APPENDIX G

MINE AND RECLAMATION PLAN FOR CEMEX

UPPER SANTA ANA RIVER WASH
LAND MANAGEMENT AND
HABITAT CONSERVATION PLAN

MINE AND RECLAMATION PLAN
FOR THE
UPPER SANTA ANA RIVER WASH AGGREGATE LANDS
TO BE OPERATED BY
CEMEX CONSTRUCTION MATERIALS L.P.

ALABAMA STREET QUARRY
WEST QUARRY
EAST QUARRY NORTH

Submitted To:

CITY OF HIGHLAND
26985 Base Line Street
Highland, California 92346

CITY OF REDLANDS
35 Cajon Street, Suite 30
Redlands, California 92373

Prepared For:

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Updated March 2006

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LAND MANAGEMENT AND
HABITAT CONSERVATION PLAN

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TABLE OF CONTENTS

TABLE OF CONTENTS

TABLES

FIGURES

SHEETS

APPENDICES

SANTA ANA RIVER WASH AGGREGATE LANDS
CEMEX CONSTRUCTION MATERIALS, INC.
MINE AND RECLAMATION PLAN

INTRODUCTION

This Mine and Reclamation Plan is unique in that it originated from the Upper Santa Ana River Wash Land Management and Habitat Conservation Plan (Wash Plan) overlying two municipal jurisdictions. Within the Wash Plan, lands have been designated for aggregate extraction and processing. Portions of these aggregate lands have been mined for over 80 years and permitted mining operations are ongoing today. Mining will be allowed to continue in existing approved mine areas and expand into adjacent undisturbed areas as part of the overall Wash Plan to balance land uses and habitat conservation.

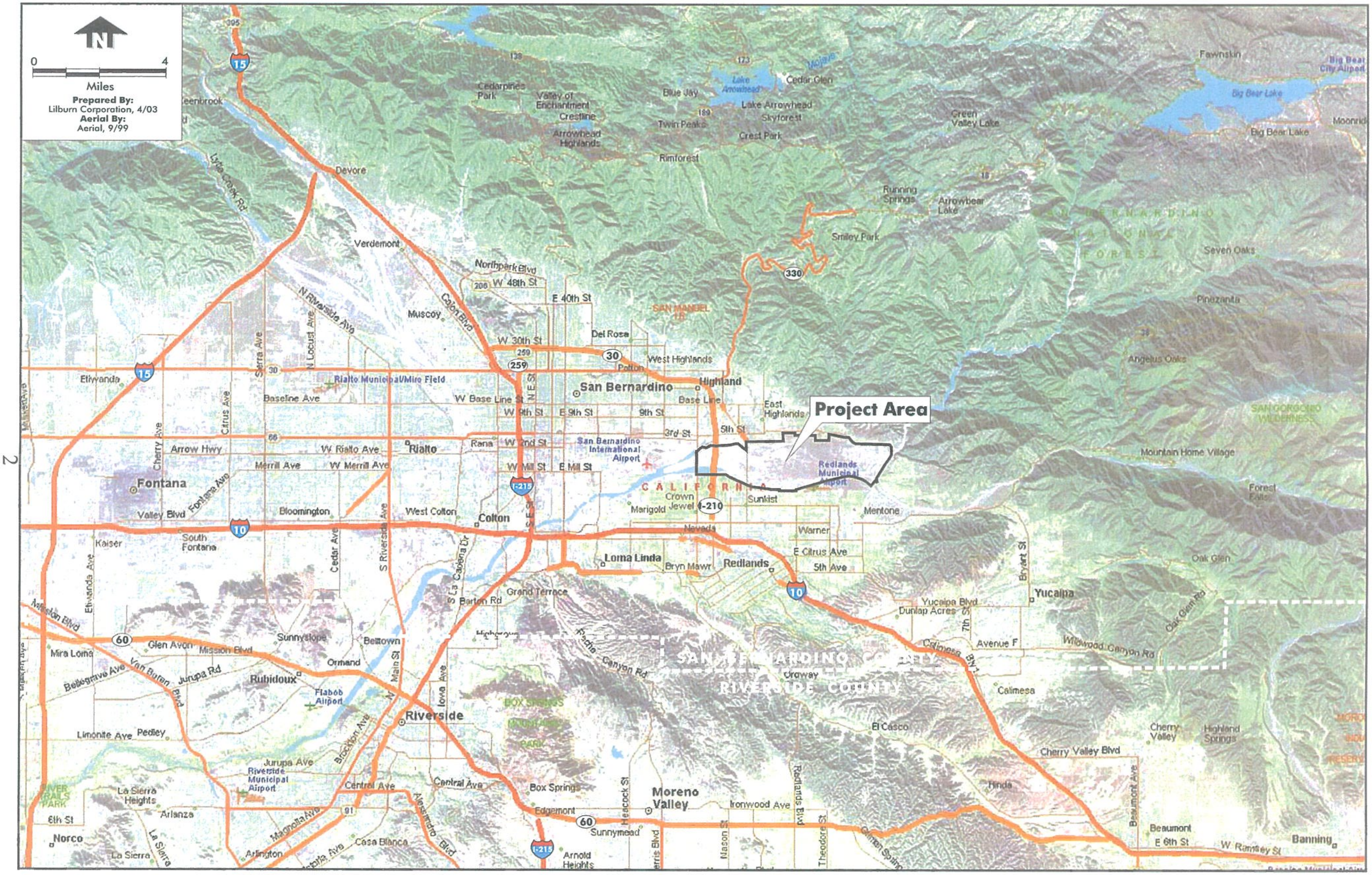
Cemex Construction Materials L.P. (Cemex) and Robertson's Ready Mix (RRM) currently mine portions of the aggregate lands. These two companies have divided the remaining aggregate lands into quarries based on property ownership, lease agreements with the San Bernardino Valley Water Conservation District (SBVWCD), and logistics related to current quarries and processing plants. The SBVWCD and RRM are the underlying property owners of much of the aggregate lands within the Wash Plan.

Cemex is submitting this Mine and Reclamation Plan (M/R Plan) for their 676-acre portion of the overall Santa Ana Wash Mine area to be operated and reclaimed by Cemex. This M/R Plan has been prepared to be consistent with the Wash Plan and in accordance with the City of Highland Surface Mining and Land Reclamation Regulations (Section 16.36, City of Highland Municipal Code), the City of Redlands' Surface Mining and Reclamation Act (SMARA) ordinance (Chapter 18.266, Redlands Municipal Code) and the California Department of Conservation Surface Mining and Reclamation Act of 1975, Public Resources Code 2770.

Section 1 of this M/R Plan discusses the past and planned mining on each of the three mining areas to be operated by Cemex within both the City of Highland and the City of Redlands. Cemex's three mining areas include the Alabama Street Quarry, the West Quarry and the East Quarry North to be described in the following report. Section 2 discusses the reclamation, revegetation, and end uses for the three sites. This report will be submitted to both cities for their review and approval. Cemex will include an index sheet, six mine sheets or plot plans with cross-sections, and one reclamation sheet. The reclamation sheet will include the entire aggregate lands to be mined and reclaimed including those areas to be reclaimed by RRM in order to view the reclamation in its entirety.

Land Management and Habitat Conservation Plan

The area of land between the mouth of the Santa Ana River Canyon, down stream of the Seven Oaks Dam, and Interstate 215 on the west, and bounded by the cities of Highland and Redlands to the north and south, is known as the Upper Santa Ana River Wash. A part of that Wash, containing approximately 4,375 acres, from the canyon mouth at Greenspot Road and 6 miles west to Alabama Street (see Figure 1), is known as the Wash Planning Area (WPA).



Legend

SAW Land Management & Habitat Conservation Areas (Wash Plan)

Regional Location Map

Santa Ana Wash Mine Areas
Cities of Highland and Redlands, California

Figure 1

Prepared By:
LILBURN CORPORATION

Historically, the Wash was a natural flood plain and alluvial fan that provided a place to convey frequently devastating floodwaters and deposit sediment. The alluvial deposit provides excellent geologic conditions to establish settling basins for percolating surface water to the groundwater basin, providing a significant part of the water supply for the local region. These same geologic conditions provide regionally significant deposits of aggregate (or sand and gravel) as classified by the California Department of Conservation that are used to support the local economy. In recent years, the value of the Wash as habitat for a variety of sensitive, threatened, and endangered species has become more apparent due to the decrease in this type of habitat throughout Southern California. Because the Wash is a unique open space and corridor, the County of San Bernardino (County) and the cities of Highland and Redlands are also planning to establish a series of recreational trails in and around the Wash. These important functions within the Wash, water conservation, aggregate extraction and processing, flood control, and wildlife habitat, are often in direct competition for much of the same land. It has been apparent since the early 1980s that a Land Management Plan for the future use of the Wash was necessary in order to maintain other needed public services (water supply facilities, transportation and utility corridors, and recreation/trails), to provide areas for the extraction of valuable construction materials, and to preserve declining sensitive habitats.

In 1993, representatives of numerous agencies, including water, mining, flood control, wildlife and municipal interests, formed a Wash Committee to address local mining issues and other land functions in the Wash. A Policy Action Committee (PAC) was established consisting of elected officials from the County, cities of Highland and Redlands, and the SBVWCD, and the Field Manager from the U.S. Bureau of Land Management (BLM). A Technical Advisory Committee (TAC) was formed with representatives of the PAC agencies and other water, mining, flood control, and wildlife interests.

A general consensus of the TAC was reached and the respective city councils and Boards also endorsed the conceptual land use plan within the WPA, which is the basis of the Land Management and Habitat Conservation Plan (Wash Plan). As expected, the proposed land use designations cross land ownership (three public and two private) and land use authority boundaries (two cities and the County). The TAC determined that mining expansion is best addressed by consolidating the future mining activity into one large area adjacent to existing mining operations within Sections 9, 10, and 11 in the western half of the WPA. This focuses extraction activities on lands currently disturbed by mining and lands with the least long-term wildlife habitat value. Furthermore, the TAC determined that portions of the BLM land designated as Areas of Critical Environmental Concern (ACEC) were either previously disturbed or were fragmented by adjacent mining activities, and thus would be better suited for mining expansion. Preserved habitat areas are located in larger connected areas with intact natural habitat and availability of future fluvial flows. The water conservation activities would passively utilize some habitat areas, continue in areas historically utilized, and be able to use completed mine sites.

The Wash Plan will coordinate and accommodate existing ongoing and anticipated future activities planned to occur in the WPA, establish habitat preserve areas, and provide recreational trail alignments. Each function will occupy designated specific areas within the WPA best suited for that function and will also accommodate the other competing uses for the overall benefit of the WPA. These existing and future activities include the following:

- Water conservation of both native and (when necessary) imported water resources for groundwater basin replenishment to augment and protect public water supplies;
- Flood control, and management of the Seven Oaks Dam releases;
- Aggregate extraction and processing;
- Protection and conservation of sensitive and listed native species and habitat;
- Recreation planning including a portion of the Santa Ana River trail system; and
- Utilities, transportation, and water supply corridors and facilities.

To facilitate approval of the Wash Plan, the SBVWCD and the Bureau of Land Management (BLM) are acting as state and federal lead agencies, respectively, for the preparation of a combined Environmental Impact Report/Environmental Impact Statement (EIR/EIS). This document will comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The EIR/EIS will assess potential environmental impacts from all activities within the WPA including the continuation and expansion of aggregate mining and processing and recommend appropriate mitigation.

Aggregate Need in Region

The availability of aggregate for concrete, asphalt and other building materials to construct new buildings, homes, and infrastructure at a competitive price is a key element of the local economy. The WPA has extensive natural sand and gravel resources for highway and building construction necessary to support the expanding economy of the Inland Empire. In 1987, the State of California Department of Conservation, Division of Mines and Geology (CDMG Special Report 143, 1987) identified the high quantity and quality of aggregate resources in the WPA as one of the best aggregate deposits in the State. It was also noted that adjacent regions in Orange, Los Angeles, and Riverside counties had lesser reserves and would likely need to import aggregates from the San Bernardino Valley to meet their local needs, adding to the extended regional importance of aggregate resources in the Inland Empire. It is State policy that when a designation of statewide or regional significance is made within its jurisdiction, a local community shall establish mineral resources management policies to be incorporated in general plans to assist in management of land use, and emphasize the conservation and development of those identified mineral deposits (SMARA Note 26, Article 4, Revised 1/97). In other words, it is State policy to protect the availability of those resources needed to support economic development in the region. Currently, aggregate materials in the WPA are near the expanding markets of the Inland Empire, which reduces the transportation cost of the raw aggregate and end products of ready-mix concrete and asphalt, which affects construction costs. The need to provide areas within the WPA for the availability of aggregate reserves is vital to the local and regional economy.

Mining Background

Cemex's Santa Ana Wash existing and planned operations are located in southwestern San Bernardino County within the wash area of the Santa Ana River (see Figure 2). Cemex currently leases approximately 1,081 acres of SBVWCD lands within the WPA and holds approved land use permits on approximately 576 acres of the total lease area. Table 1 lists the names of the various sites and their status. In addition, Cemex holds a 213-acre lease from the City of Redlands for the area west of SR-30 and east of Alabama Street of which 55 acres are permitted for operations (including 3 acres owned by Cemex). Cemex operates aggregate processing facilities at the Alabama Street Quarry and at the Orange Street Plant and a concrete batch plant at the Alabama Street Quarry.

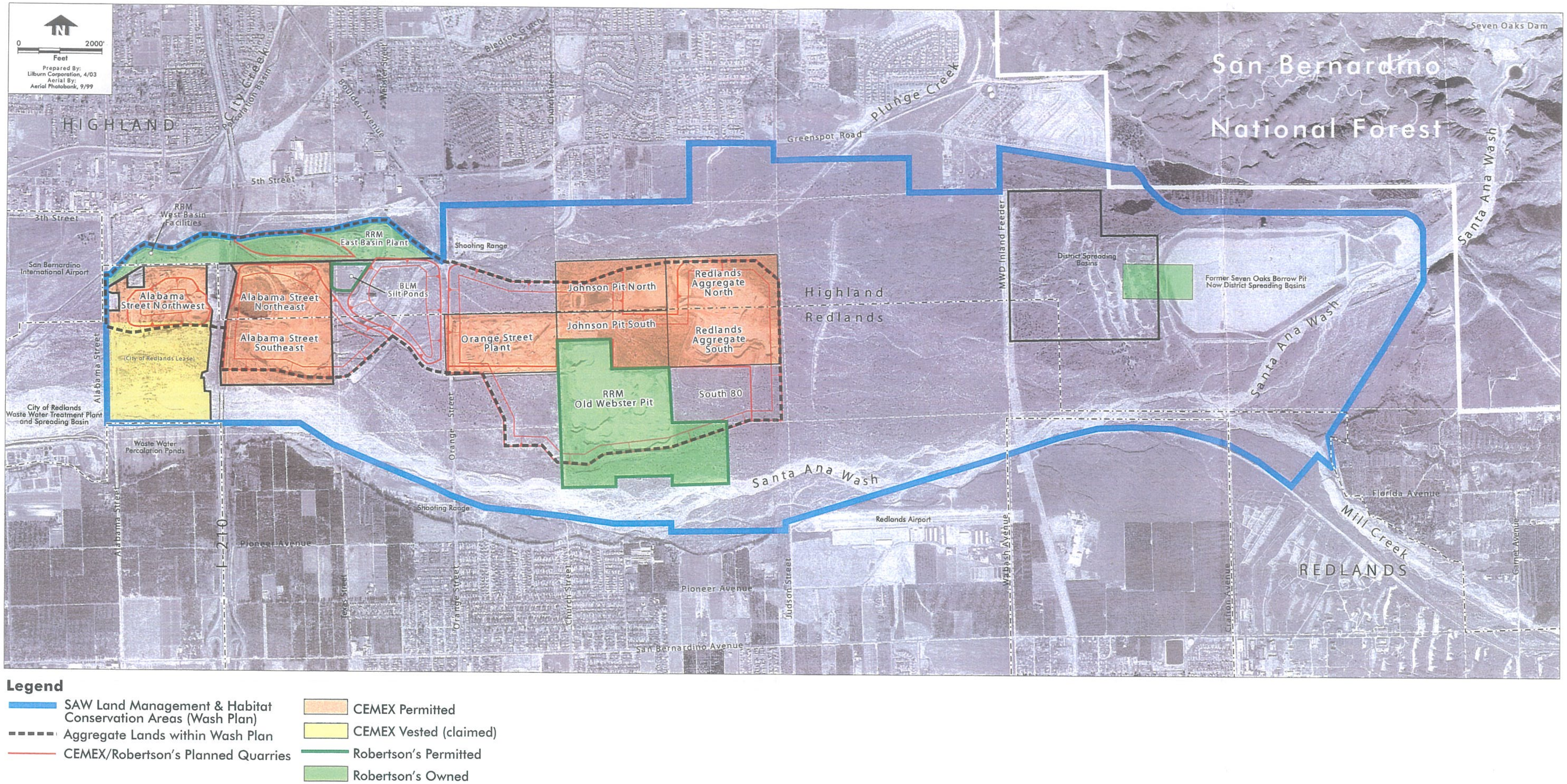
Excavations are currently being conducted in the permitted 160-acre Redlands Aggregate Pit, the 68-acre Alabama Street Northeast Quarry, and the 78-acre Alabama Street Southeast Quarry. The Johnson Pit North is permitted and used for silt ponds and aggregate storage. The total area owned by Cemex (3 acres) and currently leased (1,294 acres) to Cemex in the WPA is approximately 1,297 acres.

The designated aggregate lands are situated in the both the jurisdictions of the City of Highland and the City of Redlands, whose common east-to-west boundary bisects the operations. The aggregate lands are also generally bisected north to south by Orange Street and to the west by State Highway 30, recently designated as I-210. The total gross aggregate lands equal approximately 1,205 acres split between Cemex and RRM per prior agreement based on existing land ownership and lease holdings. Note that within the gross aggregate lands are right-of –ways for the existing SR-30 Freeway, Orange Street, and flood control easements.

Table 1 also lists the existing and planned mining areas by operator and city jurisdiction. The former names of the newly named quarries are provided for reference. Figure 3 shows the three planned quarries to be operated by Cemex. These are named the Alabama Street Quarry (west of SR-30), the West Quarry (east of SR-30 and west of Orange Street), and the East Quarry (east of Orange Street). The East Quarry is further divided into the East Quarry North to be operated by Cemex and the East Quarry South to be operated by RRM.

Approximately 431 acres in the northern portion of the operational area are located within the City of Highland. Of this total, 257 acres are part of the Cemex operations and 163 acres are part of RRM operations. Approximately 774 acres are within the City of Redlands with 443 acres part of the Cemex operations and 331 acres part of RRM operations.

Table 2 lists Cemex's existing and planned mines and processing facilities with estimates acreages for the existing and planned (new) mines, jurisdiction, and whether the area is disturbed or undisturbed.



Existing Quarries

Santa Ana Wash Mine Areas
Cities of Highland and Redlands, California

Prepared By:
LILBURN
CORPORATION

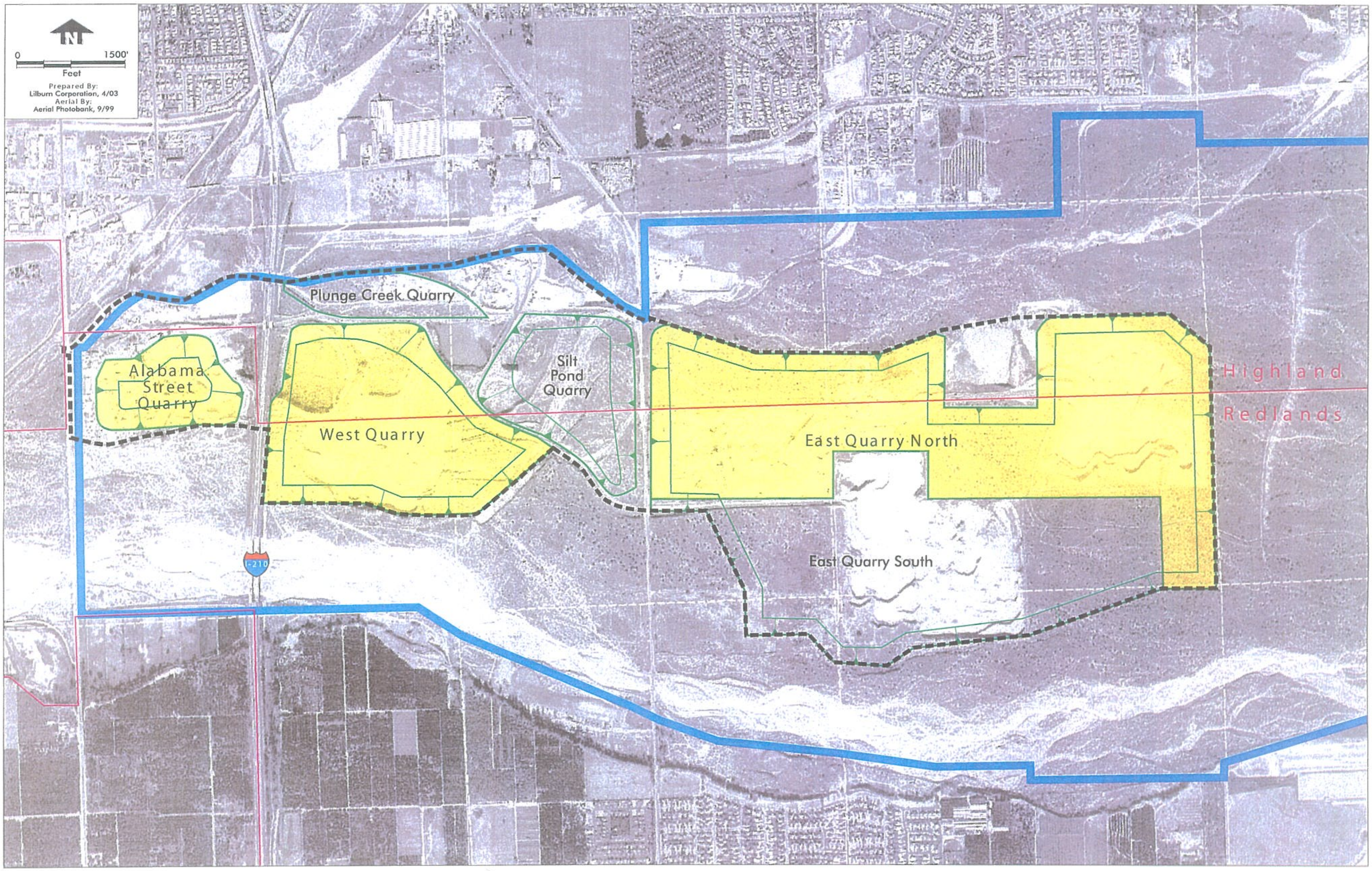
Figure 2

Table 1
Aggregate Operations and Lands Within the Wash Planning Area

New Site Name (former designation)	Area (acres)	Land Owner [1] (acres)	Jurisdiction	Permit Status	Active/ Inactive
Cemex					
Alabama Street Quarry (Alabama St. NW)	68	Redlands (65) Cemex (3)	Redlands (68)	55 acres Permitted	55 acres - Active
West Quarry (Alabama St. NE, Alabama St. SE, and former BLM)	206	SBVWCD (206)	Highland (70) Redlands (136)	146 acres Permitted	59 ac -Active 58 acres - previously mined
East Quarry North (Orange St., Johnson Pit North /South, Redlands Aggregate North/South, and former BLM)	426	SBVWCD (426)	Highland (187) Redlands (239)	375 acres Permitted	315 acres - Active
Total Cemex Project Area	**700**	**Redlands (65) SBVWCD (632) Cemex (3)**	**Highland (257) Redlands (443)**	**576 acres Permitted**	**429 acres - Active**
Robertson's Ready Mix					
Plunge Creek Quarry (Island)	45	RRM (45 acres)	Highland (45)	Not Permitted	Inactive
Silt Pond Quarry (Former BLM)	102	SBVWCD (102 acres)	Highland (60) Redlands (42)	Former BLM	Inactive - Previously mined/graded
East Quarry South (Old Webster Quarry)	289	RRM (164) SBVWCD (105) SBCFCD (20)	Redlands (289)	215 acres Permitted	140 acres - Active
West /East Basin Facilities	55	RRM (52) SBCFCD (3)	Highland (55 acres)	52 acres Permitted	52 acres – Active
Silt Pond	14	SBVWCD (14 acres)	Highland (14 acres)	14 acres Permitted	14 acres - Active
Total RRM Project Area	**505**	**RRM (261) SBVWCD (221) SBCFCD (23)**	**Highland (174) Redlands (331)**	**281 ac - Permitted**	**206 acres – Active**

Sources: Cemex, SBVWCD, RRM, Lilburn Corp., LSA – January 2006

1 - Note that BLM lands are assumed to become SBVWCD lands as part of the project. Areas are subject to revisions.



Legend

SAW Land Management & Habitat Conservation Area (Wash Plan)

Aggregate Lands within Wash Plan

CEMEX Planned Quarries

Prepared By:
LILBURN CORPORATION

Planned Quarries

Santa Ana Wash Mine Areas
Cities of Highland and Redlands, California

Figure 3

Table 2
Santa Ana Wash Mines
Existing and Planned Mine and Processing Sites

Site	Existing Area	Planned Area	City	Disturbed	Undisturbed	Pit Area	Misc. Uses
East Quarry North							
Johnson North	80	59	H	52	7	30	Ponds, haul roads - 29 acres
Johnson South	60	60	R	18	42	60	
Redlands Ag. North	80	76	H	70	6	68	Pond area – 8 acres
Redlands Ag. South	80	80	R	80 (15 acres)[1]	0	80	
Redlands Ag. Southeast	New	24	R	0	24	24	
Orange St. Plant	75	75	R	75	0	73	Setback, berm – 2 ac.
Orange St. North	New	52	H	0	52	51	Setback - 1 acre
East Quarry North - Subtotals	**375**	**426**	**H - 187 R - 239**	**295**	**131**	**386**	**40**
Alabama Street Quarry							
Alabama St. Northwest	**55**	**68**	**R**	**68**	**0**	**50**	Plant, roads, setbacks – 18 acres
West Quarry							
Alabama St. Northeast	68	70	H	70 (2 acres)[1]	0	67	Haul road, setbacks – 3 acres
Alabama Street Southeast	78	78	R	78 (18 acres)[1]	0	76	Setbacks – 2 acres
Alabama Street East	New	58	R	58 (35 acres)[2]	0	35	Setbacks, roads 23 acres
West Quarry Subtotals	**146**	**206**	**H – 70 R - 136**	**206 (55 ac)[1]**	**0**	**178**	**28**
Cemex Wash Mines Totals	***576***	***700***	***H – 257 R - 443***	***569 (70 ac)[1]***	***131***	***614***	***86***

Sources: Cemex, Robertson's, SBVWCD, Lilburn Corporation, LSA – January 2006

Notes: 1 – Areas previously cleared and graded with some natural revegetation included as disturbed.
2 - BLM lands disturbed by prior mining, grading, and flood control channels with some natural revegetation.
H – City of Highland
R – City of Redlands

Those quarry areas to be operated by Cemex, the Alabama Street Quarry, the West Quarry and the East Quarry North, totaling 257 acres within the City of Highland and 443 acres within the City of Redlands, are the subject of this Mine and Reclamation Plan and are defined as the 700-acre project site.

The SBVWCD owns all the areas to be mined by Cemex within the City of Highland and all but 68 acres to be mined by Cemex within the City of Redlands. Note that BLM lands are assumed to become SBVWCD lands as part of the Wash Plan project. The Alabama Street Quarry, located west of SR-30, is leased by Cemex from the City of Redlands and three (3) acres are owned by Cemex. Cemex leases the remainder of the planned quarries per a long-term lease agreement with the SBVWCD, originally dated June 18, 1955. This lease will be modified and extended to affect changes in lease areas per the land exchange with the BLM.

Cemex and its predecessors have conducted aggregate excavations in the project area since the 1960s. Mining, aggregate process plants, silt ponds, grading, and access roads have disturbed approximately 569 of the 700 acres of the project site.

