock (Gravel) of Material	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes	ber Section 1 Township & Range County on /pe Rock (Gravel) of Material ss of Material	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good 35' plus	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5'	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5'
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness	ber Section 1 Township & Range County on /pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche)	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus -	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5'	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' -
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material	ber Section Township & Range County on /pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good 35' plus - sandstone	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati	ber Section Township & Range County on /pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good 35' plus - sandstone pine	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetatic Local Te	ber Section Township & Range County on /pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Material Vegetati Local Te Thicknes	ber Section Township & Range County on /pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain erss of Overburden	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1'	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous -	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2'	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2'
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Material Vegetati Local Te Thickness P L (Ov	ber Section 1 Township & Range County on (pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain ers of Overburden verburden)	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P.	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous -	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P.	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P.
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Material Vegetatic Local Te Thicknes P. I. (Ov	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain erss of Overburden verburden) ed Quantity (cu. vds)	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good 35' plus - sandstone pine mountainous - loo,000 plus	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Material Vegetatic Local Te Thicknes P. I. (Ov Estimate	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain ers of Overburden verburden) ed Quantity (cu. yds.) geles Wear	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous - - 100,000 plus 34.3	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati Local Te Thicknes P. I. (Ov Estimate Los Ang	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain :ss of Overburden verburden) ed Quantity (cu. yds.) geles Wear ess Loss	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous - - 100,000 plus 34.3 40.0	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati Local Te Thicknes P. I. (Ov Estimate Los Ang Soundne	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain erss of Overburden /erburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous - - l00,000 plus 34.3 40.0	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3"	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2''
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetati Local Te Thickness P. I. (Ov Estimate Los Ang Soundne Average	ber Section Township & Range County on 'pe Cock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain ers of Overburden rerburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ined on 2" Siave	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous - l00,000 plus 34.3 40.0	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetatii Local Te Thickness P. I. (Ov Estimate Los Ang Soundnes Average % Retain	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain 'ss of Overburden /erburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ined on 2" Sieve	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous 100,000 plus 34.3 40.0 	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetatic Local Te Thicknes P. I. (Ov Estimate Los Ang Soundnes Average % Retain	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain ers of Overburden verburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ined on 2" Sieve Crushed to: 2"	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous 100,000 plus 34.3 40.0 	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received -
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Material Vegetatii Local Te Thicknes P. I. (Ov Estimate Los Ang Soundne Average % Retain	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain :ss of Overburden rerburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ined on 2'' Sieve Crushed to: 2''	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous 100,000 plus 34.3 40.0 - 100	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100 84	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received -
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Material Vegetatic Local Te Thicknes P. I. (Ov Estimate Los Ang Soundne Average % Retain	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain rers of Overburden /erburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ined on 2'' Sieve Crushed to: 2'' 1''	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous - - 100,000 plus 34.3 40.0 - - 100 59	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100 84 40	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received - no.10: 100
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati Local Te Thicknes P. I. (Ov Estimate Los Ang Soundnes Average % Retain	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain 'ss of Overburden 'erburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ned on 2" Sieve Crushed to: 2" 1" e 1/2"	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received -	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - qood 35' plus - sandstone pine mountainous - - - 100,000 plus 34.3 40.0 - - 100 59 22	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3'' 8 as received 100 84 40 25	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2" 2 as received - no.10: 100 no.40: 88
Pit Numb Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati Local Te Thicknes P. I. (Ov Estimate Los Ang Soundne Average % Retain Pit Average % Passin	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain :ss of Overburden /erburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ned on 2" Sieve Crushed to: 2" 1" e ½" ng No. 4	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - - as received - - 100	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre - good 35' plus - sandstone pine mountainous - - l00,000 plus 34.3 40.0 - l00 59 22 11	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3'' 8 as received 100 84 40 25 21	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2" 2 as received - no.10: 100 no.40: 88 no.80: 40
Pit Numt Location Formatic Rock Ty Source R Quality of Thicknes Thicknes Material Vegetati Local Te Thicknes P. I. (Ov Estimate Los Ang Soundne Average % Retain Pit Average % Passin	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain erss of Overburden rerburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ned on 2" Sieve Crushed to: 2" 1" 2 ½" ng No. 4 No. 10	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received - - 100 6	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous - - l00,000 plus 34.3 40.0 - - l00 59 22 11 2	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100 84 40 25 21 7	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetatii Local Te Thickness P. I. (Ov Estimate Los Ang Soundne Average % Retain Pit Average % Passir	ber Section Township & Range County on Pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain ess of Overburden rerburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ned on 2" Sieve Crushed to: 2" 1" e ½" ng No. 4 No. 10 No. 200	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received - - 100 6	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre 	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100 84 40 25 21 7 N.P.	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received - no.10: 100 no.40: 88 no.80: 40 no.200: 17 N.P.
Pit Numb Location Formatic Rock Ty Source R Quality of Thickness Thickness Material Vegetati Local Te Thickness P. I. (Ov Estimate Los Ang Soundne Average % Retain Pit Average % Passin	ber Section Township & Range County on 'pe Rock (Gravel) of Material ss of Material ss of Cap (Caliche) Underlying Formation ion errain :ss of Overburden verburden) ed Quantity (cu. yds.) geles Wear ess Loss Maximum Size ned on 2'' Sieve Crushed to: 2'' 1'' e ½'' ng No. 4 No. 10 No. 200 ty Index	6503 not sectionalized Jicarilla Apache Res. Rio Arriba Tsj sand - fair 12' plus - sandstone pinon & juniper mountainous 1' S.N.P. 300,000 plus - - as received - - 100 6 N.P.	0874 not sectionalized Jicarilla Apache Res. Rio Arriba Ti lamprophyre qood 35' plus sandstone pine mountainous l00,000 plus 34.3 40.0 l00 59 22 l11 2 N.P.	0875 SW 1/4 26 23N 5W Sandoval Op gravel sandstone & igneous poor 5' - sandstone grass hilly 0-2' S.N.P. 1,000 plus 47.6 40.0 3" 8 as received 100 84 40 25 21 7 N.P.	0876 NE 1/4 31 21N 5W Sandoval Op sand & minor gravel - fair 1-5' - sandstone sage hilly 0-2' S.N.P. 250,000 plus - S.E.: 54 2'' 2 as received - no.10: 100 no.40: 88 no.80: 40 no.200: 17 N.P.

QUAD No. 17

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MATERIAL PIT SUMMARY

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Die Mumba	. .		F07/	5875	5887
Pit Numbe	E Section	5845 GW 1 (4 F	58/4	SO/S	
•	Section	SW 1/4 5	5 1/2 18	5E 1/4 52	NW 1/4 33
Location	Township & Kange	21N IW			
F (1)	County	Sandoval	Sandoval	Sandoval	Sandoval
Formation	l	Qop	Qal	Q op	Qop
	e .	sand & gravel	gravel	gravel	gravel
Source Ro	ck (Gravel)	igneous & various	various	various	various
Quality of	Material	good	good	good	good
Thickness	of Material		/' plus	10	11'
Thickness	of Cap (Calicne)				-
Material U	nderlying Formation	sandstone & clay	sandstone & clay	silt & clay	silt G clay
Vegetation	1 ·	grass	pine	sage & pine	sage & pine
Local Terr	ain	hilly	hilly	hilly	hilly
Thickness	of Overburden	2-5'	2-5'	2-6'	2-8'
P. I. (Over	burden)	<u>S.N.P.</u>	<u>S.N.P.</u>	10	
Estimated	Quantity (cu. yds)	9,000	25,000	10,000	8,000
Los Angel	es wear	21.4	25.4	23.2	23.8
Soundness	Loss	4.7	15.9	8.0	14.1
Average M	aximum Size	5''	6''	4"	4''
% Retaine	d on 2" Sieve	5	17	13	15
	Crushed to:	as received	as received	as received	as received
	2"	100	77	80	
Pit	1"	76	65	65	62
Average	1/2	53	54	48	47
% Passing	No. 4	37	41	31	32
	No. 10	26	34	22	23
	No. 200	10	12	4	6
Plasticity	Index	N.P.	N.P.	N.P.	N.P.
Remarks:	5845 · nit 55	540 nearby			
	0010. pro 00				
		ī			
Pit Numh	ar	I 6173	6631	6633	6634
Pit Numb	er Section	6133 SW 1/4 30	6631 SE 1/4 30	6633 S 1/2 22 & N 1/2 27	6634 S 1/2 5
Pit Number	er Section Townshin & Bange	6133 SW 1/4 30	6631 SE 1/4 30	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E	6634 <u>S 1/2 5</u> 21N 1W
Pit Number	er Section Township & Range	6133 SW 1/4 30 21N 1W Sandoval	6631 SE 1/4 30 21N 1W	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Dio Arriba	6634 <u>S 1/2 5</u> 21N 1W Sandoval
Pit Number Location	er Section Township & Range County	6133 <u>SW 1/4 30</u> 21N 1W Sandoval	6631 <u>SE 1/4 30</u> 21N 1W Sandoval	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba	6634 <u>S 1/2 5</u> 21N 1W Sandoval Oop
Pit Number Location Formation	er Section Township & Range County	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal	6631 <u>SE 1/4 30</u> 21N 1W Sandova1 Qa1	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel
Pit Number Location Formation Rock Typ	er Section Township & Range County n e	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qal gravel	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & gravel candatono & quantaito	6634 S 1/2 5 21N 1W Sandoval Qop gravel various
Pit Number Location Formation Rock Typ Source Ro	er Section Township & Range County n e pock (Gravel)	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qal gravel various	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & gravel sandstone & quartzite poor	6634 S 1/2 5 21N 1W Sandoval Qop gravel various good
Pit Number Location Formation Rock Typ Source Ro Quality of Thiskness	er Section Township & Range County ne bock (Gravel) Material	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2 61	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20'	6634 S 1/2 5 21N 1W Sandoval Qop gravel various good 9'
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness	er Section Township & Range County n e bock (Gravel) f Material of Material of Can (Caliche)	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8'	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6'	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & gravel sandstone & quartzite poor 20'	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9'
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Inderlying Formation	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' -	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6'	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' -	6634 S 1/2 5 21N 1W Sandoval Qop gravel various good 9' -
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6' - silty clay	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & gravel sandstone & quartzite poor 20' - sandstone grass & juniper	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage billy	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage billy	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & gravel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr	er Section Township & Range County ne ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2'	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0.2'	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6'	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5'
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. L. (Our	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S N D	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0-2'	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S N P	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over	er Section Township & Range County n e bck (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden)	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 70,000	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0-2' 8	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100 000	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation n rain of Overburden tourden) Quantity (cu. yds.)	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 20.6	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29 7	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57 2	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel	er Section Township & Range County n e bock (Gravel) f Material of Cap (Caliche) Juderlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6	6631 SE 1/4 30 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20 4	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5 1
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness	er Section Township & Range County ne ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden cburden) Quantity (cu. yds.) es Wear s Loss	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4''	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6''	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5''
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden tourden) Quantity (cu. yds.) es Wear s Loss [aximum Size] d on 2 ¹¹ Size	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4''	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 grave1 various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4''	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6''	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop grave1 various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bock (Gravel) f Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss faximum Size d on 2" Sieve	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as maniformed	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4'' 15 as received	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bck (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss Iaximum Size d on 2" Sieve Crushed to: 2"	6133 SW 1/4 30 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4'' 15 as received	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 <u>5''</u> 20 as received 68
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss Iaximum Size d on 2" Sieve Crushed to: 2"	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95	$\begin{array}{r} 6631 \\ \underline{SE 1/4 30} \\ 21N 1W \\ Sandoval \\ Qa1 \\ gravel \\ various \\ good \\ 2-6' \\ - \\ - \\ silty clay \\ sage \\ hilly \\ 0-2' \\ 8 \\ 20,000 plus \\ 29.7 \\ 3.6 \\ 4'' \\ 15 \\ as received \\ 91 \\ 78 \end{array}$	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bock (Gravel) f Material of Cap (Caliche) Juderlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1"	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62	$\begin{array}{r} 6631 \\ \underline{SE 1/4 30} \\ 21N 1W \\ Sandova1 \\ Qa1 \\ grave1 \\ various \\ good \\ 2-6' \\ - \\ silty clay \\ sage \\ hilly \\ 0-2' \\ 8 \\ 20,000 plus \\ 29.7 \\ 3.6 \\ 4'' \\ 15 \\ as received \\ 91 \\ 78 \\ 63 \end{array}$	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58 50
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County ne bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss Maximum Size d on 2" Sieve Crushed to: 2" 1" ½"	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4'' 15 as received 91 78 63 50	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50 42	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 <u>5''</u> 20 as received <u>68</u> <u>58</u> <u>50</u> <u>33</u>
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County ne bock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden of Overburden of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qa1 sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62 50 40	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4'' 15 as received 91 78 63 50 41	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50 42 38	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58 50 33 19
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss faximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62 50 40	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qa1 gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4'' 15 as received 91 78 63 50 41	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50 42 38 14	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58 50 33 19 8
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e bck (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss Iaximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62 50 40 8 N P	$\begin{array}{c} 6631 \\ \underline{SE 1/4 30} \\ 21N 1W \\ Sandoval \\ Qa1 \\ gravel \\ various \\ good \\ 2-6' \\ \hline \\ \hline \\ \hline \\ silty clay \\ sage \\ hilly \\ 0-2' \\ 8 \\ 20,000 plus \\ 29.7 \\ 3.6 \\ 4'' \\ 15 \\ as received \\ \hline 91 \\ \hline 78 \\ 63 \\ \hline 50 \\ \hline 41 \\ 13 \\ 8 \end{array}$	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50 42 38 14 S M P	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58 50 33 19 8 5
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss Iaximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Index	6133 <u>SW 1/4 30</u> 21N 1W Sandoval Qal sand & gravel quartzite & igneous good 2-8' - silty clay sage hilly 0-2' S.N.P. 30,000 29.6 6.0 4'' 15 as received 95 77 62 50 40 8 N.P.	6631 <u>SE 1/4 30</u> 21N 1W Sandoval Qal gravel various good 2-6' - silty clay sage hilly 0-2' 8 20,000 plus 29.7 3.6 4" 15 as received 91 78 63 50 41 13 8	6633 <u>S 1/2 22 & N 1/2 27</u> 25N 4E Rio Arriba Qal sand & grayel sandstone & quartzite poor 20' - sandstone grass & juniper mountainous 0-6' S.N.P. 100,000 57.2 20.4 6'' 33 as received 85 62 50 42 38 14 S.N.P.	6634 <u>S 1/2 5</u> 21N 1W Sandoval Qop gravel various good 9' - clay pine mountainous 5' 11 15,000 32.8 5.1 5'' 20 as received 68 58 50 33 19 8 5