The M/R Plan proposes mining and reclamation in the Santa Ana Wash Mine to take place within the aggregate lands consistent with the overall Wash Plan. In addition, the mining depth of 120 feet and new slopes of 2H:1V are consistent with the Wash Plan and the SBVWCD lease requirements. The exception is the Alabama Street Quarry, which has received prior approval to 150 feet in depth. Mining will remove and reclaim some unsightly interior highwalls and varied slopes, excavate to final reclamation contours and slopes as depicted on the Mine and Reclamation Plan sheets, and implement concurrent and final reclamation and revegetation. This proposed M/R Plan was prepared with the following objectives:

- Provide additional aggregate reserves within the framework of the Wash Plan;
- Provide reclamation and revegetation to impacted mining sites to reduce visual, biological, safety, and hydrological impacts;
- Reclaim the site for an end use compatible with the needs of the land owners, the SBVWCD and the City of Redlands, and the city with jurisdiction; and
- Comply with the State's and City's SMARA requirements.

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909/974-5500

Representative:

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909/890-1818

Assessor's Parcel Numbers: 167-011-09, 13; 290-271-02, 03: 291-121-01; 291-112-03; 291-122-01; 290-131-01; and 291-141-08

General Plan Designation: City of Highland – Open Space
City of Redlands - Flood Control / Construction Aggregate / Conservation / Habitat Preservation

Estimate Operating Life: 60 years

Estimated Mining Termination Date: 2065

Estimated Reclamation Completion: 2070

1.0 MINE PLAN

1.1 OPERATIONS

Alabama Street Quarry
(Entirely Within the City of Redlands)

Existing Operations

The Alabama Street Quarry consists of approximately 68 acres located between Alabama Street and the SR-30 Freeway, south of Plunge Creek and north of the main channel of the Santa Ana River within the City of Redlands (refer to Figure 3 and Sheets 1 and 3 of 8). The site is currently known as the Alabama Street Northwest Quarry, a 55-acre quarry and processing site operating under Conditional Use Permit (CUP) No. 694 approved by the Redlands Planning Commission in October 1999. The City of Redlands is the owner of the 213 acres west of the SR-30 Freeway, including 52 acres within the CUP No. 694 boundary. Cemex holds a long-term mining lease from the City of Redlands for the 213 acres for a 25-year period from 1991 through June 30, 2016, with five options to renew of five years duration each.

Mining and processing operations have been conducted on or adjacent to the project site since the 1940s. Existing operations consist of an approximate 30-acre active pit, aggregate processing, ready-mix facilities and a maintenance shop located in the western portion of the site.

An existing pit located in the northeastern portion of the project site directly adjacent to and west of SR-30, within the boundaries of the City of Redlands has been backfilled with inert material in the portion within the project boundary. This pit had been excavated to a depth of approximately 100 feet and the center portion of this pit was backfilled for construction of the SR-30 Freeway. The Caltrans right-of-way (ROW) encompasses the eastern side of this pit and 50-foot setbacks will be established along their ROW.

Existing surrounding land uses to the west consist of Alabama Street, Army Corps of Engineers (ACOE) Seven Oaks Dam woolly star mitigation land (west of Alabama Street) and the San Bernardino International Airport further to the west; the SR-30 Freeway, Alabama Street East pits (to be part of West Quarry), and haul roads to the east; portions of Cemex leased land to be set aside for habitat conservation and the main channel of the Santa Ana River to the south; and City and Plunge creeks, Matich's asphalt batch plant and Robertson's ready-mix operations to the north.

Planned Mining

The Alabama Street Quarry Mine Plan depicts the existing excavations and planned mining operations for the site (refer to Sheet 7 of 8). The Alabama Street Quarry and its expansion area of about 13 acres south are completely disturbed by prior mining and processing activities as well as by activities prior to the area being leased. Mining will continue to be conducted in the 50-acre Alabama Street Quarry within the 68-acre project boundary to a maximum depth of 150 feet. Mining will be phased with depth with Phase 1 excavations to 80 feet deep, Phase 2 to 120 feet, and Phase 3 to the final depth of 150 feet. Estimated aggregate reserves for the Alabama Street Quarry are estimated at approximately 8.2 million cubic yards (cy) or 12 million tons. The ready mix plant, maintenance facilities, roads, and setbacks along Alabama Street make up the remaining 18 acres onsite.

Setbacks of 50 feet will be established along the eastern portion of the pit bordering the Caltrans ROW. No setbacks would be established on the north and west sides as the pit is not immediately adjacent to property boundaries and on the south side since the parcel south is a continuation of Cemex's lease area. Slope design will consist of 2H:1V slopes. Safety features in the form of fencing with warning signs placed every 300 feet will be constructed along the west and south sides of this quarry where there is the potential for public access. Caltrans maintains fencing along the freeway.

To the southwest of the pit, Cemex will eventually move its existing ready mix and maintenance facilities and/or construct new replacement facilities as the pit expands. Matich owns the offices directly west of the pit along Alabama Street and operates an asphalt batch plant to the northwest of the pit on land leased from Redlands.

Mining operations are planned to excavate material using standard open pit mining techniques of pushing material with a dozer to a working level, removing and loading material with the loader into haul trucks, and transporting material to the onsite processing plant and to the Orange Street Plant. Equipment used will not differ (other than technological advancements or replacement equipment) from that currently being used for mining.

Excavations will take place within the pit at varied elevation levels in order to avoid occasional high ground water levels that fluctuate year to year. Mining will be restricted to 20 feet from ground water with no operations allowed in standing ground water. An existing monitoring well located along the south side of the quarry will be used as a ground water monitoring well to determine the depth to ground water. The Alabama Street Quarry and its expansion area of about 13 acres south are completely disturbed and no soil and/or plant salvaging are feasible.

Mining and reclamation activities will be conducted concurrently and are estimated to continue intermittently until the quarry reaches its final depth with the length of time depending on market demand and aggregate quality. Reclamation of the finished slopes of the Alabama Street Quarry will begin as portions of the quarry reach final grade. Reclamation will consist of recontouring and revegetation of the slopes.

Monitoring and maintenance of reclamation efforts in the Alabama Street Quarry will be initiated once excavated areas reach final grade. The end use for the Quarry will be a ground water storage or recharge basin, open space, or other acceptable uses as determined by the landowner, the City of Redlands. Detailed reclamation plans for the site are discussed in Section 2.0.

West Quarry
(70 acres in Highland, 136 acres in Redlands)

Existing Operations

This area is now known as the Alabama Street Northeast Quarry on 68 acres in Highland and the Alabama Street Southeast Quarry on 78 acres in Redlands. Cemex holds a long-term lease on this property with the SBVWCD. The City of Highland approved a Mine Reclamation Plan for Cemex's Alabama Street Northeast Quarry in May 2003 to provide additional reserves during the review process of the overall Wash Plan and to reclaim portions of the pits visible from SR-30. The Alabama Street Southeast Quarry within the City of Redlands is operated under CUP/Reclamation Plan No. 733 approved by Redlands in August 2002. Active excavations are being conducted on approximately 59 acres within the existing pit area.

Approximately 117 acres of the 146 acres have been mined or are currently being mined. The remainder of the existing quarries (29 acres) has been disturbed in the past by mining activities (silt ponds, haul roads, and freeway construction) with approximately 20 acres having naturally revegetated over time mainly in the southwest corner of the quarry site. The 58-acre area to the east of these two existing sites will be combined with them to form the West Quarry. This area is former BLM land, which will be incorporated into the lease with Cemex, and has also been mostly disturbed by prior mining and flood control activities with some natural revegetation.

Mining and processing operations have been conducted within the site since the 1960s. Past mining operations consisted of aggregate excavation and removal from the pits and aggregate transport to the Alabama Street processing plant. At present, there are several completely disturbed existing pit areas separated by interior highwalls located on approximately 115 acres of the West Quarry. The excavated slopes are comprised of various slopes ranging from greater than 1H:1V to less than 2H:1V. The project site has been excavated up to a depth of approximately 85 to 120 feet in the western area and up to 80 feet in the central pit. The west area was part of a larger pit that extended further west but was backfilled by Caltrans for the construction of the SR-30 Freeway.

There are two existing access/haul roads leading into the mined areas. An existing haul road is aligned around the northern and northeastern edge of the West Quarry and extends west under the SR-30 Freeway to the Alabama Street Quarry and east through a tunnel to the existing Orange Street Plant. RRM and Cemex's haul trucks share this portion of the haul road and tunnel, which also connects with the planned East Quarry South (formerly Old Webster quarry).

Directly north of the West Quarry lies the planned Plunge Creek Quarry and to the northeast lies the existing East Basin Processing Area, both owned by RRM. To the east lies former BLM land with old pits utilized by RRM for silt ponds. Approximately 102 acres of this area is designated as the Silt Pond Quarry and will be mined by RRM as part of the overall Wash Plan. To the south is SBVWCD land within the Santa Ana Wash, which is occasionally impacted by flooding and will be designated for habitat conservation. West of the site is the SR-30 Freeway and the Alabama Street Quarry described above. Cemex will maintain a 50-foot setback from the Caltrans' SR-30 ROW.

Planned Mining

The West Quarry Mine Plan depicts the existing excavations and planned mining operations for the site (refer to Sheet 5 of 8). Approximately 70 acres of the West Quarry are in Highland and 136 acres are in Redlands. Mining will take place to a maximum depth of 120 feet with slopes at 2H:1V. The pit rim varies in elevation and ranges from approximately 1,250 feet to 1,220 feet msl. The corresponding pit floor will be established from about 1,130 feet to 1,100 feet msl and graded slightly to the southwest for interior pit drainage. Aggregate reserves for the West Quarry are estimated at approximately 18.4 million cy or 26.9 million tons.

The planned mining will maintain a setback of 50 feet from the Caltrans ROW along the west side. On the south, the pit lies adjacent to SBVWCD lands and no setbacks would be established on the south side of the pit. The planned paved access road for street-legal haul trucks will extend west to east and abut the West Quarry on the north.

Prior to mining previously disturbed areas outside the existing pits (approximately 60 acres), the operator will remove yucca, cacti, and other unique species deemed suitable for transplanting by qualified personnel. The removed plants will either be directly replanted to slopes ready for revegetation or be maintained for future revegetation activities. As an area is cleared for mining, the site's vegetation will be chipped, and surface material to a depth of six inches will be scraped and moved directly to an area ready for reclamation. This will preserve any seed bank that is present within the surface material and is an important factor for a successful revegetation effort. In addition, any measures required in the EIS/EIR and Habitat Conservation Plan (HCP) for the overall implementation of the Wash Plan will be undertaken.

Excavations will be phased within the pit at varied elevation levels in order to avoid the potential of high ground water levels and recharge activities that fluctuate year to year. Lease conditions also require excavations to be phased with depth. Timing of phasing will depend on the quality and demand of material, groundwater levels, and mining conducted at other sites within the wash. Phase durations are estimated at 2 to 5 years per phase, generally as follows:

- Phase 1 - Mine the high walls in the northwestern portion of the pit to an overall depth of about 80 feet
- Phase 2 - Mine the western half of the existing pit areas to an overall depth of 80 feet
- Phase 3 – Initiate mining in the east portion of the site to a depth of 40 feet
- Phase 4 – Mine the east portion to 80 feet
- Phase 5 – Excavate the site to 100 feet
- Phase 6 – Excavate the site to 120 feet
- Phase 7 – Final reclamation.

Mining operations are planned to excavate material using standard open pit mining techniques of pushing material with a dozer to a working level, removing and loading material with a loader and/or shovel into haul trucks, and transporting material to the Orange Street Plant and to the Alabama Street Quarry processing plant. Equipment used will not differ (other than technological advancements or replacement equipment) from that currently being used for mining onsite.

Mining will be restricted to 20 feet from ground water with no operations allowed in standing ground water. Existing monitoring wells will be used to monitor ground water and to determine the depth to ground water. This will be coordinated with the property owner, the SBVWCD.

The operations at this site will not increase overall mining production of the Cemex operations. The site is a location where Cemex can excavate material on an as-needed basis. Mining operations will move within the quarry and from site to site depending on actual aggregate quality and on the type of material in demand at that time.

Mining and reclamation activities will be conducted concurrently and are estimated to continue intermittently for the life of the permit depending on market demand and aggregate quality. The top of the existing pit rim adjacent to undisturbed areas will be prominently marked and staked to establish the excavation limits. Safety features in the form of a 3-strand fence with warning signs every 300 feet will be placed around the south side of the quarry where it is potentially accessible to the public. Caltrans maintains fencing along the west side of the quarry and the SR-30. Reclamation of other finished 2H:1V slopes will begin as mine phases are completed or portions of the quarry slopes reach finished grade. Reclamation will consist of ripping compacted floors and slopes parallel to the contour and revegetation of the upper slopes with native Wash plant species.

Monitoring and maintenance of reclamation efforts will be initiated once excavated areas reach final grade. The end use for the West Quarry will be a ground water storage or recharge basin, open space, or other acceptable uses such as recreation as determined by the landowner and the city with jurisdiction. Detailed reclamation plans for the site are discussed in Section 2.

East Quarry North
(187 acres in Highland and 239 acres in Redlands)

Existing Operations

Cemex and its predecessors have conducted mining, material processing, stockpiling, trucking, and loading on portions of this site since the early 1960s. Cemex currently holds permits to process and mine aggregate on one site, to mine on two sites, and to deposit silt on another. Cemex holds a long-term mining lease from the SBVWCD for all of this area. The existing approved sites, permit information, and approved activities are summarized in Table 3 and locations shown on Figure 2.

Cemex and its predecessors have conducted mining in the Johnson Pit areas since 1961 and in the Redlands Aggregate Pit since about 1990. The Orange Street Plant and Mine started operations in 1985. Approximately 220 acres of the 375 permitted sites are disturbed by mining to a depth of 80 to 120 feet with another 75 acres disturbed by the Orange Street Plant area. The excavated active slopes are comprised of various slopes ranging from 1H:1V to 2H:1V.

Table 3
Permitted And Planned
Cemex Aggregate Operations
Within East Quarry North

Current Site Name	Area (acres)	Land Owner (acres)	Jurisdiction	Permit Status	Active/ Inactive
Orange Street Quarry	75	SBVWCD	Redlands	Approved 1985 SMAR/84-0133/E281-85 85M-08	Active Process Plant
Johnson Pit North	80	SBVWCD	Highland	Approved 2000 M/R Plan #99-001; CUP 00-006	Active Silt Ponds, Haul Road (49acres)
Johnson Pit South	60	SBVWCD	Redlands	Approved 1999 CUP #692	Inactive
Redlands Aggregate Pit North	80	SBVWCD	Highland	Approved 1985 NHSA/84-0094 E289-81 85M-04	Active Mining
Redlands Aggregate Pit South	80	SBVWCD	Redlands	Approved 1999 CUP #693	Active Mining
Total Permitted Project Areas	**375**	**SBVWCD**	**Highland (160) Redlands (215)**	**375 acres Permitted**	**285 acres - Active**
Expansion Areas Orange Street Quarry North	52	SBVWCD	Highland	None	Inactive
Redlands Aggregate Southeast	24	SBVWCD	Redlands	None	Inactive

Sources: Cemex, Lilburn Corp., 2006

Material excavated from the sites are transported to the Orange Street Plant area by off-road haul trucks of various sizes up to 110-ton haul trailers via 60-foot wide private haul roads. The public entrance/exit for the plant site for the transport of sized material by public street trucks is controlled by a signalized intersection on Orange Street.

The Johnson Pit North area was excavated prior to Cemex's assumption of operations. The site currently consists of a series of five settling ponds on approximately 53 acres used for the wash water and silt disposal from the adjacent Orange Street Plant located to the southwest. A haul road is located along its southern boundary that connects the Redlands Aggregate Pit with the Orange Street Plant. A habitat reserve of 27 acres in the northwest makes up the balance of the 80-acre parcel.

The surrounding areas consist to the west of Orange Street and the planned Silt Quarry; to the north, a shooting range and the Plunge Creek habitat conservation area; to the east, habitat conservation and SBVWCD spreading basins and berms; and to the south, the existing Old Webster Quarry and the planned East Quarry South to be mined by RRM. The East Quarry North and East Quarry South will daylight with each other and combine to form one large excavation, the reason for the north and south designations being for the two different operators.

Planned Mining

The East Quarry North Mine Plan depicts the existing excavations and planned mining operations for the site (refer to Sheet 2 of 8). Mining will take place on 386 acres within the 426-acre East Quarry North to a maximum depth of 120 feet with slopes at 2H:1V. Approximately 295 acres of the site are disturbed by past and existing mining operations with about 131 acres relatively undisturbed. The pit rim will vary in elevation due to the over 7,775-foot east to west width of the site, decreasing to the west from 1,420 feet to 1,290 feet msl. The corresponding pit floor will range from about 1,300 feet in the east to 1,170 feet msl in the west and graded at 1.8 percent to the west for interior pit drainage. Aggregate reserves for the East Quarry North are estimated at approximately 52.7 million cy or 77.2 million tons.

The planned mining will maintain a setback of 50 feet from the Orange Street ROW on the west side. Within this setback, a landscape screen will be planted. On the north and east, the pit lies adjacent to SBVWCD lands to be designated for habitat conservation and no setbacks would be established. To the south, the quarry will daylight into the East Quarry South operated by RRM.

Prior to mining any undisturbed areas outside the existing pits, the operator will remove yucca, cacti, and other unique species deemed suitable for transplanting by qualified personnel. The removed plants will either be directly replanted to slopes ready for revegetation or be maintained for future revegetation activities. As an area is cleared for mining, the site's vegetation will be chipped, and surface material to a depth of six inches will be scraped and moved directly to an area ready for reclamation. This will preserve any seed bank which is present within the surface material and is an important factor for a successful revegetation effort. In addition, measures required in the EIS/EIR and Habitat Conservation Plan (HCP) for the overall implementation of the Wash Plan will be undertaken.

Excavations will be phased within the pit at varied elevation levels in order to avoid the potential of high ground water levels and recharge activities that fluctuate year to year. Timing of phasing will depend on the quality and demand of material and mining conducted at other sites within the wash with an estimated 5 to 10 years per phase, generally as follows:

- Phase 1 - Mine the previously mined eastern portion of the pit to an overall depth of about 80 feet
- Phase 2 - Mine the central area (Johnson Pit South) to an overall depth of 80 feet
- Phase 3 – Mine the central and eastern portion to a depth of 100 feet
- Phase 4 – Mine the central and east portion to 120 feet
- Phase 5 – Initiate mining on the area north of the Orange Street Plant to depth of 80 feet
- Phase 6 – Excavate the north area to 100 feet
- Phase 7 – Reconfigure Orange Street Plant and initiate mining on east half of plant site to 80 feet

- Phase 8 – Mine north area to 120 feet and east plant area to 100 feet
- Phase 9 – Move needed plant facilities to east side of Orange Street plant site and mine west half to 100 feet
- Phase 10 – Mine remainder of western areas to depth of 120 feet
- Phase 11 – Final reclamation.

Mining operations are planned to excavate material using standard open pit mining techniques of pushing material with a dozer to a working level, removing and loading material with the loader and /or shovel into haul trucks, and transporting material to the Orange Street Plant. Equipment used will not differ (other than technological advancements or replacement equipment) from that currently being used for mining onsite.

Mining will be restricted to 20 feet from ground water with no operations allowed in standing ground water. Existing SBVWCD monitoring wells located east of the quarry will be used to determine the depth to ground water. This will be coordinated with the property owner, the SBVWCD.

Mining and reclamation activities will be conducted on the finished upper slopes concurrently and are estimated to continue intermittently for the life of the permit depending on market demand and aggregate quality. The operations at this site will not increase overall mining production of the Cemex operations. The site is a location where Cemex can excavate material on an as-needed basis. Mining operations may move from within the quarry depending on actual aggregate quality and the type of material in demand at that time.

The top of the existing and planned pit rim adjacent to undisturbed areas will be prominently marked and staked to establish the excavation limits and limit any offsite disturbance. Safety features in the form of fencing, landscaped screens, and warning signs will be constructed along Orange Street. A 3-strand wire fence with signs posted every 300 feet will be constructed along the north and east sides of the quarry as necessary to restrict public access. Reclamation of finished 2H:1V slopes will begin as mine phases are completed or portions of the quarry slopes reach finished grade. Reclamation will consist of ripping floors and compacted slopes parallel to the contour, creating variations in the finished slopes with sculpting, and revegetation of the upper slopes with native Wash species.

Monitoring and maintenance of reclamation efforts will be initiated once excavated areas reach final grade. The end use for the East Quarry North will be a ground water storage or recharge basin, open space, or other acceptable uses as determined by the landowner and the city involved. Detailed reclamation plans for the site are discussed in Section 2.

1.2 <u>MINE WASTE</u>

Mining activities produce unusable materials consisting of boulders and clay or silt of approximately 5 percent. Typically material is rockier with larger boulders to the east becoming sandier to the west. Boulders not sold or crushed would be stockpiled onsite and regraded into the final reclamation of the site. The silt or fines are by-products of material washing at the Orange Street Plant and are deposited into the existing silt ponds in the eastern half of Johnson Pit North until it is filled. The western half of the Johnson Pit North site will be mined. In future years, the Silt Pond Quarry located to the west of Orange Street and to be mined by RRM, would be used for the deposition of silts by both Cemex and RRM. This material would also be sold or used for reclamation activities, revegetation and haul roads. No water contaminants are associated with the aggregate operations.

All domestic refuse is collected in approved trash bins and hauled to the nearest approved landfill for disposal. Equipment will be maintained at the Alabama Street Shop and Orange Street Plant. Used oils, fuels and solvents are collected in accordance with the Department of Toxic Substance and Control regulations and picked up by an approved hauler for recycling. The current operations maintain a Business Emergency, Hazard Communication and Training Plan with the County Environmental Health Services Agency. The site has been included in the approved storm water permit from the State Water Resources Control Board. In addition, the operator has an approved permit as a hazardous material generator.

1.3 PROCESSING

Excavated materials may be initially screened by a portable grizzly screen that moves with the mining inside the pit to separate large boulders. The material is then transported via haul truck to a surge pile at the Alabama Street Plant or Orange Street Plant. Cemex signed an agreement with RRM to utilize their tunnel under Orange Street for truck travel between its Orange Street Plant and Alabama Street and West Quarries. This will reduce the crossing of Orange Street by off-road trucks at the signal located at the plant's driveway.

Material is processed at the Orange Street Plant through a series of crushers and wet and dry screens to produce specification grade, sized aggregates and sand. The crushed and screened material is transported by customer owned trucks for a wide variety of construction uses throughout the area.

Production at the Alabama Street plants and the Orange Street Plant will not exceed existing air quality permits. The existing plants have approved air quality permits from the South Coast Air Quality Management District (SCAQMD). Dust control equipment on the plants includes water sprays and baghouses. The Orange Street Plant is permitted through the SCAQMD for a maximum production of 5.4 MT per year. Cemex will limit its maximum production from the Orange Street Plant to 3.0 MT per year. In addition to these permits, the operator complies with the SCAQMD's Rules 403 and 1157 to control fugitive dust emissions, which will be extended to include all active operations. Dust control measures may include watering of haul roads, active mining and processing areas, and stockpiles of fine materials, limiting truck speeds, use of chemical stabilizers on haul roads, and routine maintenance of equipment and trucks. Trucks sprays and wheel washers are utilized and any spillage onto public roads is cleaned-up. The mining operations will generally be within the pits protected from direct winds though mining is restricted when winds exceed 25 MPH.

In addition, the operator shall comply with all existing and future CARB and SCAQMD regulations related to diesel-fueled trucks and equipment, which may include among others: (1) meeting more stringent emission standards; (2) retrofitting existing engines with particulate traps; (3) use of low sulfur fuel; and (4) use of alternative fuels or equipment.

1.4 PRODUCTION WATER

Water consumption for aggregate washing and dust control at the Orange Street Plant is approximately 1,184 acre-feet per year or about 4 acre-feet per operating day. Dust control and ready mix operations at Alabama Street consume approximately 175 acre-feet per year or about 0.6 acre-feet per operating day. Water usage depends on actual production and extraction and weather conditions. Water is supplied from existing wells located in the northwestern portion of the Alabama Street Quarry and on the south side of the Orange Street Plant. Water during mining consists of wetting the excavation areas and haul roads. During reclamation, water will be necessary for dust control on roads and for grading during preparation of the slopes and occasional wetting of revegetated slopes if necessary.

1.5 EROSION AND SEDIMENTATION CONTROL

The potential for any offsite flow to enter the quarries is unlikely. The sites are outside the Santa Ana River and Plunge Creek 100-year floodplains as assessed by the ACOE. The Alabama Street Quarry is bordered on the north by the Plunge Creek east and west basins constructed for flood control; on the east by the elevated SR-30 Freeway and bridge over the wash, and the existing and planned quarries. The completion of the Seven Oaks Dam will limit future flooding in the wash. All of these facilities will greatly reduce and likely eliminate any significant natural runoff onto the Alabama Street Quarry.

The West Quarry is protected on the north and east by the Plunge Creek east and west basins constructed for flood control, the upstream planned Silt Pond and East Quarries, and the Plunge Creek overflow channel. The Santa Ana River main channel to the south and the Seven Oaks Dam greatly reduces the likelihood of any significant natural runoff onto the West Quarry. The existing haul road along the north and east sides of the site also serves to block any local up gradient run-off.

The East Quarry is bordered by Plunge Creek to the north, numerous SBVWCD berms and basins to the east, and the Santa Ana River channel to the south. The Seven Oaks Dam upstream greatly reduces the likelihood of any significant natural runoff onto the East Quarry.

Minor local sheet and surface runoff that may drain into the excavations would percolate rapidly into the porous alluvium material. Any locations where runoff is entering the pit will be assessed and protective measures taken as necessary to eliminate potential erosion. The planned slope revegetation will also aid in preventing slope erosion.

To safeguard against potential future erosion, the operator will conduct erosion monitoring after each major storm event or at least once per month during the rainy season defined as between October 1 and May 31. A major storm event is defined as precipitation totals of 0.5 inches per 24-hour period. The operator will visually inspect the perimeter of the excavations and berm to observe any drainage that may be entering the pit and document the observed and potential erosion occurring. The inspector shall note the occurrence and severity of any sheet, rill or gully erosion and any evidence of surficial instability. If erosion or the potential for substantial erosion is evident, the operator shall implement appropriate erosion control measures. A small berm or an interceptor ditch along the pit rim may be constructed depending on the observed flow and/or erosion. If the operator determines to allow other flows to enter the pit, then down slope drains will be installed. The down slope drains would typically be constructed with one of the following: rock reinforced with energy dissipaters; a corrugated metal pipe (CMP); or a flexible conduit of heavy-duty fabric.

1.6 BLASTING

No blasting will be conducted for mining at these sites. It may be necessary to set minor blasts and to conduct temporary crushing onsite for the removal of the concrete washout areas in the northwest portion of the West Quarry depending on its thickness. If blasting is utilized, it would be contracted to a licensed blasting company with appropriate permits from the Bureau of Alcohol, Tobacco, and Firearms, the San Bernardino County Sheriffs Department, Mine Safety and Health Administration (MSHA), and Cal OSHA, and coordinated with the City of Highland.

2.0 RECLAMATION

2.1 LAND USE

This M/R Plan is part of the proposed Upper Santa Ana River Wash Land Management and Habitat Conservation Plan (Wash Plan) overlying two municipal jurisdictions. All planned quarries described above are within the area designated for aggregate extraction and processing by the Wash Plan. Portions of this area have been mined for over 70 years and permitted mining operations are ongoing today. Mining will be allowed to continue in existing approved mine areas and expand into adjacent undisturbed areas as part of the overall Wash Plan to balance land uses including habitat conservation.

The project area is located within the Upper Santa Ana Production Area, which was the subject of a study conducted by the State Mining and Geology Board in accordance with SMARA. SMARA requires the Board to locate and designate lands in California, which are threatened by uses incompatible with aggregate mining operations. The site was classified as a "regionally significant construction aggregate resource area" by the Board. The objective of this classification and designation process is to insure that mineral deposits of statewide or regional significance would be available as needed.

Existing surrounding land uses of the aggregate lands consist of the following, starting in the northwest corner and moving clockwise around the site:

- West – Alabama Street, vacant land, San Bernardino International Airport
- North – Plunge Creek West and East Basins, shooting range, Plunge Creek habitat conservation area, MWD Inland Feeder Pipeline
- East – Vacant lands for habitat conservation and spreading basins
- South – Santa Ana River Woolly Star preserve, flood control within the active Santa Ana River, habitat conservation areas
- Internally - SR-30 Freeway, Orange Street, active mining and processing plants, silt ponds, and haul roads. There are no immediately adjacent housing or other sensitive land uses.

2.2 VISIBILITY

The project site consists of a series of pits and aggregate processing operations extending from Alabama Street east to the existing pits in Section 11, east of Orange Street. The Wash Plan defined the aggregate lands for the purpose of consolidating the future mining activity into one large area adjacent to existing mining operations within Sections 9, 10, and 11 in the western half of the WPA. This focuses extraction activities on lands currently disturbed by mining and lands with the least long-term wildlife habitat value. The BLM lands were either previously disturbed or were fragmented by adjacent mining activities, and thus would be better suited for mining expansion. Preserved habitat areas are located in larger connected areas with intact natural habitat and availability of future fluvial flows. The water conservation activities would passively utilize some habitat areas, continue in areas historically utilized, and be able to use reclaimed mine sites.

The consolidation of mining activities where it is currently taking place limits the additional visual impacts from the quarry expansions. No new process plants are planned. Mining operations will occur below grade in an area previously mined. Visual impacts of the existing and planned quarries would be reduced by removal of highwalls and concrete washout, and reclamation and revegetation of slopes with local native plants.

The principal views of the site are by drivers on the SR-30 Freeway in the west and on Orange Street to the east. Views from SR-30 are more prominent due to its raised alignment and include excavated pits with various slopes, depths, and highwalls. Actual mining may occasionally be visible and the plants west of the freeway are visible, but with no change to existing conditions planned. Actual mining may occasionally be visible though it should not further degrade the existing conditions. The planned mining and reclamation will grade the slopes and pit floor, remove any remaining stockpiles, and hydroseed and revegetate the slopes to decrease visual impacts.

Views from Orange Street are less prominent as this road is at grade. Landscape screens consisting of small berms and landscape vegetation will be planted along the west side of Orange Street by Robertson's and on the east side of Orange Street (north of the plant's driveway) by Cemex as operations adjacent to the street are initiated.

2.3 VEGETATION

Cemex, RRM and its predecessors have conducted aggregate excavations in the project area since the 1920s. Mining, aggregate process plants, silt ponds, past grading, and access roads have disturbed approximately 569 of the 700 acres of the project site. Approximately 499 acres are considered totally disturbed and 70 acres partially disturbed with some natural vegetation. The existing active onsite pit areas have been completely disturbed by past mining activities. The principal undisturbed areas to be mined by Cemex are part of the planned East Quarry North. These include approximately 52 acres north of the existing Orange Street Plant, 42 acres in the south central portion (Johnson Pit South), and approximately 24 acres located in the extreme southeast corner of the East Quarry. These areas support an assemblage of Riversidean Alluvial Fan Sage Scrub (RAFSS). In addition, fringe areas around existing pits in Section 10 that will be slightly expanded for the West Quarry will also disturb areas that contain RAFSS that have naturally revegetated.

Riversidian Alluvial Fan Sage Scrub is a sensitive habitat of limited distribution in California. The listed endangered Santa Ana River woollystar and slender-horned spineflower have been observed on the undisturbed portions of the site. Due to this sensitive habitat with listed plant species, compliance with the Federal and California Endangered Species Acts is a part of the overall Wash Plan. The planned mining in the designated aggregate lands that will impact undisturbed areas will be compensated by the establishment of permanent habitat conservation lands within the framework of an overall Wash Plan and the development and implementation of a Habitat Conservation Plan (HCP).

The Wash Plan's EIR/EIS will include a complete description of the plant communities, habitats, and sensitive and listed plant species and their occurrence, an assessment of potential impacts, and recommended mitigation measures for the entire WPA. Integral parts of the Wash Plan are the designation of habitat conservation lands for listed species and sensitive plant communities and the preparation of the HCP.

2.4 WILDLIFE

Wildlife associated with the Wash habitat is generally common to alluvial and foothill environments in southern California. Over 80 vertebrate species have been observed or detected during biological surveys conducted during the past ten years on portions of the WPA. The majority of these species are common throughout the urban, sage scrub, and chaparral communities of southern California and among others include: western fence lizard, side-blotched lizard, mourning dove, northern mockingbird, greater roadrunner, California quail, California ground squirrel, Botta's pocket gopher, and coyote.

Many sensitive vertebrate species considered "Species of Special Concern" (CSC) by the California Department of Fish and Game (CDFG) have been previously identified in the WPA. One of these species, the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) (SBKR) is Federally listed as endangered. The SBKR occupies gravelly soils as well as sandy washes on the coastal slopes of southern California. It occurs at various locations in the WPA in alluvial scrub, historic braided river channels, adjacent to active water channels, and sandy alluvial deposits.

The EIR/EIS will include a complete description of the wildlife and their occurrence, plant communities, and sensitive habitats, an assessment of potential impacts, and recommended mitigation measures for the entire WPA. Integral parts of the Wash Plan are the designation of habitat conservation lands for listed species and sensitive habitat and the preparation of the HCP.

2.5 RECLAMATION

Reclamation will be in compliance with reclamation standards recommended by SMARA regulations in 14 CCR. Reclamation of the Santa Ana Wash Mine site will be undertaken concurrently with mining as excavated slopes are completed. Final reclamation of the lower slopes will lag towards the end of mining. Time frames for reclamation are dependent on the fluctuation of product demand between the mining sites operated by Cemex in the Wash. During the review of this section, the Reclamation Plan (see Sheet 8 of 8) and Cross Sections should be referenced.

Reclamation will be undertaken concurrently with mining operations within the project site. Reclamation will be ongoing until final reclamation is completed after termination of excavations. As mining progresses, contouring of the final perimeter quarry walls will be undertaken and compacted slopes will be ripped parallel to the contour. The excavated 2H:1V slopes will meet performance standards as stated in Article 9, Reclamation Standards §3704(d) in 14 CCR. These slopes are acceptable gravel slopes with regard to their angle of repose and stability. Slope stability is discussed in Section 2.9. Slopes will also be sculptured and with some variations of slope gradients in order to reduce visual lines.

The initial reclamation will be undertaken during the first two years within the West Quarry. The existing steep slopes along the northwest side will be reclaimed by removing existing concrete washout, contouring the slopes at 2H:1V, and hydro-seeding with an appropriate native seed mix to increase stability, reduce erosion, and lessen visual impacts. In order to remove the accumulated concrete washout along the rim, minor blasting and a portable crusher/screen may be required for a short time onsite.

Revegetation of the 2H:1V slopes as well as monitoring of revegetation activities will be initiated upon completion of final grades along portions of the pit slope. Slopes will be rough graded along the contour (parallel to the rim) to allow for collection of seeds and water. Compacted areas will be scarified to a depth necessary to promote plant growth, typically to a depth of 12 inches. Any available surface material would be placed on the prepared slopes and broadcast seeded.

The lower 20 feet of the slopes and the quarry bottoms will not be revegetated due to typical operational requirements of ground water storage or recharge basins (see Figure 4). The pit floors used for ground water recharge will be ripped to a depth of two feet. If the property owner does not plan on utilizing the basin floor within one year of mining termination, then the operator will one time seed the basin floor with an acceptable erosion control grass mix of local native grasses to reduce possible wind erosion. Revegetation plans are discussed in Section 2.6.

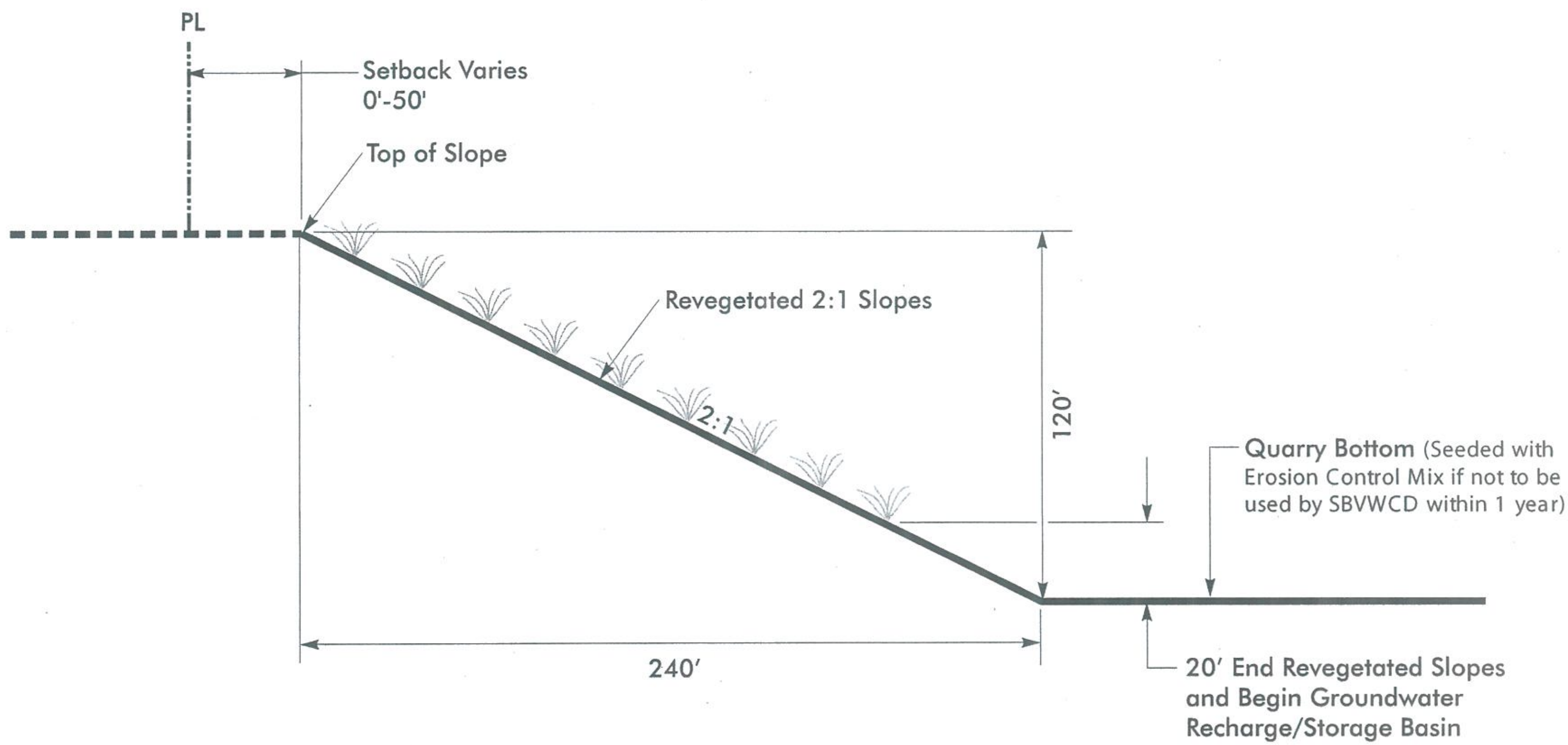
Haul roads that provide access into the quarries will remain in place for the reclamation/revegetation effort, for revegetation monitoring and remediation, and for future use of the site for ground water recharge or water storage activities. Other roads not needed will be reduced to a width of 22 feet or eliminated, scarified, and revegetated.

Process plants, mining equipment, stockpiles, and refuse will be removed. If the operator decides to continue the operation of the process plants, then those operations would need to be permitted prior to the expiration of this permit. Compacted areas will be ripped to a depth of 1 to 2 feet and the area seeded with native seeds.

Locked gates and fencing as needed along the quarries' rims as specified previously with signs placed every 300 feet, will protect access into the quarries. Upon final reclamation, the reclaimed quarries will consist of basins suitable for use as water storage or recharge basins by the SBVWCD or possibly recreational uses. Final grading of the basin floors would be coordinated with the landowner to facilitate the designated end use.

2.6 REVEGETATION

Initial reclamation and revegetation will be undertaken in the northwest portion of the West Quarry during the first two years. The existing steep slopes along the northwest rim will be contoured and hydro-seeded with an appropriate native seed mix to increase stability and reduce visual impacts and erosion. Prior to mining relatively undisturbed areas outside the existing pits, specific plants and soil will be salvaged from undisturbed areas. The operator will remove yucca, cacti, and other unique species deemed suitable for transplanting by qualified personnel. The removed plants will either be directly replanted to slopes ready for revegetation or be maintained for future revegetation activities.



Typical Slope Detail

Santa Ana Wash Mine Areas
Cities of Highland and Redlands, California

Prepared By: LILBURN CORPORATION

Figure 4

As an area is cleared for mining, the site's vegetation will be chipped, and surface material to a depth of six inches will be scraped and moved directly to an area ready for reclamation. This will preserve any seed bank, which is present within the surface material and is an important factor for a successful revegetation effort. In addition, measures required in the EIS/EIR and HCP for the overall implementation of the Wash Plan will be undertaken.

Future revegetation efforts will consist of revegetating the final basin slopes. The lower 20 feet of the slopes and the pit bottoms will not be revegetated due to the operational needs of a ground water recharge or storage basin. The goal of this revegetation program will be to reduce potential erosion and visual impacts, and to reestablish native habitat compatible with that currently found in the area. Only native species, which currently occur adjacent to the site, will be utilized and the genetic balance of the area will be maintained by avoiding the introduction of foreign species from outside the immediate vicinity.

Note that the endangered Santa Ana River woolly star may occur on adjacent areas outside of the final quarry rim. Seed collection that may be conducted in these areas and any disturbance of this listed plant or collection of its seed will require prior review by the USFWS and/or the CDFG in the framework of the HCP.

Baseline Data

Scott White Biological Consulting conducted initial baseline vegetation sampling to provide future baseline and success criteria for the Wash Plan areas. His reports are included as Appendix A and are summarized below. The survey areas were located in the undisturbed areas south of the Alabama Street Quarry, west of SR-30, and in the center area of the planned East Quarry in the Johnson Pit South.

West Wash Area

Eleven plant transects were completed to establish the vegetation cover, species richness, and shrub density of each perennial plant species in the west portion of the aggregate lands (see Table 4). To measure species density and cover, plant transects were conducted on undisturbed areas (as undisturbed as possible due to natural flooding and offroad vehicle use) representative of the western portion of the aggregate lands in the vicinity of I-210. Each line transect sample was 50 meters long and ten meters wide in which every species were recorded. In addition, densities were estimated at each transect by censusing each perennial species within a 25 m^2 area at the origin point of each transect. The shrub density data were taken at additional 12 – 25 square meter (m^2) plots. The transect data provides baseline data to determine seed, planting type, and rates, and is used to determine success criteria for future revegetation. Analyses of the samples indicate that they statistically meet SMARA guidelines of an 80 percent confidence level. Complete data tables are included in Appendix A.

Table 4
Summary Of Plant Transect Data
Western Wash Area

SPECIES	Scrub Cover (%)	Relative Cover (%)	Relative Cover (%) Cumulative
Scalebroom, *Lepidospartum squamatum*	11	38	38
California buckwheat, *Eriognonum fasciculatum*	7	24	62
Golden aster, *Heterotheca sessilifolia*	3	10	72
San Joaquin matchweed, *Gutierrezia californica*	2	7	79
Deerweed, *Lotus scoparius*	2	7	86
Groundsel, *Senecio flaccidus*	1	3	89
Santa Ana River woolly star, *Eriastrum densifolium* ssp. *Sanctorum*	1	3	92
Coastal prickly pear, *Opuntia littoralis*	<1	<1	93
Our Lord's candle, *Yucca whipplei*	<1	<1	94
hairy yerba santa, *Eriodictyon trichocalyx*	<1	<1	95
California croton, *Croton californicus*	<1	<1	96
Others	<2	<4	100
Total	29	100	100

Source: Alabama Street Baseline Vegetation Data – Scott White Biological Consulting, March 2000

Much of the site assessed has evidently been flood scoured within the past 10 to 20 years and the most common and generally dominant species are scalebroom, California buckwheat, golden aster, and San Joaquin matchweed, which account for over 79 percent of the cover. This is consistent with early-successional alluvial scrub.

East Wash Area

Eleven plant transects were also completed to establish the vegetation cover, species richness, and shrub density of each perennial plant species for the east portion of the aggregate lands (see Table 5 and report in Appendix A). To measure species density and cover, plant transects were conducted on undisturbed areas representative of the eastern portion of the aggregate lands in Section 11. Similar data collection methods as described above were employed. Complete data tables are included in Appendix A.

Table 5
Summary Of Plant Transect Data
Eastern Wash Area

SPECIES	Shrub Cover (%)	Relative Cover (%)	Relative Cover (%) Cumulative
California juniper, *Juniperus californica*	12	24	24
California buckwheat, *Eriognonum fasciculatum*	7	14	38
Yerba santa, *Eriodictyon trichocalyx*	6	12	50
Coastal prickly pear, *Opuntia littoralis*	5	10	60
Deerweed, *Lotus scoparius*	4	8	68
San Joaquin matchweed, *Gutierrezia californica*	3	6	74
Our Lord's candle, Yucca whipplei	3	6	80
Chamise, *Adenostoma fasciculatum*	2	4	84
Scalebroom, *Lepidospartum squamatum*	2	4	88
Valley cholla, *Opuntia parryi*	1	2	90
Santa Ana River woolly star, *Eriastrum densifolium* ssp. *Sanctorum*	<1	<1	91
Golden aster, *Heterotheca sessilifolia*	<1	<1	92
Others	<4	<8	100
Total	49	100	100

Source: Johnson and Redlands Aggregate Baseline Vegetation Data – Scott White Biological Consulting, March 2000

In contrast to the western site, the eastern site has not been flooded recently. Successional changes have evidently shifted from a scalebroom and golden aster dominated community toward a more dense California juniper woodland with California buckwheat, Yerba santa, and prickly pear the most common shrubs accounting for 60 percent of the cover. This pattern is consistent with succession of alluvium scrub vegetation. Total shrub cover totaled 49 percent compared to 29 percent for the western site. Note that California juniper occurs at relatively low density but is visually dominant and has significant cover (12%).

Site Preparation

Areas of revegetation will include the side slopes of the pits or basins from the original surface down to twenty feet from the basin floor (see Sheet 8). Approximately 130 acres of undisturbed areas and another 70 acres of previously disturbed areas will provide some salvaged plants and soil for use as a seed bank. Prior to revegetation, a soil analysis will be conducted on the areas to be reclaimed to determine the presence or absence of essential elements as compared to natural local soils. Soil amendments will be added if required to duplicate existing soil conditions. The slopes to be reclaimed will be graded along the contour to break up compacted alluvium where necessary in order to leave a rough surface to aid in the natural accumulation of seeds and precipitation. Available salvaged surface material will be used in areas where additional growth media is necessary due to rocky or clay conditions.

Revegetation Methods

Broadcast seeding or imprinting are planned to revegetate the slope areas designated for revegetation. Seed collection from nearby undisturbed areas will augment the broadcast seed mix. Collection will occur under the supervision of qualified personnel and within the framework of the HCP. Commercially available seeds of native species may also be used to supplement the local seeds due to variations in natural seed availability. Seeding would take place between October and December to take advantage of winter precipitation and eliminate the need for irrigation. Seed will only be collected within one year of planned reseeding.

Utilizing the data and the notes taken in the field, the site previously supported early to intermediate Riversidean Alluvial Fan Sage Scrub perennial elements including: scalebroom (*Lepidospartum squamatum*), California buckwheat (*Eriogonum fasciculatum*), golden aster *(Heterotheca sessilifolia),* deerweed (*Lotus scoparius*), San Joaquin matchweed (*Gutierrezia californica*), California croton *(Croton californicus),* Our Lord's candle (*Yucca whipplei*) and yerba santa (*Eriodictyon trichocalyx*). Without future water flows, the site will be planted with an intermediate seed mix of Riversidean sage scrub. California buckwheat and golden aster are common pioneering species on disturbed areas and will quickly grow in such areas. These species will later be displaced by the intermediate species of yerba santa, juniper, lemonade berry, prickly pear cactus, and goldenbush. Other perennial species are comparatively rare.

The disturbed areas will be broadcast seeded with the species and rates shown in Table 6. Note that the species seeded will be augmented with native annuals as recommended in the Baseline Study. Only native seeds tolerant to existing soil and rainfall conditions will be used. The average precipitation in the area should be sufficient for seed germination and root establishment of native species. Irrigation of the site will not be used to avoid encouraging non-native invasive plants.

In addition, the operator shall establish at a minimum four one-acre test plots as well as two control or no seed areas. The plot areas shall be representative of a disturbed mining slope. The test plots will be maintained and monitored. Tests are being conducted to refine planting techniques and seeding rates. Additional tests will be conducted if the initial tests and any active revegetation are not successful and may include various types and amounts of seeds, different soil preparation, and fertilization trials. The initial tests will compare imprinting techniques and broadcast seeding and two rates of seed application. Similar methods are also being utilized at Cemex's Lytle Creek site and have been shown by others to be more successful than natural revegetation or broadcast seeding only.

Table 6
Proposed Seeding Rates For Perennial Species
Santa Ana Wash Mine

SPECIES	SEEDING RATE (Pounds of Pure Live Seed/Acre)
California buckwheat	3
Hairy yerba santa	2
Our Lord's candle	0.5
Deerweed	2
Golden yarrow	0.5
California croton	1
Goldenbush	1
California sagebrush	1
Lemonadeberry	0.25
White sage	0.5
Laurel sumac	0.25

Previously established test plots were revegetated with an imprinter in the Spring of 2000. The imprinter is a tractor attachment which creates a random pattern of pockets and mounds up to three to six inches in depth and height. Seed types and rates of pure live seed as listed in Table 5 were sowed by the imprinter at the same time and covered by the imprinting action. This seeding rate is proposed for the revegetation plan for the site with revisions per results of the test plots if necessary.

Weed Control Plan

The purpose of the weed control plan is to reduce or eliminate the occurrence of non-native plant species that may invade the site where mining activities have removed the native plant cover and where active and natural revegetation is taking place. Non-native invasive species (weeds) can compete with native plant species for available moisture and nutrients and consequently interfere with revegetation of the site.

Weed or non-native species of concern at the site may include some or all of the following:

Arundo donax	giant reed, arundo
Avena barbata	slender wild oat
A. fatua	wild oat
Bromus diandrus	ripgut brome
B. madritensis	red brome

B. tectorum	cheat grass, downy brome
Cortaderia spp.	pampas grass
Eucalyptus spp.	gum tree, eucalyptus
Lepidium latifolium	pepperweed
Nicotiana glauca	tree tobacco
Ricinus communis	castor bean
Salsola tragus	Russian thistle, tumbleweed
Schinus molle	pepper tree
Tamarix spp.	tamarisk, salt cedar

The occurrence of weeds on site shall be monitored by visual inspection. The goal is to prevent weeds from becoming established and depositing seeds in areas to be revegetated at a later date. No areas will be allowed to have more than 20 percent of the ground cover provided by non-native plant species. If inspections reveal that weeds are becoming or have established on site, then removal will be initiated. Inspections shall be made in conjunction with revegetation monitoring.

Weed removal will be accomplished through manual, mechanical or chemical methods depending on the specific circumstances. For example, solitary or limited numbers of tree and tree-like species (eucalyptus, tree tobacco, castor bean, or tamarisk) will be manually removed (chopped) and the stumps sprayed with an approved weed killer such as Round-Up. Smaller plants (wild oats and bromes) that cover more area may be sprayed, scraped with a tractor, or chopped by hand, depending upon the size of the area of infestation and the number of desired native plants in proximity or mixed in with the weeds.

Reports of inspections and weed control implementation shall be part of the annual revegetation monitoring and kept on file by the operator.

Monitoring

The Biological Monitoring Plan will be an ongoing effort to assess the results of revegetation on the disturbed areas of the site. The monitoring plan will be followed annually to monitor and assess completed revegetated areas and areas where revegetation is being planned or just beginning. A Biological Monitoring Report submitted by the operator to the lead agency will be part of the overall compliance with conditions. Revegetated areas will be assessed utilizing success criteria with successful methods being implemented for future revegetation.

Revegetation efforts will be monitored annually for five years after seeding or until revegetation meets the success criteria and is self-sustaining. Revegetation observations will be summarized annually as part of the overall-monitoring program. This schedule may be revised depending on the results of the revegetation effort and the meeting of the success criteria. Monitoring and revegetation results will be reported to the appropriate city in its annual monitoring report and to the State Office of Mine Reclamation in its annual mining operation report.

Success Criteria

Success criteria will be based on the overall quality of the revegetation results compared to the recorded baseline vegetation data. From completion of the revegetation for a specific area, the surviving perennial plant species shall be evaluated annually by the consulting botanist for relative growth as determined by diversity and density. Individual specimens or areas shall receive appropriate remedial attention as necessary. Remedial actions include removing invasive weed species or reseeding. The above procedure will be repeated annually for a total of five years.

Success will be a measure of the species density and diversity based on the baseline or control areas. The west area is more indicative of early successional alluvial scrub and would act as the baseline for revegetated areas. The existing baseline transect data indicated 30 percent cover by about 12 perennial plant species. Successful revegetation based on USFWS recommendations would be achieved when the reseeded areas have achieved the following:

- 15 percent cover by native species (or 50% of existing cover);
- A minimum of 6 out of the 12 perennial shrub species represented by at least five dominant or codominant native plant species;
- Less than 20 percent cover of non-native plant species; and
- Recruitment of seedlings of native pant species must occur demonstrating a positive trend in cover and diversity.

2.7 CLEANUP

Upon the mine's termination, plant facilities, equipment, stockpiles, and other debris will be removed from the project site. Any remaining refuse will be disposed of at an appropriate disposal facility.

2.8 POST RECLAMATION AND FUTURE MINING

Upon completion of reclamation, the three sites will consist of basins with revegetated side slopes suitable for use as ground water recharge or storage basins to increase future public water supplies. The sites would be available for other appropriate uses such as recreation as determined by the landowner in consultation with the city within the site lies. Minor changes to the final grading of the slopes or basin floor for other uses agreed upon by the SBVWCD and the appropriate city prior to termination of mining would be amenable with Cemex. The use of the site as ground water percolation or storage basins would not preclude future mining of available aggregates at depth.

2.9 SLOPES AND SLOPE TREATMENT

CHJ Incorporated prepared slope stability investigations of the existing and proposed slopes for each quarry. Based on their analysis, new cut slopes from the existing depths of 40 to 60 feet down to

120 feet and inclined no steeper than 2:1 are expected to be stable against gross failure from long-term conditions including seismic shaking, standing water, and rising ground water.

During excavation, actively mined inner slopes may temporarily be as steep as 90 degrees. Upon excavation to the maximum depth, the final new perimeter slopes will be contoured to a maximum of 2H:1V. Since no structural end use is contemplated, slope compaction will not be needed to maintain slope stability. The mined slopes should be conducive to reestablishment of natural plant species which will aid in the stabilization of the slopes.

2.10 PONDS

In the overall Wash Mine Plans, RRM will mine a 90-acre pit in the east portion of Section 10 to be used for the future deposition of silts by both RRM and Cemex. The quarry has been designated the Silt Pond Quarry and will be reclaimed by RRM upon the completion of mining in the Wash. Until the Silt Pond Quarry is available for silt disposal, Cemex will continue to deposit silts into the eastern half of the existing and permitted Johnson Pit North silt ponds. Upon the completion of backfilling these ponds with silts, Cemex will allow the site to dry, grade the site for positive drainage, cover the silts with 2 feet of alluvium, and revegetate the surface.

2.11 SOILS AND SILT

Soils in the area consist of Soboba Association and Riverwash Association soils. Soboba Association soils are located along the terraced banks of creeks and washes. These soils were formed within alluvium or the outwash of streams where gentle to moderate slopes prevail. Soboba soils have a cobbly, coarse loamy sand surface underlain by pale brown, single grain, loose stratified, very gravelly and cobbly sand and loamy sand subsoils. These soils are excessively drained and exhibit very high permeability; runoff is very slow. Water holding capacity is 2 to 3 inches. Inherent fertility is very low. Under natural conditions, these soils are subject to flooding during winter rainstorms. Normally, the frequency at which overflow waters reach any particular river terrace is a function of the distance from and of its elevation above the main stream channel. However, for the project sites, upstream flood control facilities now protect many of these terraces from flooding.

Riverwash Association soils form along the main washes and creek beds. These consist of river-deposited sand, gravels, cobbles, and stones in the active channels. Inundation occurs frequently and is accompanied by scouring, deposition, and removal. For reclamation and revegetation of the upper slopes, sandy slopes will be graded along the contour to hold moisture and seeds and to create suitable habitat for native species.