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MATERIAL PIT SUMMARY

		0007	<u>0004</u>	0885	<u> </u>
Pit Number	6642	0883	0884		
Section	SW 1/4 18	SE 1/4 27	SW 1/4 6	NW 1/4 20	
Location Township & Rang	24N 4E	26N 1W	25N 4E	2,5N_4E	
County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba	
Formation		Tei	Kmg 1	Otp	
			limestone	gravel	
Rock Type	sand & gravel	Sand	Timescone	yorious	
Source Rock (Gravel)	various		-		-
Quality of Material	excellent	poor	fair	Tair	
Thickness of Material	9'	2-4'	3' plus	21	
Thickness of Cap (Caliche)	T -	-	-	-	
Material Underlying Formation	shale	silt & shale	sandstone & shale	shale & sandstone	
Vegetation	juniner & grass	nine	nine	pine	
Local Terrain	mountainous	canvon floor	mountainous	mountainous	
Thislesses of Ouerburden			11	0-21	1
Thickness of Overburden	$+$ $\frac{4}{10}$			SND	1
P. I. (Overburden)		S.N.P.	"S.N.P.	5.000	
Estimated Quantity (cu. yds)	↓ 25 , 000	50,000 plus	50,000 plus	5,000	
Los Angeles Wear	21.2	S.E.: 71	22.6	40.2	
Soundness Loss	7.9	-	5.7	1.2	
Average Maximum Size	T 8''	_	-	4''	
% Retained on 2" Sieve	[†] 40	-		29	
Crushed to	as received	as received	1"	as received	1
		z/gll. 100	.	72	
D:4		5/6. IUU	-	51	
		NO. 4: 96	100	20	
Average ¹ /2"	35	No. 10: 88	59	39	
% Passing No. 4	25	No. 40: 34	21	35	
No. 10	20	No. 80: 13	10	31	
No. 200	1 5	No. 200: 7	2	24	
Plasticity Index	N.P.	N. P.	N. P.	N.P.	
Pomorka	I man				
Dit Number	1 0 8 8 6	0887	0888	0889	
Pit Number	0886	0887 NW 1/4 22	0888 not sectionalized	0889 not sectionalized	-
Pit Number Section	0886 not sectionalized	0887 NW 1/4 22	0888 not sectionalized	0889 not sectionalized Biedra Lumbre Grant	-
Pit Number Section Location Township & Ran	0886 not sectionalized Piedra Lumbre Grant	0887 NW 1/4 22 24N 1E Dia Amarika	0888 not sectionalized Piedra Lumbre Grant	0889 not sectionalized Piedra Lumbre Grant Die Arribe	
Pit Number Section Location Township & Ran County	0886 not sectionalized Piedra Lumbre Grant Rio Arriba	0887 NW 1/4 22 24N 1E Rio Arriba	0888 not sectionalized Piedra Lumbre Grant Rio Arriba	0889 not sectionalized Piedra Lumbre Grant Rio Arriba	-
Pit Number Location Section Location Township & Ran County Formation	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2)	0887 NW 1/4 22 24N 1E Rio Arriba Qal	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5)	
Pit Number Location Section County Formation Rock Type	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel	
Pit Number Location Section County Formation Rock Type Source Rock (Gravel)	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite	
Pit Number Location Section County Formation Rock Type Source Rock (Gravel) Quality of Material	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good	-
Pit Number Location Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10'	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4'	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus	-
Pit Number Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Can (Caliche)	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10'	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4'	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus	-
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus	
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass	
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly	
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Township & Range	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0 21	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1'	
Pit Number Section Location Township & Range County County Formation County Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden Source	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2'	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1'	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2'	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1'	
Pit Number Section Location Township & Range County County Formation County Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden)	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P.	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P.	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P.	
Pit Number Section Location Township & Range County County Formation County Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.)	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus	
Pit Number Section Location Township & Range County County Formation County Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3	
Pit Number Section Location Township & Range County County Formation County Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Soundness Loss	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4	
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6''	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6''	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20"	
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Sieve	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41	
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received	
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2"	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 60	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received 62	
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2"	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received 62 48	
Pit Number Section Location Township & Rang County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69 46	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received -	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 60	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received 62 48 79	
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" Pit 1" Average ½"	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69 46 31	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received - No. 10: 100	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 69 60	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received 62 48 38	
Pit NumberLocationSectionLocationTownship & Rang CountyFormationCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SievePit1''Average½''% PassingNo. 4	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6" 33 as received 69 46 31 21	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received - No. 10: 100 No. 40: 79	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 69 60	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20'' 41 as received 62 48 38 31	
Pit NumberLocationSectionLocationTownship & Rang CountyFormationCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SievePit1"Average½"% PassingNo. 4No. 10No. 10	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69 46 31 21 18	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received - No. 10: 100 No. 40: 79 No. 80: 24	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Op gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 69 60 53	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20'' 41 as received 62 48 38 31 27	
Pit NumberSectionLocationTownship & Rang CountyFormationCountyRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SievePit1''Average½''% PassingNo. 4No. 10No. 200	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69 46 31 21 18 5	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - - No. 10: 100 No. 40: 79 No. 80: 24 No. 200: 9	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 69 60 53 24	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20'' 41 as received 62 48 38 31 27 15	
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2'' Sieve Pit 1'' Average ½'' % Passing No. 4 No. 10 No. 200 Plasticity Index Index	0886 not sectionalized Piedra Lumbre Grant Rio Arriba Ot(2) sand & gravel quartzite & igneous excellent 5' plus - silt & sand juniper hilly 0-2' 8 250,000 plus 32.6 33.8 6'' 33 as received 69 46 31 21 18 5 N.P.	0887 NW 1/4 22 24N 1E Rio Arriba Qal sand - fair 10' - silt sage creek bottom 1' S.N.P. 1,000 plus - S.E.: 64 - as received - No. 10: 100 No. 40: 79 No. 80: 24 No. 200: 9 N.P.	0888 not sectionalized Piedra Lumbre Grant Rio Arriba Qp gravel various fair 1-4' - sandstone grass & juniper mountainous 0-2' S.N.P. 50,000 38.5 16.2 6'' 17 as received 92 77 69 60 53 24 N.P.	0889 not sectionalized Piedra Lumbre Grant Rio Arriba Qt(5) gravel basalt & quartzite good 6' plus - - cactus & grass hilly 0-1' S.N.P. 400,000 plus 30.3 7.4 20" 41 as received 62 48 38 31 27 15 8	

Remarks:

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MATERIAL PIT SUMMARY

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Pit Number		0890	0891	0892	0893
	Section	SE 1/4 26	NW 1/4 35	SW 1/4 14	SE 1/4 28
Location	Township & Range	23N 3E	2.3N 3E	22N 4E	22N 4E
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation	l	0t (3)	(1, 1)	Те	OTh
Rock Typ	e	sand & gravel	gravel	sand & gravel	hasalt
Source Ro	ck (Gravel)	igneous & various	basalt & various	sandstone & various	-
Quality of	Material	read	good	good	good
Thickness	of Material	61		15!	201 plus
Thickness	of Cap (Caliche)		<u>4 pius</u>		prus
Material U	nderlying Formation	condetono	condetono	silt & conditione	dacito
Vegetation	1	amage	iuninon	nino	nino
Local Terr	ain	billy	hilly	mountainous	mountainous
Thickness	of Overburden			mountarnous	mourcarnous
P. I. (Over	burden)	<u>0-2</u>	<u> </u>		
Estimated	Quantity (cu. vds)	12F 000	75 000 mluc	$\frac{-}{150,000,000}$	700 000 mlus
Los Angel	es Wear	77 4	77. ć	20 <i>t</i>	<u>300,000 prus</u>
Soundness	Loss	1/ 0		7 /	23.0
Average M	aximum Size	<u>14.8</u>		/.4	0.8
% Retained	d on 2" Sieve	27	71	7	
,	Crushed to:	<u>4/</u>		ac magained	
	2"				1
Pit	1"	/3			-
Average	1/2"	<u> </u>	<u> </u>		
% Passing	No. 4	52		05	27
70 I 4331115	No. 10	41	43		23
	No. 200	33	36		
Disstinity	No. 200		<u> </u>		<u>5</u>
Plasticity I	Index	N.P	<u>N.P.</u>	N.P.	N.P.
		-			
Pit Numbe	21	0894	0895	0896	0897
Pit Numbe	er Section	0894 NE 1/4 32	0895 SW 1/4 5	0896 NW 1/4 5	0897 SW 1/4 15
Pit Number	er Section Township & Range	0894 NE 1/4 32 22N 4E	0895 SW 1/4 5 21N 3E	0896 NW 1/4 5 21N 2E	0897 SW 1/4 15 21N 1E
Pit Numbe	er Section Township & Range County	0894 NE 1/4 32 22N 4E Rio Arriba	0895 SW 1/4 5 21N 3E Rio Arriba	0896 NW 1/4 5 21N 2E Rio Arriba	0897 SW 1/4 15 21N 1E Rio Arriba
Pit Numbe Location Formatior	er Section Township & Range County	0894 NE 1/4 32 22N 4E Rio Arriba Tt	0895 SW 1/4 5 21N 3E Rio Arriba Qbt	0896 NW 1/4 5 21N 2E Rio Arriba P	0897 SW 1/4 15 21N 1E Rio Arriba pE
Pit Numbe Location Formatior Rock Typ	er Section Township & Range County h	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff	0896 NW 1/4 5 21N 2E Rio Arriba P limestone	0897 SW 1/4 15 21N 1E Rio Arriba pE granite
Pit Number Location Formation Rock Typ Source Ro	er Section Township & Range County h e e wck (Gravel)	0894 NE 1/4 32 22N 4E Rio Arriba T 1 dacite -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff -	0896 NW 1/4 5 21N 2E Rio Arriba P limestone	0897 SW 1/4 15 21N 1E Rio Arriba pC granite -
Pit Number Location Formation Rock Typ Source Ro Quality of	er Section Township & Range County n e cck (Gravel) Material	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness	er Section Township & Range County a e e ck (Gravel) Material of Material	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness	Section Township & Range County 1 e ck (Gravel) Material of Material of Cap (Caliche)	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus -	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus -	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus -
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U	er Section Township & Range County h e e ek (Gravel) Material of Material of Cap (Caliche) inderlying Formation	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - -
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation	er Section Township & Range County e ck (Gravel) Material of Material of Cap (Caliche) inderlying Formation	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr	er Section Township & Range County n e eck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 21	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr Thickness	er Section Township & Range County h e eck (Gravel) Material of Material of Cap (Caliche) inderlying Formation h erain of Overburden	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1'	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2'	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3'
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over	er Section Township & Range County 1 e eck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation 1 cain of Overburden burden)	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P.	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P.
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated	Section Township & Range County county Material of Material of Cap (Caliche) Inderlying Formation Cap (Caliche)	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel	Section Township & Range County County e ck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n cain of Overburden burden) Quantity (cu. yds.) es Wear	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness	er Section Township & Range County e county n e cock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n cain of Overburden burden) Quantity (cu. yds.) es Wear a Loss	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M	er Section Township & Range County h e eck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation h cain of Overburden burden) Quantity (cu. yds.) es Wear b Loss aximum Size	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 -	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 -	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 -
Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County h e county h e ck (Gravel) Material of Material of Cap (Caliche) inderlying Formation h rain of Overburden burden) Quantity (cu. yds.) es Wear burden cuss aximum Size d on 2" Sieve	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 -	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - -	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 -
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	er Section Township & Range County n e eck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n cain of Overburden burden) Quantity (cu. yds.) es Wear a Loss aximum Size d on 2" Sieve Crushed to:	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - - 1"	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 1"	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1''
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n e County n e vck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear i Loss aximum Size d on 2" Sieve Crushed to: 2"	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 - -	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - - - -	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - -	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1'' -
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County 1 e cock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation 1 rain of Overburden burden) Quantity (cu. yds.) es Wear i Loss aximum Size d on 2" Sieve Crushed to: 2" 1"	0894 NE 1/4 32 22N 4E Rio Arriba T† dacite - good 50' plus - pine mountainous - - unlimited 23.2 4.0 - 1" - 100	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - - 1'' - 100	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 1'' - 100	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1'' - 100
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine	Section Township & Range County n e ck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear a Loss aximum Size d on 2" Sieve Crushed to: 2" 1" ½"	0894 NE 1/4 32 22N 4E Rio Arriba T† dacite - good 50' plus - pine mountainous - - unlimited 23.2 4.0 - 1" - 100 59	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - 1'' - 100 60	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 100 53	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1'' - 100 56
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	er Section Township & Range County he eck (Gravel) Material of Material of Cap (Caliche) Inderlying Formation h rain of Overburden burden) Quantity (cu. yds.) es Wear burden) Quantity (cu. yds.) es Wear burden)	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 - 100 59 27	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - 1'' - 100 60 29	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 100 53 22	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1'' - 100 56 24
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	Section Township & Range County n e cock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear a Loss aximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - - pine mountainous - - unlimited 23.2 4.0 - 100 59 27 15	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - - 100 60 29 20	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - 11 125,000 plus 35.6 4.8 - - - 11 125,000 plus 35.6 4.8 - - - 11 125,000 plus 35.6 4.8 - - - 11 125,000 plus 35.6 53 22 12	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 100 56 24 15
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	Section Township & Range County n e county n e ck (Gravel) Material of Material of Cap (Caliche) inderlying Formation n cain of Overburden burden) Quantity (cu. yds.) es Wear aximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - pine mountainous - - unlimited 23.2 4.0 - 1" - 100 59 27 15 2	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - 1'' - 100 60 29 20 5	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 11'' - 100 53 22 12 4	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1'' - 100 56 24 15 2
Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Tern Thickness P. I. (Over Estimated Los Angel Soundness Average M % Retaine Pit Average % Passing	Section Township & Range County 1 e cock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation 1 rain of Overburden burden) Quantity (cu. yds.) es Wear aximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Index	0894 NE 1/4 32 22N 4E Rio Arriba Tt dacite - good 50' plus - pine mountainous - unlimited 23.2 4.0 - 100 59 27 15 2 N.P.	0895 SW 1/4 5 21N 3E Rio Arriba Qbt tuff - good 25' plus - sandstone pine mountainous 1' S.N.P. 325,000 66.0 1.2 - 1'' - 100 60 29 20 5 N.P.	0896 NW 1/4 5 21N 2E Rio Arriba P limestone - good 5' plus - sandstone pine & spruce mountainous 2' 11 125,000 plus 35.6 4.8 - - 100 53 22 12 4 N.P.	0897 SW 1/4 15 21N 1E Rio Arriba pC granite - good 100' plus - - pine mountainous 0-3' N.P. unlimited 52.6 4.1 - - 1" - 100 56 24 15 2 N.P.



QUATERNARY





QUADRANGLE PAGE 18 (1)

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MATERIAL PIT SUMMARY

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Pit Number		55120	58128	5955	5960
	Section	16	NW 1/4 19	E 1/2 9	W 1/2 27
Location	Township & Range	26N 8E	25N 9E	21N 8E	21N 8E
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation		Qal	Qal	Q†	
Rock Type		sand & gravel	sand & gravel	sand & gravel	sand & gravel
Source Rock (Gravel)		quartzite	quartzite	various	various
Quality of	Material	good	excellent	excellent	excellent
Thickness	of Material	13' plus	8' plus	14' plus	10' plus
Thickness	of Cap (Caliche)	_	-	_	·····
Material U	nderlying Formation	clav	clay	silt	sand & silt
Vegetation		pine & chamisa	woodland	cacti & grass	grass & juniper
Local Terr	ain	mountainous	river bottom	hilly	stream bed
Thickness of Overburden		2'	11	1 *	· · · · · · · · · · · · · · · · · · ·
P. I. (Overt	ourden)	6	N.P.	10	N.P.
Estimated Quantity (cu. yds)		200,000	210.000	200.000	170.000
Los Angele	s Wear	38.6	37.2	24.0	28.0
Soundness	Loss	6.0	4.7	2.3	1.3
Average Maximum Size		7"	10"	8"	14"
% Retained	l on 2" Sieve	20	41	33	40
	Crushed to:	as received	as received	as received	as received
	2"	86	56	69	59
Pit	1"	70	47	48	49
Average	1/2"	51	39	35	40
% Passing	No. 4	36	28	25	29
	No. 10	27	20	20	22
	No. 200	7	- • 4	<u> </u>	22
Plasticity I	ndex	N.P.	N ₂ P ₂		
Remarks					JIALA.

Remarks:

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58128: water at 6'

5955: San Juan Pueblo Grant

Pit Numbe	er	6013	6015	6071	6239	•
	Section	not sectionalized	not sectionalized	not sectionalized	SW 1/4 25	
Location	Township & Range	Piedra Lumbre Grant	Piedra Lumbre Grant	Piedra Lumbre Grant	25N 8F	
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba	
Formation	l ,	0+ (3)	Q+ (2)	Ot (4)	Oal	
Rock Type	e	sand, silt & gravel	sand & gravel	sand & gravel	aravel	
Source Rock (Gravel)		various	various	limestone & various	quartzite	
Quality of	Material	aood	excellent	good	exceilent	
Thickness of Material		8' plus	10' plus	9' plus	8' plus	
Thickness of Cap (Caliche)		- -	-	-		
Material Underlying Formation		clav	clay	clay	clay	
Vegetation		arass & iuniper	grass	grass	woodland	
Local Terrain		hilly	lake shoreline	canyon	mountainous	
Thickness of Overburden		3'	3'	4 '	4'	
P. I. (Overburden)		13	11	8	N.P.	
Estimated Quantity (cu. yds.)		220,000	155,000	125,000	380.000	
Los Angeles Wear		39.2	26.0	29.6	40.0	
Soundness Loss		3.0	2.1	3.0	4.6	
Average Maximum Size		11"	7"	7"	11"	
% Retained on 2" Sieve		49	37	37	31 -	
	Crushed to:	as received	as received	as received	as received	
	2"	51	. 68	65	75	
Pit	1"	30	42	50	54	
Average	1/2"	22	28	38	44	
% Passing	No. 4	16	20	28	31	
	No. 10	12	17	24	24	
	No. 200	3	3	9	4	
Plasticity Index		7	N.P.	5	N.P.	
Remarks:	<070 ·					

6239: water at 4'
MATERIAL PIT SUMMARY

Pit Numbe	er - '	6240	6241	6242	6249
† • • •	Section	NE 1/4 2	not sectionalized	SE 1/4 34	not sectionalized
Location	Township & Range	24N 7E	Juan Jose Lobato Grant	25N 8E	Piedra Lumbre Grant
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Formation		Qaa	Qal	Qa I	Q†
Rock Type	e	sand & gravel	gravel	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	various	various	quartzite	various
Quality of	Material	excellent	good	excellent	good
Thickness	of Material	10' plus	8' plus	7' plus	15' plus
Thickness	of Cap (Caliche)		· · · · · · · · · · · · · · · · · · ·	· 	
Material U	nderlying Formation	silt	clay	sandstone & quartzite	clay
Vegetation	1	juniper	grass	juniper & grass	grass
Local Terr	ain	hilly	river bottomland	mountainous	lake shoreline
Thickness	of Overburden	<u> </u>		<u> </u>	<u> </u>
P. I. (Over	burden)	S.N.P.		S.N.P.	9
Estimated	Quantity (cu. yds)	200,000	150,000	150,000	170,000
Los Angele	es Wear	26.5	33.6	33.6	26,4
Soundness	Loss	5.1	<u> </u>	5.7	6,1
Average M	aximum Size	8"		6"	8"
% Retained	1 on 2" Sieve	22	21	<u> </u>	41
	Crushed to:	as received	as received	as received	as received
•	2"	92	49		63
Pit	1"	79		83	48
Average	1/2"	63	23	79	39
% Passing	No. 4	52		71	31
	No. 10	33	10	55	26
	No. 200	4		4	3
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P