Soil samples were taken from five locations at the Cemex Santa Ana River Wash facilities and were analyzed by E.S. Babcock & Sons, Inc. in 2002 for the following plant growth factors: acidity/alkalinity, nitrogen, phosphorous, and potassium content. The samples were taken from two areas that have been reseeded and in three unmined areas adjacent to the existing mine locations. The samples were analyzed with the intent to gather basic soil information to ascertain similarities between revegetated and undisturbed areas to guide future revegetation and any necessary remedial efforts.

The results indicate that the soil is relatively low in primary plant nutrients in both the revegetated and unmined locations. The soils are psamments and fluvents, which are actively deposited and reworked by fluvial action. They are cobbly and sandy and generally low in plant nutrients. Soils that are periodically disturbed by flooding and fluvial action are expected to be lower in plant nutrients than more stable and more highly developed soils common in agricultural settings. The use of native plant species collected from the area is intended to accommodate the relatively low fertility of the soils. The mined areas have lower plant nutrient content than the adjacent undisturbed soil. This difference does not appear to be interfering with plant growth at this time.

Mining activities produce unusable materials consisting of boulders and clay or silt of approximately 5 percent. Boulders not sold or crushed would be stockpiled onsite and regraded into the final reclamation of the sites. The silt or fines are by-products of material washing at the East Basin Processing Plant and are deposited into the existing silt ponds on BLM land just southwest of the plant. In future years, both RRM and Cemex would use the Silt Pond Quarry located to the south of the East Basin Plant for the deposition of silts. This material could also be sold or used for reclamation activities, revegetation and haul roads. No water contaminants are associated with the aggregate operations and the Regional Water Quality Control Board (RWQCB) typically waives waste discharge permits.

2.12 DRAINAGE AND EROSION CONTROLS

Sheet and surface runoff that may drain into the excavated quarries would percolate rapidly into the porous alluvium. The potential for any offsite flow to enter the quarries is unlikely. The sites are outside the 100-year floodplain of the Santa Ana River as recently assessed by the ACOE. The Plunge Creek east and west basins constructed for flood control, the upstream existing and planned quarries and SBVWCD recharge basins, the Plunge Creek overflow channel, the Santa Ana River main channel to the south, and the Seven Oaks Dam greatly reduce the likelihood of any significant natural runoff onto the site or into the excavated area. Any locations where runoff is entering the pit will be evaluated and measures taken as necessary to eliminate potential erosion. The planned slope revegetation will also aid in preventing slope erosion.

Extraction and reclamation activities will be conducted to protect onsite and downstream beneficial uses of water in accordance with the Porter-Cologne Water Quality Control Act and the Federal Clean Water Act.

2.13 PUBLIC SAFETY

No refuse or dangerous material will remain onsite. Most slopes will be mined at 2H:1V to protect public safety. Three-strand wire fencing and locked gates in accessible areas will block public access onto the property, much of which is located in isolated, inaccessible portions of the wash. The perimeter of the quarries where it is potentially accessible to the public, will be fenced with warning signs posted every 300 feet to deny unlawful access.

2.14 MONITORING AND MAINTENANCE

Revegetation and reclamation efforts will be monitored pursuant to SMARA requirements and according to the approved Reclamation Plan and Cities' conditions. Cemex will be required under SMARA (Public Resources Code Section 2207) to submit an annual status report on forms provided by the Mines and Geology Board (Board). SMARA (Section 2774(b)) requires the lead agency to conduct an inspection of the mining operation within six months of receipt of the required Annual Report. The cities require the operator to submit an annual monitoring report submitted to the Community Development Director with information as listed in the approved conditions.

2.15 RECLAMATION ASSURANCE

In addition to the monitoring through inspections and reporting, Cemex is required to assure reclamation of the sites in accordance to the approved Reclamation Plan in compliance with Section 2773.1 of SMARA. The financial assurances may be in the form of surety bonds, an irrevocable letter of credit, trust funds or other forms of financial assurances approved by each city.

The financial assurance is reviewed annually by the operator and lead agency to determine if operations or reclamation during the past year and planned operations during the upcoming year would require adjustments to the amount of the estimate. Financial assurances for each of Cemex's approved projects are on file with the appropriate city. Updated financial assurances to meet the planned operations of the described reclamation plan will be provided upon completion of additional planning reports as part of overall Wash Plan.

2.16 GEOLOGY

The project site is located in the broad fluvial plain formed by the deposition of the Santa Ana River and City Creek as they flow southwest from the San Bernardino Mountains. The EIR/EIS will describe the geological conditions in detail, assess potential impacts and provide mitigation measures as necessary.

Several fault bounded structural blocks saddle the general site area. The down dropped San Bernardino Valley block underlies the site and represents a buried rift between the San Andreas Fault to the northeast, and the San Jacinto Fault to the southwest. As the block subsided, alluvium derived from the San Bernardino Mountains filled the resulting depression, causing a maximum alluvial thickness of 600 to 1,200 feet east of the San Bernardino International Airport. It is this alluvium that is mined throughout the Wash. The alluvial deposit is of the Quaternary Age and consists of igneous and metamorphic clasts whose rocks are found in the mountains and at Crafton Hills. The clasts' sizes vary from that of fine size to boulders in size. All materials on the project site are classified in the Soboba Series, specifically Soboba Stony loamy sand.

The site is subject to ground shaking from earthquakes but is not located within an Alquist-Priolo special studies zone. The area is level and is not subject to landslide hazards. Depth to ground water fluctuates with season and recharge activities. The area is subject to liquefaction though this is not considered hazardous for mine or reclamation activities. Wind erosion is controlled through roadway watering and water spraying. Water erosion is controlled through containment and percolation of surface water and through the use of reinforced berms and down drains on slopes where necessary.

The project site is located downstream of the Seven Oaks Dam which is designed to control flooding along and downstream on the Santa Ana River. The project site is outside the post-dam 100-year overflows as assessed by the ACOE (Final Biological Assessment Seven Oaks Dam, June 2000).

2.17 HYDROLOGY/GROUND WATER

The EIR/EIS will describe the surface water and ground water conditions in detail, assess potential impacts and provide mitigation measures as necessary.

Climate - The San Bernardino Valley is characterized by a climate of long dry summers and short wet winters. Annual average daily temperatures range from a low of 49° F. to an average high of 80° F. The average rainfall is about 15.6" per year, with approximately 90 percent falling from November through March.

Drainage – The site lies in the broad historic wash of the Santa Ana River and south of City and Plunge Creeks. The site is outside the ACOE's 100-year floodplain delineation due to the Seven Oaks Dam (Final Biological Assessment Seven Oaks Dam, ACOE 2000). Surface drainage in the area is east to west-southwest. Surface flows upstream are cut off by SBVWCD spreading basins and berms, Orange Street, SR-30, the Plunge Creek overflow channel, and the Seven Oaks Dam. No alteration of major drainages is proposed.

Ground Water - The project site overlies the Bunker Hill Ground Water Basin. The Bunker Hill Basin is one of the largest ground water basins in the Santa Ana River Basin and is a ground water recharge zone. This basin, whose boundaries are generally defined by earthquake faults, which effectively act as subsurface dams trapping ground water, is bounded on the north and east by the San Bernardino Mountains, on the southeast by the Crafton Hills and the Badlands, and on the west by the San Jacinto fault. Because faults can act as barriers to the movement of ground water, the faults in the vicinity of the SBVWCD Mill Creek recharge facilities may restrict the movement of water into the larger Bunker Hill basin. Three subareas within the Bunker Hill Basin have been identified. These are commonly referred to as Bunker Hill I, Bunker Hill II, and the Pressure Zone. The project site overlies the Bunker Hill II subarea. The Pressure Zone to the west is an area where high ground water levels have historically existed.

Many natural and artificial phenomena such as rainfall, natural stream inflow, evaporation, ground water extractions through wells, and spreading operations for replenishment of the water supply influence ground water levels in the Bunker Hill Basin. The Bunker Hill Basin is artificially recharged by several agencies. Included are surface stream diversions made for ground water replenishment by the SBVWCD on the Santa Ana River and Mill Creek, and facilities operated by the SBCFCD on Devil Creek, Twin Creek, Waterman Creek, and Sand Creek, which may also be used for ground water recharge. The SBVWCD and its predecessors have been diverting water from the Santa Ana River and Mill Creek for over 90 years.

The primary proprietor for ground water in this area is the SBVWCD. SBVWCD serves an area of 50,000 acres, and operates recharge facilities on Mill Creek and the Santa Ana River. SBVWCD recharges water generally during the winter rainy season and in the spring when Mill Creek and the Santa Ana River are flowing. In order to meet future consumptive demands, SBVWCD is planning for development of additional conveyance channels and basins for ground water recharge within the Wash area through the overall Wash Plan. The proposed basins would incorporate the planned quarries.

APPENDIX A
BASELINE VEGETATION DATA REPORTS

SCOTT WHITE
BIOLOGICAL CONSULTING

8 March 2000

Paul Kielhold
LILBURN CORPORATION
1905 Business Center Dr.
San Bernardino, CA 92408

Reg. CEMEX Redlands baseline vegetation data: Alabama St.

Dear Paul:

I have completed data collection and analysis at the CEMEX Redlands Alabama St. site. Methods and results are summarized here.

METHODS

Data collection: Field work was completed by Scott D. White and Tasha LaDoux between 14 January and 19 February 2000. We collected quantitative vegetation data on 11 transects. Data collection was slightly modified from methods described by Sawyer and Keeler-Wolf (1995, Appendix, p. 416 and following, "CNPS field sampling protocol"). Plot locations were scattered throughout the site and were selected to represent the range of typical vegetation occurring on the property. Plant species touching a vertical line, at ½-m intervals along 50-m line transects were recorded as "hits" and used to estimate cover by species on each transect. Every species occurring within a 10 m x 50 m belt along the transect line was recorded. In addition, densities of perennial plants were estimated at each transect site by censusing each perennial species within a 25 m^2 (5m x 5m square) area at the origin point of each transect. Shrub density data were taken at an additional 12 5m x 5m plots. All data are attached.

Analysis: Mean values were calculated for selected vegetation cover, species richness, and density variables (Table 1). Density estimates were converted from plants / 25 m^2 to plants / acre for results shown in this report but not in the data analysis shown in the appendices.

The California Surface Mining and Reclamation Act (SMARA) requires that baseline sample sizes "must be sufficient to produce at least an 80% confidence level." I used methods described by Bonham (1988: p 66) to determine sample size adequacy for estimated vegetation cover, species richness, and shrub density variables. Note, however, that the statistical approach assumes that plot sites are randomly selected, and that variables are normally distributed. These assumptions are violated here and I am not aware of a practical alternative. This compromise is common in vegetation sampling and analysis methods.

In effect, Bonham's formula determines a minimum sample size (n) to determine with 80% certainty that the average vegetation cover, species richness, and shrub densities in sample plots differ from the vegetation's actual average cover and richness by no more than 5%, 10%, or 20%, depending on maximum error selected.

RESULTS

Average vegetation cover, species richness, and shrub density are shown in Table 1. Note that the survey dates prevented identification of most native annual species, and that they are poorly represented in the data set. I recommend using the shrub species richness data here as a baseline for revegetation. Total species richness values reported here are low estimates because spring surveys would have identified more annuals, and total species richness would have been much higher. I recommend including locally-occurring native annual plants in the revegetation program if seed is commercially available, but emphasizing shrub species richness in revegetation success criteria and monitoring. Locally occurring annual species fluctuate widely seasonally and annually, so that variance in cover or density data is too high to effectively evaluate success.

Much of the Alabama St. site has evidently been flood scoured within about the past 10-20 years and the most common and generally dominant species are scalebroom (*Lepidospartum squamatum*), California buckwheat (*Eriogonum fasciculatum*), and golden aster (*Heterotheca sessilifolia*). This is consistent with early-successional alluvial scrub vegetation described by Smith (1980). Species more common in later-successional alluvial scrub, including prickly pear cactus (*Opuntia littoralis*) and yerba santa (*Eriodictyon trichocalyx*) occur at only low cover and density.

Sample size: Analysis indicates that these samples provide an adequate sample size, with an 80% confidence interval and 80% to 95% precision (5% to 20% maximum allowable error) for vegetation cover, shrub species richness, shrub densities, and densities of some dominant species (Table 2). State Mining and Geology Board personnel normally recommend a 10% - 20% maximum error for species richness and density estimates, though Board recommendations do not specify this (Gail Newton, pers. comm.). These calculations indicate that all critical cover and species richness variables meet these recommendations. I conclude that the data presented here meet the intent of the SMARA requirement for pre-disturbance vegetation sampling.

Sincerely,

Scott White

Table 1. Mean values for Alabama St. vegetation data.

Shrub species richness (10m x 50 m belt)	7.6	
Total native species richness	11.5	
Total shrub cover	29%	
Eriastrum densifolium ssp. sanctorum	1%	
Eriodictyon trichocalyx cover	< 1%	
Eriogonum fasciculatum cover	7%	
Gutierrezia californica cover	2%	
Heterotheca sessilifolia cover	3%	
Lepidospartum squamatum cover	11%	
Lotus scoparius cover	2%	
Opuntia littoralis cover	< 1%	
Senecio flaccidus cover	1%	
Other species total cover (none > 1%)	<4%	
Total shrub density (per 5m x 5m plot at left, per acre at right)	18	2910
Eriastrum densifolium ssp. sanctorum density	3.3	530
Eriodictyon trichocalyx density	0	0
Eriogonum fasciculatum density	2.2	360
Gutierrezia californica density	1.3	210
Heterotheca sessilifolia density	5.2	840
Lepidospartum squamatum density	1	160
Opuntia littoralis density	0.3	48
Other species total density (all < 1 / 5m x 5m plot)	13.3	760

Table 2. Minimum sample sizes needed to reach estimate mean values with an 80% confidence interval (Alabama St. site).

	Sample size	Estimated no. of plots needed for given maximum acceptable error			Precision of sample average
		5%	10%	20%	(80% confidence interval)
Shrub species richness	11	16	**4**	**1**	> 90%
Total shrub cover	11	40	**10**	**2**	> 90%
Total shrub density (per 5m x 5m plot)	23	**15**	**3**	**0**	> 95%
Santa Ana River woollystar density	23	94	**23**	**5**	> 90%
Calif. buckwheat density	23	140	35	**8**	> 80%
Matchweed density	23	245	61	**15**	> 80%
Golden aster density	23	56	**14**	**3**	> 90%
Scalebroom density	23	306	76	**19**	> 80%

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Sunwest Redlands Project: veg plots for Alabama St. site														
Plot #	1	2	3	4	5	6	7	8	9	10	11	n	mean	variance
Species Richness														
shrub species richness	6	8	10	10	6	9	5	9	6	8	7	11	7.6364	3.05454545
native annuals species rich.	6	6	3	4	2	3	2	5	1	3	7			
Total Native Species Richnes	**12**	**14**	**13**	**14**	**8**	**12**	**7**	**14**	**7**	**11**	**14**	**11**	11.455	8.07272727
Shrub cover														
Croton californicus	0.01	0.02	0.005		0.005	0.005	0.005	0.01					0.0079	
Eriastrum densifolium ssp. sanc	0	0.01	0.02	0.005	0	0.01	0	0.02	0.02	0.01	0.02		0.0105	
Eriogonum fasciculatum	0.005	0.05	0.06	0.09	0	0.06	0.02	0.03	0.26	0.13	0.05		0.0686	
Gnaphalium canescens	0	0	0	0.005	0	0	0	0	0	0	0		0.0005	
Gutierrezia californica	0	0	0.05	0.03	0	0	0	0	0.01	0.05	0.03		0.0155	
Heterotheca grandiflora	0.005	0	0	0	0	0	0	0.01	0	0	0		0.0009	
Heterotheca sessilifolia	0.005	0.07	0.02	0.03	0.06	0.005	0.07	0.03	0.02	0.01	0.03		0.0318	
Lepidospartum squamatum	0.13	0.08	0.12	0.07	0.02	0.21	0	0.19	0.16	0.09	0.17		0.1127	
Lotus scoparius	0.07	0.05	0.03	0.01	0.005	0.08	0.005	0.01	0.005	0.005	0.005		0.0245	
Opuntia littoralis	0	0.005	0.005	0.005	0	0.005	0	0.01	0	0.005	0		0.0027	
Senecio flaccidus	0	0.005	0.005	0.005	0.07	0.01	0.01	0.01	0	0.01	0.005		0.0118	
Yucca whipplei	0	0	0.005	0.005	0.005	0.05	0	0	0	0	0		0.0059	
Total shrub cover	**0.225**	**0.29**	**0.32**	**0.255**	**0.165**	**0.435**	**0.11**	**0.3**	**0.475**	**0.31**	**0.31**	**11**	0.2905	0.01105227
Native annuals cover														
Camissonia sp.	0.005	0.005												
Centaurea melitensis								0.01						
Cryptantha sp.	0.005	0.005	0.005	0.005		0.005	0.005	0.01			0.005			
Descuraina pinata											0.005			
Eriogonum gracile/davidsonii	0.005			0.005	0.005	0.005		0.01		0.005	0.005			
Erodium cicutarium	0.005	0.005	0.005					0.01			0.005			
Filago sp.	0.005	0.005		0.005				0.01		0.005	0.005			
Lessingia sp.	0.005	0.005	0.005			0.005								
Salvia columbariae				0.005	0.005		0.005		0.005	0.005	0.005			
Stipa speciosa											0.005			
Stylocline gnaphalioides		0.005												
Total native annual cover	**0.03**	**0.03**	**0.015**	**0.02**	**0.01**	**0.015**	**0.01**	**0.03**	**0.005**	**0.015**	**0.035**			

Plot #	1	2	3	4	5	6	7	8	9	10	11			
Alien species cover														
Avena sp.	0.005			0.005	0.005						0.005			
Brassica geniculata=Hirschfeldia incana		0.005	0.005		0.005			0.01			0.005			
Brassica nigra	0.005	0.005				0.005	0.005	0.01		0.005	0.005			
Nicotiana glauca								0.01						

	mean	var.	t2	t2s2	.05x	.1x	.2x	.05x2	.1x2	.2x2	n (.05)	n (.1)	n (.2)
Shrub species richness	7.636	3.054	0.773	2.36074	0.3818	0.764	1.5272	0.1458	0.5831	2.332	16	4	1
Total Native Species Richness	11.46	8.073	0.773	6.24043	0.5728	1.146	2.291	0.328	1.3122	5.249	19	4	1
Total shrub cover	0.29	0.011	0.773	0.0085	0.0145	0.029	0.058	0.0002	0.0008	0.003	40	10	2
Total shrub density (per 25 sq. m)	18	17.4	0.736	12.8064	0.9	1.8	3.6	0.81	3.24	12.96	**15**	3	0
Eriastrum densifolium ssp. sanctorum	3.3	3.49	0.736	2.56864	0.165	0.33	0.66	0.0272	0.1089	0.436	94	23	5
Eriogonum fasciculatum	2.2	2.31	0.736	1.70016	0.11	0.22	0.44	0.0121	0.0484	0.194	140	35	8
Gutierrezia californica	1.3	1.41	0.736	1.03776	0.065	0.13	0.26	0.0042	0.0169	0.068	245	61	15
Heterotheca sessilifolia	5.2	5.23	0.736	3.84928	0.26	0.52	1.04	0.0676	0.2704	1.082	56	14	3
Lepidospartum squamatum	1	1.04	0.736	0.76544	0.05	0.1	0.2	0.0025	0.01	0.04	306	76	19

Appendix: Alabama St. shrub density data

Alabama St. shrub density (25 sq. m)																												
plot no.	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	12	avg.	var.			
Artemisia dracunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.1				
Croton californicus	0	1	0	0	0	1	0	0	0	0	0	2	1	0	0	1	1	0	0	0	1	0	0	0.3				
Eriastrum densifolium ssp. sa	0	9	11	0	0	0	0	0	1	4	0	8	10	11	0	14	1	3	1	0	0	0	4	3.3	3.49		3.3	3.49
Eriogonum fasciculatum	0	1	1	5	0	2	1	0	3	1	2	1	0	1	9	2	2	6	0	0	2	11	1	2.2	2.31		2.2	2.31
Gutierrezia californica	0	0	0	4	0	0	0	0	0	7	7	0	0	3	0	1	2	2	2	0	0	0	3	1.3	1.41		1.3	1.41
Heterotheca sessilifolia .	5	0	0	0	6	15	6	6	4	2	19	0	3	25	3	6	0	3	8	0	9	0	0	5.2	5.23		5.2	5.23
Lepidospartum squamatum	0	0	3	2	0	0	0	1	0	0	0	1	0	0	0	1	5	1	2	4	0	0	3	1	1.04		1	1.04
Lotus scoparius	16	10	7	0	0	9	0	0	0	0	1	2	9	0	0	0	1	0	0	0	0	6	3	2.8				
Opuntia littoralis	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.3				
Senecio flaccidus	0	0	1	0	3	1	1	0	0	2	0	0	2	0	0	1	0	0	0	0	7	0	1	0.8				
Yucca whipplei	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1				
total density / 25 sq. m	21	21	29	11	9	28	8	7	8	16	29	14	25	40	12	27	12	15	13	4	19	17	19	18	17.4		18	17.4

SCOTT WHITE
BIOLOGICAL CONSULTING

8 March 2000

Paul Kielhold
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Reg. CEMEX Redlands baseline vegetation data: Johnson (south) and Redlands Aggregate (south)

Dear Paul:

I have completed data collection and analysis at the CEMEX Redlands Johnson (south) and Redlands Aggregate (south). Methods and results are summarized here.

METHODS

Data collection: Field work was completed by Scott D. White and Tasha LaDoux between 14 January and 19 February 2000. We collected quantitative vegetation data on 11 transects. Data collection was slightly modified from methods described by Sawyer and Keeler-Wolf (1995, Appendix, p. 416 and following, "CNPS field sampling protocol"). Plot locations were scattered throughout the site and were selected to represent the range of typical vegetation occurring on the property. Plant species touching a vertical line, at ½-m intervals along 50-m line transects were recorded as "hits" and used to estimate cover by species on each transect. Every species occurring within a 10 m x 50 m belt along the transect line was recorded. In addition, densities of perennial plants were estimated at each transect site by censusing each perennial species within a 25 m^2 (5m x 5m square) area at the origin point of each transect. Shrub density data were taken at an additional 12 5m x 5m plots. All data are attached.

Analysis: Mean values were calculated for selected vegetation cover, species richness, and density variables (Table 1). Density estimates were converted from plants / 25 m^2 to plants / acre for results shown in this report but not in the data analysis shown in the appendices.

The California Surface Mining and Reclamation Act (SMARA) requires that baseline sample sizes "must be sufficient to produce at least an 80% confidence level." I used methods described by Bonham (1988: p 66) to determine sample size adequacy for estimated vegetation cover, species richness, and shrub density variables. Note, however, that the statistical approach assumes that plot sites are randomly selected, and that variables are normally distributed. These assumptions are violated here and I am not aware of a practical alternative. This compromise is common in vegetation sampling and analysis methods.

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In effect, Bonham's formula determines a minimum sample size (*n*) to determine with 80% certainty that the average vegetation cover, species richness, and shrub densities in sample plots differ from the vegetation's actual average cover and richness by no more than 5%, 10%, or 20%, depending on maximum error selected.

RESULTS

Average vegetation cover, species richness, and shrub density are shown in Table 1. Note that the survey dates prevented identification of most native annual species, and that they are poorly represented in the data set. I recommend using the shrub species richness data here as a baseline for revegetation. Total species richness values reported here are low estimates because spring surveys would have identified more annuals, and total species richness would have been much higher. I recommend including locally-occurring native annual plants in the revegetation program if seed is commercially available, but emphasizing shrub species richness in revegetation success criteria and monitoring. Locally occurring annual species fluctuate widely seasonally and annually, so that variance in cover or density data is too high to effectively evaluate success.

The site has not been flooded recently. Successional changes have evidently shifted from scalebroom (*Lepidospartum squamatum*) and goldenaster (*Heterotheca sessilifolia*) dominated riverwash toward a California juniper (*Juniperus californica*) woodland with California buckwheat (*Eriogonum fasciculatum*), Yerba santa (*Eriodictyon trichocalyx*) and prickly pear (*Opuntia littoralis*) the most common shrubs. Scalebroom and a few other large shrubs occur regularly in scattered patches, and golden aster is nearly absent. This pattern is consistent with succession of alluvial scrub vegetation described by Smith (1980). Note that California juniper occurs at relatively low density (plants/area) but at significant cover (12%). Juniper is visually the most dominant plant on the site. I recommend including California juniper in revegetation efforts if nursery stock or seed is commercially available.

Sample size: Analysis indicates that these samples provide an adequate sample size, with an 80% confidence interval and 80% to 95% precision (5% to 20% maximum allowable error) for vegetation cover, shrub species richness, shrub densities, and densities of some dominant species (Table 2). State Mining and Geology Board personnel normally recommend a 10% - 20% maximum error for species richness and density estimates, though Board recommendations do not specify this (Gail Newton, pers. comm.). These calculations indicate that all critical cover and species richness variables meet these recommendations. I conclude that the data presented here meet the intent of the SMARA requirement for pre-disturbance vegetation sampling.

Sincerely,

[signature]

Table 1. Mean values for Johnson (south) and Redlands Aggregate (south) vegetation data.

Shrub species richness (10m x 50 m belt)	10.1	
Total native species richness	13.4	
Total shrub cover	49%	
Adenostoma fasciculatum cover	2%	
Eriastrum densifolium cover	<1%	
Eriodictyon trichocalyx cover	6%	
Eriogonum fasciculatum cover	7%	
Gutierrezia californica cover	3%	
Heterotheca sessilifolia cover	<1%	
Juniperus californica cover	12%	
Lepidospartum squamatum cover	2%	
Lotus scoparius cover	4%	
Opuntia littoralis cover	5%	
Opuntia parryi cover	1%	
Yucca whipplei cover	3%	
Total cover of other species (none > 1%)	< 4%	
Total shrub density (per 5m x 5m plot at left, per acre at right)	24.5	3970
Eriastrum densifolium ssp. sanctorum density	0.8	130
Eriodictyon trichocalyx density	5.1	820
Eriogonum fasciculatum density	2.8	450
Gutierrezia californica density	3.1	500
Heterotheca sessilifolia density	0	0
Juniperus californica density	0.2	32
Lepidospartum squamatum density	0.2	32
Lotus scoparius density	1.0	160
Opuntia littoralis density	4	650
Total density of other shrubs (none > 0.8 / 5m x 5m quadrat)	10.9	1770

Table 2. Minimum sample sizes needed to reach estimate mean values with an 80% confidence interval (Johnson [south] and Redlands Aggregate [south]).

	Sample size	Estimated no. of plots needed for given maximum acceptable error			Precision of sample average
		5%	10%	20%	(80% confidence interval)
Shrub species richness	15	**6**	**1**	**0**	> 95%
Total shrub cover	15	30	**7**	**1**	> 90%
Total shrub density (per 5m x 5m plot)	30	**30**	7	1	>95%
Yerba santa density	30	212	53	**13**	> 80%
Prickly pear density	30	100	49	**12**	> 80%

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Sawyer, J.O., Jr. and Todd Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento.