Remarks:

6241: water at II'

0668 Pit Number 6723 6908 6911 not sectionalized not sectionalized W 1/2 12 Section NE 1/4 35 26N 6E Location Township & Range Juan Jose Lobato Grant 21N 7E Juan Jose Lobato Grant Rio Arriba Rio Arriba County Rio Arriba Rio Arriba QTsf Q† (5) Tr QTq Formation sand & gravel sand & gravel conglomerate Rock Type gravel quartzite igneous quartzite Source Rock (Gravel) igneous excellent good good Quality of Material good II' plus 8' plus 91 30' plus Thickness of Material Thickness of Cap (Caliche) ---Material Underlying Formation _ silt silt sandstone Vegetation juniper juniper pine trees aspen.spruce& ponderosa hilly Local Terrain hilly mountainous mountainous 31 Thickness of Overburden 0-7' 0-2' 2' TT 13 5 P. I. (Overburden) S.N.P. 375,000 150,000 Estimated Quantity (cu. yds.) 330,000 660,000 Los Angeles Wear 28.0 27.2 34.8 33.2 3.9 3.7 Soundness Loss 3.8 7.0 12" 11" 15" 11" Average Maximum Size % Retained on 2" Sieve 38 15 36 41 as received as received Crushed to: as received as received 2" 78 84 scalped scalped Pit 1" 63 96 57 87 1/2" 52 76 82 40 Average 42 55 51 31 % Passing No. 4 No. 10 38 40 35 28 No. 200 3 3 13 13 N.P. N.P. N.P. 7 Plasticity Index

Remarks:

MATERIAL PIT SUMMARY

Answer Sector	Dit Numba		0770		A772	0773
Control Processor St. 1/4 10	' I	I Section	0770	0771		
Description Control Aroug Contro Aroug Control Aroug Control Aro	Tanting	Township & Dones	<u>SE 1/4 18</u>		<u>5W 1/4 18</u>	26N 0E
Density Pilo Arriba Pilo Arriba Pilo Arriba Pilo Arriba Pilo Arriba Some Sol Convol 1 Constructure Character Constructure Constructure <td>Location</td> <td>Township & Kange</td> <td>25N /E</td> <td>26N8E</td> <td><u>26N 9E</u></td> <td></td>	Location	Township & Kange	25N /E	26N8E	<u>26N 9E</u>	
Team Np Te nfm Des Te Des Te Des Te Des Te Des Te Des Te Des Des <thdes< th=""> <thdes< th=""> <thdes< th=""></thdes<></thdes<></thdes<>		County	Rio Arriba	Rio Arriba	RIO Arriba	
Base 1 pp cong logenzing cit. miscrw1fic sch1st muscrw1fic sch1st <th< td=""><td>Formation</td><td></td><td>Те</td><td>p@m</td><td>pEg</td><td></td></th<>	Formation		Те	p@m	pEg	
Same Kes (dared) numerical transmission of the provided of the provide	Rock Type	8	<u>conglomerate</u>	<u>qtz. muscovitic schist</u>	muscovitic granite	basalt, ss.conglomerate
Quality of Martial good pood good pood good pood Tableman Offsching 50° 1 10°	Source Ro	ck (Gravel)	quartzite	-		various
Control Material 50° 43° 51° puis 10° puis Statust Concentration Sandistruit Sandi	Quality of	Material	good	good	good	poor
Thickness Clay Galake)	Thickness	of Material	50'	43'	31' plus	10' plus
Matural Underlying Formation sandstone. quart zite	Thickness	of Cap (Caliche)	••••			
Vigetuon juniper & scrub.oak juniper & sland juniper & sland Tiskkan d'Ovetarda - 0-21 0-21 0-21 Tiskan d'Ovetarda 40,6 41,8 43,4 40,4 Sonden tod 25,9 9,5 2,6 47.9 Averag Miximu Side 9" - - - Tisk and a 2" Sine 70 - - - Tisk and a 2" Sine 70 - 100 - Tisk and a 2" Sine 70 - 100 - Tisk and a 2" Sine 70 3 27 8 37 So 30 1 7 N,P N,P 14 Newards Sectim Sectim	Material U	nderlying Formation	sandstone	quartzite	quartzite	quartzitic schist
Description mountainous mountainous mountainous mountainous mountainous F. I. (Oreclassion) - 0.21* 0.41* 0.24* 0.24* F. I. (Oreclassion) - 5, N, P, 8 20 Similand Quarti (V. 3/d) 200,000 310,000 440,000 485,000 plus Lon Angele War 40,6 41.8 43,4 40,4 Similand Quarti (V. 3/d) 200,000 110* - Variand Martin Size 9" - - - Variand Martin Size 9" - - - - Variand Varian Size 9" - - - - - Varian Size 9" 10* - 10* -	Vegetation	1	iuniper & scrub oak	juniper	pine	juniper & pinon
Diskuss of Overburden - 0-2' 0-4' 0-2' Exclosed Quartity (cs. ydi) 200,000 310,000 440,000 485,000,plus Exclosed Quartity (cs. ydi) 200,000 310,000 440,000 485,000,plus Exclosed Quartity (cs. ydi) 200,000 310,000 440,000 485,000,plus Soundness Ios 27,9 9,5 2,8 47,9 Average Maximum Size 9" - - - Counder ion: as received 1" 1 1/2" 1" Pr 100 52 100 Average Maximum Size 38 100 52 100 No. 10 2 16 5 20 No. 200 1 7 2 5 Particity Index N.P. N.P. N.P. N.P. Knumber 0774 0775 0776 0777 Section Section Section Section Section Section Soundexity Index N.P.	Local Terra	ain	mountainous	mountainous	mountainous	mountainous
P. LOOPENDAMEN - S.N.P. B 20 Loo Angels War 40.6 41.8 43.4 40.4 Loo Angels War 40.6 41.8 43.4 40.4 Loo Angels War 40.6 41.8 43.4 40.4 Similars Loo 25.9 9.3 2.8 47.9 Average Maximum Size 91 - - - Similars Loo 70 - - - Cuaded to: as race isold 11 1.1/2" 11" T 38 100 52 100 No.4 3 27 6 37 No.10 2 16 5 20 No.10 2 16 5 20 No.10 2 N.P. N.P. N.P. 14 Remuks: Sintarce isold 55 10.2 14 Tennsky as a sintarce isold 55 1/4.6 NE 1/4.5 No.200 1 7 2 5 Tennsky as a sintarce isold 55 1/4.6 NE 1/4.6 County PIC Arriba 25 5 10.6 10.6 Sores Rok (Grovel) OPG	Thickness	of Overburden	-	0-2'	0-4'	0-2'
bitmand Quantity (x, y6) 200, 000 310,000 440,000 485,000, plus Manufaces Lost 05, 0 9, 3 2,8 40, 4 Sundaes Lost 25, 0 9, 3 2,8 40, 4 Sundaes Lost 25, 0 9, 3 2,8 40, 4 Sundaes Lost 25, 0 9, 3 2,8 40, 4 Sundaes Lost 25, 0 9, 3 2,8 40, 4 Sundaes Lost 27, 0 9, - - - Construct 11/2 11/2 11/2 11/2 Section 52 100 - - 4/7 38 100 52 100 No. 4 3. 27. 8 37. - No. 4 3. 27. 8 37. - No. 4 5. 27. 0.75. 0.75. 0.77. No. 40 1. 7. 2 5.	P. I. (Overt	burden)		S.N.P.	8	20
Dot Angele Wat: d), 6. 41, 6. 43, 4 40, 4. 40, 4. Average Miximum Size 9° -	Estimated	Quantity (cu. yds)	200_000	310,000	440,000	485,000 plus
Soundness Los 26,9 9,3 2,6 47,9 Warrage Maximum Size 9" - 2.6 47,9 W Fandoo n." Size 70 - - - W Marine Size 9" - 11/2" 11" Y 38 100 72 100 Average W 8 66 12 75 No. 10 2 16 5 20 No. 10 2 16 5 20 No. 20 1 7 2 5 Platicity Index N.P. N.P. N.P. 14 Remarks: 0774 0775 0776 0777 Reside Site Site Site Site Site Site Site Sit	Los Angele	es Wear	40.6	41.8	43 4	40.4
Average Mission Size Original Processing	Soundness	Loss	25.0	0 3	2.8	47.9
Betwinst on 2" Server 70 -	Average Ma	aximum Size	0"		2.0	
Section Section <t< td=""><td>% Retained</td><td>t on 2" Sieve</td><td>70</td><td></td><td>ere</td><td></td></t<>	% Retained	t on 2" Sieve	70		ere	
Pit Description Pit Pit <th< td=""><td>J</td><td>Cuished to:</td><td>//</td><td></td><td>-</td><td></td></th<>	J	Cuished to:	//		-	
Image: Prime Image: Prim Image: Prime Image: Prime </td <td></td> <td></td> <td>as received</td> <td></td> <td>1.1/2"</td> <td><u> </u></td>			as received		1.1/2"	<u> </u>
No. 1 38 100 52 100 No. 4 5 27 8 37 No. 10 2 16 5 20 No. 10 2 16 5 20 No. 200 1 7 2 5 Nucity Index N.P. N.P. N.P. 14 Remarks: Section SE 1/4 25 Sw 1/4 8 NE 1/4 35 not sectionalized Location Section SE 1/4 25 Sw 1/4 8 NE 1/4 35 not sectionalized Courty RIO Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation pEq peq peq Qe Rok Trype Act Type muscoviric quartzite quartzitic schist Travertine sand Source Rok (Grave) - - - - Thicknes of Material 357 351 plus 61 plus 101 plus Thicknes of Material 357 352 plus 100 acood	Dit	2 1"	76	-	100	-
Average No.4 5 05 19 75 No.10 2 16 5 20 No.200 1 7 2 5 Planticity index N.P. N.P. 14 Remarks: N.P. N.P. 14 Pt Number 0774 0775 0776 1777 Remarks: N.P. N.P. 14 Remarks: Section SE 1/4 25 SW 1/4 8 NEP. 14 County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation PEG 026 05 06 05 06 County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Source Rock (Gravel) -	r IL	1	38	100	52	100
Prasma No. 4 3 27 6 37 No. 10 2 16 5 20 No. 200 1 7 2 5 Nunticity Index N.P. N.P. 14 Remarks: N.P. N.P. 14 Pit Number 0774 0775 0776 .0777 Section SE 1/4 25 SW 1/4 8 NE 1/4 35 not sectionalized Location Section SE 1/4 25 SW 1/4 8 NE 1/4 35 not sectionalized Township & Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation p6q ogod Qs Qe Nexity Nexity Source Rock (Grave) - - - - - - - Material Underlying Formation - - - - - - - - - - - - - - - - - <td< td=""><td>Average</td><td>72</td><td></td><td>66</td><td>19</td><td>/5</td></td<>	Average	72		66	19	/5
No.10 2 16 5 20 No.200 1 7 2 5 Phasticity Index N.P. N.P. 14 Remurks: N.P. N.P. 14 Pri Number 0774 0775 0776 0777 Loation Section SE 1/4 25 SW 1/4 8 NE 1/4 35 not sectionalized County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation pEd 960 05 06 06 County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Sace Roak (Grave) - - - - - Quality of Matriat 35' 35' plus 6' plus 10' plus Tackers of Matriat 35' 35' plus 5' plus 11' provelity sand sand & silt Vegetation cedar plond sold - - - Coll dente - -	% Passing	No. 4	3	27	8	37
No. 200 1 7 2 5 Rematicity Index N.P. N.P. N.P. 14 Remarks: N.P. N.P. 14 Remarks: Section SE 1/4 0775 0776 0777 Instanting Index N.P. N.P. N.P. 14 Remarks: Townking & Range 26N 8E 25N 9F 25N 8E Cio Calientle Grant County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation P6q p6q Qs Qo Qo Rock Type muscovitic quartzite quartzitic schist Travertine sand Soure Rock (Grave) - - - - - Thickness of Material good fair good qood - Thickness of Carbin - - - - - - Thickness of Carbin - - - - - - - -		No. 10	2	16	5	20
Phasitis (Index N.P. N.P. N.P. N.P. I.4 Remarks: Section Section <td></td> <td>No. 200</td> <td>l</td> <td>77</td> <td>2</td> <td></td>		No. 200	l	77	2	
Remarks: O774 O775 O776 O777 Section SE 1/4 25 SW 1/4 8 NE 1/4 35 not sectionalized County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation pEq pEq Ope Ope Source Rock (Gree) - - - - Ack Top muscovitic quartzite quartzitic schist Iravertine sand Nack Top muscovitic quartzite quartzitic schist Iravertine sand Material good fair good qood - Thickness of Material Good fair good qood - Vegatation - - - - - - Vegatation - - - - - - - Vegatation - - - - - - - - - - - - - - - -	Plasticity I	ndex	N.P.	N.P.	N.P.	14
Pit Number 0774 0775 0776 0777 Section SE 1/4 25 SW 1/4 8 NE 1/4 35 not sectionalized County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation pEq Definition PEq Section Sectionalized Source Rock Type muscovitic quartzite quartzitic schist fravertine sand Source Rock (Grave) - - - - - Vality of Material good fair good good good Thickness of Carelio - - - - - Thickness of Material 35' 35' plus 6! plus 10' plus Thickness of Overburden - - - - - Vegetation - - - - - - Vegetation - - - - - - - Local Terrain mountainous mountainous						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Pit Numbe		0774	0775	0776	
Location Township & Range ZN 8E O io Caliente Grant County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation p6q p6q p6q 0s 0e Rock Type muscovitic quartzite quartzitic schist fravertine sand Source Rock (Gravel) - - - - Quality of Material good fair good qood Thickness of Carce Rock (Gravel) - - - - Material 351 351 plus 6' plus 10' plus Thickness of Carce Calceloche - - - - Material Underlying Formation - - - - Cocal Termin mountrainous mountainous hilly river bottom Thickness of Overburden 0-5' 0-1' 0-10' 1' P. L (Overburden) 7 S.N.P. - S.N.P. Stimated Quartity (cu, yds.) 350_000 575_000 500_0000	_	Section	SE 1/4 25	SW 1/4 8	NE 1/4 35	not sectionalized
County Rio Arriba Rio Arriba Rio Arriba Rio Arriba Rio Arriba Formation p6q p6q Qs Qe Source Rock (Gravel) - - - - Quality of Material good fair good good Thickness of Cap (Callche) - - - - Thickness of Cap (Callche) - - - - Material Underlying Formation - - - - Vegetation Cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous mountainous hilly river bottom Thickness of Overburden 0-3'' 0-1' 0-10' 1' PL (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu. vds.) 330,000 575,000 500,000 50,000 plus Los Angeles War 49.6 40.8 43.3 - - Average Maximum Size - -	Location	Township & Range	26N 8E	25N 9E	25N 8E	Ojo Caliente Grant
Formation pEq pEq pEq quartzitic guartzitie quartzitic schist fravertine sand Rock Type muscovitic quartzite quartzitic schist fravertine sand sand Quality of Material good fair good qood qood Thickness of Cap (Caliche) - - - - - Thickness of Cap (Caliche) - - - - - Material Underlying Formation - conglomeratic mudstone silt.gravelly sand sand & silt Vegetation cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous mountainous hilly river bottom Netared Quantity (cu, vds.) 330,000 575,000 500,000 500,000 plus Soundness Loss 12,5 19,1 9,7 - - Soundness Loss 12,5 19,1 9,7 - - Y - - - - - <td></td> <td>County</td> <td>Rio Arriba</td> <td>Rio Arriba</td> <td>Rio Arriba</td> <td>Rio Arriba</td>		County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba
Rock Type muscovitic quartzite quartzitic schist fravertine sand Source Rock (Gravel) -	Formation	1	рЄд	pEq	Qs	<u>, Ŷe</u>
Source Rock (Gravel) - - - - - Quality of Material good fair good qood qood Quality of Material 35' JS' JS' JS' JO' plus Thickness of Cap (Caliche) - - - - - Material Undertying Formation - conglomeratic mudstone \$ilf.gravelly sand sand & silf Vegetation Cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous hilly river bottom Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu, yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49,6 40,8 43,3 - - Soundness Loss 12.5 19.1 9.7 - - Patt 2" - - - -<	Rock Type	e	muscovitic quartzite	quartzitic schist	Travertine	sand
Quality of Material good fair good good Thickness of Material 35' 35' plus 6' plus 10' plus Thickness of Cap (Caliche) - - - - - Material Underlying Formation - conglomeratic mudstone silt,gravelly sand sand & silt Vegetation Cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous mountainous hilly river bottom P1. (Overburden) 7 S.N.P. - S.N.P. P1. (Overburden) 7 S.N.P. - S.N.P. Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - - K Retained on 2" Sieve - - - - - - Pit 100 100 100 - - - - - - - - - <t< td=""><td>Source Ro</td><td>ck (Gravel)</td><td>-</td><td>-</td><td>-</td><td>_</td></t<>	Source Ro	ck (Gravel)	-	-	-	_
Thickness of Material 35' 35' plus 6' plus 10' plus Thickness of Cap (Caliche) - - - - - Material Underlying Formation - - - - - - Material Underlying Formation - cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous mountainous hilly river bottom Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu.yds.) 330,000 575,000 500,000 500,000 plus Los Angeles Wear 49.6 40.8 43.3 - - Soundness Loss 12.5 19.1 9.7 - - Retained on 2'' Sieve - - - - - Prit 1'' 100 100 100 - - Warrage ½'' 72 67	Quality of	Material	good	fair	good	boop
Thickness of Cap (Caliche) - - - - - Material Underlying Formation - cong lomeratic mudstone silt.gravelly sand sand & silt Vegetation cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous hilly river bottom Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu. yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49.6 40.8 43.3 - - Soundness Loss 12.5 19.1 9.7 - - Average Maximum Size - - - - - % Retained on 2" Sieve - - - - - 2" - - - - - - - Verage Maximum Size 1''' 100 100 - - </td <td>Thickness</td> <td>of Material</td> <td>35'</td> <td>35' plus</td> <td>6' plus</td> <td>10' plus</td>	Thickness	of Material	35'	35' plus	6' plus	10' plus
Material Underlying Formation - conglomeratic mudstone silt.gravelly sand sand & silt Vegetation cedar juniper & pinon sparce pinon grass, sparce juniper Local Terrain mountainous hilly river bottom Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S. N.P. - S. N.P. Estimated Quantity (cu. yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49.6 40.8 43.3 - - Soundness Loss 12.5 19.1 9.7 - - Average Maximum Size - - - - - & Retained on 2'' Sive - - - - - ?'' - - - - - - - Quantity (cu. yds.) 100 100 100 - - - - - - - - - -	Thickness	of Cap (Caliche)	-	-	-	_
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Local Terrain mountainous mountainous hilly river bottom Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu. yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49.6 40.8 43.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - Retained on 2'' Sieve - - - - Prit 1'' 100 100 - - Verage ½'' 72 67 73 - Warage ½'' 72 67 73 - % Passing No.4 30 32 34 - No.10 14 20 21 100 9 No.200 3 9 4 9 9	Vegetation	1	cedar	juniper & pinon	sparce ninon	grass, sparce iuniper
Thickness of Overburden 0-3' 0-1' 0-10' 1' P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu. yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49.6 40.8 43.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - % Retained on 2" Sieve - - - - % Retained on 2" Sieve - - - - Verage Maximum Size - - - - Verage Maximum Size - - - - Verage Maximum Size - - - - % Retained on 2" Sieve - - - - Prit 1" 100 100 - - % Passing No.4 30 32 34 - No.10 14 20 21 <td>Local Terra</td> <td>ain</td> <td>mountainous</td> <td>mountainous</td> <td>hilly</td> <td>river bottom</td>	Local Terra	ain	mountainous	mountainous	hilly	river bottom
P. I. (Overburden) 7 S.N.P. - S.N.P. Estimated Quantity (cu. yds.) 330,000 575,000 500,000 50,000 plus Los Angeles Wear 49.6 40.8 43.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - $^{\prime}$ Retained on 2" Sieve - - - - $^{\prime}$ Retained on 2" Sieve - - - - $^{\prime}$ Retained on 2" Sieve - - - - $^{\prime}$ Prit 1" 1" 1" as received $^{\prime}$ '' - - - - $^{\prime}$ Warsage $^{\prime}$ '' 72 67 73 - $^{\prime}$ '' 72 67 73 - - - $^{\prime}$ No. 10 14 20 21 100 9 4 9 Plasticity Index N.P. N.P. N.P. N.P. N.P. N.P. N.P.	Thickness	of Overburden	0-31	0-1'	0-10'	I 1
Estimated Quantity (cu. yds.) 330,000 575,000 500,000 500,000 plus Los Angeles Wear 49.6 40.8 43.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - κ Retained on 2" Sieve - - - - κ Retained on 2" Sieve - - - - κ Retained to: 1" 1" as received $2"$ - - - - Pit 1" 100 100 - - κ Passing No. 4 30 32 34 - No. 10 14 20 21 100 9 Plasticity Index N.P. N.P. N.P. N.P.	P. I. (Overl	burden)	7	S.N.P.	-	S.N.P.
Los Angeles Wear 49.6 40.8 43.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - χ Retained on 2" Sieve - - - - χ Retained on 2" Sieve - - - - χ Retained to: 1" 1" 1" as received χ " - - - - χ " 72 67 73 - χ " 72 67 73 - χ Passing No. 4 30 32 34 - No. 10 14 20 21 100 9 Plasticity Index N.P. N.P. N.P. N.P.	Estimated	Quantity (cu. vde.)	330 000	575 000	500.000	50,000 plus
Los migres wear 42.0 40.0 49.3 - Soundness Loss 12.5 19.1 9.7 - Average Maximum Size - - - - % Retained on 2" Sieve - - - - % Retained on 2" Sieve - - - - % Retained on 2" Sieve - - - - % Retained on 2" Sieve - - - - % Retained on 2" Sieve - - - - % Passing 100 100 100 - - Pit 1" 100 100 - - - % Passing No. 4 30 32 34 - - No. 10 14 20 21 100 - - - No. 200 3 9 4 9 - - - - Plasticity Index N.P. N.P. N.P. N.P. N.P. N.P.	Los Angele	wear	49.6	40.8	43 3	-
Source Maximum Size - - - - Average Maximum Size - - - - - $\%$ Retained on 2" Sieve - - - - - - $\%$ Retained on 2" Sieve - <td>Soundage</td> <td>Loss</td> <td></td> <td>19 1</td> <td></td> <td></td>	Soundage	Loss		19 1		
Average - - - $\%$ Retained on 2" Sieve - - - $\%$ Retained to: 1" 1" 1" as received 2" - - - - Pit 1" 100 100 - - Average $\%$ " 72 67 73 - $\%$ Passing No. 4 30 32 34 - No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P. N.P.	Average M	avimum Size	-	-		
Crushed to: I I as received 2" - - - - Pit 1" 100 100 - Average $\frac{1}{2}$ " 72 67 73 - No. 4 30 32 34 - No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P. N.P.	W D	aximum Size			-	
Crusned to: I I I as received 2" -	70 Ketained	C 1 Sieve	-			
$2^{\prime\prime}$ $ -$ Pit $1^{\prime\prime}$ 100 100 $-$ Average $\frac{1}{2^{\prime\prime}}$ 72 67 73 $-$ Average $\frac{1}{2^{\prime\prime}}$ 72 67 73 $-$ No. 4 30 32 34 $-$ No. 10 14 20 21 100 No. 200 $3^{\prime\prime}$ 9 4 9 Plasticity Index N.P. N.P. N.P.		Crusned to:	l	I	1	as received
I'' 100 100 100 $-$ Average $\frac{1''}{3''}$ 72 67 73 $-$ No. 4 30 32 34 $-$ No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P.		2"	-	-	-	
Average $\frac{1}{2}$ 67 73 $-$ % Passing No. 4 30 32 34 $-$ No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P.	Pit	1"	100	100	100	-
No. 4 30 32 34 - No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P. N.P.	Average	1/2"	72	6/	73	-
No. 10 14 20 21 100 No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P.	% Passing	No. 4	30	32	34	-
No. 200 3 9 4 9 Plasticity Index N.P. N.P. N.P.		No. 10	14	20	21	100
Plasticity Index N.P. N.P. N.P.						
		No. 200	3	9	4	9

Remarks:

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CONSTRUCTION MATERIALS INVENTORY

MATERIAL PIT SUMMARY

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Pit Numb	ber	0778	0779	0780	0781	
•	Section	NE 1/4 24	not sectionalized	not sectionalized	not sectionalized	
Location	Township & Range	23N 8E	Black Mesa Grant	Plaza Blanco Grant	Juan Jose Lobato Grant	· -
	County	Rio Arriba	Rio Arriba	Rio Arriba	Rio Arriba	
Formatic	n	0+	ОТЬ	Та	QTI	_
Rock Tv	ne	aravel & sand	basalt	tuff	diorite	
Source R	ock (Gravel)	quartzite	-	-		
Quality of	of Material	ovcellent	nood	poor	fair - good	
Thicknes	s of Material		6'	50' plus	9'wide X 40'plus	<i>,</i>
Thicknes	s of Can (Caliche)		~	-	-	_
Material	Underlying Formation	cond & cilt	cil+	-	-	
Vegetati	on on other and the second second		grass & juniner	iuniper	grass & sparce juniper	
J ogel To	rain	grass a juniper	grass a juitper	mountainous	hilly	
Thiskness	n af Overburden		mesa rop	$n = a^{\dagger}$	0-11	1
		2	-		S.N.P10	ì
P. I. (Ove	d Ourantitus (au arda)	S.N.P.	-	31N+F 1 300 000	20,000	
	d Quantity (cu. yus)	525,000	450,000		12 4	
Los Ang	eles wear	34.4	21.8	2014 00 4	2.5	'
Soundne	ss Loss	4.8	1+0	99.4	2 · 2	
Average	Maximum Size	15"	-	-		
% Retair	ed on 2" Sieve	28	-		-	
	Crushed to:	as received	["	1."	1 · · · ·	
I.	2"	67	-	-	-	1
Pit	1"	53	100	100	100	
Average	1/2"	43	44	77	59	
% Passin	g [No. 4	34	22	42	20	
	No. 10	29	14	31	9	
1	No. 200	7	4	8	I	
Plasticity	Index	N.P.	N.P.	N,P.	N, P,	
Remark	s:					
Pit Num	iber	0782	0783	0784	0785	
Pit Nun	iber Section	0782 not sectionalized	0783 not sectionalized	0784 not sectionalized	0785 SW 1/4 13	
Pit Num Locatio	iber Section Township & Range	0782 not sectionalized Polvadera Grant	0783 not sectionalized Juan Jose Lobato Grant	0784 not sectionalized Juan Jose Lobato Grant	0785 SW 1/4 13 21N 8E	
Pit Num Locatio	iber Section n Township & Range County	0782 not sectionalized Polvadera Grant Rio Arriba	0783 not sectionalized Juan Jose L <u>oba</u> to Grant Rio Arriba	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba	0785 SW 1/4 13 21N 8E Rio Arriba	
Pit Num Locatio Format	uber Section n Township & Range County	0782 not sectionalized Polvadera Grant Rio Arriba Obt	0783 not sectionalized Juan Jose L <u>oba</u> to Grant Rio Arriba OTg	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2)	
Pit Num Locatio Format Rock T	iber Section n Township & Range County ion	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg gravel	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) gand & gravel	
Pit Num Locatio Format Rock T Source	iber Section Township & Range County ion ype Rock (Gravel)	0782 not sectionalized Polvadera Grant Rio Arriba Qbt basalt	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg gravel dacite	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & guartzite	
Pit Num Locatio Format Rock T Source Quality	nber Section n Township & Range County ion ype Rock (Gravel) of Material	0782 not sectionalized Polvadera Grant Rio Arriba Qbt basalt - fair	0783 not sectionalized Juan Jose L <u>oba</u> to Grant Rio Arriba OTg gravel dacite fair	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite - good	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & guartzite excellent	
Pit Num Locatio Format Rock T Source Quality Thickne	nber Section n Township & Range County ion ype Rock (Gravel) of Material ess of Material	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus	0783 not sectionalized Juan Jose L <u>obato</u> Grant Rio Arriba OTg gravel dacite fair 13' plus	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite - good 1000' plus	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus	
Pit Num Locatio Format Rock T Source Quality Thickne	ber Section n Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche)	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTq gravel dacite fair 13' plus	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite good 1000' plus 	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & guartzite excellent 12' plus	
Pit Num Locatio Format Rock T Source Quality Thickne Thickne	ber Section Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche)	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus - silt & sandstone	0783 not sectionalized Juan Jose L <u>oba</u> to Grant Rio Arriba OTg gravel dacite fair 13' plus	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite 	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus - sand & silt	
Pit Num Locatio Format Rock T Source Quality Thickne Thickne Materia	ber Section Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche) I Underlying Formation ion	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus - silt & sandstone pine & aspen	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg gravel dacite fair 13' plus - - grass & juniper	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite - good 1000' plus - - spruce & aspen	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus - sand & silt grass & juniper	
Pit Num Locatio Format Rock T Source Quality Thickne Thickne Materia Vegetat	aber Section Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche) I Underlying Formation ion errain	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus - silt & sandstone pine & aspen mountainous	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg gravel dacite fair 13' plus - - grass & juniper hilly	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite - good 1000' plus - - spruce & aspen mountainous	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus - sand & silt grass & juniper hilly	
Pit Num Locatio Format Rock T Source Quality Thickne Materia Vegetat Local T	aber Section Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche) I Underlying Formation ion errain ers of Ouerburden	0782 not sectionalized Polvadera Grant Rio Arriba Qbt basalt - fair 20' plus - silt & sandstone pine & aspen mountainous 2'	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg qravel dacite fair 13' plus - - qrass & juniper hilly 0-4'	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite - good 1000' plus - - spruce & aspen mountainous 0-5'	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus - sand & silt grass & juniper hilly 0-5'	
Pit Num Locatio Format Rock T Source Quality Thickne Materia Vegetat Local T Thickne	aber Section Township & Range County ion ype Rock (Gravel) of Material ess of Cap (Caliche) 1 Underlying Formation ion errain ess of Overburden werburden)	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus - silt & sandstone pine & aspen mountainous 2' S N P	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg qravel dacite fair 13' plus - - qrass & juniper hilly 0-4' S.N.P.	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite good 1000' plus spruce & aspen mountainous 0-5' S.N.P.	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & guartzite excellent 12' plus - sand & silt grass & juniper hilly 0-5' 6	
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Pit Num Locatio Format Rock T Source Quality Thickne Materia Vegetat Local T Thickne P. I. (O Estimat Los An Soundn Average % Retai	aber Section Township & Range County ion ype Rock (Gravel) of Material ess of Material ess of Cap (Caliche) 1 Underlying Formation ion errain ess of Overburden verburden) eed Quantity (cu. yds.) geles Wear tess Loss Maximum Size ined on 2" Sieve Crushed to: on Crushed to:	0782 not sectionalized Polvadera Grant Rio Arriba Obt basalt - fair 20' plus - silt & sandstone pine & aspen mountainous 2' S.N.P. unlimited 98.6 - -	0783 not sectionalized Juan Jose Lobato Grant Rio Arriba OTg qravel dacite fair 13' plus - - qrass & juniper hilly 0-4' S.N.P. 565,000 38.0 4.2 7" 19 as received 70	0784 not sectionalized Juan Jose Lobato Grant Rio Arriba Tt dacite good 1000' plus spruce & aspen mountainous 0-5' S.N.P. unlimited 65.9 44.5 	0785 SW 1/4 13 21N 8E Rio Arriba Ot (2) sand & gravel limestone & quartzite excellent 12' plus - sand & silt grass & juniper hilly 0-5' 6 130,000 20.0 1.0 10" 23 as received 77	
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Remarks:

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QUADRANGLE PAGE 18 (5)

MATERIAL PIT SUMMARY

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Pit Number	0786	1			1	1811 P. T.	
Section	NW 1/4 28						
Location Township & Range	21N 8E			••			1
County	Rio Arriba						1
Formation	Qal				1		
Rock Type	sand & gravel	1			-		
Source Rock (Gravel)	quartzite & igneous				1		
Quality of Material	excellent	и			10		
Thickness of Material	20'						
Thickness of Cap (Caliche)	-			1			
Material Underlying Formation	silt & sand						
Vegetation	juniper & grass						
Local Terrain	hilly						
Thickness of Overburden	0-6'	-		• ·			
P. I. (Overburden)	S.N.P.						
Estimated Quantity (cu. yds)	125,000						
Los Angeles Wear	26.2						
Soundness Loss	5.5						
Average Maximum Size	7.						
% Retained on 2 Sieve	20						
Crushed to:							
D ;+ 1"	66						
$\frac{1}{1}$	50						
% Passing No. 4	36						
No. 10	30		•				
No. 200	5					1	
Plasticity Index	N.P.						
Remarks:							
			<u>,</u>				
Pit Number							
Pit Number Section			<u> </u>				
Pit Number Section Location Township & Range							
Pit Number Section Location Township & Range County	TT I I I I I I I I I I I I I I I I I I						
Pit Number Section Location Formation	**				и		
Pit Number Location Section Location Township & Range County Formation Rock Type		аланан алан алан алан алан алан алан ал		,	и		
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel)	n i				1		
Pit Number Section Location Formation Rock Type Source Rock (Gravel) Quality of Material	та г.				. <u>-</u>		
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Can (Caliche)	м г		<u>, , , , , , , , , , , , , , , , , , , </u>		и 		
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Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Verburden)			· · · · · · · · · · · · · · · · · · ·		и 		
Pit NumberLocationSectionLocationTownship & Range CountyFormationCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)							
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QUAD No. 19

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QUADRANGLE PAGE 19 (1)