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Appendix: Johnson (south) and Redlands Aggregate (south) transect data

Sunwest Redlands Project: veg plots for Orange St. sites																		
Plot #	1	2	3	4	5	6	7	8	9	10	11	c1	c2	c3	c4	n	mean	variance
Species richness																		
shrub species richness	10	10	10	9	12	9	10	10	11	9	11	10	8	9	14	15	10.133	2.12381
native annuals species rich.	3	2	0	6	1	3	5	1	3	4	2	6	7	1	5			
Total Native Species Richne	**13**	**12**	**10**	**15**	**13**	**12**	**15**	**11**	**14**	**13**	**13**	**16**	**15**	**10**	**19**	15	13.4	5.685714
Shrub cover																		
Adenostoma fasciculatum	0	0	0	0	0	0	0.19	0	0	0	0	0.06	0	0	0.005		0.017	
Artemisia californica	0.01	0	0	0	0	0	0.005	0	0	0	0	0.07	0	0	0.02		0.007	
Bebbia juncea	0	0	0	0	0	0	0	0	0.005	0	0.005	0	0	0	0		0.0007	
Croton californicus	0	0	0	0	0	0	0.01	0	0	0	0	0.01	0.005	0	0		0.0017	
Eriastrum densifolium ssp. san	0.005	0.005	0	0	0	0	0	0	0	0	0.03	0	0	0	0		0.0027	
Ericameria linearifolia	0	0	0	0	0	0	0	0	0.005	0	0.04	0	0	0	0		0.003	
Eriodictyon trichocalyx	0.12	0.05	0.13	0.04	0.01	0.01	0.09	0.005	0.02	0.01	0.08	0.16	0.07	0.03	0.1		0.0617	
Eriogonum fasciculatum	0.07	0.12	0.06	0.06	0.15	0.04	0	0.01	0.3	0.03	0.12	0.02	0.005	0.06	0.005		0.07	
Gutierrezia californica	0.005	0.03	0.06	0.02	0.02	0	0.05	0.005	0.06	0.02	0.04	0.09	0	0.01	0.01		0.028	
Heterotheca sessilifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005		0.0003	
Juniperus californica	0	0	0.05	0	0.34	0.31	0	0.3	0.03	0.27	0	0	0.26	0.11	0.18		0.1233	
Lepidospartum squamatum	0	0	0	0.03	0	0.01	0	0	0.12	0.05	0.12	0	0	0	0.005		0.0223	
Lotus scoparius	0.02	0.005	0.03	0.005	0.005	0	0.3	0.05	0.01	0.02	0.07	0.01	0.01	0.005	0.08		0.0413	
Mirabilis californica	0	0	0	0.03	0.02	0	0	0.02	0	0	0	0	0	0	0.01		0.0053	
Opuntia littoralis	0.13	0.04	0.07	0.16	0.17	0.005	0.12	0.03	0.005	0.01	0.01	0.005	0.005	0.03	0.01		0.0533	
Opuntia parryi	0.005	0.005	0.005	0.04	0.005	0.005	0.005	0.04	0.005	0.005	0.005	0.005	0.01	0.005	0.005		0.01	
Phoradendron sp.	0	0.005	0	0	0.02	0.005	0	0.005	0	0	0	0	0	0	0.01		0.003	
Rhamnus crocea	0	0	0.05	0	0.03	0	0	0	0	0	0	0	0	0	0		0.0053	
Salvia apiana	0	0	0.005	0	0.005	0.005	0.005	0.01	0	0	0	0	0	0	0		0.002	
Senecio flaccidus	0.01	0.005	0	0	0	0	0	0	0	0	0	0	0	0.005	0		0.0013	
Yucca whipplei	0.07	0.005	0.04	0.005	0.06	0.03	0.005	0	0.01	0.02	0.14	0.01	0.005	0.07	0.03		0.0333	
Total shrub cover	**0.445**	**0.27**	**0.5**	**0.39**	**0.835**	**0.42**	**0.78**	**0.475**	**0.57**	**0.435**	**0.66**	**0.44**	**0.37**	**0.325**	**0.475**	15	0.4927	0.025096

Plot #	1	2	3	4	5	6	7	8	9	10	11	c1	c2	c3	c4
Native annual cover															
Cirsium californicum							0.005				0.005				
Cryptantha sp.		0.005		0.005		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Dichelostemma capitatum				0.005											
Eriogonum gracile/davidsonii	0.005	0.005		0.005		0.005	0.005			0.005			0.005		0.005
Erodium cicutarium						0.005						0.005	0.005		
Hemizonia sp.				0.005								0.005			
Lessingia sp.	0.005			0.005			0.005					0.005	0.005		
Microseris sp.													0.005		
Phacelia sp.	0.005														
Salvia columbariae									0.005	0.005					0.005
Stephanomeria virgata				0.005			0.005		0.005	0.005		0.005	0.005		0.005
Stipa speciosa					0.005										
Total native annual cover	**0.015**	**0.01**	**0**	**0.03**	**0.005**	**0.015**	**0.025**	**0.005**	**0.015**	**0.02**	**0.01**	**0.025**	**0.03**	**0.005**	**0.02**
Alien spp.															
Avena sp.														0.005	
Brassica geniculata=Hirschfeldia incana														0.005	0.005
Brassica nigra	0.005	0.005		0.005								0.005	0.005		0.005
Centaurea melitensis												0.005	0.005		0.005

Appendix: Johnson (south) and Redlands Aggregate (south) transect data

	mean	var.	t2	t2s2	.05x	.1x	.2x	(.05x)2	(.1x)2	(.2x)2	n (.05)	n (.1)	n (.2)
Shrub species richness	10.133	2.124	0.75	1.593	0.5067	1.0133	2.027	0.2567	1.0268	4.107	6	1	0
Total native species richness	13.4	5.686	0.75	4.265	0.67	1.34	2.68	0.4489	1.7956	7.182	9	2	0
Total shrub cover	0.493	0.025	0.75	0.019	0.0247	0.0493	0.099	0.0006	0.0024	0.01	30	7	1
Total shrub density (per 25 sq. m)	19.37	62.38	0.729	45.48	0.9685	1.937	3.874	0.938	3.752	15.01	48	12	3
Eriodictyon density (per 25 sq. m)	5.1	22.02	0.729	16.05	0.255	0.51	1.02	0.065	0.2601	1.04	246	61	15
Eriogonum density (per 25 sq. m)	2.77	5.91	0.729	4.308	0.1385	0.277	0.554	0.0192	0.0767	0.307	224	56	14
Opuntia littoralis density (per 25 sq	3.37	10.93	0.729	7.968	0.1685	0.337	0.674	0.0284	0.1136	0.454	280	70	17

Orange St. shrub density (per 25 sq. m)																																	
plot no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**c1**	**c2**	**c3**	**c4**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	n	avg.	var.
Artemisia californica	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.1333	0.3264
Croton californicus	0	0	0	0	0	0	9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.3333	2.7126
Eriastrum densifolium ssp. sa	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0		0.8333	12.626
Ericameria linearifolia	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.0333	0.0333
Eriodictyon trichocalyx	11	10	5	7	2	1	12	3	0	5	3	10	2	0	7	12	2	16	11	11	0	0	9	0	0	5	3	3	3	0		5.1	22.024
Eriogonum fasciculatum	0	5	5	3	6	1	0	1	7	7	3	0	0	3	0	2	1	0	1	0	6	4	0	1	4	4	3	6	6	4		2.7667	5.9092
Gutierrezia californica	13	1	1	4	12	0	0	1	3	7	2	6	0	0	3	5	4	0	1	0	6	2	1	0	4	6	4	1	4	2		3.1	11.128
Juniperus californica	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0		0.2	0.1655
Lepidospartum squamatum	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0		0.1667	0.5575
Lotus scoparius	3	1	0	1	0	0	1	0	3	4	0	3	1	0	0	3	0	0	0	0	2	2	0	0	0	1	0	0	0	4		0.9667	1.8264
Mirabilis californica	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	3	0	0	0	1	1	0	1	0	0		0.3667	0.5161
Opuntia littoralis	4	6	3	16	9	3	1	1	1	1	0	0	0	3	0	2	4	4	3	6	4	0	0	6	3	3	5	3	6	4		3.3667	10.93
Opuntia parryi	1	0	2	0	0	2	1	1	0	1	1	0	0	0	0	2	2	0	0	0	0	1	0	0	0	3	0	0	0	0		0.5667	0.7368
Phoradendron sp.	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	5	0	0	0	0	0		0.4	1.3517
Rhamnus crocea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		0.0333	0.0333
Salvia apiana	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	2	1	0		0.2333	0.323
Senecio flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0		0.0667	0.0644
Stipa speciosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0		0.0333	0.0333
Yucca whipplei	0	1	1	0	1	2	0	0	0	0	0	1	0	1	1	2	0	0	1	1	0	0	2	0	0	1	0	0	2	2		0.6333	0.5851
total density / 25 sq. m	**33**	**28**	**17**	**32**	**33**	**11**	**25**	**8**	**15**	**25**	**15**	**20**	**5**	**7**	**14**	29	16	20	18	23	22	9	31	11	20	24	15	16	22	16	31	19.333	62.437

APPENDIX B
SLOPE STABILITY ANALYSES

C·H·J· INCORPORATED

P.O. Box 231, Colton, CA 92324-0231 • 1355 E. Cooley Dr., Colton, CA 92324-3954 • Phone (909) 824-7210 • Fax (909) 824-7209

December 31, 2001

Lilburn Corporation
1905 Business Center Drive
San Bernardino, California 92408
Attention: Mr. Marty Derus

Job No. 011052-3

Subject: Slope Stability Analysis
Amended Reclamation Plan
Cemex Redlands Aggregate Pit South
Redlands, California

Dear Mr. Derus:

As requested, our project engineer has performed a slope stability analysis for the subject final reclaimed pit slopes. The purpose of this analysis was to verify the gross stability of the planned slopes under various long-term conditions including strong seismic shaking, potential rising groundwater, and pit ponding. Our slope stability calculations were performed utilizing strength parameters supported by direct shear testing, field observations, and back analysis of nearby near-vertical pit slopes.

The location of the subject site is indicated on the attached Index Map (Enclosure "A-1"), and the current pit topography is shown on the attached Plat (Enclosure "A-2").

The amended Reclamation Plan includes deepening the 80-foot 1.5 horizontal to 1 vertical [1.5(h):1(v)] final slopes of the existing approved plan by another 40 feet inclined at 2(h):1(v). Both the existing plan and amended plan typical reclaimed slope configurations are indicated on the attached Cross Section (Enclosure "A-3").

SITE OBSERVATIONS

As part of this analysis, our project engineer performed a field reconnaissance of the subject site and surrounding areas. Our observations indicated that the subject site is located entirely within river deposits consisting of sands, gravels, cobbles, and boulders typically as large as 5± feet in dimension. Unlike the downstream Alabama Street pit sites investigated by this firm, the soil profile exposed by the pit walls in this area was essentially comprised of the clast-supported geologic unit without the presence of a significant matrix-supported upper unit. The cobbles and boulders observed within this pit as well as other nearby pits were predominantly granitic and distinctively round. The hardness and persistent nature of the granite have apparently enabled the larger clasts to survive without breaking while becoming increasing round during transport. The roundness of the clasts has enabled their close packing which, based upon our field experience, effectively contributes to the stability of such clast-supported materials.

DIRECT SHEAR TESTING (ASTM D 3080)

In order to determine appropriate strength parameters necessary for our slope stability calculations, various samples representative of the native materials exposed at the site were obtained by our project engineer and returned to our laboratory for direct shear testing and further evaluation. Sample No. 1 was obtained from the top of the pit and was comprised of loose disturbed native sands. This sample was selected for strength modeling of the anticipated backfills and disturbed soils of the final slope surface. Sample No. 2 was obtained from a colluvial wedge at the base of the existing slopes and was thought to be more representative of the gravelly materials of the overall slope. Sample No. 3 was obtained by chipping out pieces of cemented sands selected from an undisturbed lense exposed in the existing pit walls. The approximate sample locations are indicated on the enclosed Plat. Sieve analyses were performed on each of these samples for classification and correlation purposes. The plotted gradation curves are attached as Enclosure "B-1".

Specimens from Sample No. 1 were remolded and tested under various conditions to model strengths of looser surficial soils anticipated for the final slopes. In an attempt to model the in-situ strengths for gross stability evaluations, "semi-disturbed" test specimens were trimmed from pieces of cemented material obtained from a sandy lense exposed in the pit walls (Sample No. 3). To evaluate the "peak" strength and effects of wetting, the specimens were initially sheared at natural moisture content prior to inundation with water.

Our remolded and semi-disturbed direct shear results are presented on Enclosures "B-2" and "B-3", respectively.

SLOPE STABILITY ANALYSIS

The gross stability of the proposed 120± feet deep final slopes was analyzed under various static and seismic conditions for rotational failures, using Bishop's Simplified Method and the TSTAB (TAGA, 1986) computer software program. Rotational failures were considered appropriate for the relatively homogenous soil profile, of which adverse geologic structures are not anticipated. The seismic calculations were performed pseudostatically using a lateral seismic coefficient "k" of 0.20 and included a search for the critical seismic coefficient. The critical seismic coefficient is defined as the "k" required to produce failure (i.e. FS~1). The higher "k" of 0.20 was utilized instead of the standard minimum 0.15 based on judgement due to the proximity to the San Andreas Fault system.

Back Analyses of Existing Pit Slopes:

Long-standing existing slopes that demonstrate gross stability are assumed to have a static factor of safety of at least one against gross failure. Although the majority of the existing slopes at the subject site had been modified, near-vertical existing slopes 40- to 50-feet deep were observed at the Old Webster Quarry located off the southwest corner of the subject site. As such, we performed back analysis of these existing quarry slopes to supplement our direct shear data, as well as our engineering judgement, in selecting appropriately conservative strength parameters for our analyses.

This type of back analysis is a generally accepted method of estimating the lower-bound full-scale strength of the overall slope and is especially useful as an indicator of the cohesive strength contribution which can be attributed to matrix cementation combined with the effects of clast interlocking and the shear resistance across the larger clasts. Although strength parameters would be somewhat variable for the alluvial materials, to simplify our back analyses, the slopes were modeled as being homogeneous with a single set of strength parameters averaged over the entire slope.

Complete documentation of our back analysis of the Old Webster Quarry is currently being reported as part of a similar investigation being performed by this firm for Robertson's Ready Mix.

Analyses of Proposed Quarry Slopes:

Our calculations of the proposed quarry slopes were performed with the native materials modeled as homogeneous with strength parameters supported by our attached direct shear test results and back analyses. Alluvial materials similar to those exposed within the existing and nearby pits are expected to be present to at least 600 feet below the original ground surface. Therefore, it was considered reasonable to assume the presence of additional sand and gravel river deposits for the entire depth to be mined. The age, density, cementation and, in turn, strength of such materials would tend to increase with depth.

Our calculations were based upon the planned 120-feet deep final slope with a 1.5(h):1(v) inclination over the upper 80 feet and a 2(h):1(v) inclinations for the amended lower 40 feet as shown on the attached Cross Section. The majority of our calculations were performed with a friction angle of 38 degrees and an apparent cohesion of 350 pounds per square foot (psf) to estimate the averaged overall strength of the anticipated final reclaimed slope surface.

The various scenarios analyzed and the calculated factor of safety in each case are summarized in the table preceding our supporting calculations (Enclosure "C"). In each case, the results of our calculations indicated acceptable factors of safety against gross failure. Our slope stability calculations, together with the plotted output indicating the critical slip circle, are presented as Enclosure "C".

CLOSURE

We appreciate this opportunity to be of service and trust this report provides the information desired at this time. Should questions arise, please do not hesitate to contact this office.

Respectfully submitted,

C.H.J., INCORPORATED

Todd R. Wyland, R.C.E. 60618
Project Engineer

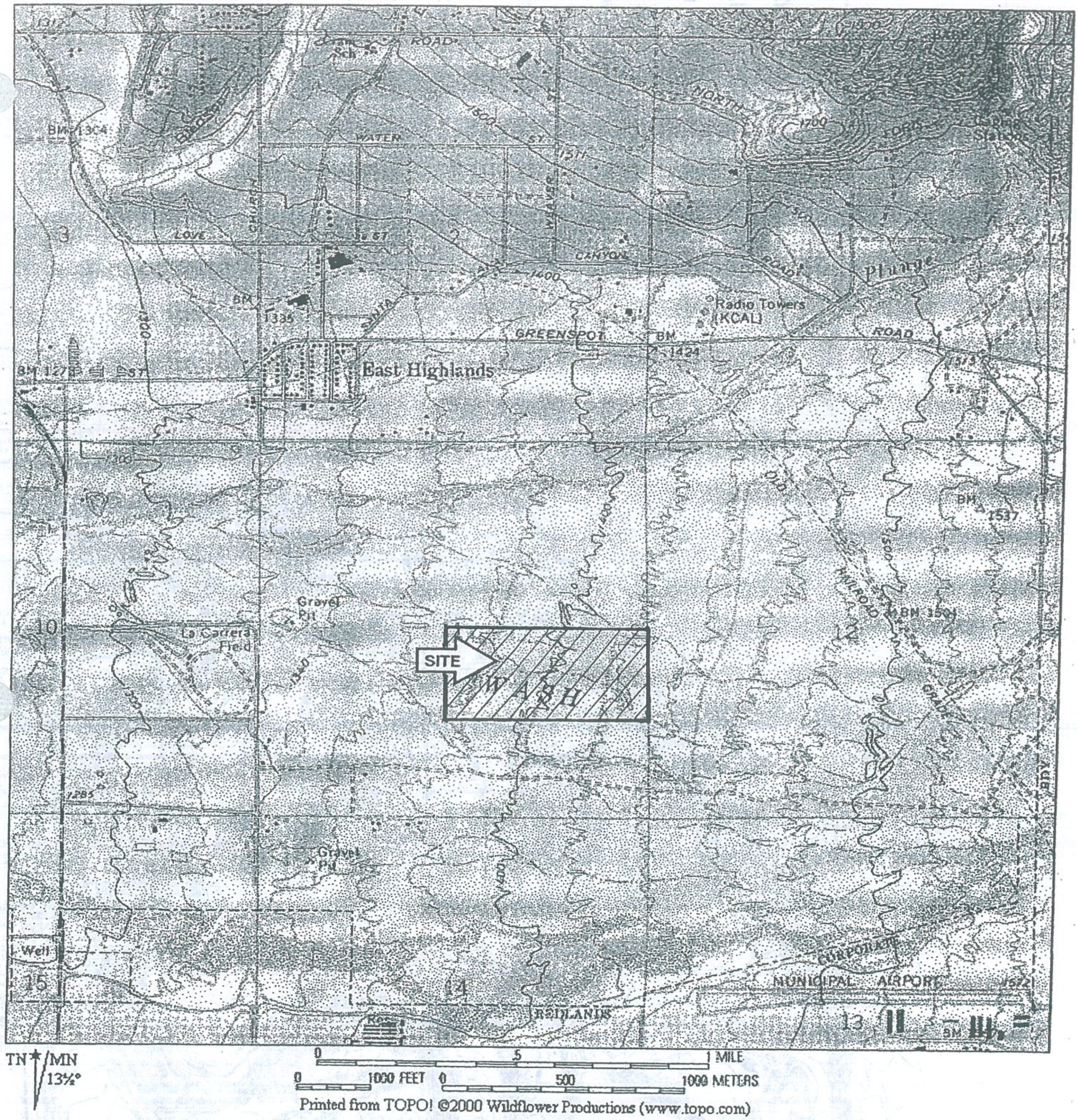
REGISTERED PROFESSIONAL ENGINEER
TODD R. WYLAND
No. 60618
Exp. 12-31-04
CIVIL
STATE OF CALIFORNIA

Robert J. Johnson, G.E.
Senior Vice President

TRW/RJJ:sra

Enclosures:	"A-1"	-	Index Map
	"A-2"	-	Plat
	"A-3"	-	Typical Reclaimed Slopes Cross Section
	"B-1"	-	Gradation Curves
	"B-2"-"B-3"	-	Direct Shear Test Graphs
	"C"	-	Slope Stability Summary Table and Calculations

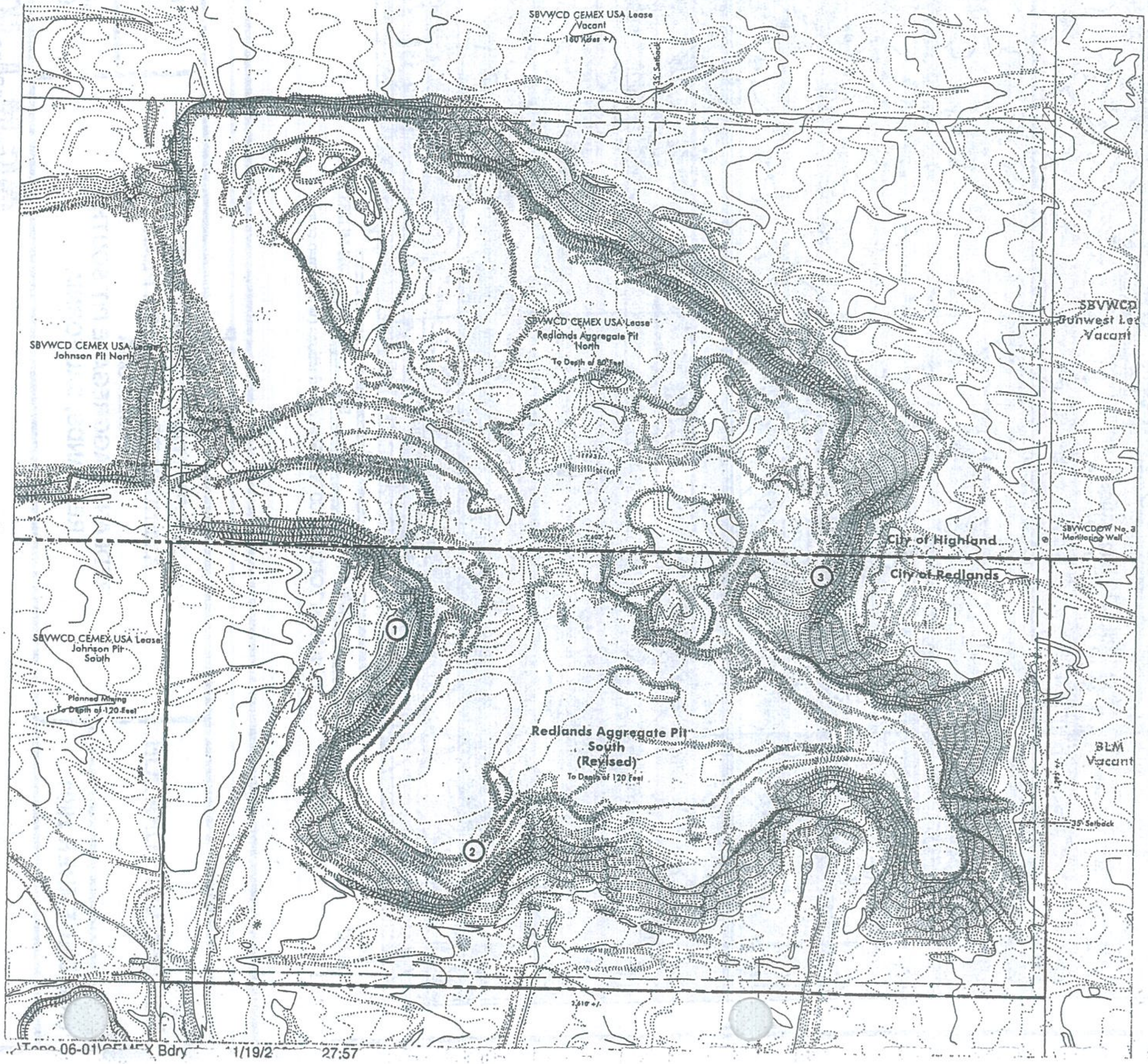
Distribution: Lilburn Corporation (8)



INDEX MAP

FOR: **LILBURN CORPORATION**	SLOPE STABILITY ANALYSIS AMENDED RECLAMATION PLAN CEMEX USA REDLANDS AGGREGATE PIT SOUTH REDLANDS, CALIFORNIA	ENCLOSURE "A-1"
DATE: **DECEMBER 2001**		JOB NUMBER 011052-3

C.H.J., INCORPORATED



PLAT

ENCLOSURE "A-2"

SLOPE STABILITY ANALYSIS

AMENDED RECLAMATION PLAN
CEMEX USA
REDLANDS AGGREGATE PIT SOUTH
REDLANDS, CALIFORNIA

PREPARED FOR:
LILBURN CORPORATION

PREPARED BY:
C.H.J., INCORPORATED
JOB NO.: 011052-3
DATE: DECEMBER 2001

- N -

SCALE
1"=30'

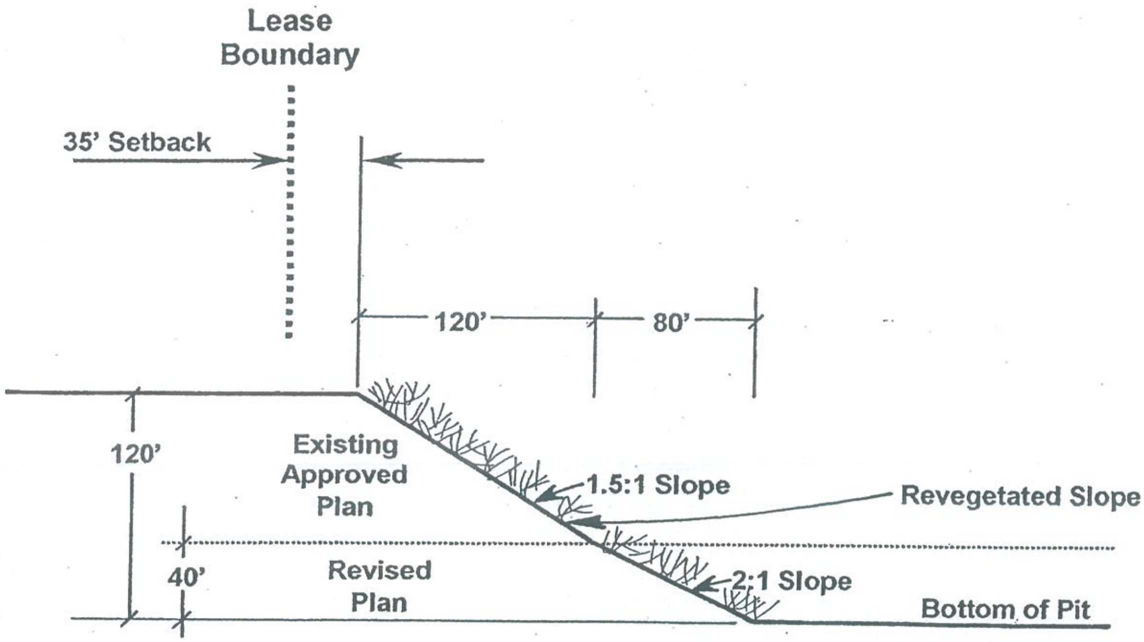
(3) APPROXIMATE SAMPLE LOCATIO

C.H.J. INCORPORATED

TYPICAL RECLAIMED SLOPES

Redlands Aggregate Pit South

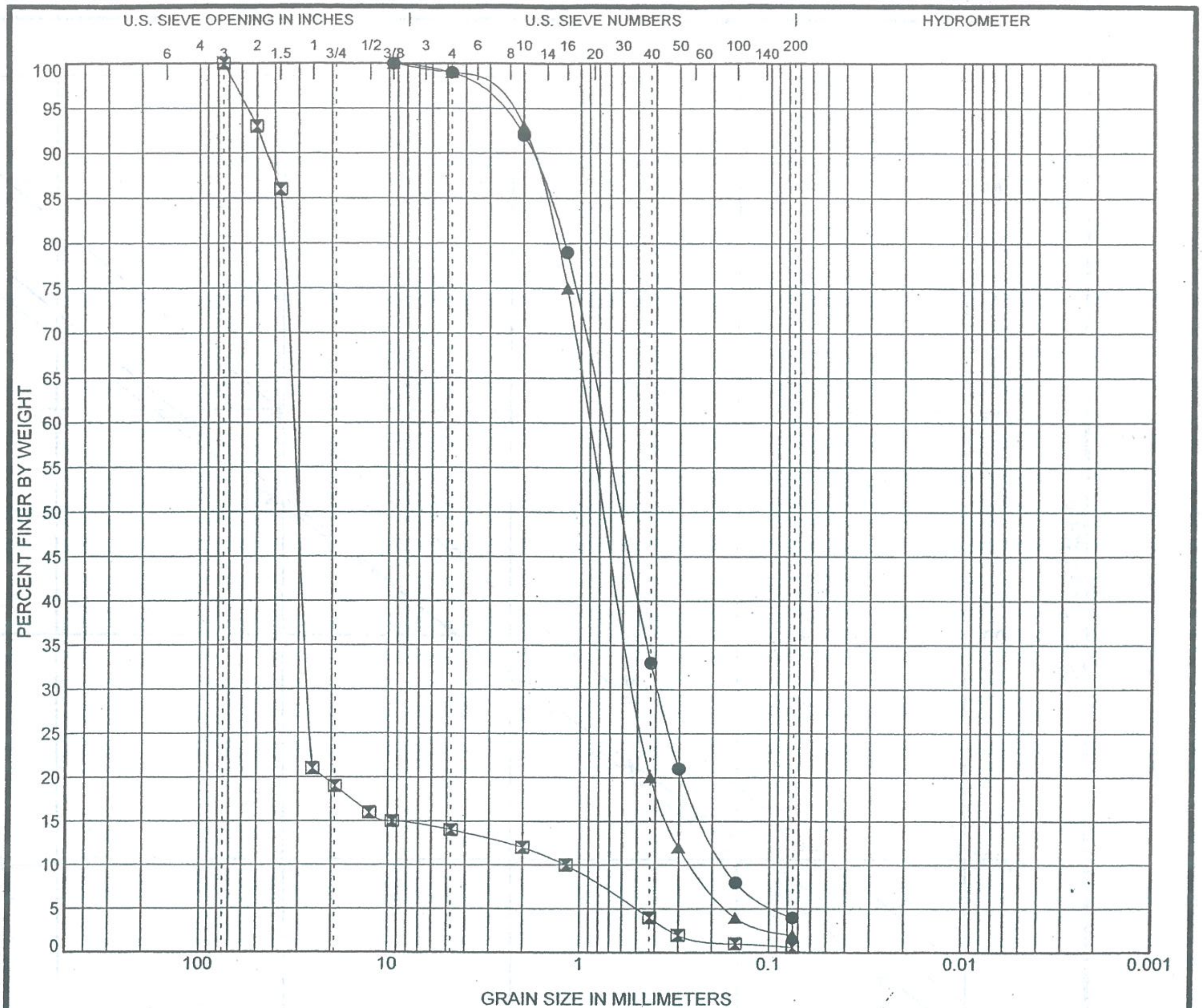
CEMEX USA
City of Redlands, California



CROSS-SECTION

FOR: LILBURN CORPORATION	SLOPE STABILITY ANALYSIS AMENDED RECLAMATION PLAN CEMEX USA REDLANDS AGGREGATE PIT SOUTH REDLANDS, CALIFORNIA	ENCLOSURE "A-3"
DATE: DECEMBER 2001		JOB NUMBER 011052-3