MATERIAL PIT SUMMARY

Pit Numbe	r T	5669	5672	5676	5747
	Section	not sectionalized	not sectionalized	E 1/2 33	not sectionalized
Location	Township & Range	Rancho Del Rio Grant	Giiosa Grant	24N 11E	Rancho Del Rio Grant
ſ	County	Таоз	Taos	Taos	Taos
Formation		Тр	Qta	QTsf	P
Rock Type	, T	gravel	sand & gravel	sand & gravel	conglomerate
Source Ro	ck (Gravel)	various	various	granite & guartzite	various
Quality of	Material	good	fair	excellent	good
Thickness	of Material	15' plus	25' plus	30' plus	10' plus
Thickness	of Cap (Caliche)	-	-	-	
Material U	nderlying Formation	conglomerate & sandsto	one -	granite	sandstone & limestone
Vegetation		juniper & pinon	sage	juniper & pinon	pine
Local Terra	ain	mountainous	hilly - rolling	mountainous	mountainous
Thickness	of Overburden	2'	0-4'	1	0-4'
P. I. (Overt	ourden)	11 - 15	8	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	125,000	500.000 plus	600,000 plus	400,000 plus
Los Angele	es Wear	48.8	53.2	32.4	16.0
Soundness	Loss	37.5	26.9	4.9	12.5
Average Ma	aximum Size	9"	5"	12"	-
% Retained	l on 2" Sieve	33	26	24	-
	Crushed to:	as received	as received	as received	/2"
	2"	68	83	59	100
Pit	1"	52	68	42	72
Average	1/2"	45	52	33	24
% Passing	No. 4	35	37	24	11
	No. 10	30	27	19	7
	No. 200	10	6	3	1
Plasticity I	ndex	N.P. to 9	N.P.	N.P.	N.P.
Remarks:	-				

Pit Numb	er	5748	5871	5872	5873
	Section	SE 1/4 32	SE 1/4 22	S 1/2 33	not sectionalized
Location	Township & Range	23N 12E	24N IIE	24N IIE	Gijosa Grant
	County	Taos	Taos	Taos	Taos
Formation	n	QTsf	QTg	Qal	QTg
Rock Typ	e	sand & gravel	sand & gravel	sand & gravel	sand & gravel
Source Ro	ock (Gravel)	various	various	granite & quartzite	various
Quality of	Material	fair	excellent	excellent	boop
Thickness	of Material	4-6'	6' plus	33' plus	25' plus
Thickness	of Cap (Caliche)			-	
Material U	Inderlying Formation	silt	siltstone & sandstone	granite	-
Vegetatio	n	pinon & juniper	sage	juniper	qrass & chamisa
Local Ter	rain	mountainous	mountainous	mountainous	rolling
Thickness	of Overburden	1-4'	0-2'	4'	0-3'
P. I. (Over	rburden)	S.N.P.	S.N.P.	6	11
Estimated	Quantity (cu. yds.)	25,000 plus	10,000 plus	200,000 plus	660,000
Los Angel	es Wear		37.0	32.4	50.0
Soundnes	s Loss		14.6	6./	28.8
Average M	laximum Size		4''	14"	4''
% Retaine	d on 2" Sieve		18	41	30
	Crushed to:	as received	as received	as received	as received
	2"		52	60	96
Pit	1"	100	43	45	82
Average	1/2"	98	34	40	59
% Passing	No. 4		26	54	34
	No. 10	65	21	50	24
	No. 200	16	4	12	6
Plasticity	Index	N.P.	N.P.	N.P. to 8	N.P.

Remarks:

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MATERIAL PIT SUMMARY

Pit Numbe	er l	5903	5904	5959	6028
	Section	not sectionalized	NW 1/4 33	NE 1/4 27	NW 1/4 27
Location	Township & Range	Las Trampas Grant	23N 12E	24N 11E	23N 12E
	County	Taos	Taos	Taos	Taos
Formation	1	pEm	QTsf	QTsf	Тр
Rock Typ	e	metamorphosed granite	gravel	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	-	quartzite & various	quartzite	quartzite & various
Quality of	Material	DOOR	aood	qood	excellent
Thickness	of Material	30' plus	6' plus	6'plus	29'
Thickness	of Cap (Caliche)	-	-		
Material U	nderlying Formation	granite	silt & sandstone	sand & silt	clay, silt & sand
Vegetatior	1		pinon, spruce, pondero	sa iuniper	pine, pinon, ponderosa
Local Terr	ain	mountainous	mountainous	mountainous	mountainous
Thickness	of Overburden	0-4'	0-4'	0-3'	2'
P. I. (Over	burden)	15	7	S.N.P.	10
Estimated	Quantity (cu. yds)	900,000	150,000	100,000	150,000 plus
Los Angel	es Wear	32.7	32.9	35.4	39.2
Soundness	Loss	51.7	5.4	7.9	4.3
Average M	aximum Size		4''	5"	16"
% Retained	d on 2" Sieve	-	25	21	16
	Crushed to:	111	as received	as received	as received
	2"	-	65	73	95
Pit	1"	100	51	56	60
Average	1/2"	64	35	43	40
% Passing	No. 4	23	29	32	40
	No. 10	12	25	25	40
	No. 200		13	7	30
Plasticity I	ndex	N.P.	N.P.	N.P.	10
Remarks					

Pit Numbe	er	6462	6465	6466	6467
	Section	not sectionalized	not sectionalized	not sectionalized	not sectionalized
Location	Township & Range	Las Trampas Grant	Las Trampas Grant	Francisco Montes Grant	Sebastian Martin Grant
	County	Taos	Rio Arriba	Rio Arriba	Rio Arriba
Formatior	1	QTq	ŌTg	Qal	Qa I
Rock Typ	e	gravel	sand & gravel	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	various	quartzite	quartzite & granite	igneous & metamorphic
Quality of	Material	boop	excellent	excellen†	good
Thickness	of Material	20' plus	97' plus	12' plus	131
Thickness	of Cap (Caliche)		-		
Material U	nderlying Formation	quartzite & granite	granite & quartzite	-	silt
Vegetatior	1	juniper & pine	white pine	pine	juniper & grass
Local Terr	ain	mountainous	mountainous	mountainous	hilly
Thickness	of Overburden	2'	3'	0-3'	0-1'
P. I. (Over	burden)		12	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds.)	375,000	500,000 plus	225,000	100,000 plus
Los Angele	es Wear	30.0	34.2	33.2	30.4
Soundness	Loss	3.0	0.4	4.8	9.6
Average M	aximum Size	7"	5"	6"	3"
% Retaine	d on 2" Sieve	36	17	30	15
	Crushed to:	as received	as received	as received	as received
	2"	62	72	61	85
Pit	1"	44	58	52	75
Average	1/2"	34	40	39	65
% Passing	No. 4	24	25	29	54
	No. 10	17	19	20	42
	No. 200	4	3	4	9
Plasticity I	ndex	N.P. to II	N.P.	N.P.	N.P.

Remarks:

MATERIAL PIT SUMMARY

Pit Numbe	r i l	6803	6804	0711	07 <u>1</u> 2
· ·	Section	NW 1/4 33	not sectionalized	SE 1/4 7	not sectionalized
Location	Township & Range	26N 13E	Cristobal Serna Grant	26N 11E	Antonio Martinez Grant
	County	Taos	Taos	Taos	Taos
Formation		Qq	0Tg	Qafv	OTa
Rock Type	;	sand & gravel	sand & gravel	gravel	sand & gravel
Source Ro	ck (Gravel)	igneous & metamorphic	various	basalt	igneous & metamorphic
Quality of	Material	bood	fair	boop	boop
Thickness	of Material	18'	8'	10' plus	18' plus
Thickness	of Cap (Caliche)			0-2'	-
Material U	nderlying Formation	sand & gravel	clay	silt	sand & gravel
Vegetation		grass	grass	sage	sagebrush
Local Terr	ain	<u>flat</u>	rolling	rolling	flat
Thickness	of Overburden	1-21	0-3'	0-2'	1-2'
P. I. (Overt	ourden)	N.P 7	N.P 10	<u>S.N.P.</u>	8
Estimated	Quantity (cu. yds)	<u>125,0</u> 00 plus	250,000	300,000	unlimited
Los Angele	es Wear	28.4	56.2	20.0	
Soundness	Loss	3.3	1.5	9.7	13.9
Average M	aximum Size	۲ ^{**}	6''	24"	4"
% Retained	1 on 2" Sieve	32	27	80	35
	Crushed to:	as received	as received		as received
	2"	80	61		89
Pit	1"	70	48	100	/3
Average	1/2"	65	36	51	51
% Passing	No. 4	50	26	23	
	No. 10	45	20	13	20
	No. 200	20	7	3	4
Plasticity I	ndex	N.P 8	6	N. P.	/
Remarks:					
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Pit Numbe	r	0713	0714	0715	0716
	Section	not sectionalized	not sectionalized	SE 1/4 35	SE 1/4 30
Location	Township & Range	Antonio Martinez Grant	Antonio Martinez Grant	25N LIE	2.5N ITE
	County	Taos	Taos	Taos	Таоз
Formation		Qal	QTq	0Tq	ОТЬ
Rock Type	e	sand & gravel	sand & gravel	sand & gravel	basalt
Source Ro	ck (Gravel)	various	igneous & metamorphic	igneous & metamorphic	
Quality of	Material	good	boop	pood	qood
Thickness	of Material	14' plus	6' plus	101	25' plus
Thickness	of Cap (Caliche)	-		-	
Material U	nderlying Formation	-	silt	basal†	silt
Vegetatior		sage	grass	sagebrush & grass	saqe
Local Terr	ain	rolling	low hills	flat	rolling
Thickness	of Overburden	0-2	1	0-21	0-2'
P. I. (Over	burden)	S.N.P.	13	15	S.N.P.
Estimated	Quantity (cu. yds.)	500,000 plus	unlimited	unlimited	900,000 plus
Los Angele	es Wear	21.1	24.4	22.4	40.2
Soundness	Loss	12.7	7.9	12.1	7.4
Average M	aximum Size	3"	3"	4"	
% Retaine	1 on 2" Sieve	19	4	35	NUT
	Crushed to:	as received	as received	as received	I **
	2"	80	91	72	
Pit	1"	66	68	58	100
Average	1/2"	48	47	45	50
% Passing	No. 4	34		29	22
	No. 10	26	20	22	14
	No. 200	9	2	3	4
Plasticity I	ndex	N.P.	N.P.	S.N.P.	N.P
Remarks:					

MATERIAL PIT SUMMARY

Pit Numbe	er	0717	0718	0719	0720
· · · · · · · · · · · · · · · · · · ·	Section	SE 1/4 2	SE 1/4 5	SE 1/4 4	NW 1/4 29
Location	Township & Range	24N 10E	24N 10E	25N 9E	24N 10E
	County	Taos	Taos	Rio Arriba	Taos
Formation	1	0e	QTsf	TIp	peq
Rock Typ	e	sand	sand & gravel	gravel	quartzite
Source Ro	ck (Gravel)	-	volcanic & various	volcanic	metamorphic
Quality of	Material	fair	good	fair	excellent
Thickness	of Material	6'	20' plus	2-6'	100' plus
Thickness	of Cap (Caliche)	-			
Material U	nderlying Formation	basalt	silt & sandstone	conglomerate	-
Vegetation	1	pinon	juniper	pinon	pinon, pine, sage
Local Terr	ain	hilly	hilly	mountainous	mountainous
Thickness	of Overburden	0-2'	1,	0-2'	_
P. I. (Over	burden)	S.N.P.	S.N.P.	12	_
Estimated	Quantity (cu. yds)	300.000	25,000	150,000	unlimited
Los Angel	es Wear	_	31.6	20.3	58.8
Soundness	Loss		4.1	5.8	2.7
Average M	aximum Size	_	4''	6"	-
% Retaine	d on 2" Sieve		8	31	_
	Crushed to:	as received	1_1/2"	1 1/2"	''
•	2"		100	100	
Pit	1"	-	88	71	100
Average	1/2"	no.10: 100	68	47	78
% Passing	No. 4	no.40: 97	60	36	35
	No. 10	no.80: 74	51	29	2.5
	No. 200	no.200: 29	10	21	5
Plasticity 1	Index	N.P.	N.P.	N.P.	N.P.

Remarks:

Pit Number		0721	0722	0723	0724
	Section	SW 1/4 23	not sectionalized	SE 1/4 7	SW 1/4 18
Location	Township & Range	24N IIE	Rancho del Rio Grant	23N 12F	23N 12E
	County	Taos	Taos	Taos	Taos
Formation	1	QTsf	MD	p⊖m	Ti
Rock Typ	e	sand	sandstone conglomerat	e granitic schistose	diabase
Source Ro	ock (Gravel)	-	_	-	-
Quality of	Material	good	poor	good	dood
Thickness	of Material	30'plus	40' plus	25' plus	30' plus
Thickness	of Cap (Caliche)	_	-	_	-
Material U	Inderlying Formation	silt	granite	quartzite	granite
Vegetation	n	juniper & sagebrush	pine	pine	pine
Local Terr	rain	mountainous	mountainous	mountainous	mountainous
Thickness	of Overburden		0-3'	0-3'	0-2'
P. I. (Over	burden)	-	S.N.P.	S.N.P.	11
Estimated	Quantity (cu. yds.)	80,000 plus	230,000	470,000	20,000
Los Angel	es Wear		70.5	37.9	18.0
Soundness	s Loss	-	17.6	1.9	2.8
Average M	laximum Size	-	_		-
% Retaine	d on 2" Sieve	-	_	-	-
	Crushed to:	as received	1"	1"	1"
	2"	_	-		
Pit	1"	-	100	100	100
Average	1/2"	no.10: 100	61	58	42
% Passing	No. 4	no.40: 99	30	25	16
	No. 10	no.80: 41	21	16	8
	No. 200	no.200: 7	2	3	2
Plasticity 1	Index	N.P.	N.P.	N.P.	N.P.

Remarks:

QUADRANGLE PAGE 19 (5)

MATERIAL PIT SUMMARY

· · ·			0726		0728
Pit Numbe	r	0725		vizi	
	Section	SE 1/4 24	NW 174 19	Cablestics Mantin Creat	
Location	Township & Range	23N 10E	23N TOE	Sepastian Marrin Gran	
	County	Taos	Rio Arriba	RIO Arrida	RIO AFFIDa
Formation		QTa	Oal	Qat .	bed
Rock Type		sand & gravel	sand	gravel	granite
Source Ro	ck (Gravel)	quartzite & granite	-	quartzite	··· -
Quality of	Material	excellent	good	excellent	good
Thickness	of Material	15' plus	10'	40' plus	loo' plus
Thickness	of Cap (Caliche)	-		-	-
Material U	nderlying Formation	granite	granite & quartzite	silt	quartzite
Vegetation		juniper	grass	juniper	pine
Local Terr	ain	mountainous	mountainous	mountainous	mountainous
Thickness	of Overburden	2'	11	0-2'	3'
P. I. (Overt	ourden)	12	S.N.P.	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	25,000 plus	4,000	450,000	unlimited
Los Angele	es Wear	37.6		39.6	28.2
Soundness	Loss	33.8	-	1.5	0.7
Average M	aximum Size	12"	-	5"	-
% Retained	1 on 2" Sieve	28		45	-
	Crushed to:	as received	as received	/2"	1 ''
	2"	70	-	100	-
Pit	1"	56	-	85	100
Average	1/2"	42	no.10: 100	48	54
% Passing	No. 4	30	no.40: 95	27	22
	No. 10	24	no.80: 45	19	13
	No. 200	I	no.200: 8	б	2
Plasticity I	ndex	N.P.	N.P.	N.P.	N.P.
Domorka	I				

Remarks:

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Pit Numbe	r	0729	
	Section	not sectionalized	
Location	Township & Range	Antonio Martinez Grant	
	County	Taos	
Formation		QTg	н
Rock Type		sand & gravel	
Source Ro	ck (Gravel)	sandstone & various	
Quality of	Material	good	0 Q
Thickness	of Material	15'	. 1.0
Thickness	of Cap (Caliche)		.0 - 0.
Material U	nderlying Formation	basal†	
Vegetation		grass	
Local Terr	ain	rolling	
Thickness	of Overburden	2-6'	
P. I. (Over	ourden)	S.N.P.	
Estimated	Quantity (cu. yds.)	440,000	
Los Angele	es Wear	46.8	·
Soundness	Loss	15.4	1
Average M	aximum Size	5"	-
% Retained	1 on 2" Sieve	21	.1
	Crushed to:	as received	
	2"	1 77	
Pit	1"	50	в
Average	1/2"	40	
% Passing	No. 4	31	
	No. 10	25	
	No. 200	6	
Plasticity I	ndex	N.P.	

Remarks:

QUAD No.20

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MATERIAL PIT SUMMARY

Pit Numbe	er i l	5427	5429	5453	5480
	Section	SF 1/4 23	W 1/2 14	SW 1/1 32	SE 1/4 31
Location	Township & Range	16N 8F	15N 7E	17N 9F	17N 9E
	County	Santa Fe	Santa Fe	Santa Fe	Santa Fe
Formation	· · · · · · · · · · · · · · · · · · ·	OTsf	QC	0al	Q+(2)
Rock Type	e	sand & gravel	cinders	sand & gravel	sand & gravel
Source Ro	ck (Gravel)	granite & guartzite	-	granite & various	granite & various
Quality of	Material	aood	fair	good to excellent	good to fair
Thickness	of Material	12' plus	85' plus	8' nlus	9' plus
Thickness	of Cap (Caliche)		0-1'	-	
Material U	nderlying Formation	volcanics & silt	basal†		clay
Vegetation	1	arass	grass	sade	scattered juniper
Local Terr	ain	hilly	hill top	river bottom	hilly
Thickness	of Overburden	0-3'	0-1 *	0-3'	0-3'
P. I. (Overl	burden)	S.N.P.	N.P.	S.N.P.	S.N.P.
Estimated	Quantity (cu. yds)	325,000 plus	100,000 plus	225,000 plus	300,000 plus
Los Angele	es Wear	29.6	38.4	35.2	34.8
Soundness	Loss	4.9	2.8	3.6	5.5
Average M	aximum Size	5"	6"	5"	4"
% Retained	d on 2" Sieve	24	20	21	32
	Crushed to:	as received	as received	as received	as received
	2"	96	95	95	80
Pit	1"	84	70	88	64
Average	1/2"	69	52	76	55
% Passing	No. 4	51	20	6	44
	No. 10	39	8	47	33
	No. 200	5		2	/
Plasticity I	ndex	N.P.	N.P.	N.P.	N•P•
Remarks:					
			_		
Pit Numbe	er	54137	5568	5574	5629
	Section	NE 1/4 14	SW 1/4 18	SE 1/4 8	NE 1/4 12
Location	Township & Range	19N 8E	20N 9E	<u>19N 9E</u>	20N 8E
_	County	Santa Fe	Santa Fe	Santa Fe	Santa Fe
Formation	1 .	Qist ,	QIST		Qal
Rock Typ	e	sand & gravel	sand & gravei		sand & gravel
Source Ro	CK (Gravel)	various	various	granne & quarizite	quarizite & various
Quality of	Material		201		
Thislans	of Material	10.	20_p1us		J' prus
Matarial II	of Cap (Canche)			cil+	_
Vagetation	inderlying Formation	arace & costtored juniper	arass	arass	cottonwoods
L cool Torr	l	billy	hilly	hilly	river bottom
Thickness	af Overhunden	-3!	0-61	0-4	0-31
P I (Ouer	hurden)	7	S.N.P.	7	S.N.P.
Fetimated	Quantity (ou vds)	7 350,000 plus	500,000 plus	150,000	275.000 plus
Los Angel	es Wear		49.6	42.8	48.0
Soundness	Loss	6 Q	19.3	2.4	2.8
Average M	aximum Size	8"	611	<u>4</u> ¹¹	<u>4</u> "
i i i i i i i i i i i i i i i i i i i					
% Retained	d on 2" Sieve	 15	<u>_</u>	31	

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N.P.

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N.P.

Remarks: 54137: Material pits 54136 & 54138 nearby. 5629**:**

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Water at 3'.

2"

1"

1⁄2"

No. 4

No. 10

No. 200

Pit

Average

% Passing

Plasticity Index

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MATERIAL PIT SUMMARY

Pit Number		5769	57107	58124	5909
<u> </u>	Section	not sectionalized	SE 1/4 15 S	SE 1/4 6	S 1/2 2
Location	Township & Range	Santa Fe Natl. Forest	19N 7E	19N 9E	16N 8E
F	County	Los Alamos	Santa Fe	Santa Fe	Santa Fe
Formation	1	0n	OTa (Dal	Q+(1)
Rock Type	e	gravel	sand & gravel	sand & gravel	sand & gravel
Source Roc	ck (Gravel)	rhyolite	volcanics & various	ranite & various	granite & various
Quality of	Material		excellent	and	excellent
Thickness (of Material		551		
Thickness (of Can (Caliche)	20° prus	-		
Matarial II	nderlying Formation		-	_	
Vagatation			souttored junipor	-	
Vegetation	1	pine	scarrered juiriper c	COTTONWOOds	grass & sage
Local Terra		mountainous		river bottom	river terrace
Thickness c	of Overburden	0-6'		[t	5'
P. I. (Overb	burden)	10	5.N.P. <u>5</u>	S.N.P.	<u>8-N.P.</u>
Estimated (Quantity (cu. yds)	250,000 plus	375,000 plus	250,000 plus	250,000 plus
Los Angele	es Wear	68.0	25.5	37.6	34.4
Soundness	Loss	20.7	5.1	2.3	4.9
Average M2	aximum Size	-	10"	5"	6"
% Retained	d on 2" Sieve	_	33	18	36
1	Crushed to:	as received	as received a	as received	as received
F	2"	56	81	93	72
Pit +	1"	40	67	81	59
Average	1/2"	32	58	69	46
% Passing	No 4	24	47	57 57	<u> </u>
/0 I assing	No. 4		47	30	
Ļ	NO. 10		40		<u> </u>
	No. 200	5	0	6	/
	5909: water	at 5'			
	5909: water	at 5'			6710
Pit Numbe	5909: water	6009	6032	6314	6318 NW 174 8
Pit Numbe	5909: water er Section	6009 SE 1/4 20 & NE 1/4 29	6032 SW 1/4 5	6314 SE 1/4 19	6318 NW 174 8
Pit Number	5909: water er Section Township & Range	6009 SE 1/4 20 & NE 1/4 29 16N 6E	6032 SW 1/4 5 19N 9E	6314 SE 1/4 19 20N 8E	6318 NW 1/4 8 19N 9E
Pit Numbe Location	5909: water er Section Township & Range County	6009 SE 1/4 20 & NE 1/4 29 I6N 6E Sandoval	6032 SW 1/4 5 19N 9E Santa Fe	6314 SE 1/4 19 20N 8E Rio Arriba	6318 NW 1/4 8 19N 9E Santa Fe
Pit Numbe Location Formation	5909: water er Section Township & Range County	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3)	6032 SW 1/4 5 19N 9E Santa Fe Qal	6314 SE 1/4 19 20N 8E Rio Arriba Qal	6318 NW 1/4 8 I9N 9E Santa Fe Qal
Pit Numbe Location Formation Rock Type	5909: water er Section Township & Range County n e	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel
Pit Numbe Location Formation Rock Type Source Roc	5909: water er Section Township & Range County n e bock (Gravel)	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite
Pit Numbe Location Formation Rock Type Source Roc Quality of	5909: water er Section Township & Range County n e bock (Gravel) Material	6009 SE 1/4 20 & NE 1/4 29 I6N 6E Sandoval Qt(3) gravel various excellent	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of	5909: water er Section Township & Range County n e bock (Gravel) Material of Material	6009 SE 1/4 20 & NE 1/4 29 I6N 6E Sandoval Qt(3) gravel various excellent 23' plus	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 1]'	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Thickness of	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche)	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus -	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11'	6318 NW 1/4 8 I9N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Material Un	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus -
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Material Un Vegetation	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n	6009 SE 1/4 20 & NE 1/4 29 I6N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Material Un Vegetation Local Terra	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material Un Vegetation Local Terra Thickness	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10'	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4'	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4'	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2'
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. L. (Over-	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P.	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P.	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P.
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overther States of P. I. (In the sta	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden cburden)	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300 000 plus	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250 000	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15.000
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overthe Estimated	5909: water er Section Township & Range County n e ock (Gravel) Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.)	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38 4	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36 4	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38 9
Pit Numbe Location Formation Rock Type Source Roc Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overth Estimated Los Angele	5909: water er Section Township & Range County n e cock (Gravel) Material of Cap (Caliche) Inderlying Formation n rain of Overburden cburden) Quantity (cu. yds.) es Wear	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4 7
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overth Estimated of Los Angele Soundness	5909: water section Township & Range County a e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3"	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3"
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material U Vegetation Local Terra Thickness of P. I. (Overthe Estimated O Los Angele Soundness Average Material	5909: water section Township & Range County n e ock (Gravel) Material of Cap (Caliche) Inderlying Formation n rain of Overburden tburden) Quantity (cu. yds.) es Wear s Loss laximum Size	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6"	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3"	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent Il' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 56'	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3"
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material UI Vegetation Local Terra Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Material Of % Retained	5909: water section Township & Range County a e ock (Gravel) Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6'' 30	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36'' 15	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Thickness of Material UI Vegetation Local Terra Thickness of P. I. (Overth Estimated O Los Angele Soundness Average Ma % Retained	5909: water section Township & Range County n e ock (Gravel) Material of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to:	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36" 15 as received	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material U Vegetation Local Terra Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Ma % Retained	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2"	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36" 15 as received 87	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84
Pit Numbe Location Formation Rock Type Source Roo Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Ma % Retained Pit	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1"	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79 66	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72 56	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36" 15 as received 87 79	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84 75
Pit Numbe Location Formation Rock Type Source Rod Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Ma % Retained Pit Average	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1" ½"	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79 66 56	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72 56 45	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & gravel igneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36" 15 as received 87 79 65	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84 75 63
Pit Numbe Location Formation Rock Type Source Rod Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Ma % Retained Pit Average % Passing	5909: water er Section Township & Range County n e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Q+(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79 66 56 47	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72 56 45 33	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & qravel iqneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36'' 15 as received 87 79 65 37	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84 75 63 50
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness of Material Un Vegetation Local Terra Thickness of P. I. (Overt Estimated of Los Angele Soundness Average Ma % Retained Pit Average % Passing	5909: water er Section Township & Range County n e Ock (Gravel) Material of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79 66 56 47 40	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72 56 45 33 26	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & qravel iqneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36'' 15 as received 87 79 65 37 21	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84 75 63 50 39
Pit Numbe Location Formation Rock Type Source Roy Quality of Thickness of Material Un Vegetation Local Terri Thickness of P. I. (Overthe Estimated of Los Angele Soundness Average Ma % Retained Pit Average % Passing	5909: water er Section Township & Range County n e Ock (Gravel) TMaterial of Cap (Caliche) Underlying Formation n rain of Overburden burden) Quantity (cu. yds.) es Wear s Loss laximum Size d on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	6009 SE 1/4 20 & NE 1/4 29 16N 6E Sandoval Qt(3) gravel various excellent 23' plus - silt grass & scattered juniper hilly 0-10' 6 350,000 plus 30.0 2.35 6" 30 as received 79 66 56 47 40 4	6032 SW 1/4 5 19N 9E Santa Fe Qal sand & gravel granite & various good 6' plus - silt grass & scattered junipe river bottom 0-4' S.N.P. 300,000 plus 38.4 4.7 3" 10 as received 72 56 45 33 26 6	6314 SE 1/4 19 20N 8E Rio Arriba Qal sand & qravel iqneous excellent 11' - silt r juniper mountainous 0-4' S.N.P. 250,000 36.4 6.4 36'' 15 as received 87 79 65 37 21 2	6318 NW 1/4 8 19N 9E Santa Fe Qal sand & gravel granite & quartzite excellent 5' plus - - cottonwood & willow tree river bottom 0-2' S.N.P. 15,000 38.9 4.7 3" 10 as received 84 75 63 50 39 5

Remarks:

6032: water at 4'



QUAD No. 42

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QUAD No. 43

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QUAD No. 55

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QUADRANGLE PAGE 55 (1)

MATERIAL PIT SUMMARY

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Pit Number	5570	5602	5603	5910
Section	CW 1/4 03		SF 1/4 23	SW 27 & SF 28
Leastion Township & Bange	SW 174 22	ON LOE		9N LOF
Location Township & Range	9N 11E	SINTUE		Torrance
County	lorrance	lorrançe	Iorrance	
Formation	Psa	Qa I	Val	
Rock Type	limestone	sand & gravel	sand & gravel	sano a gravei
Source Rock (Gravel)	-	various	limestone & quartzite	variable
Quality of Material	excellent	aood	fair	fair
Thickness of Material	12'	5-15'	5-15'	15'
Thickness of Cap (Caliche)	0-1'	-	–	0-2'
Material Underlying Formation	sandstone	sandstone & shale	sandstone & silt	sandstone & silt
Vegetation		drace	arass	grass
Local Terrain		arrovo bottom	arrovo bottom	arrovo bottom
Thickness of Overburden				1-6'
B L (Overburden)	1-4			N.P8
F. f. (Overbuilden)	9			200,000
Estimated Quantity (cu. yus)	100,000	60.000 plus		33 6
Los Angeles wear	24.0	36.2	58,0	
Soundness Loss	9.4	9.6	1,2	0.1
Average Maximum Size	-	2"	2"	2
% Retained on 2" Sieve	-	8	, 7	5
Crushed to:	3/4"	as received	as received	as received
2"	100	93	95	93
Pit 1"	100	82	83	81
Average ¹ /2"	71	65	70	67
% Passing No. 4	29	10	49	49
No. 10	20	72	37	40
No. 200			5	3
Di stata Latan	Ζ.	v N D		
Plasticity Index	N,P,	N,P,	N • F •	N•1 •
Remarks:				
Pit Number	5911	5914	5916	5922
Pit Number	5911 NW 1/4 7	5914 SW 1/4 13	5916 NE 1/4 33	5922 NE 1/4 1
Pit Number Section Location Township & Range	5911 NW 1/4 7 8N 10E	5914 SW 1/4 13 9N 9E	5916 NE 1/4 33 9N 9E	5922 NE 1/4 1 7N 12E
Pit Number Section Location Township & Range County	5911 NW 1/4 7 8N 10E Torrance	5914 SW 1/4 13 9N 9E Torrance	5916 NE 1/4 33 9N 9E Torrance	5922 NE 1/4 1 7N 12E Torrance
Pit Number Section Location Township & Range County Formation	5911 NW 1/4 7 8N 10E Torrance	5914 SW 1/4 13 9N 9E Torrance Obd	5916 NE 1/4 33 9N 9E Torrance pG	5922 NE 1/4 1 7N 12E Torrance .pGg
Pit Number Section Location Formation Rock Type	5911 NW 1/4 7 8N 10E Torrance n <u>p</u> Eq quartzite	5914 SW 1/4 13 9N 9E Torrance Obd sand & gravel	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel	5922 NE 1/4 1 7N 12E Torrance .pGq guartzite
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	5911 NW 1/4 7 8N 10E Torrance p <mark>Eq</mark> quartzite	5914 SW 1/4 13 9N 9E Torrance Obd sand & gravel various	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various	5922 NE /4 7N 2E Torrance p6q quartzite
Pit Number Section Location Formation Rock Type Source Rock (Gravel)	5911 NW 1/4 7 8N 10E Torrance .pGq quartzite - excellent	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good	5922 NE /4 7N 2E Torrance pEq quartzite - excellent
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus	5914 SW 1/4 13 9N 9E Torrance Obd sand & qravel various fair 10'	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Con (Calicha)	5911 NW 1/4 7 8N 10E Torrance .pGq quartzite - excellent 30' plus	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10'	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus
Pit Number Location Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation	5911 NW 1/4 7 8N 10E Torrance .pGq quartzite - excellent 30' plus -	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' -	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVariation	5911 NW 1/4 7 8N 10E Torrance quartzite excellent 30' plus quass	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance pGq quartzite - excellent 40' plus
Pit NumberLocationSectionLocationTøwnship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TempinLocal Tempin	5911 NW 1/4 7 8N 10E Torrance quartzite excellent 30' plus grass billy	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous
Pit Number Section Location Township & Range County County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Example 100	5911 NW 1/4 7 8N 10E Torrance quartzite excellent 30' plus grass hilly	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5'	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4'
Pit NumberSectionLocationTownship & Range CountyFormationCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenPortion	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - grass hilly	5914 SW 1/4 13 9N 9E Torrance Obd sand & qravel various fair 10' - silt & clay grass rolling 0-9'	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N P	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - grass hilly -	5914 SW 1/4 13 9N 9E Torrance Obd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500 000
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - grass hilly - 500,000	5914 SW 1/4 13 9N 9E Torrance Obd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N.P. 200,000 plus	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24 0
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles Wear	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - grass hilly - 500,000 20.0	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness Loss	5911 NW 1/4 7 8N 10E Torrance _pGq quartzite 	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7
Pit NumberLocationSectionLocationTownship & RangeCountyCountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum SizeSoundness	5911 NW 1/4 7 8N 10E Torrance _n_6q quartzite 	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2"	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5	5922 NE 1/4 1 7N 12E Torrance pGq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7
Pit NumberLocationSectionLocationTøwnship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" Sieve	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - grass hilly - 500,000 20.0 0.3 -	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 -	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: Crushed to:	5911 NW 1/4 7 8N 10E Torrance quartzite excellent 30' plus grass hilly 500,000 20.0 0.3 ["	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received	5916 NE 1/4 33 9N 9E Torrance pE sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - -
Pit Number Section Location Township & Range County Formation Rock Type Source Rock (Gravel) Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve Crushed to: 2" 2"	5911 NW 1/4 7 8N 10E Torrance pGq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - 1" 100	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 nlus 25.6 4.5 	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - -
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2'' SieveCrushed to: 2''2''Pit1''	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - 1" 100 100	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 1"	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1"
Pit NumberSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"2"Pit1" 4"	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - 1" 100 100 58	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 - - 1"	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1"
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"Pit1" Average½"% Passing% PassingNo. 4	5911 NW 1/4 7 8N 10E Torrance pEq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - !" 100 100 58 21	5914 SW 1/4 13 9N 9E Torrance Obd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85 71	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus - clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 - - 1"	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1"
Pit NumberLocationSectionLocationTownship & Range CountyFormationRock TypeSource Rock (Gravel)Quality of MaterialQuality of MaterialThickness of MaterialThickness of MaterialThickness of Cap (Caliche)Material Underlying FormationVegetationLocal TerrainThickness of OverburdenP. I. (Overburden)Estimated Quantity (cu. yds.)Los Angeles WearSoundness LossAverage Maximum Size% Retained on 2" SieveCrushed to: 2"2"Pit1"Average½"% PassingNo. 4No. 10No. 10	5911 NW 1/4 7 8N 10E Torrance pGq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - !" 100 100 58 21 11	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85 71 62	5916 NE 1/4 33 9N 9E Torrance p6 sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance p6q quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1"
Pit NumberLocationSection Township & Range CountyFormation Rock TypeSource Rock (Gravel)Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" Sieve% Retained on 2" Sieve % Pit% Passing % No. 4 No. 10 No. 200	5911 NW 1/4 7 8N 10E Torrance pGq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - I'' 100 100 58 21 11 1	5914 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85 71 62 12	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus clay & silt grass rolling 0-5' N.P. 200,000 plus 25.6 4.5 - 1"	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1"
Pit NumberLocationSection Township & Range CountyFormation Rock TypeSource Rock (Gravel)Quality of Material Thickness of Material Thickness of Cap (Caliche) Material Underlying Formation Vegetation Local Terrain Thickness of Overburden P. I. (Overburden) Estimated Quantity (cu. yds.) Los Angeles Wear Soundness Loss Average Maximum Size % Retained on 2" SieveØreitation Crushed to: 2" PitØreitation P. I.Outress Outress Outress Outress Outress Outress Material Outress <b< td=""><td>5911 NW 1/4 7 8N 10E Torrance pGq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - !" 100 100 58 21 11 1 N.P.</td><td>59.14 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85 71 62 12 N.P.</td><td>5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus </td><td>5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1" - 100 33 13 7 1 N.P.</td></b<>	5911 NW 1/4 7 8N 10E Torrance pGq quartzite - excellent 30' plus - - grass hilly - 500,000 20.0 0.3 - - !" 100 100 58 21 11 1 N.P.	59.14 SW 1/4 13 9N 9E Torrance Qbd sand & qravel various fair 10' - silt & clay grass rolling 0-9' N.P 15 500,000 plus 37.2 6.7 2" 3 as received 97 92 85 71 62 12 N.P.	5916 NE 1/4 33 9N 9E Torrance pG sand & gravel granite & various good 10' plus 	5922 NE 1/4 1 7N 12E Torrance pEq quartzite - excellent 40' plus - juniper mountainous 0-4' 32 500,000 24.0 0.7 - - 1" - 100 33 13 7 1 N.P.