C.H.J., INCORPORATED



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Classification	LL	PL	PI	Cc	Cu
●	1	POORLY GRADED SAND(SP)				1.18	4.64
⊠	2	POORLY GRADED GRAVEL(GP)				18.59	27.02
▲	3	POORLY GRADED SAND(SP)				1.16	3.54

	Sample	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	9.5	0.774	0.39	0.167	1.0	95.0	4.0	
⊠	2	75	31.886	26.444	1.18	86.0	13.4	0.6	
▲	3	9.5	0.893	0.512	0.252	1.0	97.0	2.0	

US GRAIN SIZE LAB ONLY 011052-3.GPJ US LAB.GDT 12/28/01

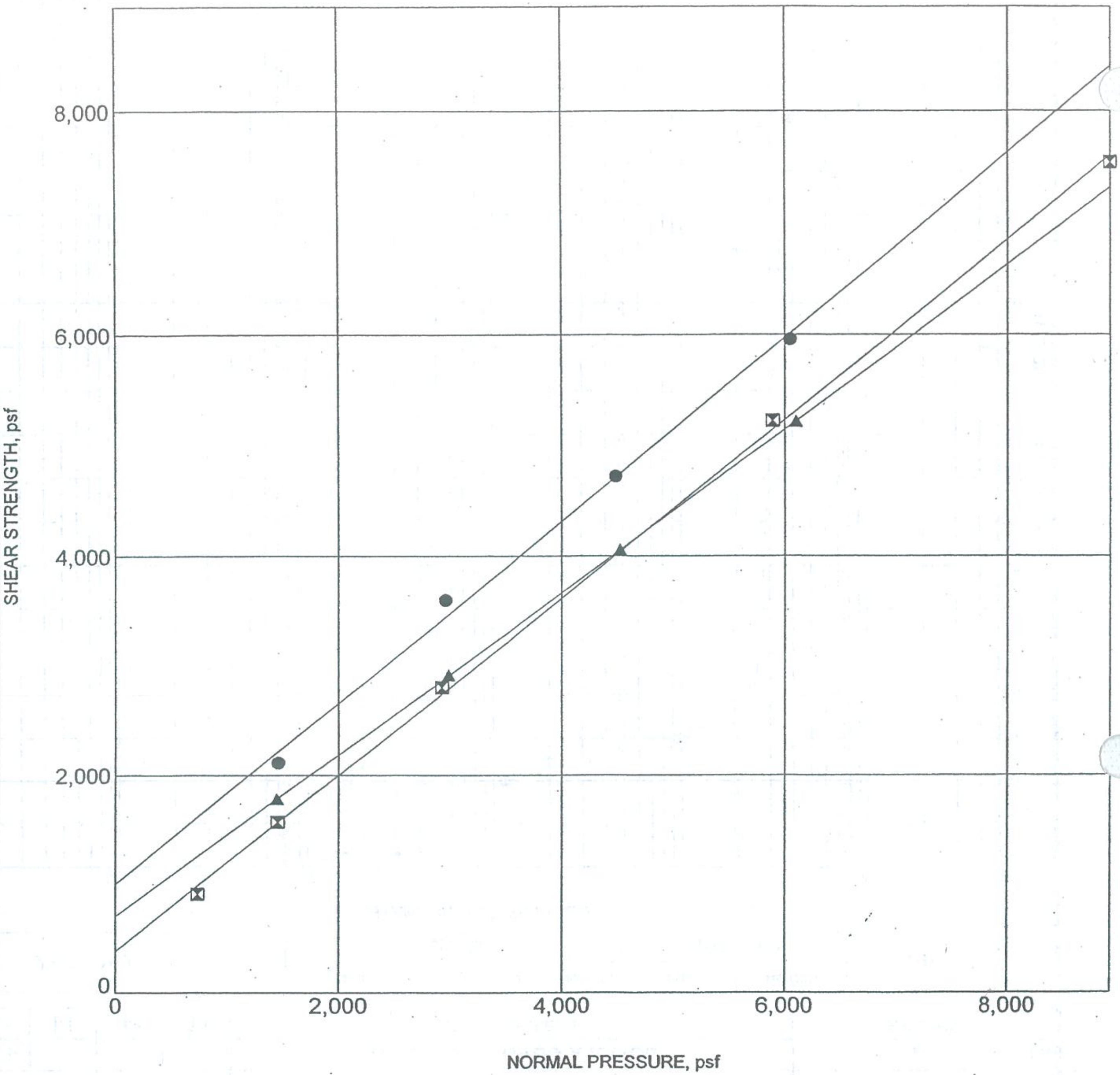
C·H·J·

GRAIN SIZE DISTRIBUTION

Client: LILBURN CORPORATION

Project: CEMEX REDLANDS AGGREGATE PIT SOUTH

Job Number: 011052-3 Enclosure: B-1



	Sample	Sample Type	γ_d	MC%	c	φ
●	1	Remolded (SP) Loose & Dry/Ultimate, Dry			1000	40
⊠	1	Remolded (SP) Loose&Dry/Ultimate,Reshear,Saturated			380	39
▲	1	Reconsol. Wet Under 6100 psf/Ultimate, Saturated			700	37

C·H·J·

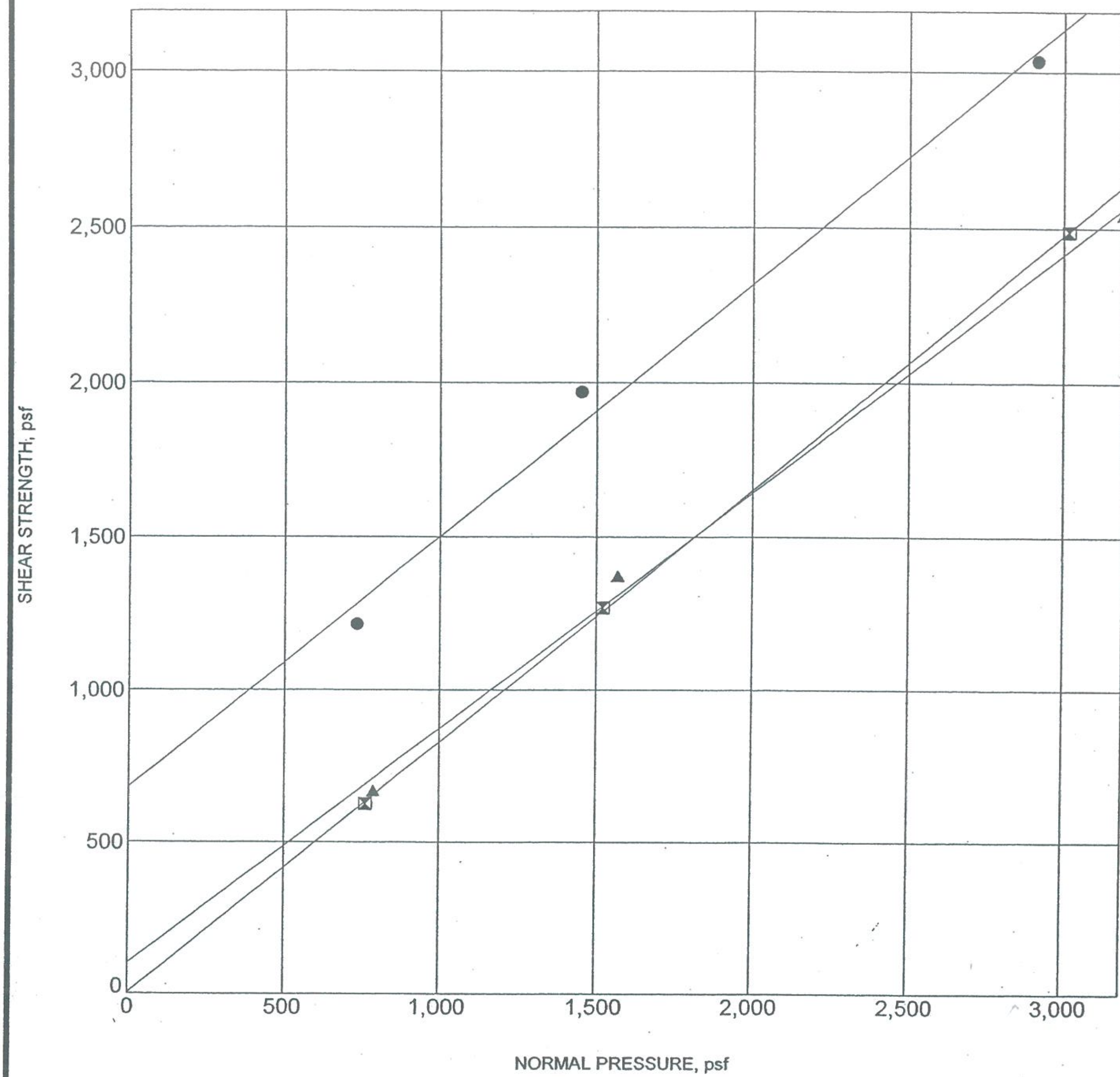
DIRECT SHEAR TEST

Client: LILBURN CORPORATION

Project: CEMEX REDLANDS AGGREGATE PIT SOUTH

Job Number: 011052-3 Enclosure: B-2

US DIRECT SHEAR LAB ONLY 011052-3.GPJ US LAB.GDT 12/28/01



	Sample	Sample Type	γ_d	MC%	c	φ
●	3	**Cemented, Semi-Disturbed/Dry, Peak**			**650**	**39**
⊠	3	**Cemented Semi-Disturbed/Dry, Ultimate**			**0**	**39**
▲	3	**Cemented, Semi-Disturbed/Ultimate, Inundated**			**100**	**38**

US DIRECT SHEAR LAB ONLY 011052-3.GPJ US LAB.GDT 12/28/01

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DIRECT SHEAR TEST

Client: LILBURN CORPORATION

Project: CEMEX REDLANDS AGGREGATE PIT SOUTH

Job Number: 011052-3

Enclosure: B-3

Enclosure "C"
Job No. 011052-3

SLOPE STABILITY SUMMARY

ANALYSIS TYPE/SCENARIO		STRENGTH PARAMETERS		RESULTS		
		Friction Angle (degrees)	Apparent Cohesion (psf)	Static FS	Seismic FS for k=0.20	Critical Seismic Coefficient
Back Calculations[1]		38	350	Conservatively based on h=45 ft. @ 0.5(h):1(v)		
		40	700	Realistically based on h=50 ft. @ 0.2(h):1(v)		
Undisturbed Native Materials[2]		37	700	1.92	1.33	0.384
Disturbed Fills Over Undisturbed Benches[3]		38	350	1.74	1.19	0.302
Ground-Water Depths[4]	10 ft. w/Pond	38	350	1.70	1.15	0.277
	10 ft. w/o Pond	38	350	1.64	1.12	0.267
	20 ft. w/o Pond	38	350	1.52	---	---
Temp. Mine Cuts[5]	1 @ 20 ft.	38	350	1.53	---	---
	2 @ 20 ft.	38	350	1.49	1.04	0.219
	2 @ 20 ft. with 10 ft. Pond	38	350	1.27	---	---

NOTES:

1 Performed on Old Webster Quarry and will be fully documented as part of our investigation report currently in progress for Robertson's Ready Mix (C.H.J., Inc., Job No. 011029-3).

2 Performed with broad search and deeper slip surfaces for setback evaluations.

3 Performed with averaged cohesion values to model alternating loose backfills and undisturbed native cuts.

4 Performed with assumed horizontal phreatic surface placed at assumed pond depth heights above bottom of pit. Calculations without the resisting pond were performed to evaluate potential sloshing during a seismic event.

Performed as a check against failure on assumed final mining excavations.

C·H·J·

SLOPE STABILITY INVESTIGATION
RECLAMATION PLAN
CEMEX ALABAMA STREET NORTHEAST QUARRY
HIGHLAND, CALIFORNIA
PREPARED FOR
LILBURN CORPORATION
JOB NO. 01633-3

C·H·J· INCORPORATED

P.O. Box 231, Colton, CA 92324-0231 • 1355 E. Cooley Dr., Colton, CA 92324-3954 • Phone (909) 824-7210 • Fax (909) 824-7209

August 20, 2001

Lilburn Corporation
1905 Business Center Drive
San Bernardino, California 92408
Attention: Mr. Marty Derus

Job No. 01633-3

Dear Mr. Derus:

Attached herewith is the slope stability investigation, prepared for the reclamation plan for the Cemex Alabama Street Northeast Quarry in the City of Highland, California.

This report was based upon a scope of services generally outlined in our proposal dated July 3, 2001, and other written and verbal communications.

We appreciate this opportunity to provide geotechnical services for this project. If you have questions or comments concerning this report, please contact this firm at your convenience.

Respectfully submitted,
C.H.J., INCORPORATED

Jay J. Martin, E.G.
Senior Geologist

TRW/JJM/RJJ:sra

Distribution: Lilburn Corporation (6)

TABLE OF CONTENTS

SLOPE STABILITY INVESTIGATION
RECLAMATION PLAN
CEMEX ALABAMA STREET NORTHEAST QUARRY
HIGHLAND, CALIFORNIA
PREPARED FOR
LILBURN CORPORATION
JOB NO. 01633-3

INTRODUCTION

During July and August of 2001, a slope stability investigation for the reclamation plan of the existing sand and gravel mine known as the Alabama Street Northeast Quarry, located in Highland, California, was performed by this firm. The purpose of our investigation was to characterize the site geology, evaluate the slope stability of both the proposed and existing slopes, and to provide geotechnical recommendations to be incorporated into the reclamation plan.

To orient our investigation, a 200-scale Mine Plan, prepared by Lilburn Corporation and dated February 21, 2001, was furnished for our use. The Mine Plan shows existing topography as well as proposed finished slope configurations. The approximate location of the site is shown on the attached Index Map (Enclosure "A-1").

The results of our investigation, together with our conclusions and recommendations, are presented in this report.

SCOPE OF SERVICES

The scope of services provided during this slope stability investigation included the following:

- Review of published and unpublished literature and maps
- Review and analysis of single and stereoscopic aerial photographs flown in 1938, 1949, 1969, 1972, 1986, 1991 and 1998
- Geologic mapping of the site and observation of existing slope inclinations
- Logging and sampling of the existing quarry walls
- Direct shear testing to provide strength parameters for our slope stability calculations
- Back analysis of the existing quarry slopes to supplement our direct shear testing and to verify our modeling of the overall gross strength of the native materials
- Slope stability calculations of the proposed quarry slopes under static and seismic conditions, as well as various groundwater conditions

- Evaluation of the geotechnical data to develop appropriate recommendations for slope construction and reclamation

PROJECT CONSIDERATIONS

Information furnished this office indicates that the existing quarry site is planned to be deepened by additional mining and then reclaimed. The final reclaimed quarry, as currently proposed, will be approximately 120 feet in depth and will include reclamation of the inactive quarry that occupies most of the site. Our analyses were based upon a maximum depth of 130 feet to account for potentially isolated, deeper areas.

Although the stability of some of the existing quarry slopes cannot be improved upon by cutting back or complete regrading due to property boundary constraints and/or environmental concerns, such slopes will be trimmed as possible and hydroseeded. In the areas where the existing steep slopes cannot be completely removed or regraded , the reclamation plan also includes a 30-foot setback between the new slopes and the toes of the existing slopes. The setback will allow the existing steep slopes to ravel back to a stable inclination with little or no impact on the new slopes and would also allow the new slopes to be created without jeopardizing the stability of the existing slopes.

SITE DESCRIPTION AND AERIAL PHOTOGRAPH REVIEW

The subject 75± acre site is located within Santa Ana River Wash and is entirely within the City of Highland, California. Most of the site is occupied by an existing sand and gravel quarry with near-vertical walls to approximately 90 feet in maximum height. The mining started after the date of the 1949 aerial photographs but prior to the date of the 1969 aerial photographs.

At the time of this investigation, the abandoned quarry slopes were observed to be comprised of near-vertical upper walls with colluvial wedges at the base. Numerous haul roads associated with the mining activity were present across most of the site except the westerly pitt. Fill piles of unprocessed material and boulders too large for the crushers were present throughout the quarry.

The area to the south of the site (Alabama Street Southeast Quarry) is an extension of the mine into the City of Redlands. The areas to the east include numerous earthen dikes or berms placed for drainage and flood control purposes, as well as haul roads and a settling pond for quarrying that has occurred on adjacent property. The western edge of the settling pond overlaps the project boundary but is not in an area of projected new mining. The right-of-way for the I-210 freeway is present west of the site.

Review of stereoscopic aerial photographs flown in 1938 revealed that most of the site was previously located within the broad, active flood plain of the Santa Ana River. The flood hazard to the existing quarry has been mitigated by the earthen berms along the southerly side of the City of Redlands portion of the mine. The active channel is as close as approximately 1,500 feet south of the southern project boundary.

The subject site is comprised of three pits, designated the West Pit, the Central Pit, and the East Pit. The West Pit is an abandoned portion of the mine. It was cut off from prior access roads by fill forming the road bed of I-210 before the 1986 aerial photographs were flown. It is approximately 90 feet deep, with slopes that average 1 1/4 horizontal to 1 vertical [1 1/4(h) to 1(v)] except along the western side where the I-210 fill slope is engineered at 2(h) to 1(v). These slopes are natural-appearing and are covered with a light growth of vegetation, except where capped by concrete on the upper north and east sides. In the northwestern corner of the West Pit, the concrete reaches the pit bottom. The 1986 aerial photographs show the bottom of this pit under water, and our investigation showed the floor of the pit has a mud-crack structure typical of desiccated pond bottoms.

The Central Pit is an inactive quarry averaging approximately 80 feet deep. The western side of the pit is an 80-foot tall slope at approximately 1(h) to 1(v) that is capped with concrete. At the top of the slope is the remains of a haul road, approximately 20 feet wide, then the slope down to the West Pit. The northwest corner of the Center Pit is a 4(h) to 1(v) slope that has been covered with concrete. The north and east sides of the pit are 1(h) to 1(v) slopes averaging approximately 70 feet in height. The south side of the pit rises approximately 40 feet on a 1(h) to 1(v) slope to a relatively flat area adjoining the Redlands portion of the quarry. The bottom of the central pit contains several boulder fill piles, as well as piles of miscellaneous fill such as concrete and unsorted mined material. A haul road tops the northern and eastern slopes of the Central Pit. The northern portion of the haul road is active; however, the eastern section was not active at the time of this investigation.

The East Pit is bordered to the north by the same major haul road that forms the northern border of the Central Pit. From the north, the East Pit descends to the south in a series of "steps". A small area is approximately 20 feet below the haul road and averages 20 feet wide. The next step is approximately

30 feet lower and extends south approximately 250 feet. The last drop is approximately 20 feet, and the floor of that portion of the pit extends south into the Redlands portion of the quarry. Access to the East Pit is by a haul road that descends the west side of the pit. The slopes in the East Pit, above and below the access road between the levels, and on the north and east sides, are all 1(h) to 1(v) or steeper.

Areas of the site within the project boundary, but not included in the projected resumption of mining activity, include the northeastern corner, the eastern boundary area, and the southwestern corner. The northeastern corner is separated from the East Pit by the main haul road. The corner is occupied by a settling pond used by an adjacent quarry. The pond extends eastward across the project boundary onto land belonging to the Bureau of Land Management. The eastern boundary area extends south of the main haul road, from the top of the East Pit wall to the project boundary. This area has been modified by previous mining and drainage diversion and now is an area of relatively low relief with a bouldery sand surface covered with a mix of native and invasive plants. The southwestern corner of the site is a fill area that once formed a contiguous levee with the active pit west of I-210.

PREVIOUS INVESTIGATION

The site includes the northern portion of a large existing quarry. The proposed reclamation of the southern portion of this quarry (Alabama Street Southeast) was the subject of a previous slope stability investigation by this firm (C.H.J., Incorporated, January 31, 2001). Geologic units and slope stability concerns and hazards are similar to the northern portion of this quarry (site). Pertinent field and laboratory test data obtained during the previous investigation were utilized during this investigation.

FIELD AND LABORATORY INVESTIGATION

The exposed quarry walls permitted observations, sampling, and testing of the soil and geologic conditions of the upper soils across the site. The deeper geologic and geotechnical conditions were modeled by projecting exposed geologic units into the subsurface.

As part of our previous investigation, a series of Torvane readings were obtained from various locations of the existing quarry walls to help evaluate the cohesive strength contribution due to cementation of the undisturbed native soils. The averaged readings of the materials tested indicated apparent cohesion values ranging between 180 pounds per square feet (psf) and 820 psf. The results of our previous direct shear testing indicated ultimate friction angles ranging between 30 and 40 degrees and ultimate apparent cohesion values ranging between 100 and 200 psf.

In order to determine appropriate strength parameters necessary for our slope stability calculations, various samples representative of the materials exposed at the site were obtained and returned to our laboratory for direct shear testing and further evaluation. In an attempt to better model the "as re-claimed" strengths of the alluvial matrix material, "reconstituted" test specimens were repaired by passing a combined sample of sandy alluvium through the No. 10 sieve prior to flooding in a pan. Brass sampling rings were pressed into the wet, sandy material, the excess moisture was poured off, and the pan with specimens were placed in an oven to dry. To evaluate the "peak" strength and effects of inun-dation with water, the specimens were initially sheared in a dry condition prior to inundation. The specimens were sheared without time to consolidate and at a relatively fast rate of 0.84 millimeters per minute (mm/min) to simulate the potential unconsolidated, undrained effects of an earthquake.

Our plotted direct shear test results showing both the peak/dry strength envelope (ϕ=42°, C=300 psf) and the ultimate inundated strength envelope (ϕ=42°, C=300 psf) are presented on Enclosure "B-1". The plotted shear stress vs. displacement data are included as Enclosure "B-2" through "B-4".

A sieve analysis was conducted on the combined direct shear sample of matrix material passing the No. 10 sieve. The resulting gradation curve is plotted on Enclosure "B-5".

SITE GEOLOGY

The site is located within the Bunker Hill - San Timoteo Basin portion of the San Bernardino Valley, at the northern edge of the Peninsular Ranges Geomorphic Province. The Bunker Hill - San Timoteo Basin is a subsiding series of horsts and grabens bounded on the northeast by the San Andreas fault and on the southwest by the San Jacinto fault. Coalesced alluvial fans emanating from the San Bernardino Mountains to the north and, to a lesser extent, from the San Timoteo Badlands to the south are filling the basin as it subsides and have formed an alluvial plain of the San Bernardino Valley floor. Because of the irregular surface of the basin floor, the depth of the in-filling sediments is exceedingly variable. Fife and others (1976) mapped a depth to the base of the water-bearing alluvium as approximately 600 feet at the site.

The site is located within a broad fluvial plain known as Santa Ana Wash. Santa Ana Wash includes various coalescing stream channels associated with drainages emanating from the San Bernardino Mountains to the north. In the area of the site, the wash includes the Santa Ana River, immediately south of the site, and the Plunge Creek wash, north of the site (Morton, 1978). West of the site, Plunge Creek merges with the Santa Ana River drainage (Morton, 1978, Enclosure "A-3").

Published geologic mapping shows most of the surficial materials at the site as pebbly to bouldery alluvium (Morton, 1978). The southern portion of the site includes part of the Santa Ana River area and is mapped as sandy to bouldery alluvium (Morton, 1978). Most of the original ground surface at the site has been removed by mining.

Geologic mapping of the site was conducted utilizing a 200-scale base map prepared from aerial photographs flown in June of 2001. The purpose of the geologic mapping was to characterize the geologic structure of the site and to evaluate the properties of each unit for purposes of our slope stability analysis.

The geologic mapping (Enclosure "A-2") revealed two major distinct lithologic units at the site. Both units consist primarily of river channel deposits associated with the Santa Ana Wash. The lower unit, mapped as Qrc_d, is relatively coarse grained, consisting of bouldery gravels and sands. Maximum clast size is several feet. The well-graded, coarse-grained size distribution and the massive character of these materials suggests they are debris flow deposits. This unit is exposed in the walls of the southern, lowest portion of the East Pit and was noted to be dense with slight to considerable carbonate cementation. This material appeared to be continuous and is expected to be encountered during future mining below approximately 1,170 feet.

The upper unit consists of finer-grained, matrix-supported sands and gravels and was mapped as Qrc_s. The contact between the two units is well exposed in the deeper, eastern quarry area. Bedding within the Qrc_s is generally well developed and includes some undifferentiated poorly-graded sands of suspected aeolian (windblown) origin in its upper horizons. The materials exposed in Qrc_s are less dense and less cemented than Qrc_d.

A significant amount of fill exists on the site and is shown on the Geologic Map. The fill is associated with stockpiles of unprocessed material and select material, as well as with numerous earthen berms and roadway fills.

Colluvial wedges exist at the toes of steep quarry slopes cut within the Qrc_s. These colluvial wedges are the result of raveling of oversteepened slopes. The colluvium is not mappable at the scale of the topographic base map and is not shown on the Geologic Map.

Three geologic cross-sections were constructed through critical areas of the various final reclaimed slope configurations: Section A-A' (Enclosure "A-4") was constructed through the northeast portion of the site to show the existing Robertson's settling pond in relation to the proposed pit reclamation. Section B-B' (Enclosure "A-5") was constructed through the southwest portion of the site showing a single 2 (h) to 1(v) final slope and potential fill areas. It is our understanding that the Mine Plan will be modified to remove the potential fill area implied by the Mine Plan, and our Section B-B' has been modified accordingly. Section C-C' (Enclosure "A-6") was constructed along the east portion of the site showing the existing near-vertical slopes and the 30-foot setback between the proposed slopes. The 30-foot setback is based upon recommendations included in our slope stability investigation of the adjacent quarry (C.H.J., Inc., January 31, 2001).

FAULTING

The site does not lie within or immediately adjacent to an Alquist-Priolo Earthquake Fault Zone designated by the State of California to include traces of suspected active faulting. No active or potentially active faults are shown on or in the immediate vicinity of the site on published geologic maps. No evidence for active faulting on or immediately adjacent to the site was observed during the geologic field reconnaissance or on the aerial photographs reviewed.