MATERIAL PIT SUMMARY

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Pit Numbe	er '	6119	6120	6443	0758
	Section	NW 1/4 26	NW 1/4 22	NF 1/4 33	NW 1/4 9
Location	Township & Range	9N 11F	9N 12W		7N 10F
	County	Torrance	Torrance		
Formation	· · · · · · · · · · · · · · · · · · ·	Pca			
Rock Type	A				
Source Ro	ck (Gravel)	Timestone	sand & gravel	sand & gravel	DIOW Sand
Ouality of	Matarial		various	variable	
Quality of	Material	good	good	good	good
Thislass	of Material	<u> </u>	9-12'	<u> </u>	8' plus
I nickness (or cap (calicne)	0-1'			-
Material U	nderlying Formation	<u>sandstone</u>	<u>limestone & sandstone</u>	<u> clay & silt </u>	silt
Vegetation	1	juniper	grass	qrass	grass & sage
Local Terra	ain	hilly	rolling	rollina	flat
Thickness	of Overburden	2'	2-8'	0-4.5'	1,
P. I. (Overb	b urden)	9	12	N.P.	S.N.P.
Estimated	Quantity (cu. yds)	200.000 plus	100.000	200.000 plus	50.000 plus
Los Angele	es Wear	cal./1s: 26.4 1s:23.2	30.0	31.6	
Soundness	Loss	3 0	5.0	1 73	_
Average Ma	aximum Size	2.0			_
% Retained	1 on 2" Sieve	_			-
]	Crushed to	-		Less Than 1	-
ŀ	2 ^{''}	L	as received	as received	as received
Pit I	1"	-	100	100	-
4 IL	1/22	100	91	98	-
Average	¹ /2 ¹¹	49	78	89	no.10: 100
% Passing	No. 4	22	57	61	no.40: 98
	No. 10	13	47	43	no.80: 73
	No. 200	3	8	8	no.200: 25
Plasticity I	ndex	4	N.P.	N.P.	N P
Pit Number	er	0759	0760	0761	0762
1	Section	NW 1/4 24	NF 1/4 30		V_{102}
Location	Township & Range	7N IIE	7N 13E	7N 13E	Z 172 JJ 7N 135
1	County	Torrance	Torrance	Torrance	
Formation		On		Og	Dula
Rock Type	, a	aravel	QOD .	YY Sand I anaval	PVIS
Source Roo	ck (Gravel)	quartzite & various	gravei		limestone
Ouslity of	Matarial	qualizite a various	quartzite	quartzite	-
Quality of			good	excellent	good
Th: -!-		2 prus	1-81	201	12' plus
I nickness o	or cap (Caliche)	-	-	—	-
Material Ur	nderlying Formation	SIIT	çaliche soil	sil†	sandstone
Vegetation	L	grass	grass_	qrass	grass
Local Terra	ain	rolling	hilly	rollinq	flat
Thickness of	of Overburden	0-1'	0-11	0-5'	l' plus
P. I. (Overt	burden)	S.N.P.	S.N.P.	S.N.P.	· · · · · · · · ·
Èstimated (Quantity (cu. yds.)	100,000	200,000 plus	300.000 nlus	50,000 plus
Los Angele	es Wear	20.2	26.0	24.8	41.2
Soundness	Loss	4.9	0 7	7	
Average Ma	aximum Size	3"	2.1 ZH	л. і б ^{іі}	10.1
% Patoinad	Lon 2" Siavo	- 9		15	•
/ Netained	Crushed to:				
ł	Crusned to:		as received	as received	I''
		94	89	94	=
Pit	1"	/4	68	79	100
Average	1/2"	56	54	61	59
% Passing	No. 4	39	40	40	24
	No. 10	34	33	32	13
			-		
	No. 200	20	17	6	4
Plasticity Ir	No. 200 ndex	20 N.P.	17 N.P.	6 N.P.	4 N.P.

MATERIAL PIT SUMMARY

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Pit Number	0763	0764	0765	0766
Section	SE 1/4 4	E 1/2 8	NE 1/4 31	SE 1/4 12
Location Township & Rang	e 6N 12E	5N 13E	5N 12E	5N 10E
County	Torrance	Torrance	Torrance	Torrance
Formation	pE	Qpc	Qbd	Qbd
Rock Type	granitic gneiss	cal.cap soft nod.cal.	gravel	sand & gravel
Source Rock (Gravel)	_	- caliche	caliche	limestone & various
Quality of Material	fair	good fair	fair	good
Thickness of Material	25' plus	2' 3' plus	101	13'
Thickness of Cap (Caliche)		2' -	_	- ⁻ I
Material Underlying Formation	1 _	soft cal. sandstone	clay	clay
Vegetation	grass	arass arass	grass	grass
Local Terrain	hilly	rolling rolling	rolling	flat
Thickness of Overburden	0-1'	0-2' 0-2'	0-11	0-3'
P. I. (Overburden)	S.N.P.	S.N.P. S.N.P.	7	S.N.P.
Estimated Quantity (cu. yds)	unlimited	50.000 100.000	75.000	300.000 plus
Los Angeles Wear	15.5	29.6 34.2	26.6	44.3
Soundness Loss	1.2	9.5 22.5	4.1	5.1
Average Maximum Size	_	- 4"	1"	1/2"
% Retained on 2" Sieve	_	- 10	2	
Crushed to:	1 11	l" as received	as received	as received
2"	· · _	- 92	100	100
Pit 1"	100	100 77	99	98
Average ¹ /2"	45	63 67	89	90
% Passing No. 4	18	24 52	61	66
No. 10		13 43	46	39
No. 200		3 20	7	2
Plasticity Index	N P.	N.P. N.P.	N.P.	N.P. 1
Remarks:	.] 14.7.			
· · •	,			j
Pit Number	0767	0768		
Section	SW 1/4 25	27		
Location Township & Rang	se 5N IOE	4N IOE		· · · · ·
County	Torrance	Torrance		а
Formation	Qьd	pe		
Rock Type	sand & gravel	granite		
Source Rock (Gravel)	various	-		
Quality of Material	good	good		
Thickness of Material	10'	85' plus		
Thickness of Cap (Caliche)	— —	-		
Material Underlying Formation	SIIT	-		
Vegetation	grass	grass		-
Local Terrain	rolling	niliy		-
Thickness of Overburden		-		-
P. I. (Overburden)	3.N.T. 255.000	- unlimited	н. Н	
Estimated Quantity (cu. yds.)				
Los Angeles Wear	42.0			·
Soundness Loss	1.9	-		
Average Maximum Size		_		-
70 Retained on 2 Sieve		1 ''		· · · · ·
Crushed to:		·		•
D:4 1.2	100	-		1
r'it 1" Average 1/?"	77 07	100 /7		· · · · · ·
Average 72	۲۵ ۲۵	4 / 22		1
70 rassing No. 4		22		ł
INO. 10	04	ر ا ح		
No. 200 Plasticity Index				ł
Plasticity Index	N.T.	IN • T •		
ACIMARKS.				

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	Qal	Alluvium	•	Developed Pit or Quarry
	Qe	Eolian sand	•//*	Prospect Pit or Quarry Fault Downthrown side Selected exploration site
	Qe	Eolian deposits		
×	000 8010	Landslide debris		
JATERNAR		Lake deposits		
õ	Qab	Bolson deposits		
		Terrace deposits (post-glacial)		
	Qp	Pediment deposits		
	Qpc	Pediment deposits Caliche capped fine grained		
	Qpcg	Pediment deposits Caliche capped coarse grained		
TERTIARY	{	Intrusive Rocks undivided		
TRIASSIC	Tes	Lower Triassic rocks (inc. Santa Rosa)		
	Pb	Bernal Formation		
	Psq	San Andres Limestone		
PERMIAN	< Pg	Glorieta Sandstone		
	Ру	Yeso Formation		
	Pyl	Yeso Limestone		



QUAD No. 66

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MATERIAL PIT SUMMARY

			5700		5732	5733	5734	
I P	it Number	i	5729		SW 1/4 30	SW 1/4 15	NF 1/4 10	1
		Section	NE 1/4 11				2N 11E	
I	ocation	Township & Range	IN 12E		IN ISE			
	1	County	Torrance		Torrance	lorrance	Iorrance	
···· F	ormation		Opc		Psa	Qpcg	Qe	
- T	lock Type		caliche		limestone	caliche & gravel	sand	
-	COCK Type	Ir (Crowal)	carrene		_	various	-	
2	ource Roc	K (Graver)			excellent	excellent	good	
(Juality of M	Materiai	fair to poor	1 II.			9 I	
_]	Thickness o	of Material	3-6'		15 prus			•
']	Thickness o	of Cap (Caliche)	1*		=		cond & cilt	
1	Material Un	derlying Formation	sand & silt		sandstone	sand & SIIT		
•	legetation		arass		pinon	grass & pinon	mesquite	
. 1	Local Terra	in	flat to rolling		hilly	hilly	rolling	
	Chickness c	of Overburden	11		0-2'	0-3'	1	1
1	I I (Ouerh	urden)			S.N.P.	S.N.P.	S.N.P.	
		Quinten)			500 000	100.000 plus	75.000	
1	stimated	Quantity (cu. yos)	50,000	65 6	26 1	20.8	_	
	Los Angele	s Wear	cap: 33.6 soft callene:	09.0	20.4	7 6	_	
1	Soundness	Loss	-		1.0	J. 0		
	Average Ma	aximum Size	-		-	5"	-	
	% Retained	on 2" Sieve	-			25		
	I	Crushed to:	11		1 **	as received	as received	
	F	2"	-		-	78	-	1
	Pit	- 1"	100		100	68	-	
	A	1/37	55		63	60	_	·
	Average	72			24	50	_	
	% Passing	No. 4	34			41	100	
		No. 10	21		14	41	13	1.1
		No. 200	4		Ζ			1.1
	Plasticity I	ndex	N.P.		N.P.	N. P.		
	Remarks.							
					5000	50115	001	
	Pit Numbe		5762		5990 SW 174-14	59115 NG 1 (4 4	001 NE 1/4 36	
	Pit Numbe	er Section	5762 SW 1/4 3		5990 SW 1/4 14	59115 NE 1/4 4	001 NE 1/4 36 2N 135	
	Pit Numbe	er Section Township & Range	5762 SW 1/4 3 2N 11E		5990 SW 1/4 14 IS 12E	59115 NE 1/4 4 2N 11E	001 NE 1/4 36 2N 13E	
	Pit Numbe	er Section Township & Range County	5762 SW I/4 3 2N IIE Torrance		5990 SW 1/4 14 IS 12E Lincoln	59115 NE 1/4 4 2N 11E Torrance	001 NE 1/4 36 2N 13E Torrance	
	Pit Number Location	er Section Township & Range County	5762 SW 1/4 3 2N IIE Torrance Qe		5990 SW 1/4 14 IS 12E Lincoln Qp	59115 NE 1/4 4 2N 11E Torrance Qe	001 NE 1/4 36 2N 13E Torrance Qpc	
	Pit Number Location Formation	er Section Township & Range County	5762 SW 1/4 3 2N 11E Torrance Qe sand		5990 SW 1/4 14 IS 12E Lincoln Qp gravel	59115 NE 1/4 4 2N 11E Torrance Qe sand	001 NE 1/4 36 2N 13E Torrance Qpc caliche	
	Pit Numbe Location Formation Rock Typ	er Section Township & Range County n e ook (Gravel)	5762 SW /4 3 2N E Torrance Qe sand		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone	59115 NE I/4 4 2N IIE Torrance Qe sand	001 NE 1/4 36 2N 13E Torrance Qpc caliche	
	Pit Numbe Location Formation Rock Typ Source Ro	er Section Township & Range County n ee bock (Gravel)	5762 SW 1/4 3 2N 11E Torrance Qe sand -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good	59115 NE 1/4 4 2N 11E Torrance Qe sand - good	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of	er Section Township & Range County n ee ock (Gravel) f Material	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 41		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5'	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5'	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness	er Section Township & Range County n ee ock (Gravel) f Material of Material	5762 SW 1/4 3 2N IIE Torrance Qe sand - good 4'		5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good 10' plus 0-2'	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5'	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18"	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Thickness	er Section Township & Range County n ee ock (Gravel) f Material of Cap (Caliche)	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4'		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' Limestone	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U	er Section Township & Range County n ee bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation	er Section Township & Range County n e bock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter	er Section Township & Range County n e bck (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good i0' plus O-2' limestone pinon hilly	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling 1'	
	Pit Number Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness	er Section Township & Range County n ee bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1'	· · · · · · · · · · · · · · · · · · ·	5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good 10' plus O-2' limestone pinon hilly O-4'	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2'	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S N P	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter. Thickness P. I. (Over	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Juderlying Formation n rain of Overburden rburden)	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P.		5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good 10' plus O-2' limestone pinon hilly O-4' 8	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P.	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P.	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated	er Section Township & Range County n e bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.)	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000		5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good 10' plus O-2' limestone pinon hilly O-4' 8 75,000 plus	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material L Vegetation Local Ter. Thickness P. I. (Over Estimated Los Ange	er Section Township & Range County n ee bock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 -		5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel	er Section Township & Range County n ee ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 -		5990 SW 1/4 14 IS 12E Lincoln Qp grave1 limestone good i0' plus O-2' limestone pinon hilly O-4' 8 75,000 plus 24.0 3.2	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes	er Section Township & Range County n ee ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good i0' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8"	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes Average M	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) i Quantity (cu. yds.) les Wear s Loss Maximum Size od on 2" Siava	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good i0' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8"	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 -	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retaine	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) 1 Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2'' Sieve	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - as received		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - -	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter. Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retaine	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) 1 Quantity (cu. yds.) les Wear s Loss Maximum Size od on 2'' Sieve Crushed to:	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - as received		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 -	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter. Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retaine	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size od on 2'' Sieve Crushed to: 2''	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - as received		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received -	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 1" -	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter. Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retaine Pit	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Juderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1"	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - as received -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 70	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 1" -	
	Pit Number Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retained Pit Average	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size od on 2" Sieve Crushed to: 2" 1" $\frac{1}{2}$ "	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - - as received -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 79 46	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 1" -	
	Pit Number Location Formation Rock Typ Source Rc Quality of Thickness Material U Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retainer	er Section Township & Range County ne ock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - - as received -		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 79 46	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received -	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 1" -	
	Pit Numbe Location Formation Rock Typ Source Rc Quality of Thickness Material L Vegetation Local Ter Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retained Pit Average % Passing	er Section Township & Range County ne bock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - - as received - 100		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 79 46 35	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received - - 100	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 100 54 21 12 2	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material L Vegetation Local Ter. Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retaine Pit Average % Passing	er Section Township & Range County n e bock (Gravel) f Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - - as received - 100 13		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 79 46 35 14	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received - - 100 50	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 100 54 21 12 2	
	Pit Numbe Location Formation Rock Typ Source Ro Quality of Thickness Thickness Material U Vegetation Local Ter. Thickness P. I. (Over Estimated Los Angel Soundnes Average M % Retained Pit Average % Passing Plasticity	er Section Township & Range County n ee ock (Gravel) f Material of Material of Cap (Caliche) Jnderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss Maximum Size od on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Index	5762 SW 1/4 3 2N 11E Torrance Qe sand - good 4' - sand & silt mesquite rolling 1' S.N.P. 50,000 - - - as received - 100 13 S.N.P.		5990 SW 1/4 14 IS 12E Lincoln Qp gravel limestone good 10' plus 0-2' limestone pinon hilly 0-4' 8 75,000 plus 24.0 3.2 8" - as received - 100 79 46 35 14 N.P.	59115 NE 1/4 4 2N 11E Torrance Qe sand - good 5' - silt pinon rolling 2' S.N.P. 25,000 - - as received - - 100 50 N.P.	001 NE 1/4 36 2N 13E Torrance Qpc caliche - good 5' 18" sand & silt grass flat to rolling l' S.N.P. 30,000 30.0 13.4 - - 100 54 21 12 2 N.P.	