The tectonics of the Southern California area are dominated by the interaction of the North American plate and the Pacific plate, which are apparently sliding past each other in a translational manner. Although some of the motion may be accommodated by rotation of crustal blocks such as the western Transverse Ranges (Dickinson, 1996), the San Andreas fault zone is thought to represent the major surface expression of the tectonic boundary and to be accommodating most of the translational motion between the Pacific plate and the North American plate. However, some of the plate motion is apparently also partitioned out to the other northwest-trending, strike-slip faults that are thought to be related to the San Andreas system, such as the San Jacinto fault and the Elsinore fault. Local compressional or extensional strain resulting from the translational motion along this boundary is accommodated by left-lateral, reverse, and normal faults such as the Cucamonga fault, the Crafton Hills fault zone, and the blind thrust faults of the Los Angeles Basin (Matti and others, 1992; Morton and Matti, 1993).

The site is located on a structural feature known as the San Bernardino Valley block. This block is bounded along the northeast by the San Andreas fault and along the southwest by the San Jacinto fault. The most significant fault to the site with respect to seismic shaking is the San Andreas fault. The San Andreas fault is located along the southwest margin of the San Bernardino Mountains, approximately 2 1/2 miles northeast of the site. The toe of the mountain front in the San Bernardino area roughly demarcates the presently active trace of the San Andreas fault, which is characterized by youthful fault scarps, vegetational lineaments, springs, and offset drainages. The Working Group on California Earthquake Probabilities (1995) tentatively assigned a 28 percent (± 13 percent) probability to a major earthquake occurring on the San Bernardino Mountains segment of the San Andreas fault between 1994 and 2024.

The main trace of the San Jacinto fault is located approximately 5 3/4 miles southwest of the site (Dutcher and Garrett, 1963; Morton, 1978). The San Jacinto fault zone is a system of northwest-trending, right-lateral, strike-slip faults. More large historic earthquakes have occurred on the San Jacinto fault than any other fault in Southern California (Working Group on California Earthquake Probabilities, 1988). Based on the data of Matti and others (1992), the San Bernardino Valley segment of the San Jacinto fault may be accommodating much of the motion between the Pacific Plate and the North American Plate in this area. Matti and others (1992) suggest this motion is transferred to the San Andreas fault in the Cajon Pass region by "stepping over" to parallel fault strands, which include the Glen Helen fault. The Working Group on California Earthquake Probabilities (1995) tentatively assigned a 37 percent (±17 percent) probability of a major earthquake on the San Bernardino Valley segment of the San Jacinto fault for the 30-year interval from 1994 to 2024.

A probabilistic seismic hazard analysis is beyond the scope and purpose of this investigation. Based on the proximity to two major active faults, the site can be expected to be subject to severe ground shaking during the lifetime of the project. The hazard of significant ground shaking was taken into account during our slope stability analyses, discussed later in this report.

GROUNDWATER

The site is located within Santa Ana Wash, an area of relatively shallow historical groundwater levels. No evidence of springs or shallow groundwater was observed at the site during our field investigation.

The minimum depth to groundwater in the area of the site during the period 1973 to 1983 is shown by Matti and Carson (1991) as between 30 and 50 feet.

Current and historical groundwater depths in the site area were researched in order to determine a reasonable depth for the proposed mining. The current depth to groundwater below the site is estimated to be approximately 130 feet based on recent data from State Well No. T1S/R3W 9E02, located less than 1/2 mile west of the site (Western Municipal Water District, 2000). Review of groundwater data dating from 1942 to 1987 from State Well Nos. T1S/R3W 9E01 and T1S/R3W 9E02 shows a minimum depth to groundwater of 30 feet in 1945 and a maximum depth of 231 feet in 1965 (California Department of Water Resources, 1990). Data available from Western Municipal Water District, dating from the present back to 1992, show a minimum depth to water of 98 feet in 1995.

The groundwater data reviewed indicate that the depth to groundwater in the site area has fluctuated significantly in the past. These fluctuations are a result of at least two factors: surface flows in Santa Ana Wash, and regional changes in recharge and extraction of groundwater. Based on the available data, it appears that groundwater may encroach upon the deeper portions (greater than approximately 100 feet deep) of the proposed mine during the project lifetime. The potential for groundwater in the quarry was taken into account during our slope stability analyses, discussed later in this report.

LIQUEFACTION

The site is located within an area of liquefaction susceptibility designated by Matti and Carson (1991). Liquefaction is a process in which strong ground shaking causes saturated soils to lose their strength and behave as a fluid (Matti and Carson, 1991). Ground failure associated with liquefaction can result in lateral spreading and slope failure. Three geologic conditions must be simultaneously present for liquefaction to occur: 1) shallow groundwater; 2) unconsolidated sandy soils; and 3) strong ground shaking.

Based upon the findings of this investigation, all three geologic conditions for liquefaction may exist at or adjacent to the site. Sustained shallow groundwater would most likely be present within the lower portion of the quarry, which is expected to expose the Qrc_d map unit (bouldery gravels and sands). These soils are not considered to be susceptible to liquefaction due to the large clast size and coarse-grain size distribution. Further, their dense and cemented condition indicates a low to non-existent susceptibility to liquefaction.

The upper Qrc_s soils of the existing quarry contain more massive lenses of looser sands prone to liquefaction and/or lateral spreading. However, due to the low possibility of sustained groundwater at the elevations where these soils are present, the potential for liquefaction of these soils is considered to be "very low".

Should liquefaction occur, it would most likely occur within isolated lenses of cohesionless sands with perched water. We would anticipate surface manifestation to be in the form of localized sand boils, isolated settlements, or localized surficial "pop out" type slope failures, which should not jeopardize the gross stability of the quarry slopes.

SLOPE STABILITY

The existing and proposed quarry slopes are entirely within river channel deposits consisting of sands and gravels. Bedding is present within the sandier lithologies, but is subhorizontal. These materials have a very low susceptibility to significant slope failure (landsliding), except when slopes have been significantly oversteepened by cutting. In oversteepened slopes, the mode of failure observed at the site slopes and in the older adjacent quarry slopes to the north is raveling (retreat) of the top portion and the concurrent formation of a colluvial wedge at the toe of the slope. The end result of the raveling process is a uniform, naturally-vegetated talus slope inclined at approximately 1 1/4(h) to 1(v). Such "mature" slopes were observed within the quarry at various locations of the site. It is our opinion that the existing quarry slopes at the site would eventually lay back to a similar "mature" configuration. However, our stability analyses, discussed below, have revealed that strong seismic shaking would cause such slopes to fail back to a flatter inclination of approximately 2(h) to 1(v). In effect, the stability of the existing and proposed slopes is controlled by the ground shaking hazard to the site.

SLOPE STABILITY ANALYSIS:

The gross stability of both the existing 65± feet deep quarry slopes and the proposed 120± feet deep quarry slopes (analyses based upon 130 feet) was analyzed under both static and seismic conditions for rotational failures using Bishop's Simplified Method and the TSTAB (TAGA, 1986) computer software program. The seismic calculations were performed pseudostatically using a lateral acceleration coefficient "k" of 0.20 and included a search for the critical seismic coefficient. The critical seismic coefficient is defined as the "k" required to produce failure (i.e. FS±1). The higher "k" of 0.20 was utilized instead of the standard 0.15 based on judgement due to the proximity to the San Andreas Fault system.

Based upon the anticipated rocky and consolidated nature of the sands and gravels at the site, a "drained" condition was assumed and the slopes were analyzed without excess pore pressures.

ANALYSES OF EXISTING SLOPES:

Although the existing oversteepened slopes are "failing" and will continue to fail surficially, we know that these existing slopes have a static factor of safety of at least one against gross failure. Therefore, we performed back analysis of the existing quarry slopes to supplement our direct shear test data, as well as our engineering judgement, in selecting appropriately conservative strength parameters for our analyses.

This type of back analysis is a generally accepted method of estimating the full-scale strength of the overall slope, including the effects of cementation and the interlocking of the larger clasts. Although strength parameters would be somewhat variable for the alluvial materials, for the purposes of our analyses, we have modeled the existing slopes as homogeneous with strength parameters averaged over the entire slope.

Our field observations indicated a wide range of compound inclinations of the existing maximum 65± feet deep slopes. However, the overall inclinations were generally approximately1(h) to 1(v).

Our back analysis of the existing near-vertical quarry slopes through Section C-C' indicated a 0.86 factor of safety (failure) utilizing our ultimate inundated friction angle of 34 degrees and apparent cohesion of 150 psf. Our calculations of this existing near-vertical slope performed with our peak/dry strengths ($\phi=42^{\circ}$, C=300 psf) indicated a 1.31 static factor of safety against gross failure. Therefore, based upon these back analyses, it follows that our ultimate inundated values would be conservative, and that the actual average values would be somewhere between the peak/dry and ultimate inundated results. Our seismic calculations performed on this slope utilizing our peak/dry strengths indicated a safety factor of 1.02 (failure pending) with the "k" of 0.20. The ultimate inundated strength values were considered appropriately conservative and were utilized to model the younger upper 65± feet of native soils in our remaining gross stability calculations.

Next, we analyzed the existing 65-feet deep slopes naturally laid back to a "mature" 1.5(h) to 1(v) inclination. These calculations indicated a 1.36 static factor of safety against gross failure.

Finally, for comparison purposes, we analyzed the proposed typical trimmed and hydroseeded existing slopes. These calculations indicated 1.27 static and 0.90 seismic factors of safety when utilizing the ultimate inundated strengths. With the peak/dry strengths, our calculations indicated a 1.32 seismic factor of safety with a critical seismic coefficient of 0.377.

ANALYSES OF PROPOSED QUARRY SLOPES:

Below the 70-foot depth, we conservatively modeled the Qrc_d with an apparent cohesion of 200 psf and a friction angle of 36 degrees to account for the uncertainty of the deeper materials to be encountered during the mining operation. The bouldery materials exposed within the bottom of the existing quarry may not be present throughout the entire additional 60± feet of depth to be mined. It was considered reasonable to assume the presence of additional sand and gravel river deposits for the entire depth. The degree of consolidation, cementation and, in turn, strength of such materials would tend to increase with depth.

As part of our slope stability analysis, we performed calculations for the various slope configurations anticipated for the reclamation. In all cases, the overall depth was 130 feet with at least the lower 60 feet inclined at 2(h) to 1(v).

First, we analyzed the proposed trimmed and hydroseeded slopes with a 30-foot setback between the mined 2(h) to 1(v) lateral slope. These calculations indicated acceptable 1.82 static and 1.17 seismic factors of safety against gross failure with a critical seismic coefficient of 0.280.

Next, we analyzed the entire 130± feet deep slopes with a continuous 2(h) to 1(v) inclination without a setback. These calculations indicated acceptable 1.68 static and 1.10 seismic factors of safety with a critical seismic coefficient of 0.241.

GROUNDWATER ANALYSES:

To evaluate the effects of potential rising groundwater and/or ponding water, we analyzed the 130-feet deep reclaimed slopes with various groundwater and pond depths. The 2(h) to 1(v) slope inclination was considered most representative and, as such, was utilized for these calculations.

Our calculations performed with the phreatic surface 5 feet above the toe, without the presence of the resisting pressure on the submerged slope, indicated an adequate 1.67 static factor of safety against gross failure.

With the phreatic surface set to a 25-foot pond depth with only 15 feet of ponded water providing resistance at the toe, our calculations indicated a 1.50 factor of safety.

To account for increases in pore pressure or a partial rapid drawdown condition created by sloshing of ponded water during a seismic event, the above calculations were conservatively performed with a horizontal phreatic surface across the slope and did not rely upon the resisting pressure of the ponded water against the submerged slope face.

With the phreatic surface and resisting pond pressure at the 15-foot pond depth, our calculations indicated a 1.65 factor of safety.

Although not anticipated, we performed calculations for 30-foot and 50-foot pond depths, which indicated 1.60 and 1.57 factors of safety, respectively.

Finally, although not anticipated, we sloped the phreatic surface from the water surface elevation to roughly model potential unsteady state seepage from the Robertson's settling pond though the Qrc_s to a pond depth of 50 feet. The results of these calculations indicated 1.50 factor of safety against gross failure.

Our slope stability calculations, together with the plotted output indicating the critical circle, are presented in the order of discussion in Appendix "C".

A detailed analysis of seepage was beyond the scope of this investigation. Rapid drawdown conditions are not considered germaine to the project because the quarry would not be outletted and any impounded water would gradually dissipate.

The potential for erosion and shallow failure of slope faces associated with standing water is considered negligible due to the gravelly lithologies, as well as the density and degree of consolidation of the materials expected to be exposed in the lower portion of the quarry.

Seiches are long-period oscillatory standing waves excited by a force acting on the water surface. Seiching are typically activated by earthquakes and/or landslides. Based on the anticipated groundwater depths, it appears that the potential for a large earthquake coinciding with significant standing water in the proposed quarry is remote. It is our opinion that a seiche would only act to surficially erode the proposed 2(h) to 1(v) slopes, and gross failure of the entire 2(h) to 1(v) slopes appears unlikely for the anticipated gravelly materials. Therefore, seiching is not considered to be a significant hazard to the gross stability of the proposed slopes.

FLOODING AND EROSION

The proposed and existing quarry slopes are susceptible to headward erosion. Therefore, measures should be incorporated into the reclamation plan to prevent water from flowing over the existing or future slopes. The tops of slopes around the quarry should be protected with berms or levees as necessary from sheet flow-type concentrated runoff, as well as from potential flooding within the Santa Ana River. The slope faces would also be prone to erosion, particularly the existing slopes and proposed slopes of the Qrc_s.

CONCLUSIONS

Based upon our geologic field observations, the results of laboratory testing and slope stability calculations, it is the opinion of this firm that the proposed mining and reclamation are feasible from a geotechnical standpoint, provided the recommendations contained in this report are implemented.

Based upon our analyses, new cut slopes up to 130 feet in height and inclined no steeper than 2(h) to 1(v) are expected to be stable against gross failure for the various anticipated long term conditions, including the effects of seismic shaking, standing water, and rising groundwater. Where new cut slopes are proposed below existing steep quarry slopes, the new slopes will need to be set back an adequate distance (30 feet) from the toes of the existing steep slopes. The setback will allow for future raveling of the existing steep slopes to a flatter inclination. If the setback is utilized, the new slopes will not jeopardize the stability of the existing slopes.

No evidence for faulting was observed on the site or the vicinity during this investigation. No groundwater barriers are known in this area.

The current depth to groundwater is anticipated to be approximately 130 feet below the original ground surface. Review of historical groundwater data back to 1942 shows groundwater as shallow as 30 feet and as deep as 231 feet in the area. Based on historical groundwater data and anticipated future conditions of recharge and extraction, groundwater can be expected to be present in the bottom of the 120-

foot deep quarry on a periodic basis. During the periods of groundwater within the quarry, equipment access for mining may be difficult or impossible.

The proposed reclaimed quarry is not expected to include significant pond depths for sustained periods of time. Therefore, seiching is not considered to be a hazard to the proposed reclaimed quarry.

Full rapid drawdown conditions are not applicable to the quarry because the quarry will not be outletted and any impounded water would gradually dissipate.

RECOMMENDATIONS

SEISMIC SHAKING HAZARDS:

Severe seismic shaking of the site can be expected to occur during the lifetime of the proposed mining and reclamation. This potential has been considered in our analyses of slope stability. It should be noted that many of the existing steep quarry slopes are expected to remain during mining and reclamation. These steep slopes are subject to failure, particularly in the event of strong seismic shaking. Therefore, mining personnel and equipment should be protected from potential slope failure, including rockfall. The recommended setbacks for new cut slopes in conjunction with the recommended maximum slope inclination of 2(h) to 1(v) should help to mitigate the exposure of personnel and equipment to the hazards posed by the existing steep slopes.

CUT SLOPE CONSTRUCTION:

Reclaimed slopes should be constructed no steeper than 2 (h) to 1 (v) up to a maximum height of 130 feet.

SLOPE SETBACKS:

In areas where property boundary constraints preclude complete removal of the existing oversteepened slopes, a 30-foot setback from the toe of the existing oversteepened slopes is expected to provide adequate separation between the existing upper slopes and the proposed lower slopes. The setback will allow the upper slopes to ravel back to their ultimate inclination. The stability of the upper slopes is not expected to be jeopardized by the new slopes if the setback is utilized.

The setback area should be sloped downward toward the descending slopes to prevent ponding and to promote uniform sheet flow over the lower cut slopes.

SLOPE PROTECTION:

Inasmuch as the native materials are susceptible to erosion by rainfall or running water, it is our recommendation that the slopes at the project be planted with native, drought-resistant vegetation as soon as possible after completion.

QUARRY BOTTOM:

It is anticipated that the quarry bottom will be sloped so that any ponding of water that does occur will be confined to a localized area. We recommend that the ponded area be kept as far away as possible from the 210 freeway right-of-way.

LIMITATIONS

C.H.J., Incorporated has striven to perform our services within the limits prescribed by our client, and in a manner consistent with the usual thoroughness and competence of reputable soils engineers and engineering geologists practicing under similar circumstances. No other representation, expressed or implied, and no warranty or guarantee is included or intended by virtue of the services performed or reports, opinion, documents, or otherwise supplied.

This report reflects the testing conducted on the site as the site existed during the investigation, which is the subject of this report. However, changes in the conditions of a property can occur with the passage of time, due to natural processes or the works of man on this or adjacent properties. Changes in applicable or appropriate standards may also occur whether as a result of legislation, application, or the broadening of knowledge. Therefore, this report is indicative of only those conditions tested at the time of the subject investigation, and the findings of this report may be invalidated fully or partially by changes outside of the control of C.H.J., Incorporated. This report is therefore subject to review and should not be relied upon after a period of one year.

The conclusions and recommendations in this report are based upon observations performed and data collected at separate locations, and interpolation between these locations, carried out for the project and the scope of services described. It is assumed and expected that the conditions between locations observed and/or sampled are similar to those encountered at the individual locations where observation and sampling was performed. However, conditions between these locations may vary significantly. Should conditions be encountered in the field, by the client or any firm performing services for the client or the client's assign, that appear different than those described herein, this firm should be contacted immediately in order that we might evaluate their effect.

If this report or portions thereof are provided to contractors or included in specifications, it should be understood by all parties that they are provided for information only and should be used as such.

The report and its contents resulting from this investigation are not intended or represented to be suitable for reuse on extensions or modifications of the project, or for use on any other project.

CLOSURE

We appreciate this opportunity to be of service and trust this report provides the information desired at this time. Should questions arise, please do not hesitate to contact this office.

Respectfully submitted,
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AERIAL PHOTOGRAPHS REVIEWED

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United States Department of Agriculture, May 23, 1949, Black and white aerial photographs, flight number AXL-9F, photograph numbers 94 and 95.

San Bernardino County Flood Control District, February 27, 1969, Black and white aerial photographs, photograph number58.

San Bernardino County Flood Control District, October 15, 1972, Black and white aerial photographs, photograph number 39.

San Bernardino County Flood Control District, February 25, 1986, Black and white aerial photographs, photograph numbers 119 and 120.

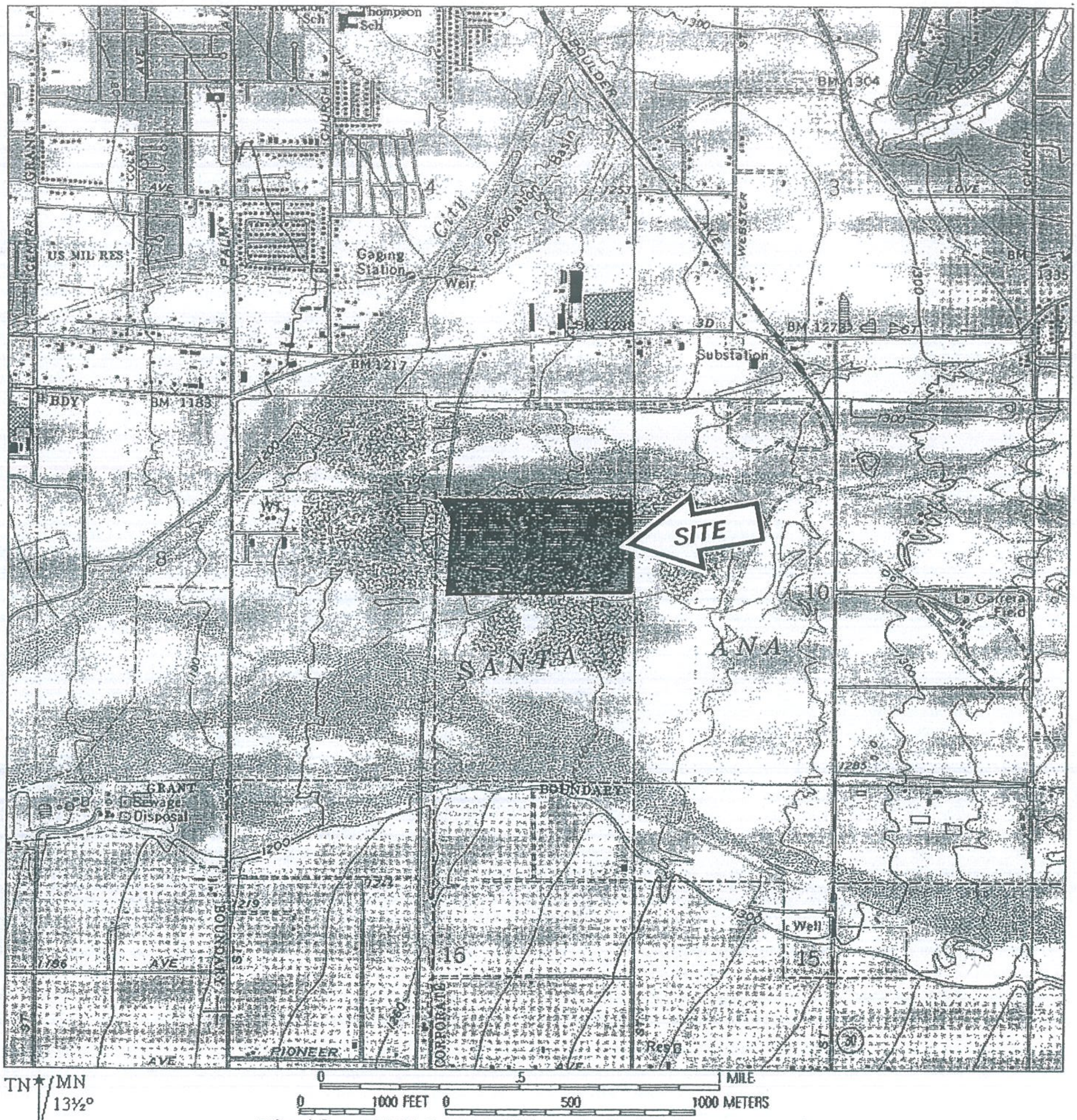
San Bernardino County Flood Control District, July 1, 1991, Black and white aerial photographs, photograph numbers 135 and 136.

San Bernardino County Flood Control District, May 31, 1996, Black and white aerial photographs, photograph numbers 157 and 158.

Integra Engineering, December 29, 1998, Black and white aerial photographs, photograph numbers 1-1, 1-2, 1-3 and 1-4.

APPENDIX "A"

GEOLOGIC MAPS
AND CROSS-SECTIONS



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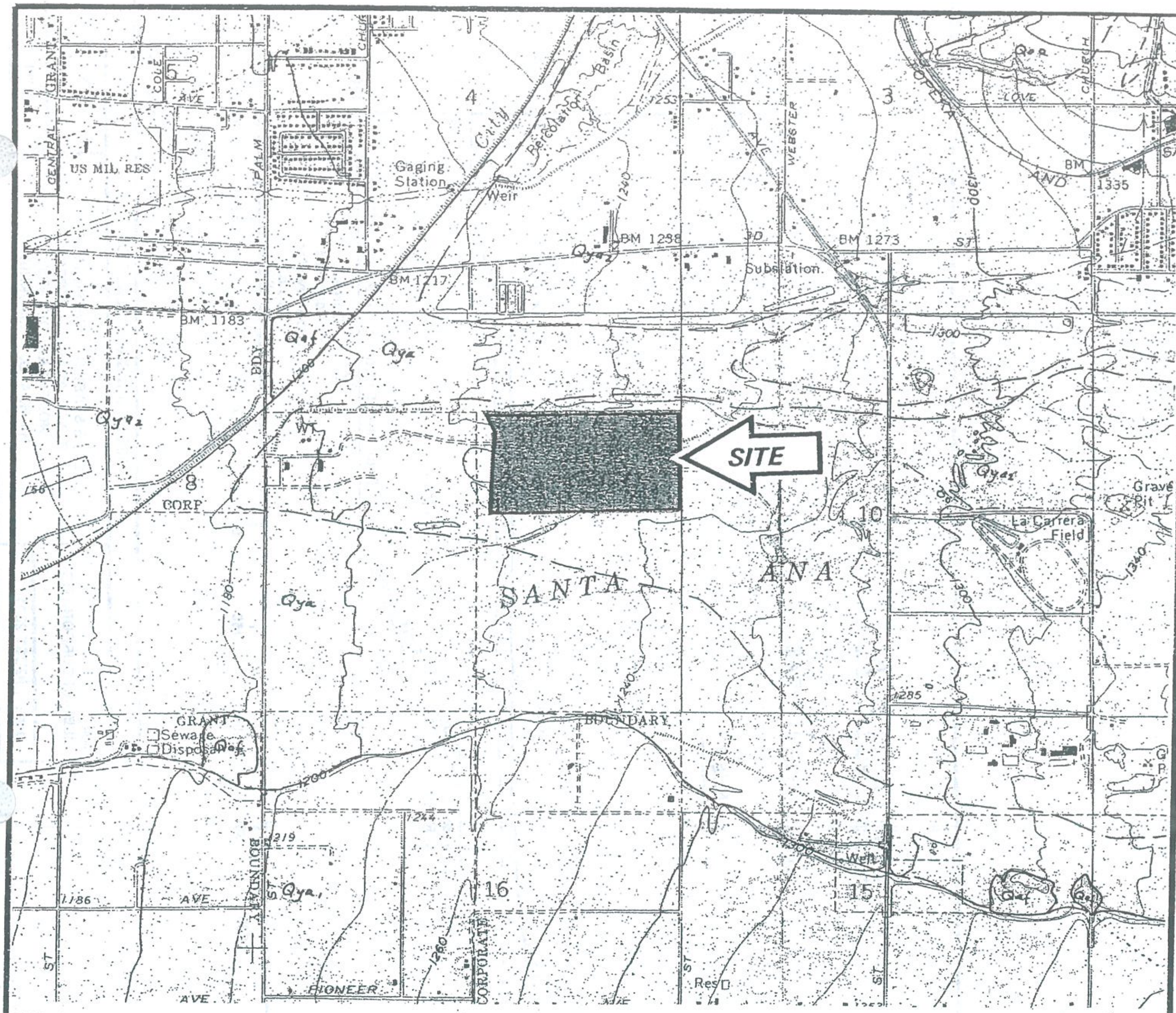
INDEX MAP

FOR: LILBURN CORPORATION	SLOPE STABILITY INVESTIGATION CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA	ENCLOSURE "A-1"
DATE: AUGUST 2001		JOB NUMBER 01633-3

C.H.J., INCORPORATED



DESCRIPTION OF MAP UNITS

Qaf — **ARTIFICIAL FILL—Uncompacted fill from solid-waste disposal**

Qya — **YOUNGER ALLUVIUM—Unconsolidated grayish sandy to bouldery alluvium along Santa Ana Wash and San Timoteo Canyon. Subject or recently subject to reworking by stream flow.**

Qya_1 — **YOUNGER ALLUVIUM—Unconsolidated grayish sandy to pebbly alluvium**

Contact. Solid where accurately located; dashed where approximately located; dotted where gradational

Base Map by: D.M. Morton (1978)