Remarks:

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MATERIAL PIT SUMMARY

D'		000	003	03	032	
Pit Number	Easting		SW 1/4 34	NW 1/4 1	SE 1/4 9	
	Section	NW 1/4 25		2N 9F	3N IOE	
Location	Township & Range	IN IOE		Torrance	Torrance	
	County	Torrance	Iorrance		Obd	
Formation		Psa	PγI		and & araval	
Rock Type		limestone	limestone	limestone	sanu a graver	
Source Rock	k (Gravel)	_	<u> </u>	-	various	
Quality of M	faterial	excellent	fair	excellent	excellent	
Thickness of	f Material		51	15' plus	lo' plus	
Thickness of	f Can (Caliche)	i prus	-		-	
I hickness of	I Cap (Callelle)		cond & cilt	sandstone	gypy silt	
Material Uno	derlying Formation	sandstone		pinon	arass	
Vegetation		pinon	grass & pinon	prinon mountoinous	rolling plains	
Local Terrai	in	hilly	hilly	mountattious		
Thickness of	of Overburden	-4 '	-	-		
P. I. (Overbu	urden)	N.P.	-	-	N.F.	
Estimated O	Duantity (cu. vds)	500 000	100.000	500,000	120,000	
Los Angeles	Wear		40.4	35.2	32.0	
Los Angeles		21.0	19.6	3.5	4.2	
Sounaness I	LUS8	-	12.0	_	4"	
Average Ma	ximum Size	-	-		25	
% Retained	on 2" Sieve	, –	-			
Ţ	Crushed to:	11	1	1"	I .	
1	2"	_	-	-	-	
Pit +	1"	100	100	100	100	
Average	- 1⁄3"	13	73	61	77	
average	No A	4) 16	35	3	46	
% Passing	INO. 4		رر 22	23	34	
	No. 10	9	25		3	
+	No. 200	2			NP	
			N.P.	N. H.	IN • I •	
Plasticity Ir	ndex	, N.P.				
Plasticity Ir Remarks:	ndex	,N.P.				
Plasticity Ir Remarks:	ndex	, N.P.	034	035	036	
Plasticity Ir Remarks: Pit Number	ndex 	N.P.	034 NW 1/4 14	035 NE 1/4 24	036 SW 1/4 35	n
Plasticity Ir Remarks: Pit Number	ndex sr Section	N.P.	034 NW 1/4 14 3N 12E	035 NE 1/4 24 2N 12E	036 SW 1/4 35 2N 13E	
Plasticity Ir Remarks: Pit Number Location	ndex sr Section Township & Range	N.P. 1033 NE 1/4 4 3S 12E	034 NW 1/4 14 3N 12E Torrance	035 NE 1/4 24 2N 12E	036 SW 1/4 35 2N 13E Torrance	
Plasticity Ir Remarks: Pit Number Location	ndex sr Section Township & Range County	N.P. 1033 NE 1/4 4 3S 12E Lincoln	034 NW 1/4 14 3N 12E Torrance	035 NE 1/4 24 2N 12E Torrance	036 SW 1/4 35 2N 13E Torrance Pv1	
Plasticity Ir Remarks: Pit Numbe Location Formation	ndex sr Section Township & Range County	N.P. 1033 NE I/4 4 3S I2E Lincoln Ti	034 NW 1/4 14 3N 12E Torrance Qpc	035 NE 1/4 24 2N 12E Torrance Qpc	036 SW 1/4 35 2N 13E Torrance Py1 Limestone	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type	ndex sr Section Township & Range County 1 e	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite	034 NW 1/4 14 3N 12E Torrance Qpc caliche	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel	036 SW 1/4 35 2N 13E Torrance Py1 limestone	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro	ndex r Section Township & Range County t e e tock (Gravel)	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite	034 NW 1/4 14 3N 12E Torrance Qpc caliche	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel various	036 SW 1/4 35 2N 13E Torrance Pyl limestone	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type Source Ro Ouality of	ndex Fr Section Township & Range County t e tock (Gravel) Material	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel various good	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness	ndex r Section Township & Range County e ock (Gravel) Material of Material	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4'	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel various good 8'	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5'	а <u></u>
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness	ndex r Section Township & Range County e ck (Gravel) Material of Material of Can (Calicha)	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited	034 NW I/4 I4 3N I2E Torrance Qpc caliche - fair 4' I'	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel various good 8'	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5'	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Thickness	ndex Pr Section Township & Range County 1 e bock (Gravel) TMaterial of Material of Cap (Caliche) Indexlution Formation	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited -	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' 1' sand & silt	035 NE 1/4 24 2N 12E Torrance Qpc caliche & gravel various good 8' - sand & silty gravel	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U	ndex Section Township & Range County county Material of Material of Cap (Caliche) Underlying Formation	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited -	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' 1' sand & silt	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon	
Plasticity Ir Remarks: Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation	ndex Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) Underlying Formation	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon meuntainous	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr	ndex Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) Underlying Formation n	N.P. N.P. N.P. N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2'	и.
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness	ndex Section Township & Range County ce ck (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden	N.P. N.P.	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1'	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling -	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P.	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over	ndex Section Township & Range County County Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden)	N.P. N.P. N.P. N.P. N.P. N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1'	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50 000 plus	
Plasticity Ir Remarks: Pit Numbe: Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated	ndex Section Township & Range County County Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.)	N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' 1' sand & silt grass rolling 0-1' - 50,000 plus	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angelo	ndex Section Township & Range County County Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear	N.P. N.P. N.P. N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss	N.P. N.P. N.P. N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous O-3' 8 unlimited 26.4 2.8	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size	N.P. N.P. 1033 NE I/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4"	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 -	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roo Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) I Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sinva	N.P. N.P. 1033 NE I/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 -	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 -	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 -	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roy Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex Section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve [N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 -	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - -	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - - 1"	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roy Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex section Township & Range County e ck (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve [Crushed to: 	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - - "	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - -	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - -	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Roy Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex section Township & Range County e ck (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2"	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' -	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - -	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 1'' - 100	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1"	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - l'' - 100	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' -	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½"	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' - 100 60	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' - 100 75	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71 61	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71 28	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - good unlimited - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' - 100 60 19	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' - 100 75 31	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71 61 52	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71 28	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex Section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2'' Sieve Crushed to: 2'' 1'' ½'' No. 4 No. 10	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' - 100 60 19 9	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' - 100 75 31 19	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71 61 52 40	036 SW 1/4 35 2N 13E Torrance Py1 limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71 28 16	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer	ndex Section Township & Range County e ock (Gravel) Material of Material of Cap (Caliche) Inderlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' - 100 60 19 9 2	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' - 100 75 31 19 6	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71 61 52 40 6	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71 28 16 6	
Plasticity Ir Remarks: Pit Number Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele Soundness Average M % Retainer Pit Average % Passing	ndex Section Township & Range County e ock (Gravel) Material of Cap (Caliche) Underlying Formation n rain of Overburden rburden) Quantity (cu. yds.) les Wear s Loss faximum Size ed on 2" Sieve Crushed to: 2" 1" ½" No. 4 No. 10 No. 200 Under	N.P. N.P. 1033 NE 1/4 4 3S 12E Lincoln Ti rhyolite - grass & pinon mountainous 0-3' 8 unlimited 26.4 2.8 - I'' - 100 60 19 9 2 N P	034 NW 1/4 14 3N 12E Torrance Qpc caliche - fair 4' I' sand & silt grass rolling 0-1' - 50,000 plus 42.4 - I'' - 100 75 31 19 6 8	035 NE 1/4 24 2N 12E Torrance Opc caliche & gravel various good 8' - sand & silty gravel grass rolling - 250,000 plus 21.9 - 4" 20 as received 80 71 61 52 40 6 N.P.	036 SW 1/4 35 2N 13E Torrance Pyl limestone - good 5' - sand & silt pinon hilly 0-2' N.P. 50,000 plus 41.2 - 100 71 28 16 6 N.P.	

I.
CONSTRUCTION MATERIALS INVENTORY

58-01-11-1460-1

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i.

MATERIAL PIT SUMMARY

Pit Number	- '	Ī 037	038	039	040
' í	Section	SE 1/4 7	SW 1/4 31	NE 1/4 11	SW 1/4 26
Location	Townshin & Range			2S 12F	3S 12E
Location	County	ZN 14E	Lincoln	lincoln	lincoln
Formation	County		Pea	Psa	Psa
Post Tune		pond i gravel	limestone	limestone	limestone
Source Do	ht (Crovel)		- Intestorie	_	_
Ouslity of	Moterial	various	excellent	nood	excellent
Thickness	of Matarial				20' plus
Thickness	of Can (Caliche)			0-1	- I
Matarial II	derlying Formation		sandstone	sandstone	sand & silt
Vegetation	denying t ofmation		salusione	arass	pinon & grass
Local Terrs			billy	rolling	hilly
Thickness	of Overburden		0-2!	0-3'	0-2•
P I (Overh	urden)		-	6	6
Estimated	Quantity (cu. vds)		500.000 plus	250.000 plus	200.000 plus
Los Angele	s Wear	33 6	33.2	16.0	20.4
Soundness	Loss	-	3.5	1.5	- 1
Average Ma		6"	_		-
% Retained	on 2" Sieve	5	-		-
Ι	Crushed to:	as received	1 "	l n	"]
ł	2"	-	_	_	-
Pit	1"	1 100	100	100	100
Average	1/2"	75	66	63	56
% Passing	No. 4	5	28	25	21
	No. 10	43	18	12	12
	No. 200	1 10	8	3	3
Plasticity I	ndex	N.P.	11	N.P.	N.P.
Remarks:	077 (1		om 51 to 0 51		
		. 0			
Pit Numbe	r	T 041	042	043	044
Pit Numbe	r Section	041 SW 1/4 36	042 NE 1/4 25	043 NE 1/4 9	044 SE 1/4 9
Pit Numbe Location	r Section Township & Range	041 SW 1/4 36 2S 10E	042 NE 1/4 25 IN 9E	043 NE 1/4 9 IS IIE	044 SE 1/4 9 3S 10E
Pit Numbe Location	r Section Township & Range County	041 SW 1/4 36 2S 10E Lincoln	042 NE 1/4 25 IN 9E Torrance	043 NE 1/4 9 IS IIE Lincoln	044 SE 1/4 9 3S 10E Lincoln
Pit Numbe Location Formation	r Section Township & Range County	041 SW 1/4 36 2S 10E Lincoln Qal	042 NE I/4 25 IN 9E Torrance Psa	043 NE 1/4 9 IS IIE Lincoln Ti	044 SE I/4 9 3S IOE Lincoln Psa
Pit Numbe Location Formation Rock Type	r Section Township & Range County	041 SW 1/4 36 2S 10E Lincoln Qal gravel	042 NE 1/4 25 IN 9E Torrance Psa limestone	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry	044 SE 1/4 9 3S 10E Lincoln Psa gravel
Pit Numbe Location Formation Rock Type Source Ro	r Section Township & Range County ck (Gravel)	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone	042 NE 1/4 25 IN 9E Torrance Psa limestone	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry -	044 SE I/4 9 3S IOE Lincoln Psa gravel Limestone
Pit Numbe Location Formation Rock Type Source Ro Quality of	r Section Township & Range County ck (Gravel) Material	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good	044 SE I/4 9 3S IOE Lincoln Psa gravel limestone good
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness	r Section Township & Range County ck (Gravel) Material of Material	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent 10' plus	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Thickness	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche)	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent IO' plus -	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited -	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Thickness Material U	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Thickness Material U Vegetation	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon solling
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass hilly	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous 0 31	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation ain of Overburden	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly 0-2'	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent IO' plus - sandstone grass hilly -	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous 0-3' N P	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling l'
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation ain of Overburden burden)	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly 0-2' N.P.	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass hilly -	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous 0-3' N.P. uplimited	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling l' 5-8
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated	r Section Township & Range County ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation ain of Overburden burden) Quantity (cu. yds.)	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly 0-2' N.P. 50,000 plus	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass hilly - 300,000 plus	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous 0-3' N.P. unlimited 20 8	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling l' 5-8 100,000 plus
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele	r Section Township & Range County county ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation ain of Overburden burden) Quantity (cu. yds.) es Wear	04 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly 0-2' N.P. 50,000 plus 34.0	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass hilly - - 300,000 plus 30.4	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous 0-3' N.P. unlimited 20.8	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling l' 5-8 100,000 plus 24.0
Pit Numbe Location Formation Rock Type Source Ro Quality of Thickness Material U Vegetation Local Terr Thickness P. I. (Over Estimated Los Angele	r Section Township & Range County ccunty ck (Gravel) Material of Material of Cap (Caliche) nderlying Formation ain of Overburden burden) Quantity (cu. yds.) cs Wear Loss	041 SW 1/4 36 2S 10E Lincoln Qal gravel limestone good 3' plus - sandstone grass hilly 0-2' N.P. 50,000 plus 34.0 5.1	042 NE 1/4 25 IN 9E Torrance Psa limestone - excellent l0' plus - sandstone grass hilly - 300,000 plus 30.4 1.2	043 NE 1/4 9 IS IIE Lincoln Ti syenite porphyry - good unlimited - sandstone pines mountainous O-3' N.P. unlimited 20.8 I.4	044 SE 1/4 9 3S 10E Lincoln Psa gravel limestone good 6' plus - sandy silt grass & pinon rolling l' 5-8 100,000 plus 24.0
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CONSTRUCTION MATERIALS INVENTORY

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QUADRANGLE PAGE 67 (4)

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MATERIAL PIT SUMMARY

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Pit Number		0877		0878	a con		
· [:	Section	NE 1/4 23		SW 1/4 7		SW 1/4 8	
Location [Township & Range	IN I3E		IS I 3E	i.	ZS IZE	1
. [•	County	Torrance		Lincoln			
Formation		pe		Psa Limenters		γp Limonito	
Rock Type	(a)	gneissic granite		Imesione	1		
Source Rock	(Gravel)	_	<u></u>				
Quality of Ma	aterial	fair		excellent		9000 81	
Thickness of I	Material	35' plus			· · · ·	0-11	
Thickness of (Cap (Caliche)				i.	sandstone	
Material Unde	erlying Formation	-			-	pinon & juniper	
Vegetation		pinon & juniper		billy		hilly	
Local Terrain	l Oronahoundan '	nilly		$n + 1 \neq 0 = 2^{\dagger}$	F - ·	0-2!	
- I nickness of	Overburden rden)					S.N.P.	
P. I. (Overbur Estimated Ou	nantity (ch vds)	- 375 000 pluc		400 000 plus		125.000	
Los Angeles V	Wear	73 7		28.0		30.1	
Soundness I o		67	······································	4.5		8.5	
Average Maxi	imum Size		2	-		2" plus	
% Retained or	on 2" Sieve				<u></u>	80	
	Crushed to:	111		1 "	1	1"	
	2"	<u>•</u>	u.	- -		-	
Pit	- 1"	100		100		100	
Average	1/2"	67		52		56	
% Passing	No. 4	33		22		25	
	No. 10	21		13		14	
	No. 200	2		4		3	
Plasticity Ind		N.P.	-	N D		N.P.	
	lex						
Remarks:	lex			N. F •			
Remarks:	lex			N.F.			
Remarks:	lex			N.F.			
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Remarks:	Section Township & Range		, 	N.F.			
Remarks:	Section Township & Range County	1		N.F.			
Remarks:	Section Township & Range County	1		N. F •			
Remarks: Pit Number Location Formation Rock Type	Section Township & Range County			N.F.			
Remarks: Pit Number Location Formation Rock Type Source Rock	Section Township & Range County k (Gravel)		·	N • F •			
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M	Section Township & Range County k (Gravel) Material			N.F.			
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of	Section Township & Range County k (Gravel) Material f Material		· · · · · · · · · · · · · · · · · · ·	N.F.		-	
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Thickness of	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche)			N. F •		-	
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Unc	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation			N. F.	· · · · · · · · · · · · · · · · · · ·		
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Unc Vegetation	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation			N.F.		-	
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Und Vegetation Local Terrai	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in			N.F.			
Remarks: Pit Number Location Formation Rock Type Source Rock Quality of M Thickness of Material Unc Vegetation Local Terrai Thickness of	Section Township & Range County k (Gravel) Material f Material f Cap (Caliche) derlying Formation in f Overburden			N. F.			
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Prospect pit or quarry