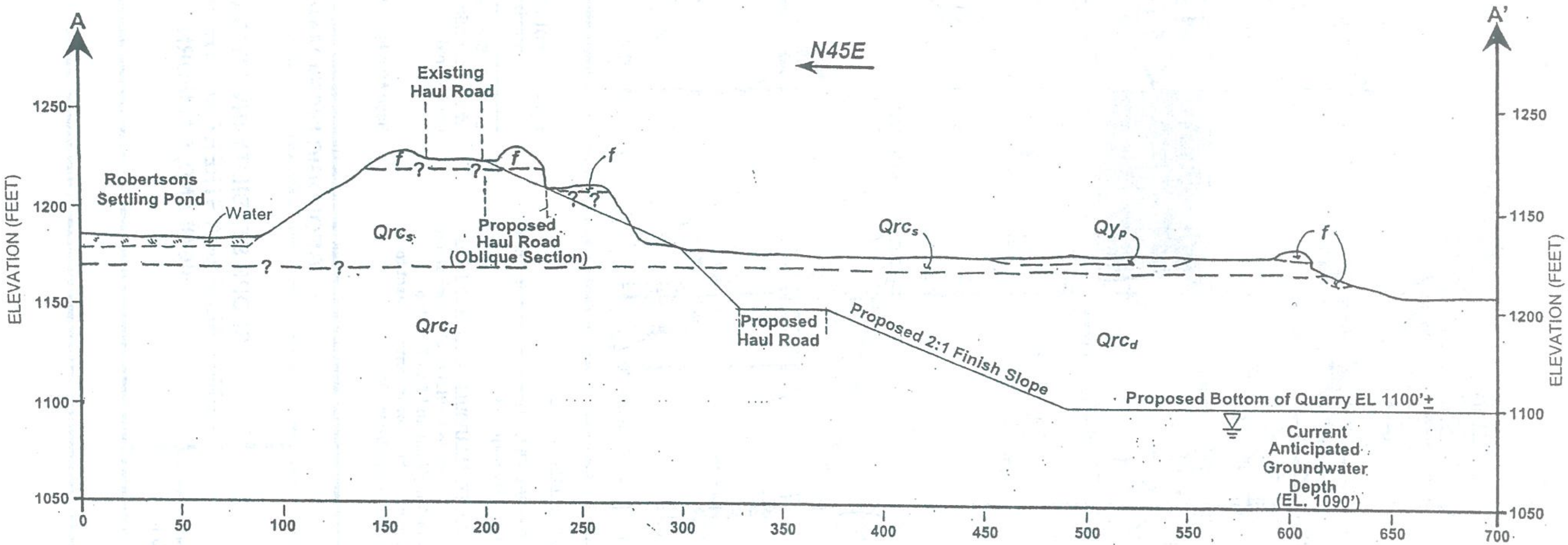
GEOLOGIC INDEX MAP

FOR: **LILBURN CORPORATION**	**SLOPE STABILITY INVESTIGATION CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA**	ENCLOSURE **"A-3"**
DATE: **AUGUST 2001**		JOB NUMBER **01633-3**

C.H.J., INCORPORATED

SECTION A-A'

LOOKING SOUTHEAST



Scale 1"=50'

GEOLOGIC CROSS-SECTION		
FOR: LILBURN CORPORATION	SLOPE STABILITY INVESTIGATION CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA	ENCLOSURE "A-4"
DATE: AUGUST 2001		JOB NUMBER 01633-3

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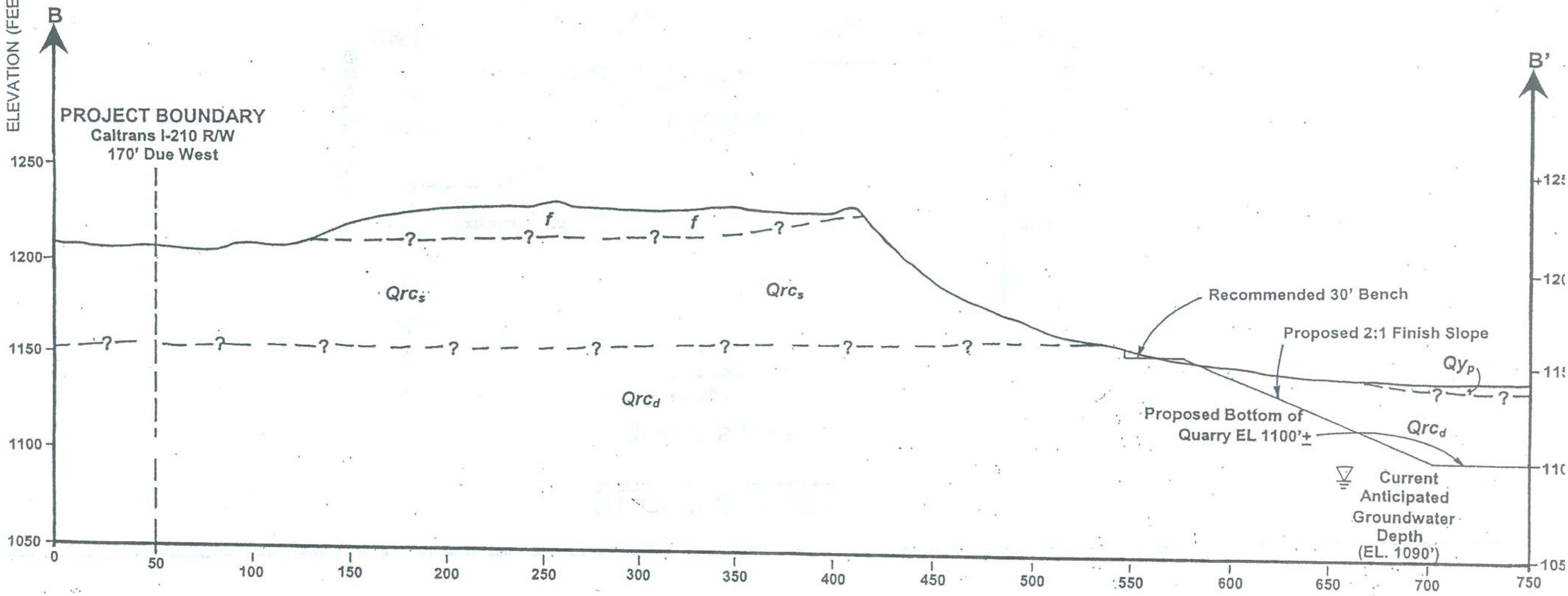
SECTION B-B'

LOOKING NORTHWEST

N52E



GEOLOGIC CROSS-SECTION		
FOR: LILBURN CORPORATION	SLOPE STABILITY INVESTIGATION CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA	ENCLOSURE "A-5"
DATE: AUGUST 2001		JOB NUMBER 01633-3

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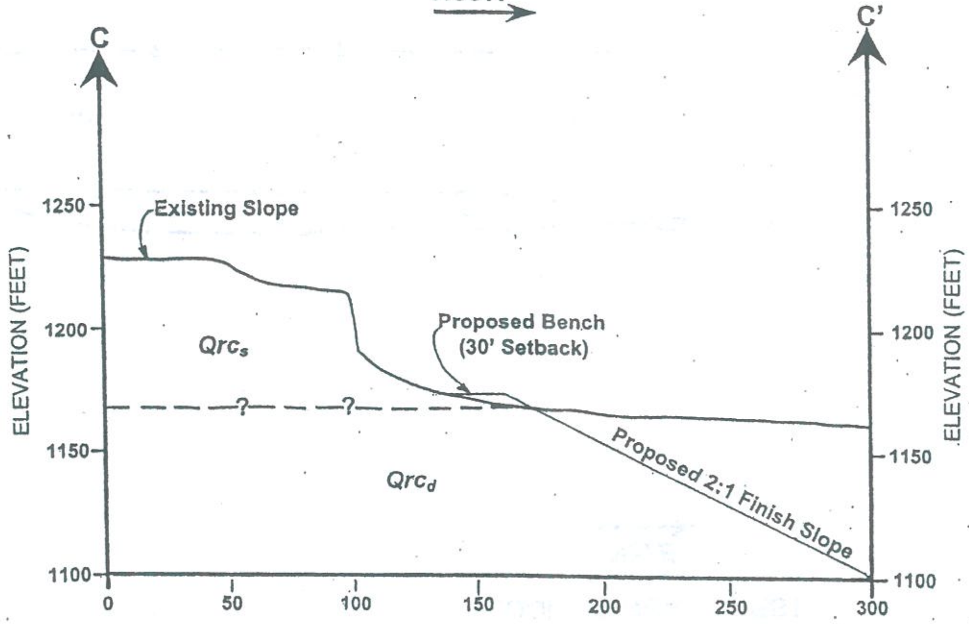
SECTION C-C'

LOOKING SOUTH

N88W →



Scale 1"=50'

GEOLOGIC CROSS-SECTION		
FOR: LILBURN CORPORATION	SLOPE STABILITY INVESTIGATION CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA	ENCLOSURE "A-6"
DATE: AUGUST 2001		JOB NUMBER 01633-3

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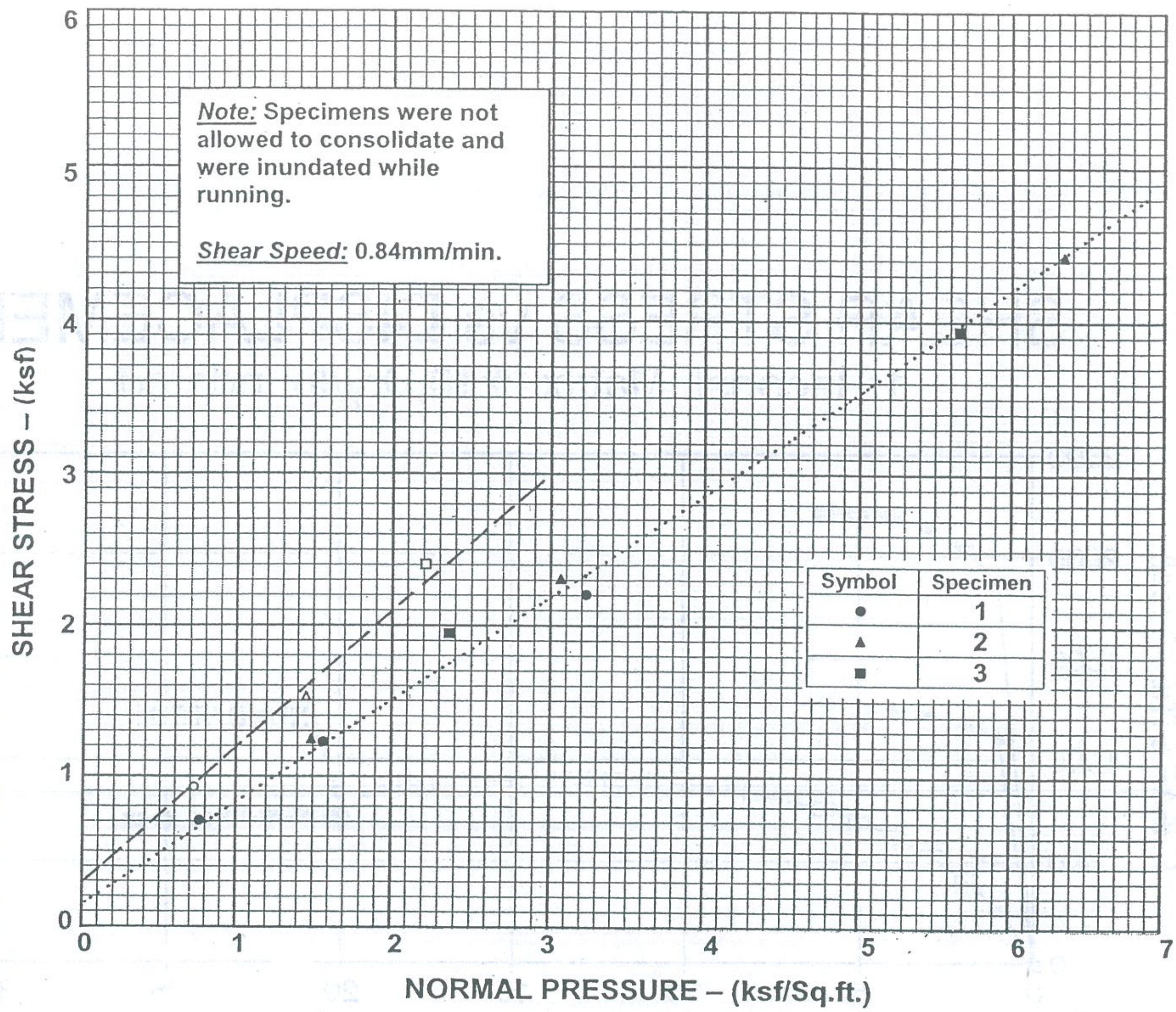
APPENDIX "B"

LABORATORY TEST DATA

Reconstituted Matrix Material - #10 Sieve, Dry/Inundated



Line Type	φ	Apparent C	Strength Condition
– – – –	42°	300 psf	Peak/Dry
....	34°	150 psf	Ultimate/Inundated

DIRECT SHEAR (ASTM D-3080) MODIFIED

FOR: LILBURN CORPORATION	RECLAMATION PLAN CEMEX ALABAMA STREET NORTHEAST QUARRY HIGHLAND, CALIFORNIA	ENCLOSURE "B-1"
DATE: AUGUST 2001		JOB NUMBER 01633-3

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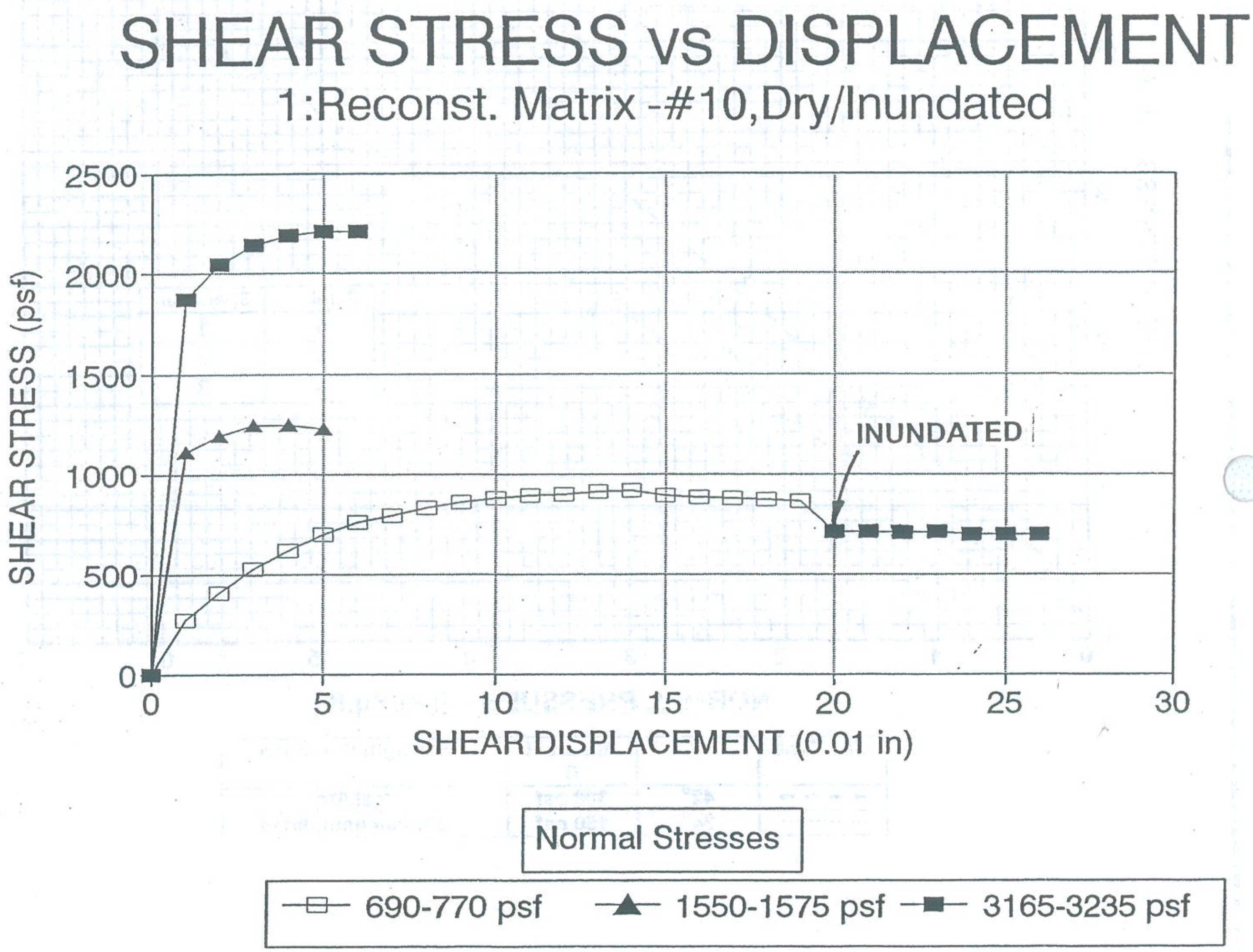
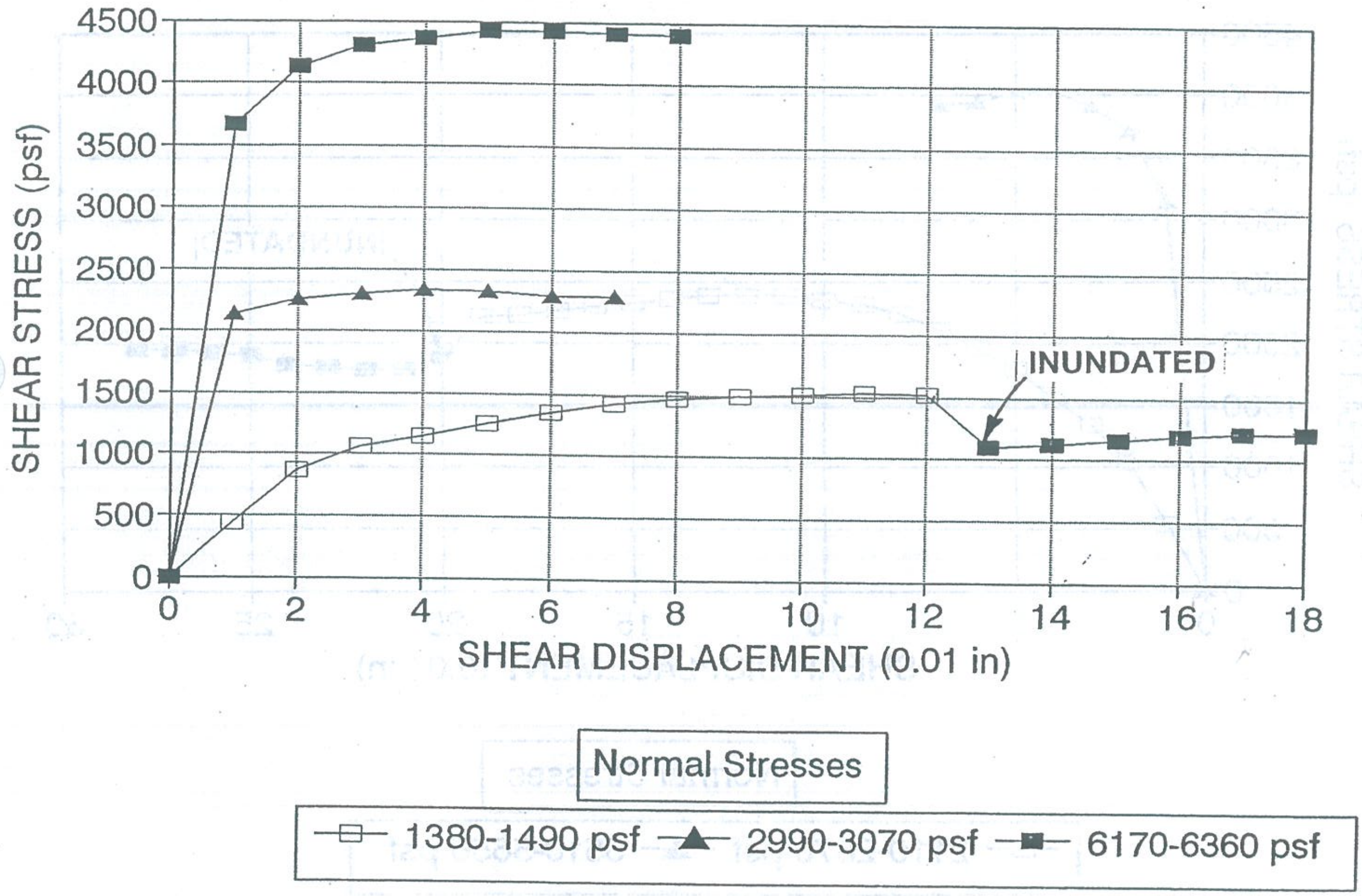

SHEAR STRESS vs DISPLACEMENT
1:Reconst. Matrix -#10,Dry/Inundated
SHEAR STRESS (psf)
2500
2000
1500
1000
500
0
0
5
10
15
20
25
30
SHEAR DISPLACEMENT (0.01 in)
INUNDATED
Normal Stresses
690-770 psf
1550-1575 psf
3165-3235 psf

ENCLOSURE: "B-3"
JOB NO.: 01633-3

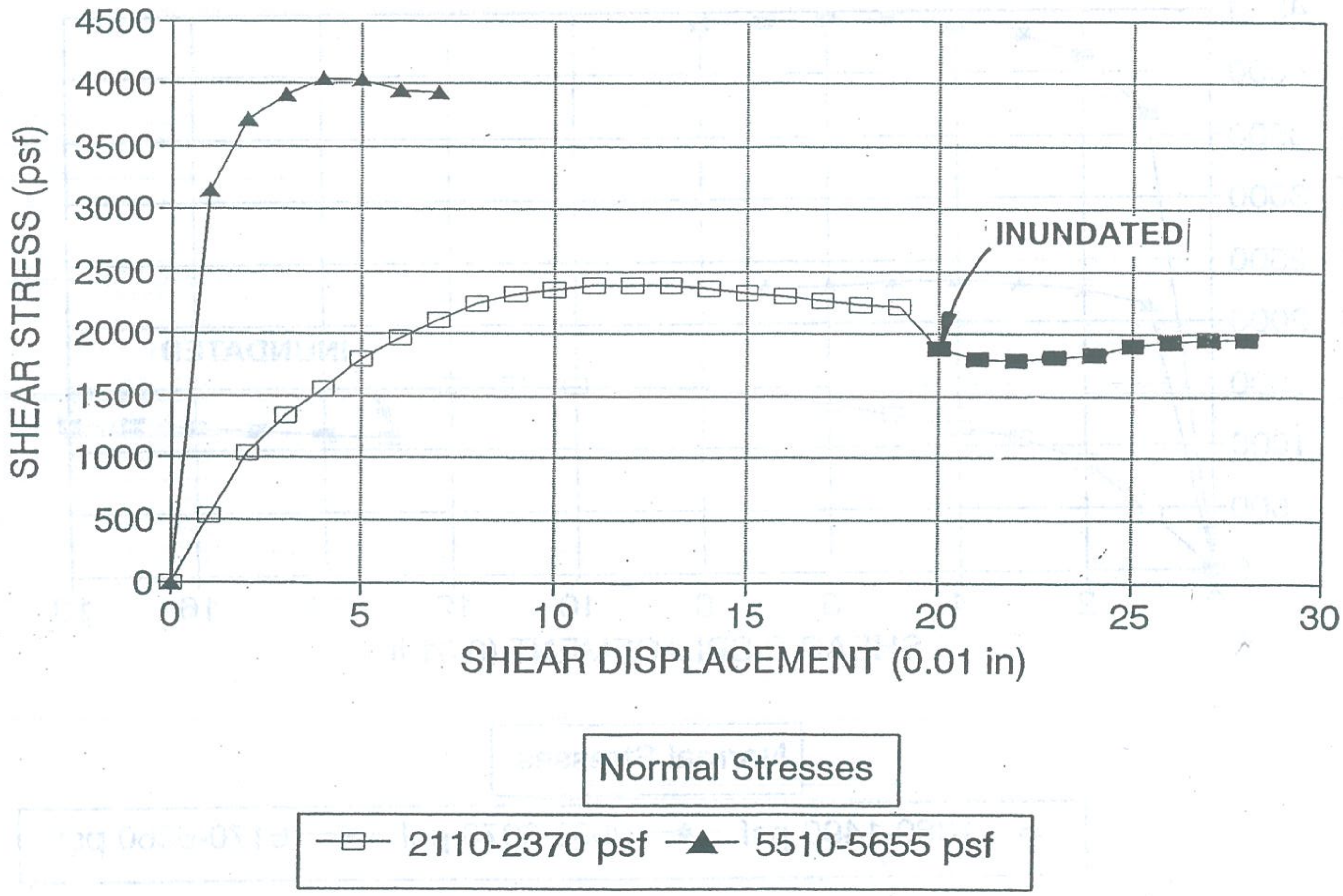
SHEAR STRESS vs DISPLACEMENT

2: Disturbed Matrix, Dry/Inundated

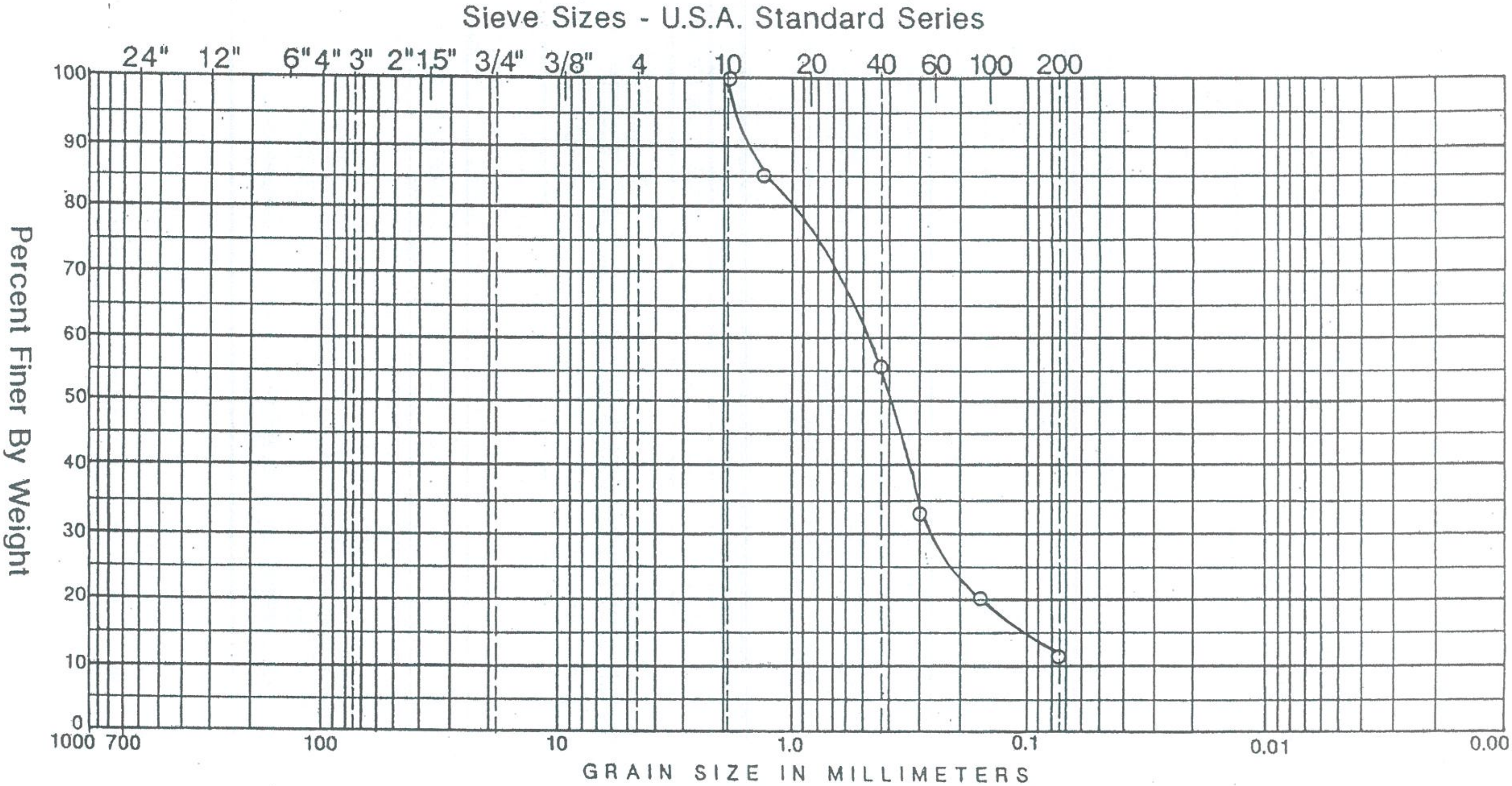


SHEAR STRESS vs DISPLACEMENT

3:Reconst. Matrix -#10,Dry/Inundated



ENCLOSURE: B-5
JOB NO.: 01633-3



Cobbles & Boulders	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol		Classification	
o	Direct Shear Matrix Material - #10 Sieve	SP-SM	Sand, fine to medium with Silt

Gradation Curves

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